

# Phosphorus use in Europe

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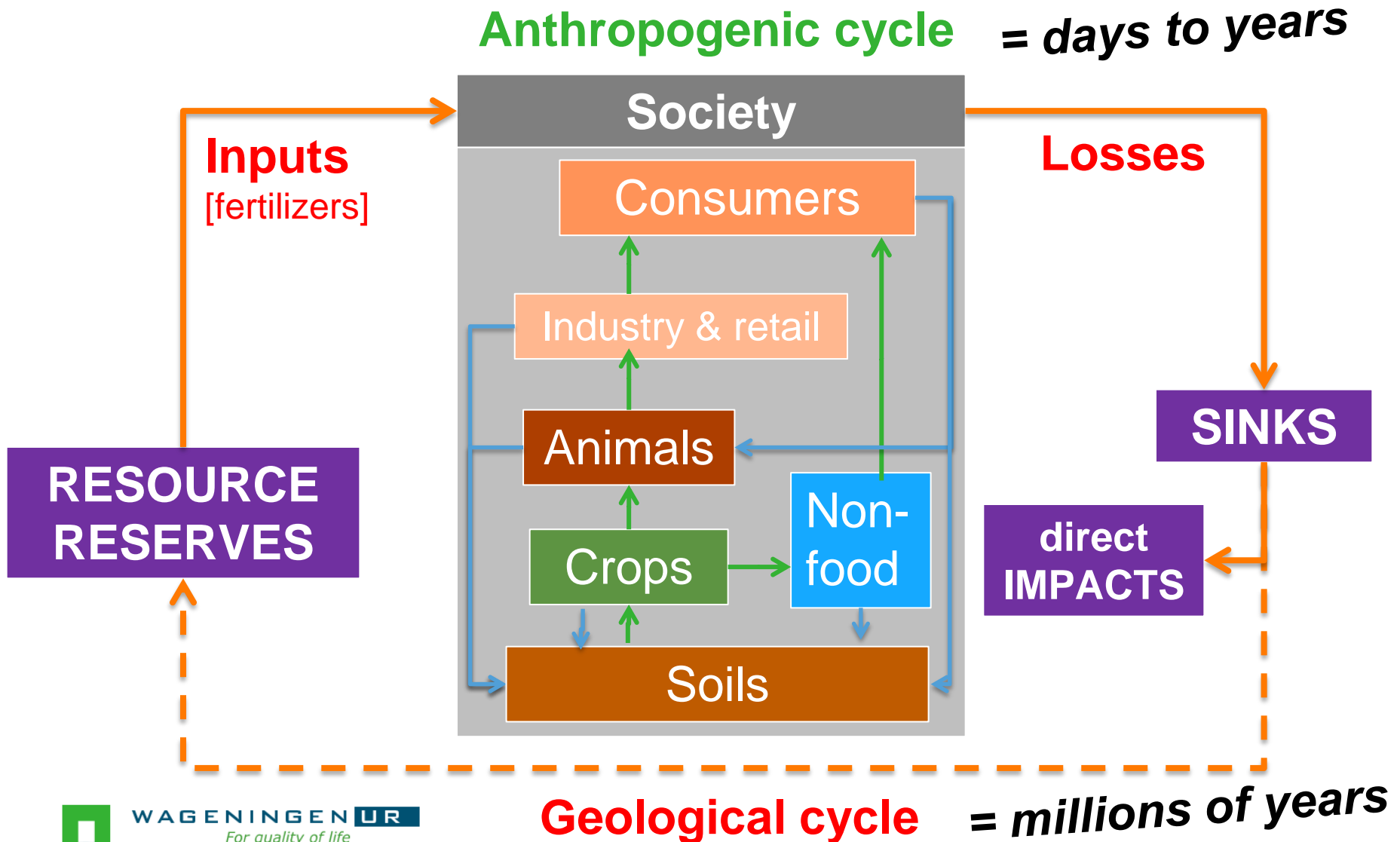
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# Outline

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- Introduction: short versus long-term P cycling
- P cycling in the food chain in EU-27
- P inputs, balances and losses in EU-27 Member States
- Summary & conclusions

# Geological versus anthropogenic cycle



# Phosphorus use in the EU-27 in 2005

## Input

Flows and stocks in Gg = Mkg = kton P per year

## Output

Non-food materials & detergents

130

Crops & food products

625

Animal feed & P additives

417

Mineral P fertilizer

1,487

Human consumption

39

272

Non-food production

14

51

14

32

Food processing & retail

39

536

637

Animal production

162

33

828

1,966

1,730

Crop production

Soil [150,000]

691

Solid & liquid organic wastes

17

Non-food export

53

Organic wastes

542

Crop & food export

275

Organic residues & wastes

31

Manure export

67

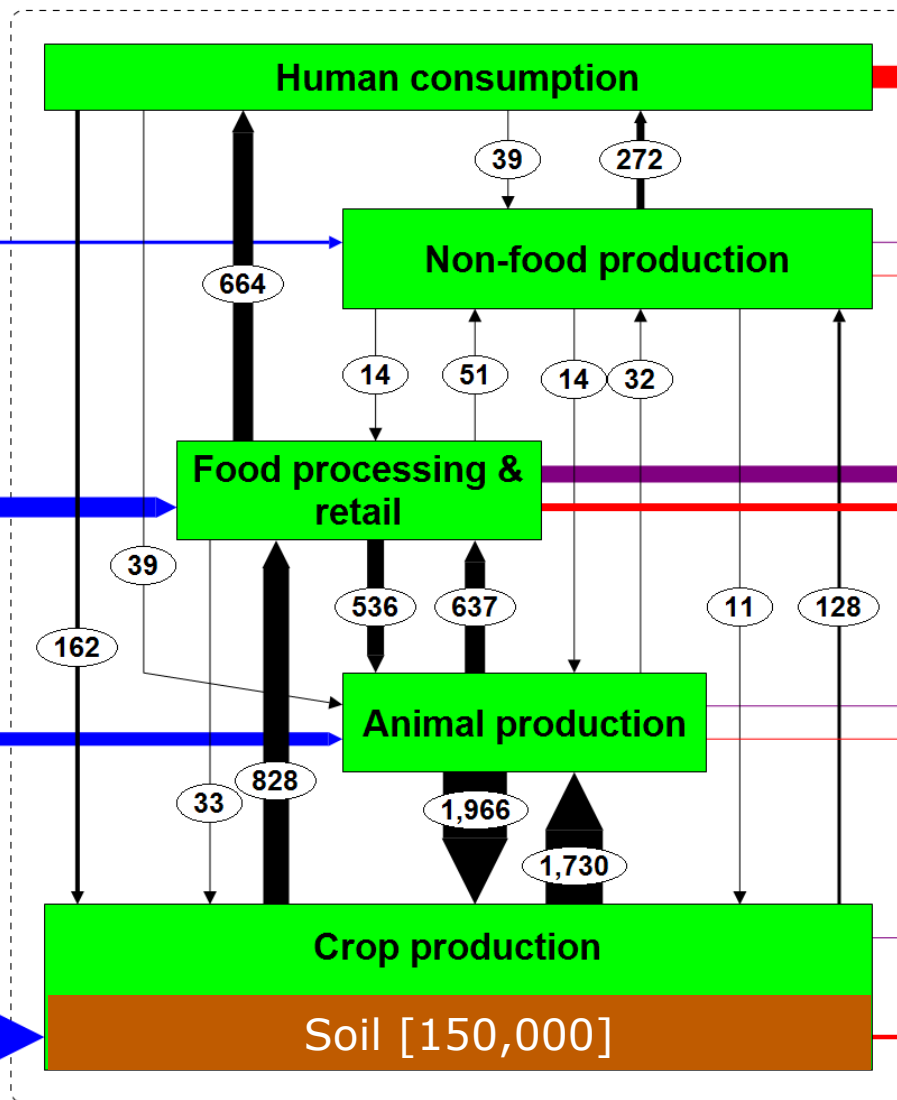
Manure losses

2

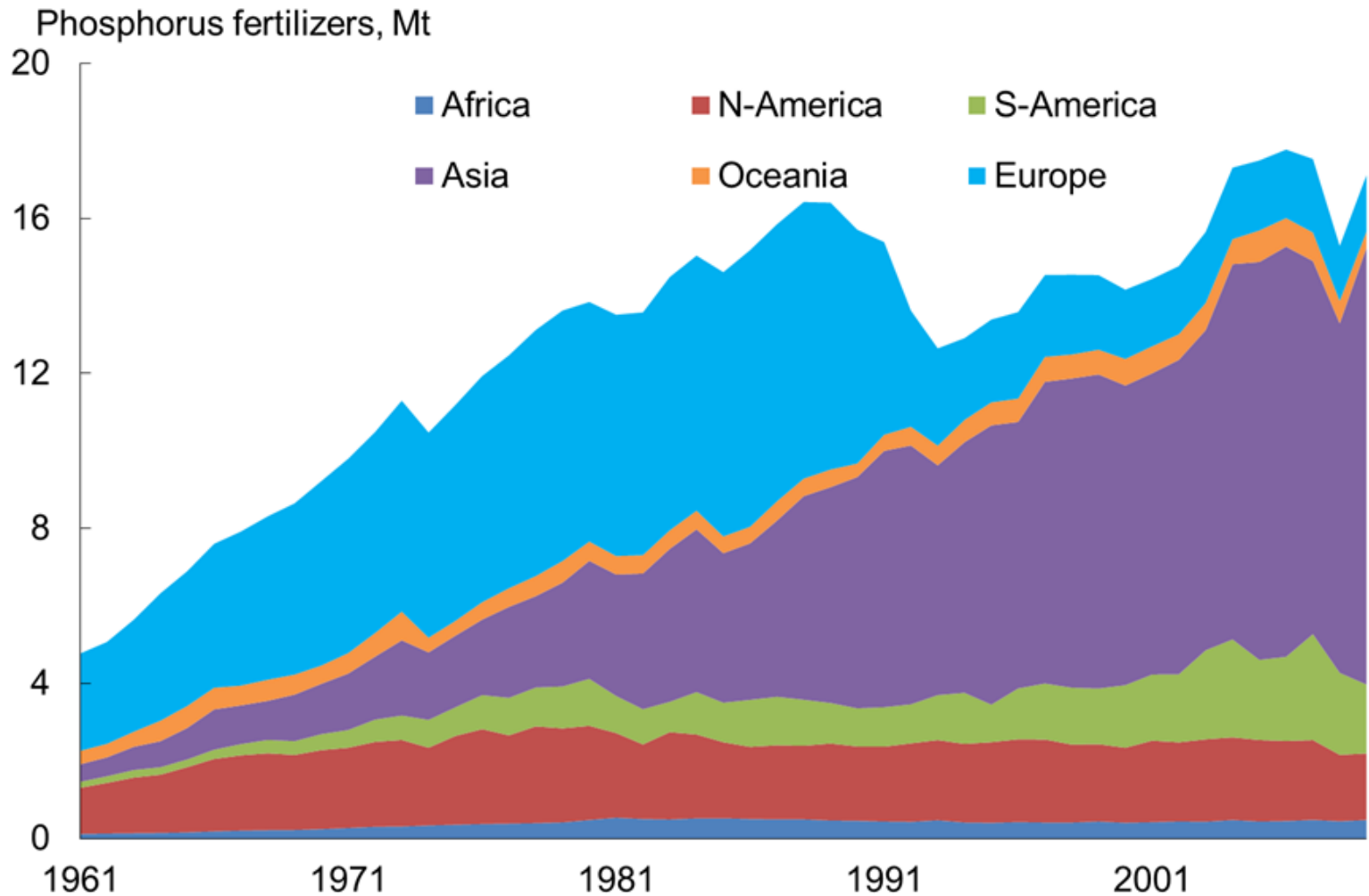
Seed export

164

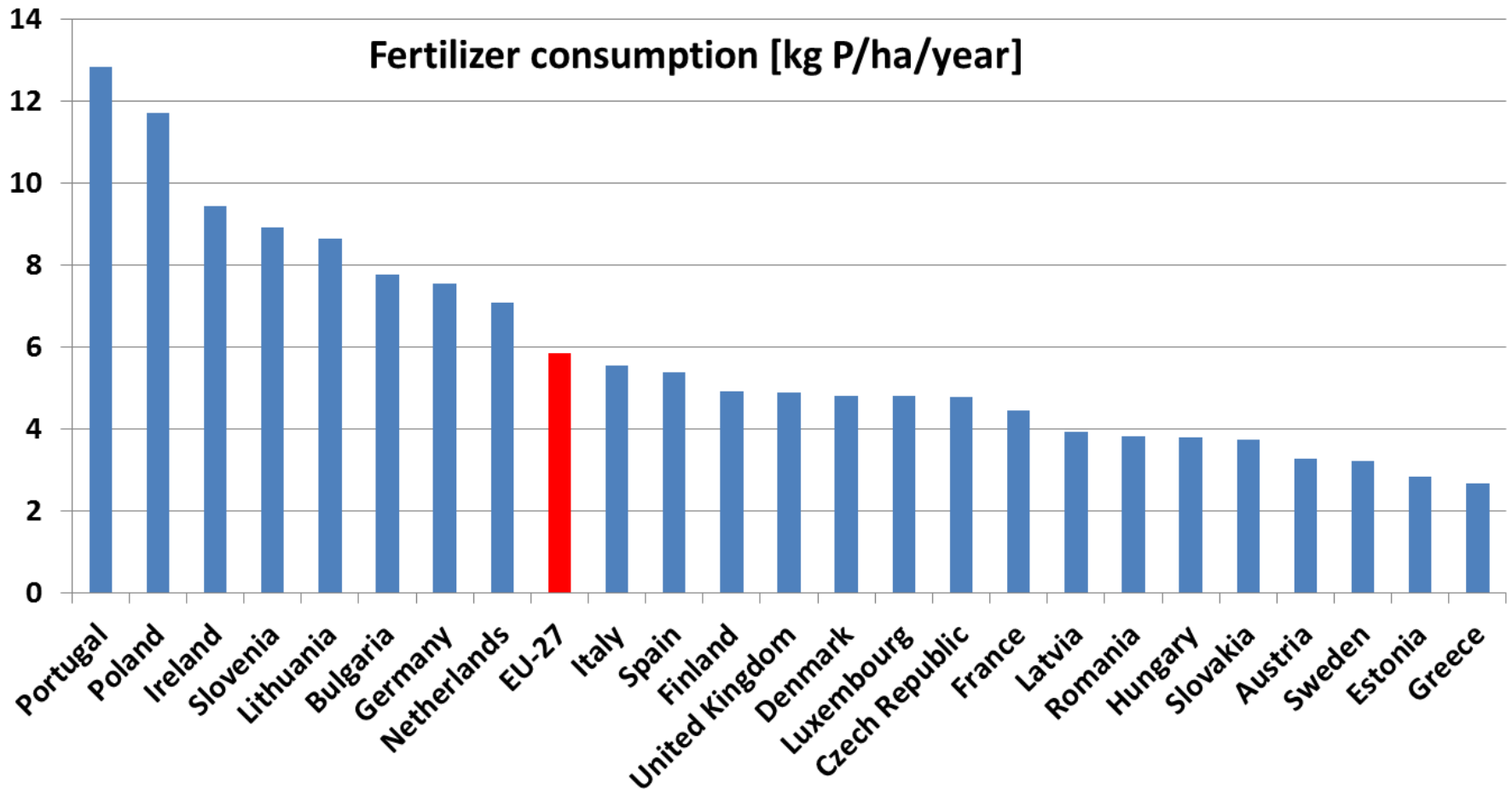
Leaching & runoff



# Global fertilizer P consumption 1961-2010

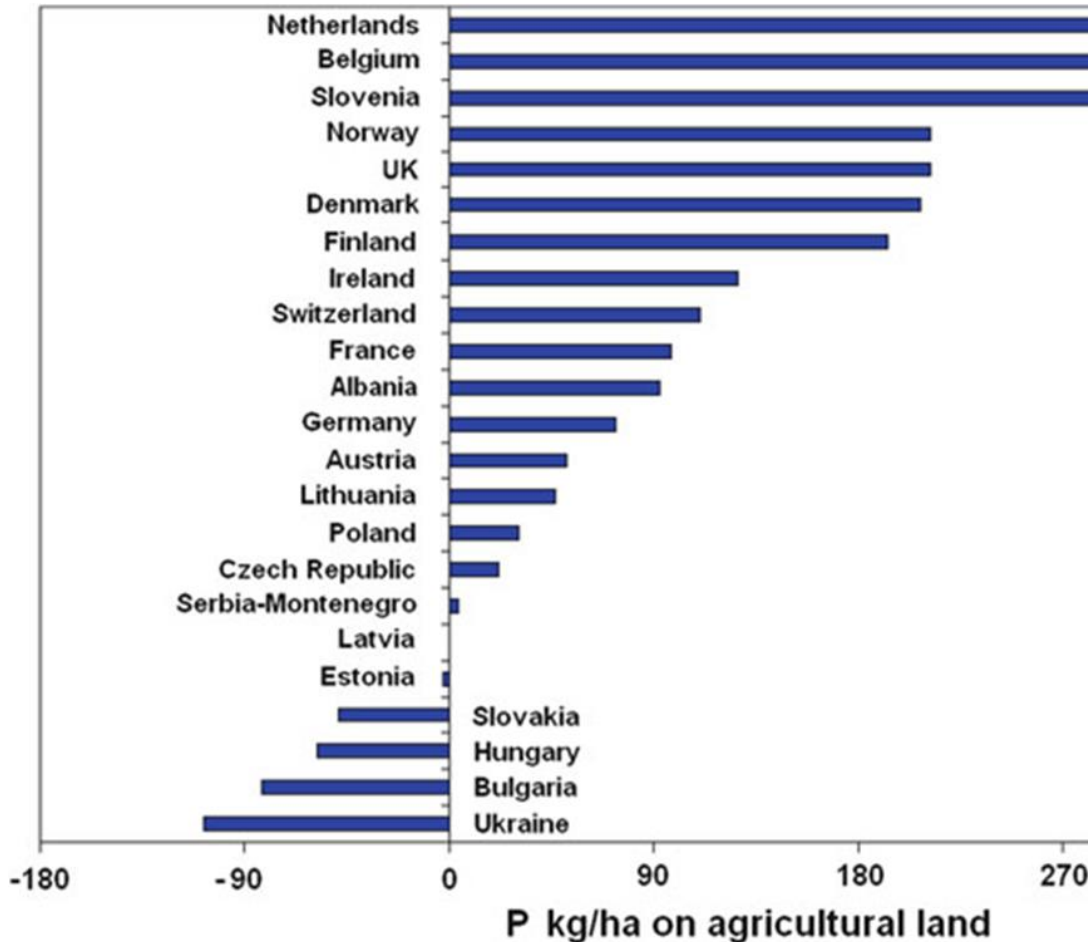


# Fertilizer P consumption in EU-27 in 2010



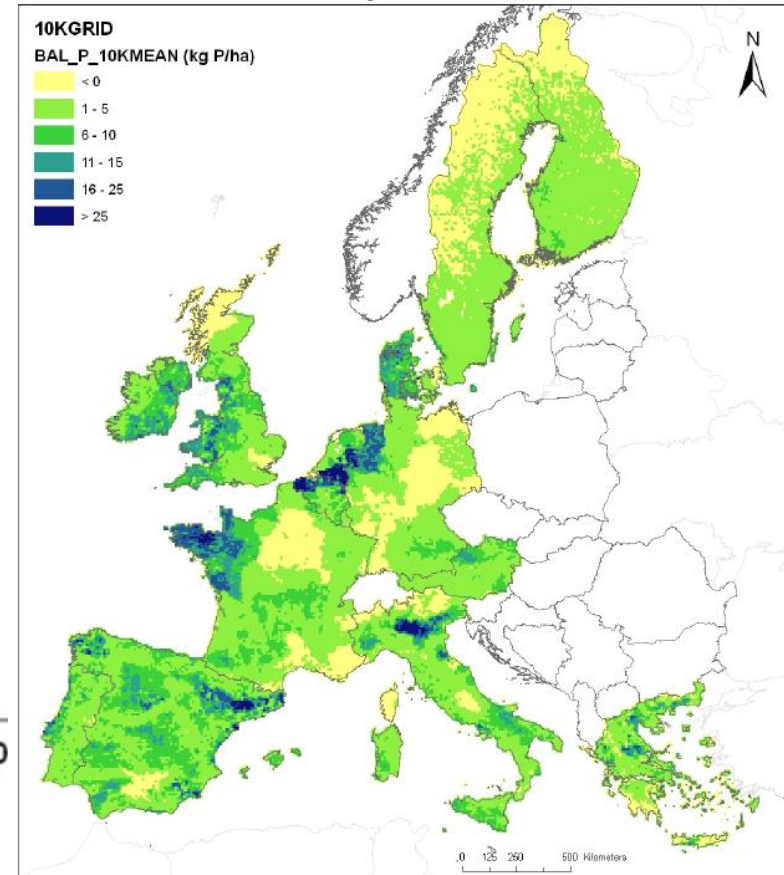
# Agronomic P balances in the EU

Grizzetti & Aloe  
2007



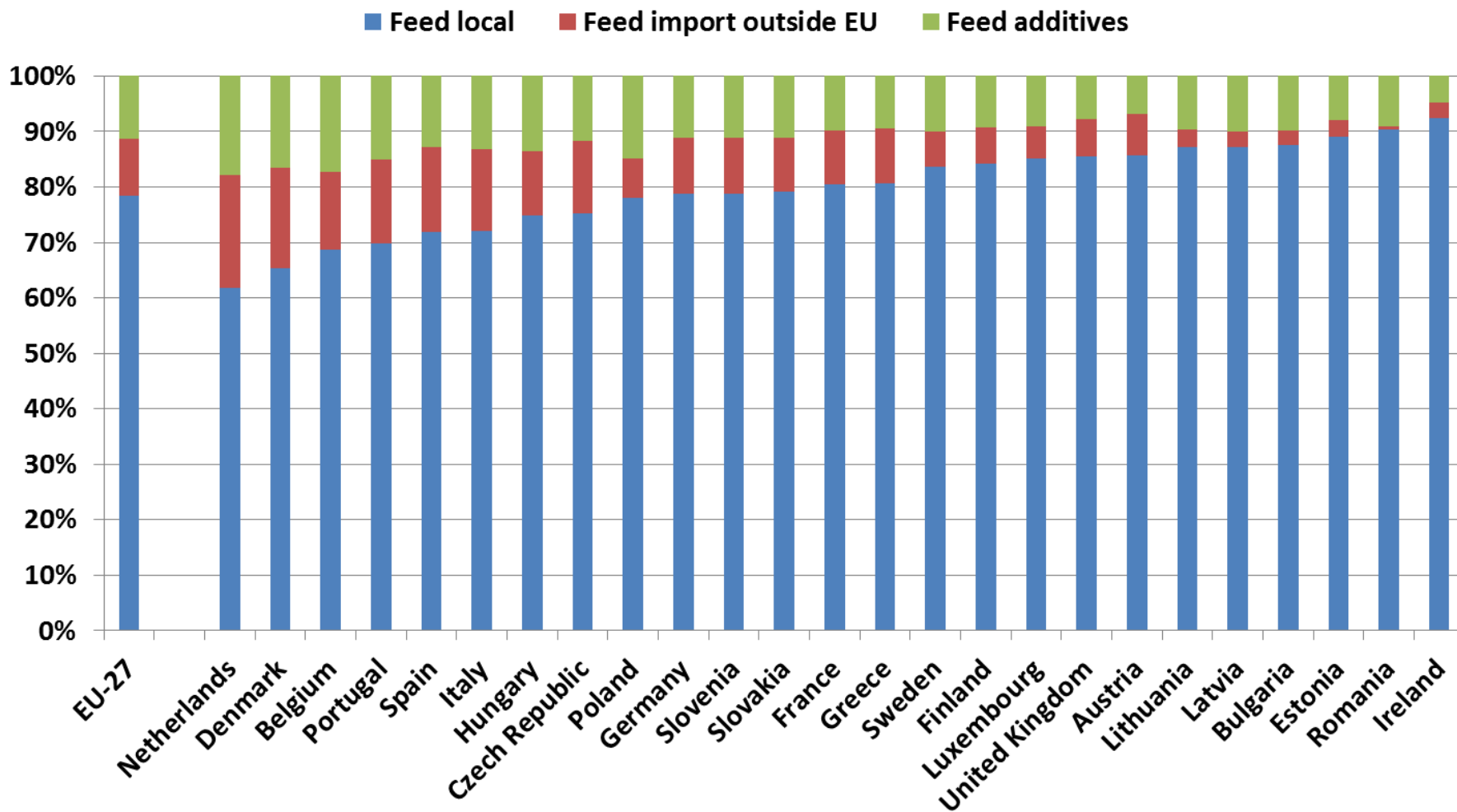
**Estimated cumulative P balances [kg P/ha] of EU countries, 1991–2005**

Csathó & Radimsky 2012



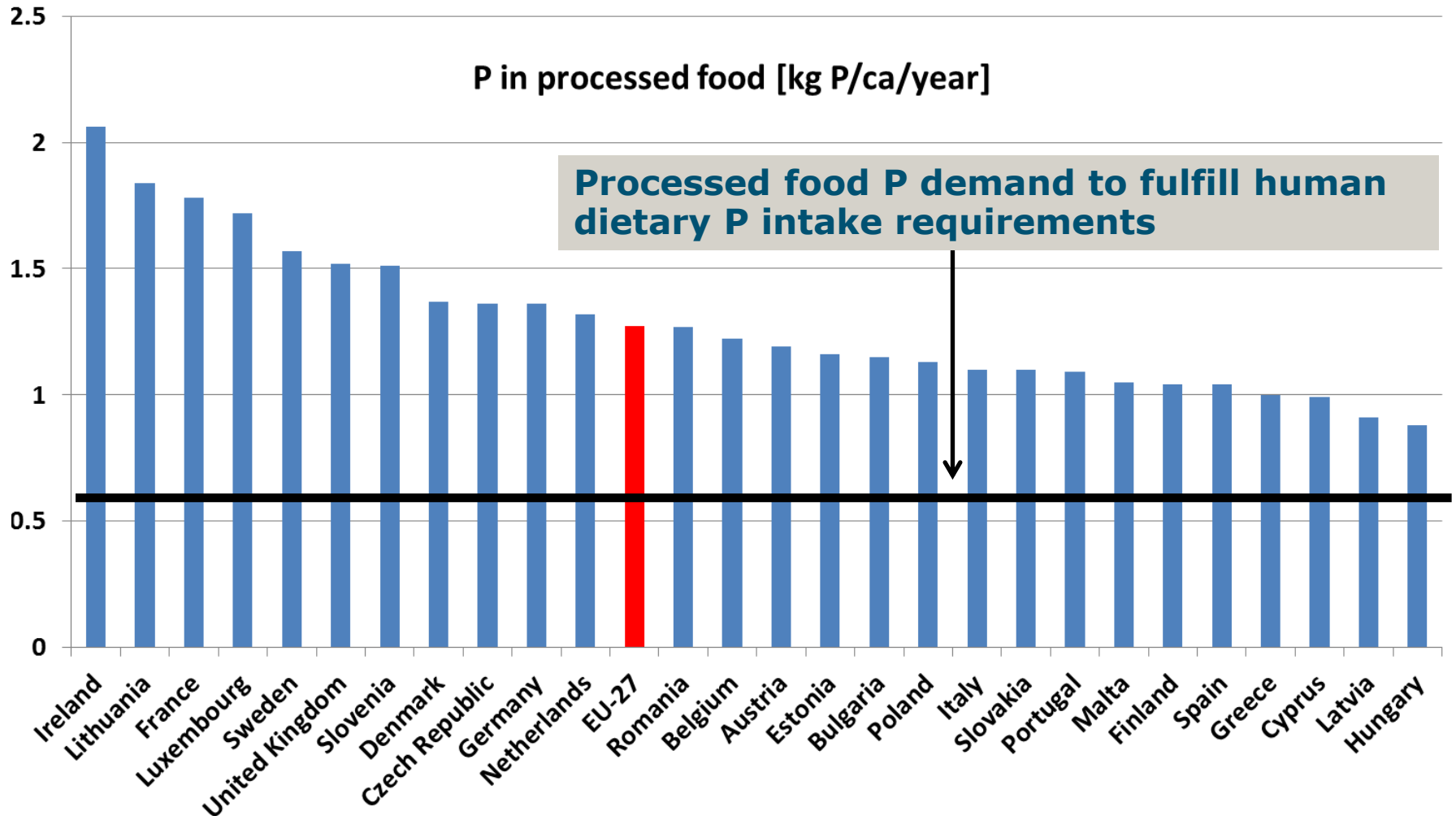
**Annual regional agricultural P balances [kg P/ha] for EU-15 in 2000**

# Animal feed use in EU-27 in 2005

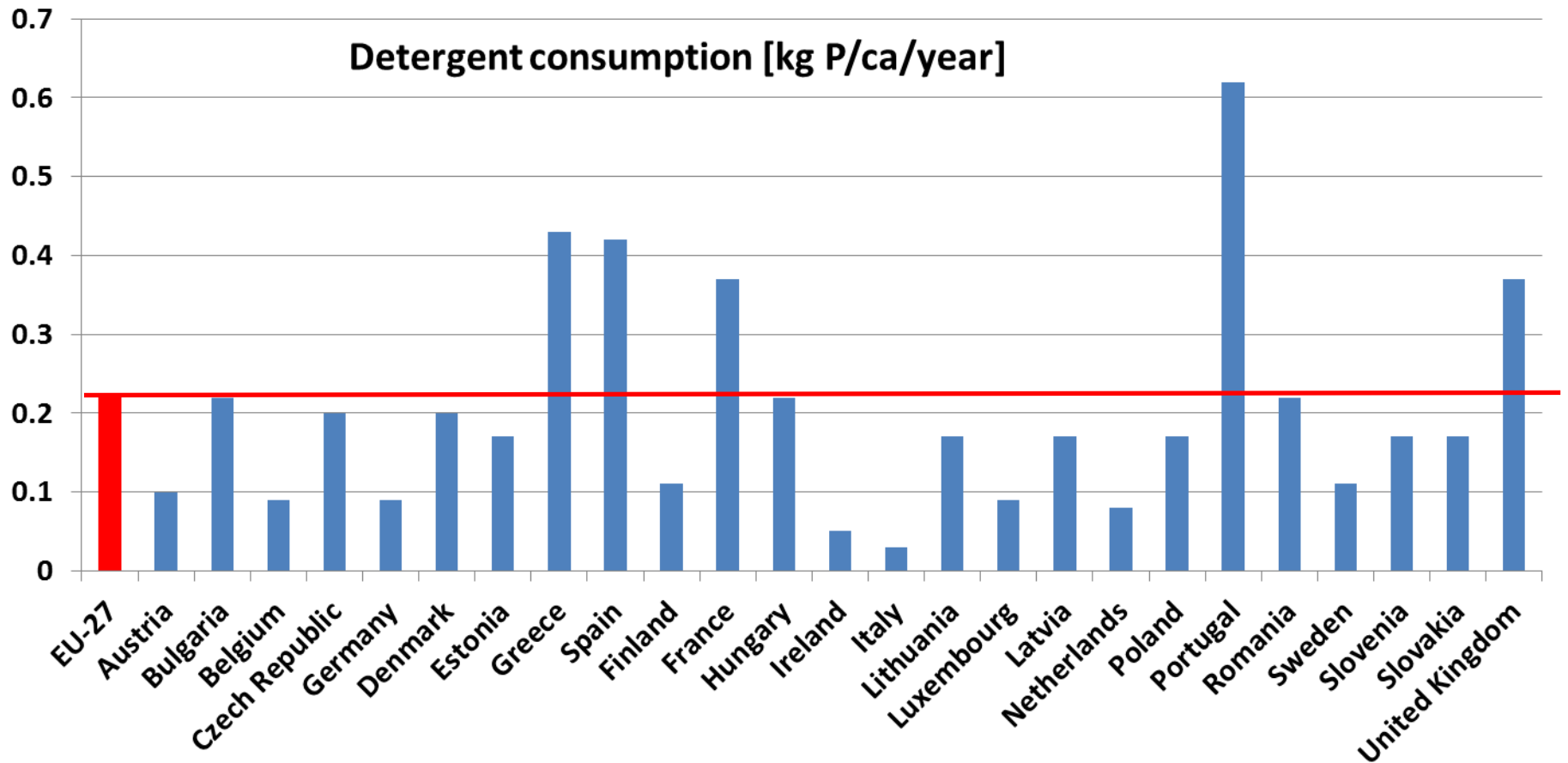




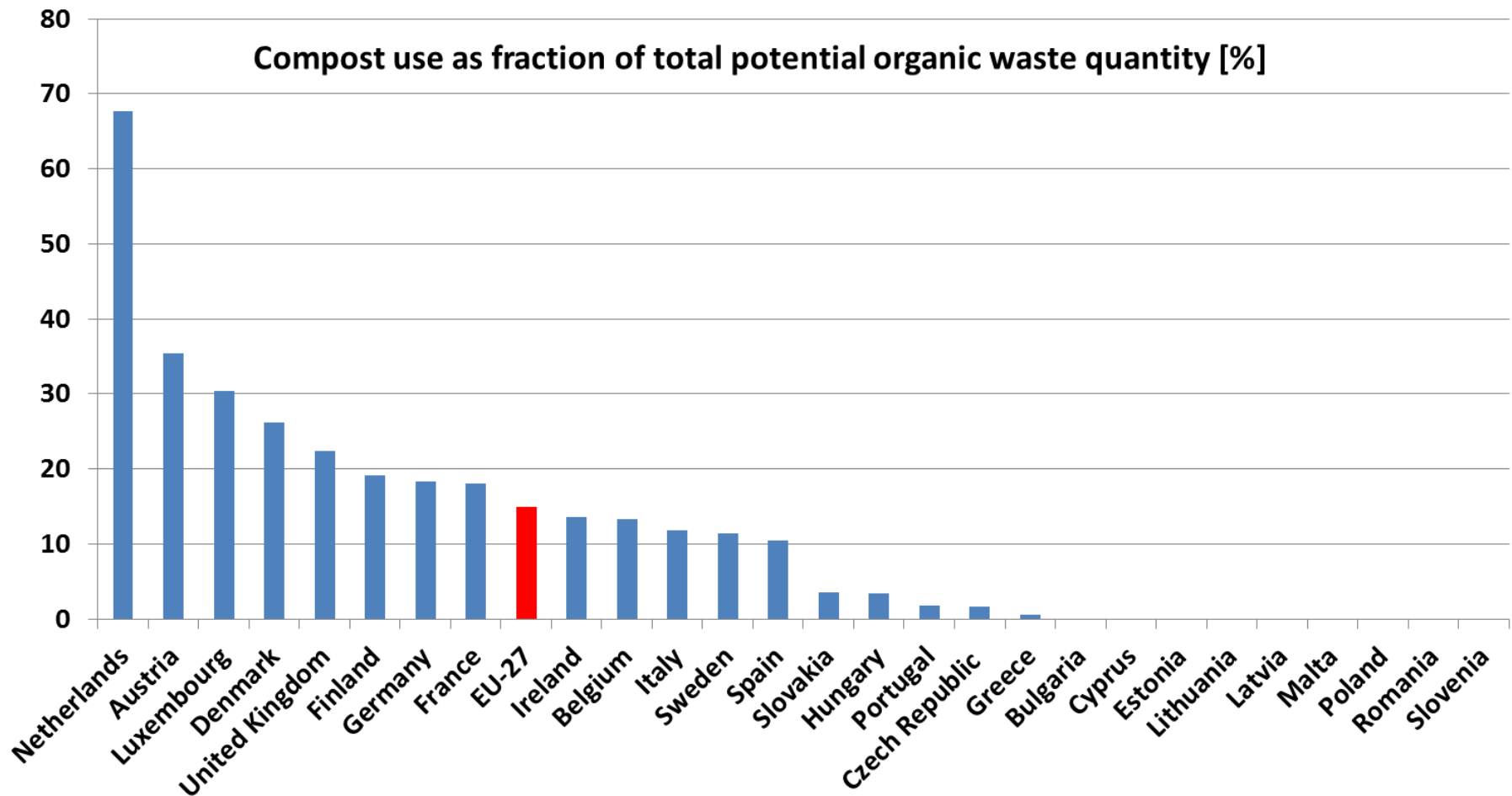
# Amounts of P in food in EU-27 in 2005



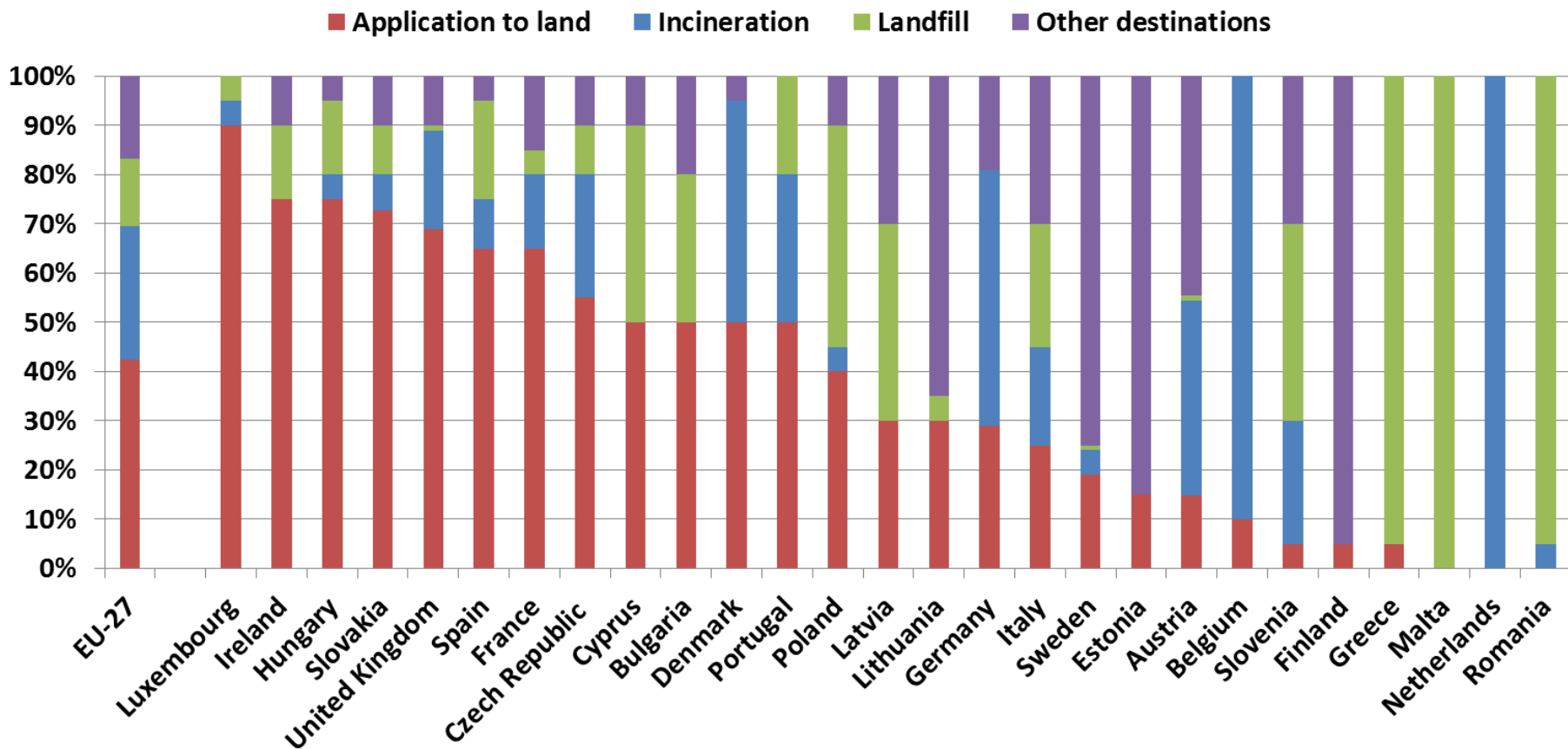
# Detergent P consumption in EU-27 in 2005



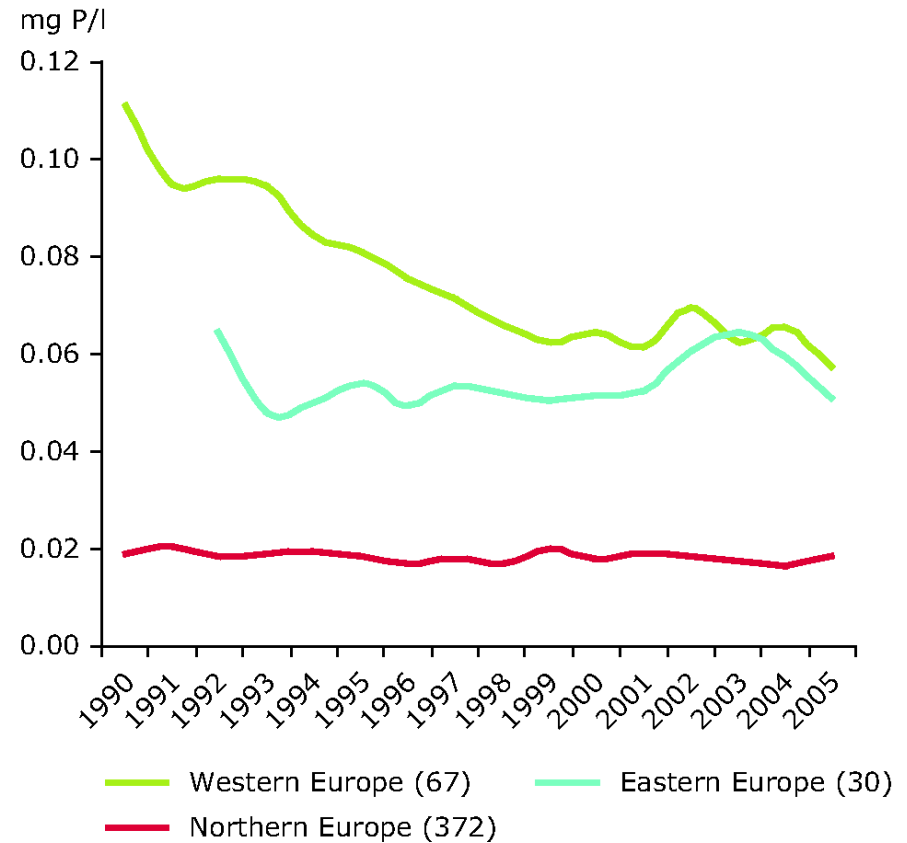
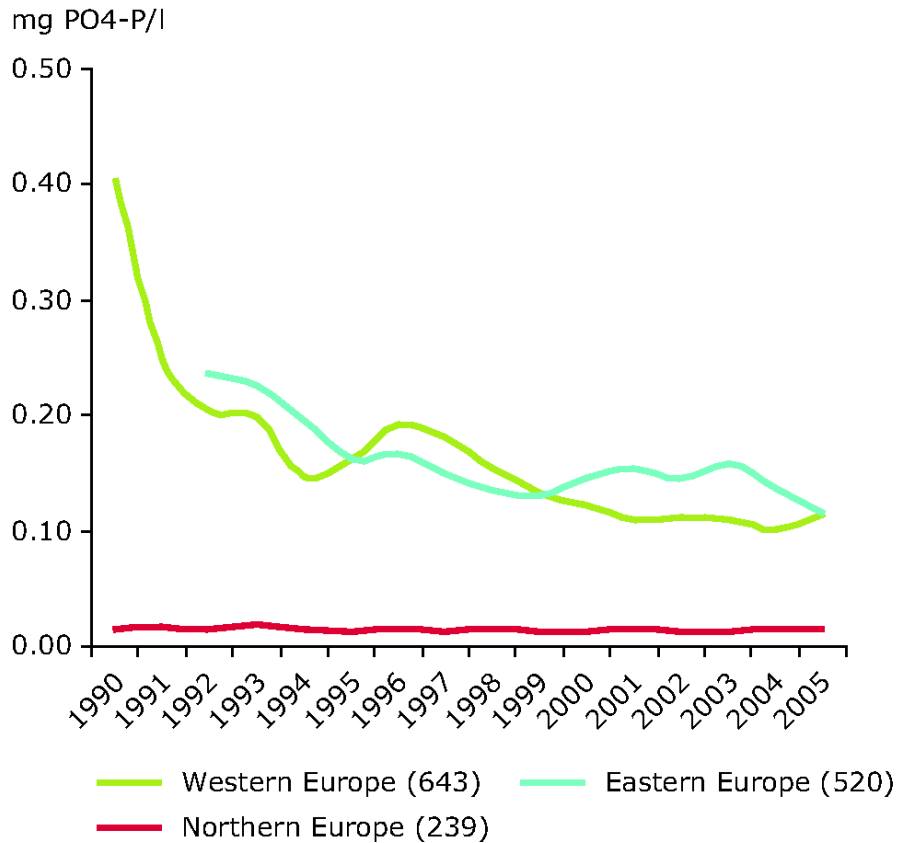
# Reuse of organic waste in EU-27 in 2005



# Sludge destinations in EU-27 in 2010



# P concentrations in rivers and lakes in EU regions, period 1990 - 2005



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# Summary & conclusions

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- Europe is largely dependent on P imports via:
  - Mineral fertilizers (70%), animal feed & additives (20%), food & non-food materials (10%)
- Ongoing P accumulation in agricultural soils, especially in western Europe by P surpluses
- Various recycling rates, generally low (except manure):
  - Sewage sludge P recycling ranging from 0 - 90%
  - Compost P re-use ranging from 0 - 70%
- Significant P losses via:
  - Waterways: sewage discharge, leaching & erosion
  - Sequestration: incineration, landfilling, infrastructure
- High potential to improve P use efficiency

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# Transition towards sustainable use of P

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- Need for more **efficient** and **effective** use of P, which includes options from the **4R strategies**:
  - **Reduce**: inputs and demands wherever possible, with a focus on primary P inputs
  - **Reuse**: P rich organic materials such as food wastes, slaughter wastes and composts
  - **Recycle**: P from 'wastes' such as excreta, wastewater, sewage sludge
  - **Redefine**: the system, processes, human choices and networks



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Thank you for  
your attention

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**Do you have  
questions, comments or data?**

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