

# Adjustment DE-A regarding NO<sub>x</sub> from Road Vehicles

## PREFACE

When deriving proposals for national emission ceilings for negotiations of the 1999 Gothenburg Protocol, sector-specific emission estimates for the year 2010 were calculated at IIASA using a set of scenarios which assumed various technological abatement measures, policy incentives, and legislation available / in place or planned at that time. As a result, the 2010 emission by road transport in Germany was estimated at NO<sub>x</sub> (IIASA, 1999) <sup>1)</sup>. The over-all 2010 national emission ceiling (NEC) for NO<sub>x</sub> was set to 1,081 kt. When negotiating the EU NEC Directive two years later, Germany agreed to reduce its NO<sub>x</sub> emissions further, resulting in a NEC of 1,051 kt.

In its 2016 NEC emissions reporting, Germany provided a national total for NO<sub>x</sub> emissions of 1,337 kt for 2010. However, this total includes emissions from agricultural soils and other source categories not accounted for when setting the NEC. In addition, some assumptions made in 1999, including on emission factors from road traffic, turned out to be wrong in reality. Like in many other European countries, non-compliance with the 2010 NEC as set in 1999 was partly not caused by failed national mitigation policies, but by changes beyond the control of, and unforeseen by, the individual Party or Member State.

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

With respect to road transport, such an unforeseeable effect was the partial failure of several so-called “Euro norms” set on the EU level to reduce emissions from road vehicles. In this report, Germany presents an estimate of the NO<sub>x</sub> emissions resulting from the partial failure of the mitigation policy reflected by the Euro norms, and lays out the calculations leading to these estimates.

## REASONS FOR MISSING THE GOTHENBURG CEILINGS

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

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

For the formalism of the adjustments, it is difficult to flag whether the modifications for road transport are due to “methodological changes” or due to “changes of emission factor”. Therefore, only the term “change of methodology” will be used (even if at the NFR reporting level this may seem like a simple change in EFs).

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

## ANALYSING THE PROBLEM: THE EUROPEAN PERSPECTIVE BASED ON COPERT

Already in 2011, these effects were demonstrated by Ntziachristos and Papageorgiou (2011). Here, the impacts of changing model versions and activity data in the context of meeting the EU NEC Directive ceiling commitments were examined for four European countries including Germany. Unfortunately, this comparison study was carried out within a COPERT environment. Therefore, the results gained cannot be transferred to the German TREMOD environment on a one-to-one level but nonetheless allow a highly illustrative insight in the reasons for not meeting the set ceiling. The study modeled fuel consumption and NO<sub>x</sub> emissions for four selected countries (Germany, France, Netherlands and Belgium) and found higher NO<sub>x</sub> emissions were estimated for the road transport sector than originally modelled by the RAINS model of IIASA (which underpinned the setting of 2010 ceilings). For Germany, this study shows that with the same activity data set (LIFE+

EC4MACS data from Amann et al. (2010)), NO<sub>x</sub> emissions estimated with COPERT II vs. COPERT 4 (v8.0) increase from 410 kt to 518 kt due to methodological changes, a difference of 282 kt. An additional consideration of changes in AD would lead to 620 kt of NO<sub>x</sub>. However, as changes in AD are no valid adjustment reason, the latter value is for information only.

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

The results of this study showed that it is the combination of different parameters which might affect the ability (to different extents) of a Party to attain the emission ceilings. In other words, the exceeding of NO<sub>x</sub> ceilings for road transport is due to:

### Changes in methodology and emission factors

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

### Changes in the activity data

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

## IN-COUNTRY ANALYSIS: THE TREMOD PERSPECTIVE

### INITIAL ASSUMPTION

In order to estimate the effect of NO<sub>x</sub> emissions resulting from the failure of the so-called Euro norms, the following procedure has been agreed by expert review teams in the last two years:



**proposed amount of adjustable emissions = current AD x current EF - current AD x original EF = current AD x (current EF - original EF)  
= current EM - “artificial” current EM<sup>1</sup>**

<sup>1</sup> “artificial” current emissions = virtual current emissions assuming no changes in emission factors



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

with

- **EM<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 TREMOD, the following comparison has to be carried out between the oldest version of TREMOD still available and the version as applied for the current inventory submission (2021).

Unfortunately, the oldest TREMOD version available for such comparison is TREMOD 3.1 from 2002 <sup>5)</sup>, including the following set of NO<sub>x</sub> emission factors:

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

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

### THE COMPARISON

#### Application of the original NO<sub>x</sub> methodology to the current road transport background activity data

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

Within this report, Germany re-estimates the NO<sub>x</sub> emission within the TREMOD 3.1 model. To isolate the requested information, the original TREMOD 3.1 activity data was combined with emission factors from both TREMOD 3.1 and the currently used TREMOD 6.12 (Knörr et al., 2020a) <sup>6)</sup>.

#### Description of the updated methodology used

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

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

and

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

#### Comparison of emission estimates made using the original and updated methodologies

The values of NO<sub>x</sub> emissions presented in the table below are estimated with:

- TREMOD 3.1 model equations as initial methodology

and ,

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

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

Table 1: Resulting adjustment proposal 2020

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

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

#### **Activity Data**

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

#### **Implied Emission Factor**

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

#### **NO<sub>x</sub> Emissions**

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

Adjustment overview for years 2010 to 2019

| NFR Code      | Fuel       | Year | Activity Data |           |            | Implied Emission Factor |          |            | NO <sub>x</sub> Emissions |             |             |            |
|---------------|------------|------|---------------|-----------|------------|-------------------------|----------|------------|---------------------------|-------------|-------------|------------|
|               |            |      | current       | adjusted  | difference | current                 | adjusted | difference | current                   | adjusted    | adjustment  | difference |
|               |            |      | in [TJ]       |           | in [%]     | in [kg/TJ]              |          | in [%]     |                           | in [kg]     |             | in [%]     |
| 1.A.3.b.i     | gasoline   |      | 795.957       | 795.957   | 0%         | 97.55                   | 84.99    | -13%       | 77.644.842                | 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 | 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 | 300.429.094 | -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                  | 360.06   | -29%       | 26.350.969                | 18.620.843  | 7.730.126   | -29%       |
| 1.A.3.b.iii   | diesel oil |      | 600.139       | 600.139   | 0%         | 353.06                  | 287.93   | -19%       | 211.887.531               | 124.788.469 | 87.099.062  | -41%       |
| 1.A.3.b.iv    | gasoline   |      | 18.229        | 18.229    | 0%         | 104.34                  | 175.38   | 68%        | 1.902.688                 | 3.197.038   | -1.294.351  | 68%        |
| 1.A.3.b TOTAL | 2013       |      | 2.132.683     | 2.132.683 | 0%         |                         |          | 0%         | 616.079.063               | 316.854.371 | 300.224.692 | -50%       |
| 1.A.3.b.i     | gasoline   |      | 752.526       | 752.526   | 0%         | 76.03                   | 73.09    | -4%        | 57.215.533                | 54.988.921  | 2.216.612   | -4%        |
| 1.A.3.b.i     | diesel oil |      | 626.845       | 626.845   | 0%         | 435.87                  | 159.12   | -63%       | 272.876.061               | 95.613.892  | 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   | gasoline   |      | 49.143        | 49.143    | 0%         | 468.37                  | 339.99   | -27%       | 23.017.115                | 16.708.234  | 6.308.881   | -27%       |
| 1.A.3.b.iii   | diesel oil |      | 572.754       | 572.754   | 0%         | 314.05                  | 196.05   | -38%       | 179.874.133               | 112.285.582 | 67.588.551  | -38%       |
| 1.A.3.b.iv    | gasoline   |      | 18.673        | 18.673    | 0%         | 100.59                  | 179.24   | 78%        | 1.878.294                 | 3.345.794   | -1.467.499  | 78%        |
| 1.A.3.b TOTAL | 2014       |      | 2.153.563     | 2.153.563 | 0%         |                         |          | 0%         | 597.120.297               | 302.252.271 | 294.868.025 | -49%       |
| 1.A.3.b.i     | gasoline   |      | 715.156       | 715.156   | 0%         | 74.38                   | 71.73    | -4%        | 53.190.787                | 51.300.983  | 1.889.805   | -4%        |
| 1.A.3.b.i     | diesel oil |      | 645.555       | 645.555   | 0%         | 426.19                  | 159.80   | -63%       | 275.130.233               | 103.163.501 | 171.966.732 | -63%       |
| 1.A.3.b.ii    | gasoline   |      | 5.793         | 5.793     | 0%         | 187.12                  | 172.80   | -8%        | 1.083.927                 | 1.000.999   | 82.928      | -8%        |
| 1.A.3.b.ii    | diesel oil |      | 135.386       | 135.386   | 0%         | 489.35                  | 187.96   | -77%       | 63.605.443                | 14.607.490  | 48.997.953  | -77%       |
| 1.A.3.b.iii   | gasoline   |      | 52.287        | 52.287    | 0%         | 458.96                  | 327.99   | -29%       | 23.997.817                | 17.149.448  | 6.848.370   | -29%       |
| 1.A.3.b.iii   | diesel oil |      | 589.411       | 589.411   | 0%         | 266.69                  | 187.51   | -30%       | 157.189.675               | 110.620.703 | 46.568.973  | -30%       |
| 1.A.3.b.iv    | gasoline   |      | 18.459        | 18.459    | 0%         | 99.32                   | 180.65   | 82%        | 1.833.362                 | 3.334.472   | -1.501.090  | 82%        |
| 1.A.3.b TOTAL | 2015       |      | 2.161.376     | 2.161.376 | 0%         |                         |          | 0%         | 575.931.265               | 301.877.596 | 274.053.670 | -48%       |
| 1.A.3.b.i     | gasoline   |      | 715.272       | 715.272   | 0%         | 79.93                   | 76.65    | -4%        | 50.736.367                | 50.535.049  | 201.318     | 0%         |
| 1.A.3.b.i     | diesel oil |      | 675.119       | 675.119   | 0%         | 410.36                  | 160.76   | -61%       | 277.041.660               | 108.535.230 | 168.506.430 | -61%       |
| 1.A.3.b.ii    | gasoline   |      | 5.926         | 5.926     | 0%         | 180.27                  | 171.05   | -5%        | 1.068.292                 | 1.013.678   | 54.614      | -5%        |
| 1.A.3.b.ii    | diesel oil |      | 144.068       | 144.068   | 0%         | 456.12                  | 185.62   | -77%       | 65.712.732                | 15.216.007  | 50.496.725  | -77%       |
| 1.A.3.b.iii   | gasoline   |      | 54.157        | 54.157    | 0%         | 424.73                  | 388.24   | -7%        | 23.002.109                | 16.683.117  | 6.308.992   | -27%       |
| 1.A.3.b.iii   | diesel oil |      | 594.013       | 594.013   | 0%         | 226.31                  | 180.97   | -20%       | 134.431.699               | 107.496.262 | 26.935.437  | -20%       |
| 1.A.3.b.iv    | gasoline   |      | 18.785        | 18.785    | 0%         | 95.14                   | 181.66   | 89%        | 1.805.897                 | 3.412.476   | -1.606.579  | 89%        |
| 1.A.3.b TOTAL | 2016       |      | 2.207.339     | 2.207.339 | 0%         |                         |          | 0%         | 553.790.558               | 302.901.820 | 250.897.738 | -45%       |
| 1.A.3.b.i     | gasoline   |      | 724.571       | 724.571   | 0%         | 67.66                   | 69.88    | 3%         | 49.026.074                | 50.634.714  | -1.607.640  | 3%         |
| 1.A.3.b.i     | diesel oil |      | 696.592       | 696.592   | 0%         | 390.65                  | 161.95   | -59%       | 272.126.091               | 112.810.721 | 159.315.370 | -59%       |
| 1.A.3.b.ii    | gasoline   |      | 6.186         | 6.186     | 0%         | 171.15                  | 167.18   | -2%        | 1.058.799                 | 1.034.211   | 24.588      | -2%        |
| 1.A.3.b.ii    | diesel oil |      | 153.284       | 153.284   | 0%         | 424.66                  | 183.89   | -76%       | 65.093.930                | 15.925.216  | 49.168.714  | -76%       |
| 1.A.3.b.iii   | gasoline   |      | 53.382        | 53.382    | 0%         | 379.80                  | 286.71   | -23%       | 19.793.901                | 15.304.828  | 4.489.073   | -23%       |
| 1.A.3.b.iii   | diesel oil |      | 596.263       | 596.263   | 0%         | 195.02                  | 175.92   | -10%       | 116.671.141               | 106.246.508 | 11.424.633  | -10%       |
| 1.A.3.b.iv    | gasoline   |      | 19.160        | 19.160    | 0%         | 92.83                   | 183.39   | 98%        | 1.778.674                 | 3.513.787   | -1.735.114  | 98%        |
| 1.A.3.b TOTAL | 2017       |      | 2.251.437     | 2.251.437 | 0%         |                         |          | 0%         | 525.549.410               | 304.469.986 | 221.079.424 | -42%       |
| 1.A.3.b.i     | gasoline   |      | 699.027       | 699.027   | 0%         | 64.42                   | 68.36    | 6%         | 45.032.996                | 47.786.817  | -2.753.820  | 6%         |
| 1.A.3.b.i     | diesel oil |      | 666.074       | 666.074   | 0%         | 371.66                  | 163.30   | -56%       | 247.556.063               | 108.768.604 | 138.787.459 | -56%       |
| 1.A.3.b.ii    | gasoline   |      | 6.315         | 6.315     | 0%         | 158.22                  | 160.11   | 1%         | 999.199                   | 1.011.138   | -11.939     | 1%         |
| 1.A.3.b.ii    | diesel oil |      | 154.259       | 154.259   | 0%         | 384.71                  | 182.69   | -73%       | 59.344.525                | 15.840.310  | 43.504.215  | -73%       |
| 1.A.3.b.iii   | gasoline   |      | 51.634        | 51.634    | 0%         | 309.75                  | 263.53   | -15%       | 15.993.526                | 13.607.106  | 2.386.420   | -15%       |
| 1.A.3.b.iii   | diesel oil |      | 585.186       | 585.186   | 0%         | 171.18                  | 172.10   | 1%         | 180.173.337               | 180.710.869 | -537.532    | 1%         |
| 1.A.3.b.iv    | gasoline   |      | 18.497        | 18.497    | 0%         | 89.66                   | 184.61   | 106%       | 1.658.588                 | 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 | -39%       |
| 1.A.3.b.i     | gasoline   |      | 704.691       | 704.691   | 0%         | 62.30                   | 68.45    | 10%        | 43.901.941                | 48.238.025  | -4.336.084  | 10%        |
| 1.A.3.b.i     | diesel oil |      | 663.841       | 663.841   | 0%         | 345.81                  | 165.07   | -52%       | 229.566.088               | 109.582.982 | 119.983.106 | -52%       |
| 1.A.3.b.ii    | gasoline   |      | 6.683         | 6.683     | 0%         | 146.08                  | 153.25   | 5%         | 976.219                   | 1.034.150   | -57.931     | 5%         |
| 1.A.3.b.ii    | diesel oil |      | 159.183       | 159.183   | 0%         | 347.42                  | 181.90   | -71%       | 55.303.535                | 16.221.445  | 39.082.090  | -71%       |
| 1.A.3.b.iii   | gasoline   |      | 52.939        | 52.939    | 0%         | 274.41                  | 247.81   | -10%       | 14.527.012                | 13.118.578  | 1.408.434   | -10%       |
| 1.A.3.b.iii   | diesel oil |      | 595.913       | 595.913   | 0%         | 153.35                  | 169.17   | 10%        | 91.380.700                | 106.809.376 | -15.428.676 | 10%        |
| 1.A.3.b.iv    | gasoline   |      | 18.750        | 18.750    | 0%         | 86.05                   | 186.83   | 117%       | 1.613.450                 | 3.502.941   | -1.889.491  | 117%       |
| 1.A.3.b TOTAL | 2019       |      | 2.202.890     | 2.202.890 | 0%         |                         |          | 0%         | 437.268.744               | 292.497.697 | 144.771.048 | -33%       |

Adjustment details for 2020

| NFR Code                                   | Fuel       | Activity Data                 |           |            | Implied Emission Factor |          |            | NO <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                      | 13,686    | 13,686     | 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     | -10%                      | 25,915,925  | 19,189,262  | -7,716,663   | -30% |
|                                            |            | Car 2                         | 96,425    | 96,425     | 0%                      | 172.95   | 135.63     | -22%                      | 16,580,020  | 13,020,026  | -3,559,995   | -22% |
|                                            |            | Car 3                         | 133,139   | 133,139    | 0%                      | 58.51    | 70.18      | 20%                       | 7,790,384   | 9,343,433   | 1,553,029    | 20%  |
|                                            |            | Car 4                         | 444,991   | 444,991    | 0%                      | 42.27    | 42.19      | 0%                        | 18,911,389  | 18,773,529  | -137,859     | 0%   |
|                                            |            | Car 5                         | 31,234    | 31,234     | 0%                      | 18.61    | 42.19      | 127%                      | 581,142     | 1,317,737   | 736,595      | 127% |
|                                            |            | Car 6                         | 0         | 0          | 0%                      | 25.08    | 42.19      | 62%                       | 2           | 3           | 1            | 62%  |
|                                            |            | Gasoline total                | 795,957   | 795,957    | 0%                      | 92.55    | 84.39      | -9%                       | 77,646,642  | 67,656,586  | -9,990,056   | -13% |
|                                            | Diesel Oil | pre-Cars                      | 1,915     | 1,915      | 0%                      | 318.13   | 264.95     | -17%                      | 583,760     | 527,256     | -56,504      | -10% |
|                                            |            | Car 1                         | 10,339    | 10,339     | 0%                      | 294.42   | 245.17     | -17%                      | 3,044,428   | 2,741,387   | -303,041     | -10% |
|                                            |            | Car 2                         | 50,088    | 50,088     | 0%                      | 406.90   | 279.19     | -30%                      | 29,372,795  | 19,974,210  | -9,398,584   | -32% |
|                                            |            | Car 3                         | 134,025   | 134,025    | 0%                      | 542.54   | 170.54     | -69%                      | 72,645,173  | 23,929,276  | -48,715,897  | -67% |
|                                            |            | Car 4                         | 279,154   | 279,154    | 0%                      | 304.37   | 140.58     | -53%                      | 167,299,160 | 39,243,811  | -128,055,349 | -77% |
|                                            |            | Car 5                         | 53,547    | 53,547     | 0%                      | 434.70   | 140.58     | -68%                      | 23,276,735  | 7,527,796   | -15,748,939  | -68% |
|                                            |            | Car 6                         | 334       | 334        | 0%                      | 257.62   | 140.58     | -45%                      | 85,044      | 46,953      | -38,091      | -45% |
|                                            |            | Diesel oil total              | 529,380   | 529,380    | 0%                      | 429.45   | 160.55     | -63%                      | 227,347,096 | 84,970,461  | -142,376,635 | -63% |
|                                            |            | Pkx Total                     | 1,325,337 | 1,325,337  | 0%                      | 238.12   | 155.14     | -36%                      | 364,985,938 | 152,627,047 | -212,358,891 | -58% |
| 1.A.3.b.i. Light Duty Vehicles (LDVs)      | Gasoline   | pre-Cars                      | 1,249     | 1,249      | 0%                      | 627.99   | 540.95     | -13%                      | 783,320     | 698,871     | -84,449      | -11% |
|                                            |            | Car 1                         | 367       | 367        | 0%                      | 361.95   | 297.39     | -18%                      | 368,969     | 186,620     | -182,349     | -50% |
|                                            |            | Car 2                         | 1,393     | 1,393      | 0%                      | 264.75   | 184.41     | -30%                      | 368,840     | 256,917     | -111,923     | -30% |
|                                            |            | Car 3                         | 856       | 856        | 0%                      | 82.47    | 30.83      | -63%                      | 70,631      | 77,625      | 6,994        | 10%  |
|                                            |            | Car 4                         | 2,420     | 2,420      | 0%                      | 36.32    | 44.90      | 24%                       | 87,967      | 188,679     | 100,712      | 24%  |
|                                            |            | Car 5                         | 49        | 49         | 0%                      | 15.34    | 44.90      | 193%                      | 750         | 2,218       | 1,468        | 193% |
|                                            |            | Car 6                         | 0         | 0          | 0%                      | 0        | 0          | 0%                        | 0           | 0           | 0            | 0%   |
|                                            |            | Gasoline total                | 6,345     | 6,345      | 0%                      | 255.87   | 254.75     | -0%                       | 1,478,832   | 1,356,126   | -122,706     | -8%  |
|                                            | Diesel Oil | pre-Cars                      | 4,876     | 4,876      | 0%                      | 425.99   | 386.79     | -9%                       | 2,077,142   | 1,436,983   | -640,159     | -31% |
|                                            |            | Car 1                         | 9,989     | 9,989      | 0%                      | 398.18   | 276.24     | -30%                      | 2,389,095   | 1,289,636   | -1,099,459   | -46% |
|                                            |            | Car 2                         | 13,126    | 13,126     | 0%                      | 336.76   | 153.18     | -54%                      | 4,420,260   | 2,534,731   | -1,885,529   | -43% |
|                                            |            | Car 3                         | 33,249    | 33,249     | 0%                      | 531.91   | 150.58     | -72%                      | 17,655,883  | 5,086,760   | -12,569,123  | -72% |
|                                            |            | Car 4                         | 54,581    | 54,581     | 0%                      | 491.42   | 80.69      | -84%                      | 26,021,036  | 4,940,722   | -21,080,314  | -81% |
|                                            |            | Car 5                         | 1,629     | 1,629      | 0%                      | 427.50   | 80.69      | -79%                      | 696,296     | 144,434     | -551,862     | -79% |
|                                            |            | Car 6                         | 0         | 0          | 0%                      | 151.73   | 80.69      | -47%                      | 7           | 4           | -3           | -43% |
|                                            |            | Diesel oil total              | 113,450   | 113,450    | 0%                      | 476.34   | 134.94     | -72%                      | 54,043,533  | 15,351,584  | -38,691,949  | -72% |
|                                            |            | LDVs Total                    | 178,775   | 178,775    | 0%                      | 464.70   | 139.18     | -70%                      | 55,658,966  | 16,688,913  | -38,970,053  | -70% |
| 1.A.3.b.ii. Heavy Duty Vehicle Buses       | Gasoline   | pre-Cars                      | 3,382     | 3,382      | 0%                      | 1096.25  | 1028.78    | -6%                       | 3,674,067   | 3,432,644   | -241,423     | -7%  |
|                                            |            | Car 1                         | 2,826     | 2,826      | 0%                      | 749.41   | 732.14     | -2%                       | 2,117,871   | 2,125,595   | 7,723        | 0%   |
|                                            |            | Car 2                         | 10,152    | 10,152     | 0%                      | 801.96   | 643.47     | -20%                      | 8,140,119   | 6,532,213   | -1,607,906   | -20% |
|                                            |            | Car 3                         | 15,090    | 15,090     | 0%                      | 633.22   | 437.25     | -30%                      | 10,865,776  | 7,269,299   | -3,596,477   | -33% |
|                                            |            | Car 4                         | 5,461     | 5,461      | 0%                      | 448.63   | 351.65     | -22%                      | 2,650,016   | 1,921,527   | -728,489     | -28% |
|                                            |            | Car 5                         | 10,326    | 10,326     | 0%                      | 327.28   | 182.33     | -44%                      | 3,882,417   | 1,882,644   | -1,999,773   | -51% |
|                                            |            | Car 6                         | 0         | 0          | 0%                      | 0        | 0          | 0%                        | 0           | 0           | 0            | 0%   |
|                                            |            | Buses Total                   | 48,044    | 48,044     | 0%                      | 623.80   | 482.55     | -23%                      | 29,931,266  | 23,183,732  | -6,747,534   | -23% |
|                                            | Diesel Oil | pre-Cars                      | 10,185    | 10,185     | 0%                      | 1040.16  | 787.37     | -24%                      | 10,510,623  | 7,754,136   | -2,756,487   | -26% |
|                                            |            | Car 1                         | 5,677     | 5,677      | 0%                      | 758.59   | 575.55     | -24%                      | 4,261,383   | 3,267,681   | -993,702     | -23% |
|                                            |            | Car 2                         | 38,558    | 38,558     | 0%                      | 817.62   | 524.79     | -35%                      | 31,525,526  | 20,234,619  | -11,290,907  | -36% |
|                                            |            | Car 3                         | 169,023   | 169,023    | 0%                      | 626.26   | 274.48     | -56%                      | 161,136,182 | 59,617,271  | -101,518,911 | -63% |
|                                            |            | 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                  | 568,741   | 568,741    | 0%                      | 446.67   | 271.83     | -39%                      | 293,148,243 | 154,696,160 | -138,452,083 | -48% |
|                                            |            | HDVs Total                    | 7,973     | 7,973      | 0%                      | 122.80   | 149.18     | 22%                       | 372,721     | 1,189,353   | 216,632      | 22%  |
| 1.A.3.b.iii. Motorised Two-Wheelers (MTWs) | Gasoline   | pre-Cars                      | 5,231     | 5,231      | 0%                      | 123.77   | 105.74     | -14%                      | 647,479     | 587,039     | -60,440      | -9%  |
|                                            |            | Car 1                         | 3,587     | 3,587      | 0%                      | 141.16   | 184.21     | 30%                       | 585,362     | 686,661     | 101,299      | 18%  |
|                                            |            | Car 2                         | 2,600     | 2,600      | 0%                      | 38.11    | 184.21     | 387%                      | 116,180     | 567,032     | 450,852      | 387% |
|                                            |            | Car 3                         | 0         | 0          | 0%                      | 0        | 0          | 0%                        | 0           | 0           | 0            | 0%   |
|                                            |            | Car 4                         | 0         | 0          | 0%                      | 0        | 0          | 0%                        | 0           | 0           | 0            | 0%   |
|                                            |            | Car 5                         | 0         | 0          | 0%                      | 0        | 0          | 0%                        | 0           | 0           | 0            | 0%   |
|                                            |            | MTWs Total                    | 79,712    | 79,712     | 0%                      | 113.68   | 168.23     | 48%                       | 2,483,149   | 3,320,634   | 1,837,485    | 48%  |
|                                            |            | 1.A.3.b. Road Transport Total | 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 <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         | 13,063    | 13,063     | 0%                      | 592.96   | 534.68     | -10%                      | 7,720,235   | 6,979,435   | -740,801     | -10%     |      |
|                                          |                                       | Car 1            | 61,979    | 61,979     | 0%                      | 347.96   | 340.16     | -2%                       | 21,640,430  | 18,884,961  | -2,755,469   | -13%     |      |
|                                          |                                       | Car 2            | 87,083    | 87,083     | 0%                      | 178.38   | 136.58     | -24%                      | 15,620,983  | 11,883,782  | -3,737,201   | -24%     |      |
|                                          |                                       | Car 3            | 124,330   | 124,330    | 0%                      | 61.94    | 71.52      | 16%                       | 7,683,891   | 8,891,671   | 1,207,780    | 16%      |      |
|                                          |                                       | Car 4            | 442,185   | 442,185    | 0%                      | 43.94    | 43.68      | 0%                        | 19,384,914  | 19,376,439  | -8,475       | 0%       |      |
|                                          |                                       | Car 5            | 66,057    | 66,057     | 0%                      | 18.58    | 43.68      | 135%                      | 1,227,381   | 2,085,636   | 1,658,255    | 135%     |      |
|                                          | Car 6                                 | 1                | 1         | 0%         | 25.06                   | 43.68    | 65%        | 17                        | 20          | 3           | 15%          |          |      |
|                                          | Gasoline total                        | 794,688          | 794,688   | 0%         | 92.69                   | 81.65    | -11%       | 73,165,851                | 64,851,551  | -8,314,300  | -11%         |          |      |
|                                          | Diesel Oil                            | pre-Cars         | 1,711     | 1,711      | 0%                      | 318.16   | 264.95     | -17%                      | 511,883     | 453,197     | -58,686      | -11%     |      |
|                                          |                                       | Car 1            | 8,426     | 8,426      | 0%                      | 297.32   | 245.65     | -17%                      | 2,585,115   | 2,239,987   | -345,128     | -13%     |      |
| Car 2                                    |                                       | 42,514           | 42,514    | 0%         | 407.93                  | 279.27   | -31%       | 17,384,549                | 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 | -71%         |          |      |
| 1.A.3.a.ii. Heavy Duty Vehicles (HDVs)   | Gasoline                              | Car 4            | 264,943   | 264,943    | 0%                      | 388.88   | 143.48     | -63%                      | 162,917,881 | 30,889,755  | -132,028,126 | -81%     |      |
|                                          |                                       | Car 5            | 113,047   | 113,047    | 0%                      | 435.12   | 143.48     | -67%                      | 49,536,960  | 16,332,974  | -33,203,986  | -67%     |      |
|                                          |                                       | Car 6            | 685       | 685        | 0%                      | 259.59   | 143.48     | -45%                      | 180,582     | 99,754      | -80,828      | -45%     |      |
|                                          |                                       | Diesel oil total | 553,564   | 553,564    | 0%                      | 434.12   | 159.92     | -63%                      | 249,713,791 | 88,138,959  | -161,574,832 | -63%     |      |
|                                          |                                       | Pkx Total        | 1,348,252 | 1,348,252  | 0%                      | 232.52   | 115.47     | -51%                      | 713,499,642 | 152,990,510 | -560,509,132 | -78%     |      |
|                                          |                                       | Diesel Oil       | pre-Cars  | 1,084      | 1,084                   | 0%       | 626.25     | 540.95                    | -13%        | 682,074     | 590,373      | -91,701  | -13% |
|                                          | Car 1                                 |                  | 283       | 283        | 0%                      | 818.74   | 584.47     | -29%                      | 243,289     | 86,158      | -157,131     | -65%     |      |
|                                          | Car 2                                 |                  | 1,184     | 1,184      | 0%                      | 268.66   | 191.68     | -29%                      | 310,529     | 223,189     | -87,340      | -28%     |      |
|                                          | Car 3                                 |                  | 783       | 783        | 0%                      | 85.97    | 35.39      | -59%                      | 67,320      | 74,782      | 7,462        | 11%      |      |
|                                          | 1.A.3.b.i. Light Duty Vehicles (LDVs) | Gasoline         | Car 4     | 2,562      | 2,562                   | 0%       | 37.38      | 46.51                     | 24%         | 95,786      | 119,162      | 23,376   | 24%  |
| Car 5                                    |                                       |                  | 241       | 241        | 0%                      | 16.13    | 46.51      | 189%                      | 3,882       | 11,190      | 7,308        | 189%     |      |
| Car 6                                    |                                       |                  | 0         | 0          | 0%                      | 15.33    | 46.51      | 203%                      | 1           | 2           | 1            | 203%     |      |
| Gasoline total                           |                                       |                  | 6,118     | 6,118      | 0%                      | 229.35   | 186.57     | -18%                      | 1,483,081   | 1,254,776   | -228,305     | -15%     |      |
| Diesel Oil                               |                                       |                  | pre-Cars  | 3,995      | 3,995                   | 0%       | 425.99     | 386.79                    | -9%         | 1,988,280   | 1,225,682    | -762,598 | -38% |
|                                          |                                       |                  | Car 1     | 4,787      | 4,787                   | 0%       | 398.71     | 276.24                    | -30%        | 1,984,260   | 1,030,426    | -953,834 | -48% |
|                                          |                                       | Car 2            | 10,816    | 10,816     | 0%                      | 336.90   | 153.18     | -54%                      | 3,644,582   | 2,091,063   | -1,553,519   | -43%     |      |
|                                          |                                       | Car 3            | 28,876    | 28,876     | 0%                      | 541.53   | 150.54     | -72%                      | 15,037,249  | 4,345,870   | -10,691,379  | -72%     |      |
| Diesel Oil                               |                                       | Car 4            | 60,832    | 60,832     | 0%                      | 403.82   | 89.26      | -62%                      | 30,039,914  | 5,429,611   | -24,610,304  | -82%     |      |
|                                          |                                       | Car 5            | 6,609     | 6,609      | 0%                      | 449.86   | 89.26      | -80%                      | 2,930,190   | 584,364     | -2,345,826   | -80%     |      |
|                                          | Car 6                                 | 0                | 0         | 0%         | 156.21                  | 89.26    | -42%       | 16                        | 8           | -6          | -42%         |          |      |
|                                          | LDVs total                            | 115,967          | 115,967   | 0%         | 485.56                  | 126.92   | -74%       | 56,848,598                | 16,781,142  | -40,167,456 | -74%         |          |      |
| 1.A.3.b.ii. Heavy Duty Vehicles (HDVs)   | Diesel Oil                            | LDVs Total       | 122,085   | 122,085    | 0%                      | 468.92   | 130.51     | -72%                      | 57,247,399  | 19,932,808  | -37,314,591  | -72%     |      |
|                                          |                                       | pre-Cars         | 2,620     | 2,620      | 0%                      | 1082.63  | 1918.76    | 6%                        | 2,896,189   | 2,671,331   | -224,858     | -8%      |      |
|                                          |                                       | Car 1            | 2,250     | 2,250      | 0%                      | 752.91   | 751.43     | 0%                        | 1,839,187   | 1,696,297   | -142,890     | -8%      |      |
|                                          |                                       | Car 2            | 9,074     | 9,074      | 0%                      | 804.17   | 543.36     | -32%                      | 7,827,125   | 5,037,695   | -2,789,430   | -36%     |      |
|                                          |                                       | Car 3            | 14,181    | 14,181     | 0%                      | 633.46   | 457.38     | -29%                      | 9,425,890   | 6,689,064   | -2,736,826   | -29%     |      |
|                                          |                                       | Car 4            | 56,537    | 56,537     | 0%                      | 448.88   | 351.91     | -21%                      | 2,363,338   | 1,685,274   | -678,064     | -29%     |      |
|                                          | Diesel Oil                            | Car 5            | 13,296    | 13,296     | 0%                      | 336.60   | 182.62     | -46%                      | 4,569,052   | 2,446,399   | -2,122,653   | -46%     |      |
|                                          |                                       | Car 6            | 0         | 0          | 0%                      | 0        | 0          | 0%                        | 0           | 0           | 0            | 0%       |      |
|                                          |                                       | Buses Total      | 47,365    | 47,365     | 0%                      | 592.65   | 448.99     | -24%                      | 20,011,221  | 17,256,323  | -2,754,898   | -14%     |      |
|                                          |                                       | pre-Cars         | 8,044     | 8,044      | 0%                      | 1038.67  | 783.98     | -24%                      | 8,355,423   | 6,144,933   | -2,210,491   | -26%     |      |
| 1.A.3.b.iii. Heavy Duty Trucks & Lorries | Diesel Oil                            | Car 1            | 29,277    | 29,277     | 0%                      | 817.97   | 504.34     | -38%                      | 23,947,123  | 15,233,223  | -8,713,900   | -36%     |      |
|                                          |                                       | Car 2            | 521       | 521        | 0%                      | 301.25   | 372.69     | 24%                       | 7,321,626   | 48,752,437  | 41,430,810   | 566%     |      |
|                                          |                                       | Car 3            | 68,430    | 68,430     | 0%                      | 305.26   | 150.63     | -50%                      | 22,977,784  | 16,960,483  | -6,017,301   | -26%     |      |
|                                          |                                       | Car 4            | 342,175   | 342,175    | 0%                      | 278.30   | 120.63     | -56%                      | 95,549,479  | 52,619,687  | -42,929,792  | -45%     |      |
|                                          |                                       | Car 5            | 0         | 0          | 0%                      | 0        | 0          | 0%                        | 0           | 0           | 0            | 0%       |      |
|                                          |                                       | Trucks Total     | 563,891   | 563,891    | 0%                      | 418.38   | 244.97     | -40%                      | 233,401,271 | 138,136,342 | -95,264,929  | -40%     |      |
|                                          | Gasoline                              | pre-Cars         | 7,389     | 7,389      | 0%                      | 122.58   | 150.34     | 22%                       | 965,588     | 1,110,176   | 144,588      | 15%      |      |
|                                          |                                       | Car 1            | 4,085     | 4,085      | 0%                      | 124.72   | 180.26     | 45%                       | 539,299     | 885,547     | 346,248      | 32%      |      |
|                                          |                                       | Car 2            | 3,544     | 3,544      | 0%                      | 137.85   | 194.58     | 41%                       | 488,552     | 680,693     | 192,141      | 41%      |      |
|                                          |                                       | Car 3            | 3,560     | 3,560      | 0%                      | 39.55    | 194.58     | 382%                      | 140,563     | 630,634     | 490,071      | 348%     |      |
| Gasoline                                 | Car 4                                 | 0                | 0         | 0%         | 0                       | 0        | 0%         | 0                         | 0           | 0           | 0%           |          |      |
|                                          | Car 5                                 | 0                | 0         | 0%         | 0                       | 0        | 0%         | 0                         | 0           | 0           | 0%           |          |      |
| MDVX Total                               | 79,819                                | 79,819           | 0%        | 118.79     | 171.64                  | 54%      | 2,137,082  | 3,299,152                 | 1,162,070   | 54%         |              |          |      |
| 1.A.3.b. Road Transport                  | Total                                 | 2,160,883        | 2,160,883 | 0%         | 305.90                  | 157.85   | -48%       | 132,365,736               | 331,625,655 | 209,259,919 | 158%         |          |      |

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     | difference   |            |      |
|                                         |                | in [t]        | in [t]    | in [%]     | in [g/t]                | in [g/t] | in [%]      | in [kg]                   | in [kg]      | in [%]       |            |      |
| 1.A.3.a.i. Passenger Cars               | Gasoline       | pre-Cars      | 11,581    | 11,581     | 0%                      | 607.72   | 635.38      | -52%                      | 7,035,041    | 6,189,785    | -845,256   | -52% |
|                                         |                | Car 1         | 47,487    | 47,487     | 0%                      | 348.56   | 341.62      | -31%                      | 16,571,746   | 11,426,129   | -5,145,617 | -31% |
|                                         |                | Car 2         | 72,781    | 72,781     | 0%                      | 194.27   | 137.82      | -25%                      | 13,487,749   | 10,035,380   | -3,452,369 | -25% |
|                                         |                | Car 3         | 189,443   | 189,443    | 0%                      | 63.89    | 72.62       | 14%                       | 6,927,963    | 7,875,172    | 947,209    | 14%  |
|                                         |                | Car 4         | 489,541   | 489,541    | 0%                      | 45.39    | 45.13       | -1%                       | 18,541,881   | 18,436,736   | -105,145   | -1%  |
|                                         |                | Car 5         | 181,961   | 181,961    | 0%                      | 18.61    | 45.13       | 143%                      | 1,887,355    | 4,681,311    | 2,793,956  | 143% |
|                                         | Car 6          | 282           | 282       | 0%         | 25.05                   | 45.13    | 74%         | 7,339                     | 12,736       | 5,396        | 74%        |      |
|                                         | Gasoline total | 750,267       | 750,267   | 0%         | 85.73                   | 78.88    | -8%         | 64,379,964                | 58,577,229   | -5,802,735   | -9%        |      |
|                                         | Diesel Oil     | pre-Cars      | 1,487     | 1,487      | 0%                      | 311.98   | 284.56      | -9%                       | 463,963      | 383,872      | -80,091    | -9%  |
|                                         |                | Car 1         | 6,660     | 6,660      | 0%                      | 297.79   | 286.44      | -4%                       | 1,980,364    | 1,771,787    | -208,577   | -11% |
| Car 2                                   |                | 33,967        | 33,967    | 0%         | 406.82                  | 279.27   | -40%        | 13,887,432                | 7,445,646    | -6,441,787   | -40%       |      |
| Car 3                                   |                | 183,539       | 183,539   | 0%         | 564.82                  | 176.63   | -69%        | 58,389,037                | 18,434,837   | -39,954,200  | -69%       |      |
| Car 4                                   |                | 234,943       | 234,943   | 0%         | 398.41                  | 146.46   | -62%        | 91,724,190                | 34,488,997   | -57,235,193  | -62%       |      |
| Car 5                                   |                | 173,112       | 173,112   | 0%         | 434.89                  | 146.46   | -66%        | 75,284,364                | 25,353,375   | -49,930,989  | -66%       |      |
| Car 6                                   | 1,557          | 1,557         | 0%        | 259.84     | 146.46                  | -44%     | 484,664     | 220,086                   | -264,578     | -44%         |            |      |
| Diesel oil total                        | 555,245        | 555,245       | 0%        | 455.96     | 158.66                  | -64%     | 242,962,982 | 88,096,639                | -154,866,343 | -64%         |            |      |
| FCs Total                               | 1,305,512      | 1,305,512     | 0%        | 234.67     | 152.29                  | -35%     | 386,442,896 | 146,673,867               | -239,769,029 | -35%         |            |      |
| 1.A.3.b.ii. Heavy Duty Vehicles (LDV)   | Gasoline       | pre-Cars      | 962       | 962        | 0%                      | 632.38   | 645.95      | 2%                        | 607,779      | 621,146      | 13,417     | 2%   |
|                                         |                | Car 1         | 232       | 232        | 0%                      | 803.24   | 183.22      | -65%                      | 189,985      | 70,295       | -119,691   | -65% |
|                                         |                | Car 2         | 989       | 989        | 0%                      | 271.16   | 195.74      | -28%                      | 268,134      | 133,538      | -134,596   | -28% |
|                                         |                | Car 3         | 835       | 835        | 0%                      | 89.38    | 98.33       | 10%                       | 74,623       | 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                  | 183.15   | -16%        | 1,238,520                 | 1,092,662    | -145,858     | -12%       |      |
|                                         | Diesel Oil     | pre-Cars      | 3,281     | 3,281      | 0%                      | 424.46   | 386.79      | -9%                       | 1,368,754    | 1,262,093    | -106,661   | -8%  |
|                                         |                | Car 1         | 3,666     | 3,666      | 0%                      | 398.34   | 276.24      | -30%                      | 1,445,980    | 1,071,634    | -374,346   | -26% |
| Car 2                                   |                | 8,479         | 8,479     | 0%         | 336.40                  | 133.28   | -40%        | 2,852,325                 | 1,639,772    | -1,212,553   | -43%       |      |
| Car 3                                   |                | 23,785        | 23,785    | 0%         | 558.53                  | 150.44   | -73%        | 13,050,281                | 3,565,082    | -9,485,199   | -73%       |      |
| Car 4                                   |                | 59,485        | 59,485    | 0%         | 494.22                  | 89.85    | -82%        | 29,369,070                | 5,337,395    | -24,031,675  | -82%       |      |
| Car 5                                   |                | 15,964        | 15,964    | 0%         | 442.70                  | 89.85    | -80%        | 7,040,461                 | 1,420,906    | -5,619,555   | -80%       |      |
| Car 6                                   | 1              | 1             | 0%        | 15.14      | 89.85                   | -61%     | 122         | 72                        | -50          | -41%         |            |      |
| Diesel oil total                        | 114,350        | 114,350       | 0%        | 485.91     | 126.17                  | -74%     | 55,186,382  | 13,741,354                | -41,445,028  | -74%         |            |      |
| FCs Total                               | 129,008        | 129,008       | 0%        | 489.51     | 123.61                  | -74%     | 56,344,903  | 14,834,656                | -41,510,247  | -74%         |            |      |
| 1.A.3.b.iii. Heavy Duty Motorized Buses | Gasoline       | pre-Cars      | 1,326     | 1,326      | 0%                      | 1093.46  | 1119.45     | 4%                        | 1,410,640    | 1,352,283    | -58,357    | -4%  |
|                                         |                | Car 1         | 1,245     | 1,245      | 0%                      | 727.34   | 731.15      | 1%                        | 1,017,476    | 1,017,184    | -292       | -0%  |
|                                         |                | Car 2         | 7,789     | 7,789      | 0%                      | 703.46   | 643.34      | -9%                       | 5,085,091    | 4,597,478    | -487,613   | -9%  |
|                                         |                | Car 3         | 14,483    | 14,483     | 0%                      | 629.94   | 437.61      | -31%                      | 9,073,137    | 6,089,744    | -2,983,393 | -33% |
|                                         |                | Car 4         | 5,331     | 5,331      | 0%                      | 468.10   | 361.85      | -23%                      | 2,642,179    | 1,675,777    | -966,402   | -23% |
|                                         |                | Car 5         | 20,752    | 20,752     | 0%                      | 347.84   | 182.99      | -47%                      | 7,219,563    | 3,787,467    | -3,432,096 | -47% |
|                                         | Car 6          | 73            | 73        | 0%         | 64.52                   | 182.99   | 286%        | 3,961                     | 13,295       | 9,334        | 236%       |      |
|                                         | Buses Total    | 50,962        | 50,962    | 0%         | 533.22                  | 384.33   | -28%        | 27,141,913                | 19,965,288   | -7,176,625   | -26%       |      |
|                                         | Diesel Oil     | pre-Cars      | 6,922     | 6,922      | 0%                      | 1036.95  | 758.82      | -27%                      | 7,107,543    | 5,252,345    | -1,855,198 | -27% |
|                                         |                | Car 1         | 3,630     | 3,630      | 0%                      | 743.70   | 570.57      | -24%                      | 2,721,326    | 2,071,111    | -650,215   | -24% |
| Car 2                                   |                | 23,577        | 23,577    | 0%         | 818.27                  | 516.43   | -37%        | 19,262,253                | 12,175,855   | -7,086,398   | -37%       |      |
| Car 3                                   |                | 96,735        | 96,735    | 0%         | 634.65                  | 370.21   | -42%        | 61,387,137                | 35,888,665   | -25,498,472  | -42%       |      |
| Car 4                                   |                | 50,550        | 50,550    | 0%         | 356.50                  | 288.44   | -19%        | 19,982,680                | 14,880,877   | -5,101,723   | -26%       |      |
| Car 5                                   |                | 485,981       | 485,981   | 0%         | 261.24                  | 152.32   | -42%        | 116,149,955               | 61,626,577   | -54,523,378  | -46%       |      |
| Car 6                                   | 2,380          | 2,380         | 0%        | 188.487    | 360.323                 | 191%     | 188,487     | 360,323                   | 171,836      | 91%          |            |      |
| Buses Total                             | 589,585        | 589,585       | 0%        | 385.33     | 224.69                  | -41%     | 224,829,180 | 132,064,153               | -92,765,027  | -41%         |            |      |
| 1.A.3.b.iv. Two-Wheelers (M2V)          | Gasoline       | pre-Cars      | 6,780     | 6,780      | 0%                      | 122.76   | 151.03      | 23%                       | 822,530      | 1,011,520    | 188,991    | 23%  |
|                                         |                | Car 1         | 4,386     | 4,386      | 0%                      | 124.61   | 171.39      | 39%                       | 536,615      | 738,050      | 201,435    | 38%  |
|                                         |                | Car 2         | 3,287     | 3,287      | 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%   |
| M2Vs Total                              | 16,268         | 16,268        | 0%        | 107.43     | 175.28                  | 61%      | 1,982,546   | 3,165,438                 | 1,182,891    | 61%          |            |      |
| 1.A.3.b. Road Transport                 | Total          | 2,084,964     | 2,084,964 | 0%         | 295.79                  | 151.71   | -49%        | 616,721,438               | 396,381,343  | -220,340,094 | -49%       |      |

Adjustment details for 2023

| NFR Code                                        | Fuel                                   | Activity Data |           |            | Implied Emission Factor |          |             | NO <sub>x</sub> Emissions |              |              |             |         |
|-------------------------------------------------|----------------------------------------|---------------|-----------|------------|-------------------------|----------|-------------|---------------------------|--------------|--------------|-------------|---------|
|                                                 |                                        | current       | adjusted  | difference | current                 | adjusted | difference  | current                   | adjusted     | difference   |             |         |
|                                                 |                                        | in [t]        | in [t]    | in [%]     | in [g/t]                | in [g/t] | in [%]      | in [kg]                   | in [kg]      | in [%]       |             |         |
| 1.A.3.a.i. Passenger Cars                       | Gasoline                               | pre-Cars      | 11,680    | 11,680     | 0%                      | 618.27   | 649.35      | -52%                      | 7,011,641    | 5,967,452    | -1,044,189  | -52%    |
|                                                 |                                        | Car 1         | 37,743    | 37,743     | 0%                      | 353.78   | 341.68      | -32%                      | 13,362,986   | 9,129,436    | -4,233,550  | -32%    |
|                                                 |                                        | Car 2         | 62,680    | 62,680     | 0%                      | 188.93   | 139.33      | -27%                      | 11,889,922   | 8,722,244    | -3,167,678  | -27%    |
|                                                 |                                        | Car 3         | 97,782    | 97,782     | 0%                      | 66.38    | 73.19       | 10%                       | 6,481,618    | 7,156,920    | 675,302     | 10%     |
|                                                 |                                        | Car 4         | 397,911   | 397,911    | 0%                      | 47.22    | 46.52       | -1%                       | 18,790,345   | 18,589,937   | -200,407    | -1%     |
|                                                 |                                        | Car 5         | 138,063   | 138,063    | 0%                      | 18.60    | 46.52       | 150%                      | 2,583,150    | 6,439,691    | 3,856,541   | 150%    |
|                                                 | Car 6                                  | 2,714         | 2,714     | 0%         | 25.99                   | 46.52    | 79%         | 70,526                    | 126,237      | 55,711       | 79%         |         |
|                                                 | Gasoline total                         | 1,615,116     | 1,615,116 | 0%         | 88.35                   | 74.85    | -16%        | 68,190,887                | 56,671,737   | -11,519,150  | -17%        |         |
|                                                 | Diesel Oil                             | pre-Cars      | 1,389     | 1,389      | 0%                      | 312.32   | 284.56      | -9%                       | 433,081      | 368,136      | -64,945     | -15%    |
|                                                 |                                        | Car 1         | 5,625     | 5,625      | 0%                      | 298.42   | 286.79      | -4%                       | 1,678,472    | 1,640,688    | -37,784     | -2%     |
|                                                 |                                        | Car 2         | 28,437    | 28,437     | 0%                      | 406.84   | 279.91      | -40%                      | 11,563,522   | 6,253,531    | -5,309,991  | -46%    |
|                                                 |                                        | Car 3         | 92,795    | 92,795     | 0%                      | 574.33   | 176.67      | -69%                      | 53,284,956   | 16,579,373   | -36,705,583 | -69%    |
|                                                 |                                        | Car 4         | 222,583   | 222,583    | 0%                      | 393.55   | 149.27      | -62%                      | 87,598,471   | 33,225,566   | -54,372,905 | -62%    |
|                                                 |                                        | Car 5         | 233,786   | 233,786    | 0%                      | 435.42   | 149.27      | -66%                      | 101,787,275  | 34,884,788   | -66,902,487 | -66%    |
|                                                 | Car 6                                  | 4,536         | 4,536     | 0%         | 259.53                  | 149.27   | -42%        | 1,177,151                 | 677,045      | -500,106     | -42%        |         |
| Diesel oil total                                | 589,131                                | 589,131       | 0%        | 437.14     | 158.71                  | -64%     | 257,533,128 | 83,899,619                | -173,633,509 | -64%         |             |         |
| FCs Total                                       | 1,338,247                              | 1,338,247     | 0%        | 237.49     | 111.77                  | -53%     | 317,723,135 | 140,571,356               | -177,151,779 | -53%         |             |         |
| Gasoline                                        | pre-Cars                               | 981           | 981       | 0%         | 633.81                  | 645.95   | 2%          | 568,320                   | 575,293      | 6,973        | 1%          |         |
|                                                 | Car 1                                  | 184           | 184       | 0%         | 803.50                  | 183.22   | -65%        | 187,281                   | 59,328       | -127,953     | -65%        |         |
|                                                 | Car 2                                  | 836           | 836       | 0%         | 274.42                  | 291.18   | 21%         | 229,520                   | 188,285      | -41,235      | -18%        |         |
|                                                 | Car 3                                  | 784           | 784       | 0%         | 52.66                   | 191.79   | 36%         | 72,691                    | 79,780       | 7,089        | 10%         |         |
|                                                 | Car 4                                  | 1,089         | 1,089     | 0%         | 43.70                   | 48.89    | 13%         | 77,284                    | 82,833       | 5,549        | 7%          |         |
|                                                 | Car 5                                  | 965           | 965       | 0%         | 16.37                   | 48.89    | 183%        | 15,187                    | 47,268       | 32,081       | 183%        |         |
|                                                 | Car 6                                  | 1             | 1         | 0%         | 17.66                   | 48.89    | 176%        | 26                        | 72           | 46           | 176%        |         |
|                                                 | Gasoline total                         | 5,578         | 5,578     | 0%         | 262.86                  | 184.67   | -30%        | 1,137,299                 | 1,096,727    | -40,572      | -4%         |         |
| 1.A.3.a.ii. Light Duty Vehicles (LDV)           | Diesel Oil                             | pre-Cars      | 2,744     | 2,744      | 0%                      | 424.37   | 386.79      | -9%                       | 1,168,757    | 944,928      | -223,829    | -19%    |
|                                                 |                                        | Car 1         | 2,945     | 2,945      | 0%                      | 398.34   | 276.24      | -30%                      | 1,166,782    | 834,596      | -332,186    | -29%    |
|                                                 |                                        | Car 2         | 6,982     | 6,982      | 0%                      | 336.92   | 133.28      | -40%                      | 2,340,147    | 1,350,674    | -989,473    | -42%    |
|                                                 |                                        | Car 3         | 20,421    | 20,421     | 0%                      | 568.12   | 150.38      | -73%                      | 11,437,995   | 3,070,913    | -8,367,082  | -73%    |
|                                                 |                                        | Car 4         | 55,087    | 55,087     | 0%                      | 497.72   | 90.46       | -82%                      | 27,774,440   | 5,048,416    | -22,726,024 | -82%    |
|                                                 |                                        | Car 5         | 29,024    | 29,024     | 0%                      | 141.37   | 90.46       | -36%                      | 12,181,325   | 2,687,964    | -9,493,361  | -60%    |
|                                                 | Car 6                                  | 41            | 41        | 0%         | 151.28                  | 90.46    | -40%        | 6,160                     | 2,638        | -3,522       | -57%        |         |
|                                                 | Diesel oil total                       | 118,177       | 118,177   | 0%         | 488.66                  | 114.63   | -77%        | 57,083,523                | 13,656,480   | -43,427,043  | -77%        |         |
|                                                 | LDVs total                             | 124,954       | 124,954   | 0%         | 464.14                  | 116.63   | -75%        | 58,214,142                | 14,677,276   | -43,536,866  | -75%        |         |
|                                                 | 1.A.3.a.iii. Heavy Duty Vehicles (HDV) | Diesel Oil    | pre-Cars  | 1,172      | 1,172                   | 0%       | 1066.69     | 1018.23                   | -5%          | 1,249,023    | 1,194,143   | -54,880 |
| Car 1                                           |                                        |               | 1,054     | 1,054      | 0%                      | 727.98   | 750.99      | 3%                        | 766,620      | 793,181      | 26,561      | 3%      |
| Car 2                                           |                                        |               | 6,084     | 6,084      | 0%                      | 784.07   | 643.48      | -18%                      | 5,734,981    | 4,770,791    | -964,190    | -17%    |
| Car 3                                           |                                        |               | 13,187    | 13,187     | 0%                      | 626.43   | 581.86      | -7%                       | 12,632,580   | 11,980,980   | -651,600    | -5%     |
| Car 4                                           |                                        |               | 4,946     | 4,946      | 0%                      | 888.55   | 812.70      | -9%                       | 2,279,061    | 2,029,724    | -249,336    | -11%    |
| Car 5                                           |                                        |               | 24,096    | 24,096     | 0%                      | 358.88   | 183.44      | -49%                      | 8,435,643    | 4,420,134    | -4,015,509  | -48%    |
| Car 6                                           | 537                                    | 537           | 0%        | 44.76      | 183.44                  | 316%     | 26,047      | 96,672                    | 70,625       | 269%         |             |         |
| Diesel total                                    | 51,776                                 | 51,776        | 0%        | 509.54     | 360.66                  | -29%     | 26,390,969  | 19,620,883                | -7,770,086   | -29%         |             |         |
| HDVs total                                      | 5,083                                  | 5,083         | 0%        | 1026.72    | 737.35                  | -29%     | 6,072,150   | 4,322,888                 | -1,749,262   | -29%         |             |         |
| 1.A.3.b.i. Heavy Duty Vehicle: Trucks & Lorries | Diesel Oil                             | Car 1         | 2,985     | 2,985      | 0%                      | 743.27   | 588.27      | -21%                      | 2,176,945    | 1,650,969    | -525,977    | -24%    |
|                                                 |                                        | Car 2         | 18,444    | 18,444     | 0%                      | 818.17   | 573.47      | -30%                      | 15,089,981   | 9,489,975    | -5,600,006  | -37%    |
|                                                 |                                        | Car 3         | 75,130    | 75,130     | 0%                      | 633.53   | 367.33      | -42%                      | 47,587,440   | 27,787,360   | -19,800,080 | -42%    |
|                                                 |                                        | Car 4         | 42,781    | 42,781     | 0%                      | 366.90   | 287.37      | -22%                      | 16,936,887   | 12,280,770   | -4,656,117  | -27%    |
|                                                 |                                        | Car 5         | 636,989   | 636,989    | 0%                      | 369.76   | 192.75      | -48%                      | 123,145,324  | 66,786,746   | -56,358,578 | -45%    |
|                                                 |                                        | Car 6         | 19,020    | 19,020     | 0%                      | 93.87    | 152.65      | 63%                       | 913,082      | 2,750,630    | 1,837,548   | 201%    |
| Trucks Total                                    | 980,139                                | 980,139       | 0%        | 516.96     | 287.93                  | -44%     | 211,887,331 | 124,188,409               | -87,698,922  | -44%         |             |         |
| 1.A.3.b.ii. Motorized Two-Wheelers (M2Ws)       | Diesel Oil                             | pre-Cars      | 6,362     | 6,362      | 0%                      | 123.57   | 117.19      | -5%                       | 181,736      | 164,179      | -17,557     | -10%    |
|                                                 |                                        | Car 1         | 4,013     | 4,013      | 0%                      | 125.11   | 175.15      | 41%                       | 582,073      | 694,880      | 112,807     | 30%     |
|                                                 |                                        | Car 2         | 3,382     | 3,382      | 0%                      | 132.24   | 195.68      | 48%                       | 435,668      | 645,804      | 209,136     | 48%     |
|                                                 |                                        | Car 3         | 4,682     | 4,682      | 0%                      | 39.81    | 195.68      | 381%                      | 181,610      | 882,175      | 700,565     | 381%    |
|                                                 |                                        | Car 4         | 0         | 0          | 0%                      | 0        | 0           | 0%                        | 0            | 0            | 0           | 0%      |
| M2Ws Total                                      | 18,229                                 | 18,229        | 0%        | 104.34     | 175.38                  | 68%      | 1,962,085   | 5,181,678                 | 3,219,593    | 68%          |             |         |
| 1.A.3.b. Road Transport Total                   |                                        | 2,132,083     | 2,132,083 | 0%         | 288.88                  | 145.35   | -50%        | 616,079,063               | 390,854,331  | -225,224,732 | -37%        |         |

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   | -795,844     | -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%                        | 6,955,585   | 6,459,757   | -494,218     | 7%        |      |
|                                                       |                                           | Car 4                         | 387,759   | 387,759    | 0%                      | 45.16    | 47.80      | 3%                        | 19,093,585  | 19,536,099  | 523,557      | 3%        |      |
|                                                       |                                           | Car 5                         | 171,270   | 171,270    | 0%                      | 18.59    | 47.80      | 151%                      | 3,183,252   | 8,187,581   | 5,004,299    | 151%      |      |
|                                                       | Car 6                                     | 10,315                        | 10,315    | 0%         | 25.97                   | 47.80    | 84%        | 267,855                   | 433,096     | 225,248     | 84%          |           |      |
|                                                       | Gasoline total                            | 752,526                       | 752,526   | 0%         | 73.80                   | 73.89    | 4%         | 37,215,533                | 34,598,921  | -2,616,612  | -4%          |           |      |
|                                                       | Diesel Oil                                | pre-Cars                      | 1,341     | 1,341      | 0%                      | 311.73   | 284.66     | -5%                       | 417,967     | 365,246     | -52,722      | -5%       |      |
|                                                       |                                           | Car 1                         | 4,992     | 4,992      | 0%                      | 298.92   | 267.29     | -11%                      | 1,482,264   | 1,387,643   | -94,621      | -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   | -49%       | 48,451,830                | 14,796,245  | -33,655,585 | -49%         |           |      |
| 1.A.3.b.i. - Light Duty Vehicles (LDVs)               | Gasoline                                  | Car 4                         | 211,237   | 211,237    | 0%                      | 297.27   | 151.77     | -42%                      | 83,917,680  | 32,059,973  | -51,857,706  | -42%      |      |
|                                                       |                                           | Car 5                         | 285,011   | 285,011    | 0%                      | 436.38   | 151.77     | -65%                      | 124,721,396 | 43,370,300  | -81,343,096  | -65%      |      |
|                                                       |                                           | Car 6                         | 16,081    | 16,081     | 0%                      | 259.34   | 151.77     | -41%                      | 4,170,580   | 2,440,686   | -1,729,814   | -41%      |      |
|                                                       |                                           | Diesel oil total              | 626,045   | 626,045    | 0%                      | 415.87   | 159.12     | -62%                      | 272,876,061 | 99,613,892  | -173,262,169 | -62%      |      |
|                                                       |                                           | Flx Total                     | 1,378,571 | 1,378,571  | 0%                      | 298.44   | 152.15     | -53%                      | 338,091,594 | 154,612,813 | -175,478,781 | -53%      |      |
|                                                       |                                           | Diesel Oil                    | pre-Cars  | 986        | 986                     | 0%       | 632.14     | 645.95                    | 2%          | 160,583     | 176,124      | 15,541    | 2%   |
|                                                       | Car 1                                     |                               | 173       | 173        | 0%                      | 968.27   | 989.96     | 64%                       | 150,074     | 53,575      | -96,499      | -64%      |      |
|                                                       | Car 2                                     |                               | 748       | 748        | 0%                      | 204.73   | 287.11     | 21%                       | 212,888     | 154,839     | -58,029      | -27%      |      |
|                                                       | Car 3                                     |                               | 771       | 771        | 0%                      | 98.62    | 185.21     | 7%                        | 75,992      | 81,070      | 5,078        | 7%        |      |
|                                                       | 1.A.3.b.ii. - Heavy Duty Vehicles - Buses | Diesel Oil                    | Car 4     | 1,087      | 1,087                   | 0%       | 43.47      | 50.15                     | 15%         | 81,139      | 83,618       | 2,479     | 15%  |
| Car 5                                                 |                                           |                               | 1,374     | 1,374      | 0%                      | 17.11    | 50.15      | 193%                      | 23,517      | 68,918      | 45,401       | 193%      |      |
| Car 6                                                 |                                           |                               | 17        | 17         | 0%                      | 18.06    | 50.15      | 179%                      | 212         | 670         | 657          | 179%      |      |
| Gasoline total                                        |                                           |                               | 5,845     | 5,845      | 0%                      | 198.34   | 176.49     | -2%                       | 1,112,584   | 1,031,852   | -80,732      | -2%       |      |
| pre-Cars                                              |                                           |                               | 2,537     | 2,537      | 0%                      | 428.16   | 386.79     | -21%                      | 1,985,919   | 776,259     | -1,209,659   | -21%      |      |
| Car 1                                                 |                                           |                               | 2,589     | 2,589      | 0%                      | 393.82   | 276.25     | -40%                      | 987,136     | 539,898     | -447,328     | -40%      |      |
| Diesel Oil                                            |                                           | Car 2                         | 6,087     | 6,087      | 0%                      | 338.91   | 133.25     | -42%                      | 1,385,995   | 1,180,889   | -205,126     | -42%      |      |
|                                                       |                                           | Car 3                         | 18,220    | 18,220     | 0%                      | 571.75   | 150.58     | -24%                      | 10,417,076  | 2,742,056   | -7,675,020   | -24%      |      |
|                                                       |                                           | Car 4                         | 52,361    | 52,361     | 0%                      | 498.70   | 91.69      | -42%                      | 26,164,486  | 4,703,746   | -21,460,740  | -42%      |      |
|                                                       |                                           | Car 5                         | 46,749    | 46,749     | 0%                      | 438.64   | 91.69      | -79%                      | 20,696,234  | 4,258,626   | -16,437,608  | -79%      |      |
| Car 6                                                 | 187                                       | 187                           | 0%        | 151.18     | 91.69                   | -40%     | 29,829     | 17,974                    | -11,855     | -40%        |              |           |      |
| Diesel oil total                                      | 128,578                                   | 128,578                       | 0%        | 415.56     | 170.94                  | -77%     | 61,146,575 | 14,267,237                | -46,879,338 | -77%        |              |           |      |
| LDVs total                                            | 134,423                                   | 134,423                       | 0%        | 463.16     | 153.81                  | -75%     | 62,259,160 | 15,298,849                | -46,960,311 | -75%        |              |           |      |
| 1.A.3.b.iii. - Heavy Duty Vehicles - Trucks & Lorries | Diesel Oil                                | pre-Cars                      | 984       | 984        | 0%                      | 1099.48  | 1919.23    | 5%                        | 1,062,384   | 1,062,921   | 48,443       | 5%        |      |
|                                                       |                                           | Car 1                         | 837       | 837        | 0%                      | 728.12   | 130.99     | 3%                        | 599,232     | 628,359     | 18,127       | 3%        |      |
|                                                       |                                           | Car 2                         | 5,596     | 5,596      | 0%                      | 704.95   | 643.67     | -50%                      | 4,284,320   | 3,683,441   | -598,807     | -50%      |      |
|                                                       |                                           | 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   | 361.79     | -24%                      | 1,972,610   | 1,584,978   | -387,632     | -24%      |      |
|                                                       |                                           | Car 5                         | 22,042    | 22,042     | 0%                      | 368.55   | 183.99     | -40%                      | 7,726,921   | 4,065,632   | -3,661,309   | -40%      |      |
|                                                       |                                           | Car 6                         | 4,182     | 4,182      | 0%                      | 42.78    | 183.99     | 330%                      | 178,913     | 789,476     | 610,563      | 330%      |      |
|                                                       |                                           | Buses Total                   | 49,143    | 49,143     | 0%                      | 468.37   | 339.99     | -27%                      | 23,017,115  | 16,788,234  | -6,208,881   | -27%      |      |
|                                                       | Trucks & Lorries                          | pre-Cars                      | 4,182     | 4,182      | 0%                      | 1034.34  | 737.35     | -29%                      | 4,945,942   | 3,525,898   | -1,420,134   | -29%      |      |
|                                                       |                                           | Car 1                         | 2,285     | 2,285      | 0%                      | 748.66   | 581.41     | -22%                      | 1,600,085   | 1,237,759   | -362,326     | -22%      |      |
| 1.A.3.b.iv. - Heavy Duty Vehicles - Trucks & Lorries  | Diesel Oil                                | Car 2                         | 13,623    | 13,623     | 0%                      | 817.90   | 510.38     | -30%                      | 11,445,865  | 6,565,736   | -4,880,129   | -30%      |      |
|                                                       |                                           | Car 3                         | 54,685    | 54,685     | 0%                      | 632.52   | 364.41     | -42%                      | 36,589,677  | 19,927,835  | -16,661,841  | -42%      |      |
|                                                       |                                           | Car 4                         | 34,037    | 34,037     | 0%                      | 396.37   | 285.34     | -30%                      | 13,481,158  | 9,711,896   | -3,779,262   | -30%      |      |
|                                                       |                                           | Car 5                         | 389,263   | 389,263    | 0%                      | 282.92   | 153.65     | -46%                      | 110,112,782 | 59,688,643  | -50,424,139  | -46%      |      |
|                                                       |                                           | Car 6                         | 34,214    | 34,214     | 0%                      | 63.96    | 153.65     | 189%                      | 3,937,089   | 11,368,582  | 7,421,413    | 189%      |      |
|                                                       |                                           | Trucks Total                  | 572,154   | 572,154    | 0%                      | 314.85   | 196.65     | -38%                      | 179,874,133 | 112,285,562 | -67,588,571  | -38%      |      |
|                                                       |                                           | Motorised Two-Wheelers (MOWs) | pre-Cars  | 6,185      | 6,185                   | 0%       | 122.85     | 158.64                    | 29%         | 795,185     | 974,388      | 218,192   | 29%  |
|                                                       |                                           |                               | Car 1     | 3,037      | 3,037                   | 0%       | 134.71     | 174.84                    | 40%         | 478,514     | 670,859      | 192,346   | 40%  |
|                                                       | 1.A.3.b.v. - Road Transport               | Gasoline                      | Car 2     | 3,365      | 3,365                   | 0%       | 128.94     | 186.25                    | 52%         | 433,874     | 680,370      | 246,504   | 52%  |
|                                                       |                                           |                               | Car 3     | 5,385      | 5,385                   | 0%       | 38.53      | 186.25                    | 380%        | 299,722     | 1,611,189    | 1,311,467 | 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   | 3,386,734   | 1,488,489    | 78%       |      |
| Total                                                 |                                           |                               | 2,153,563 | 2,153,563  | 0%                      | 277.27   | 140.35     | -49%                      | 597,120,297 | 362,252,271 | -234,868,025 | -49%      |      |

Adjustment details for 2025

| NFR Code                                | Fuel                                              | Activity Data    |           |            | Implied Emission Factor |          |            | NO <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     | -4%                       | 7,264,112   | 6,191,942    | -1,014,168   | -14%       |
|                                         |                                                   | Car 1            | 34,112    | 34,112     | 0%                      | 371.34   | 345.71     | -34%                      | 8,963,681   | 5,924,574    | -3,029,228   | -34%       |
|                                         |                                                   | Car 2            | 42,925    | 42,925     | 0%                      | 297.78   | 142.69     | -32%                      | 8,918,785   | 6,099,659    | -2,819,648   | -32%       |
|                                         |                                                   | Car 3            | 72,871    | 72,871     | 0%                      | 73.86    | 74.74      | 1%                        | 5,381,361   | 5,446,237    | 64,877       | 1%         |
|                                         |                                                   | Car 4            | 363,474   | 363,474    | 0%                      | 52.36    | 49.62      | -5%                       | 18,485,637  | 17,326,221   | -1,159,416   | -6%        |
|                                         |                                                   | Car 5            | 180,783   | 180,783    | 0%                      | 19.11    | 49.62      | 151%                      | 3,454,481   | 8,081,456    | 4,626,975    | 151%       |
|                                         | Car 6                                             | 29,612           | 29,612    | 0%         | 25.70                   | 49.62    | 84%        | 790,781                   | 1,451,433   | 658,752      | 84%          |            |
|                                         | Gasoline total                                    | 715,156          | 715,156   | 0%         | 74.38                   | 71.73    | 4%         | 53,196,187                | 51,380,983  | -1,809,895   | -4%          |            |
|                                         | Diesel Oil                                        | pre-Cars         | 1,382     | 1,382      | 0%                      | 310.30   | 284.66     | -5%                       | 367,913     | 339,733      | -28,180      | -5%        |
|                                         |                                                   | Car 1            | 4,279     | 4,279      | 0%                      | 298.14   | 267.84     | -50%                      | 1,261,930   | 1,129,989    | -132,821     | -10%       |
| Car 2                                   |                                                   | 19,689           | 19,689    | 0%         | 407.80                  | 320.36   | -40%       | 8,913,587                 | 4,338,719   | -4,574,868   | -40%         |            |
| Car 3                                   |                                                   | 71,044           | 71,044    | 0%         | 595.91                  | 179.64   | -70%       | 42,271,648                | 12,719,962  | -29,551,685  | -70%         |            |
| 1.A.3.b.i. - Heavy Duty Vehicles (LDVs) | Gasoline                                          | Car 4            | 182,410   | 182,410    | 0%                      | 401.42   | 154.67     | -62%                      | 77,237,655  | 29,644,450   | -47,593,206  | -62%       |
|                                         |                                                   | Car 5            | 364,346   | 364,346    | 0%                      | 434.67   | 154.67     | -65%                      | 132,290,433 | 46,090,424   | -86,400,009  | -65%       |
|                                         |                                                   | Car 6            | 62,576    | 62,576     | 0%                      | 259.76   | 154.67     | -41%                      | 13,657,082  | 6,180,384    | -7,476,698   | -41%       |
|                                         |                                                   | Diesel oil total | 645,565   | 645,565    | 0%                      | 426.19   | 159.88     | -63%                      | 275,138,233 | 183,163,591  | -91,974,732  | -63%       |
|                                         |                                                   | Flx Total        | 1,360,721 | 1,360,721  | 0%                      | 245.48   | 113.52     | -53%                      | 368,334,420 | 154,444,484  | -213,889,936 | -53%       |
|                                         |                                                   | Diesel Oil       | pre-Cars  | 979        | 979                     | 0%       | 664.37     | 645.95                    | 1%          | 1,375,361    | 1,611,977    | 236,616    |
|                                         | Car 1                                             |                  | 150       | 150        | 0%                      | 895.63   | 311.93     | -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                                             |                  | 781       | 781        | 0%                      | 105.50   | 186.62     | 3%                        | 73,969      | 76,155       | 2,186        | 3%         |
|                                         | 1.A.3.b.ii. - Heavy Duty Vehicles (LDVs)          | Diesel Oil       | Car 4     | 1,720      | 1,720                   | 0%       | 47.96      | 51.30                     | 9%          | 80,950       | 80,240       | -710       |
| Car 5                                   |                                                   |                  | 1,620     | 1,620      | 0%                      | 18.41    | 51.30      | 179%                      | 29,912      | 83,086       | 53,174       | 179%       |
| Car 6                                   |                                                   |                  | 94        | 94         | 0%                      | 18.71    | 51.30      | 174%                      | 1,752       | 4,884        | 3,132        | 174%       |
| Gasoline total                          |                                                   |                  | 5,793     | 5,793      | 0%                      | 187.52   | 172.88     | -8%                       | 1,683,507   | 1,680,999    | -25,508      | -8%        |
| pre-Cars                                |                                                   |                  | 2,323     | 2,323      | 0%                      | 418.91   | 386.79     | -26%                      | 986,185     | 712,531      | -273,654     | -26%       |
| Car 1                                   |                                                   |                  | 2,186     | 2,186      | 0%                      | 391.47   | 276.25     | -40%                      | 924,270     | 453,227      | -471,043     | -40%       |
| Diesel Oil                              |                                                   | Car 2            | 5,025     | 5,025      | 0%                      | 324.91   | 133.25     | -40%                      | 1,632,296   | 971,296      | -660,928     | -40%       |
|                                         |                                                   | Car 3            | 15,781    | 15,781     | 0%                      | 588.35   | 150.67     | -24%                      | 9,112,414   | 2,367,713    | -6,744,701   | -74%       |
|                                         |                                                   | Car 4            | 47,480    | 47,480     | 0%                      | 501.73   | 31.74      | -92%                      | 23,732,396  | 3,486,298    | -19,246,098  | -92%       |
|                                         |                                                   | Car 5            | 62,116    | 62,116     | 0%                      | 436.13   | 91.74      | -79%                      | 27,090,216  | 5,680,295    | -21,329,808  | -79%       |
| Car 6                                   | 635                                               | 635              | 0%        | 154.91     | 91.74                   | -40%     | 87,758     | 68,230                    | -19,528     | -40%         |              |            |
| Diesel oil total                        | 135,586                                           | 135,586          | 0%        | 408.35     | 187.96                  | -77%     | 63,565,843 | 16,681,490                | -46,884,353 | -77%         |              |            |
| LDVs Total                              | 147,098                                           | 147,098          | 0%        | 472.76     | 170.62                  | -76%     | 64,989,320 | 15,688,490                | -49,300,831 | -76%         |              |            |
| 1.A.3.b.iii. - Heavy Duty Vehicle Buses | Diesel Oil                                        | pre-Cars         | 979       | 979        | 0%                      | 1070.34  | 1019.23    | -5%                       | 1,048,312   | 990,256      | -58,056      | -5%        |
|                                         |                                                   | Car 1            | 747       | 747        | 0%                      | 728.26   | 513.91     | -30%                      | 545,471     | 381,636      | -163,835     | -30%       |
|                                         |                                                   | Car 2            | 5,211     | 5,211      | 0%                      | 767.43   | 644.46     | -16%                      | 4,163,687   | 3,359,634    | -804,053     | -16%       |
|                                         |                                                   | Car 3            | 11,282    | 11,282     | 0%                      | 633.90   | 458.07     | -28%                      | 7,141,732   | 5,174,989    | -1,966,822   | -28%       |
|                                         |                                                   | Car 4            | 4,586     | 4,586      | 0%                      | 468.70   | 351.99     | -25%                      | 2,154,066   | 1,614,177    | -539,829     | -25%       |
|                                         |                                                   | Car 5            | 34,267    | 34,267     | 0%                      | 368.77   | 184.59     | -49%                      | 8,727,060   | 4,277,641    | -4,449,427   | -49%       |
|                                         | Car 6                                             | 5,294            | 5,294     | 0%         | 63.13                   | 184.59   | 291%       | 277,542                   | 964,226     | 686,684      | 291%         |            |
|                                         | Buses Total                                       | 52,887           | 52,887    | 0%         | 436.96                  | 327.99   | -29%       | 23,987,817                | 17,149,448  | -6,838,379   | -29%         |            |
|                                         | pre-Cars                                          | 4,379            | 4,379     | 0%         | 1034.89                 | 737.35   | -29%       | 4,468,571                 | 3,184,428   | -1,284,143   | -29%         |            |
|                                         | 1.A.3.b.iv. - Heavy Duty Vehicle Trucks & Lorries | Diesel Oil       | Car 1     | 5,883      | 5,883                   | 0%       | 748.71     | 553.48                    | -26%        | 3,387,281    | 1,025,551    | -2,361,740 |
| Car 2                                   |                                                   |                  | 11,082    | 11,082     | 0%                      | 817.38   | 587.94     | -30%                      | 3,072,940   | 5,623,440    | 2,550,500    | 30%        |
| Car 3                                   |                                                   |                  | 43,481    | 43,481     | 0%                      | 765.45   | 361.64     | -43%                      | 27,460,779  | 9,123,426    | -18,337,377  | -43%       |
| Car 4                                   |                                                   |                  | 29,223    | 29,223     | 0%                      | 396.65   | 280.72     | -29%                      | 11,572,868  | 8,284,180    | -3,278,708   | -29%       |
| Car 5                                   |                                                   |                  | 309,726   | 309,726    | 0%                      | 264.17   | 153.49     | -46%                      | 93,413,973  | 60,456,496   | -32,957,477  | -46%       |
| Car 6                                   |                                                   |                  | 570,787   | 570,787    | 0%                      | 67.48    | 183.49     | 161%                      | 8,913,364   | 26,282,637   | 18,369,684   | 161%       |
| Trucks Total                            |                                                   | 589,831          | 589,831   | 0%         | 268.68                  | 157.45   | -38%       | 197,189,625               | 170,520,391 | -26,669,234  | -13%         |            |
| pre-Cars                                |                                                   | 5,744            | 5,744     | 0%         | 125.41                  | 157.28   | 25%        | 720,441                   | 983,470     | 263,028      | 25%          |            |
| Car 1                                   |                                                   | 3,517            | 3,517     | 0%         | 127.40                  | 170.22   | 30%        | 444,086                   | 619,819     | 171,733      | 30%          |            |
| Car 2                                   |                                                   | 3,382            | 3,382     | 0%         | 127.35                  | 186.53   | 45%        | 430,660                   | 665,965     | 236,305      | 45%          |            |
| Car 3                                   | 5,811                                             | 5,811            | 0%        | 49.29      | 186.53                  | 389%     | 234,126    | 1,144,416                 | 910,289     | 389%         |              |            |
| Car 4                                   | 6                                                 | 6                | 0%        | 16.96      |                         | -180%    | 69         | 884                       | 736         | 1061%        |              |            |
| Car 5                                   | 0                                                 | 0                | 0%        |            |                         | 0%       | 0          | 0                         | 0           | 0%           |              |            |
| MWVs Total                              | 18,459                                            | 18,459           | 0%        | 99.52      | 180.65                  | 82%      | 5,833,382  | 5,334,472                 | -1,501,895  | -8%          |              |            |
| 1.A.3.b. - Road Transport               | Total                                             | 2,161,905        | 2,161,905 | 0%         | 266.39                  | 129.26   | -48%       | 575,937,265               | 381,697,596 | -274,853,678 | -48%         |            |

Adjustment details for 2026

| NFR Code                                            | Fuel                                    | Activity Data    |           |            | Implied Emission Factor |          |            | NO <sub>x</sub> Emissions |             |             |              |          |
|-----------------------------------------------------|-----------------------------------------|------------------|-----------|------------|-------------------------|----------|------------|---------------------------|-------------|-------------|--------------|----------|
|                                                     |                                         | current          | adjusted  | difference | current                 | adjusted | difference | current                   | adjusted    | difference  |              |          |
|                                                     |                                         | in [t]           | in [t]    | in [%]     | in [g/t]                | in [g/t] | in [%]     | in [t]                    | in [t]      | in [%]      |              |          |
| 1.A.3.a.i - Passenger Cars                          | Gasoline                                | pre-Cars         | 11,782    | 11,782     | 0%                      | 636.75   | 644.11     | -14%                      | 7,470,914   | 6,410,967   | -1,059,947   |          |
|                                                     |                                         | Car 1            | 20,270    | 20,270     | 0%                      | 372.25   | 341.68     | -35%                      | 7,545,483   | 4,986,888   | -2,558,595   |          |
|                                                     |                                         | Car 2            | 36,062    | 36,062     | 0%                      | 212.73   | 143.11     | -33%                      | 7,671,581   | 5,180,897   | -2,490,684   |          |
|                                                     |                                         | Car 3            | 83,039    | 83,039     | 0%                      | 76.17    | 75.50      | -1%                       | 4,881,482   | 4,759,259   | -122,223     |          |
|                                                     |                                         | Car 4            | 334,413   | 334,413    | 0%                      | 53.74    | 50.17      | -7%                       | 17,369,364  | 16,777,445  | -591,919     |          |
|                                                     |                                         | Car 5            | 183,374   | 183,374    | 0%                      | 19.09    | 50.17      | 163%                      | 3,580,745   | 9,189,834   | 5,609,089    |          |
|                                                     | Car 6                                   | 65,332           | 65,332    | 0%         | 25.67                   | 50.17    | 89%        | 1,768,917                 | 3,327,855   | 1,558,938   |              |          |
|                                                     | Gasoline total                          | 715,272          | 715,272   | 0%         | 78.93                   | 70.65    | -9%        | 58,736,967                | 50,535,049  | -8,201,918  |              |          |
|                                                     | Diesel Oil                              | pre-Cars         | 1,380     | 1,380      | 0%                      | 368.76   | 254.56     | -31%                      | 386,262     | 339,172     | -47,090      |          |
|                                                     |                                         | Car 1            | 3,749     | 3,749      | 0%                      | 298.36   | 269.64     | -9%                       | 1,122,449   | 1,011,625   | -111,425     |          |
| Car 2                                               |                                         | 16,584           | 16,584    | 0%         | 407.19                  | 221.43   | -46%       | 6,720,132                 | 3,653,964   | -3,066,168  |              |          |
| Car 3                                               |                                         | 81,398           | 81,398    | 0%         | 802.50                  | 179.24   | -78%       | 36,981,999                | 11,085,409  | -25,896,590 |              |          |
| 1.A.3.b.i - Light Duty Vehicles (LDVs)              | Gasoline                                | Car 4            | 175,940   | 175,940    | 0%                      | 405.76   | 156.24     | -61%                      | 71,362,220  | 27,474,086  | -43,888,134  |          |
|                                                     |                                         | Car 5            | 299,654   | 299,654    | 0%                      | 433.34   | 156.24     | -64%                      | 130,032,044 | 46,019,229  | -83,912,815  |          |
|                                                     |                                         | Car 6            | 116,084   | 116,084    | 0%                      | 268.75   | 156.24     | -40%                      | 39,427,555  | 10,232,785  | -29,194,770  |          |
|                                                     |                                         | Diesel oil total | 625,119   | 625,119    | 0%                      | 418.36   | 160.76     | -61%                      | 277,947,660 | 188,535,230 | -89,412,430  |          |
|                                                     |                                         | Flx Total        | 1,380,391 | 1,380,391  | 0%                      | 235.75   | 154.41     | -35%                      | 327,736,627 | 199,070,280 | -128,666,347 |          |
|                                                     |                                         | Diesel Oil       | pre-Cars  | 910        | 910                     | 0%       | 602.79     | 645.95                    | -7%         | 593,186     | 547,543      | -45,643  |
|                                                     | Car 1                                   |                  | 136       | 136        | 0%                      | 908.31   | 312.78     | -66%                      | 122,126     | 42,425      | -79,701      |          |
|                                                     | Car 2                                   |                  | 540       | 540        | 0%                      | 308.39   | 217.84     | -29%                      | 162,311     | 117,737     | -44,574      |          |
|                                                     | Car 3                                   |                  | 650       | 650        | 0%                      | 108.43   | 111.57     | -3%                       | 70,432      | 72,731      | 2,299        |          |
|                                                     | 1.A.3.b.ii - Heavy Duty Vehicles (HDVs) | Gasoline         | Car 4     | 1,684      | 1,684                   | 0%       | 43.06      | 52.36                     | 7%          | 78,714      | 84,003       | 5,289    |
| Car 5                                               |                                         |                  | 1,724     | 1,724      | 0%                      | 19.82    | 52.36      | 164%                      | 34,157      | 80,258      | 46,101       |          |
| Car 6                                               |                                         |                  | 363       | 363        | 0%                      | 19.85    | 52.36      | 181%                      | 6,764       | 19,992      | 13,228       |          |
| Gasoline total                                      |                                         |                  | 5,506     | 5,506      | 0%                      | 588.27   | 171.66     | -7%                       | 1,068,292   | 1,013,478   | -54,814      |          |
| Diesel Oil                                          |                                         |                  | pre-Cars  | 2,189      | 2,189                   | 0%       | 414.81     | 386.79                    | -7%         | 899,849     | 885,433      | -14,416  |
|                                                     |                                         |                  | Car 1     | 1,780      | 1,780                   | 0%       | 391.89     | 276.25                    | -29%        | 780,189     | 385,371      | -394,818 |
|                                                     |                                         | Car 2            | 4,223     | 4,223      | 0%                      | 323.43   | 153.31     | -53%                      | 1,365,994   | 676,452     | -689,542     |          |
|                                                     |                                         | Car 3            | 13,582    | 13,582     | 0%                      | 588.91   | 150.77     | -74%                      | 8,064,323   | 2,940,233   | -5,124,090   |          |
| Diesel Oil                                          |                                         | Car 4            | 43,141    | 43,141     | 0%                      | 504.48   | 32.40      | -93%                      | 21,783,989  | 3,986,141   | -17,797,848  |          |
|                                                     |                                         | Car 5            | 74,231    | 74,231     | 0%                      | 434.16   | 32.40      | -93%                      | 32,223,283  | 6,658,780   | -25,564,503  |          |
|                                                     | Car 6                                   | 4,921            | 4,921     | 0%         | 113.49                  | 32.40    | -71%       | 755,285                   | 454,676     | -300,609    |              |          |
|                                                     | Diesel oil total                        | 148,068          | 148,068   | 0%         | 456.12                  | 185.62   | -59%       | 65,712,732                | 15,256,007  | -50,456,725 |              |          |
| LDVs total                                          | 148,994                                 | 148,994          | 0%        | 445.23     | 188.29                  | -58%     | 66,781,025 | 16,226,684                | -50,554,341 |             |              |          |
| 1.A.3.b.iii - Heavy Duty Vehicles - Buses           | Gasoline                                | pre-Cars         | 881       | 881        | 0%                      | 1076.81  | 1919.23    | -43%                      | 954,197     | 988,234     | 34,037       |          |
|                                                     |                                         | Car 1            | 583       | 583        | 0%                      | 731.36   | 732.67     | 0%                        | 433,675     | 446,236     | 12,561       |          |
|                                                     |                                         | Car 2            | 4,375     | 4,375      | 0%                      | 708.25   | 645.03     | -9%                       | 3,440,614   | 2,822,621   | -617,993     |          |
|                                                     |                                         | Car 3            | 10,333    | 10,333     | 0%                      | 632.87   | 458.91     | -27%                      | 6,539,364   | 4,741,827   | -1,797,537   |          |
|                                                     |                                         | Car 4            | 4,449     | 4,449      | 0%                      | 475.90   | 382.29     | -20%                      | 2,117,219   | 1,566,881   | -550,338     |          |
|                                                     |                                         | Car 5            | 34,380    | 34,380     | 0%                      | 366.36   | 185.22     | -49%                      | 8,935,974   | 4,517,517   | -4,418,457   |          |
|                                                     | Car 6                                   | 9,126            | 9,126     | 0%         | 62.79                   | 185.22   | 196%       | 573,066                   | 1,680,431   | 1,107,365   |              |          |
|                                                     | Buses Total                             | 54,157           | 54,157    | 0%         | 404.73                  | 388.24   | -4%        | 23,082,189                | 16,885,117  | -6,197,072  |              |          |
|                                                     | Diesel Oil                              | pre-Cars         | 3,933     | 3,933      | 0%                      | 1034.81  | 737.35     | -29%                      | 4,087,249   | 2,980,379   | -1,106,870   |          |
|                                                     |                                         | Car 1            | 1,555     | 1,555      | 0%                      | 748.16   | 587.92     | -22%                      | 1,163,482   | 789,813     | -373,669     |          |
| Car 2                                               |                                         | 8,875            | 8,875     | 0%         | 817.75                  | 585.42   | -28%       | 7,258,047                 | 4,486,626   | -2,771,421  |              |          |
| Car 3                                               |                                         | 34,167           | 34,167    | 0%         | 638.91                  | 568.04   | -11%       | 21,553,280                | 12,251,155  | -9,302,125  |              |          |
| 1.A.3.b.iv - Heavy Duty Vehicles - Trucks & Lorries | Gasoline                                | Car 4            | 34,287    | 34,287     | 0%                      | 396.94   | 281.86     | -29%                      | 9,640,364   | 6,885,621   | -2,754,743   |          |
|                                                     |                                         | Car 5            | 269,735   | 269,735    | 0%                      | 287.22   | 153.60     | -46%                      | 74,680,233  | 39,676,610  | -35,003,623  |          |
|                                                     |                                         | Car 6            | 281,480   | 281,480    | 0%                      | 61.77    | 153.60     | 149%                      | 16,149,289  | 40,284,036  | 24,134,748   |          |
|                                                     |                                         | Trucks Total     | 594,013   | 594,013    | 0%                      | 226.31   | 180.97     | -20%                      | 134,431,899 | 101,486,262 | -32,945,637  |          |
|                                                     |                                         | Diesel Oil       | pre-Cars  | 5,543      | 5,543                   | 0%       | 125.59     | 155.78                    | 24%         | 696,072     | 883,289      | 187,217  |
|                                                     |                                         |                  | Car 1     | 3,360      | 3,360                   | 0%       | 127.11     | 177.29                    | 39%         | 427,113     | 585,796      | 158,683  |
|                                                     | Car 2                                   |                  | 3,375     | 3,375      | 0%                      | 125.94   | 187.68     | 50%                       | 421,961     | 687,078     | 265,117      |          |
|                                                     | Car 3                                   |                  | 6,443     | 6,443      | 0%                      | 48.36    | 187.68     | 381%                      | 209,627     | 1,273,671   | 1,064,044    |          |
|                                                     | Car 4                                   | 85               | 85        | 0%         | 17.47                   | 187.68   | 1031%      | 1,134                     | 12,632      | 11,498      |              |          |
|                                                     | Car 5                                   | 0                | 0         | 0%         | 0                       | 0        | 0%         | 0                         | 0           | 0%          |              |          |
| MDVs total                                          | 16,185                                  | 16,185           | 0%        | 96.14      | 181.68                  | 88%      | 1,885,897  | 3,452,476                 | 1,566,579   |             |              |          |
| 1.A.3.b. Road Transport                             | Total                                   | 2,267,339        | 2,267,339 | 0%         | 258.89                  | 134.22   | -48%       | 53,799,558                | 362,891,620 | 256,891,738 | 48%          |          |

Adjustment details for 2018

| NFR Code                              | Fuel                                              | Activity Data                              |           |            | Implied Emission Factor |          |            | NO <sub>x</sub> Emissions |             |              |              |             |         |
|---------------------------------------|---------------------------------------------------|--------------------------------------------|-----------|------------|-------------------------|----------|------------|---------------------------|-------------|--------------|--------------|-------------|---------|
|                                       |                                                   | current                                    | adjusted  | difference | current                 | adjusted | difference | current                   | adjusted    | difference   |              |             |         |
|                                       |                                                   | in [t]                                     | in [t]    | in [%]     | in [g/t]                | in [g/t] | in [%]     | in [kg]                   | in [kg]     | in [%]       |              |             |         |
| 1.A.3.a.i - Passenger Cars            | Gasoline                                          | pre-Cars                                   | 12,219    | 12,219     | 0%                      | 637.58   | 644.11     | -65%                      | 7,780,965   | 6,668,721    | -1,112,234   | -55%        |         |
|                                       |                                                   | Car 1                                      | 14,362    | 14,362     | 0%                      | 374.34   | 341.68     | -36%                      | 5,371,161   | 3,448,643    | -1,922,518   | -36%        |         |
|                                       |                                                   | Car 2                                      | 34,285    | 34,285     | 0%                      | 221.97   | 111.68     | -60%                      | 5,360,977   | 2,688,163    | -2,672,814   | -50%        |         |
|                                       |                                                   | Car 3                                      | 43,642    | 43,642     | 0%                      | 88.16    | 76.96      | -4%                       | 3,487,781   | 3,388,617    | -99,164      | -4%         |         |
|                                       |                                                   | Car 4                                      | 278,738   | 278,738    | 0%                      | 55.98    | 52.30      | -7%                       | 15,683,486  | 14,576,755   | -1,106,743   | -7%         |         |
|                                       |                                                   | Car 5                                      | 186,030   | 186,030    | 0%                      | 19.35    | 52.30      | 170%                      | 3,228,282   | 8,725,668    | 5,497,386    | 170%        |         |
|                                       | Gasoline total                                    | 689,007                                    | 689,007   | 0%         | 64.40                   | 64.36    | 0%         | 45,032,966                | 47,786,817  | 2,753,851    | 6%           |             |         |
|                                       | Car 1                                             | 2,949                                      | 2,949     | 0%         | 407.20                  | 222.87   | -45%       | 4,391,383                 | 2,483,536   | -1,907,848   | -45%         |             |         |
|                                       | Car 2                                             | 10,784                                     | 10,784    | 0%         | 812.49                  | 180.15   | -71%       | 24,932,029                | 7,333,241   | -17,598,788  | -71%         |             |         |
|                                       | Car 3                                             | 40,786                                     | 40,786    | 0%         | 414.71                  | 180.40   | -56%       | 54,133,837                | 20,937,329  | -33,196,508  | -56%         |             |         |
|                                       | Car 4                                             | 251,212                                    | 251,212   | 0%         | 415.25                  | 180.40   | -56%       | 104,565,786               | 40,253,731  | -64,312,055  | -56%         |             |         |
|                                       | Car 5                                             | 220,685                                    | 220,685   | 0%         | 254.87                  | 180.40   | -31%       | 58,284,140                | 35,680,446  | -22,603,700  | -37%         |             |         |
|                                       | Diesel oil total                                  | 666,076                                    | 666,076   | 0%         | 375.66                  | 163.38   | -56%       | 247,556,063               | 188,768,684 | -158,787,459 | -56%         |             |         |
|                                       | LN <sub>2</sub> 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  | 917        | 917                     | 0%       | 664.51     | 645.95                    | -3%         | 596,851      | 582,662      | -14,189     | -2%     |
|                                       |                                                   |                                            | Car 1     | 189        | 189                     | 0%       | 911.58     | 312.78                    | -66%        | 98,528       | 33,895       | -64,633     | -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                    | 4%          | 57,282       | 60,739       | 3,457       | 6%      |
| Car 4                                 |                                                   |                                            | 1,275     | 1,275      | 0%                      | 52.02    | 54.36      | 4%                        | 65,290      | 69,270       | 2,980        | 4%          |         |
| Car 5                                 |                                                   |                                            | 1,483     | 1,483      | 0%                      | 23.70    | 54.36      | 129%                      | 35,160      | 80,626       | 45,466       | 129%        |         |
| Gasoline total                        |                                                   | 6,315                                      | 6,315     | 0%         | 154.22                  | 160.11   | 4%         | 999,199                   | 1,011,136   | 11,937       | 1%           |             |         |
| 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                  | 153.88   | -51%       | 965,389                   | 550,789     | -414,600     | -43%         |             |         |
| Car 3                                 |                                                   | 9,363                                      | 9,363     | 0%         | 558.10                  | 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%       | 15,929,185                | 3,117,457   | -12,811,728  | -82%         |             |         |
| Car 5                                 |                                                   | 66,283                                     | 66,283    | 0%         | 432.92                  | 93.81    | -78%       | 28,684,080                | 6,217,860   | -22,466,220  | -78%         |             |         |
| Diesel oil total                      |                                                   | 154,259                                    | 154,259   | 0%         | 384.71                  | 182.69   | -53%       | 59,344,525                | 35,880,316  | -23,464,210  | -41%         |             |         |
| LN <sub>2</sub> Total                 |                                                   | 180,574                                    | 180,574   | 0%         | 375.86                  | 184.94   | -52%       | 69,343,125                | 36,851,449  | -32,491,676  | -47%         |             |         |
| 1.A.3.b.ii - Heavy Duty Vehicle Buses |                                                   | Diesel Oil                                 | pre-Cars  | 547        | 547                     | 0%       | 1078.15    | 1919.23                   | 78%         | 589,267      | 557,147      | -32,120     | -5%     |
|                                       |                                                   |                                            | Car 1     | 237        | 237                     | 0%       | 732.78     | 732.57                    | 0%          | 173,676      | 178,368      | 4,692       | 3%      |
|                                       |                                                   |                                            | 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                    | -27%        | 4,262,734    | 3,183,482    | -1,079,252  | -27%    |
|                                       | Car 4                                             |                                            | 3,043     | 3,043      | 0%                      | 473.16   | 382.73     | -19%                      | 1,639,790   | 1,073,333    | -566,457     | -35%        |         |
|                                       | Car 5                                             |                                            | 18,189    | 18,189     | 0%                      | 362.42   | 186.37     | -49%                      | 6,663,265   | 3,376,016    | -3,287,249   | -49%        |         |
|                                       | Diesel Oil total                                  | 20,670                                     | 20,670    | 0%         | 64.88                   | 186.37   | 289%       | 1,176,026                 | 3,662,314   | 2,486,288    | 209%         |             |         |
|                                       | Buses Total                                       | 51,634                                     | 51,634    | 0%         | 309.75                  | 283.53   | -9%        | 15,993,546                | 13,687,186  | -2,306,360   | -15%         |             |         |
|                                       | LN <sub>2</sub> Total                             | 3,262                                      | 3,262     | 0%         | 1034.82                 | 737.35   | -29%       | 3,375,359                 | 2,485,071   | -890,288     | -26%         |             |         |
|                                       | 1.A.3.b.iii - Heavy Duty Vehicle Trucks & Lorries | Diesel Oil                                 | pre-Cars  | 1,094      | 1,094                   | 0%       | 747.82     | 488.39                    | -35%        | 918,052      | 512,378      | -405,674    | -44%    |
|                                       |                                                   |                                            | Car 1     | 5,544      | 5,544                   | 0%       | 817.44     | 581.68                    | -29%        | 4,532,190    | 2,781,516    | -1,750,674  | -39%    |
|                                       |                                                   |                                            | Car 2     | 20,583     | 20,583                  | 0%       | 629.54     | 563.68                    | -10%        | 12,367,751   | 7,277,279    | -5,090,472  | -41%    |
|                                       |                                                   |                                            | Car 3     | 15,912     | 15,912                  | 0%       | 358.89     | 276.23                    | -23%        | 6,334,421    | 4,386,424    | -1,947,997  | -31%    |
|                                       |                                                   |                                            | Car 4     | 154,983    | 154,983                 | 0%       | 250.40     | 154.68                    | -38%        | 45,964,153   | 24,283,389   | -21,680,764 | -47%    |
|                                       |                                                   |                                            | Car 5     | 381,799    | 381,799                 | 0%       | 68.78      | 154.68                    | 125%        | 28,251,482   | 69,665,886   | 41,414,404  | 146%    |
|                                       |                                                   | Trucks Total                               | 585,186   | 585,186    | 0%                      | 515.18   | 172.19     | -67%                      | 188,173,537 | 180,760,889  | -7,412,648   | -4%         |         |
|                                       |                                                   | LN <sub>2</sub> Total                      | 4,940     | 4,940      | 0%                      | 128.95   | 188.61     | 46%                       | 622,656     | 783,451      | 160,795      | 26%         |         |
|                                       |                                                   | 1.A.3.b.iv - Motorised Two-Wheelers (MOWs) | Gasoline  | pre-Cars   | 2,966                   | 2,966    | 0%         | 128.14                    | 177.79      | 41%          | 374,114      | 527,294     | 153,180 |
| Car 1                                 |                                                   |                                            |           | 3,221      | 3,221                   | 0%       | 129.33     | 188.64                    | 46%         | 387,596      | 639,833      | 252,237     | 65%     |
| Car 2                                 |                                                   |                                            |           | 6,241      | 6,241                   | 0%       | 48.24      | 188.64                    | 384%        | 20,126       | 1,239,686    | 1,219,560   | 598%    |
| Car 3                                 |                                                   |                                            |           | 1,130      | 1,130                   | 0%       | 58.41      | 188.64                    | 673%        | 23,066       | 224,682      | 201,616     | 873%    |
| Car 4                                 |                                                   |                                            |           | 0          | 0                       | 0%       | 0.00       | 0.00                      | 0%          | 0            | 0            | 0           | 0%      |
| Car 5                                 |                                                   |                                            |           | 0          | 0                       | 0%       | 0.00       | 0.00                      | 0%          | 0            | 0            | 0           | 0%      |
| MOWs Total                            |                                                   |                                            | 10,481    | 10,481     | 0%                      | 89.68    | 188.61     | 108%                      | 1,658,558   | 3,434,767    | 1,776,209    | 108%        |         |
| Road Transport Total                  |                                                   |                                            | 2,180,983 | 2,180,983  | 0%                      | 215.85   | 133.49     | -38%                      | 478,758,286 | 291,129,652  | -187,628,634 | -38%        |         |

|                                               | 2010          | 2011          | 2012          | 2013          | 2014          | 2015          | 2016          | 2017          | 2018          | 2019          |
|-----------------------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Adjustment 2014 (accepted) <sup>7) 8)</sup>   | -105.6        | -101.3        | -95.7         | -91.7         |               |               |               |               |               |               |
| Adjustment 2015 (accepted) <sup>9) 10)</sup>  | -100.3        | -95.5         | -89.9         | -85.1         |               |               |               |               |               |               |
| Adjustment 2016 (accepted) <sup>11) 12)</sup> | -151.3        | -146.9        | -145.1        | -142.5        | -128.1        |               |               |               |               |               |
| Adjustment 2017 (accepted) <sup>13)</sup>     | -151.3        | -146.8        | -145.0        | -142.4        | -127.2        | -100.9        |               |               |               |               |
| Adjustment 2018 (accepted) <sup>14) 15)</sup> | -172.3        | -174.5        | -177.4        | -180.4        | -171.5        | -148.9        | -123.2        |               |               |               |
| Adjustment 2019 (accepted) <sup>16) 17)</sup> | -172.3        | -174.5        | -177.4        | -180.3        | -171.4        | -148.8        | -123.3        | -93.7         |               |               |
| Adjustment 2020 (accepted) <sup>18)</sup>     | -297.8        | -302.3        | -301.3        | -306.1        | -294.5        | -269.0        | -244.3        | -214.9        | -174.6        |               |
| <b>Adjustment 2021 (proposal)</b>             | <b>-296.1</b> | <b>-300.7</b> | <b>-300.4</b> | <b>-305.2</b> | <b>-294.9</b> | <b>-274.9</b> | <b>-250.9</b> | <b>-221.1</b> | <b>-179.6</b> | <b>-144.8</b> |
| Change against Adjustment 2020                | 1.7           | 1.6           | 0.9           | 0.9           | -0.4          | -5.9          | -6.6          | -6.2          | -5.0          |               |

The noticeable differences between the 2017 and 2018 adjustment proposals resulted from an ad-hoc revision of the *Handbook Emission Factors for Road Transport* (HBEFA, version 3.3) in the aftermath of the so-called “Diesel-gate”. <sup>19)</sup>

The even bigger changes between adjustment 2019 and adjustment proposal 2020 result from an additional rather fundamental revision of the *Handbook Emission Factors for Road Transport* now available in version 4.1 <sup>20)</sup> strongly effecting the TREMOD model underlying Germany's emission reporting for road transport and hence any adjustments of NO<sub>x</sub> emissions. With such major model revision between submissions 2019 and 2020, the 2020 adjustment proposal differed significantly from the adjustment applied for and accepted in 2019.

**In comparison to 2020, the TREMOD model applied for the 2021 submission has been revised only slightly in terms of NO<sub>x</sub> emission factors, taking into account results from ongoing measurement campaigns especially for EURO 6 vehicles. Hence, the 2021 adjustment proposal differs onyl slightly from the (accepted) proposal provided with submission 2020.**

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<sup>2)</sup> 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](http://www.unece.org/fileadmin/DAM/env/documents/2013/air/ECE_EB.AIR_111_Add.1_ENG_DECISION_3.pdf)

<sup>3)</sup> EB, 2012c: CLRTAP EB Decision 2012/12: Guidance for adjustments under the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone to emission reduction commitments or to inventories for the purposes of comparing total national emissions with them URL: [http://www.unece.org/fileadmin/DAM/env/documents/2012/EB/Decision\\_2012\\_12.pdf](http://www.unece.org/fileadmin/DAM/env/documents/2012/EB/Decision_2012_12.pdf)

<sup>4)</sup> EB, 2012b: CLRTAP EB Decision 2012/4: Provisional Application of Amendment to the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone URL: [http://www.unece.org/fileadmin/DAM/env/documents/2013/air/ECE\\_EB.AIR\\_111\\_Add.1\\_ENG\\_DECISION\\_4.pdf](http://www.unece.org/fileadmin/DAM/env/documents/2013/air/ECE_EB.AIR_111_Add.1_ENG_DECISION_4.pdf)

<sup>5)</sup> 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

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<sup>7)</sup> 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](https://webdab01.umweltbundesamt.at/download/adjustments2014/Adjustment_Review_Report_GERMANY_2014.pdf?cgiproxy_skip=1), 5 August 2014.

<sup>9)</sup> 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](https://webdab01.umweltbundesamt.at/download/adjustments2015/Germany2015-adj.pdf?cgiproxy_skip=1), September 2015.

<sup>10)</sup> 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](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.

<sup>11)</sup> 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](https://webdab01.umweltbundesamt.at/download/adjustments2016/Germany2016-adj.pdf?cgiproxy_skip=1), 2016.

<sup>12)</sup> 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](http://www.ceip.at/fileadmin/inhalte/emep/pdf/2016/ECE_EB.AIR_GE.1_2016_10_E.pdf), 2016.

<sup>13)</sup> 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](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.

<sup>14)</sup> CEIP, 2018a: ECE/EB.AIR/GE.1/2018/10–ECE/EB.AIR/WG.1/2018/21: Review of adjustment applications 2018; URL: [https://www.ceip.at/fileadmin/inhalte/emep/pdf/2018/ADJ\\_ece.eb.air.ge.1.2018.10-ece.eb.air.wg.1.2018.21\\_advance.pdf](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.

<sup>15)</sup> CEIP, 2018b: [https://www.ceip.at/fileadmin/inhalte/ceip/00\\_pdf\\_other/2018/adj\\_ece.eb.air.ge.1.2018.10-ece.eb.air.wg.1.2018.21\\_advance.pdf](https://www.ceip.at/fileadmin/inhalte/ceip/00_pdf_other/2018/adj_ece.eb.air.ge.1.2018.10-ece.eb.air.wg.1.2018.21_advance.pdf)

<sup>16)</sup> CEIP, 2019a: Centre on Emission Inventories and Projections (CEIP): ECE/EB.AIR/GE.1/2019/10–ECE/EB.AIR/WG.1/2019/22: Review of adjustment applications 2019; URL: [https://www.ceip.at/fileadmin/inhalte/emep/pdf/2019/ECE\\_EB.AIR\\_GE.1\\_2019\\_10-1909789E.pdf](https://www.ceip.at/fileadmin/inhalte/emep/pdf/2019/ECE_EB.AIR_GE.1_2019_10-1909789E.pdf), 2019.

<sup>17)</sup> CEIP, 2019b: [https://www.ceip.at/fileadmin/inhalte/ceip/00\\_pdf\\_other/2019/ece\\_eb.air.ge.1\\_2019\\_10-1909789e.pdf](https://www.ceip.at/fileadmin/inhalte/ceip/00_pdf_other/2019/ece_eb.air.ge.1_2019_10-1909789e.pdf)

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

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<sup>20)</sup> 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](https://www.hbefa.net/e/documents/HBEFA41_Development_Report.pdf), Bern, Heidelberg, 21. August 2019.