

Adjustment DE-A regarding NO_x from Road Vehicles

PREFACE

When deriving proposals for national emission ceilings for negotiations of the 1999 Gothenburg Protocol, sector-specific emission estimates for the year 2010 were calculated at IIASA using a set of scenarios which assumed various technological abatement measures, policy incentives, and legislation available / in place or planned at that time. As a result, the 2010 emission by road transport in Germany was estimated at NO_x (IIASA, 1999) ¹⁾. The over-all 2010 national emission ceiling (NEC) for NO_x was set to 1,081 kt. When negotiating the EU NEC Directive two years later, Germany agreed to reduce its NO_x emissions further, resulting in a NEC of 1,051 kt.

In its 2016 NEC emissions reporting, Germany provided a national total for NO_x emissions of 1,337 kt for 2010. However, this total includes emissions from agricultural soils and other source categories not accounted for when setting the NEC. In addition, some assumptions made in 1999, including on emission factors from road traffic, turned out to be wrong in reality. Like in many other European countries, non-compliance with the 2010 NEC as set in 1999 was partly not caused by failed national mitigation policies, but by changes beyond the control of, and unforeseen by, the individual Party or Member State.

In order to differentiate such changes from policy failures in the responsibility of the individual Parties to the Gothenburg Protocol, a procedure (Inventory Adjustment) allowing the adjustment of emissions resulting from new emission categories, changes in estimation methodologies, emission factors etc. provided within the EMEP/EEA Guidebook, or other effects beyond national control with respect to complying to emission reduction obligations (EB, 2012a & c) ^{2), 3)} was agreed. This procedure is applicable also for existing NECs (EB, 2012b) ⁴⁾.

With respect to road transport, such an unforeseeable effect was the partial failure of several so-called “Euro norms” set on the EU level to reduce emissions from road vehicles. In this report, Germany presents an estimate of the NO_x emissions resulting from the partial failure of the mitigation policy reflected by the Euro norms, and lays out the calculations leading to these estimates.

REASONS FOR MISSING THE GOTHENBURG CEILINGS

The TREMOD methodology applied for estimating emissions from road transportation in Germany has changed over time. These changes include updates of emission factors (EF) for various pollutants and other changes such as an extension of vehicle classification (and thus inclusion of emission factors associated with these new vehicle sub-categories) to improve the estimation's accuracy.

The main changes occurred for the emission factors and for the Heavy Duty Vehicles (HDV) fleet structure. This last point led to changes in emissions because of the reallocation of activities (consumption/traffic) between the sub-categories of vehicles.

For the formalism of the adjustments, it is difficult to flag whether the modifications for road transport are due to “methodological changes” or due to “changes of emission factor”. Therefore, only the term “change of methodology” will be used (even if at the NFR reporting level this may seem like a simple change in EFs).

So far as road transport is concerned, the inability to attain the emission ceiling is most likely to have been affected by a combination of technological changes within the fleet (which of course made their way into the several versions of TREMOD) combined with greater than originally expected dieselisation of the fleet.

ANALYSING THE PROBLEM: THE EUROPEAN PERSPECTIVE BASED ON COPERT

Already in 2011, these effects were demonstrated by Ntziachristos and Papageorgiou (2011) ⁵⁾. Here, the impacts of changing model versions and activity data in the context of meeting the EU NEC Directive ceiling commitments were examined for four European countries including Germany. Unfortunately, this comparison study was carried out within a COPERT environment. Therefore, the results gained cannot be transferred to the German TREMOD environment on a one-to-one level but nonetheless allow a highly illustrative insight in the reasons for not meeting the set ceiling. The study modeled fuel consumption and NO_x emissions for four selected countries (Germany, France, Netherlands and Belgium) and found higher NO_x emissions were estimated for the road transport sector than originally modelled by the RAINS model of IIASA (which underpinned the setting of 2010 ceilings). For Germany, this study shows that with the same activity data set (LIFE+

EC4MACS data from Amann et al. (2010)), NO_x, emissions estimated with COPERT II vs. COPERT 4 (v8.0) increase from 410 kt to 518 kt due to methodological changes, a difference of 282 kt. An additional consideration of changes in AD would lead to 620 kt of NO_x. However, as changes in AD are no valid adjustment reason, the latter value is for information only.

This was mainly due to: * NO_x, emission factors updated in COPERT 4 that did not follow the reductions as set by the emission standards for diesel passenger cars; * important part of diesel fuel consumption in the total fuel consumption of the road traffic.

The results of this study showed that it is the combination of different parameters which might affect the ability (to different extents) of a Party to attain the emission ceilings. In other words, the exceeding of NO_x, ceilings for road transport is due to:

Changes in methodology and emission factors

As these technologically driven changes (as reflected in the evolution of the different so-called Euro norms) lie outside the country's responsibility, current methodology and EFs have to be adjusted in a way to allow the comparison of the actual inventory and the Gothenburg ceilings.

Changes in the activity data

As the development of mileage driven and fuels used within a country (Germany: stronger dieselisation then originally expected) is of the country's responsibility, this effect has to be excluded from any adjustment estimation.

IN-COUNTRY ANALYSIS: THE TREMOD PERSPECTIVE

INITIAL ASSUMPTION

In order to estimate the effect of NO_x, emissions resulting from the failure of the so-called Euro norms, the following procedure has been agreed by expert review teams in the last two years:

proposed amount of adjustable emissions = current AD x current EF - current AD x original EF = current AD x (current EF - original EF) = current EM - "artificial" current EM¹

¹ "artificial" current emissions = virtual current emissions assuming no changes in emission factors

$$EM_{\text{adjustment}} = AD_{\text{current}} * EF_{\text{current}} - AD_{\text{current}} * EF_{\text{original}} = AD_{\text{current}} * (EF_{\text{current}} - EF_{\text{original}}) = EM_{\text{current}} - EM_{\text{current-artificial}}$$

with * **EM_{adjustment}**, = amount of emissions to be subtracted from National Totals * **AD_{current}**, = AD from latest TREMOD version as used for current submission * **EF_{current}**, = EF from latest TREMOD version as used for current submission * **EF_{original}**, = EF from TREMOD version used at the time NEC ceilings were set (here: TREMOD 3.1) * **EM_{current}**, = EM estimated from AD and EF from latest TREMOD version = EM reported for NFR 1.A.3.b with latest submission * **EM_{current-artificial}**, = EM estimated from AD from latest TREMOD version and EF from TREMOD version used at the time NEC ceilings were set (here: TREMOD 3.1)

APPLYING THE ORIGINAL METHODOLOGY

FRAMEWORK INFORMATION

The methodology used for estimating Germany's exhaust emissions from road transport when determining emissions ceilings of the Gothenburg Protocol (1999), was the second version of the EMEP/CORINAIR guidebook corresponding to COPERT II software. This method proposed NO_x, emission factors for

- passenger cars (PC): up to Euro 1
- light commercial vehicles (LCV2): up to Euro 1
- heavy duty vehicles (HDV): pre-EURO I only (conventional)

Back then, without better knowledge, the emission factors for the most recent standards were derived by directly applying the expected reductions in emission standards.

However, as Germany does not use COPERT for compiling its road transport emissions inventory but a national model called

TREMODO, the following comparison has to be carried out between the oldest version of TREMOD still available and the version as applied for the current inventory submission (2020).

Unfortunately, the oldest TREMOD version available for such comparison is TREMOD 3.1 from 2002⁶⁾, including the following set of NO_x, emission factors:

- passenger cars (PC): up to Euro 4
- light commercial vehicles (LCV): up to Euro 4
- heavy duty vehicles (HDV) only up to EURO V

However, as this version includes the technological development since 1999 (when the ceilings were set based on COPERT II), the results from this analysis and the adjustment proposal based upon these results are likely to slightly underestimate the effect of technological changes since 1999 and must therefore be considered conservative.

THE COMPARISON

Application of the original NO_x, methodology to the current road transport background activity data

The *basic activity data* (such as over-all fuel sold and traffic mileages by vehicle type, by fuel or by Euro regulation) implemented in TREMOD 3.1 differ significantly from those of the current TREMOD version especially for the more recent years as of 2005. In addition, *specific activity data* (such as fuel consumptions per vehicle type, per fuel or per Euro regulation) strongly depend on the TREMOD version.

Within this report, Germany re-estimates the NO_x, emission within the TREMOD 3.1 model. To isolate the requested information, the original TREMOD 3.1 activity data was combined with emission factors from both TREMOD 3.1 and the currently used TREMOD 6.02 (Knörr et al., 2019a)⁷⁾.

Description of the updated methodology used

The updated methodology, used in 2019 (for NFR submission 2021) and implemented in version 6.12 of the TREMOD software, considers emission factors of

- passenger cars (PC) up to Euro 6d
- light commercial vehicles (LCV) up to Euro 6d
- heavy duty vehicles (HDV) up to EURO VI

and

- motorized two-wheelers (M2W) up to Euro 4

Comparison of emission estimates made using the original and updated methodologies

The values of NO_x, emissions presented in the table below are estimated with:

- TREMOD 3.1 model equations as initial methodology

and ,

- TREMOD 6.12 equations as methodology applied for NEC submission 2021.

The activity data applied to initial (here: oldest available) and most recent methodology, are those of the latest inventory provided with NEC submission 2021.

Table 1: Resulting adjustment proposal 2020

for year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
proposed adjustment										

The following screenshots show the TREMOD 3.1 / TREMOD 6.12 implementation comparisons per vehicle type/fuel/Euro regulation.

Activity Data

* **current:** from TREMOD 6.12, as reported with the latest inventory submission

* **adjusted:** has to be similar to **current** AD!

* **difference:** as only recent AD are to be used for adjustment estimations, this value must be zero!

Implied Emission Factor

* **current:** representing the ratio of current emissions and current AD

* **adjusted:** representing the ratio of adjusted emissions and current AD

* **difference:** shows percentual difference

NO_x, Emissions

* **current:** from TREMOD 6.12, as reported with the latest inventory submission

* **adjusted:** estimated based on TREMOD 3.1 methodology and TREMOD 6.12 AD

* **adjustment:** adjusted emissions minus current emissions

* **difference:** percentual difference between current and adjusted emissions

Adjustment overview for years 2010 to 2019

NER Code	Fuel	Year	Activity Data			Implied Emission Factor			NO _x Emissions			
			current	adjusted	difference	current	adjusted	difference	current	adjusted	adjustment	difference
			in [TJ]		in [%]	in [kg/TJ]		in [%]	in [kg]			in [%]
1.A.3.b.i	gasoline		795.957	795.957	0%	97.55	94.99	-13%	77.644.842	67.959.906	9.683.935	-13%
1.A.3.b.i	diesel oil		529.390	529.390	0%	429.45	160.51	-63%	227.341.056	84.370.461	142.970.635	-63%
1.A.3.b.ii	gasoline		6.325	6.325	0%	255.87	214.75	-16%	1.618.432	1.358.328	260.104	-16%
1.A.3.b.ii	diesel oil		113.450	113.450	0%	476.34	134.96	-72%	54.040.533	15.311.584	38.728.949	-72%
1.A.3.b.iii	diesel oil		46.844	46.844	0%	623.00	482.55	-23%	29.931.266	23.183.732	6.747.534	-23%
1.A.3.b.iii	diesel oil		566.741	566.741	0%	446.67	271.83	-39%	253.148.243	154.056.160	99.092.083	-39%
1.A.3.b.iv	gasoline		19.712	19.712	0%	113.68	168.43	48%	2.240.749	3.320.034	-1.079.285	48%
1.A.3.b TOTAL		2010	2.079.608	2.079.608	0%			0%	645.965.162	349.851.206	296.113.956	-46%
1.A.3.b.i	gasoline		794.688	794.688	0%	92.09	81.61	-11%	73.185.851	64.351.951	8.833.900	-11%
1.A.3.b.i	diesel oil		553.564	553.564	0%	434.12	159.22	-63%	248.313.791	88.138.959	160.174.832	-63%
1.A.3.b.ii	gasoline		6.118	6.118	0%	229.35	198.57	-13%	1.403.081	1.214.776	188.305	-13%
1.A.3.b.ii	diesel oil		115.967	115.967	0%	481.55	126.92	-74%	55.844.518	14.718.142	41.126.376	-74%
1.A.3.b.iii	diesel oil		47.365	47.365	0%	592.65	448.99	-24%	28.071.221	21.286.323	6.884.898	-24%
1.A.3.b.iii	diesel oil		563.891	563.891	0%	419.38	244.97	-40%	231.410.271	138.136.342	93.273.929	-40%
1.A.3.b.iv	gasoline		19.289	19.289	0%	119.79	171.60	54%	2.137.662	3.299.162	-1.162.160	54%
1.A.3.b TOTAL		2011	2.100.883	2.100.883	0%			0%	632.365.736	331.625.655	300.740.081	-48%
1.A.3.b.i	gasoline		750.957	750.957	0%	85.73	78.00	-9%	64.379.994	58.577.229	5.802.765	-9%
1.A.3.b.i	diesel oil		555.245	555.245	0%	435.96	158.66	-64%	242.062.902	88.096.699	153.966.203	-64%
1.A.3.b.ii	gasoline		5.657	5.657	0%	218.93	193.15	-12%	1.238.520	1.092.662	145.859	-12%
1.A.3.b.ii	diesel oil		114.350	114.350	0%	481.91	128.17	-75%	55.106.382	13.741.354	41.365.028	-75%
1.A.3.b.iii	diesel oil		50.902	50.902	0%	533.22	384.33	-28%	27.141.913	19.563.208	7.578.704	-28%
1.A.3.b.iii	diesel oil		589.585	589.585	0%	381.33	224.00	-41%	224.829.180	132.064.753	92.764.428	-41%
1.A.3.b.iv	gasoline		18.268	18.268	0%	107.43	173.28	61%	1.962.546	3.165.439	-1.202.893	61%
1.A.3.b TOTAL		2012	2.084.964	2.084.964	0%			0%	616.721.438	316.391.343	300.420.094	-49%
1.A.3.b.i	gasoline		749.114	749.114	0%	80.35	74.85	-7%	60.190.007	56.071.797	4.118.211	-7%
1.A.3.b.i	diesel oil		589.131	589.131	0%	437.14	158.71	-64%	257.533.728	93.499.010	164.034.718	-64%
1.A.3.b.ii	gasoline		5.578	5.578	0%	202.80	184.07	-9%	1.131.209	1.026.727	104.482	-9%
1.A.3.b.ii	diesel oil		116.777	116.777	0%	489.60	114.93	-76%	57.003.533	13.690.488	43.333.045	-76%
1.A.3.b.iii	diesel oil		81.716	81.716	0%	509.54	369.96	-29%	26.350.969	18.420.843	7.930.126	-29%
1.A.3.b.iii	diesel oil		600.139	600.139	0%	353.06	287.93	-19%	211.887.531	124.788.459	87.099.072	-41%
1.A.3.b.iv	gasoline		18.229	18.229	0%	194.34	175.38	-9%	1.902.668	3.197.038	-1.294.371	68%
1.A.3.b TOTAL		2013	2.132.843	2.132.843	0%			0%	616.078.663	316.854.371	300.224.292	-50%
1.A.3.b.i	gasoline		752.526	752.526	0%	75.03	73.09	-3%	57.215.533	54.988.921	2.216.612	-4%
1.A.3.b.i	diesel oil		626.845	626.845	0%	435.87	159.12	-63%	272.876.061	99.613.892	173.262.169	-63%
1.A.3.b.ii	gasoline		5.845	5.845	0%	190.34	176.49	-7%	1.112.584	1.031.612	80.972	-7%
1.A.3.b.ii	diesel oil		128.578	128.578	0%	475.56	110.96	-77%	61.146.575	14.267.237	46.879.338	-77%
1.A.3.b.iii	diesel oil		45.143	45.143	0%	468.37	339.99	-27%	23.017.116	16.708.234	6.308.881	-27%
1.A.3.b.iii	diesel oil		672.754	672.754	0%	314.05	196.05	-38%	179.874.133	112.285.582	67.588.551	-38%
1.A.3.b.iv	gasoline		18.673	18.673	0%	100.59	179.24	78%	1.878.294	3.346.794	-1.468.499	78%
1.A.3.b TOTAL		2014	2.153.563	2.153.563	0%			0%	597.120.297	302.252.271	294.868.025	-49%
1.A.3.b.i	gasoline		715.156	715.156	0%	74.38	71.73	-4%	53.190.787	51.300.983	1.889.805	-4%
1.A.3.b.i	diesel oil		645.555	645.555	0%	426.19	159.80	-63%	275.130.233	103.163.501	171.966.732	-63%
1.A.3.b.ii	gasoline		5.793	5.793	0%	187.12	172.80	-8%	1.083.927	1.000.999	82.928	-8%
1.A.3.b.ii	diesel oil		135.396	135.396	0%	469.35	187.96	-77%	63.505.443	14.607.490	48.897.953	-77%
1.A.3.b.iii	diesel oil		52.287	52.287	0%	458.96	327.99	-29%	23.997.817	17.149.448	6.848.370	-29%
1.A.3.b.iii	diesel oil		589.411	589.411	0%	266.69	187.51	-30%	157.189.675	116.529.703	40.659.973	-30%
1.A.3.b.iv	gasoline		18.459	18.459	0%	99.32	180.65	82%	1.833.362	3.334.472	-1.501.090	82%
1.A.3.b TOTAL		2015	2.161.576	2.161.576	0%			0%	575.931.265	301.877.596	274.053.670	-48%
1.A.3.b.i	gasoline		715.272	715.272	0%	79.93	76.65	-4%	50.736.967	50.535.049	201.918	0%
1.A.3.b.i	diesel oil		675.119	675.119	0%	410.36	160.76	-61%	277.041.660	108.535.230	168.506.430	-61%
1.A.3.b.ii	gasoline		5.926	5.926	0%	189.27	171.06	-9%	1.068.292	1.013.678	54.614	-5%
1.A.3.b.ii	diesel oil		144.068	144.068	0%	456.12	185.62	-77%	65.712.732	15.216.007	50.496.726	-77%
1.A.3.b.iii	diesel oil		54.157	54.157	0%	424.73	388.24	-9%	23.002.109	16.693.117	6.308.992	-27%
1.A.3.b.iii	diesel oil		594.013	594.013	0%	226.31	180.97	-20%	134.431.899	107.496.262	26.935.637	-20%
1.A.3.b.iv	gasoline		18.785	18.785	0%	96.14	181.66	89%	1.805.897	3.412.476	-1.606.579	89%
1.A.3.b TOTAL		2016	2.207.339	2.207.339	0%			0%	553.799.556	302.901.820	250.897.736	-45%
1.A.3.b.i	gasoline		724.571	724.571	0%	67.66	69.88	3%	49.026.074	50.634.714	-1.608.640	3%
1.A.3.b.i	diesel oil		696.592	696.592	0%	399.65	161.95	-59%	272.126.091	112.810.721	159.315.370	-59%
1.A.3.b.ii	gasoline		6.186	6.186	0%	171.15	167.18	-2%	1.058.799	1.034.211	24.588	-2%
1.A.3.b.ii	diesel oil		153.294	153.294	0%	424.66	183.89	-76%	66.093.930	15.925.216	50.168.714	-76%
1.A.3.b.iii	diesel oil		53.382	53.382	0%	378.80	286.71	-23%	19.793.501	15.304.828	4.488.673	-23%
1.A.3.b.iii	diesel oil		596.263	596.263	0%	195.02	175.92	-9%	116.671.141	105.248.508	11.422.633	-10%
1.A.3.b.iv	gasoline		19.160	19.160	0%	92.83	183.39	98%	1.778.674	3.513.787	-1.735.114	98%
1.A.3.b TOTAL		2017	2.251.437	2.251.437	0%			0%	525.549.410	304.469.906	221.079.424	-42%
1.A.3.b.i	gasoline		699.027	699.027	0%	64.42	68.36	6%	45.032.996	47.786.817	-2.753.820	6%
1.A.3.b.i	diesel oil		666.074	666.074	0%	371.66	163.30	-56%	247.695.063	108.768.604	138.926.459	-56%
1.A.3.b.ii	gasoline		6.315	6.315	0%	158.22	168.11	1%	999.199	1.011.138	-11.939	1%
1.A.3.b.ii	diesel oil		154.259	154.259	0%	384.71	182.69	-73%	59.344.525	15.840.310	43.504.215	-73%
1.A.3.b.iii	diesel oil		51.634	51.634	0%	399.75	263.53	-35%	15.993.526	13.607.106	2.386.420	-15%
1.A.3.b.iii	diesel oil		585.186	585.186	0%	171.18	172.10	1%	188.173.337	188.710.869	-537.532	1%
1.A.3.b.iv	gasoline		18.497	18.497	0%	89.66	184.61	106%	1.658.568	3.414.767	-1.756.209	106%
1.A.3.b TOTAL		2018	2.180.993	2.180.993	0%			0%	478.758.206	291.139.612	179.618.593	-38%
1.A.3.b.i	gasoline		704.691	704.691	0%	62.30	68.45	10%	43.901.941	48.238.025	-4.336.084	10%
1.A.3.b.i	diesel oil		683.841	683.841	0%	345.81	165.07	-52%	229.566.088	109.582.982	119.983.106	-52%
1.A.3.b.ii	gasoline		6.683	6.683	0%	146.08	153.25	5%	976.219	1.024.160	-47.941	5%
1.A.3.b.ii	diesel oil		159.183	159.183	0%	347.42	181.90	-71%	55.303.335	16.221.445	39.081.890	-71%
1.A.3.b.iii	diesel oil		52.939	52.939	0%	274.41	247.81	-9%	14.527.012	13.118.578	1.408.434	-10%
1.A.3.b.iii	diesel oil		595.913	595.913	0%	153.35	169.17	10%	91.380.700	100.809.376	-9.428.676	10%
1.A.3.b.iv	gasoline		18.750	18.750	0%	86.05	186.83	117%	1.613.450	3.502.941	-1.889.491	117%
1.A.3.b TOTAL		2019	2.202.000	2.202.000	0%			0%	437.268.744	292.497.497	144.771.248	-33%

Adjustment details for 2020												
NFR Code	Fuel	Activity Data			Implied Emission Factor			NO _x Emissions				
		current	adjusted	difference	current	adjusted	difference	current	adjusted	adjustment	difference	
		in [t]	in [t]	in [%]	in [g/t]	in [g/t]	in [%]	in [kg]	in [kg]		in [%]	
1.A.3.a.i. Passenger Cars	Gasoline	pre-Cars	13.686	13.686	0%	584.75	514.25	-12%	7.955.060	6.986.917	-958.143	-12%
		Car 1	36.641	36.641	0%	338.50	297.71	-12%	25.915.925	20.189.262	-3.716.663	-14%
		Car 2	96.425	96.425	0%	172.95	135.63	-22%	16.580.020	13.020.026	-3.559.995	-22%
		Car 3	133.139	133.139	0%	58.51	70.18	20%	7.790.384	9.343.433	1.553.049	20%
		Car 4	444.991	444.991	0%	42.27	42.19	0%	18.911.389	18.773.529	-137.859	0%
		Car 5	31.234	31.234	0%	18.61	42.19	127%	581.142	1.317.737	736.595	127%
	Gasoline total	795.957	795.957	0%	92.55	84.99	-10%	37.644.842	31.650.986	-5.993.855	-16%	
	Diesel Oil	pre-Cars	1.915	1.915	0%	318.13	264.56	-15%	683.760	587.256	-96.505	-14%
		Car 1	10.338	10.338	0%	296.82	246.17	-17%	3.066.428	2.741.387	-325.121	-11%
		Car 2	50.088	50.088	0%	406.90	278.19	-40%	20.372.795	10.974.230	-9.398.564	-46%
		Car 3	134.025	134.025	0%	542.94	170.54	-69%	72.645.173	23.929.276	-48.715.897	-67%
		Car 4	279.154	279.154	0%	304.37	140.58	-53%	187.299.180	39.243.811	-148.055.369	-80%
		Car 5	53.547	53.547	0%	434.70	140.58	-68%	23.275.735	7.527.796	-15.747.939	-68%
	Diesel oil total	334	334	0%	257.62	140.58	-45%	85.044	46.953	-38.091	-45%	
	LDVs Total	529.380	529.380	0%	429.45	160.55	-63%	227.347.096	84.970.461	-142.376.635	-63%	
	Flx Total	1,325,337	1,325,337	0%	238.12	155.14	-35%	364,985,938	152,621,367	-212,364,570	-58%	
1.A.3.b.i. Light Duty Vehicles (LDVs)	Gasoline	pre-Cars	1.249	1.249	0%	627.99	545.95	-13%	183.760	157.255	-26.505	-14%
		Car 1	36.541	36.541	0%	361.95	297.29	-18%	389.969	186.020	-203.950	-55%
		Car 2	1.393	1.393	0%	265.74	184.41	-30%	388.548	256.917	-131.631	-34%
		Car 3	856	856	0%	82.47	30.61	-63%	70.621	17.625	-52.996	-75%
		Car 4	2.420	2.420	0%	36.32	44.50	24%	87.887	188.679	26.772	24%
		Car 5	49	49	0%	15.34	44.50	187%	758	2.238	1.480	187%
	Gasoline total	6.345	6.345	0%	255.87	254.75	-0%	0	0	0	0%	
	Diesel Oil	pre-Cars	4.876	4.876	0%	425.99	385.79	-9%	2.077.142	1.495.993	-581.239	-28%
		Car 1	9.989	9.989	0%	399.59	276.24	-30%	2.389.095	1.289.636	-1.099.459	-46%
		Car 2	13.126	13.126	0%	336.76	153.18	-54%	4.420.260	2.534.731	-1.885.529	-43%
		Car 3	33.249	33.249	0%	531.91	150.58	-72%	17.655.883	5.085.760	-12.570.123	-71%
		Car 4	54.581	54.581	0%	491.42	80.69	-84%	25.021.036	4.940.722	-20.080.314	-78%
		Car 5	1.629	1.629	0%	427.56	80.69	-81%	696.296	144.434	-551.772	-80%
	Diesel oil total	113.450	113.450	0%	416.34	134.94	-68%	54.043.533	15.351.584	-38.691.949	-72%	
	LDVs Total	175.775	175.775	0%	464.70	139.18	-70%	55.658.966	16.689.913	-38.969.053	-70%	
	1.A.3.b.ii. Heavy Duty Vehicles (HDVs)	Gasoline	pre-Cars	3.382	3.382	0%	1096.25	1028.78	-6%	3.674.067	3.452.644	-221.423
Car 1			2.826	2.826	0%	749.41	732.14	-2%	2.117.871	2.125.595	7.723	0%
Car 2			10.152	10.152	0%	801.96	643.47	-20%	8.140.119	6.532.213	-1.607.906	-20%
Car 3			15.090	15.090	0%	633.22	437.25	-30%	10.065.776	7.269.299	-2.796.477	-28%
Car 4			5.461	5.461	0%	448.63	351.65	-21%	2.650.016	1.921.527	-728.489	-28%
Car 5			10.326	10.326	0%	337.28	182.33	-46%	3.882.417	1.882.544	-1.999.873	-51%
Car 6			0	0	0%	0	0	0%	0	0	0	0%
Buses Total			48.044	48.044	0%	623.80	482.55	-23%	29.931.266	23.185.732	-6.745.534	-23%
Diesel Oil		pre-Cars	10.185	10.185	0%	1040.16	787.37	-24%	10.510.623	7.754.136	-2.756.487	-26%
		Car 1	5.677	5.677	0%	758.59	575.55	-24%	4.261.383	3.267.681	-993.702	-23%
		Car 2	38.558	38.558	0%	817.62	524.79	-35%	31.525.526	20.234.619	-11.290.907	-36%
		Car 3	169.023	169.023	0%	636.28	374.48	-41%	161.136.182	99.617.271	-61.518.911	-38%
		Car 4	69.636	69.636	0%	368.34	280.62	-24%	27.183.867	20.146.636	-7.037.231	-26%
		Car 5	283.934	283.934	0%	276.62	151.65	-45%	78.643.643	43.115.897	-35.527.746	-45%
		Car 6	0	0	0%	0	0	0%	0	0	0	0%
		Trucks Total	566.741	566.741	0%	446.67	271.83	-39%	293.148.243	154.696.160	-138.452.083	-48%
Gasoline	pre-Cars	7.973	7.973	0%	122.80	149.18	22%	972.721	1.189.393	216.672	22%	
	Car 1	5.231	5.231	0%	123.77	165.74	34%	647.479	887.029	239.550	34%	
	Car 2	3.587	3.587	0%	141.16	194.21	38%	585.362	696.661	111.299	19%	
	Car 3	2.950	2.950	0%	38.11	184.21	381%	116.198	657.032	540.834	381%	
	Car 4	0	0	0%	0	0	0%	0	0	0	0%	
	Car 5	0	0	0%	0	0	0%	0	0	0	0%	
	LDVs Total	15.712	15.712	0%	113.68	168.43	48%	2.243.149	3.326.034	1.082.885	48%	
1.A.3.b. Road Transport	Total	2,879,688	2,879,688	0%	219.62	168.23	-26%	645,965,162	349,851,296	-296,113,866	-46%	

Adjustment details for 2021												
NFR Code	Fuel	Activity Data			Implied Emission Factor			NO _x Emissions				
		current	adjusted	difference	current	adjusted	difference	current	adjusted	adjustment	difference	
		in [T]	in [T]	in [%]	in [g/t]	in [g/t]	in [%]	in [kg]	in [kg]	in [kg]	in [%]	
1.A.3.a.i. Passenger Cars	Gasoline	pre-Cars	13.063	13.063	0%	592.96	534.68	-10%	7.720.235	6.979.435	-740.801	-10%
		Car 1	61.979	61.979	0%	347.86	340.16	-2%	21.560.430	18.884.961	-6.575.479	-31%
		Car 2	87.083	87.083	0%	178.38	136.58	-24%	15.620.983	11.883.782	-3.737.191	-24%
		Car 3	124.330	124.330	0%	61.94	71.52	16%	7.683.891	8.891.671	1.207.780	16%
		Car 4	442.185	442.185	0%	43.94	43.68	0%	19.384.914	19.376.439	-8.475	0%
		Car 5	66.057	66.057	0%	18.58	43.68	135%	1.227.381	2.085.636	1.658.255	135%
		Car 6	1	1	0%	25.06	43.68	69%	17	20	3	15%
		Gasoline total	794.688	794.688	0%	92.69	81.65	-12%	73.185.851	64.851.951	-8.333.900	-11%
	Diesel Oil	pre-Cars	1.711	1.711	0%	318.90	264.56	-16%	531.683	453.187	-78.496	-15%
		Car 1	8.426	8.426	0%	297.32	245.65	-18%	2.585.115	2.239.987	-345.119	-13%
		Car 2	42.514	42.514	0%	407.93	279.27	-32%	17.384.549	9.321.916	-8.062.633	-46%
		Car 3	121.429	121.429	0%	555.36	170.55	-69%	67.437.053	21.681.366	-45.755.687	-69%
		Car 4	264.943	264.943	0%	388.88	143.48	-63%	182.817.881	30.889.755	-151.928.126	-83%
		Car 5	113.047	113.047	0%	435.12	143.48	-67%	49.536.960	16.332.974	-33.203.986	-67%
		Car 6	695	695	0%	259.59	143.48	-45%	180.582	99.754	-80.828	-45%
		Diesel oil total	553.564	553.564	0%	434.12	159.92	-63%	249.713.791	88.138.959	-161.574.832	-63%
		Flx Total	1.348.252	1.348.252	0%	232.52	133.47	-51%	371.899.642	152.990.910	-218.908.732	-59%
	Gasoline	pre-Cars	1.084	1.084	0%	629.75	545.95	-13%	182.214	157.255	-24.959	-14%
		Car 1	283	283	0%	818.74	584.47	-29%	243.289	86.158	-157.132	-65%
		Car 2	1.184	1.184	0%	268.66	191.66	-29%	910.529	223.189	-687.340	-26%
		Car 3	783	783	0%	85.97	95.39	11%	67.320	74.782	7.461	11%
		Car 4	2.562	2.562	0%	37.38	46.51	24%	95.786	119.162	23.376	24%
		Car 5	241	241	0%	16.13	46.51	189%	3.882	11.190	7.308	189%
		Car 6	0	0	0%	15.33	46.51	283%	1	3	2	203%
Gasoline total	6.110	6.110	0%	229.35	186.57	-53%	1.481.081	1.243.716	-238.365	-16%		
Light Duty Vehicles (LDV)	pre-Cars	3.995	3.995	0%	425.39	398.79	-6%	1.689.280	1.225.662	-472.598	-28%	
	Car 1	4.787	4.787	0%	356.71	275.24	-23%	1.894.360	1.030.425	-863.935	-46%	
	Car 2	10.816	10.816	0%	336.90	193.23	-43%	3.644.582	2.091.083	-1.553.500	-43%	
	Car 3	28.925	28.925	0%	541.53	150.54	-72%	18.637.249	4.348.078	-14.289.171	-76%	
	Car 4	60.032	60.032	0%	402.82	89.26	-82%	39.079.914	5.420.811	-33.659.104	-86%	
	Car 5	6.609	6.609	0%	144.05	89.26	-40%	2.930.190	584.364	-2.345.826	-80%	
	Car 6	0	0	0%	161.21	89.26	-43%	14	6	-8	-47%	
	Diesel oil total	115.961	115.961	0%	485.55	126.92	-74%	55.844.588	15.718.142	-40.126.376	-74%	
LDVs Total	122.085	122.085	0%	488.92	130.93	-73%	127.447.999	19.932.898	-107.515.101	-86%		
1.A.3.a.ii. Heavy Duty Buses	pre-Cars	2.620	2.620	0%	1002.69	1019.18	6%	2.836.189	2.671.331	-164.778	-6%	
	Car 1	2.258	2.258	0%	752.91	711.45	-6%	1.699.781	1.696.297	-3.478	0%	
	Car 2	3.024	3.024	0%	854.35	653.36	-23%	2.281.125	1.537.559	-743.566	-33%	
	Car 3	16.887	16.887	0%	633.16	457.38	-28%	9.425.880	6.889.054	-2.536.827	-28%	
	Car 4	5.131	5.131	0%	448.88	351.81	-21%	2.303.338	1.881.274	-428.064	-21%	
	Car 5	13.396	13.396	0%	336.60	182.62	-46%	4.589.052	2.486.399	-2.092.653	-46%	
	Car 6	0	0	0%	0	0	0%	0	0	0	0%	
Buses Total	47.365	47.365	0%	592.65	448.99	-24%	28.071.221	21.896.323	-6.884.898	-24%		
1.A.3.a.iii. Heavy Duty Vehicle: Trucks & Lorries	pre-Cars	8.044	8.044	0%	1030.67	1033.88	0%	8.365.423	6.144.933	-2.210.491	-26%	
	Car 1	4.384	4.384	0%	758.16	574.04	-24%	3.280.422	2.535.327	-742.844	-23%	
	Car 2	29.277	29.277	0%	817.37	550.61	-33%	23.947.723	15.236.273	-8.711.459	-36%	
	Car 3	121.581	121.581	0%	636.16	436.56	-31%	77.271.520	45.310.423	-31.961.097	-41%	
	Car 4	68.430	68.430	0%	290.35	289.43	-0%	32.977.784	15.969.685	-6.468.019	-20%	
	Car 5	342.175	342.175	0%	278.20	152.63	-45%	96.589.479	52.019.687	-43.569.792	-45%	
	Car 6	0	0	0%	0	0	0%	0	0	0	0%	
Trucks Total	563.891	563.891	0%	418.38	244.97	-40%	215.470.271	138.136.342	-81.373.929	-40%		
1.A.3.b.iv. Motorised Two-Wheelers (MOW)	pre-Cars	7.389	7.389	0%	322.96	150.24	-53%	969.580	1.110.170	210.589	22%	
	Car 1	4.885	4.885	0%	134.72	108.26	-19%	599.299	880.547	299.248	35%	
	Car 2	3.544	3.544	0%	137.85	194.58	41%	488.552	688.693	201.851	41%	
	Car 3	3.560	3.560	0%	39.59	194.58	382%	160.553	680.634	520.080	382%	
	Car 4	0	0	0%	0	0	0%	0	0	0	0%	
	Car 5	0	0	0%	0	0	0%	0	0	0	0%	
	MOWs Total	19.289	19.289	0%	119.79	177.64	54%	2.137.082	3.299.162	1.162.190	54%	
1.A.3.b. Road Transport	Total	2.180.883	2.180.883	0%	305.90	157.85	-49%	632.363.736	321.625.655	-310.738.081	-49%	

Adjustment details for 2023												
NFR Code	Fuel	Activity Data			Implied Emission Factor			NO _x Emissions				
		current	adjusted	difference	current	adjusted	difference	current	adjusted	adjustment	difference	
		in [t]	in [t]	in [%]	in [g/t]	in [g/t]	in [%]	in [kg]	in [kg]	in [kg]	in [%]	
1.A.3.a.i. Passenger Cars	Gasoline	pre-Cars	11,581	11,581	0%	607.72	635.38	-52%	7,035,041	6,189,785	-836,256	-52%
		Car 1	47,487	47,487	0%	348.56	341.62	-31%	16,571,746	11,426,129	-5,145,617	-31%
		Car 2	72,781	72,781	0%	194.27	137.92	-29%	13,487,749	10,035,380	-3,372,369	-29%
		Car 3	189,443	189,443	0%	63.89	72.62	14%	6,927,963	7,875,172	947,209	14%
		Car 4	489,541	489,541	0%	45.39	45.13	-1%	18,541,881	18,436,736	-105,145	-1%
		Car 5	181,961	181,961	0%	18.61	45.13	142%	1,897,355	4,681,311	2,783,956	142%
		Car 6	282	282	0%	25.06	45.13	74%	7,339	12,736	5,399	74%
		Gasoline total	750,267	750,267	0%	85.73	78.88	-8%	64,379,964	58,577,229	-5,802,735	-9%
	Diesel Oil	pre-Cars	1,487	1,487	0%	311.98	284.56	-9%	463,963	383,872	-80,091	-9%
		Car 1	6,660	6,660	0%	297.79	246.44	-11%	1,980,364	1,771,787	-208,577	-11%
		Car 2	33,967	33,967	0%	406.82	279.27	-40%	13,987,432	7,445,646	-6,541,787	-40%
		Car 3	183,539	183,539	0%	564.82	176.63	-69%	58,389,037	18,434,837	-39,954,200	-69%
		Car 4	234,943	234,943	0%	398.41	146.46	-62%	91,724,190	34,488,997	-57,235,193	-62%
		Car 5	173,112	173,112	0%	434.89	146.46	-66%	75,284,364	25,353,375	-49,930,989	-66%
		Car 6	1,557	1,557	0%	219.84	146.46	-44%	484,664	220,086	-264,578	-44%
		Diesel oil total	555,245	555,245	0%	415.96	158.66	-64%	242,962,982	88,096,639	-154,866,343	-64%
		FCs Total	1,305,262	1,305,262	0%	234.61	115.29	-50%	386,442,896	146,673,867	-239,769,029	-50%
	Gasoline	pre-Cars	962	962	0%	632.36	645.95	2%	687,779	821,160	133,411	2%
		Car 1	232	232	0%	803.24	193.22	-86%	199,985	70,295	-129,691	-86%
		Car 2	989	989	0%	271.16	195.74	-28%	269,134	133,538	-135,596	-28%
		Car 3	835	835	0%	89.38	98.33	10%	14,623	82,092	7,469	10%
		Car 4	2,030	2,030	0%	38.49	47.58	24%	78,155	96,691	18,536	24%
		Car 5	610	610	0%	16.36	47.58	182%	9,941	29,011	19,069	182%
		Car 6	0	0	0%	15.37	47.58	210%	2	6	4	210%
		Gasoline total	5,657	5,657	0%	218.93	193.15	-12%	1,238,520	1,092,662	-145,858	-12%
	Diesel Oil	pre-Cars	3,281	3,281	0%	424.46	386.79	-9%	1,368,754	1,022,093	-346,661	-9%
		Car 1	3,666	3,666	0%	399.34	276.24	-40%	1,445,980	1,017,634	-428,346	-40%
		Car 2	8,479	8,479	0%	336.40	133.39	-49%	2,852,325	1,639,772	-1,212,553	-49%
		Car 3	23,785	23,785	0%	558.53	150.44	-73%	13,050,281	3,546,082	-9,504,199	-73%
		Car 4	59,485	59,485	0%	494.22	89.85	-82%	29,369,070	5,337,395	-24,031,675	-82%
		Car 5	15,964	15,964	0%	442.70	89.85	-80%	7,040,461	1,420,906	-5,619,555	-80%
		Car 6	1	1	0%	15.14	89.85	-81%	122	72	-50	-81%
		Diesel oil total	114,550	114,550	0%	485.91	126.17	-79%	55,186,382	13,741,354	-41,445,028	-79%
		LDNs Total	129,088	129,088	0%	489.51	123.61	-74%	56,344,903	14,834,656	-41,510,247	-74%
1.A.3.b.ii. Heavy Duty Vehicles Buses	Gasoline	pre-Cars	1,326	1,326	0%	1091.46	1919.46	4%	1,410,640	1,352,283	-58,357	-4%
		Car 1	1,245	1,245	0%	727.34	731.15	1%	1,017,476	1,017,184	-292	-1%
		Car 2	7,789	7,789	0%	703.46	643.34	-9%	5,085,091	4,597,478	-487,613	-9%
		Car 3	14,483	14,483	0%	629.94	437.61	-31%	9,073,197	6,089,744	-2,983,453	-31%
		Car 4	5,331	5,331	0%	468.10	361.86	-23%	2,642,179	1,675,777	-966,402	-23%
		Car 5	20,752	20,752	0%	347.84	182.99	-47%	7,219,563	3,787,467	-3,432,096	-47%
		Car 6	73	73	0%	64.52	182.99	236%	3,961	13,296	9,334	236%
		Buses Total	50,962	50,962	0%	533.22	384.33	-28%	27,141,913	19,565,288	-7,576,624	-28%
	Diesel Oil	pre-Cars	6,922	6,922	0%	1036.95	158.82	-21%	7,107,543	5,252,345	-1,855,198	-21%
		Car 1	3,630	3,630	0%	749.70	570.57	-24%	2,721,326	2,071,111	-650,215	-24%
		Car 2	23,577	23,577	0%	818.27	516.43	-37%	19,262,253	12,175,855	-7,086,398	-37%
		Car 3	96,736	96,736	0%	634.65	270.21	-42%	61,387,137	35,888,665	-25,498,472	-42%
		Car 4	69,550	69,550	0%	366.50	288.44	-21%	19,982,680	16,880,877	-3,101,723	-21%
		Car 5	485,981	485,981	0%	261.24	152.32	-40%	116,149,955	61,626,577	-54,523,378	-40%
		Car 6	2,380	2,380	0%	188.487	360.323	345%	188,487	360,323	171,836	345%
		Trucks Total	589,585	589,585	0%	385.33	224.69	-41%	224,829,180	132,064,153	-92,765,027	-41%
	Gasoline	pre-Cars	6,780	6,780	0%	122.76	151.03	23%	822,539	1,011,920	189,381	23%
		Car 1	4,386	4,386	0%	124.61	171.39	39%	536,615	738,050	201,435	39%
		Car 2	3,287	3,287	0%	136.22	184.56	45%	445,087	636,853	191,766	45%
		Car 3	3,984	3,984	0%	39.66	184.56	382%	19,386	778,616	759,230	382%
		Car 4	0	0	0%	0	0	0%	0	0	0	0%
		Car 5	0	0	0%	0	0	0%	0	0	0	0%
		LDNs Total	18,268	18,268	0%	107.43	173.28	61%	1,982,546	3,165,439	1,182,893	61%
		1.A.3.b. Road Transport	2,084,964	2,084,964	0%	295.79	151.71	-49%	616,721,438	396,381,343	-220,340,094	-49%

Adjustment details for 2023												
NFR Code	Fuel	Activity Data			Implied Emission Factor			NO _x Emissions				
		current	adjusted	difference	current	adjusted	difference	current	adjusted	adjustment	difference	
		in [t]	in [t]	in [%]	in [g/t]	in [g/t]	in [%]	in [kg]	in [kg]	in [kg]	in [%]	
1.A.3.a.i. Passenger Cars	Gasoline	pre-Cars	11,680	11,680	0%	619.27	549.35	-55%	7,011,541	5,967,452	-1,044,089	-55%
		Car 1	37,743	37,743	0%	353.78	341.68	-32%	13,362,986	9,129,436	-4,233,550	-32%
		Car 2	62,680	62,680	0%	188.93	139.33	-27%	11,889,922	8,722,244	-3,167,678	-27%
		Car 3	97,782	97,782	0%	66.38	73.19	10%	6,481,618	7,156,920	675,303	10%
		Car 4	397,911	397,911	0%	47.22	46.52	-1%	18,790,345	18,589,937	-200,407	-1%
		Car 5	138,063	138,063	0%	18.60	46.52	150%	2,583,150	6,439,691	3,856,541	150%
	Car 6	2,714	2,714	0%	25.99	46.52	79%	70,526	126,237	55,711	79%	
	Gasoline total	748,116	748,116	0%	88.35	74.85	-16%	69,090,687	56,671,737	-12,418,950	-18%	
	Diesel Oil	pre-Cars	1,389	1,389	0%	312.32	284.56	-9%	433,081	368,136	-64,945	-9%
		Car 1	5,626	5,626	0%	298.42	246.79	-11%	1,678,472	1,640,688	-37,784	-11%
		Car 2	28,437	28,437	0%	406.84	279.91	-40%	11,563,522	6,253,531	-5,309,991	-40%
		Car 3	92,795	92,795	0%	574.33	176.67	-69%	53,284,956	16,579,373	-36,705,583	-69%
		Car 4	222,583	222,583	0%	393.55	149.27	-62%	87,598,471	33,225,566	-54,372,905	-62%
		Car 5	233,766	233,766	0%	435.42	149.27	-66%	101,787,275	34,894,768	-66,892,507	-66%
	Car 6	4,536	4,536	0%	219.53	149.27	-42%	1,177,151	677,045	-500,106	-42%	
	Diesel oil total	589,131	589,131	0%	437.14	158.71	-64%	257,533,128	83,899,619	-173,633,509	-64%	
FCs Total	1,338,245	1,338,245	0%	237.40	111.77	-53%	317,723,735	146,571,356	-171,152,379	-53%		
Gasoline	pre-Cars	987	987	0%	633.81	645.95	2%	1,683,320	1,751,293	67,973	2%	
	Car 1	194	194	0%	803.50	386.27	-86%	187,281	59,328	-127,953	-86%	
	Car 2	836	836	0%	274.42	291.18	21%	229,520	188,285	-41,235	-21%	
	Car 3	784	784	0%	52.66	191.79	10%	72,691	79,780	7,089	10%	
	Car 4	1,089	1,089	0%	43.70	48.89	20%	77,284	82,833	5,549	20%	
	Car 5	966	966	0%	16.67	48.89	183%	16,187	47,268	31,081	183%	
	Car 6	1	1	0%	17.66	48.89	170%	26	72	46	170%	
	Gasoline total	5,578	5,578	0%	262.86	184.67	-3%	1,131,299	1,096,727	-34,572	-3%	
1.A.3.a.ii. Heavy Duty Vehicles (LDV)	Diesel Oil	pre-Cars	2,744	2,744	0%	424.37	386.79	-9%	1,168,757	944,928	-223,829	-9%
		Car 1	2,945	2,945	0%	399.75	276.25	-40%	1,166,782	834,566	-332,216	-40%
		Car 2	6,982	6,982	0%	336.92	133.39	-49%	2,340,147	1,350,674	-989,473	-49%
		Car 3	20,421	20,421	0%	568.12	150.38	-74%	11,437,989	3,670,821	-7,767,168	-74%
		Car 4	55,087	55,087	0%	69.72	90.45	40%	27,776,440	5,040,454	-22,735,986	-40%
		Car 5	29,024	29,024	0%	441.97	90.45	-80%	13,181,325	2,687,964	-10,493,361	-80%
	Car 6	41	41	0%	161.20	90.45	-40%	6,160	3,688	-2,472	-40%	
	Diesel oil total	118,777	118,777	0%	488.60	154.83	-76%	57,083,513	13,656,480	-43,427,033	-76%	
	LDVs Total	124,934	124,934	0%	488.54	156.83	-69%	58,214,142	14,677,219	-43,537,923	-69%	
	Diesel Oil	pre-Cars	1,172	1,172	0%	1098.69	1019.23	-4%	1,249,028	1,134,143	-114,885	-4%
Car 1		1,054	1,054	0%	727.68	759.39	2%	786,020	791,181	24,161	2%	
Car 2		6,884	6,884	0%	764.87	643.48	-16%	3,324,968	4,379,371	1,054,403	16%	
Car 3		11,187	11,187	0%	638.43	473.65	-21%	6,262,880	5,998,226	-2,654,757	-21%	
Car 4		4,946	4,946	0%	460.55	351.71	-24%	2,278,051	1,739,736	-538,314	-24%	
Car 5		26,096	26,096	0%	368.98	183.48	-40%	8,435,583	4,240,743	-4,194,761	-40%	
Car 6		537	537	0%	44.76	183.48	170%	24,047	86,672	74,625	170%	
Diesel total		51,716	51,716	0%	508.54	340.06	-29%	25,369,989	16,620,843	-7,749,146	-29%	
1.A.3.a.iii. Heavy Duty Vehicle: Trucks & Lorries	Diesel Oil	pre-Cars	5,983	5,983	0%	1030.72	737.35	-29%	6,072,170	4,322,888	-1,749,303	-29%
		Car 1	2,945	2,945	0%	748.27	583.27	-24%	2,176,946	1,650,960	-525,987	-24%
		Car 2	16,888	16,888	0%	818.17	510.45	-37%	10,080,881	6,949,975	-3,130,906	-37%
		Car 3	45,517	45,517	0%	633.52	387.73	-39%	47,587,448	27,881,577	-19,705,871	-39%
		Car 4	42,781	42,781	0%	356.90	287.27	-27%	16,936,867	12,289,770	-4,647,097	-27%
		Car 5	436,980	436,980	0%	261.70	152.65	-40%	123,181,324	66,796,436	-56,384,887	-40%
	Car 6	18,020	18,020	0%	913.87	152.65	-281%	913,082	2,750,630	1,837,548	281%	
	Trucks Total	680,139	680,139	0%	353.96	287.33	-41%	218,587,531	124,188,449	-94,399,082	-41%	
	Diesel Oil	pre-Cars	6,352	6,352	0%	123.97	151.79	23%	781,730	964,170	182,443	23%
		Car 1	4,013	4,013	0%	125.91	173.15	39%	582,073	634,880	52,807	39%
Car 2		3,362	3,362	0%	132.24	158.58	40%	436,688	648,894	212,206	40%	
Car 3		4,562	4,562	0%	39.81	158.58	281%	181,610	882,175	716,565	281%	
Car 4	0	0	0%	0	0	0%	0	0	0	0%		
Car 5	0	0	0%	0	0	0%	0	0	0	0%		
MWVs Total	18,229	18,229	0%	104.34	175.38	68%	1,962,088	3,197,038	1,234,951	68%		
1.A.3.b. Road Transport	Total	2,132,083	2,132,083	0%	268.88	182.57	-56%	616,073,963	310,854,371	-305,224,592	-56%	

Adjustment details for 2024												
NFR Code	Fuel	Activity Data			Implied Emission Factor			NO _x Emissions				
		current	adjusted	difference	current	adjusted	difference	current	adjusted	adjustment	difference	
		in [t]	in [t]	in [%]	in [g/t]	in [g/t]	in [%]	in [kg]	in [kg]	in [kg]	in [kg]	
1.A.3.a.i - Passenger Cars	Gasoline	pre-Cars	11.647	11.647	0%	812.37	844.11	-11%	7.132.688	6.327.484	-796.844	-11%
		Car 1	30.667	30.667	0%	368.77	343.93	-32%	11.082.246	7.480.641	-3.621.706	-32%
		Car 2	53.486	53.486	0%	198.58	140.31	-29%	10.514.477	7.584.432	-3.018.844	-29%
		Car 3	87.374	87.374	0%	65.31	73.93	7%	6.955.589	6.459.797	-494.218	-7%
		Car 4	387.759	387.759	0%	45.16	47.80	-3%	19.093.585	19.536.099	-523.557	-3%
		Car 5	171.270	171.270	0%	18.59	47.80	151%	3.183.282	0.187.581	5.004.299	151%
		Car 6	10.315	10.315	0%	25.97	47.80	84%	267.855	433.096	-225.245	-84%
		Gasoline total	752.426	752.426	0%	76.40	73.89	4%	57.215.533	54.598.501	2,216.412	-4%
	Diesel Oil	pre-Cars	1.341	1.341	0%	311.73	284.66	-5%	417.947	364.246	-42.722	-5%
		Car 1	4.892	4.892	0%	298.92	267.28	-11%	1.482.284	1.387.643	-156.951	-11%
		Car 2	23.934	23.934	0%	408.71	320.45	-40%	9.734.484	5.276.480	4.458.004	-40%
		Car 3	82.749	82.749	0%	585.53	176.81	-69%	48.451.830	14.796.245	-33.655.585	-69%
		Car 4	211.237	211.237	0%	297.27	151.77	-62%	83.917.680	32.059.973	-51.857.706	-62%
		Car 5	285.011	285.011	0%	436.38	151.77	-65%	124.721.396	43.370.300	-81.343.896	-65%
		Car 6	16.081	16.081	0%	259.34	151.77	-41%	4.170.580	2.440.686	-1.729.814	-41%
		Diesel oil total	626.045	626.045	0%	415.87	159.12	-62%	272.876.061	99.613.892	-173.262.169	-62%
		Pkcs Total	1,338,571	1,338,571	0%	298.44	152.15	-53%	138,091,584	154,652,853	-175,478,269	-53%
	Gasoline	pre-Cars	986	986	0%	632.44	645.95	-2%	1463.683	1276.124	-187.844	-2%
		Car 1	173	173	0%	968.27	989.98	-64%	150.074	53.575	-96.499	-64%
		Car 2	748	748	0%	204.73	287.11	-21%	212.888	154.839	-58.029	-27%
		Car 3	771	771	0%	98.62	185.21	7%	75.982	81.070	-5.078	7%
		Car 4	1.087	1.087	0%	43.47	50.15	15%	81.139	83.618	-2.479	15%
		Car 5	1.374	1.374	0%	17.11	50.15	183%	23.517	68.918	-45.401	183%
		Car 6	17	17	0%	18.06	50.15	179%	212	670	-657	179%
		Gasoline total	5.845	5.845	0%	198.34	176.49	-2%	1,112,584	1,031,852	-88,732	-2%
1.A.3.b.i - Light Duty Vehicles (LDVs)	Gasoline	pre-Cars	2.537	2.537	0%	428.16	386.79	-21%	1.985.919	1.716.259	-269.659	-21%
		Car 1	2.588	2.588	0%	393.82	276.25	-40%	987.136	639.898	-347.328	-40%
		Car 2	6.087	6.087	0%	338.91	193.25	-42%	1.385.995	1.180.889	-205.126	-42%
		Car 3	18.220	18.220	0%	571.75	150.58	-74%	10.417.076	2.742.056	-7.675.020	-74%
		Car 4	52.361	52.361	0%	498.70	91.69	-82%	26.164.486	4.703.746	-21.394.748	-82%
		Car 5	46.749	46.749	0%	438.44	91.69	-79%	20.696.234	4.258.626	-16.237.709	-79%
	Diesel Oil	pre-Cars	187	187	0%	151.18	91.69	-60%	29.829	17.974	-11.855	-60%
		Car 1	187	187	0%	151.18	91.69	-60%	29.829	17.974	-11.855	-60%
		Car 2	187	187	0%	151.18	91.69	-60%	29.829	17.974	-11.855	-60%
		Car 3	187	187	0%	151.18	91.69	-60%	29.829	17.974	-11.855	-60%
		Car 4	187	187	0%	151.18	91.69	-60%	29.829	17.974	-11.855	-60%
		Car 5	187	187	0%	151.18	91.69	-60%	29.829	17.974	-11.855	-60%
		Diesel oil total	187.528	187.528	0%	415.56	170.94	-77%	61.146.575	14,267,237	-46,879,338	-77%
		LDVs Total	134,423	134,423	0%	463.16	153.81	-75%	62,299,160	15,298,849	-46,988,311	-75%
	Diesel Oil	pre-Cars	984	984	0%	1099.48	1919.23	-5%	1.062.384	1.062.921	-48.443	-5%
		Car 1	837	837	0%	728.12	130.99	-3%	899.232	628.359	-270.827	-3%
		Car 2	5.586	5.586	0%	704.95	643.67	-95%	4.284.320	3.683.441	-598.887	-95%
		Car 3	11.221	11.221	0%	621.20	458.38	-27%	7.082.740	5.143.628	-1.939.228	-27%
		Car 4	4.270	4.270	0%	461.10	361.79	-24%	1.972.610	1.584.978	-387.632	-24%
		Car 5	22.042	22.042	0%	368.55	183.99	-49%	7.726.921	4.065.632	-3.671.389	-49%
		Car 6	4.182	4.182	0%	42.78	183.99	330%	178.913	789.476	-610.563	330%
		Diesel Total	49,143	49,143	0%	468.37	339.99	-27%	23,017,115	16,788,234	-6,228,881	-27%
		Trucks Total	572,754	572,754	0%	314.85	196.65	-38%	179,874,133	112,285,562	-67,588,571	-38%
1.A.3.b.ii - Heavy Duty Vehicles (HDVs)	Gasoline	pre-Cars	6.185	6.185	0%	122.85	158.64	29%	795.185	974.388	218.182	29%
		Car 1	3.037	3.037	0%	134.71	174.84	40%	478.514	670.859	192.346	40%
		Car 2	3.365	3.365	0%	128.94	186.25	52%	433.874	680.370	246.504	52%
		Car 3	5.385	5.385	0%	38.53	186.25	380%	299.722	1.041.189	821.467	380%
		Car 4	0	0	0%	0	0	0%	0	0	0	0%
		Car 5	0	0	0%	0	0	0%	0	0	0	0%
		Gasoline total	18,673	18,673	0%	108.59	179.24	78%	1,878,294	3,386,734	1,488,499	78%
	Diesel Oil	pre-Cars	1.583	1.583	0%	122.85	158.64	29%	795.185	974.388	218.182	29%
		Car 1	3.037	3.037	0%	134.71	174.84	40%	478.514	670.859	192.346	40%
		Car 2	3.365	3.365	0%	128.94	186.25	52%	433.874	680.370	246.504	52%
		Car 3	5.385	5.385	0%	38.53	186.25	380%	299.722	1.041.189	821.467	380%
		Car 4	0	0	0%	0	0	0%	0	0	0	0%
		Car 5	0	0	0%	0	0	0%	0	0	0	0%
		Gasoline total	18,673	18,673	0%	108.59	179.24	78%	1,878,294	3,386,734	1,488,499	78%
		LDVs Total	2,153,563	2,153,563	0%	277.27	140.35	-49%	597,120,287	362,252,271	-234,868,025	-49%

Adjustment details for 2025												
NFR Code	Fuel	Activity Data			Implied Emission Factor			NO _x Emissions				
		current	adjusted	difference	current	adjusted	difference	current	adjusted	adjustment	difference	
		in [t]	in [t]	in [%]	in [g/t]	in [g/t]	in [%]	in [kg]	in [kg]	in [kg]	in [%]	
1.A.3.a.i - Passenger Cars	Gasoline	pre-Cars	11.380	11.380	0%	823.33	844.11	-16%	7.266.152	6.191.942	-1.074.168	-16%
		Car 1	34.112	34.112	0%	371.34	345.71	-34%	8.963.681	5.924.574	-3.029.228	-34%
		Car 2	42.925	42.925	0%	297.78	142.69	-32%	8.918.785	6.099.659	-2.818.648	-32%
		Car 3	72.871	72.871	0%	73.86	74.74	1%	5.381.351	5.448.237	64.897	1%
		Car 4	363.474	363.474	0%	52.36	49.62	-6%	18.485.637	17.326.221	-1.159.416	-6%
		Car 5	180.783	180.783	0%	19.11	49.62	157%	3.454.481	0.881.456	-5.406.375	157%
		Car 6	29.612	29.612	0%	25.70	49.62	84%	790.781	1.451.433	-652.752	-84%
		Gasoline total	715.156	715.156	0%	76.38	71.73	-6%	53.196.787	51.380.983	-1.889.805	-4%
	Diesel Oil	pre-Cars	1.382	1.382	0%	311.32	284.66	-5%	417.947	364.246	-44.704	-5%
		Car 1	4.279	4.279	0%	298.14	267.84	-10%	1.261.930	1.129.989	-132.021	-10%
		Car 2	19.689	19.689	0%	407.80	220.36	-46%	8.913.687	4.338.719	-3.674.968	-46%
		Car 3	71.044	71.044	0%	595.91	179.64	-70%	42.271.648	12.719.962	-29.551.686	-70%
		Car 4	182.410	182.410	0%	401.42	154.07	-62%	77.237.655	29.644.450	-47.593.206	-62%
		Car 5	364.346	364.346	0%	434.67	154.07	-65%	132.290.433	46.090.424	-86.409.959	-65%
		Car 6	62.576	62.576	0%	259.76	154.07	-41%	13.657.082	0.180.384	-5.556.778	-41%
		Diesel oil total	645.565	645.565	0%	426.19	159.88	-63%	275.138.233	183.163.591	-91.964.732	-63%
		Pkcs Total	1,368,721	1,368,721	0%	245.26	153.52	-53%	128,317,020	154,444,484	-173,856,536	-53%
	Gasoline	pre-Cars	979	979	0%	664.37	645.95	-1%	1,375.361	1,047.977	-327.384	-1%
		Car 1	150	150	0%	895.63	911.93	-65%	134.523	46.851	-87.672	-65%
		Car 2	629	629	0%	298.27	212.94	-29%	187.533	133.879	-53.654	-29%
		Car 3	781	781	0%	105.50	186.62	3%	73.969	76.155	2.186	3%
		Car 4	1.720	1.720	0%	47.06	51.30	9%	80.950	80.240	7.290	9%
		Car 5	1.620	1.620	0%	18.41	51.30	179%	29.912	83.086	-53.274	179%
		Car 6	94	94	0%	18.71	51.30	174%	1.752	4.884	-3.132	174%
		Gasoline total	5,793	5,793	0%	187.52	172.88	-8%	5,083,597	4,080,999	-982,598	-8%
Diesel Oil	pre-Cars	2,323	2,323	0%	418.91	386.79	-26%	969.185	712.531	-253.854	-26%	
	Car 1	2,186	2,186	0%	391.47	212.25	-45%	824.270	453.227	-371.043	-45%	
	Car 2	5,025	5,025	0%	324.81	193.29	-40%	1,632.296	971.296	-660.928	-40%	
	Car 3	15,781	15,781	0%	308.92	150.67	-24%	5,112.414	2,365.703	-2,746.711	-24%	
	Car 4	47,480	47,480	0%	501.73	91.76	-42%	23,762.396	3,540.299	-19,434.098	-42%	
	Car 5	62,146	62,146	0%	436.13	91.76	-79%	27,090.214	5,630.295	-21,342.009	-79%	
	Car 6	635	635	0%	154.91	91.76	-40%	87.758	62.236	-25.528	-40%	
	Diesel oil total	135,366	135,366	0%	368.35	187.96	-27%	63,565,843	54,681.496	-8,884,353	-27%	
LDVs total	147,098	147,098	0%	412.76	170.62	-16%	64,809,530	55,686,496	-9,188,805	-16%		
1.A.3.a.ii - Heavy Duty Vehicles	Diesel Oil	pre-Cars	979	979	0%	1070.34	1019.23	-5%	1,048.372	995.256	-53.086	-5%
		Car 1	747	747	0%	738.26	715.91	3%	542.471	581.636	18.165	3%
		Car 2	5,211	5,211	0%	707.43	644.44	-10%	4,103.087	3,359.944	-743.053	-18%
		Car 3	15,782	15,782	0%	633.86	488.67	-24%	7,541.732	6,174.989	-1,366.822	-24%
		Car 4	4,686	4,686	0%	689.70	351.99	-35%	2,154.096	1,154.177	-999.829	-20%
		Car 5	36,257	36,257	0%	368.77	184.59	-49%	9,737.608	4,477.641	-5,259.427	-20%
		Car 6	5,224	5,224	0%	63.13	184.59	247%	277.542	964.226	686.684	247%
		Dieses Total	52,887	52,887	0%	438.96	327.99	-29%	23,937,817	17,149,448	-6,888,370	-29%
1.A.3.a.iii - Heavy Duty Vehicle: Trucks & Lorries	Diesel Oil	pre-Cars	4,319	4,319	0%	1034.69	973.35	-29%	4,488.571	3,184.420	-1,294.143	-29%
		Car 1	1,883	1,883	0%	748.71	553.48	-26%	1,387.291	1,025.551	-361.740	-26%
		Car 2	11,052	11,052	0%	817.38	587.99	-30%	9,072.940	6,532.450	-2,540.391	-30%
		Car 3	47,482	47,482	0%	629.55	381.66	-39%	27,463.779	17,724.623	-9,749.156	-39%
		Car 4	39,233	39,233	0%	356.86	287.72	-20%	11,572.860	9,294.190	-2,278.769	-20%
		Car 5	309,736	309,736	0%	264.17	153.49	-40%	80,413.973	60,546.436	-19,867.477	-40%
		Car 6	179,787	179,787	0%	67.48	153.49	167%	9,913.364	26,282.637	16,369.684	167%
		Trucks Total	589,431	589,431	0%	268.69	189.33	-30%	157,189,675	119,520,933	-36,668,742	-30%
1.A.3.b.iv - Motorized Two-Wheelers (MOWs)	Gasoline	pre-Cars	5,744	5,744	0%	125.41	157.28	25%	720.441	983.470	183.828	25%
		Car 1	1,517	1,517	0%	127.40	176.22	39%	444.086	670.819	171.733	39%
		Car 2	3,382	3,382	0%	127.35	196.53	55%	430.680	666.565	235.206	55%
		Car 3	5,917	5,917	0%	48.29	196.53	399%	236.136	1,144.416	1,158.289	399%
		Car 4	4	0	0%	16.96	0	-100%	89	0	-736	-100%
		Car 5	0	0	0%	0	0	0%	0	0	0	0%
		MOWs Total	18,499	18,499	0%	98.52	180.65	82%	1,833.382	5,334.472	1,501.890	82%
		1.A.3.b - Road Transport	Total	2,161,592	2,161,592	0%	265.86	176.27	-48%	575,925,395	381,697,596	-174,853,787

Adjustment details for 2026												
NFR Code	Fuel	Activity Data			Implied Emission Factor			NO _x Emissions				
		current	adjusted	difference	current	adjusted	difference	current	adjusted	adjustment	difference	
		in [t]	in [t]	in [%]	in [g/t]	in [g/t]	in [%]	in [g]	in [g]	in [g]	in [g]	
1.A.3.a.i. Passenger Cars	Gasoline	pre-Cars	15 782	15 782	0%	636.75	648.11	-16%	7 670 916	6 410 967	-1 657 867	-16%
		Car 1	20 270	20 270	0%	372.25	268.68	-36%	7 545 483	4 886 888	-2 648 596	-36%
		Car 2	36 062	36 062	0%	212.73	143.11	-33%	7 671 581	5 180 897	-2 516 693	-33%
		Car 3	83 039	83 039	0%	76.17	75.50	-1%	4 881 482	4 759 259	-42 233	-1%
		Car 4	334 413	334 413	0%	53.74	50.17	-7%	17 363 364	16 777 445	-1 192 488	-7%
		Car 5	183 374	183 374	0%	19.09	50.17	163%	3 580 745	9 189 834	5 609 089	163%
	Car 6	65 332	65 332	0%	25.67	50.17	89%	1 768 917	3 327 855	1 558 938	89%	
	Gasoline total	715 272	715 272	0%	78.93	70.65	-9%	58 736 267	50 535 049	-8 201 218	-9%	
	Diesel Oil	pre-Cars	1 380	1 380	0%	368.76	264.56	-28%	386 262	339 173	-46 089	-14%
		Car 1	3 749	3 749	0%	298.36	269.66	-9%	1 122 449	1 011 626	-111 425	-10%
Car 2		16 584	16 584	0%	407.19	221.43	-46%	6 720 132	3 663 964	-3 056 168	-46%	
Car 3		81 398	81 398	0%	802.50	179.24	-78%	36 981 999	11 085 409	-25 896 590	-70%	
Car 4		175 040	175 040	0%	405.76	156.24	-61%	71 362 220	27 474 086	-43 878 214	-61%	
Car 5		299 054	299 054	0%	433.34	156.24	-64%	130 032 044	46 019 229	-83 912 815	-64%	
Diesel oil total	116 034	116 034	0%	268.75	156.24	-41%	30 427 555	10 232 785	-19 194 770	-60%		
LDVs total	675 119	675 119	0%	418.36	160.76	-61%	277 941 660	188 535 230	-89 406 430	-61%		
Pkcs Total	1 386 391	1 386 391	0%	235.75	154.41	-35%	62 778 627	159 670 289	-146 786 362	-59%		
1.A.3.b.i. Light Duty Vehicles (LDVs)	Gasoline	pre-Cars	910	910	0%	602.79	645.35	-7%	593 186	547 543	-45 643	-8%
		Car 1	136	136	0%	908.31	312.78	-65%	122 126	42 425	-79 708	-65%
		Car 2	540	540	0%	308.39	217.84	-29%	162 311	117 737	-44 604	-27%
		Car 3	650	650	0%	108.43	111.57	3%	70 432	72 731	2 299	3%
		Car 4	1 684	1 684	0%	43.06	52.36	7%	78 714	84 003	5 289	7%
		Car 5	1 724	1 724	0%	19.82	52.36	164%	34 157	80 258	46 106	164%
	Car 6	363	363	0%	19.85	52.36	181%	6 764	18 992	12 228	181%	
	Gasoline total	5 506	5 506	0%	588.27	171.66	-7%	1 068 292	1 013 678	-54 614	-5%	
	Diesel Oil	pre-Cars	2 189	2 189	0%	414.81	386.73	-7%	899 549	885 433	-14 116	-2%
		Car 1	1 780	1 780	0%	391.89	276.25	-29%	780 189	385 371	-394 798	-49%
Car 2		4 223	4 223	0%	323.43	153.31	-53%	1 365 594	676 452	-689 142	-49%	
Car 3		13 582	13 582	0%	588.91	150.77	-74%	8 064 323	2 040 233	-6 024 090	-74%	
Car 4		43 141	43 141	0%	504.48	32.40	-93%	21 783 989	3 986 141	-17 777 788	-82%	
Car 5		74 231	74 231	0%	434.16	32.40	-93%	32 223 283	6 658 730	-25 564 553	-79%	
Car 6	4 921	4 921	0%	113.49	82.43	-27%	755 285	454 676	-300 609	-40%		
LDVs total	144 068	144 068	0%	456.12	185.62	-77%	65 712 732	15 256 007	-50 456 726	-77%		
HDVs total	149 994	149 994	0%	445.23	188.29	-58%	66 781 625	16 229 684	-50 551 948	-76%		
1.A.3.b.ii. Heavy Duty Vehicles (HDVs)	Diesel Oil	pre-Cars	881	881	0%	1076.81	1918.23	-43%	964 197	988 234	24 037	2%
		Car 1	583	583	0%	731.36	732.67	0%	433 675	446 236	12 568	3%
		Car 2	4 375	4 375	0%	788.25	645.03	-18%	3 440 614	2 822 621	-617 993	-18%
		Car 3	10 333	10 333	0%	632.87	458.91	-28%	6 530 364	4 741 827	-1 787 536	-27%
		Car 4	43 141	43 141	0%	504.48	32.40	-93%	21 783 989	3 986 141	-17 777 788	-82%
		Car 5	74 231	74 231	0%	434.16	32.40	-93%	32 223 283	6 658 730	-25 564 553	-79%
	Car 6	4 921	4 921	0%	113.49	82.43	-27%	755 285	454 676	-300 609	-40%	
	Diesel total	144 068	144 068	0%	456.12	185.62	-77%	65 712 732	15 256 007	-50 456 726	-77%	
	Diesel Oil	pre-Cars	9 126	9 126	0%	62.79	185.22	196%	573 066	1 680 431	1 107 365	196%
		Car 1	54 157	54 157	0%	404.73	388.24	-4%	23 082 189	16 885 117	-6 197 072	-27%
Car 2		3 933	3 933	0%	1034.81	737.35	-29%	4 087 249	2 980 379	-1 106 870	-29%	
Car 3		1 555	1 555	0%	748.16	587.92	-22%	1 163 482	789 813	-373 669	-32%	
Car 4		8 876	8 876	0%	817.75	585.52	-28%	7 258 047	4 486 626	-2 771 421	-38%	
Car 5		34 167	34 167	0%	638.91	588.64	-9%	21 553 280	12 251 155	-9 302 125	-43%	
Diesel Oil	pre-Cars	34 287	34 287	0%	396.94	281.86	-29%	9 640 384	6 885 621	-2 754 803	-29%	
	Car 1	269 735	269 735	0%	267.22	153.60	-42%	74 680 233	39 976 610	-34 671 623	-48%	
	Car 2	261 480	261 480	0%	61.77	153.60	149%	16 149 280	40 304 036	24 154 748	149%	
	Car 3	584 013	584 013	0%	226.31	180.97	-20%	134 431 899	101 486 262	-32 945 637	-24%	
	Car 4	5 543	5 543	0%	125.59	155.78	24%	696 072	883 289	187 218	24%	
	Car 5	3 360	3 360	0%	127.11	177.29	39%	427 113	585 796	158 682	39%	
Gasoline	pre-Cars	3 375	3 375	0%	125.94	187.68	50%	421 961	687 078	265 127	50%	
	Car 1	6 443	6 443	0%	48.36	187.68	381%	209 627	1 273 671	1 064 043	508%	
	Car 2	85	85	0%	17.47	187.68	1031%	1 134	12 632	11 498	1021%	
	Car 3	0	0	0%	0	0	0%	0	0	0	0%	
	Car 4	16 185	16 185	0%	16.14	187.68	108%	1 885 897	3 452 476	1 566 579	88%	
	Car 5	16 185	16 185	0%	16.14	187.68	108%	1 885 897	3 452 476	1 566 579	88%	
1.A.3.b.iii. Road Transport	Total	2 267 339	2 267 339	0%	258.89	137.22	-45%	553 799 598	362 981 620	-190 817 978	-45%	

Adjustment details for 2018												
NFR Code	Fuel	Activity Data			Implied Emission Factor			NO _x Emissions				
		current	adjusted	difference in [%]	current	adjusted	difference in [%]	current	adjusted	adjustment	difference in [%]	
1.A.3.a.i - Passenger Cars	Gasoline	pre-Cars	12 219	12 219	0%	637.58	644.11	-6%	7 780 965	6 648 721	-1 132 234	-15%
		Car 1	14 362	14 362	0%	374.34	341.68	-9%	5 371 161	3 448 643	-1 922 518	-36%
		Car 2	34 285	34 285	0%	221.97	111.68	-50%	5 360 977	2 688 163	-2 672 814	-50%
		Car 3	43 642	43 642	0%	88.16	76.96	-4%	3 487 781	3 388 617	-138 164	-4%
		Car 4	278 738	278 738	0%	55.98	52.30	-7%	15 683 488	14 576 755	-1 106 733	-7%
		Car 5	186 830	186 830	0%	19.35	52.30	170%	3 228 282	8 725 688	5 497 406	170%
		Car 6	189 041	189 041	0%	6.00	52.30	0%	4 190 422	8 716 250	4 525 828	89%
	Diesel Oil	Gasoline total	689 027	689 027	0%	64.42	68.36	-6%	45 032 296	47 786 817	2 753 521	6%
		pre-Cars	1 363	1 363	0%	303.16	264.96	-13%	171 670	146 173	-25 497	-15%
		Car 1	2 949	2 949	0%	299.17	272.65	-9%	962 432	775 166	-187 267	-20%
		Car 2	10 784	10 784	0%	407.20	222.87	-45%	4 391 383	2 483 536	-1 907 848	-45%
		Car 3	40 786	40 786	0%	812.49	180.15	-71%	24 932 029	7 333 241	-17 598 788	-71%
		Car 4	130 534	130 534	0%	414.71	180.40	-51%	54 133 837	20 937 329	-33 196 508	-61%
		Car 5	251 212	251 212	0%	416.25	180.40	-51%	104 585 786	40 293 731	-64 292 055	-61%
		Car 6	228 685	228 685	0%	254.87	180.40	-31%	58 284 140	35 680 446	-22 603 700	-37%
		Diesel oil total	646 074	646 074	0%	375.66	163.38	-56%	247 596 063	188 748 684	-158 767 459	-56%
		Pkx Total	1 365 101	1 365 101	0%	214.34	114.68	-46%	262 589 060	196 535 421	-136 633 639	-46%
1.A.3.b.i - Light Duty Vehicles (LDVs)	Gasoline	pre-Cars	917	917	0%	944.51	645.95	-1%	994 851	582 662	-4 169	-1%
		Car 1	188	188	0%	911.58	312.78	-66%	98 528	33 895	-64 633	-66%
		Car 2	377	377	0%	303.84	224.45	-26%	114 682	84 713	-29 969	-26%
		Car 3	511	511	0%	111.92	116.84	6%	57 282	60 739	3 457	6%
		Car 4	1 275	1 275	0%	52.02	54.36	4%	65 290	69 278	3 988	4%
		Car 5	1 483	1 483	0%	23.70	54.36	129%	35 160	80 626	45 466	129%
		Car 6	1 643	1 643	0%	19.18	54.36	182%	39 550	89 326	49 776	182%
	Diesel Oil	Gasoline total	6 315	6 315	0%	154.22	160.11	1%	999 199	1 091 136	11 936	1%
		pre-Cars	1 872	1 872	0%	411.51	386.79	-6%	771 337	574 742	-196 595	-26%
		Car 1	1 285	1 285	0%	389.94	276.28	-29%	483 128	272 296	-210 832	-44%
		Car 2	2 942	2 942	0%	318.56	193.88	-39%	965 389	556 789	-408 600	-42%
		Car 3	9 383	9 383	0%	598.10	150.74	-75%	5 689 152	1 411 299	-4 277 853	-75%
		Car 4	33 232	33 232	0%	508.42	93.81	-82%	16 929 185	3 117 457	-13 811 728	-82%
		Car 5	66 283	66 283	0%	432.92	93.81	-78%	28 684 080	6 217 860	-22 466 220	-78%
		Car 6	39 482	39 482	0%	158.79	93.81	-41%	5 941 615	3 686 228	-2 255 387	-38%
		Diesel oil total	154 259	154 259	0%	384.71	182.69	-71%	98 344 525	55 880 316	-42 464 215	-71%
		LDVs Total	160 574	160 574	0%	375.80	184.94	-72%	68 343 125	96 851 449	43 492 216	72%
1.A.3.b.ii - Heavy Duty Vehicles (HDVs)	Diesel Oil	pre-Cars	547	547	0%	1078.16	1919.23	-4%	585 267	557 147	-28 120	-5%
		Car 1	237	237	0%	732.78	132.57	-8%	173 678	178 368	4 690	3%
		Car 2	2 270	2 270	0%	787.83	646.33	-18%	1 780 686	1 487 437	-293 249	-16%
		Car 3	6 757	6 757	0%	638.89	459.32	-21%	4 262 734	3 183 482	-1 079 252	-21%
		Car 4	3 043	3 043	0%	473.16	382.73	-20%	1 439 790	1 073 333	-366 457	-25%
		Car 5	18 189	18 189	0%	362.42	186.37	-49%	6 463 265	3 376 016	-3 087 249	-49%
		Car 6	20 670	20 670	0%	64.89	186.37	288%	1 176 026	3 682 314	2 506 288	288%
	Trucks & Lorries	Buses Total	91 634	91 634	0%	309.75	283.53	-18%	15 993 546	13 687 186	-2 306 428	-15%
		pre-Cars	3 262	3 262	0%	1034.82	737.35	-29%	3 375 359	2 485 071	-890 288	-29%
		Car 1	1 094	1 094	0%	747.82	488.39	-31%	918 052	512 378	-405 674	-31%
		Car 2	5 544	5 544	0%	817.44	581.68	-29%	4 632 180	2 781 516	-1 850 664	-40%
		Car 3	20 583	20 583	0%	629.54	563.68	-10%	12 367 751	7 277 279	-5 090 472	-44%
		Car 4	15 912	15 912	0%	358.89	276.23	-21%	6 334 421	4 386 424	-1 947 997	-31%
		Car 5	154 983	154 983	0%	292.40	154.68	-47%	45 964 153	24 283 389	-21 680 764	-47%
		Car 6	381 799	381 799	0%	68.78	154.68	125%	26 251 482	69 665 886	43 414 404	125%
		Trucks Total	585 186	585 186	0%	515.18	172.19	-1%	188 173 537	180 710 889	-7 462 648	-4%
1.A.3.b.iii - Motorised Two-Wheelers (MTWs)	Gasoline	pre-Cars	4 940	4 940	0%	128.95	188.61	20%	622 666	783 451	160 785	26%
		Car 1	2 966	2 966	0%	128.14	177.79	41%	374 114	527 294	153 180	41%
		Car 2	3 221	3 221	0%	128.33	188.64	6%	387 596	639 833	252 237	65%
		Car 3	6 241	6 241	0%	48.24	188.64	384%	251 126	1 239 688	988 562	394%
		Car 4	1 130	1 130	0%	58.41	188.64	827%	23 066	224 682	201 616	877%
		Car 5	0	0	0%	0.00		0%	0	0	0	0%
		MTWs Total	16 497	16 497	0%	85.86	188.61	198%	1 658 558	3 454 167	1 795 609	198%
	Road Transport	Total	2 189 983	2 189 983	0%	215.85	133.49	-38%	478 758 286	291 129 652	-178 618 593	-38%

Adjustment details for 2019													
NFR Code	Fuel	Activity Data				Implied Emission Factor				NO _x Emissions			
		current	adjusted	difference	in [%]	current	adjusted	difference	in [%]	current	adjusted	adjustment	difference in [%]
1.A.3.a.i - Passenger Cars	Gasoline	pre-Cars	13 588	13 588	0%	638.58	644.11	-6%	-10%	8 664 521	7 382 686	-1 281 835	-15%
		Car 1	12 427	12 427	0%	378.32	341.68	-9%	-36%	4 781 480	3 083 383	-1 698 096	-36%
		Car 2	20 086	20 086	0%	225.58	92.59	-60%	-69%	4 531 070	1 858 078	-2 673 052	-60%
		Car 3	36 216	36 216	0%	82.22	76.12	-5%	-5%	2 977 840	2 829 186	-148 653	-5%
		Car 4	295 220	295 220	0%	57.04	53.29	-7%	-7%	14 588 285	13 589 621	-998 664	-7%
		Car 5	180 537	180 537	0%	19.77	53.29	170%	170%	3 173 728	8 054 356	4 880 628	170%
		Car 6	285 626	285 626	0%	25.63	53.29	180%	180%	5 295 099	11 010 782	5 715 683	180%
	Gasoline total	784 631	784 631	0%	62.36	68.45	16%	16%	43 961 941	48 238 025	4 276 084	16%	
	pre-Cars	2 736	2 736	0%	333.76	264.96	-16%	-16%	913 180	724 923	-188 257	-21%	
	Car 1	2 545	2 545	0%	299.80	272.65	-9%	-9%	766 913	687 786	-80 127	-10%	
	Car 2	8 891	8 891	0%	407.19	229.16	-44%	-44%	3 620 286	2 037 480	-1 582 806	-44%	
	Car 3	33 079	33 079	0%	815.11	180.42	-71%	-71%	20 370 125	5 957 493	-14 412 632	-71%	
	Car 4	111 335	111 335	0%	419.17	182.44	-51%	-51%	48 688 685	18 085 622	-30 603 063	-61%	
	Car 5	231 784	231 784	0%	419.37	182.44	-40%	-40%	95 117 643	37 650 997	-57 466 646	-60%	
	Car 6	273 511	273 511	0%	227.36	182.44	-20%	-20%	62 183 230	44 429 184	-17 754 046	-29%	
	Diesel oil total	663 841	663 841	0%	345.81	165.67	-52%	-52%	229 566 088	189 582 982	-139 983 106	-52%	
	Pkx Total	1 368 532	1 368 532	0%	699.83	195.19	-46%	-46%	273 668 029	157 821 087	-115 846 942	-46%	
1.A.3.b.i - Light Duty Vehicles (LDVs)	Gasoline	pre-Cars	909	909	0%	644.89	645.95	-1%	-1%	881 459	581 962	-2 997	-1%
		Car 1	87	87	0%	915.28	312.78	-66%	-66%	88 953	30 396	-58 557	-66%
		Car 2	316	316	0%	304.63	224.45	-26%	-26%	96 158	70 848	-25 310	-26%
		Car 3	447	447	0%	112.68	121.47	8%	8%	59 355	54 283	-5 072	-8%
		Car 4	1 126	1 126	0%	53.08	55.26	4%	4%	59 652	62 199	2 547	4%
		Car 5	1 361	1 361	0%	25.34	55.26	119%	119%	34 240	74 680	40 440	119%
		Car 6	2 420	2 420	0%	18.75	55.26	180%	180%	45 383	133 753	88 370	180%
	Gasoline total	6 483	6 483	0%	144.88	153.25	5%	5%	974 279	1 094 156	11 877	5%	
	pre-Cars	1 744	1 744	0%	418.96	386.79	-6%	-6%	725 111	541 376	-183 735	-26%	
	Car 1	1 079	1 079	0%	389.52	276.28	-29%	-29%	420 285	232 256	-188 029	-45%	
	Car 2	2 334	2 334	0%	315.90	194.79	-39%	-39%	737 682	454 630	-283 052	-39%	
	Car 3	7 649	7 649	0%	801.11	150.79	-71%	-71%	4 597 943	1 152 737	-3 445 206	-75%	
	Car 4	28 714	28 714	0%	512.28	94.57	-82%	-82%	14 788 306	2 716 154	-11 993 154	-82%	
	Car 5	68 774	68 774	0%	434.30	94.57	-79%	-79%	25 499 580	5 032 428	-19 467 152	-79%	
	Car 6	69 931	69 931	0%	148.18	94.57	-30%	-30%	6 614 586	5 672 892	-9 461 614	-30%	
	Diesel oil total	159 183	159 183	0%	347.42	181.90	-47%	-47%	56 383 335	36 221 445	-20 161 890	-47%	
	LDVs total	165 866	165 866	0%	339.31	183.89	-46%	-46%	56 279 554	35 245 936	-21 033 618	-46%	
1.A.3.b.ii - Heavy Duty Vehicles (HDVs)	Diesel Oil	pre-Cars	489	489	0%	1080.20	1019.23	-6%	-6%	585 887	476 258	-109 629	-19%
		Car 1	147	147	0%	738.37	732.57	-2%	-2%	188 212	110 593	-77 619	-41%
		Car 2	1 611	1 611	0%	709.47	666.77	-7%	-7%	2 097 343	1 941 621	-155 722	-8%
		Car 3	5 789	5 789	0%	824.86	419.83	-49%	-49%	7 066 381	2 422 749	-4 643 632	-66%
		Car 4	2 747	2 747	0%	473.93	352.84	-26%	-26%	1 382 061	960 413	-421 648	-31%
		Car 5	17 130	17 130	0%	362.91	186.64	-49%	-49%	6 212 175	3 180 781	-3 031 394	-49%
		Car 6	25 135	25 135	0%	60.43	186.64	299%	299%	1 518 961	4 086 133	2 567 172	299%
	Diesel total	52 939	52 939	0%	274.41	247.85	-10%	-10%	14 547 072	15 158 078	1 408 434	10%	
	pre-Cars	3 140	3 140	0%	1034.96	737.35	-29%	-29%	3 260 020	2 376 443	-883 577	-29%	
	Car 1	989	989	0%	747.60	488.34	-35%	-35%	724 240	453 754	-270 486	-37%	
	Car 2	4 560	4 560	0%	817.42	581.14	-29%	-29%	3 734 343	2 280 967	-1 448 376	-39%	
	Car 3	16 377	16 377	0%	881.94	381.93	-57%	-57%	13 066 383	5 750 747	-7 315 636	-57%	
	Car 4	13 137	13 137	0%	598.96	279.43	-53%	-53%	1 235 679	5 089 330	1 646 349	31%	
	Car 5	125 233	125 233	0%	26.13	154.90	490%	490%	36 960 599	59 481 429	22 520 830	490%	
	Car 6	432 488	432 488	0%	72.98	154.92	110%	110%	31 175 496	67 083 865	35 908 369	110%	
	Trucks Total	595 913	595 913	0%	553.39	189.17	-16%	-16%	55 380 180	180 889 376	5 428 674	16%	
	1.A.3.b.iii - Motorized Two-Wheelers (M2Ws)	Gasoline	pre-Cars	4 813	4 813	0%	125.89	164.78	31%	31%	664 997	732 771	167 774
Car 1			2 035	2 035	0%	125.39	177.29	41%	41%	355 495	582 589	147 113	41%
Car 2			3 084	3 084	0%	119.33	190.06	67%	67%	303 224	610 757	246 933	67%
Car 3			6 082	6 082	0%	48.81	180.06	267%	267%	204 284	1 252 817	853 233	267%
Car 4			2 068	2 068	0%	21.69	180.06	817%	817%	23 489	386 467	365 178	817%
Car 5			0	0	0%	0.00		0%	0%	0	0	0	0%
M2Ws Total			18 160	18 160	0%	86.09	186.83	115%	115%	1 613 580	3 582 941	1 889 491	115%
1.A.3.b. Road Transport		Total	2 262 080	2 262 080	0%	198.58	132.83	-33%	-33%	437 206 746	292 497 497	-144 719 248	-33%

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Adjustment 2014 (accepted)	-105.6	-101.3	-95.7	-91.7						
Adjustment 2015 (accepted)	-100.3	-95.5	-89.9	-85.1						
Adjustment 2016 (accepted)	-151.3	-146.9	-145.1	-142.5	-128.1					
Adjustment 2017 (accepted)	-151.3	-146.8	-145.0	-142.4	-127.2	-100.9				
Adjustment 2018 (accepted)	-172.3	-174.5	-177.4	-180.4	-171.5	-148.9	-123.2			
Adjustment 2019 (accepted)	-172.3	-174.5	-177.4	-180.3	-171.4	-148.8	-123.3	93.7		
Adjustment 2020 (accepted)	-297.8	-302.3	-301.3	-306.1	-294.5	-269.0	-244.3	-214.9	-174.6	
Adjustment 2021 (proposal)	-296.1	-300.7	-300.4	-305.2	-294.9	-274.9	-250.9	-221.1	-179.6	-144.8
Change against Adjustment 2020	1.7	1.6	0.9	0.9	-0.4	-5.9	-6.6	-6.2	-5.0	

The noticeable differences between the 2017 and 2018 adjustment proposals resulted from an ad-hoc revision of the *Handbook Emission Factors for Road Transport* (HBEFA, version 3.3) in the aftermath of the so-called "Diesel-gate".⁸⁾

The even bigger changes between adjustment 2019 and adjustment proposal 2020 result from an additional rather fundamental revision of the *Handbook Emission Factors for Road Transport* now available in version 4.1 >⁹⁾ strongly effecting the TREMOD model underlying Germany's emission reporting for road transport and hence any adjustments of NO_x emissions.

With such major model revision between submissions 2019 and 2020, the current adjustment proposal differs significantly from the adjustment applied for and accepted in 2019.

Adjustment description as provided in IIRs 2014 and 2015:

[image Description%20Adjustment%20DE-A%20-%20NOx%20from%201.A.3.b%20Road%20transport%20-%20IIRs%202014%20%26%202015.pdf](#)

bibliography : 1 : EB, 2012a: CLRTAP EB Decision 2012/3, ECE/EB.AIR/111/Add.1: Adjustments under the Gothenburg Protocol to emission reduction commitments or to inventories for the purposes of comparing total national emissions with them URL: http://www.unece.org/fileadmin/DAM/env/documents/2013/air/ECE_EB.AIR_111_Add.1_ENG_DECISION_3.pdf : 2 : EB, 2012b: CLRTAP EB Decision 2012/4: Provisional Application of Amendment to the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone URL: http://www.unece.org/fileadmin/DAM/env/documents/2013/air/ECE_EB.AIR_111_Add.1_ENG_DECISION_4.pdf : 3 : EB, 2012c: CLRTAP EB Decision 2012/12: Guidance for adjustments under the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone to emission reduction commitments or to inventories for the purposes of comparing total national emissions with them URL: http://www.unece.org/fileadmin/DAM/env/documents/2012/EB/Decision_2012_12.pdf : 4 : IIASA, 1999: Amann, M.; Bertok, I.; Cofala, J.; Gyarfas, F.; Heyes, Chr.; Klimont, Zb.; Syri, S.; Schöpp, W.: Further analysis of scenario results obtained with the RAINS model - Interim Report to the Ministère de L'Aménagement du Territoire et de l'Environnement Direction de la Prévention des Pollutions et des Risques 20, avenue de Ségur 75302 Paris 07 SP, April 1999 - URL: <https://iiasa.ac.at/web/home/research/researchPrograms/air/policy/france3b.pdf> : 5 : ifeu, 2002: Final report to UFOPLAN study FKZ 201 45 112 (German version only): Aktualisierung des Daten- und Rechenmodells: Energieverbrauch und Schadstoffemissionen des motorisierten Verkehrs in Deutschland 1980-2020; Im Auftrag des Umweltbundesamtes; ifeu Institut für Energie- und Umweltforschung Heidelberg GmbH (Institute for Energy and Environmental Research), Wilckensstraße 3, D-69120 Heidelberg, Germany, phone: +49 (0) 6221 / 47 67 -0, fax: +49 (0) 6221 / 47 67 -19, Heidelberg, 31. Oktober 2002 : 6 : Knörr et al. (2019a): Knörr, W., Heidt, C., Gores, S., & Bergk, F.: ifeu Institute for Energy and Environmental Research (Institut für Energie- und Umweltforschung Heidelberg gGmbH, ifeu): Fortschreibung des Daten- und Rechenmodells: Energieverbrauch und Schadstoffemissionen des motorisierten Verkehrs in Deutschland 1960-2035, sowie TREMOD, im Auftrag des Umweltbundesamtes, Heidelberg & Berlin, 2019. : 7 : UBA, 2018: CLRTAP submission 2018, Dessau, 2018 : 8 : ECE/EB.AIR/113/Add.1, 2012: Report of the Executive Body on its thirty-first session, Decision 2012/12 on Guidance for adjustments under the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone to emission reduction commitments or to inventories for the purposes of comparing total national emissions with them; URL: http://www.unece.org/fileadmin/DAM/env/documents/2012/EB/ECE_EB.AIR_113_Add.1_ENG_1_.pdf : 9 : CEIP, 2014a: Centre on Emission Inventories and Projections (CEIP): CEIP/Adjustment RR/2014/GERMANY: Review of the 2014 Adjustment Application by Germany, URL: https://webdab01.umweltbundesamt.at/download/adjustments2014/Adjustment_Review_Report_GERMANY_2014.pdf?cgiproxy_skip=1, 5 August 2014 : 10 : CEIP, 2014b: Centre on Emission Inventories and Projections (CEIP): ECE/EB.AIR/GE.1/2014/10: Review of adjustment applications 2014; URL: http://www.ceip.at/fileadmin/inhalte/emep/pdf/2015/ece.eb.air.ge.1.2014.10.edited.ae_formatting_accepted.ko.pdf, 5 August 2014 : 11 : CEIP, 2015a: Centre on Emission Inventories and Projections (CEIP): CEIP/Adjustment RR/2015/Germany: Review of the 2015 Adjustment Application by Germany, URL:

https://webdab01.umweltbundesamt.at/download/adjustments2015/Germany2015-adj.pdf?cgiproxy_skip=1, September 2015 : 12 : CEIP, 2015b: Centre on Emission Inventories and Projections (CEIP): CE/EB.AIR/GE.1/2015/10–ECE/EB.AIR/WG.1/2015/13: Review of adjustment applications 2015; URL: http://www.ceip.at/fileadmin/inhalte/emep/Adjustments/ece.eb.air.ge.1.2015.10_ece.eb.air.wg.1.2015.13.AV.pdf, 6 July 2015 : 13 : CEIP, 2016a: Centre on Emission Inventories and Projections (CEIP): Review of the 2016 Adjustment Application by Germany, URL: https://webdab01.umweltbundesamt.at/download/adjustments2016/Germany2016-adj.pdf?cgiproxy_skip=1, 2016 : 14 : CEIP, 2016b: Centre on Emission Inventories and Projections (CEIP): ECE/EB.AIR/GE.1/2016/10–ECE/EB.AIR/WG.1/2016/18: Review of adjustment applications 2016; URL: http://www.ceip.at/fileadmin/inhalte/emep/pdf/2016/ECE_EB.AIR_GE.1_2016_10_E.pdf, 2016 : 15 : CEIP, 2017a: Centre on Emission Inventories and Projections (CEIP): ECE/EB.AIR/GE.1/2017/10–ECE/EB.AIR/WG.1/2017/20: Review of adjustment applications 2017; URL: http://www.ceip.at/fileadmin/inhalte/emep/pdf/2017/Advance_ece_eb_air_ge_1_2017_10_ece_eb_air_wg_1_2017.pdf, 2017 : 16 : CEIP, 2018a: Centre on Emission Inventories and Projections (CEIP): ECE/EB.AIR/GE.1/2018/10–ECE/EB.AIR/WG.1/2018/21: Review of adjustment applications 2018; URL: https://www.ceip.at/fileadmin/inhalte/emep/pdf/2018/ADJ_ece.eb.air.ge.1.2018.10-ece.eb.air.wg.1.2018.21_advance.pdf, 2018 : 17 : CEIP, 2019a: Centre on Emission Inventories and Projections (CEIP): ECE/EB.AIR/GE.1/2019/10–ECE/EB.AIR/WG.1/2019/22: Review of adjustment applications 2019; URL: https://www.ceip.at/fileadmin/inhalte/emep/pdf/2019/ECE_EB.AIR_GE.1_2019_10-1909789E.pdf, 2019 : 18 : Keller et al. (2017): Keller, M., Hausberger, S., Matzer, C., Wüthrich, P., & Notter, B.: Handbook Emission Factors for Road Transport, version 3.3 (Handbuch Emissionsfaktoren des Straßenverkehrs 3.3) URL: https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=2ahUKEwj0y67pi5foAhWB16QKHfpYDIgQFjAAegQIAhAB&url=https%3A%2F%2Fwww.hbefa.net%2Fd%2Fdocuments%2FHBEFA33_Hintergrundbericht.pdf&usq=AOvVaw2sOF884KtccVyWLItdt1CIZ - Dokumentation, Bern, 2017. : 19 : Notter et al. (2019): Keller, M., Althaus, H.-J., Cox, B., Knörr, W., Heidt, Ch., Biemann, K., Räder, D.: Handbook Emission Factors for Road Transport, version 4.1 (Handbuch Emissionsfaktoren des Straßenverkehrs 4.1), HBEFA 4.1 Development Report; URL: https://www.hbefa.net/e/documents/HBEFA41_Development_Report.pdf, Bern, Heidelberg, 21. August 2019. [bibliography](#)

¹⁾ (bibcite 4)

²⁾ (bibcite 1)

³⁾ (bibcite 3)

⁴⁾ (bibcite 2)

⁵⁾ (bibcite 4)

⁶⁾ (bibcite 5)

⁷⁾ (bibcite 6)

⁸⁾ (bibcite 18)

⁹⁾ (bibcite 19)