
Measuring and comparing carbon pricing and the pricing of embodied and transport emissions

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A stylized graphic of a globe, composed of several overlapping, curved lines in shades of blue and cyan, representing the Earth's latitude and longitude. The lines are thick and have a slight gradient, giving it a three-dimensional appearance. It is positioned on the left side of the slide, partially overlapping the text area.

Measuring Carbon Pricing

Many ways to price carbon. Not just carbon taxes/ETS.

There are various carbon pricing designs...

Implicit carbon pricing

- **Fuel and commodity taxes / subsidies:** implicitly pricing carbon-intensive products → all countries
- **Tradeable performance standards:** introducing trading into existing environmental regulations
- **Shadow carbon pricing:** private entities accounting for social costs, portfolio construction and stress-testing

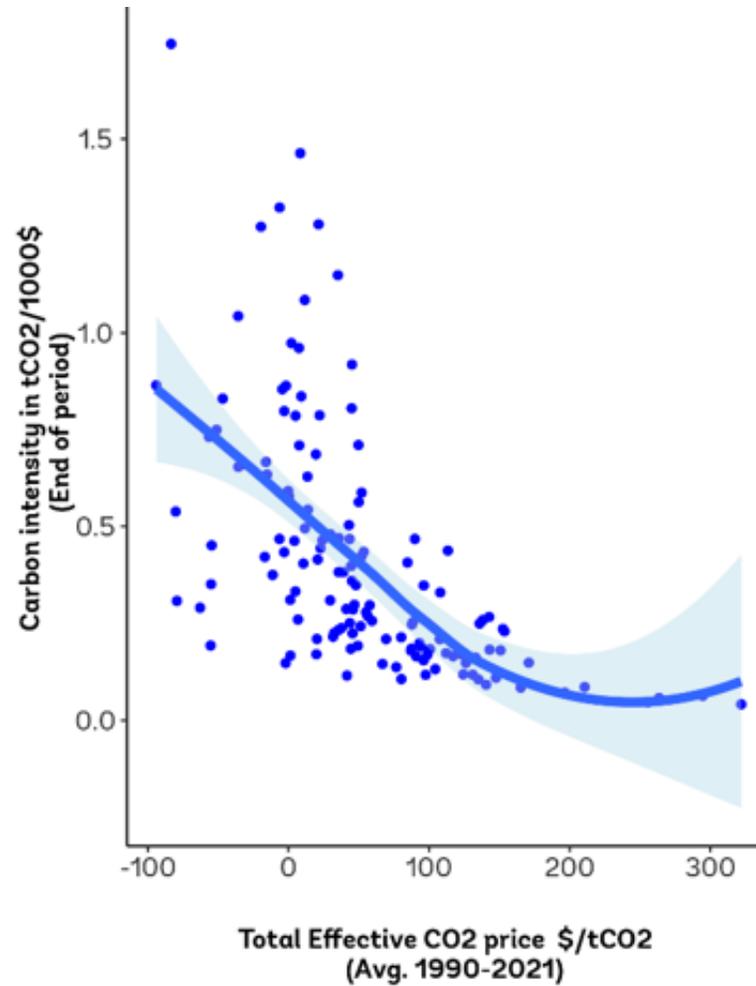
Explicit carbon pricing

- **Carbon taxes:** taxing emissions directly, or explicitly varying fuel/commodity taxes by carbon content → 32 jurisdictions
- **Emissions Trading Systems:** fixing total emissions through tradeable emissions permits, incl. with offsets → 28 markets, often covering several jurisdictions
- **Feebates (fee & rebate):** price carbon and rebate the revenues back to the industry per unit of output

... accommodating different country priorities

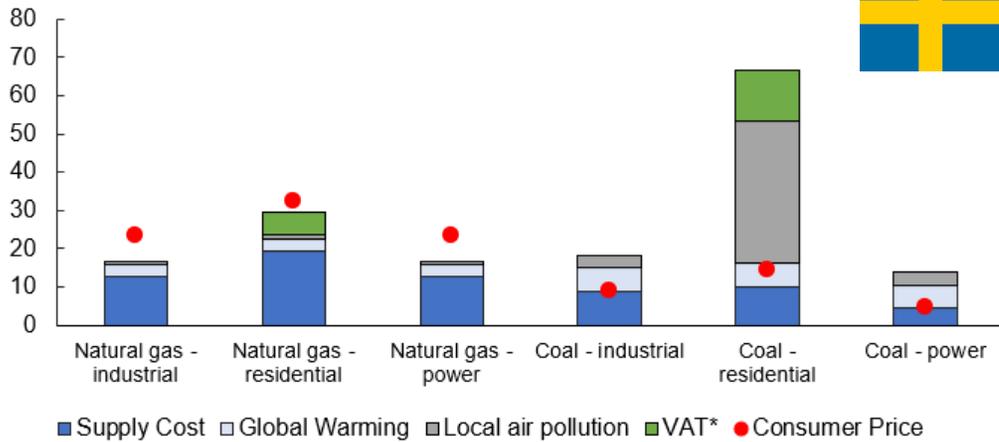
- **Priority on revenues:** taxes, auctioned ETS permits
- **Priority on industrial policy:** feebates, tradeable performance standards
- **Priority on reusing existing systems:** taxes, tradeable performance standards
- **Priority on simple governance:** carbon taxes administratively simple; politically difficult – ETS reverse
- **Priority on cross-sector/international transfers:** ETS or carbon tax with policy crediting or traded offsets
- **Combining carbon price with other mitigation instruments:** Taxes (with their fixed price) have simple, positive interaction effects with green bonds, public investments, sectoral regulations. ETS require managing price reductions caused by other mitigation instruments.

Fuel taxes and subsidies greatly shape emission outcomes

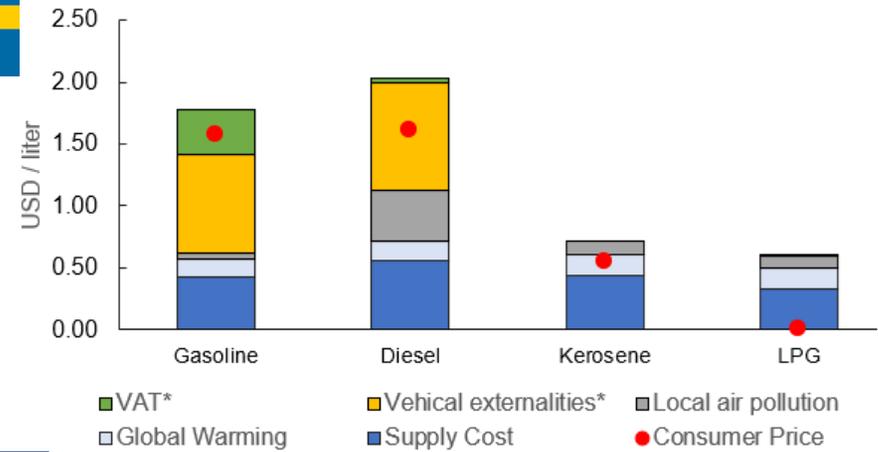


Accounting for fuel taxes is essential to avoid discrimination

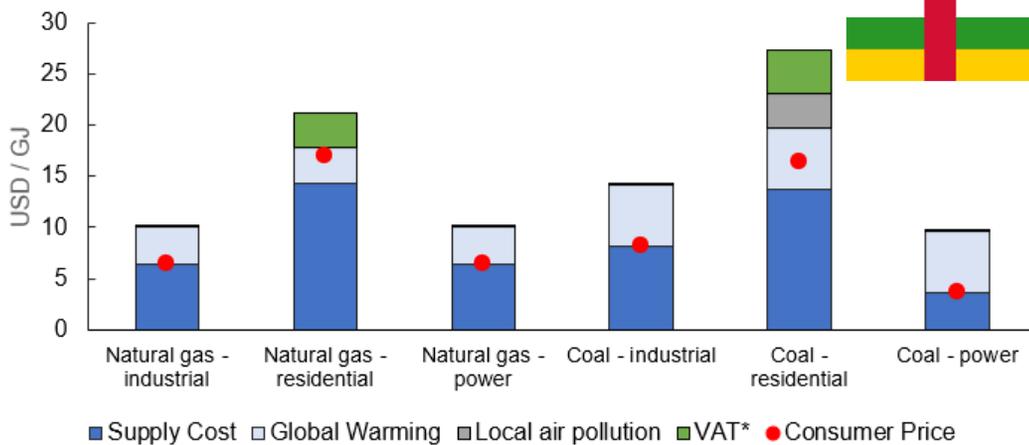
Natural Gas and Coal Pricing, 2020



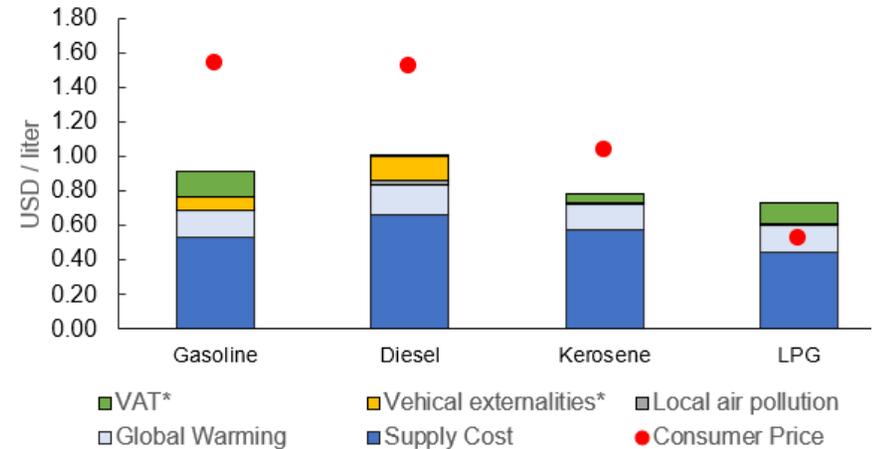
Liquid Fuels Pricing, 2020



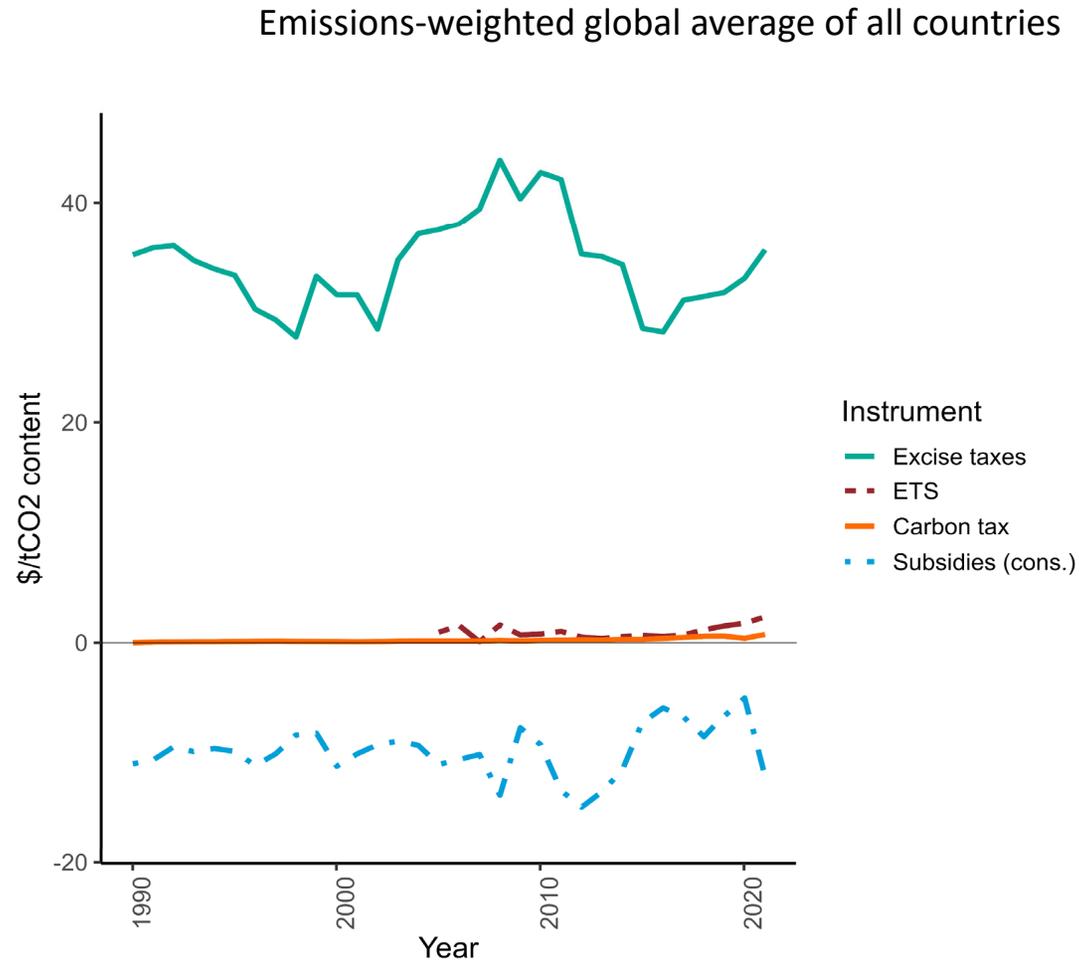
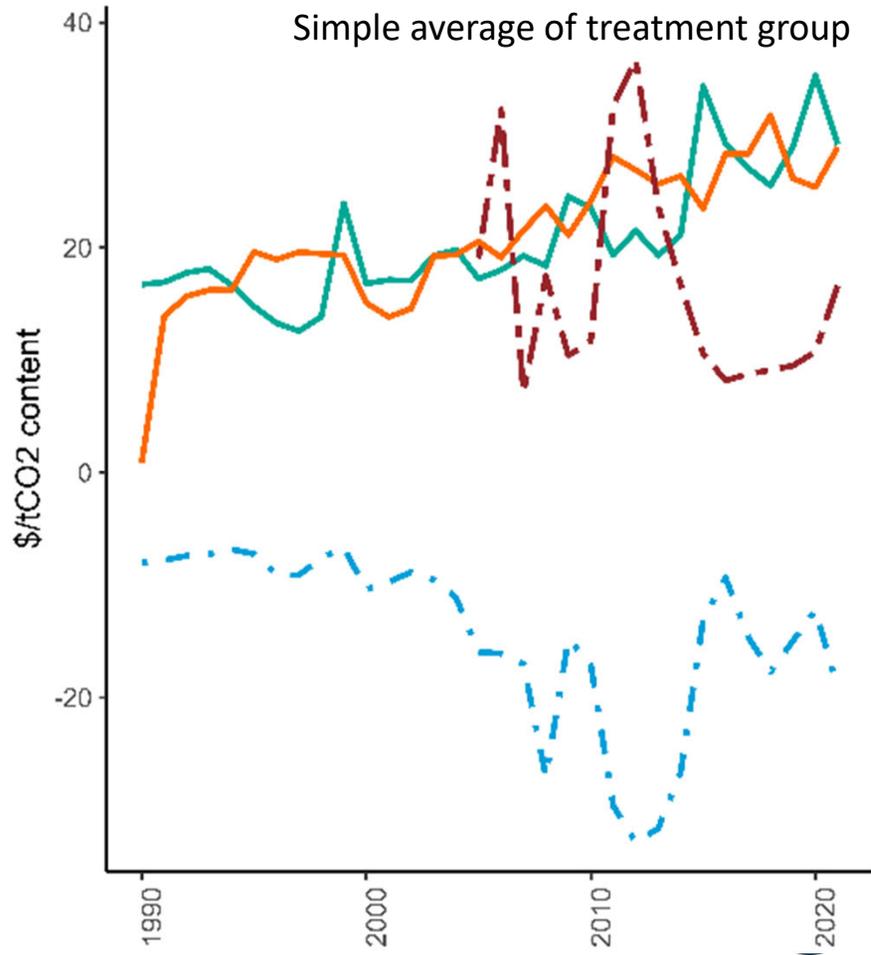
Natural Gas and Coal Pricing, 2020



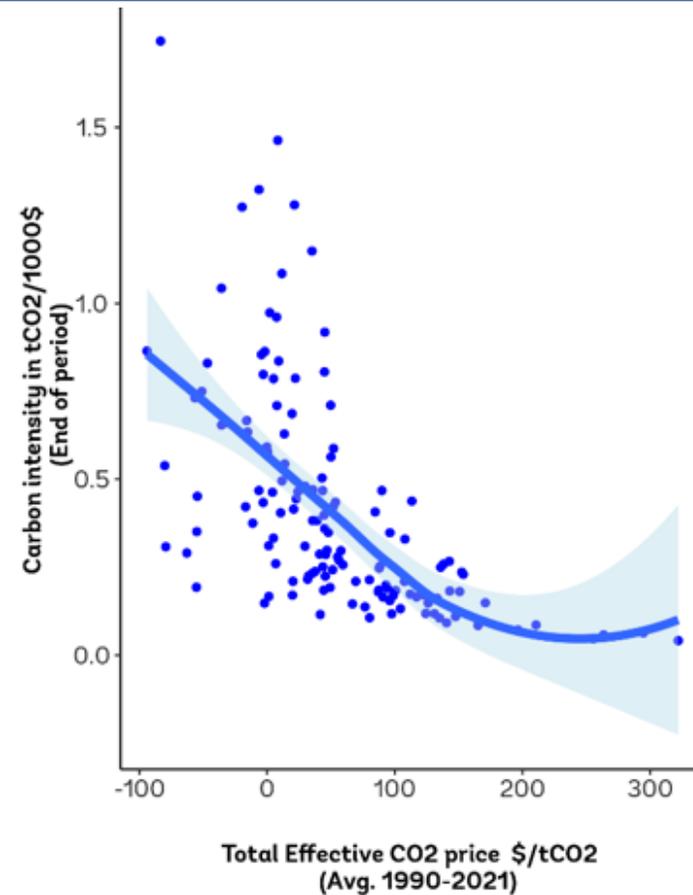
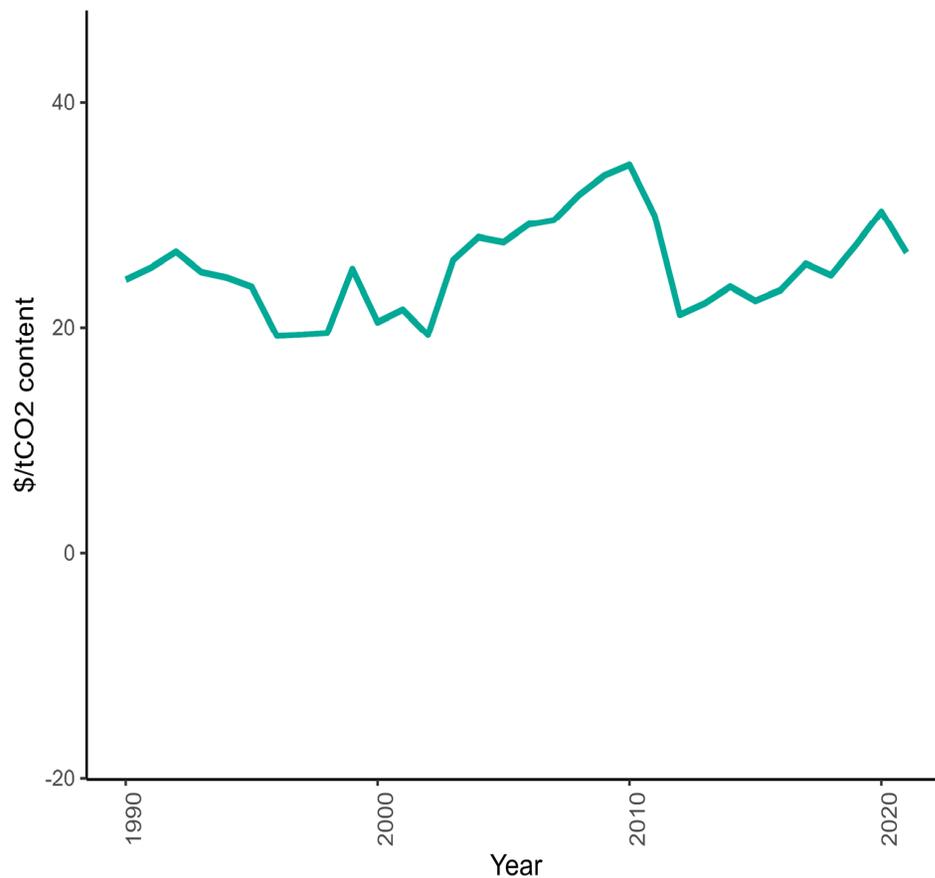
Liquid Fuels Pricing, 2020



Evolution of direct and indirect carbon prices



The world has not raised carbon prices much since it started debating climate change. But countries which did significantly price carbon were successful reducing emissions intensity.



Measuring Carbon Content

Seemingly complicated, but we have been here before!

- Personal Income Taxation: widely accepted method for taxing an uncertain tax base
 1. Default values based on typification
 2. Refunds upon provision of tax declaration
- Private sustainability certificates: widely used instrument for proving better-than-average production standards
- Health & Safety regulation: governments using private certification companies for cross-border rule enforcement
- Imported deforestation rules: use of private FSC certificates in showing compliance with EU ban on illegal timber, and UK public procurement system



Process generates data to improve typification

We can reuse the same systems. No need to await public MRV.

- Carbon pricing based on default values with typification
- Correction through system of rebates using accredited certification companies as clearing houses
- Need to add: use of carbon revenues to subsidize certification in developing countries

Cleaning up more widely than carbon

- Sustainability certificates often include more than low-carbon production
 - Can simultaneously address other sustainability/social issues plaguing GVCs
- For those wider, non-carbon issues, sustainability certificates are wanted anyway
 - Sink that cost once

Embodied emissions: example of steel



Carbon price charged to first entity purchasing the steel for average emissions per tonne of that steel type

Rebate or subsidy to steel producer upon proof that emissions for producing that steel were lower than assumed

Embodied emissions: example of steel



Steel tax calculated using default values

Excise tax for purchaser i = Tons of steel purchased \times Average tons of CO_2^e per tonne of that steel class \times Social cost per ton of carbon

Subsidy for the steel producer on proof of lower emissions

Subsidy for steel producer j = Tons of steel sold to domestic users \times Amount by which steel producer outperformed assumed emissions per ton of that steel class \times Social cost per ton of carbon

Embodied emissions: example of timber



Carbon price applied to imported timber based on default value for external cost of wood production

Rebate/subsidy/discount if an accredited agency certifies that the timber is more sustainable than the default value

Further information: [World Bank \(2021, ch. 6-10\)](#)

Transport emissions: example of maritime sector

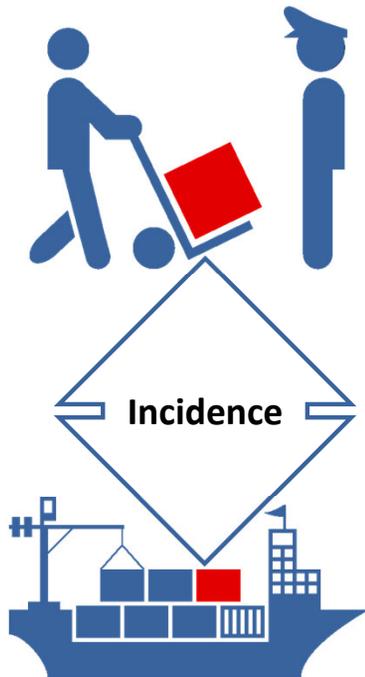


Carbon price charged to cargo consignee based on default value for average emissions associated with cargo's transport

Subsidy to ship upon proof that emissions for that cargo were lower than the default value

Further information: [Dominioni, Heine & Martinez Romera \(2018\)](#), [Heine & Gäde \(2018\)](#)

Transport emissions: example of maritime sector



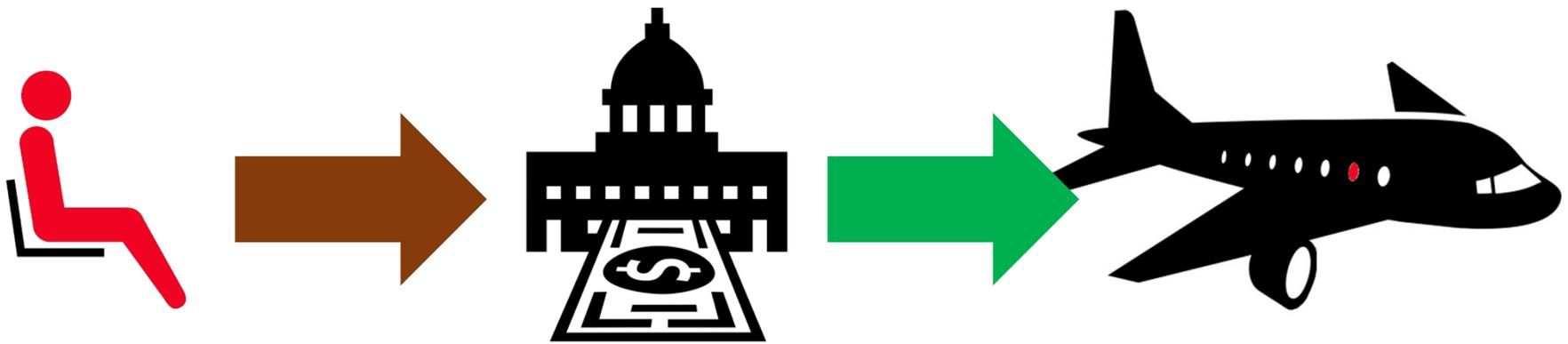
Consignee/consignor-based tax calculated using default values

Tax bill = assumed distance * tonnage * assumed efficiency *
assumed emissions factor * carbon price * 1/2

Subsidy for the shipping company on proof of lower emissions

Subsidy for unit of cargo transported = tax bill – actual distance *
actual efficiency * assumed emissions factor * carbon price * 1/2

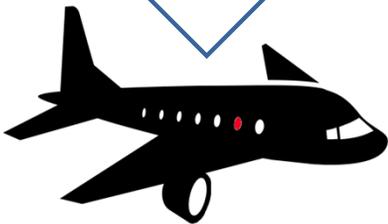
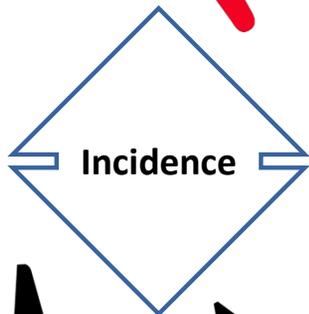
Transport emissions: example of aviation sector



Ticket tax charged to the passengers based on default value for average pollution per passenger-mile

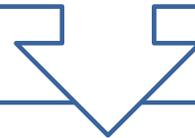
Potential subsidy to airline upon proof that emissions for transporting that passenger were lower than assumed

Transport emissions: example of aviation sector



Ticket tax calculated using default values

Ticket tax for passenger $i = \frac{1}{2} \times \text{Miles flown by passenger } i \times \text{Average plane tons of CO}_2^e \text{ per passenger mile} \times \text{Social cost per ton of carbon}$



Subsidy for the airline on proof of lower emissions

Subsidy for airline $j = \frac{1}{2} \times \text{Miles that } j \text{ transported } i \times \text{Amount by which } j \text{ outperformed assumed emissions per passenger mile} \times \text{Social cost per ton of carbon}$

Conclusion

- Most countries, especially in the developing world, price carbon implicitly through fuel/commodity taxes/subsidies, not CT/ETS
 - Need to include in accounting for CPF/BCA
- Can price carbon based on default values, with rebates when lower emissions are proven via sustainability certificate.
 - No need for global public MRV system. Work with, not against, existing private sector systems.
 - Use share of carbon revenues to support certification in developing countries.