

Environmental Taxation in the Transport Sector

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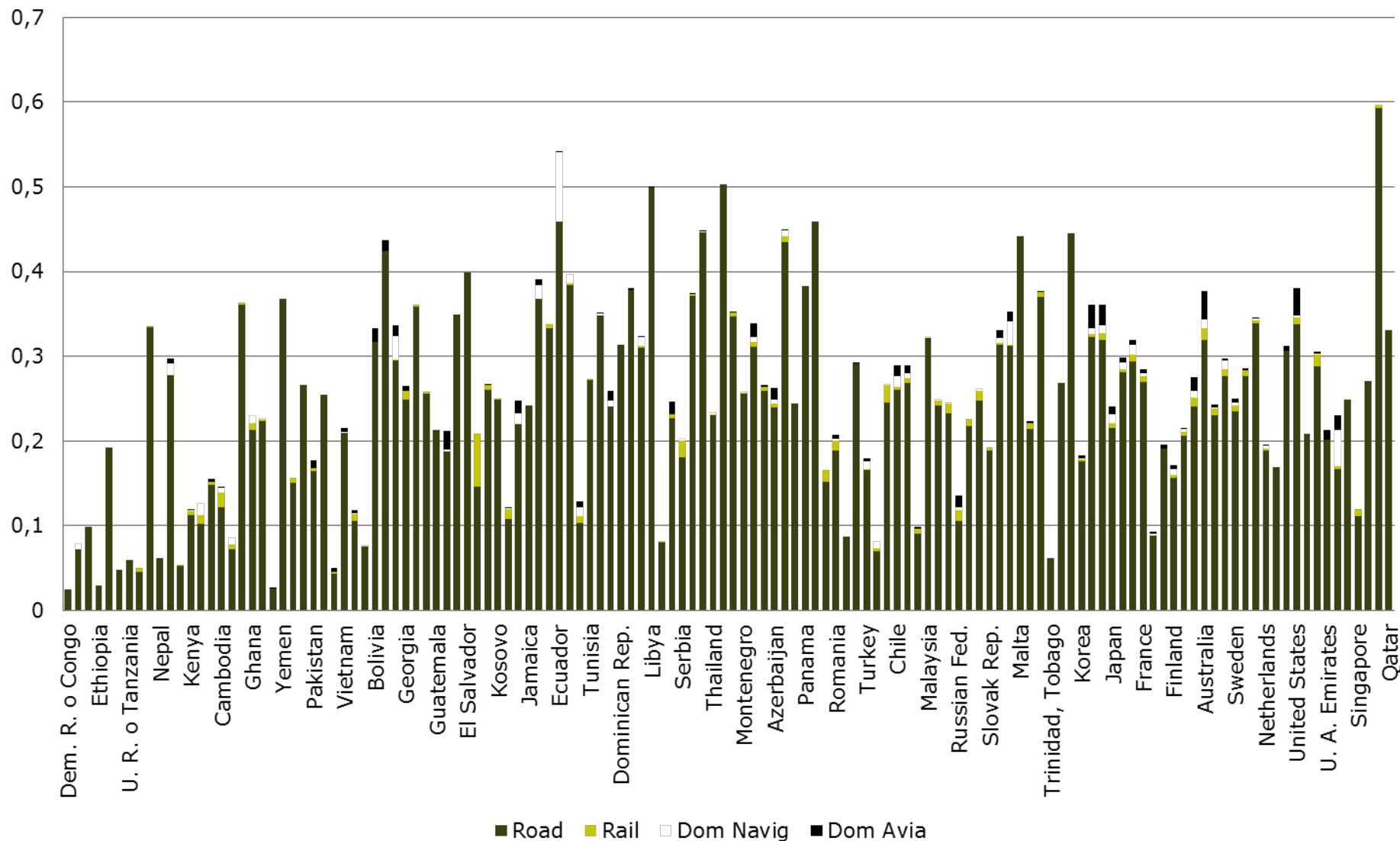
Main observations

- Transport important for many environmental challenges
- Public goods provision is a suitable analytical framework
- Energy use is a suitable indicator and 'first' base for taxation
- Pressures and priorities for range of public goods
 - Air quality
 - Greenhouse gas mitigation
 - Congestion relief
 - Accidents
- So policy instruments will grow in sophistication to exploit opportunities
- Road traffic and shipping shares many characteristics - and potential - but will differ in policy instruments/intervention



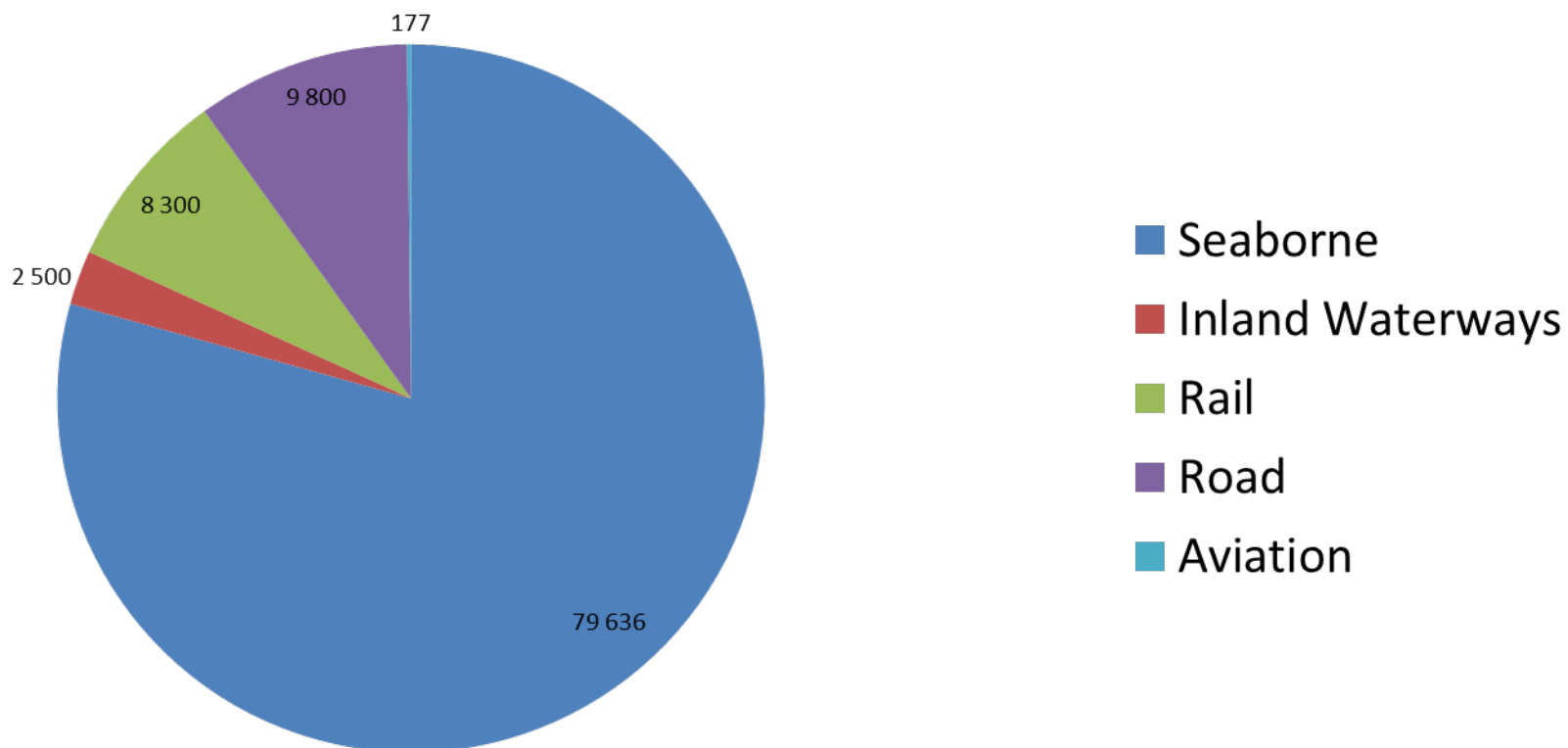
NHH i) Road dominant; ii) one quarter

Domestic transport's share in country's energy use



International freight *is* maritime shipping

Global Cargo Freight Work Billion ton kilometers





	Public Good (Benefit) domain		Important contributor (example/typical)	
	Geographic/ jurisdiction	Time	Transport	Other
Air quality	From city to valley to neighboring states	Hours to weeks	Road vehicles (diesel especially), vessels near/in in port	Power generation, manufacturing, waste burning
Greenhouse gases	Global only	Cumulative, centuries	Road, maritime shipping, aviation	Power generation, cattle, cement, all fuel burning
Accidents	Local, also national in prevention policies	Spontaneous, to decades in strategies	Road, others	Agriculture, industry, homes
Congestion	Local	Hours	Road vehicles, unmotorized	None

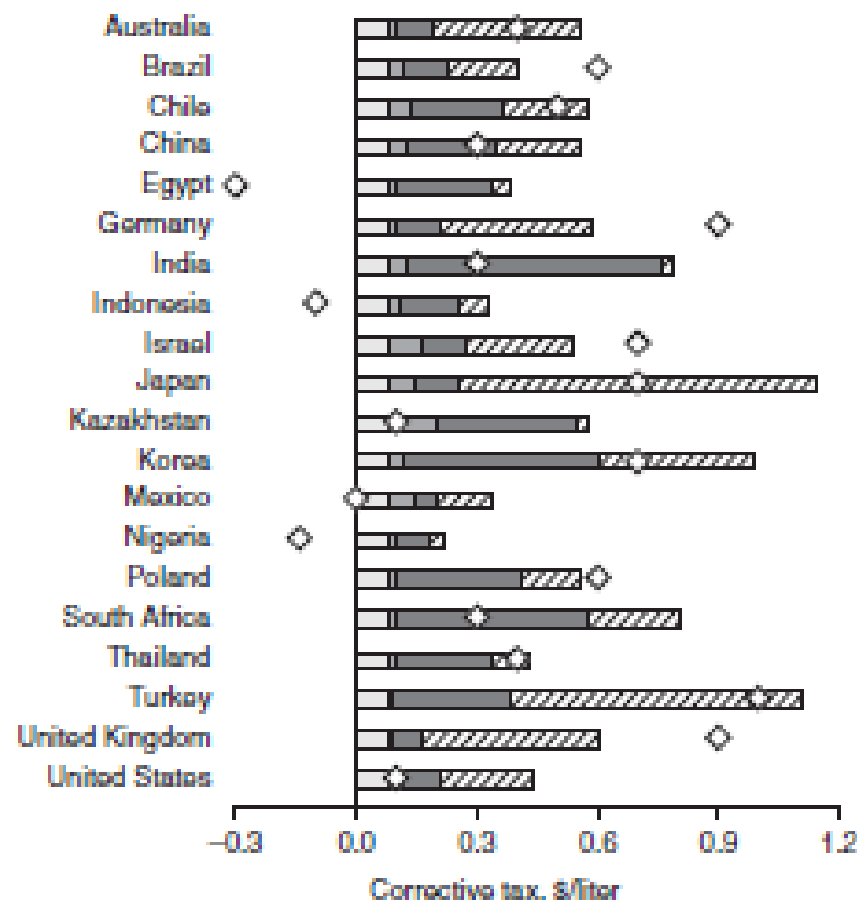


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Multiple public goods: underprovided

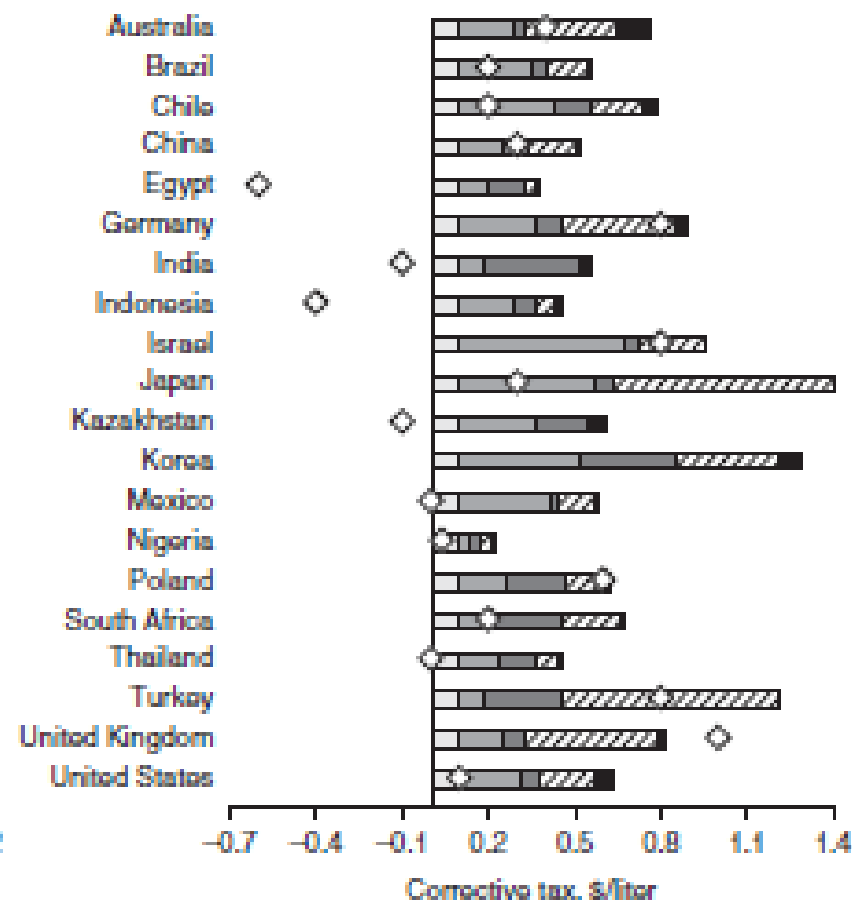


3. Gasoline



Carbon Local pollution Accident
Congestion Current tax

4. Motor Diesel



Carbon Local pollution Accident
Congestion Road damage Current tax

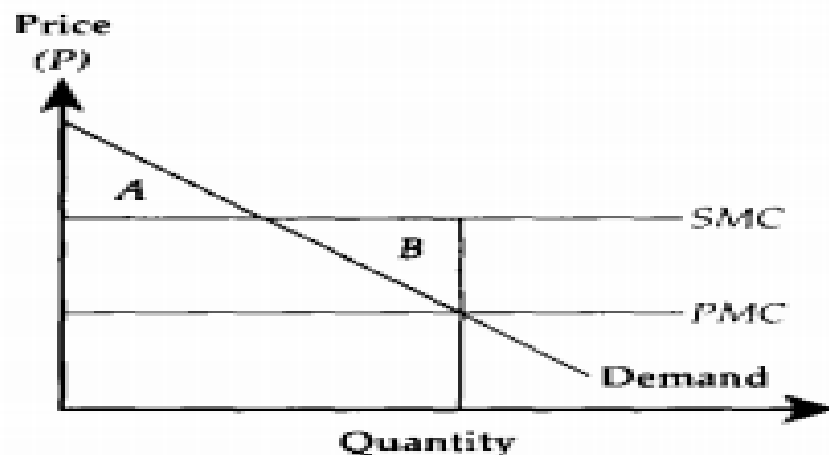
Source: Authors, based on methodology described in the book.

From Parry et al, 2014

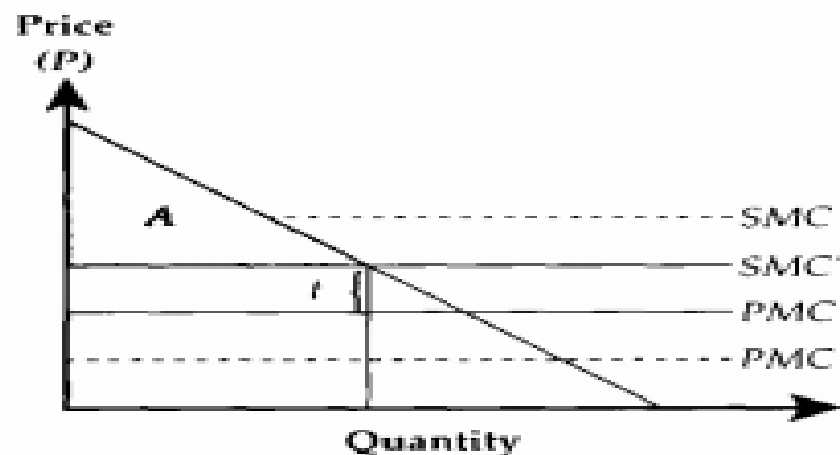


i) Less and ii) cleaner: fuel tax and...

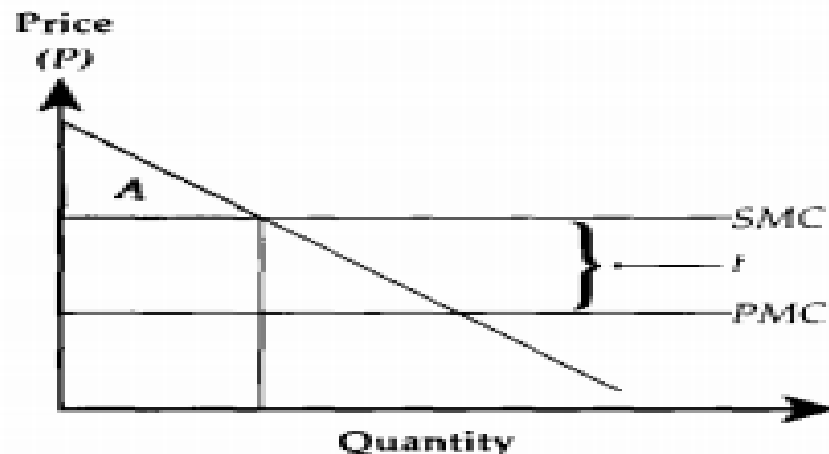
(a) No intervention
Consumer surplus = $(A - B)$



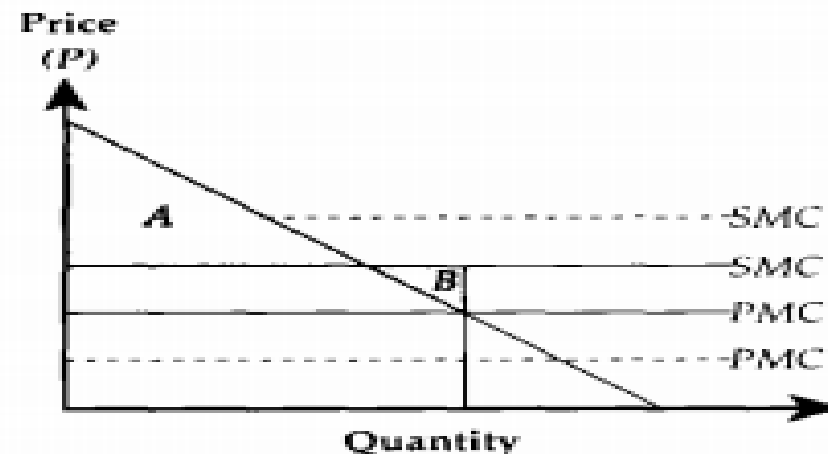
(b) A pollution tax
(or output tax and abatement)
Consumer surplus = A



(c) Pollution tax on output
Consumer surplus = A



(d) Mandated abatement
Consumer surplus = $(A - B)$



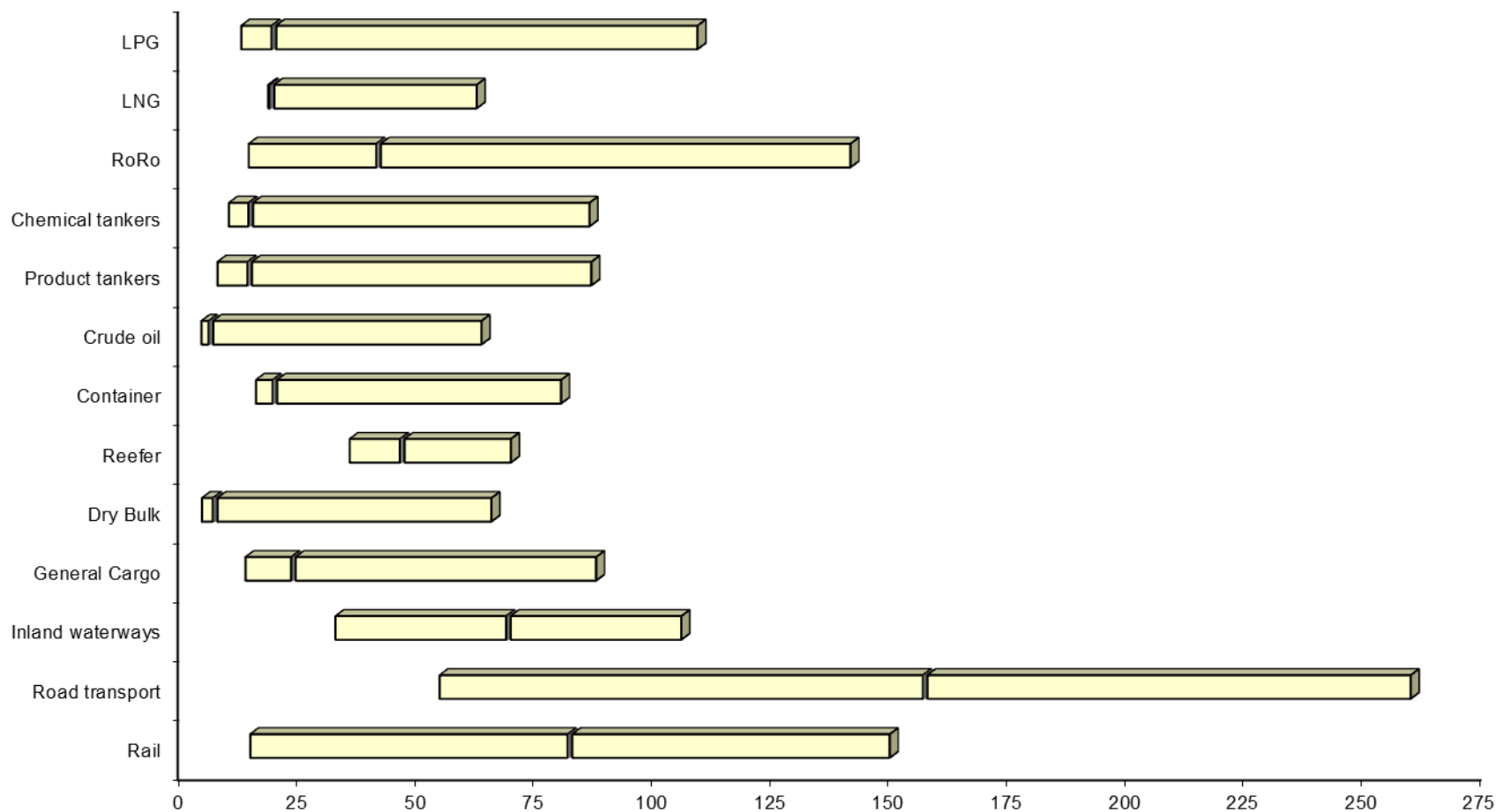


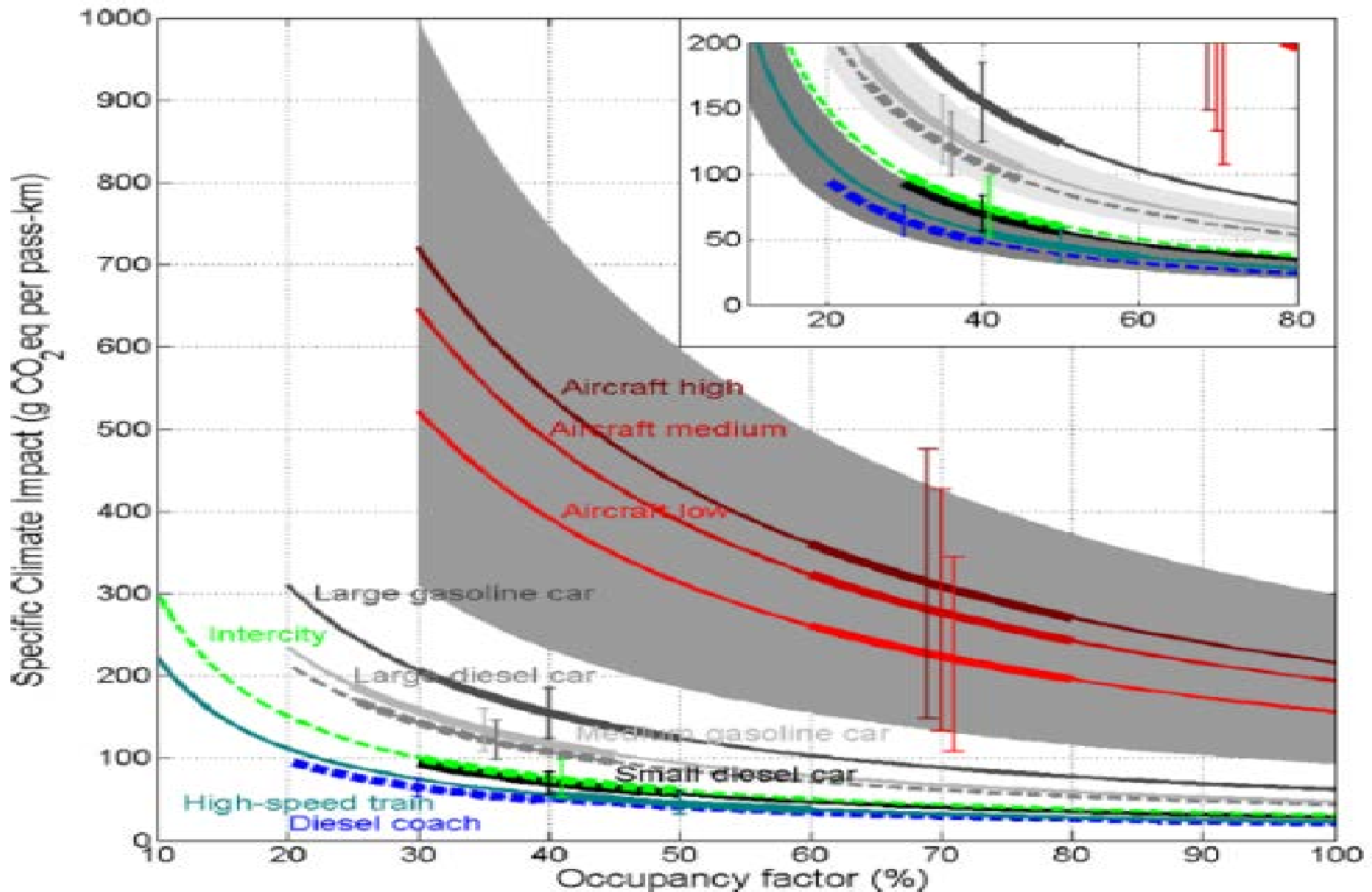
General for energy, air quality, climate: *Larger, slower* (same for passenger km)

Carrier		Boeing 747 Freighter	6500 TEU container vessel	18 000 TEU container vessel	Dry Bulk Panamax 80 000 dwt	Dry Bulk Capesize 180 000 dwt	Truck & Trailer	Rail
Voyage speed	km/h	850	39	39	22	22	60	60
CO ₂ Emissions per ton km	gram/ ton km	550	18	13	4	3	85	50
CO ₂ Emissions per cubic km	gram/ m ³ km	50	5	4			21	17
Cost per 10 000 ton km		2865	55	45	13	11	590	444
Fuel cost in percentage per ton		58%	75%	67%	61%	57%	47%	36%



Gram CO2 per ton km range per vessel type





Four principles

- Market based; a charge (emission tax, congestion fee, pay-as-you-drive insurance and liability): textbook recommendations
- In practice, instrument like fuel taxes, toll rings – are suitable for multiple public good provision challenges, despite imperfections
- But will often want to be supplemented by other instruments:
 - to push cleaner cars and fuels,
 - to give differentiation (urban area, time of day, season) according to air quality challenges, congestion

Policy instruments used in combination will influence each other, but not much, and not in complicated ways



Policy instruments used in combination will influence each other, but not much, and not in complicated ways:

Say emission standards are used to make vessels, cars, fuels leaner with respect to air pollution, greenhouse gases:

The principle for taxing fuels to change or discourage use of vessels, cars, fuels is unchanged, but applies to the current, lower emission factors

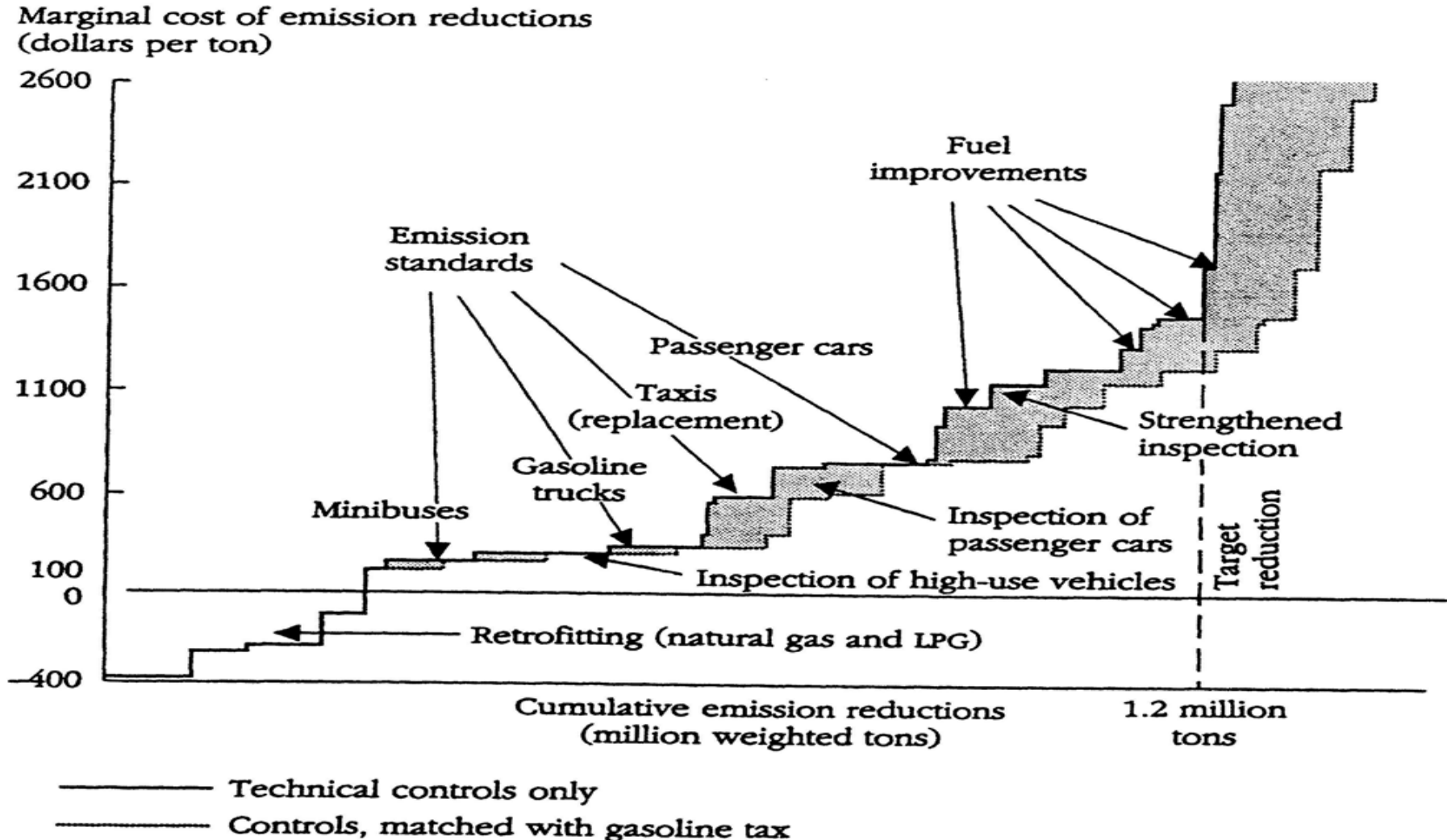
Say city applies differentiated tolls for road use, congestion, and air quality reasons

A national (or global) fuel tax for greenhouse gas mitigation is still applied, with no or very little coordination between the different jurisdiction levels/objectives (apart from authorization)



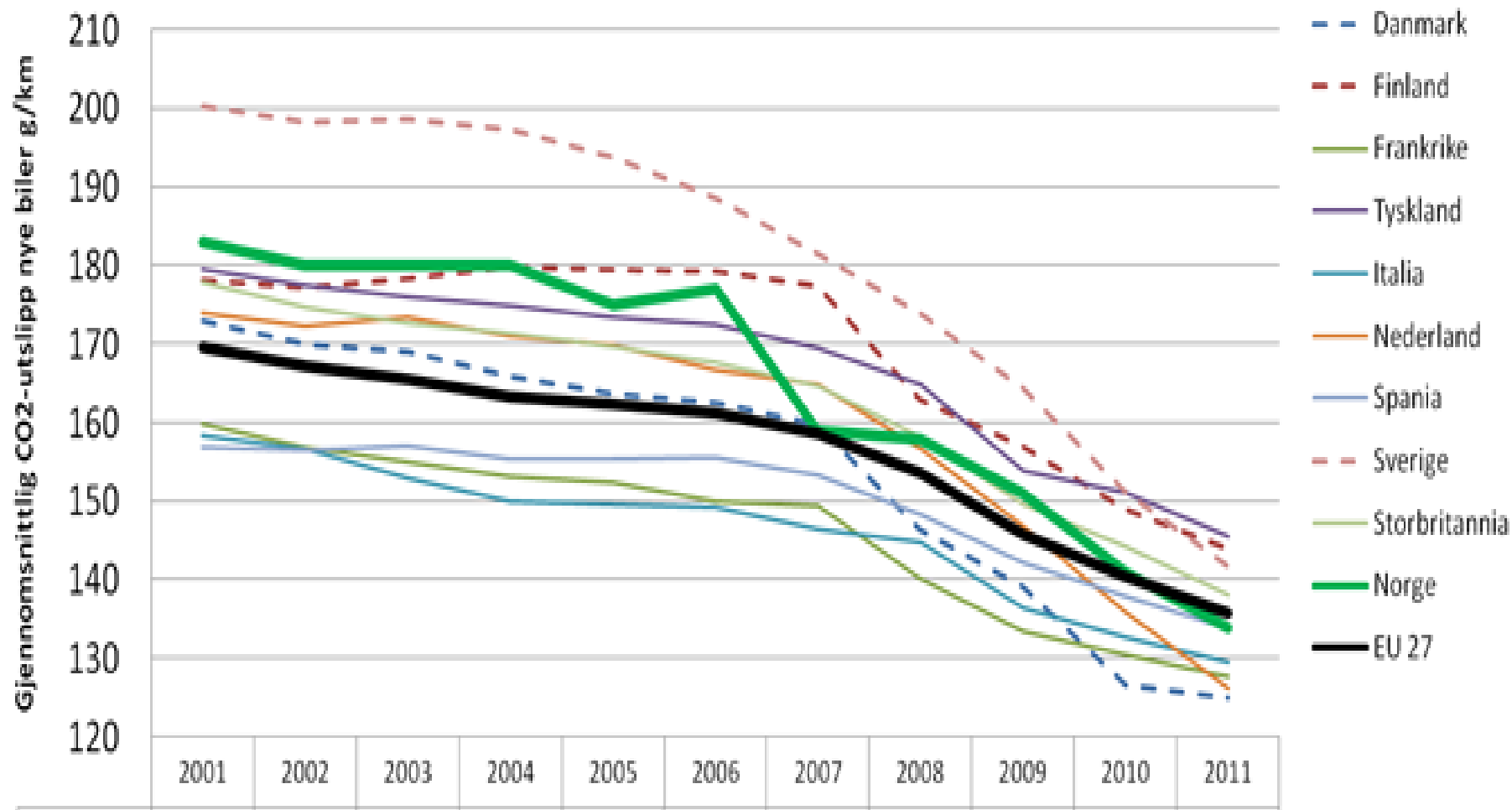
Insufficiently addressed policy objectives (public goods) *impose* coordination problems:

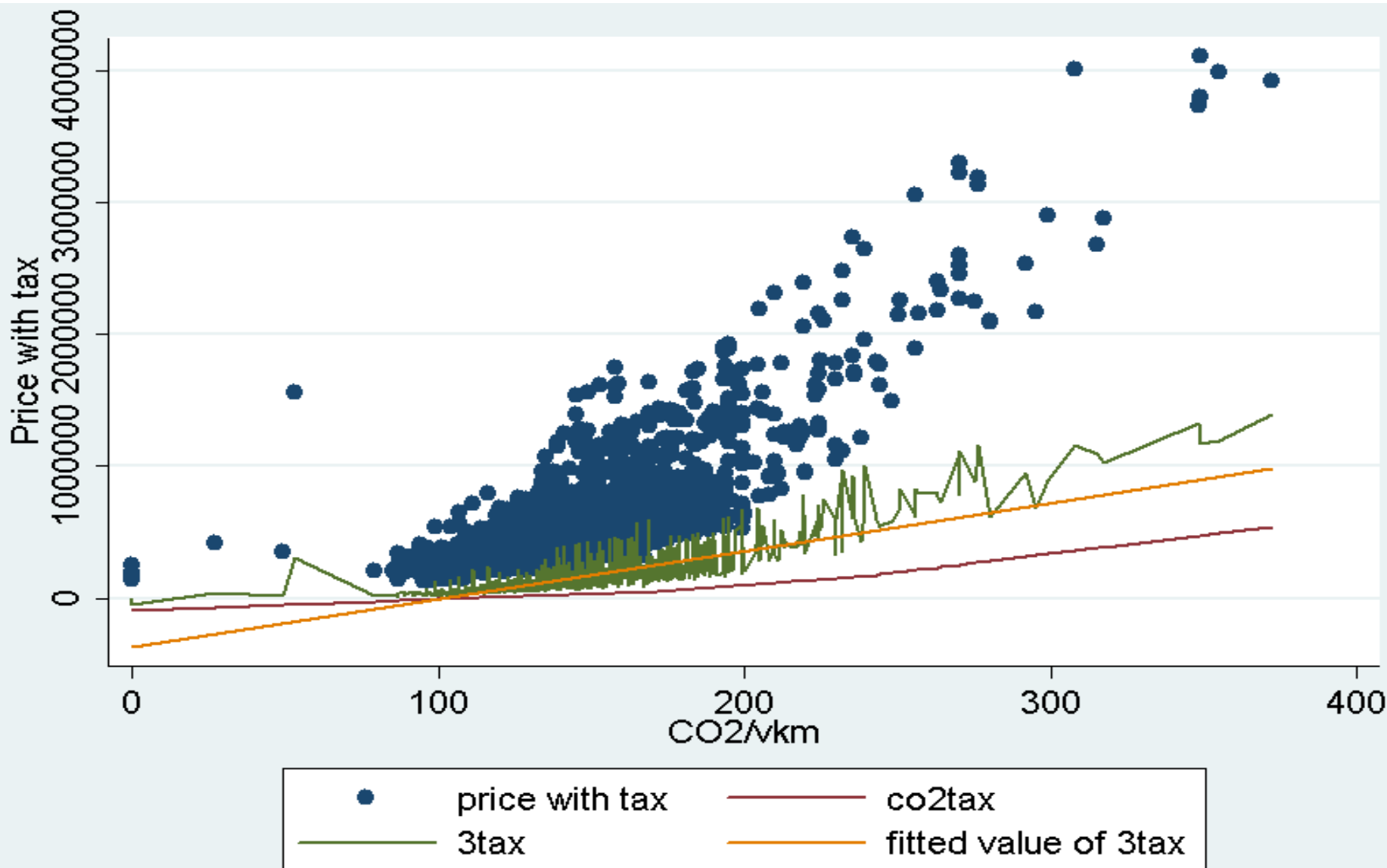
Emission constraint areas (ECA) for shipping; air quality reasons, in Northwestern Europe and USA, can increase shipping's global warming, **because** greenhouse gas mitigation is not well addressed by national (or global) authorities.

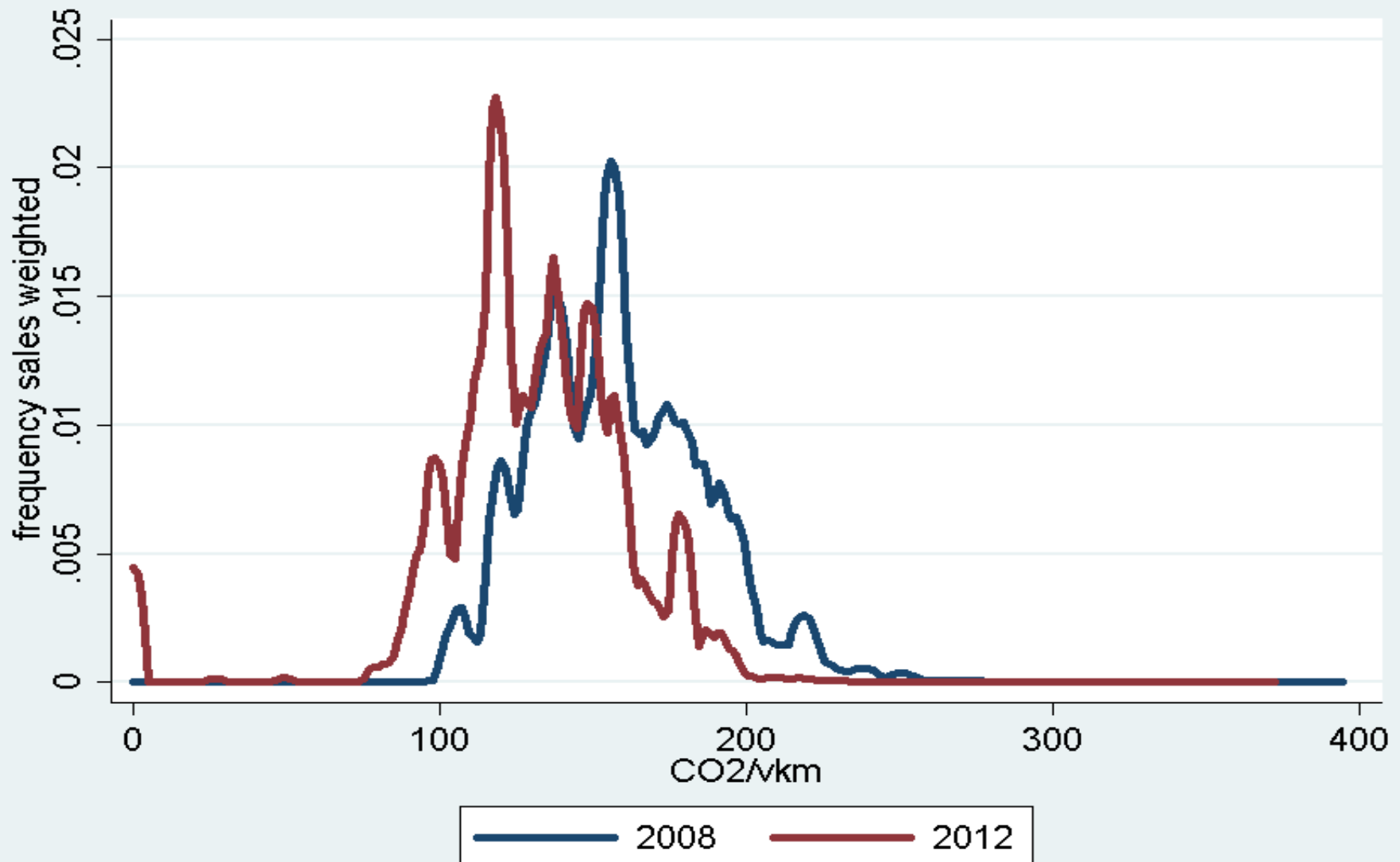


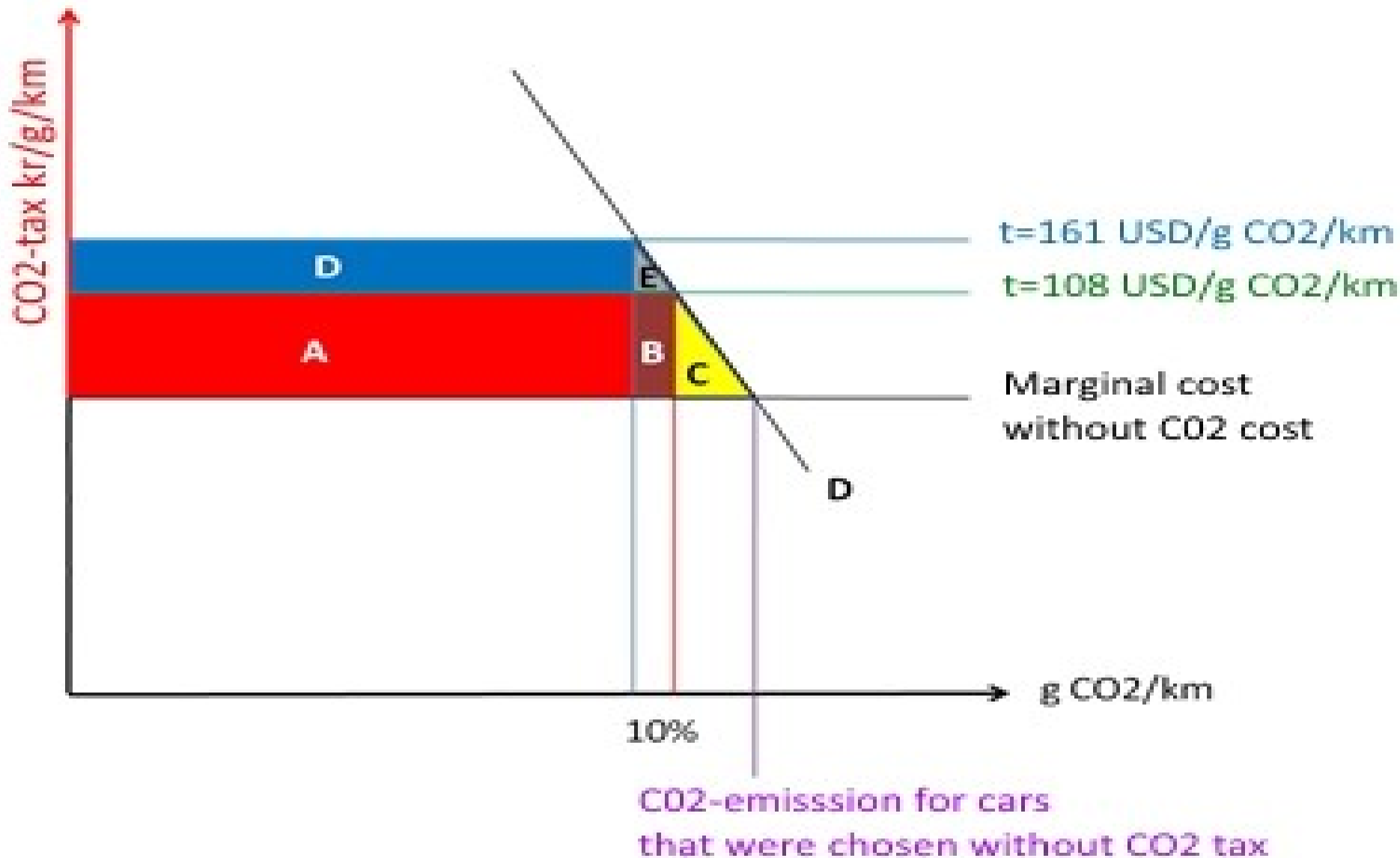
Note: Calculations are based on -0.8 elasticity of demand for gasoline.

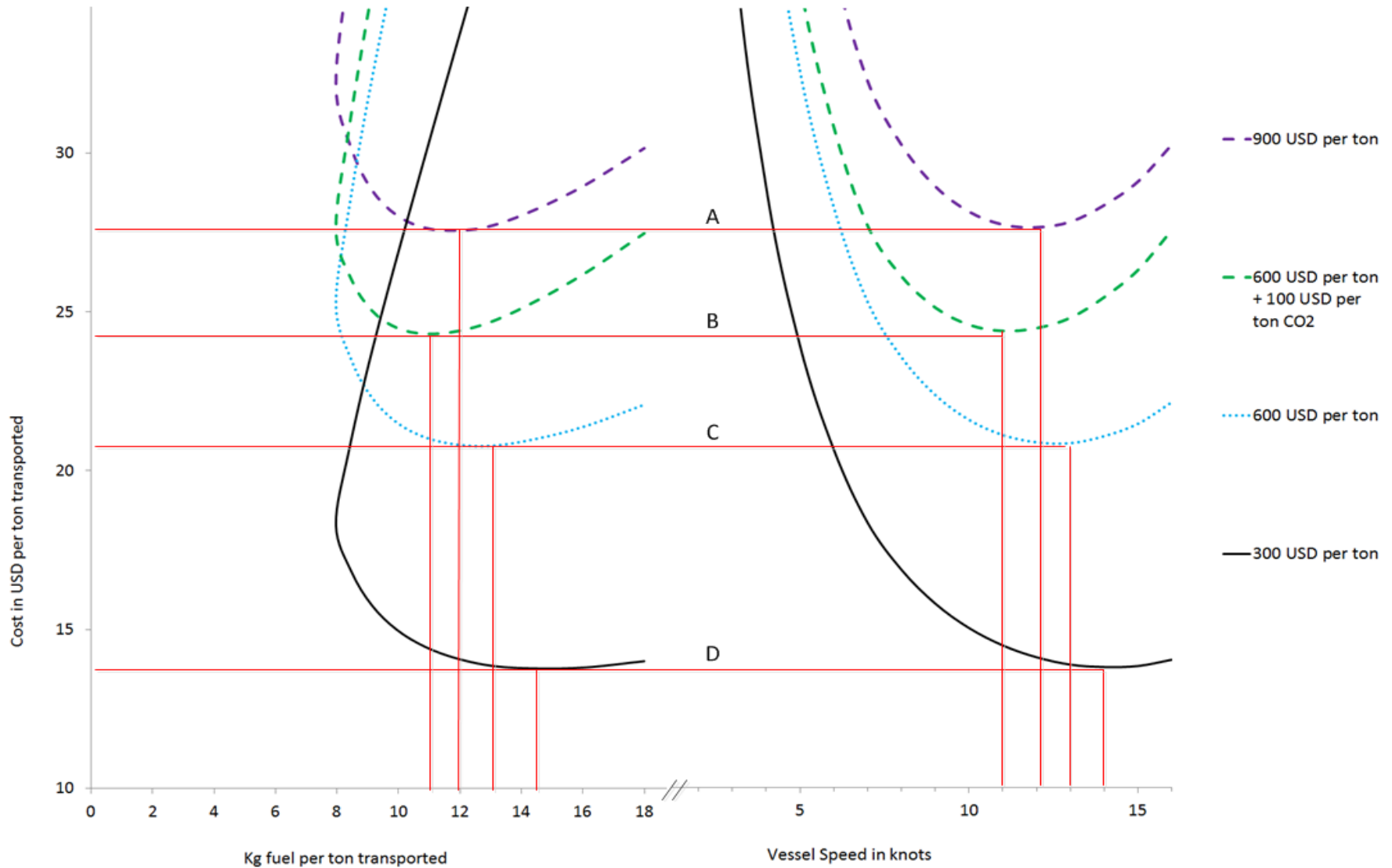
European new car sales: rapidly greening

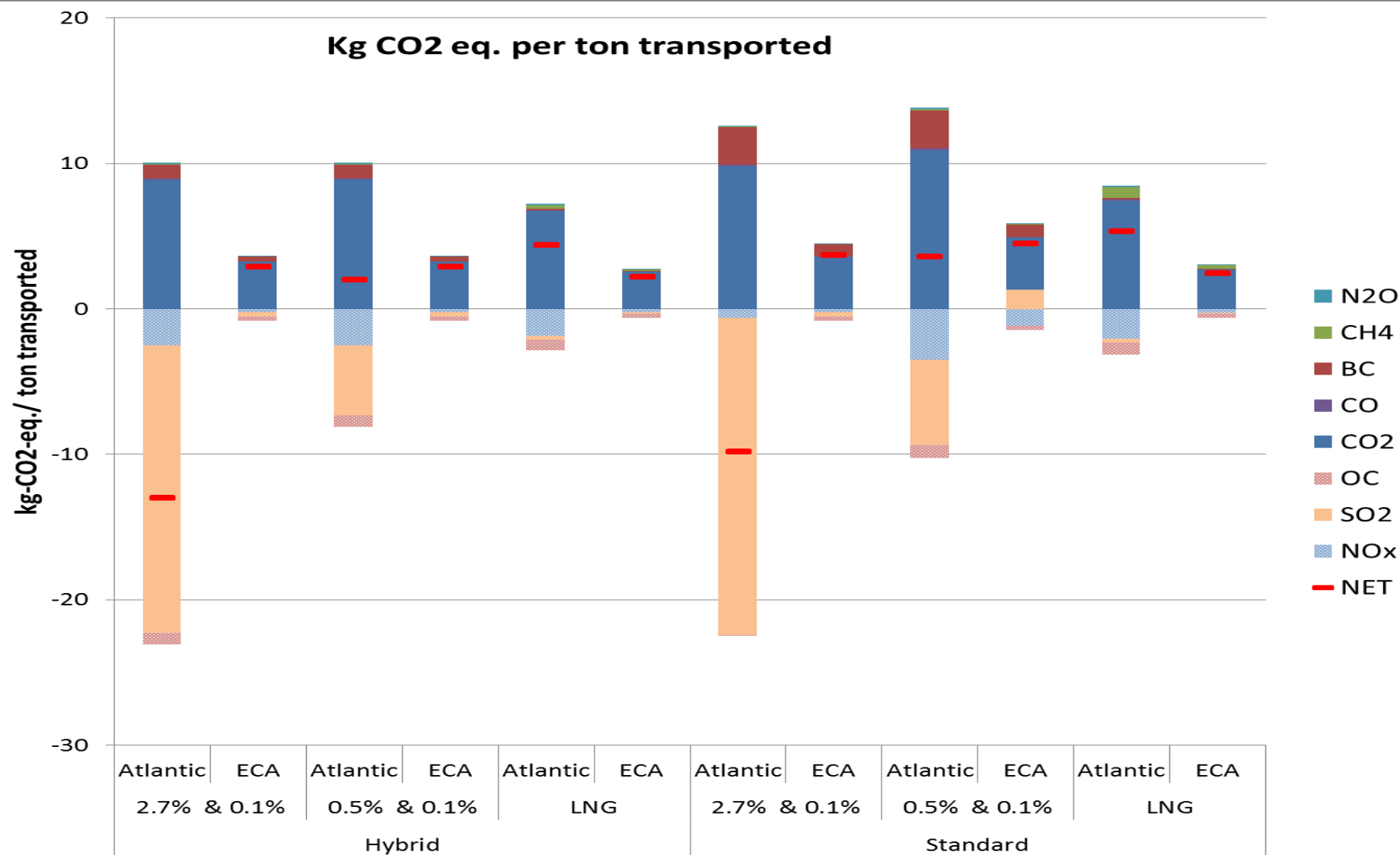














Multiple public goods ask for policy intervention in transport sector

Taxes – imperfect ones such as fuel taxes, tolls, taxes on characteristics of vessels, vehicles, fuels, belong in a practical toolbox

Public goods at various levels – local, national, global – typically do not require coordination: intervention additively generally works well

Since theoretically ideal instruments typically do not exist, policy makers cannot be totally ignorant about major abatement options, like speed in maritime, new car technologies

A major difference between two examples – road transport and maritime shipping – is the greater importance of global movements in latter.

Major improvements environmentally – public goods – are available, and tax intervention is suited.



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Thank you, and



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