ENVIRONMENTAL PRODUCT INFORMATION

RENAULT TRUCKS D WIDE Z.E.

renault-trucks.com

RENAULT TRUCKS

Renault Trucks is committed to improving sustainable goods mobility and is striving to reduce the effects its products have on the environment. Renault Trucks vehicles are designed to comply with legislation limiting atmospheric pollution and also to continue lowering fuel consumption which results in reducing carbon dioxide emissions.

Together with ever more fuel efficient transport solutions, Renault Trucks offers a full range of vehicles powered by alternatives to diesel fuel to enable operation in any environment: 100% electric; compressed natural gas; biofuels.

Renault Trucks implements an environmental policy based on specific commitments and a stringent management system that covers its dealer network, suppliers and partners. Its vehicles are manufactured in ISO 14001 certified production plants. It is geared to limiting its consumption of energy, water and raw materials but also to reducing waste production. Its products are designed to allow maximum reuse of the materials that have gone into their production.

.

ENVIRONMENTAL PRODUCT INFORMATION

Environmental product information is drawn from life cycle analyses (LCAs) carried out on our vehicles. These cover all phases in a truck's life, from the production of raw materials right through to final dismantling and recycling. It provides data concerning the environmental impact of each one of these phases. In some cases, the LCA, which is far-reaching and complex, includes approximations. The results reveal the most important environmental parameters in the product life cycle.

THE THEMES

The environmental product information studies the impact of:

- **materials:** extraction and processing of raw materials used to produce the vehicle.
- **production:** manufacturing processes used by the plants, component production at suppliers and on site transport of parts.
- **use phase:** production and consumption of electric energy. Homologation trials carried out for each type of engine as well as on-road tests make it possible to ascertain the effects of energy consumption. Depending on the conditions of use, a truck's actual energy consumption can differ from the published results.
- **maintenance:** consumables and materials used in preventive maintenance and the production of parts (impact calculated on the basis of average values).
- **end of life management:** dismantling of products, management of waste and recycling the truck's materials.

THE RESULTS

The results shown include:

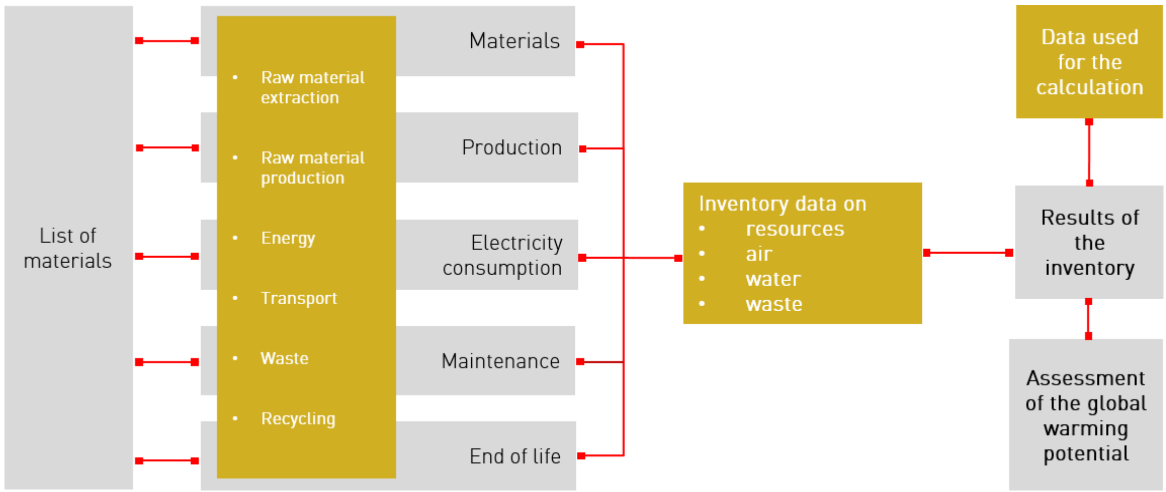
- the vehicle's bill of materials
- the rates of recyclability and recoverability as defined by the IS0 22628 standard
- the inventory results which show the data for the resources used and the emissions produced (pollution and waste).
- the assessment of the potential contribution to global warming.

BENCHMARK VALUES

Life cycle analysis results vary considerably depending on the data used for the calculations, the most important being energy consumption, mileage, vehicle configuration. The results shown here are based on the benchmark values for a **Renault Trucks D Wide Z.E.**, a 6x2 rigid truck designed for urban distribution, throughout its entire life cycle. It is important to stress that energy consumption, as well as the mileage, can vary considerably according to the conditions of use

ENVIRONMENTAL PRODUCT INFORMATION

METHOD



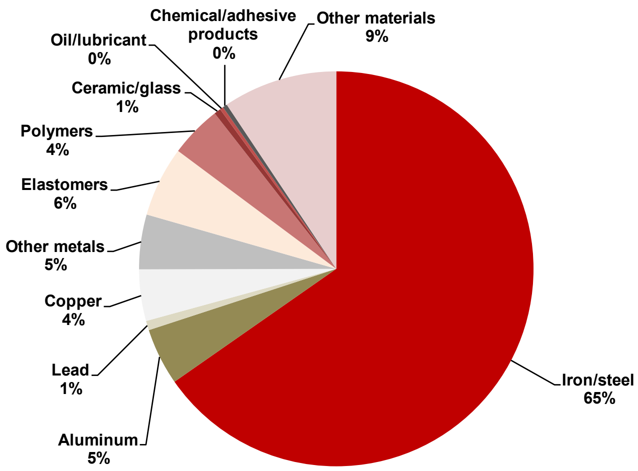
DATA USED FOR THE CALCULATION

Vehicle model	Emission level	Engine type	Vehicle type	Number of batteries	Distance (km)
Renault Trucks D Wide Z.E.	Euro VI	370 kW ; 500 hp	6x2 rigid	4	600,000

Bill of materials

Bill of materials used in the vehicle and taken into account for calculating the life cycle analyses.

Materials	kg
Iron/steel	6091
Aluminum	435,1
Lead	71,75
Copper	393,2
Other metals	417,4
Elastomers	536,2
Polymers	395,75
Ceramic/glass	50,9
Oil/lubricant	26,6
Chemical/adhesive products	34,1
Other materials	874,4
TOTAL	**9326,6**



ENVIRONMENTAL PRODUCT INFORMATION

Rate of recyclability and recoverability

The vehicles are designed to ensure that the maximum amount of materials used in their construction can be reused.

Rate of recyclability* 92,8%
Rate of recoverability*97,6%

* Calculations according to the ISO 22628 standard: The rate of recoverability is the percentage of the vehicle's mass potentially able to be reused, recycled or recovered as energy (incineration with energy recovery); it is therefore always higher than the rate of recyclability.

Inventory results

	Unit	Materials	Production	Energy consumption	Maintenance	End of life	Total	Battery exchange
Electricity renewable	MWh	11,41	4,60		4,87	0,67	17	5
Electricity non-renewable	MWh	9,55	15,08		0,284	0,50	25	18
Other renewable energy	MWh	0,037	0,0000		0,000	-0,0001	0	0
Other non-renewable energy	MWh	107,7	42,1		2,6	-36,1	116	58
Materials	kg	9902	0		316	-8102	2117	
CO	kg	122,9	3,19		1,8	-86,1	42	19
CO_2	kg	28439	11922		598	-9355	31604	18595
HC/VOC	kg	87,1	27,6		1,7	-30,9	85	47
NOx	kg	75,5	15,31		1,7	-20,83	72	35
SO_2	kg	363,5	6,71	According to country and primary energy source	1,9	-80,7	291	233
Particulates	kg	27,98	1,86		0,39	-5,65	25	17
Biological oxygen demand	kg	17,06	0,01		0,03	-0,27	17	16
Chemical oxygen demand	kg	26,00	9,96		0,46	0,21	37	25
CO_2-eq	kg	31752,88122	12690		694	-10311,1	34826	19947
Use of water (excluding cooling)	m3		3,95					
Use of water for cooling	m3		0,08					
Non-hazardous waste treated	kg		133,58					
Non-hazardous waste to landfill	kg		0,22					
Hazardous waste treated	kg		78,96					
Hazardous waste to landfill	kg		0,57					

ENVIRONMENTAL PRODUCT INFORMATION

	Unit	BE	CH	SP	FR	GB	IT	LU	NL	NO	SW	DE	EU28
Electricity renewable	MWh	468,9	683,54	959,17	286,32	410,54	1024,01	916,71	376,04	993,21	719,73	774,40	617,57
Electricity non renewable	MWh	1069	935,76	514,82	1818,10	509,03	181,02	532,86	175,95	30,46	856,41	412,98	685,91
Other renewable energy	MWh	0	0	0	0	0	0	0	0	0	0	0	0
Other non renewable	MWh	627,3	249,76	842,17	134,76	1280,27	1125,04	1304,66	1407,70	45,34	64,22	1240,72	957,75
Materials	kg	0	0	0	0	0	0	0	0	0	0	0	0
CO	kg	151	75	161,71	36,99	278,12	209,10	227,41	150,88	15,30	137,15	234,21	238,67
CO_2	kg	171934,3	97073	251361,2	40713,99	344439,89	298981,4	402357	406597,30	23234,16	33052,10	439375,58	306927,81
HC/VOC	kg	333,7	166,88	640,98	94,41	976,42	1007,23	643,02	816,30	19,26	49,83	656,28	619,77
NO x	kg	238,2	138,66	515,81	93,10	691,62	386,30	420,18	418,15	15,43	69,39	492,20	461,83
SO_2	kg	87	76,90	394,45	71,91	521,78	266,58	220,32	173,34	7,06	37,19	289,49	498,77
PM	kg	23,85	20,21	54,40	12,01	70,65	42,73	66,37	59,60	2,13	9,37	90,88	74,34
BOD	kg	0,4	0,43	0,26	0,15	0,92	1,60	1,37	0,70	0,02	0,07	1,51	0,74
COD	kg	149,76	106,65	361,30	31,31	45,9	270,07	423,79	490,13	4,11	7,78	619,07	358,45
CO_2 eq.	kg	181678,55	102534,6	269659,30	43639,27	372675,50	327869,28	423119,91	430633,97	23850,77	34784,30	461940,82	325687,34

	Unit	Hard Coal	Brown Coal/ Lignite	Natural Gas	Hydro Power	Nuclear Power	Wind Power	PV Solar Cells	Solar Thermal	Biomass
Electricity renewable	MWh	9,61	17,78	2,48	931,88	1,05	1957,26	5429,51	6970,97	2574,47
Electricity non renewable	MWh	6,76	9,46	0,63	0,40	2155,42	2,19	32,20	20,41	5,42
Other renewable energy	MWh	0	0	0	0	0	0	0	0	0
Other non renewable	MWh	2209,16	2155,61	1715,52	5	17,50	32,24	204,48	102,76	90,39
Materials	kg	0	0	0	0	0	0	0	0	0
CO	kg	151,75	346,45	147,85	10,98	5,49	33,28	84,70	66,95	898,97
CO_2	kg	739016,92	877752,25	353858,73	4581,19	3453,77	8921,03	59392,52	29878,53	22874,99
HC/VOC	kg	1910,78	42,83	986,49	2,75	10,42	18,56	212,16	72,46	160,33
NO x	kg	871,28	577,78	286,97	5,46	16,89	17,89	123,89	66,22	723,08
SO_2	kg	481,49	472,06	63	3,28	11,99	15,40	153,98	38,46	403,76
PM	kg	145,70	192,44	3,35	1,15	4,79	6,50	96,05	11,79	66,18
BOD	kg	0,09	0,05	0,56	0,008	0,02	0,08	0,53	0,25	0,14
COD	kg	1514,37	1208,06	6,61	0,99	1,13	4,63	45,20	17,09	730,50
CO_2 eq.	kg	796781,41	885968,61	381861,16	4657,54	3685,93	9473,50	64413,29	37248,25	32061,14

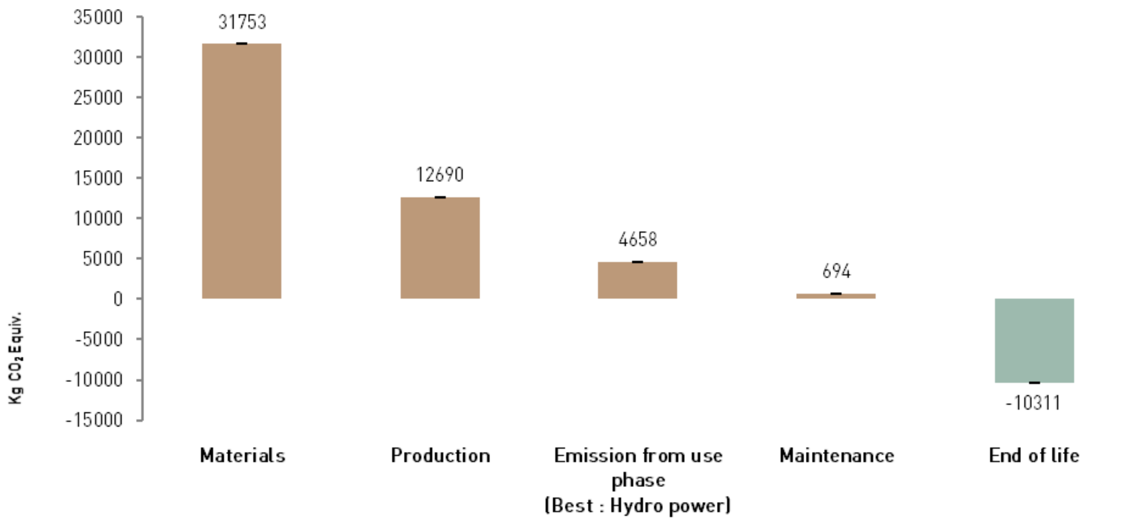
ASSESMENT OF THE IMPACT ON THE ENVIRONMENT

Assessing a product's environmental impact throughout its lifetime makes it possible to determine which aspects must be studied to improve its overall environmental performance. This assessment may be qualitative but also quantitative by using appropriate methods and tools

GLOBAL WARMING POTENTIAL

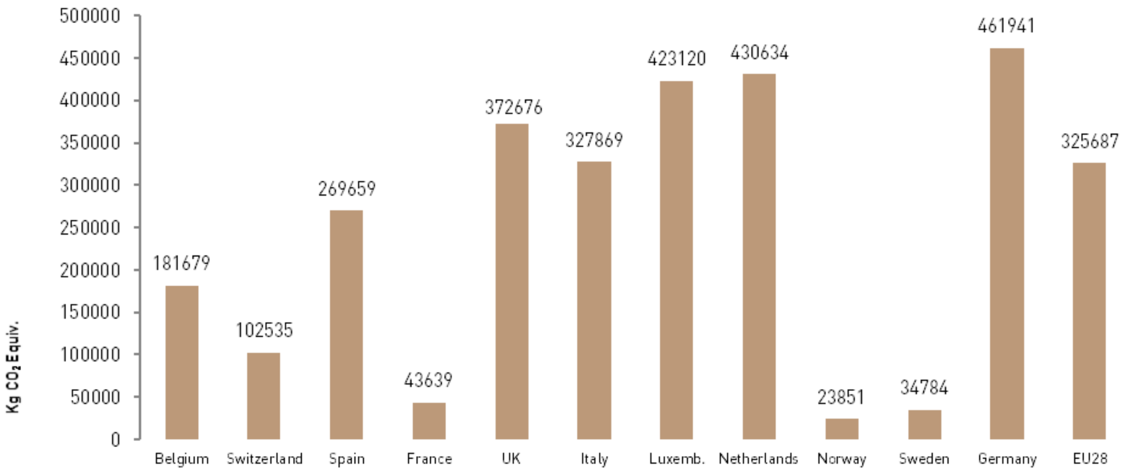
Life cycle analysis makes it possible to determine a vehicle's global warming potential throughout its operational life. This potential consists of the various greenhouse gas emissions it produces that affect the climatic system. It is expressed as the equivalent quantitiy of Carbon Dioxide (kg equ. CO_2).

Life cycle emissions



Global warming potential for the different life cycles of Renault Trucks D Wide Z.E.. The use phase shows the best case.

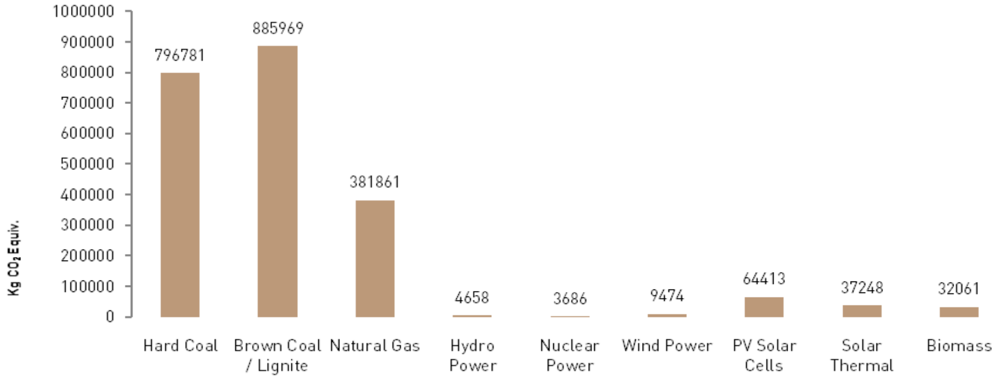
Use phase emissions from production of electricity - National/Regional average



Use phase emissions fom production of electricity. Main markets for Renault Trucks D Wide Z.E. are presented.

ASSESMENT OF THE IMPACT ON THE ENVIRONMENT

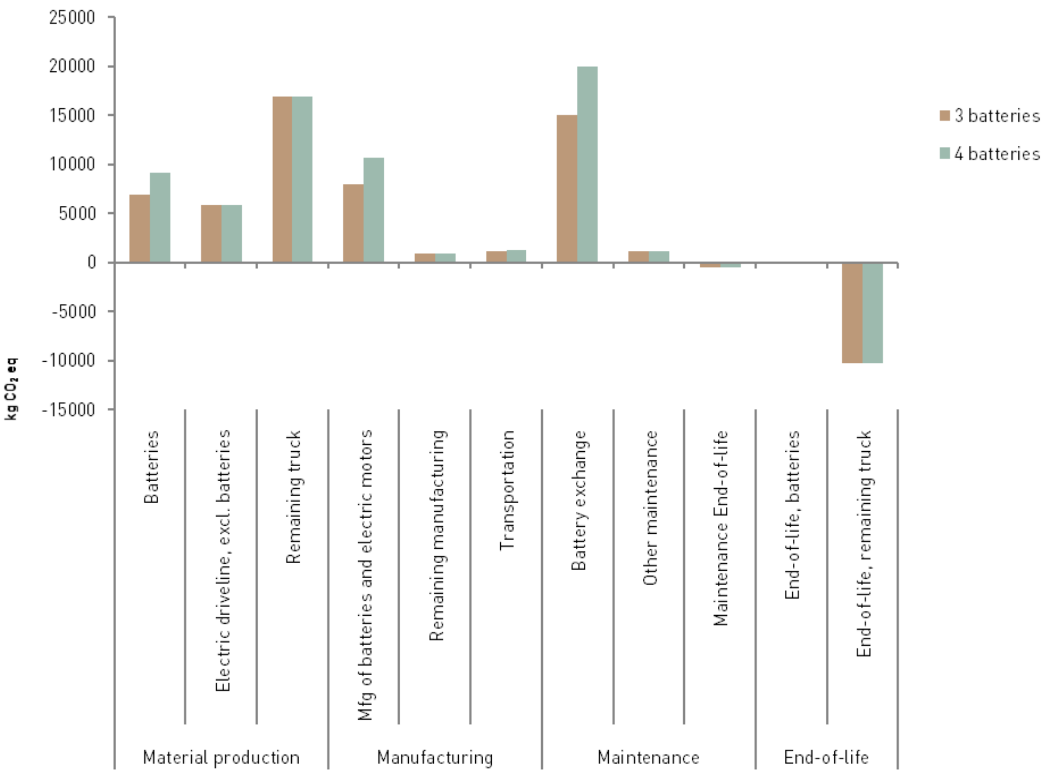
Use phase emissions from production of electricity - Energy sources



Use phase emissions from production of electricity. In the graph selected electricity sources are presented

The type of electricity used during operation is the most important parameter determining the climate impact of an electric truck. The total life cycle result becomes completely different whether different national grid mixes in the EU are used.

CO_2 emissions from production of materials, parts and manufacturing



Use phase emissions from production of electricity. In the graph selected electricity sources are presented.

Impacts related to the batteries accounts for a major part of the total impact. Based on the model made and the assumption of one battery exchange 62-83% of the truck life cycle climate impact are related to the batteries, depending on model and number of batteries. 33-44% are from battery manufacturing as modelled with Korean electricity grid mix (0,60 kg CO2 eq./kWh, which is higher than e.g. the figure for EU-28 average grid mix).

ASSESSMENT OF THE IMPACT ON THE ENVIRONMENT

CONCLUSIONS

The type of electricity used during operation is the most important parameter determining the climate impact of an electric truck. The total life cycle result becomes completely different whether different national grid mixes in the EU are used. When using low carbon electricity, Renault D electric enables a drastic decrease in life cycle CO_2 equiv. emissions.

Based on the model made and the assumption of one battery exchange, 62-83% of the truck life cycle climate impact are related to the batteries depending on model and number of batteries.

The introduction of new electric vehicles in Renault Trucks range is an opportunity to substantially reduce the CO_2 emissions from products over their entire life. Renault Trucks is continuing its efforts to reduce batteries environmental impact by securing materials supply and recycling and by using new technologies.

Find out more about the environment at Renault Trucks:
http://corporate.renault-trucks.com/en/environment/

renault-trucks.com

RENAULT
TRUCKS