European Commission

Waste Management:
Science steering EU waste management policies

Hans Saveyn
Joint Research Centre
The European Commission's in-house science service

www.jrc.ec.europa.eu

Serving society
Stimulating innovation
Supporting legislation

WTO Environmental Technology
Dissemination Workshop
Geneva 12 November 2012

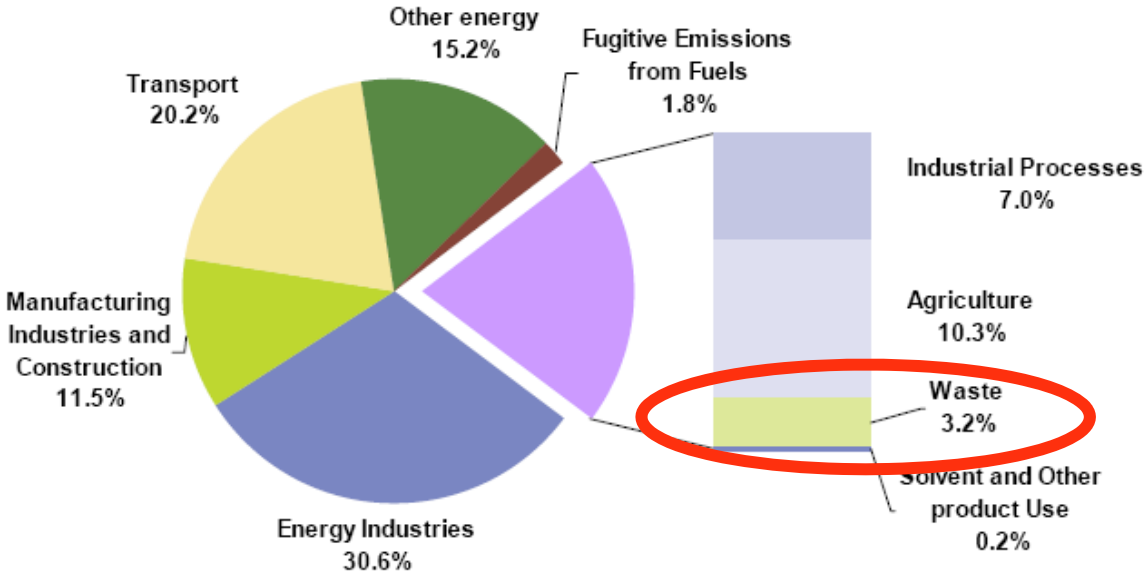
Waste management driving forces

- Environmental concerns
- Market forces
- Legislation
- Technological and scientific development

Waste management:
Decoupling environment from economic growth

Appreciable environmental impacts from waste management in EU-27

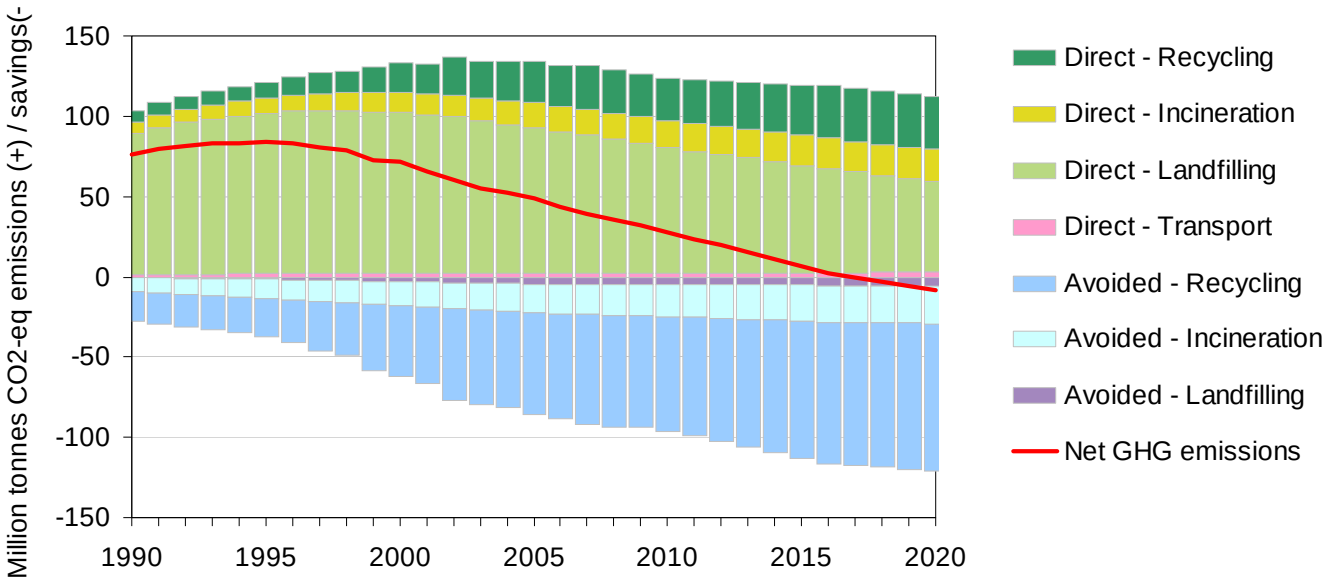
- Total greenhouse gas (GHG) emissions in 2009: 4600 Mt CO_2-eq
- Waste management sector: 147 Mt CO_2-eq or **3.2% of total GHG**



Source: EEA, also available at Eurostat (online data code: tsdcc210)

Waste management:
Decoupling environment from economic growth

- Municipal solid waste (MSW) sector is one of the few sectors reducing emissions, realizing a **reduction of 35%** over the period 1990-2008
- MSW sector is expected to **become GHG neutral** by further savings from recycling, but even offers potential for becoming GHG negative by advancing waste treatment technology



European Commission

Waste management:
EU waste policy in a changing economic landscape

- Pioneering EU Directives for key waste streams

Directive on	Year of first adoption
Packaging waste	1994
End of life vehicles	2000
Waste electrical and electronic equipment	2002

Main elements:

- Obligations to collect waste separately
- Prescription of environmentally friendly treatment
- Quantitative targets for recovery and recycling
- Financial responsibility of the producers for the end of life management of their products (aiming to incentivise ecodesign)

Created at a time when diverting these wastes from disposal was still the main aim and collecting and recycling often implied high net costs.

Joint Research Centre

Waste management:
EU waste policy in a changing economic landscape

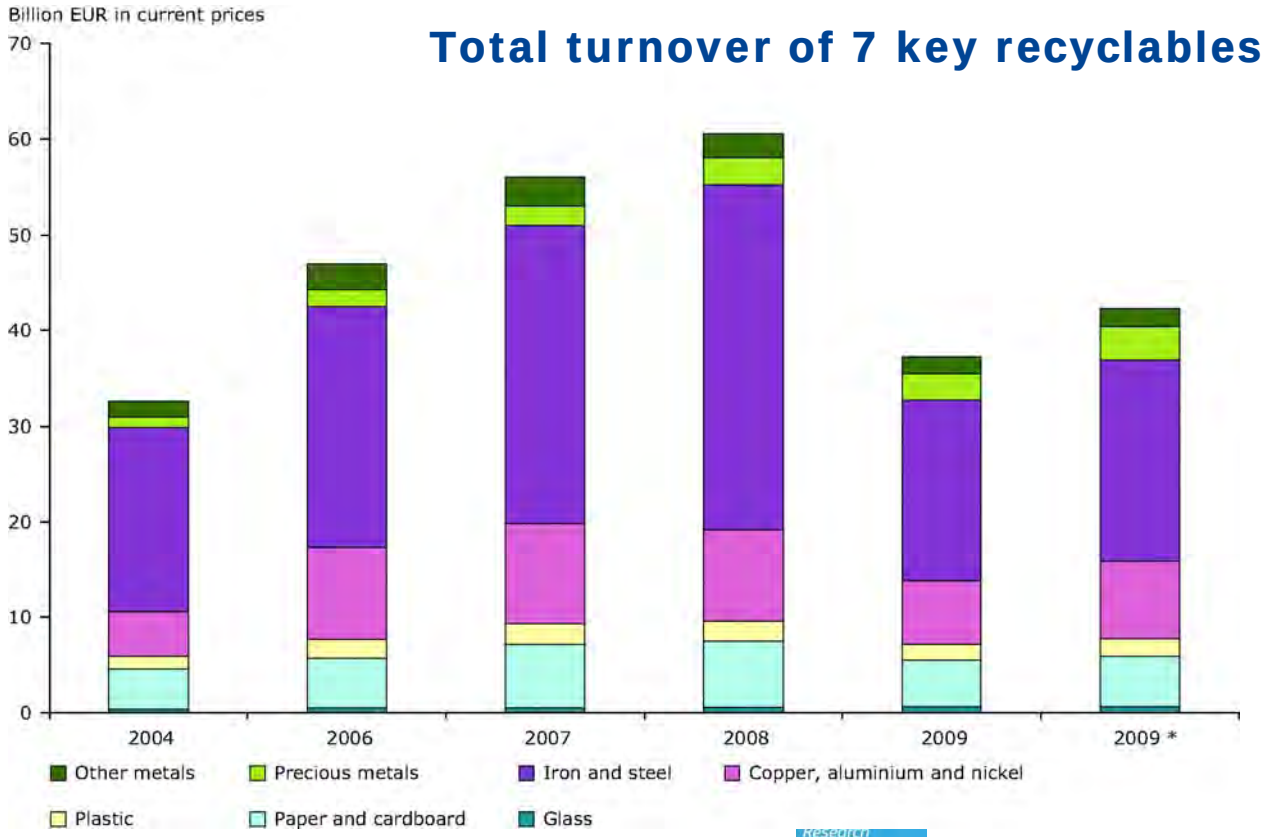
- Waste management featured by high costs but also high possible revenue

Municipal solid waste (MSW) and waste electronic and electrical equiment (WEEE) illustrative examples

Yearly costs of collecting and landfilling MSW in the EU	**12.500 MEUR**
EU-27 population	500 million
MSW generated per capita and year	500 kg
Percentage of MSW landfilled	38 % (68% in 1995)
Cost of collecting and landfilling a ton of MSW *Calculation approximates 2004 situation, direct costs without externalities, taxes or subsidies*	100 EUR
Yearly costs of WEEE collection and treatment	**~ 3.500 MEUR**

Waste management:
EU waste policy in a changing economic landscape

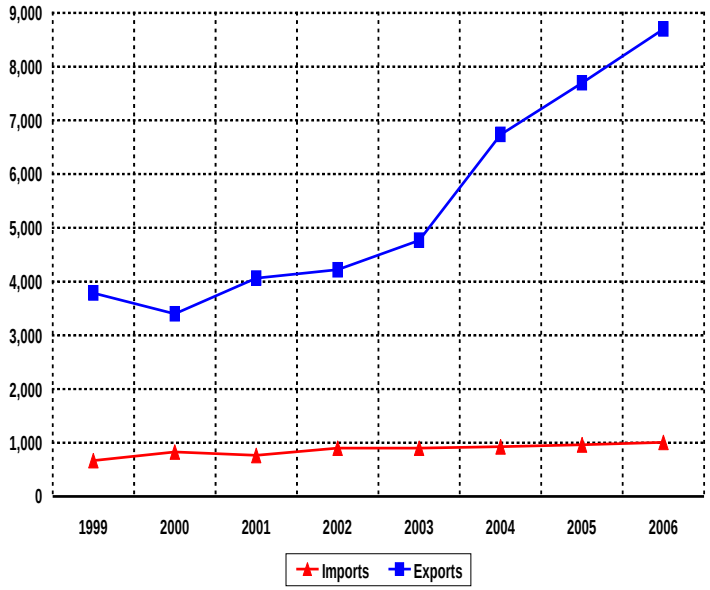
Waste management featured by high costs but also high possible revenue

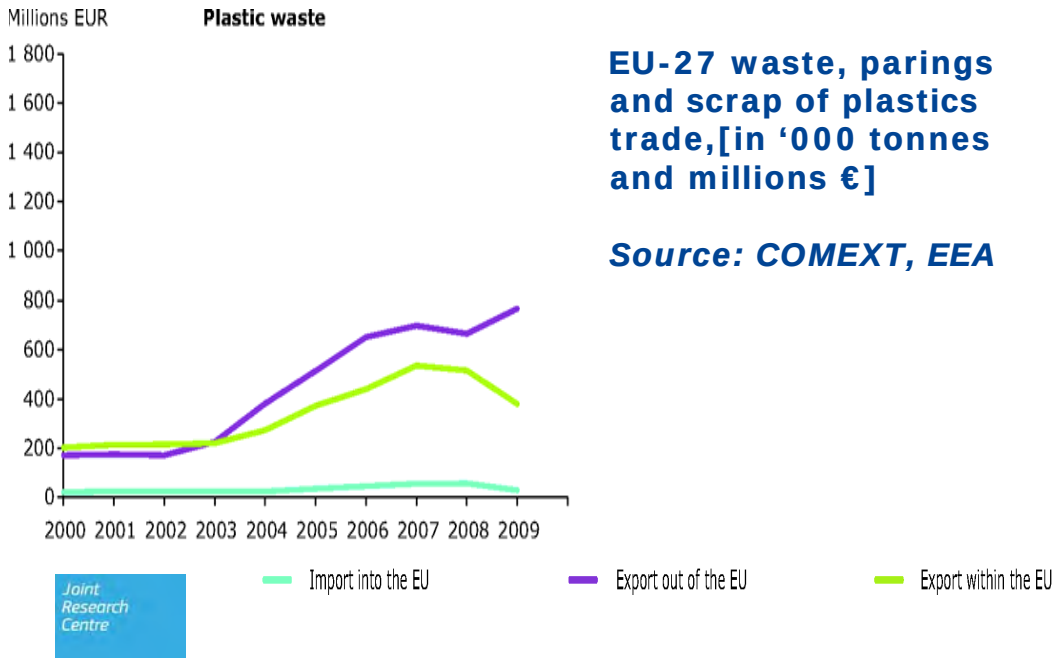


Recycling has the fastest growth rate amongst the largest eco-industry subsector, 17 % annual increase rate in 2004-08

Waste management:
EU waste policy in a changing economic landscape

- Treatment technologies and markets for waste develop rapidly
  - Raw material prices are rising
  - Recycling has become a global business
  - Recovered materials are traded internationally
  - More efficient processing and recycling technologies have been developed
  - For an increasing number of waste streams the break-even can be reached and the revenues of recycling outweigh the costs





EU-27 waste, parings and scrap of plastics trade,[in '000 tonnes and millions €]

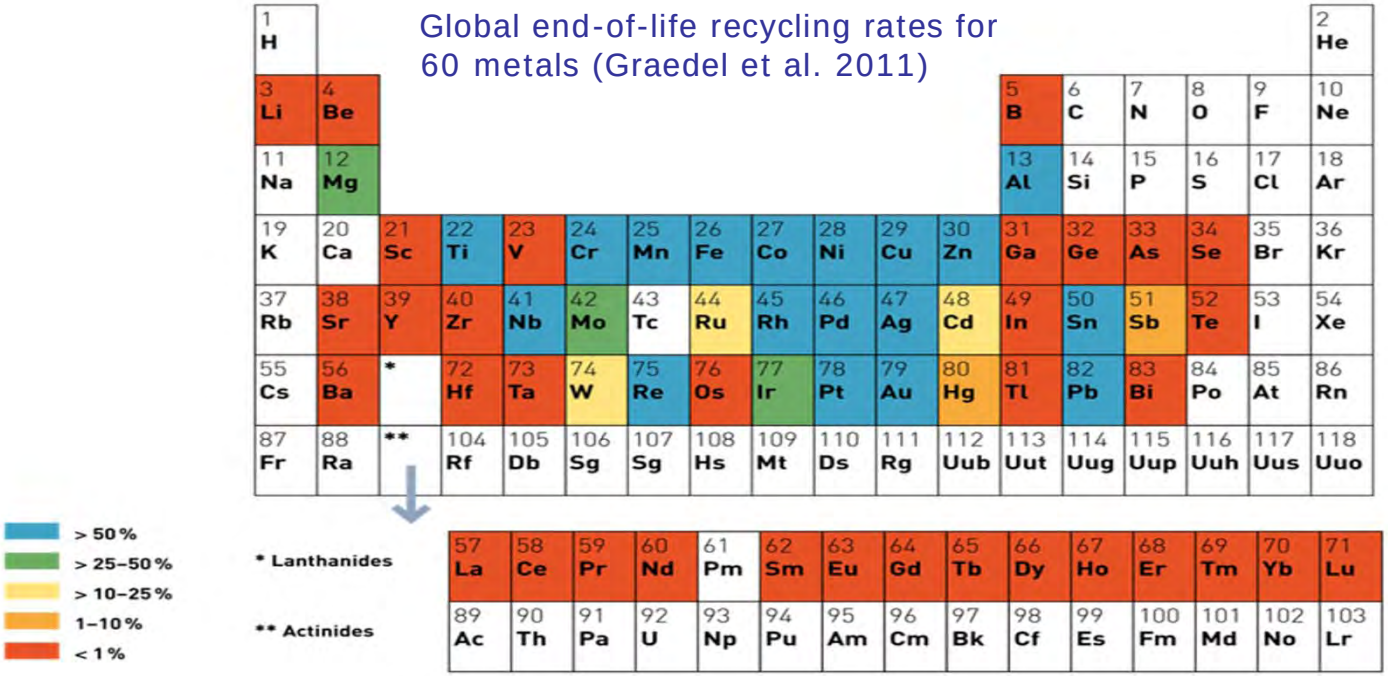
Source: COMEXT, EEA

European Commission

Waste management:
EU waste policy in a changing economic landscape

There is still room to increase recycling rates of key materials, in particular critical materials for emerging technologies

Global end-of-life recycling rates for 60 metals (Graedel et al. 2011)



Joint Research Centre

European Commission

Waste management:
New policy relies on applied science and research

Research needed to answer how to adjust frameworks and incentives for recycling in the global economy

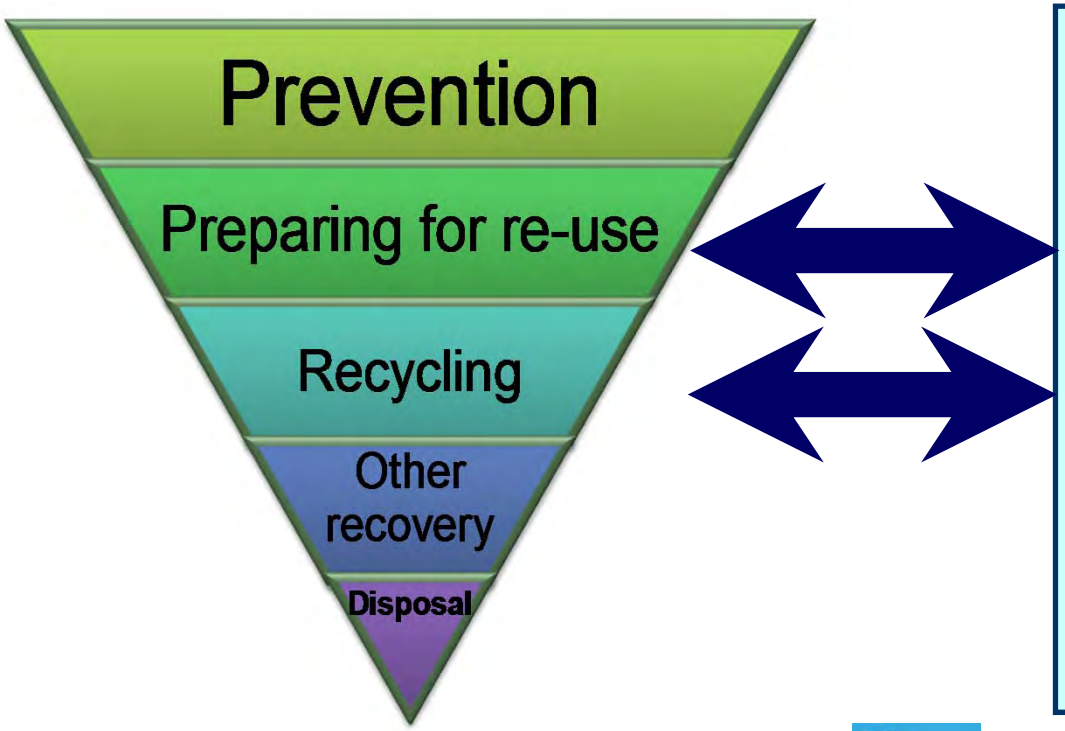
- Which frameworks and incentives will allow to reap the benefits of recycling for sustainable growth in the EU? How can we get the most out of waste for the European economy and for the environment?
- More **data and analysis** needed to understand correctly:
  - How can deregulation (e.g. end of waste) make recycling markets work better, contributing to growth in the EU and reducing the global environmental impacts?
  - Where in the product life cycle and recycling chain incentives are more eficient?
  - What role can product ecodesign requirements regarding recycled content or recyclability play?
  - What is the most efficient role of producers, households, waste collectors, processors, recyclers?
  - Which is the potential of consumer oriented measures to reduce waste generation?
  - How is shared the cost of the treatment of waste streams?
  - How are distributed the benefits from recycling?

Joint Research Centre

Waste management:
New policy relies on applied science and research

New Waste Framework Directive (2008/98/EC) calls for applied science and research

- Waste treatment may depart from waste hierarchy by **Life Cycle Thinking** (Article 4)

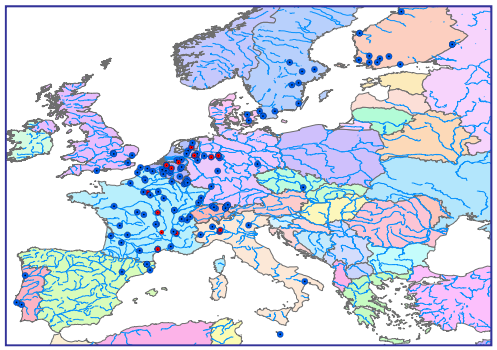


*"Member States shall take measures to encourage the options that deliver the **best overall environmental outcome**. This may require specific waste streams **departing the hierarchy** where this is **justified by life-cycle thinking** on the overall impacts of the generation and management of such waste"*

Waste management:
New policy relies on applied science and research

New Waste Framework Directive (2008/98/EC) calls for applied science and research

- **End-of-waste concept** (EoW): stimulate recycling markets by releasing valuable resources from waste status (Article 6)
- Based on a set of criteria that may include pollutant limit values
- Example: on-going study on EoW criteria for **biodegradable waste** (recycling potential of 80 Mtonne/year in EU-27 into compost or digestate)
  - Pollutant limit values need to be based on standard measurement methods
  - Determination of suitability of input materials and technologies for EoW should be based on recent and independent data, gathered in a uniform way, therefore a pan-European sampling and analysis campaign was carried out by JRC to assess quality of compost and digestate derived from different technologies (publication in 2012)



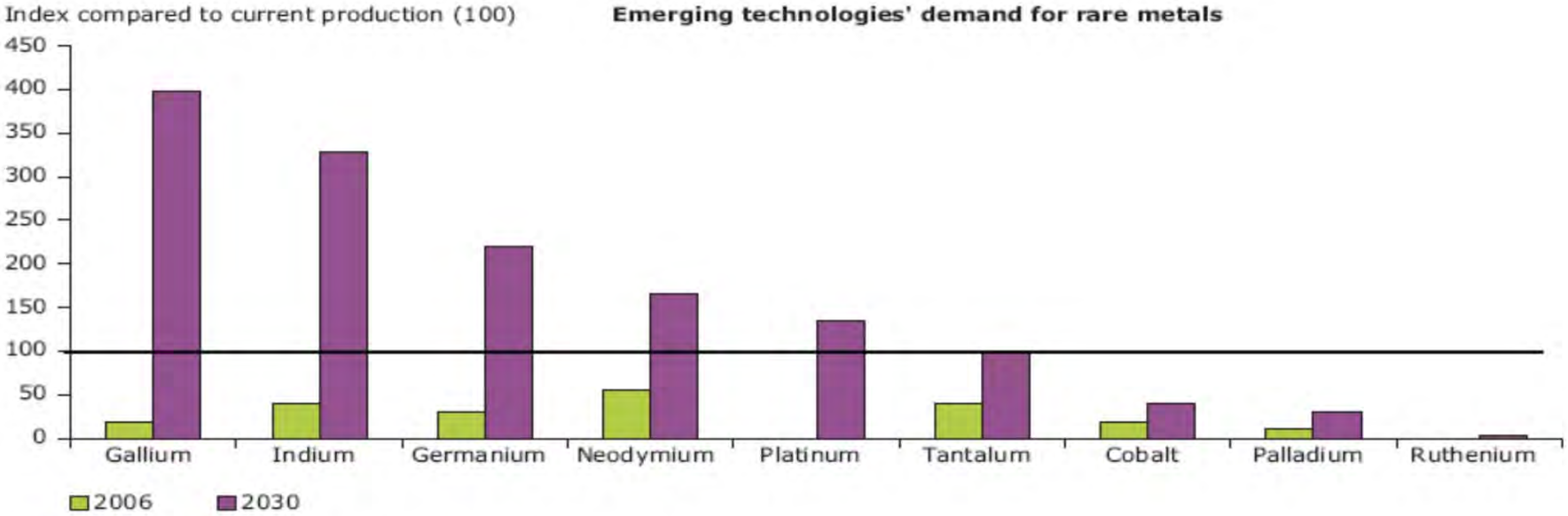
Key features:

- 120 plants sampled throughout EU
- 10 bio-waste types
- Analysed for heavy metals, industrial chemicals, personal care product ingredients, pharmaceuticals, pesticides, etc.

Waste management:
New policy relies on applied science and research

Critical raw materials listed by Commission Report (June 2010)

- 14 critical materials listed, based on supply risks and environmental country risk
  - Some critical for emerging technologies such as renewable energy systems and IT
  - Scarcity may jeopardise future economic and technological development in EU
  - Urban mining research challenge: development of new recycling technologies needed to safeguard material input to EU industry



Source: Based on ISI/IZT, 2009; and Elsner et al., 2010.

European Commission

Conclusions

- Waste management has a considerable environmental impact, but at the same time can help decouple the environment from economic growth
- Waste policy has helped stimulating the development of technology and markets in the waste management and recycling sectors
- Applied science and research is key to further increase the environmental and economic benefits from waste management :
  - Develop policy tools to unlock new benefits from recycling and waste management by state-of-the-art research on the mechanisms of the waste management sector
  - Scientific decision making tools such as Life Cycle Thinking used by authorities to optimize environmental benefits from waste management
  - New waste legislation requires standardized measurement methods as well as independent and uniform scientific data to set pollutant limits and assess waste management technologies
  - Technological developments are needed to optimize material supply from waste, especially for critical materials. The potential of policy instruments in this respect should be carefully assessed

Joint Research Centre

Further info

EC Reports and activity updates on Waste

Joint Research Centre-IPTS:

http://susproc.jrc.ec.europa.eu/activities/waste/index.html

DG Environment:

http://ec.europa.eu/environment/waste/index.htm