

# 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, 2012a & 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) <sup>5)</sup>. 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>, 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

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

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

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

Unfortunately, the oldest TREMOD version available for such comparison is TREMOD 3.1 from 2002<sup>6)</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 6.02 (Knörr et al., 2019a)<sup>7)</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>										

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

NER Code	Fuel	Year	Activity Data			Implied Emission Factor			NO <sub>x</sub> Emissions			
			current	adjusted	difference	current	adjusted	difference	current	adjusted	adjustment	difference
			in [TJ]		in [%]	in [kg/TJ]		in [%]	in [kg]			in [%]
1.A.3.b.i	gasoline		795.957	795.957	0%	97.55	94.99	-13%	77.644.842	67.959.906	9.683.935	-13%
1.A.3.b.i	diesel oil		529.390	529.390	0%	429.45	160.51	-63%	227.341.056	84.370.461	142.970.635	-63%
1.A.3.b.ii	gasoline		6.325	6.325	0%	255.87	214.75	-16%	1.618.432	1.358.328	260.104	-16%
1.A.3.b.ii	diesel oil		113.450	113.450	0%	476.34	134.96	-72%	54.040.533	15.311.584	38.728.949	-72%
1.A.3.b.iii	diesel oil		46.844	46.844	0%	623.00	482.55	-23%	29.931.266	23.183.732	6.747.534	-23%
1.A.3.b.iii	diesel oil		566.741	566.741	0%	446.67	271.83	-39%	253.148.243	154.056.160	99.092.083	-39%
1.A.3.b.iv	gasoline		19.712	19.712	0%	113.68	168.43	48%	2.240.749	3.320.034	-1.079.285	48%
1.A.3.b TOTAL		2010	2.079.608	2.079.608	0%			0%	645.965.162	349.851.206	296.113.956	-46%
1.A.3.b.i	gasoline		794.688	794.688	0%	92.09	81.61	-11%	73.185.851	64.351.951	8.833.900	-11%
1.A.3.b.i	diesel oil		553.564	553.564	0%	434.12	159.22	-63%	248.313.791	88.138.959	160.174.832	-63%
1.A.3.b.ii	gasoline		6.118	6.118	0%	229.35	198.57	-13%	1.403.081	1.214.776	188.305	-13%
1.A.3.b.ii	diesel oil		115.967	115.967	0%	481.55	126.92	-74%	55.844.518	14.718.142	41.126.376	-74%
1.A.3.b.iii	diesel oil		47.365	47.365	0%	592.65	448.99	-24%	28.071.221	21.286.323	6.884.898	-24%
1.A.3.b.iii	diesel oil		563.891	563.891	0%	419.38	244.97	-40%	231.410.271	138.136.342	93.273.929	-40%
1.A.3.b.iv	gasoline		19.289	19.289	0%	119.79	171.60	54%	2.137.602	3.299.162	-1.162.160	54%
1.A.3.b TOTAL		2011	2.100.883	2.100.883	0%			0%	632.365.736	331.625.655	300.740.081	-48%
1.A.3.b.i	gasoline		750.957	750.957	0%	85.73	78.00	-9%	64.379.994	58.577.229	5.802.765	-9%
1.A.3.b.i	diesel oil		555.245	555.245	0%	435.96	158.66	-64%	242.062.902	88.096.699	153.966.203	-64%
1.A.3.b.ii	gasoline		5.657	5.657	0%	218.93	193.15	-12%	1.238.520	1.092.662	145.859	-12%
1.A.3.b.ii	diesel oil		114.350	114.350	0%	481.91	128.17	-75%	55.106.382	13.741.354	41.365.028	-75%
1.A.3.b.iii	diesel oil		50.902	50.902	0%	533.22	384.33	-28%	27.141.913	19.563.208	7.578.704	-28%
1.A.3.b.iii	diesel oil		589.585	589.585	0%	381.33	224.00	-41%	224.829.180	132.064.753	92.764.428	-41%
1.A.3.b.iv	gasoline		18.268	18.268	0%	107.43	173.28	61%	1.962.546	3.165.439	-1.202.893	61%
1.A.3.b TOTAL		2012	2.084.964	2.084.964	0%			0%	616.721.438	316.391.343	300.420.094	-49%
1.A.3.b.i	gasoline		749.114	749.114	0%	80.35	74.85	-7%	60.190.007	56.071.797	4.118.211	-7%
1.A.3.b.i	diesel oil		589.131	589.131	0%	437.14	158.71	-64%	257.533.728	93.499.010	164.034.718	-64%
1.A.3.b.ii	gasoline		5.578	5.578	0%	202.80	184.07	-9%	1.131.209	1.026.727	104.482	-9%
1.A.3.b.ii	diesel oil		116.777	116.777	0%	489.60	114.93	-76%	57.003.533	13.690.488	43.333.045	-76%
1.A.3.b.iii	diesel oil		81.716	81.716	0%	509.54	369.96	-29%	26.350.969	18.420.843	7.930.126	-29%
1.A.3.b.iii	diesel oil		600.139	600.139	0%	353.06	287.93	-19%	211.887.531	124.788.459	87.099.072	-41%
1.A.3.b.iv	gasoline		18.229	18.229	0%	194.34	175.38	88%	1.902.668	3.197.038	-1.294.361	88%
1.A.3.b TOTAL		2013	2.132.683	2.132.683	0%			0%	616.078.063	316.854.371	300.224.692	-50%
1.A.3.b.i	gasoline		752.526	752.526	0%	75.03	73.09	-3%	57.215.533	54.988.921	2.216.612	-4%
1.A.3.b.i	diesel oil		626.845	626.845	0%	435.87	159.12	-63%	272.876.061	99.613.892	173.262.169	-63%
1.A.3.b.ii	gasoline		5.845	5.845	0%	190.34	176.49	-7%	1.112.584	1.031.612	80.972	-7%
1.A.3.b.ii	diesel oil		128.578	128.578	0%	475.56	110.96	-77%	61.146.575	14.267.237	46.879.338	-77%
1.A.3.b.iii	diesel oil		45.143	45.143	0%	468.37	339.99	-27%	23.017.116	16.708.234	6.308.881	-27%
1.A.3.b.iii	diesel oil		672.754	672.754	0%	314.05	196.05	-38%	179.874.133	112.285.582	67.588.551	-38%
1.A.3.b.iv	gasoline		18.673	18.673	0%	100.59	179.24	78%	1.878.294	3.346.794	-1.468.499	78%
1.A.3.b TOTAL		2014	2.153.563	2.153.563	0%			0%	597.120.297	302.252.271	294.868.025	-49%
1.A.3.b.i	gasoline		715.156	715.156	0%	74.38	71.73	-4%	53.190.787	51.300.983	1.889.805	-4%
1.A.3.b.i	diesel oil		645.555	645.555	0%	426.19	159.80	-63%	275.130.233	103.163.501	171.966.732	-63%
1.A.3.b.ii	gasoline		5.793	5.793	0%	187.12	172.80	-8%	1.083.927	1.000.999	82.928	-8%
1.A.3.b.ii	diesel oil		135.396	135.396	0%	469.35	187.96	-77%	63.505.443	14.607.490	48.897.953	-77%
1.A.3.b.iii	diesel oil		52.287	52.287	0%	458.96	327.99	-29%	23.997.817	17.149.448	6.848.370	-29%
1.A.3.b.iii	diesel oil		589.411	589.411	0%	266.69	187.51	-30%	157.189.676	116.529.703	40.659.973	-30%
1.A.3.b.iv	gasoline		18.459	18.459	0%	99.32	180.65	82%	1.833.362	3.334.472	-1.501.090	82%
1.A.3.b TOTAL		2015	2.161.576	2.161.576	0%			0%	575.931.265	301.877.596	274.053.670	-48%
1.A.3.b.i	gasoline		715.272	715.272	0%	79.93	76.65	-4%	50.736.967	50.535.049	201.918	0%
1.A.3.b.i	diesel oil		675.119	675.119	0%	410.36	160.76	-61%	277.041.660	108.535.230	168.506.430	-61%
1.A.3.b.ii	gasoline		5.926	5.926	0%	189.27	171.06	-9%	1.068.292	1.013.678	54.614	-5%
1.A.3.b.ii	diesel oil		144.068	144.068	0%	456.12	185.62	-77%	65.712.732	15.216.007	50.496.726	-77%
1.A.3.b.iii	diesel oil		54.157	54.157	0%	424.73	388.24	-7%	23.002.109	16.693.117	6.308.992	-27%
1.A.3.b.iii	diesel oil		594.013	594.013	0%	226.31	180.97	-20%	134.431.899	107.496.262	26.935.637	-20%
1.A.3.b.iv	gasoline		18.785	18.785	0%	96.14	181.66	89%	1.805.897	3.412.476	-1.606.579	89%
1.A.3.b TOTAL		2016	2.207.339	2.207.339	0%			0%	553.799.556	302.901.820	250.897.738	-45%
1.A.3.b.i	gasoline		724.571	724.571	0%	67.66	69.88	3%	49.026.074	50.634.714	-1.608.640	3%
1.A.3.b.i	diesel oil		696.592	696.592	0%	399.65	161.95	-59%	272.126.091	112.810.721	159.315.370	-59%
1.A.3.b.ii	gasoline		6.186	6.186	0%	171.15	167.18	-2%	1.058.799	1.034.211	24.588	-2%
1.A.3.b.ii	diesel oil		153.294	153.294	0%	424.66	183.89	-76%	66.093.930	15.925.216	50.168.714	-76%
1.A.3.b.iii	diesel oil		53.382	53.382	0%	378.80	286.71	-23%	19.793.501	15.304.828	4.488.673	-23%
1.A.3.b.iii	diesel oil		596.263	596.263	0%	195.02	175.92	-10%	116.671.141	105.248.508	11.422.633	-10%
1.A.3.b.iv	gasoline		19.160	19.160	0%	92.83	183.39	98%	1.778.674	3.513.787	-1.735.114	98%
1.A.3.b TOTAL		2017	2.251.437	2.251.437	0%			0%	525.549.410	304.469.906	221.079.424	-42%
1.A.3.b.i	gasoline		699.027	699.027	0%	64.42	68.36	6%	45.032.996	47.786.817	-2.753.820	6%
1.A.3.b.i	diesel oil		666.074	666.074	0%	371.66	163.30	-56%	247.695.063	108.768.604	138.926.459	-56%
1.A.3.b.ii	gasoline		6.315	6.315	0%	158.22	168.11	1%	999.199	1.011.138	-11.939	1%
1.A.3.b.ii	diesel oil		154.259	154.259	0%	384.71	182.69	-73%	69.344.525	15.840.310	53.504.215	-73%
1.A.3.b.iii	diesel oil		51.634	51.634	0%	399.75	263.53	-35%	15.993.526	13.607.106	2.386.420	-15%
1.A.3.b.iii	diesel oil		585.186	585.186	0%	171.18	172.10	1%	188.173.337	188.710.869	-537.532	1%
1.A.3.b.iv	gasoline		18.497	18.497	0%	89.66	184.61	106%	1.658.568	3.414.767	-1.756.209	106%
1.A.3.b TOTAL		2018	2.180.993	2.180.993	0%			0%	478.758.206	291.139.612	179.618.593	-38%
1.A.3.b.i	gasoline		704.691	704.691	0%	62.30	68.45	10%	43.901.941	48.238.025	-4.336.084	10%
1.A.3.b.i	diesel oil		683.841	683.841	0%	345.81	165.07	-52%	229.566.088	109.582.982	119.983.106	-52%
1.A.3.b.ii	gasoline		6.683	6.683	0%	146.08	153.25	5%	976.219	1.024.160	-47.941	5%
1.A.3.b.ii	diesel oil		159.183	159.183	0%	347.42	181.90	-71%	55.303.335	16.221.445	39.081.890	-71%
1.A.3.b.iii	diesel oil		52.939	52.939	0%	274.41	247.81	-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	100.809.376	-9.428.676	10%
1.A.3.b.iv	gasoline		18.750	18.750	0%	86.05	186.83	117%	1.613.450	3.502.941	-1.889.491	117%
1.A.3.b TOTAL		2019	2.202.000	2.202.000	0%			0%	437.268.744	292.497.497	144.771.248	-33%

Adjustment details for 2020												
NFR Code	Fuel	Activity Data			Implied Emission Factor			NO <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 [kg]	
1.A.3.a.i. Passenger Cars	Gasoline	pre-Cars	13.685	13.685	0%	584.75	514.25	-12%	7.955.060	6.986.917	-958.143	-12%
		Car 1	36.541	36.541	0%	338.50	297.71	-12%	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	-3.568.995	-22%
		Car 3	133.139	133.139	0%	58.51	70.18	20%	7.790.384	9.343.433	1.553.129	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	67%	2	2	0	0%
		Gasoline total	795.057	795.057	0%	92.55	83.59	-10%	37.644.042	31.650.586	-5.993.455	-16%
	Diesel Oil	pre-Cars	1.249	1.249	0%	627.99	545.95	-13%	183.760	157.255	-26.505	-15%
		Car 1	10.338	10.338	0%	294.42	245.17	-17%	3.044.428	2.741.387	-302.521	-10%
		Car 2	50.088	50.088	0%	406.90	299.19	-27%	20.372.795	10.974.210	-9.398.584	-46%
		Car 3	134.025	134.025	0%	542.54	170.54	-69%	72.645.173	23.929.276	-48.715.957	-67%
		Car 4	279.154	279.154	0%	304.37	140.58	-53%	187.299.180	39.243.811	-148.055.349	-81%
		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	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	-35%	364,985,938	152,621,367	-212,364,570	-58%
	Gasoline	pre-Cars	1.249	1.249	0%	627.99	545.95	-13%	183.760	157.255	-26.505	-15%
		Car 1	36.541	36.541	0%	338.50	297.71	-12%	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	-3.568.995	-22%
		Car 3	133.139	133.139	0%	58.51	70.18	20%	7.790.384	9.343.433	1.553.129	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%
1.A.3.b.i. Light Duty Vehicles (LDVs)	Gasoline	pre-Cars	1.249	1.249	0%	627.99	545.95	-13%	183.760	157.255	-26.505	-15%
		Car 1	36.541	36.541	0%	338.50	297.71	-12%	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	-3.568.995	-22%
		Car 3	133.139	133.139	0%	58.51	70.18	20%	7.790.384	9.343.433	1.553.129	20%
		Car 4	444.991	444.991	0%	42.27	42.19	0%	18.911.389	18.773.529	-137.859	0%
		Car 5	31.234	31.234	0%	18.61	42.19	127%	581.142	1.317.737	736.595	127%
		Gasoline total	6.345	6.345	0%	255.87	254.75	-0%	1,419,832	1,358,126	-61,706	-4%
	Diesel Oil	pre-Cars	4.876	4.876	0%	425.99	385.79	-9%	2,077,142	1,495,983	-581,239	-28%
		Car 1	9.989	9.989	0%	399.18	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%	4,420,280	2,534,731	-1,885,629	-43%
		Car 3	33.249	33.249	0%	531.91	150.58	-72%	17,655,883	5,085,760	-12,569,123	-72%
		Car 4	54.581	54.581	0%	491.42	80.69	-84%	26,021,636	4,940,722	-21,080,914	-80%
		Car 5	1,629	1,629	0%	427.52	80.69	-81%	696,296	144,434	-551,772	-79%
		Car 6	0	0	0%	15.73	80.69	-81%	7	4	-3	-43%
		Diesel oil total	113,450	113,450	0%	416.34	134.94	-72%	54,043,533	15,351,584	-38,691,949	-72%
		LDVs Total	175,775	175,775	0%	464.70	139.18	-70%	55,658,966	16,685,913	-38,973,053	-70%
	Diesel Oil	pre-Cars	3.382	3.382	0%	709.25	193.78	-73%	3,674,087	3,452,644	-221,423	-6%
		Car 1	2,826	2,826	0%	749.41	152.14	-79%	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	15,890	15,890	0%	633.22	437.25	-30%	13,065,776	7,269,299	-5,796,477	-44%
		Car 4	5,461	5,461	0%	448.63	351.65	-21%	2,650,016	1,501,527	-1,148,489	-43%
		Car 5	10,326	10,326	0%	337.28	182.33	-46%	3,882,417	1,882,644	-1,999,773	-51%
1.A.3.b.ii. Heavy Duty Vehicles (HDVs)	Diesel Oil	pre-Cars	48,044	48,044	0%	623.80	482.55	-23%	29,931,266	23,185,732	-6,745,534	-23%
		Car 1	10,185	10,185	0%	1040.16	787.37	-24%	10,510,623	7,754,136	-2,756,487	-26%
		Car 2	5,677	5,677	0%	758.55	575.55	-24%	4,261,383	3,287,681	-973,702	-23%
		Car 3	38,558	38,558	0%	817.62	524.79	-35%	31,525,526	20,234,619	-11,290,907	-36%
		Car 4	169,023	169,023	0%	636.28	274.48	-57%	161,136,182	59,617,271	-101,518,911	-63%
		Car 5	69,636	69,636	0%	368.34	280.62	-24%	27,183,867	20,146,636	-7,037,231	-26%
		Car 6	283,934	283,934	0%	276.42	151.65	-45%	79,543,643	43,115,897	-36,427,746	-46%
		Trucks Total	565,141	565,141	0%	446.67	271.83	-39%	293,148,243	154,696,160	-138,452,083	-48%
	Gasoline	pre-Cars	7,973	7,973	0%	122.80	149.18	22%	972,721	1,189,393	216,672	22%
		Car 1	5,231	5,231	0%	123.77	165.74	34%	647,479	887,039	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%	116,189	567,032	450,843	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%
		HDVs 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	2,079,688	2,079,688	0%	219.62	168.23	-26%	645,965,162	349,851,296	-296,113,866	-46%

Adjustment details for 2021												
NFR Code	Fuel	Activity Data			Implied Emission Factor			NO <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	13.063	13.063	0%	592.96	534.68	-10%	7.720.235	6.979.435	-740.801	-10%
		Car 1	61.979	61.979	0%	347.86	340.16	-2%	21.560.430	18.884.961	-6.575.479	-31%
		Car 2	87.083	87.083	0%	178.38	136.58	-24%	15.620.983	11.883.782	-3.737.191	-24%
		Car 3	124.330	124.330	0%	61.94	71.52	16%	7.683.891	8.891.671	1.207.780	16%
		Car 4	442.185	442.185	0%	43.94	43.68	0%	19.384.914	19.376.439	-8.475	0%
		Car 5	66.057	66.057	0%	18.58	43.68	135%	1.227.381	2.085.636	1.658.255	135%
		Car 6	1	1	0%	25.06	43.68	69%	17	20	3	15%
		Gasoline total	794.688	794.688	0%	92.69	81.65	-12%	73.185.851	64.851.951	-8.333.900	-11%
	Diesel Oil	pre-Cars	1.711	1.711	0%	318.90	264.56	-16%	531.683	453.187	-78.496	-15%
		Car 1	8.426	8.426	0%	297.32	245.65	-18%	2.585.115	2.239.987	-345.119	-13%
		Car 2	42.514	42.514	0%	407.93	279.27	-32%	17.384.549	9.321.916	-8.062.633	-46%
		Car 3	121.429	121.429	0%	555.36	170.55	-69%	67.437.053	21.681.366	-45.755.687	-69%
		Car 4	264.943	264.943	0%	388.88	143.48	-63%	182.817.881	30.889.755	-151.928.126	-83%
		Car 5	113.047	113.047	0%	435.12	143.48	-67%	49.536.960	16.332.974	-33.203.984	-67%
		Car 6	695	695	0%	259.55	143.48	-45%	180.582	99.754	-80.828	-45%
		Diesel oil total	553.564	553.564	0%	434.12	159.92	-63%	249.713.791	88.138.959	-161.574.832	-63%
		Pkx Total	1.348.252	1.348.252	0%	232.52	133.47	-51%	371.899.642	152.990.910	-218.908.732	-59%
	Gasoline	pre-Cars	1.084	1.084	0%	629.25	545.95	-13%	182.214	157.255	-24.959	-14%
		Car 1	283	283	0%	819.74	594.47	-27%	243.289	86.158	-157.132	-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	7.461	11%
		Car 4	2.562	2.562	0%	37.38	46.51	24%	95.786	119.162	23.376	24%
		Car 5	241	241	0%	16.13	46.51	189%	3.882	11.190	7.308	189%
		Car 6	0	0	0%	15.33	46.51	203%	1	2	1	203%
		Gasoline total	6.118	6.118	0%	229.35	186.57	-53%	1.481.081	1.244.716	-236.365	-16%
Light Duty Vehicles (LDV)	pre-Cars	3.995	3.995	0%	425.39	398.79	-6%	1.689.280	1.225.662	-472.598	-28%	
	Car 1	4.787	4.787	0%	356.71	275.24	-23%	1.894.360	1.030.425	-863.935	-46%	
	Car 2	10.816	10.816	0%	336.90	153.23	-53%	3.644.582	2.091.083	-1.553.500	-43%	
	Car 3	28.925	28.925	0%	541.53	150.54	-72%	18.637.249	4.348.078	-14.289.171	-77%	
	Car 4	60.032	60.032	0%	402.82	89.25	-82%	39.079.914	5.420.811	-33.659.104	-86%	
	Car 5	6.609	6.609	0%	144.05	89.25	-40%	2.930.190	584.364	-2.345.826	-80%	
	Car 6	0	0	0%	161.21	89.25	-43%	14	6	-8	-43%	
	Diesel oil total	115.961	115.961	0%	485.55	126.92	-74%	55.844.598	15.708.142	-40.136.376	-74%	
LDVs Total	122.085	122.085	0%	408.92	130.55	-68%	127.447.999	19.932.898	-107.515.101	-88%		
1.A.3.a.ii. Heavy Duty Vehicles (HDV)	pre-Cars	2.620	2.620	0%	1002.69	1019.78	6%	2.836.189	2.671.331	-164.778	-6%	
	Car 1	2.258	2.258	0%	752.91	711.45	-5%	1.639.781	1.636.297	-3.484	0%	
	Car 2	3.024	3.024	0%	804.79	653.36	-20%	2.281.125	1.537.559	-743.566	-33%	
	Car 3	16.887	16.887	0%	633.16	457.38	-28%	9.425.880	6.889.054	-2.536.827	-27%	
	Car 4	5.131	5.131	0%	448.88	351.81	-21%	2.303.338	1.881.274	-426.064	-20%	
	Car 5	13.396	13.396	0%	336.60	182.62	-46%	4.589.052	2.486.399	-2.092.653	-46%	
	Car 6	0	0	0%	0	0	0%	0	0	0	0%	
	Buses Total	47.365	47.365	0%	902.65	448.59	-50%	28.071.221	21.286.323	-6.884.898	-25%	
1.A.3.a.iii. Heavy Duty Vehicle: Trucks & Lorries	pre-Cars	8.044	8.044	0%	1030.67	1753.88	70%	8.365.423	6.144.933	-2.210.491	-26%	
	Car 1	4.384	4.384	0%	758.16	574.04	-23%	3.280.422	2.535.327	-742.844	-23%	
	Car 2	29.277	29.277	0%	817.37	550.61	-33%	23.947.723	12.926.277	-11.021.446	-46%	
	Car 3	121.581	121.581	0%	636.16	436.56	-31%	77.271.520	45.310.423	-31.961.097	-41%	
	Car 4	68.430	68.430	0%	290.35	289.43	-0%	32.977.784	15.969.685	-6.468.019	-20%	
	Car 5	342.175	342.175	0%	278.20	152.63	-45%	96.589.479	52.019.687	-44.569.792	-45%	
	Car 6	0	0	0%	0	0	0%	0	0	0	0%	
	Trucks Total	563.891	563.891	0%	418.38	244.97	-40%	215.470.271	138.136.342	-77.333.929	-36%	
1.A.3.b.iv. Motorised Two-Wheelers (M2W)	pre-Cars	7.389	7.389	0%	322.96	150.24	-53%	969.588	1.110.170	210.588	22%	
	Car 1	4.885	4.885	0%	134.72	108.26	-20%	599.299	888.547	289.248	35%	
	Car 2	3.544	3.544	0%	137.85	194.58	41%	488.552	688.693	201.851	41%	
	Car 3	3.560	3.560	0%	39.59	194.58	382%	160.553	680.634	520.080	382%	
	Car 4	0	0	0%	0	0	0%	0	0	0	0%	
	Car 5	0	0	0%	0	0	0%	0	0	0	0%	
	M2Ws Total	19.289	19.289	0%	119.79	177.64	54%	2.137.082	3.299.162	1.162.080	54%	
	1.A.3.b. Road Transport	Total	2.180.883	2.180.883	0%	305.90	157.85	-49%	632.363.736	321.625.655	-310.738.081	-49%



Adjustment details for 2023												
NFR Code	Fuel	Activity Data			Implied Emission Factor			NO <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	11,581	11,581	0%	607.72	635.39	-12%	7,026,041	6,189,785	-836,256	-12%
		Car 1	47,487	47,487	0%	348.56	341.62	-2%	16,571,746	11,426,129	-5,145,617	-31%
		Car 2	72,781	72,781	0%	194.27	177.82	-9%	13,487,749	10,039,380	-3,372,369	-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	142%	1,897,355	4,681,311	2,783,956	142%
	Gasoline total	750,267	750,267	0%	85.73	78.89	-8%	64,379,964	58,577,229	-5,802,735	-9%	
	Car 1	6,660	6,660	0%	267.79	246.44	-11%	1,980,364	1,771,787	-208,577	-11%	
	Car 2	33,967	33,967	0%	406.82	279.27	-40%	13,987,432	7,445,646	-6,541,787	-40%	
	Car 3	183,539	183,539	0%	564.82	176.63	-69%	58,399,037	18,434,837	-39,964,200	-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%	
	Diesel oil total	555,245	555,245	0%	455.96	158.66	-64%	242,962,986	88,096,639	-154,866,347	-64%	
	FCs Total	1,305,262	1,305,262	0%	234.61	152.29	-35%	386,442,896	146,673,867	-239,769,029	-35%	
	Car 1	232	232	0%	803.24	383.22	-52%	199,985	70,295	-129,690	-60%	
Car 2	989	989	0%	271.16	195.58	-28%	269,134	133,598	-135,536	-29%		
Car 3	835	835	0%	89.38	98.33	10%	14,623	82,092	7,469	10%		
Car 4	2,030	2,030	0%	38.49	47.58	24%	78,155	96,691	18,536	24%		
Car 5	610	610	0%	16.36	47.58	182%	9,941	29,011	19,069	182%		
Car 6	0	0	0%	15.37	47.58	210%	2	6	4	210%		
Gasoline total	5,657	5,657	0%	218.93	193.15	-12%	1,238,520	1,092,662	-145,858	-12%		
Car 1	3,666	3,666	0%	398.34	276.24	-30%	1,445,980	1,017,634	-428,346	-29%		
Car 2	8,479	8,479	0%	336.40	193.39	-42%	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	3,546,082	-9,504,199	-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%	7,040,451	1,420,906	-5,619,545	-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%		
LDVs Total	129,088	129,088	0%	489.51	123.61	-74%	56,344,983	14,834,656	-41,510,327	-74%		
Car 1	1,245	1,245	0%	727.34	131.15	-82%	1,017,476	337,184	-680,292	-63%		
Car 2	7,788	7,788	0%	703.46	643.34	-9%	5,085,091	4,597,478	-487,613	-9%		
Car 3	14,483	14,483	0%	629.94	437.61	-31%	9,073,197	6,089,744	-2,983,453	-33%		
Car 4	5,331	5,331	0%	468.10	361.86	-22%	2,642,179	1,675,777	-966,402	-37%		
Car 5	20,752	20,752	0%	347.84	182.99	-47%	7,219,563	3,787,467	-3,432,096	-48%		
Car 6	73	73	0%	64.52	182.99	286%	3,961	13,296	9,334	236%		
Buses Total	50,962	50,962	0%	533.22	384.33	-28%	27,141,913	19,945,288	-7,196,625	-27%		
Trucks Total	589,585	589,585	0%	385.33	224.69	-41%	224,829,180	132,064,153	-92,765,027	-41%		
Car 1	4,386	4,386	0%	134.61	171.39	28%	536,615	738,050	201,435	38%		
Car 2	3,267	3,267	0%	136.22	184.56	35%	445,087	636,853	191,766	43%		
Car 3	3,984	3,984	0%	38.66	184.56	382%	18,386	778,616	760,230	382%		
Car 4	0	0	0%	0	0	0%	0	0	0	0%		
Car 5	0	0	0%	0	0	0%	0	0	0	0%		
MWVs Total	18,268	18,268	0%	107.43	173.28	61%	1,982,546	3,165,439	1,182,893	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												
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	649.35	-5%	7,011,541	6,967,452	-4,189	-0%
		Car 1	37,743	37,743	0%	353.78	341.68	-3%	13,362,966	9,129,495	-4,233,471	-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	97,792	97,792	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	748,116	748,116	0%	88.35	74.85	-16%	68,190,687	56,671,737	-11,518,950	-17%
	Diesel Oil	pre-Cars	1,389	1,389	0%	312.32	284.56	-9%	463,963	386,139	-77,824	-17%
		Car 1	6,605	6,605	0%	268.42	246.79	-11%	1,970,472	1,680,688	-289,784	-15%
		Car 2	28,437	28,437	0%	406.84	279.91	-40%	11,983,522	6,253,531	-5,729,991	-40%
		Car 3	182,795	182,795	0%	574.33	176.67	-69%	53,284,956	18,579,373	-34,705,583	-69%
		Car 4	222,583	222,583	0%	393.55	149.27	-62%	87,598,471	33,225,566	-54,372,905	-62%
		Car 5	233,766	233,766	0%	435.42	149.27	-66%	101,787,275	34,894,788	-66,892,487	-66%
		Car 6	4,536	4,536	0%	259.53	149.27	-42%	1,177,151	677,045	-500,106	-42%
		Diesel oil total	589,131	589,131	0%	437.14	158.71	-64%	257,533,128	83,899,619	-173,633,509	-64%
	FCs Total	1,338,247	1,338,247	0%	237.49	151.77	-35%	317,723,735	146,571,356	-171,152,379	-35%	
	Gasoline	pre-Cars	981	981	0%	633.81	645.95	2%	608,320	621,160	12,840	2%
		Car 1	194	194	0%	803.50	386.27	-45%	167,261	59,326	-107,935	-61%
		Car 2	836	836	0%	274.42	211.18	-23%	229,520	180,265	-49,255	-21%
		Car 3	784	784	0%	52.66	111.73	30%	72,691	79,780	7,089	10%
		Car 4	1,889	1,889	0%	43.70	48.89	10%	77,284	82,833	5,549	7%
		Car 5	965	965	0%	16.67	48.89	183%	15,187	47,268	32,081	183%
		Car 6	1	1	0%	17.66	48.89	170%	26	72	46	170%
Gasoline total		5,578	5,578	0%	262.86	184.67	-3%	1,131,299	1,096,727	-34,572	-3%	
LDVs Total	pre-Cars	2,754	2,754	0%	424.37	386.79	-9%	1,168,757	944,928	-223,829	-20%	
	Car 1	2,945	2,945	0%	398.75	276.25	-30%	1,166,782	834,566	-332,216	-29%	
	Car 2	6,982	6,982	0%	338.92	155.35	-42%	2,340,147	1,350,674	-989,473	-42%	
	Car 3	20,421	20,421	0%	568.12	150.38	-73%	11,437,995	3,070,913	-8,367,082	-73%	
	Car 4	55,887	55,887	0%	497.72	90.46	-82%	27,775,440	5,040,416	-22,735,024	-82%	
	Car 5	29,024	29,024	0%	441.97	90.46	-80%	13,181,325	2,687,964	-10,493,361	-80%	
	Car 6	41	41	0%	15.126	90.46	-80%	6,160	2,688	-3,472	-60%	
	Diesel oil total	118,777	118,777	0%	488.66	124.93	-74%	57,083,513	13,656,488	-43,427,025	-74%	
	LDVs Total	124,354	124,354	0%	488.14	126.03	-74%	58,214,142	14,677,215	-43,536,927	-74%	
Heavy Duty Vehicles (HDV)	pre-Cars	1,172	1,172	0%	1096.68	1919.23	4%	1,249,029	1,194,143	-54,886	-4%	
	Car 1	1,054	1,054	0%	727.68	150.19	-79%	766,620	251,181	-515,439	-3%	
	Car 2	6,984	6,984	0%	764.97	645.48	-14%	3,324,968	4,379,371	1,054,403	31%	
	Car 3	11,187	11,187	0%	638.43	475.65	-25%	6,262,880	5,998,226	-2,654,757	-27%	
	Car 4	4,946	4,946	0%	460.55	351.71	-24%	2,270,061	1,730,736	-538,324	-24%	
	Car 5	26,096	26,096	0%	368.98	183.48	-40%	8,435,583	4,240,743	-4,194,761	-40%	
	Car 6	537	537	0%	44.76	183.48	310%	24,047	86,672	62,625	260%	
	Buses Total	31,716	31,716	0%	505.94	340.06	-29%	25,369,989	16,620,843	-7,749,126	-29%	
Heavy Duty Vehicle: Trucks & Lorries	pre-Cars	5,983	5,983	0%	1030.72	737.35	-29%	6,072,170	4,322,888	-1,749,283	-29%	
	Car 1	2,945	2,945	0%	748.27	583.27	-24%	2,176,946	1,650,960	-525,987	-24%	
	Car 2	11,444	11,444	0%	818.17	510.45	-37%	10,080,881	6,949,975	-3,130,906	-31%	
	Car 3	15,142	15,142	0%	633.52	387.73	-39%	47,587,448	27,881,147	-19,706,301	-39%	
	Car 4	42,781	42,781	0%	356.90	287.27	-27%	16,936,867	12,289,770	-4,647,097	-27%	
	Car 5	436,980	436,980	0%	261.70	152.65	-40%	123,181,324	66,796,436	-56,384,887	-40%	
	Car 6	18,020	18,020	0%	91.87	152.65	261%	913,082	2,750,630	1,837,548	201%	
	Trucks Total	680,139	680,139	0%	353.96	287.33	-21%	218,587,531	124,180,449	-94,407,082	-43%	
Motorized Two-Wheelers (MOW)	pre-Cars	6,352	6,352	0%	123.97	151.79	23%	781,736	964,170	182,433	23%	
	Car 1	4,013	4,013	0%	125.91	173.15	39%	582,073	634,880	52,807	30%	
	Car 2	3,362	3,362	0%	132.24	158.58	40%	436,688	648,024	209,136	40%	
	Car 3	4,562	4,562	0%	39.81	158.58	261%	181,610	882,175	716,565	281%	
	Car 4	0	0	0%	0	0	0%	0	0	0	0%	
	Car 5	0	0	0%	0	0	0%	0	0	0	0%	
	Car 6	0	0	0%	0	0	0%	0	0	0	0%	
	MOWs Total	18,229	18,229	0%	104.34	175.38	68%	1,962,088	3,197,038	1,234,951	68%	
1.A.3.b. Road Transport	Total	2,132,683	2,132,683	0%	268.88	182.67	-50%	616,073,963	310,854,371	-305,224,692	-50%	

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	
		in [t]	in [t]	in [%]	in [g/t]	in [g/t]	in [%]	in [kg]	in [kg]	in [kg]	in [kg]	
1.A.3.a.i - Passenger Cars	Gasoline	pre-Cars	11.647	11.647	0%	812.37	844.11	-11%	7.132.688	6.327.484	-796.844	-11%
		Car 1	30.667	30.667	0%	368.77	343.93	-32%	11.082.246	7.480.541	-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%	6.955.589	6.459.797	-494.218	-7%
		Car 4	387.759	387.759	0%	45.16	47.80	-3%	19.093.585	19.536.009	-523.557	-3%
		Car 5	171.270	171.270	0%	18.59	47.80	151%	3.183.282	0.187.581	5.004.209	151%
		Car 6	10.315	10.315	0%	25.97	47.80	84%	267.855	433.096	-225.245	-84%
		Gasoline total	752.426	752.426	0%	76.40	73.89	4%	57.215.533	54.598.501	2,216.412	-4%
	Diesel Oil	pre-Cars	1.341	1.341	0%	311.73	284.66	-5%	417.947	364.246	-52.722	-5%
		Car 1	4.892	4.892	0%	298.92	267.28	-11%	1.482.284	1.387.643	-156.951	-11%
		Car 2	23.934	23.934	0%	408.71	320.45	-40%	9.734.484	5.276.480	4.458.004	-40%
		Car 3	82.749	82.749	0%	585.53	176.81	-69%	48.451.830	14.796.245	-33.655.585	-69%
		Car 4	211.237	211.237	0%	297.27	151.77	-62%	83.917.680	32.059.973	-51.857.706	-62%
		Car 5	285.011	285.011	0%	436.38	151.77	-65%	124.721.396	43.370.300	-81.343.896	-65%
		Car 6	16.081	16.081	0%	259.34	151.77	-41%	4.170.580	2.440.686	-1.729.814	-41%
		Diesel oil total	626.045	626.045	0%	415.87	159.12	-62%	272.876.061	99.613.892	-173.262.169	-62%
		Pkcs Total	1,338,571	1,338,571	0%	298.44	152.15	-53%	138,091,584	154,652,853	-175,478,269	-53%
	Gasoline	pre-Cars	986	986	0%	632.44	645.95	-2%	193.683	176.124	-18.444	-2%
		Car 1	173	173	0%	968.27	989.98	-64%	150.074	53.575	-96.499	-64%
		Car 2	748	748	0%	204.73	287.11	-31%	212.888	154.839	-58.029	-27%
		Car 3	771	771	0%	98.62	185.21	7%	75.982	81.070	-5.078	7%
		Car 4	1.087	1.087	0%	43.47	50.15	15%	81.139	83.618	-2.479	15%
		Car 5	1.374	1.374	0%	17.11	50.15	183%	23.517	68.918	-45.401	183%
		Car 6	17	17	0%	18.06	50.15	179%	212	670	-657	179%
		Gasoline total	5.845	5.845	0%	198.34	176.49	-2%	1,112,584	1,031,852	-88,732	-2%
1.A.3.b.i - Light Duty Vehicles (LDVs)	Gasoline	pre-Cars	2.537	2.537	0%	428.16	386.79	-21%	1.985.919	1.76.259	-257.659	-21%
		Car 1	2.588	2.588	0%	393.82	276.25	-40%	987.136	639.898	-347.328	-40%
		Car 2	6.087	6.087	0%	338.91	133.25	-42%	1.385.995	1.180.889	-428.128	-42%
		Car 3	18.220	18.220	0%	571.75	150.58	-74%	10.417.076	2.742.056	-7.675.020	-74%
		Car 4	52.361	52.361	0%	498.70	91.69	-82%	26.164.486	4.703.746	-21.394.748	-82%
		Car 5	46.749	46.749	0%	438.44	91.69	-79%	20.696.234	4.258.626	-16.237.309	-79%
	Diesel Oil	pre-Cars	187	187	0%	151.18	91.69	-60%	29.829	17.974	-11.855	-60%
		Car 1	187	187	0%	151.18	91.69	-60%	29.829	17.974	-11.855	-60%
		Car 2	187	187	0%	151.18	91.69	-60%	29.829	17.974	-11.855	-60%
		Car 3	187	187	0%	151.18	91.69	-60%	29.829	17.974	-11.855	-60%
		Car 4	187	187	0%	151.18	91.69	-60%	29.829	17.974	-11.855	-60%
		Car 5	187	187	0%	151.18	91.69	-60%	29.829	17.974	-11.855	-60%
		Diesel oil total	187.528	187.528	0%	415.56	170.94	-77%	61.146.575	14,267,237	-46,879,338	-77%
		LDVs Total	134,423	134,423	0%	463.56	153.81	-75%	62,299,160	15,298,849	-46,988,311	-75%
1.A.3.b.ii - Heavy Duty Vehicles (HDVs)	Gasoline	pre-Cars	984	984	0%	1099.48	1919.23	-5%	1.062.384	1.062.921	-48.443	-5%
		Car 1	837	837	0%	728.12	130.99	3%	659.232	628.359	-18.127	-3%
		Car 2	5.586	5.586	0%	704.30	643.67	-9%	4.284.320	3.683.441	-798.887	-9%
		Car 3	11.221	11.221	0%	621.20	458.38	-27%	7.082.740	5.143.628	-1.939.228	-27%
		Car 4	4.270	4.270	0%	461.10	351.79	-24%	1.972.610	1.584.978	-467.632	-24%
		Car 5	22.042	22.042	0%	368.55	183.99	-49%	7.726.921	4.065.632	-3.671.389	-49%
	Diesel Oil	pre-Cars	4.182	4.182	0%	42.78	183.99	330%	178.913	789.476	-610.563	330%
		Car 1	4.182	4.182	0%	42.78	183.99	330%	178.913	789.476	-610.563	330%
		Car 2	4.182	4.182	0%	42.78	183.99	330%	178.913	789.476	-610.563	330%
		Car 3	4.182	4.182	0%	42.78	183.99	330%	178.913	789.476	-610.563	330%
		Car 4	4.182	4.182	0%	42.78	183.99	330%	178.913	789.476	-610.563	330%
		Car 5	4.182	4.182	0%	42.78	183.99	330%	178.913	789.476	-610.563	330%
		Diesel Oil total	49.143	49.143	0%	468.37	339.99	-27%	23,017,115	16,788,234	-6,228,881	-27%
		HDVs Total	4.182	4.182	0%	1034.34	737.35	-29%	4.945.942	3.525.898	-1.420.134	-29%
1.A.3.b.iii - Heavy Duty Vehicles (HDVs) - Trucks & Lorries	Gasoline	pre-Cars	2.285	2.285	0%	748.66	581.41	-22%	1.800.085	1.237.759	-562.348	-22%
		Car 1	13.623	13.623	0%	817.30	510.38	-38%	11.446.862	6.565.738	-4.891.123	-38%
		Car 2	54.685	54.685	0%	632.52	384.41	-42%	36.589.677	19.937.835	-16.651.841	-42%
		Car 3	34.037	34.037	0%	396.37	285.34	-30%	13.481.158	9.711.896	-3.779.262	-30%
		Car 4	389.263	389.263	0%	282.92	153.66	-46%	110.112.782	59.688.043	-50.424.748	-46%
		Car 5	34.214	34.214	0%	63.96	153.66	189%	3.937.089	11.368.682	-7,421,413	189%
	Diesel Oil	pre-Cars	572.754	572.754	0%	314.85	196.65	-38%	179,874,133	112,285,562	-67,588,571	-38%
		Car 1	572.754	572.754	0%	314.85	196.65	-38%	179,874,133	112,285,562	-67,588,571	-38%
		Car 2	572.754	572.754	0%	314.85	196.65	-38%	179,874,133	112,285,562	-67,588,571	-38%
		Car 3	572.754	572.754	0%	314.85	196.65	-38%	179,874,133	112,285,562	-67,588,571	-38%
		Car 4	572.754	572.754	0%	314.85	196.65	-38%	179,874,133	112,285,562	-67,588,571	-38%
		Car 5	572.754	572.754	0%	314.85	196.65	-38%	179,874,133	112,285,562	-67,588,571	-38%
		Diesel Oil total	572.754	572.754	0%	314.85	196.65	-38%	179,874,133	112,285,562	-67,588,571	-38%
		Trucks Total	572.754	572.754	0%	314.85	196.65	-38%	179,874,133	112,285,562	-67,588,571	-38%
1.A.3.b.iv - Motorised Two-Wheelers (MOWs)	Gasoline	pre-Cars	6.185	6.185	0%	122.85	158.64	29%	795.185	974.388	-218.182	-29%
		Car 1	3.037	3.037	0%	124.71	174.84	40%	478.514	670.859	-192.346	-40%
		Car 2	3.365	3.365	0%	128.94	186.25	52%	433.874	680.370	-246.504	-52%
		Car 3	5.385	5.385	0%	38.53	186.25	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%
	Diesel Oil	pre-Cars	18.673	18.673	0%	108.59	179.24	78%	1,878,294	3,380,734	-1,488,498	78%
		Car 1	18.673	18.673	0%	108.59	179.24	78%	1,878,294	3,380,734	-1,488,498	78%
		Car 2	18.673	18.673	0%	108.59	179.24	78%	1,878,294	3,380,734	-1,488,498	78%
		Car 3	18.673	18.673	0%	108.59	179.24	78%	1,878,294	3,380,734	-1,488,498	78%
		Car 4	18.673	18.673	0%	108.59	179.24	78%	1,878,294	3,380,734	-1,488,498	78%
		Car 5	18.673	18.673	0%	108.59	179.24	78%	1,878,294	3,380,734	-1,488,498	78%
		Diesel Oil total	18.673	18.673	0%	108.59	179.24	78%	1,878,294	3,380,734	-1,488,498	78%
		LDVs Total	2,153,563	2,153,563	0%	277.27	140.35	-49%	597,120,287	362,252,271	-234,868,025	-49%

Adjustment details for 2025												
NFR Code	Fuel	Activity Data			Implied Emission Factor			NO <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	11.380	11.380	0%	823.37	844.11	-16%	7.266.152	6.191.942	-1.074.168	-16%
		Car 1	34.112	34.112	0%	371.34	345.71	-34%	8.963.681	5.924.574	-3.029.228	-34%
		Car 2	42.925	42.925	0%	297.78	142.69	-32%	8.918.785	6.099.659	-2.818.648	-32%
		Car 3	72.871	72.871	0%	73.86	74.74	1%	5.381.361	5.448.237	-64.897	-1%
		Car 4	353.474	353.474	0%	52.36	49.23	-6%	18.485.637	17.328.027	-1.157.418	-6%
		Car 5	180.783	180.783	0%	19.11	49.52	157%	3.454.481	8.061.456	5.406.975	157%
	Car 6	29.612	29.612	0%	25.76	46.62	84%	790.781	1.451.433	662.752	84%	
	Gasoline total	715.156	715.156	0%	34.38	71.73	-4%	53.180.787	51.380.983	-1.889.805	-4%	
	pre-Cars	1.282	1.282	0%	318.32	264.56	-16%	387.917	329.733	-48.184	-16%	
	Car 1	4.219	4.219	0%	298.14	287.84	-10%	1.261.930	1.129.989	-132.821	-10%	
	Car 2	19.689	19.689	0%	407.80	220.36	-46%	8.013.581	4.339.716	-3.674.788	-46%	
	Car 3	71.044	71.044	0%	595.91	179.64	-70%	42.271.648	13.719.962	-28.551.686	-70%	
	Car 4	182.414	182.414	0%	491.42	154.67	-69%	7.727.629	29.644.435	41.917.208	69%	
	Car 5	304.346	304.346	0%	434.57	154.67	-65%	13.629.483	46.090.244	32.460.969	65%	
	Car 6	42.575	42.575	0%	258.76	154.67	-40%	11.617.082	8.180.394	-3.456.778	-40%	
Diesel oil total	645.565	645.565	0%	426.19	159.88	-63%	275.133.283	183.163.191	-91.969.732	-63%		
Px Total	1.360.721	1.360.721	0%	245.26	131.59	-53%	328.317.060	154.484.484	-173.856.576	-53%		
Gasoline	pre-Cars	879	879	0%	817.31	646.56	-19%	575.380	587.67	7.434	1%	
	Car 1	150	150	0%	896.83	311.83	-65%	134.523	46.851	-87.672	-65%	
	Car 2	629	629	0%	298.27	212.94	-29%	187.533	133.879	-53.654	-29%	
	Car 3	782.81	782.81	0%	95.56	188.62	3%	72.968	79.155	2.188	3%	
	Car 4	1.720	1.720	0%	47.96	51.30	9%	80.565	85.246	7.299	9%	
	Car 5	1.620	1.620	0%	18.41	51.30	175%	29.812	83.086	53.274	175%	
Car 6	84	84	0%	18.71	51.30	174%	1.752	4.884	3.838	174%		
Gasoline total	5.793	5.793	0%	587.52	172.88	-8%	5.083.937	1.088.999	-3.926	-8%		
pre-Cars	2.323	2.323	0%	418.91	386.79	-26%	968.185	712.531	-253.854	-26%		
Car 1	2.186	2.186	0%	391.47	212.25	-45%	824.270	453.227	-371.843	-45%		
Car 2	5.025	5.025	0%	328.81	193.29	-41%	1.632.296	971.296	-660.928	-41%		
Car 3	15.781	15.781	0%	304.82	150.67	-50%	3.112.414	2.365.763	-746.651	-24%		
Car 4	47.480	47.480	0%	50.73	91.76	42%	23.762.396	3.548.299	-19.434.098	-42%		
Car 5	62.146	62.146	0%	436.13	91.76	-79%	27.090.214	6.088.295	-21.382.089	-79%		
Car 6	635	635	0%	154.91	91.76	-40%	87.768	62.236	-26.628	-40%		
Diesel oil total	135.386	135.386	0%	868.35	187.96	-77%	63.565.843	54.681.496	-8.887.953	-14%		
LDVs total	147.088	147.088	0%	476.76	170.62	-65%	64.809.539	55.688.498	-9.188.881	-14%		
pre-Cars	979	979	0%	707.34	1919.23	-5%	1.048.372	995.256	-56.856	-5%		
Car 1	747	747	0%	1380.36	751.91	-3%	542.471	581.636	18.165	3%		
Car 2	5.211	5.211	0%	707.43	644.44	-10%	4.103.087	3.599.644	-503.493	-10%		
Car 3	15.782	15.782	0%	633.86	488.67	-24%	7.541.732	6.174.989	-1.366.822	-18%		
Car 4	4.686	4.686	0%	868.76	351.99	-35%	2.154.086	1.674.177	-479.829	-20%		
Car 5	26.257	26.257	0%	368.77	184.59	-49%	8.737.608	4.477.641	-4.269.427	-49%		
Car 6	5.224	5.224	0%	63.13	184.59	247%	277.542	964.226	686.684	247%		
Buses total	52.887	52.887	0%	438.96	329.59	-25%	23.957.817	17.149.448	-6.848.319	-25%		
pre-Cars	4.319	4.319	0%	1034.89	737.35	-29%	4.488.571	3.184.428	-1.294.143	-29%		
Car 1	1.883	1.883	0%	748.71	553.48	-26%	1.387.291	1.025.551	-361.744	-26%		
Car 2	11.052	11.052	0%	817.38	587.79	-30%	8.072.940	6.032.450	-3.941.391	-30%		
Car 3	41.282	41.282	0%	429.15	381.65	-11%	27.463.779	21.724.673	-5.749.106	-11%		
Car 4	39.223	39.223	0%	356.86	287.72	-20%	11.572.860	9.294.190	-3.278.769	-20%		
Car 5	308.796	308.796	0%	264.17	153.49	-40%	80.413.973	60.546.436	-24.927.477	-40%		
Car 6	179.787	179.787	0%	67.48	153.49	167%	9.813.364	26.282.637	16.468.684	167%		
Trucks total	589.411	589.411	0%	268.69	189.33	-30%	157.189.675	119.526.783	-36.662.891	-23%		
pre-Cars	5.744	5.744	0%	125.41	157.28	25%	720.441	983.470	183.828	25%		
Car 1	1.517	1.517	0%	127.40	176.22	39%	448.086	670.819	171.733	39%		
Car 2	3.382	3.382	0%	127.35	196.53	55%	430.680	666.565	236.206	55%		
Car 3	5.81	5.811	0%	48.29	196.53	399%	236.136	1.144.416	908.280	399%		
Car 4	4	0	0%	16.96		180%	89	884	736	904%		
Car 5	0	0	0%			0%	0	0	0	0%		
MWVs total	18.489	18.489	0%	98.52	180.65	82%	1.833.382	5.334.472	1.501.898	82%		
1.A.3.b - Road Transport	Total	2.161.592	2.161.592	0%	263.86	139.27	-48%	575.925.385	381.697.596	-194.853.788	-48%	

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	adjustment	difference	
		in [t]	in [t]	in [%]	in [g/t]	in [g/t]	in [%]	in [g]	in [g]	in [g]	in [g]	
1.A.3.a.i - Passenger Cars	pre-Cars	15 782	15 782	0%	636.75	648.11	-14%	7 670 916	6 410 967	-1 657 867	-14%	
	Car 1	20 270	20 270	0%	372.25	341.68	-35%	7 545 483	4 986 888	-2 648 596	-35%	
	Car 2	36 062	36 062	0%	212.73	143.11	-33%	7 671 581	5 180 897	-2 516 693	-33%	
	Car 3	83 039	83 039	0%	76.17	75.50	-1%	4 881 482	4 759 259	-42 233	-1%	
	Car 4	334 413	334 413	0%	53.74	50.17	-7%	17 363 364	16 777 445	-1 192 488	-7%	
	Car 5	183 374	183 374	0%	19.09	50.17	163%	3 580 745	9 189 834	5 609 089	163%	
	Car 6	65 332	65 332	0%	25.67	50.17	89%	1 768 917	3 327 855	1 558 938	89%	
	Gasoline total	715 272	715 272	0%	78.93	70.65	-9%	58 736 267	50 535 049	-8 201 218	-9%	
	pre-Cars	1 280	1 280	0%	368.76	264.56	-14%	386 262	339 173	-46 089	-14%	
	Car 1	3 749	3 749	0%	298.36	269.66	-9%	1 122 449	1 011 626	-111 425	-10%	
1.A.3.b.i - Heavy Duty Vehicles - Buses	pre-Cars	1 380	1 380	0%	368.76	254.56	-31%	583 186	547 543	-35 643	-6%	
	Car 1	136	136	0%	908.31	312.78	-66%	122 126	42 425	-79 708	-66%	
	Car 2	540	540	0%	308.39	217.84	-29%	162 311	117 737	-44 574	-27%	
	Car 3	650	650	0%	108.43	111.57	3%	70 432	72 731	2 299	3%	
	Car 4	1 684	1 684	0%	43.06	52.36	7%	78 714	84 003	5 289	7%	
	Car 5	1 724	1 724	0%	19.82	52.36	164%	34 157	80 258	46 108	164%	
	Car 6	363	363	0%	19.85	52.36	181%	6 764	18 992	12 228	181%	
	Gasoline total	5 506	5 506	0%	588.27	171.66	-7%	1 068 292	1 013 678	-54 614	-5%	
	pre-Cars	2 189	2 189	0%	414.81	386.73	-7%	899 549	846 433	-53 116	-6%	
	Car 1	1 780	1 780	0%	391.89	276.25	-30%	780 189	585 371	-194 798	-24%	
1.A.3.b.ii - Heavy Duty Vehicles - Trucks & Lorries	pre-Cars	4 223	4 223	0%	323.43	193.31	-40%	1 365 594	816 452	-549 142	-40%	
	Car 1	13 582	13 582	0%	588.91	150.77	-74%	8 064 323	2 040 233	-6 024 090	-74%	
	Car 2	43 141	43 141	0%	504.48	32.40	-93%	21 783 989	3 986 141	-17 777 788	-82%	
	Car 3	74 231	74 231	0%	434.16	32.40	-93%	32 223 283	6 658 730	-25 564 553	-79%	
	Car 4	4 921	4 921	0%	113.49	32.40	-72%	755 285	454 676	-300 609	-40%	
	Diesel oil total	148 068	148 068	0%	456.12	185.62	-77%	65 712 732	15 256 007	-50 456 726	-77%	
	LNx Total	149 994	149 994	0%	445.23	188.29	-76%	66 781 025	16 229 684	-50 551 348	-76%	
	pre-Cars	881	881	0%	1076.81	1319.23	-25%	964 197	988 234	24 037	2%	
	Car 1	583	583	0%	731.35	732.67	2%	433 675	446 236	12 568	3%	
	Car 2	4 375	4 375	0%	788.25	645.03	-18%	3 440 614	2 822 621	-617 993	-18%	
1.A.3.b.iii - Heavy Duty Vehicles - Trucks & Lorries	pre-Cars	10 333	10 333	0%	632.87	458.91	-28%	6 530 364	4 741 827	-1 787 536	-27%	
	Car 1	4 449	4 449	0%	475.90	382.29	-20%	2 117 219	1 686 881	-430 338	-20%	
	Car 2	34 380	34 380	0%	366.38	185.22	-49%	8 935 974	4 517 517	-4 418 457	-49%	
	Car 3	9 126	9 126	0%	62.79	185.22	196%	573 066	1 680 431	1 107 365	196%	
	Buses Total	54 157	54 157	0%	404.73	388.24	-2%	23 082 189	16 885 117	-6 197 072	-27%	
	pre-Cars	3 933	3 933	0%	1034.81	737.35	-29%	4 087 249	2 980 379	-1 106 870	-29%	
	Car 1	1 555	1 555	0%	748.16	587.92	-22%	1 163 482	789 813	-373 669	-33%	
	Car 2	8 856	8 856	0%	817.75	585.42	-28%	7 258 040	4 486 626	-2 771 218	-38%	
	Car 3	34 167	34 167	0%	638.91	568.04	-11%	21 553 280	12 251 155	-9 302 125	-43%	
	Car 4	34 287	34 287	0%	396.94	281.86	-29%	9 640 384	6 885 621	-2 754 803	-29%	
1.A.3.b.iv - Motorized Two-Wheelers (M2W)	Car 5	269 735	269 735	0%	287.22	153.50	-46%	74 680 233	39 976 610	-34 623 623	-46%	
	Car 6	261 480	261 480	0%	61.77	153.50	149%	16 149 289	40 284 036	24 094 748	149%	
	Trucks Total	584 013	584 013	0%	226.31	180.97	-26%	134 431 899	101 496 262	-32 935 637	-26%	
	pre-Cars	5 543	5 543	0%	125.59	155.78	24%	696 072	883 289	187 218	24%	
	Car 1	3 360	3 360	0%	127.11	177.29	39%	427 113	585 796	158 683	39%	
	Car 2	3 375	3 375	0%	125.94	187.68	50%	421 961	687 078	265 127	50%	
	Car 3	6 443	6 443	0%	48.36	187.68	381%	209 627	1 273 571	1 064 043	381%	
	Car 4	65	65	0%	17.47	187.68	1031%	1 134	12 632	11 498	1031%	
	Car 5	0	0	0%	0	0	0%	0	0	0	0%	
	M2Ws Total	16 185	16 185	0%	96.14	181.68	89%	1 885 897	3 452 476	1 566 579	89%	
1.A.3.b - Road Transport	Total	2 267 339	2 267 339	0%	258.89	137.22	-46%	553 799 598	362 981 820	-190 817 778	-45%	



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	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	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	-8%	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	-129,164	-4%
		Car 4	278,738	278,738	0%	55.98	52.30	-7%	15,683,488	14,576,755	-1,106,733	-7%
		Car 5	186,830	186,830	0%	19.35	52.30	-170%	3,228,282	8,725,668	5,497,386	170%
		Car 6	189,041	189,041	0%	6.00	52.30	-89%	4,190,422	6,718,250	2,527,828	60%
		Gasoline total	689,027	689,027	0%	64.42	68.36	-6%	45,032,296	47,786,817	2,754,521	6%
	Diesel Oil	pre-Cars	1,363	1,363	0%	303.16	264.96	-13%	171,676	245,173	73,497	43%
		Car 1	2,949	2,949	0%	299.17	272.65	-9%	962,432	775,166	-187,266	-20%
		Car 2	10,784	10,784	0%	407.20	222.87	-45%	4,391,383	2,483,536	-1,907,848	-43%
		Car 3	40,786	40,786	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	40,253,731	-64,332,055	-61%
		Car 6	228,685	228,685	0%	254.87	180.40	-30%	58,284,140	35,680,446	-22,603,694	-39%
		Diesel oil total	646,076	646,076	0%	375.66	163.38	-56%	247,596,063	188,748,684	-158,847,359	-56%
		FCs Total	1,365,103	1,365,103	0%	214.34	154.68	-28%	262,588,360	196,535,421	-136,633,639	-48%
	Gasoline	pre-Cars	911	911	0%	944.51	645.95	-32%	594,851	582,662	-12,189	-2%
		Car 1	189	189	0%	911.58	312.78	-66%	99,528	33,895	-65,633	-66%
		Car 2	377	377	0%	303.84	224.45	-26%	114,682	84,713	-29,969	-26%
		Car 3	511	511	0%	111.92	116.84	5%	57,282	60,739	3,457	6%
		Car 4	1,275	1,275	0%	52.02	54.36	4%	65,290	69,278	3,988	4%
		Car 5	1,483	1,483	0%	23.70	54.36	129%	35,160	80,626	45,466	129%
		Car 6	1,643	1,643	0%	19.09	54.36	182%	39,550	89,326	49,776	182%
		Gasoline total	6,315	6,315	0%	154.22	160.11	4%	999,199	1,011,138	11,939	1%
1.A.3.b.i - Light Duty Vehicles (LDVs)	Gasoline	pre-Cars	1,872	1,872	0%	411.51	386.79	-6%	771,337	674,742	-96,595	-13%
		Car 1	1,285	1,285	0%	389.94	276.25	-29%	483,129	272,296	-210,833	-44%
		Car 2	2,942	2,942	0%	318.56	193.88	-39%	965,389	550,789	-414,600	-43%
		Car 3	9,363	9,363	0%	559.10	150.74	-73%	5,689,152	1,411,299	-4,277,853	-75%
		Car 4	33,232	33,232	0%	508.42	93.81	-82%	16,929,185	3,117,457	-13,811,728	-82%
		Car 5	66,283	66,283	0%	432.92	93.81	-78%	28,684,080	6,217,860	-22,466,220	-78%
		Car 6	39,482	39,482	0%	158.79	93.81	-41%	5,941,615	3,686,228	-2,255,387	-38%
		Diesel oil total	154,259	154,259	0%	384.71	182.69	-53%	59,344,525	15,880,186	-43,464,339	-73%
		LDVs Total	180,574	180,574	0%	375.86	184.94	-52%	69,343,125	16,851,449	-52,491,676	-76%
	Diesel Oil	pre-Cars	547	547	0%	1079.15	1919.23	-45%	589,267	557,147	-32,120	-5%
		Car 1	237	237	0%	732.78	132.57	-82%	173,676	138,368	-35,308	-20%
		Car 2	2,270	2,270	0%	787.83	646.33	-18%	1,780,686	1,487,437	-293,249	-16%
		Car 3	6,757	6,757	0%	638.89	459.32	-29%	4,262,734	3,183,482	-1,079,252	-25%
		Car 4	3,043	3,043	0%	473.16	382.73	-19%	1,439,790	1,073,333	-366,457	-26%
		Car 5	18,189	18,189	0%	362.42	186.37	-49%	6,463,265	3,376,016	-3,087,249	-48%
		Car 6	20,670	20,670	0%	64.89	186.37	289%	1,176,026	3,682,314	2,506,288	214%
		Diesel Total	51,634	51,634	0%	309.75	283.53	-9%	15,993,546	13,687,186	-2,306,360	-15%
1.A.3.b.ii - Heavy Duty Vehicles (HDVs)	Gasoline	pre-Cars	3,262	3,262	0%	1034.82	737.35	-29%	3,375,359	2,485,071	-890,288	-26%
		Car 1	1,094	1,094	0%	747.82	488.39	-34%	918,052	512,378	-405,674	-44%
		Car 2	5,544	5,544	0%	817.44	581.68	-29%	4,532,190	2,781,516	-1,750,674	-39%
		Car 3	20,583	20,583	0%	629.54	563.68	-11%	12,367,751	7,277,279	-5,090,472	-41%
		Car 4	15,912	15,912	0%	358.89	276.23	-23%	6,334,421	4,386,424	-1,947,997	-31%
		Car 5	154,983	154,983	0%	250.40	154.68	-38%	45,964,153	24,283,389	-21,680,764	-47%
		Car 6	381,799	381,799	0%	68.78	154.68	125%	26,251,482	69,665,886	43,414,404	165%
		Gasoline total	585,186	585,186	0%	515.18	172.19	-66%	188,173,537	180,710,889	-7,462,648	-4%
	Diesel Oil	pre-Cars	4,940	4,940	0%	128.95	188.61	46%	622,656	783,451	160,795	26%
		Car 1	2,966	2,966	0%	126.14	177.79	41%	374,114	527,294	153,180	41%
		Car 2	3,221	3,221	0%	129.33	188.64	46%	387,596	639,833	252,237	65%
		Car 3	6,241	6,241	0%	48.24	188.64	284%	251,126	1,239,686	988,560	394%
		Car 4	1,130	1,130	0%	58.41	188.64	324%	23,966	224,682	200,716	837%
		Car 5	0	0	0%	0.00	188.64	0%	0	0	0	0%
		Gasoline total	18,497	18,497	0%	85.66	188.61	120%	1,658,558	3,454,167	1,795,609	108%
		LDVs Total	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												
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	13,588	13,588	0%	638.58	644.11	-6%	8,664,521	7,382,686	-1,281,835	-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	-2,673,052	-59%
		Car 3	38,216	38,216	0%	82.22	76.12	-7%	2,977,840	2,829,186	-148,654	-5%
		Car 4	295,220	295,220	0%	57.04	53.29	-7%	14,588,285	13,589,621	-998,664	-7%
		Car 5	180,537	180,537	0%	19.77	53.29	-170%	3,173,728	8,054,356	4,880,628	154%
		Car 6	285,626	285,626	0%	25.63	53.29	108%	5,295,099	11,010,782	5,715,683	108%
		Gasoline total	784,631	784,631	0%	62.36	68.45	10%	43,961,941	48,238,025	4,276,084	10%
	Diesel Oil	pre-Cars	2,736	2,736	0%	333.76	264.96	-18%	913,180	724,923	-188,257	-21%
		Car 1	2,545	2,545	0%	299.80	272.65	-9%	769,913	687,786	-82,127	-11%
		Car 2	8,891	8,891	0%	407.19	229.16	-44%	3,620,286	2,037,480	-1,582,806	-44%
		Car 3	33,079	33,079	0%	815.11	180.42	-78%	20,310,125	5,967,483	-14,342,642	-71%
		Car 4	111,335	111,335	0%	419.17	182.44	-56%	48,688,685	18,085,621	-30,603,064	-63%
		Car 5	231,784	231,784	0%	419.37	182.44	-56%	95,117,643	37,650,997	-57,466,646	-60%
		Car 6	273,511	273,511	0%	227.36	182.44	-20%	62,189,230	44,429,184	-17,760,046	-29%
		Diesel oil total	663,841	663,841	0%	345.81	165.67	-52%	229,566,088	109,582,982	-119,983,106	-52%
		FCs Total	1,348,512	1,348,512	0%	599.83	155.19	-74%	273,668,029	157,821,067	-115,846,962	-42%
1.A.3.b.i - Light Duty Vehicles (LDVs)	Gasoline	pre-Cars	909	909	0%	644.89	645.95	1%	687,449	581,962	-105,487	-15%
		Car 1	87	87	0%	915.20	312.78	-66%	89,953	30,396	-59,557	-66%
		Car 2	316	316	0%	304.63	224.45	-26%	96,158	70,848	-25,310	-26%
		Car 3	447	447	0%	112.68	121.47	8%	59,355	54,283	-5,072	-8%
		Car 4	1,126	1,126	0%	53.08	55.26	4%	59,652	62,199	2,547	4%
		Car 5	1,361	1,361	0%	25.34	55.26	119%	34,240	74,680	40,440	119%
		Car 6	2,420	2,420	0%	18.75	55.26	193%	45,383	133,753	88,370	193%
		Gasoline total	6,483	6,483	0%	144.88	153.25	5%	974,299	1,044,150	69,851	7%
	Diesel Oil	pre-Cars	1,744	1,744	0%	418.96	386.79	-7%	725,111	641,376	-83,735	-12%
		Car 1	1,079	1,079	0%	389.52	276.25	-29%	420,285	232,256	-188,029	-44%
		Car 2	2,334	2,334	0%	315.11	154.73	-50%	737,682	454,690	-282,992	-39%
1.A.3.b.ii - Heavy Duty Vehicles (HDVs)	Diesel Oil	Car 3	7,649	7,649	0%	808.18	170.79	-79%	4,597,943	1,152,737	-3,445,206	-75%
		Car 4	28,714	28,714	0%	512.28	94.57	-82%	14,748,306	2,716,154	-11,932,154	-81%
		Car 5	68,714	68,714	0%	434.30	94.57	-78%	29,499,580	5,032,428	-24,467,152	-83%
		Car 6	69,931	69,931	0%	148.18	94.57	-36%	3,614,586	5,672,892	2,058,306	57%
		LDVs total	159,183	159,183	0%	347.42	181.90	-47%	56,383,335	36,221,445	-20,161,890	-37%
		HDVs total	165,866	165,866	0%	338.31	183.89	-46%	56,279,554	37,485,938	-18,793,616	-33%
		FCs Total	489	489	0%	1080.20	1019.23	-6%	589,887	476,258	-113,629	-20%
		Car 1	147	147	0%	738.37	732.57	2%	188,212	110,593	-77,619	-41%
	1.A.3.b.iii - Heavy Duty Vehicles (Buses)	Diesel Oil	Car 1	1,611	1,611	0%	709.47	666.77	-7%	1,282,331	1,041,621	-240,710
Car 2			5,789	5,789	0%	824.86	439.85	-46%	3,066,381	2,422,479	-643,902	-21%
Car 3			2,747	2,747	0%	473.93	352.84	-26%	1,382,061	960,413	-421,648	-31%
Car 4			17,130	17,130	0%	362.91	186.64	-49%	6,212,175	3,180,781	-3,031,394	-49%
Car 5			25,135	25,135	0%	60.43	186.64	209%	1,518,961	4,086,133	2,567,172	169%
Buses Total			52,939	52,939	0%	274.41	247.85	-10%	14,547,072	15,158,078	1,408,434	10%
1.A.3.b.iv - Heavy Duty Vehicle: Trucks & Lorries	Diesel Oil	pre-Cars	3,140	3,140	0%	1034.96	737.35	-29%	3,260,020	2,370,443	-889,577	-28%
		Car 1	969	969	0%	747.60	488.34	-35%	724,240	453,754	-270,486	-37%
		Car 2	4,560	4,560	0%	817.42	581.14	-29%	3,734,343	2,280,967	-1,453,376	-39%
		Car 3	16,377	16,377	0%	589.34	381.93	-34%	13,869,383	8,759,747	-5,109,636	-37%
		Car 4	13,137	13,137	0%	598.96	279.43	-53%	12,675,679	5,889,330	-6,786,349	-54%
		Car 5	125,233	125,233	0%	26.13	154.90	-86%	36,960,599	59,481,429	22,520,830	61%
		Car 6	432,488	432,488	0%	72.98	154.92	110%	31,175,446	67,083,865	35,908,419	115%
1.A.3.b.v - Motorized Two-Wheelers (MOWs)	Gasoline	Trucks Total	595,913	595,913	0%	553.39	189.17	-66%	55,380,190	18,889,376	-36,490,814	-64%
		pre-Cars	4,813	4,813	0%	125.89	164.78	31%	664,997	732,771	167,774	25%
		Car 1	2,035	2,035	0%	125.39	177.29	41%	355,495	582,589	227,094	64%
		Car 2	3,084	3,084	0%	119.33	180.06	47%	303,224	610,757	307,533	101%
		Car 3	6,082	6,082	0%	48.83	180.06	267%	204,284	1,252,817	1,048,533	513%
		Car 6	0	0	0%	0.00	180.06	0%	0	0	0	0%
MOWs Total	18,160	18,160	0%	86.09	186.83	115%	1,613,450	3,582,841	1,969,391	122%		
1.A.3.b - Road Transport	Total	2,262,080	2,262,080	0%	198.58	132.83	-33%	437,206,744	292,497,497	-144,709,248	-33%	

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Adjustment 2014 (accepted)	-105.6	-101.3	-95.7	-91.7						
Adjustment 2015 (accepted)	-100.3	-95.5	-89.9	-85.1						
Adjustment 2016 (accepted)	-151.3	-146.9	-145.1	-142.5	-128.1					
Adjustment 2017 (accepted)	-151.3	-146.8	-145.0	-142.4	-127.2	-100.9				
Adjustment 2018 (accepted)	-172.3	-174.5	-177.4	-180.4	-171.5	-148.9	-123.2			
Adjustment 2019 (accepted)	-172.3	-174.5	-177.4	-180.3	-171.4	-148.8	-123.3	93.7		
Adjustment 2020 (accepted)	-297.8	-302.3	-301.3	-306.1	-294.5	-269.0	-244.3	-214.9	-174.6	
<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>8)</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>9)</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 current adjustment proposal differs significantly from the adjustment applied for and accepted in 2019.**

#### **Adjustment description as provided in IIRs 2014 and 2015:**

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

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