

# 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) <sup>5)</sup>. Here, the impacts of changing model versions and activity data in the context of meeting the EU NEC Directive ceiling commitments were examined for four European countries including Germany. Unfortunately, this comparison study was carried out within a COPERT environment. Therefore, the results gained cannot be transferred to the German TREMOD environment on a one-to-one level but nonetheless allow a highly illustrative insight in the reasons for not meeting the set ceiling. The study modeled fuel consumption and NO<sub>x</sub> emissions for four selected countries (Germany, France, Netherlands and Belgium) and found higher NO<sub>x</sub> emissions were estimated for the road transport sector than originally modelled by the RAINS model of IIASA (which underpinned the setting of 2010 ceilings). For Germany, this study shows that with the same activity data set (LIFE+

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

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

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

### Changes in methodology and emission factors

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

### Changes in the activity data

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

## IN-COUNTRY ANALYSIS: THE TREMOD PERSPECTIVE

### INITIAL ASSUMPTION

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



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

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



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

with

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

### APPLYING THE ORIGINAL METHODOLOGY

## FRAMEWORK INFORMATION

The methodology used for estimating Germany's exhaust emissions from road transport when determining emissions ceilings of the Gothenburg Protocol (1999), was the second version of the EMEP/CORINAIR guidebook corresponding to COPERT II software. This method proposed NO<sub>x</sub> emission factors for

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

Back then, without better knowledge, the emission factors for the most recent standards were derived by directly applying the expected reductions in emission standards.

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

Unfortunately, the oldest TREMOD version available for such comparison is TREMOD 3.1 from 2002 <sup>6)</sup>, including the following set of NO<sub>x</sub> emission factors:

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

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

## THE COMPARISON

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

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

Within this report, Germany re-estimates the NO<sub>x</sub> emission within the TREMOD 3.1 model. To isolate the requested information, the original TREMOD 3.1 activity data was combined with emission factors from both TREMOD 3.1 and the currently used TREMOD 6.12 (Knörr et al., 2021a) <sup>7)</sup>.

### Description of the updated methodology used

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

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

and

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

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

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

- TREMOD 3.1 model equations as initial methodology

and ,

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

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

Table 1: Resulting adjustment proposal 2020

| for year                   | 2010          | 2011          | 2012          | 2013          | 2014          | 2015          | 2016          | 2017          | 2018          | 2019          |
|----------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| <b>proposed adjustment</b> | <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 [TJ]   | in [%]     | in [kg/TJ]              | in [%]   | in [%]     | in [kg]                   | in [kg]     | in [%]      | 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   | diesel oil |      | 48.844        | 48.844    | 0%         | 823.00                  | 482.55   | -23%       | 29.931.266                | 23.183.732  | 6.747.534   | -23%       |
| 1.A.3.b.iii   | diesel oil |      | 566.741       | 566.741   | 0%         | 446.67                  | 271.83   | -39%       | 253.148.243               | 154.056.160 | 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   | diesel oil |      | 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   | diesel oil |      | 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 | 300.420.094 | -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   | diesel oil |      | 51.716        | 51.716    | 0%         | 509.64                  | 260.06   | -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   | -41%       | 211.887.531               | 124.788.469 | 87.099.062  | -41%       |
| 1.A.3.b.iv    | gasoline   |      | 18.229        | 18.229    | 0%         | 104.34                  | 175.30   | 68%        | 1.902.068                 | 3.197.038   | -1.294.951  | 68%        |
| 1.A.3.b TOTAL | 2013       |      | 2.132.683     | 2.132.683 | 0%         |                         |          | 0%         | 616.079.063               | 316.854.371 | 300.224.692 | -50%       |
| 1.A.3.b.i     | gasoline   |      | 752.526       | 752.526   | 0%         | 76.03                   | 73.09    | -4%        | 57.215.533                | 54.988.921  | 2.216.612   | -4%        |
| 1.A.3.b.i     | diesel oil |      | 626.845       | 626.845   | 0%         | 435.87                  | 159.12   | -63%       | 272.876.061               | 99.613.892  | 173.262.169 | -63%       |
| 1.A.3.b.ii    | gasoline   |      | 5.845         | 5.845     | 0%         | 190.34                  | 176.49   | -7%        | 1.112.584                 | 1.031.612   | 80.972      | -7%        |
| 1.A.3.b.ii    | diesel oil |      | 128.578       | 128.578   | 0%         | 475.56                  | 110.96   | -77%       | 61.546.575                | 14.267.237  | 46.879.338  | -77%       |
| 1.A.3.b.iii   | diesel oil |      | 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                 | 3.346.794   | -1.468.499  | 78%        |
| 1.A.3.b TOTAL | 2014       |      | 2.153.563     | 2.153.563 | 0%         |                         |          | 0%         | 597.120.297               | 302.252.271 | 294.868.025 | -49%       |
| 1.A.3.b.i     | gasoline   |      | 715.156       | 715.156   | 0%         | 74.30                   | 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   | diesel oil |      | 52.287        | 52.287    | 0%         | 458.96                  | 327.99   | -29%       | 23.997.817                | 17.149.448  | 6.848.370   | -29%       |
| 1.A.3.b.iii   | diesel oil |      | 589.411       | 589.411   | 0%         | 266.69                  | 187.51   | -30%       | 157.189.675               | 110.620.703 | 46.568.973  | -30%       |
| 1.A.3.b.iv    | gasoline   |      | 18.459        | 18.459    | 0%         | 99.32                   | 180.65   | 82%        | 1.833.362                 | 3.334.472   | -1.501.090  | 82%        |
| 1.A.3.b TOTAL | 2015       |      | 2.161.976     | 2.161.976 | 0%         |                         |          | 0%         | 575.931.265               | 301.877.596 | 274.053.670 | -48%       |
| 1.A.3.b.i     | gasoline   |      | 715.272       | 715.272   | 0%         | 79.93                   | 76.65    | -4%        | 50.736.367                | 50.535.049  | 201.318     | 0%         |
| 1.A.3.b.i     | diesel oil |      | 675.119       | 675.119   | 0%         | 410.36                  | 160.76   | -61%       | 277.041.660               | 108.535.230 | 168.506.430 | -61%       |
| 1.A.3.b.ii    | gasoline   |      | 5.926         | 5.926     | 0%         | 180.27                  | 171.05   | -5%        | 1.068.292                 | 1.013.678   | 54.614      | -5%        |
| 1.A.3.b.ii    | diesel oil |      | 144.068       | 144.068   | 0%         | 456.12                  | 185.62   | -77%       | 65.712.732                | 15.216.007  | 50.496.725  | -77%       |
| 1.A.3.b.iii   | diesel oil |      | 54.157        | 54.157    | 0%         | 424.73                  | 388.24   | -27%       | 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 | 26.935.637  | -20%       |
| 1.A.3.b.iv    | gasoline   |      | 18.785        | 18.785    | 0%         | 95.14                   | 181.66   | 89%        | 1.805.897                 | 3.412.476   | -1.606.579  | 89%        |
| 1.A.3.b TOTAL | 2016       |      | 2.207.339     | 2.207.339 | 0%         |                         |          | 0%         | 553.790.558               | 302.901.820 | 250.897.738 | -45%       |
| 1.A.3.b.i     | gasoline   |      | 724.571       | 724.571   | 0%         | 67.66                   | 69.88    | 3%         | 49.026.074                | 50.634.714  | -1.607.640  | 3%         |
| 1.A.3.b.i     | diesel oil |      | 696.592       | 696.592   | 0%         | 390.65                  | 161.95   | -59%       | 272.126.091               | 112.810.721 | 159.315.370 | -59%       |
| 1.A.3.b.ii    | gasoline   |      | 6.186         | 6.186     | 0%         | 171.15                  | 167.18   | -2%        | 1.058.799                 | 1.034.211   | 24.588      | -2%        |
| 1.A.3.b.ii    | diesel oil |      | 153.284       | 153.284   | 0%         | 424.66                  | 183.89   | -76%       | 65.093.930                | 15.925.216  | 49.168.714  | -76%       |
| 1.A.3.b.iii   | diesel oil |      | 53.382        | 53.382    | 0%         | 370.80                  | 286.71   | -23%       | 19.793.901                | 15.304.828  | 4.489.073   | -23%       |
| 1.A.3.b.iii   | diesel oil |      | 596.263       | 596.263   | 0%         | 195.02                  | 175.92   | -10%       | 116.671.141               | 106.246.508 | 11.424.633  | -10%       |
| 1.A.3.b.iv    | gasoline   |      | 19.160        | 19.160    | 0%         | 92.83                   | 183.39   | 98%        | 1.778.674                 | 3.513.787   | -1.735.114  | 98%        |
| 1.A.3.b TOTAL | 2017       |      | 2.251.437     | 2.251.437 | 0%         |                         |          | 0%         | 525.549.410               | 304.469.986 | 221.079.424 | -42%       |
| 1.A.3.b.i     | gasoline   |      | 699.027       | 699.027   | 0%         | 64.42                   | 68.36    | 6%         | 45.032.996                | 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   | diesel oil |      | 51.634        | 51.634    | 0%         | 309.75                  | 263.53   | -15%       | 15.993.526                | 13.607.106  | 2.386.420   | -15%       |
| 1.A.3.b.iii   | diesel oil |      | 585.186       | 585.186   | 0%         | 171.18                  | 172.10   | 1%         | 180.173.337               | 180.710.869 | -537.532    | 1%         |
| 1.A.3.b.iv    | gasoline   |      | 18.497        | 18.497    | 0%         | 89.66                   | 184.61   | 106%       | 1.658.588                 | 3.414.767   | -1.756.209  | 106%       |
| 1.A.3.b TOTAL | 2018       |      | 2.180.993     | 2.180.993 | 0%         |                         |          | 0%         | 478.758.206               | 291.139.612 | 179.618.593 | -38%       |
| 1.A.3.b.i     | gasoline   |      | 704.691       | 704.691   | 0%         | 62.30                   | 68.45    | 10%        | 43.901.941                | 48.238.025  | -4.336.084  | 10%        |
| 1.A.3.b.i     | diesel oil |      | 663.841       | 663.841   | 0%         | 345.81                  | 165.07   | -52%       | 229.566.088               | 109.582.982 | 119.983.106 | -52%       |
| 1.A.3.b.ii    | gasoline   |      | 6.683         | 6.683     | 0%         | 146.08                  | 153.25   | 5%         | 976.219                   | 1.034.150   | -57.931     | 5%         |
| 1.A.3.b.ii    | diesel oil |      | 159.183       | 159.183   | 0%         | 347.42                  | 181.90   | -71%       | 55.303.535                | 16.221.445  | 39.082.090  | -71%       |
| 1.A.3.b.iii   | diesel oil |      | 52.939        | 52.939    | 0%         | 274.41                  | 247.81   | -10%       | 14.527.012                | 13.118.578  | 1.408.434   | -10%       |
| 1.A.3.b.iii   | diesel oil |      | 595.913       | 595.913   | 0%         | 153.35                  | 169.17   | 10%        | 91.380.760                | 106.809.376 | -15.428.616 | 10%        |
| 1.A.3.b.iv    | gasoline   |      | 18.750        | 18.750    | 0%         | 86.05                   | 186.83   | 117%       | 1.613.450                 | 3.502.941   | -1.889.491  | 117%       |
| 1.A.3.b TOTAL | 2019       |      | 2.202.888     | 2.202.888 | 0%         |                         |          | 0%         | 437.268.744               | 292.497.697 | 144.771.248 | -33%       |

| Adjustment details for 2020              |   |                  |           |            |                         |          |            |                           |             |             |              |             |      |
|--|---|------------------|-----------|------------|-------------------------|----------|------------|---------------------------|-------------|-------------|--------------|-------------|------|
| NFR Code                                 | Fuel                                      | Activity Data    |           |            | Implied Emission Factor |          |            | NO <sub>x</sub> Emissions |             |             |              |             |      |
|  |   | current          | adjusted  | difference | current                 | adjusted | difference | current                   | adjusted    | adjustment  | difference   |             |      |
|  |   | in [t]           | in [t]    | in [%]     | in [g/t]                | in [g/t] | in [%]     | in [kg]                   | in [kg]     | in [kg]     | in [kg]      |             |      |
| 1.A.3.a.i. Passenger Cars                | Gasoline                                  | pre-Cars         | 13.685    | 13.685     | 0%                      | 584.75   | 514.25     | -12%                      | 7.955.060   | 6.986.917   | -958.143     | -12%        |      |
|  |   | Car 1            | 36.541    | 36.541     | 0%                      | 338.50   | 297.71     | -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   | 1.553.129    | 20%         |      |
|  |   | Car 4            | 444.991   | 444.991    | 0%                      | 42.27    | 42.19      | 0%                        | 18.911.389  | 18.773.529  | -137.859     | 0%          |      |
|  |   | Car 5            | 31.234    | 31.234     | 0%                      | 18.61    | 42.19      | 127%                      | 581.142     | 1.317.737   | 736.595      | 127%        |      |
|  | Car 6                                     | 0                | 0         | 0%         | 25.08                   | 42.19    | 67%        | 2                         | 3           | 1           | 67%          |             |      |
|  | Gasoline total                            | 795.057          | 795.057   | 0%         | 92.55                   | 84.99    | -10%       | 37.644.842                | 31.650.586  | -5.993.255  | -16%         |             |      |
|  | Diesel Oil                                | pre-Cars         | 1.915     | 1.915      | 0%                      | 318.13   | 264.95     | -15%                      | 383.760     | 327.256     | -56.504      | -15%        |      |
|  |   | Car 1            | 10.338    | 10.338     | 0%                      | 294.42   | 245.17     | -17%                      | 3.046.428   | 2.741.387   | -305.121     | -10%        |      |
| Car 2                                    |   | 50.088           | 50.088    | 0%         | 406.90                  | 278.19   | -30%       | 29.372.795                | 19.974.210  | -9.398.584  | -32%         |             |      |
| Car 3                                    |   | 134.025          | 134.025   | 0%         | 542.94                  | 170.54   | -69%       | 72.645.173                | 23.929.276  | -48.715.897 | -67%         |             |      |
| 1.A.3.b.i. Light Duty Vehicles (LDVs)    | Gasoline                                  | pre-Cars         | 279.154   | 279.154    | 0%                      | 304.37   | 140.58     | -53%                      | 187.299.180 | 39.243.811  | -148.055.369 | -83%        |      |
|  |   | Car 1            | 53.547    | 53.547     | 0%                      | 434.70   | 140.58     | -68%                      | 23.276.735  | 7.527.796   | -15.748.939  | -68%        |      |
|  |   | Car 2            | 334       | 334        | 0%                      | 257.62   | 140.58     | -45%                      | 85.044      | 46.553      | -38.491      | -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 | 152.421.367 | -212.564.570 | -58%        |      |
|  |   | Diesel Oil       | pre-Cars  | 1.249      | 1.249                   | 0%       | 627.99     | 645.95                    | 1%          | 783.320     | 886.871      | 21.551      | 3%   |
|  | Car 1                                     |                  | 367       | 367        | 0%                      | 961.95   | 297.39     | -69%                      | 369.969     | 186.620     | -183.349     | -50%        |      |
|  | Car 2                                     |                  | 1.393     | 1.393      | 0%                      | 264.75   | 184.41     | -30%                      | 368.840     | 256.917     | -111.923     | -30%        |      |
|  | Car 3                                     |                  | 856       | 856        | 0%                      | 82.47    | 90.83      | 10%                       | 70.631      | 77.625      | 6.994        | 10%         |      |
|  | 1.A.3.b.ii. Heavy Duty Vehicles (HDVs)    | Gasoline         | pre-Cars  | 2.420      | 2.420                   | 0%       | 36.32      | 44.90                     | 24%         | 87.987      | 188.679      | 20.772      | 24%  |
| Car 1                                    |   |                  | 49        | 49         | 0%                      | 15.34    | 44.90      | 193%                      | 750         | 2.218       | 1.468        | 193%        |      |
| Car 2                                    |   |                  | 0         | 0          | 0%                      | 0%       | 0%         | 0                         | 0           | 0           | 0%           |             |      |
| Gasoline total                           |   |                  | 6.325     | 6.325      | 0%                      | 255.87   | 254.75     | -0%                       | 1.478.832   | 1.596.326   | 117.494      | 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%       | 399.59     | 276.24                    | -30%        | 2.389.080   | 1.289.636    | -1.099.444  | -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  | 5.085.760   | -12.570.123  | -72%        |      |
| 1.A.3.b.iii. Heavy Duty Vehicles (HDVs)  |   | Diesel Oil       | pre-Cars  | 54.581     | 54.581                  | 0%       | 491.42     | 80.69                     | -84%        | 26.021.036  | 4.940.722    | -21.080.314 | -80% |
|  |   |                  | Car 1     | 1.629      | 1.629                   | 0%       | 427.50     | 80.69                     | -81%        | 696.296     | 144.434      | -551.862    | -80% |
|  | Car 2                                     |                  | 0         | 0          | 0%                      | 15.73    | 80.69      | -81%                      | 7           | 4           | -3           | -43%        |      |
|  | Diesel oil total                          |                  | 113.450   | 113.450    | 0%                      | 416.34   | 134.96     | -68%                      | 54.043.533  | 15.351.584  | -38.691.949  | -72%        |      |
|  | LDVs Total                                |                  | 119.175   | 119.175    | 0%                      | 464.70   | 139.18     | -70%                      | 55.658.966  | 36.685.913  | -18.973.053  | -34%        |      |
|  | Diesel Oil                                |                  | pre-Cars  | 3.382      | 3.382                   | 0%       | 1096.25    | 1628.78                   | 48%         | 3.674.087   | 3.452.644    | -221.443    | -6%  |
|  |   | Car 1            | 2.826     | 2.826      | 0%                      | 749.41   | 732.14     | -2%                       | 2.117.871   | 2.125.595   | 7.723        | 0%          |      |
|  |   | Car 2            | 10.152    | 10.152     | 0%                      | 801.96   | 643.47     | -20%                      | 8.140.119   | 6.532.213   | -1.607.906   | -20%        |      |
|  |   | Car 3            | 15.890    | 15.890     | 0%                      | 633.22   | 437.25     | -30%                      | 13.065.776  | 7.269.299   | -5.796.477   | -44%        |      |
|  | 1.A.3.b.iv. Motorised Two-Wheelers (MOWs) | Diesel Oil       | pre-Cars  | 5.461      | 5.461                   | 0%       | 448.63     | 351.65                    | -21%        | 2.650.016   | 1.921.527    | -728.489    | -28% |
| Car 1                                    |   |                  | 10.326    | 10.326     | 0%                      | 337.28   | 182.33     | -46%                      | 3.882.417   | 1.882.544   | -1.999.873   | -51%        |      |
| Car 2                                    |   |                  | 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%        |      |
| pre-Cars                                 |   |                  | 10.185    | 10.185     | 0%                      | 1040.16  | 787.37     | -26%                      | 10.510.623  | 7.754.136   | -2.756.487   | -26%        |      |
| Car 1                                    |   |                  | 5.677     | 5.677      | 0%                      | 758.59   | 575.55     | -23%                      | 4.261.383   | 3.267.681   | -993.702     | -23%        |      |
| Diesel Oil                               |   | pre-Cars         | 38.558    | 38.558     | 0%                      | 817.62   | 524.79     | -35%                      | 31.525.526  | 20.234.619  | -11.290.907  | -36%        |      |
|  |   | Car 1            | 15.890    | 15.890     | 0%                      | 636.28   | 274.48     | -56%                      | 161.136.182 | 59.617.271  | -101.518.911 | -63%        |      |
|  |   | Car 2            | 69.636    | 69.636     | 0%                      | 368.34   | 290.62     | -21%                      | 27.183.867  | 20.146.636  | -7.037.231   | -26%        |      |
|  |   | Car 3            | 283.934   | 283.934    | 0%                      | 276.42   | 151.65     | -45%                      | 78.643.643  | 43.115.897  | -35.527.746  | -45%        |      |
| 1.A.3.b.v. Motorised Two-Wheelers (MOWs) | Gasoline                                  | pre-Cars         | 566.141   | 566.141    | 0%                      | 446.67   | 271.83     | -39%                      | 253.148.243 | 154.696.160 | -98.452.083  | -39%        |      |
|  |   | Car 1            | 7.973     | 7.973      | 0%                      | 122.80   | 149.18     | 22%                       | 972.721     | 1.189.393   | 216.672      | 22%         |      |
|  |   | Car 2            | 5.231     | 5.231      | 0%                      | 123.77   | 165.74     | 34%                       | 647.479     | 887.039     | 239.560      | 34%         |      |
|  |   | Car 3            | 3.587     | 3.587      | 0%                      | 141.16   | 184.21     | 30%                       | 585.362     | 696.681     | 111.319      | 30%         |      |
|  |   | Car 4            | 2.950     | 2.950      | 0%                      | 38.11    | 184.21     | 381%                      | 116.180     | 657.032     | 540.852      | 381%        |      |
|  |   | Car 5            | 0         | 0          | 0%                      | 0%       | 0%         | 0                         | 0           | 0           | 0%           |             |      |
|  | MOWs Total                                | 19.172           | 19.172    | 0%         | 113.68                  | 168.43   | 48%        | 2.243.149                 | 3.326.034   | 1.082.885   | 48%          |             |      |
|  | 1.A.3.b. Road Transport                   | Total            | 2.079.680 | 2.079.680  | 0%                      | 218.62   | 168.23     | -46%                      | 645.951.152 | 349.851.296 | -296.113.956 | -46%        |      |



| Adjustment details for 2023           |            |                         |           |            |                         |          |            |                           |             |             |              |      |
|---------------------------------------|------------|-------------------------|-----------|------------|-------------------------|----------|------------|---------------------------|-------------|-------------|--------------|------|
| NFR Code                              | Fuel       | Activity Data           |           |            | Implied Emission Factor |          |            | NO <sub>x</sub> Emissions |             |             |              |      |
|                                       |            | current                 | adjusted  | difference | current                 | adjusted | difference | current                   | adjusted    | adjustment  | difference   |      |
|                                       |            | in [t]                  | in [t]    | in [%]     | in [g/t]                | in [g/t] | in [%]     | in [kg]                   | in [kg]     | in [kg]     | in [%]       |      |
| 1.A.3.a.i. Passenger Cars             | Gasoline   | pre-Cars                | 11,581    | 11,581     | 0%                      | 607.72   | 635.38     | -52%                      | 7,035,041   | 6,189,785   | -836,256     | -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   | 137.92     | -29%                      | 13,487,749  | 10,035,380  | -3,372,369   | -29% |
|                                       |            | Car 3                   | 189,443   | 189,443    | 0%                      | 63.89    | 72.62      | 14%                       | 6,927,963   | 7,875,172   | 947,209      | 14%  |
|                                       |            | Car 4                   | 489,541   | 489,541    | 0%                      | 45.39    | 45.13      | -1%                       | 18,541,881  | 18,436,736  | -105,145     | -1%  |
|                                       |            | Car 5                   | 181,961   | 181,961    | 0%                      | 18.61    | 45.13      | 142%                      | 1,897,355   | 4,681,311   | 2,783,956    | 142% |
|                                       |            | Car 6                   | 282       | 282        | 0%                      | 25.06    | 45.13      | 74%                       | 7,339       | 12,736      | 5,399        | 74%  |
|                                       |            | Gasoline total          | 790,267   | 790,267    | 0%                      | 85.73    | 79.88      | -9%                       | 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%                      | 13,987,432  | 7,445,646   | -6,541,787   | -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%                      | 415.96   | 158.66     | -64%                      | 242,962,982 | 88,096,639  | -154,866,343 | -64% |
|                                       |            | FCs Total               | 1,345,512 | 1,345,512  | 0%                      | 234.61   | 115.29     | -50%                      | 386,442,896 | 146,673,867 | -239,769,029 | -50% |
|                                       | Gasoline   | pre-Cars                | 962       | 962        | 0%                      | 632.36   | 645.95     | 2%                        | 687,779     | 821,166     | 133,387      | 2%   |
|                                       |            | Car 1                   | 232       | 232        | 0%                      | 803.24   | 193.22     | -86%                      | 199,985     | 70,295      | -129,691     | -86% |
|                                       |            | Car 2                   | 989       | 989        | 0%                      | 271.16   | 195.74     | -28%                      | 269,134     | 133,538     | -135,596     | -28% |
|                                       |            | Car 3                   | 835       | 835        | 0%                      | 89.38    | 98.33      | 10%                       | 14,623      | 82,092      | 7,469        | 10%  |
|                                       |            | Car 4                   | 2,030     | 2,030      | 0%                      | 38.49    | 47.58      | 24%                       | 78,155      | 96,691      | 18,536       | 24%  |
|                                       |            | Car 5                   | 610       | 610        | 0%                      | 16.36    | 47.58      | 182%                      | 9,941       | 29,011      | 19,069       | 182% |
|                                       |            | Car 6                   | 0         | 0          | 0%                      | 15.37    | 47.58      | 210%                      | 2           | 6           | 4            | 210% |
|                                       |            | Gasoline total          | 5,657     | 5,657      | 0%                      | 218.93   | 193.15     | -32%                      | 1,238,520   | 1,092,662   | -145,858     | -12% |
|                                       | Diesel Oil | pre-Cars                | 3,281     | 3,281      | 0%                      | 424.46   | 386.79     | -9%                       | 1,368,754   | 1,022,093   | -346,661     | -9%  |
|                                       |            | Car 1                   | 3,666     | 3,666      | 0%                      | 398.34   | 276.24     | -30%                      | 1,445,980   | 1,017,634   | -428,346     | -30% |
|                                       |            | Car 2                   | 8,479     | 8,479      | 0%                      | 336.40   | 133.39     | -49%                      | 2,852,325   | 1,639,772   | -1,212,553   | -43% |
|                                       |            | Car 3                   | 23,785    | 23,785     | 0%                      | 558.53   | 150.44     | -73%                      | 13,050,281  | 3,565,082   | -9,485,199   | -73% |
|                                       |            | Car 4                   | 59,485    | 59,485     | 0%                      | 494.22   | 89.85      | -82%                      | 29,369,870  | 5,337,395   | -24,032,475  | -82% |
|                                       |            | Car 5                   | 15,964    | 15,964     | 0%                      | 442.70   | 89.85      | -80%                      | 7,040,461   | 1,420,906   | -5,619,555   | -80% |
|                                       |            | Car 6                   | 1         | 1          | 0%                      | 15.14    | 89.85      | -81%                      | 122         | 72          | -50          | -41% |
|                                       |            | Diesel oil total        | 114,350   | 114,350    | 0%                      | 485.91   | 126.17     | -79%                      | 55,186,382  | 13,741,354  | -41,445,028  | -79% |
|                                       |            | DNVs Total              | 129,008   | 129,008    | 0%                      | 489.51   | 123.61     | -74%                      | 56,344,903  | 14,834,696  | -41,510,207  | -74% |
| 1.A.3.b.ii. Heavy Duty Vehicles Buses | Gasoline   | pre-Cars                | 1,326     | 1,326      | 0%                      | 1091.46  | 1918.46    | 4%                        | 1,410,640   | 1,352,283   | -58,357      | -4%  |
|                                       |            | Car 1                   | 1,245     | 1,245      | 0%                      | 727.34   | 131.15     | -3%                       | 1,017,476   | 337,184     | -680,292     | -3%  |
|                                       |            | 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%                      | 9,073,197   | 6,089,744   | -2,983,453   | -31% |
|                                       |            | Car 4                   | 5,331     | 5,331      | 0%                      | 468.10   | 361.86     | -23%                      | 2,642,179   | 1,675,777   | -966,402     | -23% |
|                                       |            | Car 5                   | 20,752    | 20,752     | 0%                      | 347.84   | 182.99     | -47%                      | 7,219,563   | 3,787,467   | -3,432,096   | -47% |
|                                       |            | Car 6                   | 73        | 73         | 0%                      | 64.52    | 182.99     | 236%                      | 3,961       | 13,296      | 9,334        | 236% |
|                                       |            | Buses Total             | 50,962    | 50,962     | 0%                      | 533.22   | 384.33     | -28%                      | 27,141,913  | 19,965,288  | -7,176,625   | -28% |
|                                       | Diesel Oil | pre-Cars                | 6,922     | 6,922      | 0%                      | 1036.95  | 158.82     | -21%                      | 7,107,543   | 5,252,345   | -1,855,198   | -21% |
|                                       |            | Car 1                   | 3,630     | 3,630      | 0%                      | 743.70   | 570.57     | -24%                      | 2,721,305   | 2,071,111   | -650,194     | -24% |
|                                       |            | Car 2                   | 23,577    | 23,577     | 0%                      | 818.27   | 516.43     | -37%                      | 19,262,253  | 12,175,855  | -7,086,398   | -37% |
|                                       |            | Car 3                   | 96,736    | 96,736     | 0%                      | 634.65   | 270.21     | -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  | 14,680,877  | -5,301,723   | -27% |
|                                       |            | Car 5                   | 485,981   | 485,981    | 0%                      | 261.24   | 152.32     | -42%                      | 116,149,955 | 61,626,577  | -54,523,378  | -42% |
|                                       |            | Car 6                   | 2,380     | 2,380      | 0%                      | 188.487  | 360.323    | 345%                      | 188,487     | 360,323     | 171,836      | 223% |
|                                       |            | Trucks Total            | 589,585   | 589,585    | 0%                      | 385.33   | 224.69     | -41%                      | 224,829,180 | 132,064,153 | -92,765,027  | -41% |
|                                       | Gasoline   | pre-Cars                | 6,190     | 6,190      | 0%                      | 122.76   | 151.03     | 23%                       | 822,539     | 1,011,520   | 188,981      | 23%  |
|                                       |            | Car 1                   | 4,386     | 4,386      | 0%                      | 134.61   | 171.39     | 28%                       | 536,615     | 738,050     | 201,435      | 38%  |
|                                       |            | Car 2                   | 3,267     | 3,267      | 0%                      | 136.22   | 184.56     | 45%                       | 445,087     | 636,853     | 191,766      | 43%  |
|                                       |            | Car 3                   | 3,984     | 3,984      | 0%                      | 38.66    | 184.56     | 382%                      | 19,386      | 778,616     | 759,230      | 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%   |
|                                       |            | GNVs Total              | 18,268    | 18,268     | 0%                      | 107.43   | 175.28     | 61%                       | 1,982,546   | 3,165,439   | 1,182,893    | 61%  |
|                                       |            | 1.A.3.b. Road Transport | 2,084,964 | 2,084,964  | 0%                      | 295.79   | 151.71     | -49%                      | 616,721,438 | 396,381,343 | -220,340,094 | -49% |

| Adjustment details for 2023                       |                         |               |           |            |                         |          |             |                           |              |              |             |      |
|---|-------------------------|---------------|-----------|------------|-------------------------|----------|-------------|---------------------------|--------------|--------------|-------------|------|
| NFR Code  | Fuel                    | Activity Data |           |            | Implied Emission Factor |          |             | NO <sub>x</sub> Emissions |              |              |             |      |
|   |                         | current       | adjusted  | difference | current                 | adjusted | difference  | current                   | adjusted     | adjustment   | difference  |      |
|   |                         | in [t]        | in [t]    | in [%]     | in [g/t]                | in [g/t] | in [%]      | in [kg]                   | in [kg]      | in [kg]      | in [%]      |      |
| 1.A.3.a.i. Passenger Cars                         | Gasoline                | pre-Cars      | 11,680    | 11,680     | 0%                      | 618.27   | 649.35      | -5%                       | 7,011,541    | 6,967,452    | -4,444,808  | -95% |
|   |                         | Car 1         | 37,743    | 37,743     | 0%                      | 353.78   | 341.68      | -32%                      | 13,362,986   | 9,129,495    | -4,233,491  | -32% |
|   |                         | Car 2         | 62,680    | 62,680     | 0%                      | 188.93   | 139.33      | -27%                      | 11,889,922   | 8,722,244    | -3,167,678  | -27% |
|   |                         | Car 3         | 97,792    | 97,792     | 0%                      | 66.38    | 73.19       | 10%                       | 6,481,618    | 7,156,920    | 675,302     | 10%  |
|   |                         | Car 4         | 397,911   | 397,911    | 0%                      | 47.22    | 46.52       | -1%                       | 18,790,345   | 18,589,937   | -200,407    | -1%  |
|   |                         | Car 5         | 138,063   | 138,063    | 0%                      | 18.60    | 46.52       | 150%                      | 2,583,150    | 6,439,691    | 3,856,541   | 150% |
|   | Car 6                   | 2,714         | 2,714     | 0%         | 25.99                   | 46.52    | 79%         | 70,526                    | 126,237      | 55,711       | 79%         |      |
|   | Gasoline total          | 748,116       | 748,116   | 0%         | 88.35                   | 74.85    | -16%        | 68,090,687                | 56,671,737   | -11,418,950  | -17%        |      |
|   | Diesel Oil              | pre-Cars      | 1,389     | 1,389      | 0%                      | 112.74   | 284.56      | -61%                      | 433,081      | 268,136      | -164,945    | -61% |
|   |                         | Car 1         | 5,626     | 5,626      | 0%                      | 298.42   | 286.79      | -4%                       | 1,678,472    | 1,640,688    | -37,784     | -4%  |
|   |                         | Car 2         | 28,437    | 28,437     | 0%                      | 406.84   | 279.91      | -40%                      | 11,563,522   | 6,253,531    | -5,309,991  | -40% |
|   |                         | Car 3         | 92,795    | 92,795     | 0%                      | 574.33   | 176.67      | -69%                      | 53,284,956   | 16,579,373   | -36,705,583 | -69% |
|   |                         | Car 4         | 222,583   | 222,583    | 0%                      | 393.55   | 149.27      | -62%                      | 87,598,471   | 33,225,566   | -54,372,905 | -62% |
|   |                         | Car 5         | 233,766   | 233,766    | 0%                      | 435.42   | 149.27      | -66%                      | 101,787,275  | 34,894,788   | -66,892,487 | -66% |
|   | Car 6                   | 4,536         | 4,536     | 0%         | 259.53                  | 149.27   | -42%        | 1,177,151                 | 677,045      | -500,106     | -42%        |      |
|   | Diesel oil total        | 589,131       | 589,131   | 0%         | 437.14                  | 158.71   | -64%        | 257,533,128               | 83,899,619   | -173,633,509 | -64%        |      |
| FCs Total   | 1,337,247               | 1,337,247     | 0%        | 237.49     | 111.77                  | -53%     | 317,723,735 | 146,571,356               | -171,152,379 | -53%         |             |      |
| Gasoline  | pre-Cars                | 981           | 981       | 0%         | 633.81                  | 645.95   | 2%          | 1,683,320                 | 1,751,293    | 67,973       | 2%          |      |
|   | Car 1                   | 194           | 194       | 0%         | 803.50                  | 386.27   | -86%        | 187,281                   | 59,328       | -127,953     | -86%        |      |
|   | Car 2                   | 836           | 836       | 0%         | 274.42                  | 291.18   | 21%         | 229,520                   | 188,285      | -41,235      | -21%        |      |
|   | Car 3                   | 784           | 784       | 0%         | 52.66                   | 191.79   | 10%         | 72,691                    | 79,780       | 7,089        | 10%         |      |
|   | Car 4                   | 1,089         | 1,089     | 0%         | 43.70                   | 48.89    | 20%         | 77,284                    | 82,833       | 5,549        | 20%         |      |
|   | Car 5                   | 966           | 966       | 0%         | 16.67                   | 48.89    | 183%        | 16,187                    | 47,268       | 31,081       | 183%        |      |
|   | Car 6                   | 1             | 1         | 0%         | 17.66                   | 48.89    | 170%        | 26                        | 72           | 46           | 170%        |      |
|   | Gasoline total          | 5,578         | 5,578     | 0%         | 262.86                  | 184.67   | -3%         | 1,131,299                 | 1,096,727    | -34,572      | -3%         |      |
| Diesel Oil  | pre-Cars                | 2,744         | 2,744     | 0%         | 424.37                  | 386.79   | -9%         | 1,168,757                 | 944,928      | -223,829     | -9%         |      |
|   | Car 1                   | 2,945         | 2,945     | 0%         | 398.34                  | 276.25   | -29%        | 1,166,782                 | 834,596      | -332,186     | -29%        |      |
|   | Car 2                   | 6,982         | 6,982     | 0%         | 336.92                  | 133.39   | -49%        | 2,340,147                 | 1,350,674    | -989,473     | -42%        |      |
|   | Car 3                   | 20,421        | 20,421    | 0%         | 568.12                  | 150.38   | -73%        | 11,437,989                | 3,670,823    | -7,767,166   | -73%        |      |
|   | Car 4                   | 55,087        | 55,087    | 0%         | 69.72                   | 90.45    | 40%         | 27,776,440                | 5,040,454    | -22,735,986  | -40%        |      |
|   | Car 5                   | 29,024        | 29,024    | 0%         | 441.97                  | 90.45    | -40%        | 13,181,325                | 2,687,954    | -10,493,371  | -40%        |      |
|   | Car 6                   | 41            | 41        | 0%         | 161.28                  | 90.45    | -40%        | 6,168                     | 2,688        | -3,479       | -40%        |      |
|   | Diesel oil total        | 118,777       | 118,777   | 0%         | 488.86                  | 154.83   | -76%        | 57,083,513                | 13,656,488   | -43,427,025  | -76%        |      |
| LDWs Total  | 124,354                 | 124,354       | 0%        | 488.84     | 156.83                  | -69%     | 58,214,142  | 14,677,215                | -43,537,927  | -69%         |             |      |
| 1.A.3.a.ii. Heavy Duty Vehicles (HDV)             | pre-Cars                | 1,172         | 1,172     | 0%         | 1098.69                 | 1110.23  | 4%          | 1,249,028                 | 1,134,143    | -114,885     | -9%         |      |
|   | Car I                   | 1,054         | 1,054     | 0%         | 727.68                  | 759.39   | 2%          | 786,020                   | 791,181      | 24,951       | 3%          |      |
|   | Car II                  | 6,684         | 6,684     | 0%         | 764.87                  | 643.48   | -40%        | 3,324,968                 | 4,379,371    | 1,054,403    | 31%         |      |
|   | Car III                 | 13,187        | 13,187    | 0%         | 638.43                  | 473.65   | -27%        | 6,262,880                 | 5,998,226    | -2,654,575   | -27%        |      |
|   | Car IV                  | 4,946         | 4,946     | 0%         | 868.55                  | 351.71   | -34%        | 2,278,051                 | 1,739,736    | -548,354     | -24%        |      |
|   | Car V                   | 26,096        | 26,096    | 0%         | 368.98                  | 183.48   | -40%        | 8,435,583                 | 4,240,743    | -4,194,761   | -40%        |      |
|   | Car VI                  | 537           | 537       | 0%         | 44.76                   | 183.48   | 310%        | 24,047                    | 86,672       | 74,625       | 310%        |      |
|   | Buses Total             | 31,716        | 31,716    | 0%         | 508.54                  | 360.06   | -29%        | 26,390,969                | 16,620,843   | -9,769,126   | -29%        |      |
| 1.A.3.a.iii. Heavy Duty Vehicle: Trucks & Lorries | pre-Cars                | 5,983         | 5,983     | 0%         | 1030.72                 | 737.35   | -29%        | 6,072,170                 | 4,322,888    | -1,749,303   | -29%        |      |
|   | Car I                   | 2,945         | 2,945     | 0%         | 748.27                  | 583.27   | -24%        | 2,176,946                 | 1,650,980    | -526,877     | -24%        |      |
|   | Car II                  | 16,884        | 16,884    | 0%         | 818.17                  | 510.45   | -37%        | 10,080,881                | 6,949,975    | -3,130,906   | -31%        |      |
|   | Car III                 | 45,517        | 45,517    | 0%         | 633.52                  | 487.73   | -24%        | 47,587,448                | 27,081,187   | -19,998,688  | -24%        |      |
|   | Car IV                  | 42,781        | 42,781    | 0%         | 356.96                  | 287.27   | -27%        | 16,936,867                | 12,289,770   | -4,647,097   | -27%        |      |
|   | Car V                   | 436,980       | 436,980   | 0%         | 261.70                  | 152.65   | -40%        | 123,181,324               | 66,796,436   | -56,384,897  | -40%        |      |
|   | Car VI                  | 18,020        | 18,020    | 0%         | 913.87                  | 152.65   | -281%       | 913,082                   | 2,750,630    | 1,837,548    | 281%        |      |
|   | Trucks Total            | 680,139       | 680,139   | 0%         | 353.96                  | 287.33   | -21%        | 218,587,531               | 124,188,469  | -97,899,062  | -47%        |      |
| 1.A.3.b.iv. Motorised Two-Wheelers (MOWs)         | pre-Cars                | 6,352         | 6,352     | 0%         | 123.97                  | 151.79   | 23%         | 781,736                   | 964,170      | 182,443      | 23%         |      |
|   | Car I                   | 4,013         | 4,013     | 0%         | 125.91                  | 173.15   | 39%         | 582,073                   | 634,880      | 152,807      | 39%         |      |
|   | Car 2                   | 3,362         | 3,362     | 0%         | 132.24                  | 158.58   | 40%         | 436,688                   | 648,894      | 209,136      | 40%         |      |
|   | Car 3                   | 4,562         | 4,562     | 0%         | 39.81                   | 158.58   | 281%        | 181,610                   | 882,175      | 716,565      | 281%        |      |
|   | Car 4                   | 0             | 0         | 0%         | 0                       | 0        | 0%          | 0                         | 0            | 0            | 0%          |      |
|   | Car 5                   | 0             | 0         | 0%         | 0                       | 0        | 0%          | 0                         | 0            | 0            | 0%          |      |
|   | MOWs Total              | 18,229        | 18,229    | 0%         | 104.34                  | 175.38   | 68%         | 1,962,088                 | 3,197,038    | 1,234,951    | 68%         |      |
|   | 1.A.3.b. Road Transport | 2,132,083     | 2,132,083 | 0%         | 268.88                  | 186.27   | -56%        | 616,073,963               | 310,854,371  | -305,224,592 | -56%        |      |

| 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   | 6.337.484   | -796.844     | -11%  |
|  |            | Car 1            | 30.667    | 30.667     | 0%                      | 368.77   | 343.93     | -32%                      | 11.082.246  | 7.480.541   | -3.621.706   | -32%  |
|  |            | Car 2            | 53.486    | 53.486     | 0%                      | 198.58   | 140.31     | -29%                      | 10.514.477  | 7.584.432   | -3.018.844   | -29%  |
|  |            | Car 3            | 87.374    | 87.374     | 0%                      | 65.31    | 73.93      | 7%                        | 6.955.589   | 6.459.797   | -494.218     | -7%   |
|  |            | Car 4            | 387.759   | 387.759    | 0%                      | 45.16    | 47.80      | -3%                       | 19.093.585  | 19.536.009  | -523.557     | -3%   |
|  |            | Car 5            | 171.270   | 171.270    | 0%                      | 18.59    | 47.80      | 151%                      | 3.183.282   | 0.187.581   | 5.004.209    | 151%  |
|  |            | Car 6            | 10.315    | 10.315     | 0%                      | 25.97    | 47.80      | 84%                       | 267.855     | 433.096     | -225.245     | -84%  |
|  |            | Gasoline total   | 752.526   | 752.526    | 0%                      | 76.03    | 73.89      | 4%                        | 57.215.533  | 54.988.521  | 2,216.412    | -4%   |
|  | Diesel Oil | pre-Cars         | 1.341     | 1.341      | 0%                      | 311.73   | 284.66     | -56%                      | 417.967     | 366.246     | -52.722      | -13%  |
|  |            | Car 1            | 4.892     | 4.892      | 0%                      | 298.92   | 267.28     | -11%                      | 1.482.284   | 1.387.643   | -156.951     | -11%  |
|  |            | Car 2            | 23.934    | 23.934     | 0%                      | 408.71   | 320.45     | -49%                      | 9.734.484   | 5.276.480   | 4.458.004    | -49%  |
|  |            | Car 3            | 82.749    | 82.749     | 0%                      | 585.53   | 176.81     | -69%                      | 48.451.830  | 14.796.245  | -33.655.585  | -69%  |
|  |            | Car 4            | 211.237   | 211.237    | 0%                      | 297.27   | 151.77     | -62%                      | 83.917.680  | 32.059.973  | -51.857.706  | -62%  |
|  |            | Car 5            | 285.011   | 285.011    | 0%                      | 436.38   | 151.77     | -65%                      | 124.721.396 | 43.370.300  | -81.343.896  | -65%  |
|  |            | Car 6            | 16.081    | 16.081     | 0%                      | 259.34   | 151.77     | -41%                      | 4.170.580   | 2.440.686   | -1.729.814   | -41%  |
|  |            | Diesel oil total | 626.045   | 626.045    | 0%                      | 415.87   | 159.12     | -63%                      | 272.876.061 | 99.613.892  | -173.262.169 | -63%  |
|  |            | Pkcs Total       | 1,338,571 | 1,338,571  | 0%                      | 238.44   | 152.15     | -53%                      | 138,891.584 | 154,652.853 | -175,476.261 | -53%  |
|  | Gasoline   | pre-Cars         | 986       | 986        | 0%                      | 632.44   | 645.95     | -2%                       | 193.683     | 176.124     | -18.444      | -10%  |
|  |            | Car 1            | 173       | 173        | 0%                      | 968.27   | 989.98     | -64%                      | 150.074     | 53.575      | -96.499      | -64%  |
|  |            | Car 2            | 748       | 748        | 0%                      | 204.73   | 287.11     | -31%                      | 212.888     | 154.839     | -58.029      | -27%  |
|  |            | Car 3            | 771       | 771        | 0%                      | 98.62    | 185.21     | -7%                       | 75.982      | 81.070      | -5.078       | -7%   |
|  |            | Car 4            | 1.087     | 1.087      | 0%                      | 43.47    | 50.15      | 15%                       | 81.139      | 83.618      | -2.479       | -15%  |
|  |            | Car 5            | 1.374     | 1.374      | 0%                      | 17.11    | 50.15      | 183%                      | 23.517      | 68.918      | -45.401      | -183% |
|  |            | Car 6            | 17        | 17         | 0%                      | 18.06    | 50.15      | 179%                      | 212         | 670         | -657         | -179% |
|  |            | Gasoline total   | 5.845     | 5.845      | 0%                      | 198.34   | 176.49     | -2%                       | 1,112.584   | 1,031.852   | -88.732      | -8%   |
| 1.A.3.b.i. - Light Duty Vehicles (LDVs)      | Gasoline   | pre-Cars         | 2.537     | 2.537      | 0%                      | 428.16   | 386.79     | -21%                      | 1.985.879   | 1.76.259    | -257.559     | -21%  |
|  |            | Car 1            | 2.588     | 2.588      | 0%                      | 393.82   | 276.25     | -45%                      | 987.136     | 539.898     | -447.328     | -45%  |
|  |            | Car 2            | 6.087     | 6.087      | 0%                      | 338.91   | 193.25     | -42%                      | 1.385.995   | 1.180.889   | -428.128     | -42%  |
|  |            | Car 3            | 18.220    | 18.220     | 0%                      | 571.75   | 150.58     | -74%                      | 10.417.076  | 2.742.056   | -7.675.028   | -74%  |
|  |            | Car 4            | 52.361    | 52.361     | 0%                      | 498.70   | 91.69      | -82%                      | 26.164.486  | 4.703.746   | -21.394.748  | -82%  |
|  |            | Car 5            | 46.749    | 46.749     | 0%                      | 438.44   | 91.69      | -79%                      | 20.696.234  | 4.258.626   | -16.237.309  | -79%  |
|  | Diesel Oil | pre-Cars         | 187       | 187        | 0%                      | 151.18   | 91.69      | -60%                      | 29.829      | 17.974      | -11.855      | -60%  |
|  |            | Car 1            | 187       | 187        | 0%                      | 151.18   | 91.69      | -60%                      | 29.829      | 17.974      | -11.855      | -60%  |
|  |            | Car 2            | 187       | 187        | 0%                      | 151.18   | 91.69      | -60%                      | 29.829      | 17.974      | -11.855      | -60%  |
|  |            | Car 3            | 187       | 187        | 0%                      | 151.18   | 91.69      | -60%                      | 29.829      | 17.974      | -11.855      | -60%  |
|  |            | Car 4            | 187       | 187        | 0%                      | 151.18   | 91.69      | -60%                      | 29.829      | 17.974      | -11.855      | -60%  |
|  |            | Car 5            | 187       | 187        | 0%                      | 151.18   | 91.69      | -60%                      | 29.829      | 17.974      | -11.855      | -60%  |
|  |            | Diesel oil total | 187.528   | 187.528    | 0%                      | 415.56   | 170.96     | -77%                      | 61.146.575  | 14,267.237  | -46,879.338  | -77%  |
|  |            | LDVs Total       | 134,423   | 134,423    | 0%                      | 463.56   | 153.81     | -75%                      | 62,299.160  | 15,298.849  | -46,988.311  | -75%  |
|  | Diesel Oil | pre-Cars         | 984       | 984        | 0%                      | 1099.48  | 1919.23    | -5%                       | 1.062.384   | 1.062.921   | -48.443      | -5%   |
|  |            | Car 1            | 837       | 837        | 0%                      | 728.12   | 130.98     | -3%                       | 659.232     | 628.359     | -18.127      | -3%   |
|  |            | Car 2            | 5.586     | 5.586      | 0%                      | 704.95   | 643.67     | -95%                      | 4.284.320   | 3.683.441   | -798.887     | -95%  |
|  |            | 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   | -467.632     | -24%  |
|  |            | Car 5            | 22.042    | 22.042     | 0%                      | 368.55   | 183.99     | -49%                      | 7.726.921   | 4.065.632   | -3.671.389   | -49%  |
|  |            | Car 6            | 4.182     | 4.182      | 0%                      | 42.78    | 183.99     | 330%                      | 178.913     | 789.476     | -610.563     | -330% |
|  |            | Diesel Total     | 49,143    | 49,143     | 0%                      | 468.37   | 339.99     | -27%                      | 23,017.115  | 16,788.234  | -6,228.881   | -27%  |
|  |            | Trucks Total     | 572,754   | 572,754    | 0%                      | 314.85   | 196.65     | -38%                      | 179,874.133 | 112,285.562 | -67,588.571  | -38%  |
| 1.A.3.b.ii. - Heavy Duty Vehicles (HDVs)     | Gasoline   | pre-Cars         | 6.185     | 6.185      | 0%                      | 122.85   | 158.64     | -29%                      | 795.185     | 974.388     | -218.182     | -29%  |
|  |            | Car 1            | 3.037     | 3.037      | 0%                      | 134.71   | 174.84     | -40%                      | 478.514     | 670.859     | -192.346     | -40%  |
|  |            | Car 2            | 3.365     | 3.365      | 0%                      | 128.94   | 186.25     | -52%                      | 433.874     | 680.378     | -246.504     | -52%  |
|  |            | Car 3            | 5.385     | 5.385      | 0%                      | 38.53    | 186.25     | 386%                      | 29.722      | 1.041.189   | -831.467     | -386% |
|  |            | Car 4            | 0         | 0          | 0%                      | 0        | 0          | 0%                        | 0           | 0           | 0            | 0%    |
|  |            | Car 5            | 0         | 0          | 0%                      | 0        | 0          | 0%                        | 0           | 0           | 0            | 0%    |
|  |            | Gasoline total   | 18,673    | 18,673     | 0%                      | 108.59   | 179.24     | -78%                      | 1,878.294   | 3,386.734   | -1,488.499   | -78%  |
|  | Diesel Oil | pre-Cars         | 187       | 187        | 0%                      | 151.18   | 91.69      | -60%                      | 29.829      | 17.974      | -11.855      | -60%  |
|  |            | Car 1            | 187       | 187        | 0%                      | 151.18   | 91.69      | -60%                      | 29.829      | 17.974      | -11.855      | -60%  |
|  |            | Car 2            | 187       | 187        | 0%                      | 151.18   | 91.69      | -60%                      | 29.829      | 17.974      | -11.855      | -60%  |
|  |            | Car 3            | 187       | 187        | 0%                      | 151.18   | 91.69      | -60%                      | 29.829      | 17.974      | -11.855      | -60%  |
|  |            | Car 4            | 187       | 187        | 0%                      | 151.18   | 91.69      | -60%                      | 29.829      | 17.974      | -11.855      | -60%  |
|  |            | Car 5            | 187       | 187        | 0%                      | 151.18   | 91.69      | -60%                      | 29.829      | 17.974      | -11.855      | -60%  |
|  |            | Diesel oil total | 187.528   | 187.528    | 0%                      | 415.56   | 170.94     | -77%                      | 61.146.575  | 14,267.237  | -46,879.338  | -77%  |
|  |            | Trucks Total     | 572,754   | 572,754    | 0%                      | 314.85   | 196.65     | -38%                      | 179,874.133 | 112,285.562 | -67,588.571  | -38%  |
|  | 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%                       | 659.232     | 628.359     | -18.127      | -3%   |
|  |            | Car 2            | 5.586     | 5.586      | 0%                      | 704.95   | 643.67     | -95%                      | 4.284.320   | 3.683.441   | -798.887     | -95%  |
|  |            | 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   | -467.632     | -24%  |
|  |            | Car 5            | 22.042    | 22.042     | 0%                      | 368.55   | 183.99     | -49%                      | 7.726.921   | 4.065.632   | -3.671.389   | -49%  |
|  |            | Car 6            | 4.182     | 4.182      | 0%                      | 42.78    | 183.99     | 330%                      | 178.913     | 789.476     | -610.563     | -330% |
|  |            | Diesel Total     | 49,143    | 49,143     | 0%                      | 468.37   | 339.99     | -27%                      | 23,017.115  | 16,788.234  | -6,228.881   | -27%  |
|  |            | Trucks Total     | 572,754   | 572,754    | 0%                      | 314.85   | 196.65     | -38%                      | 179,874.133 | 112,285.562 | -67,588.571  | -38%  |
| 1.A.3.b.iii. - Motorised Two-Wheelers (MOWs) | Gasoline   | pre-Cars         | 6.185     | 6.185      | 0%                      | 122.85   | 158.64     | -29%                      | 795.185     | 974.388     | -218.182     | -29%  |
|  |            | Car 1            | 3.037     | 3.037      | 0%                      | 134.71   | 174.84     | -40%                      | 478.514     | 670.859     | -192.346     | -40%  |
|  |            | Car 2            | 3.365     | 3.365      | 0%                      | 128.94   | 186.25     | -52%                      | 433.874     | 680.378     | -246.504     | -52%  |
|  |            | Car 3            | 5.385     | 5.385      | 0%                      | 38.53    | 186.25     | 386%                      | 29.722      | 1.041.189   | -831.467     | -386% |
|  |            | Car 4            | 0         | 0          | 0%                      | 0        | 0          | 0%                        | 0           | 0           | 0            | 0%    |
|  |            | Car 5            | 0         | 0          | 0%                      | 0        | 0          | 0%                        | 0           | 0           | 0            | 0%    |
|  |            | Gasoline total   | 18,673    | 18,673     | 0%                      | 108.59   | 179.24     | -78%                      | 1,878.294   | 3,386.734   | -1,488.499   | -78%  |
|  | Diesel Oil | pre-Cars         | 187       | 187        | 0%                      | 151.18   | 91.69      | -60%                      | 29.829      | 17.974      | -11.855      | -60%  |
|  |            | Car 1            | 187       | 187        | 0%                      | 151.18   | 91.69      | -60%                      | 29.829      | 17.974      | -11.855      | -60%  |
|  |            | Car 2            | 187       | 187        | 0%                      | 151.18   | 91.69      | -60%                      | 29.829      | 17.974      | -11.855      | -60%  |
|  |            | Car 3            | 187       | 187        | 0%                      | 151.18   | 91.69      | -60%                      | 29.829      | 17.974      | -11.855      | -60%  |
|  |            | Car 4            | 187       | 187        | 0%                      | 151.18   | 91.69      | -60%                      | 29.829      | 17.974      | -11.855      | -60%  |
|  |            | Car 5            | 187       | 187        | 0%                      | 151.18   | 91.69      | -60%                      | 29.829      | 17.974      | -11.855      | -60%  |
|  |            | Diesel oil total | 187.528   | 187.528    | 0%                      | 415.56   | 170.94     | -77%                      | 61.146.575  | 14,267.237  | -46,879.338  | -77%  |
|  |            | Trucks Total     | 572,754   | 572,754    | 0%                      | 314.85   | 196.65     | -38%                      | 179,874.133 | 112,285.562 | -67,588.571  | -38%  |
|  | 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%                       | 659.232     | 628.359     | -18.127      | -3%   |
|  |            | Car 2            | 5.586     | 5.586      | 0%                      | 704.95   | 643.67     | -95%                      | 4.284.320   | 3.683.441   | -798.887     | -95%  |
|  |            | 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   | -467.632     | -24%  |
|  |            |                  |           |            |                         |          |            |                           |             |             |              |       |



| Adjustment details for 2026                |                  |               |           |            |                         |          |            |                           |             |              |            |      |
|--|------------------|---------------|-----------|------------|-------------------------|----------|------------|---------------------------|-------------|--------------|------------|------|
| NFR Code                                   | Fuel             | Activity Data |           |            | Implied Emission Factor |          |            | NO <sub>x</sub> Emissions |             |              |            |      |
|  |                  | current       | adjusted  | difference | current                 | adjusted | difference | current                   | adjusted    | adjustment   | difference |      |
|  |                  | in [t]        | in [t]    | in [%]     | in [g/t]                | in [g/t] | in [%]     | in [kg]                   | in [kg]     | in [kg]      | in [kg]    |      |
| 1.A.3.a.i - Passenger Cars                 | Gasoline         | pre-Cars      | 11 782    | 11 782     | 0%                      | 634.75   | 644.11     | -14%                      | 7 470 914   | 6 410 967    | -1 059 947 | -14% |
|  |                  | Car 1         | 20 270    | 20 270     | 0%                      | 372.25   | 341.68     | -8%                       | 7 545 483   | 4 886 888    | -2 658 595 | -35% |
|  |                  | Car 2         | 36 062    | 36 062     | 0%                      | 212.73   | 143.11     | -33%                      | 7 671 581   | 5 180 897    | -2 490 684 | -33% |
|  |                  | Car 3         | 83 039    | 83 039     | 0%                      | 76.17    | 75.50      | -1%                       | 4 881 482   | 4 759 259    | -122 223   | -1%  |
|  |                  | Car 4         | 334 413   | 334 413    | 0%                      | 53.74    | 50.17      | -7%                       | 17 369 364  | 16 777 445   | -591 919   | -3%  |
|  |                  | Car 5         | 183 374   | 183 374    | 0%                      | 19.09    | 50.17      | 163%                      | 3 580 745   | 9 189 834    | 5 609 089  | 163% |
|  | Car 6            | 65 332        | 65 332    | 0%         | 25.67                   | 50.17    | 89%        | 1 768 917                 | 3 327 855   | 1 558 938    | 88%        |      |
|  | Gasoline total   | 715 272       | 715 272   | 0%         | 70.93                   | 70.65    | -0%        | 58 736 267                | 50 535 049  | -8 201 218   | -14%       |      |
|  | pre-Cars         | 1 280         | 1 280     | 0%         | 364.76                  | 264.56   | -16%       | 365 262                   | 339 173     | -26 089      | -7%        |      |
|  | Car 1            | 3 749         | 3 749     | 0%         | 298.36                  | 269.64   | -10%       | 1 122 449                 | 1 011 625   | -111 425     | -10%       |      |
|  | Car 2            | 16 584        | 16 584    | 0%         | 407.19                  | 221.43   | -46%       | 6 720 132                 | 3 653 964   | -3 066 168   | -46%       |      |
|  | Car 3            | 81 398        | 81 398    | 0%         | 802.50                  | 179.24   | -78%       | 36 991 999                | 11 085 409  | -25 906 590  | -70%       |      |
|  | Car 4            | 475 040       | 475 040   | 0%         | 405.76                  | 156.24   | -61%       | 173 622 220               | 47 474 086  | -126 148 134 | -61%       |      |
|  | Car 5            | 299 054       | 299 054   | 0%         | 433.34                  | 156.24   | -64%       | 130 032 044               | 46 019 229  | -83 912 815  | -64%       |      |
|  | Car 6            | 116 034       | 116 034   | 0%         | 268.75                  | 156.24   | -41%       | 30 427 555                | 10 232 785  | -20 194 770  | -66%       |      |
|  | Diesel oil total | 675 119       | 675 119   | 0%         | 418.36                  | 160.76   | -61%       | 277 947 660               | 188 535 230 | -89 412 430  | -61%       |      |
|  | Pkx Total        | 1 390 391     | 1 390 391 | 0%         | 235.75                  | 154.41   | -35%       | 67 778 627                | 159 070 289 | -191 291 662 | -28%       |      |
| 1.A.3.b.i - Light Duty Vehicles (LDVs)     | Gasoline         | pre-Cars      | 910       | 910        | 0%                      | 602.79   | 645.35     | -7%                       | 593 186     | 547 543      | -45 643    | -8%  |
|  |                  | Car 1         | 136       | 136        | 0%                      | 908.31   | 312.78     | -66%                      | 122 126     | 42 425       | -79 701    | -65% |
|  |                  | Car 2         | 540       | 540        | 0%                      | 308.39   | 217.84     | -30%                      | 162 311     | 117 737      | -44 574    | -28% |
|  |                  | Car 3         | 650       | 650        | 0%                      | 108.43   | 111.57     | -3%                       | 70 432      | 72 731       | 2 299      | 3%   |
|  |                  | Car 4         | 1 684     | 1 684      | 0%                      | 43.06    | 52.36      | 21%                       | 78 714      | 84 003       | 5 289      | 7%   |
|  |                  | Car 5         | 1 724     | 1 724      | 0%                      | 19.82    | 52.36      | 164%                      | 34 157      | 80 258       | 46 101     | 164% |
|  | Car 6            | 363           | 363       | 0%         | 19.85                   | 52.36    | 181%       | 6 764                     | 19 992      | 13 228       | 181%       |      |
|  | Gasoline total   | 5 506         | 5 506     | 0%         | 588.27                  | 171.66   | -7%        | 1 068 292                 | 1 013 678   | -54 614      | -5%        |      |
|  | pre-Cars         | 2 189         | 2 189     | 0%         | 414.81                  | 385.79   | -7%        | 899 549                   | 845 433     | -54 116      | -6%        |      |
|  | Car 1            | 1 790         | 1 790     | 0%         | 391.89                  | 276.25   | -30%       | 780 189                   | 385 371     | -394 818     | -50%       |      |
|  | Car 2            | 4 223         | 4 223     | 0%         | 323.43                  | 153.31   | -53%       | 1 365 994                 | 676 452     | -689 542     | -50%       |      |
|  | Car 3            | 13 582        | 13 582    | 0%         | 588.91                  | 150.77   | -74%       | 8 064 323                 | 2 040 233   | -6 024 090   | -74%       |      |
|  | Car 4            | 43 141        | 43 141    | 0%         | 504.48                  | 32.40    | -93%       | 21 783 989                | 3 985 141   | -17 798 848  | -82%       |      |
|  | Car 5            | 74 231        | 74 231    | 0%         | 434.16                  | 32.40    | -93%       | 32 223 283                | 6 658 730   | -25 564 553  | -79%       |      |
|  | Car 6            | 4 921         | 4 921     | 0%         | 113.49                  | 32.40    | -72%       | 755 285                   | 454 676     | -300 609     | -40%       |      |
|  | Diesel oil total | 148 068       | 148 068   | 0%         | 454.12                  | 185.62   | -59%       | 65 712 732                | 15 296 087  | -50 416 645  | -77%       |      |
|  | LDVs Total       | 149 994       | 149 994   | 0%         | 445.23                  | 188.29   | -58%       | 66 781 025                | 16 298 684  | -50 482 341  | -76%       |      |
| 1.A.3.b.ii - Heavy Duty Vehicles (HDVs)    | Gasoline         | pre-Cars      | 891       | 891        | 0%                      | 1076.81  | 1319.23    | -18%                      | 964 197     | 988 234      | 24 037     | 2%   |
|  |                  | Car 1         | 583       | 583        | 0%                      | 731.35   | 732.57     | 0%                        | 433 675     | 446 236      | 12 561     | 3%   |
|  |                  | Car 2         | 4 375     | 4 375      | 0%                      | 708.25   | 645.03     | -9%                       | 3 440 614   | 2 822 621    | -617 993   | -18% |
|  |                  | Car 3         | 10 333    | 10 333     | 0%                      | 632.87   | 458.91     | -28%                      | 6 530 364   | 4 741 827    | -1 788 537 | -27% |
|  |                  | Car 4         | 4 449     | 4 449      | 0%                      | 475.90   | 382.29     | -20%                      | 2 117 219   | 1 586 881    | -530 338   | -25% |
|  |                  | Car 5         | 34 380    | 34 380     | 0%                      | 364.36   | 185.22     | -49%                      | 8 935 974   | 4 517 517    | -4 418 457 | -49% |
|  | Car 6            | 9 126         | 9 126     | 0%         | 62.79                   | 185.22   | 196%       | 573 066                   | 1 680 431   | 1 107 365    | 196%       |      |
|  | Diesel Total     | 54 157        | 54 157    | 0%         | 404.73                  | 388.24   | -2%        | 23 082 189                | 16 885 117  | -6 197 072   | -27%       |      |
|  | pre-Cars         | 3 933         | 3 933     | 0%         | 1034.81                 | 737.35   | -29%       | 4 087 249                 | 2 980 379   | -1 106 870   | -29%       |      |
|  | Car 1            | 1 555         | 1 555     | 0%         | 748.16                  | 587.92   | -22%       | 1 163 482                 | 789 813     | -373 669     | -32%       |      |
|  | Car 2            | 8 876         | 8 876     | 0%         | 817.75                  | 585.52   | -30%       | 7 258 046                 | 4 486 628   | -2 771 418   | -38%       |      |
|  | Car 3            | 34 167        | 34 167    | 0%         | 638.91                  | 458.91   | -28%       | 6 530 364                 | 4 741 827   | -1 788 537   | -27%       |      |
|  | Car 4            | 4 449         | 4 449     | 0%         | 475.90                  | 382.29   | -20%       | 2 117 219                 | 1 586 881   | -530 338     | -25%       |      |
|  | Car 5            | 34 380        | 34 380    | 0%         | 364.36                  | 185.22   | -49%       | 8 935 974                 | 4 517 517   | -4 418 457   | -49%       |      |
|  | Car 6            | 9 126         | 9 126     | 0%         | 62.79                   | 185.22   | 196%       | 573 066                   | 1 680 431   | 1 107 365    | 196%       |      |
|  | Diesel Total     | 148 068       | 148 068   | 0%         | 454.12                  | 185.62   | -59%       | 65 712 732                | 15 296 087  | -50 416 645  | -77%       |      |
|  | HDVs Total       | 149 994       | 149 994   | 0%         | 445.23                  | 188.29   | -58%       | 66 781 025                | 16 298 684  | -50 482 341  | -76%       |      |
| 1.A.3.b.iii - Heavy Duty Trucks & Lorries  | Gasoline         | pre-Cars      | 910       | 910        | 0%                      | 602.79   | 645.35     | -7%                       | 593 186     | 547 543      | -45 643    | -8%  |
|  |                  | Car 1         | 136       | 136        | 0%                      | 908.31   | 312.78     | -66%                      | 122 126     | 42 425       | -79 701    | -65% |
|  |                  | Car 2         | 540       | 540        | 0%                      | 308.39   | 217.84     | -30%                      | 162 311     | 117 737      | -44 574    | -28% |
|  |                  | Car 3         | 650       | 650        | 0%                      | 108.43   | 111.57     | -3%                       | 70 432      | 72 731       | 2 299      | 3%   |
|  |                  | Car 4         | 1 684     | 1 684      | 0%                      | 43.06    | 52.36      | 21%                       | 78 714      | 84 003       | 5 289      | 7%   |
|  |                  | Car 5         | 1 724     | 1 724      | 0%                      | 19.82    | 52.36      | 164%                      | 34 157      | 80 258       | 46 101     | 164% |
|  | Car 6            | 363           | 363       | 0%         | 19.85                   | 52.36    | 181%       | 6 764                     | 19 992      | 13 228       | 181%       |      |
|  | Gasoline total   | 5 506         | 5 506     | 0%         | 588.27                  | 171.66   | -7%        | 1 068 292                 | 1 013 678   | -54 614      | -5%        |      |
|  | pre-Cars         | 2 189         | 2 189     | 0%         | 414.81                  | 385.79   | -7%        | 899 549                   | 845 433     | -54 116      | -6%        |      |
|  | Car 1            | 1 790         | 1 790     | 0%         | 391.89                  | 276.25   | -30%       | 780 189                   | 385 371     | -394 818     | -50%       |      |
|  | Car 2            | 4 223         | 4 223     | 0%         | 323.43                  | 153.31   | -53%       | 1 365 994                 | 676 452     | -689 542     | -50%       |      |
|  | Car 3            | 13 582        | 13 582    | 0%         | 588.91                  | 150.77   | -74%       | 8 064 323                 | 2 040 233   | -6 024 090   | -74%       |      |
|  | Car 4            | 43 141        | 43 141    | 0%         | 504.48                  | 32.40    | -93%       | 21 783 989                | 3 985 141   | -17 798 848  | -82%       |      |
|  | Car 5            | 74 231        | 74 231    | 0%         | 434.16                  | 32.40    | -93%       | 32 223 283                | 6 658 730   | -25 564 053  | -79%       |      |
|  | Car 6            | 4 921         | 4 921     | 0%         | 113.49                  | 32.40    | -72%       | 755 285                   | 454 676     | -300 609     | -40%       |      |
|  | Diesel oil total | 148 068       | 148 068   | 0%         | 454.12                  | 185.62   | -59%       | 65 712 732                | 15 296 087  | -50 416 645  | -77%       |      |
|  | LDVs Total       | 149 994       | 149 994   | 0%         | 445.23                  | 188.29   | -58%       | 66 781 025                | 16 298 684  | -50 482 341  | -76%       |      |
| 1.A.3.b.iv - Motorised Two-Wheelers (MOWs) | Gasoline         | pre-Cars      | 891       | 891        | 0%                      | 1076.81  | 1319.23    | -18%                      | 964 197     | 988 234      | 24 037     | 2%   |
|  |                  | Car 1         | 583       | 583        | 0%                      | 731.35   | 732.57     | 0%                        | 433 675     | 446 236      | 12 561     | 3%   |
|  |                  | Car 2         | 4 375     | 4 375      | 0%                      | 708.25   | 645.03     | -9%                       | 3 440 614   | 2 822 621    | -617 993   | -18% |
|  |                  | Car 3         | 10 333    | 10 333     | 0%                      | 632.87   | 458.91     | -28%                      | 6 530 364   | 4 741 827    | -1 788 537 | -27% |
|  |                  | Car 4         | 4 449     | 4 449      | 0%                      | 475.90   | 382.29     | -20%                      | 2 117 219   | 1 586 881    | -530 338   | -25% |
|  |                  | Car 5         | 34 380    | 34 380     | 0%                      | 364.36   | 185.22     | -49%                      | 8 935 974   | 4 517 517    | -4 418 457 | -49% |
|  | Car 6            | 9 126         | 9 126     | 0%         | 62.79                   | 185.22   | 196%       | 573 066                   | 1 680 431   | 1 107 365    | 196%       |      |
|  | Diesel Total     | 54 157        | 54 157    | 0%         | 404.73                  | 388.24   | -2%        | 23 082 189                | 16 885 117  | -6 197 072   | -27%       |      |
|  | pre-Cars         | 3 933         | 3 933     | 0%         | 1034.81                 | 737.35   | -29%       | 4 087 249                 | 2 980 379   | -1 106 870   | -29%       |      |
|  | Car 1            | 1 555         | 1 555     | 0%         | 748.16                  | 587.92   | -22%       | 1 163 482                 | 789 813     | -373 669     | -32%       |      |
|  | Car 2            | 8 876         | 8 876     | 0%         | 817.75                  | 585.52   | -30%       | 7 258 046                 | 4 486 628   | -2 771 418   | -38%       |      |
|  | Car 3            | 34 167        | 34 167    | 0%         | 638.91                  | 458.91   | -28%       | 6 530 364                 | 4 741 827   | -1 788 537   | -27%       |      |
|  | Car 4            | 4 449         | 4 449     | 0%         | 475.90                  | 382.29   | -20%       | 2 117 219                 | 1 586 881   | -530 338     | -25%       |      |
|  | Car 5            | 34 380        | 34 380    | 0%         | 364.36                  | 185.22   | -49%       | 8 935 974                 | 4 517 517   | -4 418 457   | -49%       |      |
|  | Car 6            | 9 126         | 9 126     | 0%         | 62.79                   | 185.22   | 196%       | 573 066                   | 1 680 431   | 1 107 365    | 196%       |      |
|  | Diesel Total     | 148 068       | 148 068   | 0%         | 454.12                  | 185.62   | -59%       | 65 712 732                | 15 296 087  | -50 416 645  | -77%       |      |
|  | HDVs Total       | 149 994       | 149 994   | 0%         | 445.23                  | 188.29   | -58%       | 66 781 025                | 16 298 684  | -50 482 341  | -76%       |      |
| 1.A.3.b.v - Motorised Two-Wheelers (MOWs)  | Gasoline         | pre-Cars      | 910       | 910        | 0%                      | 602.79   | 645.35     | -7%                       | 593 186     | 547 543      | -45 643    | -8%  |
|  |                  | Car 1         | 136       | 136        | 0%                      | 908.31   | 312.78     | -66%                      | 122 126     | 42 425       | -79 701    | -65% |
|  |                  | Car 2         | 540       | 540        | 0%                      | 308.39   | 217.84     | -30%                      | 162 311     | 117 737      | -44 574    | -28% |
|  |                  | Car 3         | 650       | 650        | 0%                      | 108.43   | 111.57     | -3%                       | 70 432      | 72 731       | 2 299      | 3%   |
|  |                  | Car 4         | 1 684     | 1 684      | 0%                      | 43.06    | 52.36      | 21%                       | 78 714      | 84 003       | 5 289      | 7%   |
|  |                  | Car 5         | 1 724     | 1 724      | 0%                      | 19.82    | 52.36      | 164%                      | 34 157      | 80 258       | 46 101     | 164% |
|  | Car 6            | 363           | 363       | 0%         | 19.85                   | 52.36    | 181%       | 6 764                     | 19 992      | 13 228       | 181%       |      |
|  | Gasoline total   | 5 506         | 5 506     | 0%         | 588.27                  | 171.66   | -7%        | 1 068 292                 | 1 013 678   | -54 614      | -5%        |      |
|  | pre-Cars         | 2 189         | 2 189     | 0%         | 414.81                  | 385.79   | -7%        | 899 549                   | 845 433     | -54 116      | -6%        |      |
|  | Car 1            | 1 790         | 1 790     | 0%         | 391.89                  | 276.25   | -30%       | 780 189                   | 385 371     | -394 818     | -50%       |      |
|  | Car 2            | 4 223         | 4 223     | 0%         | 323.43                  | 153.31   | -53%       | 1 365 994                 | 676 452     | -689 542     | -50%       |      |
|  | Car 3            | 13 582        | 13 582    | 0%         | 588.91                  | 150.77   | -74%       | 8 064 323                 | 2 040 233   | -6 024 090   | -74%       |      |
|  | Car 4            | 43 141        | 43 141    | 0%         | 504.48                  | 32.40    | -93%       | 21 783 989                | 3 985 141   | -17 798 848  | -82%       |      |
|  | Car 5            | 74 231        | 74 231    | 0%         | 434.16                  | 32.40    | -93%       | 32 223 283                | 6 658 730   | -25 564 053  | -79%       |      |
|  | Car 6            | 4 921         | 4 921     | 0%         | 113.49                  | 32.40    | -72%       | 755 285                   | 454 676     | -300 609     | -40%       |      |
|  | Diesel oil total | 148 068       | 148 068   | 0%         | 454.12                  | 185.62   | -59%       | 65 712 732                | 15 296 087  | -50 416 645  | -77%       |      |
|  | LDVs Total       | 149 994       | 149 994   | 0%         | 445.23                  | 188.29   | -58%       | 66 781 025                | 16 298 684  | -50 482 341  | -76%       |      |
| 1.A.3.b.vi - Road Transport                | Gasoline         | pre-Cars      | 910       | 910        | 0%                      | 602.79   | 645.35     | -7%                       | 593 186     | 547 543      | -45 643    | -8%  |
|  |                  | Car 1         | 136       | 136        | 0%                      | 908.31   | 312.78     | -66%                      | 122 126     | 42 425       | -79 701    | -65% |
|  |                  | Car 2         | 540       | 540        | 0%                      | 308.39   | 217.84     | -30%                      | 162 311     | 117 737      | -44 574    | -28% |
|  |                  | Car 3         | 650       | 650        | 0%</                    |          |            |                           |             |              |            |      |

| Adjustment details for 2018             |            |                  |           |            |                         |          |            |                           |             |             |              |      |
|---|------------|------------------|-----------|------------|-------------------------|----------|------------|---------------------------|-------------|-------------|--------------|------|
| NFR Code                                | Fuel       | Activity Data    |           |            | Implied Emission Factor |          |            | NO <sub>x</sub> Emissions |             |             |              |      |
|   |            | current          | adjusted  | difference | current                 | adjusted | difference | current                   | adjusted    | adjustment  | difference   |      |
|   |            | in [t]           | in [t]    | in [%]     | in [g/t]                | in [g/t] | in [%]     | in [kg]                   | in [kg]     | in [kg]     | in [%]       |      |
| 1.A.3.a.i - Passenger Cars              | Gasoline   | pre-Cars         | 12 219    | 12 219     | 0%                      | 637.58   | 644.11     | -6%                       | 7 780 965   | 6 648 721   | -1 132 234   | -15% |
|   |            | Car 1            | 14 362    | 14 362     | 0%                      | 374.34   | 341.68     | -9%                       | 5 371 161   | 3 448 643   | -1 922 518   | -36% |
|   |            | Car 2            | 34 285    | 34 285     | 0%                      | 221.97   | 111.68     | -50%                      | 5 360 977   | 2 688 163   | -2 672 814   | -50% |
|   |            | Car 3            | 43 642    | 43 642     | 0%                      | 88.16    | 76.96      | -13%                      | 3 487 781   | 3 358 617   | -129 164     | -4%  |
|   |            | Car 4            | 278 738   | 278 738    | 0%                      | 55.98    | 52.30      | -7%                       | 15 683 488  | 14 576 755  | -1 106 733   | -7%  |
|   |            | Car 5            | 186 830   | 186 830    | 0%                      | 19.35    | 52.30      | 170%                      | 3 228 282   | 8 725 688   | 5 497 406    | 170% |
|   |            | Car 6            | 159 041   | 159 041    | 0%                      | 6.00     | 52.30      | 788%                      | 4 190 422   | 6 718 250   | 2 527 828    | 60%  |
|   |            | Gasoline total   | 689 027   | 689 027    | 0%                      | 64.42    | 68.36      | -6%                       | 45 032 296  | 47 186 817  | 2 154 521    | 5%   |
|   | Diesel Oil | pre-Cars         | 1 363     | 1 363      | 0%                      | 303.16   | 264.96     | -13%                      | 171 676     | 146 173     | -25 503      | -15% |
|   |            | Car 1            | 2 849     | 2 849      | 0%                      | 298.17   | 272.65     | -9%                       | 962 432     | 775 166     | -187 266     | -20% |
|   |            | Car 2            | 10 784    | 10 784     | 0%                      | 407.20   | 222.87     | -45%                      | 4 391 383   | 2 483 536   | -1 907 848   | -45% |
|   |            | Car 3            | 40 786    | 40 786     | 0%                      | 812.49   | 180.15     | -78%                      | 24 932 029  | 7 333 241   | -17 598 788  | -71% |
|   |            | Car 4            | 130 534   | 130 534    | 0%                      | 414.71   | 180.40     | -56%                      | 54 133 837  | 20 937 329  | -33 196 508  | -61% |
|   |            | Car 5            | 251 212   | 251 212    | 0%                      | 416.25   | 180.40     | -56%                      | 104 585 786 | 40 253 731  | -64 332 055  | -61% |
|   |            | Car 6            | 228 685   | 228 685    | 0%                      | 254.87   | 180.40     | -30%                      | 58 284 140  | 35 680 446  | -22 603 694  | -39% |
|   |            | Diesel oil total | 646 074   | 646 074    | 0%                      | 375.66   | 163.38     | -56%                      | 247 596 063 | 188 748 684 | -158 847 379 | -56% |
|   |            | FCs Total        | 1 363 181 | 1 363 181  | 0%                      | 214.34   | 114.68     | -46%                      | 262 588 360 | 156 555 421 | -106 032 939 | -40% |
|   | Gasoline   | pre-Cars         | 911       | 911        | 0%                      | 944.51   | 645.95     | -32%                      | 594 851     | 582 662     | -12 189      | -2%  |
|   |            | Car 1            | 189       | 189        | 0%                      | 911.58   | 312.78     | -66%                      | 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     | 5%                        | 57 282      | 60 739      | 3 457        | 6%   |
|   |            | Car 4            | 1 275     | 1 275      | 0%                      | 52.02    | 54.36      | 4%                        | 65 290      | 69 278      | 3 988        | 4%   |
|   |            | Car 5            | 1 483     | 1 483      | 0%                      | 23.70    | 54.36      | 129%                      | 35 160      | 80 626      | 45 466       | 129% |
|   |            | Car 6            | 1 643     | 1 643      | 0%                      | 19.09    | 54.36      | 182%                      | 39 550      | 89 326      | 49 776       | 182% |
|   |            | Gasoline total   | 6 315     | 6 315      | 0%                      | 154.22   | 160.11     | 4%                        | 999 199     | 1 091 136   | 91 937       | 9%   |
| 1.A.3.b.i - Light Duty Vehicles (LDVs)  | Gasoline   | pre-Cars         | 1 872     | 1 872      | 0%                      | 411.51   | 386.79     | -6%                       | 771 337     | 674 432     | -96 905      | -13% |
|   |            | Car 1            | 1 285     | 1 285      | 0%                      | 389.94   | 276.25     | -29%                      | 483 129     | 272 296     | -210 833     | -44% |
|   |            | Car 2            | 2 942     | 2 942      | 0%                      | 318.56   | 153.88     | -52%                      | 965 389     | 550 789     | -414 600     | -43% |
|   |            | Car 3            | 9 363     | 9 363      | 0%                      | 559.10   | 150.74     | -73%                      | 5 689 152   | 1 411 299   | -4 277 853   | -75% |
|   |            | Car 4            | 33 232    | 33 232     | 0%                      | 508.42   | 93.81      | -82%                      | 16 929 185  | 3 117 457   | -13 811 728  | -82% |
|   |            | Car 5            | 66 283    | 66 283     | 0%                      | 432.92   | 93.81      | -78%                      | 28 684 080  | 6 217 860   | -22 466 220  | -78% |
|   | Diesel Oil | pre-Cars         | 39 482    | 39 482     | 0%                      | 158.79   | 93.81      | -41%                      | 5 941 615   | 3 686 228   | -2 255 387   | -38% |
|   |            | Car 1            | 154 259   | 154 259    | 0%                      | 384.71   | 182.69     | -53%                      | 59 344 525  | 15 880 316  | -43 464 210  | -73% |
|   |            | Car 2            | 180 574   | 180 574    | 0%                      | 375.86   | 184.94     | -51%                      | 69 343 125  | 16 851 449  | -52 491 676  | -72% |
|   |            | Car 3            | 547       | 547        | 0%                      | 1078.15  | 1919.23    | 78%                       | 589 267     | 557 147     | -32 120      | -5%  |
|   |            | Car 4            | 237       | 237        | 0%                      | 732.78   | 732.57     | 0%                        | 173 676     | 178 368     | 4 692        | 3%   |
|   |            | Car 5            | 2 270     | 2 270      | 0%                      | 787.83   | 646.33     | -18%                      | 1 780 686   | 1 487 437   | -293 249     | -16% |
|   | Diesel Oil | pre-Cars         | 6 757     | 6 757      | 0%                      | 638.89   | 459.32     | -29%                      | 4 262 734   | 3 183 482   | -1 079 252   | -25% |
|   |            | Car 1            | 3 043     | 3 043      | 0%                      | 473.16   | 382.73     | -19%                      | 1 439 790   | 1 073 333   | -366 457     | -25% |
|   |            | Car 2            | 18 189    | 18 189     | 0%                      | 362.42   | 186.37     | -49%                      | 6 463 265   | 3 376 016   | -3 087 249   | -48% |
|   |            | Car 3            | 20 670    | 20 670     | 0%                      | 64.99    | 186.37     | 289%                      | 1 176 026   | 3 682 314   | 2 506 288    | 214% |
|   |            | Car 4            | 91 634    | 91 634     | 0%                      | 309.75   | 283.53     | -8%                       | 15 993 546  | 13 687 186  | -2 306 360   | -15% |
|   |            | Car 5            | 3 262     | 3 262      | 0%                      | 1034.82  | 737.35     | -29%                      | 3 375 359   | 2 485 071   | -890 288     | -26% |
| 1.A.3.b.ii - Heavy Duty Vehicles (HDVs) | Gasoline   | pre-Cars         | 1 094     | 1 094      | 0%                      | 747.82   | 488.39     | -35%                      | 818 052     | 512 378     | -305 674     | -37% |
|   |            | 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     | -11%                      | 12 367 751  | 7 277 279   | -5 090 472   | -44% |
|   |            | 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%                      | 26 251 482  | 69 665 886  | 43 414 404   | 165% |
|   | Diesel Oil | pre-Cars         | 585 186   | 585 186    | 0%                      | 515.18   | 172.19     | -66%                      | 188 173 537 | 180 710 889 | -7 462 648   | -4%  |
|   |            | Car 1            | 4 940     | 4 940      | 0%                      | 128.95   | 188.61     | 46%                       | 622 656     | 783 451     | 160 795      | 26%  |
|   |            | Car 2            | 2 966     | 2 966      | 0%                      | 126.14   | 177.79     | 41%                       | 374 114     | 527 294     | 153 180      | 41%  |
|   |            | Car 3            | 3 221     | 3 221      | 0%                      | 129.33   | 188.64     | 46%                       | 387 596     | 639 833     | 252 237      | 65%  |
|   |            | Car 4            | 6 241     | 6 241      | 0%                      | 48.24    | 188.64     | 288%                      | 251 126     | 1 239 686   | 988 560      | 394% |
|   |            | Car 5            | 1 130     | 1 130      | 0%                      | 58.41    | 188.64     | 323%                      | 23 066      | 224 682     | 201 616      | 875% |
|   | Diesel Oil | pre-Cars         | 0         | 0          | 0%                      | 0.00     | 0.00       | 0%                        | 0           | 0           | 0            | 0%   |
|   |            | Car 1            | 18 487    | 18 487     | 0%                      | 85.66    | 188.61     | 100%                      | 1 658 558   | 3 454 767   | 1 796 209    | 108% |
|   |            | Car 2            | 2 180 983 | 2 180 983  | 0%                      | 215.85   | 133.49     | -38%                      | 478 758 286 | 291 129 652 | -187 628 634 | -39% |
|   |            | Car 3            | 2 180 983 | 2 180 983  | 0%                      | 215.85   | 133.49     | -38%                      | 478 758 286 | 291 129 652 | -187 628 634 | -39% |
|   |            | Car 4            | 2 180 983 | 2 180 983  | 0%                      | 215.85   | 133.49     | -38%                      | 478 758 286 | 291 129 652 | -187 628 634 | -39% |
|   |            | Car 5            | 2 180 983 | 2 180 983  | 0%                      | 215.85   | 133.49     | -38%                      | 478 758 286 | 291 129 652 | -187 628 634 | -39% |

| Adjustment details for 2019                |                  |               |           |            |                         |          |            |                           |             |              |             |      |
|--|------------------|---------------|-----------|------------|-------------------------|----------|------------|---------------------------|-------------|--------------|-------------|------|
| NFR Code                                   | Fuel             | Activity Data |           |            | Implied Emission Factor |          |            | NO <sub>x</sub> Emissions |             |              |             |      |
|  |                  | current       | adjusted  | difference | current                 | adjusted | difference | current                   | adjusted    | adjustment   | difference  |      |
|  |                  | in [T]        | in [T]    | in [%]     | in [g/t]                | in [g/t] | in [%]     | in [kg]                   | in [kg]     | in [kg]      | in [%]      |      |
| 1.A.3.a.i - Passenger Cars                 | Gasoline         | pre-Cars      | 13 588    | 13 588     | 0%                      | 638.58   | 644.11     | -6%                       | 8 664 521   | 7 382 686    | -1 281 835  | -15% |
|  |                  | Car 1         | 12 427    | 12 427     | 0%                      | 378.32   | 341.68     | -9%                       | 4 781 480   | 3 683 383    | -1 098 096  | -23% |
|  |                  | Car 2         | 20 086    | 20 086     | 0%                      | 225.58   | 92.59      | -59%                      | 4 531 070   | 1 858 018    | -2 673 052  | -59% |
|  |                  | Car 3         | 36 216    | 36 216     | 0%                      | 82.22    | 76.12      | -7%                       | 2 977 840   | 2 829 186    | -148 654    | -5%  |
|  |                  | Car 4         | 295 220   | 295 220    | 0%                      | 57.04    | 53.29      | -7%                       | 14 588 285  | 13 589 621   | -998 664    | -7%  |
|  |                  | Car 5         | 180 537   | 180 537    | 0%                      | 19.77    | 53.29      | 170%                      | 3 173 728   | 8 054 356    | 4 880 628   | 154% |
|  | Car 6            | 285 636       | 285 636   | 0%         | 25.63                   | 53.29    | 108%       | 5 295 099                 | 11 010 782  | 5 715 683    | 108%        |      |
|  | Gasoline total   | 784 031       | 784 031   | 0%         | 62.36                   | 68.45    | 10%        | 43 961 941                | 48 238 025  | 4 276 084    | 10%         |      |
|  | Diesel Oil       | pre-Cars      | 1 363     | 1 363      | 0%                      | 303.16   | 264.96     | -13%                      | 171 676     | 146 173      | -25 503     | -15% |
|  |                  | Car 1         | 2 849     | 2 849      | 0%                      | 298.17   | 272.65     | -9%                       | 962 432     | 775 166      | -187 266    | -20% |
|  |                  | Car 2         | 10 784    | 10 784     | 0%                      | 407.20   | 222.87     | -45%                      | 4 391 383   | 2 483 536    | -1 907 848  | -45% |
|  |                  | Car 3         | 40 786    | 40 786     | 0%                      | 812.49   | 180.15     | -78%                      | 24 932 029  | 7 333 241    | -17 598 788 | -71% |
|  |                  | Car 4         | 130 534   | 130 534    | 0%                      | 414.71   | 180.40     | -56%                      | 54 133 837  | 20 937 329   | -33 196 508 | -61% |
|  |                  | Car 5         | 251 212   | 251 212    | 0%                      | 416.25   | 180.40     | -56%                      | 104 585 786 | 40 253 731   | -64 332 055 | -61% |
|  | Car 6            | 228 685       | 228 685   | 0%         | 254.87                  | 180.40   | -30%       | 58 284 140                | 35 680 446  | -22 603 694  | -39%        |      |
|  | Diesel oil total | 646 074       | 646 074   | 0%         | 375.66                  | 163.38   | -56%       | 247 596 063               | 188 748 684 | -158 847 379 | -56%        |      |
|  | FCs Total        | 1 368 512     | 1 368 512 | 0%         | 998.83                  | 151.19   | -8%        | 273 688 009               | 157 891 681 | -115 796 328 | -42%        |      |
|  | Gasoline         | pre-Cars      | 926       | 926        | 0%                      | 944.51   | 645.95     | -32%                      | 594 851     | 582 662      | -12 189     | -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     | 5%                        | 57 282      | 60 739       | 3 457       | 6%   |
|  |                  | Car 4         | 1 275     | 1 275      | 0%                      | 52.02    | 54.36      | 4%                        | 65 290      | 69 278       | 3 988       | 4%   |
|  |                  | Car 5         | 1 483     | 1 483      | 0%                      | 23.70    | 54.36      | 129%                      | 35 160      | 80 626       | 45 466      | 129% |
|  | Car 6            | 1 643         | 1 643     | 0%         | 19.09                   | 54.36    | 182%       | 39 550                    | 89 326      | 49 776       | 125%        |      |
| Gasoline total                             | 6 483            | 6 483         | 0%        | 148.86     | 151.25                  | 5%       | 956 299    | 1 004 156                 | 47 857      | 5%           |             |      |
| Diesel Oil                                 | pre-Cars         | 1 184         | 1 184     | 0%         | 418.96                  | 396.79   | -5%        | 725 111                   | 547 336     | -183 776     | -25%        |      |
|  | Car 1            | 1 079         | 1 079     | 0%         | 389.52                  | 288.19   | -26%       | 420 286                   | 232 256     | -188 030     | -45%        |      |
|  | Car 2            | 2 234         | 2 234     | 0%         | 737.682                 | 354 490  | -52%       | 854 490                   | 250 314     | -604 176     | -70%        |      |
|  | Car 3            | 7 649         | 7 649     | 0%         | 801.11                  | 150.73   | -81%       | 4 587 942                 | 1 152 711   | -3 435 231   | -75%        |      |
|  | Car 4            | 28 711        | 28 711    | 0%         | 512.94                  | 94.57    | -82%       | 14 788 306                | 2 716 154   | -11 932 154  | -80%        |      |
|  | Car 5            | 58 714        | 58 714    | 0%         | 434.30                  | 94.57    | -78%       | 26 689 580                | 5 032 428   | -9 967 152   | -70%        |      |
| Car 6                                      | 58 931           | 58 931        | 0%        | 146.18     | 94.57                   | -35%     | 6 614 586  | 6 072 692                 | -5 611 614  | -83%         |             |      |
| Diesel oil total                           | 159 183          | 159 183       | 0%        | 342.42     | 191.98                  | -43%     | 55 363 335 | 36 221 445                | -19 141 890 | -35%         |             |      |
| LDN's Total                                | 165 866          | 165 866       | 0%        | 338.31     | 183.87                  | -46%     | 56 279 554 | 37 245 596                | -19 033 958 | -34%         |             |      |
| 1.A.3.b.i - Light Duty Vehicles (LDVs)     | Gasoline         | pre-Cars      | 489       | 489        | 0%                      | 708.20   | 1919.23    | -6%                       | 588 887     | 476 258      | -112 629    | -6%  |
|  |                  | Car I         | 147       | 147        | 0%                      | 738.37   | 152.57     | -7%                       | 189 232     | 119 193      | -70 039     | -2%  |
|  |                  | Car II        | 1 611     | 1 611      | 0%                      | 788.47   | 686.77     | -12%                      | 1 271 448   | 1 041 622    | -229 826    | -8%  |
|  |                  | Car III       | 5 789     | 5 789      | 0%                      | 671.95   | 459.05     | -27%                      | 3 686 351   | 2 623 779    | -962 572    | -27% |
|  |                  | Car IV        | 2 747     | 2 747      | 0%                      | 432.92   | 352.84     | -20%                      | 1 382 061   | 960 413      | -421 648    | -27% |
|  |                  | Car V         | 17 130    | 17 130     | 0%                      | 862.91   | 186.64     | -49%                      | 6 213 175   | 3 180 781    | -3 032 394  | -49% |
|  | Car VI           | 25 135        | 25 135    | 0%         | 60.43                   | 186.64   | 209%       | 1 515 961                 | 4 686 133   | 3 170 172    | 209%        |      |
|  | Bikes Total      | 52 939        | 52 939    | 0%         | 214.41                  | 247.85   | 16%        | 14 527 072                | 15 198 578  | 1 408 434    | 16%         |      |
|  | Gasoline total   | 3 140         | 3 140     | 0%         | 103.96                  | 717.35   | -29%       | 3 293 020                 | 2 379 443   | -913 577     | -29%        |      |
|  | Diesel Oil       | pre-Cars      | 969       | 969        | 0%                      | 747.86   | 486.39     | -37%                      | 724 240     | 453 754      | -270 486    | -37% |
| Car I                                      |                  | 4 458         | 4 458     | 0%         | 612.47                  | 681.29   | 11%        | 2 734 342                 | 2 288 567   | -445 775     | -39%        |      |
| Car II                                     |                  | 16 377        | 16 377    | 0%         | 628.94                  | 361.63   | -42%       | 10 360 323                | 5 756 580   | -4 603 743   | -44%        |      |
| Car III                                    |                  | 13 127        | 13 127    | 0%         | 368.85                  | 274.43   | -24%       | 5 235 679                 | 3 589 330   | -1 646 349   | -31%        |      |
| Car IV                                     | 125 233          | 125 233       | 0%        | 295.23     | 193.62                  | -34%     | 36 960 589 | 19 811 449                | -17 058 158 | -46%         |             |      |
| Car V                                      | 432 488          | 432 488       | 0%        | 72.98      | 154.92                  | 110%     | 31 175 448 | 67 083 653                | 36 908 205  | 118%         |             |      |
| Trucks Total                               | 585 913          | 585 913       | 0%        | 953.39     | 169.17                  | -16%     | 95 389 180 | 188 895 376               | 9 428 678   | 16%          |             |      |
| 1.A.3.b.ii - Motorised Two-Wheelers (M2Ws) | pre-Cars         | 4 815         | 4 815     | 0%         | 125.69                  | 184.79   | 31%        | 684 997                   | 732 771     | 47 774       | 31%         |      |
|  | Car I            | 2 835         | 2 835     | 0%         | 115.39                  | 174.19   | 41%        | 353 456                   | 582 589     | 229 133      | 41%         |      |
|  | Car II           | 3 098         | 3 098     | 0%         | 95.39                   | 180.86   | 87%        | 339 224                   | 616 216     | 276 992      | 87%         |      |
|  | Car 3            | 6 082         | 6 082     | 0%         | 49.93                   | 180.86   | 261%       | 240 284                   | 1 183 617   | 943 333      | 281%        |      |
|  | Car 4            | 2 085         | 2 085     | 0%         | 21.69                   | 180.86   | 817%       | 42 489                    | 288 667     | 246 178      | 581%        |      |
| Car 5                                      | 0                | 0             | 0%        | 0.00       | 0.00                    | 0%       | 0          | 0                         | 0           | 0%           |             |      |
| M2Ws Total                                 | 18 150           | 18 150        | 0%        | 86.95      | 180.83                  | 113%     | 1 613 450  | 3 582 841                 | 1 889 491   | 113%         |             |      |
| 1.A.3.b. Road Transport                    | Total            | 2 262 000     | 2 262 000 | 0%         | 198.58                  | 132.83   | -33%       | 437 263 744               | 292 497 497 | -144 776 248 | -33%        |      |

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

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

The even bigger changes between adjustment 2019 and adjustment proposal 2020 result from an additional rather fundamental revision of the *Handbook Emission Factors for Road Transport* now available in version 4.1<sup>9)</sup> strongly effecting the TREMOD model underlying Germany's emission reporting for road transport and hence any adjustments of NO<sub>x</sub> emissions. With such major model revision between submissions 2019 and 2020, the 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. Hence, the 2021 adjustment proposal differs only slightly from the (accepted) proposal provided with submission 2020.**

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

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

<sup>10)</sup> <sup>11)</sup> <sup>12)</sup> <sup>13)</sup> : 5 : ifeu, 2002: Final report to UFOPLAN study FKZ 201 45 112 (German version only): Aktualisierung des Daten- und Rechenmodells: Energieverbrauch und Schadstoffemissionen des motorisierten Verkehrs in Deutschland 1980-2020; Im Auftrag des Umweltbundesamtes; ifeu Institut für Energie- und Umweltforschung Heidelberg GmbH (Institute for Energy and Environmental Research), Wilckensstraße 3, D-69120 Heidelberg, Germany, phone: +49 (0) 6221 / 47 67 -0, fax: +49 (0) 6221 / 47 67 -19, Heidelberg, 31. Oktober 2002 : 6 : Knörr et al. (2019a): Knörr, W., Heidt, C., Gores, S., & Bergk, F.: ifeu Institute for Energy and Environmental Research (Institut für Energie- und Umweltforschung Heidelberg gGmbH, ifeu): Fortschreibung des Daten- und Rechenmodells: Energieverbrauch und Schadstoffemissionen des motorisierten Verkehrs in Deutschland 1960-2035, sowie TREMOD, im Auftrag des Umweltbundesamtes, Heidelberg & Berlin, 2019. : 7 : UBA, 2018: CLRTAP submission 2018, Dessau, 2018 : 8 : ECE/EB.AIR/113/Add.1, 2012: Report of the Executive Body on its thirty-first session, Decision 2012/12 on Guidance for adjustments under the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone to emission reduction commitments or to inventories for the purposes of comparing total national emissions with them; URL: [http://www.unece.org/fileadmin/DAM/env/documents/2012/EB/ECE\\_EB.AIR\\_113\\_Add.1\\_ENG\\_1\\_.pdf](http://www.unece.org/fileadmin/DAM/env/documents/2012/EB/ECE_EB.AIR_113_Add.1_ENG_1_.pdf) : 9 : CEIP, 2014a: Centre on Emission Inventories and Projections (CEIP): CEIP/Adjustment RR/2014/GERMANY: Review of the 2014 Adjustment Application by Germany, URL: [https://webdab01.umweltbundesamt.at/download/adjustments2014/Adjustment\\_Review\\_Report\\_GERMANY\\_2014.pdf?cgiproxy\\_skip=1](https://webdab01.umweltbundesamt.at/download/adjustments2014/Adjustment_Review_Report_GERMANY_2014.pdf?cgiproxy_skip=1), 5 August 2014 : 10 : CEIP, 2014b: Centre on Emission Inventories and Projections (CEIP): ECE/EB.AIR/GE.1/2014/10: Review of adjustment applications 2014; URL: [http://www.ceip.at/fileadmin/inhalte/emep/pdf/2015/ece.eb.air.ge.1.2014.10.edited.ae\\_formatting\\_accepted.ko.pdf](http://www.ceip.at/fileadmin/inhalte/emep/pdf/2015/ece.eb.air.ge.1.2014.10.edited.ae_formatting_accepted.ko.pdf), 5 August 2014 : 11 : CEIP, 2015a: Centre on Emission Inventories and Projections (CEIP): CEIP/Adjustment RR/2015/Germany: Review of the 2015 Adjustment Application by Germany, URL: [https://webdab01.umweltbundesamt.at/download/adjustments2015/Germany2015-adj.pdf?cgiproxy\\_skip=1](https://webdab01.umweltbundesamt.at/download/adjustments2015/Germany2015-adj.pdf?cgiproxy_skip=1), September 2015 : 12 : CEIP, 2015b: Centre on Emission Inventories and Projections (CEIP): CE/EB.AIR/GE.1/2015/10-ECE/EB.AIR/WG.1/2015/13: Review of adjustment applications 2015; URL: [http://www.ceip.at/fileadmin/inhalte/emep/Adjustments/ece.eb.air.ge.1.2015.10\\_ece.eb.air.wg.1.2015.13.AV.pdf](http://www.ceip.at/fileadmin/inhalte/emep/Adjustments/ece.eb.air.ge.1.2015.10_ece.eb.air.wg.1.2015.13.AV.pdf), 6 July 2015 : 13 : CEIP, 2016a: Centre on Emission Inventories and Projections (CEIP): Review of the 2016 Adjustment Application by Germany, URL: [https://webdab01.umweltbundesamt.at/download/adjustments2016/Germany2016-adj.pdf?cgiproxy\\_skip=1](https://webdab01.umweltbundesamt.at/download/adjustments2016/Germany2016-adj.pdf?cgiproxy_skip=1), 2016 : 14 : CEIP, 2016b: Centre on Emission Inventories and Projections (CEIP): ECE/EB.AIR/GE.1/2016/10-ECE/EB.AIR/WG.1/2016/18: Review of adjustment applications 2016; URL: [http://www.ceip.at/fileadmin/inhalte/emep/pdf/2016/ECE\\_EB.AIR\\_GE.1\\_2016\\_10\\_E.pdf](http://www.ceip.at/fileadmin/inhalte/emep/pdf/2016/ECE_EB.AIR_GE.1_2016_10_E.pdf), 2016 : 15 : CEIP, 2017a: Centre on Emission Inventories and Projections (CEIP): ECE/EB.AIR/GE.1/2017/10-ECE/EB.AIR/WG.1/2017/20: Review of adjustment applications 2017; URL: [http://www.ceip.at/fileadmin/inhalte/emep/pdf/2017/Advance\\_ece\\_eb\\_air\\_ge\\_1\\_2017\\_10\\_ece\\_eb\\_air\\_wg\\_1\\_2017.pdf](http://www.ceip.at/fileadmin/inhalte/emep/pdf/2017/Advance_ece_eb_air_ge_1_2017_10_ece_eb_air_wg_1_2017.pdf), 2017 :

16 : CEIP, 2018a: Centre on Emission Inventories and Projections (CEIP): ECE/EB.AIR/GE.1/2018/10-ECE/EB.AIR/WG.1/2018/21: Review of adjustment applications 2018; URL: [https://www.ceip.at/fileadmin/inhalte/emep/pdf/2018/ADJ\\_ece.eb.air.ge.1.2018.10-ece.eb.air.wg.1.2018.21\\_advance.pdf](https://www.ceip.at/fileadmin/inhalte/emep/pdf/2018/ADJ_ece.eb.air.ge.1.2018.10-ece.eb.air.wg.1.2018.21_advance.pdf), 2018 : 17 : CEIP, 2019a: Centre on Emission Inventories and Projections (CEIP): ECE/EB.AIR/GE.1/2019/10–ECE/EB.AIR/WG.1/2019/22: Review of adjustment applications 2019; URL: [https://www.ceip.at/fileadmin/inhalte/emep/pdf/2019/ECE\\_EB.AIR\\_GE.1\\_2019\\_10-1909789E.pdf](https://www.ceip.at/fileadmin/inhalte/emep/pdf/2019/ECE_EB.AIR_GE.1_2019_10-1909789E.pdf), 2019 : 18 : Keller et al. (2017): Keller, M., Hausberger, S., Matzer, C., Wüthrich, P., & Notter, B.: Handbook Emission Factors for Road Transport, version 3.3 (Handbuch Emissionsfaktoren des Straßenverkehrs 3.3) URL: [https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=2ahUKewj0y67pi5foAhWB16QKHfpYDIgQFjAAegQIAhAB&url=https%3A%2F%2Fwww.hbefa.net%2Fd%2Fdocuments%2FHBEFA33\\_Hintergrundbericht.pdf&usq=AOvVaw2sOF884KtccVyWLItdt1CIZ](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=2ahUKewj0y67pi5foAhWB16QKHfpYDIgQFjAAegQIAhAB&url=https%3A%2F%2Fwww.hbefa.net%2Fd%2Fdocuments%2FHBEFA33_Hintergrundbericht.pdf&usq=AOvVaw2sOF884KtccVyWLItdt1CIZ) - Dokumentation, Bern, 2017. : 19 : Notter et al. (2019): Keller, M., Althaus, H.-J., Cox, B., Knörr, W., Heidt, Ch., Biemann, K., Räder, D.: Handbook Emission Factors for Road Transport, version 4.1 (Handbuch Emissionsfaktoren des Straßenverkehrs 4.1), HBEFA 4.1 Development Report; URL: [https://www.hbefa.net/e/documents/HBEFA41\\_Development\\_Report.pdf](https://www.hbefa.net/e/documents/HBEFA41_Development_Report.pdf), Bern, Heidelberg, 21. August 2019. [bibliography](#)

<sup>1), 13)</sup> IIASA, 1999: Amann, M.; Bertok, I.; Cofala, J.; Gyarmas, F.; Heyes, Chr.; Klimont, Zb.; Syri, S.; Schöpp, W.: Further analysis of scenario results obtained with the RAINS model - Interim Report to the Ministère de L'Aménagement du Territoire et de l'Environnement Direction de la Prévention des Pollutions et des Risques 20, avenue de Ségur 75302 Paris 07 SP, April 1999 - URL: <https://iiasa.ac.at/web/home/research/researchPrograms/air/policy/france3b.pdf>

<sup>2), 10)</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), 12)</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), 11)</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> (bibcite 4)

<sup>6)</sup> (bibcite 5)

<sup>7)</sup> (bibcite 6)

<sup>8)</sup> (bibcite 18)

<sup>9)</sup> (bibcite 19)