

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) 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 “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 2002 ⁶⁾, 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) 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	-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		2.079.688	2.079.688	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%	1.902.688	3.197.038	-1.294.351	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%	61.546.575	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	189.65	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%	49.026.874	50.634.714	-1.607.840	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	13,686	13,686	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	84.39	-9%	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	-30%	29,372,795	19,974,210	-9,398,584	-32%	
Car 3		134,025	134,025	0%	542.54	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%	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	46,953	-38,091	-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%	364,985,538	152,627,057	-212,358,481	-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%	961.95	297.39	-69%	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	90.83	10%	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	0%	
	Gasoline total	6,345	6,345	0%	255.87	254.75	-0%	1,478,832	1,596,126	117,294	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%	398.18	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	5,086,760	-12,569,123	-72%	
Car 4		54,581	54,581	0%	491.42	80.69	-84%	26,021,036	4,940,722	-21,080,314	-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%	151.73	80.69	-47%	7	4	-3	-43%		
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 Vehicle Buses	Diesel Oil	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%	10,865,776	7,289,299	-3,576,477	-33%
		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	1,882,644	-1,999,773	-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%	
	Heavy Duty Trucks & Lorries	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	3,287,681	-973,702	-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%	626.26	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	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. Motorized Two-Wheelers (M2Ws)	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	887,039	239,560	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%	116,199	657,032	540,833	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%
M2Ws 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	-46%	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 [kg]		
1.A.3.a.i. Passenger Cars	Gasoline	pre-Cars	13,063	13,063	0%	592.96	534.69	-9%	7,720,235	6,979,435	-740,801	-10%	
		Car 1	61,979	61,979	0%	347.96	340.16	-2%	21,640,430	18,884,961	-2,755,469	-13%	
		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%	61.94	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	65%	17	20	3	15%		
	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%	318.16	264.95	-17%	511,863	453,197	-58,666	-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	-31%	17,384,549	13,921,916	-3,462,633	-20%		
Car 3		121,429	121,429	0%	555.36	170.55	-69%	67,437,053	21,681,366	-45,755,687	-69%		
1.A.3.a.ii. Heavy Duty Vehicles (HDVs)	Gasoline	Car 4	264,943	264,943	0%	388.88	143.48	-63%	162,917,881	39,089,755	-123,828,126	-76%	
		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	552,990,510	-160,509,132	-23%	
		Gasoline	pre-Cars	1,084	1,084	0%	626.25	640.95	1%	482,074	760,373	278,299	58%
	Car 1		283	283	0%	818.74	194.47	-76%	243,289	86,158	-157,131	-65%	
	Car 2		1,184	1,184	0%	268.66	191.66	-29%	310,529	223,189	-87,340	-28%	
	Car 3		783	783	0%	85.97	95.39	11%	67,320	74,782	7,462	11%	
	1.A.3.b.i. Light Duty Vehicles (LDVs)	Gasoline	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%	1,998,280	1,225,682	-772,598	-39%
			Car 1	4,787	4,787	0%	398.71	276.24	-30%	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	4,346,870	-10,690,379	-71%	
Diesel Oil		Car 4	60,032	60,032	0%	493.82	80.69	-84%	30,039,914	5,429,011	-24,610,904	-81%	
		Car 5	6,609	6,609	0%	449.36	80.69	-82%	3,030,190	584,364	-2,445,826	-80%	
	Car 6	0	0	0%	156.21	80.69	-49%	16	8	-6	-43%		
	LDVs total	115,967	115,967	0%	485.56	126.90	-74%	56,848,598	14,781,142	-42,067,456	-74%		
1.A.3.b.ii. Heavy Duty Vehicles (HDVs)	Gasoline	LDVs Total	122,085	122,085	0%	468.92	130.51	-72%	17,247,399	19,932,808	2,685,409	15%	
		pre-Cars	2,620	2,620	0%	1062.63	1918.76	8%	2,896,189	2,671,331	-224,858	-8%	
		Car 1	2,250	2,250	0%	752.91	751.43	0%	1,039,187	1,096,297	57,110	5%	
		Car 2	9,074	9,074	0%	804.17	143.36	-82%	7,827,125	5,037,695	-2,789,430	-36%	
		Car 3	14,181	14,181	0%	633.46	457.38	-29%	9,425,090	6,689,064	-2,736,026	-29%	
		Car 4	56,037	56,037	0%	448.88	351.91	-21%	2,363,338	1,685,274	-678,064	-29%	
	Diesel Oil	Car 5	13,296	13,296	0%	336.60	182.62	-46%	4,569,062	2,446,399	-2,122,663	-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%	28,011,221	21,256,323	-6,754,898	-24%	
		HDVs Total	8,044	8,044	0%	1038.67	783.98	-25%	8,355,423	6,144,933	-2,210,490	-27%	
1.A.3.b.iii. Heavy Duty Trucks & Lorries	Gasoline	Car 1	29,277	29,277	0%	817.97	504.30	-38%	23,947,723	15,233,223	-8,714,500	-36%	
		Car 2	121,429	121,429	0%	804.17	372.69	-53%	17,271,625	48,752,437	31,480,812	182%	
		Car 3	68,430	68,430	0%	305.25	150.63	-50%	22,977,784	16,960,483	-6,017,301	-26%	
		Car 4	342,175	342,175	0%	278.30	120.63	-57%	95,549,479	62,679,687	-32,869,792	-34%	
		Car 5	0	0	0%	0	0	0%	0	0	0	0%	
		Trucks Total	563,891	563,891	0%	418.38	244.97	-40%	233,493,271	138,136,342	-95,356,929	-41%	
	Diesel Oil	pre-Cars	7,389	7,389	0%	122.58	150.34	22%	965,588	1,110,176	144,588	15%	
		Car 1	4,085	4,085	0%	124.72	180.26	45%	599,299	885,547	286,248	48%	
		Car 2	3,544	3,544	0%	137.85	194.58	41%	488,552	680,633	192,081	41%	
		Car 3	3,550	3,550	0%	39.55	194.58	382%	140,563	630,634	490,071	345%	
Gasoline	Car 4	0	0	0%	0	0	0%	0	0	0	0%		
	Car 5	0	0	0%	0	0	0%	0	0	0	0%		
HDVs Total	79,893	79,893	0%	118.79	171.64	54%	2,177,062	3,299,152	1,122,090	51%			
1.A.3.b. Road Transport	Total	2,160,883	2,160,883	0%	305.90	157.85	-48%	132,365,736	131,625,655	-740,081	0%		

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	11,581	11,581	0%	607.72	635.38	-52%	7,035,041	6,189,785	-845,256	-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	137.82	-25%	13,487,749	10,035,380	-3,452,369	-25%
		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	143%	1,887,355	4,681,311	2,793,956	143%
	Car 6	282	282	0%	25.05	45.13	74%	7,339	12,736	5,396	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	286.44	-4%	1,980,364	1,771,787	-208,577	-11%
Car 2		33,967	33,967	0%	408.82	279.27	-40%	13,887,432	7,445,646	-6,441,787	-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%	259.84	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	1,305,512	1,305,512	0%	234.67	152.29	-35%	386,442,896	146,673,867	-239,769,029	-35%		
1.A.3.b.ii. Heavy Duty Vehicles (LDV)	Gasoline	pre-Cars	962	962	0%	632.38	645.95	2%	607,779	621,166	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	82,082	7,459	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	183.15	-15%	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%	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%	
Car 3		23,785	23,785	0%	558.53	150.44	-73%	13,050,281	3,565,082	-9,485,199	-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	-81%	122	72	-50	-41%		
Diesel oil total	114,350	114,350	0%	485.91	120.17	-75%	55,186,382	13,741,354	-41,445,028	-75%		
FCs Total	129,008	129,008	0%	489.51	123.61	-74%	56,344,903	14,834,656	-41,510,247	-74%		
1.A.3.b.iii. Heavy Duty Motorized Buses	Gasoline	pre-Cars	1,326	1,326	0%	1093.46	1119.45	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	437.61	-31%	9,073,137	6,089,744	-2,983,393	-31%
		Car 4	5,331	5,331	0%	468.10	361.85	-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	13,295	9,334	236%	
	Buses Total	50,962	50,962	0%	533.22	384.33	-28%	27,141,913	19,965,288	-7,176,625	-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		60,550	60,550	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%	116,149,855	61,626,577	-54,523,278	-42%	
Car 6	2,380	2,380	0%	188.487	360.323	345%	188,487	360,323	171,836	223%		
Buses Total	589,585	589,585	0%	385.33	224.69	-41%	224,829,180	132,064,153	-92,765,027	-41%		
1.A.3.b.iv. Two-Wheelers (M2V)	Gasoline	pre-Cars	6,780	6,780	0%	122.76	151.03	23%	822,530	1,011,520	188,991	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	184.55	45%	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%
M2Vs Total	18,268	18,268	0%	107.43	173.28	61%	1,982,546	3,165,438	1,182,891	61%		
1.A.3.b. Road Transport	Total	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

Table 1.3.a.i. Passenger Cars												
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	115,880	115,880	0%	618.27	649.35	-5%	7,011,641	6,967,452	-44,189	-5%
		Car 1	37,743	37,743	0%	353.78	341.68	-3%	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	675,302	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	1,613,116	1,613,116	0%	88.35	74.85	-16%	68,190,887	56,671,737	-11,519,150	-17%	
	Diesel Oil	pre-Cars	1,389	1,389	0%	312.32	284.56	-9%	433,081	368,136	-64,945	-9%
		Car 1	5,625	5,625	0%	298.42	286.79	-4%	1,678,472	1,640,688	-37,784	-1%
Car 2		28,437	28,437	0%	408.84	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		233,786	233,786	0%	435.42	149.27	-66%	101,787,275	34,884,788	-66,902,487	-66%	
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	1,338,247	1,338,247	0%	237.40	111.77	-53%	317,723,135	146,576,886	-171,146,249	-53%		
1.A.3.a.ii. Light Duty Vehicles (LDV)	Gasoline	pre-Cars	981	981	0%	633.81	645.95	2%	568,320	575,293	6,973	1%
		Car 1	184	184	0%	803.50	183.22	-65%	187,281	59,528	-127,753	-61%
		Car 2	836	836	0%	274.42	291.18	6%	229,520	188,285	-41,235	-27%
		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	47,288	31,101	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%	1,137,289	1,096,727	-40,562	-3%	
	Diesel Oil	pre-Cars	2,744	2,744	0%	424.37	386.79	-9%	1,168,757	944,928	-223,829	-20%
		Car 1	2,945	2,945	0%	398.34	276.24	-30%	1,166,782	834,566	-332,216	-29%
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%	
Diesel Oil total	55,087	55,087	0%	497.72	90.45	-82%	27,774,440	5,048,416	-22,726,024	-82%		
LDVs total	29,024	29,024	0%	511.37	80.45	-80%	12,181,325	2,687,964	-9,493,361	-80%		
Car 6	41	41	0%	161.28	80.45	-40%	6,160	2,688	-3,472	-40%		
Diesel oil total	118,177	118,177	0%	488.66	114.63	-77%	57,083,523	13,656,480	-43,427,043	-77%		
LDVs total	124,764	124,764	0%	464.14	116.03	-75%	58,214,142	14,677,276	-43,536,867	-75%		
1.A.3.a.iii. Heavy Duty Vehicles (HDV)	Diesel Oil	pre-Cars	1,172	1,172	0%	1066.69	1018.23	-5%	1,249,023	1,194,143	-54,880	-4%
		Car 1	1,054	1,054	0%	727.98	750.99	3%	766,620	793,181	26,561	3%
		Car 2	6,084	6,084	0%	784.07	643.48	-18%	5,234,981	4,370,791	-864,190	-17%
		Car 3	13,187	13,187	0%	626.43	586.86	-7%	12,032,580	10,980,980	-1,051,600	-9%
		Car 4	4,946	4,946	0%	868.55	812.70	-6%	2,278,061	2,078,234	-199,826	-9%
		Car 5	24,096	24,096	0%	358.88	183.44	-49%	8,435,643	4,420,134	-4,015,509	-48%
	Car 6	537	537	0%	44.76	183.44	310%	26,047	86,672	74,625	310%	
	Diesel total	51,776	51,776	0%	509.54	360.06	-29%	26,390,969	19,620,883	-7,770,126	-29%	
	Gasoline	5,083	5,083	0%	120.52	737.35	29%	6,972,190	4,322,888	-2,649,302	-38%	
	Car 1	2,985	2,985	0%	743.27	588.27	-21%	2,176,945	1,650,969	-525,977	-24%	
Car 2	18,444	18,444	0%	818.17	513.47	-37%	15,089,861	9,489,975	-5,599,886	-37%		
Car 3	75,130	75,130	0%	633.53	367.33	-42%	47,581,440	27,787,360	-19,794,080	-42%		
Car 4	42,781	42,781	0%	366.90	287.37	-22%	16,936,887	12,280,770	-4,656,117	-28%		
Car 5	236,998	236,998	0%	361.70	152.65	-58%	123,145,324	66,786,746	-56,358,578	-58%		
Car 6	19,020	19,020	0%	63.87	152.65	239%	913,082	2,750,630	1,837,548	239%		
Trucks Total	980,139	980,139	0%	593.96	287.83	-51%	211,857,331	124,188,489	-87,668,842	-41%		
pre-Cars	6,362	6,362	0%	123.57	151.79	23%	181,736	964,179	152,443	23%		
Car 1	4,013	4,013	0%	125.11	175.15	41%	582,073	694,880	112,807	30%		
Car 2	3,382	3,382	0%	132.24	195.68	49%	435,668	645,804	209,136	48%		
Car 3	4,682	4,682	0%	39.81	195.68	381%	181,610	882,175	716,565	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%		
Car 6	0	0	0%	0	0	0%	0	0	0	0%		
HDVs total	18,229	18,229	0%	164.34	175.38	6%	1,962,085	5,181,628	3,219,543	68%		
1.A.3.b. Road Transport Total		2,132,083	2,132,083	0%	208.88	145.35	-36%	616,079,063	390,854,371	-225,224,692	-37%	

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	6,337,484	-795,844	-11%	
		Car 1	30,667	30,667	0%	368.77	343.93	-32%	11,062,246	7,480,541	-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%	6,955,585	6,459,757	-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%	3,183,252	8,187,581	5,004,299	151%	
	Car 6	10,315	10,315	0%	25.97	47.80	84%	267,855	433,096	165,241	84%		
	Gasoline total	752,526	752,526	0%	73.80	73.89	-0%	57,215,533	54,998,921	-2,216,612	-4%		
	Diesel Oil	pre-Cars	1,341	1,341	0%	311.73	284.66	-5%	417,967	365,246	-52,722	-5%	
		Car 1	4,992	4,992	0%	298.92	267.29	-11%	1,482,264	1,387,643	-155,951	-11%	
Car 2		23,934	23,934	0%	408.71	320.45	-49%	9,734,484	5,276,480	4,458,004	-49%		
Car 3		82,749	82,749	0%	585.53	176.81	-69%	48,451,830	14,796,245	33,655,585	-69%		
1.A.3.b.i. - Light Duty Vehicles (LDVs)	Gasoline	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	81,343,096	-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%	
		Flx Total	1,338,571	1,338,571	0%	298.44	152.15	-53%	588,091,594	154,612,813	433,478,781	-53%	
		Diesel Oil	pre-Cars	986	986	0%	632.14	645.95	-2%	160,583	176,124	-15,844	-2%
	Car 1		173	173	0%	968.27	989.96	-64%	150,074	53,575	96,499	-64%	
	Car 2		748	748	0%	204.73	287.11	-21%	212,888	154,839	-58,029	-21%	
	Car 3		771	771	0%	98.62	185.21	7%	75,992	81,070	-5,078	7%	
	1.A.3.b.ii. - Heavy Duty Vehicles - Buses	Diesel Oil	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	193%	23,517	68,918	-45,401	193%	
Car 6			17	17	0%	18.06	50.15	179%	212	870	-657	179%	
Gasoline total			5,845	5,845	0%	198.34	176.49	-2%	1,112,584	1,031,852	88,732	-2%	
pre-Cars			2,537	2,537	0%	428.16	386.79	-21%	1,985,919	776,259	1,209,659	-21%	
Car 1			2,589	2,589	0%	393.82	276.25	-49%	987,136	539,898	447,328	-49%	
Diesel Oil		Car 2	6,087	6,087	0%	338.91	133.25	-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	21,460,740	-82%	
		Car 5	46,749	46,749	0%	438.64	91.69	-79%	20,696,234	4,258,626	16,437,608	-79%	
Car 6	187	187	0%	151.18	91.69	-60%	29,829	17,974	-11,855	-60%			
Diesel oil total	128,578	128,578	0%	415.56	170.96	-77%	61,146,575	14,267,237	46,879,338	-77%			
LDVs total	134,423	134,423	0%	463.16	153.81	-75%	62,259,160	15,298,489	46,960,671	-75%			
1.A.3.b.iii. - Heavy Duty Vehicles - Trucks & Lorries	Diesel Oil	pre-Cars	984	984	0%	1099.48	1919.23	-5%	1,062,384	1,062,921	-48,433	-5%	
		Car 1	837	837	0%	728.12	170.99	-2%	939,232	628,359	310,827	-2%	
		Car 2	5,586	5,586	0%	704.95	643.67	-9%	4,284,320	3,683,441	-598,887	-9%	
		Car 3	11,221	11,221	0%	621.20	458.38	-21%	7,082,740	5,143,520	-1,939,220	-21%	
		Car 4	4,270	4,270	0%	461.10	351.79	-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	3,661,289	-49%	
		Car 6	4,182	4,182	0%	42.78	183.99	330%	178,913	789,476	-610,563	330%	
		Buses Total	49,143	49,143	0%	468.37	339.99	-27%	23,017,115	16,788,234	6,228,881	-27%	
	Trucks Total	pre-Cars	4,182	4,182	0%	1034.34	737.35	-29%	4,945,942	3,525,898	-1,420,134	-29%	
		Car 1	2,285	2,285	0%	748.66	561.41	-25%	1,600,085	1,237,759	-362,326	-25%	
1.A.3.b.iv. - Heavy Duty Vehicles - Motorised Two-Wheelers (MOWs)	Gasoline	Car 2	13,623	13,623	0%	817.90	510.38	-38%	11,445,865	6,565,736	4,880,129	-38%	
		Car 3	54,685	54,685	0%	632.52	364.41	-42%	36,589,677	19,927,835	16,661,841	-42%	
		Car 4	34,037	34,037	0%	396.37	285.34	-30%	13,481,158	9,711,896	3,769,262	-30%	
		Car 5	389,263	389,263	0%	282.92	153.65	-46%	110,112,782	59,688,643	50,424,139	-46%	
		Car 6	34,214	34,214	0%	63.96	153.65	189%	3,937,089	11,368,582	-7,431,413	189%	
		Trucks Total	572,754	572,754	0%	314.85	196.65	-38%	179,874,133	112,285,562	67,588,571	-38%	
		Motorised Two-Wheelers (MOWs)	pre-Cars	6,185	6,185	0%	122.85	158.64	29%	795,185	974,388	-218,152	29%
			Car 1	3,037	3,037	0%	134.71	174.84	40%	478,514	670,859	-192,346	40%
	1.A.3.b. - Road Transport	Gasoline	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	386%	299,722	1,041,189	-821,467	386%
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			18,673	18,673	0%	108.59	179.24	78%	1,878,294	3,386,734	-1,508,439	78%	
Total			2,153,563	2,153,563	0%	277.27	140.35	-49%	597,120,297	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 [kg]	
1.A.3.a.i. - Passenger Cars	Gasoline	pre-Cars	11,380	11,380	0%	823.37	844.11	-14%	7,264,112	6,191,942	-1,072,169	-14%
		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	-2,819,646	-32%
		Car 3	72,871	72,871	0%	73.86	74.74	1%	5,381,351	5,446,237	64,887	1%
		Car 4	363,474	363,474	0%	52.30	49.62	-5%	18,485,637	17,326,221	-1,159,416	-5%
		Car 5	180,783	180,783	0%	19.11	49.62	151%	3,454,481	0,881,456	5,406,375	151%
	Car 6	29,612	29,612	0%	25.70	49.62	84%	790,781	1,451,433	658,752	84%	
	Gasoline total	715,156	715,156	0%	74.38	71.73	-4%	53,196,187	51,380,983	1,815,204	-4%	
	Diesel Oil	pre-Cars	1,382	1,382	0%	310.30	284.66	-5%	367,913	339,733	-28,180	-5%
		Car 1	4,279	4,279	0%	298.14	267.84	-9%	1,261,930	1,129,989	-132,021	-9%
Car 2		19,689	19,689	0%	407.80	320.36	-49%	8,913,587	4,338,719	4,574,868	-49%	
Car 3		71,044	71,044	0%	595.91	179.64	-70%	42,271,648	12,719,962	29,551,686	-70%	
1.A.3.b.i. - Heavy Duty Vehicles (HDV)	Gasoline	Car 4	182,410	182,410	0%	401.42	154.67	-62%	77,237,655	29,644,450	47,593,206	-62%
		Car 5	364,346	364,346	0%	434.67	154.67	-65%	132,290,433	46,090,424	86,400,009	-65%
		Car 6	62,576	62,576	0%	259.76	154.67	-41%	13,657,082	0,180,384	13,476,698	-41%
		Diesel oil total	645,565	645,565	0%	426.19	159.88	-63%	275,138,233	163,163,591	111,974,732	-63%
		Flx Total	1,360,721	1,360,721	0%	245.48	113.52	-53%	538,334,420	154,544,484	383,789,936	-53%
		Gasoline	pre-Cars	979	979	0%	664.37	645.95	-1%	1,375,361	1,617,977	-242,616
	Car 1		150	150	0%	895.63	911.93	-6%	134,523	46,851	87,672	-6%
	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%
	1.A.3.b.ii. - Heavy Duty Vehicles (HDV)	Diesel Oil	Car 4	1,720	1,720	0%	47.06	51.30	9%	80,950	80,240	7,290
Car 5			1,620	1,620	0%	18.41	51.30	179%	29,912	83,086	-53,174	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%	1,683,507	1,680,999	2,508	-8%
pre-Cars			2,323	2,323	0%	418.91	386.79	-26%	986,185	712,531	273,654	-26%
Car 1			2,186	2,186	0%	391.47	276.25	-49%	924,270	453,227	471,043	-49%
Diesel Oil		Car 2	5,025	5,025	0%	324.91	133.25	-49%	1,632,296	971,296	661,020	-49%
		Car 3	15,781	15,781	0%	588.35	150.67	-74%	9,112,414	2,367,713	6,744,701	-74%
		Car 4	47,480	47,480	0%	501.73	31.74	-92%	23,732,396	3,486,290	19,246,106	-92%
		Car 5	62,116	62,116	0%	436.13	91.74	-79%	27,090,216	5,680,295	21,329,800	-79%
Car 6	635	635	0%	154.91	91.74	-40%	87,758	68,230	-19,528	-40%		
Diesel oil total	135,586	135,586	0%	406.35	187.96	-77%	63,565,843	16,681,490	46,884,353	-77%		
LDVs Total	147,098	147,098	0%	476.76	170.62	-76%	64,989,320	15,680,490	49,308,831	-76%		
1.A.3.b.iii. - Heavy Duty Vehicle Fleets	Diesel Oil	pre-Cars	979	979	0%	1070.34	1019.23	-2%	1,048,312	996,256	-52,056	-2%
		Car 1	747	747	0%	728.26	513.91	-3%	545,471	481,636	-63,835	-3%
		Car 2	5,211	5,211	0%	767.43	644.46	-4%	4,163,687	3,359,634	804,053	-4%
		Car 3	11,282	11,282	0%	633.90	458.67	-28%	7,141,732	5,174,989	1,966,743	-28%
		Car 4	4,586	4,586	0%	468.70	351.99	-25%	2,154,066	1,614,177	539,889	-25%
		Car 5	34,267	34,267	0%	368.77	184.59	-49%	8,727,060	4,277,641	4,449,419	-49%
	Car 6	5,294	5,294	0%	63.13	184.59	241%	277,542	964,225	-686,684	241%	
	Dieses Total	52,887	52,887	0%	436.96	327.99	-29%	23,987,817	17,149,448	6,838,370	-29%	
	Diesel Oil	pre-Cars	4,379	4,379	0%	1034.89	737.35	-29%	4,468,571	3,184,428	1,284,143	-29%
		Car 1	1,083	1,083	0%	748.71	553.48	-26%	1,387,281	1,025,551	361,740	-26%
Car 2		11,082	11,082	0%	817.38	585.99	-30%	3,072,940	5,623,440	-2,439,301	-30%	
Car 3		43,481	43,481	0%	765.45	361.64	-43%	27,460,779	9,123,221	18,337,557	-43%	
1.A.3.b.iv. - Heavy Duty Vehicle Fleets and Lorries	Diesel Oil	Car 4	29,223	29,223	0%	966.36	285.72	-60%	11,572,868	8,294,180	3,278,708	-60%
		Car 5	309,726	309,726	0%	264.17	153.49	-46%	93,413,973	60,456,496	32,957,477	-46%
		Car 6	570,787	570,787	0%	67.48	183.49	161%	8,913,364	26,282,637	-18,369,684	161%
		Trucks Total	589,871	589,871	0%	264.68	153.49	-38%	197,189,625	170,520,781	26,668,845	-38%
		pre-Cars	5,744	5,744	0%	125.41	157.28	25%	720,441	983,470	-263,028	25%
		Car 1	3,517	3,517	0%	127.40	170.22	33%	444,086	619,819	-175,733	33%
	Gasoline	Car 2	3,382	3,382	0%	127.35	186.53	5%	430,660	665,965	-236,305	5%
		Car 3	5,011	5,011	0%	49.29	186.53	389%	234,126	1,144,416	-910,289	389%
		Car 4	6	6	0%	16.96		-180%	69	884	-736	1001%
		Car 5	0	0	0%			0%	0	6	-6	0%
MGNs Total	18,459	18,459	0%	99.52	180.65	82%	5,833,382	5,334,472	1,501,896	82%		
1.A.3.b. - Road Transport	Total	2,161,905	2,161,905	0%	266.39	129.26	-48%	575,937,265	381,697,596	274,853,678	-48%	

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	11,782	11,782	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	-35%	7,545,483	4,986,888	-2,558,595
		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%	17,363,364	16,777,445	-585,919
		Car 5	183,374	183,374	0%	19.09	50.17	163%	3,580,745	9,189,834	5,609,089
		Car 6	65,332	65,332	0%	25.67	50.17	89%	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%	304.76	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%	36,991,999	11,085,409	-25,906,590
		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
		Car 6	116,084	116,084	0%	268.75	156.24	-42%	30,427,555	10,232,785	-20,194,770
		Diesel oil total	625,119	625,119	0%	418.36	160.76	-61%	277,941,660	188,535,230	-89,406,430
Flx Total	1,380,391	1,380,391	0%	235.75	154.41	-51%	327,778,427	199,070,280	-128,708,147		
1.A.3.b.i - Light Duty Vehicles (LDV)	Gasoline	pre-Cars	910	910	0%	602.79	645.95	-7%	593,188	587,543	-5,645
		Car 1	136	136	0%	308.31	312.78	-6%	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%	388.27	171.66	-5%	1,068,292	1,013,478	-54,814
	Diesel Oil	pre-Cars	2,189	2,189	0%	414.81	386.79	-7%	899,849	886,433	-13,416
		Car 1	1,780	1,780	0%	391.89	276.25	-29%	780,189	385,371	-394,818
		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
		Car 6	4,921	4,921	0%	113.49	32.40	-72%	755,285	454,676	-300,609
		Diesel oil total	148,068	148,068	0%	454.12	185.62	-77%	65,712,732	15,256,007	-50,456,725
Flx Total	148,994	148,994	0%	445.23	188.29	-76%	66,781,025	16,226,684	-50,554,341		
1.A.3.b.ii - Heavy Duty Vehicles - Buses	Diesel Oil	pre-Cars	881	881	0%	1076.81	1919.23	-43%	954,197	928,234	-25,963
		Car 1	583	583	0%	731.36	732.67	0%	433,675	446,236	12,561
		Car 2	4,375	4,375	0%	788.25	645.03	-18%	3,440,614	2,822,621	-617,993
		Car 3	10,333	10,333	0%	632.87	458.91	-28%	6,539,364	4,741,827	-1,797,537
		Car 4	4,449	4,449	0%	475.90	382.29	-20%	2,117,219	1,666,881	-450,338
		Car 5	34,380	34,380	0%	364.36	185.22	-49%	8,935,974	4,517,517	-4,418,457
		Car 6	9,126	9,126	0%	62.79	185.22	196%	573,066	1,680,431	1,107,365
		Buses Total	54,157	54,157	0%	404.73	388.24	-2%	23,082,189	16,885,117	-6,197,072
	Gasoline	pre-Cars	3,933	3,933	0%	1,034.81	737.35	-29%	4,087,249	2,980,379	-1,106,870
		Car 1	1,555	1,555	0%	748.16	587.92	-21%	1,163,482	789,813	-373,669
		Car 2	8,876	8,876	0%	817.75	585.42	-28%	7,258,047	4,486,626	-2,771,421
		Car 3	34,167	34,167	0%	638.91	568.04	-11%	21,553,280	12,251,155	-9,302,125
		Car 4	34,287	34,287	0%	394.94	281.86	-28%	9,640,364	6,885,621	-2,754,743
		Car 5	269,735	269,735	0%	287.22	153.60	-46%	74,680,233	39,676,610	-35,003,623
		Car 6	261,480	261,480	0%	61.77	153.60	149%	16,149,280	40,244,036	24,094,756
		Trucks Total	594,013	594,013	0%	226.31	180.97	-20%	134,431,899	101,486,262	-32,945,637
1.A.3.b.iii - Heavy Duty Vehicles - Trucks & Lorries	Gasoline	pre-Cars	5,543	5,543	0%	125.59	155.78	24%	696,072	883,289	187,217
		Car 1	3,360	3,360	0%	127.11	177.29	39%	427,113	585,796	158,683
		Car 2	3,375	3,375	0%	125.94	187.68	50%	421,961	687,078	265,117
		Car 3	6,443	6,443	0%	48.36	187.68	281%	209,627	1,273,671	1,064,044
		Car 4	65	65	0%	17.47	187.68	1011%	1,134	12,632	11,498
		Car 5	0	0	0%	0	0	0%	0	0	0
		Car 6	0	0	0%	0	0	0%	0	0	0
		MWVs total	16,185	16,185	0%	96.14	181.68	88%	1,885,897	3,452,476	1,566,579
	1.A.3.b. - Road Transport	Total	2,267,339	2,267,339	0%	258.89	137.32	-46%	553,790,550	382,961,620	-170,828,930

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	-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	-13%	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	-100%	3,228,282	8,725,668	5,497,386	170%	
	LN ₂ Total	666,076	666,076	0%	6.00	52.30	-98%	4,190,432	8,716,250	4,525,818	108%		
	Diesel Oil	pre-Cars	699,007	699,007	0%	64.42	68.36	-6%	45,032,966	47,786,817	2,753,851	6%	
		Car 1	1,363	1,363	0%	303.16	272.65	-10%	286,430	245,173	-41,257	-14%	
		Car 2	2,849	2,849	0%	407.20	222.87	-45%	4,981,983	2,483,536	-2,498,447	-50%	
		Car 3	10,784	10,784	0%	812.49	180.15	-78%	24,932,029	7,333,241	-17,598,788	-71%	
		Car 4	130,534	130,534	0%	414.71	180.40	-56%	54,133,837	20,937,329	-33,196,508	-61%	
		Car 5	251,212	251,212	0%	416.25	180.40	-56%	104,585,786	40,293,731	-64,292,055	-61%	
	LN ₂ Total	220,685	220,685	0%	254.87	180.40	-31%	58,284,140	35,680,446	-22,603,694	-39%		
	1.A.3.b.i - Light Duty Vehicles (LDVs)	Gasoline	pre-Cars	6,315	6,315	0%	375.66	163.38	-56%	247,596,063	188,748,684	-158,847,459	-56%
			Car 1	1,365,181	1,365,181	0%	214.34	154.68	-28%	262,589,060	156,555,421	-106,033,639	-40%
			Car 2	911	911	0%	604.51	645.95	11%	596,851	582,662	-14,189	-2%
			Car 3	189	189	0%	911.58	312.78	-66%	98,528	33,895	-64,633	-66%
Car 4			377	377	0%	303.84	224.45	-26%	114,682	84,713	-29,969	-26%	
Car 5			511	511	0%	111.92	116.84	4%	57,282	60,739	3,457	6%	
Diesel Oil		pre-Cars	1,872	1,872	0%	52.02	54.36	4%	65,290	69,270	3,980	4%	
		Car 1	1,285	1,285	0%	23.70	54.36	129%	35,160	80,626	45,466	129%	
		Car 2	2,942	2,942	0%	19.18	54.36	182%	39,550	89,326	49,776	182%	
		Car 3	9,363	9,363	0%	154.22	160.11	4%	999,199	1,011,136	11,937	1%	
		Car 4	33,232	33,232	0%	411.51	386.79	-6%	771,337	574,742	-196,595	-26%	
		Car 5	1,285	1,285	0%	389.94	276.25	-29%	483,129	272,296	-210,833	-44%	
LN ₂ Total		154,259	154,259	0%	318.56	153.88	-52%	965,389	550,789	-414,600	-43%		
1.A.3.b.ii - Heavy Duty Vehicle Buses		Diesel Oil	pre-Cars	9,363	9,363	0%	558.10	150.74	-73%	5,689,152	1,411,299	-4,277,853	-75%
			Car 1	66,283	66,283	0%	432.92	93.81	-79%	28,684,080	6,217,860	-22,466,220	-79%
			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	15,880,316	-43,464,210	-73%
			Car 4	180,574	180,574	0%	375.86	184.94	-51%	69,343,125	16,851,449	-52,491,676	-76%
	Car 5		547	547	0%	1078.15	1919.23	78%	589,267	557,147	-32,120	-5%	
	LN ₂ Total	pre-Cars	237	237	0%	732.78	732.57	0%	173,676	176,368	2,692	2%	
		Car 1	2,270	2,270	0%	787.83	646.33	-18%	1,780,686	1,447,437	-333,249	-19%	
		Car 2	6,757	6,757	0%	638.89	459.32	-29%	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	-26%	
		Car 4	18,189	18,189	0%	362.42	186.37	-49%	6,463,265	3,376,016	-3,087,249	-48%	
		Car 5	20,670	20,670	0%	64.89	186.37	289%	1,176,026	3,682,314	2,506,288	214%	
	1.A.3.b.iii - Heavy Duty Vehicle Trucks & Lorries	Diesel Oil	pre-Cars	51,634	51,634	0%	309.75	283.53	-9%	15,993,546	13,687,186	-2,306,360	-15%
			Car 1	3,262	3,262	0%	1034.82	737.35	-29%	3,375,359	2,485,071	-890,288	-26%
			Car 2	1,094	1,094	0%	747.82	488.39	-35%	918,052	512,378	-405,674	-44%
			Car 3	5,544	5,544	0%	817.44	581.68	-29%	4,532,190	2,781,516	-1,750,674	-39%
			Car 4	20,583	20,583	0%	629.54	563.68	-11%	12,967,751	7,277,279	-5,690,472	-44%
			Car 5	15,912	15,912	0%	358.89	276.23	-23%	6,334,421	4,386,424	-1,947,997	-31%
LN ₂ Total		pre-Cars	154,983	154,983	0%	250.40	154.68	-38%	45,964,153	24,283,389	-21,680,764	-47%	
		Car 1	381,799	381,799	0%	68.78	154.68	125%	28,251,482	69,665,886	41,414,404	146%	
		Car 2	585,186	585,186	0%	515.18	172.19	-67%	188,173,537	180,760,889	-7,412,648	-4%	
		Car 3	4,940	4,940	0%	128.95	186.61	45%	622,656	783,451	160,795	26%	
		Car 4	2,966	2,966	0%	128.14	177.79	41%	374,114	527,294	153,180	41%	
		Car 5	3,221	3,221	0%	129.33	186.64	45%	387,596	639,833	252,237	65%	
LN ₂ Total		pre-Cars	6,241	6,241	0%	48.24	186.64	284%	20,126	1,239,686	1,219,560	598%	
		Car 1	1,130	1,130	0%	58.41	186.64	220%	23,066	224,682	201,616	874%	
		Car 2	0	0	0%	0.00	186.64	0%	0	0	0	0%	
		Car 3	18,487	18,487	0%	85.66	186.61	118%	1,658,558	3,434,767	1,776,209	108%	
		Car 4	2,180,983	2,180,983	0%	215.85	133.49	-38%	478,758,286	291,129,652	-187,628,634	-39%	
		Car 5	2,180,983	2,180,983	0%	215.85	133.49	-38%	478,758,286	291,129,652	-187,628,634	-39%	

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	-6%	8,664,621	7,382,686	-1,281,935	-15%
		Car 1	12,427	12,427	0%	378.32	341.68	-9%	4,781,480	3,083,383	-1,698,096	-36%
		Car 2	20,086	20,086	0%	225.58	92.59	-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	-100%	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	108%
		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%	1,913,180	1,744,621	-168,559	-9%
		Car 3	2,545	2,545	0%	298.80	272.65	-9%	764,913	687,786	-77,127	-10%
		Car 4	8,891	8,891	0%	407.19	226.16	-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%
	LN ₂ Total	pre-Cars	111,335	111,335	0%	419.17	182.44	-56%	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	-61%
		Car 4	1,368,532	1,368,532	0%	699.83	155.32	-78%	273,668,009	157,821,687	-115,846,322	-42%
		Car 5	909	909	0%	644.89	645.95	1%	687,449	581,962	-105,487	-15%
1.A.3.b.i - Heavy Duty Vehicles (HDVs)	Gasoline	pre-Cars	376	376	0%	304.63	224.45	-26%	96,150	70,848	-25,302	-26%
		Car 1	447	447	0%	112.68	121.47	8%	50,355	54,283	3,928	8%
		Car 2	1,126	1,126	0%	53.08	55.26	4%	59,652	62,199	2,547	4%
		Car 3	1,361	1,361	0%	25.34	55.26	119%	34,240	74,680	40,440	119%
		Car 4	2,420	2,420	0%	18.75	55.26	188%	45,383	133,753	88,370	188%
	LN ₂ Total	pre-Cars	6,483	6,483	0%	146.88	153.25	9%	976,279	1,044,156	67,877	7%
		Car 1	1,744	1,744	0%	418.96	386.79	-25%	725,111	541,376	-183,735	-25%
		Car 2	1,079	1,079	0%	389.52	276.25	-29%	420,285	232,256	-188,029	-44%
		Car 3	2,334	2,334	0%	315.90	154.79	-51%	737,682	454,630	-283,052	-39%
		Car 4	7,649	7,649	0%	601.11	194.73	-68%	4,587,943	1,744,621	-2,843,322	-62%
Diesel Oil	pre-Cars	20,711	20,711	0%	512.28	94.57	-82%	14,788,380	2,716,154	-12,072,226	-82%	
	Car 1	58,794	58,794	0%	436.30	94.57	-79%	25,499,080	5,552,420	-19,946,660	-78%	
	Car 2	69,031	69,031	0%	146.18	81.57	-35%	8,616,586	5,722,892	-2,893,694	-33%	
	Car 3	159,183	159,183	0%	347.42	191.98	-41%	55,383,325	36,221,485	-19,161,840	-35%	
	Car 4	165,866	165,866	0%	339.31	183.97	-46%	56,279,594	37,248,596	-19,030,998	-34%	
1.A.3.b.ii - Heavy Duty Vehicles (HDVs) - Buses	Gasoline	pre-Cars	489	489	0%	1086.23	1193.23	-6%	588,087	478,258	-109,829	-19%
		Car 1	147	147	0%	738.37	752.57	2%	188,232	110,953	-77,279	-41%
		Car 2	1,611	1,611	0%	629.67	645.57	-3%	1,271,445	1,041,621	-229,824	-18%
		Car 3	5,709	5,709	0%	733.67	466.75	-36%	3,885,261	2,623,779	-1,261,482	-33%
		Car 4	2,747	2,747	0%	473.92	242.84	-49%	1,382,041	969,434	-412,607	-30%
	Diesel Oil	pre-Cars	17,130	17,130	0%	362.91	186.64	-49%	6,219,175	3,180,791	-3,038,384	-49%
		Car 1	25,395	25,395	0%	69.43	186.64	269%	5,918,901	4,686,133	-1,232,768	-21%
		Car 2	52,939	52,939	0%	274.81	247.83	-10%	14,547,072	13,158,878	-1,388,194	-10%
		Car 3	3,140	3,140	0%	1034.98	737.35	-29%	3,250,020	2,370,443	-879,577	-27%
		Car 4	989	989	0%	747.90	584.04	-22%	724,240	453,754	-270,486	-37%
LN ₂ 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%	13,300,323	7,536,540	-5,763,783	-43%	
	Car 2	15,127	15,127	0%	396.86	269.63	-31%	12,235,679	3,689,320	-8,546,359	-70%	
	Car 3	185,213	185,213	0%	965.15	292.89	-69%	36,969,499	10,488,219	-26,481,280	-72%	
	Car 4	432,496	432,496	0%	72.98	154.92	110%	11,175,486	67,683,853	56,508,367	150%	
1.A.3.b.iii - Heavy Duty Vehicles (HDVs) - Trucks & Lorries	Gasoline	pre-Cars	365,913	365,913	0%	133.35	169.17	26%	95,380,190	100,893,376	5,513,186	6%
		Car 1	4,913	4,913	0%	125.89	164.79	31%	664,997	792,791	127,794	19%
		Car 2	2,835	2,835	0%	129.39	177.29	37%	355,496	582,589	227,093	64%
		Car 3	3,094	3,094	0%	119.23	180.86	67%	389,224	615,317	226,093	58%
		Car 4	6,082	6,082	0%	43.03	180.86	381%	284,284	1,193,617	909,333	319%
	Diesel Oil	pre-Cars	2,085	2,085	0%	21.68	180.86	817%	47,489	386,647	339,158	714%
		Car 1	0	0	0%	0.00	180.86	0%	0	0	0	0%
		Car 2	0	0	0%	0.00	180.86	0%	0	0	0	0%
		Car 3	0	0	0%	0.00	180.86	0%	0	0	0	0%
		Car 4	0	0	0%	0.00	180.86	0%	0	0	0	0%
1.A.3.b.iii - Motorized Two-Wheelers (M2Ws)	pre-Cars	18,150	18,150	0%	86.95	186.83	115%	5,615,450	5,562,941	-52,509	-1%	
	Car 1	2,262,080	2,262,080	0%	99.58	132.83	33%	67,268,146	292,497,437	164,771,248	245%	

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

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 ¹⁸⁾ 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. Hence, the 2021 adjustment proposal differs only slightly from the (accepted) proposal provided with submission 2020.**

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](#)

¹⁾ 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>

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⁾ (bibcite 4)

⁶⁾ 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

⁷⁾ 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.

⁸⁾ 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.

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