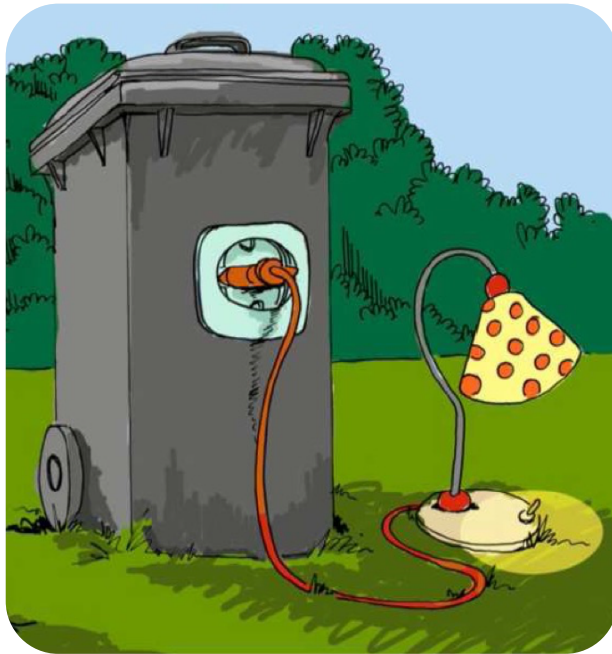


Waste to Energy in a Circular Economy



Lighea Speciale



WERT 2016,
Columbia University, NY

- CEWEP is the **umbrella association of Waste-to-Energy Plants across Europe** (owners and operators).

CEWEP Members: **69.1 Mio. tonnes (85%); 386 plants**
Capacity Europe: **88.6 Mio. Tonnes; 483 plants***

- They generate **energy from household and similar waste** that remains after waste prevention, reuse and recycling by thermally treating it.
- This is how they **replace fossil fuels**, such as coal, gas and oil, used by conventional power plants.
- At the same time Waste-to-Energy Plants help to reduce Greenhouse gas emissions by **diverting waste from landfills**.

Waste-to-Energy:

Creating reliable, cost-effective, local energy from citizens' waste

Summary

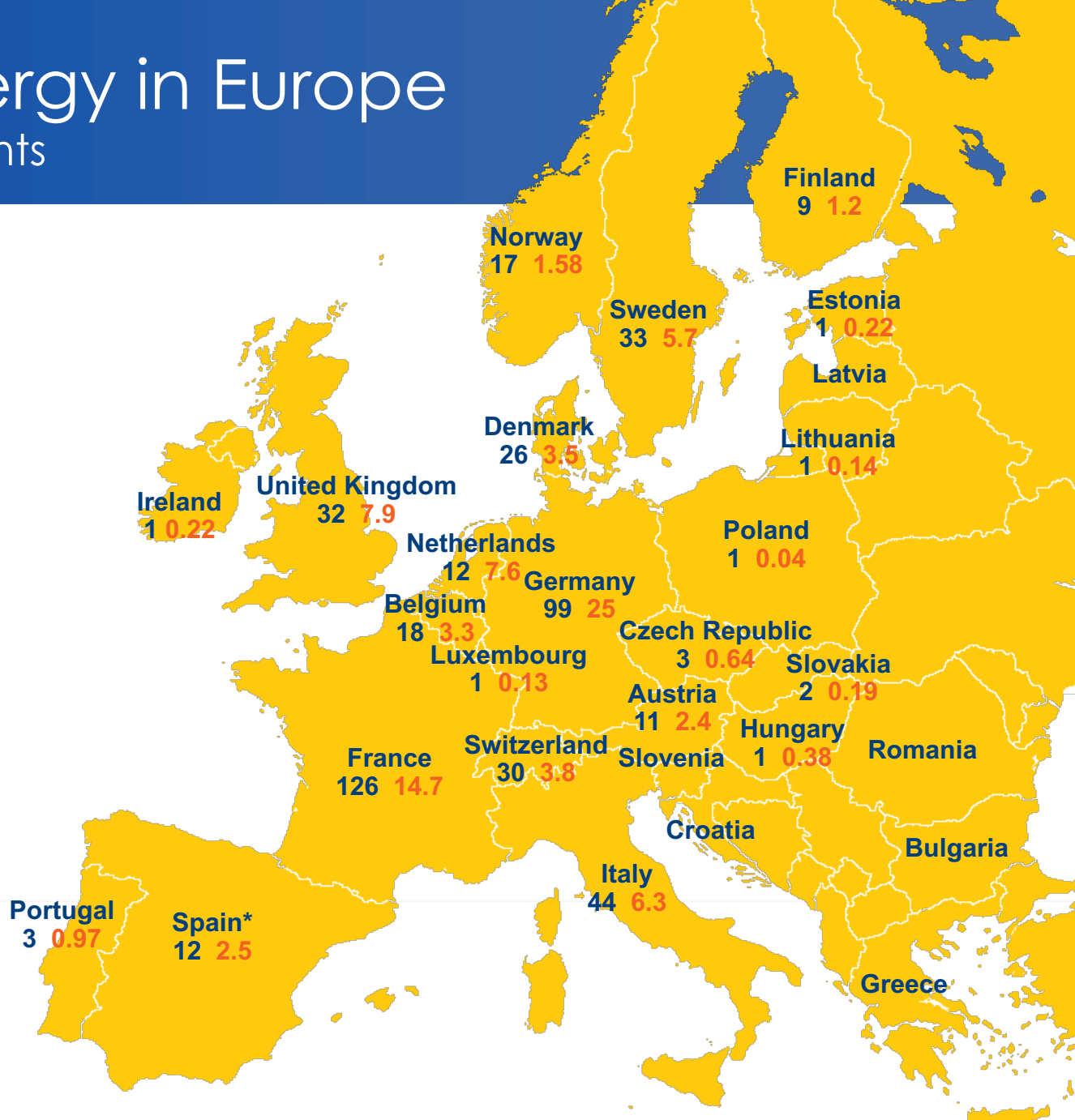
- Waste-To-Energy in Europe
 - Overview of WtE plants
 - Municipal Waste treatment
 - Municipal Waste treatment trends (EU 28)
- Circular Economy
 - EU Circular Economy Package on waste management
 - EU Circular Economy Package on secondary raw materials
 - EU Circular Economy Package Action Plan
 - Role of Waste-to-Energy
 - Waste-to-Energy Cycle
 - Waste-to-Energy Regulations
 - Question #1: why is landfill diversion important?
 - Question #2: can't everything be recycled?
 - Question #3: what about energy?
- Conclusions

Waste-to-Energy in Europe

Overview of WtE plants

Waste-to-Energy Plants
operating in Europe
(not including hazardous
waste incineration
plants)

Waste thermally treated
in Waste-to-Energy
plants in million tonnes



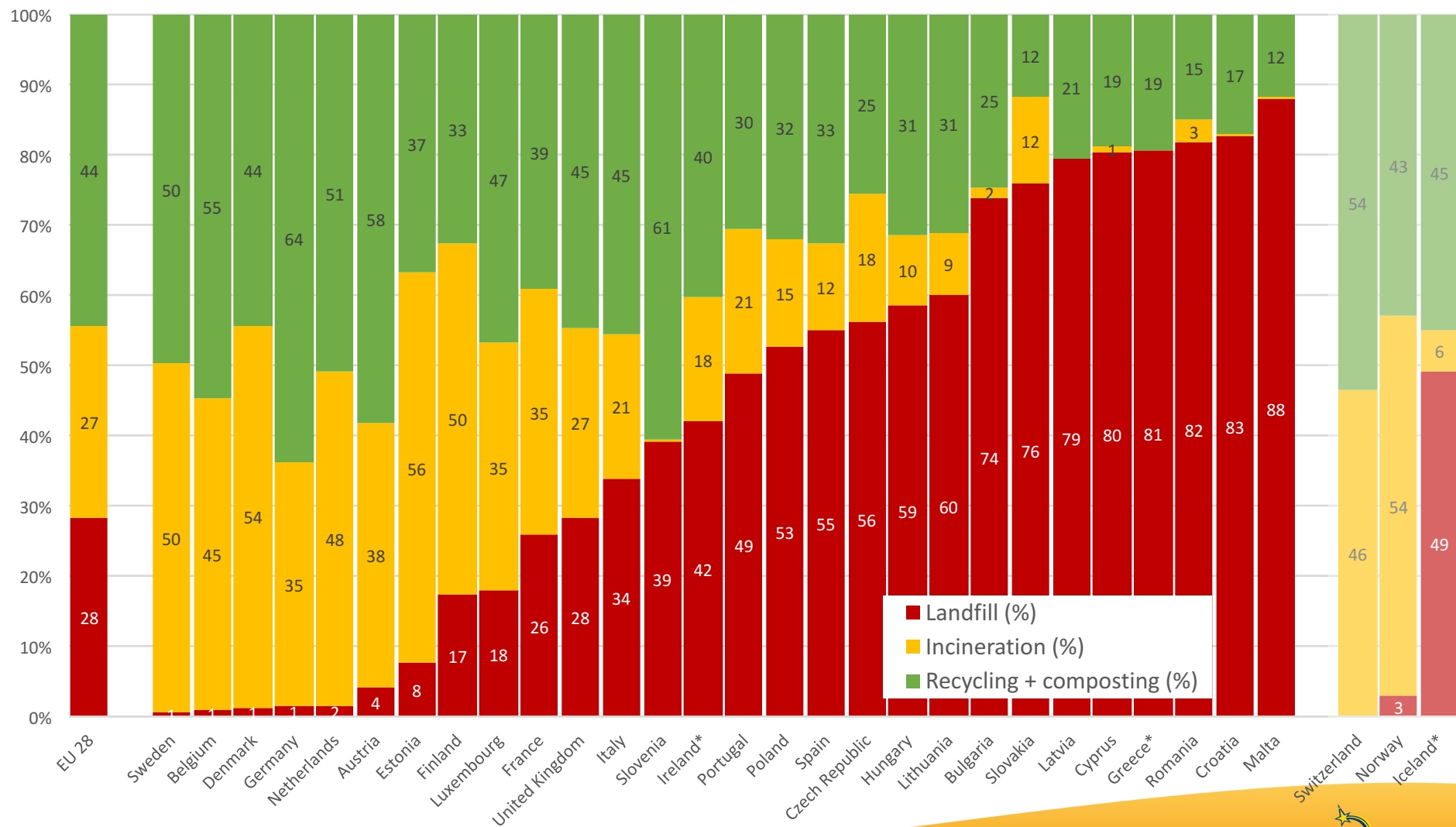
info@cewep.eu ► www.cewep.eu

Data of 2014 supplied by CEWEP members and national sources.

* Includes plant in Andorra

Waste-to-Energy in Europe

Municipal waste treatment

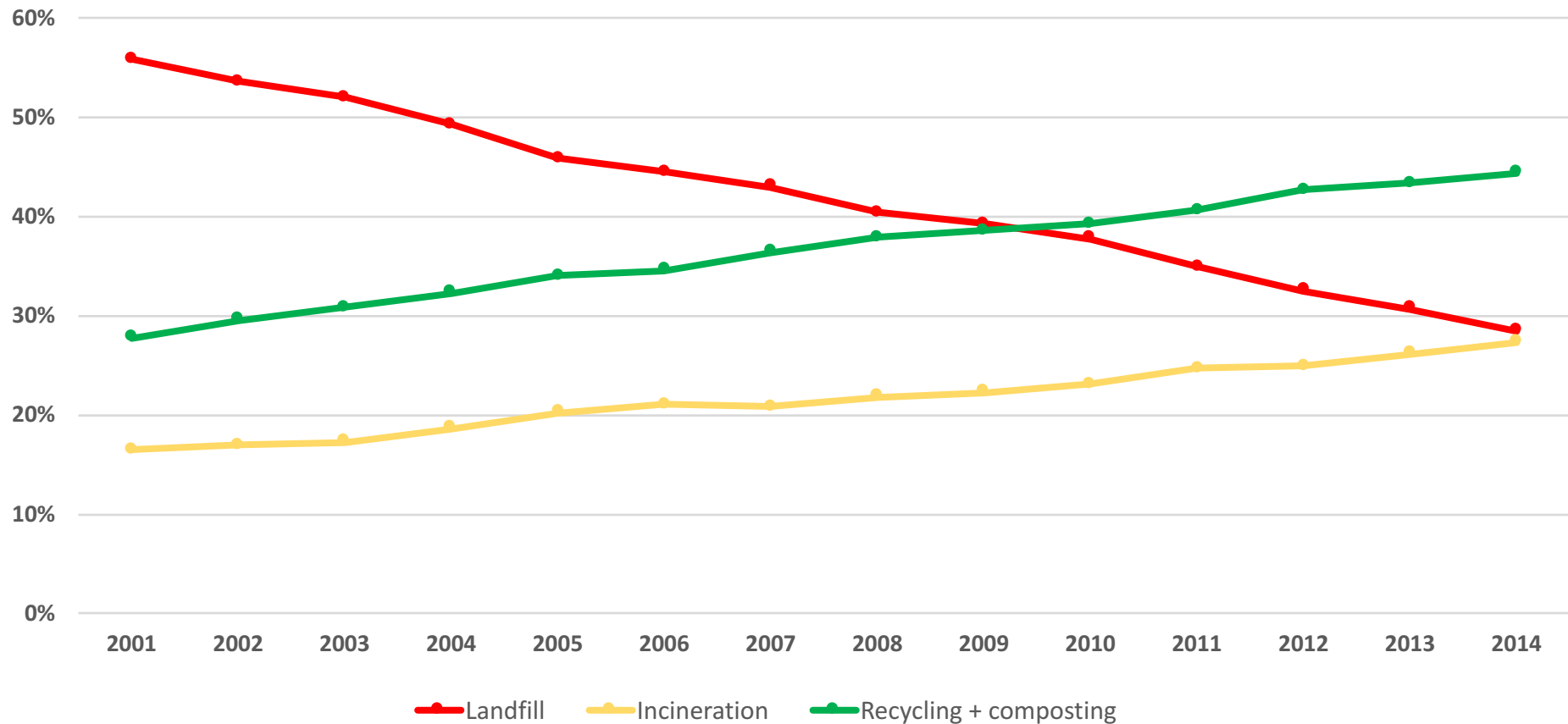


Data of 2014 supplied by EUROSTAT, graph by CEWEP.

* 2013 data

Waste-to-Energy in Europe

Municipal waste treatment trends (EU28)



Although recycling has been increasing steadily, the average European family still produces about **10 kg of residual waste every week**.

Circular Economy

EU Circular Economy Package on waste management

- General requirements for **Extended Producer Responsibility** schemes
- Simplification and **harmonisation** of definitions and calculation methods
- Long-term **recycling targets** for municipal waste, packaging waste and landfill. Municipal Waste targets: preparing for re-use and recycling:
 - Minimum 60% by weight (input) by 2025 and 65% by weight (input) for 2030.
 - Estonia, Greece, Croatia, Latvia, Malta, Romania and Slovakia may obtain five additional years to reach these targets. They have to reach 50% and 60% (by weight) by 2025 and 2030 respectively.
 - “Member States shall take the necessary measures to ensure that by 2030 the amount of MW landfilled is reduced to 10% of the total amount of MW generated”
 - Estonia, Greece, Croatia, Latvia, Malta, Romania and Slovakia may obtain 5 additional years for achieving the target. If they ask for an extension, they have to achieve 20% by 2030.
 - An early warning report will be issued 3 years before each time limit.

Circular Economy

EU Circular Economy Package on waste management

- Reporting of the recycling **targets** must be **based on the input** to the final recycling process.
- Under strict conditions, recycling rates can be reported on the basis of the output of sorting facilities.
- For the purpose of calculating the targets Member States may take into account the **recycling of metals** that takes place in conjunction with incineration in proportion to the share of the municipal waste incinerated provided that the recycled metals meet certain quality requirements.
- A common methodology for this calculation will be adopted in a delegated act.



1 tonne of bottom ash contains between **10-15% metals**, including 15 to 20kg of aluminium

Circular Economy

EU Circular Economy Package on waste management

A **new definition of Municipal Waste** is proposed:

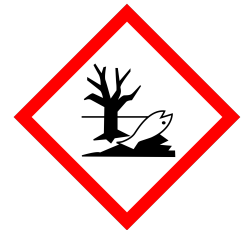
- Mixed waste and separately collected waste from **households** including:
 - Paper and cardboard, glass, metals, plastics, bio-waste, wood, textiles, waste electrical and electronic equipment, waste batteries and accumulators
 - Bulky waste, including white goods, mattresses, furniture
 - Garden waste, including leaves, grass clipping
- Mixed waste and separately collected waste from **other sources** that is **comparable to household** waste in nature, composition and quantity
- **Market cleansing waste and waste from street cleaning services**, including street sweepings, the content of litter containers, waste from park and garden maintenance.

Municipal waste does not include waste from sewage network and treatment, including sewage sludge and construction and demolition waste.

Circular Economy

EU Circular Economy Package on secondary raw materials

- **Priority areas:** plastics, food waste, critical raw materials, construction and demolition waste, biomass and bio-based products
- Work on **quality standards** for secondary raw materials (in particular for plastics).
- Revision of the EU regulation on **fertilisers** - recognition of organic and waste-based fertilisers in the single market
- Analysis and options on **the interface between chemicals, products and waste legislation**, including on how to promote non-toxic cycles and improve the tracking of chemicals of concern in products.



Circular Economy

EU Circular Economy Package Action plan



Dec 2015

Proposal adopted by European Commission

Now

Discussion – amendements:
European Parliament (EP)
Council of the European Union

Beginning 2017

Adoption by EP and Council –
Maltase Presidency

2017 & beyond

Transposition by Member States

Circular Economy

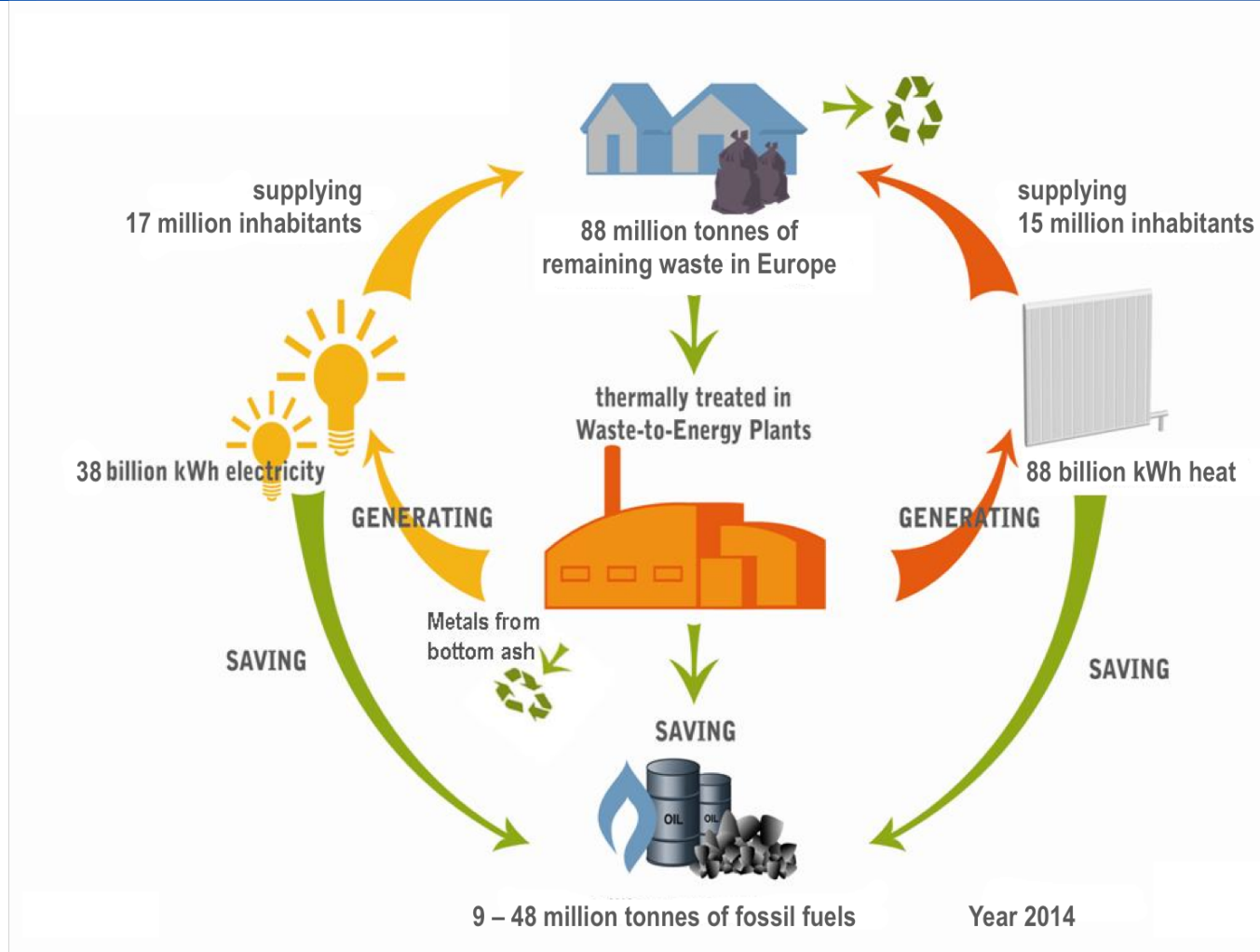
Role of Waste-to-Energy

- EU circular economy model for materials aims at avoiding waste and, if not possible, at reusing or recycling.
- Residual waste: too polluted or material of poor quality after having been recycled several times.



Circular Economy

Waste-to-Energy Cycle



Circular Economy

Waste-to-Energy Regulations

Waste-to-Energy Plants are equipped with **sophisticated filtering devices** to deal with the pollutants that are in the waste and minimise emissions into the atmosphere.

*“Directive 2000/76/EC on the incineration of waste makes the incineration of waste **one of the most stringently regulated and controlled industrial activities.**”*

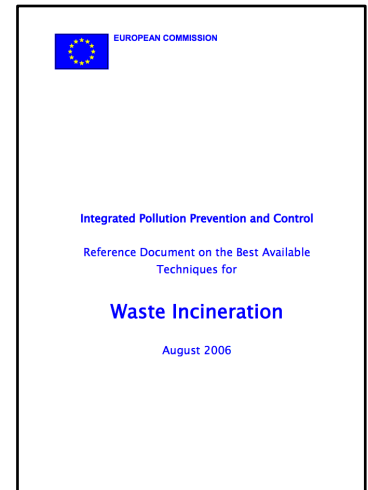
Answer given by Mr. Potočník, Environment Commissioner,
to a Parliamentary Question on 10th June 2010

Circular Economy

Waste-to-Energy Regulations

To guarantee the lowest environmental impact of Waste-to-Energy technologies, the future requirements will be based on the findings of **the Waste Incineration Best available techniques REFERENCE document (WI BREF)**.

The WI BREF will contain requirements on emissions energy, residues, general management, etc...



To know more: <http://eippcb.jrc.ec.europa.eu/reference/wi.html>

Circular Economy

Question #1: why is landfill diversion important?

In order to :

- Avoid the **emission of methane** - a potent greenhouse gas (equal to 25 times CO₂ in mass)
- **Protection** of soil and groundwater from contamination
- Harness the **energy** content of residual waste
- **Preservation** of natural resources
- **Save space** (Waste-to-Energy reduces the volume of waste by 90%)



This is why the EU should take an ambitious approach and phase out landfilling as much and as soon as possible

Circular Economy

Question #2: can't everything be recycled?

- New recycled materials depend on the **quality** of the sorted waste:
 - Materials too dirty or too contaminated (e.g. vacuum-cleaning bags)
 - Mixed materials (too difficult/expensive to sort)
 - Materials degrade after repeated recycling
 - Demand necessary for recycled products
 - If high quality recycling is not possible
 - the waste should be turned into energy
 - rather than being landfilled
- **Residues from recycling also often need thermal treatment**

Even countries with the highest recycling rates in Europe (e.g. Austria, Belgium, Germany and the Netherlands) depend on WtE to treat remaining waste not suitable for recycling.

Circular Economy

Question #3: what about energy?

WtE helps to divert waste from landfills, contributing to the waste targets. And by treating the waste that is not suitable for quality recycling and producing energy from it, it helps to make Europe less dependent on fossil fuel imports and contributes to security of energy supply, a major goal of the Energy Union policy.



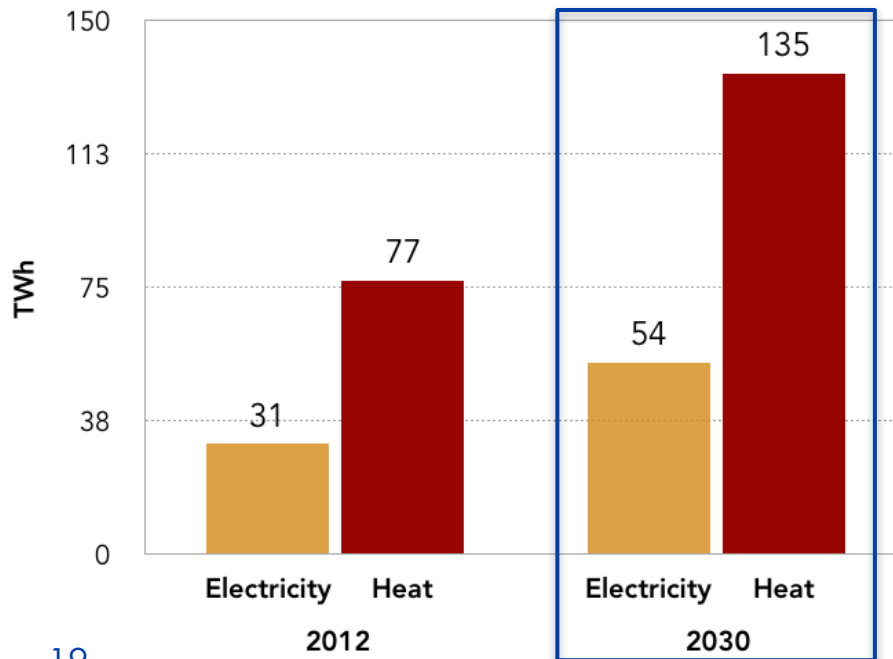
Circular Economy

Question #3: what about energy?

Based on Circular Economy targets for MW:

- Reuse + Recycling: **65%** by 2030
- Landfill: maximum **10%** by 2030
- Remaining MW to WtE + residual Commercial&Industrial (C&I) waste

2030 Energy potential for WtE in EU28 based on Circular Economy targets



Potentially producing **189 TWh** of secure energy from MW and C&I waste

Which would replace 10% of the energy supplied by the coal sector*

Circular Economy

Question #3: what about energy?

- In Europe recovered energy from waste for District Heating systems represents 50 TWh per year, i.e. around 10% of the total heat delivered through DH systems.*
- Studies suggest that the potential for using heat from waste in Europe equals to **200 TWh per year by 2050**.**
- Energy represents 80% of the total variable costs for the production of AkzoNobel Industrial Chemicals. The WtE plant of Twence, in the Netherlands, supplies steam to AkzoNobel's salt-production plant. 1.5 km steam pipeline delivers 838,000 tonnes of steam per year which helps to reduce consumption of natural gas by 80 million m³ per year.

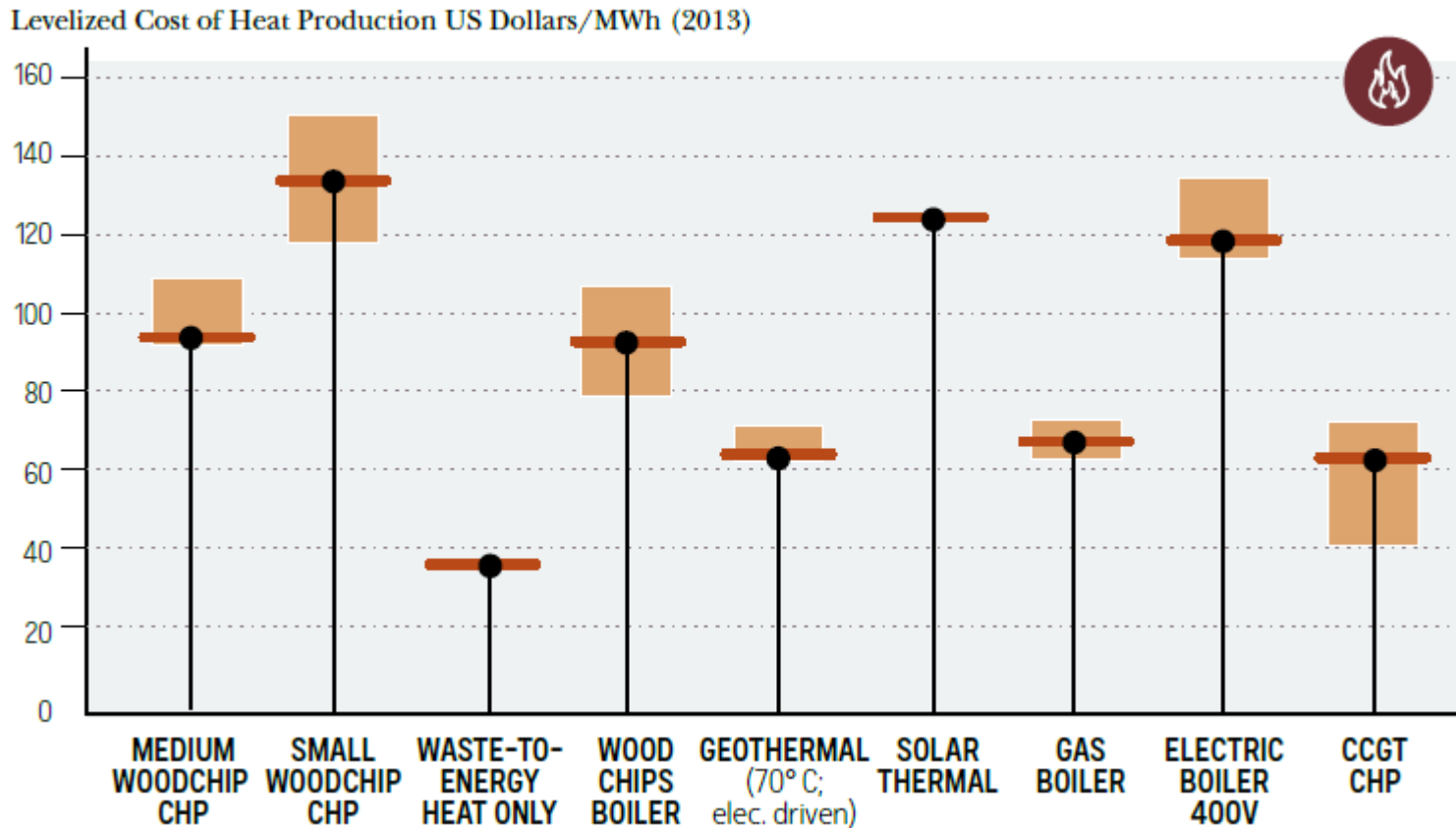
*Heat Roadmap Europe 2050 (Second pre-study for the EU27), May 2013

**Warmth from Waste: A Win-Win Synergy, April 2014

Circular Economy

Question #3: what about energy?

Comparative costs of district heating sources



Conclusions

The following topics should be tackled as key priorities for a full Circular Economy:

- **Minimising landfilling** of waste (municipal but also other waste) and **maximising the use of waste as a resource**
- Developing **clear definitions and monitoring**
- **Tackling Quality Recycling** - Only a Clean Circular Economy is a good Circular Economy
- Uniting the Circular Economy and Energy Union goals – taking a **holistic approach**

CEWEP

For more information

CEWEP

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European Waste-to-Energy Plants

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