

Sizing refueling bays



Description of the Excel model

The model helps the user dimension fueling and charging stations based on future traffic flows.

Cells to be changed by the user – marked in orange

Cells that can be changed by the user – marked in yellow

Cells showing results – marked in green

Cells that should not be changed are white

Prerequisites

To run the calculation, the user needs to enter:

Traffic flows for 2025

Forecast year

Expected traffic growth per year up to the forecast year

Input data and calculation logic

The model combines the input data with a previously developed forecast to calculate how future traffic will be distributed across different fuels.

The user also needs to estimate what share of the traffic is expected to refuel or charge at the port. This can be specified either:

for **all** vehicles combined, or **broken down by fuel type**

If the share that refuels/charges differs significantly between fuels (to the extent that it affects the dimensioning), separate shares should be entered for each powertrain/fuel type

Special notes on charging electric vehicles

Charging differs from other fuels because it can be carried out using different types of chargers with different charging times.

For the model to be able to calculate the need, the user must therefore estimate what share of electric-vehicle traffic is expected to use each type of charger.

The split is made between:

Depot charging (8 hours/charge) (43 kW AC)

Longer stop (2 hours/charge) (300 kW DC)

Short stop / fast charging (30 min) (750 kW DC)

Resultat

In the Results tab, the following results are presented:

calculated traffic flows

refueling/charging volumes

refueling/charging times

The Results tab can also be used to dimension the number of bays (e.g., pumps/charging bays) based on how many vehicles can use the same bay.

Columns 1–2: show the number of vehicles and how many spaces are required for all vehicles to be able to refuel/charge without waiting time

Column 3: the user can choose the number of bays/chargers

Based on this, the model calculates how long it takes before the last vehicle is finished.

Input data for the calculation

To run the calculation, input data must be provided.

Number of vehicles/day (heavy goods vehicles)	2800
Forecast year	2040
Annual traffic growth	1

The calculation is carried out per day, but also for the share of traffic that may vary from port to port.
Example: If traffic to the port arrives in two periods over a day, it can be assumed that half of the day is used for refueling.
 How large a share of the traffic do you want to dimension for? 33%

The total number of vehicles per fuel that are assumed to pass the port is calculated
The distribution can be changed by the user in “Values for calculations”, cells C3–G1

The next step is to calculate how many of the total number of vehicles are expected to refuel/charge at the port
The user then needs to specify this share, either as a total share or broken down by fuel type
 The simplest option is to enter a share for all vehicles (cell C23). If there is knowledge of different fuel types, the share can be specified for each fuel type.
Example: If it is advantageous to refuel, e.g. due to cheap diesel, a larger share may do so. Another

If you want to specify the share by fuel, the share for “All” (cell C23) should be set to 0. The

Share of vehicles expected to refuel/charge at the port	Share of all vehicles
All	0,1
HVO	
Electricity	
Hydrogen	
Gas	
Other	

Electric charging is assumed to work differently from other fuels, as there are different charger types.
The user needs to specify what share is expected to use each charger type.

Split for electric charging	Share per day
Depot charging (8 hours/charge) (43 kW AC)	0,2
Longer stop (2 hours/charge) (300 kW DC)	0,1
Short stop / fast charging (30 min) (750 kW DC)	0,7

Vehicles per day are entered for 2025. The model then scales this up to the selected forecast year.

Entered as a percentage per year (e.g. 1 = 1% traffic growth per year).

rt to port depending on departures, etc. The user therefore needs to specify what share of the traffic th
ly traffic is the traffic that dimensions the facility. In that case, enter 50% below.

based on the distribution given in “Values for calculations”.

B.

to refuel/charge at the port.

fuel.

ferences between fuels that are large enough to affect the dimensioning, different shares can be ente
example: if the port does not offer hydrogen, the share can be set to 0.

shares **should not** sum to 1.

Share split by fules	
	0
	0
	0
	0

Specified as share (0,1 = 10% of all vehicles are expected to refuel at the port

Specified as share (0,1 = 10% of all vehicles that runs on HVO are expected t

No calculation is performed for “Other”

nt types of chargers.

Shares must sum to 1

ie model should dimension for.

red by fuel type.

;) (to refuel at the port)

Distribution of vehicles per type of fuel Trelleborgs hamn					
Fuel type	2030	2035	2040	2045	2050
HVO	90%	80%	70%	60%	50%
Electricity	4%	11%	17%	24%	30%
Hydrogen	1%	2%	5%	6%	9%
Gas	4%	6%	7%	9%	10%
Övriga	1%	1%	1%	1%	1%
	100%	100%	100%	100%	100%

No calculation is performed

Volumes

	Fuel type	Volume (L)	Volume (Kg)	
LNG	HVO	1000		43 kW AC
	Hydrogen	296	80	1 kg H2 corresponds to 3,7 l HVO
	Gas	1000		300 kW DC 750 kW DC

Times

	Fuel type	Tid	Komment	Valt värde enhet	
LNG	HVO	5-10 min		10 minuter	
	Hydrogen	15 min		15 minuter	
	Gas	5-10 min		10 minuter	
	Electricity				
	Depot charging	43 kW AC	7-10 tim	Depot charging	8 timmar
	Longer stop	300 kW DC	1-4 tim	Longer stop	2 timmar
	Short stop	750 kW DC	30-45 min	Short stop	30 minuter

ormed for "Other"

Type of charger	Effekt (kW)
<i>Depot charging</i>	43
<i>Longer stop</i>	300
<i>Short stop / fast charging</i>	750

Indata			
Number of vehicles/day (heavy goods)	2800		
Forecast year	3	2040	
Annual traffic growth	1		
Share of traffic used for sizing	0,333333333		

Share refueling/charging at the point of use	
All	0,1
HVO	0
Electricity	0
Hydrogen	0
Gas	0
Other	0

Type of charging	
Depot charging	0,2
Longer stop	0,1
Short stop	0,7

Forecast	no. of vehicles
no. of vehicles	3251

Distribution by type och fuel	2040
HVO	2276
Electricity	553
Hydrogen	163
Gas	228
Other	33

Share of vehicles expected to refuel	no. of vehicles	no. of vehicles used for sizing
All	325	108
HVO	228	76
Electricity	55	
Hydrogen	16	5
Gas	23	8
Other	3	1

Volumes	L per 24 hours	L for sizing traffic
HVO	228000	76000
Hydrogen	4736	1480
Gas	23000	8000

Time	24 hours			no. of vehicle
	no. of vehicles	Minutes	Hours	
Fuel type				
HVO	228	2280	38	76
Hydrogen	16	240	4	5
Gas	23	230	4	8

Electricity		24 hours	Sizing traffic
Type of charger		kW	kW
43 kW AC	Depot charging	473	
300 kW DC	Longer stop	1800	
750 kW DC	Short stop / fast	29250	9750

Electricity	24 hours
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Type of charger		no. of vehicles	Minutes	Hours
		55		
43 kW AC	<i>Depot charging</i>	11		88
300 kW DC	<i>Longer stop</i>	6		12
750 kW DC	<i>Short stop / fast</i>	39	1170	19,5

Used for dropdown list
Translation be Year

1	2030
2	2035
3	2040
4	2045
5	2050

Used for dropdown list

1	100%
2	50%
3	33%
4	25%

Sizing traffic	
Minutes	Hours
760	12,67
75	1,25
80	1,33

Sizing traffic

no. of vehicle	Minutes	Hours
13	390	6,50

Based on the input data provided, the following results have been calculated

Number of vehicles	Year	Number of vehicles
No of vehicles during 24 hours	2025	2800
No of vehicles/24 hours forecast year	2040	3251
Vehicles refueling/24 hours		325
Sizing traffic		102

Results during 24 hours 2040

Fuel type	Vehicles, total	Vehicles, refueling	Refueling volume (L)	Total refueling time (hours)
HVO	2276	228	228000	38.00
Hydrogen	163	16	4700	4.00
Gas	228	23	23000	3.83
Electricity	553	55		

Electric vehicles distributed across different chargers

Type of charger	Vehicles, total	Vehicles, refueling	Refueling volume (KW)	Total refueling time (hours)
43 KW AC	11	11	473	88
300 KW DC	6	6	1800	12
750 KW DC	39	39	29250	19.5

Results for sizing traffic (33%)

2040

The results for depot charging and charging during extended breaks are not presented for sizing traffic.

Fuel type	Vehicles	Refueling volume (L)	Total refueling time (hours)
HVO	78	78000	12.67
Hydrogen	5	1500	1.25
Gas	8	8000	1.33

Type of charger	Vehicles	Refueling volume (KW)	Total refueling time (hours)
750 KW DC	13	9750	6.5

Number of refueling/charging bays

Sizing traffic

The first two result columns show the number of vehicles and how many bays are needed if all vehicles must be able to refuel/charge without queuing (vehicles = bays).

In the third result column, the user can choose the number of bays/chargers.

Given the number of bays/chargers, the model calculates how long it takes until the last vehicle is finished refueling

Fuel type	Vehicles	If all vehicles must be served without queuing		Number of bays/chargers	Number of vehicles per bay	How long does the last vehicle have to wait until its refueling/charging is completed?	
		bays	minutes			hours	
HVO	78	78	76	1	78	760	12.67
Hydrogen	5	5	5	1	5	75	1.25
Gas	8	8	8	1	8	80	1.33
Type of charger	Vehicles	bays	Number of bays/chargers	vehicles/bay	minutes	hours	
750 KW DC	13	13	1	13	350	6.50	

24 hours— For chargers with longer charging times, the calculation is performed on a daily basis only.

Type of charger	Vehicles	If all vehicles must be served without queuing		Number of bays/chargers	Number of vehicles per bay	How long does the last vehicle have to wait until its refueling/charging is completed?	
		bays	minutes			hours	
43 KW AC	11	11	11	1	11	88	
300 KW DC	6	6	6	1	6	12	

