# Environmental taxation and EU environmental policies: energy, water and resources

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- Environmental taxation and environmental fiscal/tax reform
- European situation
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  - Trend in environmental tax revenues
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- A broader approach towards environmental taxation
- Reflections

# Environmental taxation - motivation

- The primary objectives and benefits of environmental taxes are to reduce pollution and resource use; changing behaviour and internalising externalities / external costs, i.e. to correct an inefficient market outcome → rationale for governmental intervention (*polluter pays principle*)
- Several secondary benefits to be considered too: lower health-related costs, trigger eco-innovations that generate wealth and jobs
- A further benefit of environmental taxes is their fiscal function, i.e. generating budgetary sources
- More cost effective than regulation; more effective than voluntary agreements and information

# Environmental taxation - motivation

Main concerns hampering the widespread application of energy/CO2 taxes:

- Competitiveness issues (regularly addressed by the provision of tax exemptions / reductions for energy-intensive industries)
- Distributional implications (impact on low-income households)
- Unstable/shrinking tax base and revenue stability over time *(less discussed in the literature)*

# Environmental tax/fiscal reform

Environmental /ecological/ green tax /fiscal reform:

- *Environmental tax reform (ETR) is a reform of the national tax system where there is a shift of the burden of taxation from conventional taxes, for example on labour, to environmentally damaging activities, such as resource use or pollution. The burden of taxes should fall more on 'bads' than 'goods' so that appropriate signals are given to consumers and producers and the tax burdens across the economy are better distributed from a sustainable development perspective* (EEA, 2005)

Design and the selection of instruments varies and depends on prevailing economic, social, institutional and political conditions of the countries.

ETR/EFR – a tool for governments, implemented along side other policy measures, aiming of achieving multiple objectives (environment/economy) simultaneously.

# European experience with ETR/EFR

**Competitiveness Effects of Environmental Tax Reform (COMETR)**

Analysis of Environmental Tax Reform (ETRs) implemented in Europe (*ex-post analysis*): Denmark, Finland, Germany, Netherlands, Sweden, UK and Slovenia:

- Large differences in the design of ETRs implemented in EU member states regarding (1) sectors affected; (2) energy/CO2 taxes; (3) recycling mechanism.
- Outcomes (modelling results) – environmental and economic – have been broadly positive: energy demand and emissions are reduced; employment is increased; effects on GDP are very small.

For more information:

Andersen, M.S. and Ekins, P. (eds.), 2009, *Carbon Taxation: Lessons from Europe*, Oxford University Press, Oxford.

Ekins, P. and Speck, S. (eds.), 2011, *Environmental Tax Reform: A Policy for Green Growth*, Oxford University Press, Oxford.

Mori, A., Ekins, P., Lee, S., Speck, S., and Ueta, K. (eds.), 2013, *The Green Fiscal Mechanism and Reform for Low Carbon Development*, Routledge, London/New York.

# Environmental tax reform and EC policies

*On the revenue side, it is important to ensure an efficient and growth-friendly tax system. Employment and growth can be stimulated by shifting the tax burden away from labour towards other types of taxes which are less detrimental to growth, such as recurrent property, environment and consumption taxes, taking into account the potential distributional impact of such a shift.*

Source: European Commission (EC), 2015, Annual Growth Survey. COM(2014)902final, Brussels

→ promotion of tax-shifting programme (also by OECD, IMF, …)

# Environmental taxes – classification

Classification of environmental taxes and revenue share in EU-28 (2014; Eurostat)

- **Energy / CO2 taxes** (includes revenues from auctioning of emission trading schemes)
  - EU-28: average 77% of total environmental tax revenues; Belgium 60%; Lithuania 94%

- **Transport taxes**
  - EU-28: average 20%; Estonia 2% and Lithuania 4%; Malta 41% and Austria 36%

- **Pollution and resource taxes**
  - EU-28: average 4%; Czech Republic 1% and Germany 0%; Netherlands 14%

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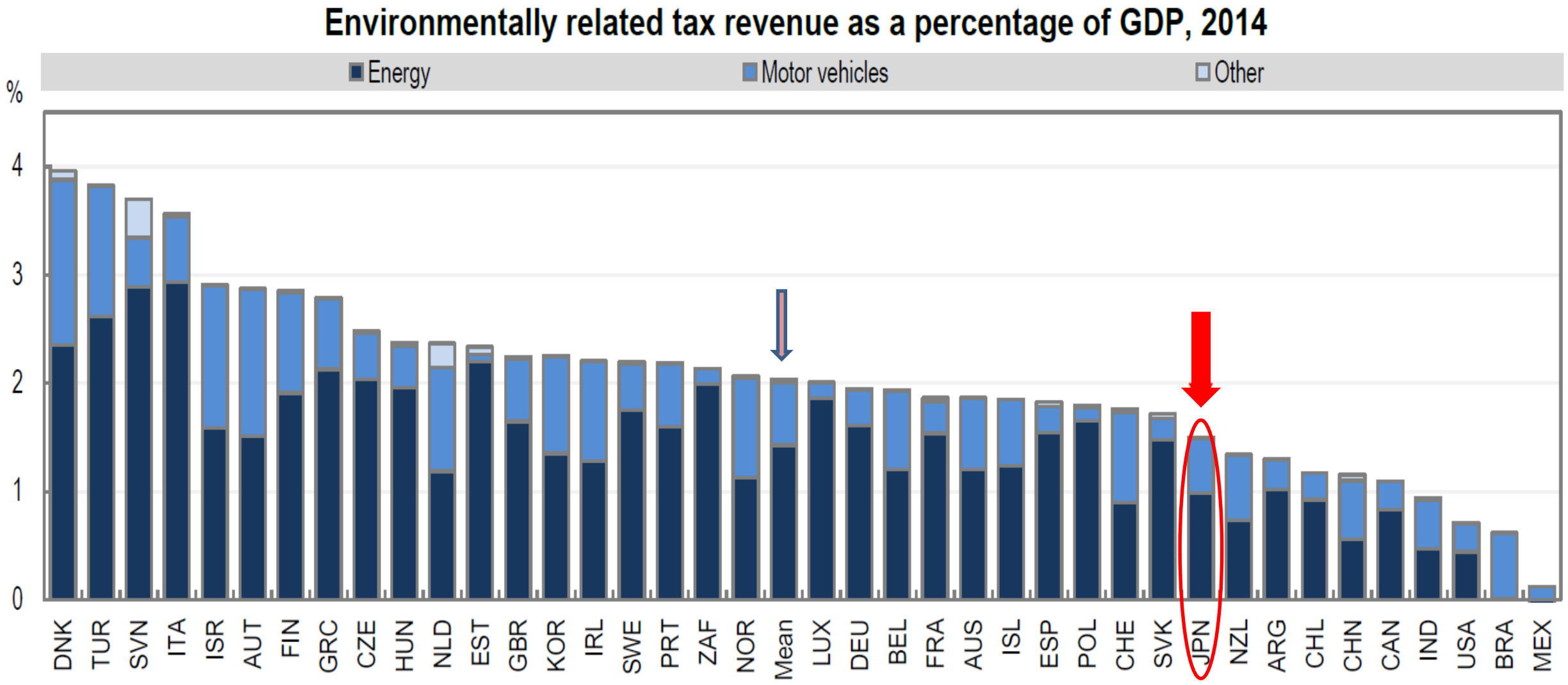
Environmental tax revenue percentage of GDP (2015): EU-28: 2.4%; Slovakia:

# Environmental tax revenues – OECD

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Source: OECD https://www.oecd.org/tax/tax-policy/environmental-tax-profile-japan.pdf

# Environmental taxation in Europe (source: EEA, 2016)

| | Austria | Belgium | Bulgaria | Croatia | Cyprus | Czech Republic | Denmark | Estonia | Finland | France | Germany | Greece | Hungary | Ireland | Italy | Latvia | Lithuania | Luxembourg | Malta | Netherlands | Poland | Portugal | Romania | Slovakia | Slovenia | Spain | Sweden | United Kingdom | Iceland | Liechtenstein | Norway | Switzerland | Turkey |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Energy (including fuel for transport)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Energy products for transport purposes | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| Energy products for stationary purposes | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| Greenhouse gases (GHG) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| • Carbon content of fuels — $CO_2$ tax | | | | x | | | x | x | x | x | | | | x | | x | | | | | x | x | | | x | | x | x (*) | x | x | x | x | |
| • GHG emissions trading schemes | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | |

# Environmental taxation in Europe (cont'd)

| | Austria | Belgium | Bulgaria | Croatia | Cyprus | Czech Republic | Denmark | Estonia | Finland | France | Germany | Greece | Hungary | Ireland | Italy | Latvia | Lithuania | Luxembourg | Malta | Netherlands | Poland | Portugal | Romania | Slovakia | Slovenia | Spain | Sweden | United Kingdom | Iceland | Liechtenstein | Norway | Switzerland | Turkey |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Transport (excluding fuel for transport)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Motor vehicles import or sale, one off/ registration tax | x | x | | x | x | | x | | x | x | | x | x | x | x | x | | | x | x | x | x | x | x | x | x | | x | x | x | x | x |
| Use of motor vehicles, recurrent (yearly/ circulation taxes) | x | x | x | x | x | x (b) | x | x (b) | x | x (b) | x | x | x | x | x | x | x (b) | x | x | x | x (b) | x | x | x | x (b) | x | x | x | x | x | x | x | x |
| Road use: passenger car (distance based/ vignette) | x | | x | x | | x | | | | x | | x | x | | x | x | | | | | x | x | x | x | x | x | | | | x | | x | |
| Road use: commercial/ heavy goods vehicles (HGV) (distance based/ vignette) | x | x | x | x | | x | x | | x | x | x | x | x | x | x | x | x | x | | x | x | x | x | x | x | x | x | x | | | x | x | x |
| Congestion charges (cities) | | | | | | | | | | | | | | | x | | | | x | | | | | | | | | x | x | | | x | | |

# Environmental taxation in Europe (cont'd)

| | Austria | Belgium | Bulgaria | Croatia | Cyprus | Czech Republic | Denmark | Estonia | Finland | France | Germany | Greece | Hungary | Ireland | Italy | Latvia | Lithuania | Luxembourg | Malta | Netherlands | Poland | Portugal | Romania | Slovakia | Slovenia | Spain | Sweden | United Kingdom | Iceland | Liechtenstein | Norway | Switzerland | Turkey |
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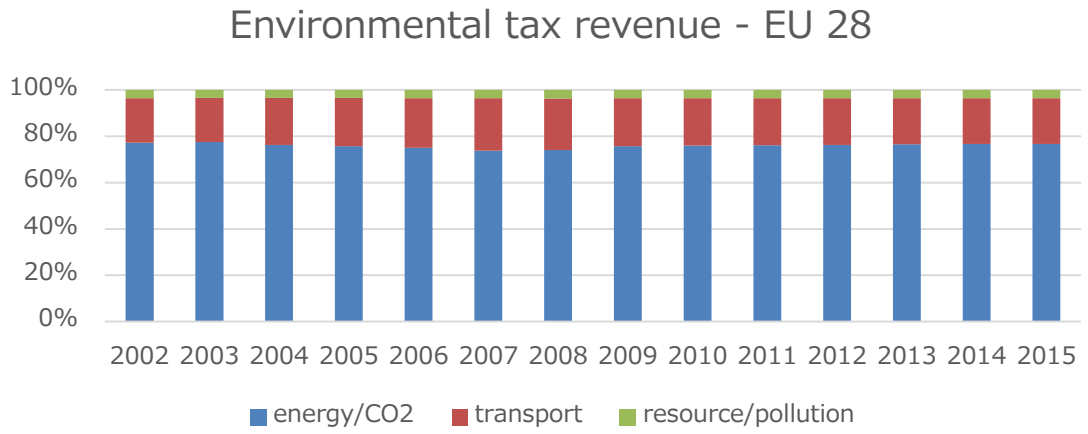
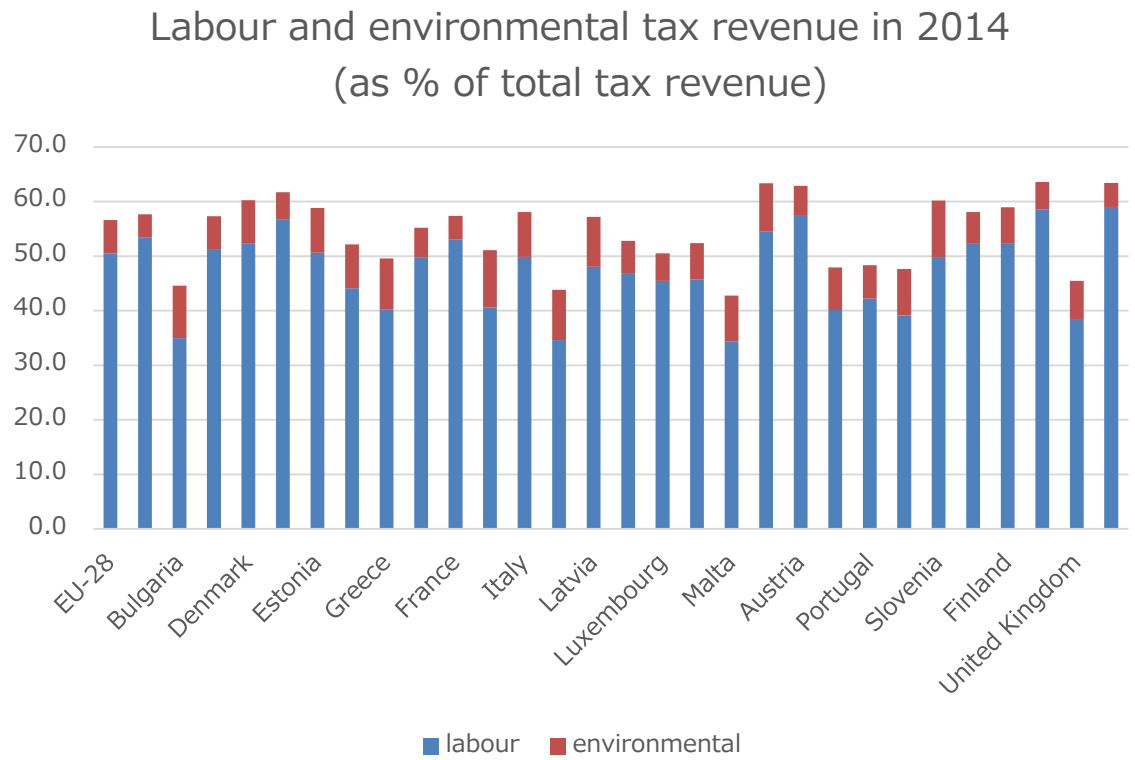
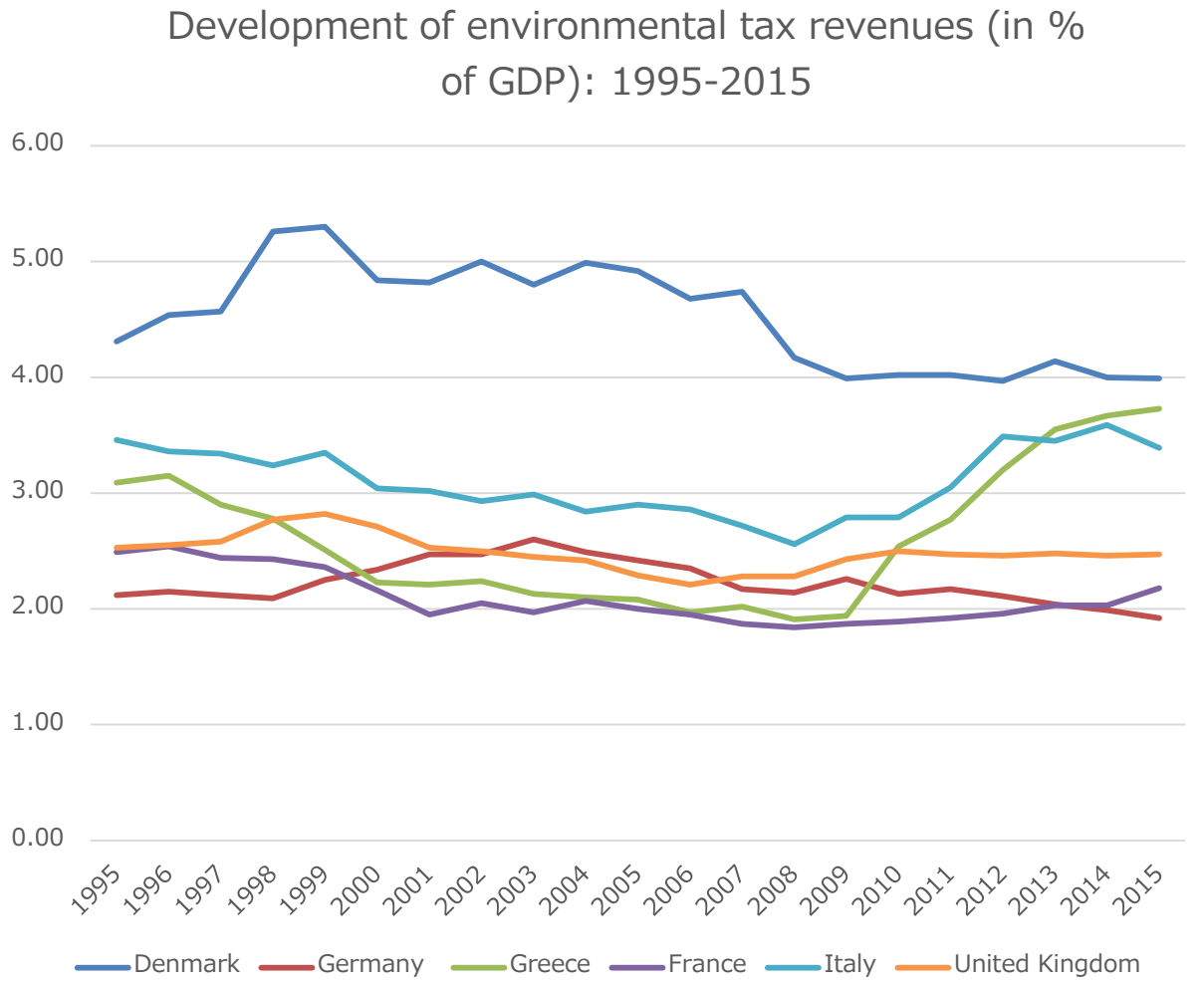
| **Pollution** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Measured or estimated emissions to air (*) | | | | x | | x | x | x | | x | | | x | | | x | x | | | | x | | x | x | | x | | | | | x | x | |
| Measured or estimated effluents to water | | x | | x | | x | x | x | | x | x | | x | | | x | x | x | | x | x | x | x | x | x | x | | | | | | | |
| Waste management | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| • Landfill | x | x | x | x | | x | x | x | x | x | | x | x | x | x | x | x | | | x | x | x | x | x | x | x | x | x | | x | x | x | x | x |
| • Incinerator | x | x | | | | | x | | | x | | | | | | | | | | x | | x | | | | x | (*) | | | | (*) | | x |
| • Individual products (*) | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| Non-point sources of water pollution | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pesticides | | x | | | | | x | | (*) | | | | | | x | | | | | | | | | | | | x | | | | x | | |
| Fertilisers | (*) | | | | | | x | | (*) | | | | | | | | | | | | | | | | | | (*) | | | | | | | |
| **Resources** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Water abstraction | | x | x | x | | x | x | x | | x | x | | x | | x | x | x | x | | x | x | x | x | | x | x | | | | | | | x |
| Extraction of certain raw materials | x | x | x | x | x | x | x | x | | x | x | | x | | x | x | x | | x | | x | | x | | x | | x | x | | | | | x |

# Trends in environmental tax revenue in the EU

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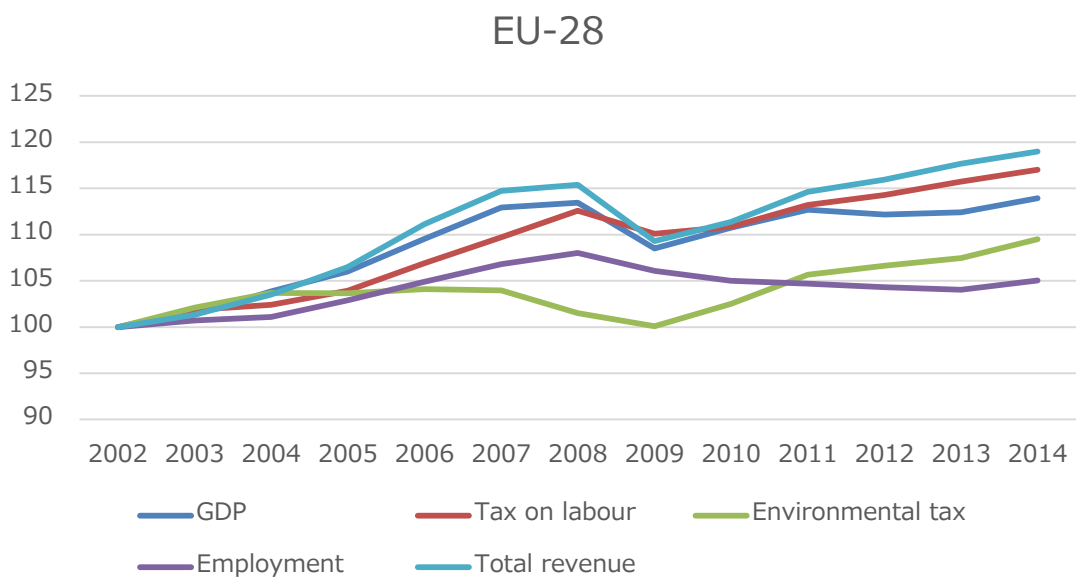
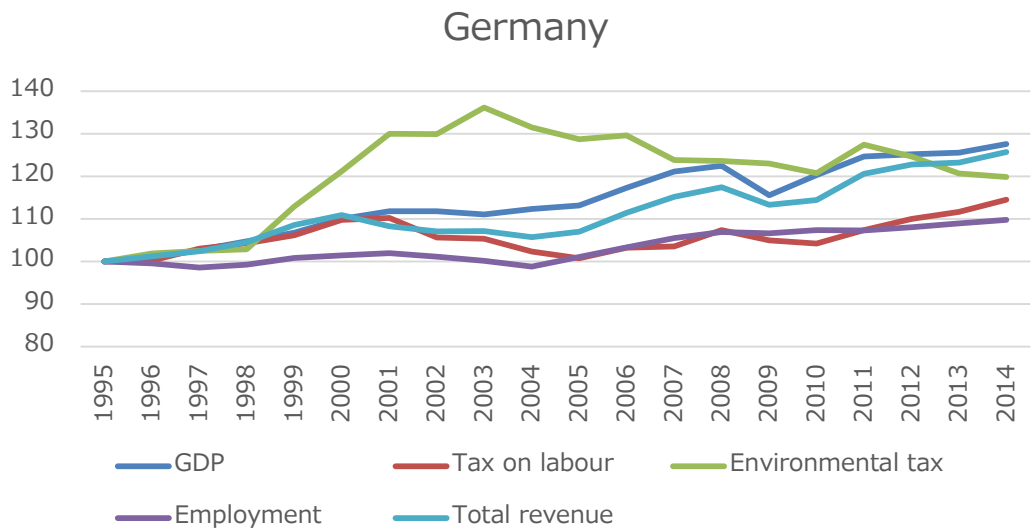
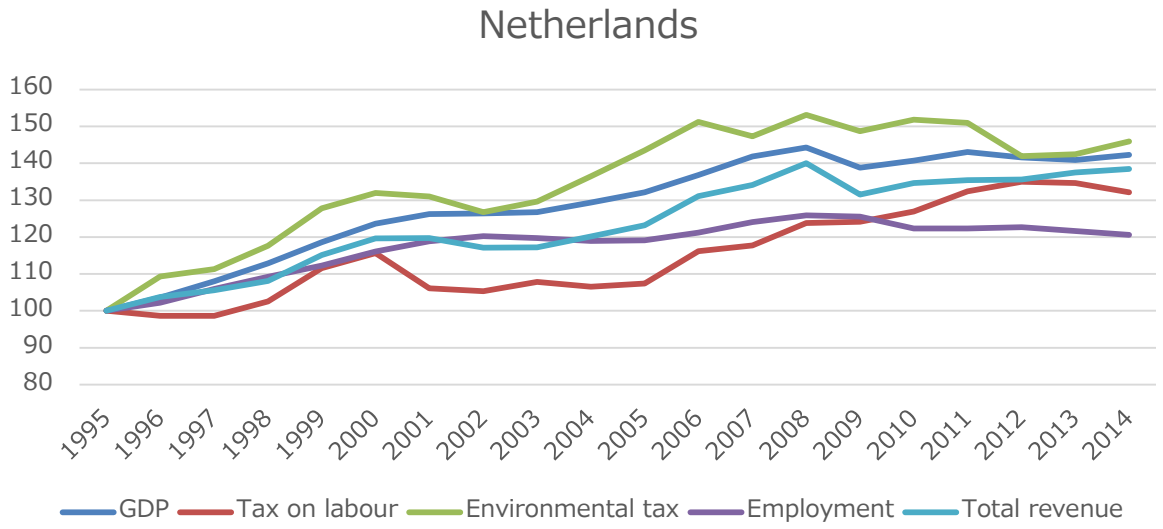
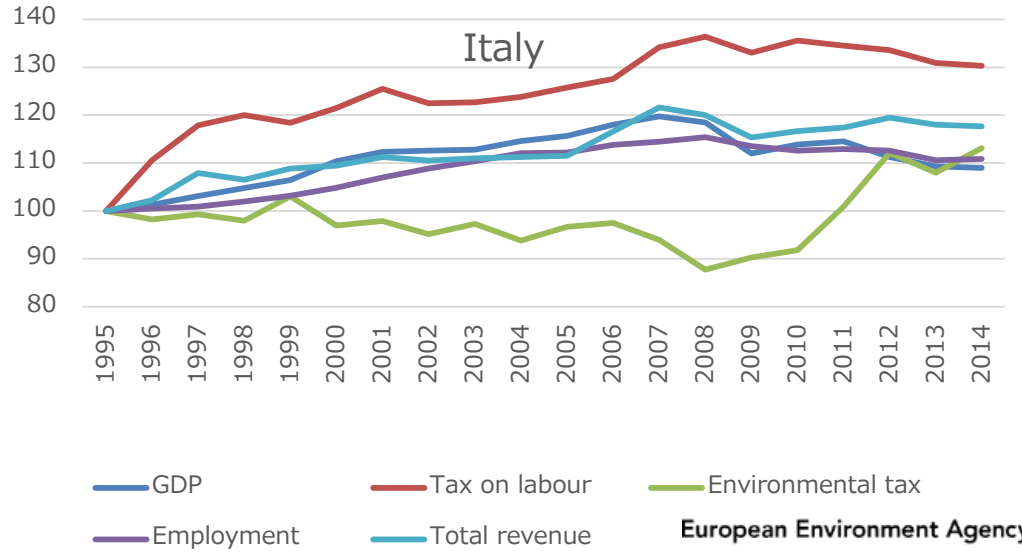
Source: Eurostat and OECD (Japan)

# Trends in tax revenue, GDP and employment




European Environment Agency

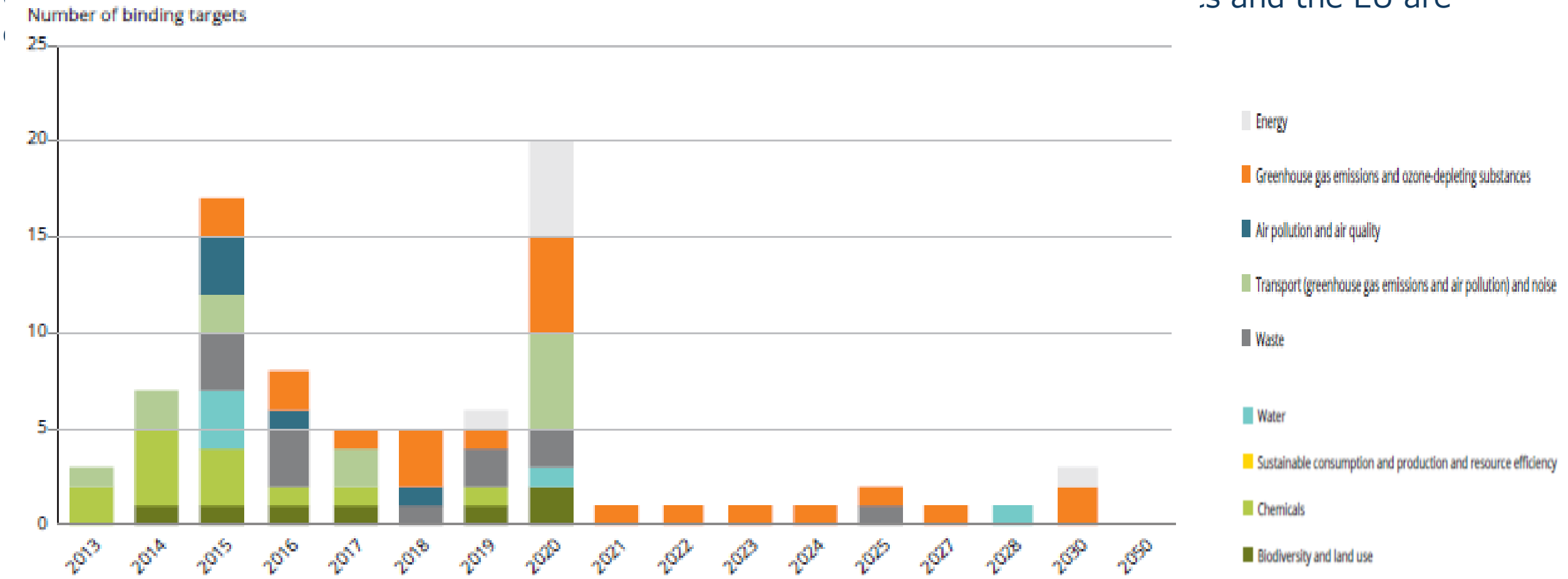
Source: Eurostat

# EU policies – setting of environmental policy targets

EU environmental policies address a range of environmental and resource use challenge. Overall, there are currently 82 binding targets and 84 non-binding objectives for 2013-2050 (source: EEA, 2016)

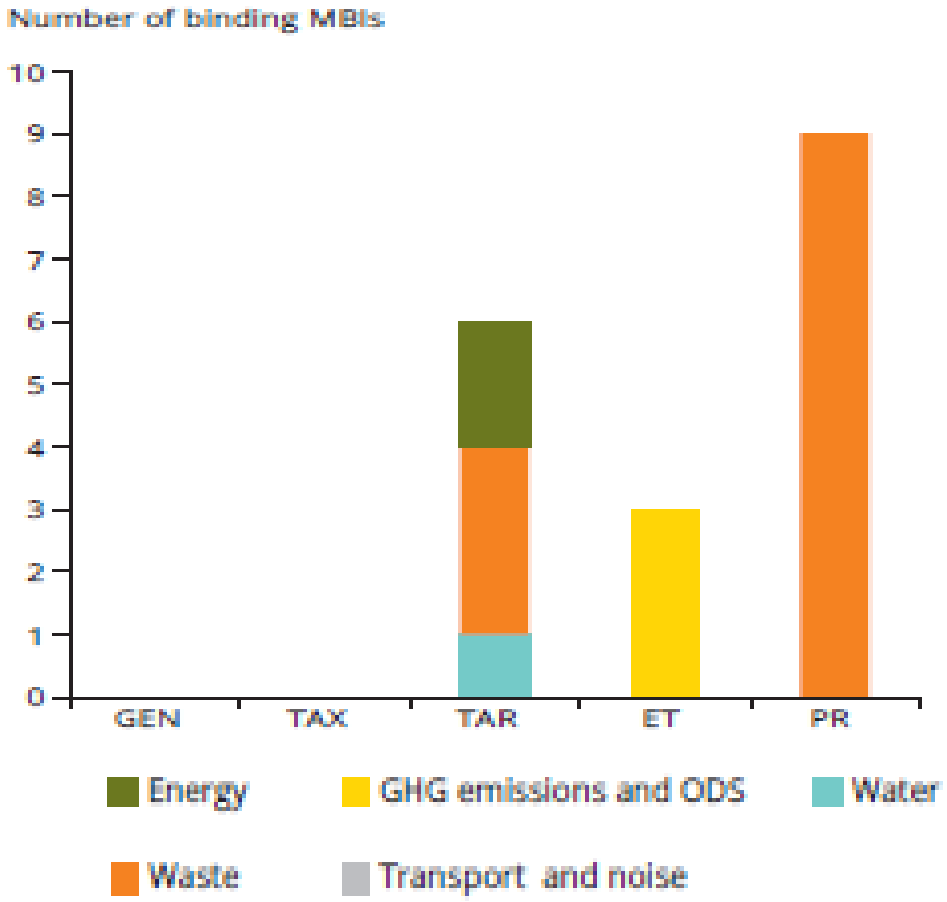
Targets are binding when established by EU legislation (regulations, directives, and decisions), European

es and the EU are



# MBIs in EU environmental legislation

- Achieving policy targets cost-effectively can require the use of market-based instruments (MBIs) – also in tandem with regulations. We identified 18 binding and 24 non-binding MBIs based on current EU environmental legislation.



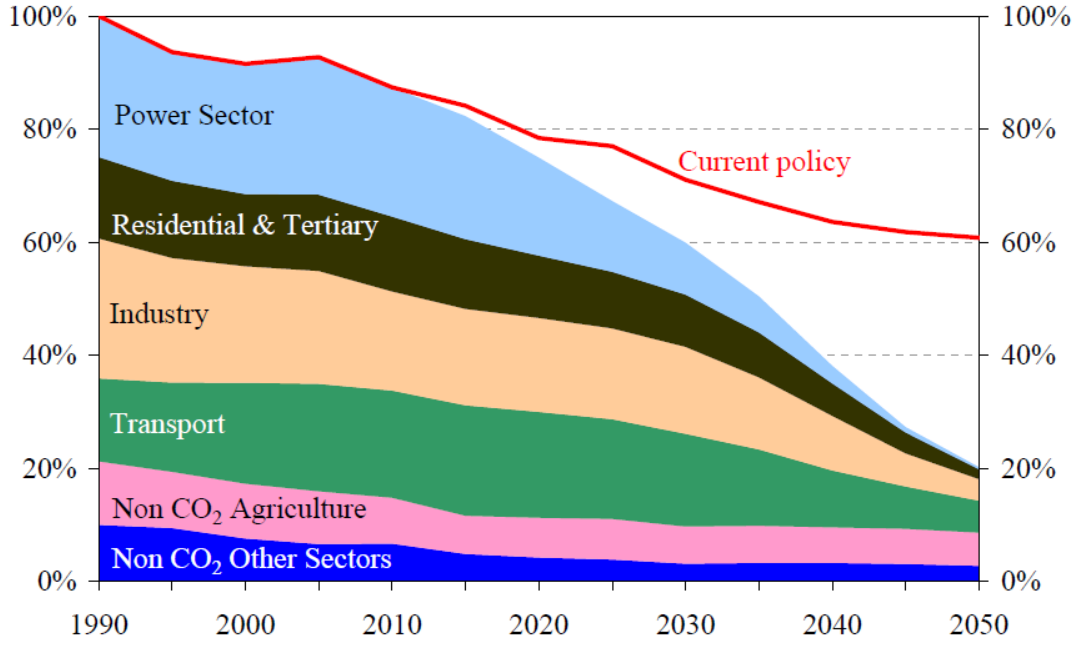

Binding MBIs: required by legislative provisions to adopt and implement - all others are non-binding.

When MBIs are set out in very generic terms (for example, 'Member States shall apply the "polluter pays principle" to waste management'), when they are only one of a number of possible measures that Member States are required to implement, or when Member States 'shall facilitate' or 'encourage' their adoption, the provisions are non-binding.

**Note:** GEN: general and mixed instruments; TAX: taxation and environmental tax reform: TAR: tariffs, fees, charges and pricing policies; ET: tradable permits and quotas; PR: producer responsibility schemes.

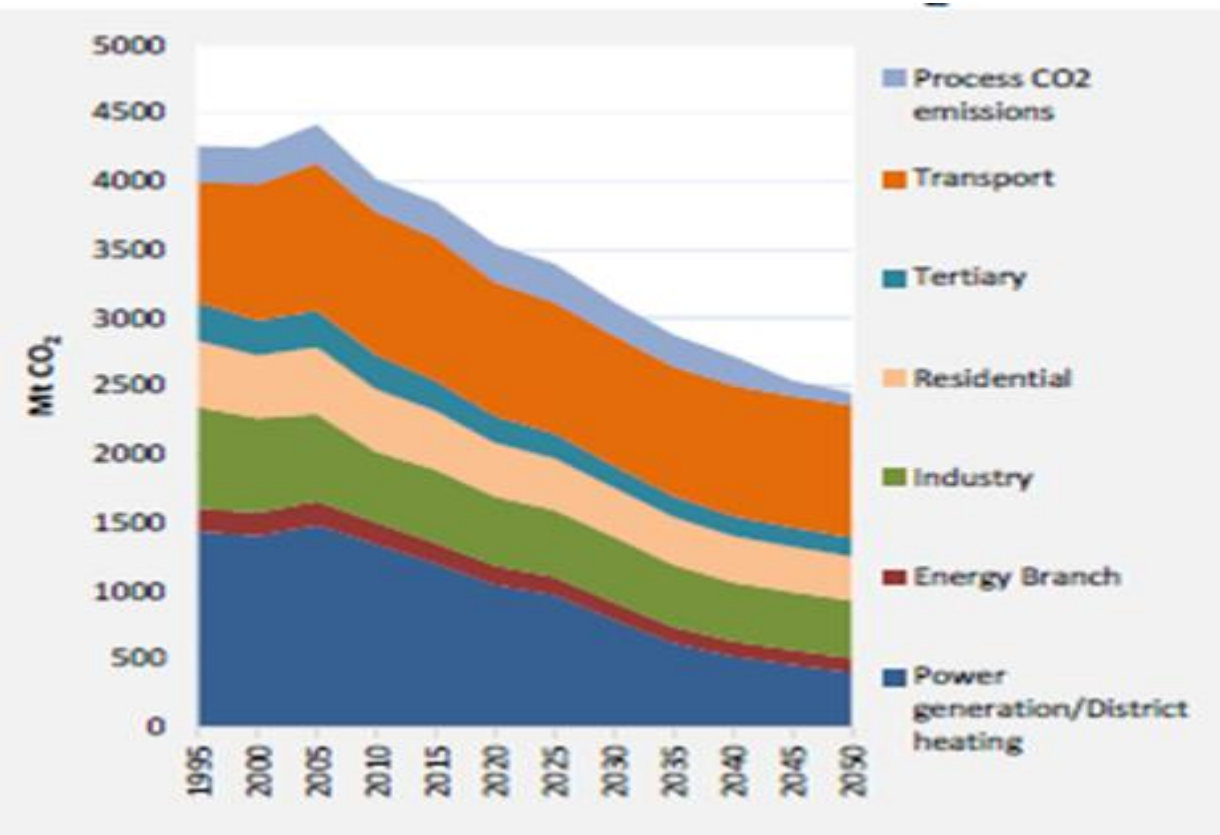
# GHG emissions projections / objectives up tp 2050

Figure 1: EU GHG emissions towards an 80% domestic reduction (100% =1990)



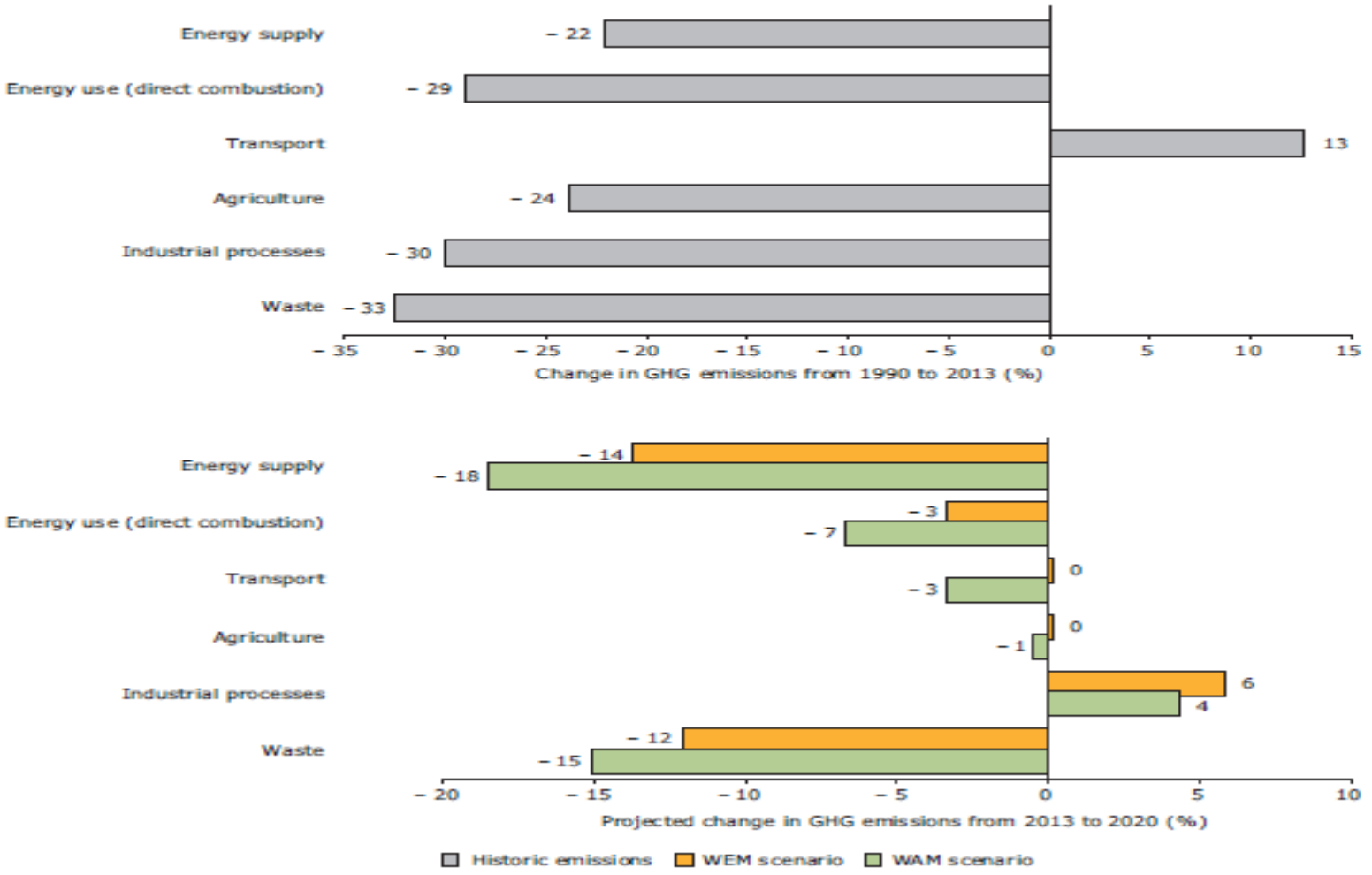

EU goal: reduction in GHG reduction by at least 80 % compared to the 1990 level in 2050 EC, 2011 (2030 – 40% reduction)

EC reference 2013 (2016) scenario: with existing policies 32 (35)% reduction in 2030 and 44 (48)% reduction in 2050 EC, 2013 and 2016



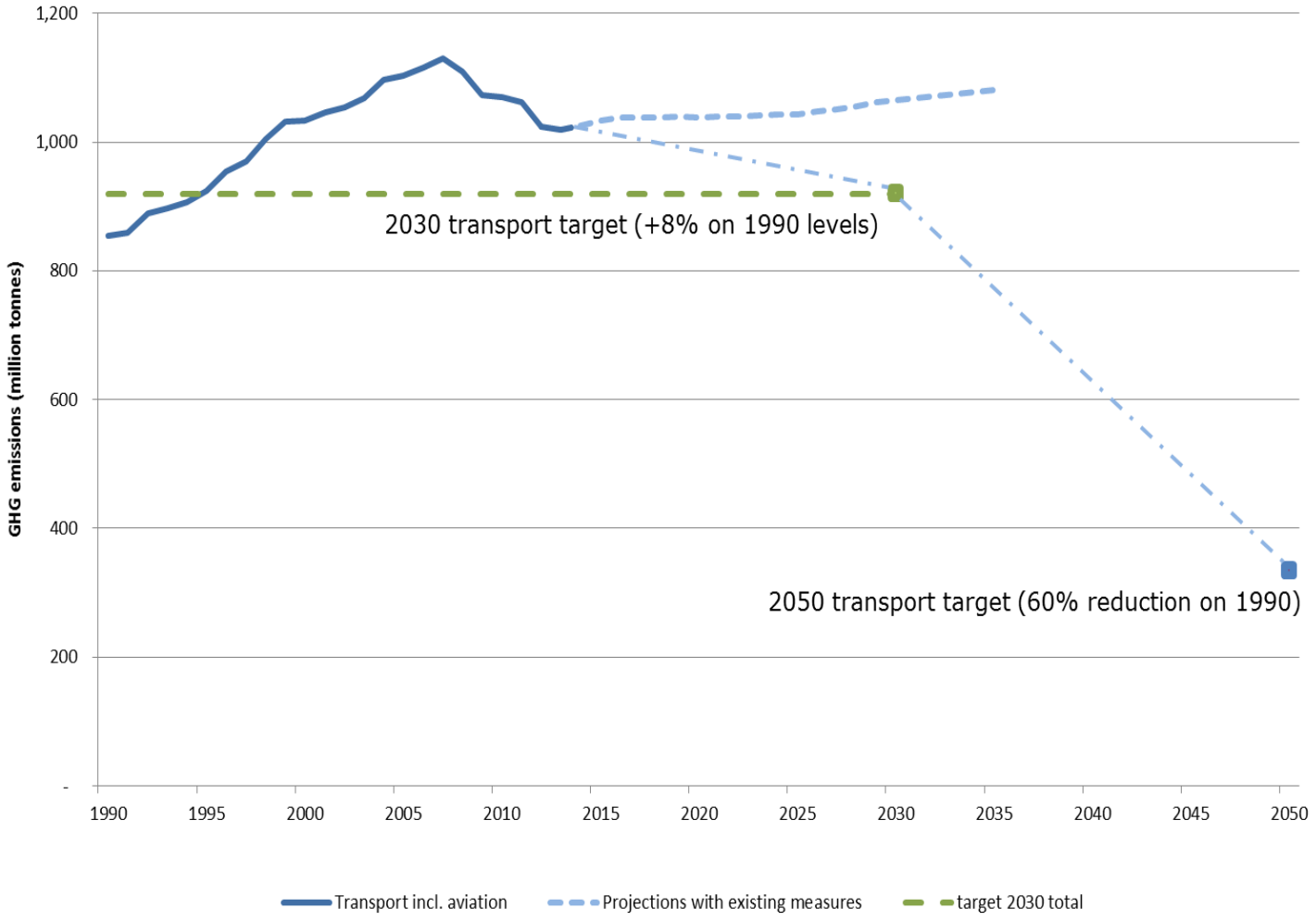
# Sectoral GHG emission changes – EU level

**Figure 4.2** Emission changes by sector, 1990–2013 (top) and projected changes under the 'with existing measures' scenario, 2013–2020 (bottom)




Source: EEA, 2014

# The transport sector illustrates the challenge




Source: EEA, 2016

Transport GHG emissions fell between 2008 and 2013, but rose in 2014.

They will have to fall by 67% by 2050 to meet the EU's 60% target.

But current projections based on existing policy measures point to an increase in coming years

# Policy target – transport fuels EU

EC Transport White Paper (2011) – aiming for a 70% reduction of transport oil consumption from 2008 levels by 2050 (EEA, 2014):

→Implication: reduction in tax base of 2.8% p.a. (tax base erosion?)

→Keeping transport fuel tax revenues constant would require annual average increase by more than 4% of tax(in real terms) assuming GDP increase of about 78%

→Increase in numbers of electric vehicles has also fiscal implications (i.e. electricity tax versus petrol/diesel taxation; average 8 and 5 times higher than electric-driven vehicles – based on German energy tax rates)

Programmes of a ban of sales of internal combustion engine (ICE) / phasing out fuel-powered transportation (for example, Norway 2025)→ what will be the **fiscal implications?**

# Trends in EU15 petrol tax rates 1995-2015

Japan – tax rate on unleaded petrol: 48 600 JPY per 1,000 litres (approx. € 395) (source: OECD) --- €1 – 123 JPY

# Trends in EU15 diesel tax rates 1995-2015

Japan – tax rate diesel: 32 100 JPY per 1,000 litres (source: OECD) (approx. € 261)


Source: author based on EC and Eurostat

# Reflections: Environmental taxation

**Co-benefits of carbon pricing / environmental taxation**:

- *Unlike previous research on fiscal consolidation, our findings* [IMF] *show that raising tax revenue is key to successful debt reduction in countries with large fiscal adjustment needs …. carbon taxation may help the budget while at the same time addressing efficiency concerns* (Baldacci et al., 2010)
- Environmental taxes: have mostly positive effect on growth as compared to other taxes (direct and indirect): *energy taxes would cause less economic harm per unit of revenue than direct (i.e. income) or indirect taxes, while also producing other benefits* (Vivid Economics, 2012) → less-detrimental to growth!

**Environmental taxation is a key policy for fostering sustainable growth, should also promote innovation supported by complementary policies.**

**Carbon pricing (emission trading or carbon taxation) – a prerequisite for effective climate change and essential for the transition to a low-carbon, resource efficient economy!**

# Carbon/energy taxation in the future

It is regularly stated that tax base erosion of energy/CO2 dimension (relevance of transport fuels) is not an issue because

- no substitution possibilities;
- price elasticities are low and long-run demand for fuels is inelastic;
- income elasticity less than one.

→Situation will change in the long-run as reduction targets were so far not leading to a major reduction in energy consumption – and reduction targets are established

Denmark - goal for 2050 is that all energy consumption, including the transport sector, will be based on renewable; Norway – climate neutral 2030; Sweden – 2045 climate neutral; EU low carbon roadmap – 80% GHG reduction; German Climate Action Plan 2050 – transport GHG emission reduction target corresponds to annual reduction by about 3% (2014-2030)

# Carbon/energy taxation in the future

It is regularly argued that an increase in CO2 prices offset decrease in energy use

IEA/IRENA, 2017, Perspectives for the Energy Transition Investment needs for a low-carbon energy (scenario: to limit the rise in global average temperature to well below 2° C from pre-industrial levels)

Table 2.1 • Summary of $CO_2$ prices in the 66% 2°C Scenario (USD/$tCO_2$)

| | 2020 | 2030 | 2040 | 2050 |
|---|---|---|---|---|
| OECD countries | 20 | 120 | 170 | 190 |
| Major emerging economies* | 10 | 90 | 150 | 170 |
| Other regions | 5 | 30 | 60 | 80 |

* includes People's Republic of China (hereafter "China"), the Russian Federation (hereafter "Russia"), Brazil and South Africa.

% annual increase:
7.8% - 9.9% - 9.7% (2020-2050) and
19.6% - 24.6 % - 19.6% (2020-2030)

Rockstroem et al. (2017; Science 255): $400 by mid-century (carbon law: halving GHG emission every decade)

→ Social cost of carbon (SCC) as a proxy for carbon pricing (taxation) policy: this discussion seems to be obsolete as rate is put at $(2007) 36 per ton of CO2 in 2015 – increasing to $ 69 in 2050 (based on US Interagency Working Group (IAWG) on SCC – but now withdrawn; importance for cost-benefit analysis)

*As regards valuing carbon damages, the standard approach in the economics literature would be use the social cost of carbon ⋯ In light of the 2015 Paris Agreement, countries may instead prefer to use CO2 values in line with their mitigation pledges* (Coady et al., 2017).

# Ageing population

The age structure will have major implications as Europe is *turning increasingly grey* (EC, 2015) and the budgetary implications as public age-related expenditure (pension, health care, long-term care and education) are projected to increase by about 2 pp of GDP in 2050.

❖Shrinking labour force with implications → erosion of labour tax base; impact on growth (GDP, jobs – labour productivity, etc.) and environment

❖Expenditure patterns will differ because of demographic changes – reduction in VAT and income tax revenues (?)

❖Current state of low growth rates and low investment (‘*secular stagnation*’); low growth rates leads to low increase in tax revenues / employment / investment (productivity change)

*Shrinking populations pose a formidable fiscal challenge. …. In particular, a declining*

# Population projection

Projection:

- Total population
- Elderly population (65 years and over)
- Labour force (age between 15 and 64 years)

→ Large differences between EU Member States; similar projection for Japan and Germany!

| | Total population | Elderly population (65 and over) | Share of elderly population | Labour force (age between 15 and 64) | Share of age group (15-64) | increase in elderly population | change in labour force share |
|---|---|---|---|---|---|---|---|
| | million | million | % of total population | million | % of total population | in % | in % |
| Germany | | | | | | | |
| 2013 | 81.3 | 17.1 | 21.0 | 41.8 | 51.4 | | |
| 2050 | 74.5 | 23.7 | 31.8 | 33.0 | 44.3 | 38.6 | -21.1 |
| UK | | | | | | | |
| 2013 | 64.1 | 11.1 | 17.3 | 31.8 | 38.5 | | |
| 2050 | 77.3 | 18.5 | 23.9 | 36.1 | 32.0 | 66.7 | 13.5 |
| Italy | | | | | | | |
| 2013 | 60.2 | 12.8 | 21.2 | 24.7 | 52.8 | | |
| 2050 | 67.0 | 20.0 | 29.9 | 24.7 | 53.9 | 56.3 | 0.0 |
| Japan | | | | | | | |
| 2015 | 126.5 | 33.3 | 26.3 | 77.0 | 60.8 | | |
| 2050 | 107.4 | 39.0 | 36.3 | 55.1 | 51.3 | 17.1 | -28.4 |

Source: EC, 2015 Ageing Report and UN data https://esa.un.org/unpd/wpp/Download/Probabilistic/Population/data (Japan)

# Challenges of fiscal policy – demography and environment

- Environmental tax revenues – policy targets; reduction in primary energy consumption / CO2 emissions
- Income / consumption by age cohort → income tax revenues and VAT; a granular representation of the age structure as compared to intertemporal consumption
- Increase in age-related expenditures
- Future employment and the 'gig' economy / digitalisation / robotics / industry 4.0: (different taxation rules and social security contribution – income level 'precariat'; inequality) → new business model as one of the critical factors in the circular economy discussion as well as in the 'evolving society' (a large variety of studies is available with different results regarding the number of job losses (?) as a consequence of robots)

- Fiscal policy – effects of demographic change, environmental and labour 'tax base erosion' and fiscal sustainability!

# Fiscal/tax stem in the futureys

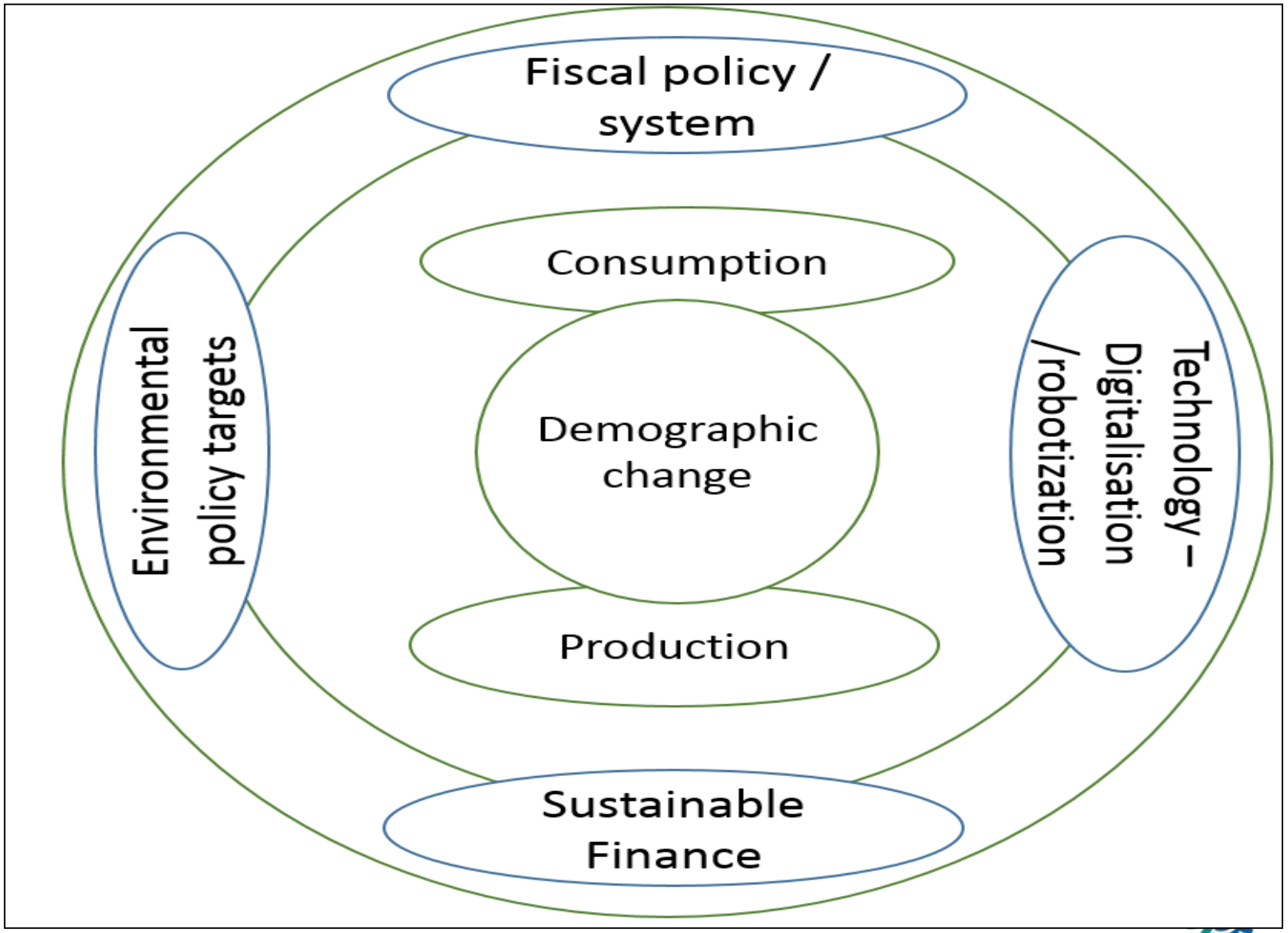
*A tax base should reflect an economy's capacity to fund public expenditures, meaning that as the economy grows, the tax base should grow with it. Otherwise, it will be necessary to raise tax rates and, in doing so, worsen economic distortions*

Source: Auerbach A.J., 2010, California's Future Tax System, *The California Journal of Politics & Policy,* Vol 2:3, pp1-20

# Ageing population: challenge or opportunity?

New research project started at the EEA – see schematic representation (a graphical attempt):

Assessing demographic change, fiscal/finance, environmental policy and technological development in a systemic way



# Reflections

Task: **to establish a resilient, long-term fiscal system in the face of systemic challenges**

- the challenge is to combine economic, environmental and social policies – offset rather complex policies and country specific conditions in the EU
- environmental / energy taxation including EU ETS - stable revenues guaranteed in the long-run *versus* reduction targets of climate and energy policies (tax base erosion)
- ageing population with reduction in labour force (tax base erosion)
- income /wealth inequality increase
- ETR / tax-shifting programme: a policy tool for the short- and medium term but question remains – the role for ETR in the longer-term?

# Thank you for your attention

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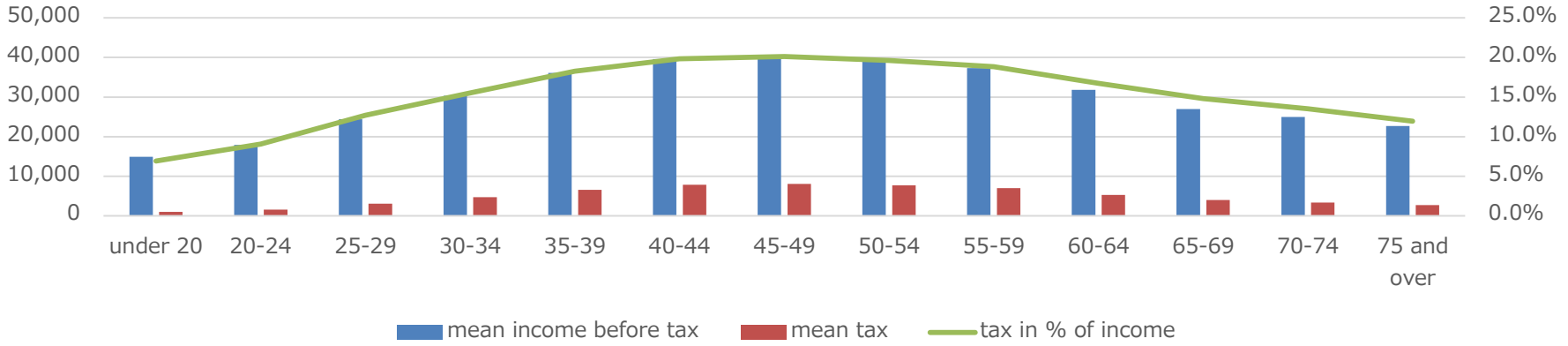
- Additional slides

# Fiscal – demographic changes and the environment

UK – annual mean income (UK£) and tax by age range, 2014-15
(source: ONS)




'est/cal' income tax revenue per age cohort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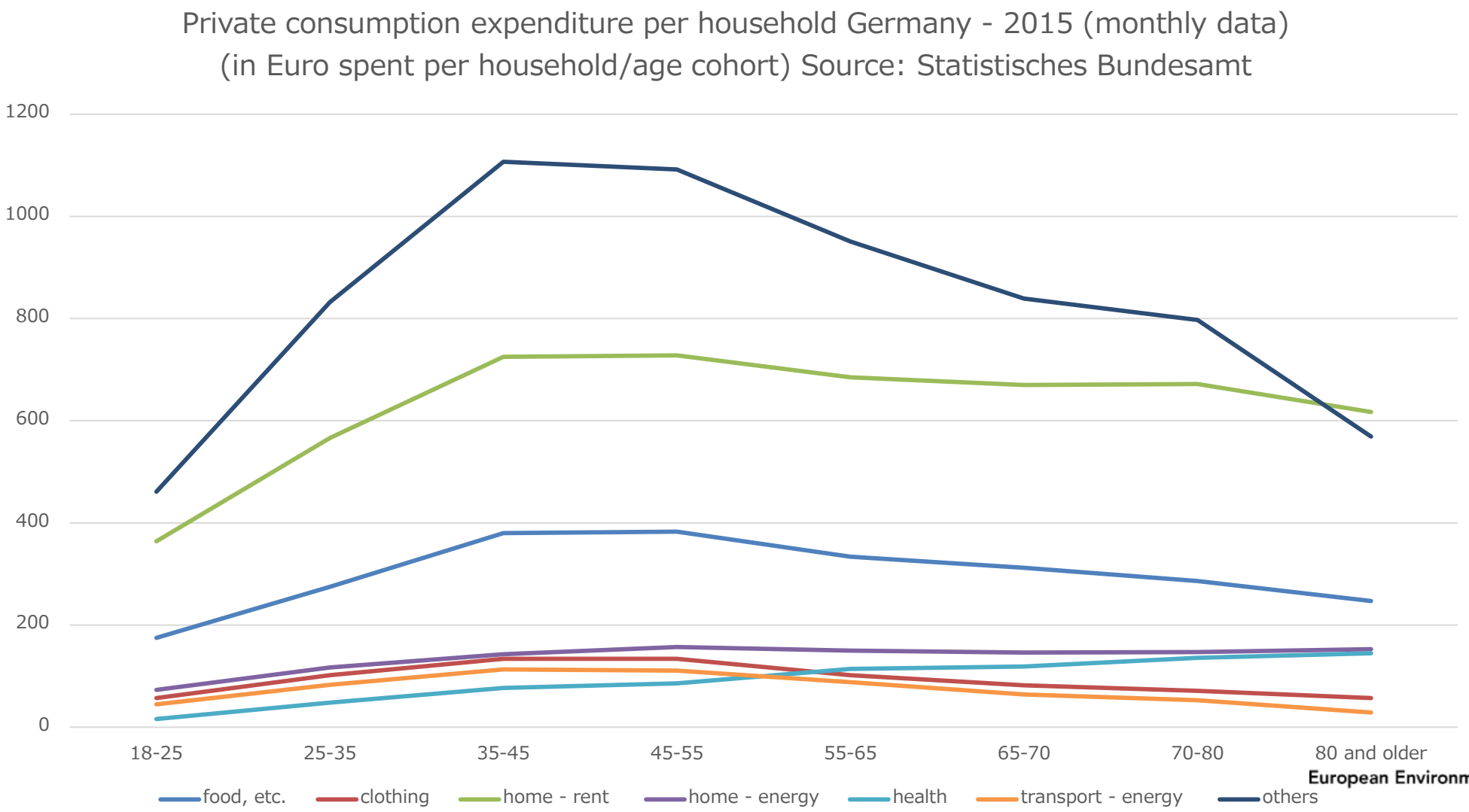
# Fiscal - demographic changes and the environment

Consumption expenditure by age cohort (Eurostat http://ec.europa.eu/eurostat/web/household-budget-surveys/database)




European Environment Agency

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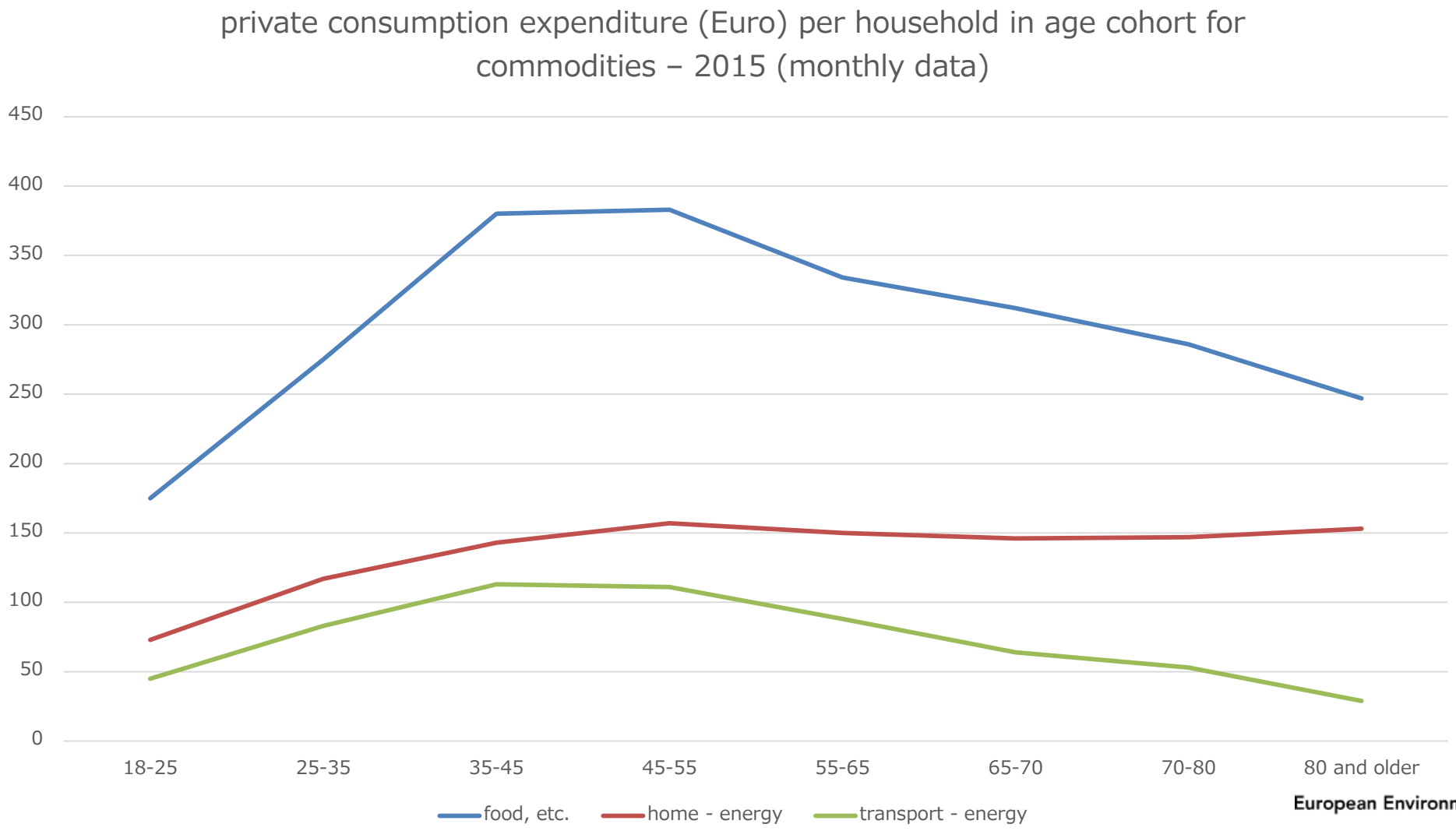


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