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Öko-Institut e.V.
Institut für angewandte Ökologie
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Impact of slow steaming for bulk carriers

Assessment of the impacts on transport costs for different ship sizes

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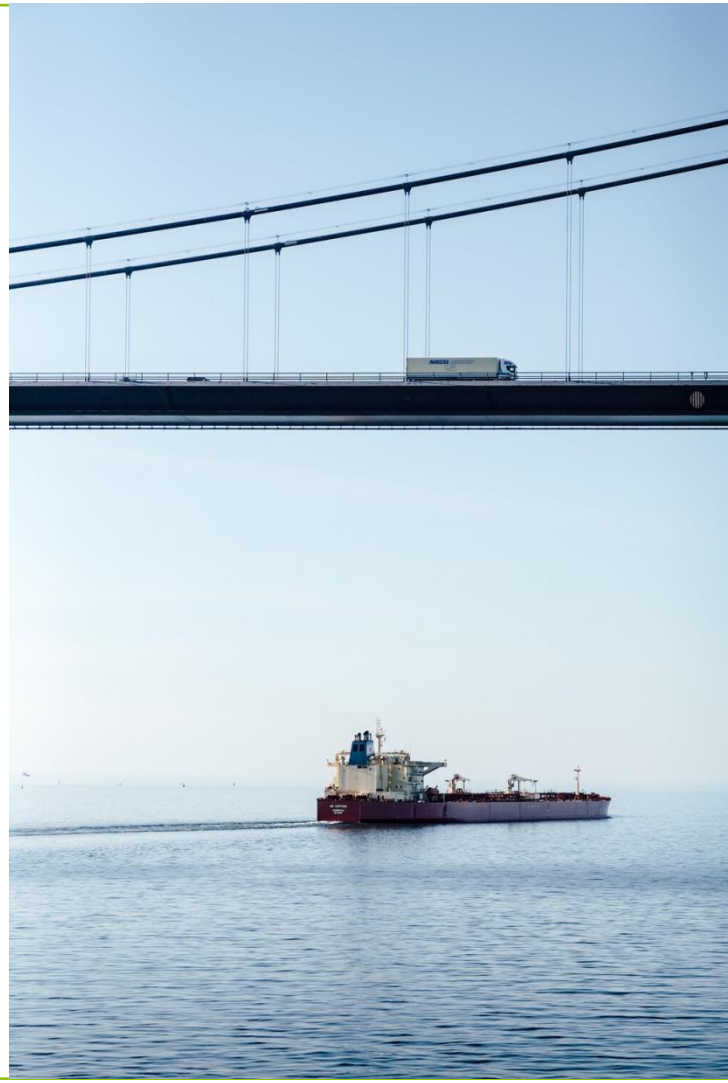
IMO ISWG-GHG Side Event

London, 7 May 2019



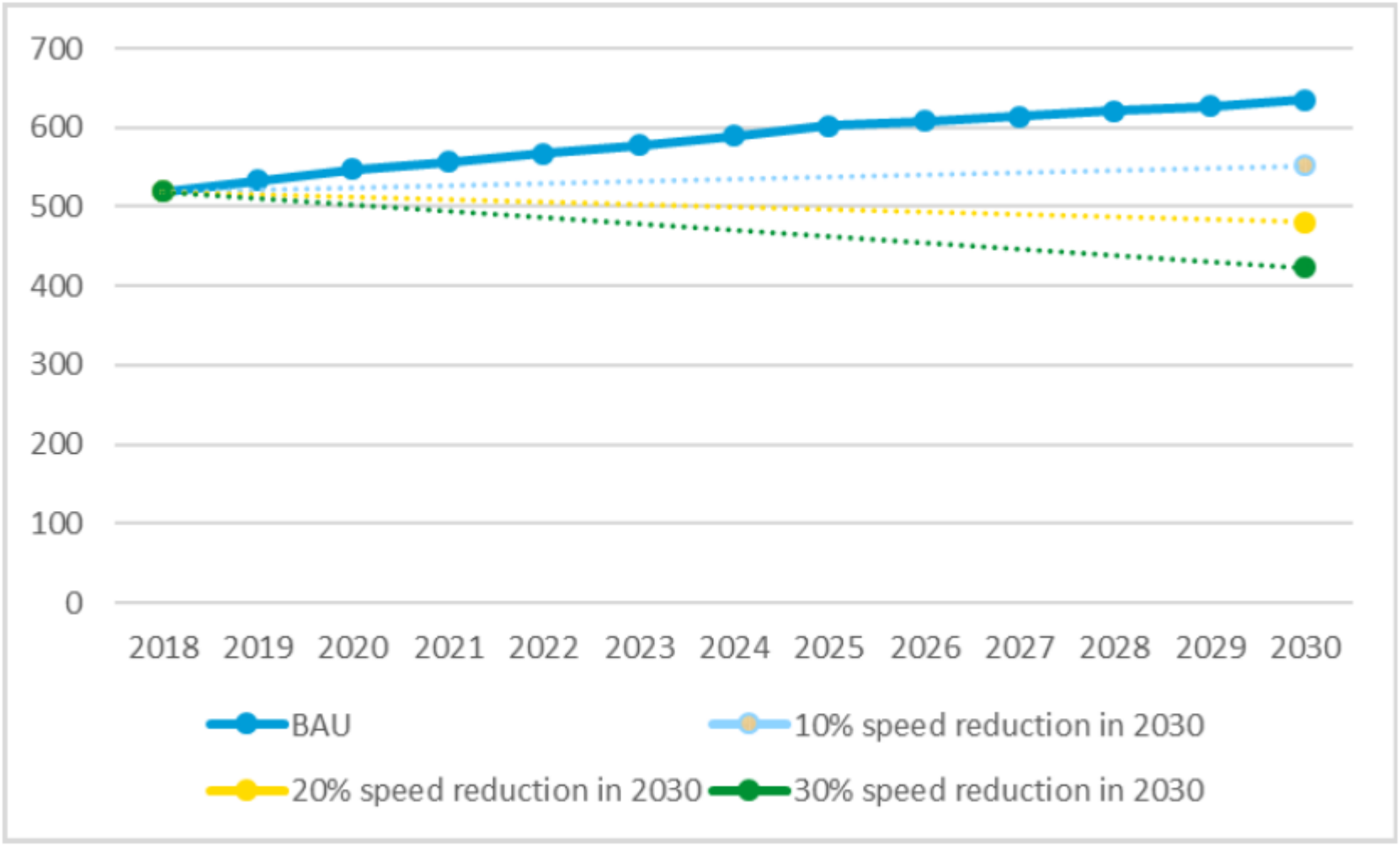
Background

- Initial IMO GHG strategy:
  - 50% reduction compared to 2008 by 2050
  - Peaking as soon as possible
  - “use of speed optimization and speed reduction as a measure”
- Relationship between slower speeds and fuel consumption follows a cubic function:

Speed reduction	5%	10%	15%	20%	25%	30%
Fuel savings	14%	27%	39%	49%	58%	66%

- Slow steaming most promising high-impact short-term measure to reduce GHG emissions from shipping

Impact of slow steaming on GHG emissions (dry bulk, oil tanker and container fleet)



Source: CE Delft (2017): Regulating speed: a short-term measure to reduce maritime GHG emissions.

Slow steaming and transport costs

- Crucial questions for
  - Exporting countries/industries: how will slow steaming impact their market position?
  - Importing countries (and especially SIDS): how will slow steaming impact consumer prices?
- Most studies assess the impact of CO_2 prices on the sector and nations (e.g. World Bank 2019, Vivid Economics 2010)
- Case studies have assessed the impact of slow steaming on exporting nations (e.g. CE Delft 2017)
- This study assess the impact of slow steaming on transport costs which affect both exporter's market position as well as consumer prices

Slow steaming and transport costs

- Main contributors to transport costs:
  - Capital costs (purchasing or leasing of vessel)
  - Operational costs (crew, insurance, repairs, …)
  - Voyage costs (fuel, port charges, …)
  - Earnings of ship owner
- Longer transport times will lead to higher costs/trip for:
  - Capital costs, operational costs, earnings (proportional increase with time at sea)
  - Fuel costs for auxiliary engines (proportional increase with time at sea)
- Fuel costs savings (main engines) depend on the speed reduction (cubic relationship)

Methodology to model impact of slow steaming on transport costs

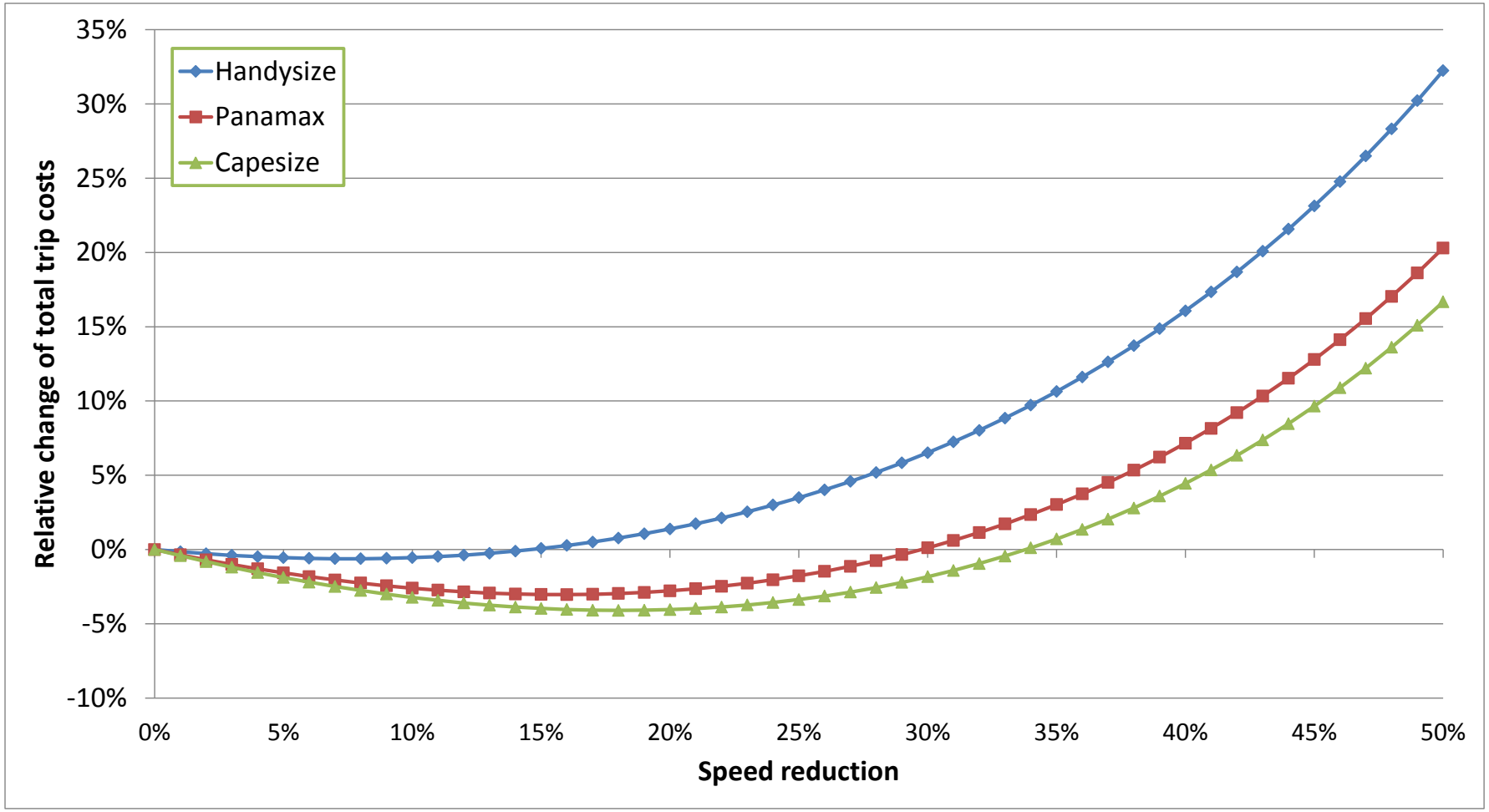
- Model calculates relative change of transport costs per trip
- All parameters are calculated as daily rates
- Distance does not affect relative results; absolute costs strongly depend on distance.
- Modelling for three different ship types and ranges for some parameters:

Ship type	Fuel consumption	Auxiliary fuel consumption	Speed	Operation costs	Capital costs	Earnings
	[t/day]	[%]	[kn]	[$/day]	[$/day]	[$/day]
Panamax	37.7	10 (5 – 15)	13.8	5 700	2 700	10 000 (5 000 – 15 000)
Handysize	22.2	10 (5 – 15)	12.7	5 000	2 200	7 500 (4 000 – 12 000)
Capesize	55.5	10 (5 – 15)	13.6	6 700	5 500	12 500 (5 000 – 20 000)

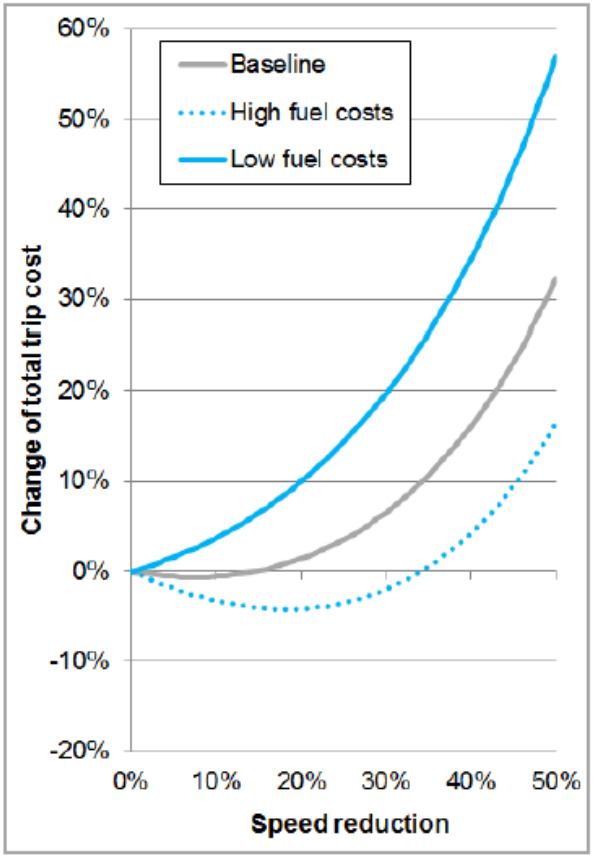
Source: IMO (2014); Greiner (2017); Kemene (2018); UNCTAD (2018)

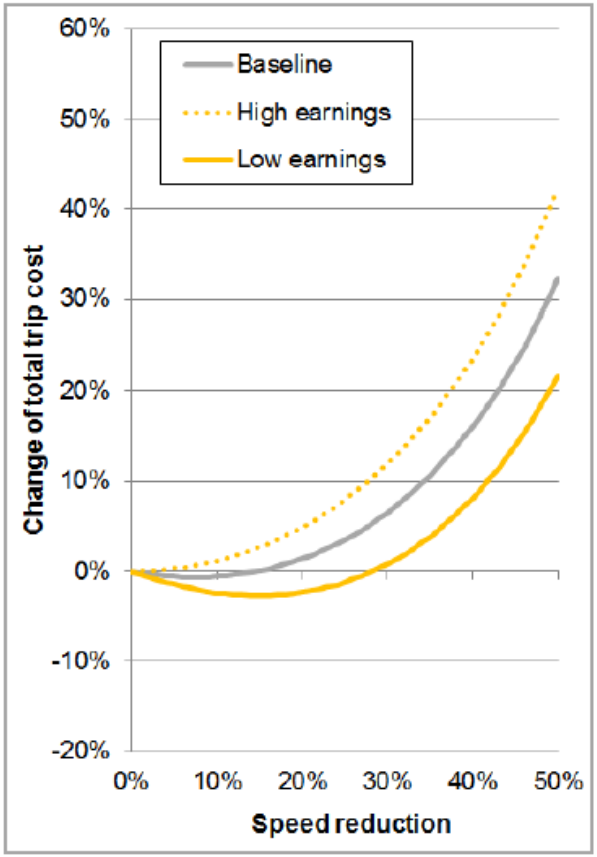
- Fuel price assumption: 500 (250-750) USD/ton

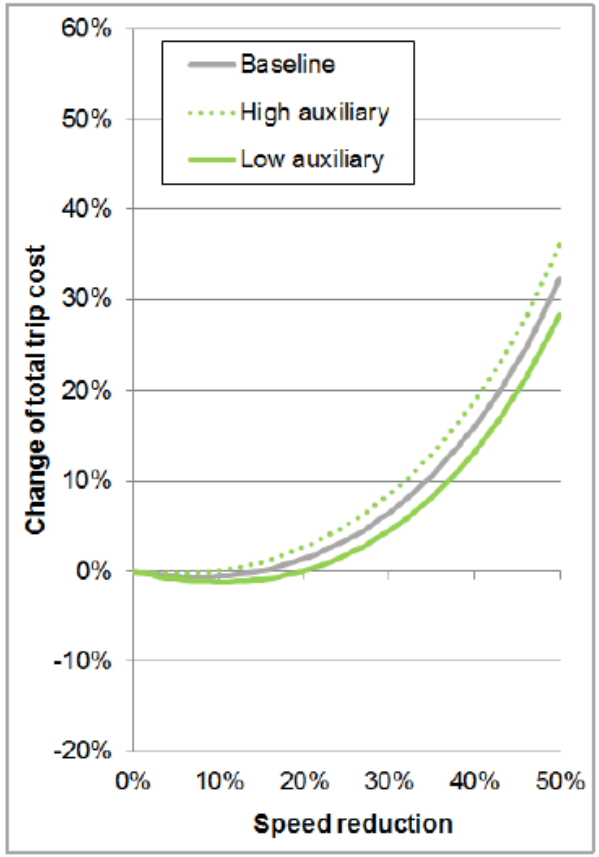
Impact of slow steaming on transport costs in the reference case



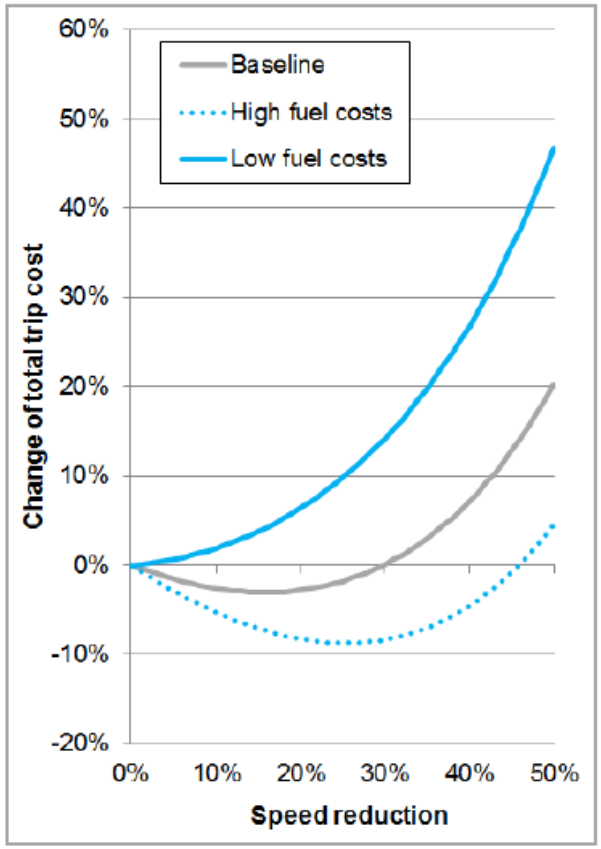
Impact of slow steaming on handysize bulk carriers

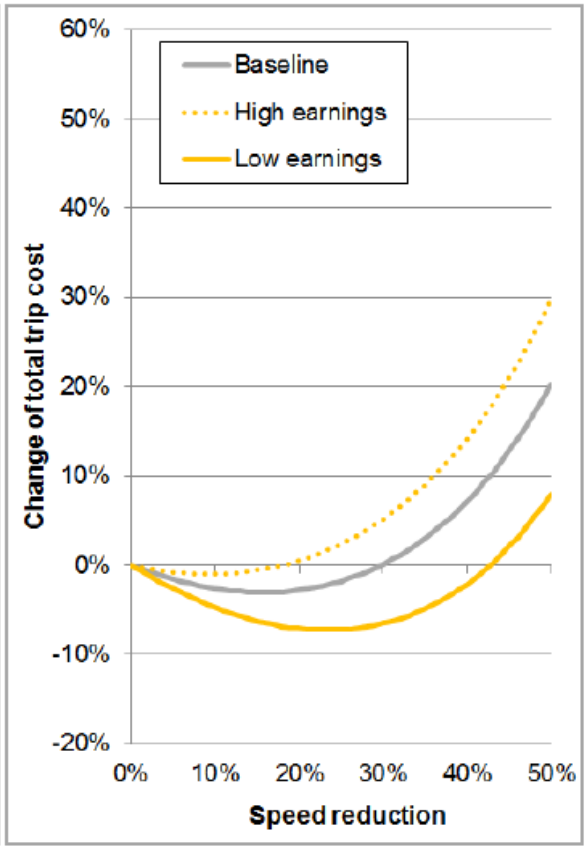


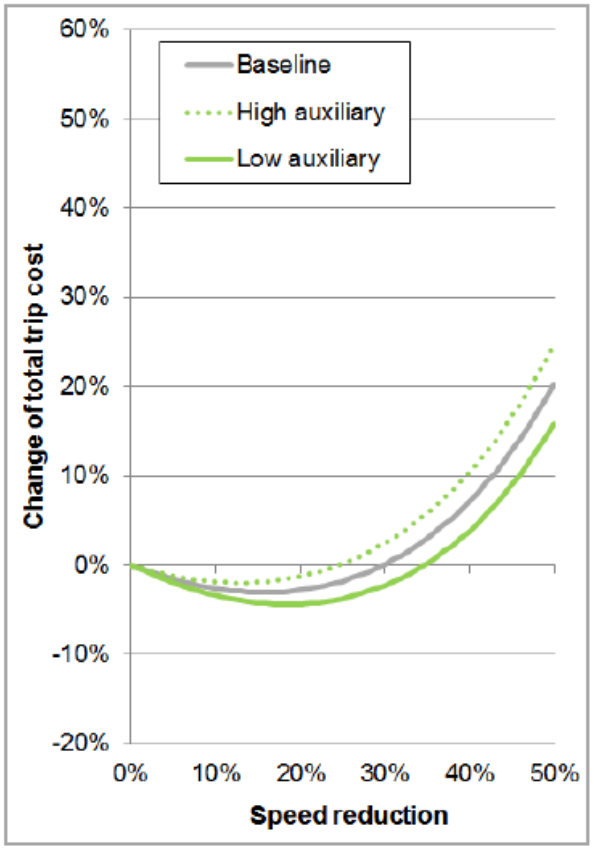




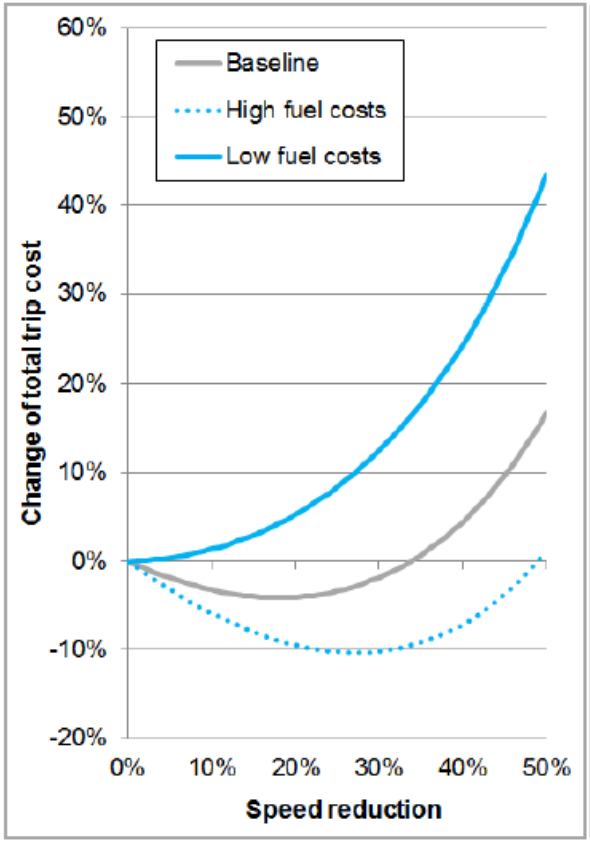
Impact of slow steaming on Panamax bulk carriers

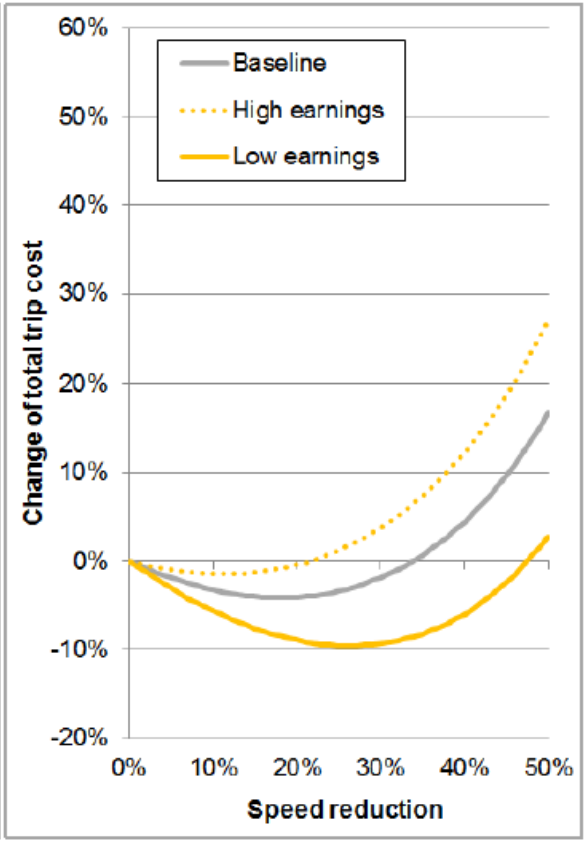


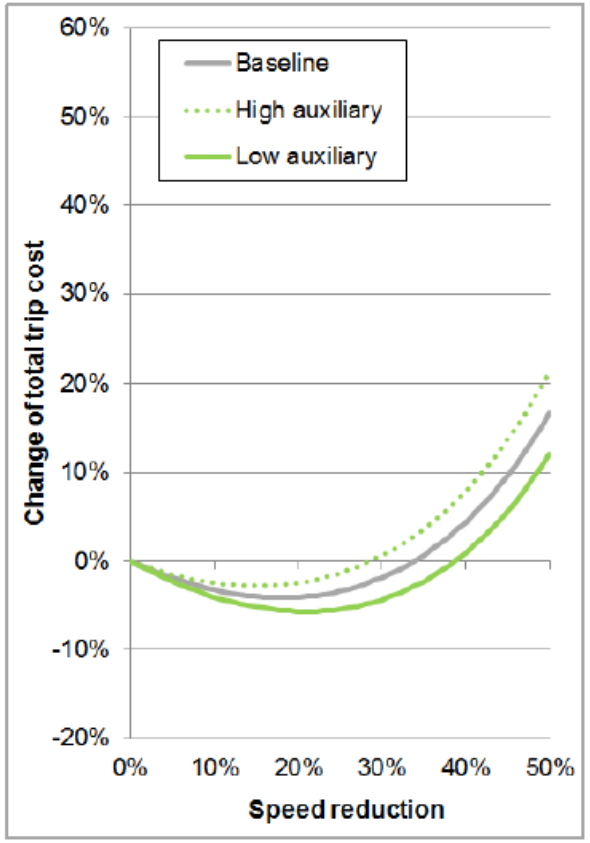




Impact of slow steaming on Capesize bulk carriers







Key messages

- For most scenarios slower steaming will bring down transport costs;
- Fuel price has highest impact on economic viability of slow steaming;
- Depending on the ship type there is a) an economically optimal speed (minimum) and b) a maximum speed reduction which would maintain transport cost (break even point);
- impact on freight rates depends on the cost-pass through and might be smaller than the actual change of transport costs;
- Maritime transport costs contribute with less than 5% to consumer prices in most cases; small changes in either direction will not have a significant impact.

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Estimation of bulk freight costs for a selection of illustrative routes and different assumption

	Round trip	Speed reduction	Typical speed	Days at sea	Reduced fuel consumption (main engine)	Total daily fuel con-sumption	Main engine	Auxiliary engine	Fuel consumption costs		Operation costs (other than fuel consumption)		Capital cost		Earnings		Total cost	
	[nm]	[%]	[kn]	[d]	[%]	[t/d]	[t/d]	[t/d]	[t/trip]	[$/trip]	[$/d]	[$/trip]	[$/d]	[$/trip]	[$/d]	[$/trip]	[$/trip]	[change]
Bulk, Panamax (500 USD/t fuel)	20,000	0	13.8	60.5	--	37.7	33.9	3.8	2,282	1,140,765	5,700	344,953	2,700	163,399	10,000	605,180	2,254,297	--
		10	12.4	67.2	27	28.5	24.7		1,917	958,369		383,281		181,554		672,423	2,195,627	-2.6%
		20	11.0	75.6	49	21.1	17.4		1,599	799,676		431,191		204,248		756,475	2,191,591	-2.8%
		30	9.6	86.5	66	15.4	11.6		1,332	666,044		492,790		233,427		864,543	2,256,804	0.1%
Bulk, Panamax (250 USD/t fuel)	20,000	0	13.8	60.5	--	37.7	33.9	3.8	2,282	570,382	5,700	344,953	2,700	163,399	10,000	605,180	1,683,914	--
		10	12.4	67.2	27	28.5	24.7		1,917	479,185		383,281		181,554		672,423	1,716,442	1.9%
		20	11.0	75.6	49	21.1	17.4		1,599	399,838		431,191		204,248		756,475	1,791,753	6.4%
		30	9.6	86.5	66	15.4	11.6		1,332	333,022		492,790		233,427		864,543	1,923,782	14.2%
Bulk, Panamax (800 USD/t fuel)	20,000	0	13.8	60.5	--	37.7	33.9	3.8	2,282	1,825,224	5,700	344,953	2,700	163,399	10,000	605,180	2,938,756	--
		10	12.4	67.2	27	28.5	24.7		1,917	1,533,391		383,281		181,554		672,423	2,770,648	-5.7%
		20	11.0	75.6	49	21.1	17.4		1,599	1,279,482		431,191		204,248		756,475	2,671,397	-9.1%
		30	9.6	86.5	66	15.4	11.6		1,332	1,065,670		492,790		233,427		864,543	2,656,430	-9.6%
Bulk, Capesize (500 USD/t fuel)	30,000	0	13.6	91.8	--	55.5	50.0	5.6	5,095	2,547,367	6,700	615,040	5,500	504,884	12,500	1,147,463	4,814,754	--
		10	12.3	102.0	27	42.0	36.4		4,280	2,140,072		683,378		560,982		1,274,959	4,659,390	-3.2%
		20	10.9	114.7	49	31.1	25.6		3,571	1,785,704		768,800		631,105		1,434,328	4,619,937	-4.0%
		30	9.5	131.1	66	22.7	17.1		2,975	1,487,299		878,629		721,262		1,639,232	4,726,422	-1.8%
Bulk, Handysize (500 USD/t fuel)	6,000	0	12.7	19.6	--	22.2	20.0	2.2	436	218,023	5,000	98,209	2,200	43,212	7,500	147,313	506,757	--
		10	11.5	21.8	27	16.8	14.6		366	183,164		109,121		48,013		163,681	503,979	-0.5%
		20	10.2	24.6	49	12.4	10.2		306	152,834		122,761		54,015		184,141	513,751	1.4%
		30	8.9	28.1	66	9.1	6.9		255	127,294		140,298		61,731		210,447	539,771	6.5%