

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, 2012 a & 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). 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 “artificial” current emissions = virtual current emissions assuming no changes in emission factors 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



$$\begin{aligned} EM_{\text{adjustment}} &= AD_{\text{current}} * EF_{\text{current}} - AD_{\text{current}} * EF_{\text{original}} \\ &= AD_{\text{current}} * (EF_{\text{current}} - EF_{\text{original}}) \\ &= EM_{\text{current}} - EM_{\text{current "artificial"}} \end{aligned}$$

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 TREMOD, 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 (2021).

Unfortunately, the oldest TREMOD version available for such comparison is TREMOD 3.1 from 2002⁵⁾, 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 6.12 (Knörr et al., 2020a)⁶⁾.

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	-296.1	-300.7	-300.4	-305.2	-294.9	-274.9	-250.9	-221.1	-179.6	-144.8

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

NFR 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	84.99	-13%	77.64.842	67.690.906	9.993.935	-13%
1.A.3.b.i	diesel oil		629.380	629.380	0%	429.45	160.51	-63%	227.341.096	84.970.461	142.370.635	-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	gasoline		48.844	48.844	0%	823.00	482.55	-42%	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	64.851.951	8.333.900	-11%
1.A.3.b.i	diesel oil		553.564	553.564	0%	434.12	159.22	-63%	240.313.791	88.138.959	152.174.832	-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	gasoline		47.355	47.355	0%	592.65	448.99	-24%	28.071.221	21.268.323	6.804.898	-24%
1.A.3.b.iii	diesel oil		563.891	563.891	0%	410.38	244.97	-40%	231.410.271	138.135.342	93.273.929	-40%
1.A.3.b.iv	gasoline		19.289	19.289	0%	110.79	171.60	54%	2.137.002	3.299.162	-1.162.160	54%
1.A.3.b TOTAL	2011		2.106.883	2.106.883	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	58.677.229	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%	55.106.362	13.741.354	41.365.008	-75%
1.A.3.b.iii	gasoline		50.902	50.902	0%	533.22	384.33	-28%	27.141.913	19.563.200	7.578.704	-28%
1.A.3.b.iii	diesel oil		589.585	589.585	0%	381.33	224.00	-41%	234.829.180	132.064.753	102.764.428	-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	300.429.094	-49%
1.A.3.b.i	gasoline		749.114	749.114	0%	89.35	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%	257.633.728	93.499.010	164.134.718	-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		118.777	118.777	0%	480.60	114.93	-76%	57.083.533	13.690.488	43.433.045	-76%
1.A.3.b.iii	gasoline		51.716	51.716	0%	509.64	368.06	-29%	26.350.969	18.620.843	7.730.126	-29%
1.A.3.b.iii	diesel oil		600.139	600.139	0%	353.06	287.93	-19%	211.887.531	124.788.469	87.099.062	-41%
1.A.3.b.iv	gasoline		18.229	18.229	0%	104.34	175.38	68%	1.902.068	3.197.038	-1.294.951	68%
1.A.3.b TOTAL	2013		2.132.683	2.132.683	0%			0%	616.079.063	316.854.371	300.224.692	-50%
1.A.3.b.i	gasoline		752.526	752.526	0%	76.03	73.09	-4%	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	95.613.892	177.262.169	-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	gasoline		49.143	49.143	0%	468.37	339.99	-27%	23.017.115	16.708.234	6.308.881	-27%
1.A.3.b.iii	diesel oil		572.754	572.754	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	3.345.794	-1.467.499	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		135.386	135.386	0%	489.35	187.96	-77%	63.605.443	14.607.490	48.997.953	-77%
1.A.3.b.iii	gasoline		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	110.620.703	46.568.973	-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		2.161.376	2.161.376	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%	50.736.367	50.535.049	201.318	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%	180.27	171.05	-5%	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	50.496.725	-77%
1.A.3.b.iii	gasoline		54.157	54.157	0%	424.73	388.24	-7%	23.002.109	16.683.117	6.308.992	-27%
1.A.3.b.iii	diesel oil		594.013	594.013	0%	226.31	180.97	-20%	134.431.699	107.496.262	26.935.437	-20%
1.A.3.b.iv	gasoline		18.785	18.785	0%	95.14	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%	553.790.558	302.901.820	250.897.738	-45%
1.A.3.b.i	gasoline		724.571	724.571	0%	67.66	69.88	3%	49.026.074	50.634.714	-1.607.640	3%
1.A.3.b.i	diesel oil		696.592	696.592	0%	390.65	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		153.284	153.284	0%	424.66	183.89	-76%	65.093.930	15.925.216	49.168.714	-76%
1.A.3.b.iii	gasoline		53.382	53.382	0%	379.80	286.71	-23%	19.793.901	15.304.828	4.489.073	-23%
1.A.3.b.iii	diesel oil		596.263	596.263	0%	195.02	175.92	-10%	116.671.141	106.246.508	11.424.633	-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	304.469.986	221.079.424	-42%
1.A.3.b.i	gasoline		699.027	699.027	0%	64.42	68.36	6%	45.032.566	47.786.817	-2.753.250	6%
1.A.3.b.i	diesel oil		666.074	666.074	0%	371.66	163.30	-56%	247.556.063	108.768.604	138.787.459	-56%
1.A.3.b.ii	gasoline		6.315	6.315	0%	158.22	160.11	1%	999.159	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	gasoline		51.634	51.634	0%	309.75	263.53	-15%	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%	180.173.337	180.710.869	-537.532	1%
1.A.3.b.iv	gasoline		18.497	18.497	0%	89.66	184.61	106%	1.658.588	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		663.841	663.841	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	1.034.150	-57.931	5%
1.A.3.b.ii	diesel oil		159.183	159.183	0%	347.42	181.90	-71%	55.303.535	16.221.445	39.082.090	-71%
1.A.3.b.iii	gasoline		52.939	52.939	0%	274.41	247.81	-10%	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	106.809.376	-15.428.676	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		2.202.899	2.202.899	0%			0%	437.268.744	292.497.697	144.771.048	-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 [kg]	in [kg]	
1.A.3.a.i. Passenger Cars	Gasoline	pre-Cars	13,685	13,685	0%	584.75	514.25	-12%	7,955,060	6,996,917	-958,143	-12%
		Car 1	36,541	36,541	0%	338.50	297.71	-10%	25,915,925	19,189,262	-7,716,663	-30%
		Car 2	96,425	96,425	0%	172.95	135.63	-22%	16,580,020	13,020,026	-3,559,994	-22%
		Car 3	133,139	133,139	0%	58.51	70.18	20%	7,790,384	9,343,433	1,553,029	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%
	Car 6	0	0	0%	25.08	42.19	62%	2	3	1	62%	
	Gasoline total	795,957	795,957	0%	92.55	84.99	-8%	77,646,642	67,656,596	-9,990,045	-13%	
	Diesel Oil	pre-Cars	1,915	1,915	0%	318.13	264.95	-17%	583,760	527,256	-56,504	-10%
		Car 1	10,339	10,339	0%	294.42	245.17	-17%	3,044,428	2,741,387	-303,041	-10%
Car 2		50,088	50,088	0%	406.90	279.19	-40%	29,372,795	19,974,210	-9,398,584	-32%	
Car 3		134,025	134,025	0%	542.54	176.54	-67%	72,645,173	23,929,276	-48,715,897	-67%	
Car 4		279,154	279,154	0%	304.37	140.58	-53%	167,299,180	39,243,811	-128,055,369	-77%	
Car 5		53,547	53,547	0%	434.70	140.58	-68%	23,276,735	7,527,796	-15,748,939	-68%	
Car 6	334	334	0%	257.62	140.58	-45%	85,044	46,553	-38,491	-45%		
Diesel oil total	529,380	529,380	0%	429.45	160.55	-63%	227,347,096	84,970,461	-142,376,635	-63%		
Pkx Total	1,325,337	1,325,337	0%	238.12	155.14	-36%	364,985,938	152,627,057	-212,358,881	-58%		
1.A.3.b.i. Light Duty Vehicles (LDVs)	Gasoline	pre-Cars	1,249	1,249	0%	627.99	640.95	1%	783,320	906,871	123,551	16%
		Car 1	367	367	0%	361.95	297.39	-16%	368,969	186,620	-182,349	-50%
		Car 2	1,393	1,393	0%	264.75	184.41	-30%	368,840	256,917	-111,923	-30%
		Car 3	856	856	0%	82.47	30.83	-63%	70,631	77,625	6,994	10%
		Car 4	2,420	2,420	0%	36.32	44.90	24%	87,967	188,679	100,712	115%
		Car 5	49	49	0%	15.34	44.90	193%	750	2,218	1,468	193%
	Car 6	0	0	0%	0%	0%	0	0	0	0%		
	Gasoline total	6,345	6,345	0%	255.87	254.75	-0%	1,478,832	1,358,126	-120,706	-8%	
	Diesel Oil	pre-Cars	4,876	4,876	0%	425.99	386.79	-9%	2,077,142	1,436,983	-640,159	-31%
		Car 1	9,989	9,989	0%	398.59	276.24	-40%	2,389,095	1,289,630	-1,099,465	-46%
Car 2		13,126	13,126	0%	442.30	254.71	-42%	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	5,086,700	-12,569,183	-72%	
Car 4		54,581	54,581	0%	491.42	80.69	-84%	26,021,636	4,940,722	-21,080,914	-81%	
Car 5		1,629	1,629	0%	427.50	80.69	-79%	696,296	144,434	-551,862	-79%	
Car 6	0	0	0%	15.73	80.69	-42%	7	4	-3	-42%		
Diesel oil total	113,450	113,450	0%	476.34	134.94	-72%	54,043,533	15,351,584	-38,691,949	-72%		
LDVs Total	119,775	119,775	0%	464.70	139.18	-70%	55,658,966	16,685,913	-38,973,053	-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	-6%
		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%	10,866,776	7,289,299	-3,577,477	-33%
		Car 4	5,461	5,461	0%	448.63	351.65	-22%	2,650,016	1,921,527	-728,489	-22%
		Car 5	10,326	10,326	0%	327.28	182.33	-44%	3,882,417	1,882,644	-1,999,773	-51%
	Car 6	0	0	0%	0%	0%	0	0	0	0%		
	Diesel Total	48,044	48,044	0%	623.80	482.55	-23%	29,931,266	23,183,732	-6,747,534	-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%	626.28	274.48	-56%	161,136,182	59,617,271	-101,518,911	-63%	
Car 4		69,636	69,636	0%	368.34	290.62	-21%	27,183,867	20,146,636	-7,037,231	-26%	
Car 5		283,934	283,934	0%	276.42	151.65	-45%	78,643,643	43,115,897	-35,527,746	-45%	
Car 6	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%		
1.A.3.b.iii. Two-Wheelers (MOWs)	Gasoline	pre-Cars	7,973	7,973	0%	122.80	149.18	22%	972,721	1,189,353	216,632	22%
		Car 1	5,231	5,231	0%	123.77	165.74	34%	647,479	887,039	239,560	34%
		Car 2	3,587	3,587	0%	141.16	184.21	31%	585,362	696,661	111,299	19%
		Car 3	2,950	2,950	0%	38.11	184.21	387%	116,189	657,032	540,843	387%
		Car 4	0	0	0%	0%	0%	0	0	0	0%	
MOWs Total	19,172	19,172	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%	347.96	340.14	-31%	21,640,430	14,884,961	-6,755,469	-31%
		Car 2	87,083	87,083	0%	178.38	136.58	-24%	15,620,983	11,883,782	-3,737,201	-24%
		Car 3	124,330	124,330	0%	61.64	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	65%	17	20	3	11%	
	Gasoline total	794,688	794,688	0%	92.69	81.65	-11%	73,165,851	64,851,551	-8,314,300	-11%	
	Diesel Oil	pre-Cars	1,711	1,711	0%	318.10	264.95	-17%	511,883	453,197	-58,686	-11%
		Car 1	8,426	8,426	0%	297.32	245.85	-17%	2,585,115	2,239,987	-345,128	-13%
		Car 2	42,514	42,514	0%	407.93	279.27	-46%	17,384,549	13,921,916	-3,462,633	-20%
		Car 3	121,429	121,429	0%	555.36	176.55	-68%	67,437,053	21,681,366	-45,755,687	-68%
		Car 4	264,943	264,943	0%	388.88	143.48	-63%	162,917,881	39,089,755	-123,828,126	-63%
		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	80,138,959	-169,574,832	-63%	
	Pkx Total	1,348,252	1,348,252	0%	232.52	133.47	-43%	713,499,642	152,990,510	-560,509,132	-78%	
1.A.3.b.i. Light Duty Vehicles (LDVs)	Gasoline	pre-Cars	1,084	1,084	0%	626.25	640.95	1%	682,074	760,373	78,299	11%
		Car 1	283	283	0%	818.74	584.47	-29%	243,289	86,158	-157,131	-65%
		Car 2	1,184	1,184	0%	268.66	191.68	-29%	710,529	223,189	-487,340	-68%
		Car 3	783	783	0%	85.97	35.39	-59%	67,320	74,782	7,462	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	203%	1	2	1	203%
		Gasoline total	6,118	6,118	0%	229.35	186.57	-18%	1,483,081	1,254,776	-228,305	-15%
	Diesel Oil	pre-Cars	3,995	3,995	0%	425.99	386.79	-9%	1,989,280	1,225,652	-763,628	-38%
		Car 1	4,787	4,787	0%	398.71	276.24	-40%	1,984,260	1,030,426	-953,834	-48%
		Car 2	10,816	10,816	0%	336.90	153.18	-54%	3,644,582	2,091,063	-1,553,519	-43%
		Car 3	28,876	28,876	0%	541.53	150.54	-72%	15,037,249	4,345,870	-10,691,379	-72%
		Car 4	60,032	60,032	0%	493.82	80.69	-84%	30,039,914	5,429,811	-24,610,103	-84%
Car 5	6,609	6,609	0%	168.10	80.69	-50%	2,930,190	634,364	-2,295,826	-50%		
Car 6	0	0	0%	154.21	80.69	-47%	16	6	-6	-62%		
Diesel oil total	115,967	115,967	0%	485.58	126.92	-74%	55,848,558	14,783,142	-41,165,416	-74%		
LDVs total	122,085	122,085	0%	464.92	130.51	-72%	57,247,599	15,932,958	-41,314,641	-72%		
1.A.3.b.ii. Heavy Duty Vehicles (HDVs)	Diesel Oil	pre-Cars	2,620	2,620	0%	1062.69	1118.76	6%	2,639,189	2,671,331	32,142	1%
		Car 1	2,250	2,250	0%	752.91	571.48	-24%	1,830,781	1,696,237	-134,544	-7%
		Car 2	9,074	9,074	0%	804.17	643.36	-20%	7,297,125	5,927,569	-1,369,556	-20%
		Car 3	14,887	14,887	0%	630.95	545.89	-13%	9,425,890	6,880,837	-2,545,053	-28%
		Car 4	5,913	5,913	0%	448.80	381.24	-15%	2,367,138	1,685,274	-680,864	-28%
		Car 5	13,266	13,266	0%	336.40	182.62	-46%	4,589,052	2,446,399	-2,142,653	-46%
		Car 6	0	0	0%	154.21	80.69	-47%	16	6	-6	-62%
		Diesel total	47,365	47,365	0%	592.85	448.99	-24%	28,011,221	21,296,321	-6,804,899	-24%
	Gasoline	pre-Cars	8,044	8,044	0%	120.67	183.88	50%	8,395,423	6,144,933	-2,250,491	-26%
		Car 1	4,384	4,384	0%	758.16	574.04	-23%	3,280,422	2,516,377	-772,844	-23%
		Car 2	29,277	29,277	0%	817.97	520.51	-36%	23,947,723	15,233,223	-8,714,500	-36%
		Car 3	121,581	121,581	0%	636.56	372.68	-41%	77,215,020	46,312,437	-31,892,884	-41%
		Car 4	58,430	58,430	0%	393.25	269.43	-31%	22,977,714	16,969,865	-6,008,849	-26%
Car 5	342,755	342,755	0%	278.30	152.63	-45%	16,549,479	12,019,619	-4,529,860	-45%		
Car 6	0	0	0%	154.21	80.69	-47%	16	6	-6	-62%		
Gasoline total	563,891	563,891	0%	418.38	244.97	-40%	231,493,271	136,176,342	-95,317,929	-40%		
1.A.3.b.iii. Heavy Duty Trucks & Lorries	Diesel Oil	pre-Cars	7,389	7,389	0%	668.98	150.24	22%	668,588	1,170,176	501,588	22%
		Car 1	4,085	4,085	0%	124.72	168.26	35%	599,299	885,547	286,248	35%
		Car 2	3,544	3,544	0%	137.95	194.58	41%	485,552	689,633	204,081	41%
		Car 3	3,050	3,050	0%	39.59	194.58	382%	140,563	680,834	540,270	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%
		Car 6	0	0	0%	0	0	0%	0	0	0	0%
		Diesel total	19,289	19,289	0%	119.79	171.64	54%	2,137,067	3,295,152	1,158,085	54%
	Gasoline	pre-Cars	2,160,883	2,160,883	0%	306.80	157.85	-48%	632,365,736	312,625,435	-319,740,801	-48%
		Car 1	0	0	0%	0	0	0%	0	0	0	0%
		Car 2	0	0	0%	0	0	0%	0	0	0	0%
		Car 3	0	0	0%	0	0	0%	0	0	0	0%
		Car 4	0	0	0%	0	0	0%	0	0	0	0%

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%	7,026,041	6,189,785	-836,256	-52%	
		Car 1	47,487	47,487	0%	348.56	281.60	-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	-3,452,369	-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%	1,887,355	4,681,311	2,793,956	142%	
		Car 6	282	282	0%	25.05	45.13	74%	7,339	12,735	5,396	74%	
		Gasoline total	750,957	750,957	0%	85.73	78.89	-9%	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%	267.79	266.44	-1%	1,980,364	1,771,787	-208,577	-11%	
		Car 2	33,957	33,957	0%	406.82	279.27	-40%	13,887,432	7,445,646	-6,441,787	-46%	
		Car 3	183,539	183,539	0%	564.82	176.63	-69%	58,398,037	18,434,837	-39,963,200	-68%	
		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%	
1.A.3.b.i. Light Duty Vehicles (LDVs)	Gasoline	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%	455.96	158.66	-64%	242,962,982	88,096,639	-154,866,343	-64%	
		FCs Total	1,306,262	1,306,262	0%	234.61	152.29	-54%	386,442,896	186,673,597	-199,769,298	-54%	
		pre-Cars	962	962	0%	632.38	645.95	2%	607,779	621,146	13,417	2%	
		Car 1	232	232	0%	803.24	183.22	-65%	199,985	70,295	-129,691	-61%	
		Car 2	989	989	0%	271.16	195.74	-28%	268,134	133,538	-134,596	-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%	
	Diesel Oil	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	-13%	1,238,546	1,092,662	-145,884	-12%	
		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%	398.34	276.24	-30%	1,445,980	1,017,634	-428,346	-30%	
		Car 2	8,479	8,479	0%	336.40	133.28	-49%	2,852,325	1,639,772	-1,212,553	-43%	
Diesel Oil	Car 3	23,785	23,785	0%	558.53	150.44	-73%	13,050,281	3,566,082	-9,484,199	-73%		
	Car 4	59,485	59,485	0%	494.22	89.85	-82%	29,369,870	5,337,395	-24,032,475	-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	-61%	122	72	-50	-61%		
	Diesel oil total	114,350	114,350	0%	485.91	126.17	-79%	55,186,382	13,741,354	-41,445,028	-79%		
	LDVs Total	129,008	129,008	0%	489.51	125.61	-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	1918.45	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	457.61	-27%	9,073,197	6,889,744	-2,183,453	-27%	
Car 4			5,331	5,331	0%	468.10	361.85	-22%	2,642,179	1,677,777	-964,402	-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	13,295	9,334	236%	
Buses Total			50,962	50,962	0%	533.22	384.33	-28%	27,141,913	19,965,298	-7,176,615	-28%	
Diesel Oil		pre-Cars	6,922	6,922	0%	1036.95	758.82	-27%	7,107,543	5,252,345	-1,855,198	-27%	
		Car 1	3,630	3,630	0%	743.70	570.57	-24%	2,721,305	2,071,111	-650,194	-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	96,735	96,735	0%	634.65	370.21	-42%	61,387,137	35,888,665	-25,498,472	-42%	
		Car 4	50,550	50,550	0%	356.50	288.44	-19%	19,982,680	16,880,877	-3,101,723	-19%	
		Car 5	485,981	485,981	0%	261.24	152.32	-42%	116,149,955	61,626,577	-54,523,378	-42%	
1.A.3.b.iii. Heavy Duty Vehicle Trucks & Lorries	Gasoline	Car 6	2,380	2,380	0%	188.487	360.323	345%	188,487	360,323	171,836	223%	
		Trucks Total	589,585	589,585	0%	385.33	224.69	-41%	224,829,180	132,064,153	-92,765,027	-41%	
		pre-Cars	6,780	6,780	0%	122.76	151.03	23%	822,539	1,011,520	188,981	23%	
		Car 1	4,386	4,386	0%	124.61	171.39	39%	536,615	738,050	201,435	38%	
		Car 2	3,287	3,287	0%	136.22	184.55	43%	445,087	636,853	191,766	43%	
		Car 3	3,984	3,984	0%	38.66	184.55	382%	18,386	778,616	760,230	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%	
	MWVs Total	18,268	18,268	0%	107.43	173.28	61%	1,982,548	3,183,438	1,200,890	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	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	11,680	11,680	0%	618.27	649.35	-5%	7,011,641	6,967,452	-4,444,808	-5%
		Car 1	37,743	37,743	0%	353.78	341.68	-32%	13,362,966	9,129,436	-4,233,530	-32%
		Car 2	62,680	62,680	0%	188.93	139.33	-21%	11,889,922	8,722,244	-3,167,678	-21%
		Car 3	97,782	97,782	0%	66.38	73.19	10%	6,481,618	7,156,920	665,303	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%	88.25	74.85	-16%	69,190,687	56,671,737	-12,518,950	-18%
	Diesel Oil	pre-Cars	1,389	1,389	0%	312.32	284.56	-9%	433,081	368,136	-64,945	-9%
		Car 1	5,425	5,425	0%	298.42	266.79	-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	-46%
		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	233,786	233,786	0%	435.42	149.27	-66%	101,787,275	34,884,788	-66,902,487	-66%
		Car 6	4,536	4,536	0%	259.53	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	148,571,356	-169,152,379	-53%		
Gasoline	pre-Cars	981	981	0%	633.81	645.95	2%	568,320	575,293	6,973	2%	
	Car 1	184	184	0%	803.50	183.22	-65%	187,281	59,328	-127,953	-66%	
	Car 2	836	836	0%	274.42	291.18	21%	229,520	188,285	-41,235	-21%	
	Car 3	784	784	0%	52.66	181.79	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	965	965	0%	16.67	48.89	183%	16,187	47,268	31,081	183%	
	Car 6	1	1	0%	17.66	48.89	176%	26	72	46	176%	
	Gasoline total	5,578	5,578	0%	262.86	184.67	-3%	1,137,299	1,096,727	-40,572	-3%	
1.A.3.b.i. Light Duty Vehicles (LDVs)	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%	398.34	276.24	-30%	1,166,782	834,566	-332,216	-30%
		Car 2	6,982	6,982	0%	336.92	133.28	-49%	2,340,147	1,350,674	-989,473	-42%
		Car 3	20,421	20,421	0%	568.12	150.38	-73%	11,437,995	3,070,913	-8,367,082	-73%
		Car 4	55,087	55,087	0%	497.72	90.45	-82%	27,776,440	5,048,416	-22,728,024	-82%
	Gasoline	Car 5	29,024	29,024	0%	14,971	90.45	-80%	13,911,325	2,687,964	-10,483,361	-80%
		Car 6	41	41	0%	51.26	90.45	-40%	6,160	2,688	-2,472	-40%
		Diesel oil total	118,777	118,777	0%	488.66	184.63	-76%	47,083,533	13,656,488	-33,423,845	-76%
		LDVs total	126,354	126,354	0%	484.14	178.03	-76%	18,214,742	16,677,275	-1,537,467	-76%
		1.A.3.b.ii. Heavy Duty Vehicle Reses	Diesel Oil	pre-Cars	1,172	1,172	0%	1096.89	1118.23	-4%	1,249,028	1,194,143
Car 1	1,004			1,004	0%	727.95	170.88	-76%	766,620	791,181	24,561	76%
Car 2	6,084			6,084	0%	764.37	643.48	-19%	5,326,969	4,576,271	-750,697	-19%
Car 3	13,167			13,167	0%	628.43	457.65	-27%	8,262,880	5,988,202	-2,264,678	-27%
Car 4	4,945			4,945	0%	485.55	351.71	-27%	2,270,611	1,739,796	-538,814	-27%
Car 5	26,096			26,096	0%	388.98	183.48	-40%	8,435,683	4,420,713	-4,014,970	-40%
Car 6	537			537	0%	44.76	183.48	319%	34,047	86,572	52,525	319%
Buses Total	51,776	51,776	0%	509.54	380.06	-26%	26,790,969	16,620,483	-7,738,126	-26%		
pre-Cars	9,893	9,893	0%	1036.72	717.35	-29%	6,072,150	4,322,888	-1,748,263	-29%		
Car 1	2,985	2,985	0%	743.27	585.27	-24%	1,150,848	1,060,909	-89,939	-24%		
Car 2	16,444	16,444	0%	918.17	610.47	-33%	11,093,881	9,440,953	-1,652,928	-33%		
Car 3	78,750	78,750	0%	823.53	587.53	-29%	47,837,440	27,587,440	-20,250,000	-29%		
Car 4	42,781	42,781	0%	396.90	287.27	-27%	16,936,987	12,989,770	-4,457,217	-27%		
Car 5	436,969	436,969	0%	261.70	152.65	-40%	193,161,304	66,796,496	-126,364,807	-40%		
Car 6	18,020	18,020	0%	58.67	152.65	261%	913,082	2,750,630	1,837,548	261%		
Trucks Total	1,887,739	1,887,739	0%	353.86	287.20	-21%	211,087,531	124,188,949	-87,898,582	-41%		
1.A.3.b.iii. Heavy Duty Vehicle Trucks & Lorries	Diesel Oil	pre-Cars	6,362	6,362	0%	123.07	119.79	-2%	181,736	164,179	-16,557	-2%
		Car 1	4,013	4,013	0%	102.03	173.15	30%	562,073	694,880	132,807	30%
		Car 2	3,362	3,362	0%	132.24	195.58	40%	435,668	645,804	209,136	40%
		Car 3	4,562	4,562	0%	39.81	195.58	391%	181,610	882,175	716,565	391%
		Car 5	0	0	0%	0	0	0%	0	0	0	0%
Car 6	0	0	0%	0	0	0%	0	0	0	0%		
MWVs total	18,029	18,029	0%	104.34	175.38	68%	5,962,088	5,187,618	-1,294,851	-68%		
1.A.3.b. Road Transport		2,132,683	2,132,683	0%	288.88	145.76	-50%	616,079,063	390,854,371	-395,224,692	-50%	

NER Code	Fuel	Activity Data			Implied Emission Factor			MO ₂ Emissions				
		current	adjusted	difference	current	adjusted	difference	current	adjusted	difference		
		in [t]	in [t]	in [%]	in [kg/t]	in [kg/t]	in [%]	in [kg]	in [kg]	in [%]		
1.A.3.b.1 - Passenger Car	Gasoline	pre-Euro	116,607	116,607	0%	812.37	844.11	-11%	7,132,580	6,337,484	-796,044	-11%
		Euro 1	30,667	30,667	0%	364.77	263.93	-30%	11,062,246	7,480,541	-3,521,705	-30%
		Euro 2	53,486	53,486	0%	196.58	140.31	-29%	10,514,477	7,584,432	-3,816,844	-29%
		Euro 3	87,374	87,374	0%	68.31	75.83	0%	6,965,588	6,459,377	-424,216	7%
		Euro 4	387,139	387,139	0%	45.16	47.80	-3%	13,093,585	10,536,009	-2,557,535	-20%
		Euro 5	171,250	171,250	0%	18.50	47.80	157%	3,183,252	6,187,581	-5,004,289	157%
	Diesel Oil	Euro 1	82,316	82,316	0%	257.87	257.87	0%	20,757,688	43,317,341	-22,559,653	-48%
		Gasoline total	752,596	752,596	0%	70.30	73.69	-4%	52,275,533	56,998,591	-2,723,612	-5%
		pre-Euro	1,341	1,341	0%	311.73	264.96	-16%	217,967	356,266	-42,722	-16%
		Euro 1	4,962	4,962	0%	298.92	267.29	-11%	1,482,284	1,387,663	-165,161	-11%
		Euro 2	23,934	23,934	0%	406.71	220.45	-46%	9,734,484	5,276,400	-4,458,084	-46%
		Euro 3	82,749	82,749	0%	585.53	176.81	-69%	48,481,830	14,796,246	-33,685,589	-69%
	Petrol total	Euro 4	211,237	211,237	0%	307.27	151.77	-42%	83,917,068	32,059,973	-51,857,706	-42%
		Euro 5	285,011	285,011	0%	436.38	151.77	-65%	104,721,396	43,376,380	-61,345,036	-62%
		Euro 6	16,081	16,081	0%	253.34	151.77	-40%	4,175,580	2,640,686	-1,729,814	-40%
		Gasoline total	626,465	626,465	0%	220.45	180.12	-23%	22,835,061	19,640,913	-3,194,148	-14%
		Petrol total	1,338,551	1,338,551	0%	218.44	151.77	-30%	33,881,074	15,643,653	-17,478,267	-52%
1.A.3.b.2 - Light Duty Vehicles (LDV)	Gasoline	pre-Euro	996	996	0%	634.74	646.95	2%	589,663	575,724	-18,444	2%
		Euro 1	173	173	0%	886.21	389.96	-54%	150,074	53,575	-96,499	-64%
		Euro 2	748	748	0%	264.73	287.11	21%	212,888	154,839	-58,029	-27%
		Euro 3	177	177	0%	96.62	185.21	0%	75,952	81,070	5,878	7%
		Euro 4	1,067	1,067	0%	43.47	50.15	15%	81,129	83,610	12,475	15%
		Euro 5	1,374	1,374	0%	17.11	50.15	183%	23,517	30,616	6,491	183%
	Diesel Oil	Euro 6	17	17	0%	18.06	56.11	179%	312	672	360	179%
		Gasoline total	5,845	5,845	0%	498.34	176.49	-65%	5,114,544	1,031,652	-4,082,892	-80%
		pre-Euro	2,517	2,517	0%	426.76	378.73	-11%	1,066,675	287,719	-778,956	-20%
		Euro 1	2,588	2,588	0%	393.62	279.25	-30%	987,136	559,649	-427,428	-43%
		Euro 2	6,067	6,067	0%	338.61	183.25	-42%	1,985,985	1,180,889	-825,126	-42%
		Euro 3	18,220	18,220	0%	511.						

MFR Code	Fuel	Activity Data				Applied Emission Factor				NO _x Emissions			
		current	adjusted	difference	in %	current	adjusted	difference	in %	current	adjusted	adjustment	difference in %
		in [t]	in [t]	in [t]		in [kg/t]	in [kg/t]	in [t]		in [t]	in [t]	in [t]	in %
1.A.3.a.i. Passenger Cars	Gasoline	pre-Euro	11,380	11,380	0%	833.23	844.11	-10%	7,206.112	6,191.962	-1,014.150	-14%	
	Euro 1	34,112	34,112	0%	371.34	245.71	-34%	8,963.881	6,924.572	-3,029.229	-34%		
	Euro 2	42,925	42,925	0%	207.78	124.09	-37%	8,919.795	6,099.059	-2,818.646	-32%		
	Euro 3	72,871	72,871	0%	73.86	74.74	1%	5,381.351	5,440.237	58.887	1%		
	Euro 4	353,474	353,474	0%	52.36	49.62	-6%	18,485.037	17,326.221	-1,158.816	-6%		
	Euro 5	180,783	180,783	0%	19.11	49.62	157%	3,454.481	8,081.456	4,626.975	157%		
	Euro 6	23,012	23,012	0%	35.70	49.62	84%	750.781	1,413.103	662.322	84%		
	Gasoline Total	715,156	715,156	0%	34.38	37.83	9%	53,138.187	51,380.964	-1,757.223	-3%		
	Diesel Oil	pre-Euro	1,282	1,282	0%	318.32	264.96	-16%	387.917	320.733	-67.184	-16%	
	Euro 1	4,219	4,219	0%	298.14	261.43	-10%	1,261.930	1,129.989	-132.021	-10%		
Euro 2	19,689	19,689	0%	407.90	220.36	-46%	8,013.587	4,339.719	-3,674.786	-46%			
Euro 3	71,044	71,044	0%	595.91	179.04	-70%	42,271.649	12,719.962	-29,551.687	-70%			
Euro 4	182,410	182,410	0%	401.42	154.07	-62%	77,227.055	29,644.450	-47,593.205	-62%			
Euro 5	364,346	364,346	0%	434.62	154.07	-65%	132,290.493	46,890.424	-85,400.069	-65%			
Euro 6	52,676	52,676	0%	253.16	154.07	-41%	13,637.082	8,180.354	-5,456.728	-41%			
Diesel Oil Total	645,535	645,535	0%	406.19	154.08	-62%	275,136.233	183,161.591	-91,964.732	-62%			
LDN Total	5,360.121	5,360.121	0%	34.38	37.83	9%	58,347.000	55,544.444	-2,802.556	-5%			
1.A.3.a.ii. Light Duty Vehicles (LDV)	Gasoline	pre-Euro	979	979	0%	954.31	685.39	-28%	5,755.300	541.977	-5,213.323	-91%	
	Euro 1	180	180	0%	895.63	311.93	-65%	134.523	46.851	-87.672	-65%		
	Euro 2	629	629	0%	298.27	212.94	-29%	187.533	133.879	-53.654	-29%		
	Euro 3	781	781	0%	90.50	188.62	1%	73.989	76.155	2.166	3%		
	Euro 4	1,720	1,720	0%	47.96	51.30	9%	89.950	80.240	-9.710	-9%		
	Euro 5	1,620	1,620	0%	18.61	51.30	179%	29.912	83.086	53.274	179%		
	Euro 6	84	84	0%	18.71	51.30	174%	1.752	4.884	3.132	174%		
	Gasoline Total	5,193	5,193	0%	987.52	172.88	-8%	5,853.507	1,086.999	-4,766.508	-81%		
	Diesel Oil	pre-Euro	2,323	2,323	0%	474.91	386.79	-20%	598.185	775.521	257.336	20%	
	Euro 1	2,196	2,196	0%	391.47	495.43	26%	824.237	453.227	-371.010	-45%		
Euro 2	5,025	5,025	0%	334.81	183.29	-45%	1,622.296	971.296	-651.000	-40%			
Euro 3	15,781	15,781	0%	580.35	150.67	-74%	3,112.414	2,385.713	-726.701	-24%			
Euro 4	47,480	47,480	0%	501.73	91.74	-82%	23,782.396	4,340.290	-19,442.098	-82%			
Euro 5	62,116	62,116	0%	436.13	91.74	-79%	27,090.214	5,690.295	-21,393.809	-79%			
Euro 6	635	635	0%	154.91	91.74	-40%	87.768	60.230	-27.538	-40%			
Diesel Oil Total	135,356	135,356	0%	488.35	187.96	-77%	63,565.443	16,687.490	-46,877.953	-77%			
LDN Total	141,0												

Adjustment details for 2026

NFR Code	Fuel	Activity Data			Implied Emission Factor			NO _x Emissions			
		current	adjusted	difference	current	adjusted	difference	current	adjusted	difference	
		in [t]	in [t]	in [%]	in [g/t]	in [g/t]	in [%]	in [t]	in [t]	in [%]	
1.A.3.a.i - Passenger Cars	Gasoline	pre-Cars	15,782	15,782	0%	634.75	644.11	-14%	7,470,914	6,410,967	-1,059,947
		Car 1	20,270	20,270	0%	372.25	281.68	-30%	7,545,483	4,988,888	-2,556,595
		Car 2	36,062	36,062	0%	212.73	143.11	-33%	7,671,581	5,180,897	-2,490,684
		Car 3	83,039	83,039	0%	76.17	75.50	-1%	4,881,482	4,759,259	-122,223
		Car 4	334,413	334,413	0%	53.74	50.17	-7%	17,369,364	16,777,445	-591,919
		Car 5	183,374	183,374	0%	19.09	50.17	163%	3,580,745	9,189,834	5,609,089
		Car 6	66,332	66,332	0%	26.67	50.17	88%	1,768,917	3,327,855	1,558,938
		Gasoline total	715,272	715,272	0%	78.93	70.65	-9%	58,736,967	50,535,049	-8,201,918
	Diesel Oil	pre-Cars	1,280	1,280	0%	308.76	264.56	-14%	386,262	339,172	-47,090
		Car 1	3,749	3,749	0%	1,122.49	1,011.625	-10%	1,122,449	1,011,625	-110,824
		Car 2	16,584	16,584	0%	407.19	221.43	-46%	6,720,132	3,653,964	-3,066,168
		Car 3	81,398	81,398	0%	802.50	179.24	-78%	36,981,999	11,085,409	-25,896,590
		Car 4	175,940	175,940	0%	405.76	156.24	-61%	71,362,220	27,474,086	-43,888,134
		Car 5	299,654	299,654	0%	433.34	156.24	-64%	130,032,044	46,019,229	-83,912,815
1.A.3.b.i - Heavy Duty Vehicles - Trucks & Lorries	Gasoline	pre-Cars	1,136	1,136	0%	602.79	645.95	-1%	593,188	587,543	-5,645
		Car 1	930	930	0%	908.31	312.78	-66%	122,126	42,425	-79,701
		Car 2	540	540	0%	308.39	217.84	-29%	162,311	117,737	-44,574
		Car 3	650	650	0%	108.43	111.57	3%	70,432	72,731	2,299
		Car 4	1,684	1,684	0%	43.06	52.36	7%	78,714	84,003	5,289
		Car 5	1,724	1,724	0%	19.82	52.36	164%	34,157	80,258	46,101
		Car 6	363	363	0%	19.85	52.36	181%	6,764	19,992	13,228
		Gasoline total	5,606	5,606	0%	588.27	171.66	-7%	1,068,292	1,013,478	-54,814
	Diesel Oil	pre-Cars	2,189	2,189	0%	414.81	386.79	-7%	899,849	885,433	-14,416
		Car 1	1,780	1,780	0%	391.89	276.25	-30%	780,189	585,371	-194,798
		Car 2	4,223	4,223	0%	323.43	153.31	-53%	1,365,994	676,452	-689,542
		Car 3	13,582	13,582	0%	588.91	150.77	-74%	8,064,323	2,940,233	-5,124,090
		Car 4	43,141	43,141	0%	504.48	32.40	-93%	21,783,989	3,986,141	-17,797,848
		Car 5	74,231	74,231	0%	434.16	32.40	-93%	32,223,283	6,688,780	-25,534,503
1.A.3.b.ii - Heavy Duty Vehicles - Buses	Gasoline	pre-Cars	910	910	0%	602.79	645.95	-1%	593,188	587,543	-5,645
		Car 1	136	136	0%	908.31	312.78	-66%	122,126	42,425	-79,701
		Car 2	540	540	0%	308.39	217.84	-29%	162,311	117,737	-44,574
		Car 3	650	650	0%	108.43	111.57	3%	70,432	72,731	2,299
		Car 4	1,684	1,684	0%	43.06	52.36	7%	78,714	84,003	5,289
		Car 5	1,724	1,724	0%	19.82	52.36	164%	34,157	80,258	46,101
		Car 6	363	363	0%	19.85	52.36	181%	6,764	19,992	13,228
		Gasoline total	5,606	5,606	0%	588.27	171.66	-7%	1,068,292	1,013,478	-54,814
	Diesel Oil	pre-Cars	2,189	2,189	0%	414.81	386.79	-7%	899,849	885,433	-14,416
		Car 1	1,780	1,780	0%	391.89	276.25	-30%	780,189	585,371	-194,798
		Car 2	4,223	4,223	0%	323.43	153.31	-53%	1,365,994	676,452	-689,542
		Car 3	13,582	13,582	0%	588.91	150.77	-74%	8,064,323	2,940,233	-5,124,090
		Car 4	43,141	43,141	0%	504.48	32.40	-93%	21,783,989	3,986,141	-17,797,848
		Car 5	74,231	74,231	0%	434.16	32.40	-93%	32,223,283	6,688,780	-25,534,503
1.A.3.b.iii - Heavy Duty Vehicles - Tractors & Locomotives	Gasoline	pre-Cars	1,136	1,136	0%	602.79	645.95	-1%	593,188	587,543	-5,645
		Car 1	930	930	0%	908.31	312.78	-66%	122,126	42,425	-79,701
		Car 2	540	540	0%	308.39	217.84	-29%	162,311	117,737	-44,574
		Car 3	650	650	0%	108.43	111.57	3%	70,432	72,731	2,299
		Car 4	1,684	1,684	0%	43.06	52.36	7%	78,714	84,003	5,289
		Car 5	1,724	1,724	0%	19.82	52.36	164%	34,157	80,258	46,101
		Car 6	363	363	0%	19.85	52.36	181%	6,764	19,992	13,228
		Gasoline total	5,606	5,606	0%	588.27	171.66	-7%	1,068,292	1,013,478	-54,814
	Diesel Oil	pre-Cars	2,189	2,189	0%	414.81	386.79	-7%	899,849	885,433	-14,416
		Car 1	1,780	1,780	0%	391.89	276.25	-30%	780,189	585,371	-194,798
		Car 2	4,223	4,223	0%	323.43	153.31	-53%	1,365,994	676,452	-689,542
		Car 3	13,582	13,582	0%	588.91	150.77	-74%	8,064,323	2,940,233	-5,124,090
		Car 4	43,141	43,141	0%	504.48	32.40	-93%	21,783,989	3,986,141	-17,797,848
		Car 5	74,231	74,231	0%	434.16	32.40	-93%	32,223,283	6,688,780	-25,534,503
1.A.3.b.iv - Motorized Two-Wheelers (MOWs)	Gasoline	pre-Cars	1,136	1,136	0%	602.79	645.95	-1%	593,188	587,543	-5,645
		Car 1	930	930	0%	908.31	312.78	-66%	122,126	42,425	-79,701
		Car 2	540	540	0%	308.39	217.84	-29%	162,311	117,737	-44,574
		Car 3	650	650	0%	108.43	111.57	3%	70,432	72,731	2,299
		Car 4	1,684	1,684	0%	43.06	52.36	7%	78,714	84,003	5,289
		Car 5	1,724	1,724	0%	19.82	52.36	164%	34,157	80,258	46,101
		Car 6	363	363	0%	19.85	52.36	181%	6,764	19,992	13,228
		Gasoline total	5,606	5,606	0%	588.27	171.66	-7%	1,068,292	1,013,478	-54,814
	MOWs Total	pre-Cars	1,136	1,136	0%	602.79	645.95	-1%	593,188	587,543	-5,645
		Car 1	930	930	0%	908.31	312.78	-66%	122,126	42,425	-79,701
		Car 2	540	540	0%	308.39	217.84	-29%	162,311	117,737	-44,574
		Car 3	650	650	0%	108.43	111.57	3%	70,432	72,731	2,299
		Car 4	1,684	1,684	0%	43.06	52.36	7%	78,714	84,003	5,289
		Car 5	1,724	1,724	0%	19.82	52.36	164%	34,157	80,258	46,101
1.A.3.b.v - Road Transport	Gasoline	pre-Cars	1,136	1,136	0%	602.79	645.95	-1%	593,188	587,543	-5,645
		Car 1	930	930	0%	908.31	312.78	-66%	122,126	42,425	-79,701
		Car 2	540	540	0%	308.39	217.84	-29%	162,311	117,737	-44,574
		Car 3	650	650	0%	108.43	111.57	3%	70,432	72,731	2,299
		Car 4	1,684	1,684	0%	43.06	52.36	7%	78,714	84,003	5,289
		Car 5	1,724	1,724	0%	19.82	52.36	164%	34,157	80,258	46,101
		Car 6	363	363	0%	19.85	52.36	181%	6,764	19,992	13,228
		Gasoline total	5,606	5,606	0%	588.27	171.66	-7%	1,068,292	1,013,478	-54,814
	MOWs Total	pre-Cars	1,136	1,136	0%	602.79	645.95	-1%	593,188	587,543	-5,645
		Car 1	930	930	0%	908.31	312.78	-66%	122,126	42,425	-79,701
		Car 2	540	540	0%	308.39	217.84	-29%	162,311	117,737	-44,574
		Car 3	650	650	0%	108.43	111.57	3%	70,432	72,731	2,299
		Car 4	1,684	1,684	0%	43.06	52.36	7%	78,714	84,003	5,289
		Car 5	1,724	1,724	0%	19.82	52.36	164%	34,157	80,258	46,101

Adjustment details for 2018

NFR Code	Fuel	Activity Data			Implied Emission Factor			NO _x Emissions				
		current	adjusted	difference	current	adjusted	difference	current	adjusted	difference		
		in [t]	in [t]	in [%]	in [g/t]	in [g/t]	in [%]	in [t]	in [t]	in [%]		
1.A.3.a.i - Passenger Cars	Gasoline	pre-Cars	12,219	12,219	0%	637.58	644.11	-65%	7,780,965	6,648,721	-1,132,234	-15%
		Car 1	14,362	14,362	0%	374.34	341.68	-36%	5,371,161	3,448,643	-1,922,518	-36%
		Car 2	34,285	34,285	0%	221.97	111.68	-60%	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	3,358,617	-139,164	-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	186,030	186,030	0%	19.35	52.30	170%	3,228,282	8,725,688	5,497,406	170%
	Diesel Oil	pre-Cars	159,041	159,041	0%	6.00	52.30	0%	4,190,422	8,718,250	4,527,828	89%
		Car 1	689,007	689,007	0%	64.42	62.36	-3%	45,032,966	47,786,817	2,753,851	6%
		Car 2	1,363	1,363	0%	303.16	272.65	-10%	286,430	245,173	-41,257	-14%
		Car 3	2,849	2,849	0%	407.20	222.87	-45%	4,982,432	2,715,167	-2,267,265	-45%
		Car 4	10,784	10,784	0%	499.20	222.87	-55%	4,391,793	2,483,536	-1,908,258	-44%
		Car 5	40,786	40,786	0%	812.49	180.15	-78%	24,932,029	7,333,241	-17,598,788	-71%
	LNW Total	pre-Cars	130,534	130,534	0%	414.71	180.40	-56%	54,133,837	20,937,329	-33,196,508	-61%
		Car 1	251,212	251,212	0%	416.25	180.40	-56%	104,585,786	40,293,731	-64,292,055	-61%
		Car 2	220,685	220,685	0%	254.87	180.40	-31%	58,284,140	35,680,446	-22,603,694	-37%
		Car 3	666,076	666,076	0%	375.66	163.38	-56%	247,556,063	188,748,684	-158,807,379	-64%
		Car 4	1,365,181	1,365,181	0%	214.34	154.68	-28%	262,589,060	156,555,421	-106,033,639	-40%
		Car 5	911	911	0%	604.51	645.95	11%	596,859	582,662	-14,197	-2%
1.A.3.b.i - Light Duty Vehicles (LDV)	Gasoline	pre-Cars	189	189	0%	911.58	312.78	-66%	98,528	33,895	-64,633	-66%
		Car 1	377	377	0%	303.84	224.45	-26%	114,682	84,713	-29,969	-26%
		Car 2	511	511	0%	111.92	116.84	4%	57,282	60,739	3,457	6%
		Car 3	1,275	1,275	0%	52.02	54.36	4%	65,290	69,278	3,988	4%
		Car 4	1,483	1,483	0%	23.70	54.36	129%	35,160	80,626	45,466	129%
	Diesel Oil	pre-Cars	1,643	1,643	0%	19.18	54.36	182%	39,550	89,326	49,776	182%
		Car 1	6,315	6,315	0%	154.22	160.11	4%	999,199	1,011,138	11,939	1%
		Car 2	1,872	1,872	0%	411.51	386.79	-6%	771,337	574,742	-196,595	-26%
		Car 3	1,285	1,285	0%	389.94	276.25	-29%	483,129	272,296	-210,833	-44%
		Car 4	2,942	2,942	0%	318.56	153.88	-52%	965,389	550,789	-414,600	-43%
		Car 5	9,383	9,383	0%	558.10	150.74	-73%	5,689,152	1,411,299	-4,277,853	-75%
	LNW Total	pre-Cars	33,232	33,232	0%	508.42	93.81	-82%	15,929,185	3,117,457	-12,811,728	-80%
		Car 1	66,283	66,283	0%	432.92	93.81	-78%	28,684,080	6,217,860	-22,466,220	-78%
		Car 2	39,482	39,482	0%	158.79	93.81	-41%	5,941,615	3,686,228	-2,255,387	-38%
		Car 3	154,259	154,259	0%	384.71	182.69	-53%	59,344,525	35,880,316	-23,464,209	-48%
		Car 4	180,574	180,574	0%	375.86	184.94	-52%	69,343,125	36,851,449	-32,491,676	-52%
		Car 5	547	547	0%	1078.15	1919.23	78%	589,267	557,147	-32,120	-5%
	1.A.3.b.ii - Heavy Duty Vehicle Buses	Diesel Oil	pre-Cars	237	237	0%	732.78	732.57	0%	173,678	176,368	2,690
Car 1			2,270	2,270	0%	787.83	646.33	-18%	1,780,686	1,487,437	-293,249	-16%
Car 2			6,757	6,757	0%	638.89	459.32	-28%	4,262,734	3,183,482	-1,079,252	-25%
Car 3			3,043	3,043	0%	473.16	382.73	-19%	1,439,790	1,073,333	-366,457	-25%
Car 4			18,189	18,189	0%	362.42	186.37	-49%	6,663,265	3,376,016	-3,287,249	-49%
LNW Total		pre-Cars	20,670	20,670	0%	64.89	186.37	289%	1,176,026	3,662,314	2,486,288	289%
		Car 1	51,634	51,634	0%	309.75	283.53	-9%	15,993,526	13,687,186	-2,306,340	-15%
		Car 2	3,262	3,262	0%	1034.82	737.35	-29%	3,375,359	2,485,071	-890,288	-26%
		Car 3	1,094	1,094	0%	747.82	488.39	-35%	918,052	512,378	-405,674	-44%
		Car 4	5,544	5,544	0%	817.44	581.68	-29%	4,532,190	2,781,516	-1,750,674	-39%
		Car 5	20,583	20,583	0%	629.54	563.68	-10%	12,967,751	7,277,279	-5,690,472	-44%
LNW Total		pre-Cars	15,912	15,912	0%	358.89	276.23	-23%	6,334,421	4,386,424	-1,947,997	-31%
		Car 1	154,983	154,983	0%	250.40	154.68	-38%	45,964,153	24,283,389	-21,680,764	-47%
		Car 2	381,799	381,799	0%	68.78	154.68	125%	28,251,482	69,665,886	41,414,404	146%
		Car 3	585,186	585,186	0%	515.18	172.19	-67%	188,173,537	180,760,889	-7,412,648	-4%
		Car 4	4,940	4,940	0%	128.95	186.61	45%	622,656	783,451	160,795	26%
		Car 5	2,966	2,966	0%	128.14	177.79	41%	374,114	527,294	153,180	41%
1.A.3.b.iii - Motorised Two-Wheelers (M2W)		Gasoline	pre-Cars	3,221	3,221	0%	129.33	186.64	45%	387,596	639,833	252,237
	Car 1		6,241	6,241	0%	48.24	186.64	284%	20,126	1,239,686	1,219,560	598%
	Car 2		1,130	1,130	0%	58.41	186.64	220%	23,066	224,682	201,616	875%
	Car 3		0	0	0%	0.00	0.00	0%	0	0	0	0%
	Car 4		18,487	18,487	0%	85.86	186.64	198%	1,658,558	3,454,767	1,796,209	108%
	LNW Total	pre-Cars	2,180,983	2,180,983	0%	215.85	133.49	-38%	478,758,286	291,129,652	-187,628,634	-38%
		Car 1	1,130	1,130	0%	58.41	186.64	220%	23,066	224,682	201,616	875%
		Car 2	0	0	0%	0.00	0.00	0%	0	0	0	0%
		Car 3	18,487	18,487	0%	85.86	186.64	198%	1,658,558	3,454,767	1,796,209	108%
		Car 4	2,180,983	2,180,983	0%	215.85	133.49	-38%	478,758,286	291,129,652	-187,628,634	-38%
		Car 5	1,130	1,130	0%	58.41	186.64	220%	23,066	224,682	201,616	875%

Adjustment details for 2019

Detailed Data for 2022												
NFR Code	Fuel	Activity Data			Implied Emission Factor			NO _x Emissions				
		current	adjusted	difference	current	adjusted	difference	current	adjusted	difference		
		in [t]	in [t]	in [%]	in [g/t]	in [g/t]	in [%]	in [t]	in [t]	in [%]		
1.A.3.a.i - Passenger Cars	Gasoline	pre-Cars	13,648	13,648	0%	638.58	644.11	-65%	8,664,621	7,382,686	-1,281,935	-15%
		Car 1	12,427	12,427	0%	378.32	341.68	-36%	4,781,480	3,083,383	-1,698,096	-36%
		Car 2	20,086	20,086	0%	225.58	92.58	-59%	4,531,070	1,858,018	-2,672,852	-59%
		Car 3	38,216	38,216	0%	82.22	76.12	-7%	2,977,840	2,829,186	-148,654	-5%
		Car 4	295,220	295,220	0%	57.04	53.29	-7%	14,588,285	13,589,621	-998,664	-7%
		Car 5	180,537	180,537	0%	19.77	53.29	170%	3,173,728	8,584,356	5,410,628	170%
	Diesel Oil	pre-Cars	285,636	285,636	0%	25.63	53.29	180%	5,295,099	11,010,782	5,715,683	180%
		Car 1	174,681	174,681	0%	62.36	68.45	10%	43,961,941	48,238,025	4,276,084	10%
		Car 2	2,736	2,736	0%	313.70	244.61	-21%	313,180	244,621	-68,559	-21%
		Car 3	2,546	2,546	0%	298.80	272.65	-9%	764,913	687,786	-77,127	-10%
		Car 4	8,991	8,991	0%	407.19	229.16	-44%	3,620,286	2,037,480	-1,582,806	-44%
		Car 5	33,079	33,079	0%	615.11	180.42	-71%	20,310,125	5,967,483	-14,342,642	-71%
	LNW Total	pre-Cars	111,335	111,335	0%	419.17	182.44	-51%	48,688,685	10,885,228	-37,803,457	-78%
		Car 1	231,784	231,784	0%	419.37	182.44	-56%	95,117,643	37,650,997	-57,466,646	-60%
		Car 2	273,511	273,511	0%	227.36	182.44	-20%	62,183,230	44,429,184	-17,754,046	-29%
		Car 3	663,841	663,841	0%	345.81	165.67	-52%	229,566,088	189,582,982	-139,983,106	-52%
1.A.3.b.i - Light Duty Vehicles (LDV)	Gasoline	pre-Cars	1,368,532	1,368,532	0%	199.83	153.39	-23%	273,688,089	151,821,807	-121,866,282	-45%
		Car 1	526	526	0%	643.69	645.95	1%	611,459	587,992	-23,466	-4%
		Car 2	97	97	0%	315.58	272.78	-13%	89,353	30,396	-58,957	-66%
		Car 3	336	336	0%	368.43	212.45	-42%	36,158	70,848	34,690	96%
		Car 4	447	447	0%	112.68	121.47	8%	50,355	54,283	3,928	8%
		Car 5	1,136	1,136	0%	53.08	55.36	4%	49,692	62,199	12,507	25%
	Diesel Oil	pre-Cars	1,361	1,361	0%	25.34	55.36	119%	34,240	74,680	40,440	119%
		Car 1	2,420	2,420	0%	18.76	55.36	180%	45,389	133,733	88,343	180%
		Car 2	6,483	6,483	0%	148.86	153.39	5%	94,299	1,004,156	910,857	9%
		Car 3	1,164	1,164	0%	418.96	389.79	-7%	725,111	541,376	-183,735	-25%
		Car 4	1,079	1,079	0%	389.52	275.25	-29%	420,285	232,255	-188,030	-46%
		Car 5	2,334	2,334	0%	315.99	154.79	-50%	377,682	454,490	76,808	20%
	LNW Total	pre-Cars	7,740	7,740	0%	601.11	500.13	-17%	4,587,943	3,742,462	-845,481	-19%
		Car 1	20,711	20,711	0%	512.28	94.57	-82%	14,788,380	2,716,154	-12,072,226	-82%
		Car 2	58,794	58,794	0%	434.30	94.57	-78%	25,459,080	5,552,420	-19,906,660	-78%
		Car 3	69,531	69,531	0%	146.18	81.57	-43%	8,616,586	5,722,892	-2,893,694	-33%
1.A.3.b.ii - Heavy Duty Vehicles (HDV)	Diesel Oil	pre-Cars	159,183	159,183	0%	347.42	191.98	-44%	55,383,325	36,921,485	-18,461,840	-33%
		LDN Total	165,866	165,866	0%	339.31	183.97	-46%	56,279,594	37,248,596	-19,030,998	-34%
		Car 1	489	489	0%	1086.23	1193.23	10%	588,087	478,258	-109,829	-19%
		Car 2	147	147	0%	738.37	752.57	2%	188,232	110,933	-77,299	-41%
		Car 3	1,611	1,611	0%	629.67	645.57	10%	1,271,445	1,041,621	-229,824	-18%
		Car 4	5,709	5,709	0%	733.67	466.75	-36%	3,885,261	2,623,779	-1,261,482	-33%
	Diesel Oil	Car 5	2,747	2,747	0%	473.92	342.84	-28%	1,382,041	969,434	-412,607	-30%
		Car 6	17,190	17,190	0%	362.91	186.64	-49%	6,219,175	3,180,791	-3,038,384	-49%
		Car 7	25,135	25,135	0%	69.43	186.64	269%	5,918,961	4,686,133	-1,232,828	-21%
		Car 8	52,939	52,939	0%	274.81	247.83	-10%	14,547,072	15,138,878	1,488,806	10%
		Car 9	3,140	3,140	0%	1034.98	737.35	-29%	3,250,020	2,370,443	-879,577	-27%
		Car 10	989	989	0%	747.90	581.04	-22%	724,240	453,754	-270,486	-37%
	LNW Total	pre-Cars	4,560	4,560	0%	817.42	581.04	-29%	3,734,343	2,288,967	-1,445,376	-39%
		Car 1	16,377	16,377	0%	628.94	371.48	-41%	13,903,323	6,758,540	-7,144,783	-51%
		Car 2	15,137	15,137	0%	396.86	269.43	-33%	1,225,679	3,689,320	1,463,641	119%
		Car 3	185,213	185,213	0%	965.15	219.90	-77%	36,969,499	10,488,219	-26,481,280	-72%
1.A.3.b.iii - Motorcycles, Scooters, and Other Two-Wheelers (MOTV)	Gasoline	pre-Cars	432,496	432,496	0%	72.38	154.92	112%	11,735,486	67,683,853	55,948,367	477%
		Car 1	365,913	365,913	0%	73.15	169.17	130%	9,538,780	160,893,376	151,354,596	1575%
		Car 2	4,913	4,913	0%	125.89	164.79	31%	664,997	792,771	127,774	19%
		Car 3	2,835	2,835	0%	129.39	177.29	36%	355,496	582,589	227,093	64%
		Car 4	3,094	3,094	0%	119.33	180.66	51%	389,224	615,317	226,093	58%
		Car 5	6,082	6,082	0%	43.03	180.66	381%	284,284	1,193,617	909,333	319%
	LNW Total	pre-Cars	2,085	2,085	0%	21.68	180.66	817%	43,489	386,647	343,158	791%
		Car 1	0	0	0%	0.00	180.66	18066%	0	0	0	0%
	MOTV Total	pre-Cars	18,150	18,150	0%	86.95	180.63	107%	5,615,450	5,562,941	-52,509	-1%
		Car 1	2,262,080	2,262,080	0%	99.58	132.83	-23%	67,268,146	292,497,437	164,771,248	245%

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Adjustment 2014 (accepted) ^{7), 8)}	-105.6	-101.3	-95.7	-91.7						
Adjustment 2015 (accepted) ^{9), 10)}	-100.3	-95.5	-89.9	-85.1						
Adjustment 2016 (accepted) ^{11), 12)}	-151.3	-146.9	-145.1	-142.5	-128.1					
Adjustment 2017 (accepted) ¹³⁾	-151.3	-146.8	-145.0	-142.4	-127.2	-100.9				
Adjustment 2018 (accepted) ^{14), 15)}	-172.3	-174.5	-177.4	-180.4	-171.5	-148.9	-123.2			
Adjustment 2019 (accepted) ^{16), 17)}	-172.3	-174.5	-177.4	-180.3	-171.4	-148.8	-123.3	-93.7		
Adjustment 2020 (accepted) ¹⁸⁾	-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”. ¹⁹⁾

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 ²⁰⁾ 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 2020 adjustment proposal differed significantly from the adjustment applied for and accepted in 2019.

In comparison to 2020, the TREMOD model applied for the 2021 submission has been revised only slightly in terms of NO_x emission factors, taking into account results from ongoing measurement campaigns especially for EURO 6 vehicles. Hence, the 2021 adjustment proposal differs onyl slightly from the (accepted) proposal provided with submission 2020.

¹⁾ IIASA, 1999: Amann, M.; Bertok, I.; Cofala, J.; Gyarmas, 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>

²⁾ 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

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⁾ 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

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. (2020a): 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, 2020.

⁷⁾ 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.

⁹⁾ 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.

¹⁰⁾ 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.

¹¹⁾ 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.

¹²⁾ 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.

¹³⁾ 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.

¹⁴⁾ CEIP, 2018a: 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.

¹⁵⁾ CEIP, 2018b: https://www.ceip.at/fileadmin/inhalte/ceip/00_pdf_other/2018/adj_ece.eb.air.ge.1.2018.10-ece.eb.air.wg.1.2018.21_advance.pdf

¹⁶⁾ 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.

¹⁷⁾ CEIP, 2019b: https://www.ceip.at/fileadmin/inhalte/ceip/00_pdf_other/2019/ece_eb.air.ge.1_2019_10-1909789e.pdf

¹⁸⁾ CEIP, 2020: https://www.ceip.at/fileadmin/inhalte/ceip/00_pdf_other/2020/adj-status_ece_eb.air.ge.1_2020_10-2008939e.pdf

¹⁹⁾ 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%2FHBFA33_Hintergrundbericht.pdf&usq=AOvVaw2sOF884KtccVyWLItd1CIZ - Dokumentation, Bern, 2017.

²⁰⁾ 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.