ECONOMÍA CIRCULAR
Y LODOS DE DEPURADORA

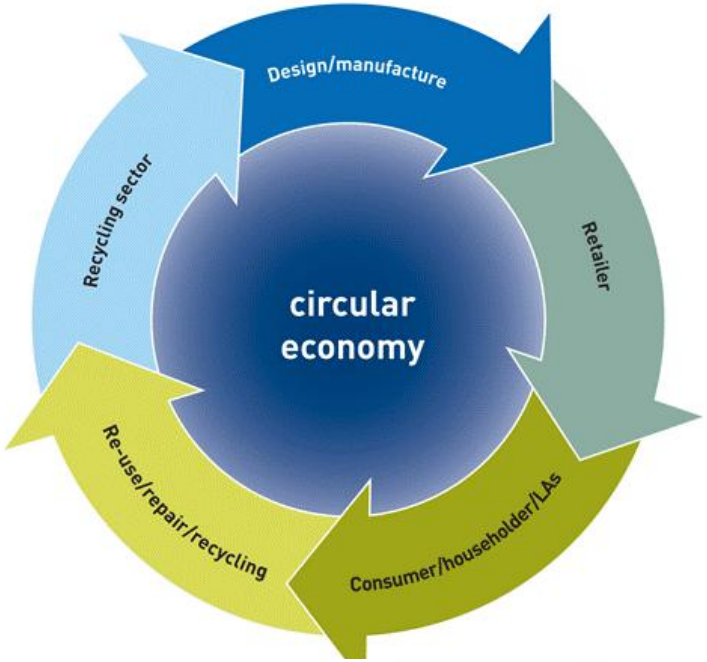
ASOCIACIÓN TÉCNICA PARA LA GESTIÓN DE RESIDUOS, ASEO URBANO Y MEDIOAMBIENTE

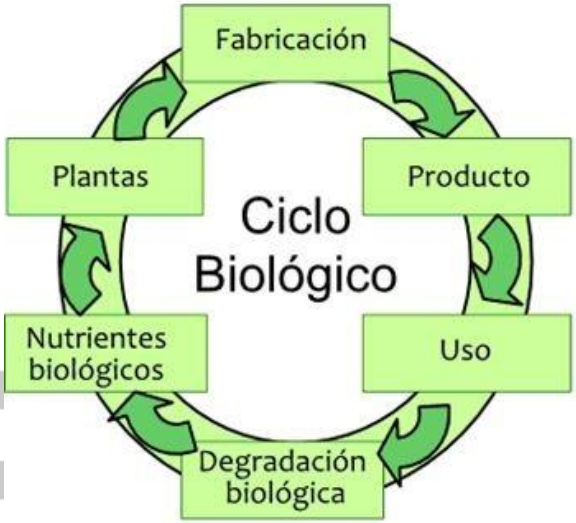
NATIONAL MEMBER OF ISWA
International Solid Waste Association

8-11 Marzo / March
smagua 2016
22 Salón Internacional del agua y del riego
International water and irrigation exhibition

ECONOMÍA CIRCULAR

- El valor de los productos y materiales se mantiene el mayor tiempo posible
- Los residuos y el uso de recursos se reduce al mínimo
- Los recursos se conservan en la economía cuando el producto llega al final de su vida útil, con el fin de volverlos a utilizar repetidamente y seguir creando valor.





Productos de Consumo

Productos de Servicio

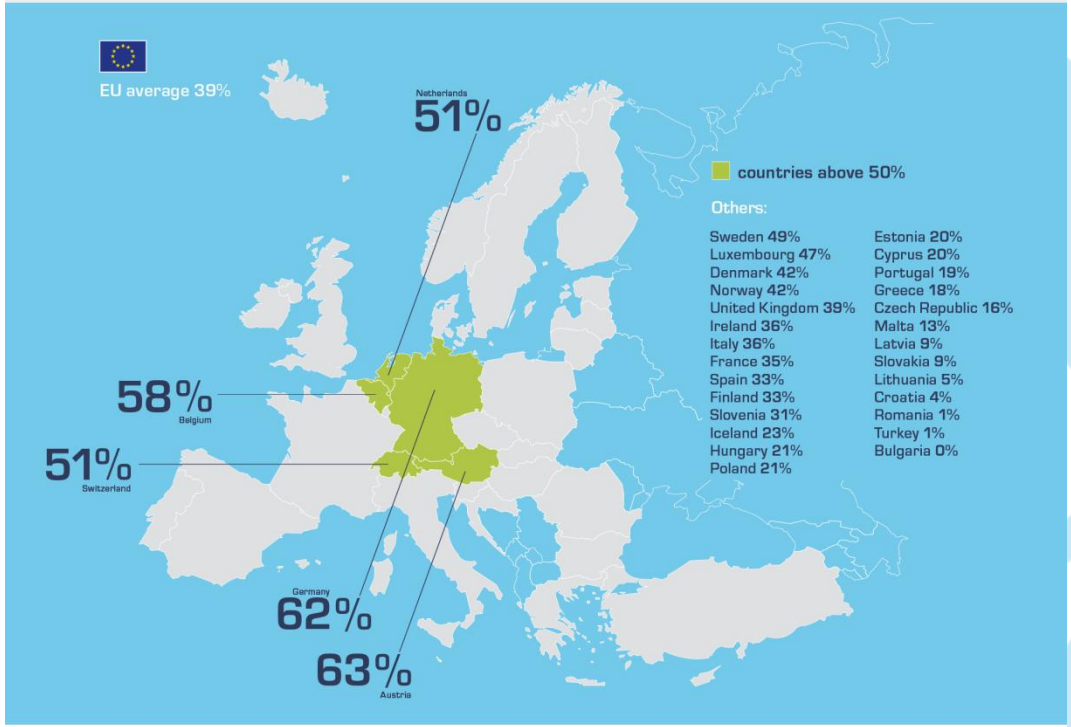
El principio de las 3R

- Reducir: Se propugna la máxima disminución en el uso de los recursos, maximizando su eficiencia y reduciendo la producción de residuos.
- Reusar y reciclar: los bienes de hoy deben ser remanufacturados o reusados en el futuro, vinculando la EC al desarrollo económico y social.

European Environment Agency

Recycling rates in Europe

Much of the waste we throw away can be recycled. Recycling benefits the environment by diverting waste away from landfills and by providing raw materials for new products. Recycling can also encourage innovation and create jobs.



In Europe, employment related to recycling increased by 45 % between 2000 and 2007

50/20

EU countries should recycle at least 50% of their municipal waste by 2020.

Recycling an aluminium can saves around 95% of the energy needed to make a new one from raw material.

Sources: EEA, European Commission, Eurostat

What's your take on waste in Europe?
Send your entry by 30 September 2013
eea.europa.eu/wastesmart

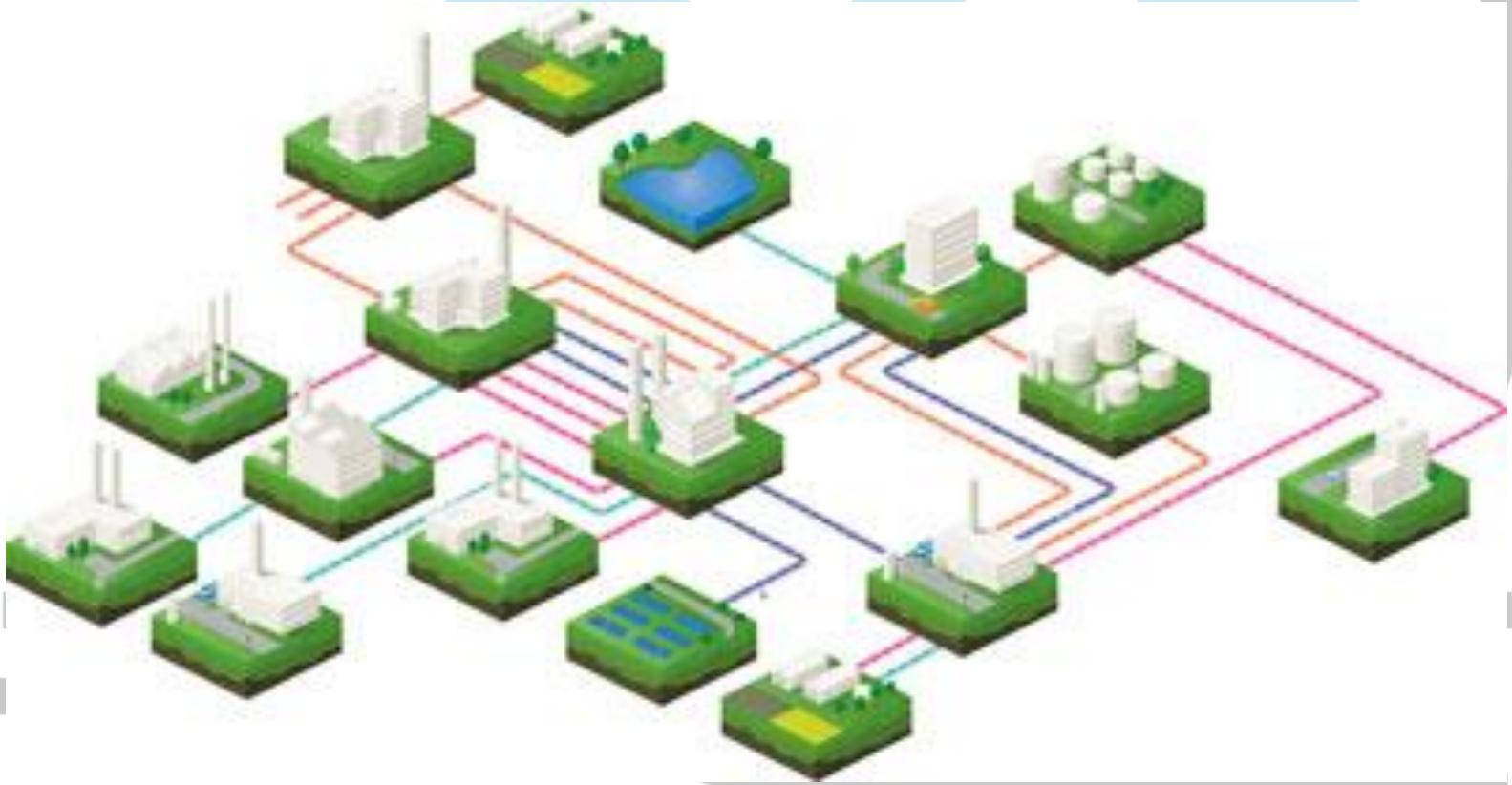
WasteSmART
European Environment Agency

La economía circular en las empresas

- Comienza en el diseño
- Continúa en la producción
- Sigue en la gestión de los recursos

Los residuos de una empresa pueden ser los recursos de otra y dar lugar a una simbiosis industrial

Simbiosis de Kalundborg



Requisitos simbiosis exitosas

- Los miembros encajan entre sí, pero pueden ser diferentes
- Los miembros se centran en grandes y continuos flujos de residuos.
- Cada proyecto es económicamente viable
- La distancia geográfica entre los miembros es pequeña
- La distancia ideológica entre los miembros es pequeña

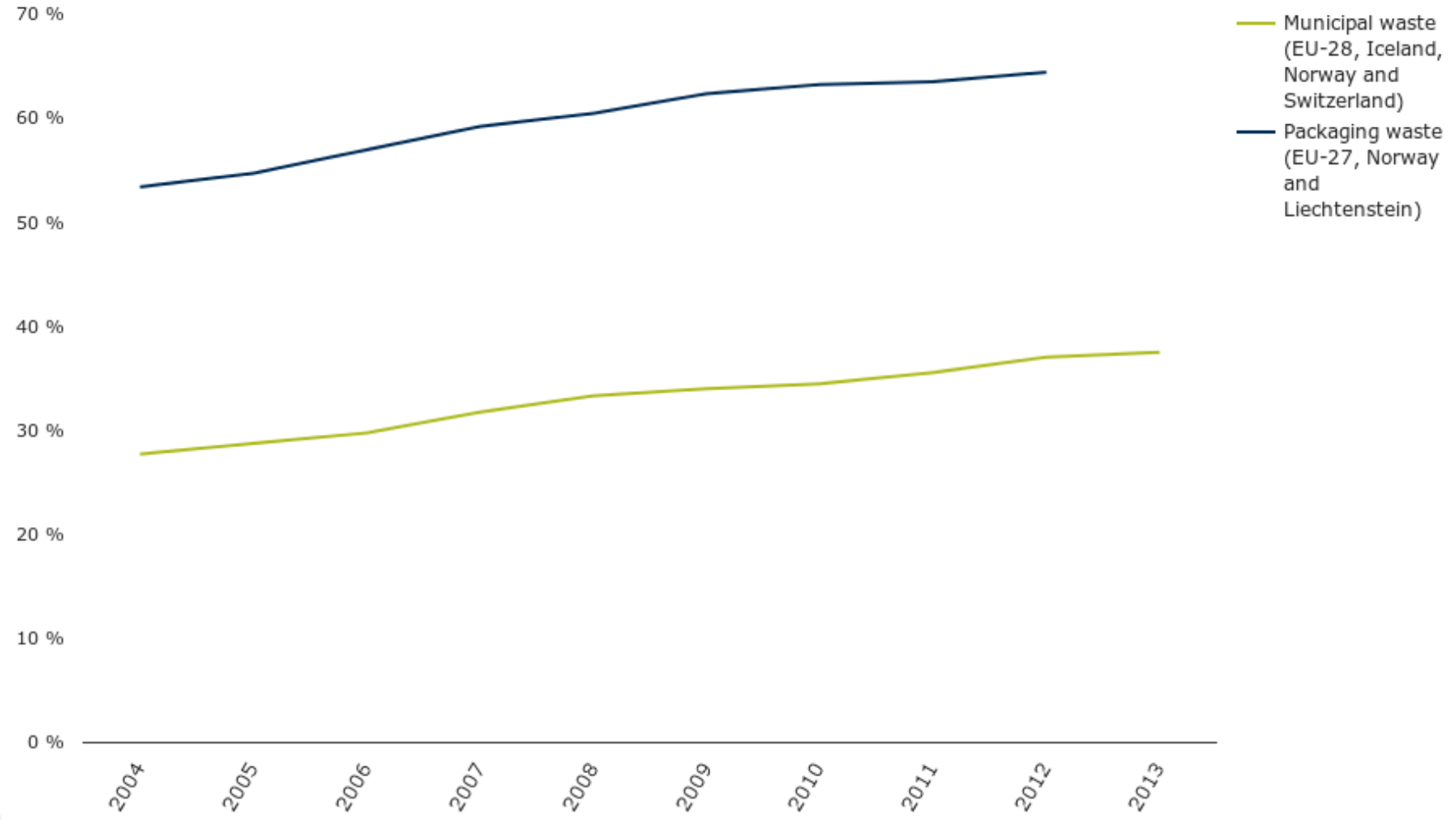
¿Por qué hablamos de EC y lodos de depuradora?

- La UE cuenta con un plan de acción para la Economía Circular.
- Propuesta de acciones para “cerrar el círculo” a través de un mayor reciclaje y reutilización.

Algunos elementos clave:

- Objetivo de reciclar el 65 % de los residuos municipales para el año 2030
- Objetivo de reciclar el 75% de los residuos de envases en 2030

Chart — Recycling rates by waste streams in Europe



Otros elementos clave

- Prohibición del vertido de residuos recogidos de forma selectiva.
- Medidas para fomentar la simbiosis industrial
- Incentivos económicos para los productores que pongan productos más ecológicos en los planes de recuperación de apoyo al mercado del reciclaje.

Revisión de las principales Directivas de Residuos

- Directiva marco de residuos: ha sido revisada y se proponen cambios
- Directiva de envases y embalajes: ha sido revisada y se proponen cambios
- Directiva sobre el vertido de residuos: ha sido revisada y se proponen cambios
- Directiva residuos aparatos eléctricos y electrónicos: revisada y se proponen cambios

¿Qué ha pasado con la Directiva de Lodos de Depuradora?

- Analizada en el documento del año 2014 “Ex post evaluation on certain Waste Directives”

EFICACIA

- La Directiva ha logrado sus objetivos iniciales, mediante el aumento de la cantidad de lodo utilizado en la agricultura y contribuyendo a la reducción de daños al medio ambiente, asegurando que los metales pesados en los suelos y los lodos no superen los límites establecidos en la Directiva.

EFICIENCIA

- El beneficio principal es su papel en la protección salud humana y el medioambiente contra los efectos nocivos de los lodos contaminados en agricultura.

- Sustituto eficaz de fertilizantes químicos, especialmente de fósforo

RELEVANCIA

- Sólo un pequeños grupo considera que la gestión de lo lodos podría integrarse en otra legislación de la UE (suelos, residuos biológicos o fertilizantes).
- La Directiva es coherente con la hoja de ruta por un uso eficiente de los recursos.

COHERENCIA

- Los objetivos de esta Directiva complementan la legislación europea de residuos al integrar los lodos en la jerarquía de residuos, promover la salud y la protección del medioambiente.

La investigación y los lodos de depuradora

- La mayoría de las investigaciones estudian cómo recuperar el fósforo presente en los lodos.
- Suiza ha impuesto la obligación de recicla el fósforo, regulación que entró en vigor el 1 de enero de 2016
- Hay informes que indican que las reservas de fósforo podrían agotarse en 50 años

Leaching of ashes from co-combustion of sewage sludge and wood
Part I: Recovery of phosphorus

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Abstract

Combustion of sewage sludge with subsequent recovery of phosphorous is a relatively new sludge treatment option. In the work described in this paper, recovery of phosphorus by acid leaching of fly-ashes from co-combustion of sewage sludge with wood in a circulating fluidiz bed combustor was investigated. The results showed that it is possible to find a pH range (0.5 in which it is possible to extract a significant fraction of the phosphorous from these ashes without precipitation of secondary phosphates. The type of flocculation agent used in the was water treatment plant where the sludge is formed has a significant effect on the phosphorous

RECOVERY OF PHOSPHORUS FROM SEWAGE

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ABSTRACT

In this paper we will discuss alternatives to recover phosphorus from sewage for reuse by the phosphorus industry
Recovery of phosphorus from sewage sludge:

- Ash from incinerated sewage sludge (mixture of primary and secondary sludge) contains too much iron, copper and zinc to meet the requirement of the phosphorus industry.
- Ash from bio-P sludge almost meets the requirements of the phosphorus industry.

Two alternatives for stripping of phosphorus from bio-P sludge are discussed:

- Stripping from sludge withdrawn from the settler results in a good P-precipitate with a good quality with respect to iron, zinc and copper.
- Withdrawing excess sludge from the anaerobic compartment is easy to implement at a plant and will results in a good quality precipitate.

In theory from Dutch sewage 18 kt P_2O_5 per year can be reused by the phosphorus industry.

Keywords: Phosphorus, recycling, recovery, reuse, sewage, biological P-removal

INTRODUCTION

In 1998 the Dutch sewage contained about 14 kt/year phosphorus (as P) (1). In the wastewater treatment plants about 10 kt P/year was removed by chemical and biological treatment methods. The intention is to increase this amount even further to approximately 12 kt P/year. Almost all the removed phosphorus is fixed in the primary and secondary sewage sludge. This sludge is treated and disposed of in several ways, but not more than 14% has a useful application as compost (table 1). As application in agriculture is no longer accepted the amount of sludge incinerated will increase.

Sludge disposal and utilisation	Sewage sludge (Dry mass) kton	%

Energy & Fuels **2008,** *22,* 9–15

Sewage Sludge as a Biomass Resource for the Production of Energy: Overview and Assessment of the Various Options†

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Received May 25, 2007. Revised Manuscript Received July 24, 2007

Treatment of municipal wastewater results worldwide in the production of large amounts of sewage sludge The major part of the dry matter content of this sludge consists of nontoxic organic compounds, in general combination of primary sludge and secondary (microbiological) sludge. The sludge also contains a substantia amount of inorganic material and a small amount of toxic components. There are many sludge-managemen options in which production of energy (heat, electricity, or biofuel) is one of the key treatment steps. The mos important options are anaerobic digestion, co-digestion, incineration in combination with energy recovery co-incineration in coal-fired power plants, co-incineration in combination with organic waste focused on energ recovery, use as an energy source in the production of cement or building materials, pyrolysis, gasification supercritical (wet) oxidation, hydrolysis at high temperature, production of hydrogen, acetone, butanol, o ethanol, and direct generation of electrical energy by means of specific micro-organisms. Incineration an co-incineration with energy recovery and use of sewage sludge in the production of Portland cement are applie on a large scale. In these processes, the toxic organics are destructed and the heavy metals are immobilized i the ash or cement. The energy efficiency of these processes strongly depends upon the dewatering and dryin step. It is expected that these applications will strongly increase in the future. Supercritical wet oxidation is promising innovative technology but is still in the development stage. With the exception of biogas production the other biological methods to produce energy are still in the initial research phase. Production of bioga from sewage sludge is already applied worldwide on small, medium, and large scales. With this process, substantial experience exists and it is expected that this application is getting more and more attention. Beside the increasing focus on the recovery and reuse of energy, inorganics, and phosphorous, there is also an increasin focus to solve completely the problem of the toxic organics and inorganic compounds in sludge. In the assessmen and selection of options for energy recovery by means of biological methods, this aspect has to be taken int account.

Introduction

During the last 2 decades, developments in municipal wastewater treatment strategies are characterized by a continuous effort to improve the quality of the effluent by upgrading existing treatment plants and designing and implementation of new more effective treatment plants. This effort simultaneously proceeded with an enforcement of the industry and households to reduce or eliminate the discharge of toxic pollutants into the sewer

increasingly under pressure.[1,2] This is also cau increasing insight into the possible adverse effect o pollutants and pathogens. Parallel to this developm government policy and regulations regarding the ap sludge in agriculture have changed considerably. policy and legislation regarding sludge application management in general are heavily dependent national, and regional conditions. The costs of sew treatment often represent more than 50% of the total

CONCLUSIÓN: CÓMO LOS LODOS CONTRIBUYEN A LA EC

- Hacen que los residuos se conviertan en recursos.
- Opción de waste to energy (producción de energía)
- Evita el agotamiento de las reservas de fósforo
- Tiene beneficios económicos, medioambientales y sociales

MUCHAS GRACIAS

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