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## A consumption-based indicator for water purification

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# **Policy issue: where to address action? On production? On consumption?**

We need to fill the gap when a spatial disconnection occurs between the place where the service is supplied and the (traded) good where the service is embedded

→ quantification of environmental “footprints” and impacts embodied in international trade

The building block of Input Output Analysis are input-output tables (IOTs) (normally compiled by national statistical offices), derived from the supply and use tables of the SNA.

Several multi-regional input-output (MRIO) databases exist (GTAP, EXIOBASE, WIOD, EORA).

# Consumption-based indicators: concept

Consumption is the ultimate driver behind production processes: to tackle overexploitation of ecosystem services requires knowledge of who in the end uses what is generated from/through them



# Extract the information from the accounting tables

	Type of economic unit				Type of ecosystem unit
	Primary sector	Secondary sector	Tertiary sector	Households	
					Rest of the world - exports
					Green urban areas
					Cropland
					Grassland
					Heathland and shrub
					Woodland and forest
					Sparingly vegetated land
					Wetlands
					Rivers and lakes
					Coastal and intertidal areas
<b>water purification</b> mln euro year 2005					
AT					153.95
BE					106.16
BG					114.51
CY					2.71
CZ					135.74
DE					1,024.53
DK					118.50
EE					139.27
EL					189.05
ES					749.12
FI					1,989.50
FR					2,118.36
HR					79.01
HU					50.21
IE					174.21
IT					1,108.30
LT					207.87
EU					18.61
LV					234.15
NL					96.83
PL					708.07
PT					123.71
RO					135.57
SE					3,097.06
SI					47.09
SK					33.49
UK					726.44
EU					13,682.03

Supply table

	Type of economic unit				Type of ecosystem unit
	Primary sector	Secondary sector	Tertiary sector	Households	
					Rest of the world - exports
					Green urban areas
					Cropland
					Grassland
					Heathland and shrub
					Woodland and forest
					Sparingly vegetated land
					Wetlands
					Rivers and lakes
					Coastal and intertidal areas
<b>water purification</b> mln euro year 2005					
AT	140.28	13.67			
BE	96.93	9.23			
BG	104.45	10.06			
CY	2.50	0.22			
CZ	123.65	12.09			
DE	929.73	94.80			
DK	109.99	8.51			
EE	128.17	11.11			
EL	172.28	16.77			
ES	682.69	66.43			
FI	1,821.26	58.24			
FR	1,926.37	31.99			
HR	71.21	7.79			
HU	44.94	5.28			
IE	160.78	13.44			
IT	1,007.26	101.03			
LT	187.44	20.43			
EU	16.65	1.96			
LV	211.60	22.56			
NL	87.50	9.33			
PL	643.59	64.48			
PT	112.53	11.18			
RO	122.24	13.33			
SE	2,815.40	281.67			
SI	42.76	4.33			
SK	30.55	2.94			
UK	666.68	59.76			
EU	12,459.40	1,222.63			

Complementary Use table

# Multi-regional input-output analysis

2013 Release of the World Input-Output database (WIOD)

- disaggregation level:
  - 40 countries one Rest of the World region,
  - 35 industries
- time series: 1995-2011

The computation of the consumption-based water purification accounts followed the standard environmentally extended input-output model:

$$\mathbf{E} = \mathbf{f}(\mathbf{I} - \mathbf{A})^{-1} \mathbf{Y}$$

$m$  denote the number of countries,

$k$  the number of industries and

$j$  the number of environmental resources or impacts under analysis.

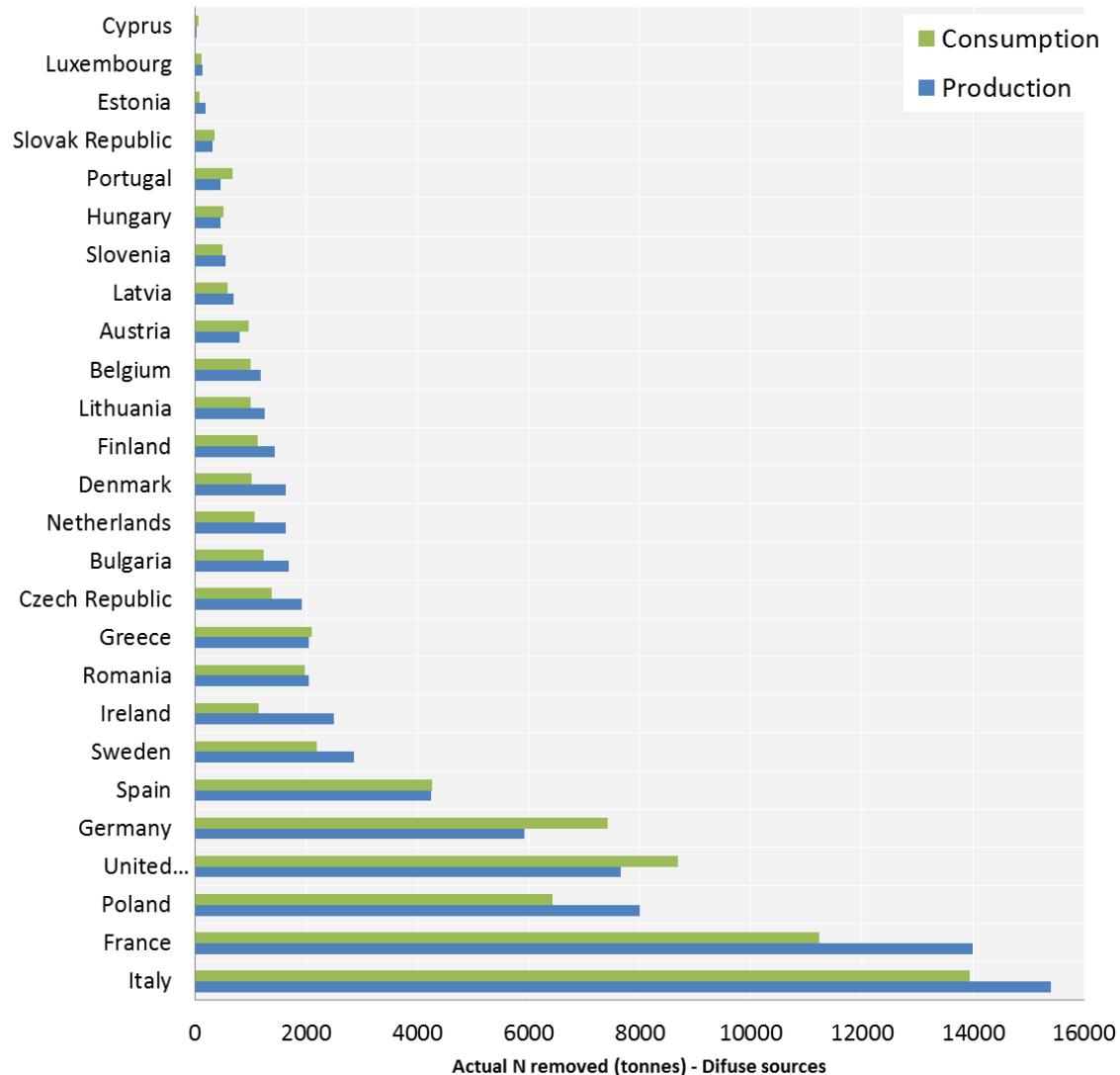
**E** is the  $(j \times m.k)$  matrix of total (direct and indirect) environmental impacts associated with the consumption activities of each country.

**f** is a  $(j \times m.k)$  matrix of the direct environmental resources required to supply one unit of industry output

**(I-A)<sup>-1</sup>** is the  $(m.k \times m.k)$  Leontief inverse matrix, which informs on the total (direct and indirect) environmental resources required to supply one unit of industry output

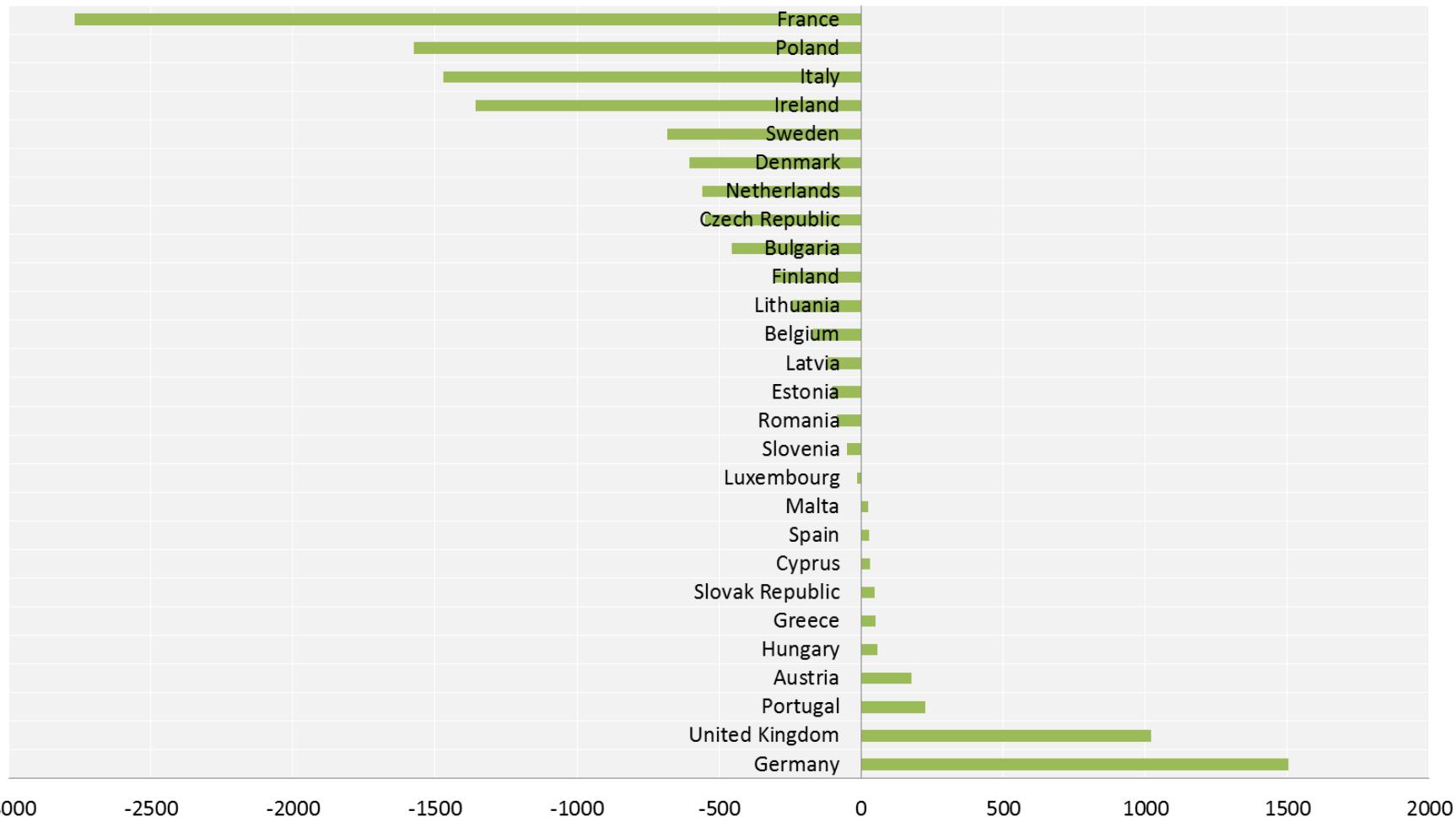
**Y** is  $(m.k \times m)$  the final demand (or consumption activities) matrix

# Comparison between the production-based and consumption-based water purification accounts (2005)

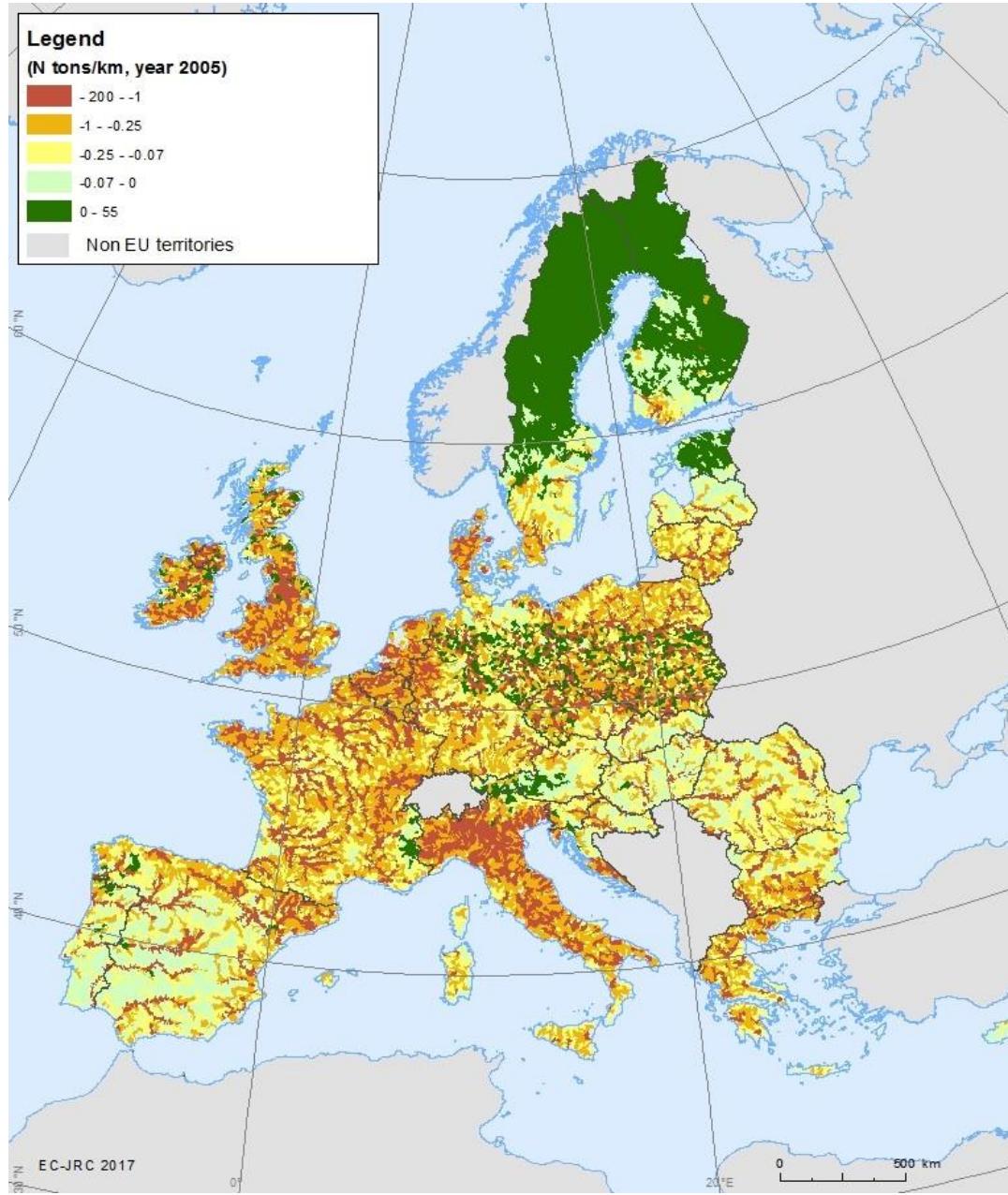


This graph informs about the reliance of a country on external ecosystem services to fulfil its consumption

# Exporters and importers of embodied water purification

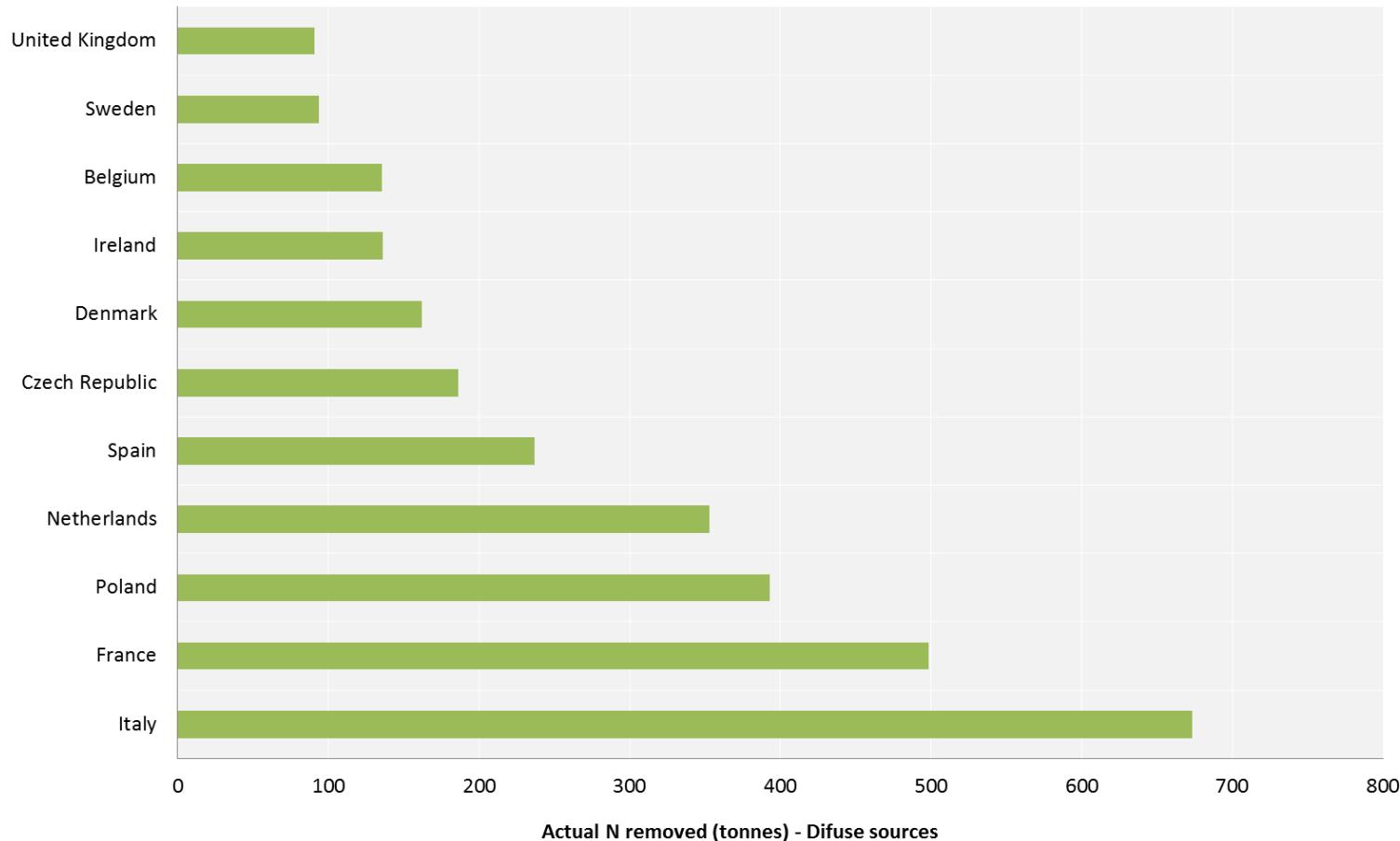


Major exporters of water purification services embodied in agriculture (negative values) and Major importers of water purification services embodied in agriculture (positive values)

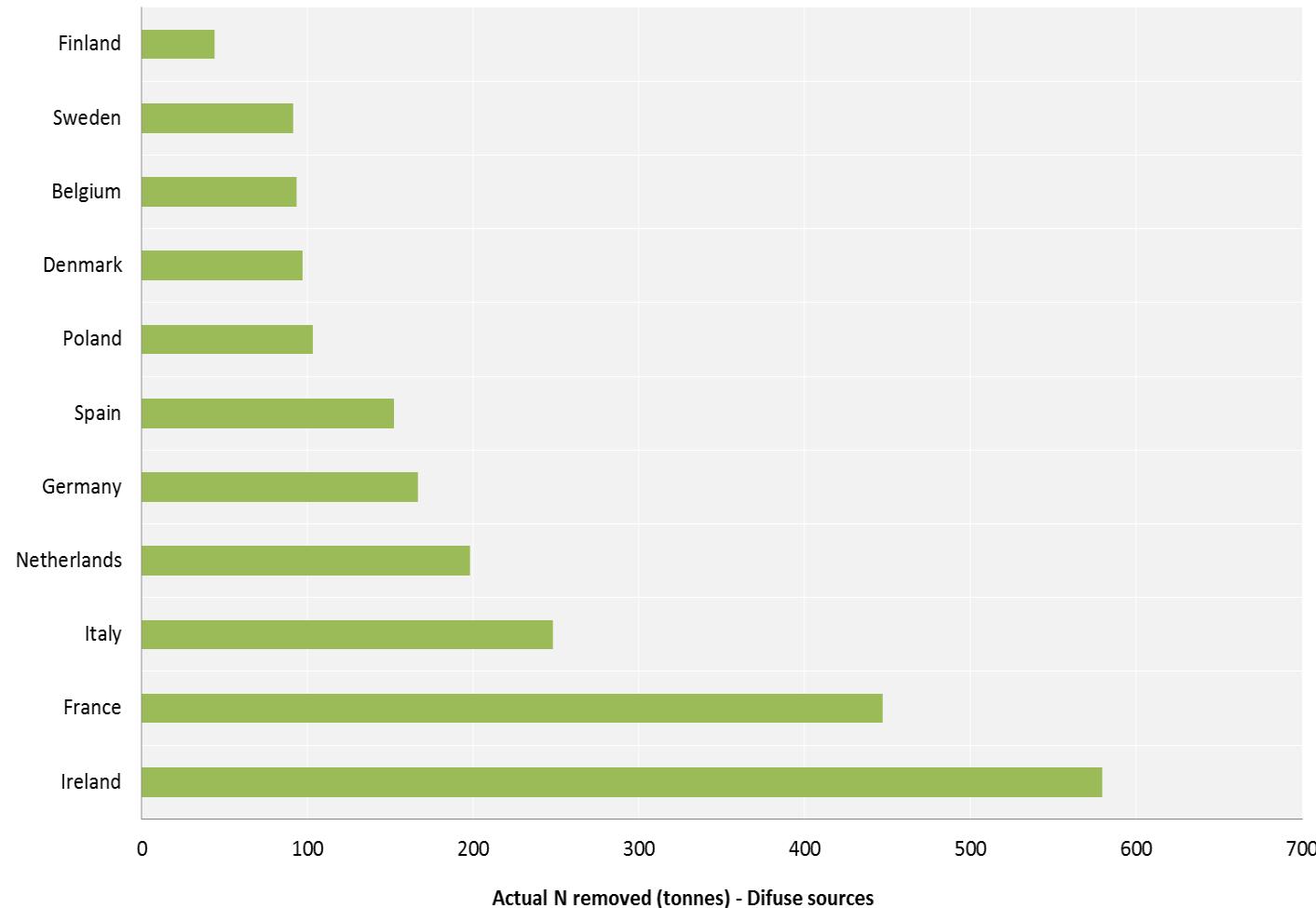


# Overused service

# Germany's imports of water purification ecosystem services in 2005



# United Kingdom's imports of water purification ecosystem services in 2005



# Few preliminary conclusions

- The biggest importers of water purification ecosystem services are importing these services from countries whose water bodies are highly pressured by nitrogen pollution.
- The majority of actions to improve the good ecological status of water bodies in Europe are planned at the River Basin level, nevertheless a systems perspective should consider the flows of ecosystem services as well as the goods they generate that are traded
- New alternatives to tackle degradation and overexploitation of natural capital could then be considered.

# Questions for the London Group

1. Do you see as viable to standardize this footprint-type indicators for ecosystem services accounts?
2. Do you think it would be possible to assess such an indicator considering sustainability issues? How?
3. What would be the most effective way to communicate this kind of information? To whom?

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