How to achieve less air pollution and GHG emissions from long distance freight transport

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VTI, Swedish National Road and Transport Research Institute
National conference in transport research,
Göteborg, October 15, 2018

Tonne-km and emissions on Swedish territory i base line sceanrio 2016

	Road	Rail	Sea	Total
Billion tonne-km	53	20	36	109
Emissions				
-CO2-equivalents (1000 tonnes)	3,333	29	1,247	4,609
-NOx (tonnes)	12,621	365	17,972	30,958
-SOx (tonnes)	8	0	709	718
-PM 2,5 (tonnes)	207	13	360	581

Sources: Transport Analysis, Statistics Sweden, Swedish Environmental Protection Agency and own assumptions

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Approach

Simulation of different policy instruments with Swedish transport model

- Model is based on minimization of logistics costs
- Constant freight transport demand
- Calculation of modal split in baseline and different scenarios

Calculation of

- GHG and air pollution emissions in different scenarios
- External costs of GHG and air pollution emissions (based on Ricardo (2014))

Policy instruments in Sweden

National taxes and fees

- 8% higher fairway dues and 5% higher pilot fees (implemented 2018-01-01)
- 40% higher rail track fees 2025 (decided)
- Km-tax: 0,06 € /km for trucks < 40 ton and 0,11 €/km for trucks => 40 ton (discussed)

Hypothetical fees in ports

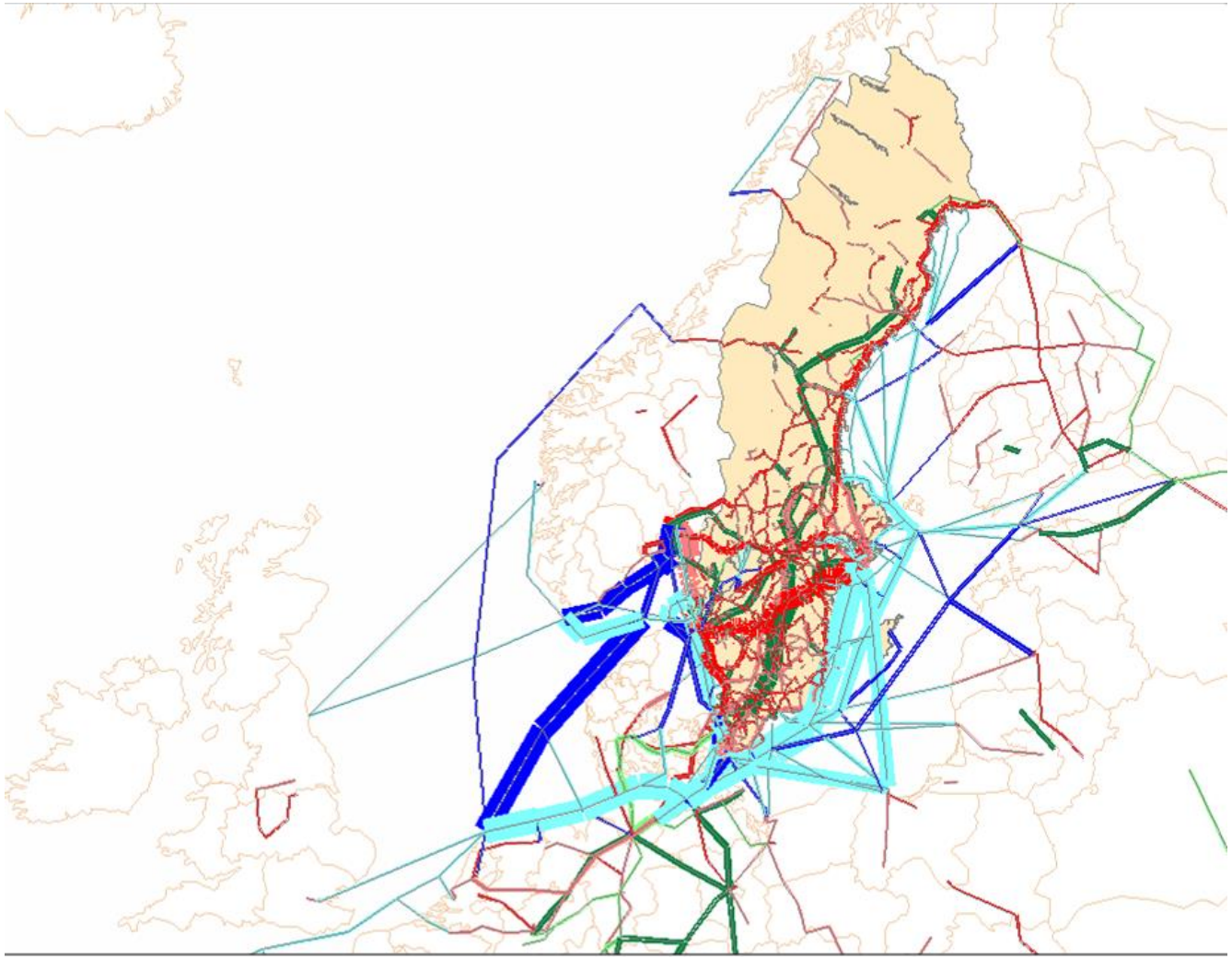
- Passage fee of 5,10, **20**, 30, 50 och 100 €/truck in all Swedish ports
- Passage fee of 5,10, **20**, 30, 50 och 100 €/truck in ports of Gothenburg, Trelleborg and Stockholm

Result in form of differences between scenarios that include policies and base in tonne-km per mode in Sweden

Calculated impact on tonne-km in Sweden compared to baseline

Policy instrument(s)	Road	Rail	Sea	Total
(1) Higher fairway dues and pilot fees	0,1%	0,1%	-0,3%	0,0%
(2) Higher rail track fees	-0,1%	-0,8%	1,1%	0,2%
(3) Km-tax for trucks	-4,7%	4,4%	2,8%	0,2%
(1-3) Higher fairway dues/pilot fees, rail track fees and km-tax for trucks	-4,6%	3,3%	3,6%	-0,1%
(4) Passage fee of 200 SEK/truck in all Swedish ports	0,6%	1,4%	-2,2%	-0,3%
(5) Passage fee of 200 SEK/truck in Göteborg/Trelleborg/Stockholm ports	-0,3%	0,8%	0,7%	0,3%
(1-4) Higher fairway dues/pilot fees, rail track fees, km-tax for trucks and passage fee of 200 SEK/truck in all Swedish ports	-4,1%	3,9%	1,1%	-0,7%

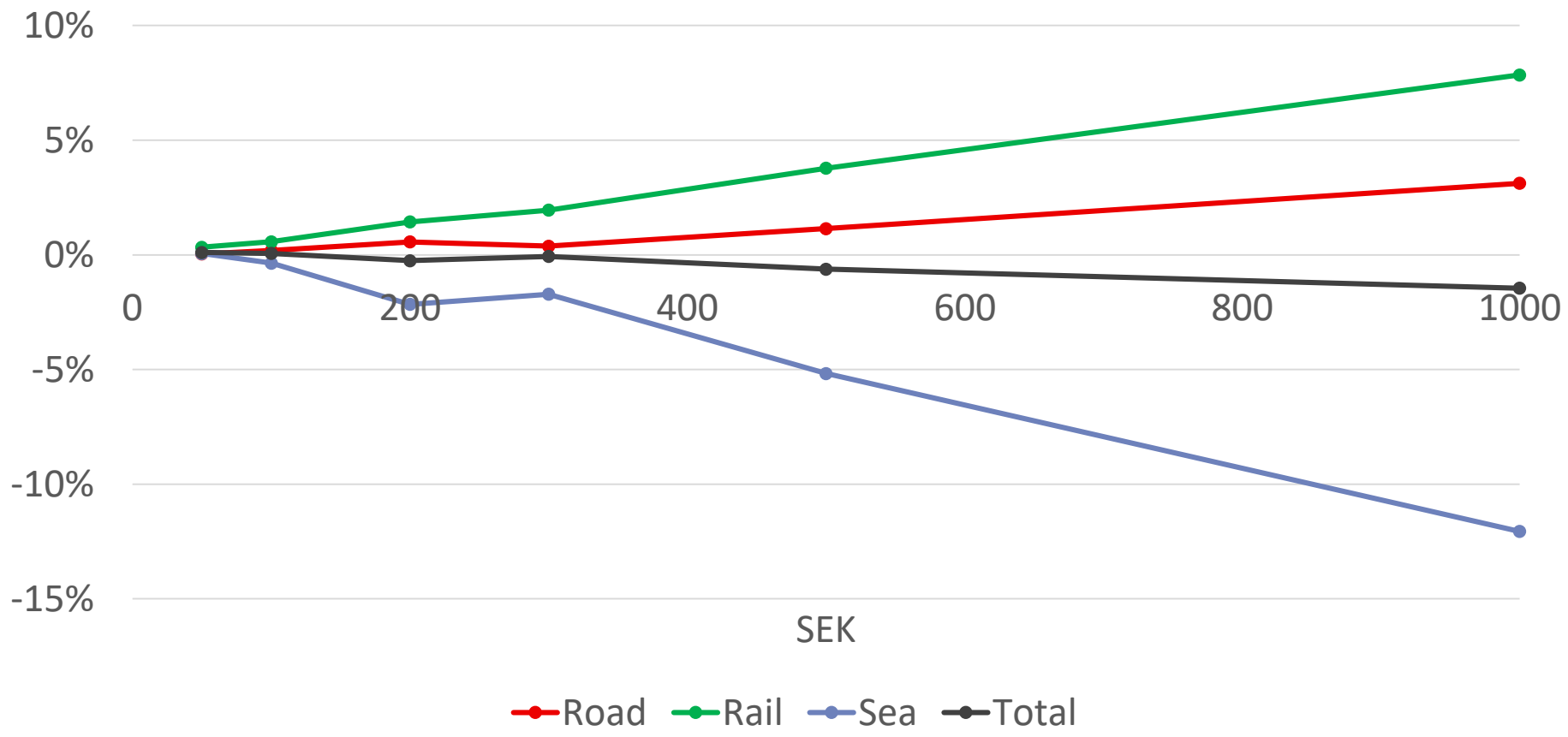
Calculated impact of passage fee of 20 €/truck in all Swedish ports compared to baseline (tonnes)



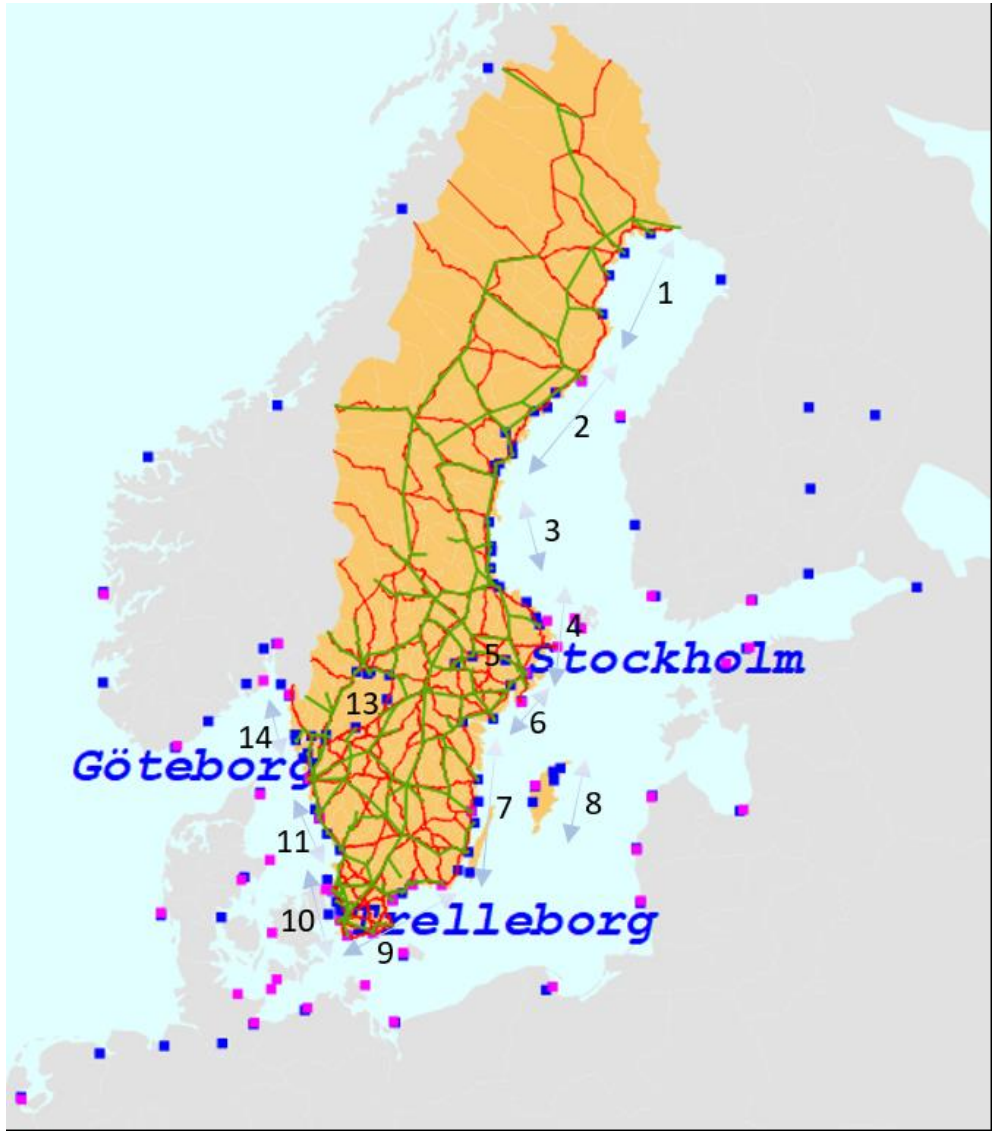
Blue=sea
Green=rail
Red=road

Dark colors=increases
Bright colors=decreases

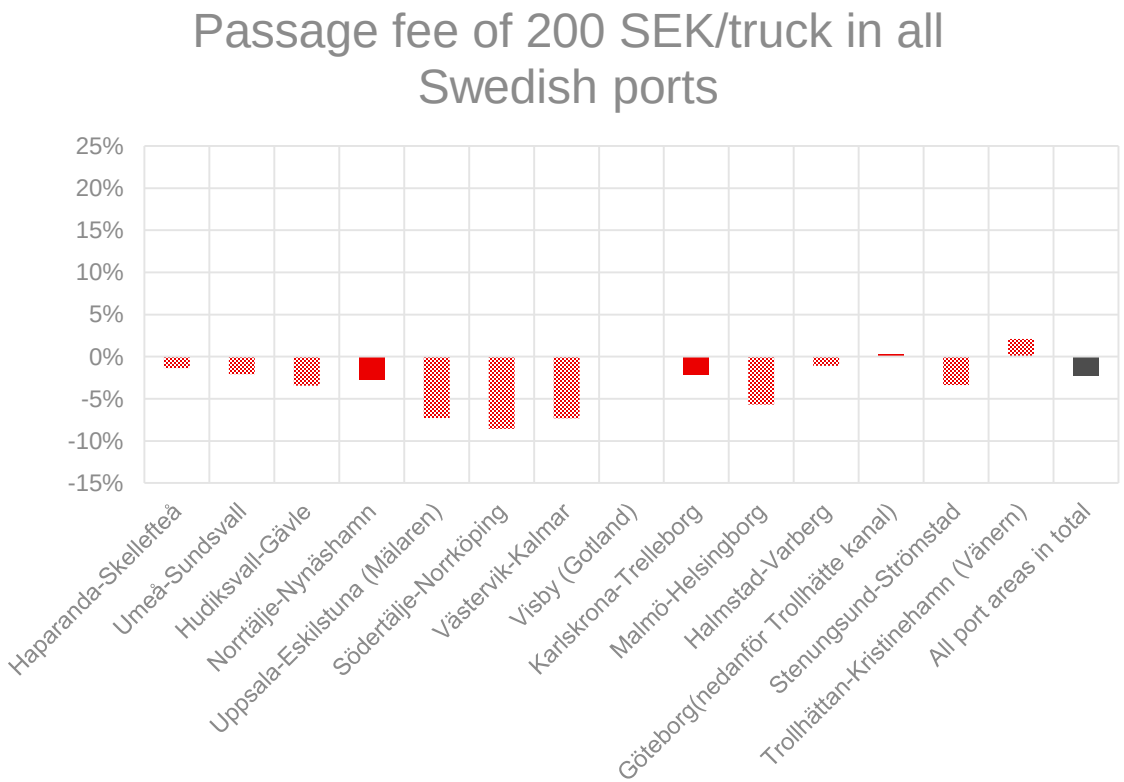
Calculated impact on tonne-km in Sweden for different levels of passage fee per truck (1 SEK = 0,1 €)

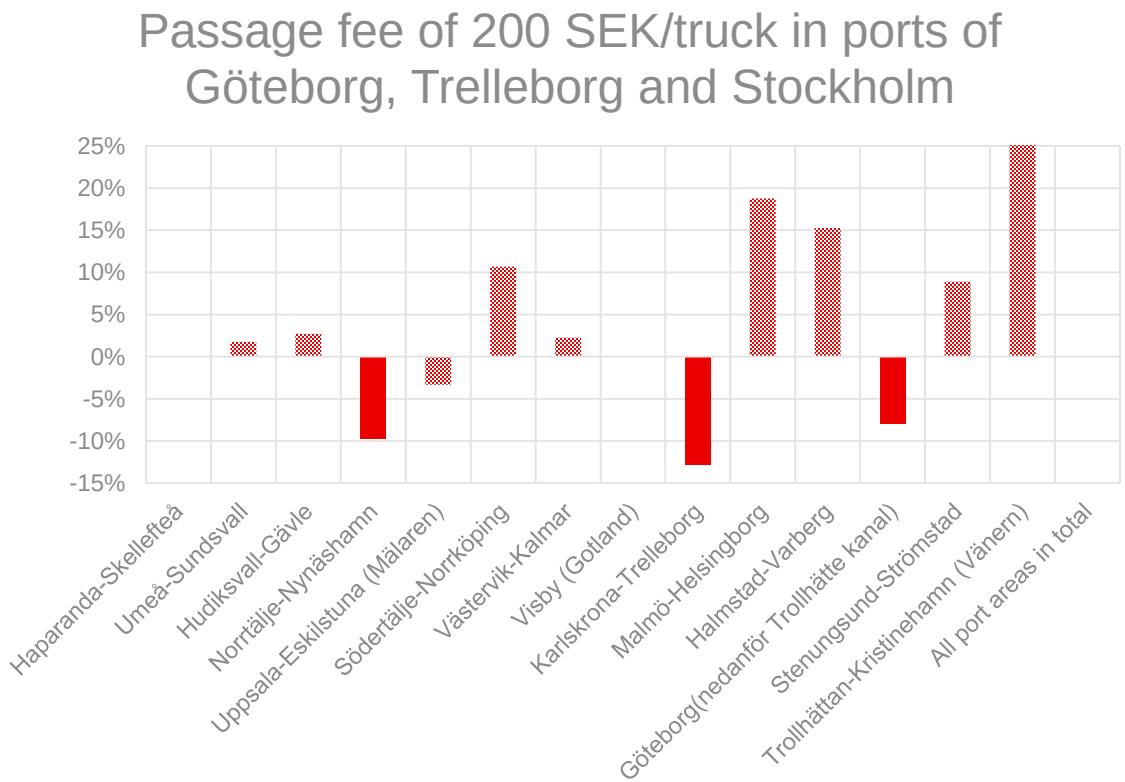


Result in form of differences between
scenarios that include policies and base
in tonnes throughput per coastal area in Sweden


1
2
3
4
5
Stockholm
13
6
14
Göteborg
7
8
11
10
Trelleborg
9

Calculated impact of passage fee of 20 € / truck on port throughput compared to baseline





Calculated impact of gate fees of 20 €/truck in all Swedish ports on throughput (in tonnes) in Swedish ports by STAN commodity (aggregated NSTR)

STAN-commodity	Agriculture	Timber	Wood prod.	Food	Crude oil	Oil prod	Iron ore	Metal prod	Paper, pulp	Sand etc	Chemicals	Industry prod.	Total
Change in %	-6,5	-0,7	-3,4	-8,9	0	-2,2	-0,3	-2,1	-1,3	-1,8	-2,7	-3,2	-2,3

Result in form of differences between
scenarios that include policies and base
in tonnes emissions and logistics costs in Sweden

Calculated impact on GHG and air pollution in Sweden (compared to baseline)

Policy instrument(s)	CO2-equivalents (1000 tonnes)	NOx (tonnes)	SOx (tonnes)	PM 2,5 (tonnes)
(1) Higher fairway dues and pilot fees		-41	-2	-1
(2) Higher rail track fees	10	182	8	4
(3) Km-tax for trucks	-120	-74	20	1
(1-3) Higher fairway dues/pilot fees, rail track fees and km-tax for trucks	-108	79	25	4
(4) Passage fee of 200 SEK/truck in all Swedish ports	-7	**-315**	-16	-7
(5) Passage fee of 200 SEK/truck in Göteborg/Trelleborg/Stockholm ports	-1	91	5	2
(1-4) Higher fairway dues/pilot fees, rail track fees, km-tax for trucks and passage fee of 200 SEK/truck in all Swedish ports	**-122**	**-306**	8	-40

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Calculated impact on air pollution, GHG and logistics costs in Sweden (million SEK)

Policy instrument(s)	Air pollution and GHG costs	Logistics Costs
(1) Higher fairway dues and pilot fees	-2	6
(2) Higher rail track fees	18	30
(3) Km-tax for trucks	-117	908
(1-3) Higher fairway dues/pilot fees, rail track fees and km-tax	-97	984
(4) Passage fee of 200 SEK/truck in all Swedish ports	-22	104
(5) Passage fee of 200 SEK/truck in Göteborg, Trelleborg and Stockholm	4	55
(1-4) Higher fairway dues/pilot fees, rail track fees, km-tax and passage fee of 200 SEK/truck in all Swedish ports	-129	1072

Conclusions

- Introduction of the km-tax for heavy trucks is calculated to have by far the largest individual impact on reducing the external costs of air pollution and GHG
- Impact increases slightly when the km-tax is combined with higher fees for sea and rail transports and/or passage fees for trucks in all Swedish ports

- Higher rail track fees and passage fees in the ports of Göteborg, Trelleborg and Stockholm are calculated to lead to slightly increased external costs of air pollution and GHG

- Passage fees in all Swedish ports are calculated to lead to small reductions of the throughput in Swedish ports and the sea tonne-km in Sweden and a reduction of the external costs of air pollution and GHG costs

- Firms' increased logistics costs are calculated to be 3 to 10 times higher than the benefits of reduced air pollution and GHG emissions
- Other benefits to society need to be considered

Thank you for your attention

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