



**Calculation of CO<sub>2</sub> emissions for container  
transport from Bremerhaven to Kalundborg  
by different transport routes**

**11<sup>th</sup> May 2022**

## Introduction

On behalf of Kalundborg Harbor this report contains calculations of CO<sub>2</sub> emissions for a container transport from Bremerhaven to Kalundborg, Tåstrup, Slagelse, Køge and Vordingborg by two different routes:

Direct sea transport from Bremerhaven to Kalundborg via the Kieler Canal

Sea transport from Bremerhaven to Copenhagen via the Kieler Canal, through the Great Belt and along the north coast of Sealand to Øresund

Transport to Slagelse, Tåstrup, Køge and Vordingborg is carried out by truck of three different sizes, i.e. 1, 2 and 3 TEU per truck.

## Ship and engine characteristics

The sea transport is carried out by a large feeder vessel of 2000 TEU having following main dimensions:

Length between pp:	207.2 m
Breadth:	27.8 m
Max. draught:	10.5 m
Draught at 70 % Dw (allowable draught in Kieler Canal= 9.5 m):	9.2 m
Max. service speed:	19.5 knots
Service speed in open sea	17 and 19 knots
Max. service speed in the Kieler Canal	8 knots

The general ship characteristics are shown on page 5 while the main engine characteristics are shown on page 6 together with the sailing distances which have been calculated by using the following web page:

<https://sea-distances.org/advanced>

Calculations of the emissions have been carried by the generic so-called ship design model SHIP-DESMO developed at The Technical University of Denmark (DTU). Emissions of trucks have been carried out by the so-called TEMA model developed by The Danish Ministry of Transport.



On page 7 is shown the actual sailing condition assuming an average deadweight utilization of 70 %, which is often the average loading of a container ship.

On page 8 - 11 are shown the emissions for the container ship and the truck respectively. Calculations have been carried out for three truck types: 1) truck with only one container, 2) truck with 2 containers and finally 3) truck (module truck) loaded with 3 containers.

The specific emissions (emissions per transport unit) have been combined with the actual sailing distances and truck driving distances for the different transport scenarios for a container (one TEU) transported from Bremerhaven to Kalundborg, Slagelse, Køge, Vordingborg and Tåstrup respectively, assuming 1 hour idling in Nordhavn and 10 minutes idling in Kalundborg. These CO<sub>2</sub> emissions are summed up on page 12 - 14, and the final results are as follows:

Ship speed = 17 knots

From	To	Harbor	1 TEU per truck	2 TEU per truck	3 TEU per truck
			CO <sub>2</sub> emissions in kg per TEU	CO <sub>2</sub> emissions in kg per TEU	CO <sub>2</sub> emissions in kg per TEU
Bremerhaven	Tåstrup	via Kalundborg	131	103	92
Bremerhaven	Slagelse	via Kalundborg	86	74	69
Bremerhaven	Kalundborg	via Kalundborg	51	51	51
Bremerhaven	Køge	via Kalundborg	146	113	100
Bremerhaven	Vordingborg	via Kalundborg	147	114	100
Bremerhaven	Kalundborg	via Copenhagen	203	166	150
Bremerhaven	Tåstrup	via Copenhagen	123	114	110
Bremerhaven	Slagelse	via Copenhagen	202	165	150
Bremerhaven	Køge	via Copenhagen	151	132	124
Bremerhaven	Vordingborg	via Copenhagen	204	166	151



In order to explore the sensitivity of the ship speed on the final results/conclusion, calculations have also been carried out with a ship speed of 19 knots, which are given in following table. It is seen that the overall conclusion is still the same, i.e. only a marginal influence of the ship speed is observed on the overall result.

From	To	Harbor	1 TEU per truck	2 TEU per truck	3 TEU per truck
			CO <sub>2</sub> emissions in kg per TEU	CO <sub>2</sub> emissions in kg per TEU	CO <sub>2</sub> emissions in kg per TEU
Bremerhaven	Tåstrup	via Kalundborg	142	114	103
Bremerhaven	Slagelse	via Kalundborg	97	85	80
Bremerhaven	Kalundborg	via Kalundborg	62	62	62
Bremerhaven	Køge	via Kalundborg	157	124	110
Bremerhaven	Vordingborg	via Kalundborg	158	124	111
Bremerhaven	Kalundborg	via Copenhagen	221	183	168
Bremerhaven	Tåstrup	via Copenhagen	141	131	127
Bremerhaven	Slagelse	via Copenhagen	220	183	168
Bremerhaven	Køge	via Copenhagen	169	150	142
Bremerhaven	Vordingborg	via Copenhagen	221	184	169



Ship data (container ship)	Units	Default values	Alternative 1	Alternative 2
Container capacity	TEU	2000	2000	2000
Panamax breadth = 32.2 m (0 = NO, 1 = yes)		1	1	1
Feeder ship - type 1 (<2900 TEU) - Panamax - type 2 (2900 - 5300 TEU) or Post Panamax - type 3 (>3500 TEU - B < 49 m) - Post Panamax - type 4 (>14000 TEU - B > 49 m)	(-)	1	1	1
Elongation in percent	%	0	0.0	0.0
Length between pp	m	175.90	175.90	175.90
Length in waterline incl. bulbous bow (= 1.01 Lpp)	m	177.66	177.66	177.66
Length over all	m	186.86	186.86	186.86
Breadth mld.	m	27.80	27.80	27.80
Depth	m	15.21	15.21	15.21
Design draught	m	9.90	9.90	9.90
Maximum draught	m	10.48	10.48	10.48
Maximum draught - design draught	m	0.57	0.57	0.57
Design deadweight/Maximum deadweight	%	91	91	91
Design deadweight	tons	23924	23924	23924
Maximum deadweight	tons	26375	26375	26375
Design deadweight/Maximum deadweight	pct.	90.7	90.7	90.7
Maximum deadweight/TEU	tons/TEU	13.19	13.19	13.19
Lightweight coefficient	t/m <sup>3</sup>	0.121	0.121	0.121
Steel weight correction	%	0	0	0
Lightweight	tons	8981	8981	8981
Steel weight	tons	6724	6724	6724
Displacement at design draught	tons	32905	32905	32905
Displacement at maximum draught	tons	35356	35356	35356
Block coefficient (based on Lpp) at design draught	-	0.663	0.663	0.663
Block coefficient (based on Lpp) at maximum draught	-	0.673	0.673	0.673
Lpp/Displ.vol. <sup>1/3</sup> at design draught	-	5.53	5.53	5.53
Lpp/Displ.vol. <sup>1/3</sup> at maximum draught	-	5.40	5.40	5.40
Midship section coefficient at design draught	-	0.979	0.979	0.979
Midship section coefficient at maximum draught	-	0.980	0.980	0.980
Prismatic coefficient at design draught	-	0.677	0.677	0.677
Prismatic coefficient at maximum draught	-	0.687	0.687	0.687
Waterplane area coefficient based on Lpp	-	0.853	0.853	0.853
Wetted surface at design draught	m <sup>2</sup>	6512	6512	6512
Wetted surface at maximum draught	m <sup>2</sup>	6795	6795	6795
Service speed at design draught	knots	19.5	19.5	19.5
Service speed correction at design draught		0.0	0.0	0.0
Froude Number at service speed	-	0.240	0.240	0.240
Scantling trial speed at 100 % deadweight at 75 % MCR	knots	19.1	19.1	19.1
Froude Number at 'reference speed'	-	0.235	0.235	0.235



## Engine characteristics

ENGINE TYPE & TECHNOLOGY				
Main engine type (slow speed = 1, medium speed = 2)	(-)	1	1	1
Main engine service rating (for non derated engine only)	pct. MCR	90	90	90
Fuel type (HFO = 1, MD/GO = 2, LNG = 3, Dual fuel = 4)	-	2	2	2
SFOC at 75 % MCR in normal ME mode (If default press 1)	g/kW/hour	1	1	1
If normal tuning press 1 - if low load tuning press 2	-	1	1	1
Sulphur content in heavy fuel (HFO)	pct.	0.1	0.1	0.1
Sulphur content in diesel oil or gas oil (DO/GO)	pct.	0.1	0.1	0.1
Derated 2 stroke main engine? (NO = 0, YES = 1)	-	1	1	1
Fuel optimised main engine? (NO = 0, YES = 1)	-	0	0	0
TIER 1, 2 or 3 engine? (1 - 3)	-	3	3	3
Specify NOx reduction technology: <u>EGR (Exhaust Gas Recirculation) = 1, SCR (Selective Catalytic Reduction) = 2 or other technology = 3</u>	-	1	1	1
Use of scrubbers if oil is used (NO = 0, YES=1)	-	0	0	0

## Sailing route lengths

SEA-DISTANCES.ORG										
Ports Distances Voyage Calculator Advertise Contact us										
Add port <span style="float: right;">Create new route</span>										
#	Country, port	Speed, knots	Distance, miles	Days		Costs		Arrival	Departure	Actions
				at sea	in port	at sea	in port			
From 1	Germany, Bremerhaven GMT +1.0								07 May 22 12:43	
via	Direct	10	81	0.3		0				
To 2	Germany, Brunsbüttel GMT +1.0				0		0	07 May 2022 19:55	07 May 2022 19:55	
via	Direct	10	134	0.5		0				
To 3	Germany, Kiel-Holtenau GMT +1.0				0		0	08 May 2022 00:43	08 May 2022 00:43	
via	Direct	10	234	0.9		0				
To 4	Denmark, Kalundborg GMT +1.0				0		0	08 May 2022 10:19	08 May 2022 10:19	
via	Direct	10	349	1.4		0				
To 5	Denmark, Copenhagen GMT +1.0							08 May 2022 22:19		
<b>Total</b>			<b>349</b>	<b>1.4</b>	<b>0</b>	<b>0</b>	<b>0</b>			



## Actual sailing condition

ACTUAL CONDITION				
Statistical payload/deadweight in full load condition	%	67.4	67.4	67.4
(Deadweight - payload)/max. deadweight	%	32.6	32.6	32.6
Cargo utilization (percentage of maximum TEU capacity)	%	70.0	70.0	70.0
Actual number of containers	TEU	1400	1400	1400
Actual average weight per container	t/TEU	8.9	8.9	8.9
Actual deadweight	tons	21042	21042	21042
Actual payload	tons	12444	12444	12444
Actual displacement	tons	30023	30023	30023
Waterplane area coefficient based on Lpp	-	0.832	0.832	0.832
Actual draught	m	9.21	9.21	9.21
Block coefficient at design draught	-	0.65	0.65	0.65
Midship section coefficient at actual draught	-	0.977	0.977	0.977
Wetted surface at actual draught	m <sup>2</sup>	6171	6171	6171
Service speed at actual draught	knots	19.0	17.0	8.0
Service allowance on resistance	%	0	0.0	0.0
Beaufort No.	-	4.5	4.5	4.5
Wind speed according to Beaufort No.	m/s	8.2	8.2	8.2
Significant wave height	m	1.4	1.4	1.4
Short crested wave resistance (MEPC 71/INF.29, p. 20)	kN	52	48	32
Wind and wave resistance fraction of calm water resistance	pct.	17.7	22.1	66.9
Speed dependency exponent n (Power = constant V <sup>n</sup> )	-	3.7	3.1	2.2
Necessary propulsion power at actual deadweight	kW	13548	9307	1360
Engine rating in actual condition (Cont. Service Rating = CSR)	% MCR	77	53	8
SFOC at CSR	g/kW/hour	168.3	170.3	188.5
Oil consumption per hour (auxiliary engines at sea)	t/hour	0.14	0.14	0.14
Oil consumption per hour (auxiliary engines in harbor)	t/hour	0.17	0.17	0.17
Oil consumption per hour (main engine)	t/hour	2.28	1.58	0.26
Oil consumption per hour (main and auxiliary engines at sea)	t/hour	2.42	1.72	0.39



## Emissions and energy demand (Container ship)

Default Alternative 1 Alternative 2

Capacity utilization (100 % ~ design condition)	%	70	70	70
Utilized number of containers	TEU	1400	1400	1400
Deadweight	tons	21042	21042	21042
Deadweight per container	dwt/TEU	15.0	15.0	15.0
Draught	m	9.21	9.21	9.21
Ship speed	knots	19.0	17.0	8.0

### Energy demand

Energy demand per hour	GJ/hour	103	73	17
Energy demand per nautical mile	GJ/nm	5.4	4.3	2.1
Energy demand per TEU per nautical mile	MJ/TEU/nm	3.88	3.09	1.49

### Oil consumption

Oil consumption per hour	t/hour	2.42	1.72	0.39
Oil consumption demand per nautical mile	kg/nm	127	101	49
Oil consumption per TEU per nautical mile	g/TEU/nm	90.8	72.3	35.0

### CO<sub>2</sub> emissions

CO <sub>2</sub> emissions per hour	t/hour	7.7	5.5	1.3
CO <sub>2</sub> emissions per nautical mile	kg/nm	408	324	157
CO <sub>2</sub> emissions per TEU per nautical mile	g/TEU/nm	291	232	112

### NOx emissions

NOx emissions per hour	kg/hour	48	34	7
NOx emissions per nautical mile	kg/nm	2.5	2.0	0.9
NOx emissions per TEU per nautical mile	g/TEU/nm	1.79	1.41	0.61

### SOx emissions

SOx emissions per hour	kg/hour	5	4	1
SOx emissions per nautical mile	kg/nm	0.27	0.21	0.10
SOx emissions per TEU per nautical mile	g/TEU/nm	0.19	0.15	0.07

### CO emissions

CO emissions per hour	kg/hour	5.1	3.6	0.9
CO emissions per nautical mile	kg/nm	0.27	0.21	0.11
CO emissions per TEU per nautical mile	g/TEU/nm	0.19	0.15	0.08

### HC emissions

HC emissions per hour	kg/hour	7.1	5.1	1.1
HC emissions per nautical mile	kg/nm	0.37	0.30	0.14
HC emissions per TEU per nautical mile	g/TEU/nm	0.27	0.21	0.10

### Particulate emissions

Particulate emissions per hour	kg/hour	3.8	2.7	0.6
Particulate emissions per nautical mile	kg/nm	0.20	0.16	0.07
Particulate emissions per TEU per nautical mile	g/TEU/nm	0.14	0.11	0.05





## Truck data inclusive oil consumption and CO<sub>2</sub> emissions

### 1 TEU per truck

Truck engine data	EU 1996	EU 2001	EU 2006	EU 2011	EU 2015
	EURO 2	EURO 3	EURO 4	EURO 5	EURO 6
Specific oil consumption (kg/kWh)	0.20	0.20	0.20	0.20	0.20
NOx emission (g/kWh)	7.0	5.0	3.5	2.0	0.4
CO emission (g/kWh)	1.20	1.20	0.10	0.10	0.10
HC emission (g/kWh)	0.30	0.25	0.015	0.015	0.004
Particulate emission (g/kWh)	0.15	0.10	0.02	0.02	0.01
Sulphur content in oil (pct.)	0.001	0.001	0.001	0.001	0.001
SO <sub>2</sub> emission (g/kWh)	0.004	0.004	0.004	0.004	0.004
CO <sub>2</sub> emission (g/kg)	3206	3206	3206	3206	3206
NOx emission (g/kg)	35.0	25.0	17.5	10.0	2.0
CO emission (g/kg)	6.0	6.0	0.5	0.5	0.5
HC emission (g/kg)	1.50	1.25	0.075	0.075	0.02
Particulate emission (g/kg)	0.75	0.50	0.10	0.10	0.05
SO <sub>2</sub> emission (g/kg)	0.02	0.02	0.02	0.02	0.02
NOx emission (g/MJ)	0.82	0.58	0.41	0.23	0.05
CO emission (g/MJ)	0.14	0.14	0.01	0.01	0.01
HC emission (g/MJ)	0.035	0.029	0.00175	0.00175	0.0005
Particulate emission (g/MJ)	0.018	0.012	0.002	0.002	0.001
SO <sub>2</sub> emission (g/MJ)	0.0005	0.0005	0.0005	0.0005	0.0005
Calorific value for diesel oil (MJ/kg)	42.8	42.8	42.8	42.8	42.8
EURO NORM (2 - 6)			4	6	6
Cargo weight per truck	t		20	20	20
Truck weight (empty)	t		10.0	10.0	10.0
Length of truck - total	m		15.0	12.0	12.0
Truck weight (loaded)	t		30.0	30.0	30.0
Cargo weight per meter	t/m		1.3	1.7	1.7
Truck weight per meter	t/m		1.8	1.8	1.8
Driving distance	km		400	400	26
Fuel consumption ratio - driving distance	(-)		1.00	1.00	1.11
Energy consumption per km	MJ/km		12.5	12.5	13.8
Energy consumption per km	MJ/km		11.3	11.3	12.5
Energy consumption per lanemeter per km	MJ/lm/km		0.83	1.04	1.15
Energy consumption per ton load per km	MJ/t/km		0.63	0.63	0.69
Oil consumption per km	g/km		292	292	323
Oil consumption per lanemeter per km	g/lm/km		19.5	24.3	26.9
Oil consumption per ton load per km	g/t/km		14.6	14.6	16.1
CO <sub>2</sub> emissions per km	g/km		936	936	1035
CO <sub>2</sub> emissions per lanemeter per km	g/lm/km		62.4	78.0	86.2
CO <sub>2</sub> emissions per ton load per km	g/t/km		46.8	46.8	51.7



## Truck data inclusive oil consumption and CO<sub>2</sub> emissions

### 2 TEU per truck

Truck engine data	EU 1996	EU 2001	EU 2006	EU 2011	EU 2015
	EURO 2	EURO 3	EURO 4	EURO 5	EURO 6
Specific oil consumption (kg/kWh)	0.20	0.20	0.20	0.20	0.20
NOx emission (g/kWh)	7.0	5.0	3.5	2.0	0.4
CO emission (g/kWh)	1.20	1.20	0.10	0.10	0.10
HC emission (g/kWh)	0.30	0.25	0.015	0.015	0.004
Particulate emission (g/kWh)	0.15	0.10	0.02	0.02	0.01
Sulphur content in oil (pct.)	0.001	0.001	0.001	0.001	0.001
SO <sub>2</sub> emission (g/kWh)	0.004	0.004	0.004	0.004	0.004
CO <sub>2</sub> emission (g/kg)	3206	3206	3206	3206	3206
NOx emission (g/kg)	35.0	25.0	17.5	10.0	2.0
CO emission (g/kg)	6.0	6.0	0.5	0.5	0.5
HC emission (g/kg)	1.50	1.25	0.075	0.075	0.02
Particulate emission (g/kg)	0.75	0.50	0.10	0.10	0.05
SO <sub>2</sub> emission (g/kg)	0.02	0.02	0.02	0.02	0.02
NOx emission (g/MJ)	0.82	0.58	0.41	0.23	0.05
CO emission (g/MJ)	0.14	0.14	0.01	0.01	0.01
HC emission (g/MJ)	0.035	0.029	0.00175	0.00175	0.0005
Particulate emission (g/MJ)	0.018	0.012	0.002	0.002	0.001
SO <sub>2</sub> emission (g/MJ)	0.0005	0.0005	0.0005	0.0005	0.0005
Calorific value for diesel oil (MJ/kg)	42.8	42.8	42.8	42.8	42.8
EURO NORM (2 - 6)			6	6	6
Cargo weight per truck		t	38	38	38
Truck weight (empty)		t	10.0	10.0	10.0
Length of truck - total		m	16.0	16.0	16.0
Truck weight (loaded)		t	48.0	48.0	48.0
Cargo weight per meter		t/m	2.4	2.4	2.4
Truck weight per meter		t/m	2.8	2.8	2.8
Driving distance		km	400	400	27
Fuel consumption ratio - driving distance		(-)	1.00	1.00	1.10
Energy consumption per km		MJ/km	16.3	16.3	18.0
Energy consumption per km		MJ/km	15.5	15.5	17.1
Energy consumption per lanemeter per km		MJ/lm/km	1.02	1.02	1.12
Energy consumption per ton load per km		MJ/t/km	0.43	0.43	0.47
Oil consumption per km		g/km	381	381	420
Oil consumption per lanemeter per km		g/lm/km	23.8	23.8	26.3
Oil consumption per ton load per km		g/t/km	10.0	10.0	11.1
CO <sub>2</sub> emissions per km		g/km	1222	1222	1347
CO <sub>2</sub> emissions per lanemeter per km		g/lm/km	76.4	76.4	84.2
CO <sub>2</sub> emissions per ton load per km		g/t/km	32.2	32.2	35.5



## Truck data inclusive oil consumption and CO<sub>2</sub> emissions

### 3 TEU per truck

Truck engine data	EU 1996	EU 2001	EU 2006	EU 2011	EU 2015
	EURO 2	EURO 3	EURO 4	EURO 5	EURO 6
Specific oil consumption (kg/kWh)	0.20	0.20	0.20	0.20	0.20
NOx emission (g/kWh)	7.0	5.0	3.5	2.0	0.4
CO emission (g/kWh)	1.20	1.20	0.10	0.10	0.10
HC emission (g/kWh)	0.30	0.25	0.015	0.015	0.004
Particulate emission (g/kWh)	0.15	0.10	0.02	0.02	0.01
Sulphur content in oil (pct.)	0.001	0.001	0.001	0.001	0.001
SO <sub>2</sub> emission (g/kWh)	0.004	0.004	0.004	0.004	0.004
CO <sub>2</sub> emission (g/kg)	3206	3206	3206	3206	3206
NOx emission (g/kg)	35.0	25.0	17.5	10.0	2.0
CO emission (g/kg)	6.0	6.0	0.5	0.5	0.5
HC emission (g/kg)	1.50	1.25	0.075	0.075	0.02
Particulate emission (g/kg)	0.75	0.50	0.10	0.10	0.05
SO <sub>2</sub> emission (g/kg)	0.02	0.02	0.02	0.02	0.02
NOx emission (g/MJ)	0.82	0.58	0.41	0.23	0.05
CO emission (g/MJ)	0.14	0.14	0.01	0.01	0.01
HC emission (g/MJ)	0.035	0.029	0.00175	0.00175	0.0005
Particulate emission (g/MJ)	0.018	0.012	0.002	0.002	0.001
SO <sub>2</sub> emission (g/MJ)	0.0005	0.0005	0.0005	0.0005	0.0005
Calorific value for diesel oil (MJ/kg)	42.8	42.8	42.8	42.8	42.8
EURO NORM (2 - 6)			6	6	6
Cargo weight per truck		t	54	54	54
Truck weight (empty)		t	12.0	12.0	12.0
Length of truck - total		m	24.0	24.0	24.0
Truck weight (loaded)		t	66.0	66.0	66.0
Cargo weight per meter		t/m	2.3	2.3	2.3
Truck weight per meter		t/m	3.9	3.9	3.9
Driving distance		km	400	400	27
Fuel consumption ratio - driving distance		(-)	1.00	1.00	1.10
Energy consumption per km		MJ/km	19.2	19.2	21.1
Energy consumption per km		MJ/km	19.3	19.3	21.2
Energy consumption per lanemeter per km		MJ/lm/km	0.80	0.80	0.88
Energy consumption per ton load per km		MJ/t/km	0.35	0.35	0.39
Oil consumption per km		g/km	448	448	494
Oil consumption per lanemeter per km		g/lm/km	18.7	18.7	20.6
Oil consumption per ton load per km		g/t/km	8.3	8.3	9.1
CO <sub>2</sub> emissions per km		g/km	1436	1436	1583
CO <sub>2</sub> emissions per lanemeter per km		g/lm/km	59.8	59.8	65.9
CO <sub>2</sub> emissions per ton load per km		g/t/km	26.6	26.6	29.3



**Sailing distances and respective CO<sub>2</sub> emissions at 17 knots**

From	To	Sailing distance nautical miles	Speed knots	CO <sub>2</sub> emissions per TEU per nautical mile gram CO <sub>2</sub> per TEU per nm	Total emissions per TEU kg CO <sub>2</sub> per TEU
Bremerhafen	Brunsbüttel	81	17	232	18.8
Brunsbüttel	Kiel Holtenau	53	8	112	5.9
Kiel Holtenau	Kalundborg	100	17	232	23.2
<b>Total</b>		<b>234</b>			<b>47.9</b>

Kalundborg	Copenhagen	115	17	232	26.6
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**Sailing distances and respective CO<sub>2</sub> emissions at 19 knots**

From	To	Sailing distance nautical miles	Speed knots	CO <sub>2</sub> emissions per TEU per nautical mile gram CO <sub>2</sub> per TEU per nm	Total emissions per TEU kg CO <sub>2</sub> per TEU
Bremerhaven	Brunsbüttel	81	19	291	23.6
Brunsbüttel	Kiel Holtenau	53	8	112	5.9
Kiel Holtenau	Kalundborg	100	19	291	29.1
<b>Total</b>		<b>234</b>			<b>58.6</b>

Kalundborg	Copenhagen	115	19	291	33.5
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**Truck driving distances and respective CO<sub>2</sub> emissions assuming 1 TEU per truck**

From	To	Distance km	Speed km/hour	CO <sub>2</sub> emissions in kg per TEU per km g CO <sub>2</sub> /TEU/km	CO <sub>2</sub> emissions in kg per TEU kg CO <sub>2</sub> /TEU
Kalundborg	Tåstrup	85	90	936	79.6
Kalundborg	Vordingborg	102	90	936	95.5
Kalundborg	Køge	101	90	936	94.5
Kalundborg	Slagelse	37	90	936	34.6
Tastrup	Nordhavn	27	54	1032	27.9
Tåstrup	Slagelse	84	90	936	78.6
Tåstrup	Køge	30	90	936	28.1
Tåstrup	Vordingborg	86	90	936	80.5

**Truck driving distances and respective CO<sub>2</sub> emissions assuming 2 TEU's per truck**

From	To	Distance km	Speed km/hour	CO <sub>2</sub> emissions in kg per TEU per km g CO <sub>2</sub> /TEU/km	CO <sub>2</sub> emissions in kg per TEU kg CO <sub>2</sub> /TEU
Kalundborg	Tåstrup	85	90	611	51.9
Kalundborg	Vordingborg	102	90	611	62.3
Kalundborg	Køge	101	90	611	61.7
Kalundborg	Slagelse	37	90	611	22.6
Tastrup	Nordhavn	27	54	674	18.2
Tåstrup	Slagelse	84	90	611	51.3
Tåstrup	Køge	30	90	611	18.3
Tåstrup	Vordingborg	86	90	611	52.5



**Truck driving distances and respective CO<sub>2</sub> emissions assuming 3 TEU's per truck**

From	To	Distance km	Speed km/hour	CO <sub>2</sub> emissions in kg per TEU per km g CO <sub>2</sub> /TEU/km	CO <sub>2</sub> emissions in kg per TEU kg CO <sub>2</sub> /TEU
Kalundborg	Tåstrup	85	90	479	40.7
Kalundborg	Vordingborg	102	90	479	48.8
Kalundborg	Køge	101	90	479	48.3
Kalundborg	Slagelse	37	90	479	17.7
Tastrup	Nordhavn	27	54	528	14.2
Tåstrup	Slagelse	84	90	479	40.2
Tåstrup	Køge	30	90	479	14.4
Tåstrup	Vordingborg	86	90	479	41.2

**Idling CO<sub>2</sub> emissions**

	Idling time minutes	CO <sub>2</sub> emissions per mintúte g CO <sub>2</sub> per minute	Total CO <sub>2</sub> emissions kg CO <sub>2</sub>
Idling in Nordhavn	60	350	21
Idling in Kalundborg	10	350	4