



Chris Thornton - European Sustainable Phosphorus Platform

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



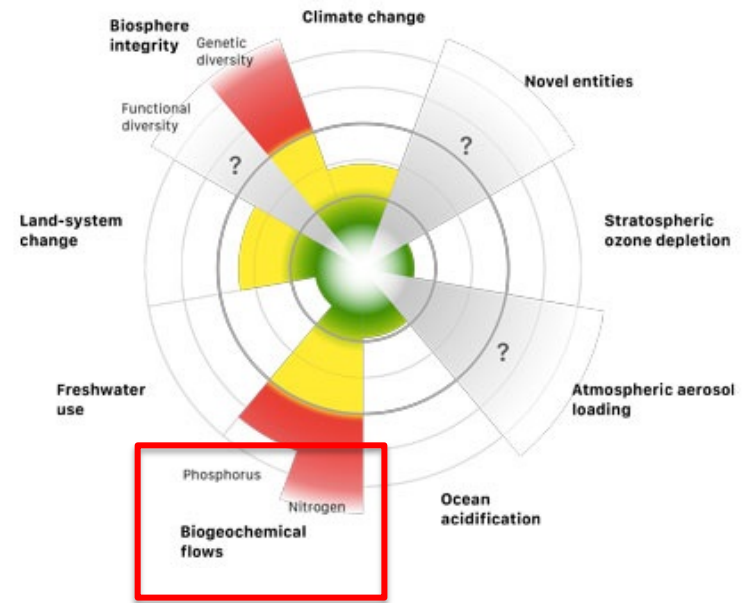
Pourquoi recycler le phosphore?



Le phosphore (P)

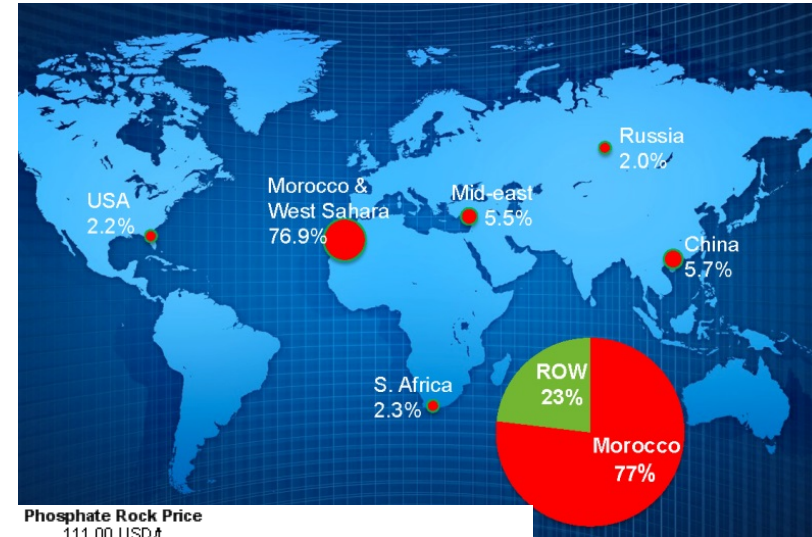
- *eutrophisation:*
principale cause (non morphologique) de non-atteinte
des objectifs de qualité de la Directive Cadre Eau

- *Planetary Boundaries*

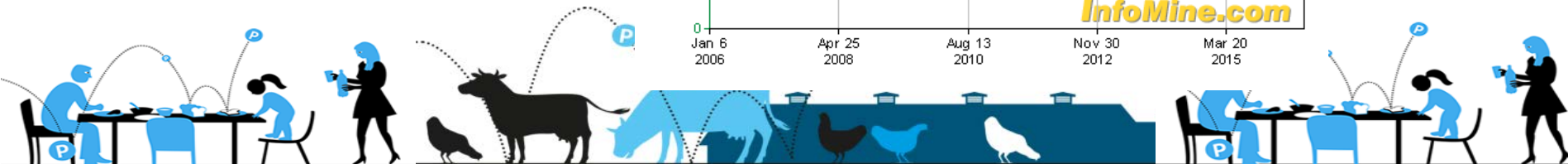
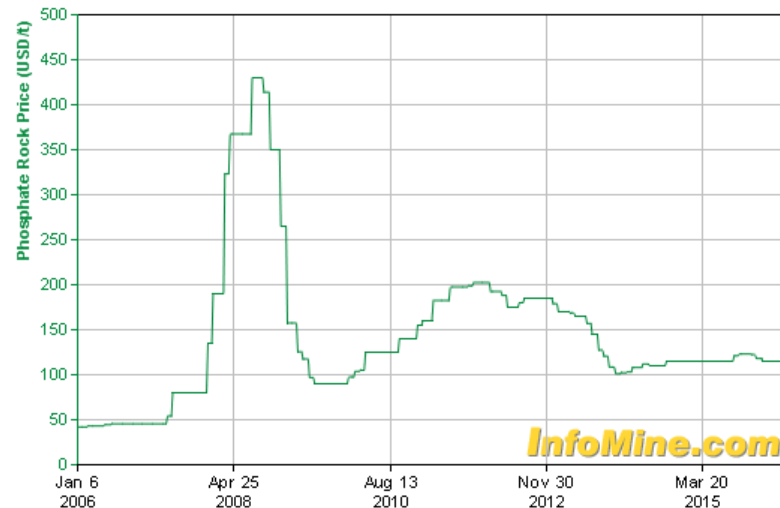


L'Europe

- *Dépendance à 90% d'importations*
- *Concentration géopolitique des ressources*
- *Prix au marché mondial*
 - *variabilité*
 - *lié au prix des commodités agricoles*



Phosphate Rock Price
111.00 USD/t
31 Aug '16



Apports de phosphore, France 2015: fertilisants commercialisés et effluents d'élevage non commercialisés, total 400 000 tP

Recyclage du P en France

- *Les lisiers = autant d'apport en P que les engrais minéraux*¹
- *75% des boues d'épuration valorisés en agriculture*²
- *engrais minéraux phosphatés = 192Kt P = 400 millions d'€*³

1 = Observatoire de la fertilisation minérale et organique 2015 (ANPEA, UNIFA, AFCOME, AFAIA, COOP de France, CTPL, UP Chaux, UPJ)

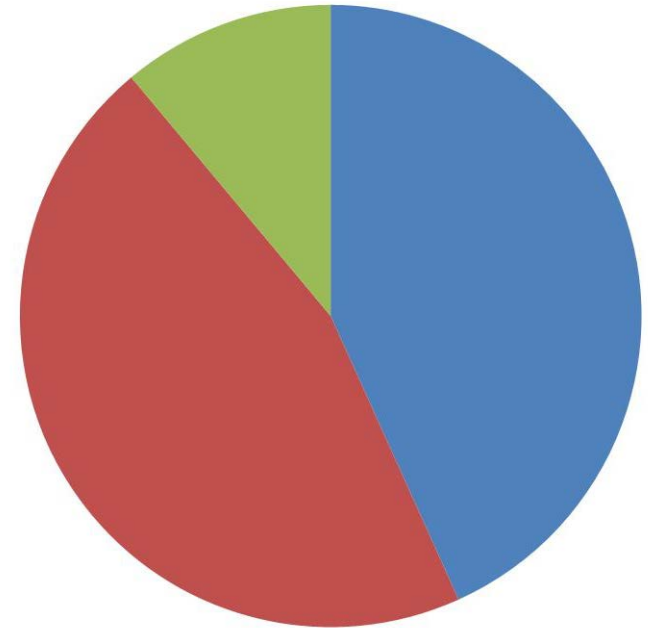
<http://www.anpea.com/livraisons-de-fertilisants/observatoire-de-la-fertilisation-minerale-et-organique.html>

2 = "Answers to the Sewage Sludge Questionnaire", EurEau 4.10.2016

www.eureau.org (under Positions/Reports)

3 = en valorisant l'unité de P₂O₅ autour de 1€/kg

- Effluents d'élevage
- Engrais minéraux
- Engrais organiques etc



Economie circulaire du phosphore

- *Resource non renouvelable, dépendance d'importations*
- *Eutrophisation*
- *Emissions d'ammoniac¹*
- *Retour de carbone organique au sol²*
- *Méthanisation*
- *Gestion des boues et déchets alimentaires*
- *Concentration de la production animale*
- *Création d'emplois en zone rurale*
- *Economie agricole*

1 = National Emissions Ceilings Directive
et UNECE Long Range Transboundary Air Pollution
Convention for ammonia emissions

2 = engagement climat Paris 2016 = 4/1000°



CIRCULAR ECONOMY
saving resources, creating jobs



Les politiques européennes



<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

Smarter and Cleaner

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...](#)

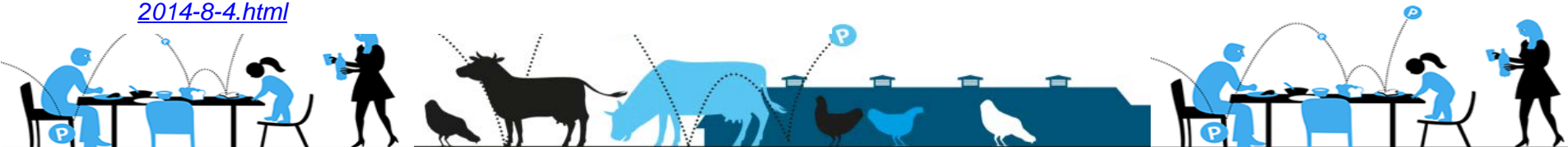
Phosphorus is one of the essential nutrients for plants, animals and humans - to put it simply without phosphorus, life would not exist. Within plants, P is essential to cell development and structure, reproductive and enzyme balance and within animals for bone development, cell structure, reproduction 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>



Un historique de contentieux

- 1994 Urban Waste Water Treatment Directive (DERU)
- 1994 Nitrates Directive
- 2000 Water Framework Directive (DCE)
- 2016 National Emissions Ceilings Directive - update



InfoCuria - Jurisprudence de la Cour de justice français (fr)

Accueil > Formulaire de recherche > Liste des résultats > Documents

Langue du document : français ECLI:EU:C:2016:887 Lancer l'impression

ARRÊT DE LA COUR (sixième chambre)
23 novembre 2016 (*)



European Commission > Press releases database > Press Release details

IP/04/39

Brussels, 13 January 2004

Water policy: Commission acts against eight Member States

The European Commission is taking legal action against Greece, France, the Netherlands, Belgium, Poland and the Czech Republic for non-compliance with EU laws on water quality. The Commission has sent final written warnings to Greece, France, the Netherlands, Belgium, Poland and the Czech Republic.

« Manquement d'État – Directive 91/271/CEE – Traitement des eaux urbaines résiduelles – Article 4, paragraphes 1 et 3 – Traitement secondaire ou traitement équivalent »

Dans l'affaire C-314/15,

ayant pour objet un recours en manquement au titre de l'article 258 TFUE, introduit le 26 juin 2015,

Commission européenne, représentée par M^{mes} O. Beynet et M. E. Manhaeve, en qualité d'agents, ayant élu domicile à Luxembourg,

partie requérante,

contre

République française, représentée par M^{mes} S. Ghiandoni et A. Daly ainsi que par M. D. Colas, en qualité d'agents,



Politiques européennes

- 2014 EU Consultative Communication on Sustainable Use of Phosphorus
- 2014 Phosphate rock added to EU list of 20 Critical Raw Materials



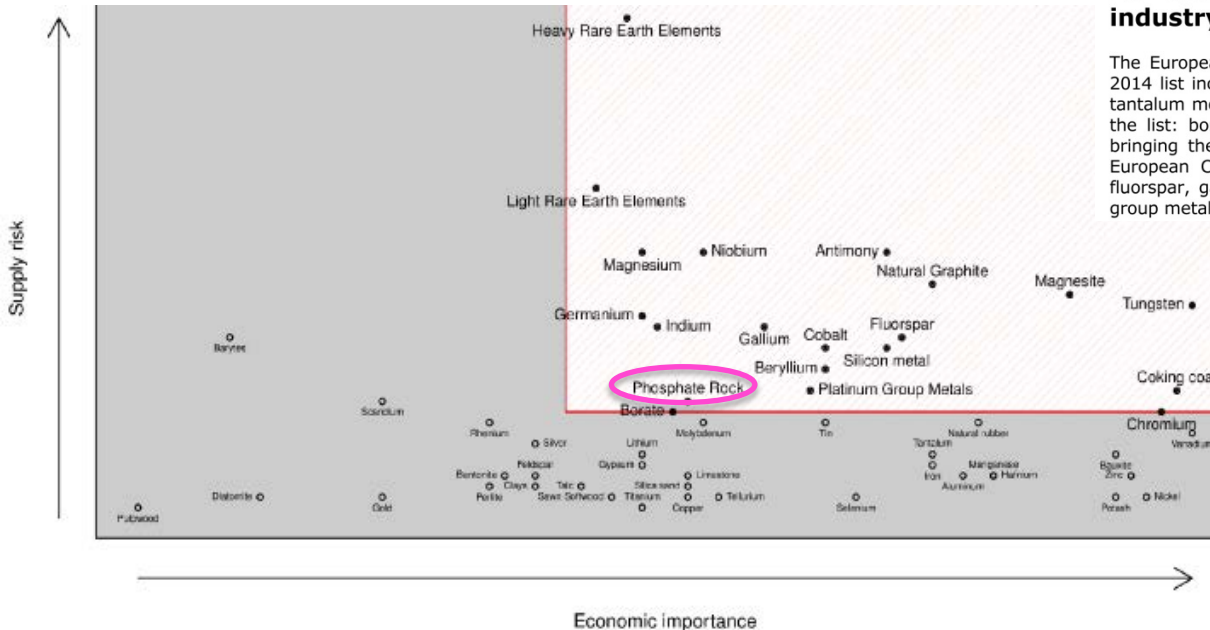
EUROPEAN COMMISSION

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](#)).



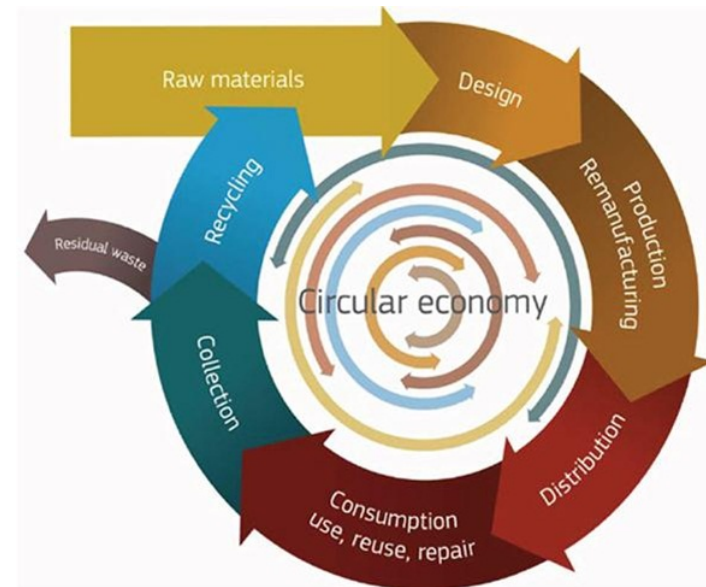
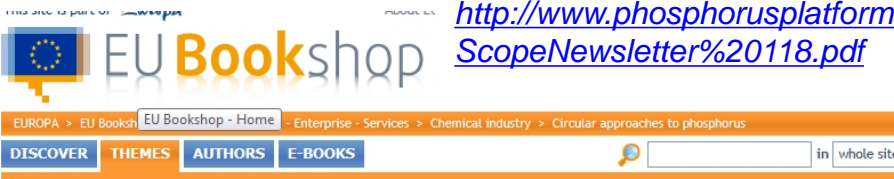
2015 EU Circular Economy Package

En réponse à la consultation publique consultation:

- 30% des répondants considèrent les bio-nutriments comme des “materials the EU should target first” (Q5, Q3)
- En tout, 54% citent les bio-nutriments ou le phosphore (ensemble des questions)

Scope Newsletter n° 118

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

EU Bookshop

EUROPA > EU Bookshop > EU Bookshop - Home > Enterprise - Services > Chemical industry > Circular approaches to phosphorus

DISCOVER THEMES AUTHORS E-BOOKS

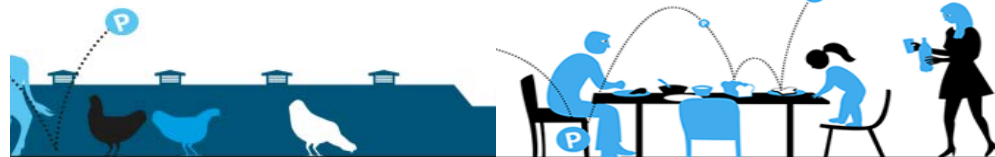
in whole site

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



2016 ... EU Fertilisers Regulation

- Actuellement au Parlement Européen & Conseil
- Tous les engrais (minéraux, organiques), amendements
- Fixera critères européens pour composts, digestats, sous-produits agro-alimentaires, Animal By Products
- Boues d'épuration **sont exclues**
- STRUBIAS en cours (struvite, biochars, ash based products)
- **traçabilité non prévue**
- de nombreux problèmes de rédaction restent à résoudre

Voir www.phosphorusplatform.eu/regulatory

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



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



Politiques nationales

- **Suisse 2016**: obligation de récupérer le P dans les boues d'épuration et l'équarrissage

- **Allemagne en cours (2017)**: nouveau décret boues d'épuration (AbfklärV) obligation de récupérer le P pour les STEP > 50 000 ie

- **2017 Helcom Recommendation on Sewage Sludge Handling 38/1**: 9 pays 'maximum recycling or recovery of phosphorus ...'

(y.c. valorisation agricole), reporting par les Etats du % de P recyclé



Scope Newsletter n° 118

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



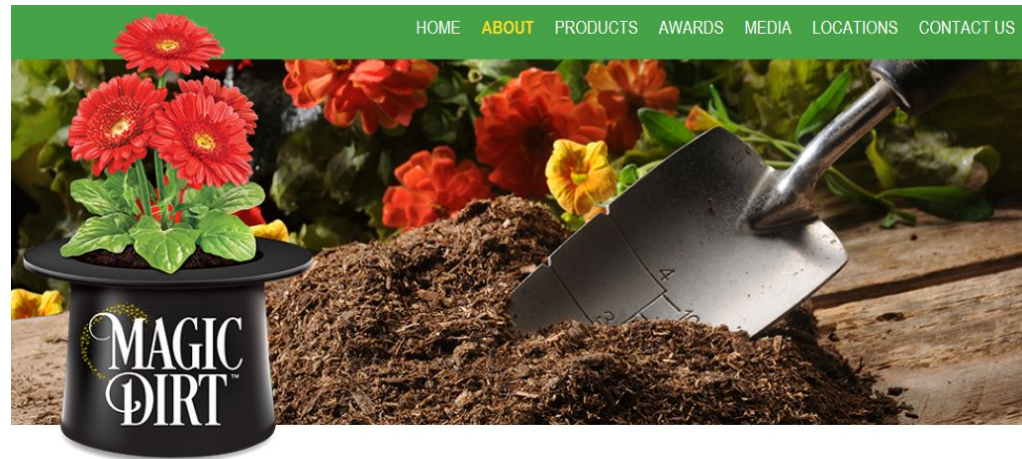
Principales nouveautés dans l'ordonnance sur le traitement des déchets

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

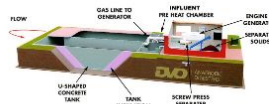
- Des exigences sont formulées pour la valorisation de certains déchets, laquelle n'était pas encore réglementée dans le droit fédéral. Il s'agit notamment des biodéchets (y compris réglementation relative aux possibles installations de traitement) et des déchets riches en phosphore.
- Un plan d'élimination 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

Le recyclage du phosphore en action

www.magic-dirt.com



ANAEROBICALLY DIGESTED FIBER



The digested fiber in Magic Dirt™ is a byproduct made exclusively from DVO, Inc.'s patented anaerobic digestion (AD) process.

WHAT'S TO LIKE

- Independent growth tests confirm Magic Dirt™ equal to or better than leading brands
- For use indoors, outdoors, in containers and mixed with gardens soils
- Can be used to grow flowering plants, vegetables and herbs without any added ingredients.
- Certified as Premium Potting Soil by

INNOVATION CENTER FOR U.S. DAIRY

A recent study commissioned by the Innovation Center for U. S. Dairy, which was established by dairy producers, reports that the digested organic fiber that is used in MAGIC DIRT™ "provides an environmental advantage in comparison to peat moss for all indicators examined... (R)eplacing peat moss with dairy digester fiber in the US market could avoid the release of greenhouse gases equivalent to 5.8 million metric tons of CO₂-eq."



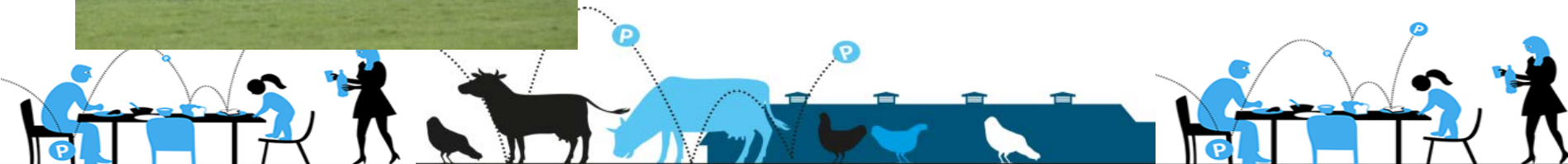
Success story: SARIA UK – Kalfos

- 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/>

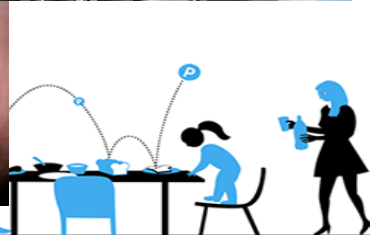


Kalfos[®]
we help you grow.



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:

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: Géotexia



<https://geotexia.wordpress.com/le-digestat/>

- Saint Gilles du Mené, Brittany
- 33 pig farmers
- Methanisation of 70 000 t(wet weight)/y
 - pig manure (c. 50% of input), sludges, chicken litter and other agri-food wastes
- 14 000 MWh electricity = 4 600 households
- digestate
 - solid-liquid separation (centrifuge, coagulation)
 - drying of solids to 80% DM
 - osmosis of liquids to < 10mg/l N, irrigation willow energy crop (58 000 m³/y, 14 ha)
 - evapo-concentration to mineral concentrate (20% DM)
- French fertiliser homologation obtained for digestate 2013

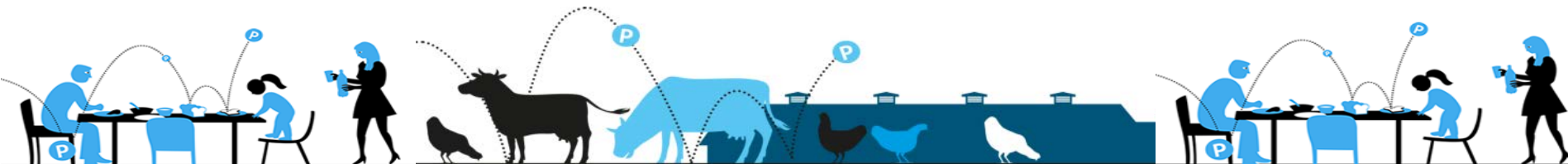
https://www.anses.fr/sites/default/files/documents/FERTIXIANK_FSIM_2013-0856_Ans.pdf



Success story: Véolia Struvia

- Struvite recovery for small-medium sewage works operating biological P removal
- Compact footprint, limited height (3,5m)
- Turbomix struvite reactor, lamella settler & bag draining of struvite prills
- Helsingor Denmark 2016
 - 70 000 p.e. sewage works
 - 60 m³/day treats 100% of works digestate after centrifuge
 - produces 36 t/y struvite

<http://technomaps.veoliawatertechnologies.com/struvia/fr/>



Success story:

Suez Phosphogreen

- Struvite recovery from sewage
- Biological P removal sewage works with anaerobic sludge digestion
 - 2013 Aby wwtp, Aarhus, 84 000 p.e.
 - 2015, Herning, Denmark, 150 000 p.e.
 - 2017, Marselisborg, Denmark 200 000p.e.
- Advantages
 - struvite sale: 250€ - 300€ /tonne
 - reduced P-removal chemical costs
 - avoidance of nuisance deposits
 - reduced sludge volumes
 - reduced energy consumption for biological N removal

<https://www.suezwaterhandbook.com/degremont-R-technologies/sludge-treatment/recovery/recycle-phosphorus-from-effluent-to-produce-a-valuable-fertilizer-Phosphogreen>



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

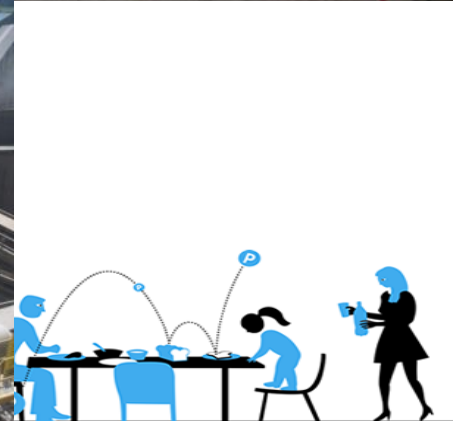


Success story:

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: Recophos – ICL

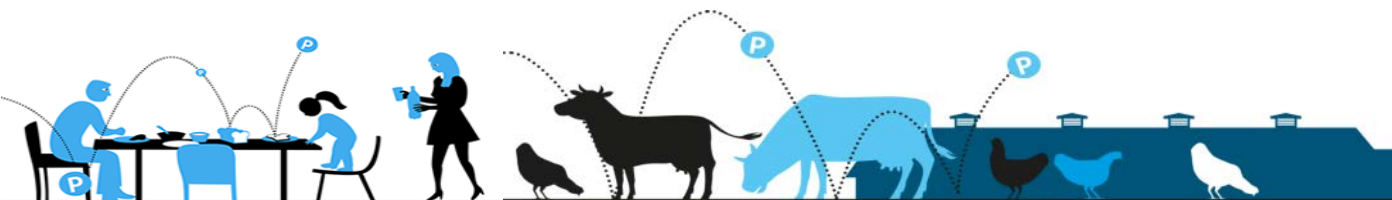
- Electrothermal production of white phosphorus (P₄) from sewage sludge / ashes
- High-value raw material for chemicals: fire safety, electronics, ...
- Recophos FP7 pilot project
- Technology acquired by ICL March 2016

www.icl-group.com

<http://www.prnewswire.com/news-releases/icl---next-step-towards-sustainable-innovation-571973381.html>

Rechargeable battery

LiFePO₄



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:

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

**Efficient and
sustainable
production chains**

Improving resource
utilisation

**Sustainable
dairy farming**

Setting the
standard





Chris Thornton - European Sustainable Phosphorus Platform

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