

Environmental taxation in Europe

DIS – Study Abroad in Scandinavia

14 April 2020

Stefan Speck

European Environment Agency

The views expressed are those of the author and may not in any circumstances be regarded as stating an official position of the European Environment Agency or its Management Board.

Content

1. General aspects: motivation / rationale for environmental taxation

2. Environmental taxation in practice

Types of environmental taxes

Revenues from environmental taxes

3. Design of environmental taxes

Public Policy (*'Realpolitik'*)– the difference between theory and practice

4. Carbon pricing policies

Europe and US

1. General aspects: motivation / rationale for environmental taxation

Market-based instruments the reason for their use

Markets provide the most efficient means of allocating scarce resources

- neoclassical economics: markets lead to pareto-efficient outcome (maximum satisfaction of preferences) but outcome can be '*perfectly disgusting*' (Amartya Sen)

Markets can also be subject to failures with the consequence that environmental costs and benefits are not reflected in prices (prices do not reflect the '*true*' or '*full*' costs/externalities) → rationale for governmental intervention (**market failure - *polluter pays principle***: practice that those who produce pollution should bear the costs of managing it to prevent damage to human health or the environment (OECD, 1972)

→ set out in the Treaty on the Functioning of the European Union (Article 191(2) TFEU)

→ USA: principle employed in major US pollution control laws (Clean Air Act, Clean Water Act); but not fully implemented as a distinct principle or policy

Government intervention: ***existing markets*** (taxation) or ***creating new markets*** (trading schemes) – regulatory policies (ban, performance standards, etc.)

Environmental taxation – rationale

- The *primary objectives* and benefits of environmental taxes are to reduce pollution and resource use; by internalising externalities / external costs, i.e. to correct an inefficient market outcome, and to change behaviour [societal costs are higher than individual costs, i.e. influence relative prices]
- *Secondary benefits* to be considered: 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 revenue

Advantages - Taxes encourage both static and dynamic efficiency gains as compared to regulation

- helping to ensure that environmental goals are achieved at the lowest social cost
- creating ongoing incentives to continually reduce pollution / resource use

Environmental taxation – main barriers

Main concerns hampering the widespread application of environmental taxes:

- **Competitiveness** issues (regularly addressed by providing tax exemptions / reduction; example: tax reductions for energy-intensive industries)
- **Distributional / equity** implications (impact on low-income households)
- Unstable/shrinking tax base and **revenue stability over time** (*less discussed in the literature so far but of relevance in context of environmental tax reform / tax-shifting programme*)

neither regulatory policies nor market-based policies alone to be implemented as they work together best – the implementation of a **smart policy mix** is required (example: transport fuel taxes and vehicle emission performance standards, i.e. improvement in vehicle efficiency but challenge achieving efficiency gains because of rebound effect – more efficient cars but they are larger and heavier)

Policy failure - arises from government policies that generate ‘perverse’ incentives with regard to the uses of resources and pollution behaviour (for example, environmentally damaging subsidies)

2. Environmental taxation in practice

Types of environmental taxes

Revenues from environmental taxes

What is an environmental tax?

The definition of an environmental tax:

A tax whose tax base is a physical unit (or a proxy of it) of something that has a proven, specific negative impact on the environment

Source: United Nations, European Union, Food and Agriculture Organization of the United Nations, International Monetary Fund, Organisation for Economic Co-operation and Development, The World Bank, 2014, System of Environmental-Economic Accounting 2012 - Central Framework.

→ environmental motivation and/or the purpose for implementing a tax is not relevant for the definition of an environmental tax - completely based on the tax base

Environmental taxes – classification

- **Energy**
 - Energy products for transport purposes; energy products for stationary purposes; CO2 taxes
- **Transport**
 - Motor vehicles import or sale (one off taxes); registration or use of motor vehicles - recurrent (e.g. yearly taxes); road use (e.g. motorway taxes); flights (flight ticket tax); etc.
- **Pollution**
 - Measured or estimated emissions to air; ozone depleting substances (e.g. CFCs or halons); measured or estimated effluents to water; non-point sources of water pollution (e.g. pesticides); waste management; noise
- **Resources**
 - Water abstraction; extraction of raw materials (minerals, aggregates, sand); forestry

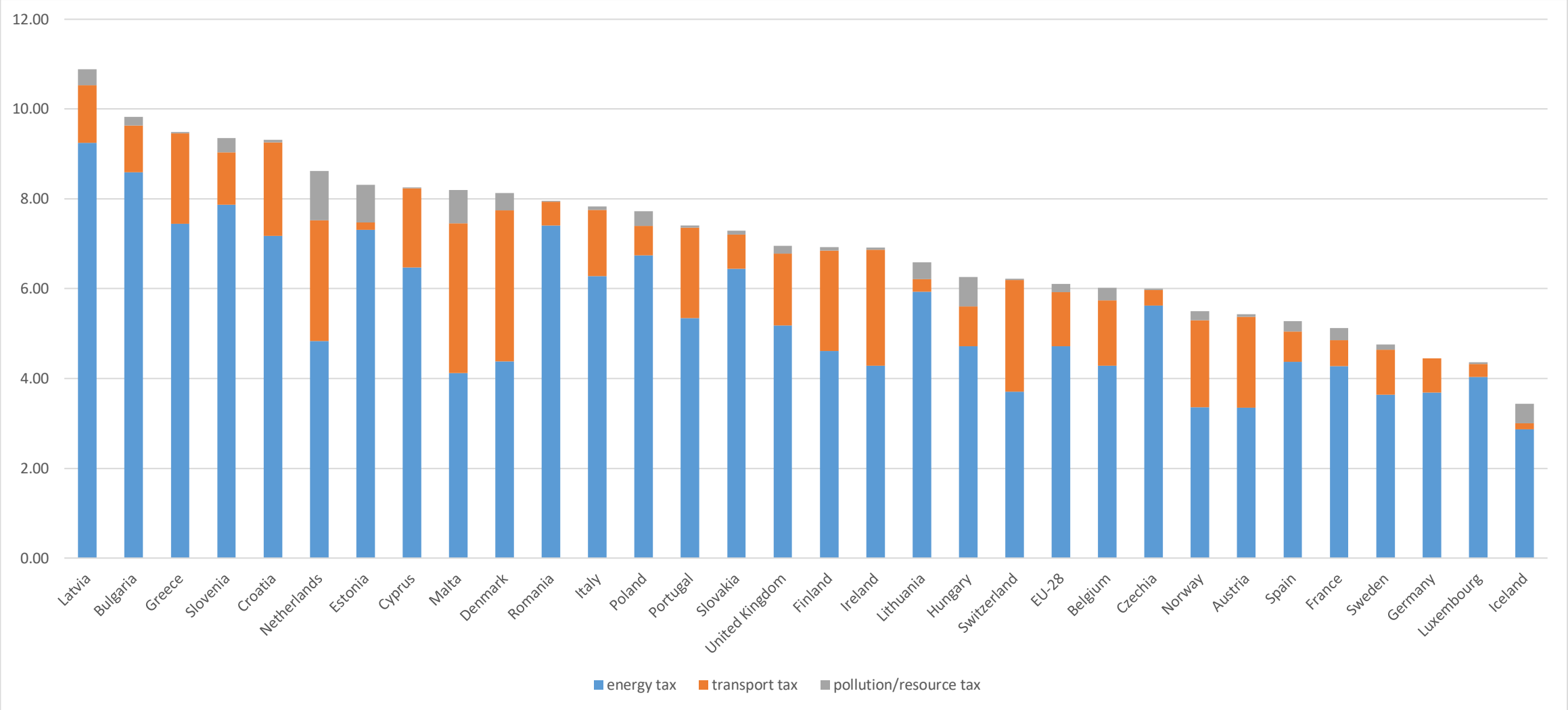
In national accounts, the payments for emission permits are recorded as ‘other taxes on production’ (i.e. revenues included under environmental taxes)

Environmental taxes – revenue

Classification of environmental taxes and revenue share in EU-28 (2018)

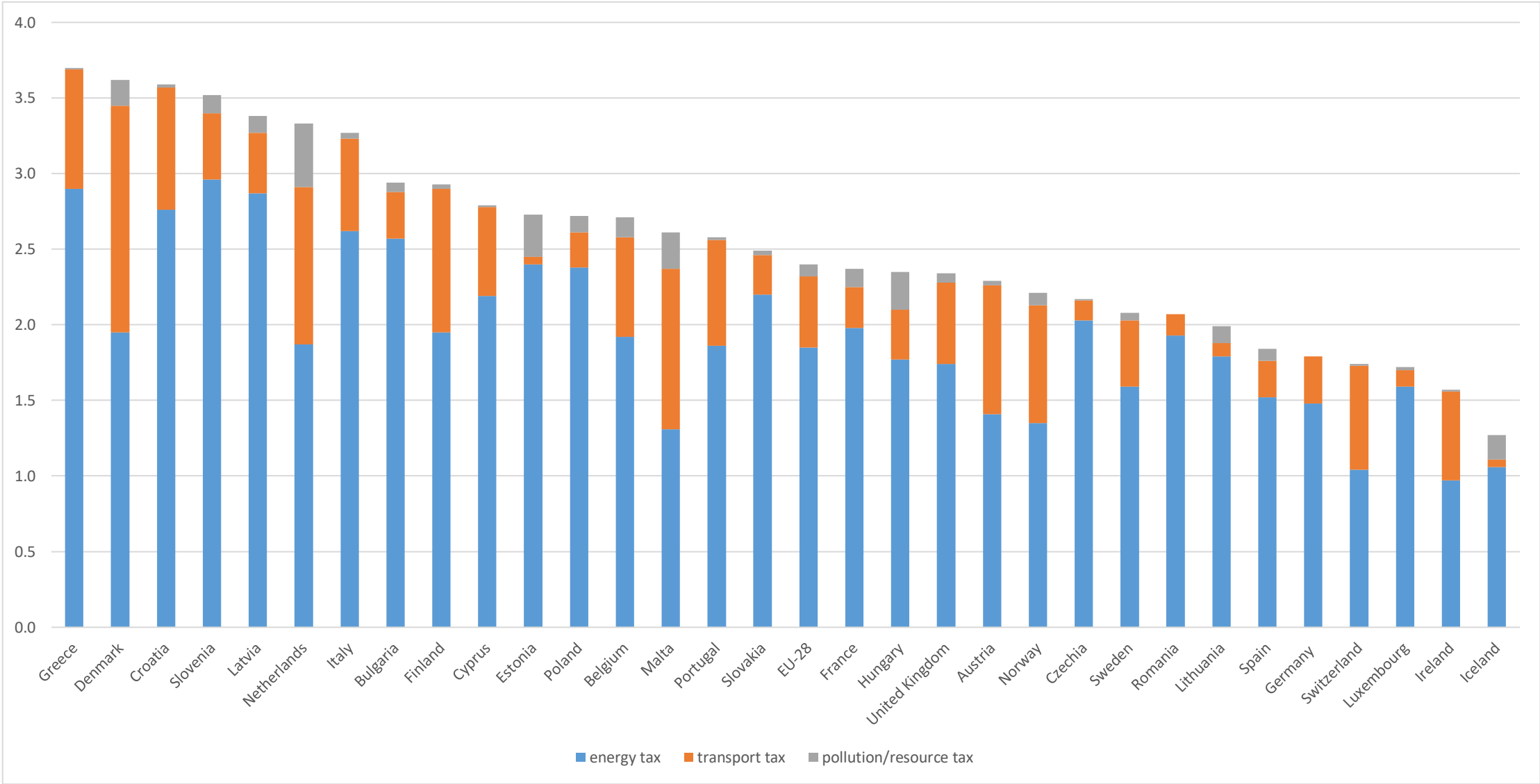
- **Energy / CO2 taxes** (includes revenues from auctioning of emission trading schemes EU ETS)
 - EU-28: average 77% of total environmental tax revenues; Malta 50%, Denmark 54%
Luxembourg 92% and Czechia 94%
 - (EU ETS: less than 5% of total environmental tax revenues in 23 EU MS; Bulgaria, Czechia and Romania between 9 and 16%)
- **Transport taxes**
 - EU-28: average 20%; Estonia 2% and Lithuania 6%; Denmark and Malta 41% and Austria 37%
- **Pollution and resource taxes**
 - EU-28: average 3%; Czech Republic 1% and Germany 0%; Hungary and Netherlands 13%

Environmental tax revenues in % of total tax revenues (2018)



Source: Eurostat

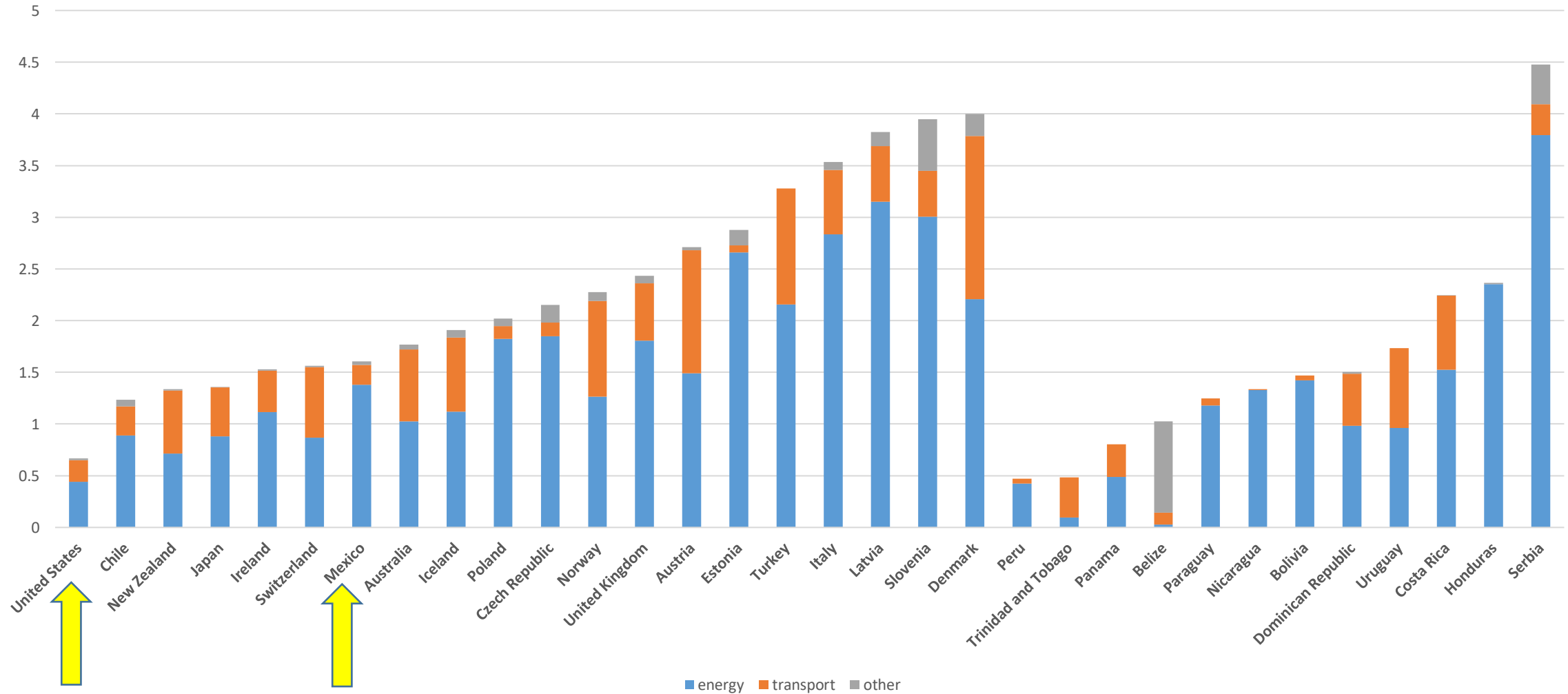
Environmental tax revenues in % of GDP (2018)



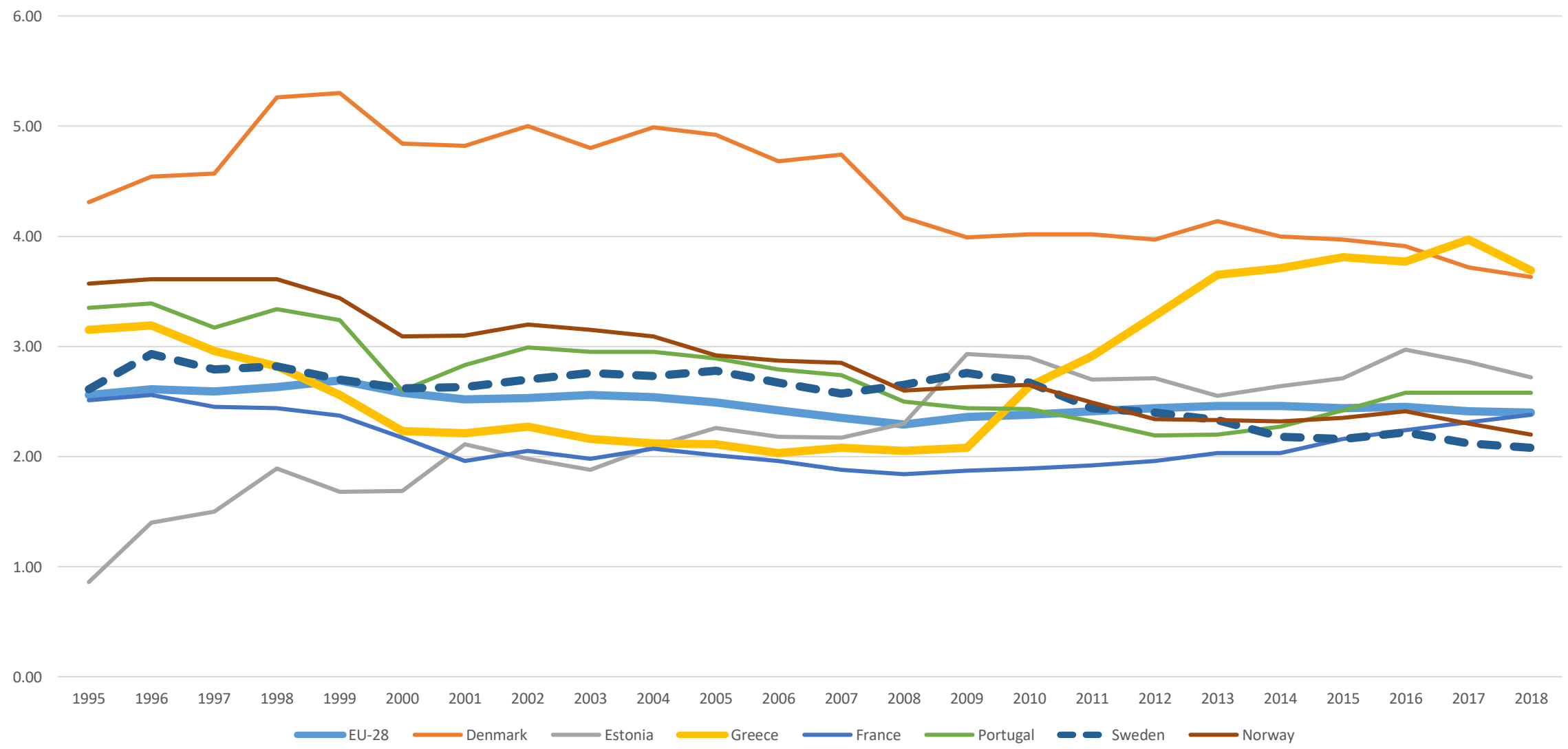
Source: Eurostat

Environmental tax revenue of selected countries

Revenue from environmental taxes in 2016 (% of GDP)



Trends in environmental tax revenue (% of GDP; 1995-2018)



Source: Eurostat

The fiscal dimension - Environmental Tax Reform

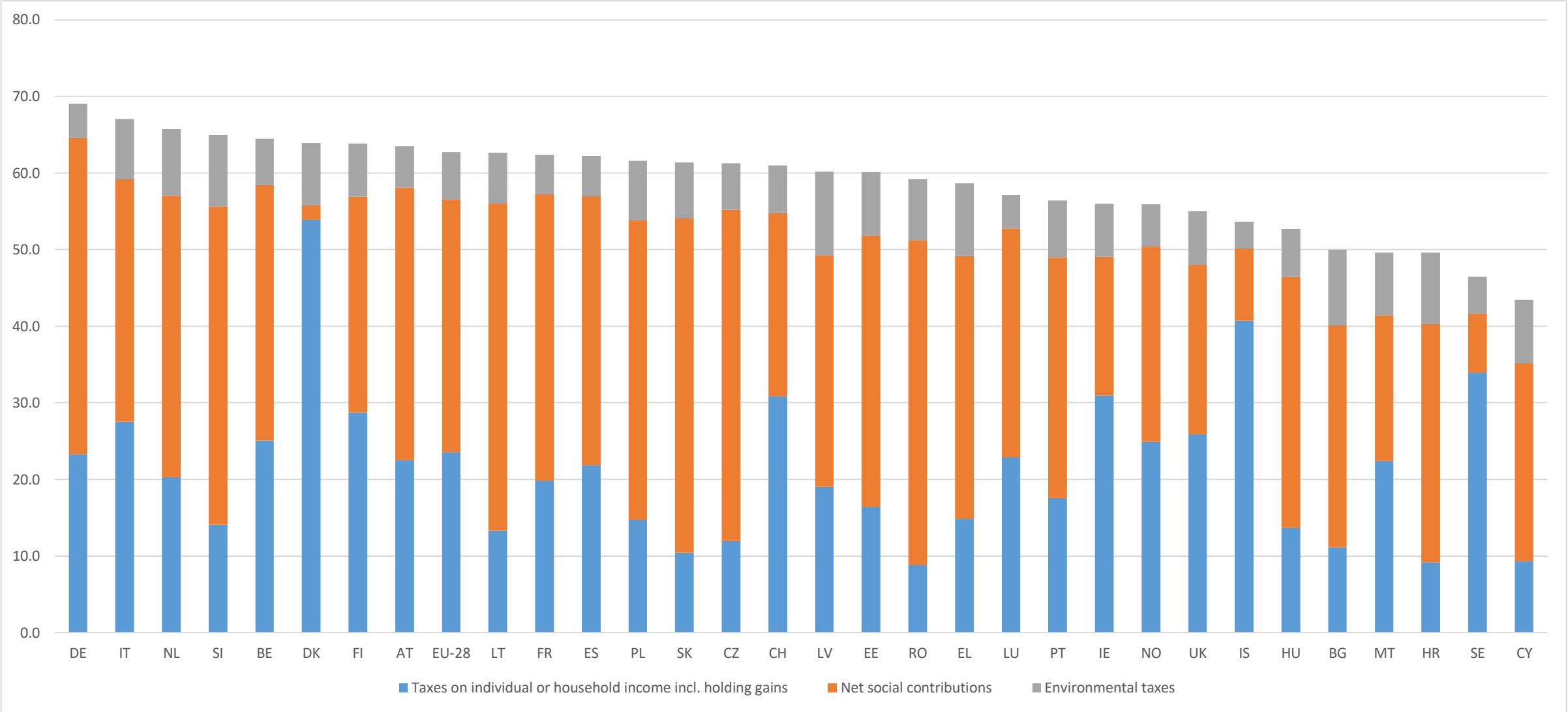
Environmental /ecological/ green tax reform:

*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, ..., 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)*

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

Implemented in different countries: Sweden, Denmark, Norway, Germany, UK, Canada (British Columbia), ..

Trends in environmental / labour tax revenue in % of total tax revenues (2018)



Source: Eurostat

Environmental taxes – USA

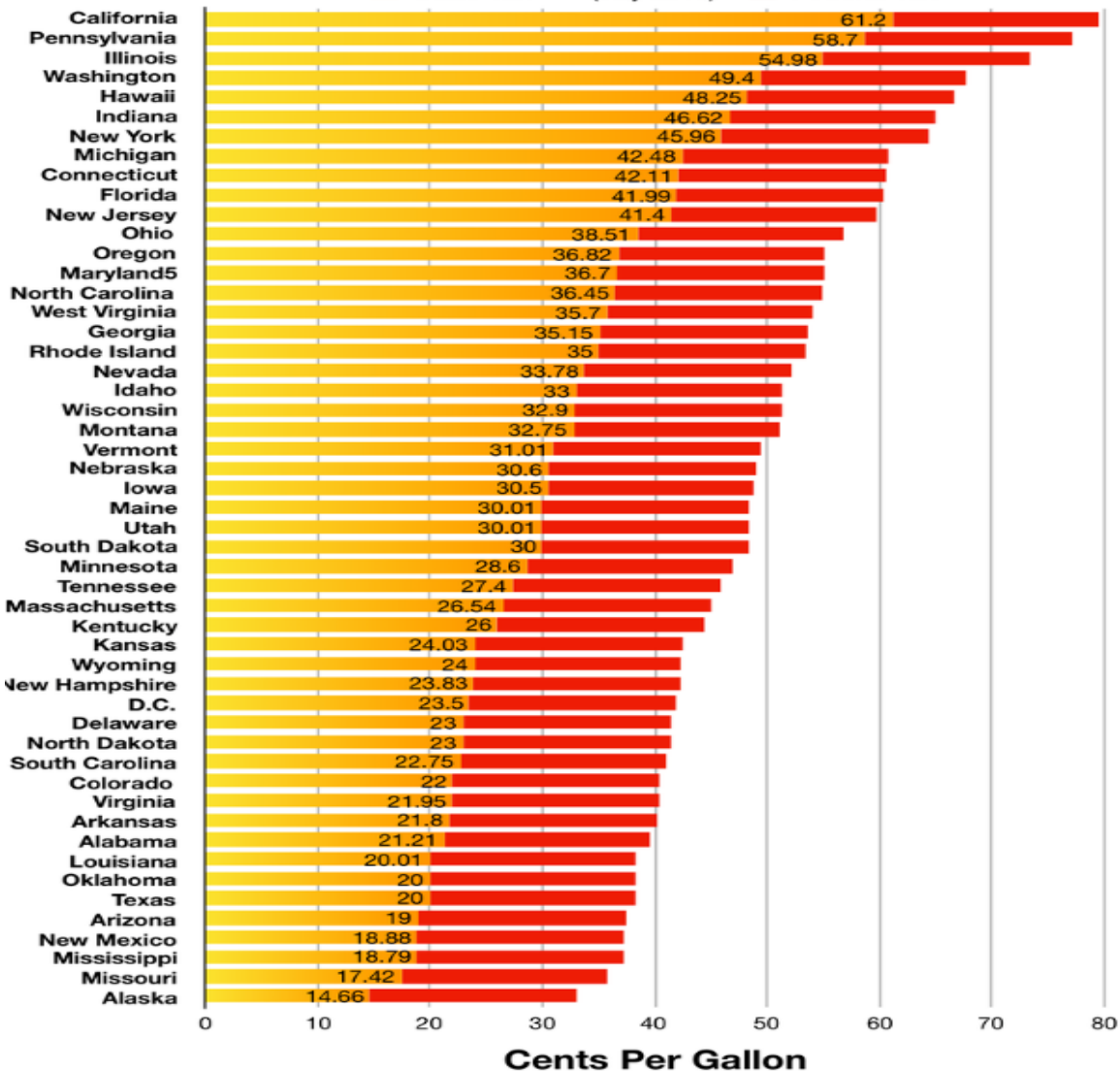
Environmental taxation in the USA

- Taxes on energy (transport fuels) – federal (1932) as well as state taxes
- Taxes on energy – electricity
- Transport – vehicle weight fees
- Resource – pollution taxes:
 - Beverage container recycling fee - Delaware
 - Ozone depleting chemicals tax - federal
 - Water quality tax – Florida
 - Waste tyre tax – Kansas
 - Timber tax – Mississippi
 - Waste disposal fee – Mississippi
- See for more information – OECD database on policy instrument for environmental purposes
<https://pinedatabase.oecd.org/>

Environmental taxes – USA: transport fuel tax rates

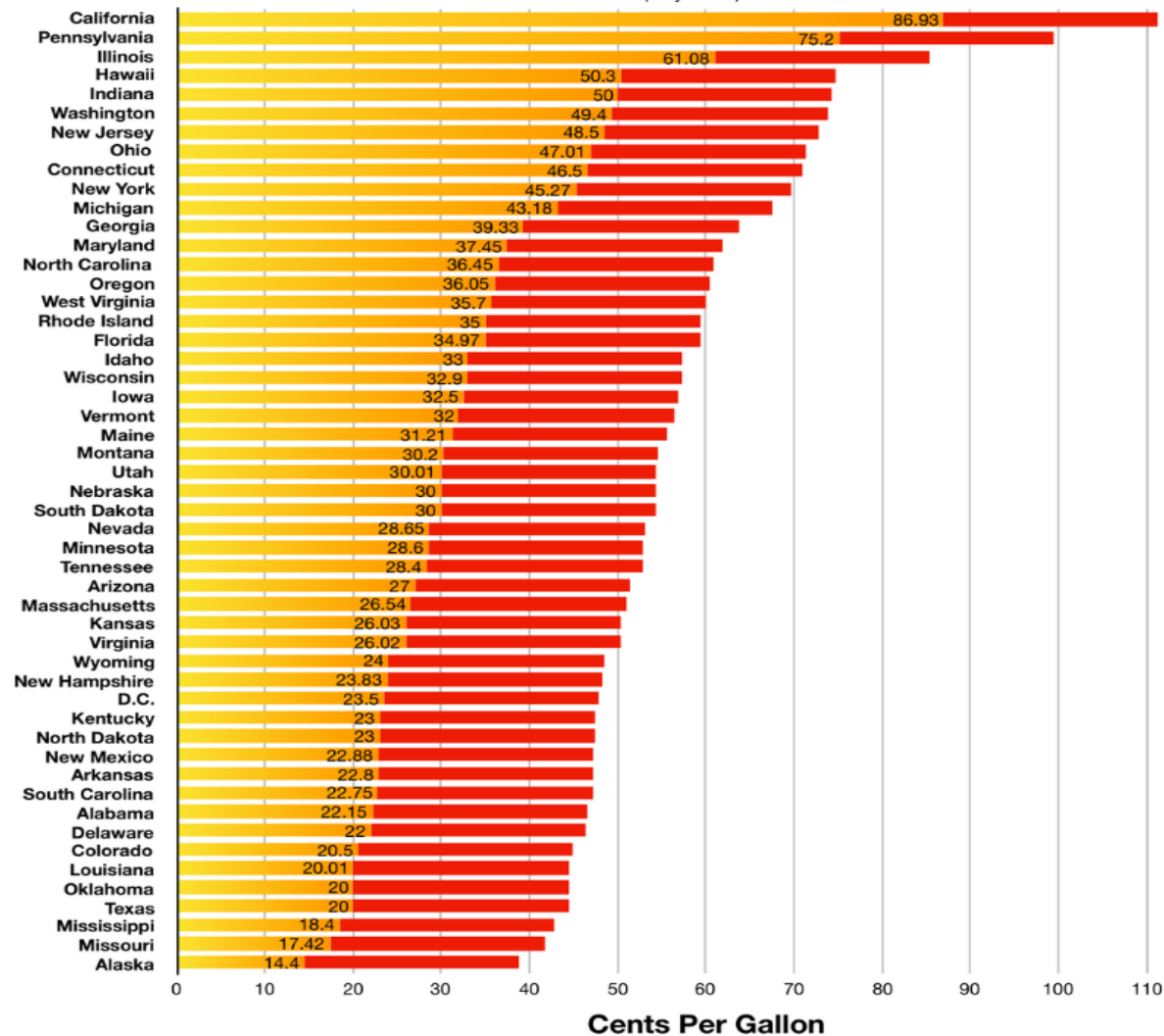
Gas Taxes in the United States

State Tax (July 2019) Federal Tax

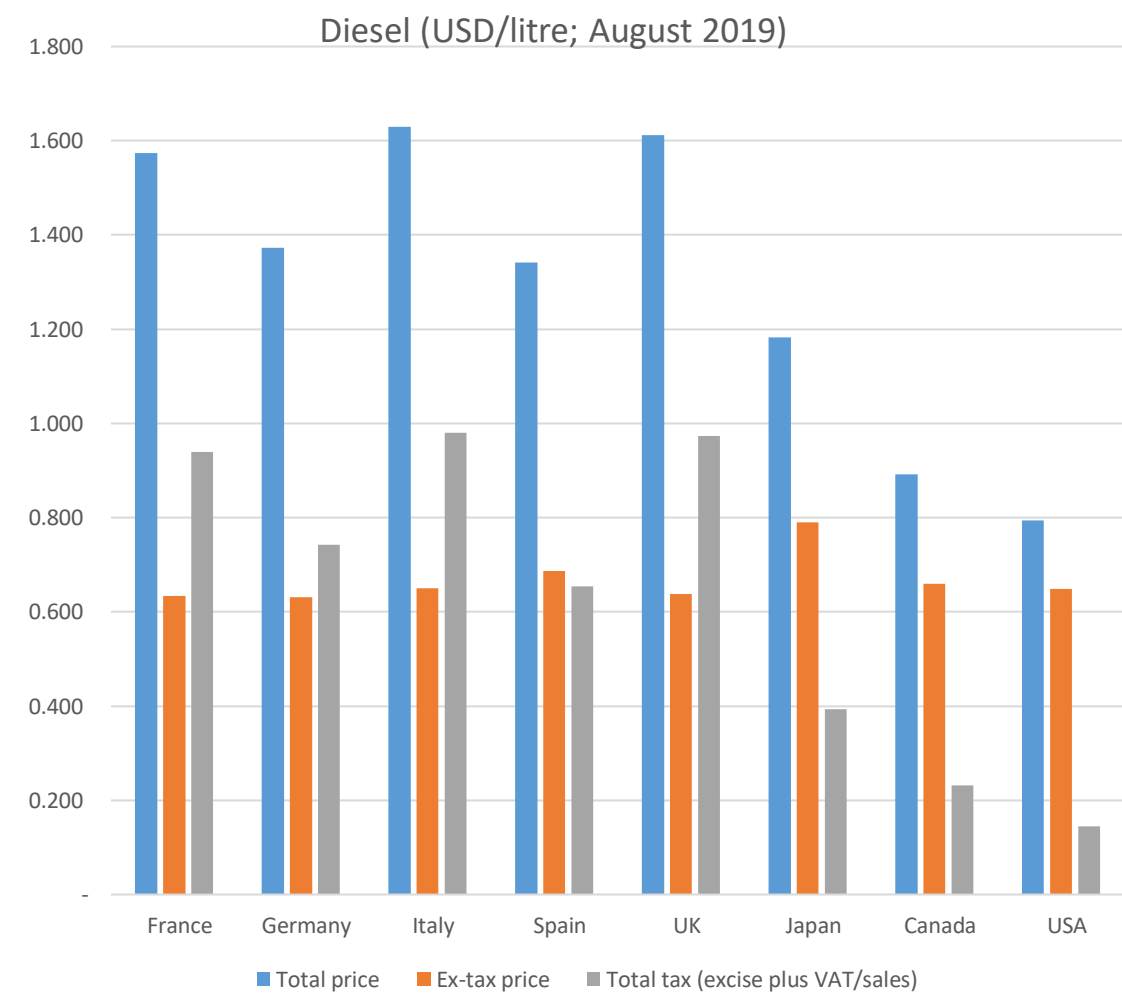
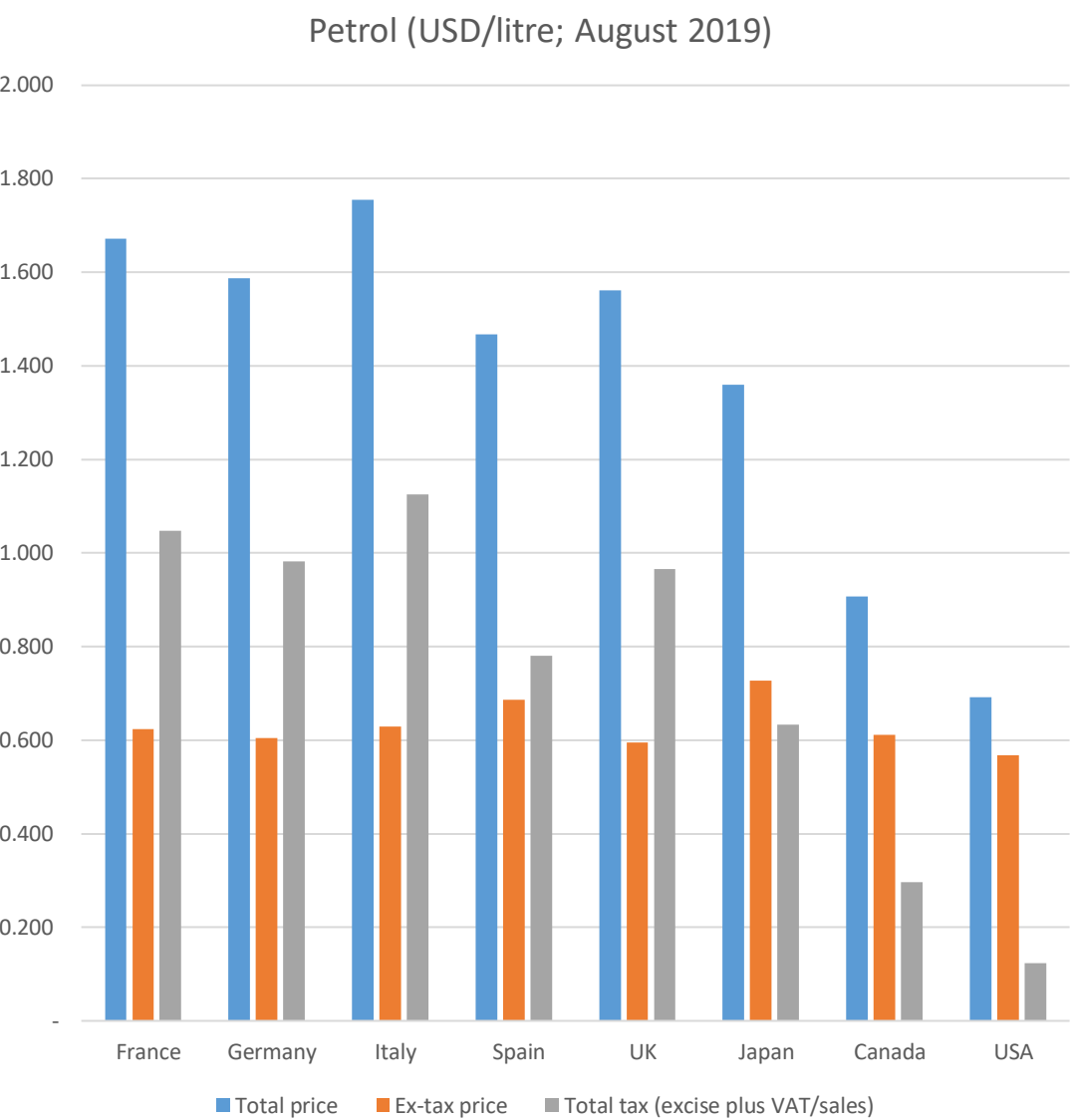


Diesel Taxes in the United States

State Tax (July 2019) Federal Tax



Comparison of transport fuel prices and tax



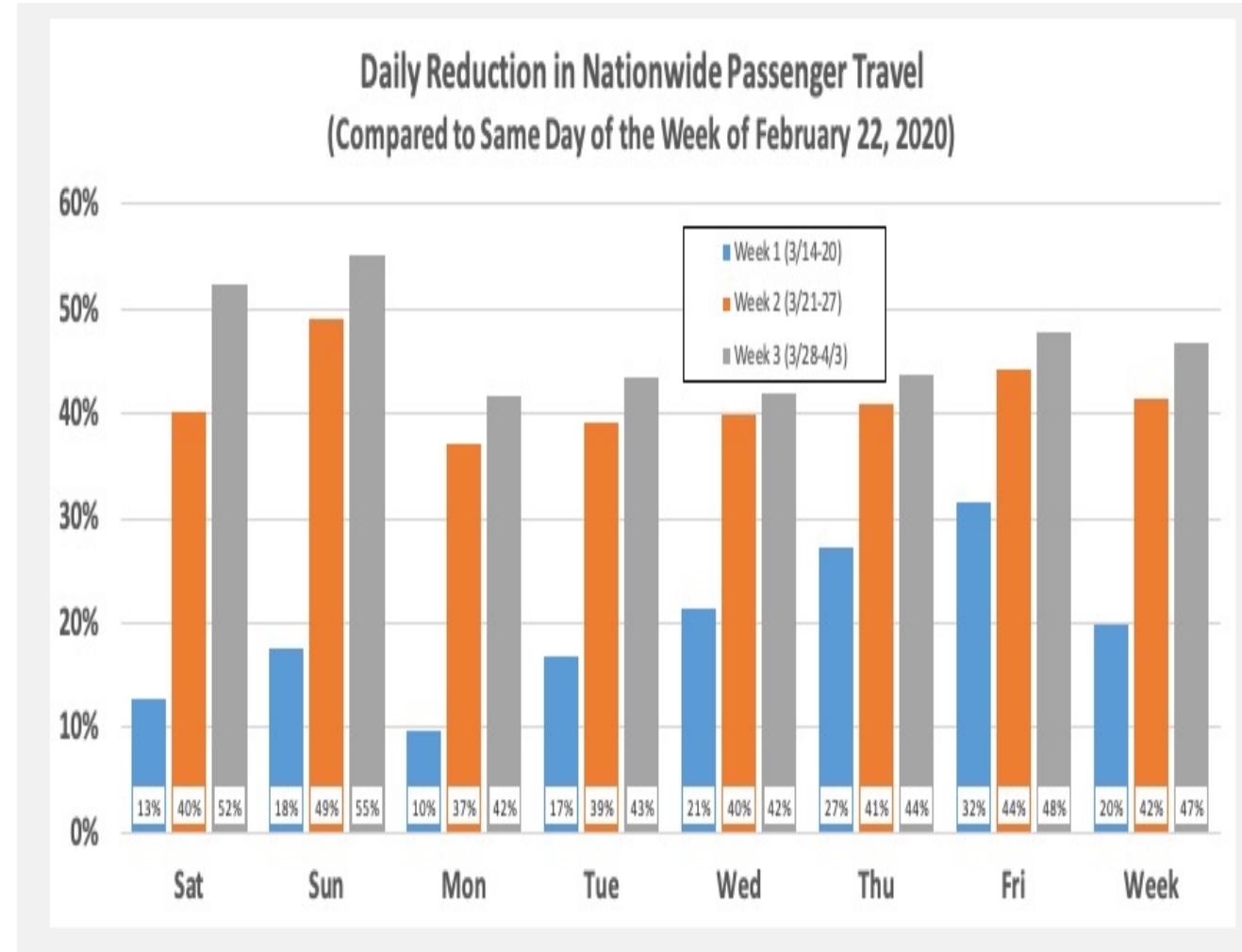
Based on <http://www.iea.org/statistics/monthlystatistics/monthlyoilprices/#d.en.34639> - US: 0.47 USD/gallon

Environmental taxes – USA: transport fuel tax

In 2018, state governments raised USD 48.2 billion and the federal government raised USD 36 billion in motor fuel excise tax revenue. Revenue from these taxes is largely used to fund infrastructure maintenance and new projects. (EU-27: €170 bill)

Since 1993 the federal tax rate was not increased / not indexed to inflation. This has eroded the value of the tax over the last 27 years; to maintain constant value, an 18.4-cent per gallon tax in 1993 would have to be 32 cents today.

Inflation increased by a total of 74 percent from 1993 until 2018



3. Design of environmental taxation from theory to practice (*Realpolitik*)

Design of environmental taxation – the theory

Economic theory for having a cost-effective and efficient carbon taxation scheme: all sources would be covered by the tax and the tax rate *‘would be set equal to the marginal benefits of emission reduction, represented by estimates of the social cost of carbon’* (Aldy and Stevens, 2012)

Two major approaches are known for designing the environmental tax rate:

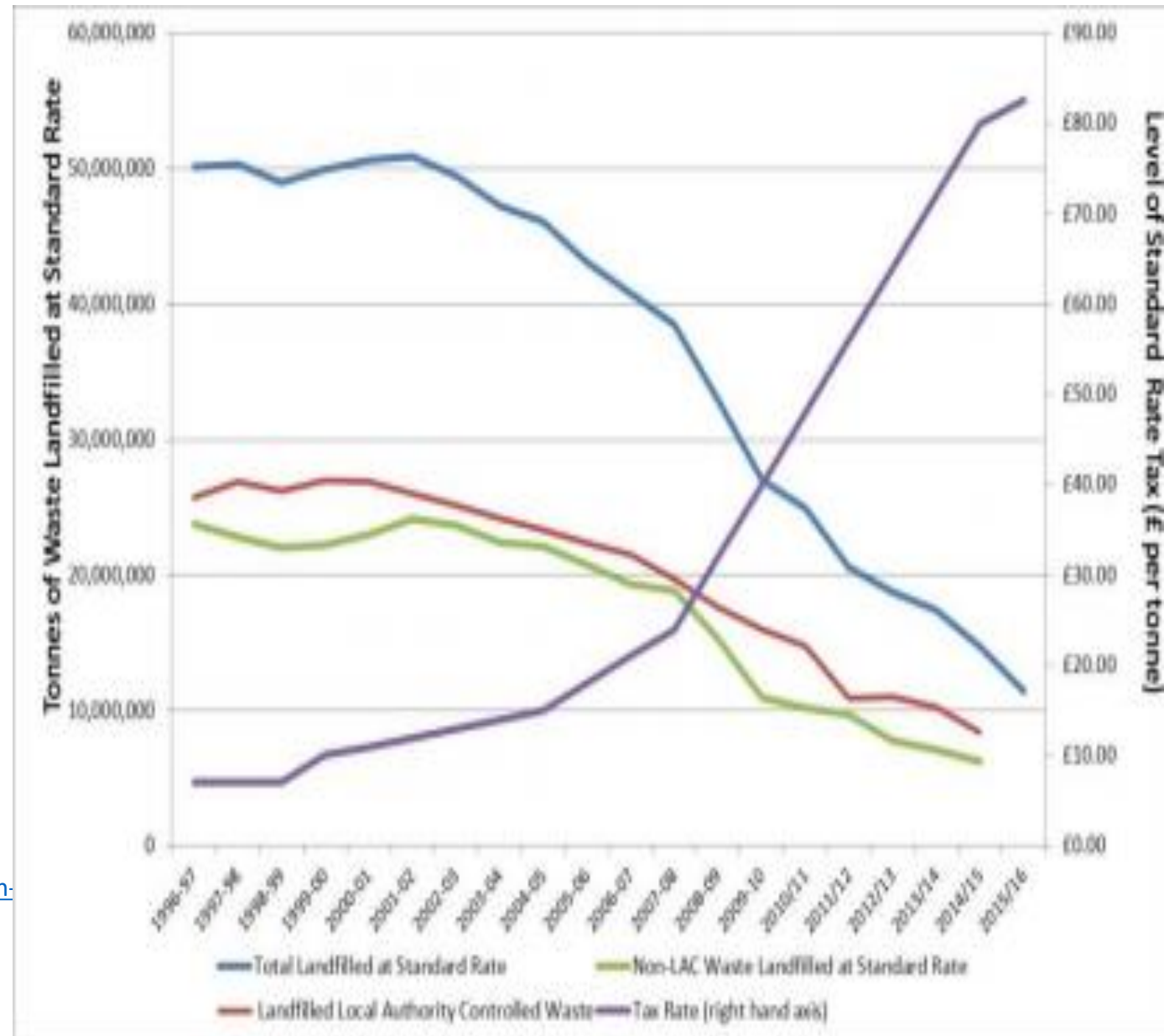
- assessment of external costs - ***internalising externalities*** - going back to Pigou, *The Economics of Welfare* (1920); sometimes called ***‘corrective taxes’*** (or *‘optimal taxes’*) (Pigouvian tax, need to know damage costs)
- A more pragmatic approach: tax rate is set on a level estimated via an iterative adjustment process arriving at emissions reductions; to be sufficient to reach a given reduction target – Baumol and Oates (1971); ***‘standard price approach’*** (need to know the reduction target)

UK landfill tax: moving from Pigou to standard-price approach

- Introduced in 1996 – based on the quantification / valuation of externalities – started with £7 per tonne
- Period 1999-2004: increase £1 per annum
- Period 2005-2007: increase £3 per annum
- Period 2008-2014: increase £8 per annum
- Now (since 2014): increase in line with Retail Prices Index (RPI)

→ target-based setting of the tax rate to comply with waste management targets

Source: <https://ieep.eu/publications/green-economy/new-suite-of-40-case-studies-on-environmental-fiscal-reform> (case study: UK landfill tax);
<https://www.gov.uk/government/publications/rates-and-allowances-landfill-tax/landfill-tax-rates-from-1-april-2013> and
<https://www.uktradeinfo.com/Statistics/Pages/TaxAndDutybulletins.aspx>



Economic theory – carbon taxation scheme: the pragmatic way

Example of combining pricing/taxing tool with quantitative policy target:

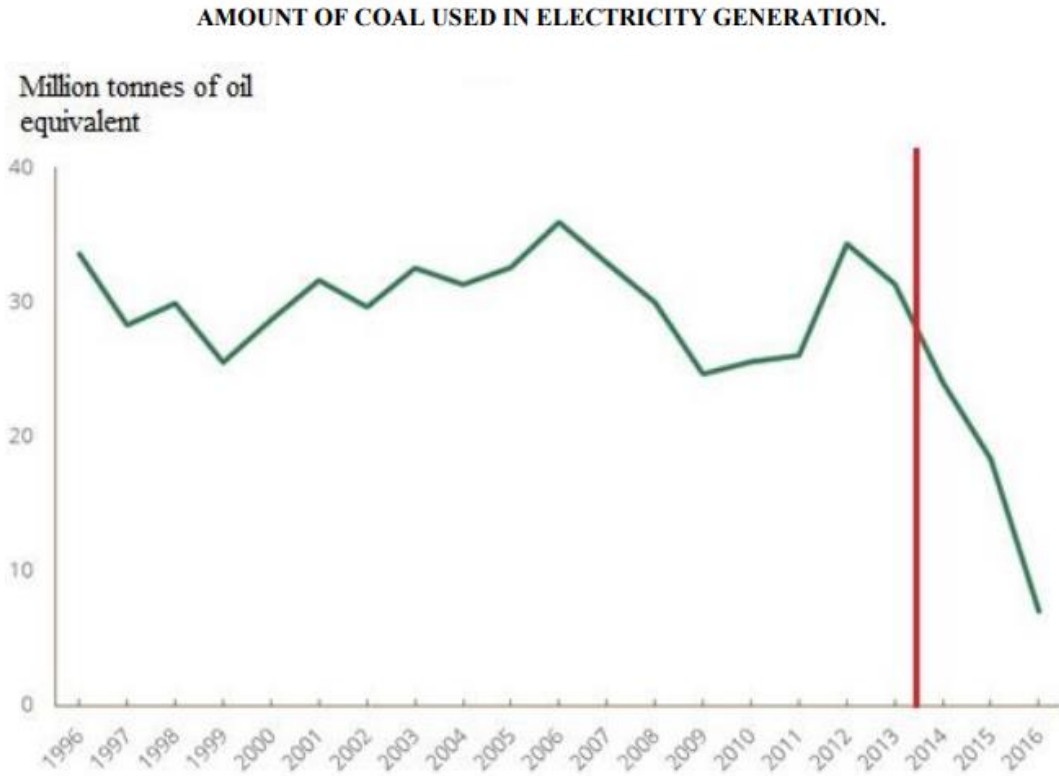
The Swiss CO2 levy

The Swiss CO2 levy on thermal fuels was introduced in 2008 and rate increased from CHF 12/t CO2 (10.7 Euro) to its current amount of CHF 96 CHF/t CO2 (85.3 Euro – as of 1.1.2018). The 2018 increase was implemented as the reduction of CO2 emissions from thermal fuels in 2016 amounted to 24.8% compared to the 1990 base year and the target was 27%, but will not further increase to the lawful maximum rate of 120 CHF/t CO2 (106 Euro).

Impact assessment: the CO2 levy has led to noticeable emission reductions (Federal Office for the Environment, 2018 see <https://www.bafu.admin.ch/bafu/en/home/topics/climate/info-specialists/climate-policy/co2-levy.html> and <https://www.bafu.admin.ch/bafu/en/home/topics/climate/info-specialists/climate-policy/co2-levy.html>)

Carbon Price Support (CPS) and Carbon Price Floor – UK

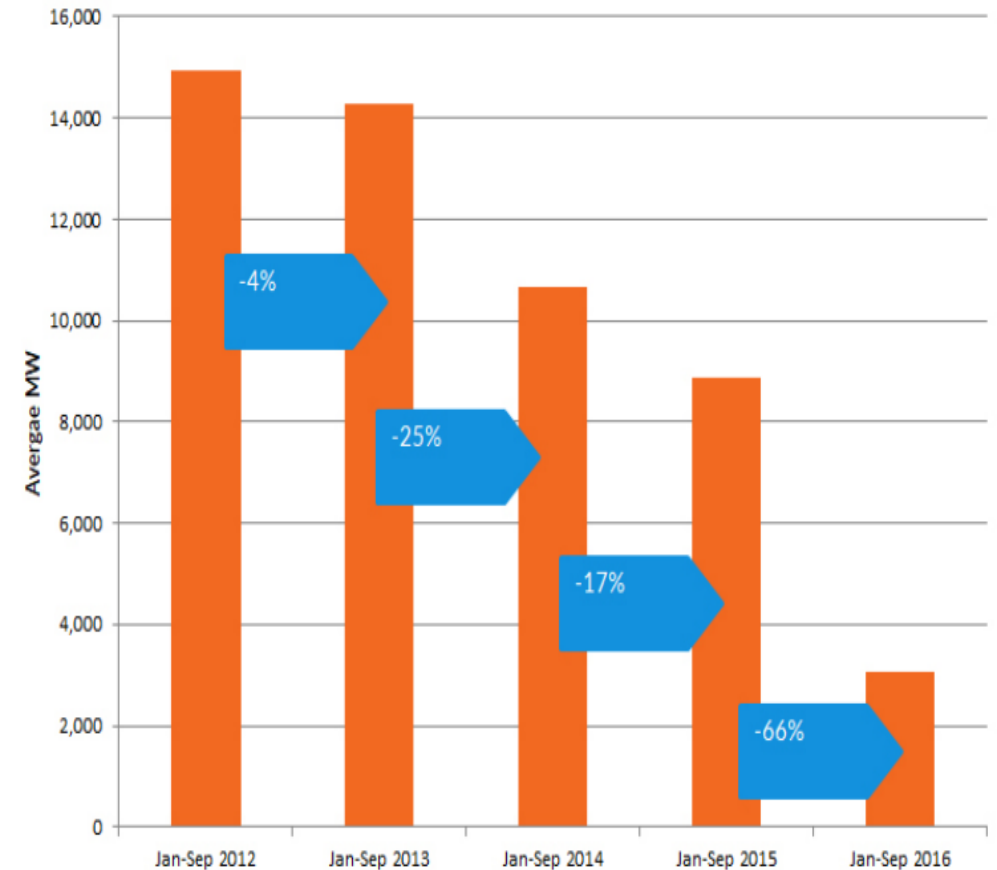
Figure 4.5. Coal use before and after the implementation of the UK Carbon Floor Price



Note: UK Carbon Price Floor was introduced in April 2013, indicated by the red line.

Source: (Hirst and Keep, 2018^[21])

Figure 3.8: Decline of coal power in the UK energy system⁹⁷



The CPS (18£/tCO₂) alone caused 73% of the reduction in coal generation from 2012 to 2016!

Aurora Energy Research, 2017 - CPF = CPS + price of CO₂ from the EU ETS! Rates: 2013/14: 4.94£/tCO₂; 2014/15: 9.55£/tCO₂; 2015/16: 18.1£/tCO₂ – frozen until 2021

4. Carbon pricing policies

Carbon pricing in the future

How to set future carbon prices – *corrective tax or standard-price approach?*

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 https://www.cesifo-group.de/DocDL/cesifo1_wp6342.pdf).

→ High-Level Commission on Carbon Prices ‘*concludes that the explicit carbon-price level consistent with achieving the Paris temperature target is at least US\$ 40–80/tCO₂ by 2020 and US\$ 50–100/tCO₂ by 2030*’ (extrapolated by 2.25% p.a. to US\$ 78/156 by 2050 – World Bank; constant prices)

(https://static1.squarespace.com/static/54ff9c5ce4b0a53deccfb4c/t/59b7f2409f8dce5316811916/1505227332748/CarbonPricing_FullReport.pdf and <http://documents.worldbank.org/curated/en/621721519940107694/pdf/2017-Shadow-Price-of-Carbon-Guidance-Note.pdf>

→ carbon price of \$75 a ton in 2030 consistent with a 2°C target (IMF, 2019 <https://www.imf.org/en/Publications/FM/Issues/2019/09/12/fiscal-monitor-october-2019>)

Table 1.1. Selected Carbon Pricing Arrangements, 2019

Country or Region	Year Introduced	2019 Price (\$/Ton CO ₂)	Coverage of GHGs, 2018	
			Million Tons	Percent
Carbon Taxes				
Chile	2017	5	47	39
Colombia	2017	5	42	40
Denmark	1992	26	22	40
Finland	1990	65	25	38
France	2014	50	176	37
Ireland	2010	22	31	48
Japan	2012	3	999	68
Mexico	2014	1–3	307	47
Norway	1991	59	40	63
Portugal	2015	14	21	29
South Africa	2019	10	360	10
Sweden	1991	127	26	40
Switzerland	2008	96	18	35

Country or Region	Year Introduced	2019 Price (\$/Ton CO ₂)	Coverage of GHGs, 2018	
			Million Tons	Percent
Emissions Trading Systems				
California, United States	2012	16	378	85
China	2020	na	3,232	
European Union	2005	25	2,132	45
Korea	2015	22	453	68
New Zealand	2008	17	40	52
Regional Greenhouse Gas Initiative ¹	2009	5	94	21
Carbon Price Floors				
Canada	2016	15	na	70
United Kingdom	2013	24	136	24

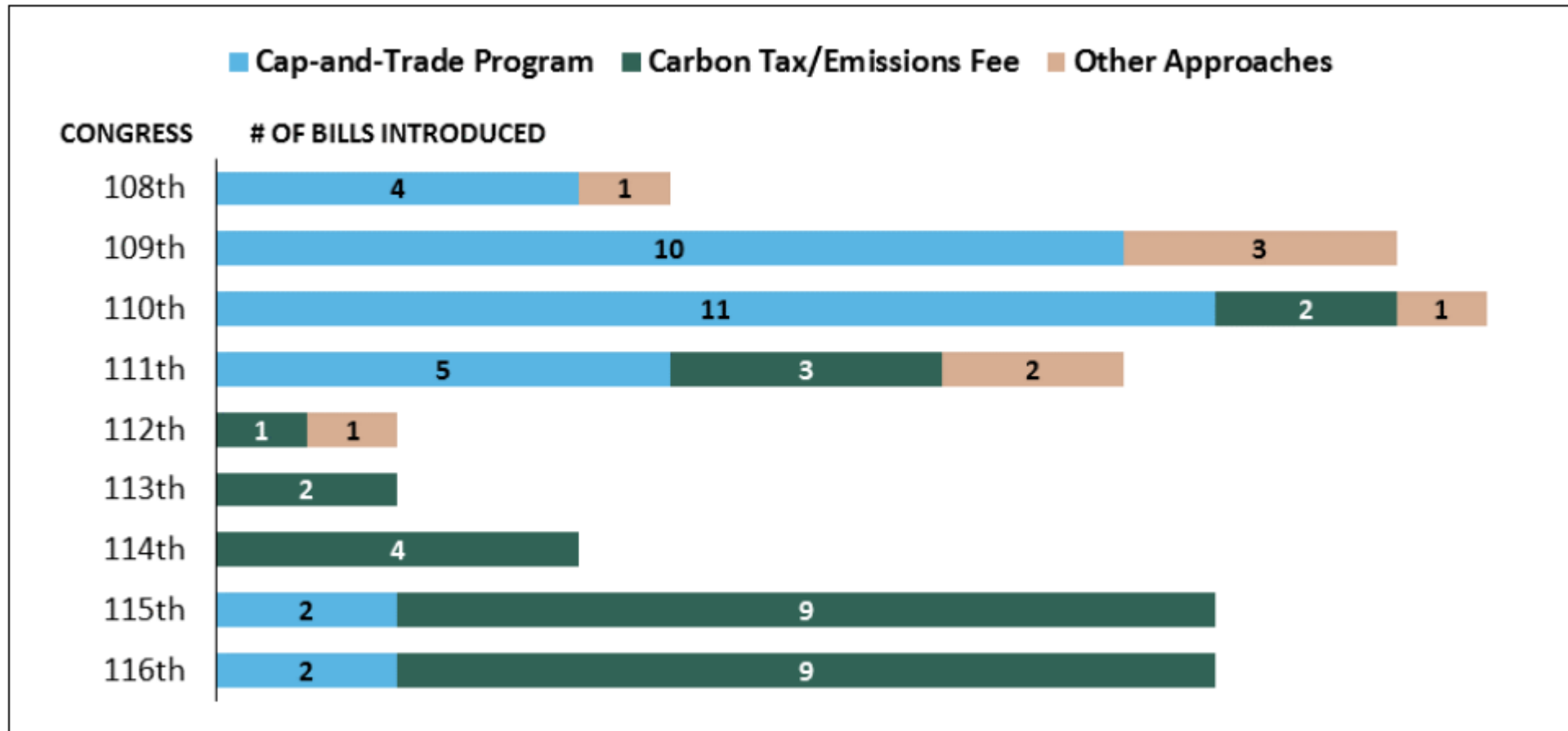
Carbon pricing – Europe: transport fuels (petrol)

2020	total tax burden	excise	CO2	other	total	CO2 tax
	EUR/1000 litre	EUR/1000 litre	EUR/1000 litre	EUR/1000 litre	EUR/1000 litre	EUR/ton CO2
Netherlands	800	800			800	
Italy	728	728			728	
Finland	703	522	174	7	703	75
Greece	700	700			700	
France	683	576	107		683	46
Norway	661	533	128		661	55
Germany	655	655	Increase by 128 EUR/1000 litre - 2025		655	55 in 2025
Portugal	643	527	29	87	643	12
Denmark	631	577	54 (increase to 465 EUR/1000 litre under proposal of Danish Council of Climate Change in 2030)		631	23 – 201 in 2030
Sweden	619	380	240		619	103
Ireland	602	542	60		602	26
Estonia	563	563			563	
Malta	549	549			549	
Slovenia	547	478	40	29	547	17
Austria	482	482			482	
Spain	473	473			473	
Romania	373	373			373	
Bulgaria	363	363			363	

Carbon pricing proposals in US

- Former US Federal Reserve Chair Janet Yellen has spoken out in support of a carbon tax as the most effective and efficient way to reduce US GHG emissions. Yellen, who chaired the Fed until February 2018, has joined the **Climate Leadership Council (CLC)**, a bipartisan group pushing for the US to address the threat of global warming by introducing a carbon tax, with revenues returned to the public in dividend payments (to be called: ***carbon dividend*** instead of ***carbon tax***).
- CLC members : among others George P. Shultz (served as Secretary of State under President Ronald Reagan, and as Secretary of Treasury and Labor under President Nixon), Rob Walton (board of Walmart), Lawrence Summers (served as Secretary of the Treasury under President Clinton and Director of the National Economic Council under President Obama). https://www.clcouncil.org/media/Exceeding-Paris.pdf?utm_source=CP+Daily&utm_campaign=e07c8916d9-CPdaily10092018&utm_medium=email&utm_term=0_a9d8834f72-e07c8916d9-110249789
- January 17, 2019: ***Economists' Statement on Carbon Dividends***; signed by 4 Former Chairs of the Federal Reserve; 27 Nobel Laureate Economists; 17 Former Chairs of the Council of Economic Advisors; 2 Former Secretaries of the U.S. Department of Treasury <https://www.econstatement.org/>

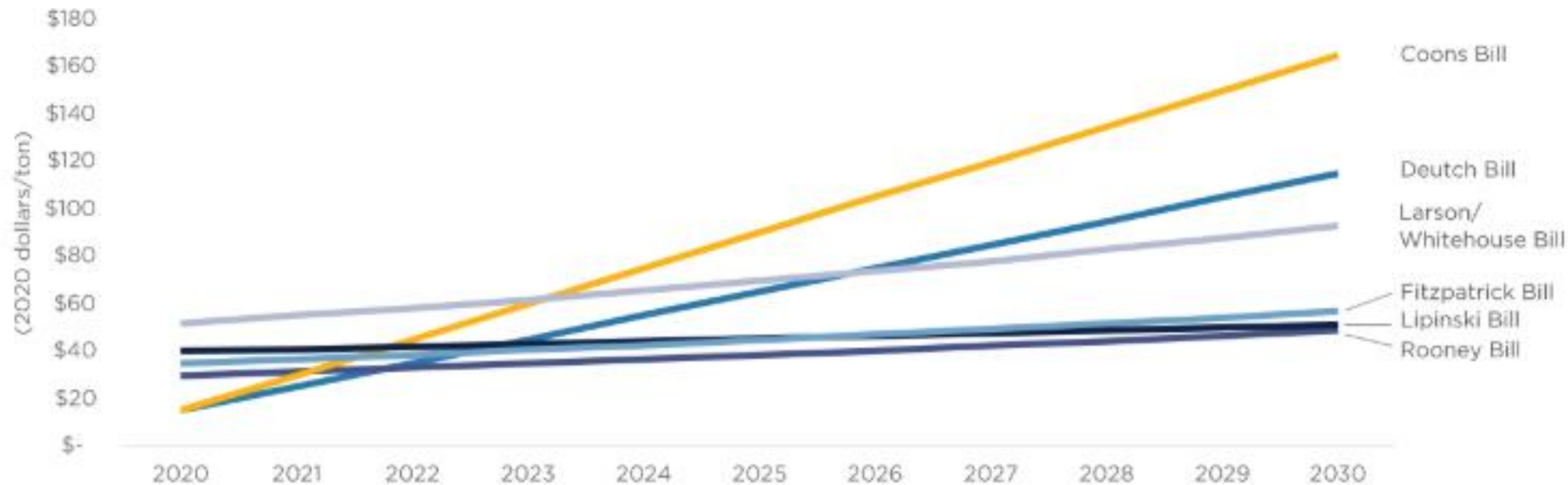
Carbon pricing proposals in US



Notes: "Other Approaches" include (1) proposals that did not specify the overall framework but would have provided EPA with the authority to establish a GHG emission reduction program and (2) proposals that combine elements from a cap-and-trade system with price control features in a carbon tax or emissions fee system, sometimes describes as hybrid approaches.

Carbon pricing proposals in US

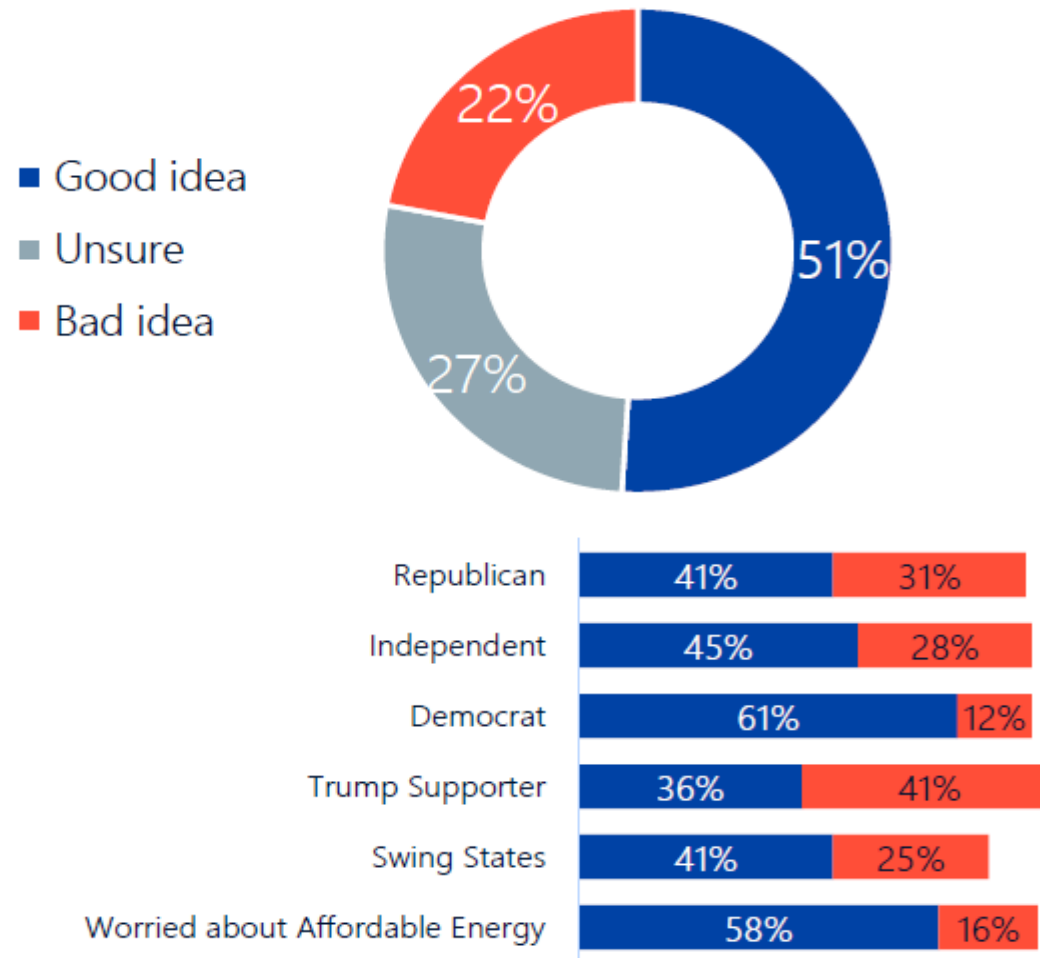
Figure 1: Carbon Tax Rates for Federal Carbon Tax Proposals (2020 dollars/ton)



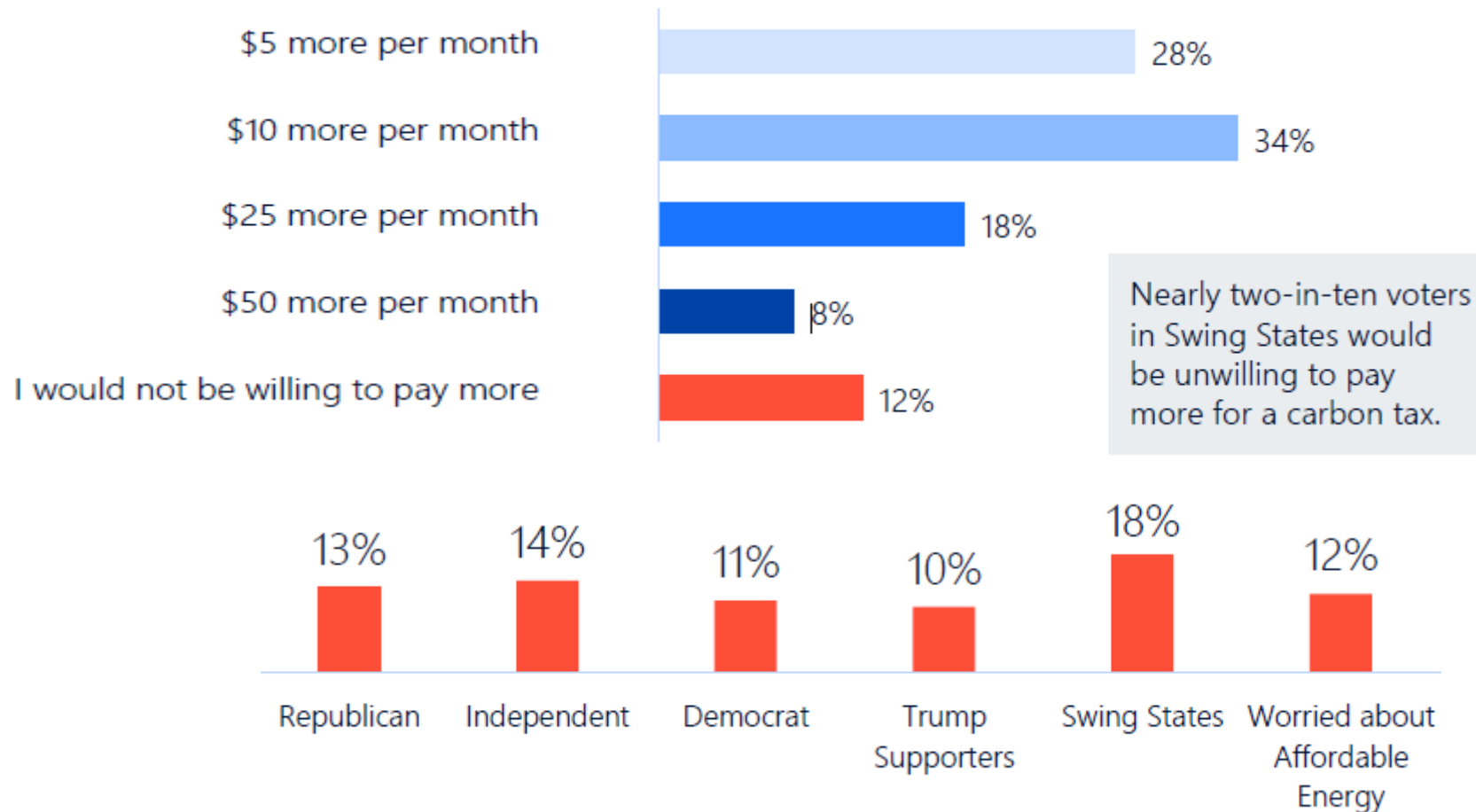
Source: CGEP Analysis

- The **American Opportunity Carbon Fee Act** proposed by Senator Sheldon Whitehouse in April 2019 ("Whitehouse Bill")
- The **Energy Innovation and Carbon Dividend Act** proposed by Congressman Ted Deutch in January of 2019 ("Deutch Bill")
- The **Stemming Warming and Augmenting Pay Act** proposed by Congressman Francis Rooney in July of 2019 ("Rooney Bill")
- The **Climate Action Rebate Act** proposed by Senator Chris Coons in July of 2019 ("Coons Bill")
- The **Raise Wages, Cut Carbon Act** proposed by Congressman Dan Lipinski in July of 2019 ("Lipinski Bill")
- The **America Wins Act** proposed by Congressman John Larson in August of 2019 ("Larson Bill")
- The **MARKET CHOICE Act** proposed by Congressman Brian Fitzpatrick in July 2018 ("Fitzpatrick Bill")

Do you think a tax on emissions of carbon-based fuels such as coal, oil, and natural gas is a good idea or a bad idea?



- If this tax on emissions were implemented, what additional cost for your monthly energy expenses (electricity, heating, and gasoline) would you be willing to accept?*



Average monthly electricity bill in US in 2018: USD 118

and average US household expenditure on gasoline in 2017 is about USD 2,000 (USD 166 per month)

→ approx. USD 285 per month; USD 50 roughly 18 % increase)

https://www.eia.gov/electricity/sales_revenue_price/pdf/table5_a.pdf

<https://www.eia.gov/todayinenergy/detail.php?id=33232>



CANADA'S **ECOFISCAL** COMMISSION
Practical solutions for growing prosperity

Canada's Ecofiscal Commission

10 Myths About Carbon Pricing in Canada

<https://ecofiscal.ca/wp-content/uploads/2019/03/Ecofiscal-Commission-10-Myths-about-carbon-pricing-March-2019-FINAL.pdf>

Thank you for your attention!

stefan.speck@eea.europa.eu

www.eea.europa.eu

10 MYTHS ABOUT CARBON PRICING IN CANADA

March 2019

Bev Dahlby
Don Drummond
Brendan Frank
France St-Hilaire
Chris Ragan