

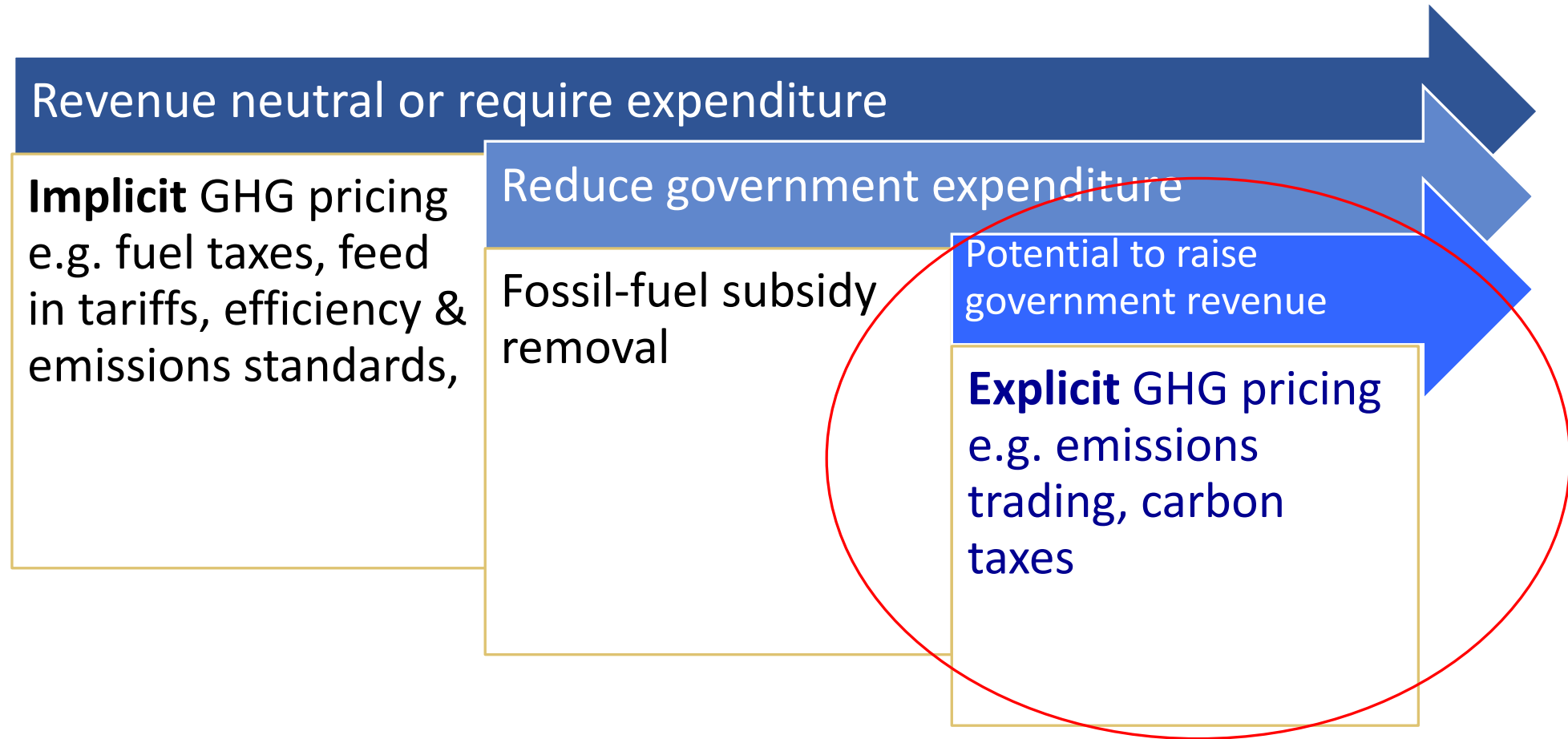


***Carbon pricing, Competitiveness
and Carbon Leakage:***
THEORY, EVIDENCE AND POLICY DESIGN

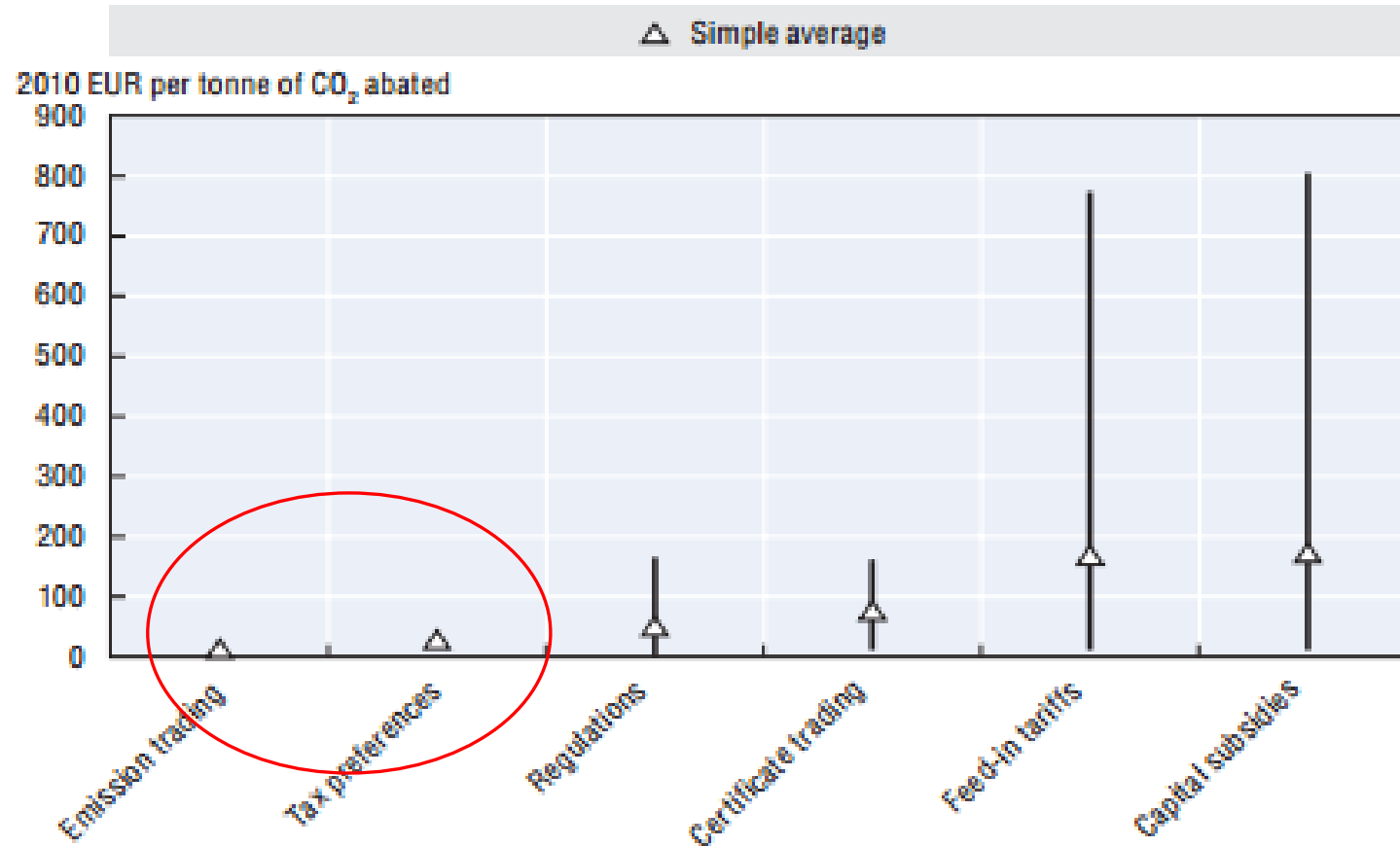
Grzegorz Peszko, the World Bank
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NBI workshop South Africa,
Johannesburg, 11 Nov 2015

Explicit and Implicit Pricing of GHG Emissions



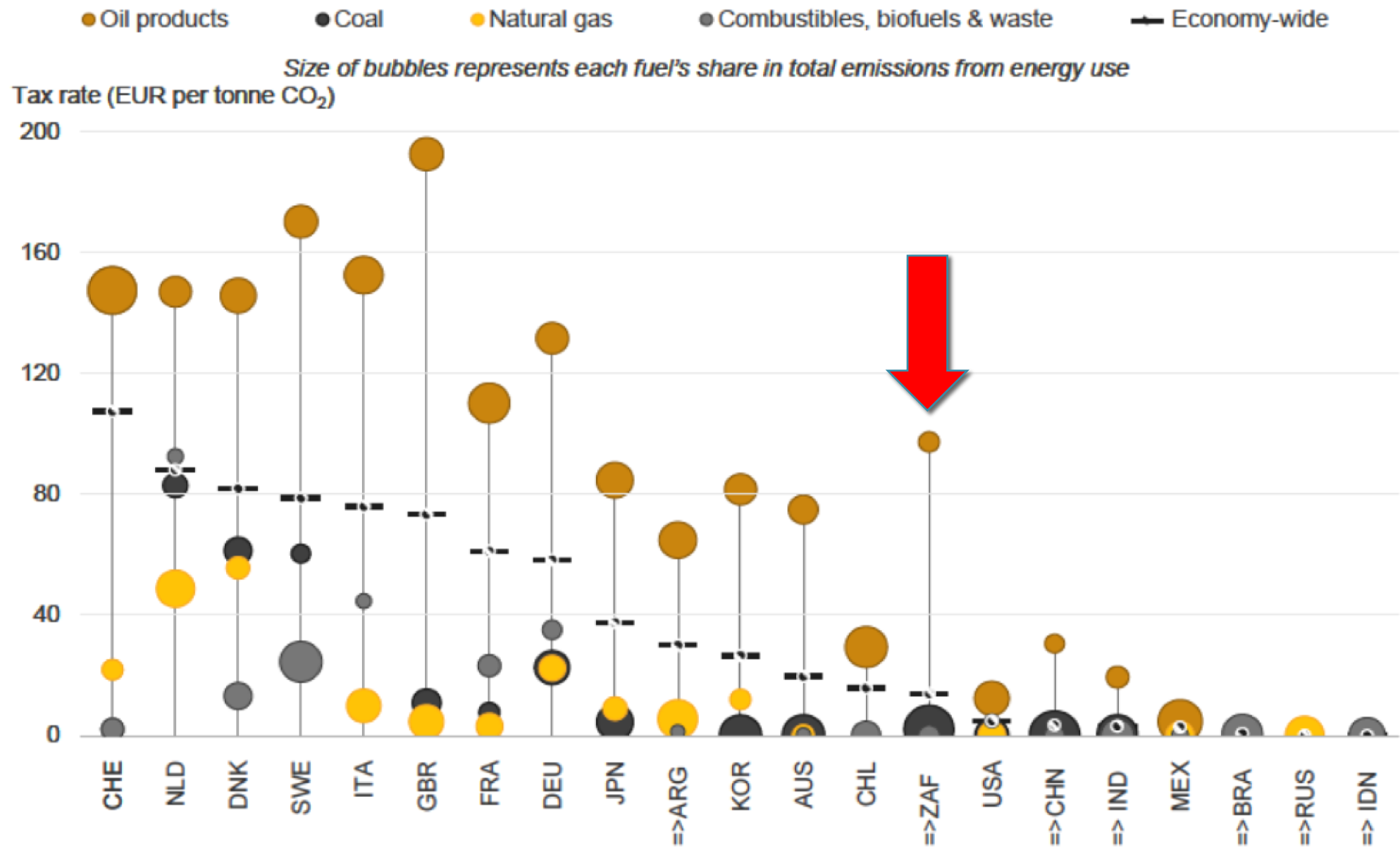
Explicit carbon prices dwarfed by implicit ones



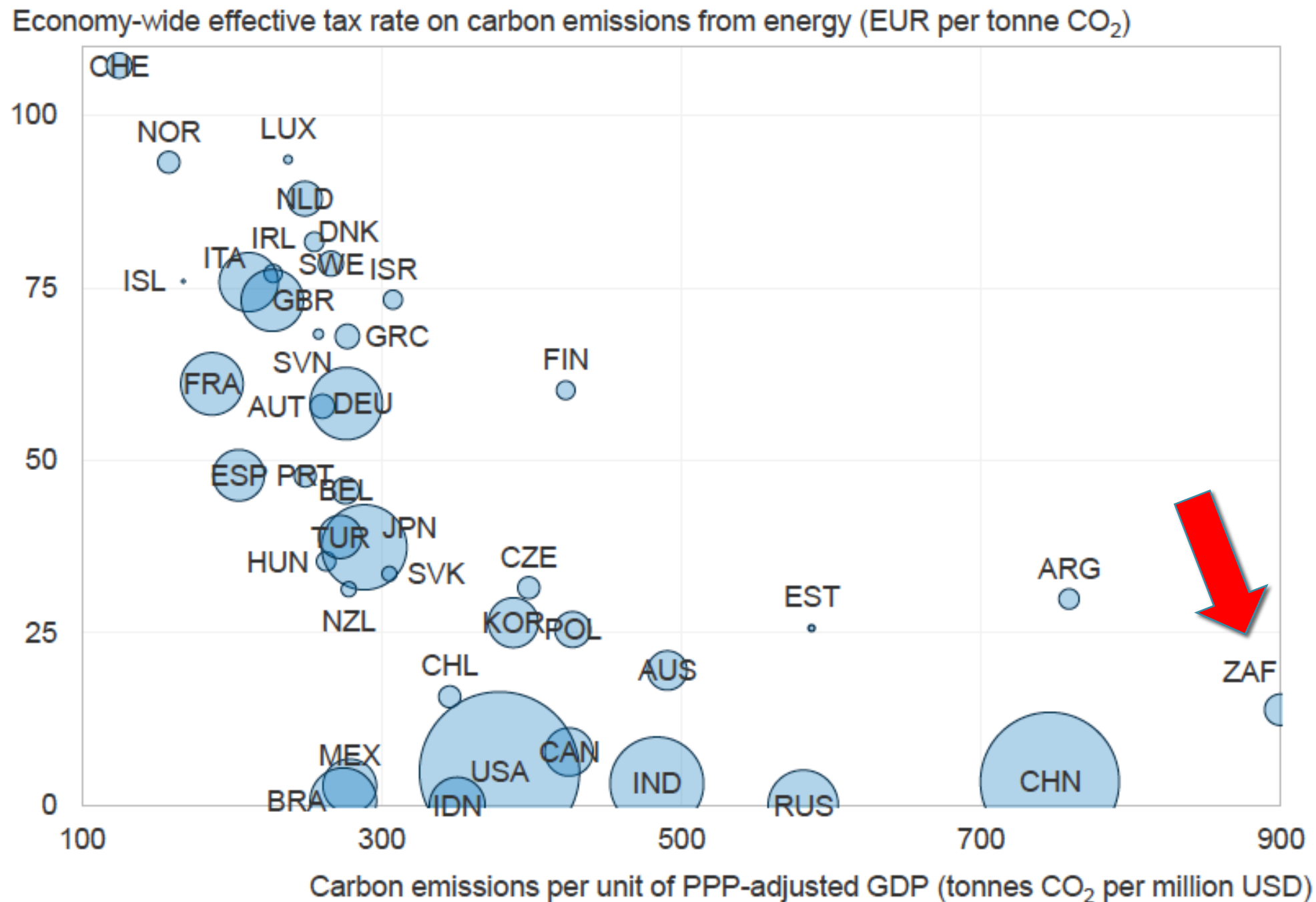
Note: The height of the bars represents the range of effective carbon price estimates found for the different instrument categories; the triangles represent a simple average of these estimates. "Regulations" refers to renewable portfolio standards.

OECD (2013) Effective carbon prices

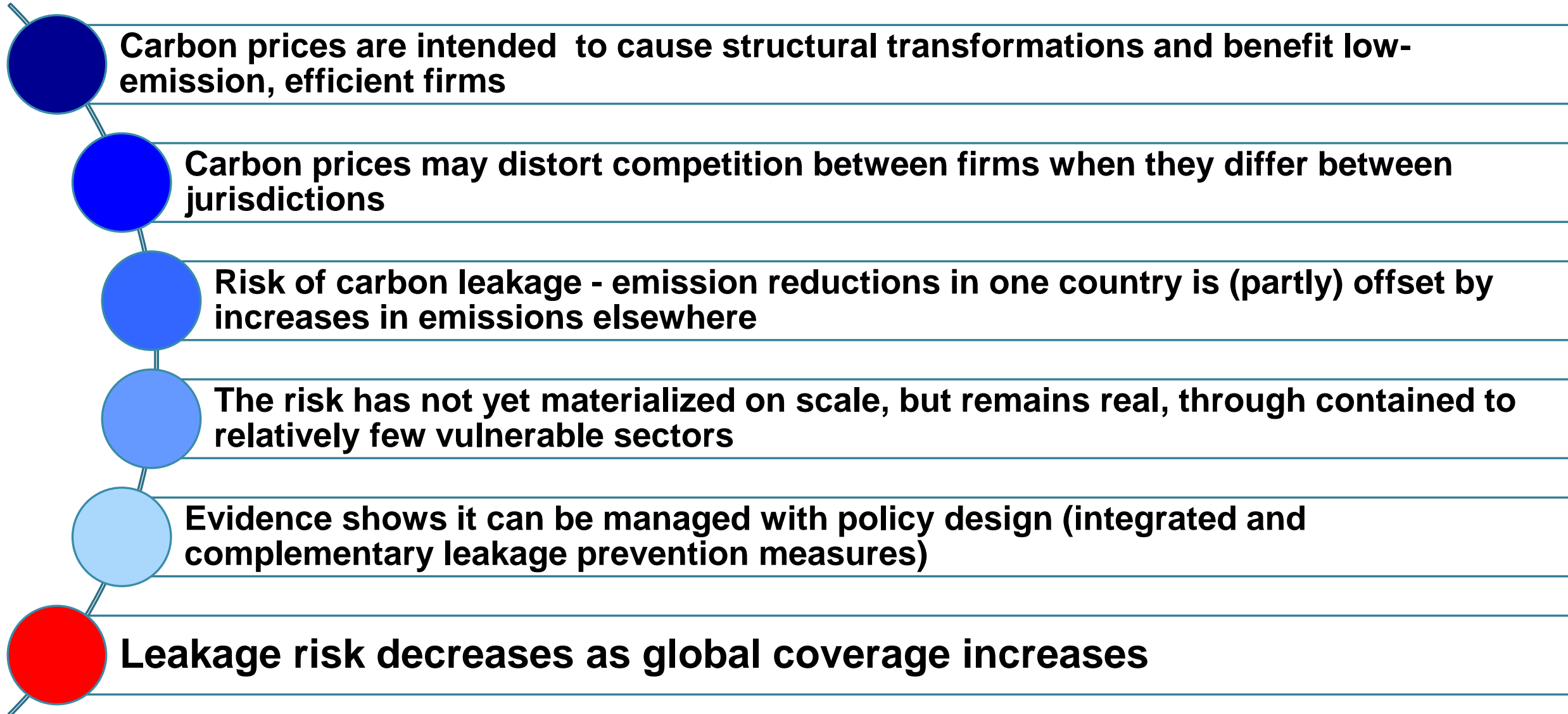
Effective tax rates on CO₂ from different fuels



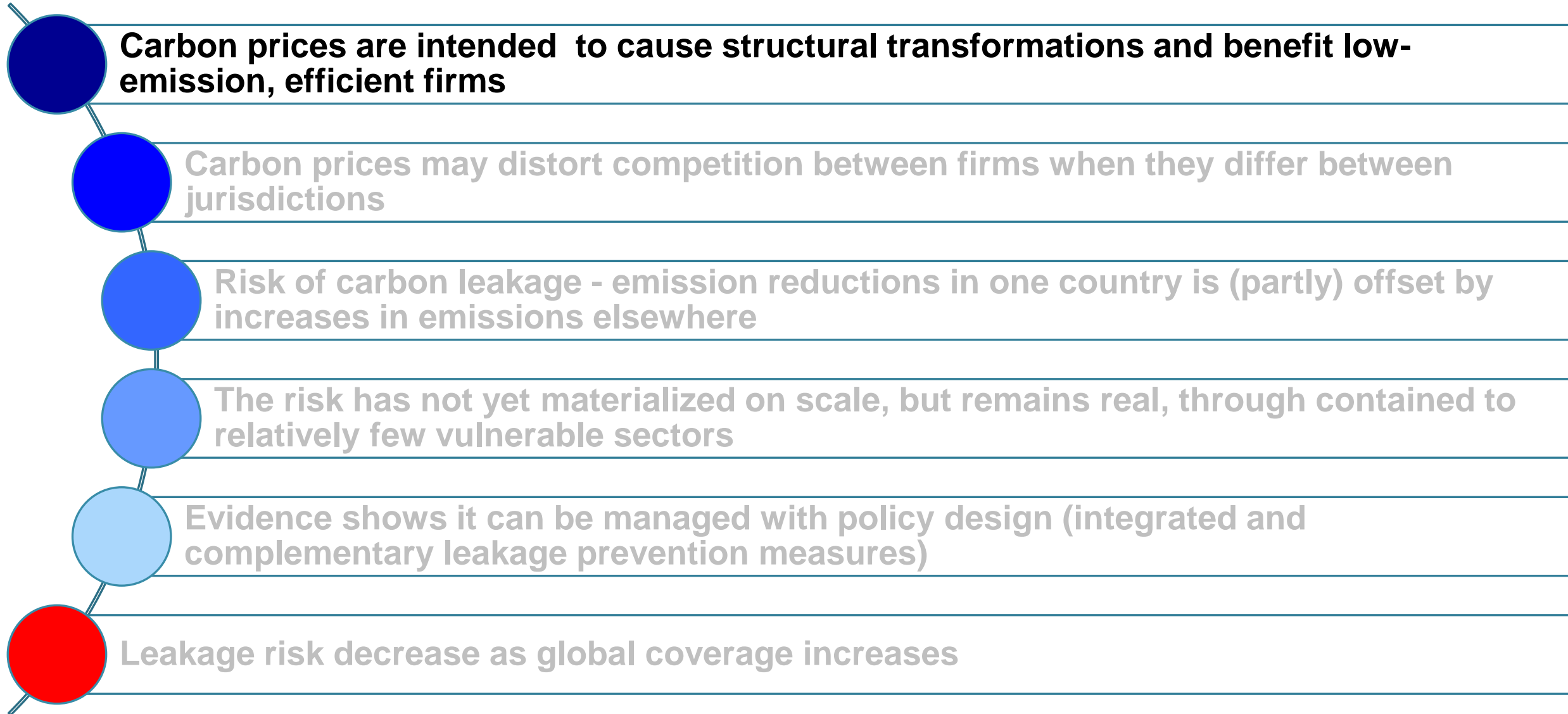
Economy wide tax rate on CO₂ and carbon intensity of GDP



Carbon leakage risk: potential, contained and manageable



Carbon leakage risk: potential, contained and manageable



Environmental dividend:

- Cost-effective emission reduction
- Flexibility
- Discovery

Economic dividend

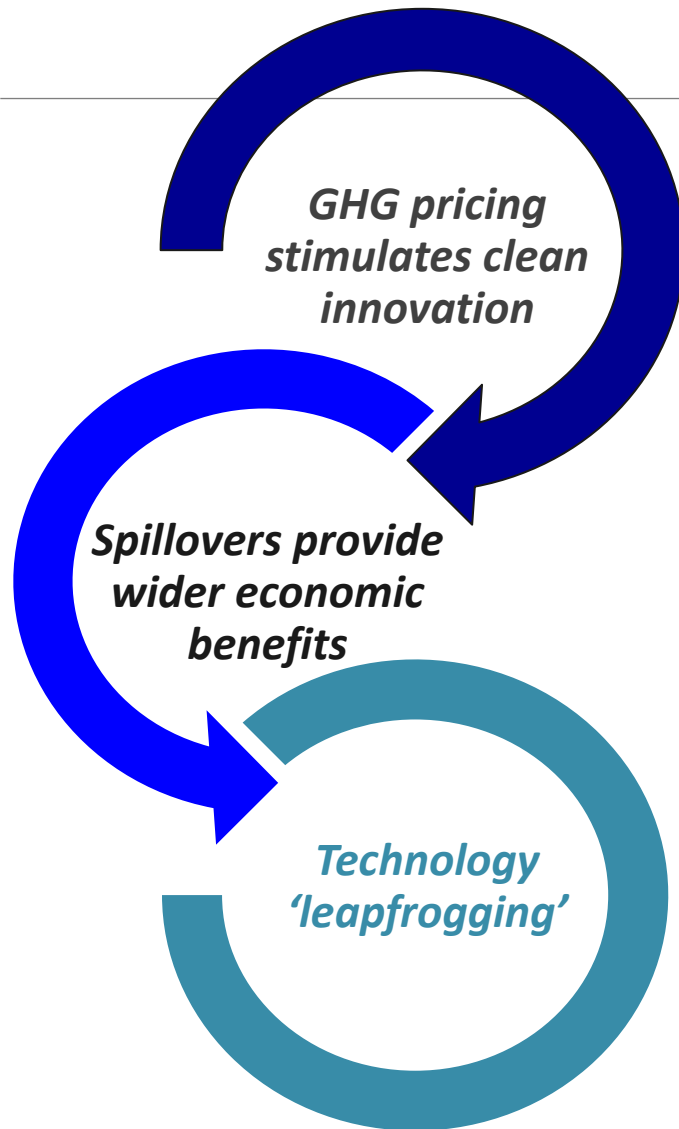
- Corrected price mechanism
- Efficient use of resources
- Innovation incentives
- Structural transformation/diversification (products and assets)

**Why countries
use
environmental
taxes?**

Fiscal dividend

- Efficient taxation (taxing 'bads' not 'goods')
- Easy administration
- Low evasion

GHG pricing encourages innovation and modernization



- evidence shows that carbon and energy pricing drive innovation in green technologies
- Economy-wide spillover benefits similar to nanotechnologies and robotics: 40 per cent greater than in conventional technologies
- Reduced technology cost; industry more competitive; global leaders in new “green” technologies

Republic of Korea's Emissions Trading Scheme

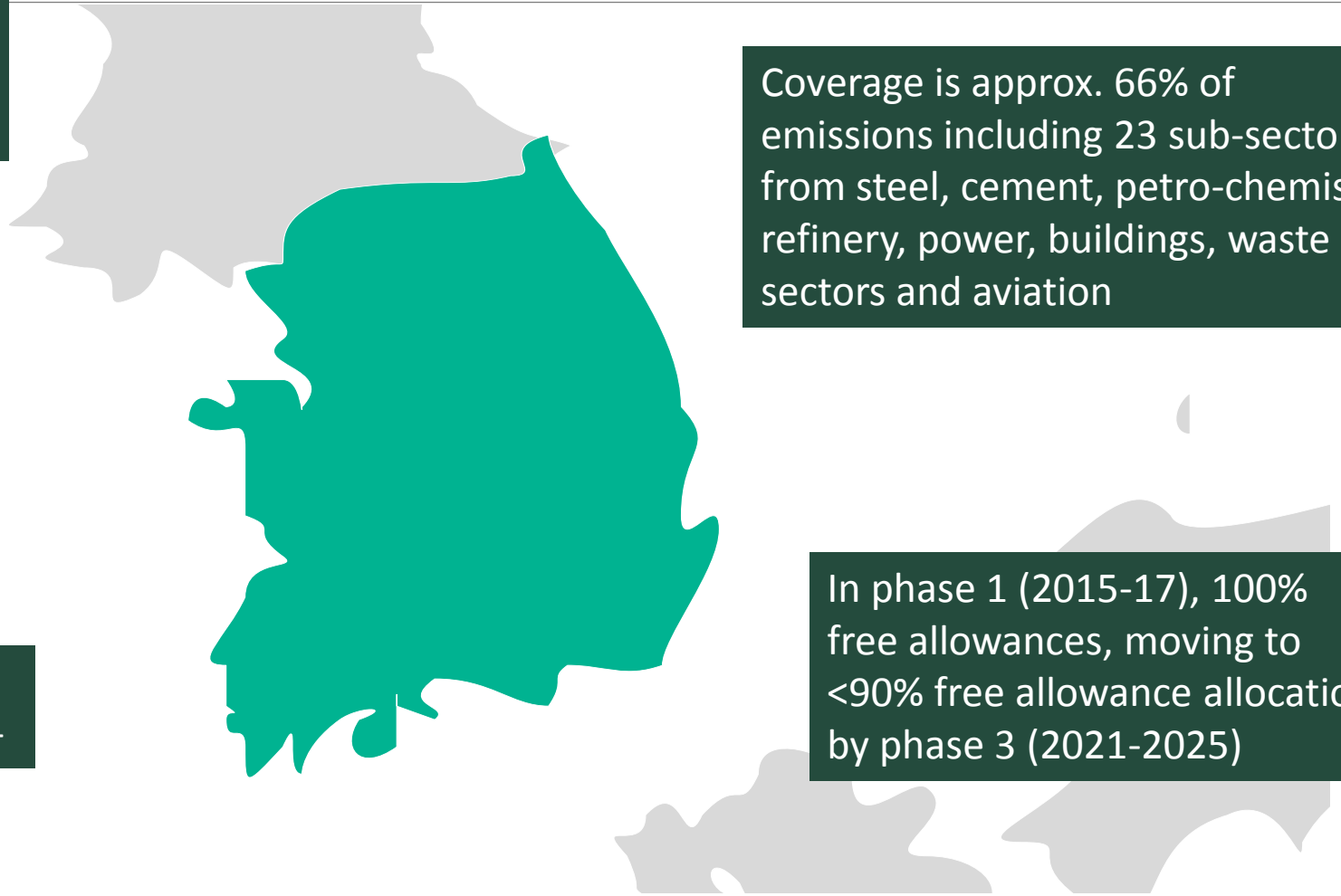
A policy package to reduce emissions by 30% against BAU by 2020

Part of overarching Green Growth Strategy which envisages Korea becoming a world-leader in green technologies

Prices capped at KRW 10,000/tCO₂ (\$9/tCO₂ in 2015-

Coverage is approx. 66% of emissions including 23 sub-sectors from steel, cement, petro-chemistry, refinery, power, buildings, waste sectors and aviation

In phase 1 (2015-17), 100% free allowances, moving to <90% free allowance allocation by phase 3 (2021-2025)



Additional relevance for energy exporters

- ✓ **More effective and efficient collection of resource rents (if upstream tax);**
- ✓ **Hedging against the risk of sudden and permanent decline in global demand for fossil fuels (as a result of megatrends driven by technology development and consumer preferences);**
- ✓ **Hedging against the risk of climate policies of energy importers (e.g. to prevent border adjustment measures).**

British Columbia's Carbon Tax

Third largest exporter of metallurgical coal in the world. One of the earliest carbon price schemes, aimed at establishing BC as a leader in the clean economy

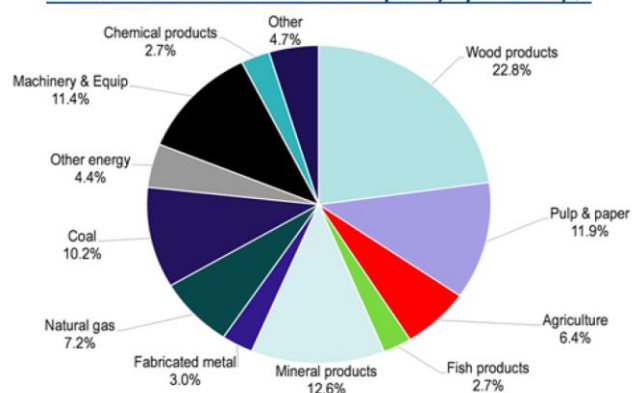
Since tax introduced, consumption of petroleum products fallen by 16% compared with 3% increase in rest of Canada

GDP per capita growth rates outperformed the rest of Canada

Home for 22% of Canada's clean technology firms with 13% of population

Only cement sector lost some market share: R&D assistance instead of exceptions

BC International Merchandise Exports, by Product, %

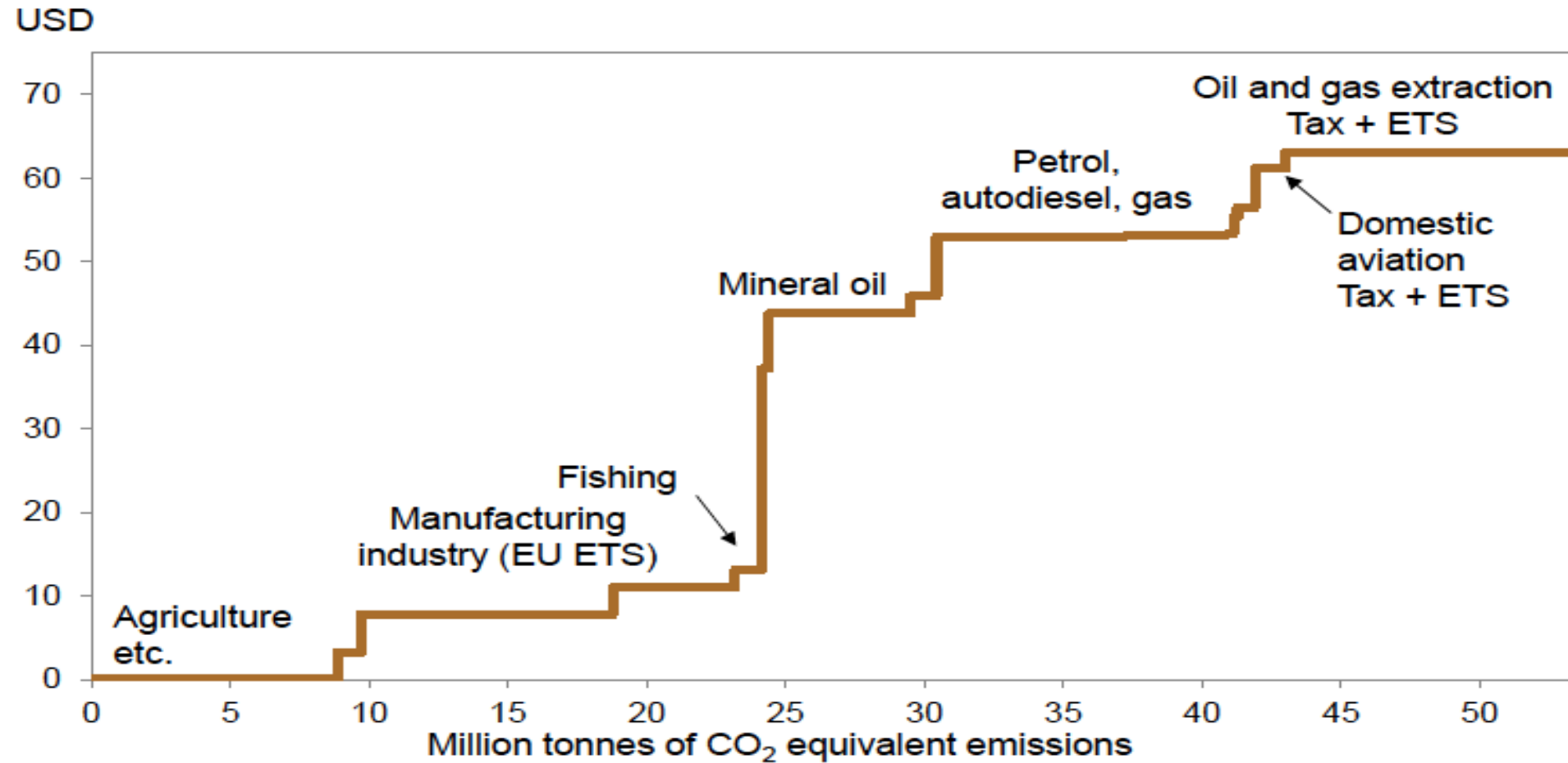


Source: BC Stats. 2014 data.

Price rose by \$5/t per annum between 2008 and 2012 to C\$30/t (\$24/t)

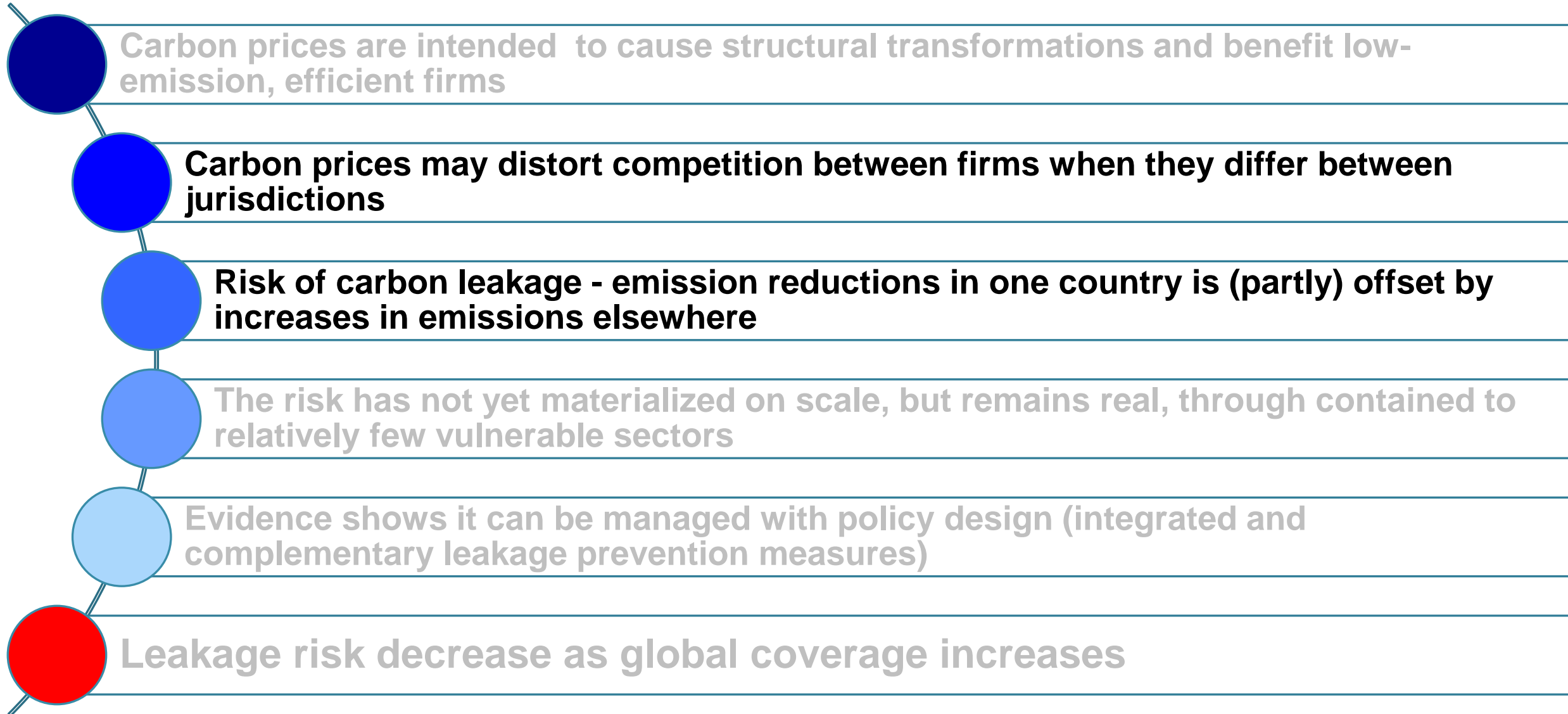
Revenues around C\$1.2 billion returned through cuts in other taxes

Norway: pricing GHG emissions by energy exporter

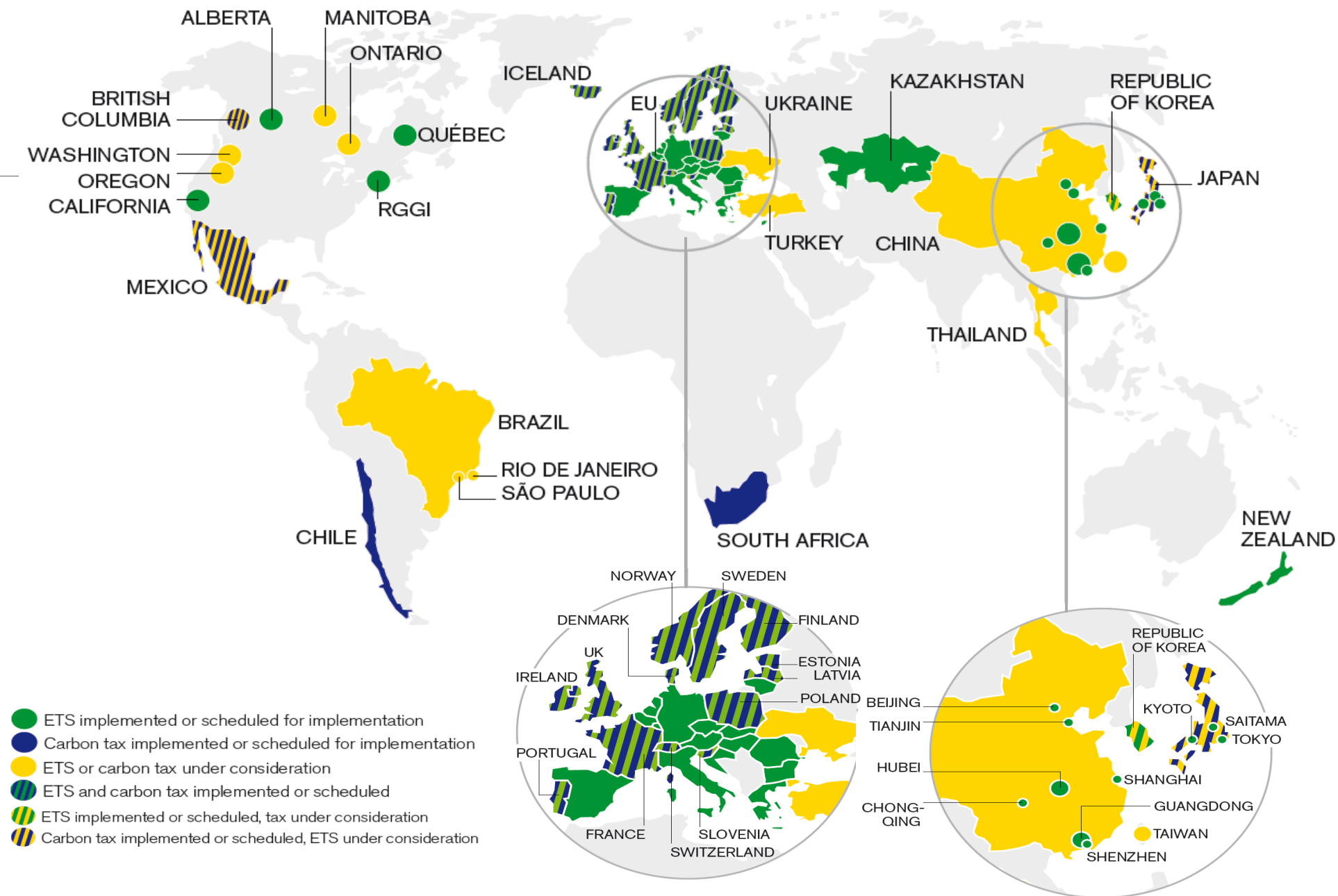


Norwegian Ministry of Finance

Carbon leakage risk: potential, contained and manageable

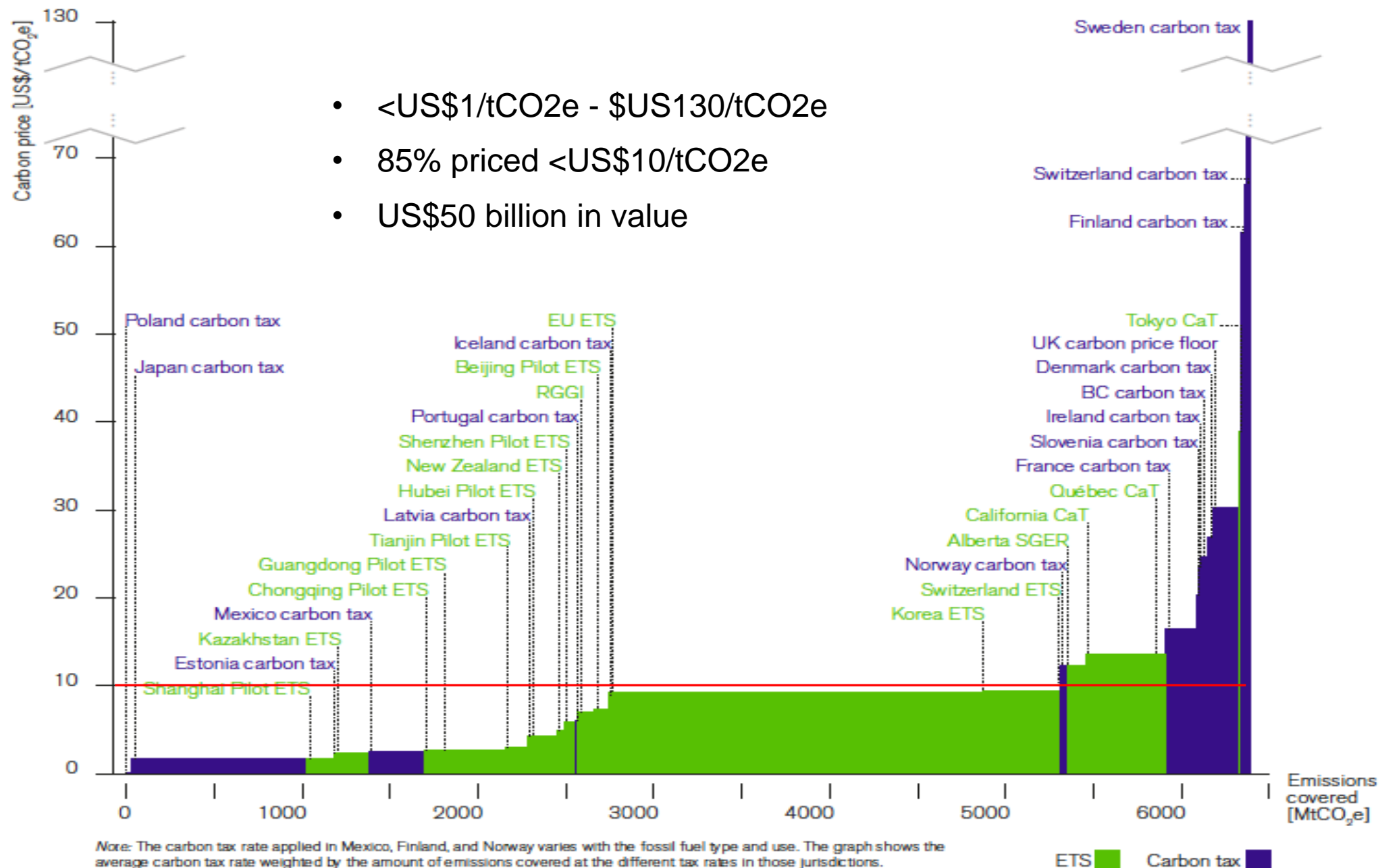


Coverage of explicit carbon pricing instruments remains fragmented



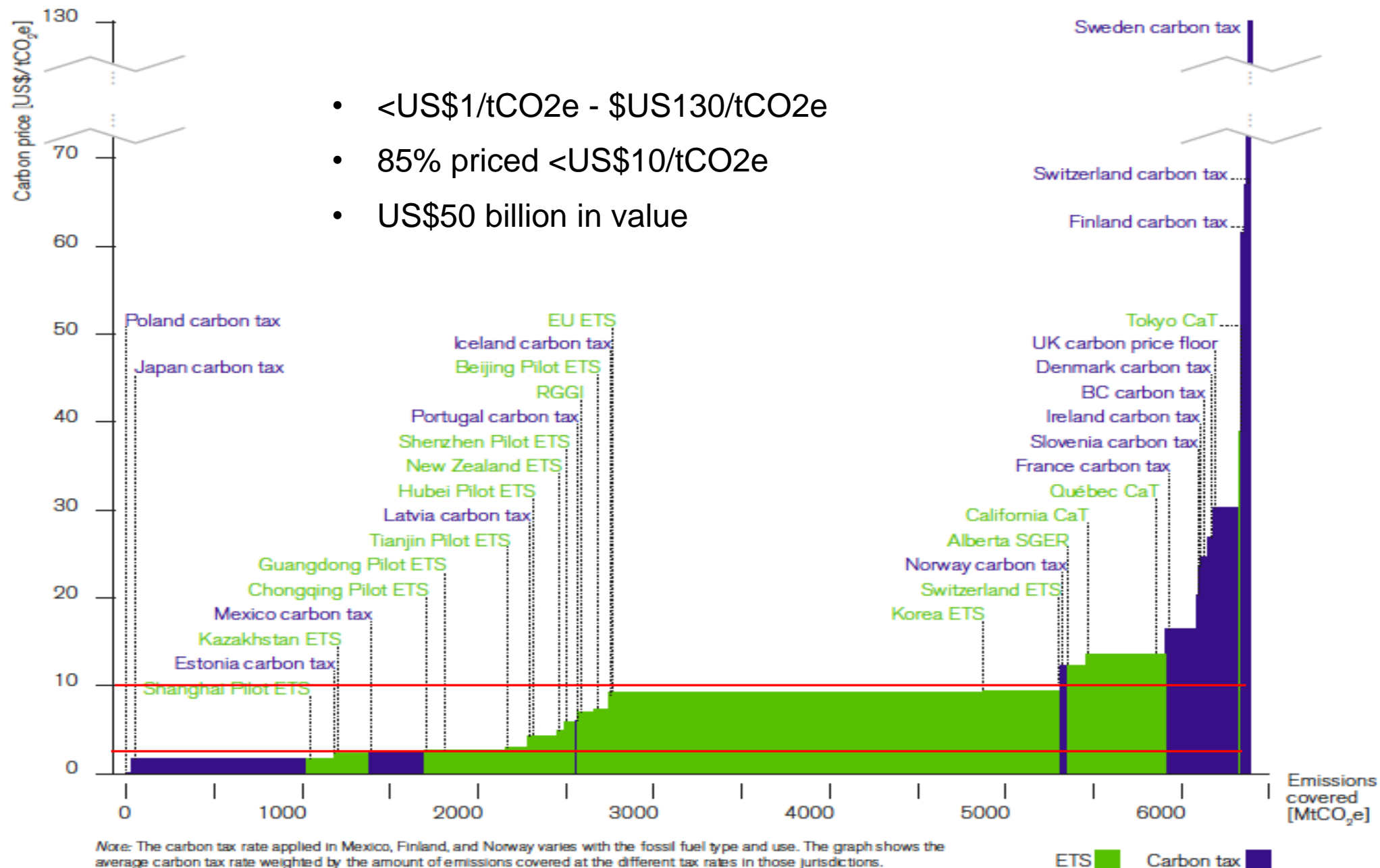
Explicit carbon prices vary

- <US\$1/tCO₂e - \$US130/tCO₂e
- 85% priced <US\$10/tCO₂e
- US\$50 billion in value

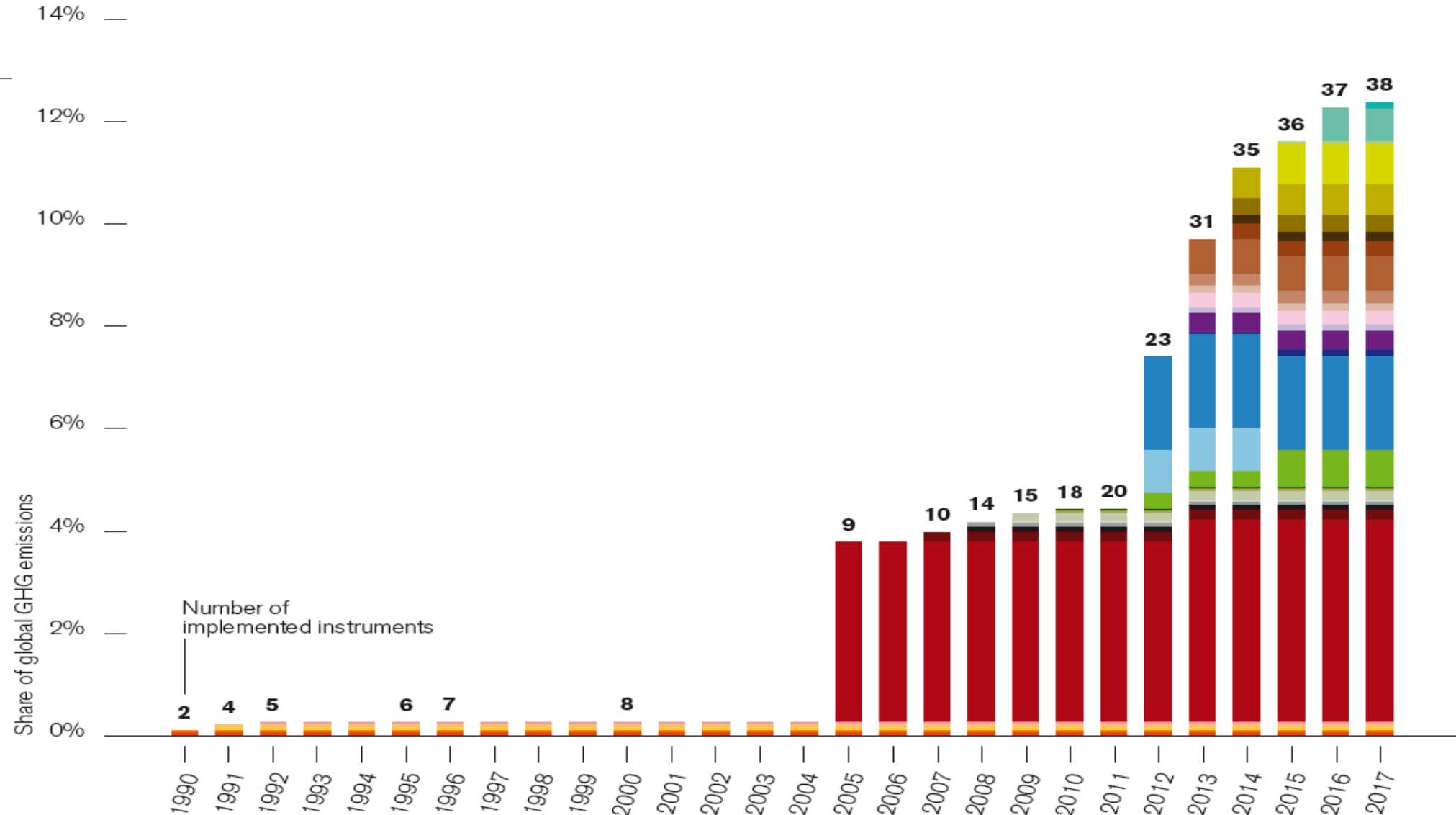


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Growing global GHG emissions being explicitly priced



Inefficient competitiveness impact and risk of leakage

Carbon leakage: the transfer of production (and hence emissions) from one jurisdiction to another as a result of differences ('asymmetries') in the stringency of carbon regulation, hence different carbon emissions costs

Direct and indirect impact (e.g. through electricity prices)

Unpleasant consequences:

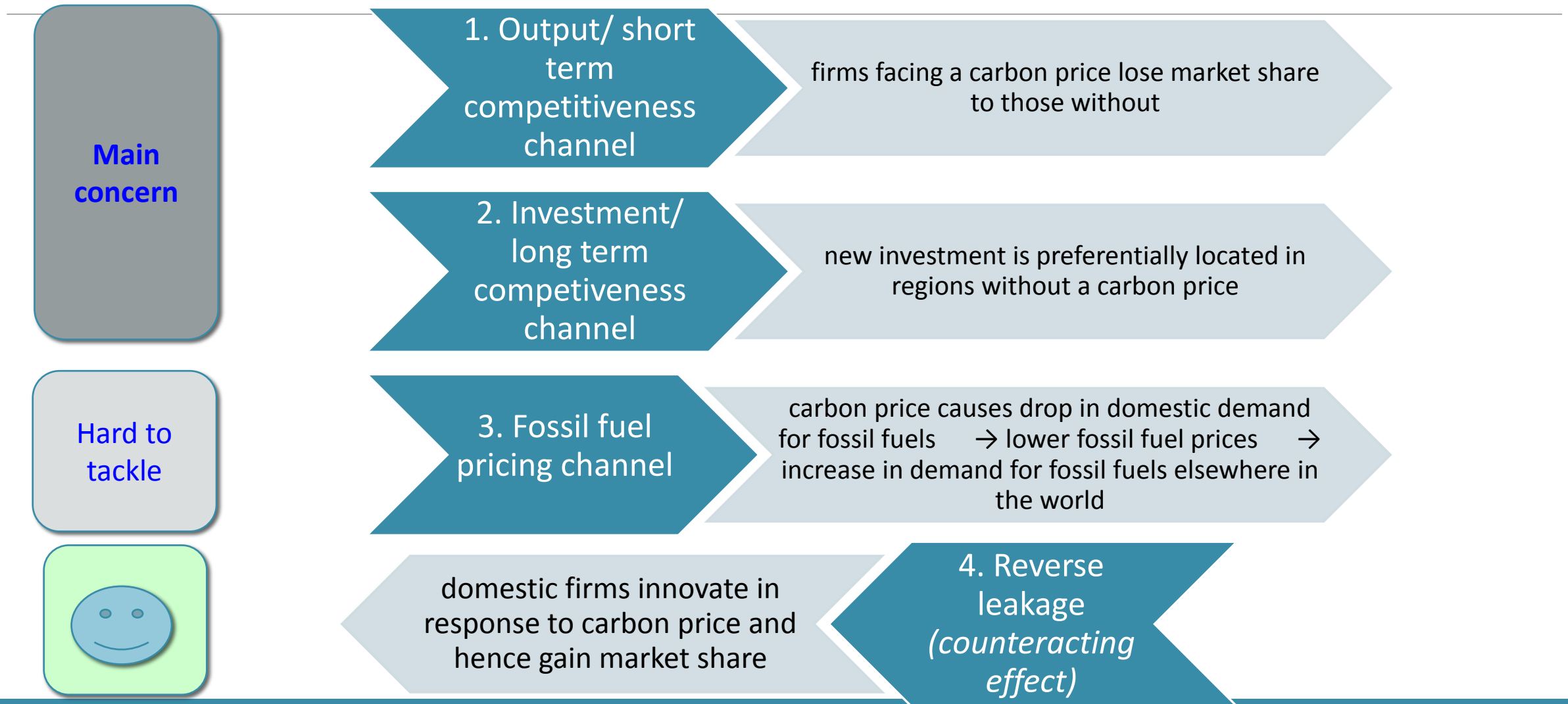
- ***Distorted competition***: loss of market share to firms not facing comparable costs
- ***Environmental integrity***: Carbon leakage would lower environmental effect & increase the cost of climate stabilization targets

Proof of attribution: A robust assessment of carbon leakage must take into account what would have happened under symmetric regulation

Comparing carbon prices across jurisdictions should also include implicit and indirect carbon prices embedded in other policies, e.g. energy taxes

In most sectors firms compete on productivity rather than costs only, but for commodities and homogenous products cost-competition crucial

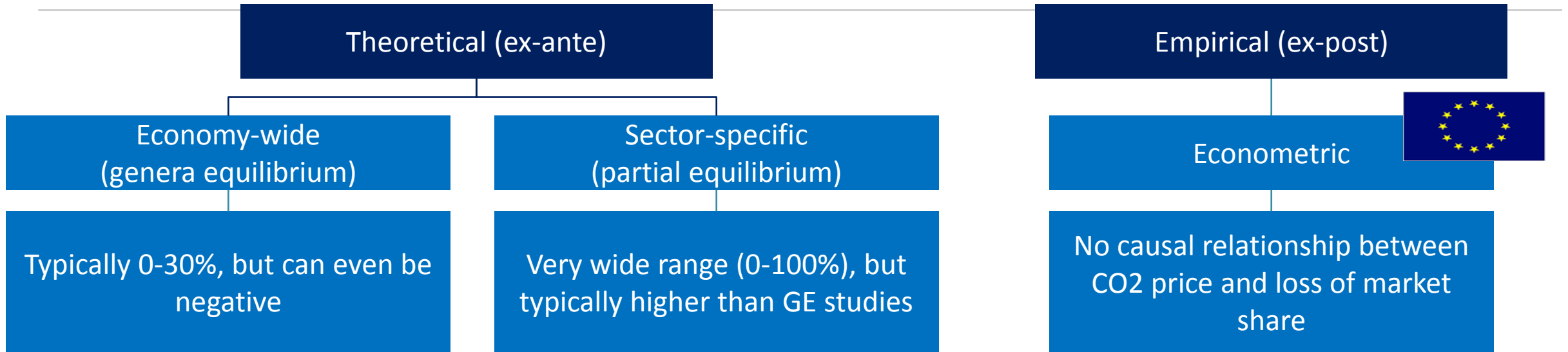
4 channels of carbon leakage



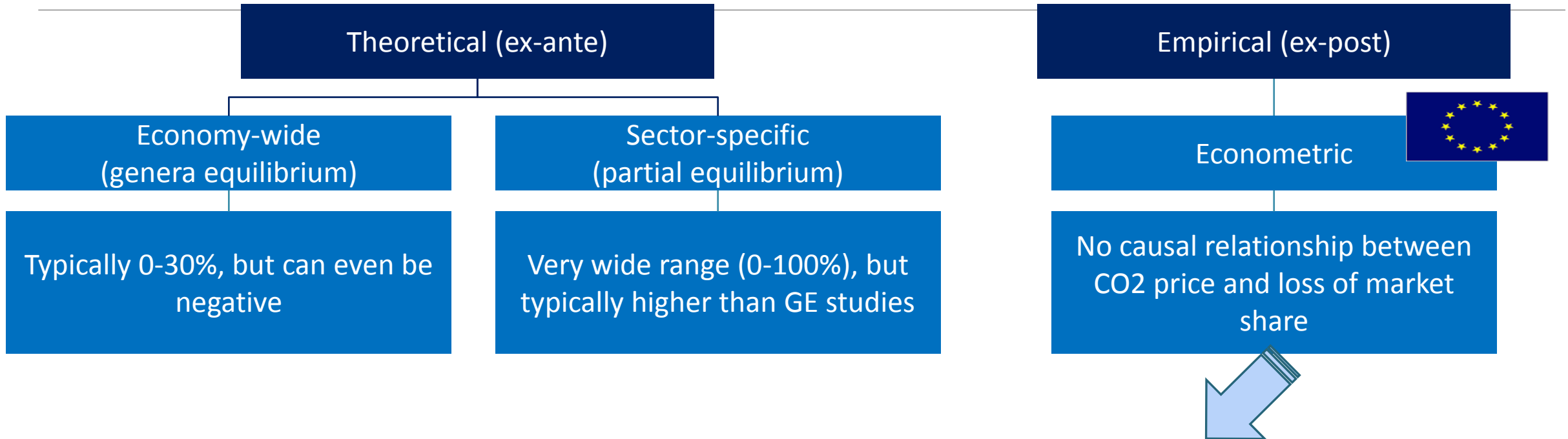
Carbon leakage risk: potential, contained and manageable



Many ways of measuring the scale of carbon leakage risk



Many ways of measuring the scale of carbon leakage risk



- The impact of carbon pricing relative to other factors has indeed been small?
- Carbon prices in many schemes have been low?
- Mitigation measures, for example free allowances, have successfully dampened leakage risk?
- Methodological challenges: short time periods and focus on EU?
- **Mixed evidence requires policy judgement, with pressure for action likely to remain**

Assistance can be limited to vulnerable sectors only

Broad support to all sectors may be necessary to generate sufficient support for carbon pricing

- But it has high fiscal cost and may introduce distortion
- Ideally, support limited to those likely to be at risk of carbon leakage

2 key criteria are typically used identify carbon leakage risk

- **Cost increase** (capturing *impact* of carbon prices) - including indirect emissions where relevant
- **Trade intensity** (capturing *exposure* to carbon price) – proxy for ability to pass-through cost of carbon price

More robust when considered together rather than each in isolation

Assessment is less distortive if carried out at sector rather than firm level

Exemptions have been used as a way to avoid carbon leakage

Sector		Basic tax free threshold	Trade exposure (Max)	Process emissions	Carbon budget	Z-factor performance	Total	Offset allowance (Max)
Electricity		60	-	-	5	-	65	10
Petroleum (coal/gas liquid)	to	60	10	10	5	5	90	5
Petroleum (refinery)		60	10	-	5	5	80	10
Iron and steel		60	10	10	5	5	90	5
Cement		60	10	10	5	5	90	5
Glass and ceramics		60	10	10	5	5	90	5
Chemicals		60	10	10	5	5	80	5
Pulp and paper		60	10	-	5	5	80	10
Sugar		60	10	-	5	5	80	10
Agriculture/Land-use/Forestry		100	-	0	0		100	0
Waste		100	-	0	0		100	0
Fugitive emissions		60	10	10	5	5	90	5
Other		60	10	-	5	10	85	10

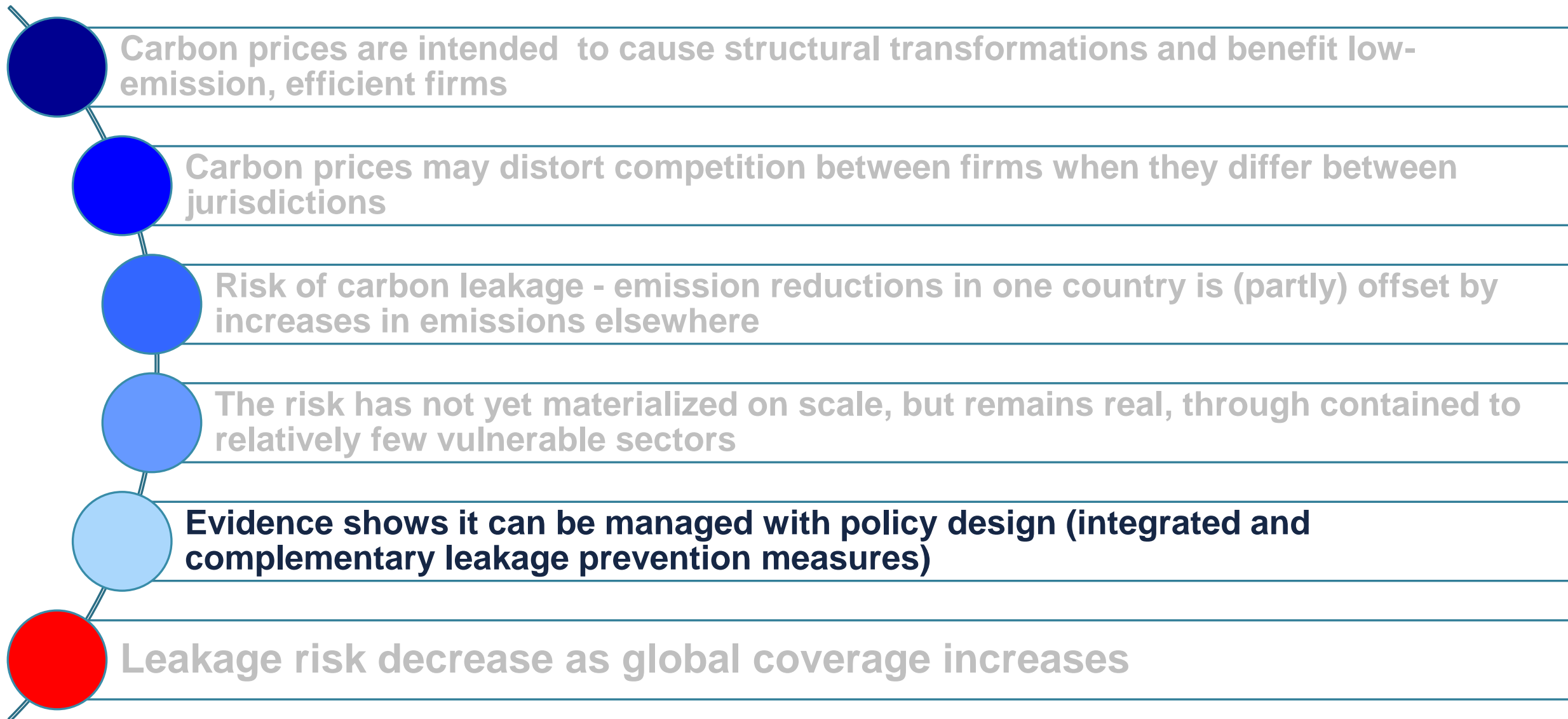
California, Quebec, (Ontario)

- Three tiers: combination of emission and trade intensity
- Trade intensity: High >19%, Medium 10-19%, low <10%

EU, sectors are eligible that

- face a cost increase of >30%,
- have a trade intensity of >30%,
- or face a cost increase of >5% and trade intensity of >10%

Carbon leakage risk: potential, contained and manageable



Risk of leakage mitigated by policy design

Integrated measures (designed within the scheme)

- Free allowances
 - Based on historical emissions
 - Based on industry performance benchmarks (Fixed Sector Benchmarks or Output Based Allocation)
- Exemptions, tax free thresholds
- Output based rebates
- Border carbon adjustments

Complementary measures

- Subsidies to affected sectors to improve technologies
- Support for R&D
- Adjustment of other taxes

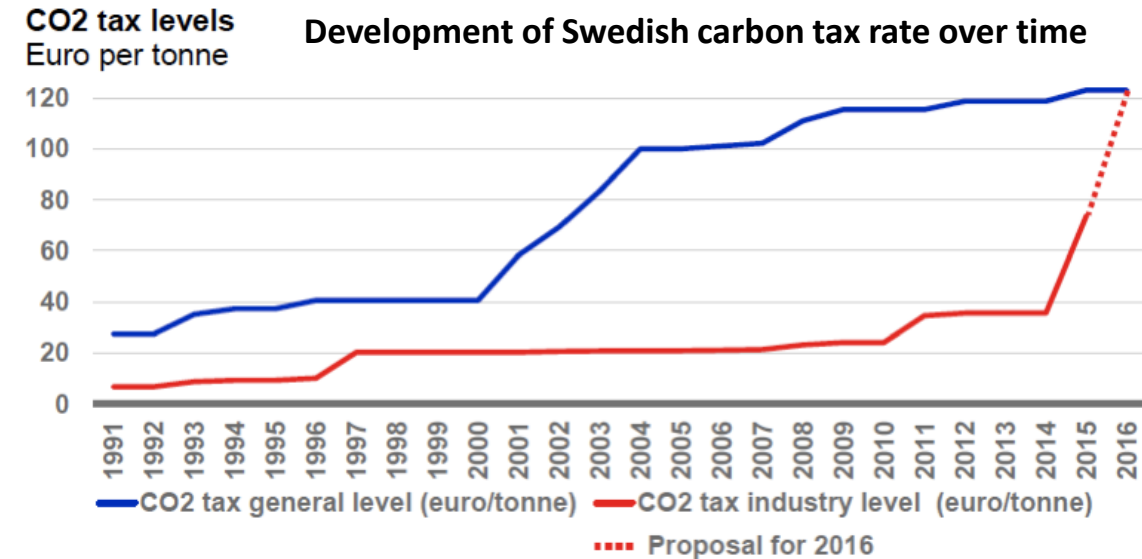
Pros and cons of different options (ctd.)

	Grandfathering	FSB	OBA	Exemptions	Rebates	BCA
Leakage prevention	Weak, unless closure rules and updating included	Weak, unless closure rules and updating included	Strong	Strong	Depends on design	Strong
Incentives to improve emissions intensity	In principle strong, but diluted when updating included	Preserved	Preserved	Often removed, but depends on design	Preserved	Preserved
Demand-side abatement incentives	Preserved	Preserved	Dulled, especially if applied too broadly	Often removed, but depends on design	Depends on design	Preserved
Administrative complexity	Easy to implement	Some complexity in establishing benchmarks	Complexity in establishing benchmarks, collating output data	Easy to implement	Some complexity	Very complex
Risk of windfall profits	Some risk	No	No	No	No	No
Risk to environmental outcome	No	No	Yes, depending on design	Yes, exempt emissions uncapped	Depends on design	No
Political and legal challenges	No	No	No	No	No	Yes, but potentially doable for large coalition

Designing exemptions/allowances under carbon tax

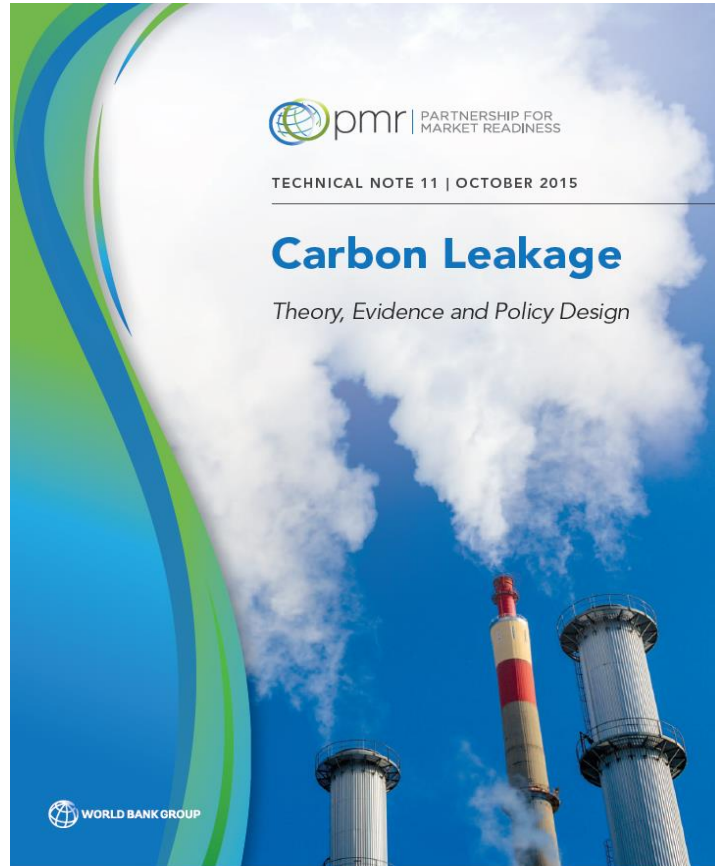
- Weighting environmental integrity and administrative/political feasibility
 - Average (percentage based) or marginal effective tax rate (pricing above threshold/benchmark)
 - Latter preserves stronger incentives for emission reduction and can be linked to a carbon budget/performance standards. Possibly evolve into ETS.
 - Phasing-out exemptions over time

- Germany and Sweden combined a broad energy tax with exemptions for energy-intensive processes
- Finland and Denmark provided tax refunds on large proportion of their energy taxes for energy-intensives (gradually phased out)

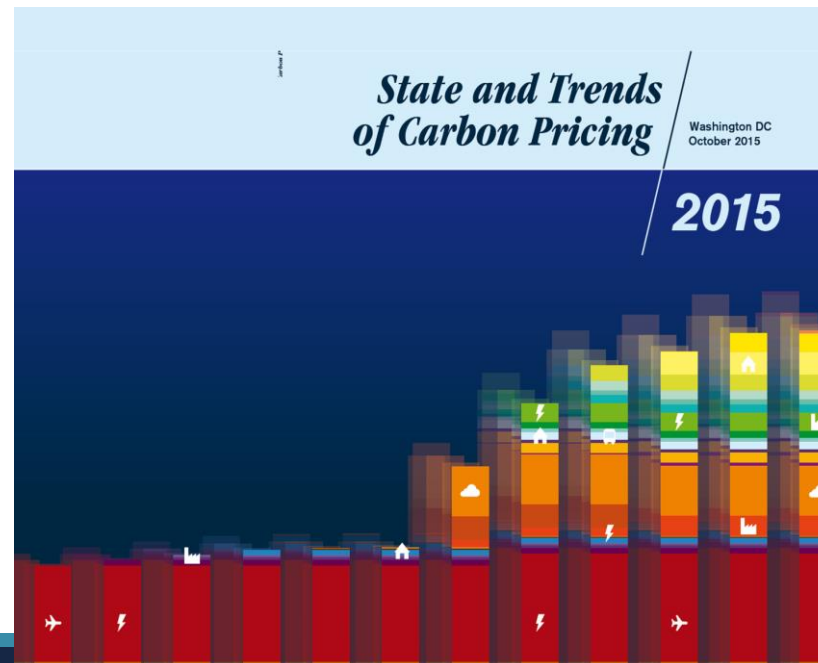


Recent WBG publications on leakage

Technical note



Summary for policy makers



High level summary

