

Adjustment DE-A regarding NO_x from Road Vehicles

PREFACE

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

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

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

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

REASONS FOR MISSING THE GOTHENBURG CEILINGS

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

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

For the formalism of the adjustments, it is difficult to flag whether the modifications for road transport

are due to “methodological changes” or due to “changes of emission factor”. Therefore, only the term “change of methodology” will be used (even if at the NFR reporting level this may seem like a simple change in EFs).

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

ANALYSING THE PROBLEM: THE EUROPEAN PERSPECTIVE BASED ON COPERT

Already in 2011, these effects were demonstrated by Ntziachristos and Papageorgiou (2011)⁵⁾. Here, the impacts of changing model versions and activity data in the context of meeting the EU NEC Directive ceiling commitments were examined for four European countries including Germany. Unfortunately, this comparison study was carried out within a COPERT environment. Therefore, the results gained cannot be transferred to the German TREMOD environment on a one-to-one level but nonetheless allow a highly illustrative insight in the reasons for not meeting the set ceiling. The study modeled fuel consumption and NO_x emissions for four selected countries (Germany, France, Netherlands and Belgium) and found higher NO_x emissions were estimated for the road transport sector than originally modelled by the RAINS model of IIASA (which underpinned the setting of 2010 ceilings). For Germany, this study shows that with the same activity data set (LIFE+ EC4MACS data from Amann et al. (2010)), NO_x emissions estimated with COPERT II vs. COPERT 4 (v8.0) increase from 410 kt to 518 kt due to methodological changes, a difference of 282 kt. An additional consideration of changes in AD would lead to 620 kt of NO_x. However, as changes in AD are no valid adjustment reason, the latter value is for information only.

This was mainly due to: * NO_x “artificial” current emissions = virtual current emissions assuming no changes in emission factors emission factors updated in COPERT 4 that did not follow the reductions as set by the emission standards for diesel passenger cars; * important part of diesel fuel consumption in the total fuel consumption of the road traffic.

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

Changes in methodology and emission factors

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

Changes in the activity data

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

IN-COUNTRY ANALYSIS: THE TREMOD PERSPECTIVE

INITIAL ASSUMPTION

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



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

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



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

with

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

APPLYING THE ORIGINAL METHODOLOGY

FRAMEWORK INFORMATION

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

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

Back then, without better knowledge, the emission factors for the most recent standards were derived

by directly applying the expected reductions in emission standards.

However, as Germany does not use COPERT for compiling its road transport emissions inventory but a national model called TREMOD, the following comparison has to be carried out between the oldest version of TREMOD still available and the version as applied for the current inventory submission (2021).

Unfortunately, the oldest TREMOD version available for such comparison is TREMOD 3.1 from 2002 ⁶⁾, including the following set of NO_x emission factors:

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

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

THE COMPARISON

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

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

Within this report, Germany re-estimates the NO_x emission within the TREMOD 3.1 model. To isolate the requested information, the original TREMOD 3.1 activity data was combined with emission factors from both TREMOD 3.1 and the currently used TREMOD 6.12 (Knörr et al., 2021a) ⁷⁾.

Description of the updated methodology used

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

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

and

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

Comparison of emission estimates made using the original and updated methodologies

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

- TREMOD 3.1 model equations as initial methodology

and ,

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

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

Table 1: Resulting adjustment proposal 2020

for year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
proposed adjustment	-296.1	-300.7	-300.4	-305.2	-294.9	-274.9	-250.9	-221.1	-179.6	-144.8

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

Activity Data

- **current:** from TREMOD 6.12, as reported with the latest inventory submission
- **adjusted:** has to be similar to **current** AD!
- **difference:** as only recent AD are to be used for adjustment estimations, this value must be zero!

Implied Emission Factor

- **current:** representing the ratio of current emissions and current AD
- **adjusted:** representing the ratio of adjusted emissions and current AD
- **difference:** shows percentual difference

NO_x Emissions

- **current:** from TREMOD 6.12, as reported with the latest inventory submission
- **adjusted:** estimated based on TREMOD 3.1 methodology and TREMOD 6.12 AD
- **adjustment:** adjusted emissions minus current emissions
- **difference:** percentual difference between current and adjusted emissions

Adjustment overview for years 2010 to 2019

NFR Code	Fuel	Year	Activity Data			Implied Emission Factor			NO _x Emissions			
			current	adjusted	difference	current	adjusted	difference	current	adjusted	adjustment	difference
			in [TJ]	in [TJ]	in [%]	in [kg/TJ]	in [kg/TJ]	in [%]	in [kg]	in [kg]	in [kg]	in [%]
1.A.3.b.i	gasoline		795.957	795.957	0%	97.55	84.99	-13%	77.644.842	67.690.906	9.953.935	-13%
1.A.3.b.i	diesel oil		629.380	629.380	0%	429.45	160.51	-63%	227.341.096	84.970.461	142.370.635	-63%
1.A.3.b.ii	gasoline		6.325	6.325	0%	255.87	214.75	-16%	1.618.432	1.358.328	260.104	-16%
1.A.3.b.ii	diesel oil		113.450	113.450	0%	476.34	134.96	-72%	54.040.533	15.311.584	38.728.949	-72%
1.A.3.b.iii	gasoline		48.844	48.844	0%	823.00	482.55	-42%	29.931.266	23.183.732	6.747.534	-23%
1.A.3.b.iii	diesel oil		566.741	566.741	0%	446.67	271.83	-39%	253.148.243	154.056.160	99.092.083	-39%
1.A.3.b.iv	gasoline		19.712	19.712	0%	113.68	168.43	48%	2.240.749	3.320.034	-1.079.285	-48%
1.A.3.b TOTAL		2010	2.079.608	2.079.608	0%			0%	645.965.162	349.851.206	296.113.956	-46%
1.A.3.b.i	gasoline		794.688	794.688	0%	92.09	81.61	-11%	73.185.851	64.851.951	8.333.900	-11%
1.A.3.b.i	diesel oil		553.564	553.564	0%	434.12	159.22	-63%	240.313.791	88.138.959	152.174.832	-63%
1.A.3.b.ii	gasoline		6.118	6.118	0%	229.35	198.57	-13%	1.403.081	1.214.776	188.305	-13%
1.A.3.b.ii	diesel oil		115.967	115.967	0%	481.55	126.92	-74%	55.844.518	14.718.142	41.126.376	-74%
1.A.3.b.iii	gasoline		47.355	47.355	0%	592.65	448.99	-24%	28.071.221	21.268.323	6.804.898	-24%
1.A.3.b.iii	diesel oil		563.891	563.891	0%	410.38	244.97	-40%	231.410.271	138.135.342	93.273.929	-40%
1.A.3.b.iv	gasoline		19.289	19.289	0%	110.79	171.60	54%	2.137.002	3.299.162	-1.162.160	-54%
1.A.3.b TOTAL		2011	2.106.883	2.106.883	0%			0%	632.365.736	331.625.655	300.740.081	-48%
1.A.3.b.i	gasoline		750.957	750.957	0%	85.73	78.00	-9%	64.379.994	58.677.229	5.802.765	-9%
1.A.3.b.i	diesel oil		555.245	555.245	0%	435.96	158.66	-64%	242.062.902	88.096.699	153.966.203	-64%
1.A.3.b.ii	gasoline		5.657	5.657	0%	218.93	193.15	-12%	1.238.520	1.092.662	145.859	-12%
1.A.3.b.ii	diesel oil		114.350	114.350	0%	481.91	128.17	-75%	55.106.362	13.741.354	41.365.008	-75%
1.A.3.b.iii	gasoline		50.902	50.902	0%	533.22	384.33	-28%	27.141.913	19.563.200	7.578.704	-28%
1.A.3.b.iii	diesel oil		589.585	589.585	0%	381.33	224.00	-41%	234.829.180	132.064.753	102.764.428	-41%
1.A.3.b.iv	gasoline		18.268	18.268	0%	107.43	173.28	61%	1.962.546	3.165.439	-1.202.893	-61%
1.A.3.b TOTAL		2012	2.084.964	2.084.964	0%			0%	616.721.438	316.391.343	300.429.094	-49%
1.A.3.b.i	gasoline		749.114	749.114	0%	89.35	74.85	-7%	60.190.007	56.071.797	4.118.211	-7%
1.A.3.b.i	diesel oil		589.131	589.131	0%	437.14	158.71	-64%	257.633.728	93.499.010	164.134.718	-64%
1.A.3.b.ii	gasoline		5.578	5.578	0%	202.80	184.07	-9%	1.131.209	1.026.727	104.482	-9%
1.A.3.b.ii	diesel oil		118.777	118.777	0%	480.60	114.93	-76%	57.083.533	13.690.488	43.433.045	-76%
1.A.3.b.iii	gasoline		51.716	51.716	0%	509.64	368.06	-29%	26.350.969	18.620.843	7.730.126	-29%
1.A.3.b.iii	diesel oil		600.139	600.139	0%	353.06	287.93	-19%	211.887.531	124.788.469	87.099.062	-41%
1.A.3.b.iv	gasoline		18.229	18.229	0%	104.34	175.38	68%	1.902.688	3.197.038	-1.294.351	-68%
1.A.3.b TOTAL		2013	2.132.683	2.132.683	0%			0%	616.079.063	316.854.371	300.224.692	-50%
1.A.3.b.i	gasoline		752.526	752.526	0%	76.03	73.09	-4%	57.215.533	54.988.921	2.216.612	-4%
1.A.3.b.i	diesel oil		626.845	626.845	0%	435.87	159.12	-63%	272.876.061	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%	61.546.575	14.267.237	46.879.338	-77%
1.A.3.b.iii	gasoline		49.143	49.143	0%	468.37	339.99	-27%	23.017.115	16.708.234	6.308.881	-27%
1.A.3.b.iii	diesel oil		572.754	572.754	0%	314.05	196.05	-38%	179.874.133	112.285.582	67.588.551	-38%
1.A.3.b.iv	gasoline		18.673	18.673	0%	100.59	179.24	78%	1.878.294	3.345.794	-1.467.499	-78%
1.A.3.b TOTAL		2014	2.153.563	2.153.563	0%			0%	597.120.297	302.252.271	294.868.025	-49%
1.A.3.b.i	gasoline		715.156	715.156	0%	74.38	71.73	-4%	53.190.787	51.300.983	1.889.805	-4%
1.A.3.b.i	diesel oil		645.555	645.555	0%	426.19	159.80	-63%	275.130.233	103.163.501	171.966.732	-63%
1.A.3.b.ii	gasoline		5.793	5.793	0%	187.12	172.80	-8%	1.083.927	1.000.999	82.928	-8%
1.A.3.b.ii	diesel oil		135.386	135.386	0%	489.35	187.96	-77%	63.605.443	14.607.490	48.997.953	-77%
1.A.3.b.iii	gasoline		52.287	52.287	0%	458.96	327.99	-29%	23.997.817	17.149.448	6.848.370	-29%
1.A.3.b.iii	diesel oil		589.411	589.411	0%	266.69	187.51	-30%	157.189.675	110.620.703	46.568.973	-30%
1.A.3.b.iv	gasoline		18.459	18.459	0%	99.32	180.65	82%	1.833.362	3.334.472	-1.501.090	-82%
1.A.3.b TOTAL		2015	2.161.976	2.161.976	0%			0%	575.931.265	301.877.596	274.053.670	-48%
1.A.3.b.i	gasoline		715.272	715.272	0%	79.93	76.65	-4%	50.736.367	50.535.049	201.318	0%
1.A.3.b.i	diesel oil		675.119	675.119	0%	410.36	160.76	-61%	277.041.660	108.535.230	168.506.430	-61%
1.A.3.b.ii	gasoline		5.926	5.926	0%	180.27	171.05	-5%	1.068.292	1.013.678	54.614	-5%
1.A.3.b.ii	diesel oil		144.068	144.068	0%	456.12	185.62	-77%	65.712.732	15.216.007	50.496.725	-77%
1.A.3.b.iii	gasoline		54.157	54.157	0%	424.73	388.24	-7%	23.002.109	16.833.117	6.168.992	-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%	95.14	181.66	89%	1.805.897	3.412.476	-1.606.579	-89%
1.A.3.b TOTAL		2016	2.207.339	2.207.339	0%			0%	553.790.558	302.901.820	250.897.738	-45%
1.A.3.b.i	gasoline		724.571	724.571	0%	67.66	69.88	3%	49.026.074	50.634.714	-1.607.640	-3%
1.A.3.b.i	diesel oil		696.592	696.592	0%	390.65	161.95	-59%	272.126.091	112.810.721	159.315.370	-59%
1.A.3.b.ii	gasoline		6.186	6.186	0%	171.15	167.18	-2%	1.058.799	1.034.211	24.588	-2%
1.A.3.b.ii	diesel oil		153.284	153.284	0%	424.66	183.89	-76%	65.093.930	15.925.216	49.168.714	-76%
1.A.3.b.iii	gasoline		53.382	53.382	0%	370.80	286.71	-23%	19.793.901	15.304.828	4.489.073	-23%
1.A.3.b.iii	diesel oil		596.263	596.263	0%	195.02	175.92	-10%	116.671.141	106.246.508	11.424.633	-10%
1.A.3.b.iv	gasoline		19.160	19.160	0%	92.83	183.39	98%	1.778.674	3.513.787	-1.735.114	-98%
1.A.3.b TOTAL		2017	2.251.437	2.251.437	0%			0%	525.549.410	304.469.986	221.079.424	-42%
1.A.3.b.i	gasoline		699.027	699.027	0%	64.42	68.36	6%	45.032.566	47.786.817	-2.753.250	-6%
1.A.3.b.i	diesel oil		666.074	666.074	0%	371.66	163.30	-56%	247.556.063	108.768.604	138.787.459	-56%
1.A.3.b.ii	gasoline		6.315	6.315	0%	158.22	160.11	1%	999.199	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%	1.658.588	3.414.767	-1.756.209	-106%
1.A.3.b TOTAL		2018	2.180.993	2.180.993	0%			0%	478.758.206	291.139.612	179.618.593	-38%
1.A.3.b.i	gasoline		704.691	704.691	0%	62.30	68.45	10%	43.901.941	48.238.025	-4.336.084	-10%
1.A.3.b.i	diesel oil		663.841	663.841	0%	345.81	165.07	-52%	229.566.088	109.582.982	119.983.106	-52%
1.A.3.b.ii	gasoline		6.683	6.683	0%	146.08	153.25	5%	976.219	1.034.150	-57.931	-5%
1.A.3.b.ii	diesel oil		159.183	159.183	0%	347.42	181.90	-71%	55.303.535	16.221.445	39.082.090	-71%
1.A.3.b.iii	gasoline		52.939	52.939	0%	274.41	247.81	-10%	14.527.012	13.118.578	1.408.434	-10%
1.A.3.b.iii	diesel oil		595.913	595.913	0%	153.35	169.17	10%	91.380.760	106.809.376	-15.428.616	-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	2.202.888	2.202.888	0%			0%	437.268.744	292.497.497	144.771.248	-33%

Adjustment details for 2020												
NFR Code	Fuel	Activity Data			Implied Emission Factor			NO _x Emissions				
		current	adjusted	difference	current	adjusted	difference	current	adjusted	adjustment	difference	
		in [t]	in [t]	in [%]	in [g/t]	in [g/t]	in [%]	in [t]	in [t]	in [t]	in [t]	
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	-658.143	-8%
		Car 1	36.541	36.541	0%	338.50	297.71	-10%	25.915.925	19.189.262	-7.716.663	-30%
		Car 2	96.425	96.425	0%	172.95	135.63	-22%	16.580.020	13.020.026	-3.569.995	-22%
		Car 3	133.139	133.139	0%	58.51	70.19	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%	99.25	84.39	-13%	77.646.042	67.650.586	-9.995.456	-13%
	Diesel Oil	pre-Cars	1.915	1.915	0%	318.13	264.95	-15%	583.760	527.256	-56.504	-10%
		Car 1	10.339	10.339	0%	266.42	245.17	-11%	3.064.428	2.741.387	-323.041	-11%
		Car 2	50.088	50.088	0%	406.90	279.19	-40%	20.372.795	10.974.210	-9.398.584	-46%
		Car 3	134.025	134.025	0%	542.54	176.54	-47%	72.645.173	23.929.276	-48.715.897	-47%
		Car 4	279.154	279.154	0%	384.37	140.58	-43%	107.299.180	39.243.811	-68.055.349	-43%
		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	-36%	364.985.938	152.621.367	-152.364.570	-56%
	Gasoline	pre-Cars	1.249	1.249	0%	627.99	645.95	2%	783.320	986.871	203.551	26%
		Car 1	367	367	0%	361.95	297.39	-16%	361.969	186.620	-175.349	-49%
		Car 2	1.393	1.393	0%	264.75	184.41	-30%	368.840	256.917	-111.923	-30%
		Car 3	856	856	0%	82.47	30.83	-10%	70.631	77.625	6.994	10%
		Car 4	2.420	2.420	0%	36.32	44.90	24%	87.987	188.679	20.772	24%
		Car 5	49	49	0%	15.34	44.90	183%	750	2.218	1.468	183%
		Car 6	0	0	0%	0	0	0%	0	0	0	0%
		Gasoline total	6.345	6.345	0%	255.87	254.75	-1%	1.478.832	1.358.128	-120.704	-8%
	Diesel Oil	pre-Cars	4.876	4.876	0%	425.99	386.79	-9%	2.077.142	1.436.983	-640.159	-31%
		Car 1	9.989	9.989	0%	398.18	276.24	-40%	2.389.080	1.289.636	-1.099.444	-46%
		Car 2	13.126	13.126	0%	336.76	153.18	-43%	4.420.280	2.534.731	-1.885.549	-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	-82%	26.021.036	4.940.722	-21.080.314	-82%
		Car 5	1.629	1.629	0%	427.50	80.69	-79%	696.286	144.434	-551.772	-79%
		Car 6	0	0	0%	15.73	80.69	-42%	7	4	-3	-43%
		Diesel oil total	113.450	113.450	0%	476.34	134.94	-72%	54.043.533	15.351.584	-38.691.949	-72%
		LNx Total	178.775	178.775	0%	464.70	139.18	-70%	55.658.966	16.689.953	-38.969.013	-70%
1.A.3.b.ii. - Heavy Duty Vehicles - Buses	Gasoline	pre-Cars	3.382	3.382	0%	1096.25	1028.78	-6%	3.674.087	3.452.644	-221.423	-6%
		Car 1	2.826	2.826	0%	749.41	732.14	-2%	2.117.871	2.125.595	7.723	0%
		Car 2	10.152	10.152	0%	801.96	643.47	-20%	8.140.119	6.532.213	-1.607.906	-20%
		Car 3	15.890	15.890	0%	633.22	437.25	-30%	10.865.776	7.289.299	-3.576.477	-30%
		Car 4	5.461	5.461	0%	448.63	351.65	-22%	2.650.016	1.921.527	-728.489	-22%
		Car 5	10.326	10.326	0%	337.28	182.33	-46%	3.882.417	1.882.644	-1.999.773	-46%
		Car 6	0	0	0%	0	0	0%	0	0	0	0%
		Buses Total	48.044	48.044	0%	623.80	482.55	-23%	29.931.286	23.183.732	-6.747.554	-23%
	Diesel Oil	pre-Cars	10.185	10.185	0%	1040.16	787.37	-26%	10.510.623	7.754.138	-2.756.485	-26%
		Car 1	5.677	5.677	0%	758.59	575.55	-23%	4.261.383	3.287.681	-973.702	-23%
		Car 2	38.555	38.555	0%	817.62	524.79	-36%	31.525.526	20.234.619	-11.290.907	-36%
		Car 3	169.023	169.023	0%	626.28	274.48	-41%	161.136.182	59.617.271	-101.518.911	-41%
		Car 4	69.636	69.636	0%	368.34	280.62	-24%	27.183.867	20.146.636	-7.037.231	-26%
		Car 5	283.934	283.934	0%	276.42	151.65	-45%	78.643.643	43.115.897	-35.527.746	-45%
		Car 6	0	0	0%	0	0	0%	0	0	0	0%
		Trucks Total	566.741	566.741	0%	446.67	271.83	-39%	293.148.243	154.696.160	-138.452.083	-39%
	Gasoline	pre-Cars	7.973	7.973	0%	122.80	149.18	22%	372.721	1.189.393	216.502	22%
		Car 1	5.231	5.231	0%	123.77	165.74	34%	647.479	887.039	239.560	34%
		Car 2	3.587	3.587	0%	141.16	184.21	30%	585.362	686.681	101.319	30%
		Car 3	2.950	2.950	0%	38.11	184.21	387%	116.188	657.032	452.844	387%
		Car 4	0	0	0%	0	0	0%	0	0	0	0%
		Car 5	0	0	0%	0	0	0%	0	0	0	0%
		LNx Total	19.172	19.172	0%	113.68	168.43	48%	2.483.149	3.326.034	1.878.285	48%
		1.A.3.b. - Road Transport	2.879.688	2.879.688	0%	218.62	168.23	-46%	645.965.162	349.851.296	-296.113.866	-46%

Adjustment details for 2021												
NFR Code	Fuel	Activity Data			Implied Emission Factor			NO _x Emissions				
		current	adjusted	difference	current	adjusted	difference	current	adjusted	adjustment	difference	
		in [t]	in [t]	in [%]	in [g/t]	in [g/t]	in [%]	in [t]	in [t]	in [t]	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%	347.86	340.16	-11%	21.040.430	14.884.961	-6.155.469	-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%
	Gasoline total	794.688	794.688	0%	92.69	81.65	-11%	73.165.851	64.851.551	-8.333.800	-11%	
	Diesel Oil	pre-Cars	1.711	1.711	0%	318.18	264.95	-15%	583.760	453.187	-130.566	-15%
		Car 1	8.426	8.426	0%	297.32	246.66	-11%	2.685.115	2.239.987	-445.119	-11%
		Car 2	42.514	42.514	0%	407.93	279.27	-40%	17.384.549	9.321.916	-8.062.633	-40%
		Car 3	121.429	121.429	0%	555.36	176.55	-69%	67.437.053	21.681.386	-45.755.667	-69%
		Car 4	264.943	264.943	0%	388.88	143.48	-43%	162.817.881	39.089.755	-123.728.126	-43%
		Car 5	113.047	113.047	0%	435.12	143.48	-47%	49.536.960	16.332.974	-33.203.984	-47%
	Diesel oil total	695	695	0%	259.59	143.48	-45%	180.582	99.754	-80.828	-45%	
	Pkx Total	553.564	553.564	0%	434.12	159.92	-63%	249.713.791	88.138.959	-161.574.832	-63%	
1.A.3.a.ii. - Light Duty Vehicles (LDV)	Gasoline	pre-Cars	1.348.252	1.348.252	0%	232.52	131.47	-51%	713.899.642	152.990.510	-560.909.132	-51%
		Car 1	1.084	1.084	0%	626.75	645.95	3%	682.074	790.373	108.299	16%
		Car 2	283	283	0%	818.74	584.47	-46%	243.289	86.158	-157.132	-46%
		Car 3	1.184	1.184	0%	268.66	191.68	-29%	310.529	223.189	-87.340	-28%
		Car 4	783	783	0%	85.97	35.39	-11%	67.320	74.782	7.462	11%
		Car 5	2.562	2.562	0%	37.38	46.51	24%	95.786	119.162	23.376	24%
	Gasoline total	6.118	6.118	0%	15.33	46.51	283%	1	2	1	203%	
	Diesel Oil	pre-Cars	3.995	3.995	0%	425.99	386.79	-9%	1.986.280	1.225.682	-760.598	-38%
		Car 1	4.787	4.787	0%	398.71	276.24	-40%	1.984.260	1.030.426	-953.835	-48%
		Car 2	10.816	10.816	0%	336.90	153.29	-43%	3.644.582	2.091.063	-1.553.519	-43%
		Car 3	28.876	28.876	0%	541.53	150.54	-72%	15.037.249	4.346.870	-10.690.379	-72%
		Car 4	60.827	60.827	0%	449.82	89.29	-80%	39.029.914	5.429.811	-33.600.103	-80%
		Car 5	6.609	6.609	0%	449.82	89.29	-80%	2.930.190	584.354	-2.335.836	-80%
	Diesel oil total	115.967	115.967	0%	195.21	89.29	-47%	16	6	-6	-47%	
	LDVs Total	122.085	122.085	0%	405.55	126.92	-74%	55.844.558	15.716.142	-40.128.416	-74%	
1.A.3.a.iii. - Heavy Duty Vehicles (HDV)	Diesel Oil	pre-Cars	12.085	12.085	0%	408.92	130.55	-72%	57.247.599	19.932.858	-37.314.741	-72%
		Car 1	2.620	2.620	0%	702.89	119.18	-76%	2.836.189	2.671.331	-164.778	-6%
		Car 2	2.258	2.258	0%	105.61	73.14	-40%	1.693.781	1.636.297	-57.484	-3%
		Car 3	9.074	9.074	0%	804.17	645.36	-20%	7.127.125	5.655.659	-1.471.466	-20%
		Car 4	16.887	16.887	0%	823.96	417.28	-49%	14.681.880	6.889.054	-7.802.827	-49%
		Car 5	5.131	5.131	0%	448.86	361.81	-20%	2.363.330	1.681.274	-680.056	-29%
	Diesel Oil total	13.296	13.296	0%	336.60	182.62	-46%	4.589.052	2.486.399	-2.092.653	-46%	
	Buses Total	47.365	47.365	0%	592.65	448.99	-24%	28.071.271	21.286.323	-6.884.948	-24%	
	Trucks & Lorries	pre-Cars	8.044	8.044	0%	1.030.67	783.88	-26%	8.365.423	6.144.933	-2.210.491	-26%
		Car 1	4.384	4.384	0%	758.16	574.04	-23%	3.288.422	2.536.377	-752.044	-23%
		Car 2	29.277	29.277	0%	817.37	550.61	-30%	23.947.723	15.233.223	-8.714.499	-30%
		Car 3	121.581	121.581	0%	538.56	472.69	-11%	117.521.620	45.312.437	-72.209.183	-31%
		Car 4	59.430	59.430	0%	395.26	299.43	-26%	32.977.784	15.969.685	-16.998.099	-49%
		Car 5	342.715	342.715	0%	278.30	162.03	-40%	96.589.479	52.019.687	-44.569.792	-40%
	Trucks Total	563.891	563.891	0%	418.38	244.97	-40%	219.470.121	136.136.342	-83.333.779	-40%	
Motorized Two-Wheelers (M2W)	pre-Cars	7.389	7.389	0%	122.96	150.24	22%	969.588	1.110.170	201.580	22%	
	Car 1	4.085	4.085	0%	124.72	108.26	-15%	599.299	889.547	290.248	30%	
	Car 2	3.544	3.544	0%	137.85	134.58	-4%	488.552	688.693	201.851	41%	
	Car 3	3.560	3.560	0%	39.59	134.58	362%	160.553	688.693	528.140	362%	
	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%	119.78	171.64	54%	217.082	3.299.162	1.162.180	54%		
1.A.3.b. Road Transport	Total	2.160.883	2.160.883	0%	305.90	157.85	-49%	632.365.736	321.625.655	-308.740.081	-49%	

Adjustment details for 2023												
NFR Code	Fuel	Activity Data			Implied Emission Factor			NO _x Emissions				
		current	adjusted	difference	current	adjusted	difference	current	adjusted	adjustment	difference	
		in [t]			in [g/t]			in [t]				
1.A.3.a.i. Passenger Cars	Gasoline	pre-Euro	11,581	11,581	0%	607.72	636.38	-52%	7,035,041	6,189,785	-836,256	-52%
		Euro 1	47,487	47,487	0%	348.56	241.62	-31%	16,571,746	11,426,129	-5,145,617	-31%
		Euro 2	72,781	72,781	0%	184.27	137.92	-25%	13,487,749	10,035,380	-3,372,369	-25%
		Euro 3	189,443	189,443	0%	63.89	72.62	14%	6,927,963	7,875,172	947,209	14%
		Euro 4	489,541	489,541	0%	45.39	45.13	-1%	18,541,881	18,436,736	-105,145	-1%
		Euro 5	181,961	181,961	0%	18.61	45.13	143%	1,887,355	4,681,311	2,793,956	143%
	Euro 6	282	282	0%	25.06	45.13	74%	7,339	12,736	5,399	74%	
	Gasoline total	790,997	790,997	0%	85.73	78.88	-8%	64,379,964	58,577,229	-5,802,735	-9%	
	pre-Euro	1,487	1,487	0%	311.98	284.96	-9%	463,963	383,872	-80,091	-9%	
	Euro 1	6,660	6,660	0%	297.79	266.44	-11%	1,989,384	1,771,787	-208,517	-11%	
	Euro 2	33,967	33,967	0%	406.82	279.27	-40%	13,987,432	7,445,646	-6,541,787	-40%	
	Euro 3	183,539	183,539	0%	564.82	176.63	-69%	58,389,037	18,434,837	-39,954,200	-69%	
	Euro 4	234,943	234,943	0%	398.41	146.46	-62%	91,724,190	34,488,997	-57,235,193	-62%	
	Euro 5	173,112	173,112	0%	434.89	146.46	-66%	75,284,364	25,353,375	-49,930,989	-66%	
	Euro 6	1,557	1,557	0%	259.84	146.46	-44%	484,664	220,086	-264,578	-44%	
	Diesel oil total	555,245	555,245	0%	415.96	158.66	-64%	242,962,982	88,096,639	-154,866,343	-64%	
	Pkcs Total	1,346,242	1,346,242	0%	234.61	115.29	-50%	386,442,896	146,673,867	-239,769,029	-50%	
1.A.3.b.i. Light Duty Vehicles (LDVs)	Gasoline	pre-Euro	962	962	0%	632.36	645.95	2%	607,179	621,166	13,987	2%
		Euro 1	232	232	0%	803.24	193.22	-86%	189,985	70,295	-119,690	-86%
		Euro 2	989	989	0%	271.16	195.74	-28%	269,134	133,538	-135,596	-28%
		Euro 3	835	835	0%	89.38	98.33	10%	74,623	82,092	7,469	10%
		Euro 4	2,030	2,030	0%	38.49	47.58	24%	78,155	96,691	18,536	24%
		Euro 5	610	610	0%	16.36	47.58	182%	9,941	29,011	19,069	182%
	Euro 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%	
	pre-Euro	3,281	3,281	0%	424.46	386.79	-9%	1,368,754	1,022,093	-346,661	-9%	
	Euro 1	3,666	3,666	0%	399.34	276.24	-30%	1,445,960	1,017,634	-428,326	-30%	
	Euro 2	8,479	8,479	0%	336.46	133.39	-49%	2,852,325	1,639,772	-1,212,553	-43%	
	Euro 3	23,785	23,785	0%	558.53	150.44	-73%	13,050,281	3,546,082	-9,504,199	-73%	
	Euro 4	59,485	59,485	0%	494.22	89.85	-82%	29,369,070	5,337,395	-24,031,675	-82%	
	Euro 5	15,964	15,964	0%	442.70	89.85	-80%	7,040,461	1,420,906	-5,619,555	-80%	
	Euro 6	1	1	0%	15.14	89.85	-81%	122	72	-50	-41%	
	Diesel oil total	114,550	114,550	0%	485.91	126.17	-75%	55,186,382	13,741,354	-41,445,028	-75%	
	LDVs Total	129,088	129,088	0%	489.51	123.61	-74%	56,344,903	14,834,656	-41,510,247	-74%	
1.A.3.b.ii. Heavy Duty Vehicles (HDVs)	Diesel Oil	pre-Euro	1,326	1,326	0%	1093.46	1919.46	4%	1,410,640	1,352,283	-58,357	-4%
		Euro 1	1,246	1,246	0%	727.34	731.15	1%	1,017,476	1,017,184	-292	0%
		Euro 2	7,789	7,789	0%	703.46	643.34	-9%	5,085,091	4,597,478	-487,613	-9%
		Euro 3	14,483	14,483	0%	629.94	457.61	-27%	9,073,137	6,889,744	-2,183,393	-27%
		Euro 4	5,331	5,331	0%	468.16	361.86	-22%	2,642,179	1,675,777	-966,402	-22%
		Euro 5	20,752	20,752	0%	347.84	182.99	-47%	7,219,563	2,787,467	-4,432,096	-47%
		Euro 6	73	73	0%	64.52	182.99	236%	3,961	13,296	9,334	236%
		Diesels Total	50,962	50,962	0%	533.22	384.33	-28%	27,141,913	19,565,288	-7,576,625	-28%
	pre-Euro	6,922	6,922	0%	1036.95	158.82	-21%	7,107,543	5,252,345	-1,855,198	-21%	
	Euro 1	3,630	3,630	0%	743.70	570.57	-24%	2,721,326	2,071,111	-650,215	-24%	
	Euro 2	23,577	23,577	0%	818.27	516.43	-37%	19,262,253	12,175,855	-7,086,398	-37%	
	Euro 3	96,736	96,736	0%	634.65	270.21	-42%	61,387,137	35,888,665	-25,498,472	-42%	
	Euro 4	60,550	60,550	0%	366.50	288.44	-21%	19,962,680	14,880,877	-5,081,723	-27%	
	Euro 5	485,981	485,981	0%	261.24	152.32	-40%	114,149,955	61,626,577	-52,523,378	-40%	
	Euro 6	2,380	2,380	0%	188.487	360.323	345%	188,487	360,323	171,836	223%	
	Trucks Total	589,585	589,585	0%	385.33	224.69	-41%	224,829,180	132,064,153	-92,765,027	-41%	
1.A.3.b.iii. Motorised Two-Wheelers (MOWs)	Gasoline	pre-Euro	6,780	6,780	0%	122.76	151.03	23%	822,539	1,011,920	189,381	23%
		Euro 1	4,386	4,386	0%	124.61	171.39	39%	536,615	738,050	201,435	39%
		Euro 2	3,267	3,267	0%	136.22	184.56	45%	445,087	636,853	191,766	43%
		Euro 3	3,984	3,984	0%	38.66	184.56	382%	18,386	778,616	760,230	382%
		Euro 4	0	0	0%	0	0	0%	0	0	0	0%
		Euro 5	0	0	0%	0	0	0%	0	0	0	0%
		MOWs Total	18,268	18,268	0%	107.43	175.28	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 _x Emissions				
		current	adjusted	difference	current	adjusted	difference	current	adjusted	adjustment	difference	
		in [t]	in [t]	in [%]	in [g/t]	in [g/t]	in [%]	in [t]	in [t]	in [t]	in [%]	
1.A.3.a.i. Passenger Cars	Gasoline	pre-Euro	11,680	11,680	0%	618.27	649.35	-5%	7,011,641	6,967,452	-4,448	-5%
		Euro 1	37,743	37,743	0%	353.76	241.68	-32%	13,362,966	9,129,436	-4,233,530	-32%
		Euro 2	62,680	62,680	0%	188.93	139.33	-27%	11,889,922	8,722,244	-3,167,678	-27%
		Euro 3	97,782	97,782	0%	66.38	73.19	10%	6,481,618	7,156,920	675,303	10%
		Euro 4	397,911	397,911	0%	47.22	46.52	-1%	18,790,345	18,589,937	-200,407	-1%
		Euro 5	138,063	138,063	0%	18.60	46.52	150%	2,583,150	6,459,691	3,876,541	150%
		Euro 6	2,714	2,714	0%	25.99	46.52	79%	70,526	126,237	55,711	79%
Gasoline total	748,154	748,154	0%	88.35	74.85	-16%	68,190,887	56,671,737	-11,519,150	-17%		
Diesel Oil	pre-Euro	1,389	1,389	0%	312.32	284.96	-9%	433,081	368,136	-64,945	-9%	
	Euro 1	5,426	5,426	0%	268.42	246.79	-11%	1,678,472	1,540,688	-137,784	-11%	
	Euro 2	28,437	28,437	0%	406.84	279.91	-40%	11,563,522	6,253,531	-5,309,991	-40%	
	Euro 3	92,795	92,795	0%	574.33	176.67	-69%	53,284,956	16,579,373	-36,705,583	-69%	
	Euro 4	222,583	222,583	0%	393.55	149.27	-62%	87,588,471	33,225,566	-54,362,905	-62%	
	Euro 5	233,766	233,766	0%	435.42	149.27	-66%	101,787,275	34,884,788	-66,902,487	-66%	
	Euro 6	4,536	4,536	0%	259.53	149.27	-42%	5,177,151	677,046	-4,500,105	-42%	
Diesel oil total	589,131	589,131	0%	437.14	158.71	-64%	257,533,128	83,899,619	-173,633,509	-64%		
Pkcs Total	1,337,285	1,337,285	0%	237.49	111.77	-53%	317,723,735	149,571,356	-168,152,379	-53%		
1.A.3.b.i. Heavy Duty Vehicles (HDVs)	Diesel Oil	pre-Euro	981	981	0%	633.81	645.95	2%	568,320	575,293	6,973	2%
		Euro 1	194	194	0%	803.50	386.27	-86%	187,281	59,328	-127,953	-86%
		Euro 2	836	836	0%	274.42	281.18	21%	229,520	188,285	-41,235	-21%
		Euro 3	784	784	0%	52.66	111.79	10%	72,691	79,780	7,089	10%
		Euro 4	1,089	1,089	0%	40.70	48.89	20%	77,284	82,833	5,549	20%
		Euro 5	965	965	0%	16.67	48.89	183%	15,187	47,268	32,081	183%
		Euro 6	1	1	0%	17.66	48.89	170%	26	72	46	170%
Gasoline total	5,578	5,578	0%	262.86	184.67	-3%	1,137,299	1,096,727	-40,572	-3%		
1.A.3.b.ii. Light Duty Vehicles (LDVs)	Diesel Oil	pre-Euro	2,744	2,744	0%	424.37	386.79	-9%	1,168,757	944,928	-223,829	-9%
		Euro 1	1,054	1,054	0%	727.68	731.15	1%	1,166,782	1,166,596	-186	0%
		Euro 2	6,982	6,982	0%	338.92	153.35	-48%	2,346,147	1,350,014	-996,133	-42%
		Euro 3	20,421	20,421	0%	568.12	150.38	-73%	11,427,965	3,070,913	-8,357,052	-73%
		Euro 4	59,887	59,887	0%	497.72	30.45	-42%	27,776,440	5,046,416	-22,730,024	-42%
		Euro 5	29,891	29,891	0%	44.78	30.45	-33%	13,181,585	2,087,864	-11,093,721	-33%
		Euro 6	41	41	0%	15.26	30.45	-46%	5,160	3,688	-1,472	-46%
Diesel oil total	119,737	119,737	0%	488.66	154.63	-76%	572,833,533	133,650,480	-439,183,053	-76%		
LDVs Total	124,584	124,584	0%	461.54	118.07	-79%	58,214,172	8,427,275	-49,786,897	-79%		
1.A.3.b.iii. Heavy Duty Vehicles (HDVs)	Diesel Oil	pre-Euro	1,172	1,172	0%	1066.69	1919.23	4%	1,249,028	1,194,143	-54,886	-4%
		Euro 1	1,054	1,054	0%	727.68	750.29	3%	766,620	791,181	24,561	3%
		Euro 2	6,184	6,184	0%	704.87	437.48	-38%	5,324,968	4,370,271	-954,697	-38%
		Euro 3	13,087	13,087	0%	636.43	643.65	1%	8,262,860	8,590,226	3,264,357	39%
		Euro 4	4,046	4,046	0%	468.56	351.71	-24%	2,378,081	1,739,349	-638,732	-24%
		Euro 5	34,096	34,096	0%	349.86	182.44	-48%	8,635,650	4,420,714	-4,214,935	-48%
		Euro 6	417	417	0%	15.26	183.48	370%	26,047	86,572	74,525	370%
Diesel Total	59,176	59,176	0%	509.54	386.68	-24%	26,590,969	16,620,843	-9,970,126	-24%		
HDVs Total	5,983	5,983	0%	10,792	737.35	-29%	6,072,170	4,322,868	-1,749,302	-29%		
1.A.3.b.iv. Heavy Duty Vehicles (HDVs)	Diesel Oil	pre-Euro	2,985	2,985	0%	743.27	580.27	-24%	2,176,945	1,650,969	-525,977	-24%
		Euro 1	18,444	18,444	0%	818.17	514.45	-37%	15,089,061	9,469,975	-5,619,086	-37%
		Euro 2	75,730	75,730	0%	633.53	367.33	-42%	47,537,440	27,837,760	-19,699,680	-42%
		Euro 3	42,711	42,711	0%	766.90	287.27	-63%	16,886,007	10,280,770	-6,605,237	-63%
		Euro 4	636,969	636,969	0%	805.12	154.24	-81%	129,141,254	66,736,476	-62,404,778	-81%
		Euro 5	10,020	10,020	0%	68.87	152.65	201%	913,082	2,750,630	1,837,548	201%
		Euro 6	680,139	680,139	0%	351.86	270.63	-41%	211,987,531	124,188,469	-87,799,062	-41%
Gasoline total	6,362	6,362	0%	123.97	151.79	23%	81,730	964,179	102,443	23%		
Euro 1	4,013	4,013	0%	125.11	173.15	39%	582,073	634,880	102,807	39%		
Euro 2	3,382	3,382	0%	132.24	185.68	40%	436,688	664,894	209,106	40%		
Euro 3	4,652	4,652	0%	39.91	185.58	381%	181,610	982,176	796,566	381%		
Euro 4	0	0	0%	0	0	0%	0	0	0	0%		
Euro 5	0	0	0%	0	0	0%	0	0	0	0%		
Euro 6	18,229	18,229	0%	104.34	175.38	68%	1,962,080	5,197,638	1,234,557	68%		
LDVs Total	2,132,683	2,132,683	0%	208.88	145.76	-30%	616,076,063	290,654,371	-325,421,692	-30%		

Adjustment details for 2024													
NFR Code	Fuel	Activity Data				Implied Emission Factor				NO _x Emissions			
		current	adjusted	difference	in [%]	current	adjusted	difference	in [%]	current	adjusted	adjustment	difference
1.A.3.a.i. - Passenger Cars	Gasoline	pre-Cars	11.647	11.647	0%	812.37	844.11	-11%	7.132.688	6.337.484	-796.844	-11%	
		Car 1	30.667	30.667	0%	368.77	343.93	-32%	11.082.246	7.480.641	-3.621.706	-32%	
		Car 2	53.486	53.486	0%	198.58	140.31	-29%	10.514.477	7.584.432	-3.018.844	-29%	
		Car 3	87.374	87.374	0%	65.31	73.93	7%	6.955.589	6.459.797	-494.218	-7%	
		Car 4	387.759	387.759	0%	45.16	47.80	-3%	19.093.585	19.536.099	-523.557	-3%	
		Car 5	171.270	171.270	0%	18.59	47.80	151%	3.183.282	0.187.581	5.004.299	151%	
	Car 6	10.315	10.315	0%	25.97	47.80	84%	267.855	433.096	-225.248	-84%		
	Gasoline total	752.526	752.526	0%	36.80	73.89	-4%	57.215.533	54.988.501	-2.216.812	-4%		
	Diesel Oil	pre-Cars	1.341	1.341	0%	311.73	284.66	-5%	417.947	366.246	-42.722	-5%	
		Car 1	4.892	4.892	0%	298.92	267.28	-11%	1.482.284	1.387.643	-156.951	-11%	
Car 2		23.934	23.934	0%	408.71	320.45	-49%	9.734.484	5.276.480	-4.458.004	-49%		
Car 3		82.749	82.749	0%	585.53	176.81	-69%	48.451.830	14.796.245	-33.655.585	-69%		
1.A.3.b.i. - Light Duty Vehicles (LDVs)	Gasoline	pre-Cars	211.237	211.237	0%	397.27	317.77	-20%	83.917.680	32.059.973	-51.857.706	-20%	
		Car 1	285.011	285.011	0%	436.38	151.77	-65%	124.721.396	43.370.380	-81.343.896	-65%	
		Car 2	16.081	16.081	0%	259.34	151.77	-41%	4.170.580	2.440.686	-1.729.814	-41%	
		Gasoline 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%	
		Diesel Oil	pre-Cars	986	986	0%	632.44	645.95	-2%	193.683	176.124	-18.844	-2%
	Car 1		173	173	0%	968.27	389.98	-64%	150.074	53.575	-96.499	-64%	
	Car 2		748	748	0%	204.73	287.11	-21%	212.888	154.839	-58.829	-21%	
	Car 3		771	771	0%	98.62	185.21	7%	75.982	81.070	-5.078	7%	
	1.A.3.b.ii. - Heavy Duty Vehicle Buses	Gasoline	pre-Cars	1.087	1.087	0%	43.47	50.15	15%	81.139	83.618	-2.479	15%
Car 1			1.374	1.374	0%	17.11	50.15	183%	23.517	68.918	-45.401	183%	
Car 2			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	-88.712	-2%	
Diesel Oil			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	-49%	987.136	639.898	-347.328	-49%
		Car 2	6.087	6.087	0%	338.91	133.25	-42%	1.385.995	1.180.889	-205.126	-42%	
		Car 3	18.220	18.220	0%	571.75	150.58	-74%	10.417.076	2.742.656	-7.674.828	-74%	
1.A.3.b.iii. - Heavy Duty Vehicle Trucks & Lorries		Gasoline	pre-Cars	52.361	52.361	0%	498.70	91.69	-82%	26.164.486	4.703.746	-21.394.748	-82%
			Car 1	46.749	46.749	0%	438.44	91.69	-79%	20.696.234	4.258.626	-16.237.709	-79%
	Car 2		187	187	0%	151.18	91.69	-60%	29.829	17.974	-11.855	-60%	
	Gasoline total		128.528	128.528	0%	415.56	170.96	-77%	61.146.575	14.267.237	-46.879.338	-77%	
	LDVs Total		134.423	134.423	0%	463.16	153.81	-75%	62.299.160	15.298.849	-46.968.311	-75%	
	Diesel Oil		pre-Cars	984	984	0%	1099.48	1919.23	-5%	1.062.384	1.062.921	-48.443	-5%
		Car 1	837	837	0%	728.12	130.98	-3%	689.232	628.359	-18.127	-3%	
		Car 2	5.586	5.586	0%	704.95	643.67	-9%	4.284.320	3.683.441	-598.887	-9%	
		Car 3	11.221	11.221	0%	621.20	458.38	-21%	7.082.740	5.143.628	-1.939.228	-21%	
	1.A.3.b.iv. - Motorised Two-Wheelers (MOWs)	Gasoline	pre-Cars	4.270	4.270	0%	461.10	361.79	-24%	1.972.610	1.584.978	-467.632	-24%
Car 1			22.042	22.042	0%	368.55	183.99	-49%	7.726.921	4.065.632	-3.671.389	-49%	
Car 2			4.182	4.182	0%	42.78	183.99	330%	178.913	789.476	-610.563	330%	
Buses Total			49.143	49.143	0%	468.37	339.99	-27%	23.017.115	16.788.234	-6.288.881	-27%	
Gasoline total			4.182	4.182	0%	1034.34	737.35	-29%	4.945.942	3.925.898	-1.020.134	-29%	
Diesel Oil			pre-Cars	2.285	2.285	0%	748.66	561.41	-25%	1.600.685	1.237.759	-362.948	-25%
		Car 1	13.623	13.623	0%	817.90	510.38	-38%	11.446.860	6.565.736	-4.891.124	-38%	
		Car 2	54.685	54.685	0%	632.52	364.41	-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%	
1.A.3.b. - Road Transport		Gasoline	pre-Cars	389.263	389.263	0%	282.92	153.66	-46%	110.112.782	59.688.643	-50.424.749	-46%
	Car 1		34.214	34.214	0%	63.96	153.66	189%	3.937.089	11.368.582	-7.421.413	189%	
	Trucks Total		572.754	572.754	0%	314.85	196.65	-38%	179.874.133	112.285.562	-67.588.551	-38%	
	pre-Cars		6.185	6.185	0%	122.85	158.64	29%	795.185	974.388	218.192	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	380%	299.722	1.041.189	821.467	380%		
	Car 4	0	0	0%	0	0	0%	0	0	0	0%		
	Car 5	0	0	0%	0	0	0%	0	0	0	0%		
	MOWs Total	18.673	18.673	0%	108.59	179.24	78%	1.878.294	3.381.794	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	362.252.271	-234.868.025	-49%		

Adjustment details for 2026												
NFR Code	Fuel	Activity Data			Implied Emission Factor			NO _x Emissions				
		current	adjusted	difference	current	adjusted	difference	current	adjusted	adjustment	difference	
		in [t]	in [t]	in [%]	in [g/t]	in [g/t]	in [%]	in [t]	in [t]	in [t]	in [t]	
1.A.3.a.i - Passenger Cars	Gasoline	pre-Euro	11 782	11 782	0%	634.75	644.11	-14%	7 470 914	6 410 967	-1 059 947	-14%
		Euro 1	39 270	39 270	0%	372.25	341.68	-8%	7 545 483	4 986 888	-2 558 595	-34%
		Euro 2	36 062	36 062	0%	212.73	143.11	-33%	7 671 581	5 180 897	-2 490 684	-33%
		Euro 3	83 039	83 039	0%	76.17	75.50	-1%	4 881 482	4 759 259	-122 223	-1%
		Euro 4	334 413	334 413	0%	53.74	50.17	-7%	17 369 364	16 777 445	-591 919	-3%
		Euro 5	183 374	183 374	0%	19.09	50.17	163%	3 580 745	9 189 834	5 609 089	162%
		Euro 6	65 332	65 332	0%	25.67	50.17	94%	1 768 917	3 327 855	1 558 938	88%
		Gasoline total	715 272	715 272	0%	79.93	70.65	-9%	58 736 267	50 535 049	-8 201 218	-14%
	Diesel Oil	pre-Euro	1 380	1 380	0%	364.76	254.56	-30%	364 262	339 173	-25 089	-7%
		Euro 1	3 749	3 749	0%	298.36	269.66	-9%	1 122 449	1 011 626	-110 823	-10%
		Euro 2	16 584	16 584	0%	407.19	221.43	-46%	6 720 132	3 663 964	-3 056 168	-46%
		Euro 3	81 398	81 398	0%	802.50	179.24	-78%	36 981 999	11 085 409	-25 896 590	-70%
		Euro 4	175 040	175 040	0%	405.76	156.24	-61%	71 362 220	27 474 086	-43 888 134	-61%
		Euro 5	299 054	299 054	0%	433.34	156.24	-64%	130 032 044	46 019 229	-83 912 815	-64%
		Euro 6	116 034	116 034	0%	268.75	156.24	-41%	30 427 555	10 232 785	-20 194 770	-66%
		Diesel oil total	625 119	625 119	0%	418.36	160.76	-61%	277 941 660	188 535 230	-89 406 430	-61%
		Pkx Total	1 384 391	1 384 391	0%	235.75	154.41	-35%	327 778 627	199 070 280	-128 708 347	-39%
	Gasoline	pre-Euro	910	910	0%	602.79	645.95	-7%	593 186	547 543	-45 643	-8%
		Euro 1	136	136	0%	908.31	312.78	-66%	122 126	42 425	-79 701	-65%
		Euro 2	540	540	0%	308.39	217.84	-29%	162 311	117 737	-44 574	-27%
		Euro 3	650	650	0%	108.43	111.57	-3%	70 432	72 731	2 299	3%
		Euro 4	1 684	1 684	0%	43.06	52.36	21%	78 714	84 003	5 289	7%
		Euro 5	1 724	1 724	0%	19.82	52.36	164%	34 157	80 258	46 101	164%
		Euro 6	363	363	0%	19.85	52.36	181%	6 764	18 992	12 228	181%
		Gasoline total	5 506	5 506	0%	388.27	171.66	-56%	1 068 292	1 013 678	-54 614	-5%
	Diesel Oil	pre-Euro	2 189	2 189	0%	414.81	386.79	-7%	899 549	846 433	-53 116	-6%
		Euro 1	1 780	1 780	0%	391.89	276.25	-29%	780 189	585 371	-194 818	-25%
		Euro 2	4 223	4 223	0%	323.43	153.31	-53%	1 365 594	676 452	-689 142	-50%
		Euro 3	13 582	13 582	0%	588.91	150.77	-74%	8 064 323	2 040 233	-6 024 090	-74%
		Euro 4	43 141	43 141	0%	504.48	32.40	-93%	21 783 989	3 986 141	-17 797 848	-82%
		Euro 5	74 231	74 231	0%	434.16	32.40	-92%	32 223 283	6 658 780	-25 564 503	-79%
		Euro 6	4 921	4 921	0%	113.49	32.40	-71%	755 285	454 676	-300 609	-40%
		Diesel oil total	144 068	144 068	0%	454.12	185.62	-59%	65 712 132	15 256 007	-50 456 125	-77%
		LNx Total	149 994	149 994	0%	445.23	188.29	-58%	66 781 825	16 226 684	-50 555 141	-76%
1.A.3.b.i - Heavy Duty Vehicles - Buses	Diesel Oil	pre-Euro	891	891	0%	1076.81	1919.23	-43%	964 197	988 234	24 037	2%
		Euro I	583	583	0%	731.36	732.67	0%	433 675	446 236	12 561	3%
		Euro II	4 375	4 375	0%	708.25	645.03	-9%	3 440 614	2 822 621	-617 993	-18%
		Euro III	10 333	10 333	0%	632.87	458.91	-27%	6 539 364	4 741 827	-1 797 536	-27%
		Euro IV	4 449	4 449	0%	475.90	382.29	-19%	2 117 219	1 586 881	-530 338	-25%
		Euro V	34 380	34 380	0%	364.36	185.22	-49%	8 935 974	4 517 517	-4 418 457	-49%
		Euro VI	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%
	Trucks & Lorries	pre-Euro	3 933	3 933	0%	1034.81	737.35	-29%	4 087 249	2 980 379	-1 106 870	-29%
		Euro I	1 555	1 555	0%	748.16	587.92	-22%	1 163 482	789 813	-373 669	-32%
		Euro II	8 856	8 856	0%	817.75	585.42	-28%	7 258 047	4 486 626	-2 771 421	-38%
		Euro III	34 167	34 167	0%	638.91	588.64	-8%	21 553 280	12 251 155	-9 302 125	-43%
		Euro IV	34 287	34 287	0%	394.94	281.86	-29%	9 640 384	6 885 621	-2 754 763	-29%
		Euro V	269 735	269 735	0%	287.22	153.50	-46%	74 680 233	39 976 610	-34 703 623	-46%
1.A.3.b.ii - Motorised Two-Wheelers (MOWs)	Gasoline	pre-Euro	5 543	5 543	0%	125.59	155.78	24%	696 072	883 289	187 217	24%
		Euro 1	3 360	3 360	0%	127.11	177.29	39%	427 113	585 796	158 683	39%
		Euro 2	3 375	3 375	0%	125.94	187.68	50%	421 961	687 078	265 117	63%
		Euro 3	6 443	6 443	0%	48.36	187.68	281%	209 627	1 273 671	1 064 044	508%
		Euro 4	65	65	0%	17.47	187.68	1031%	1 134	12 632	11 498	1015%
		Euro 5	0	0	0%	0	0	0%	0	0	0	0%
		MOWs Total	16 185	16 185	0%	96.14	181.68	88%	1 885 897	3 452 476	1 566 579	83%
	Road Transport	pre-Euro	2 287 339	2 287 339	0%	258.89	137.22	-46%	553 799 598	362 981 620	-190 817 978	-34%
		LNx Total	2 287 339	2 287 339	0%	258.89	137.22	-46%	553 799 598	362 981 620	-190 817 978	-34%

Adjustment details for 2027												
NFR Code	Fuel	Activity Data			Implied Emission Factor			NO _x Emissions				
		current	adjusted	difference	current	adjusted	difference	current	adjusted	adjustment	difference	
		in [t]	in [t]	in [%]	in [g/t]	in [g/t]	in [%]	in [t]	in [t]	in [t]	in [t]	
1.A.3.a.i - Passenger Cars	Gasoline	pre-Euro	12 282	12 282	0%	636.73	644.11	-11%	7 814 267	6 680 187	-1 126 100	-14%
		Euro 1	17 449	17 449	0%	372.96	341.68	-8%	6 588 311	4 217 044	-2 371 267	-36%
		Euro 2	30 435	30 435	0%	217.43	141.75	-35%	6 617 570	4 314 140	-2 303 430	-35%
		Euro 3	54 271	54 271	0%	78.48	76.27	-3%	4 254 938	4 139 376	-115 562	-3%
		Euro 4	315 086	315 086	0%	54.96	51.26	-7%	17 316 320	16 511 881	-804 439	-5%
		Euro 5	180 240	180 240	0%	19.17	51.26	167%	3 485 382	9 239 815	5 754 433	167%
	Euro 6	114 791	114 791	0%	25.65	51.26	102%	3 063 235	5 884 372	2 821 137	92%	
	Gasoline total	724 571	724 571	0%	67.66	60.88	-8%	49 046 874	50 634 374	1 587 500	3%	
	Diesel Oil	pre-Euro	1 780	1 780	0%	364.96	254.56	-30%	489 363	347 020	-142 343	-29%
		Euro 1	3 749	3 749	0%	298.17	271.67	-9%	1 082 286	910 182	-172 104	-16%
Euro 2		13 788	13 788	0%	407.17	222.43	-45%	5 914 130	3 066 393	-2 847 736	-48%	
Euro 3		52 128	52 128	0%	808.95	179.65	-78%	31 696 478	9 364 788	-22 331 690	-70%	
1.A.3.a.ii - Light Duty Vehicles (LDV)	Gasoline	Euro 4	187 047	187 047	0%	418.16	158.34	-61%	64 733 485	24 983 323	-39 750 162	-61%
		Euro 5	283 480	283 480	0%	423.99	158.34	-63%	120 187 656	44 073 190	-76 114 466	-63%
		Euro 6	184 768	184 768	0%	262.61	158.34	-40%	48 521 183	20 255 985	-28 265 198	-58%
		Diesel oil total	686 582	686 582	0%	394.65	161.95	-59%	272 126 081	112 890 717	-159 235 364	-58%
		Pkx Total	1 421 152	1 421 152	0%	225.98	155.61	-31%	521 152 965	163 445 091	-357 707 874	-68%
		Gasoline	pre-Euro	940	940	0%	611.41	645.95	-7%	612 247	596 878	-15 369
	Euro 1	124	124	0%	908.23	312.78	-66%	112 083	39 682	-72 401	-65%	
	Euro 2	485	485	0%	302.12	221.62	-27%	140 344	102 950	-37 394	-27%	
	Euro 3	596	596	0%	118.57	115.36	-3%	65 955	68 812	2 857	4%	
	Euro 4	1 476	1 476	0%	50.72	53.38	5%	74 877	78 816	3 938	5%	
Euro 5	1 680	1 680	0%	21.73	53.38	146%	36 240	89 034	52 794	146%		
Euro 6	910	910	0%	19.18	53.38	187%	17 052	49 080	31 928	187%		
Gasoline total	6 186	6 186	0%	171.55	167.18	-2%	1 058 799	1 034 211	-24 588	-2%		
1.A.3.a.iii - Heavy Duty Vehicles (HDV)	Diesel Oil	pre-Euro	2 087	2 087	0%	413.41	386.79	-6%	860 499	811 183	-49 316	-6%
		Euro 1	1 538	1 538	0%	398.47	276.25	-30%	680 795	511 158	-169 636	-25%
		Euro 2	3 580	3 580	0%	321.26	153.04	-53%	1 143 793	687 293	-456 500	-40%
		Euro 3	11 684	11 684	0%	556.30	150.7	-73%	5 240 323	1 789 515	-3 450 808	-66%
		Euro 4	39 050	39 050	0%	866.78	30.69	-97%	19 789 647	3 626 025	-16 163 622	-82%
		Euro 5	75 789	75 789	0%	432.95	30.69	-93%	32 790 566	7 054 566	-25 736 011	-79%
	Euro 6	19 625	19 625	0%	161.71	30.69	-81%	2 977 239	1 626 875	-1 350 364	-45%	
	Diesel oil total	153,284	153,284	0%	424.66	181.89	-57%	65,083,930	15,925,274	-49,158,674	-74%	
	LDVs total	199,470	199,470	0%	414.83	186.35	-54%	66,152,129	16,959,427	-49,192,702	-74%	
	Diesel Oil	pre-Euro	736	736	0%	1073.33	1019.23	-5%	790 259	750 425	-39 834	-5%
Euro 1		411	411	0%	731.97	732.57	0%	300 684	389 062	8 839	3%	
Euro 2		3 325	3 325	0%	707.91	646.79	-9%	2 620 087	2 147 480	-472 606	-18%	
Euro 3		8 678	8 678	0%	824.32	419.12	-49%	6 457 480	3 984 085	-2 473 395	-38%	
Euro 4		3 923	3 923	0%	474.07	362.49	-23%	2 812 380	1 347 600	-1 464 780	-52%	
Euro 5		21 613	21 613	0%	363.92	186.49	-49%	7 937 975	4 050 686	-3 884 291	-49%	
Euro 6	14 586	14 586	0%	68.52	186.49	270%	864 215	2 712 580	1 848 375	214%		
Diesel Oil total	53,382	53,382	0%	318.80	286.71	-23%	19,193,981	15,384,628	-3,809,353	-20%		
Buses Total	3 686	3 686	0%	1034.49	737.35	-29%	3 730 272	2 659 076	-1 071 256	-29%		
Heavy Duty Vehicle: Trucks & Lorries	Diesel Oil	Euro 1	1 311	1 311	0%	807.48	708.38	-13%	900 942	614 151	-286 690	-31%
		Euro 2	7 087	7 087	0%	817.66	543.45	-33%	5 794 876	3 588 026	-2 206 850	-38%
		Euro 3	20 062	20 062	0%	538.17	401.21	-24%	16 581 727	9 652 457	-6 929 270	-42%
		Euro 4	30 062	30 062	0%	307.77	279.34	-9%	7 965 414	5 687 045	-2 268 369	-28%
		Euro 5	264 365	264 365	0%	266.16	154.36	-41%	49 280 789	31 636 347	-17 644 342	-36%
		Euro 6	335 065	335 065	0%	65.82	154.36	135%	21 985 366	51 718 641	29 733 275	136%
Trucks Total	588,263	588,263	0%	195.92	175.92	-10%	116,617,141	105,248,508	-11,428,633	-10%		
Motorized Two-Wheelers (M2W)	Gasoline	pre-Euro	5 336	5 336	0%	125.91	151.19	25%	671 088	830 189	158 851	25%
		Euro 1	3 257	3 257	0%	126.39	177.86	41%	411 617	579 244	167 627	41%
		Euro 2	3 396	3 396	0%	122.55	180.33	62%	416 290	673 540	257 248	62%
		Euro 3	6 711	6 711	0%	41.22	180.33	263%	271 187	1 396 566	1 065 849	283%
		Euro 4	430	430	0%	18.26	180.33	987%	7 982	85 275	77 293	968%
		Euro 5	0	0	0%	0.00	0	0%	0	0	0	0%
M2Ws Total	19 160	19 160	0%	52.81	183.39	98%	1 178,624	5,551,181	1,735,114	98%		
1.A.3.b - Road Transport	Total	2,251,471	2,251,471	0%	213.43	175.23	-42%	525 540,490	384,485 986	-141 074 424	-42%	

Adjustment details for 2018												
NFR Code	Fuel	Activity Data			Implied Emission Factor			NO _x Emissions				
		current	adjusted	difference	current	adjusted	difference	current	adjusted	adjustment	difference	
		in [t]	in [t]	in [%]	in [g/t]	in [g/t]	in [%]	in [t]	in [t]	in [t]	in [t]	in [%]
1.A.3.a.i - Passenger Cars	Gasoline	pre-Cars	12,219	12,219	0%	637.58	644.11	-6%	7,780,965	6,668,721	-1,112,234	-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	8,725,688	5,497,406	170%
	Diesel Oil	pre-Cars	159,041	159,041	0%	6.00	52.30	788%	4,190,422	8,316,250	4,125,828	98%
		Car 1	3,949	3,949	0%	303.16	264.96	-13%	121,661	345,173	223,512	183%
		Car 2	10,784	10,784	0%	407.20	222.67	-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	40,293,731	-64,292,055	-61%
	Trucks & Lorries	pre-Cars	228,685	228,685	0%	254.87	180.40	-30%	58,284,140	35,680,446	-22,603,694	-39%
		Diesel oil total	666,076	666,076	0%	375.66	163.38	-56%	247,596,063	188,768,684	-158,767,459	-56%
	FCA Total		1,365,181	1,365,181	0%	214.34	154.68	-28%	262,589,060	156,555,421	-106,033,639	-40%
1.A.3.b.i - Light Duty Vehicles (LDVs)	Gasoline	pre-Cars	911	911	0%	664.51	645.95	-3%	596,851	582,662	-14,189	-2%
		Car 1	189	189	0%	911.58	312.78	-66%	99,529	33,895	-65,634	-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	4%	57,282	60,739	3,457	6%
		Car 4	1,275	1,275	0%	52.02	54.36	4%	65,290	69,270	3,980	4%
		Car 5	1,483	1,483	0%	23.70	54.36	129%	35,160	80,626	45,466	129%
	Diesel Oil	pre-Cars	1,643	1,643	0%	19.18	54.36	182%	39,550	89,326	49,776	182%
		Car 1	6,315	6,315	0%	154.22	160.11	4%	999,199	1,011,136	11,937	1%
		Car 2	1,872	1,872	0%	411.51	386.79	-6%	771,337	574,432	-196,905	-26%
		Car 3	1,285	1,285	0%	389.94	276.25	-29%	483,129	272,296	-210,833	-44%
		Car 4	2,942	2,942	0%	318.56	153.88	-52%	965,389	550,789	-414,600	-43%
		Car 5	9,363	9,363	0%	598.10	150.74	-75%	5,689,152	1,411,299	-4,277,853	-75%
	Trucks & Lorries	pre-Cars	33,232	33,232	0%	508.42	93.81	-82%	16,929,185	3,117,457	-13,811,728	-82%
		Diesel oil total	66,283	66,283	0%	432.92	93.81	-78%	28,684,080	6,217,660	-22,466,420	-78%
	LDVs Total		39,482	39,482	0%	158.79	93.81	-41%	5,941,615	3,686,228	-2,255,387	-38%
1.A.3.b.ii - Heavy Duty Vehicles (HDVs)	Gasoline	pre-Cars	180,574	180,574	0%	375.86	184.94	-51%	69,343,125	36,851,449	-32,491,676	-47%
		Car 1	547	547	0%	1078.15	1919.23	78%	589,267	557,147	-32,120	-5%
		Car 2	237	237	0%	732.78	732.57	0%	173,676	178,368	4,692	3%
		Car 3	2,270	2,270	0%	787.83	646.33	-18%	1,780,686	1,487,437	-293,249	-16%
		Car 4	6,757	6,757	0%	628.89	459.32	-27%	4,262,734	3,183,482	-1,079,252	-25%
		Car 5	3,043	3,043	0%	473.16	382.73	-19%	1,439,790	1,073,333	-366,457	-26%
	Diesel Oil	pre-Cars	18,189	18,189	0%	362.42	186.37	-49%	6,663,265	3,376,016	-3,287,249	-49%
		Car 1	20,670	20,670	0%	64.89	186.37	289%	1,176,026	3,662,314	2,486,288	209%
		Car 2	91,634	91,634	0%	309.75	283.53	-8%	15,993,546	13,687,186	-2,306,360	-15%
		Car 3	3,262	3,262	0%	1034.82	737.35	-29%	3,375,399	2,485,071	-890,328	-26%
		Car 4	1,094	1,094	0%	747.82	488.39	-35%	918,052	512,378	-405,674	-44%
		Car 5	5,544	5,544	0%	817.44	581.68	-29%	4,532,180	2,781,516	-1,750,664	-39%
	Trucks & Lorries	pre-Cars	20,583	20,583	0%	629.54	563.68	-10%	12,367,751	7,277,279	-5,090,472	-41%
		Diesel oil total	15,912	15,912	0%	358.89	276.23	-23%	6,334,421	4,386,424	-1,947,997	-31%
	HDVs Total		154,963	154,963	0%	250.40	154.68	-38%	45,964,153	24,283,389	-21,680,764	-47%
	Trucks Total		381,799	381,799	0%	68.78	154.68	125%	28,251,482	69,665,886	41,414,404	145%
1.A.3.b.iii - Motorised Two-Wheelers (MTWs)	Gasoline	pre-Cars	585,186	585,186	0%	515.18	172.19	-66%	188,173,537	180,760,889	-7,412,648	-4%
		Car 1	4,940	4,940	0%	128.95	188.61	46%	622,695	783,451	160,756	26%
		Car 2	2,966	2,966	0%	128.14	177.79	41%	374,114	527,294	153,180	41%
		Car 3	3,221	3,221	0%	129.33	188.64	46%	387,596	639,833	252,237	65%
		Car 4	6,241	6,241	0%	48.24	188.64	288%	20,126	1,239,686	1,219,560	598%
		Car 5	1,130	1,130	0%	58.41	188.64	322%	23,966	224,682	200,716	837%
	Trucks & Lorries	pre-Cars	0	0	0%	0.00	188.64	0%	0	0	0	0%
		MTWs Total	18,497	18,497	0%	85.86	188.64	198%	1,658,558	3,454,167	1,795,609	108%
	Road Transport Total		2,189,983	2,189,983	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 _x Emissions			
		current	adjusted	difference	in [%]	current	adjusted	difference	in [g/t]	current	adjusted	adjustment	difference
1.A.3.a.i - Passenger Cars	Gasoline	pre-Cars	13,588	13,588	0%	638.58	644.11	-6%		8,664,621	7,382,686	-1,281,935	-15%
		Car 1	12,427	12,427	0%	378.32	341.68	-8%		4,781,480	3,083,383	-1,698,096	-36%
		Car 2	20,086	20,086	0%	225.58	111.68	-50%		4,531,070	1,858,018	-2,672,852	-59%
		Car 3	38,216	38,216	0%	82.22	76.12	-7%		2,977,840	2,829,186	-148,654	-5%
		Car 4	295,220	295,220	0%	57.04	52.29	-7%		14,588,285	13,889,621	-698,664	-5%
		Car 5	180,537	180,537	0%	19.77	52.29	170%		3,173,728	8,584,356	5,410,628	170%
	Diesel Oil	pre-Cars	285,636	285,636	0%	25.63	52.29	180%		5,295,099	11,010,782	5,715,683	180%
		Diesel oil total	764,031	764,031	0%	62.36	68.45	10%	43,961,941	48,238,025	4,276,084	10%	
		Car 1	2,736	2,736	0%	333.74	264.96	-21%	913,180	724,923	-188,257	-21%	
		Car 2	2,545	2,545	0%	298.80	272.65	-9%	766,913	687,786	-79,127	-10%	
		Car 3	8,891	8,891	0%	407.19	229.16	-44%	3,620,286	2,037,480	-1,582,806	-44%	
		Car 4	33,079	33,079	0%	815.11	180.42	-78%	20,310,125	5,967,483	-14,342,642	-71%	
	Trucks & Lorries	pre-Cars	111,335	111,335	0%	419.17	182.44	-56%	48,688,685	10,885,228	-37,803,457	-78%	
		Diesel oil total	231,784	231,784	0%	419.37	182.44	-56%	95,117,643	27,650,997	-67,466,646	-71%	
		FCA Total	273,511	273,511	0%	227.36	182.44	-20%	62,183,230	44,429,184	-17,754,046	-29%	
1.A.3.b.i - Light Duty Vehicles (LDVs)	Gasoline	pre-Cars	663,841	663,841	0%	345.81	165.67	-52%	229,566,088	189,582,982	-139,983,106	-61%	
		Car 1	1,368,532	1,368,532	0%	699.83	155.32	-78%	273,668,009	157,821,687	-115,846,322	-42%	
		Car 2	909	909	0%	644.89	645.95	1%	687,449	581,962	-105,487	-15%	
		Car 3	316	316	0%	915.20	312.78	-66%	89,953	30,396	-59,557	-66%	
		Car 4	3,716	3,716	0%	304.63	224.45	-26%	95,158	70,848	-24,310	-26%	
		Car 5	4,447	4,447	0%	112.68	121.47	8%	59,355	54,283	-5,072	-8%	
	Diesel Oil	pre-Cars	1,126	1,126	0%	53.08	55.26	4%	59,652	62,199	2,547	4%	
		Car 1	1,361	1,361	0%	25.34	55.26	180%	34,240	74,680	40,440	180%	
		Car 2	2,420	2,420	0%	18.75	55.26	180%	45,383	133,753	88,370	180%	
		Car 3	6,483	6,483	0%	144.88	153.25	5%	974,299	1,044,150	69,851	7%	
		Car 4	1,744	1,744	0%	418.96	386.79	-7%	725,111	541,376	-183,735	-25%	
		Car 5	1,079	1,079	0%	389.52	276.25	-29%	420,285	232,256	-188,029	-44%	
	Trucks & Lorries	pre-Cars	2,334	2,334	0%	315.90	194.79	-39%	737,682	454,630	-283,052	-39%	
		Diesel oil total	7,649	7,649	0%	601.11	150.79	-75%	4,587,943	1,152,711	-3,435,232	-75%	
		LDVs Total	20,114	20,114	0%	512.28	94.57	-82%	14,768,368	2,716,104	-12,052,264	-82%	
1.A.3.b.ii - Heavy Duty Vehicles (HDVs)	Diesel Oil <td>pre-Cars</td> <td>58,974</td> <td>58,974</td> <td>0%</td> <td>434.30</td> <td>94.57</td> <td>-79%</td> <td>25,499,580</td> <td>5,632,428</td> <td>-19,867,152</td> <td>-79%</td>	pre-Cars	58,974	58,974	0%	434.30	94.57	-79%	25,499,580	5,632,428	-19,867,152	-79%	
		Car 1	58,974	58,974	0%	145.18	94.57	-35%	8,614,586	6,672,892	-1,941,694	-35%	
		Diesel oil total	159,183	159,183	0%	347.42	191.90	-44%	55,363,335	36,221,445	-19,141,890	-44%	
		LDVs Total	165,866	165,866	0%	338.31	193.89	-40%	56,279,554	37,485,938	-18,793,616	-40%	
		Car 2	489	489	0%	1086.20	1019.23	-6%	589,887	476,258	-113,629	-6%	
		Car 3	147	147	0%	738.37	732.57	2%	188,212	170,593	-17,619	-2%	
	Buses	pre-Cars	1,611	1,611	0%	709.47	666.77	-7%	1,277,445	1,041,621	-235,824	-18%	
		Car 1	5,789	5,789	0%	824.65	439.65	-46%	2,086,381	2,782,799	696,418	46%	
		Car 2	2,747	2,747	0%	473.92	352.84	-26%	1,302,061	960.413	-341,648	-26%	
		Car 3	17,130	17,130	0%	362.91	186.64	-49%	6,212,175	3,186,781	-3,025,394	-49%	
		Car 4	25,135	25,135	0%	60.43	186.64	299%	1,518,961	4,866,133	3,347,172	299%	
		Buses Total	52,939	52,939	0%	214.41	247.85	16%	14,547,052	15,158,078	610,448	16%	
	Trucks & Lorries	pre-Cars	3,140	3,140	0%	1034.96	737.35	-29%	3,250,020	2,370,443	-879,577	-29%	
		Car 1	969	969	0%	747.60	488.34	-35%	724,240	453,754	-270,486	-37%	
		Car 2	4,560	4,560	0%	184.68	541.04	-29%	3,734,343	2,280,957	-1,453,386	-39%	
Car 3		16,377	16,377	0%	828.94	610.94	-26%	12,666,383	8,750,479	-4,915,904	-39%		
Car 4		13,137	13,137	0%	396.85	273.43	-31%	1,235,679	3,589,330	2,353,651	31%		
Car 5		125,233	125,233	0%	216.13	154.90	-29%	36,960,598	59,481,429	22,520,831	29%		
1.A.3.b.iii - Motorized Two-Wheelers (M2Ws)	Gasoline <td>pre-Cars</td> <td>432,488</td> <td>432,488</td> <td>0%</td> <td>72.08</td> <td>154.90</td> <td>115%</td> <td>31,175,496</td> <td>67,083,653</td> <td>35,908,157</td> <td>115%</td>	pre-Cars	432,488	432,488	0%	72.08	154.90	115%	31,175,496	67,083,653	35,908,157	115%	
		Trucks Total	389,913	389,913	0%	933.39	149.17	-16%	55,180,190	180,889,316	125,699,126	16%	
		Car 1	4,813	4,813	0%	125.89	164.79	31%	664,997	732,771	167,774	31%	
		Car 2	2,035	2,035	0%	125.39	177.29	41%	355,495	582,589	227,094	41%	
		Car 3	3,084	3,084	0%	113.33	180.66	61%	303,224	612,751	309,527	61%	
		Car 4	6,062	6,062	0%	48.03	180.66	267%	204,264	1,761,637	1,557,373	267%	
	M2Ws Total	pre-Cars	2,066	2,066	0%	21.69	180.66	917%	2,489	386,667	384,178	917%	
		Car 5	0	0	0%	0.00		0%	0	0	0	0%	
		M2Ws Total	18,750	18,750	0%	86.05	186.83	117%	1,613,850	5,562,841	3,948,991	117%	
	1.A.3.b. Road Transport	Total	2,262,080	2,262,080	0%	498.18	132.83	-33%	437,268,746	292,497,497	-144,771,248	-33%	

REVISION OF ADJUSTMENT PROPOSAL COMPARED TO SUBMISSIONS 2014 to 2019

Table 2: annual NO_x, adjustment proposals, in kilotonnes

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

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

The even bigger changes between adjustment 2019 and adjustment proposal 2020 result from an additional rather fundamental revision of the *Handbook Emission Factors for Road Transport* now available in version 4.1 ⁹⁾ strongly effecting the TREMOD model underlying Germany's emission reporting for road transport and hence any adjustments of NO_x emissions. With such major model revision between submissions 2019 and 2020, the 2020 adjustment proposal differed significantly from the adjustment applied for and accepted in 2019. **In comparison to 2020, the TREMOD model applied for the 2021 submission has been revised only slightly in terms of NO_x emission factors. Hence, the 2021 adjustment proposal differs only slightly from the (accepted) proposal provided with submission 2020.**

Adjustment description as provided in IIRs 2014 and 2015:

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

¹⁰⁾ ¹¹⁾ ¹²⁾ ¹³⁾ : 5 : ifeu, 2002: Final report to UFOPLAN study FKZ 201 45 112 (German version only): Aktualisierung des Daten- und Rechenmodells: Energieverbrauch und Schadstoffemissionen des motorisierten Verkehrs in Deutschland 1980-2020; Im Auftrag des Umweltbundesamtes; ifeu Institut für Energie- und Umweltforschung Heidelberg GmbH (Institute for Energy and Environmental

Research), Wilckensstraße 3, D-69120 Heidelberg, Germany, phone: +49 (0) 6221 / 47 67 -0, fax: +49 (0) 6221 / 47 67 -19, Heidelberg, 31. Oktober 2002 : 6 : Knörr et al. (2019a): Knörr, W., Heidt, C., Gores, S., & Bergk, F.: ifeu Institute for Energy and Environmental Research (Institut für Energie- und Umweltforschung Heidelberg gGmbH, ifeu): Fortschreibung des Daten- und Rechenmodells: Energieverbrauch und Schadstoffemissionen des motorisierten Verkehrs in Deutschland 1960-2035, sowie TREMOD, im Auftrag des Umweltbundesamtes, Heidelberg & Berlin, 2019. : 7 : UBA, 2018: CLRTAP submission 2018, Dessau, 2018 : 8 : ECE/EB.AIR/113/Add.1, 2012: Report of the Executive Body on its thirty-first session, Decision 2012/12 on Guidance for adjustments under the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone to emission reduction commitments or to inventories for the purposes of comparing total national emissions with them; URL:

http://www.unece.org/fileadmin/DAM/env/documents/2012/EB/ECE_EB.AIR_113_Add.1_ENG_1_.pdf : 9 : CEIP, 2014a: Centre on Emission Inventories and Projections (CEIP): CEIP/Adjustment

RR/2014/GERMANY: Review of the 2014 Adjustment Application by Germany, URL:

https://webdab01.umweltbundesamt.at/download/adjustments2014/Adjustment_Review_Report_GERMANY_2014.pdf?cgiproxy_skip=1, 5 August 2014 : 10 : CEIP, 2014b: Centre on Emission Inventories and Projections (CEIP): ECE/EB.AIR/GE.1/2014/10: Review of adjustment applications 2014; URL:

http://www.ceip.at/fileadmin/inhalte/emep/pdf/2015/ece.eb.air.ge.1.2014.10.edited.ae_formatting_accpted.ko.pdf, 5 August 2014 : 11 : CEIP, 2015a: Centre on Emission Inventories and Projections (CEIP):

CEIP/Adjustment RR/2015/Germany: Review of the 2015 Adjustment Application by Germany, URL:

https://webdab01.umweltbundesamt.at/download/adjustments2015/Germany2015-adj.pdf?cgiproxy_skip=1, September 2015 : 12 : CEIP, 2015b: Centre on Emission Inventories and Projections (CEIP):

CE/EB.AIR/GE.1/2015/10-ECE/EB.AIR/WG.1/2015/13: Review of adjustment applications 2015; URL:

http://www.ceip.at/fileadmin/inhalte/emep/Adjustments/ece.eb.air.ge.1.2015.10_ece.eb.air.wg.1.2015.13.AV.pdf, 6 July 2015 : 13 : CEIP, 2016a: Centre on Emission Inventories and Projections (CEIP):

Review of the 2016 Adjustment Application by Germany, URL:

https://webdab01.umweltbundesamt.at/download/adjustments2016/Germany2016-adj.pdf?cgiproxy_skip=1, 2016 : 14 : CEIP, 2016b: Centre on Emission Inventories and Projections (CEIP):

ECE/EB.AIR/GE.1/2016/10-ECE/EB.AIR/WG.1/2016/18: Review of adjustment applications 2016; URL:

http://www.ceip.at/fileadmin/inhalte/emep/pdf/2016/ECE_EB.AIR_GE.1_2016_10_E.pdf, 2016 : 15 :

CEIP, 2017a: Centre on Emission Inventories and Projections (CEIP):

ECE/EB.AIR/GE.1/2017/10-ECE/EB.AIR/WG.1/2017/20: Review of adjustment applications 2017; URL:

http://www.ceip.at/fileadmin/inhalte/emep/pdf/2017/Advance_ece_eb_air_ge_1_2017_10_ece_eb_air_wg_1_2017.pdf, 2017 : 16 : CEIP, 2018a: Centre on Emission Inventories and Projections (CEIP):

ECE/EB.AIR/GE.1/2018/10-ECE/EB.AIR/WG.1/2018/21: Review of adjustment applications 2018; URL:

https://www.ceip.at/fileadmin/inhalte/emep/pdf/2018/ADJ_ece.eb.air.ge.1.2018.10-ece.eb.air.wg.1.2018.21_advance.pdf, 2018 : 17 : CEIP, 2019a: Centre on Emission Inventories and Projections (CEIP):

ECE/EB.AIR/GE.1/2019/10-ECE/EB.AIR/WG.1/2019/22: Review of adjustment applications 2019; URL:

https://www.ceip.at/fileadmin/inhalte/emep/pdf/2019/ECE_EB.AIR_GE.1_2019_10-1909789E.pdf, 2019 : 18 : Keller et al. (2017): Keller, M., Hausberger, S., Matzer, C., Wüthrich, P., & Notter, B.: Handbook

Emission Factors for Road Transport, version 3.3 (Handbuch Emissionsfaktoren des Straßenverkehrs 3.3) URL:

https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=2ahUKewj0y67pi5foAhWB16QKHfpYDIgQFjAAegQIAhAB&url=https%3A%2F%2Fwww.hbefa.net%2F%2Fdocuments%2FHBFEFA33_Hintergrundbericht.pdf&usg=AOvVaw2sOF884KtccVyWLItdt1CIZ -

Dokumentation, Bern, 2017. : 19 : Notter et al. (2019): Keller, M., Althaus, H.-J., Cox, B., Knörr, W., Heidt, Ch., Biemann, K., Räder, D.: Handbook Emission Factors for Road Transport, version 4.1

(Handbuch Emissionsfaktoren des Straßenverkehrs 4.1), HBEFA 4.1 Development Report; URL:

https://www.hbefa.net/e/documents/HBEFA41_Development_Report.pdf, Bern, Heidelberg, 21. August 2019. bibliography

- ^{1), 13)} IIASA, 1999: Amann, M.; Bertok, I.; Cofala, J.; Gyarfas, F.; Heyes, Chr.; Klimont, Zb.; Syri, S.; Schöpp, W.: Further analysis of scenario results obtained with the RAINS model - Interim Report to the Ministère de L'Aménagement du Territoire et de l'Environnement Direction de la Prévention des Pollutions et des Risques 20, avenue de Ségur 75302 Paris 07 SP, April 1999 - URL: <https://iiasa.ac.at/web/home/research/researchPrograms/air/policy/france3b.pdf>
- ^{2), 10)} EB, 2012a: CLRTAP EB Decision 2012/3, ECE/EB.AIR/111/Add.1: Adjustments under the Gothenburg Protocol to emission reduction commitments or to inventories for the purposes of comparing total national emissions with them URL: http://www.unece.org/fileadmin/DAM/env/documents/2013/air/ECE_EB.AIR_111_Add.1__ENG_DECISION_3.pdf
- ^{3), 12)} EB, 2012c: CLRTAP EB Decision 2012/12: Guidance for adjustments under the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone to emission reduction commitments or to inventories for the purposes of comparing total national emissions with them URL: http://www.unece.org/fileadmin/DAM/env/documents/2012/EB/Decision_2012_12.pdf
- ^{4), 11)} EB, 2012b: CLRTAP EB Decision 2012/4: Provisional Application of Amendment to the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone URL: http://www.unece.org/fileadmin/DAM/env/documents/2013/air/ECE_EB.AIR_111_Add.1__ENG_DECISION_4.pdf
- ⁵⁾ (bibcite 4)
- ⁶⁾ (bibcite 5)
- ⁷⁾ (bibcite 6)
- ⁸⁾ (bibcite 18)
- ⁹⁾ (bibcite 19)