



Seminar "National planning of sewage sludge management in Bulgaria"
Sofia, 30.-31. October 2013


Advisory Assistance Programme for Environmental Protection in the Countries of Central and Eastern Europe, the Caucasus and Central Asia

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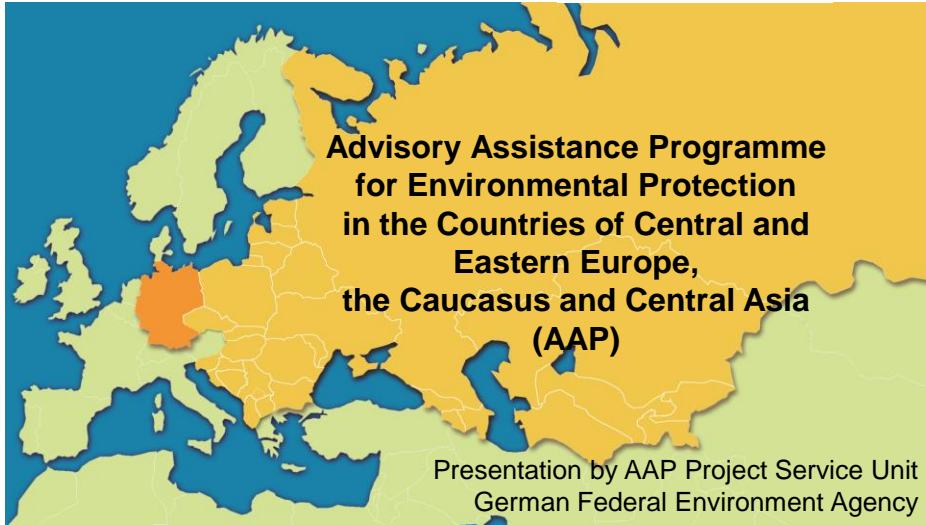
Current developments of the European sewage sludge management framework and techniques

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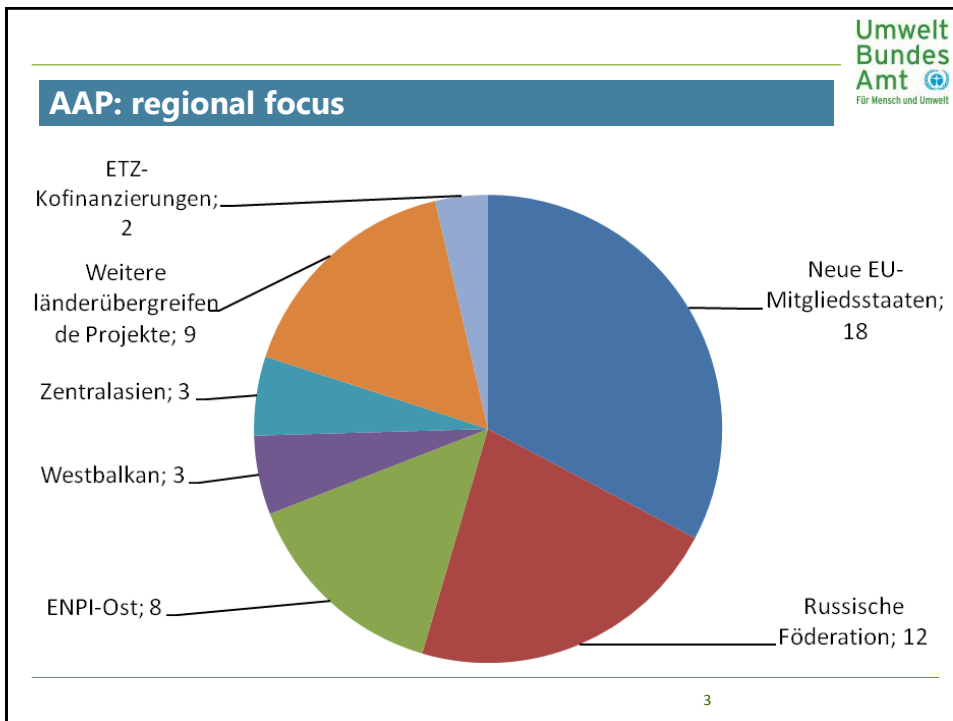
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

Advisory Assistance Programme for Environmental Protection in the Countries of Central and Eastern Europe, the Caucasus and Central Asia (AAP)

Presentation by AAP Project Service Unit
German Federal Environment Agency

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Umwelt Bundes Amt
Für Mensch und Umwelt

AAP approach, intentions and numbers

Approach


- facilitate demand-driven tailor-made consultation projects
- implemented in cooperation with regional and German partners
- with contributions made by every partner

Intentions

- to improve the environmental situation
- to help implementing EU environmental standards
- to support cross-border cooperation

Numbers

- start of the AAP: 2000
- budget: currently 2.74 Mio. € p.a.
- number of running projects p.a.: ca. 50
- project volume: 1.500 € – 300.000 €



Running projects in 2013:
38
(new projects started in 2013: 24)

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AAP projects' initiation, variety and properties

Contexts of projects' initiation

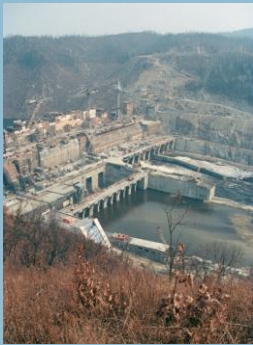
- bilateral governmental agreements
- EU environmental policy
- international environmental agreements

Projects' variety

- knowledge transfer
- awareness raising
- institution building

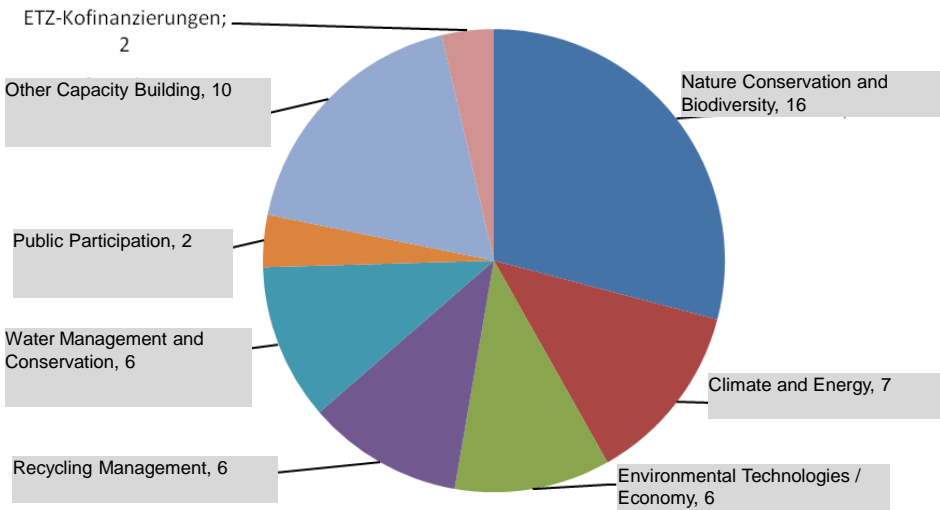
Projects' properties

- environmental protection goals
- sustainable project design
- cooperative implementation
- leverage and multiplier effects



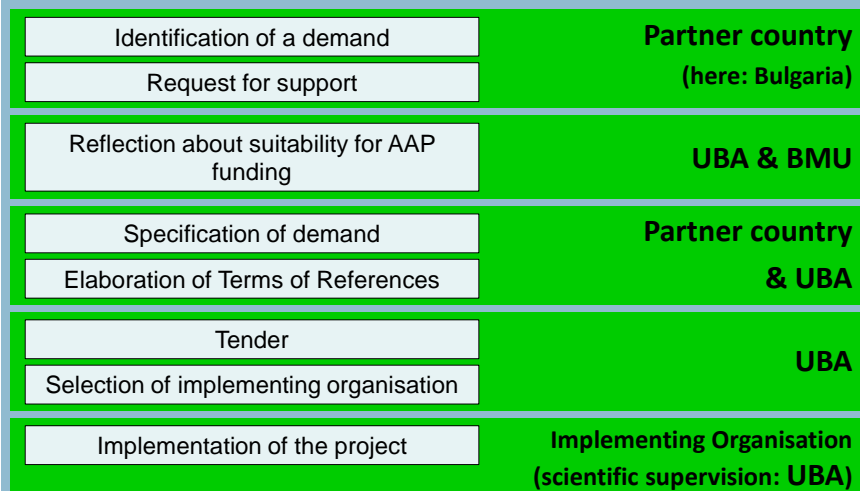
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AAP: thematic focus



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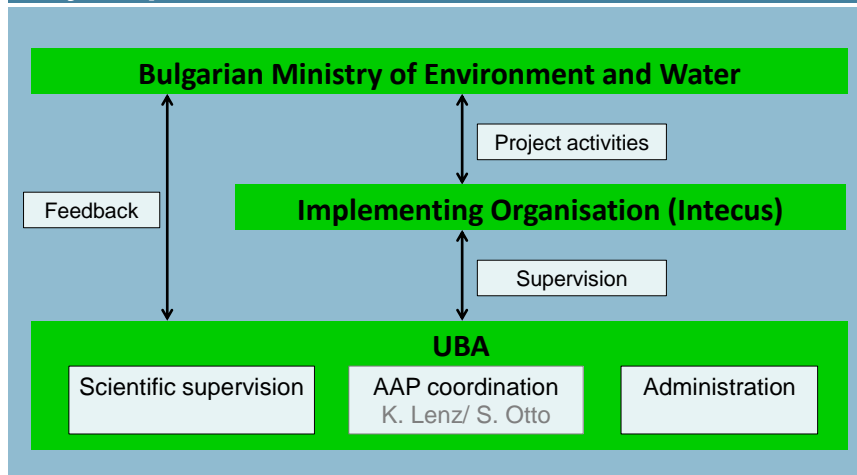
Stages of AAP project development (typically)



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Advisory Assistance Programme for Environmental Protection

Project specific division of tasks



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01.11.2013

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Sewage sludge facts

Sewage sludge

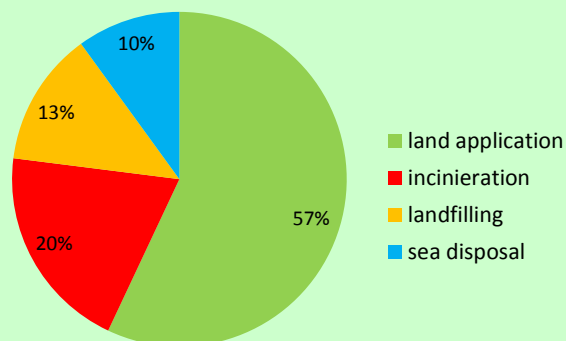
- is a “product” of waste water treatment
- has a high content of pollutants from the waste water (heavy metals, organic pollutants, pathogens)
- has a high content of nutrients (e.g. phosphorus = 2-55 g/kg, nitrogen = 20-60 g/kg dry weight)
- has an energetic potential (10-12 MJ/kg dry weight)
- has to be decomposed (digestion) and dried before further treatment to reduce odors and moisture (ca. 50%)

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Sewage sludge disposal situation in Europe

- **Europe: Sewage sludge from municipal sewage treatment plants:**
ca. 10 million tones dry weight

- **World:**
Ca. 30 million tones dry weight

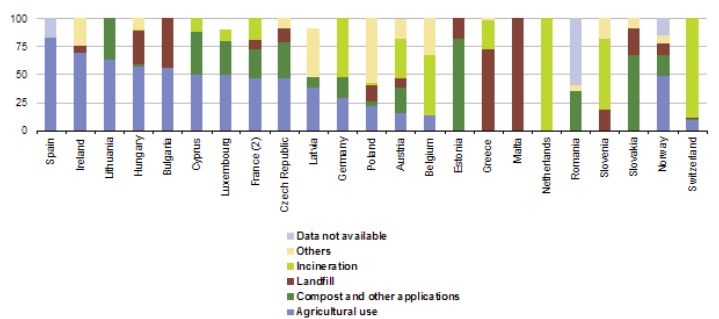


Helmut Kriess, Helmut Rechberger and Lukas Egle
Phosphorus in Water Quality and Waste Management
(2011) DOI: 10.5772/18482

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Sewage sludge disposal situation in Europe

Sewage sludge disposal from urban wastewater treatment, by type of treatment, 2009 (% of total mass)



(1) Belgium, the Czech Republic, Germany, France, Luxembourg, the Netherlands and Austria, 2008; Ireland, Cyprus, Latvia, Hungary and Slovakia, 2007; Switzerland, 2006; Denmark, Italy, Portugal, Finland, Sweden and the United Kingdom, not available.
(2) Based on a total excluding the category of other types of treatment.
Source: Eurostat (online data code: env_watq6)

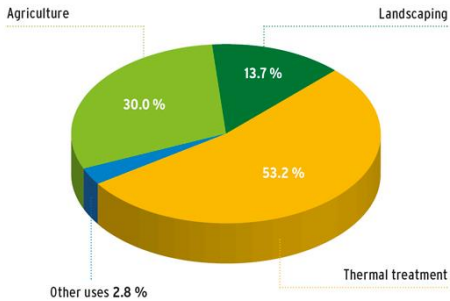
Source: Eurostat (env_watq6)

Sewage sludge disposal situation in Germany

- sewage sludge from municipal sewage treatment plants: ca. 2 million tons dry weight
- sewage sludge ashes: ca. 1 million tons
- > 50 % are thermal treated
- 50 % of the thermal treated ashes are incinerated in mono incineration plants
- energy used and organic pollutants destroyed by incineration

Disposal and recycling of sewage sludge

Disposal pathways of sewage sludge from municipal waste water treatment plants in 2010 - total sewage sludge volume: 1.9 million tonnes, divided as follows:



Source: Federal Statistical Office (Statistisches Bundesamt), Federal Environment Ministry (BMU) 2012

Sewage sludge disposal situation in Germany

Conclusion:

Incineration of sewage sludge is a save way of disposal!

but:

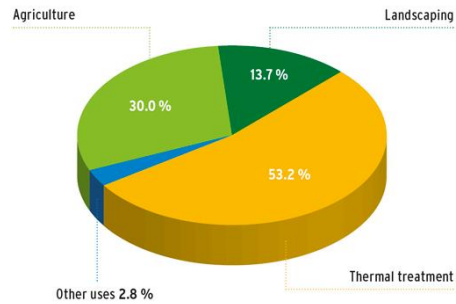
Sewage sludge has high content of nutrients especially phosphours and this will be lost!

Solution:

Phosphorus recovery!

Disposal and recycling of sewage sludge

Disposal pathways of sewage sludge from municipal waste water treatment plants in 2010 – total sewage sludge volume: 1.9 million tonnes, divided as follows:



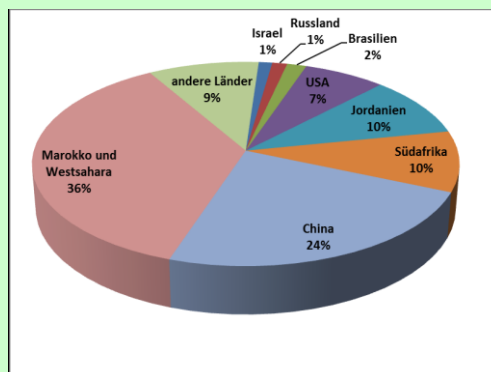
Source: Federal Statistical Office (Statistisches Bundesamt), Federal Environment Ministry (BMU) 2012

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Phosphorus recovery from sewage sludge

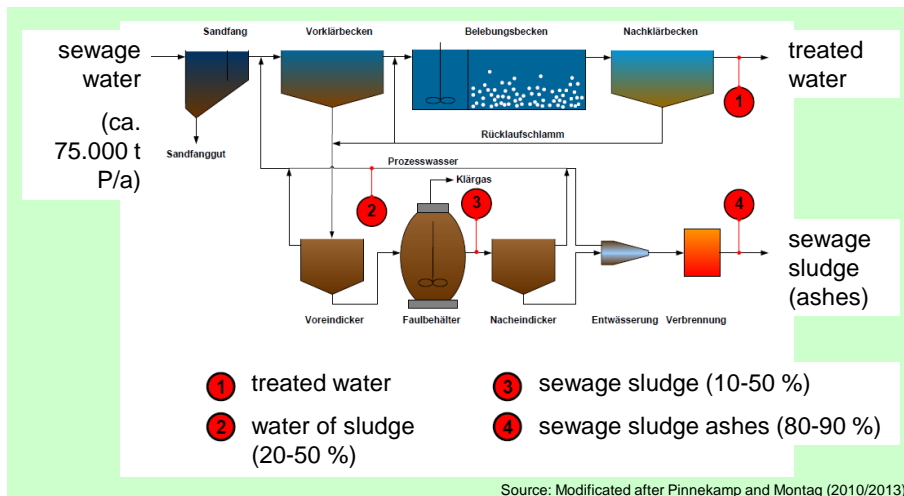
Why phosphorus is important?

- key element for all living systems and can not be substituted
- highly important for food production (fertilizer)
- limited resource which is not renewable (P-peak)
- already high content of Cd and U in P-rock
- no resources in Europe (all P and fertilizer is imported)



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Places for phosphorus recovery at treatment plant



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Techniques for phosphorus recovery in Europe

water/ sewage sludge

PEARL (MAP)
 AirPrex (MAP)
 FixPhos (CaP/CSH)
 PHOSPAQ (MAP)
 Budenheim (CaP)
 NuReSys (MAP)
 LYSOGEST (MAP)
 Gifhorn process (MAP, CaP)
 Crystalactor (MAP, CaP)
 KREPRO (FeP)
 P-Roc (CaP/CSH)
 PHOSTRIP (MAP, caP)
 Stuttgart process (MAP)
 REPHOS (MAP)

Sewage sludge ashes

LeachPhos (P mineral)
 P-bac (MAP)
 EcoPhos (DCP)
 SESAL-PHOS (caP)
 RECOPHOS (P mineral)
 MEPHREC (P mineral)
 AshDec (P mineral)
 THERMPHOS (P4)
 RECOPHOS AT (H3PO4)

tested in demonstration or pilot projects

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Political developments in Europe



Consultative Communication on sustainable use of Phosphorus

launched on 08/07/2013

http://ec.europa.eu/environment/consultations/phosphorus_en.htm

Consultation asks

- how to use phosphorus in a more sustainable way
- how to ensure that reserves are available for future generations
- about ways to minimize the undesirable side effects phosphorus use can have on the environment

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Political developments in Europe



European phosphorus platform

<http://phosphorusplatform.org/>

**Participate
Collaborate
Innovate**

- relaunched after first European Sustainable Phosphorus Conference in March 2013 (Brussels)
- initiated by partners throughout the European Phosphate Value Chain
- aim is to secure phosphorus for future generations
- inspiration is to take action by recycling more, using less and cooperating smartly

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Political developments in Germany



Deutsches Ressourceneffizienzprogramm (ProgRes)
Programm zur nachhaltigen Nutzung und zum Schutz der natürlichen Ressourcen
 Beschluss des Bundeskabinetts vom 29.2.2012

**Eine arbeitet hier ineffizient.
Und es ist nicht Frau Meier.**

Resource Efficiency Programme (ProgRes)

- adopted by Federal Cabinet German (29.02.2012)
- to address the sustainable use of raw materials

Five strategic approaches are considered:

- securing a sustainable raw material supply
- raising resource efficiency in production
- making consumption more resource-efficient
- enhancing resource-efficient closed cycle management
- using overarching instruments.

example of material flow:
Phosphorus-recycling from different organic materials such as **sewage sludge**

http://www.bmu.de/english/current_press_releases/pm/48442.php

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Political developments in Germany

Bund/Länder Working Group of Waste (LAGA)

- Evaluation of Options for the Sustainable Use of Secondary Phosphorus Reserves (2010-2012)**
 result: Working Group's proposals (as download)
- Working group already founded:**
Protection of resources through P-recovery
 develop more concrete strategies for P-recycling

German phosphorus platform

- will be established on 15. November 2013
- information, monitoring, networking, co-ordination



Bund/Länder-Arbeitsgemeinschaft Abfall

Bericht

„Bewertung von Handlungsoptionen zur nachhaltigen Nutzung sekundärer Phosphorreserven“

Stand 30. Januar 2012

http://www.laga-online.de/serveis/23875/Bericht_Phosphor/CC%3BCoGewinnung_engl.pdf?command=downloadContent&filename=Bericht_Phosphor%3BCoGewinnung_engl.pdf



DEUTSCHE PHOSPHOR-PLATTFORM

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Political developments in Germany

„Phosphorus-Recycling-Ordinance“ (AbfPhosV) included in the upcoming German sewage sludge ordinance

- P-Recycling is necessary if sewage sludge is not used in agriculture (soil concerning)
- P-Recycling is required if P content in the sewage sludge is over a specified content
- co-combustion is not allowed if P is not recycled before
- or: thermal treatment in mono incineration plants and P-recycling from the ashes
- or: interim storage of the sewage sludge on mono landfills
- mixing and dilution of the sewage sludge is not allowed

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Situation in Germany: P-Recycling Techniques

Sewage sludge

| | | | |
|---|---------------|-------------------|--------------------------------------|
| Air Prex, Berliner Verfahren (KA Waßmannsdorf) (ABA Neuweg-Mönchengladbach) | sewage sludge | MAP-precipitation | MAP-fertilizer "Berliner Pflanze" |
| REPHOS Remondis Aqua | sewage water | MAP-precipitation | MAP (Struvit) |
| Seaborne (KA Giffhorn) | sewage sludge | MAP-precipitation | MAP-fertilizer (Struvit) |
| Stuttgarter Verfahren (KA Offenburg) | sewage sludge | MAP-precipitation | MAP-fertilizer (Struvit) |

Sewage sludge ashes

| | | | |
|-----------------------|------------------------------|--|--------------------------|
| RecoPhos (Neuburg) | ashes (low metal content) | thermocemical (no further loss of metals) | P-Dünger, -Komponente |
| Mephrec | Sewage sludge/ashes | matalurgical | fertilizer |
| Ashdec | ashes | thermochemical | fertilizer |

Political developments – comming novellation sewage
sludge ordinance – limit values

| Nr. | Stoffbezeichnung | Grenzwert |
|-----|---|-----------|
| 1 | Arsen (As) | 40 |
| 2 | Blei (Pb) | 150 |
| 3 | Cadmium (Cd) | 3 |
| 4 | Chrom (Cr) | 300 |
| 5 | Kupfer (Cu) | 900 |
| 6 | Nickel (Ni) | 100 |
| 7 | Quecksilber (Hg) | 2 |
| 8 | Thallium (Tl) | 1,5 |
| 9 | Zink (Zn) | 5.000 |
| 10 | Summe organische Halogenverbindungen als adsorbierte organisch-gebundene Halogene (AOX) | 400 |
| 11 | Benzo(a)pyren (B(a)P) | 1 |
| 12 | Polychlorierte Biphenyle (PCB), jeweils für die Kongenere Nummer 28, 52, 101, 138, 153, 180 | 0,1 |
| | Polychlorierte Dibenzodioxine und Dibenzofurane (PCDD/PCDF) einschließlich dioxinähnliche polychlorierte Biphenyle, in Nanogramm TCDD-Toxizitätsäquivalente (gemäß Berechnungsformel in Anlage 3) | 30 |
| 14 | Polyfluorierte Verbindungen (PFC - als Summe der Einzelsubstanzen Perfluorooctansäure [PFOA] und Perfluorooctansulfonsäure [PFOS]) | 0,1 |

Phosphorreycling - Verfahren - Förderungen

Forschung und Entwicklung

- BMBF-Förderinitiativen <http://www.bmbf.de/foerderungen/10760.php>
- Projektträger Jülich <http://www.ptj.de/foerderinitiativen>
- DBU <http://www.dbu.de/1824.html>

Großtechnische Umsetzung von Investitionsvorhaben

- **Umweltinnovationsprogramm (UIP)** des BMU (KfW-Bank)
<http://www.umweltbundesamt.de/service/uiip/index.htm>
- KfW Investitionskredit http://www.kfw.de/kfw/de/Inlandsfoerderung/Programmuebersicht/KfW-Investitionskredit_Kommunen/index.jsp

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For our Environment is the mission statement of the Federal Environment Agency (UBA). Founded in 1974, the UBA is Germany's central federal authority on environmental matters. Its key statutory mandates are:

- scientific environmental authority under the jurisdiction of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)
- assume responsibility for the protection of the environment and of humankind against adverse environmental factors
- represent all essential fields of study and qualifications
- Implementation of environmental laws (e.g. emissions trading, authorisation of chemicals, pharmaceuticals, and plant protection agents)
- Information of the public about environmental protection

Division III: Sustainable Production and Products, Recycling Management

Dept. III 2: Sustainable Production, Resource Conservation and Material Cycles

Section III 2.5: Monitoring Methods, Waste Water Management

What I do: Sewage sludge, resource conservation, phosphorus recycling and concerning questions about methods, strategies, laws and ordinances, project monitoring, standardization of analytical methods