



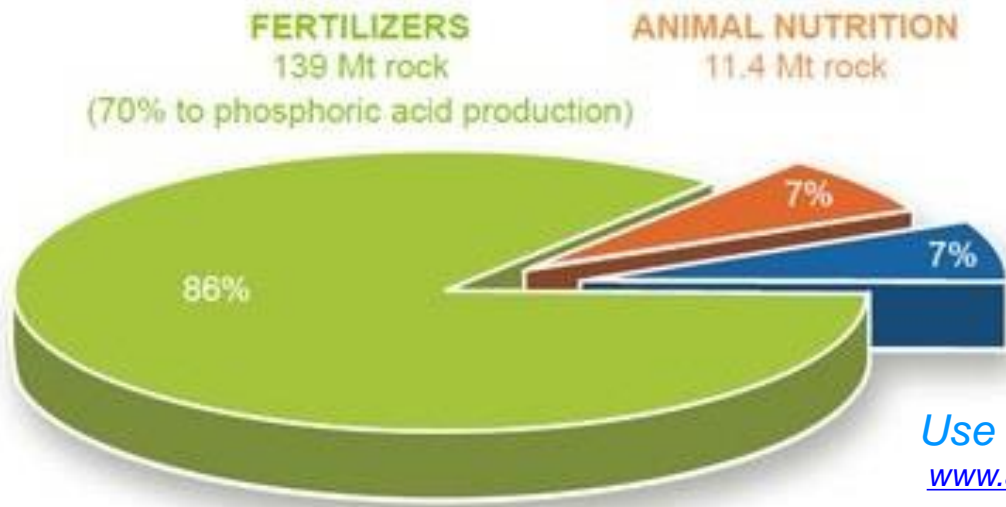
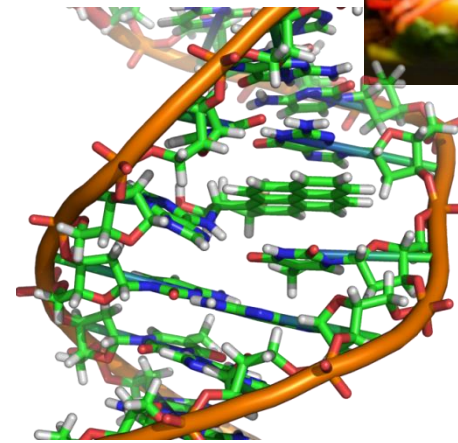
Recycling nutrients from bio-wastes as opportunity for rural economy development

Kimo van Dijk - European Sustainable Phosphorous Platform

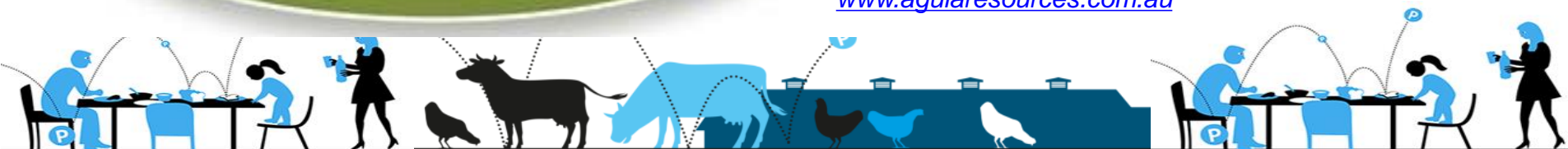
- info@phosphorusplatform.eu
- www.phosphorusplatform.eu  [@phosphorusfacts](https://twitter.com/phosphorusfacts)



Phosphorus:
*essential,
non substitutable,
non renewable*

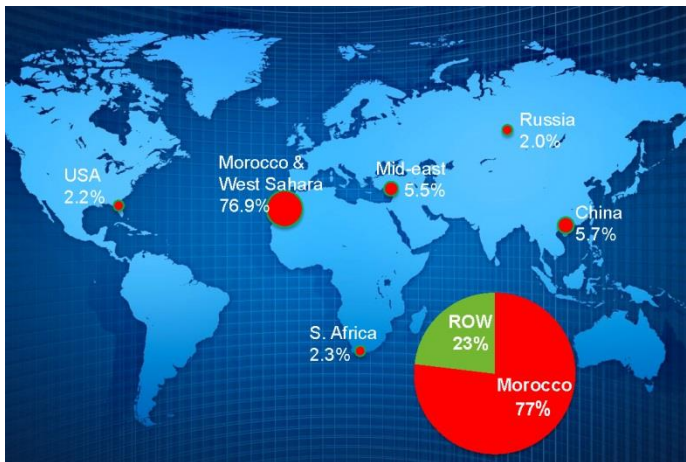


Use of phosphate rock
www.aquiareources.com.au



Phosphate rock is on EU Critical Raw Materials list

- Linked to world food security and price instability
- Europe > 90% dependent on imports
- Geo-political concentration of reserves



Without phosphate fertilisers we could feed around 1/5 of the world population

Adapted from Dawson et al., Food Policy 2011:

<http://www.sciencedirect.com/science/journal/03069192>

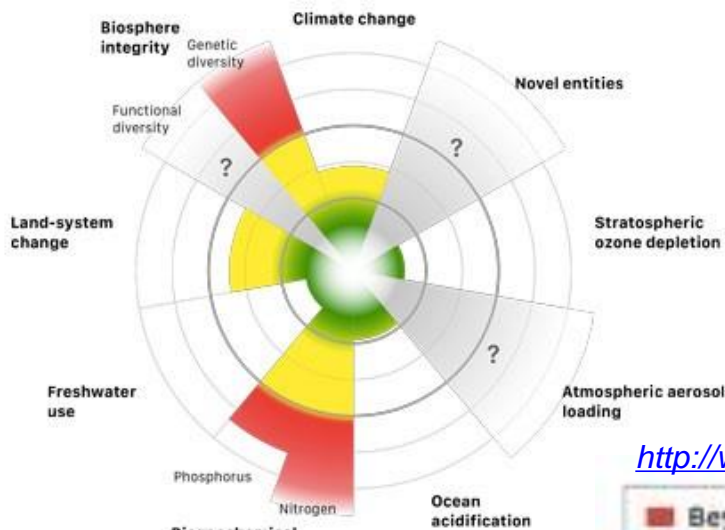


Environmental impacts

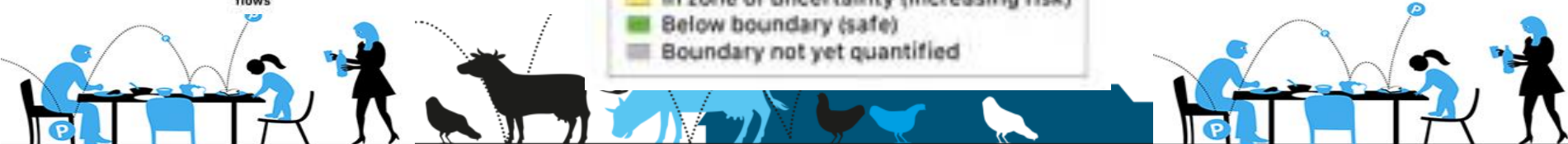
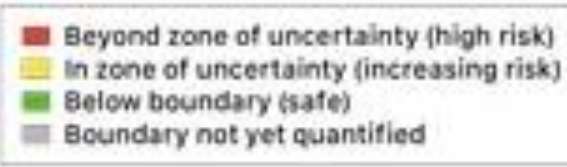
- Eutrophication
- Ammonia emissions
- Planetary boundaries



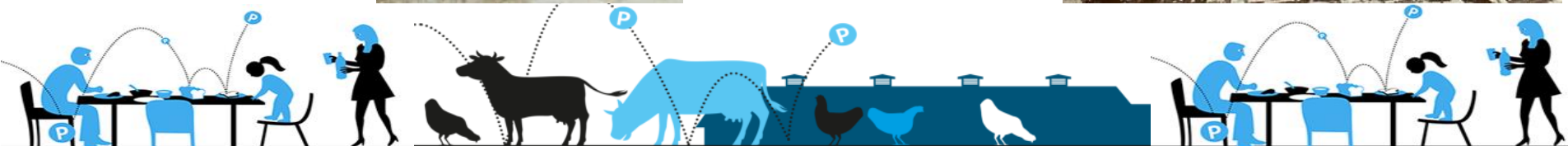
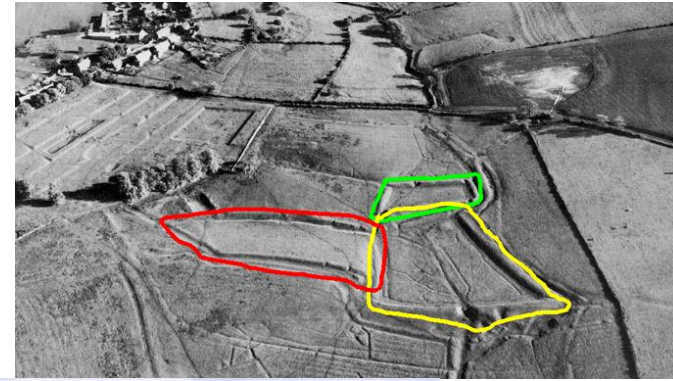
Phosphorus is the first cause of EU Water Framework Directive quality failure (other than morphology)



<http://www.stockholmresilience.org>



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***
- new potential nutrient recovery feedstocks:
food wastes, bio-energy, food processing ...***

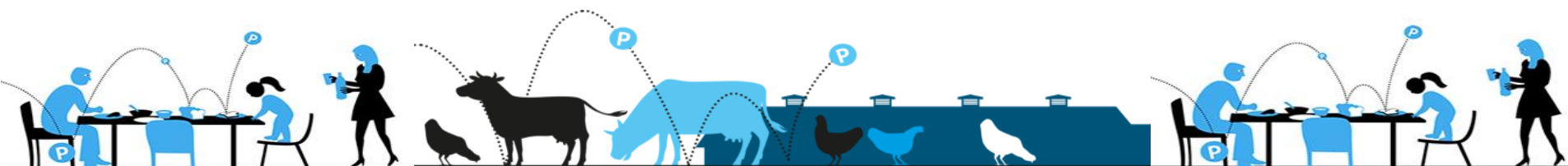


Phosphorus recycling potential in EU-27

[kton P/year]	Total	Recycled	Potential
Sewage sludge	297	115	182
Biodegradable solid waste	130	38	92
Meat & bone meal	128	6	122
Total	427-555	153-160	274-396
Manure recycling =	1 736		
Mineral fertiliser use =	1 448		

Van Dijk & Oenema "Overview of phosphorus flows in wastes in Europe", 2013, Fertilisers Europe seminar, 6 Feb. 2013.

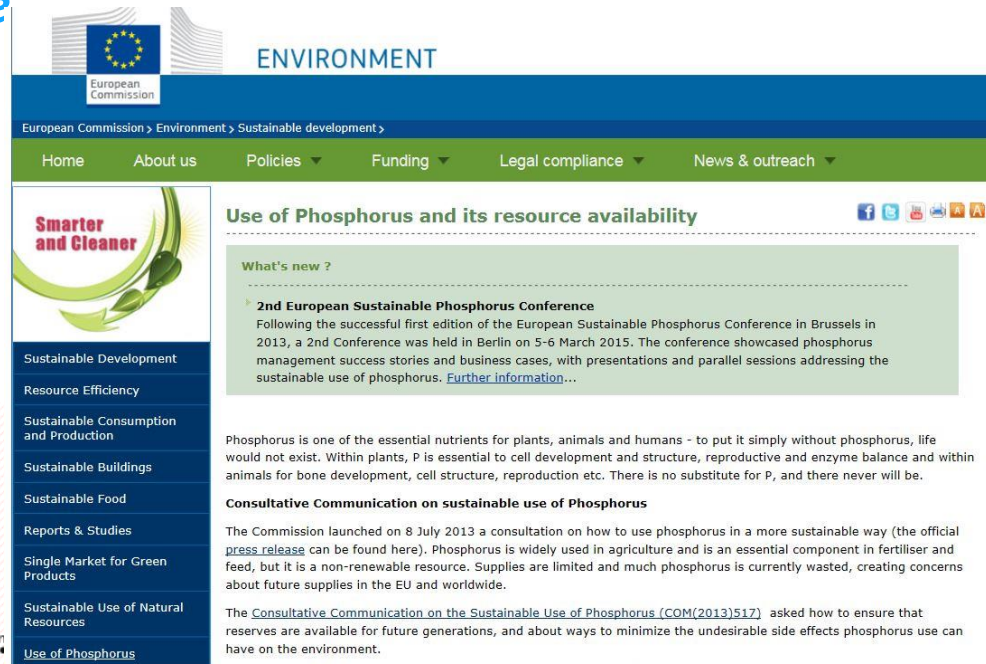
Van Dijk KC, Lesschen JP, Oenema O. Phosphorus flows and balances of the European Union Member States. Sci Total Environ 2016. DOI 10.1016/j.scitotenv.2015.08.048



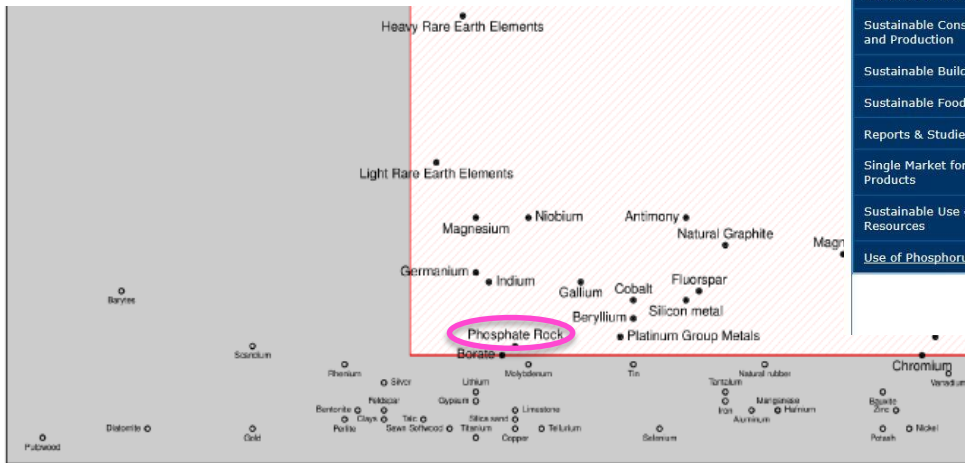
Regulatory drivers - EU

- 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

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



The screenshot shows the 'ENVIRONMENT' section of the European Commission website. The page title is 'Use of Phosphorus and its resource availability'. A sidebar on the left lists various topics under 'Sustainable Development', including 'Resource Efficiency', 'Sustainable Consumption and Production', 'Sustainable Buildings', 'Sustainable Food', 'Reports & Studies', 'Single Market for Green Products', 'Sustainable Use of Natural Resources', and 'Use of Phosphorus'. The main content area features a 'What's new?' section with a link to the '2nd European Sustainable Phosphorus Conference' held in Berlin in 2015. Below this, there is a detailed text block about phosphorus as an essential nutrient and a consultation on its sustainable use launched in 2013.



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



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
P-recovery from sewage
(*obligation wwtp > 50 kpe, notified to EU*)



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 hydrocarbures).



Bundesministerium
für Umwelt, Naturschutz,
Bau und Reaktorsicherheit

Suche

Ministerium

Themen

Service

Presse

Wasser · Abfall · Boden

Startseite · Themen · Wasser · Abfall · Boden · Abfallwirtschaft

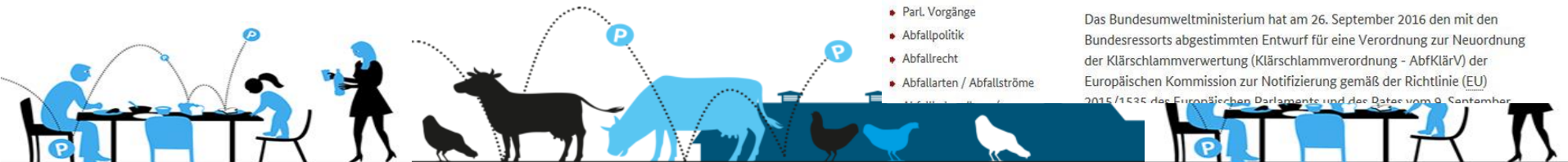
Abfallwirtschaft

- Kurzinfo
- Pressemitteilungen
- Downloads
- Parl. Vorgänge
- Abfallpolitik
- Abfallrecht
- Abfallarten / Abfallströme

AbfKlärV: Klärschlammverordnung

Einleitung des Notifizierungsverfahren bei der EU-Kommission zur Novelle der Klärschlammverordnung

Das Bundesumweltministerium hat am 26. September 2016 den mit den Bundesressorts abgestimmten Entwurf für eine Verordnung zur Neuordnung der Klärschlammverwertung (Klärschlammverordnung - AbfKlärV) der Europäischen Kommission zur Notifizierung gemäß der Richtlinie (EU) 2015/1535 des Europäischen Parlaments und des Rates vom 9. September



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



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>



Phosphorus recycling synergies

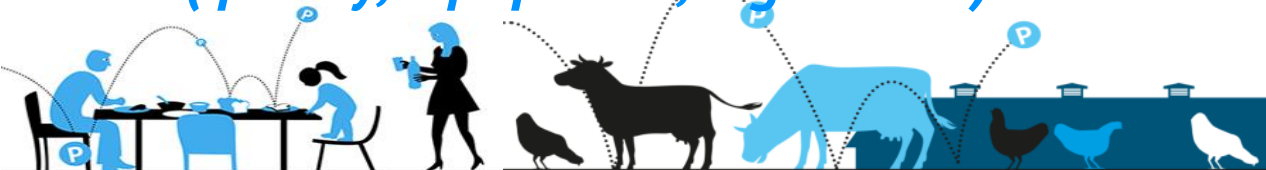
- Improving sewage treatment (nutrient removal)
- Reducing ammonia emissions
- Anaerobic digestion & biogas
- Avoiding landfill
- Rural economy development

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



Nutrient recycling products

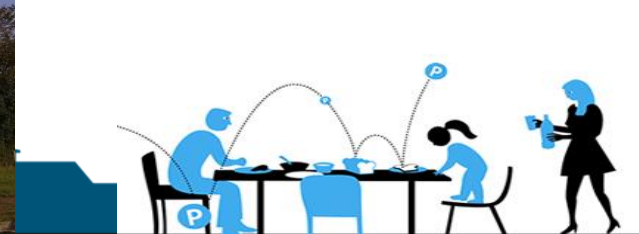
- ***Refined fertiliser products***
- ***Organic fertilisers:***
 - ***composts, digestates***
 - ***dried pelleted bio-wastes***
- ***Mineral concentrates***
- ***Industrial chemicals:***
 - ***phosphoric acid***
 - ***P4 (white phosphorus)***
- ***Key = product must correspond to user requirements needs and requirements (quality, equipment, logistics ...)***



New business opportunities

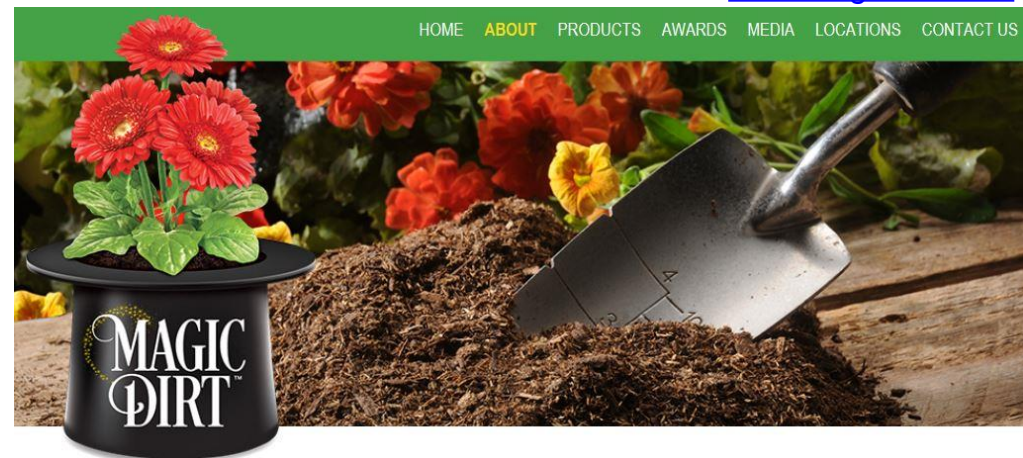
P-recycling inputs

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

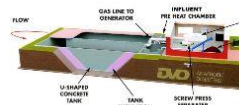


Phosphorus recycling success stories

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. Anaerobic digestion is a

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 Mulch and Soil Council

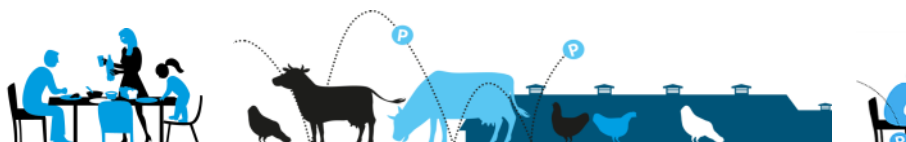
INNOVATION CENTER FOR U.S. DAIRY

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: Fertikal, Antwerp

- 180 000 t/y (wet weight) manure processed to organic fertilisers:
 - solid/liquid separation
dried, pelletised
 - For agriculture, horticulture
 - Distributed
to 25 countries worldwide
- www.fertikal.be



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/>



Success story:

KOTO AlgaeBioGas, Ljubljana

- 13 000 t/y household and industry food waste converted to biogas
- 30 m² pilot algae pond fed with digestate
- Algae used for energy production, fertilisers or bioplastics



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:

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

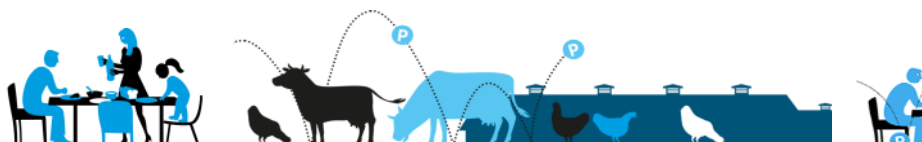
Efficient and sustainable production chains

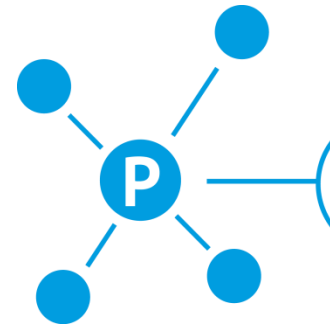
Improving resource utilisation



Sustainable dairy farming

Setting the standard





**Participate
Collaborate
Innovate**

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**





Recycling nutrients from bio-wastes as opportunity for rural economy development

Kimo van Dijk - European Sustainable Phosphorous Platform

- info@phosphorusplatform.eu
- www.phosphorusplatform.eu  [@phosphorusfacts](https://twitter.com/phosphorusfacts)

