Environmental Calculator
Danske Fragtmænd

DANSKE FRAGTMÆND ENVIRONMENTAL CALCULATOR

Contents

The purpose of Danske Fragtmænd's Environmental Calculator is to calculate the energy consumption and volume of CO2(e) emissions for the transport of a consignment.

Reporting takes place in accordance with DS EN 16258

System limits:

Included:

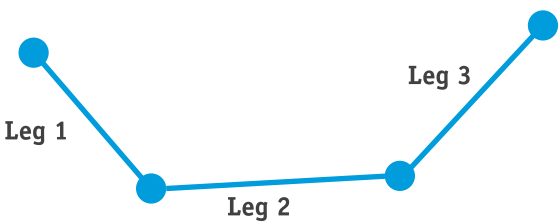
- All transport involved, whether this is produced in own means of transport or by subsuppliers.
- Operation of all auxiliary machinery, such as refrigeration machines, hoists and cranes.
- Energy consumption and CO2(e) compiled according to Tank-to-Wheel and Well-to-Wheel.

Not included:

- Energy consumption and emissions from warehouses, offices and transshipment.
- Auxiliary equipment for handling and reloading.
- Production, maintenance and disposal of means of transport and infrastructure.
- Refrigerant emissions.
- RFI factor for air transport.

Procedure

1. Compilation of transport activities per leg (new leg on a change in transport method).
2. Calculation of energy consumption and GHG emissions for each leg.
3. The total energy consumption and emissions are the sum of the part-contributions from the individual legs.



Basic formulas

Tank-to-Wheel energy consumption: Fuel consumption x conversion factor

Well-to-Wheel energy consumption: Fuel consumption x conversion factor

Tank-to-Wheel CO2(e) emissions: Fuel consumption x conversion factor

Well-to-Wheel CO2(e) emissions: Fuel consumption x conversion factor

Allocation principles

General:

- The total energy consumption and CO2(e) emissions must be distributed 100 % on the completed tonne-km, including empty runs.
- It is not permitted to use marginal distribution methods.
- If an allocation method is used, it must be used in all cases.

Four reporting levels

1. Measurement of environmental performance for the concrete sub-transport.
2. Calculations based on the transport company's statements for types of transport methods or route-specific values.
3. Calculation based on the transport company's environmental performance statements for the entire company's "fleet".
4. Calculation determined on the basis of standardised average values (default values).

Default values must be used as the last resort.

Declaration

Danske Fragtmænd's Environmental Calculator/reporting is based on the following principles:

The formula is:

$$\frac{(CO2(e)\ \text{emission per km x km distance)}\ \text{x weight}}{(\text{payload x utilisation rate in }\%)}$$

As Danske Fragtmænd does not have data, or the opportunity to gather data, for which specific lorries actually carry individual consignments, the concept of "**Standard Vehicle**" is used.

Danske Fragtmænd operates with two types of Standard Vehicle:

- **Freight Standard Vehicle**, which concerns ordinary distribution, including night distribution.
- **Crane Standard Vehicle**, which concerns consignments carried in crane distribution.

Standard Vehicles are fictively calculated average lorries, calculated on the basis of the fleet of lorries which Danske Fragtmænd's routes have at their disposal. Calculations are based on data from the Danish Centralised Vehicle Register, which is extracted in December each year. Data for the calculated Standard Vehicle will be used in the following year, so that Standard Vehicle 2016 is based on data from December 2015.

The Standard Vehicles are calculated on the basis of the following values:

- EURO Norm (Motor technology).
- Payload.
- Fuel consumption per km driven.
- Utilisation rate.

Fuel consumption and utilisation rate are calculated in September, based on selected vehicle sizes and use.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Calculation of distance
The distance a shipment has been transported is found on the basis of scanning and geopositions.
In principle, freight bills are scanned on collection, on arrival at a terminal, on departure from a terminal and on delivery to the recipient.

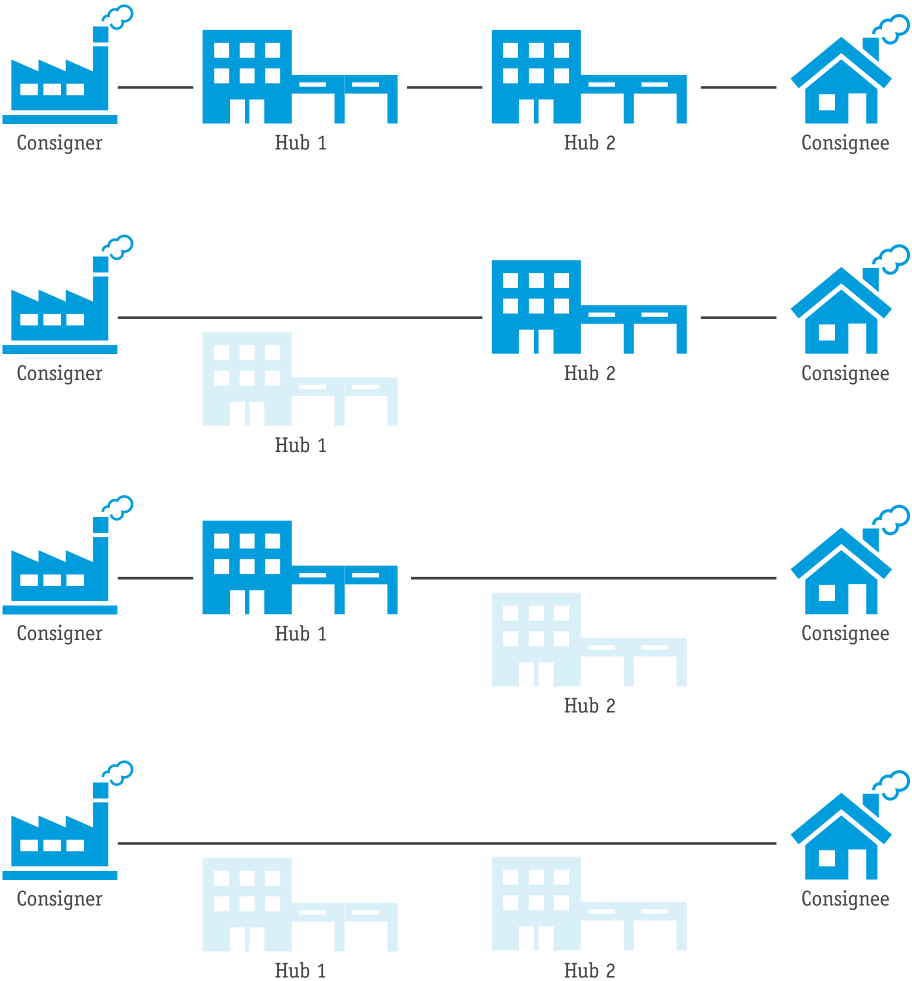
Simplified algorithm:
First, the freight bill is divided into transport legs based on scannings of the freight bill number on our terminals. No scannings show that the freight bill has been transported directly from sender to recipient, while one scanning on a terminal shows that we have transported the consignment from sender to recipient via a terminal, and thus have a collection leg and a delivery leg.

For each transport leg, a distance is calculated, as follows:

1. If there is a start scanning and an end scanning for the transport leg, these are used, together with the collected geopositions for the driver between the two times, to calculate the length of the transport leg.

2. If a) is not possible, the length of the transport leg is found as the Bing distance from the start position measured by the postcode for either the sender (collection leg) or terminal (transit leg) to the end position measured by either the postcode for the terminal (transit leg) or the postcode for the recipient (delivery leg).

The total distance for the transport is then found as the sum of the distances for the individual transport legs.



Emission figures and energy figures are based on the following conversion factors:

Table A.4 — Diesel/bio-diesel blend factors, % biofuel (share by volume)

Diesel/Bio-diesel blend	Density (d)	Energy factor				GHG emission factor					
% of bio-diesel in volume		Tank-to-wheels (e_t)		Well-to-wheels (e_w)		Tank-to-wheels (g_t)			Well-to-wheels (g_w)		
	kg/l	MJ/kg	MJ/l	MJ/kg	MJ/l	gCO$_2$e/MJ	kgCO$_2$e/kg	kgCO$_2$e/l	gCO$_2$e/MJ	kgCO$_2$e/kg	kgCO$_2$e/l
1 %	0,83258	43,1	35,9	51,6	43,0	73,7	3,17	2,64	89,96	3,88	3,23
2 %	0,83316	43,0	35,8	51,9	43,2	73,0	3,14	2,62	89,67	3,86	3,21
3 %	0,83374	42,9	35,8	52,1	43,5	72,3	3,11	2,59	89,38	3,84	3,20
4 %	0,83432	42,9	35,8	52,4	43,7	71,6	3,07	2,56	89,09	3,82	3,19
5 %	0,83490	42,8	35,7	52,7	44,0	71,0	3,04	2,54	88,80	3,80	3,17
6 %	0,83548	42,7	35,7	53,0	44,2	70,3	3,00	2,51	88,50	3,78	3,16
7 %	0,83606	42,7	35,7	53,2	44,5	69,6	2,97	2,48	88,21	3,76	3,15
8 %	0,83664	42,6	35,7	53,5	44,8	68,9	2,94	2,46	87,92	3,75	3,13
9 %	0,83722	42,5	35,6	53,8	45,0	68,2	2,90	2,43	87,62	3,73	3,12
10 %	0,83780	42,5	35,6	54,0	45,3	67,5	2,87	2,40	87,33	3,71	3,11
15 %	0,84070	42,1	35,4	55,4	46,6	64,0	2,70	2,27	85,85	3,62	3,04
20 %	0,84360	41,8	35,3	56,7	47,9	60,5	2,53	2,14	84,35	3,53	2,98
50 %	0,86100	39,9	34,4	64,6	55,6	38,9	1,55	1,34	75,11	3,00	2,58
85 %	0,88130	37,7	33,3	73,3	64,6	12,0	0,45	0,40	63,67	2,40	2,12

Table A.5 — Diesel/bio-diesel blend factors, % biofuel (share by energy)

Diesel/Bio-diesel blend	Density (d)	Energy factor				GHG emission factor					
% of bio-diesel in energy		Tank-to-wheels (e_t)		Well-to-wheels (e_w)		Tank-to-wheels (g_t)			Well-to-wheels (g_w)		
	kg/l	MJ/kg	MJ/l	MJ/kg	MJ/l	gCO$_2$e/MJ	kgCO$_2$e/kg	kgCO$_2$e/l	gCO$_2$e/MJ	kgCO$_2$e/kg	kgCO$_2$e/l
1 %	0,83268	43,0	35,8	51,6	43,0	73,8	3,17	2,64	90,09	3,88	3,23
2 %	0,83335	43,0	35,8	51,9	43,2	73,0	3,14	2,61	89,78	3,86	3,21
3 %	0,83403	42,9	35,8	52,2	43,5	72,3	3,10	2,58	89,46	3,84	3,20
4 %	0,83470	42,8	35,7	52,5	43,8	71,5	3,06	2,56	89,14	3,82	3,19
5 %	0,83537	42,7	35,7	52,8	44,1	70,8	3,02	2,53	88,83	3,80	3,17
6 %	0,83603	42,7	35,7	53,1	44,4	70,0	2,99	2,50	88,51	3,78	3,16
7 %	0,83670	42,6	35,6	53,4	44,7	69,3	2,95	2,47	88,19	3,76	3,14
8 %	0,83736	42,5	35,6	53,7	44,9	68,5	2,91	2,44	87,88	3,74	3,13
9 %	0,83802	42,4	35,6	53,9	45,2	67,8	2,88	2,41	87,56	3,72	3,11
10 %	0,83868	42,4	35,5	54,2	45,5	67,1	2,84	2,38	87,25	3,70	3,10
15 %	0,84193	42,0	35,4	55,7	46,9	63,3	2,66	2,24	85,66	3,60	3,03
20 %	0,84514	41,7	35,2	57,1	48,3	59,6	2,48	2,10	84,08	3,50	2,96

Reporting

- Environmental data is reported retrospectively, on a monthly or on a quarterly basis.
- Environmental data reports are sent by mail to the customer.
- Environmental data reports at consignment level are transferred to the customer in EXCEL format.
- Environmental data reports are transferred to the customer in PDF format.

What is CO_2(e)?

Instead of working with values for N_2O Nitrous oxide (laughing gas), Methane CH_4 and CFC gases, the effect of each of the various greenhouse gases is included as the amount of CO_2 that would generate the same amount of heating.
In this way, a CO_2 emission may consist of various greenhouse gases, but can be expressed as a single figure.

Standard key ratios are used to convert the various gases to equivalent amounts of CO_2. These factors are based on the Global Warming Potential (GWP) for each gas, which describes the overall heating effect in relation to CO_2 during a specific period (100 years).

The methane score is 25, which means that one tonne of methane will entail the same amount of heating as 25 tonnes of CO_2. Laughing gas has a score of 298. F-gases have scores that may exceed 10,000.

What is?

Tank to wheel CO_2 = The CO_2(e) emission from fuel tank to wheel, or the emissions resulting from the vehicle's transport of a consignment.

Tank to wheel MJ = The energy volume used from fuel tank to wheel, or the energy volume used by the vehicle for the actual transport to the customer.

Well to wheel CO_2 = The CO_2(e) emission from well to wheel, or the emission relating to the extraction and refining of the oil, transport to fuel tank, and actual transport to the customer.

Well to wheel MJ = The energy volume used from well to wheel, or the volume of energy used for the extraction and refining of the oil, transport to fuel tank, and actual transport to the customer.

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