

# Adjustment DE-A regarding NO<sub>x</sub> 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<sub>x</sub> (IIASA, 1999) <sup>1)</sup>. The over-all 2010 national emission ceiling (NEC) for NO<sub>x</sub> was set to 1,081 kt. When negotiating the EU NEC Directive two years later, Germany agreed to reduce its NO<sub>x</sub> emissions further, resulting in a NEC of 1,051 kt.

In its 2016 NEC emissions reporting, Germany provided a national total for NO<sub>x</sub> 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) <sup>2), 3)</sup> was agreed. This procedure is applicable also for existing NECs (EB, 2012b) <sup>4)</sup>.

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<sub>x</sub> 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<sub>x</sub> emissions for four selected countries (Germany, France, Netherlands and Belgium) and found higher NO<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub>. However, as changes in AD are no valid adjustment reason, the latter value is for information only.

This was mainly due to: \* NO<sub>x</sub> "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<sub>x</sub> 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<sub>x</sub> 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 EM<sup>1</sup>**

<sup>1</sup> "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<sub>x</sub> 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<sup>5)</sup>, including the following set of NO<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub> 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)<sup>6)</sup>.

### 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<sub>x</sub> 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
<b>proposed adjustment</b>	<b>-296.1</b>	<b>-300.7</b>	<b>-300.4</b>	<b>-305.2</b>	<b>-294.9</b>	<b>-274.9</b>	<b>-250.9</b>	<b>-221.1</b>	<b>-179.6</b>	<b>-144.8</b>

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<sub>x</sub> 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 <sub>x</sub> Emissions			
			current in [TJ]	adjusted in [TJ]	difference in [%]	current in [kg/TJ]	adjusted in [kg/TJ]	difference in [%]	current in [kg]	adjusted in [kg]	adjustment difference in [%]	
1.A.3.b.i	gasoline		795.957	795.957	0%	97.55	84.99	-13%	77.644.842	67.590.906	9.993.935	-13%
1.A.3.b.i	diesel oil		629.380	629.380	0%	429.45	160.61	-63%	227.341.696	84.970.461	142.378.635	-63%
1.A.3.b.ii	gasoline		6.325	6.325	0%	255.87	214.75	-16%	1.618.432	1.358.328	268.104	-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	-23%	29.931.266	23.183.732	6.747.534	-23%
1.A.3.b.iii	diesel oil		566.741	566.741	0%	446.67	271.83	-39%	253.148.243	154.956.160	99.892.083	-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%
<b>1.A.3.b TOTAL</b>		<b>2010</b>	<b>2.079.688</b>	<b>2.079.688</b>	<b>0%</b>			<b>0%</b>	<b>645.965.162</b>	<b>348.851.206</b>	<b>296.113.956</b>	<b>-46%</b>
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		47.365	47.365	0%	592.65	448.99	-24%	28.071.221	21.286.323	6.884.898	-24%
1.A.3.b.iii	diesel oil		563.891	563.891	0%	410.38	244.97	-40%	231.410.271	138.136.342	93.273.929	-40%
1.A.3.b.iv	gasoline		19.289	19.289	0%	119.79	171.60	54%	2.137.002	3.299.162	-1.162.160	54%
<b>1.A.3.b TOTAL</b>		<b>2011</b>	<b>2.106.883</b>	<b>2.106.883</b>	<b>0%</b>			<b>0%</b>	<b>632.365.736</b>	<b>331.625.655</b>	<b>300.740.081</b>	<b>-48%</b>
1.A.3.b.i	gasoline		750.957	750.957	0%	85.73	78.00	-9%	64.379.994	58.877.229	5.802.765	-9%
1.A.3.b.i	diesel oil		555.245	555.245	0%	435.96	158.66	-64%	242.062.902	88.896.699	153.866.203	-64%
1.A.3.b.ii	gasoline		5.657	5.657	0%	218.93	183.15	-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	19.563.208	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	92.764.428	-41%
1.A.3.b.iv	gasoline		18.268	18.268	0%	107.43	173.28	61%	1.962.546	3.165.439	-1.202.893	61%
<b>1.A.3.b TOTAL</b>		<b>2012</b>	<b>2.084.964</b>	<b>2.084.964</b>	<b>0%</b>			<b>0%</b>	<b>616.721.438</b>	<b>316.391.343</b>	<b>300.428.094</b>	<b>-49%</b>
1.A.3.b.i	gasoline		749.114	749.114	0%	80.35	74.05	-7%	60.190.007	56.071.797	4.118.211	-7%
1.A.3.b.i	diesel oil		585.131	585.131	0%	437.14	158.71	-64%	257.633.728	93.499.010	164.834.718	-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%	57.003.533	13.690.488	43.433.045	-76%
1.A.3.b.iii	gasoline		51.716	51.716	0%	509.64	360.06	-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	-11%	211.807.531	124.798.459	87.099.062	-41%
1.A.3.b.iv	gasoline		18.229	18.229	0%	104.34	175.30	68%	1.902.688	3.197.038	-1.294.351	68%
<b>1.A.3.b TOTAL</b>		<b>2013</b>	<b>2.132.683</b>	<b>2.132.683</b>	<b>0%</b>			<b>0%</b>	<b>616.079.663</b>	<b>316.854.371</b>	<b>305.224.692</b>	<b>-50%</b>
1.A.3.b.i	gasoline		752.526	752.526	0%	76.03	73.09	-4%	57.215.533	54.998.921	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	173.262.169	-63%
1.A.3.b.ii	gasoline		5.845	5.845	0%	190.34	176.49	-7%	1.112.184	1.031.612	80.572	-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%	23.017.116	16.708.234	6.308.881	-27%
1.A.3.b.iii	diesel oil		672.754	672.754	0%	314.05	196.05	-38%	179.874.133	112.285.582	67.588.551	-38%
1.A.3.b.iv	gasoline		18.673	18.673	0%	100.59	179.24	78%	1.070.294	3.346.794	-1.468.499	78%
<b>1.A.3.b TOTAL</b>		<b>2014</b>	<b>2.153.563</b>	<b>2.153.563</b>	<b>0%</b>			<b>0%</b>	<b>597.120.297</b>	<b>302.252.271</b>	<b>294.868.025</b>	<b>-49%</b>
1.A.3.b.i	gasoline		715.156	715.156	0%	74.38	71.73	-4%	53.190.787	51.390.983	1.899.805	-4%
1.A.3.b.i	diesel oil		645.565	645.565	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%	469.35	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%	23.997.617	17.149.448	6.848.170	-29%
1.A.3.b.iii	diesel oil		589.411	589.411	0%	266.69	187.51	-30%	157.189.675	110.620.703	46.888.973	-30%
1.A.3.b.iv	gasoline		18.459	18.459	0%	93.32	189.69	82%	1.833.362	3.334.472	-1.501.090	82%
<b>1.A.3.b TOTAL</b>		<b>2015</b>	<b>2.161.976</b>	<b>2.161.976</b>	<b>0%</b>			<b>0%</b>	<b>575.931.265</b>	<b>301.077.596</b>	<b>274.853.670</b>	<b>-48%</b>
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		5.925	5.925	0%	193.27	171.05	-11%	1.068.292	1.013.678	54.614	-5%
1.A.3.b.ii	diesel oil		144.868	144.868	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	308.24	-27%	23.002.109	16.693.117	6.308.992	-27%
1.A.3.b.iii	diesel oil		594.013	594.013	0%	226.31	180.97	-20%	134.431.699	107.496.262	26.935.637	-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%
<b>1.A.3.b TOTAL</b>		<b>2016</b>	<b>2.207.339</b>	<b>2.207.339</b>	<b>0%</b>			<b>0%</b>	<b>553.199.558</b>	<b>302.901.820</b>	<b>250.897.738</b>	<b>-45%</b>
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%	272.126.691	112.810.721	159.315.970	-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%	370.80	288.71	-23%	19.793.901	15.394.828	4.489.073	-23%
1.A.3.b.iii	diesel oil		598.263	598.263	0%	195.02	175.92	-10%	116.671.141	106.246.508	11.424.633	-10%
1.A.3.b.iv	gasoline		19.180	19.180	0%	92.83	183.39	98%	1.778.674	3.513.787	-1.735.114	98%
<b>1.A.3.b TOTAL</b>		<b>2017</b>	<b>2.251.437</b>	<b>2.251.437</b>	<b>0%</b>			<b>0%</b>	<b>525.549.410</b>	<b>304.469.986</b>	<b>221.079.424</b>	<b>-42%</b>
1.A.3.b.i	gasoline		699.027	699.027	0%	64.42	68.36	6%	45.032.996	47.786.817	-2.753.820	6%
1.A.3.b.i	diesel oil		666.074	666.074	0%	371.66	163.30	-56%	247.556.063	108.768.604	138.787.459	-56%
1.A.3.b.ii	gasoline		6.315	6.315	0%	158.22	160.11	1%	999.199	1.011.138	-11.939	1%
1.A.3.b.ii	diesel oil		154.259	154.259	0%	384.71	182.69	-73%	59.344.525	15.840.310	43.504.215	-73%
1.A.3.b.iii	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%	1.608.588	3.414.767	-1.756.209	106%
<b>1.A.3.b TOTAL</b>		<b>2018</b>	<b>2.180.993</b>	<b>2.180.993</b>	<b>0%</b>			<b>0%</b>	<b>478.758.206</b>	<b>291.139.612</b>	<b>179.618.593</b>	<b>-38%</b>
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%	148.08	153.25	5%	976.219	1.024.150	-47.931	5%
1.A.3.b.ii	diesel oil		169.183	169.183	0%	347.42	181.90	-71%	55.303.535	16.221.445	39.081.890	-71%
1.A.3.b.iii	gasoline		52.939	52.939	0%	274.41	247.81	-10%	14.627.012	13.118.678	1.488.434	-10%
1.A.3.b.iii	diesel oil		595.913	595.913	0%	153.35						

Adjustment details for 2020

NFR Code	Fuel	Activity Data			Implied Emission Factor			NO <sub>x</sub> 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 [t]		
1.A.3.a.i. Passenger Cars	Gasoline	pre-Cars	13,685	13,685	0%	584.75	514.25	-8%	7,965,060	6,986,917	-858,143	-10%
		Car 1	36,541	36,541	0%	338.50	297.71	-9%	25,915,925	19,189,262	-7,716,663	-30%
		Car 2	96,425	96,425	0%	172.95	135.03	-22%	16,580,020	13,020,026	-3,559,994	-22%
		Car 3	133,139	133,139	0%	58.51	70.19	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	18,173,529	-737,859	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	67%	2	2	0	0%	
	Gasoline total	795,957	795,957	0%	97.55	84.39	-13%	37,644,842	47,456,968	9,802,126	26%	
	pre-Cars	1,113	1,113	0%	311.13	244.56	-21%	183,760	147,256	-36,504	-20%	
	Car 1	10,338	10,338	0%	294.62	295.17	0%	3,064,428	2,741,587	-322,821	-11%	
	Car 2	50,088	50,088	0%	406.90	279.19	-31%	20,372,795	10,974,210	-9,398,584	-46%	
	Car 3	134,025	134,025	0%	542.94	176.54	-27%	72,648,173	23,929,276	-48,718,897	-67%	
	Car 4	279,154	279,154	0%	364.37	140.58	-61%	107,299,160	39,243,811	-68,055,349	-63%	
	Car 5	53,547	53,547	0%	434.70	140.58	-68%	23,276,735	7,527,796	-15,748,929	-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	140.58	-67%	227,341,096	84,920,491	-142,420,605	-63%		
PKs Total	1,325,337	1,325,337	0%	234.32	155.14	-34%	364,985,938	152,421,367	-212,564,570	-58%		
pre-Cars	1,249	1,249	0%	627.29	640.56	1%	783,320	898,871	115,551	15%		
Car 1	367	367	0%	861.95	297.39	-65%	368,969	186,020	-182,949	-50%		
Car 2	5,293	5,293	0%	264.75	184.41	-30%	368,948	256,917	-112,031	-30%		
Car 3	856	856	0%	82.47	90.63	10%	70,631	77,625	6,994	10%		
Car 4	2,420	2,420	0%	36.32	44.90	24%	87,987	188,679	100,692	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	6,325	6,325	0%	255.87	274.75	10%	1,478,832	1,358,328	-120,504	-8%		
pre-Cars	4,876	4,876	0%	425.99	386.79	-9%	2,017,142	1,436,983	-580,159	-29%		
Car 1	5,989	5,989	0%	395.19	276.24	-30%	2,269,095	1,289,036	-1,080,059	-48%		
Car 2	13,126	13,126	0%	336.76	193.10	-42%	4,420,380	2,534,731	-1,885,629	-43%		
Car 3	33,249	33,249	0%	531.01	150.58	-72%	17,655,823	5,085,760	-12,570,023	-72%		
Car 4	54,581	54,581	0%	491.42	80.69	-84%	26,021,036	4,840,722	-21,180,314	-82%		
Car 5	1,629	1,629	0%	427.50	80.69	-81%	696,296	144,434	-551,772	-79%		
Car 6	0	0	0%	151.73	80.69	-47%	7	4	-3	-43%		
Diesel oil total	113,450	113,450	0%	416.34	134.94	-74%	54,040,533	15,311,584	-38,728,949	-72%		
LNAs Total	119,175	119,175	0%	464.70	139.18	-70%	55,658,966	16,689,933	-38,969,033	-70%		
pre-Cars	3,382	3,382	0%	1036.25	1029.78	-0%	3,674,087	3,452,644	-221,423	-6%		
Car 1	2,626	2,626	0%	749.41	732.14	-2%	2,117,871	2,126,595	7,723	0%		
Car 2	10,162	10,162	0%	801.96	643.47	-20%	8,140,119	6,532,213	-1,607,906	-20%		
Car 3	15,890	15,890	0%	633.22	437.25	-30%	13,066,176	7,289,299	-5,776,877	-44%		
Car 4	5,461	5,461	0%	448.63	361.65	-20%	2,450,016	1,921,527	-528,489	-22%		
Car 5	10,326	10,326	0%	327.28	182.33	-44%	3,482,417	1,882,644	-1,599,773	-46%		
Car 6	0	0	0%	0	0	0%	0	0	0	0%		
Bees Total	48,044	48,044	0%	623.80	482.55	-23%	29,931,266	23,183,732	-6,747,534	-23%		
pre-Cars	10,185	10,185	0%	1046.16	787.37	-25%	10,510,623	7,754,130	-2,756,493	-26%		
Car 1	5,677	5,677	0%	759.59	575.55	-24%	4,261,383	3,287,681	-973,702	-23%		
Car 2	35,565	35,565	0%	817.62	524.79	-35%	31,525,526	20,224,079	-11,301,447	-36%		
Car 3	168,223	168,223	0%	626.28	274.48	-41%	84,126,182	50,617,271	-33,508,921	-41%		
Car 4	69,635	69,635	0%	368.94	280.62	-24%	27,183,867	20,166,636	-7,017,231	-26%		
Car 5	283,934	283,934	0%	278.62	151.65	-45%	78,440,643	43,116,987	-35,323,646	-45%		
Car 6	0	0	0%	0	0	0%	0	0	0	0%		
Trucks Total	566,141	566,141	0%	446.67	271.83	-39%	293,148,243	154,096,160	-139,052,083	-48%		
pre-Cars	7,973	7,973	0%	122.90	149.16	22%	372,721	1,189,353	2,186,522	585%		
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	30%	585,362	686,681	101,319	17%		
Car 3	2,920	2,920	0%	38.11	184.21	381%	116,190	617,032	490,842	423%		
Car 4	0	0	0%	0	0	0%	0	0	0	0%		
Car 5	0	0	0%	0	0	0%	0	0	0	0%		
MOVs Total	19,112	19,112	0%	113.68	188.43	68%	2,249,149	3,320,034	1,070,885	48%		
1.A.3.b. Road Transport	Total	2,079,688	2,079,688	0%	218.62	148.23	-46%	645,965,162	349,851,296	-296,113,866	-46%	

Adjustment details for 2021

NFR Code	Fuel	Activity Data			Implied Emission Factor			NO <sub>x</sub> 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 [t]		
1.A.3.a.i. Passenger Cars	Gasoline	pre-Cars	13,063	13,063	0%	592.96	534.68	-9%	7,728,235	6,979,435	-748,801	-10%
		Car 1	61,979	61,979	0%	347.96	240.16	-31%	21,040,430	14,884,961	-6,155,479	-31%
		Car 2	87,083	87,083	0%	179.38	136.68	-24%	15,620,983	11,883,782	-3,737,191	-24%
		Car 3	124,330	124,330	0%	61.94	71.52	16%	7,683,891	8,891,671	1,207,780	16%
		Car 4	442,185	442,185	0%	43.84	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%	25.08	43.68	69%	17	20	3	17%	
	Gasoline total	794,688	794,688	0%	92.09	81.65	-11%	33,183,891	44,851,951	11,668,060	35%	
	pre-Cars	1,084	1,084	0%	629.25	640.56	1%	162,214	193,373	31,159	19%	
	Car 1	8,426	8,426	0%	297.32	295.65	-1%	2,165,115	2,239,987	74,872	3%	
	Car 2	42,514	42,514	0%	407.93	279.27	-31%	17,384,549	9,321,916	-8,062,633	-46%	
	Car 3	121,429	121,429	0%	555.36	176.55	-68%	67,437,053	21,681,386	-45,755,667	-68%	
	Car 4	264,943	264,943	0%	308.08	143.46	-53%	162,917,081	38,089,755	-124,827,326	-76%	
	Car 5	113,047	113,047	0%	435.12	143.46	-67%	49,536,960	16,332,974	-33,203,984	-67%	
	Car 6	695	695	0%	259.59	143.46	-45%	180,582	99,754	-80,828	-45%	
Diesel oil total	553,564	553,564	0%	434.52	159.92	-63%	249,713,191	88,138,959	-161,574,232	-65%		
PKs Total	1,348,252	1,348,252	0%	212.52	115.47	-46%	313,896,642	152,990,910	-160,905,732	-51%		
pre-Cars	1,084	1,084	0%	629.25	640.56	1%	162,214	193,373	31,159	19%		
Car 1	283	283	0%	818.74	384.47	-53%	243,289	86,158	-157,132	-64%		
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%		
Car 4	2,582	2,582	0%	37.38	46.51	24%	95,786	119,162	23,376	24%		
Car 5	241	241	0%	16.13	46.51	188%	3,082	11,190	7,308	188%		
Car 6	0	0	0%	15.33	46.51	293%	1	3	2	203%		
Gasoline total	6,118	6,118	0%	229.35	186.52	-18%	1,483,081	1,254,716	-228,365	-15%		
pre-Cars	3,395	3,395	0%	425.99	386.79	-9%	1,989,280	1,225,682	-763,598	-38%		
Car 1	4,787	4,787	0%	395.71	276.24	-30%	1,984,360	1,030,426	-953,934	-48%		
Car 2	10,810	10,810	0%	336.90	193.29	-42%	3,644,582	2,091,863	-1,552,719	-43%		
Car 3	28,076	28,076	0%	541.53	150.54	-72%	15,037,240	4,346,870	-10,690,370	-72%		
Car 4	60,832	60,832	0%	493.82	80.26	-84%	30,039,914	5,429,011	-24,610,904	-82%		
Car 5	6,609	6,609	0%	448.95	80.26	-82%	2,930,190	594,364	-2,335,826	-80%		
Car 6	0	0	0%	154.21	80.26	-48%	16	8	-8	-43%		
Diesel oil total	115,967	115,967	0%	481.55	126.90	-74%	55,844,519	14,718,142	-41,126,376	-74%		
LNAs Total	122,085	122,085	0%	468.92	130.95	-72%	57,247,599	15,932,898	-41,314,681	-7		

Adjustment details for 2023

NFR Code	Fuel	Activity Data			Implied Emission Factor			NO <sub>x</sub> 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	11,561	11,561	0%	607.72	635.38	-5%	7,035,041	6,189,785	-836,256	-12%
		Car 1	47,487	47,487	0%	349.56	341.60	-2%	16,571,746	11,426,129	-5,145,617	-31%
		Car 2	72,781	72,781	0%	164.27	137.92	-16%	13,487,749	10,035,380	-3,452,369	-26%
		Car 3	189,443	189,443	0%	63.99	72.62	14%	6,927,963	7,875,172	947,209	14%
		Car 4	488,541	488,541	0%	45.29	45.13	-1%	18,541,881	18,436,736	-105,145	-1%
		Car 5	181,961	181,961	0%	18.61	45.13	143%	1,897,355	4,681,311	2,783,956	143%
	Car 6	282	282	0%	25.06	45.13	78%	7,339	12,736	5,397	74%	
	Gasoline total	790,957	790,957	0%	65.73	78.88	20%	64,379,943	58,577,229	-5,802,715	-9%	
	pre-Cars	1,487	1,487	0%	311.98	284.56	-9%	463,963	383,922	-80,041	-17%	
	Car 1	4,660	4,660	0%	257.79	266.44	-11%	1,980,364	1,717,787	-262,577	-13%	
	Car 2	33,967	33,967	0%	408.82	279.27	-32%	13,987,432	7,445,646	-6,541,787	-46%	
	Car 3	183,539	183,539	0%	564.82	176.63	-69%	58,389,037	18,434,837	-39,954,200	-68%	
	Car 4	234,943	234,943	0%	398.41	146.46	-63%	91,724,188	34,488,997	-57,235,191	-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	-54%	
Diesel Oil total	555,245	555,245	0%	415.96	158.66	-62%	242,962,982	88,096,699	-154,866,283	-64%		
PKs Total	1,386,202	1,386,202	0%	234.61	152.29	-35%	386,442,896	146,671,927	-239,770,969	-62%		
pre-Cars	962	962	0%	832.39	646.95	-22%	487,779	621,166	133,387	27%		
Car 1	232	232	0%	803.24	383.22	-52%	189,985	70,295	-119,690	-63%		
Car 2	989	989	0%	271.96	195.74	-28%	268,154	183,588	-84,566	-31%		
Car 3	835	835	0%	89.38	98.33	10%	74,623	82,082	7,459	10%		
Car 4	2,030	2,030	0%	38.49	47.58	24%	78,155	96,611	18,456	24%		
Car 5	610	610	0%	16.38	47.58	192%	9,941	29,011	19,070	192%		
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	-25%	1,238,520	1,092,667	-145,853	-12%		
pre-Cars	3,281	3,281	0%	424.48	386.79	-9%	1,368,754	982,093	-386,661	-28%		
Car 1	3,666	3,666	0%	399.34	276.24	-30%	1,445,963	787,034	-658,929	-46%		
Car 2	8,479	8,479	0%	336.46	193.39	-42%	2,852,325	1,629,772	-1,222,553	-43%		
Car 3	23,785	23,785	0%	558.53	150.44	-73%	13,050,281	3,585,082	-9,465,199	-73%		
Car 4	59,485	59,485	0%	454.22	89.85	-80%	29,369,078	5,337,395	-24,031,683	-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%	151.94	89.85	-41%	122	72	-50	-41%		
Diesel Oil total	114,350	114,350	0%	485.91	126.17	-74%	55,186,382	13,741,354	-41,445,028	-75%		
LNAs Total	129,088	129,088	0%	469.51	125.65	-74%	56,344,963	14,834,696	-41,510,267	-74%		
pre-Cars	1,326	1,326	0%	1091.48	1919.45	4%	1,410,640	1,352,283	-58,357	-4%		
Car 1	1,248	1,248	0%	727.34	751.15	3%	287,476	337,184	49,708	17%		
Car 2	7,780	7,780	0%	703.46	643.34	-9%	6,085,091	4,997,478	-1,087,613	-18%		
Car 3	14,483	14,483	0%	629.94	437.61	-31%	9,073,197	6,089,744	-2,983,453	-33%		
Car 4	5,331	5,331	0%	468.90	361.86	-23%	2,442,179	1,875,777	-566,402	-23%		
Car 5	30,752	30,752	0%	347.84	182.99	-47%	7,219,663	2,787,467	-4,432,196	-61%		
Car 6	73	73	0%	64.52	182.99	284%	3,961	13,296	9,334	236%		
Diesel Total	30,962	30,962	0%	533.28	384.33	-28%	27,141,913	19,945,288	-7,196,625	-26%		
pre-Cars	6,922	6,922	0%	1036.95	758.82	-27%	7,107,543	5,252,345	-1,855,198	-26%		
Car 1	3,630	3,630	0%	749.70	570.57	-24%	2,721,326	2,071,111	-650,215	-24%		
Car 2	23,577	23,577	0%	811.27	516.43	-36%	19,322,253	12,175,855	-7,146,398	-37%		
Car 3	96,726	96,726	0%	634.65	370.21	-42%	61,287,137	35,848,665	-25,438,472	-42%		
Car 4	50,650	50,650	0%	356.50	280.44	-21%	19,982,680	14,880,877	-5,101,803	-26%		
Car 5	485,981	485,981	0%	261.24	152.32	-42%	116,149,955	61,626,577	-54,523,378	-47%		
Car 6	2,380	2,380	0%	189.487	360.323	189%	189,487	360,323	170,836	223%		
Trucks Total	589,585	589,585	0%	305.33	224.69	-27%	224,829,180	132,064,753	-92,764,427	-41%		
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%	134.61	171.39	28%	536,615	738,050	201,435	38%		
Car 2	3,287	3,287	0%	136.22	184.95	43%	445,087	636,833	191,746	43%		
Car 3	3,994	3,994	0%	39.66	184.95	382%	158,286	778,616	620,330	392%		
Car 4	0	0	0%	0	0	0%	0	0	0	0%		
Car 5	0	0	0%	0	0	0%	0	0	0	0%		
Motor Total	18,268	18,268	0%	167.41	175.28	5%	1,982,548	3,163,438	1,180,891	60%		
1.A.3.b - Road Transport	Total	2,084,964	2,084,964	0%	295.79	151.71	-49%	616,721,438	296,381,343	-320,340,094	-48%	

Adjustment details for 2023

NFR Code	Fuel	Activity Data			Implied Emission Factor			NO <sub>x</sub> Emissions				
		current	adjusted	difference	current	adjusted	difference	current	adjusted	adjustment	difference	
		in [t]	in [t]	in [%]	in [g/t]	in [g/t]	in [%]	in [kg]	in [kg]	in [kg]	in [%]	
1.A.3.a.i - Passenger Cars	Gasoline	pre-Cars	11,680	11,680	0%	618.27	619.35	-0%	7,011,641	5,967,452	-1,044,189	-15%
		Car 1	37,743	37,743	0%	353.78	341.68	-3%	13,362,986	9,129,495	-4,233,491	-32%
		Car 2	62,680	62,680	0%	189.93	139.33	-27%	11,889,922	8,722,244	-3,167,678	-27%
		Car 3	97,792	97,792	0%	68.38	73.19	9%	6,491,618	7,156,920	665,303	10%
		Car 4	387,911	387,911	0%	47.22	46.52	-1%	18,790,345	18,589,937	-200,407	-1%
		Car 5	138,063	138,063	0%	18.68	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%	70,626	126,237	55,611	79%	
	Gasoline total	748,116	748,116	0%	88.35	74.85	-15%	69,190,887	56,671,797	-12,519,090	-18%	
	pre-Cars	987	987	0%	112.28	146.96	31%	433,081	348,138	-84,943	-19%	
	Car 1	5,625	5,625	0%	298.42	266.79	-11%	1,678,472	1,640,688	-37,784	-2%	
	Car 2	28,437	28,437	0%	408.64	279.91	-32%	11,963,522	6,253,531	-5,709,991	-48%	
	Car 3	92,795	92,795	0%	574.33	176.67	-69%	53,284,956	16,979,373	-36,305,583	-68%	
	Car 4	222,583	222,583	0%	393.55	149.27	-62%	87,598,471	33,225,586	-54,372,885	-62%	
	Car 5	233,766	233,766	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%	5,177,151	677,045	-4,500,106	-87%	
Diesel Oil total	589,131	589,131	0%	437.54	158.75	-64%	257,533,128	83,699,698	-173,833,430	-64%		
PKs Total	1,338,247	1,338,247	0%	217.42	111.77	-49%	317,723,735	148,576,896	-169,146,839	-53%		
pre-Cars	184	184	0%	831.81	646.96	-22%	968,320	729,233	-239,087	-25%		
Car 1	836	836	0%	274.42	291.18	7%	229,520	188,285	-41,235	-18%		
Car 2	784	784	0%	52.66	191.79	36%	72,691	79,780	7,089	10%		
Car 3	1,089	1,089	0%	43.70	48.89	11%	77,284	82,833	5,549	7%		
Car 4	966	966	0%	16.67	48.89	192%	15,187	47,268	31,081	192%		
Car 5	1	1	0%	17.68	48.89	176%	26	72	46	176%		
Gasoline total	5,578	5,578	0%	262.86	184.67	-30%	1,131,299	1,026,727	-104,572	-9%		
pre-Cars	2,754	2,754	0%	424.37	286.79	-33%	1,988,757	944,928	-1,043,829	-53%		
Car 1	2,948	2,948	0%	399.75	276.25	-30%	1,166,782	634,586	-532,196	-46%		
Car 2	6,982	6,982	0%	336.92	193.38	-42%	2,246,147	1,260,074	-986,073	-44%		
Car 3	20,421	20,421	0%	569.12	150.38	-73%	11,437,995	3,070,913	-8,367,082	-73%		
Car 4	55,887	55,887	0%	497.72	90.45	-82%	27,775,440	5,048,416	-22,727,024	-82%		
Car 5	29,024	29,024	0%	441.97	90.45	-80%	13,181,305	2,687,664	-10,493,641	-80%		
Car 6	41	41	0%	151.26	90.45	-40%	6,160	3,688	-2,472	-40%		
Diesel Oil total	118,777	118,777	0%	488.66	174.93	-65%	57,083,513	13,656,488	-43,427,025	-76%		
LNAs Total	124,354	124,354	0%	468.54	198.03	-58%	58,214,142	14,67				

Adjustment details for 2024

NFR Code	Fuel	Activity Data			Implied Emission Factor			NO <sub>x</sub> Emissions				
		current	adjusted	difference	current	adjusted	difference	current	adjusted	adjustment	difference	
		kg [t]	kg [t]	%	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	848.11	-11%	7,132,680	6,337,484	-796,844	-11%
		Car 1	30,667	30,667	0%	358.77	343.93	-32%	11,082,246	7,480,541	-3,621,706	-32%
		Car 2	53,486	53,486	0%	196.58	140.31	-29%	10,514,477	7,584,432	-2,918,844	-29%
		Car 3	87,374	87,374	0%	69.31	73.93	7%	8,955,589	6,459,757	-404,218	-7%
		Car 4	387,159	387,159	0%	49.16	47.80	-3%	19,093,585	18,536,009	-523,557	-3%
		Car 5	171,270	171,270	0%	18.59	47.80	151%	3,183,282	0,187,581	-5,044,209	151%
	Gasoline total	752,526	752,526	0%	78.33	73.89	-4%	57,215,533	54,998,501	-2,216,812	-4%	
	pre-Cars	1,341	1,341	0%	311.73	284.66	-9%	417,987	364,246	-42,722	-9%	
	Car 1	4,982	4,982	0%	298.92	287.28	-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	5,276,490	-4,458,094	-49%	
	Car 3	82,749	82,749	0%	589.53	176.81	-69%	48,481,830	14,796,249	-33,685,589	-69%	
	Car 4	211,237	211,237	0%	397.27	151.77	-62%	83,917,680	32,059,973	-51,857,706	-62%	
	Car 5	285,011	285,011	0%	436.38	151.77	-65%	124,721,396	43,370,300	-81,343,896	-65%	
	Car 6	16,081	16,081	0%	259.34	151.77	-41%	4,170,580	2,480,686	-1,729,814	-41%	
	Diesel oil total	626,045	626,045	0%	415.87	159.12	-62%	272,876,061	89,643,892	-173,262,919	-62%	
PKs Total	1,338,571	1,338,571	0%	218.44	152.15	-31%	338,091,584	154,642,853	-175,478,261	-31%		
1.A.3.b.i. Light Duty Vehicles (LDV)	Gasoline	pre-Cars	986	986	0%	838.14	646.96	-23%	563,683	378,724	-184,848	-23%
		Car 1	173	173	0%	868.27	389.96	-54%	160,074	53,576	-86,499	-54%
		Car 2	748	748	0%	284.73	287.11	21%	212,888	154,839	-58,029	-27%
		Car 3	771	771	0%	98.02	185.21	7%	75,982	81,070	5,078	7%
		Car 4	1,087	1,087	0%	43.47	50.15	15%	81,139	83,618	12,479	15%
		Car 5	1,374	1,374	0%	17.11	50.15	183%	23,517	68,918	45,401	193%
	Car 6	17	17	0%	18.06	50.15	179%	212	670	457	179%	
	Gasoline total	5,845	5,845	0%	198.34	176.49	-7%	1,112,584	1,031,652	-80,972	-7%	
	pre-Cars	2,537	2,537	0%	428.16	386.79	-21%	1,985,979	1,762,259	-223,729	-21%	
	Car 1	2,589	2,589	0%	393.82	276.25	-45%	987,136	639,888	-347,328	-45%	
	Car 2	6,087	6,087	0%	338.81	133.25	-62%	1,985,985	1,180,889	-825,128	-62%	
	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%	499.70	91.69	-82%	26,184,486	4,703,796	-21,944,748	-82%	
	Car 5	46,749	46,749	0%	438.64	91.69	-79%	20,496,234	4,258,626	-16,237,708	-79%	
	Car 6	187	187	0%	151.18	91.69	-40%	29,829	17,974	-11,855	-40%	
Diesel oil total	128,578	128,578	0%	415.56	170.94	-77%	61,146,525	14,267,237	-46,879,318	-77%		
LDVs Total	134,423	134,423	0%	463.56	153.85	-75%	62,259,160	15,298,849	-46,968,311	-75%		
1.A.3.b.ii. Heavy Duty Vehicles (HDV)	Diesel Oil	pre-Cars	984	984	0%	1059.48	1819.23	-5%	1,062,384	1,062,921	-48,443	-5%
		Car 1	837	837	0%	728.32	750.99	3%	699,222	628,359	-18,127	-3%
		Car 2	5,588	5,588	0%	784.35	643.67	-18%	4,384,320	3,623,441	-758,807	-18%
		Car 3	11,221	11,221	0%	621.20	458.38	-27%	7,082,740	5,143,528	-1,939,228	-27%
		Car 4	4,278	4,278	0%	461.50	361.79	-21%	1,972,610	1,584,978	-407,632	-21%
		Car 5	32,042	32,042	0%	358.55	183.99	-49%	7,726,911	4,065,532	-3,671,389	-49%
	Car 6	4,182	4,182	0%	42.78	183.99	330%	178,913	789,476	616,563	330%	
	Diesel Total	49,143	49,143	0%	468.37	339.99	-27%	23,017,115	16,788,234	-6,238,881	-27%	
	pre-Cars	4,782	4,782	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	581.41	-22%	1,600,088	1,237,759	-362,329	-22%	
	Car 2	13,023	13,023	0%	817.90	510.28	-37%	11,146,862	6,565,738	-4,191,151	-37%	
	Car 3	54,085	54,085	0%	632.52	384.41	-42%	36,589,677	19,927,835	-14,661,841	-42%	
	Car 4	34,037	34,037	0%	396.37	285.34	-30%	13,481,100	9,711,896	-3,779,202	-30%	
	Car 5	389,283	389,283	0%	262.92	153.66	-42%	110,112,782	69,688,043	-40,544,749	-42%	
	Car 6	34,214	34,214	0%	63.95	153.66	189%	3,937,089	11,368,682	7,421,413	189%	
Trucks Total	572,154	572,154	0%	314.85	196.65	-38%	179,874,133	112,295,562	-67,588,551	-38%		
1.A.3.b.iii. Motorised Two-Wheelers (M2W)	pre-Cars	6,185	6,185	0%	122.85	158.04	29%	795,185	974,388	218,152	29%	
	Car 1	3,837	3,837	0%	134.71	174.84	40%	478,514	670,859	192,346	40%	
	Car 2	3,365	3,365	0%	128.94	186.25	52%	433,874	680,379	226,504	52%	
	Car 3	5,385	5,385	0%	38.53	186.25	386%	209,722	1,041,189	831,467	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%	
M2Ws Total	18,675	18,675	0%	108.59	176.24	78%	1,828,294	3,386,194	1,488,499	78%		
1.A.3.b. Road Transport Total	2,153,563	2,153,563	0%	277.27	140.35	-49%	597,120,297	382,252,271	-214,868,025	-49%		

Adjustment details for 2025

NFR Code	Fuel	Activity Data			Implied Emission Factor			NO <sub>x</sub> Emissions					
		current	adjusted	difference	current	adjusted	difference	current	adjusted	adjustment	difference		
		kg [t]	kg [t]	%	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%	833.23	848.11	-14%	7,266,112	6,191,942	-1,074,168	-14%	
		Car 1	36,112	36,112	0%	371.34	345.71	-34%	8,963,881	5,924,574	-3,029,228	-34%	
		Car 2	42,925	42,925	0%	267.78	142.69	-32%	8,918,785	6,099,659	-2,819,648	-32%	
		Car 3	72,871	72,871	0%	73.96	74.74	1%	5,381,361	5,446,237	64,897	1%	
		Car 4	353,474	353,474	0%	52.36	49.62	-6%	18,485,637	17,326,221	-1,159,416	-6%	
		Car 5	180,783	180,783	0%	19.11	49.62	151%	3,454,481	0,881,456	-5,408,575	151%	
	Car 6	29,612	29,612	0%	25.70	49.62	84%	790,791	1,451,433	660,752	84%		
	Gasoline total	715,156	715,156	0%	74.38	71.73	-4%	53,190,787	51,280,983	-1,889,805	-4%		
	pre-Cars	1,342	1,342	0%	311.32	284.66	-9%	387,913	339,733	-48,180	-9%		
	Car 1	4,279	4,279	0%	298.14	287.84	-9%	1,261,930	1,129,989	-132,821	-10%		
	Car 2	19,689	19,689	0%	407.80	320.98	-49%	8,013,687	4,338,179	-3,674,788	-49%		
	Car 3	71,044	71,044	0%	595.81	179.04	-70%	42,271,648	12,719,962	-29,551,686	-70%		
	Car 4	182,410	182,410	0%	401.42	154.07	-62%	77,237,655	29,644,450	-47,593,206	-62%		
	Car 5	364,346	364,346	0%	434.67	154.07	-65%	132,290,433	46,080,424	-86,408,809	-65%		
	Car 6	52,576	52,576	0%	259.76	154.07	-41%	13,657,082	0,180,384	-5,556,778	-41%		
Diesel oil total	645,565	645,565	0%	426.19	159.89	-62%	275,130,223	183,163,591	-91,966,732	-62%			
PKs Total	1,360,721	1,360,721	0%	245.28	153.52	-37%	328,321,020	154,444,484	-173,876,536	-37%			
1.A.3.b.i. Light Duty Vehicles (LDV)	Gasoline	pre-Cars	979	979	0%	876.34	737.35	-29%	4,488,571	3,184,428	-1,294,143	-29%	
		Car 1	1,853	1,853	0%	748.71	553.48	-26%	1,387,291	1,025,251	-361,748	-26%	
		Car 2	11,082	11,082	0%	817.90	510.28	-37%	9,072,940	5,633,460	-3,439,351	-37%	
		Car 3	43,481	43,481	0%	621.55	381.64	-42%	27,460,779	15,734,621	-11,726,147	-42%	
		Car 4	15,781	15,781	0%	588.35	150.67	-74%	9,112,414	2,385,113	-6,747,701	-74%	
		Car 5	47,480	47,480	0%	501.73	91.74	-82%	23,782,396	4,348,298	-19,434,098	-82%	
	Car 6	62,116	62,116	0%	436.13	91.74	-79%	27,090,214	5,690,295	-21,392,809	-79%		
	Car 6	635	635	0%	154.91	91.74	-40%	87,760	88,230	-46	-40%		
	Diesel oil total	135,386	135,386	0%	469.35	187.96	-77%	64,585,643	14,687,496	-49,898,153	-77%		
	LDVs Total	141,098	141,098	0%	497.76	170.62	-76%	64,585,320	15,688,496	-48,896,821	-76%		
	1.A.3.b.ii. Heavy Duty Vehicles (HDV)	Diesel Oil	pre-Cars	979	979	0%	1076.34	1819.23	-5%	1,048,312	986,255	-62,057	-5%
			Car 1	747	747	0%	738.26	751.91	3%	545,471	581,836	16,165	3%
			Car 2	5,211	5,211	0%	787.43	644.46	-18%	4,183,087	3,358,604	-745,803	-18%
			Car 3	11,282	11,282	0%	633.90	458.67	-29%	7,141,732	5,174,989	-1,966,822	-29%
			Car 4	4,586	4,586	0							



Adjustment details for 2026

NFR Code	Fuel	Activity Data			Implied Emission Factor			NO <sub>x</sub> 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 [t]		
1.A.3.a i - Passenger Cars	Gasoline	pre-Cars	15,782	15,782	0%	636.76	648.11	-14%	7,670,916	6,410,967	-1,260,867	
		Cars 1	20,270	20,270	0%	372.26	241.68	-35%	7,545,483	4,988,688	-2,556,795	
		Cars 2	36,082	36,082	0%	212.73	143.11	-33%	7,671,581	5,160,897	-2,510,684	
		Cars 3	83,039	83,039	0%	78.17	75.50	-3%	4,881,482	4,759,259	-122,223	
		Cars 4	334,413	334,413	0%	53.74	50.17	-7%	17,383,984	16,777,445	-606,539	
		Cars 5	183,374	183,374	0%	19.09	50.17	163%	3,580,746	9,139,834	5,559,088	
			Cars 6	86,332	86,332	0%	26.67	50.17	86%	1,769,917	3,207,850	1,437,933
			Gasoline total	715,272	715,272	0%	78.93	70.65	-9%	58,736,967	50,535,049	-8,201,918
			pre-Cars	1,280	1,280	0%	368.78	254.66	-31%	396,263	209,172	-187,091
			Cars 1	3,749	3,749	0%	298.30	289.66	-3%	1,122,449	1,011,625	-111,425
			Cars 2	18,684	18,684	0%	407.19	221.48	-46%	8,720,132	3,883,984	-4,836,148
			Cars 3	81,388	81,388	0%	802.50	179.24	-78%	36,991,999	11,085,409	-25,906,590
			Cars 4	175,940	175,940	0%	405.78	156.24	-61%	71,362,220	27,474,086	-43,888,134
			Cars 5	299,654	299,654	0%	433.34	156.24	-64%	130,032,044	46,019,229	-84,012,815
			Cars 6	116,094	116,094	0%	268.78	156.24	-42%	30,427,555	10,232,785	-20,194,770
			Diesel Oil total	625,119	625,119	0%	410.36	160.76	-61%	277,941,660	188,535,230	-89,406,430
			PUs Total	1,368,391	1,368,391	0%	215.75	154.41	-29%	527,738,621	399,670,280	-128,068,341
	1.A.3.a ii - Light Duty Vehicles (LDV)	Gasoline	pre-Cars	910	910	0%	602.79	640.56	-6%	583,789	581,643	-2,146
			Cars 1	136	136	0%	908.31	512.78	-43%	122,120	42,425	-79,695
Cars 2			540	540	0%	308.39	217.84	-30%	182,311	117,197	-65,114	
Cars 3			650	650	0%	108.43	111.97	3%	70,432	72,731	2,299	
Cars 4			1,684	1,684	0%	43.06	52.36	21%	73,714	84,003	10,289	
Cars 5			1,724	1,724	0%	19.82	52.36	164%	36,157	80,258	44,101	
			Cars 6	363	363	0%	19.85	52.36	181%	6,764	19,982	13,218
			Gasoline total	5,506	5,506	0%	188.27	171.86	-9%	1,068,292	1,053,678	-14,614
			pre-Cars	2,189	2,189	0%	414.87	386.79	-7%	999,649	985,433	-14,216
			Cars 1	1,790	1,790	0%	391.89	276.25	-29%	780,189	385,271	-394,918
			Cars 2	4,223	4,223	0%	323.43	183.71	-43%	1,385,994	878,452	-507,542
			Cars 3	13,582	13,582	0%	588.91	150.77	-74%	8,084,323	2,949,233	-5,135,090
			Cars 4	43,141	43,141	0%	504.48	92.49	-82%	21,783,989	3,985,141	-17,798,848
			Cars 5	74,231	74,231	0%	434.16	92.49	-79%	32,223,283	6,659,790	-25,563,493
			Cars 6	4,921	4,921	0%	153.49	92.49	-40%	755,285	454,676	-300,609
			Diesel Oil total	148,068	148,068	0%	456.12	185.62	-59%	65,712,732	35,276,087	-30,436,645
			LDVs Total	149,994	149,994	0%	445.23	188.29	-57%	66,781,025	36,229,684	-30,551,341
1.A.3.a iii - Heavy Duty Vehicles (HDV)		Diesel Oil	pre-Cars	891	891	0%	1076.81	1819.23	-41%	964,197	980,234	16,037
			Cars 1	4,375	4,375	0%	731.87	732.27	0%	433,075	446,226	13,151
	Cars 2		4,223	4,223	0%	708.25	645.03	-9%	3,440,614	2,822,621	-617,993	
	Cars 3		10,333	10,333	0%	632.87	458.91	-28%	6,539,364	4,741,827	-1,797,537	
	Cars 4		4,449	4,449	0%	475.90	382.29	-19%	2,117,219	1,588,081	-529,138	
	Cars 5		34,390	34,390	0%	366.38	186.22	-49%	9,935,974	4,617,617	-5,318,357	
			Cars 6	9,126	9,126	0%	62.78	186.22	198%	673,066	1,680,481	1,007,415
			Diesel Total	54,157	54,157	0%	404.73	388.24	-7%	23,082,189	16,685,117	-6,397,072
			pre-Cars	3,933	3,933	0%	1034.81	737.35	-29%	4,087,249	2,980,379	-1,106,870
			Cars 1	1,585	1,585	0%	748.16	587.92	-21%	1,163,482	789,813	-373,669
			Cars 2	8,075	8,075	0%	817.75	585.52	-29%	7,258,045	4,486,620	-2,771,425
			Cars 3	34,187	34,187	0%	638.91	568.68	-11%	21,553,289	12,251,155	-9,302,134
			Cars 4	34,287	34,287	0%	356.94	281.86	-21%	9,649,364	6,685,621	-2,963,743
			Cars 5	269,736	269,736	0%	267.22	153.80	-43%	74,688,233	39,978,610	-34,709,623
			Cars 6	261,480	261,480	0%	67.77	153.80	149%	16,149,289	40,244,036	24,094,747
			Trucks Total	964,013	964,013	0%	298.31	180.97	-39%	134,431,899	101,496,262	-32,935,637
			pre-Cars	5,543	5,543	0%	125.59	155.78	24%	696,072	683,289	-12,783
			Cars 1	3,360	3,360	0%	107.11	177.29	39%	427,113	585,796	158,683
			Cars 2	3,375	3,375	0%	125.94	187.68	50%	421,961	687,078	265,117
		Cars 3	6,443	6,443	0%	48.36	187.68	381%	209,627	1,273,271	1,063,644	
		Cars 4	66	66	0%	17.47	187.68	1011%	1,134	12,822	11,688	
		Cars 5	0	0	0%	0.00	187.68	0%	0	0	0	
		MDVs Total	18,185	18,185	0%	98.14	181.68	86%	1,889,897	3,432,476	1,542,579	
		1.A.3.b - Road Transport	2,287,329	2,287,329	0%	258.89	137.22	-47%	93,789,558	382,981,820	-289,192,262	

Adjustment details for 2027

NFR Code	Fuel	Activity Data			Implied Emission Factor			NO <sub>x</sub> 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 [t]		
1.A.3.a i - Passenger Cars	Gasoline	pre-Cars	12,282	12,282	0%	636.76	648.11	-14%	7,816,287	6,686,187	-1,130,100	
		Cars 1	17,449	17,449	0%	372.99	241.68	-35%	6,588,911	4,217,644	-2,371,267	
		Cars 2	30,435	30,435	0%	217.43	147.75	-32%	6,617,570	4,174,140	-2,443,430	
		Cars 3	54,271	54,271	0%	78.48	76.27	-3%	4,254,938	4,139,376	-115,562	
		Cars 4	315,086	315,086	0%	54.96	51.26	-7%	17,315,320	16,151,881	-1,163,439	
		Cars 5	180,240	180,240	0%	19.17	51.26	161%	3,485,382	9,229,815	5,744,433	
			Cars 6	114,791	114,791	0%	27.66	51.26	82%	3,080,236	5,884,372	2,804,136
			Gasoline total	724,571	724,571	0%	67.86	60.88	-9%	49,046,874	38,534,714	-10,512,160
			pre-Cars	1,880	1,880	0%	368.39	254.66	-31%	680,863	347,030	-333,833
			Cars 1	3,360	3,360	0%	298.17	271.67	-9%	1,082,290	910,182	-172,108
			Cars 2	13,788	13,788	0%	407.17	222.48	-45%	6,914,130	3,086,983	-3,827,147
			Cars 3	52,128	52,128	0%	808.86	179.66	-78%	31,686,478	9,384,788	-22,301,690
			Cars 4	187,647	187,647	0%	418.10	158.34	-61%	64,733,485	24,993,323	-39,740,162
			Cars 5	283,480	283,480	0%	423.99	158.34	-63%	120,187,656	44,073,190	-76,114,466
			Cars 6	184,760	184,760	0%	262.61	158.34	-40%	48,521,183	20,259,985	-28,261,198
			Diesel Oil total	696,582	696,582	0%	396.65	161.95	-59%	272,126,091	152,890,721	-119,235,370
			PUs Total	1,421,162	1,421,162	0%	295.98	155.69	-48%	521,152,965	348,448,435	-172,704,530
	1.A.3.a ii - Light Duty Vehicles (LDV)	Gasoline	pre-Cars	960	960	0%	616.11	640.56	-6%	612,247	606,978	-5,269
			Cars 1	124	124	0%	908.23	512.78	-43%	112,083	38,682	-73,401
Cars 2			485	485	0%	302.12	221.62	-27%	140,344	102,950	-37,394	
Cars 3			596	596	0%	118.57	116.38	-2%	65,955	68,812	2,857	
Cars 4			1,476	1,476	0%	58.72	53.38	-9%	74,877	78,816	3,939	
Cars 5			1,680	1,680	0%	21.73	53.38	146%	36,240	89,034	52,794	
			Cars 6	910	910	0%	19.18	53.38	181%	17,022	49,080	31,858
			Gasoline total	6,186	6,186	0%	171.55	167.18	-3%	1,058,199	1,034,211	-23,988
			pre-Cars	2,087	2,087	0%	411.41	386.79	-6%	980,499	931,183	-49,316
			Cars 1	1,538	1,538	0%	398.47	276.25	-30%	680,716	331,158	-349,558
			Cars 2	3,580	3,580	0%	321.26	183.04	-43%	1,143,793	687,293	-456,501
			Cars 3	11,684	11,684	0%	558.88	150.79	-73%	6,940,879	1,758,147	-5,182,732
			Cars 4	39,050	39,050	0%	506.70	93.69	-82%	19,789,647	3,635,035	-16,154,612
			Cars 5	75,789	75,789	0%	432.66	93.69	-78%	32,790,966	7,054,946	-25,736,020
			Cars 6	19,626	19,626	0%	151.71	93.69	-39%	2,977,439	1,026,876	-1,950,563
			Diesel Oil total	153,284	153,284	0%	404.66	183.89	-55			

Adjustment details for 2018

NFR Code	Fuel	Activity Data			Implied Emission Factor			NO <sub>x</sub> Emissions			
		current	adjusted	difference	current	adjusted	difference	current	adjusted	difference	
		kg [t]	kg [t]	in [%]	in [kg/T]	in [kg/T]	in [%]	in [kg]	in [kg]	in [t]	
1.A.3.a.i - Passenger Cars	Gasoline	pre-Cars	12,219	12,219	0%	637.58	648.11	-6%	7,780,965	6,668,721	-1,112,234
		Car 1	14,362	14,362	0%	374.34	241.68	-35%	5,371,161	3,488,643	-1,882,518
		Car 2	24,285	24,285	0%	221.87	111.66	-50%	5,360,977	2,688,163	-2,672,814
		Car 3	43,642	43,642	0%	88.16	76.96	-4%	3,497,781	3,368,617	-139,164
		Car 4	278,738	278,738	0%	55.98	52.30	-7%	15,683,498	14,570,755	-1,112,743
		Car 5	166,030	166,030	0%	19.39	52.30	170%	3,238,282	6,725,666	3,487,384
	Car 6	159,041	159,041	0%	0.00	52.30	0%	4,190,422	6,710,250	4,127,828	
	Gasoline total	689,027	689,027	0%	64.42	68.45	6%	45,032,596	47,186,887	2,153,291	
	pre-Cars	1,543	1,543	0%	303.16	342.96	-13%	386,486	349,173	-37,313	
	Car 1	2,849	2,849	0%	294.17	272.65	-9%	862,432	775,166	-87,267	
	Car 2	10,784	10,784	0%	407.20	322.87	-44%	4,381,983	2,483,536	-1,898,448	
	Car 3	40,786	40,786	0%	812.49	180.15	-71%	24,932,029	7,333,241	-17,598,788	
	Car 4	130,534	130,534	0%	414.71	180.40	-41%	54,133,837	20,937,329	-33,196,508	
Car 5	251,212	251,212	0%	416.26	180.40	-41%	104,586,786	40,283,731	-64,303,055		
Car 6	238,685	238,685	0%	354.87	180.40	-37%	58,284,140	36,680,446	-21,603,704		
Diesel oil total	666,074	666,074	0%	379.66	163.30	-56%	247,596,063	188,768,684	-158,787,459		
PXs Total	1,365,101	1,365,101	0%	214.34	154.68	-28%	262,589,060	186,555,421	-136,033,639		
pre-Cars	917	917	0%	868.33	648.95	-1%	596,899	582,862	-14,037		
Car 1	188	188	0%	911.58	312.78	-66%	88,529	33,895	-54,634		
Car 2	377	377	0%	303.64	224.45	-26%	114,682	84,173	-30,509		
Car 3	511	511	0%	111.92	116.84	6%	57,282	60,739	3,457		
Car 4	1,275	1,275	0%	52.02	54.36	4%	65,290	69,276	3,986		
Car 5	1,483	1,483	0%	23.70	54.36	129%	35,160	80,626	45,466		
Car 6	1,643	1,643	0%	18.59	54.36	182%	30,660	89,326	58,666		
Gasoline total	6,315	6,315	0%	154.22	160.11	7%	999,199	1,071,138	71,939		
pre-Cars	1,872	1,872	0%	411.57	286.79	-29%	771,337	574,472	-196,865		
Car 1	1,285	1,285	0%	389.94	276.25	-28%	483,129	372,296	-110,833		
Car 2	2,942	2,942	0%	318.58	183.80	-39%	965,289	560,789	-394,500		
Car 3	5,363	5,363	0%	599.10	150.74	-75%	5,609,152	1,411,299	-4,197,853		
Car 4	33,232	33,232	0%	609.42	93.81	-82%	16,929,185	3,117,457	-13,811,728		
Car 5	66,283	66,283	0%	432.92	93.81	-78%	28,694,880	6,217,660	-22,477,220		
Car 6	39,482	39,482	0%	158.79	93.81	-39%	5,941,616	3,696,298	-2,245,318		
Diesel oil total	154,259	154,259	0%	384.71	182.69	-37%	59,344,525	35,800,316	-23,544,211		
LN% Total	160,574	160,574	0%	375.86	184.94	-27%	69,343,725	36,851,449	-32,492,276		
pre-Cars	547	547	0%	1078.16	1919.23	-43%	589,267	587,147	-2,120		
Car 1	237	237	0%	732.678	178.369	-76%	178,369	4,808	-173,561		
Car 2	2,270	2,270	0%	787.83	646.33	-18%	1,788,686	1,447,437	-341,249		
Car 3	6,737	6,737	0%	638.89	459.32	-28%	4,262,734	3,183,482	-1,079,252		
Car 4	3,043	3,043	0%	473.96	362.73	-23%	1,639,790	1,073,333	-566,457		
Car 5	18,189	18,189	0%	362.42	186.37	-49%	6,463,265	3,376,016	-3,087,249		
Car 6	20,670	20,670	0%	64.89	186.37	289%	1,176,026	3,682,314	2,506,288		
Diesel Total	91,634	91,634	0%	309.75	283.93	-10%	15,993,526	13,687,196	-2,306,330		
LN% Total	9,168	9,168	0%	1034.82	737.35	-29%	3,375,399	2,485,071	-890,328		
pre-Cars	1,094	1,094	0%	747.82	488.39	-34%	918,052	572,378	-345,674		
Car 1	5,544	5,544	0%	817.44	581.68	-29%	4,632,192	2,781,518	-1,850,674		
Car 2	20,583	20,583	0%	629.54	583.68	-6%	12,967,751	7,277,279	-5,690,472		
Car 3	15,912	15,912	0%	368.90	276.23	-24%	6,334,421	4,386,424	-1,947,997		
Car 4	164,960	164,960	0%	292.40	154.68	-47%	45,964,153	24,283,389	-21,680,764		
Car 5	381,799	381,799	0%	68.76	154.68	123%	26,251,482	69,665,888	43,414,406		
Diesel Total	585,186	585,186	0%	575.38	172.19	-70%	180,173,337	100,760,889	-79,412,448		
LN% Total	58,519	58,519	0%	1078.16	1919.23	-43%	589,267	587,147	-2,120		
pre-Cars	4,940	4,940	0%	128.95	188.61	20%	622,666	783,451	160,785		
Car 1	2,965	2,965	0%	126.94	177.73	41%	374,114	527,294	153,180		
Car 2	3,221	3,221	0%	129.33	188.64	65%	387,596	639,633	252,037		
Car 3	6,241	6,241	0%	48.24	188.64	381%	251,126	1,239,688	988,562		
Car 4	1,130	1,130	0%	28.41	188.64	672%	23,066	234,627	211,561		
Car 5	0	0	0%	0.00	188.64	0%	0	0	0		
MOWs Total	18,497	18,497	0%	89.68	188.64	198%	1,698,568	3,434,197	1,735,629		
LN% Total	2,180,993	2,180,993	0%	215.85	133.49	-38%	478,758,286	291,129,652	-177,628,634		

Adjustment details for 2019

NFR Code	Fuel	Activity Data			Implied Emission Factor			NO <sub>x</sub> Emissions			
		current	adjusted	difference	current	adjusted	difference	current	adjusted	difference	
		kg [t]	kg [t]	in [%]	in [kg/T]	in [kg/T]	in [%]	in [kg]	in [kg]	in [t]	
1.A.3.a.i - Passenger Cars	Gasoline	pre-Cars	13,569	13,569	0%	638.58	648.11	-6%	8,664,621	7,382,686	-1,281,935
		Car 1	12,427	12,427	0%	378.32	241.68	-36%	4,781,480	3,083,383	-1,698,096
		Car 2	20,086	20,086	0%	225.58	111.66	-50%	4,511,070	1,868,018	-2,643,052
		Car 3	39,216	39,216	0%	82.22	76.12	-7%	2,977,840	2,829,186	-148,654
		Car 4	295,220	295,220	0%	57.04	52.29	-7%	14,588,285	13,989,621	-598,664
		Car 5	180,537	180,537	0%	19.77	52.29	170%	3,173,729	6,584,356	3,410,627
	Car 6	206,626	206,626	0%	25.62	52.29	180%	5,295,099	11,010,782	5,715,683	
	Gasoline total	784,631	784,631	0%	62.36	68.45	10%	43,961,597	48,238,025	4,276,428	
	pre-Cars	1,546	1,546	0%	333.78	374.24	-13%	673,198	724,923	51,725	
	Car 1	2,849	2,849	0%	294.17	272.65	-9%	764,913	687,796	-77,117	
	Car 2	8,891	8,891	0%	407.59	328.16	-44%	3,420,286	2,037,480	-1,382,806	
	Car 3	33,079	33,079	0%	815.11	180.42	-71%	20,370,125	5,967,483	-14,402,642	
	Car 4	111,335	111,335	0%	419.17	182.44	-41%	46,669,685	18,085,228	-28,584,457	
Car 5	231,784	231,784	0%	418.37	182.44	-40%	95,117,643	37,650,997	-57,466,645		
Car 6	273,511	273,511	0%	227.30	182.44	-20%	62,189,230	44,429,184	-17,760,046		
Diesel oil total	663,841	663,841	0%	345.81	165.67	-52%	229,566,089	189,582,982	-139,983,106		
PXs Total	1,368,512	1,368,512	0%	699.83	195.32	-72%	273,668,029	157,821,687	-115,846,342		
pre-Cars	929	929	0%	841.89	648.95	-1%	681,419	681,962	543		
Car 1	87	87	0%	915.28	312.78	-66%	88,953	30,296	-58,657		
Car 2	316	316	0%	304.63	224.45	-26%	96,159	70,848	-25,311		
Car 3	447	447	0%	112.68	121.47	8%	50,365	54,283	3,918		
Car 4	1,126	1,126	0%	53.06	55.26	4%	59,652	62,199	2,547		
Car 5	1,361	1,361	0%	25.34	55.26	119%	34,240	74,680	40,440		
Car 6	2,420	2,420	0%	18.75	55.26	185%	45,383	133,753	88,370		
Gasoline total	6,483	6,483	0%	146.88	153.25	9%	976,279	1,004,156	27,877		
pre-Cars	1,744	1,744	0%	418.96	286.79	-29%	725,111	541,376	-183,735		
Car 1	1,079	1,079	0%	389.52	276.25	-28%	420,285	332,256	-88,029		
Car 2	2,234	2,234	0%	316.90	174.79	-39%	737,682	454,830	-282,852		
Car 3	7,649	7,649	0%	601.11	150.79	-75%	4,587,943	1,152,711	-3,435,232		
Car 4	28,711	28,711	0%	512.20	94.57	-82%	14,788,380	2,715,154	-12,073,226		
Car 5	58,714	58,714	0%	434.30	94.57	-78%	25,499,580	6,582,428	-18,917,152		
Car 6	58,931	58,931	0%	145.18	94.57	-35%	8,614,586	6,722,892	-1,891,694		
Diesel oil total	158,183	158,183	0%	347.44	181.99	-48%	55,383,535	26,221,446	-29,162,089		
LN% Total	165,666	165,666	0%	339.31	183.97	-46%	66,279,564	31,245,996	-35,033,568		
pre-Cars	489	489	0%	1086.20	1919.23	-43%	589,267	476,258	-113,009		
Car 1	147	147	0%	738.37	178.369	-76%	178,369	110,933	-67,436		
Car 2	1,611	1,611	0%	789.47	646.77	-18%	5,721,445	1,041,621	-4,679,824		
Car 3	5,789	5,789	0%	631.62	459.55	-27%	3,68				

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Adjustment 2014 (accepted) <sup>7), 8)</sup>	-105.6	-101.3	-95.7	-91.7						
Adjustment 2015 (accepted) <sup>9), 10)</sup>	-100.3	-95.5	-89.9	-85.1						
Adjustment 2016 (accepted) <sup>11), 12)</sup>	-151.3	-146.9	-145.1	-142.5	-128.1					
Adjustment 2017 (accepted) <sup>13)</sup>	-151.3	-146.8	-145.0	-142.4	-127.2	-100.9				
Adjustment 2018 (accepted) <sup>14), 15)</sup>	-172.3	-174.5	-177.4	-180.4	-171.5	-148.9	-123.2			
Adjustment 2019 (accepted) <sup>16), 17)</sup>	-172.3	-174.5	-177.4	-180.3	-171.4	-148.8	-123.3	-93.7		
Adjustment 2020 (accepted) <sup>18)</sup>	-297.8	-302.3	-301.3	-306.1	-294.5	-269.0	-244.3	-214.9	-174.6	
<b>Adjustment 2021 (proposal)</b>	<b>-296.1</b>	<b>-300.7</b>	<b>-300.4</b>	<b>-305.2</b>	<b>-294.9</b>	<b>-274.9</b>	<b>-250.9</b>	<b>-221.1</b>	<b>-179.6</b>	<b>-144.8</b>
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". <sup>19)</sup>

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 <sup>20)</sup> strongly effecting the TREMOD model underlying Germany's emission reporting for road transport and hence any adjustments of NO<sub>x</sub> 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<sub>x</sub> 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.**

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<sup>3)</sup> 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](http://www.unece.org/fileadmin/DAM/env/documents/2012/EB/Decision_2012_12.pdf)

<sup>4)</sup> 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](http://www.unece.org/fileadmin/DAM/env/documents/2013/air/ECE_EB.AIR_111_Add.1_ENG_DECISION_4.pdf)

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<sup>15)</sup> 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](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)

<sup>16)</sup> 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](https://www.ceip.at/fileadmin/inhalte/emep/pdf/2019/ECE_EB.AIR_GE.1_2019_10-1909789E.pdf), 2019.

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<sup>18)</sup> CEIP, 2020: [https://www.ceip.at/fileadmin/inhalte/ceip/00\\_pdf\\_other/2020/adj-status\\_ece\\_eb.air.ge.1\\_2020\\_10-2008939e.pdf](https://www.ceip.at/fileadmin/inhalte/ceip/00_pdf_other/2020/adj-status_ece_eb.air.ge.1_2020_10-2008939e.pdf)

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