

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

## PREFACE

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

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

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

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

## REASONS FOR MISSING THE GOTHENBURG CEILINGS

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

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

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

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

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

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

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

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

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

### Changes in methodology and emission factors

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

### Changes in the activity data

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

## IN-COUNTRY ANALYSIS: THE TREMOD PERSPECTIVE

### INITIAL ASSUMPTION

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



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

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



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

with

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

## APPLYING THE ORIGINAL METHODOLOGY

### FRAMEWORK INFORMATION

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

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

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

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

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

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

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

### THE COMPARISON

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

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

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

#### Description of the updated methodology used

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

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

and

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

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

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

- TREMOD 3.1 model equations as initial methodology

and ,

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

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

Table 1: Resulting adjustment proposal 2020

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

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

#### **Activity Data**

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

#### **Implied Emission Factor**

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

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

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

Adjustment overview for years 2010 to 2019

| NFR Code      | Fuel       | Year | Activity Data |           |            | Implied Emission Factor |          |            | NO <sub>x</sub> Emissions |             |             |            |
|---------------|------------|------|---------------|-----------|------------|-------------------------|----------|------------|---------------------------|-------------|-------------|------------|
|               |            |      | current       | adjusted  | difference | current                 | adjusted | difference | current                   | adjusted    | adjustment  | difference |
|               |            |      | in [TJ]       |           | in [%]     | in [kg/TJ]              |          | in [%]     | in [kg]                   |             |             | in [%]     |
| 1.A.3.b.i     | gasoline   |      | 795.957       | 795.957   | 0%         | 97.55                   | 84.99    | -13%       | 77.64.842                 | 67.690.906  | 9.993.935   | -13%       |
| 1.A.3.b.i     | diesel oil |      | 629.380       | 629.380   | 0%         | 429.45                  | 160.51   | -63%       | 227.341.096               | 84.970.461  | 142.370.635 | -63%       |
| 1.A.3.b.ii    | gasoline   |      | 6.325         | 6.325     | 0%         | 255.87                  | 214.75   | -16%       | 1.618.432                 | 1.358.328   | 260.104     | -16%       |
| 1.A.3.b.ii    | diesel oil |      | 113.450       | 113.450   | 0%         | 476.34                  | 134.96   | -72%       | 54.040.533                | 15.311.584  | 38.728.949  | -72%       |
| 1.A.3.b.iii   | gasoline   |      | 48.844        | 48.844    | 0%         | 823.00                  | 482.55   | -42%       | 29.931.266                | 23.183.732  | 6.747.534   | -23%       |
| 1.A.3.b.iii   | diesel oil |      | 566.741       | 566.741   | 0%         | 446.67                  | 271.83   | -39%       | 253.148.243               | 154.056.160 | 99.092.083  | -39%       |
| 1.A.3.b.iv    | gasoline   |      | 19.712        | 19.712    | 0%         | 113.68                  | 168.43   | 48%        | 2.240.749                 | 3.320.034   | -1.079.285  | 48%        |
| 1.A.3.b TOTAL | 2010       |      | 2.079.608     | 2.079.608 | 0%         |                         |          | 0%         | 645.965.162               | 349.851.206 | 296.113.956 | -46%       |
| 1.A.3.b.i     | gasoline   |      | 794.688       | 794.688   | 0%         | 92.09                   | 81.61    | -11%       | 73.185.851                | 64.851.951  | 8.333.900   | -11%       |
| 1.A.3.b.i     | diesel oil |      | 553.564       | 553.564   | 0%         | 434.12                  | 159.22   | -63%       | 240.313.791               | 88.138.959  | 152.174.832 | -63%       |
| 1.A.3.b.ii    | gasoline   |      | 6.118         | 6.118     | 0%         | 229.35                  | 198.57   | -13%       | 1.403.081                 | 1.214.776   | 188.305     | -13%       |
| 1.A.3.b.ii    | diesel oil |      | 115.967       | 115.967   | 0%         | 481.55                  | 126.92   | -74%       | 55.844.518                | 14.718.142  | 41.126.376  | -74%       |
| 1.A.3.b.iii   | gasoline   |      | 47.355        | 47.355    | 0%         | 592.65                  | 448.99   | -24%       | 28.071.221                | 21.268.323  | 6.804.898   | -24%       |
| 1.A.3.b.iii   | diesel oil |      | 563.891       | 563.891   | 0%         | 410.38                  | 244.97   | -40%       | 231.410.271               | 138.135.342 | 93.273.929  | -40%       |
| 1.A.3.b.iv    | gasoline   |      | 19.289        | 19.289    | 0%         | 110.79                  | 171.60   | 54%        | 2.137.002                 | 3.299.162   | -1.162.160  | 54%        |
| 1.A.3.b TOTAL | 2011       |      | 2.106.883     | 2.106.883 | 0%         |                         |          | 0%         | 632.365.736               | 331.625.655 | 300.740.081 | -48%       |
| 1.A.3.b.i     | gasoline   |      | 750.957       | 750.957   | 0%         | 85.73                   | 78.00    | -9%        | 64.379.994                | 58.677.229  | 5.802.765   | -9%        |
| 1.A.3.b.i     | diesel oil |      | 555.245       | 555.245   | 0%         | 435.96                  | 158.66   | -64%       | 242.062.902               | 88.096.699  | 153.966.203 | -64%       |
| 1.A.3.b.ii    | gasoline   |      | 5.657         | 5.657     | 0%         | 218.93                  | 193.15   | -12%       | 1.238.520                 | 1.092.662   | 145.859     | -12%       |
| 1.A.3.b.ii    | diesel oil |      | 114.350       | 114.350   | 0%         | 481.91                  | 128.17   | -75%       | 55.106.362                | 13.741.354  | 41.365.008  | -75%       |
| 1.A.3.b.iii   | gasoline   |      | 50.902        | 50.902    | 0%         | 533.22                  | 384.33   | -28%       | 27.141.913                | 19.563.200  | 7.578.704   | -28%       |
| 1.A.3.b.iii   | diesel oil |      | 589.585       | 589.585   | 0%         | 381.33                  | 224.00   | -41%       | 234.829.180               | 132.064.753 | 92.764.428  | -41%       |
| 1.A.3.b.iv    | gasoline   |      | 18.268        | 18.268    | 0%         | 107.43                  | 173.28   | 61%        | 1.962.546                 | 3.165.439   | -1.202.893  | 61%        |
| 1.A.3.b TOTAL | 2012       |      | 2.084.964     | 2.084.964 | 0%         |                         |          | 0%         | 616.721.438               | 316.391.343 | 300.429.094 | -49%       |
| 1.A.3.b.i     | gasoline   |      | 749.114       | 749.114   | 0%         | 89.35                   | 74.85    | -7%        | 60.190.007                | 56.071.797  | 4.118.211   | -7%        |
| 1.A.3.b.i     | diesel oil |      | 589.131       | 589.131   | 0%         | 437.14                  | 158.71   | -64%       | 257.633.728               | 93.499.010  | 164.134.718 | -64%       |
| 1.A.3.b.ii    | gasoline   |      | 5.578         | 5.578     | 0%         | 202.80                  | 184.07   | -9%        | 1.131.209                 | 1.026.727   | 104.482     | -9%        |
| 1.A.3.b.ii    | diesel oil |      | 118.777       | 118.777   | 0%         | 480.60                  | 114.93   | -76%       | 57.083.533                | 13.690.488  | 43.433.045  | -76%       |
| 1.A.3.b.iii   | gasoline   |      | 51.716        | 51.716    | 0%         | 509.64                  | 360.06   | -29%       | 26.350.969                | 18.620.843  | 7.730.126   | -29%       |
| 1.A.3.b.iii   | diesel oil |      | 600.139       | 600.139   | 0%         | 353.06                  | 287.93   | -19%       | 211.887.531               | 124.788.469 | 87.099.062  | -41%       |
| 1.A.3.b.iv    | gasoline   |      | 18.229        | 18.229    | 0%         | 104.34                  | 175.38   | 68%        | 1.902.688                 | 3.197.038   | -1.294.351  | 68%        |
| 1.A.3.b TOTAL | 2013       |      | 2.132.683     | 2.132.683 | 0%         |                         |          | 0%         | 616.079.063               | 316.854.371 | 300.224.692 | -50%       |
| 1.A.3.b.i     | gasoline   |      | 752.526       | 752.526   | 0%         | 76.03                   | 73.09    | -4%        | 57.215.533                | 54.988.921  | 2.216.612   | -4%        |
| 1.A.3.b.i     | diesel oil |      | 626.845       | 626.845   | 0%         | 435.87                  | 159.12   | -63%       | 272.876.061               | 95.613.892  | 173.262.169 | -63%       |
| 1.A.3.b.ii    | gasoline   |      | 5.845         | 5.845     | 0%         | 190.34                  | 176.49   | -7%        | 1.112.584                 | 1.031.612   | 80.972      | -7%        |
| 1.A.3.b.ii    | diesel oil |      | 128.578       | 128.578   | 0%         | 475.56                  | 110.96   | -77%       | 61.146.575                | 14.267.237  | 46.879.338  | -77%       |
| 1.A.3.b.iii   | gasoline   |      | 49.143        | 49.143    | 0%         | 468.37                  | 339.99   | -27%       | 23.017.115                | 16.708.234  | 6.308.881   | -27%       |
| 1.A.3.b.iii   | diesel oil |      | 572.754       | 572.754   | 0%         | 314.05                  | 196.05   | -38%       | 179.874.133               | 112.285.582 | 67.588.551  | -38%       |
| 1.A.3.b.iv    | gasoline   |      | 18.673        | 18.673    | 0%         | 100.59                  | 179.24   | 78%        | 1.878.294                 | 3.345.794   | -1.467.499  | 78%        |
| 1.A.3.b TOTAL | 2014       |      | 2.153.563     | 2.153.563 | 0%         |                         |          | 0%         | 597.120.297               | 302.252.271 | 294.868.025 | -49%       |
| 1.A.3.b.i     | gasoline   |      | 715.156       | 715.156   | 0%         | 74.38                   | 71.73    | -4%        | 53.190.787                | 51.300.983  | 1.889.805   | -4%        |
| 1.A.3.b.i     | diesel oil |      | 645.555       | 645.555   | 0%         | 426.19                  | 159.80   | -63%       | 275.130.233               | 103.163.501 | 171.966.732 | -63%       |
| 1.A.3.b.ii    | gasoline   |      | 5.793         | 5.793     | 0%         | 187.12                  | 172.80   | -8%        | 1.083.927                 | 1.000.999   | 82.928      | -8%        |
| 1.A.3.b.ii    | diesel oil |      | 135.386       | 135.386   | 0%         | 489.35                  | 187.96   | -77%       | 63.605.443                | 14.607.490  | 48.997.953  | -77%       |
| 1.A.3.b.iii   | gasoline   |      | 52.287        | 52.287    | 0%         | 458.96                  | 327.99   | -29%       | 23.997.817                | 17.149.448  | 6.848.370   | -29%       |
| 1.A.3.b.iii   | diesel oil |      | 589.411       | 589.411   | 0%         | 266.69                  | 187.51   | -30%       | 157.189.675               | 110.620.703 | 46.568.973  | -30%       |
| 1.A.3.b.iv    | gasoline   |      | 18.459        | 18.459    | 0%         | 99.32                   | 180.65   | 82%        | 1.833.362                 | 3.334.472   | -1.501.090  | 82%        |
| 1.A.3.b TOTAL | 2015       |      | 2.161.376     | 2.161.376 | 0%         |                         |          | 0%         | 575.931.265               | 301.877.596 | 274.053.670 | -48%       |
| 1.A.3.b.i     | gasoline   |      | 715.272       | 715.272   | 0%         | 79.93                   | 76.65    | -4%        | 50.736.367                | 50.535.049  | 201.318     | 0%         |
| 1.A.3.b.i     | diesel oil |      | 675.119       | 675.119   | 0%         | 410.36                  | 160.76   | -61%       | 277.041.660               | 108.535.230 | 168.506.430 | -61%       |
| 1.A.3.b.ii    | gasoline   |      | 5.926         | 5.926     | 0%         | 180.27                  | 171.05   | -5%        | 1.068.292                 | 1.013.678   | 54.614      | -5%        |
| 1.A.3.b.ii    | diesel oil |      | 144.068       | 144.068   | 0%         | 456.12                  | 185.62   | -77%       | 65.712.732                | 15.216.007  | 50.496.725  | -77%       |
| 1.A.3.b.iii   | gasoline   |      | 54.157        | 54.157    | 0%         | 424.73                  | 388.24   | -7%        | 23.002.109                | 16.683.117  | 6.308.992   | -27%       |
| 1.A.3.b.iii   | diesel oil |      | 594.013       | 594.013   | 0%         | 226.31                  | 180.97   | -20%       | 134.431.699               | 107.496.262 | 26.935.437  | -20%       |
| 1.A.3.b.iv    | gasoline   |      | 18.785        | 18.785    | 0%         | 95.14                   | 181.66   | 89%        | 1.805.897                 | 3.412.476   | -1.606.579  | 89%        |
| 1.A.3.b TOTAL | 2016       |      | 2.207.339     | 2.207.339 | 0%         |                         |          | 0%         | 553.790.558               | 302.901.820 | 250.897.738 | -45%       |
| 1.A.3.b.i     | gasoline   |      | 724.571       | 724.571   | 0%         | 67.66                   | 69.88    | 3%         | 49.026.074                | 50.634.714  | -1.607.640  | 3%         |
| 1.A.3.b.i     | diesel oil |      | 696.592       | 696.592   | 0%         | 390.65                  | 161.95   | -59%       | 272.126.091               | 112.810.721 | 159.315.370 | -59%       |
| 1.A.3.b.ii    | gasoline   |      | 6.186         | 6.186     | 0%         | 171.15                  | 167.18   | -2%        | 1.058.799                 | 1.034.211   | 24.588      | -2%        |
| 1.A.3.b.ii    | diesel oil |      | 153.284       | 153.284   | 0%         | 424.66                  | 183.89   | -76%       | 65.093.930                | 15.925.216  | 49.168.714  | -76%       |
| 1.A.3.b.iii   | gasoline   |      | 53.382        | 53.382    | 0%         | 379.80                  | 286.71   | -23%       | 19.793.901                | 15.304.828  | 4.489.073   | -23%       |
| 1.A.3.b.iii   | diesel oil |      | 596.263       | 596.263   | 0%         | 195.02                  | 175.92   | -10%       | 116.671.141               | 106.246.508 | 11.424.633  | -10%       |
| 1.A.3.b.iv    | gasoline   |      | 19.160        | 19.160    | 0%         | 92.83                   | 183.39   | 98%        | 1.778.674                 | 3.513.787   | -1.735.114  | 98%        |
| 1.A.3.b TOTAL | 2017       |      | 2.251.437     | 2.251.437 | 0%         |                         |          | 0%         | 525.549.410               | 304.469.986 | 221.079.424 | -42%       |
| 1.A.3.b.i     | gasoline   |      | 699.027       | 699.027   | 0%         | 64.42                   | 68.36    | 6%         | 45.032.966                | 47.786.817  | -2.753.850  | 6%         |
| 1.A.3.b.i     | diesel oil |      | 666.074       | 666.074   | 0%         | 371.66                  | 163.30   | -56%       | 247.556.063               | 108.768.604 | 138.787.459 | -56%       |
| 1.A.3.b.ii    | gasoline   |      | 6.315         | 6.315     | 0%         | 158.22                  | 160.11   | 1%         | 999.199                   | 1.011.138   | -11.939     | 1%         |
| 1.A.3.b.ii    | diesel oil |      | 154.259       | 154.259   | 0%         | 384.71                  | 182.69   | -73%       | 59.344.525                | 15.840.310  | 43.504.215  | -73%       |
| 1.A.3.b.iii   | gasoline   |      | 51.634        | 51.634    | 0%         | 309.75                  | 263.53   | -15%       | 15.993.526                | 13.607.106  | 2.386.420   | -15%       |
| 1.A.3.b.iii   | diesel oil |      | 585.186       | 585.186   | 0%         | 171.18                  | 172.10   | 1%         | 180.173.337               | 180.710.869 | -537.532    | 1%         |
| 1.A.3.b.iv    | gasoline   |      | 18.497        | 18.497    | 0%         | 89.66                   | 184.61   | 106%       | 1.658.588                 | 3.414.767   | -1.756.209  | 106%       |
| 1.A.3.b TOTAL | 2018       |      | 2.180.993     | 2.180.993 | 0%         |                         |          | 0%         | 478.758.206               | 291.139.612 | 179.618.593 | -38%       |
| 1.A.3.b.i     | gasoline   |      | 704.691       | 704.691   | 0%         | 62.30                   | 68.45    | 10%        | 43.901.941                | 48.238.025  | -4.336.084  | 10%        |
| 1.A.3.b.i     | diesel oil |      | 663.841       | 663.841   | 0%         | 345.81                  | 165.07   | -52%       | 229.566.088               | 109.582.982 | 119.983.106 | -52%       |
| 1.A.3.b.ii    | gasoline   |      | 6.683         | 6.683     | 0%         | 146.08                  | 153.25   | 5%         | 976.219                   | 1.034.150   | -57.931     | 5%         |
| 1.A.3.b.ii    | diesel oil |      | 159.183       | 159.183   | 0%         | 347.42                  | 181.90   | -71%       | 55.303.535                | 16.221.445  | 39.082.090  | -71%       |
| 1.A.3.b.iii   | gasoline   |      | 52.939        | 52.939    | 0%         | 274.41                  | 247.81   | -10%       | 14.527.012                | 13.118.578  | 1.408.434   | -10%       |
| 1.A.3.b.iii   | diesel oil |      | 595.913       | 595.913   | 0%         | 153.35                  | 169.17   | 10%        | 91.380.760                | 106.809.376 | -15.428.616 | 10%        |
| 1.A.3.b.iv    | gasoline   |      | 18.750        | 18.750    | 0%         | 86.05                   | 186.83   | 117%       | 1.613.450                 | 3.502.941   | -1.889.491  | 117%       |
| 1.A.3.b TOTAL | 2019       |      | 2.202.899     | 2.202.899 | 0%         |                         |          | 0%         | 437.268.744               | 292.497.697 | 144.771.048 | -33%       |

Adjustment details for 2020

| NFR Code                                         | Fuel                    | Activity Data |           |            | Implied Emission Factor |          |             | NO <sub>x</sub> Emissions |              |              |            |      |
|--------------------------------------------------|-------------------------|---------------|-----------|------------|-------------------------|----------|-------------|---------------------------|--------------|--------------|------------|------|
|                                                  |                         | current       | adjusted  | difference | current                 | adjusted | difference  | current                   | adjusted     | adjustment   | difference |      |
|                                                  |                         | in [t]        | in [t]    | in [%]     | in [g/t]                | in [g/t] | in [%]      | in [kg]                   | in [kg]      | in [kg]      | in [kg]    |      |
| 1.A.3.a.i. Passenger Cars                        | Gasoline                | pre-Cars      | 13,686    | 13,686     | 0%                      | 584.75   | 514.25      | -12%                      | 7,955,060    | 6,986,917    | -958,143   | -12% |
|                                                  |                         | Car 1         | 36,541    | 36,541     | 0%                      | 338.50   | 297.71      | -10%                      | 25,915,925   | 19,189,262   | -7,716,663 | -30% |
|                                                  |                         | Car 2         | 96,425    | 96,425     | 0%                      | 172.95   | 135.63      | -22%                      | 16,580,020   | 13,020,026   | -3,559,995 | -22% |
|                                                  |                         | Car 3         | 133,139   | 133,139    | 0%                      | 58.51    | 70.18       | 20%                       | 7,790,384    | 9,343,433    | 1,553,029  | 20%  |
|                                                  |                         | Car 4         | 444,991   | 444,991    | 0%                      | 42.27    | 42.19       | 0%                        | 18,911,389   | 18,773,529   | -137,859   | 0%   |
|                                                  |                         | Car 5         | 31,234    | 31,234     | 0%                      | 18.61    | 42.19       | 127%                      | 581,142      | 1,317,737    | 736,595    | 127% |
|                                                  | Car 6                   | 0             | 0         | 0%         | 25.08                   | 42.19    | 62%         | 2                         | 3            | 1            | 62%        |      |
|                                                  | Gasoline total          | 795,957       | 795,957   | 0%         | 92.55                   | 84.39    | -9%         | 77,646,642                | 67,656,586   | -9,990,056   | -13%       |      |
|                                                  | Diesel Oil              | pre-Cars      | 1,915     | 1,915      | 0%                      | 318.13   | 264.95      | -17%                      | 583,760      | 527,256      | -56,504    | -10% |
|                                                  |                         | Car 1         | 10,339    | 10,339     | 0%                      | 294.42   | 245.17      | -17%                      | 3,046,428    | 2,741,387    | -305,041   | -10% |
| Car 2                                            |                         | 50,088        | 50,088    | 0%         | 406.90                  | 299.19   | -26%        | 29,372,795                | 19,974,210   | -9,398,584   | -32%       |      |
| Car 3                                            |                         | 134,025       | 134,025   | 0%         | 542.54                  | 176.54   | -67%        | 72,645,173                | 23,929,276   | -48,715,897  | -67%       |      |
| Car 4                                            |                         | 279,154       | 279,154   | 0%         | 304.37                  | 140.58   | -53%        | 187,299,180               | 39,243,811   | -148,055,369 | -79%       |      |
| Car 5                                            |                         | 53,547        | 53,547    | 0%         | 434.70                  | 140.58   | -68%        | 23,276,735                | 7,527,796    | -15,748,939  | -68%       |      |
| Car 6                                            | 334                     | 334           | 0%        | 257.62     | 140.58                  | -45%     | 85,044      | 46,953                    | -38,091      | -45%         |            |      |
| Diesel oil total                                 | 529,380                 | 529,380       | 0%        | 429.45     | 160.55                  | -63%     | 227,347,096 | 84,970,461                | -142,376,635 | -63%         |            |      |
| Pkx Total                                        | 1,325,337               | 1,325,337     | 0%        | 238.12     | 155.14                  | -36%     | 364,985,938 | 152,627,047               | -212,358,891 | -58%         |            |      |
| 1.A.3.b.i. Light Duty Vehicles (LDVs)            | Gasoline                | pre-Cars      | 1,249     | 1,249      | 0%                      | 627.99   | 640.95      | 1%                        | 783,320      | 906,871      | 123,551    | 16%  |
|                                                  |                         | Car 1         | 367       | 367        | 0%                      | 361.95   | 297.39      | -18%                      | 368,969      | 186,620      | -182,349   | -50% |
|                                                  |                         | Car 2         | 1,393     | 1,393      | 0%                      | 264.75   | 184.41      | -30%                      | 368,840      | 256,917      | -111,923   | -30% |
|                                                  |                         | Car 3         | 856       | 856        | 0%                      | 82.47    | 30.83       | -63%                      | 70,631       | 77,625       | 6,994      | 10%  |
|                                                  |                         | Car 4         | 2,420     | 2,420      | 0%                      | 36.32    | 44.90       | 24%                       | 87,987       | 188,679      | 100,692    | 114% |
|                                                  |                         | Car 5         | 49        | 49         | 0%                      | 15.34    | 44.90       | 183%                      | 750          | 2,218        | 1,468      | 183% |
|                                                  | Car 6                   | 0             | 0         | 0%         | 0                       | 0        | 0%          | 0                         | 0            | 0            | 0%         |      |
|                                                  | Gasoline total          | 6,345         | 6,345     | 0%         | 255.87                  | 254.75   | -0%         | 1,419,832                 | 1,358,126    | -61,706      | -4%        |      |
|                                                  | Diesel Oil              | pre-Cars      | 4,876     | 4,876      | 0%                      | 425.99   | 386.79      | -9%                       | 2,077,142    | 1,436,983    | -640,159   | -31% |
|                                                  |                         | Car 1         | 9,989     | 9,989      | 0%                      | 398.18   | 276.24      | -30%                      | 2,389,095    | 1,289,636    | -1,099,459 | -46% |
| Car 2                                            |                         | 13,126        | 13,126    | 0%         | 336.76                  | 153.18   | -54%        | 4,420,280                 | 2,534,731    | -1,885,549   | -43%       |      |
| Car 3                                            |                         | 33,249        | 33,249    | 0%         | 531.91                  | 150.58   | -72%        | 17,655,883                | 5,086,760    | -12,569,123  | -72%       |      |
| Car 4                                            |                         | 54,581        | 54,581    | 0%         | 491.42                  | 80.69    | -84%        | 26,021,036                | 4,940,722    | -21,080,314  | -80%       |      |
| Car 5                                            |                         | 1,629         | 1,629     | 0%         | 427.50                  | 80.69    | -79%        | 696,296                   | 144,434      | -551,862     | -79%       |      |
| Car 6                                            | 0                       | 0             | 0%        | 15.73      | 80.69                   | -42%     | 7           | 4                         | -3           | -42%         |            |      |
| Diesel oil total                                 | 113,450                 | 113,450       | 0%        | 476.34     | 134.94                  | -72%     | 54,043,533  | 15,351,584                | -38,691,949  | -72%         |            |      |
| LDVs Total                                       | 119,775                 | 119,775       | 0%        | 464.70     | 139.18                  | -70%     | 55,658,966  | 16,685,913                | -38,973,053  | -70%         |            |      |
| 1.A.3.b.ii. Heavy Duty Vehicle Buses             | Gasoline                | pre-Cars      | 3,382     | 3,382      | 0%                      | 1096.25  | 1028.78     | -6%                       | 3,674,087    | 3,432,644    | -241,443   | -7%  |
|                                                  |                         | Car 1         | 2,826     | 2,826      | 0%                      | 749.41   | 732.14      | -2%                       | 2,117,871    | 2,125,595    | 7,723      | 0%   |
|                                                  |                         | Car 2         | 10,152    | 10,152     | 0%                      | 801.96   | 643.47      | -20%                      | 8,140,119    | 6,532,213    | -1,607,906 | -20% |
|                                                  |                         | Car 3         | 15,090    | 15,090     | 0%                      | 633.22   | 437.25      | -30%                      | 10,865,776   | 7,289,299    | -3,576,477 | -33% |
|                                                  |                         | Car 4         | 5,461     | 5,461      | 0%                      | 448.63   | 351.65      | -21%                      | 2,650,016    | 1,921,527    | -728,489   | -28% |
|                                                  |                         | Car 5         | 10,326    | 10,326     | 0%                      | 327.28   | 182.33      | -44%                      | 3,882,417    | 1,882,644    | -1,999,773 | -51% |
|                                                  | Car 6                   | 0             | 0         | 0%         | 0                       | 0        | 0%          | 0                         | 0            | 0            | 0%         |      |
|                                                  | Buses Total             | 48,044        | 48,044    | 0%         | 623.80                  | 482.55   | -23%        | 29,931,266                | 23,183,732   | -6,747,534   | -23%       |      |
|                                                  | Diesel Oil              | pre-Cars      | 10,185    | 10,185     | 0%                      | 1040.16  | 787.37      | -24%                      | 10,510,623   | 7,754,136    | -2,756,487 | -26% |
|                                                  |                         | Car 1         | 5,677     | 5,677      | 0%                      | 758.59   | 575.55      | -24%                      | 4,261,383    | 3,287,681    | -973,702   | -23% |
| Car 2                                            |                         | 38,558        | 38,558    | 0%         | 817.62                  | 524.79   | -35%        | 31,525,526                | 20,234,619   | -11,290,907  | -36%       |      |
| Car 3                                            |                         | 169,023       | 169,023   | 0%         | 626.28                  | 274.48   | -56%        | 161,136,182               | 59,617,271   | -101,518,911 | -63%       |      |
| Car 4                                            |                         | 69,636        | 69,636    | 0%         | 368.34                  | 280.62   | -24%        | 27,183,867                | 20,146,636   | -7,037,231   | -26%       |      |
| Car 5                                            |                         | 283,934       | 283,934   | 0%         | 276.42                  | 151.65   | -45%        | 78,643,643                | 43,115,897   | -35,527,746  | -45%       |      |
| Car 6                                            | 0                       | 0             | 0%        | 0          | 0                       | 0%       | 0           | 0                         | 0            | 0%           |            |      |
| Trucks Total                                     | 565,741                 | 565,741       | 0%        | 446.67     | 271.83                  | -39%     | 293,148,243 | 154,696,160               | -138,452,083 | -48%         |            |      |
| 1.A.3.b.iii. Heavy Duty Vehicle Trucks & Lorries | Gasoline                | pre-Cars      | 7,973     | 7,973      | 0%                      | 122.80   | 149.18      | 22%                       | 972,721      | 1,189,393    | 216,672    | 22%  |
|                                                  |                         | Car 1         | 5,231     | 5,231      | 0%                      | 123.77   | 165.74      | 34%                       | 647,479      | 887,039      | 239,560    | 34%  |
|                                                  |                         | Car 2         | 3,587     | 3,587      | 0%                      | 141.16   | 184.21      | 30%                       | 585,362      | 696,661      | 111,299    | 19%  |
|                                                  |                         | Car 3         | 2,950     | 2,950      | 0%                      | 38.11    | 184.21      | 381%                      | 116,188      | 657,032      | 540,844    | 381% |
|                                                  |                         | Car 4         | 0         | 0          | 0%                      | 0        | 0           | 0%                        | 0            | 0            | 0          | 0%   |
|                                                  |                         | Car 5         | 0         | 0          | 0%                      | 0        | 0           | 0%                        | 0            | 0            | 0          | 0%   |
|                                                  | LDVs Total              | 19,172        | 19,172    | 0%         | 113.68                  | 168.43   | 48%         | 2,483,149                 | 3,326,034    | 842,885      | 48%        |      |
|                                                  | 1.A.3.b. Road Transport | 2,879,688     | 2,879,688 | 0%         | 219.62                  | 168.23   | -46%        | 645,965,162               | 349,851,296  | -296,113,866 | -46%       |      |

Adjustment details for 2021

| NFR Code                                 | Fuel                                  | Activity Data    |           |            | Implied Emission Factor |          |            | NO <sub>x</sub> Emissions |             |             |              |          |      |
|------------------------------------------|---------------------------------------|------------------|-----------|------------|-------------------------|----------|------------|---------------------------|-------------|-------------|--------------|----------|------|
|                                          |                                       | current          | adjusted  | difference | current                 | adjusted | difference | current                   | adjusted    | adjustment  | difference   |          |      |
|                                          |                                       | in [t]           | in [t]    | in [%]     | in [g/t]                | in [g/t] | in [%]     | in [kg]                   | in [kg]     | in [kg]     | in [kg]      |          |      |
| 1.A.3.a.i. Passenger Cars                | Gasoline                              | pre-Cars         | 13,063    | 13,063     | 0%                      | 592.96   | 534.68     | -10%                      | 7,720,235   | 6,979,435   | -740,801     | -10%     |      |
|                                          |                                       | Car 1            | 61,979    | 61,979     | 0%                      | 347.96   | 340.16     | -31%                      | 21,640,430  | 18,884,961  | -2,755,469   | -13%     |      |
|                                          |                                       | Car 2            | 87,083    | 87,083     | 0%                      | 178.38   | 136.58     | -24%                      | 15,620,983  | 11,883,782  | -3,737,201   | -24%     |      |
|                                          |                                       | Car 3            | 124,330   | 124,330    | 0%                      | 61.94    | 71.52      | 16%                       | 7,683,891   | 8,891,671   | 1,207,780    | 16%      |      |
|                                          |                                       | Car 4            | 442,185   | 442,185    | 0%                      | 43.94    | 43.68      | 0%                        | 19,384,914  | 19,376,439  | -8,475       | 0%       |      |
|                                          |                                       | Car 5            | 66,057    | 66,057     | 0%                      | 18.58    | 43.68      | 135%                      | 1,227,381   | 2,085,636   | 1,658,255    | 135%     |      |
|                                          | Car 6                                 | 1                | 1         | 0%         | 25.05                   | 43.68    | 65%        | 17                        | 20          | 3           | 11%          |          |      |
|                                          | Gasoline total                        | 794,688          | 794,688   | 0%         | 92.69                   | 81.65    | -11%       | 73,165,851                | 64,851,551  | -8,314,300  | -11%         |          |      |
|                                          | Diesel Oil                            | pre-Cars         | 1,711     | 1,711      | 0%                      | 318.13   | 264.95     | -17%                      | 583,760     | 527,256     | -56,504      | -10%     |      |
|                                          |                                       | Car 1            | 8,426     | 8,426      | 0%                      | 297.37   | 245.17     | -17%                      | 2,585,115   | 2,239,987   | -345,128     | -13%     |      |
| Car 2                                    |                                       | 42,514           | 42,514    | 0%         | 407.93                  | 299.27   | -26%       | 17,384,549                | 13,211,916  | -4,172,633  | -24%         |          |      |
| Car 3                                    |                                       | 121,429          | 121,429   | 0%         | 555.36                  | 176.55   | -68%       | 67,437,053                | 21,881,386  | -45,555,667 | -68%         |          |      |
| 1.A.3.a.ii. Heavy Duty Vehicles (HDVs)   | Gasoline                              | Car 4            | 264,943   | 264,943    | 0%                      | 388.88   | 143.48     | -63%                      | 182,917,881 | 39,089,755  | -143,828,126 | -79%     |      |
|                                          |                                       | Car 5            | 113,047   | 113,047    | 0%                      | 435.12   | 143.48     | -67%                      | 49,536,960  | 16,332,974  | -33,203,986  | -67%     |      |
|                                          |                                       | Car 6            | 685       | 685        | 0%                      | 259.59   | 143.48     | -45%                      | 180,582     | 99,754      | -80,828      | -45%     |      |
|                                          |                                       | Diesel oil total | 553,564   | 553,564    | 0%                      | 434.12   | 159.92     | -63%                      | 249,313,791 | 80,138,959  | -169,174,832 | -63%     |      |
|                                          |                                       | Pkx Total        | 1,348,252 | 1,348,252  | 0%                      | 232.52   | 133.47     | -43%                      | 713,499,642 | 152,990,510 | -560,509,132 | -78%     |      |
|                                          |                                       | Gasoline         | pre-Cars  | 1,084      | 1,084                   | 0%       | 626.25     | 640.95                    | 1%          | 482,014     | 560,371      | 78,357   | 16%  |
|                                          | Car 1                                 |                  | 283       | 283        | 0%                      | 818.74   | 584.47     | -29%                      | 243,289     | 86,158      | -157,131     | -65%     |      |
|                                          | Car 2                                 |                  | 1,184     | 1,184      | 0%                      | 268.66   | 191.66     | -29%                      | 310,529     | 223,189     | -87,340      | -28%     |      |
|                                          | Car 3                                 |                  | 783       | 783        | 0%                      | 85.97    | 35.39      | -59%                      | 67,320      | 74,782      | 7,462        | 11%      |      |
|                                          | 1.A.3.b.i. Light Duty Vehicles (LDVs) | Gasoline         | Car 4     | 2,562      | 2,562                   | 0%       | 37.38      | 46.51                     | 24%         | 95,786      | 119,162      | 23,376   | 24%  |
| Car 5                                    |                                       |                  | 241       | 241        | 0%                      | 16.13    | 46.51      | 189%                      | 3,882       | 11,190      | 7,308        | 189%     |      |
| Car 6                                    |                                       |                  | 0         | 0          | 0%                      | 15.33    | 46.51      | 203%                      | 1           | 2           | 1            | 203%     |      |
| Gasoline total                           |                                       |                  | 6,118     | 6,118      | 0%                      | 229.35   | 186.57     | -18%                      | 1,483,081   | 1,254,776   | -228,305     | -15%     |      |
| Diesel Oil                               |                                       |                  | pre-Cars  | 3,995      | 3,995                   | 0%       | 425.99     | 386.79                    | -9%         | 1,986,280   | 1,225,682    | -760,598 | -38% |
|                                          |                                       |                  | Car 1     | 4,787      | 4,787                   | 0%       | 398.18     | 276.24                    | -30%        | 1,984,260   | 1,030,426    | -953,834 | -48% |
|                                          |                                       | Car 2            | 10,816    | 10,816     | 0%                      | 336.76   | 153.18     | -54%                      | 3,644,582   | 2,091,063   | -1,553,519   | -43%     |      |
|                                          |                                       | Car 3            | 28,876    | 28,876     | 0%                      | 541.53   | 150.58     | -72%                      | 15,037,249  | 4,346,870   | -10,690,379  | -72%     |      |
| Diesel Oil                               |                                       | Car 4            | 60,032    | 60,032     | 0%                      | 493.82   | 80.69      | -84%                      | 30,039,914  | 5,429,011   | -24,610,904  | -82%     |      |
|                                          |                                       | Car 5            | 6,609     | 6,609      | 0%                      | 449.36   | 80.69      | -80%                      | 2,930,190   | 584,364     | -2,345,826   | -80%     |      |
|                                          | Car 6                                 | 0                | 0         | 0%         | 156.21                  | 80.69    | -49%       | 16                        | 8           | -8          | -49%         |          |      |
|                                          | LDVs total                            | 115,967          | 115,967   | 0%         | 485.56                  | 126.90   | -74%       | 56,848,598                | 14,781,142  | -42,067,456 | -74%         |          |      |
| 1.A.3.b.ii. Heavy Duty Vehicles (HDVs)   | Gasoline                              | LDVs Total       | 122,085   | 122,085    | 0%                      | 468.92   | 130.51     | -72%                      | 17,247,399  | 19,932,808  | 2,685,409    | 15%      |      |
|                                          |                                       | pre-Cars         | 2,620     | 2,620      | 0%                      | 1062.63  | 1018.76    | -5%                       | 2,896,189   | 2,671,331   | -224,858     | -8%      |      |
|                                          |                                       | Car 1            | 2,250     | 2,250      | 0%                      | 752.91   | 751.43     | -0%                       | 1,839,187   | 1,696,297   | -142,890     | -8%      |      |
|                                          |                                       | Car 2            | 9,374     | 9,374      | 0%                      | 804.17   | 543.36     | -32%                      | 7,827,125   | 5,037,699   | -2,789,426   | -36%     |      |
|                                          |                                       | Car 3            | 14,181    | 14,181     | 0%                      | 633.46   | 457.38     | -29%                      | 9,425,090   | 6,689,054   | -2,736,037   | -29%     |      |
|                                          |                                       | Car 4            | 56,937    | 56,937     | 0%                      | 448.88   | 351.81     | -22%                      | 2,363,338   | 1,685,274   | -678,064     | -29%     |      |
|                                          | Diesel Oil                            | Car 5            | 13,266    | 13,266     | 0%                      | 336.60   | 182.62     | -46%                      | 4,569,052   | 2,446,399   | -2,122,653   | -46%     |      |
|                                          |                                       | Car 6            | 0         | 0          | 0%                      | 0        | 0          | 0%                        | 0           | 0           | 0            | 0%       |      |
|                                          |                                       | Buses Total      | 47,365    | 47,365     | 0%                      | 592.65   | 448.99     | -24%                      | 28,011,221  | 21,256,323  | -6,754,898   | -24%     |      |
|                                          |                                       | HDVs Total       | 8,044     | 8,044      | 0%                      | 1038.67  | 783.98     | -25%                      | 8,355,423   | 6,144,933   | -2,210,491   | -26%     |      |
| 1.A.3.b.iii. Heavy Duty Trucks & Lorries | Gasoline                              | Car 1            | 29,277    | 29,277     | 0%                      | 817.97   | 504.30     | -38%                      | 23,947,123  | 15,233,223  | -8,713,900   | -36%     |      |
|                                          |                                       | Car 2            | 521       | 521        | 0%                      | 804.17   | 372.69     | -53%                      | 7,321,626   | 4,352,437   | -2,969,189   | -40%     |      |
|                                          |                                       | Car 3            | 68,430    | 68,430     | 0%                      | 305.25   | 152.63     | -50%                      | 22,977,784  | 15,960,483  | -6,998,301   | -30%     |      |
|                                          |                                       | Car 4            | 342,175   | 342,175    | 0%                      | 278.30   | 120.63     | -57%                      | 95,549,479  | 62,619,687  | -32,929,792  | -34%     |      |
|                                          |                                       | Car 5            | 0         | 0          | 0%                      | 0        | 0          | 0%                        | 0           | 0           | 0            | 0%       |      |
|                                          |                                       | Trucks Total     | 563,891   | 563,891    | 0%                      | 418.38   | 244.97     | -40%                      | 233,493,271 | 138,136,342 | -95,356,929  | -40%     |      |
|                                          | Diesel Oil                            | pre-Cars         | 7,389     | 7,389      | 0%                      | 122.58   | 150.24     | 22%                       | 965,588     | 1,110,176   | 144,588      | 15%      |      |
|                                          |                                       | Car 1            | 4,085     | 4,085      | 0%                      | 124.72   | 180.25     | 45%                       | 599,299     | 885,547     | 286,248      | 32%      |      |
|                                          |                                       | Car 2            | 3,544     | 3,544      | 0%                      | 137.85   | 194.58     | 41%                       | 488,552     | 680,633     | 192,081      | 41%      |      |
|                                          |                                       | Car 3            | 3,550     | 3,550      | 0%                      | 39.55    | 194.58     | 382%                      | 140,563     | 630,634     | 490,071      | 382%     |      |
| Gasoline                                 | Car 4                                 | 0                | 0         | 0%         | 0                       | 0        | 0%         | 0                         | 0           | 0           | 0%           |          |      |
|                                          | Car 5                                 | 0                | 0         | 0%         | 0                       | 0        | 0%         | 0                         | 0           | 0           | 0%           |          |      |
| MDOVs Total                              | 79,819                                | 79,819           | 0%        | 118.79     | 171.64                  | 54%      | 2,137,062  | 3,299,152                 | 1,162,090   | 54%         |              |          |      |
| 1.A.3.b. Road Transport                  | Total                                 | 2,160,883        | 2,160,883 | 0%         | 305.90                  | 157.85   | -48%       | 132,365,736               | 131,625,655 | -740,081    | -0%          |          |      |

Adjustment details for 2023

| NFR Code                             | Fuel                                  | Activity Data    |           |            | Implied Emission Factor |          |            | NO <sub>x</sub> Emissions |             |             |              |          |      |
|--------------------------------------|---------------------------------------|------------------|-----------|------------|-------------------------|----------|------------|---------------------------|-------------|-------------|--------------|----------|------|
|                                      |                                       | current          | adjusted  | difference | current                 | adjusted | difference | current                   | adjusted    | difference  |              |          |      |
|                                      |                                       | in [t]           | in [t]    | in [%]     | in [g/t]                | in [g/t] | in [%]     | in [kg]                   | in [kg]     | in [%]      |              |          |      |
| 1.A.3.a.i. Passenger Cars            | Gasoline                              | pre-Cars         | 11,581    | 11,581     | 0%                      | 607.72   | 635.38     | -52%                      | 7,035,041   | 6,189,785   | -845,256     | -12%     |      |
|                                      |                                       | Car 1            | 47,487    | 47,487     | 0%                      | 348.56   | 341.62     | -2%                       | 16,571,746  | 11,426,129  | -5,145,617   | -31%     |      |
|                                      |                                       | Car 2            | 72,781    | 72,781     | 0%                      | 194.27   | 137.82     | -29%                      | 13,487,749  | 10,035,380  | -3,452,369   | -26%     |      |
|                                      |                                       | Car 3            | 189,443   | 189,443    | 0%                      | 63.89    | 72.62      | 14%                       | 6,927,963   | 7,875,172   | 947,209      | 14%      |      |
|                                      |                                       | Car 4            | 489,541   | 489,541    | 0%                      | 45.39    | 45.13      | -1%                       | 18,541,881  | 18,436,736  | -105,145     | -1%      |      |
|                                      |                                       | Car 5            | 181,961   | 181,961    | 0%                      | 18.61    | 45.13      | 143%                      | 1,887,355   | 4,681,311   | 2,793,956    | 143%     |      |
|                                      | Car 6                                 | 282              | 282       | 0%         | 25.05                   | 45.13    | 74%        | 7,339                     | 12,736      | 5,397       | 74%          |          |      |
|                                      | Gasoline total                        | 750,567          | 750,567   | 0%         | 85.73                   | 78.88    | -8%        | 64,379,964                | 58,577,229  | -5,802,735  | -9%          |          |      |
|                                      | Diesel Oil                            | pre-Cars         | 1,487     | 1,487      | 0%                      | 311.98   | 284.56     | -9%                       | 463,963     | 383,872     | -80,091      | -9%      |      |
|                                      |                                       | Car 1            | 6,660     | 6,660      | 0%                      | 297.79   | 286.44     | -4%                       | 1,980,364   | 1,771,787   | -208,577     | -11%     |      |
| Car 2                                |                                       | 33,967           | 33,967    | 0%         | 406.82                  | 279.27   | -40%       | 13,887,432                | 7,445,646   | -6,441,787  | -46%         |          |      |
| Car 3                                |                                       | 183,539          | 183,539   | 0%         | 564.82                  | 176.63   | -69%       | 58,389,037                | 18,434,837  | -39,954,200 | -68%         |          |      |
| 1.A.3.b.i. Heavy Duty Vehicles (HDV) | Gasoline                              | Car 4            | 234,943   | 234,943    | 0%                      | 398.41   | 146.46     | -62%                      | 91,724,190  | 34,488,997  | -57,235,193  | -62%     |      |
|                                      |                                       | Car 5            | 173,112   | 173,112    | 0%                      | 434.89   | 146.46     | -66%                      | 75,284,364  | 25,353,375  | -49,930,989  | -66%     |      |
|                                      |                                       | Car 6            | 1,557     | 1,557      | 0%                      | 259.84   | 146.46     | -44%                      | 484,664     | 220,086     | -264,578     | -44%     |      |
|                                      |                                       | Diesel oil total | 555,245   | 555,245    | 0%                      | 455.96   | 158.66     | -64%                      | 242,962,982 | 88,096,639  | -154,866,343 | -64%     |      |
|                                      |                                       | FCs Total        | 1,306,262 | 1,306,262  | 0%                      | 234.61   | 152.29     | -35%                      | 386,442,896 | 146,673,867 | -239,769,029 | -35%     |      |
|                                      |                                       | Diesel Oil       | pre-Cars  | 962        | 962                     | 0%       | 632.38     | 645.95                    | 2%          | 607,779     | 621,160      | 13,381   | 2%   |
|                                      | Car 1                                 |                  | 232       | 232        | 0%                      | 803.24   | 183.22     | -65%                      | 199,985     | 70,295      | -129,690     | -61%     |      |
|                                      | Car 2                                 |                  | 989       | 989        | 0%                      | 271.16   | 195.74     | -28%                      | 268,134     | 133,538     | -134,596     | -28%     |      |
|                                      | Car 3                                 |                  | 835       | 835        | 0%                      | 89.38    | 98.33      | 10%                       | 14,623      | 82,082      | 7,459        | 10%      |      |
|                                      | 1.A.3.b.ii. Heavy Duty Vehicles (HDV) | Gasoline         | Car 4     | 2,030      | 2,030                   | 0%       | 38.49      | 47.58                     | 24%         | 78,155      | 96,691       | 18,536   | 24%  |
| Car 5                                |                                       |                  | 610       | 610        | 0%                      | 16.36    | 47.58      | 182%                      | 9,941       | 29,011      | 19,069       | 182%     |      |
| Car 6                                |                                       |                  | 0         | 0          | 0%                      | 15.37    | 47.58      | 210%                      | 2           | 6           | 4            | 210%     |      |
| Gasoline total                       |                                       |                  | 5,657     | 5,657      | 0%                      | 218.93   | 193.15     | -12%                      | 1,238,520   | 1,692,662   | 454,142      | 37%      |      |
| Diesel Oil                           |                                       |                  | pre-Cars  | 3,281      | 3,281                   | 0%       | 424.46     | 386.79                    | -9%         | 1,368,754   | 1,362,083    | -6,671   | -0%  |
|                                      |                                       |                  | Car 1     | 3,666      | 3,666                   | 0%       | 398.34     | 276.24                    | -30%        | 1,445,960   | 1,187,634    | -258,326 | -18% |
|                                      |                                       | Car 2            | 8,479     | 8,479      | 0%                      | 336.40   | 133.39     | -40%                      | 2,852,325   | 1,639,772   | -1,212,553   | -43%     |      |
|                                      |                                       | Car 3            | 23,785    | 23,785     | 0%                      | 558.53   | 150.44     | -73%                      | 13,050,281  | 3,565,082   | -9,485,199   | -73%     |      |
| Diesel Oil                           |                                       | 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                  | 120.17   | -75%       | 55,186,382                | 13,741,354  | -41,445,028 | -75%         |          |      |
| 1.A.3.b.iii. Motorized Buses         | Gasoline                              | LDVs Total       | 129,008   | 129,008    | 0%                      | 489.51   | 123.61     | -74%                      | 56,344,963  | 14,834,656  | -41,510,307  | -74%     |      |
|                                      |                                       | pre-Cars         | 1,326     | 1,326      | 0%                      | 1093.46  | 1119.45    | 4%                        | 1,410,640   | 1,352,283   | -58,357      | -4%      |      |
|                                      |                                       | Car 1            | 1,245     | 1,245      | 0%                      | 727.34   | 731.15     | 1%                        | 1,017,476   | 1,017,184   | -292         | -0%      |      |
|                                      |                                       | Car 2            | 7,789     | 7,789      | 0%                      | 703.46   | 643.34     | -9%                       | 5,085,091   | 4,597,478   | -487,613     | -9%      |      |
|                                      |                                       | Car 3            | 14,483    | 14,483     | 0%                      | 629.94   | 437.61     | -31%                      | 9,073,137   | 6,089,744   | -2,983,393   | -33%     |      |
|                                      |                                       | Car 4            | 5,331     | 5,331      | 0%                      | 468.10   | 361.85     | -23%                      | 2,642,179   | 1,675,777   | -966,402     | -37%     |      |
|                                      | Diesel Oil                            | Car 5            | 20,752    | 20,752     | 0%                      | 347.84   | 182.99     | -47%                      | 7,219,563   | 3,787,467   | -3,432,096   | -47%     |      |
|                                      |                                       | Car 6            | 73        | 73         | 0%                      | 64.52    | 182.99     | 286%                      | 3,961       | 13,295      | 9,334        | 236%     |      |
|                                      |                                       | Buses Total      | 50,962    | 50,962     | 0%                      | 533.22   | 384.33     | -28%                      | 27,141,913  | 19,965,288  | -7,176,625   | -26%     |      |
|                                      |                                       | Trucks Total     | 589,585   | 589,585    | 0%                      | 385.33   | 224.69     | -41%                      | 224,829,180 | 132,064,753 | -92,764,427  | -41%     |      |
| 1.A.3.b.iv. Two-Wheelers (M2W)       | Gasoline                              | pre-Cars         | 6,780     | 6,780      | 0%                      | 122.76   | 151.03     | 23%                       | 822,530     | 1,011,520   | 188,990      | 23%      |      |
|                                      |                                       | Car 1            | 4,386     | 4,386      | 0%                      | 134.61   | 171.39     | 28%                       | 536,615     | 738,050     | 201,435      | 38%      |      |
|                                      |                                       | Car 2            | 3,287     | 3,287      | 0%                      | 136.22   | 184.56     | 35%                       | 445,087     | 636,853     | 191,766      | 43%      |      |
|                                      |                                       | Car 3            | 3,984     | 3,984      | 0%                      | 38.66    | 184.56     | 382%                      | 18,386      | 778,616     | 760,230      | 382%     |      |
|                                      |                                       | Car 4            | 0         | 0          | 0%                      | 0        | 0          | 0%                        | 0           | 0           | 0            | 0%       |      |
|                                      |                                       | Car 5            | 0         | 0          | 0%                      | 0        | 0          | 0%                        | 0           | 0           | 0            | 0%       |      |
|                                      | M2Ws Total                            | 18,268           | 18,268    | 0%         | 107.43                  | 173.28   | 61%        | 1,982,546                 | 3,165,439   | 1,182,893   | 61%          |          |      |
|                                      | 1.A.3.b. Road Transport               | Total            | 2,084,964 | 2,084,964  | 0%                      | 295.79   | 151.71     | -49%                      | 616,721,438 | 396,381,343 | -220,340,094 | -49%     |      |

Adjustment details for 2023

| Table 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Adjustment details for 2024

| NFR Code                                              | Fuel                                      | Activity Data    |           |            | Implied Emission Factor |          |            | NO <sub>x</sub> Emissions |             |             |             |         |
|-------------------------------------------------------|-------------------------------------------|------------------|-----------|------------|-------------------------|----------|------------|---------------------------|-------------|-------------|-------------|---------|
|                                                       |                                           | current          | adjusted  | difference | current                 | adjusted | difference | current                   | adjusted    | adjustment  | difference  |         |
|                                                       |                                           | in [t]           | in [t]    | in [%]     | in [g/t]                | in [g/t] | in [%]     | in [kg]                   | in [kg]     | in [kg]     | in [kg]     |         |
| 1.A.3.a.i. - Passenger Cars                           | Gasoline                                  | pre-Cars         | 11,647    | 11,647     | 0%                      | 812.37   | 844.11     | -11%                      | 7,132,688   | 6,327,484   | -795,844    | -11%    |
|                                                       |                                           | Car 1            | 30,667    | 30,667     | 0%                      | 368.77   | 343.93     | -32%                      | 11,082,246  | 7,480,541   | -3,621,706  | -32%    |
|                                                       |                                           | Car 2            | 53,486    | 53,486     | 0%                      | 198.58   | 140.31     | -29%                      | 10,514,477  | 7,584,432   | -3,018,844  | -29%    |
|                                                       |                                           | Car 3            | 87,374    | 87,374     | 0%                      | 65.31    | 73.93      | 7%                        | 6,955,585   | 6,459,757   | -494,218    | -7%     |
|                                                       |                                           | Car 4            | 387,759   | 387,759    | 0%                      | 45.16    | 47.80      | -3%                       | 19,093,585  | 19,536,099  | -523,557    | -3%     |
|                                                       |                                           | Car 5            | 171,270   | 171,270    | 0%                      | 18.59    | 47.80      | 151%                      | 3,183,252   | 8,187,581   | 5,004,299   | 151%    |
|                                                       | Car 6                                     | 10,315           | 10,315    | 0%         | 25.97                   | 47.80    | 84%        | 267,855                   | 433,096     | 165,241     | 84%         |         |
|                                                       | Gasoline total                            | 752,526          | 752,526   | 0%         | 76.60                   | 73.89    | 4%         | 57,215,533                | 54,998,921  | 2,216,612   | 4%          |         |
|                                                       | Diesel Oil                                | pre-Cars         | 1,341     | 1,341      | 0%                      | 311.73   | 284.66     | -55%                      | 417,967     | 365,246     | -52,722     | -13%    |
|                                                       |                                           | Car 1            | 4,892     | 4,892      | 0%                      | 298.92   | 267.29     | -11%                      | 1,482,264   | 1,387,643   | -94,621     | -11%    |
| Car 2                                                 |                                           | 23,934           | 23,934    | 0%         | 408.71                  | 320.45   | -49%       | 9,734,484                 | 5,276,480   | 4,458,004   | -49%        |         |
| Car 3                                                 |                                           | 82,749           | 82,749    | 0%         | 585.53                  | 176.81   | -69%       | 48,451,830                | 14,796,245  | 33,655,585  | -69%        |         |
| 1.A.3.b.i. - Light Duty Vehicles (LDVs)               | Gasoline                                  | Car 4            | 211,237   | 211,237    | 0%                      | 297.27   | 151.77     | -62%                      | 83,917,680  | 32,059,973  | 51,857,706  | -62%    |
|                                                       |                                           | Car 5            | 285,011   | 285,011    | 0%                      | 436.38   | 151.77     | -65%                      | 124,721,396 | 43,370,300  | 81,343,896  | -65%    |
|                                                       |                                           | Car 6            | 16,081    | 16,081     | 0%                      | 259.34   | 151.77     | -41%                      | 4,170,580   | 2,440,686   | 1,729,814   | -41%    |
|                                                       |                                           | Diesel oil total | 626,045   | 626,045    | 0%                      | 415.87   | 159.12     | -62%                      | 272,876,061 | 99,613,892  | 173,262,169 | -62%    |
|                                                       |                                           | Flx Total        | 1,338,571 | 1,338,571  | 0%                      | 294.44   | 152.15     | -53%                      | 588,091,594 | 154,612,813 | 433,478,781 | -53%    |
|                                                       |                                           | Diesel Oil       | pre-Cars  | 986        | 986                     | 0%       | 632.14     | 645.95                    | -2%         | 160,583     | 176,124     | -15,541 |
|                                                       | Car 1                                     |                  | 173       | 173        | 0%                      | 968.27   | 989.96     | -64%                      | 150,074     | 53,575      | 96,499      | -64%    |
|                                                       | Car 2                                     |                  | 748       | 748        | 0%                      | 204.73   | 287.11     | -21%                      | 212,888     | 154,839     | -58,029     | -21%    |
|                                                       | Car 3                                     |                  | 771       | 771        | 0%                      | 98.62    | 185.21     | 7%                        | 75,992      | 81,070      | -5,078      | 7%      |
|                                                       | 1.A.3.b.ii. - Heavy Duty Vehicles - Buses | Diesel Oil       | Car 4     | 1,087      | 1,087                   | 0%       | 43.47      | 50.15                     | 15%         | 81,139      | 83,618      | -2,479  |
| Car 5                                                 |                                           |                  | 1,374     | 1,374      | 0%                      | 17.11    | 50.15      | 193%                      | 23,517      | 68,918      | -45,401     | 193%    |
| Car 6                                                 |                                           |                  | 17        | 17         | 0%                      | 18.06    | 50.15      | 179%                      | 212         | 870         | -657        | 179%    |
| Gasoline total                                        |                                           |                  | 5,845     | 5,845      | 0%                      | 196.34   | 176.49     | -2%                       | 1,112,584   | 1,031,852   | 80,732      | -2%     |
| pre-Cars                                              |                                           |                  | 2,537     | 2,537      | 0%                      | 428.16   | 386.79     | -21%                      | 1,985,919   | 776,259     | 1,209,659   | -21%    |
| Car 1                                                 |                                           |                  | 2,589     | 2,589      | 0%                      | 393.82   | 276.25     | -49%                      | 987,136     | 539,898     | 447,328     | -49%    |
| Diesel Oil                                            |                                           | Car 2            | 6,087     | 6,087      | 0%                      | 338.91   | 133.25     | -42%                      | 1,385,995   | 1,180,889   | -205,126    | -42%    |
|                                                       |                                           | Car 3            | 18,220    | 18,220     | 0%                      | 571.75   | 150.58     | -74%                      | 10,417,076  | 2,742,056   | 7,675,020   | -74%    |
|                                                       |                                           | Car 4            | 52,361    | 52,361     | 0%                      | 498.70   | 91.69      | -82%                      | 26,164,486  | 4,703,746   | 21,460,740  | -82%    |
|                                                       |                                           | Car 5            | 46,749    | 46,749     | 0%                      | 438.64   | 91.69      | -79%                      | 20,696,234  | 4,258,626   | 16,437,608  | -79%    |
| Car 6                                                 | 187                                       | 187              | 0%        | 151.18     | 91.69                   | -60%     | 29,829     | 17,974                    | 11,855      | -60%        |             |         |
| Diesel oil total                                      | 128,578                                   | 128,578          | 0%        | 415.56     | 170.94                  | -77%     | 61,146,575 | 14,267,237                | 46,879,338  | -77%        |             |         |
| LDVs total                                            | 134,423                                   | 134,423          | 0%        | 403.16     | 153.81                  | -75%     | 62,259,160 | 15,298,849                | 46,960,311  | -75%        |             |         |
| 1.A.3.b.iii. - Heavy Duty Vehicles - Trucks & Lorries | Diesel Oil                                | pre-Cars         | 984       | 984        | 0%                      | 1099.48  | 1919.23    | -5%                       | 1,062,384   | 1,062,921   | -537        | -5%     |
|                                                       |                                           | Car 1            | 837       | 837        | 0%                      | 728.12   | 130.99     | 3%                        | 599,232     | 628,359     | -18,127     | 3%      |
|                                                       |                                           | Car 2            | 5,596     | 5,596      | 0%                      | 704.30   | 643.67     | -59%                      | 4,284,320   | 3,683,441   | -598,879    | -59%    |
|                                                       |                                           | Car 3            | 11,221    | 11,221     | 0%                      | 621.20   | 458.38     | -21%                      | 7,082,740   | 5,143,628   | -1,939,228  | -21%    |
|                                                       |                                           | Car 4            | 4,270     | 4,270      | 0%                      | 461.10   | 351.79     | -24%                      | 1,972,610   | 1,584,978   | -387,632    | -24%    |
|                                                       |                                           | Car 5            | 22,042    | 22,042     | 0%                      | 368.55   | 183.99     | -49%                      | 7,726,921   | 4,065,632   | 3,661,289   | -49%    |
|                                                       | Car 6                                     | 4,182            | 4,182     | 0%         | 42.78                   | 183.99   | 330%       | 178,913                   | 789,476     | -610,563    | 330%        |         |
|                                                       | Buses Total                               | 49,143           | 49,143    | 0%         | 468.37                  | 339.99   | -27%       | 23,017,115                | 16,788,234  | 6,228,881   | -27%        |         |
|                                                       | Trucks Total                              | pre-Cars         | 4,182     | 4,182      | 0%                      | 1034.34  | 737.35     | -29%                      | 4,945,942   | 3,525,898   | 1,420,134   | -29%    |
|                                                       |                                           | Car 1            | 2,285     | 2,285      | 0%                      | 748.66   | 561.41     | -25%                      | 1,600,085   | 1,237,759   | 362,326     | -25%    |
| Car 2                                                 |                                           | 13,623           | 13,623    | 0%         | 817.30                  | 510.38   | -38%       | 11,445,865                | 6,565,736   | 4,880,129   | -38%        |         |
| Car 3                                                 |                                           | 54,685           | 54,685    | 0%         | 632.52                  | 364.41   | -42%       | 36,589,677                | 19,937,835  | 16,651,841  | -42%        |         |
| 1.A.3.b.iv. - Motorised Two-Wheelers (MOWs)           | Gasoline                                  | Car 4            | 34,037    | 34,037     | 0%                      | 396.37   | 285.34     | -30%                      | 13,481,158  | 9,711,896   | 3,769,262   | -30%    |
|                                                       |                                           | Car 5            | 389,263   | 389,263    | 0%                      | 282.92   | 153.66     | -46%                      | 110,112,782 | 59,688,643  | 50,424,139  | -46%    |
|                                                       |                                           | Car 6            | 34,214    | 34,214     | 0%                      | 63.96    | 153.66     | 189%                      | 3,937,089   | 11,368,582  | -7,431,413  | 189%    |
|                                                       |                                           | Trucks Total     | 572,154   | 572,154    | 0%                      | 314.85   | 196.65     | -38%                      | 179,874,133 | 112,285,562 | 67,588,571  | -38%    |
|                                                       |                                           | pre-Cars         | 6,185     | 6,185      | 0%                      | 122.85   | 158.64     | 29%                       | 795,185     | 974,388     | -179,203    | 29%     |
|                                                       |                                           | Car 1            | 3,037     | 3,037      | 0%                      | 134.71   | 174.84     | 40%                       | 478,514     | 670,859     | -192,345    | 40%     |
|                                                       | MOWs Total                                | Car 2            | 3,365     | 3,365      | 0%                      | 128.94   | 186.25     | 52%                       | 433,874     | 680,370     | -246,496    | 52%     |
|                                                       |                                           | Car 3            | 5,365     | 5,365      | 0%                      | 38.53    | 186.25     | 386%                      | 299,722     | 1,611,189   | -1,311,467  | 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%      |
| 1.A.3.b. - Road Transport                             | Total                                     | 2,153,563        | 2,153,563 | 0%         | 277.27                  | 140.35   | -49%       | 597,120,297               | 362,252,271 | 234,868,025 | -49%        |         |

Adjustment details for 2025

| NFR Code                                         | Fuel                                      | Activity Data    |           |            | Implied Emission Factor |          |            | NO <sub>x</sub> Emissions |             |             |             |             |      |
|--------------------------------------------------|-------------------------------------------|------------------|-----------|------------|-------------------------|----------|------------|---------------------------|-------------|-------------|-------------|-------------|------|
|                                                  |                                           | current          | adjusted  | difference | current                 | adjusted | difference | current                   | adjusted    | adjustment  | difference  |             |      |
|                                                  |                                           | in [t]           | in [t]    | in [%]     | in [g/t]                | in [g/t] | in [%]     | in [kg]                   | in [kg]     | in [kg]     | in [kg]     |             |      |
| 1.A.3.a.i. - Passenger Cars                      | Gasoline                                  | pre-Cars         | 11,380    | 11,380     | 0%                      | 823.37   | 844.11     | -14%                      | 7,266,112   | 6,191,942   | -1,074,169  | -14%        |      |
|                                                  |                                           | Car 1            | 34,112    | 34,112     | 0%                      | 371.34   | 345.71     | -34%                      | 8,963,681   | 5,924,574   | -3,029,228  | -34%        |      |
|                                                  |                                           | Car 2            | 42,925    | 42,925     | 0%                      | 297.78   | 142.69     | -32%                      | 8,918,785   | 6,099,659   | -2,819,646  | -32%        |      |
|                                                  |                                           | Car 3            | 72,871    | 72,871     | 0%                      | 73.86    | 74.74      | 1%                        | 5,381,361   | 5,446,237   | 64,877      | 1%          |      |
|                                                  |                                           | Car 4            | 363,474   | 363,474    | 0%                      | 52.36    | 49.62      | -5%                       | 18,485,637  | 17,326,221  | -1,159,416  | -5%         |      |
|                                                  |                                           | Car 5            | 180,783   | 180,783    | 0%                      | 19.11    | 49.62      | 151%                      | 3,454,481   | 0,881,456   | 5,406,375   | 151%        |      |
|                                                  | Gasoline total                            | 715,156          | 715,156   | 0%         | 76.38                   | 71.73    | 4%         | 53,196,187                | 51,380,983  | 1,815,204   | 4%          |             |      |
|                                                  | Diesel Oil                                | pre-Cars         | 1,382     | 1,382      | 0%                      | 313.30   | 284.66     | -55%                      | 367,917     | 339,733     | -28,184     | -15%        |      |
|                                                  |                                           | Car 1            | 4,279     | 4,279      | 0%                      | 298.14   | 267.84     | -59%                      | 1,261,930   | 1,129,989   | -132,921    | -10%        |      |
|                                                  |                                           | Car 2            | 19,689    | 19,689     | 0%                      | 407.80   | 320.36     | -49%                      | 8,913,587   | 4,339,719   | 4,574,868   | -49%        |      |
| Car 3                                            |                                           | 71,044           | 71,044    | 0%         | 595.91                  | 179.64   | -70%       | 42,271,648                | 12,719,962  | 29,551,686  | -70%        |             |      |
| 1.A.3.b.i. - Heavy Duty Vehicles (HDVs)          | Gasoline                                  | Car 4            | 182,410   | 182,410    | 0%                      | 401.42   | 154.67     | -62%                      | 77,237,655  | 29,644,450  | 47,593,206  | -62%        |      |
|                                                  |                                           | Car 5            | 364,346   | 364,346    | 0%                      | 434.67   | 154.67     | -65%                      | 132,290,433 | 46,090,424  | 86,400,009  | -65%        |      |
|                                                  |                                           | Car 6            | 62,576    | 62,576     | 0%                      | 259.76   | 154.67     | -41%                      | 13,657,082  | 0,180,384   | 13,476,698  | -41%        |      |
|                                                  |                                           | Diesel oil total | 645,565   | 645,565    | 0%                      | 426.19   | 159.88     | -63%                      | 275,138,233 | 183,163,591 | 91,974,732  | -63%        |      |
|                                                  |                                           | Flx Total        | 1,360,721 | 1,360,721  | 0%                      | 245.48   | 153.52     | -53%                      | 538,334,420 | 154,544,484 | 383,789,936 | -53%        |      |
|                                                  |                                           | Gasoline         | pre-Cars  | 979        | 979                     | 0%       | 664.37     | 645.95                    | 1%          | 1,375,361   | 1,611,977   | -236,616    | 1%   |
|                                                  | Car 1                                     |                  | 150       | 150        | 0%                      | 895.63   | 311.93     | -65%                      | 134,523     | 46,851      | 87,672      | -65%        |      |
|                                                  | Car 2                                     |                  | 629       | 629        | 0%                      | 298.27   | 212.94     | -29%                      | 187,533     | 133,879     | -53,654     | -29%        |      |
|                                                  | Car 3                                     |                  | 781       | 781        | 0%                      | 105.50   | 186.62     | 3%                        | 73,969      | 76,155      | -2,186      | 3%          |      |
|                                                  | 1.A.3.b.ii. Light Duty Vehicles (LDVs)    | Diesel Oil       | Car 4     | 1,720      | 1,720                   | 0%       | 47.06      | 51.30                     | 9%          | 80,950      | 80,240      | 710         | 9%   |
| Car 5                                            |                                           |                  | 1,620     | 1,620      | 0%                      | 18.41    | 51.30      | 179%                      | 29,912      | 83,086      | -53,174     | 179%        |      |
| Car 6                                            |                                           |                  | 94        | 94         | 0%                      | 18.71    | 51.30      | 174%                      | 1,752       | 4,884       | -3,132      | 174%        |      |
| Gasoline total                                   |                                           |                  | 5,793     | 5,793      | 0%                      | 187.52   | 172.88     | 8%                        | 1,683,507   | 1,680,999   | 2,508       | 8%          |      |
| Diesel Oil                                       |                                           |                  | pre-Cars  | 2,323      | 2,323                   | 0%       | 418.91     | 386.79                    | -26%        | 986,185     | 712,531     | 273,654     | -26% |
|                                                  |                                           |                  | Car 1     | 2,186      | 2,186                   | 0%       | 391.47     | 276.25                    | -49%        | 924,270     | 453,227     | 471,043     | -49% |
|                                                  |                                           | Car 2            | 5,025     | 5,025      | 0%                      | 324.91   | 133.25     | -49%                      | 1,632,296   | 971,296     | 661,020     | -49%        |      |
|                                                  |                                           | Car 3            | 15,781    | 15,781     | 0%                      | 588.35   | 150.67     | -74%                      | 9,112,414   | 2,385,713   | 6,746,701   | -74%        |      |
| 1.A.3.b.iii. Heavy Duty Vehicle Fleets           |                                           | Diesel Oil       | Car 4     | 47,480     | 47,480                  | 0%       | 501.73     | 31.74                     | -92%        | 23,732,396  | 4,340,290   | 19,392,106  | -92% |
|                                                  |                                           |                  | Car 5     | 62,116     | 62,116                  | 0%       | 436.13     | 91.74                     | -79%        | 27,090,214  | 5,680,295   | 21,392,809  | -79% |
|                                                  | Car 6                                     |                  | 635       | 635        | 0%                      | 154.91   | 91.74      | -40%                      | 87,758      | 68,230      | -19,528     | -40%        |      |
|                                                  | Diesel oil total                          |                  | 135,366   | 135,366    | 0%                      | 488.35   | 187.96     | -77%                      | 63,565,843  | 16,461,490  | 47,104,353  | -77%        |      |
|                                                  | LDVs Total                                |                  | 141,098   | 141,098    | 0%                      | 476.78   | 130.62     | -76%                      | 64,589,330  | 15,680,490  | 48,908,861  | -76%        |      |
|                                                  | Gasoline                                  |                  | pre-Cars  | 979        | 979                     | 0%       | 707.34     | 1819.23                   | -26%        | 1,048,312   | 986,256     | -62,056     | -6%  |
|                                                  |                                           | Car 1            | 747       | 747        | 0%                      | 545.47   | 181.91     | -67%                      | 545,471     | 181,636     | 363,835     | -67%        |      |
|                                                  |                                           | Car 2            | 5,211     | 5,211      | 0%                      | 787.43   | 644.46     | -49%                      | 4,637,087   | 3,359,634   | 1,277,453   | -49%        |      |
|                                                  |                                           | Car 3            | 11,282    | 11,282     | 0%                      | 633.90   | 458.67     | -29%                      | 1,741,732   | 1,154,589   | 587,143     | -29%        |      |
|                                                  | 1.A.3.b.iv. Heavy Duty Vehicle Fleets     | Diesel Oil       | Car 4     | 4,586      | 4,586                   | 0%       | 489.70     | 351.99                    | -35%        | 2,154,066   | 1,614,177   | 539,889     | -35% |
| Car 5                                            |                                           |                  | 26,267    | 26,267     | 0%                      | 368.77   | 184.58     | -49%                      | 8,727,068   | 4,277,641   | 4,449,427   | -49%        |      |
| Car 6                                            |                                           |                  | 5,224     | 5,224      | 0%                      | 63.13    | 184.58     | 241%                      | 277,542     | 964,226     | -686,684    | 241%        |      |
| Diesel total                                     |                                           |                  | 52,877    | 52,877     | 0%                      | 458.96   | 327.59     | -29%                      | 23,957,871  | 17,149,448  | 6,808,419   | -29%        |      |
| Gasoline                                         |                                           |                  | pre-Cars  | 4,319      | 4,319                   | 0%       | 1034.89    | 317.35                    | -29%        | 4,488,571   | 3,184,428   | 1,294,143   | -29% |
|                                                  |                                           |                  | Car 1     | 1,083      | 1,083                   | 0%       | 748.71     | 553.48                    | -26%        | 1,387,291   | 1,025,551   | 361,740     | -26% |
|                                                  |                                           | Car 2            | 11,902    | 11,902     | 0%                      | 817.38   | 587.58     | -30%                      | 3,072,940   | 5,633,480   | -4,349,381  | -30%        |      |
|                                                  |                                           | Car 3            | 47,481    | 47,481     | 0%                      | 571.54   | 311.64     | -45%                      | 27,460,779  | 19,722,011  | 7,738,768   | -45%        |      |
| 1.A.3.b.v. Heavy Duty Vehicle Fleets and Lorries |                                           | Diesel Oil       | Car 4     | 29,223     | 29,223                  | 0%       | 356.88     | 263.72                    | -26%        | 11,572,866  | 8,294,190   | 3,278,676   | -26% |
|                                                  |                                           |                  | Car 5     | 309,736    | 309,736                 | 0%       | 264.17     | 153.49                    | -46%        | 93,413,973  | 59,456,496  | 33,957,477  | -46% |
|                                                  | Car 6                                     |                  | 103,787   | 103,787    | 0%                      | 67.48    | 183.49     | 161%                      | 8,913,354   | 26,262,637  | -16,369,684 | 161%        |      |
|                                                  | Trucks Total                              |                  | 589,811   | 589,811    | 0%                      | 264.68   | 153.49     | -30%                      | 197,189,625 | 129,920,733 | 68,268,893  | -30%        |      |
|                                                  | Gasoline                                  |                  | pre-Cars  | 5,744      | 5,744                   | 0%       | 125.41     | 157.28                    | 25%         | 720,441     | 983,470     | -263,028    | 25%  |
|                                                  |                                           |                  | Car 1     | 3,517      | 3,517                   | 0%       | 127.40     | 170.22                    | 33%         | 444,086     | 619,819     | -171,733    | 33%  |
|                                                  |                                           | Car 2            | 3,382     | 3,382      | 0%                      | 127.35   | 186.53     | 55%                       | 430,600     | 665,965     | -236,365    | 55%         |      |
|                                                  |                                           | Car 3            | 5,011     | 5,011      | 0%                      | 49.29    | 196.53     | 389%                      | 234,136     | 1,144,416   | -910,280    | 389%        |      |
|                                                  | 1.A.3.b.vi. Motorized Two-Wheelers (MOWs) | Gasoline         | Car 4     | 6          | 6                       | 0%       | 19.96      | 19.96                     | 180%        | 69          | 884         | -736        | 180% |
|                                                  |                                           |                  | Car 5     | 0          | 0                       | 0%       | 0          | 0                         | 0%          | 0           | 0           | 0           | 0%   |
| MOWs Total                                       |                                           |                  | 18,459    | 18,459     | 0%                      | 99.32    | 180.65     | 82%                       | 1,833,382   | 5,334,472   | -1,501,090  | 82%         |      |
| 1.A.3.b.vii. Road Transport                      |                                           |                  | Total     | 2,161,950  | 2,161,950               | 0%       | 264.39     | 139.26                    | -48%        | 575,931,265 | 381,697,596 | 214,853,678 | -48% |

Adjustment details for 2026

| NFR Code                                   | Fuel                     | Activity Data |           |            | Implied Emission Factor |          |             | NO <sub>x</sub> Emissions |             |             |              |
|--------------------------------------------|--------------------------|---------------|-----------|------------|-------------------------|----------|-------------|---------------------------|-------------|-------------|--------------|
|                                            |                          | current       | adjusted  | difference | current                 | adjusted | difference  | current                   | adjusted    | difference  |              |
|                                            |                          | in [t]        | in [t]    | in [%]     | in [g/t]                | in [g/t] | in [%]      | in [t]                    | in [t]      | in [%]      |              |
| 1.A.3.a.i - Passenger Cars                 | Gasoline                 | pre-Cars      | 11,782    | 11,782     | 0%                      | 634.75   | 644.11      | -14%                      | 7,470,914   | 6,410,967   | -1,059,947   |
|                                            |                          | Car 1         | 20,270    | 20,270     | 0%                      | 372.25   | 201.68      | -35%                      | 7,545,483   | 4,988,888   | -2,556,595   |
|                                            |                          | Car 2         | 36,062    | 36,062     | 0%                      | 212.73   | 143.11      | -33%                      | 7,671,581   | 5,180,897   | -2,490,684   |
|                                            |                          | Car 3         | 83,039    | 83,039     | 0%                      | 76.17    | 75.50       | -1%                       | 4,881,482   | 4,759,259   | -122,223     |
|                                            |                          | Car 4         | 334,413   | 334,413    | 0%                      | 53.74    | 50.17       | -7%                       | 17,369,364  | 16,777,445  | -591,919     |
|                                            |                          | Car 5         | 183,374   | 183,374    | 0%                      | 19.09    | 50.17       | 163%                      | 3,580,745   | 9,189,834   | 5,609,089    |
|                                            | Gasoline total           | 715,272       | 715,272   | 0%         | 78.93                   | 70.65    | -9%         | 58,736,967                | 50,535,049  | -8,201,918  |              |
|                                            | Diesel Oil               | pre-Cars      | 1,280     | 1,280      | 0%                      | 304.76   | 264.56      | -14%                      | 386,262     | 339,172     | -47,090      |
|                                            |                          | Car 1         | 3,749     | 3,749      | 0%                      | 1,122.49 | 1,011.625   | -10%                      | 1,122,449   | 1,011,625   | -111,425     |
|                                            |                          | Car 2         | 16,584    | 16,584     | 0%                      | 407.19   | 221.43      | -46%                      | 6,720,132   | 3,653,964   | -3,066,168   |
|                                            |                          | Car 3         | 81,398    | 81,398     | 0%                      | 802.50   | 179.24      | -78%                      | 36,981,999  | 11,085,409  | -25,896,590  |
|                                            |                          | Car 4         | 175,940   | 175,940    | 0%                      | 405.76   | 156.24      | -61%                      | 71,362,220  | 27,474,086  | -43,888,134  |
|                                            |                          | Car 5         | 299,654   | 299,654    | 0%                      | 433.34   | 156.24      | -64%                      | 130,032,044 | 46,019,229  | -83,912,815  |
| Diesel oil total                           | 625,119                  | 625,119       | 0%        | 268.75     | 156.24                  | -40%     | 30,427,555  | 10,232,785                | -20,194,770 |             |              |
| Flx Total                                  | 1,380,391                | 1,380,391     | 0%        | 418.36     | 160.76                  | -61%     | 277,947,660 | 188,535,230               | -89,412,430 |             |              |
| 1.A.3.b.i - Light Duty Vehicles (LDV)      | Gasoline                 | pre-Cars      | 910       | 910        | 0%                      | 602.79   | 645.95      | -7%                       | 593,188     | 587,543     | -5,645       |
|                                            |                          | Car 1         | 136       | 136        | 0%                      | 308.31   | 312.78      | -1%                       | 122,126     | 42,425      | -79,701      |
|                                            |                          | Car 2         | 540       | 540        | 0%                      | 308.39   | 217.84      | -29%                      | 162,311     | 117,737     | -44,574      |
|                                            |                          | Car 3         | 650       | 650        | 0%                      | 108.43   | 111.57      | -3%                       | 70,432      | 72,731      | 2,299        |
|                                            |                          | Car 4         | 1,684     | 1,684      | 0%                      | 43.06    | 52.36       | 7%                        | 78,714      | 84,003      | 5,289        |
|                                            |                          | Car 5         | 1,724     | 1,724      | 0%                      | 19.82    | 52.36       | 164%                      | 34,157      | 80,258      | 46,101       |
|                                            | Gasoline total           | 3,613         | 3,613     | 0%         | 19.85                   | 52.36    | 181%        | 6,764                     | 19,892      | 13,128      |              |
|                                            | Diesel Oil               | pre-Cars      | 2,189     | 2,189      | 0%                      | 988.27   | 986.79      | -0%                       | 1,068,292   | 1,044,784   | -23,508      |
|                                            |                          | Car 1         | 1,780     | 1,780      | 0%                      | 414.81   | 386.79      | -7%                       | 899,549     | 846,433     | -53,116      |
|                                            |                          | Car 2         | 4,223     | 4,223      | 0%                      | 391.89   | 275.25      | -29%                      | 1,901,189   | 1,385,371   | -515,818     |
|                                            |                          | Car 3         | 13,582    | 13,582     | 0%                      | 323.43   | 153.31      | -53%                      | 5,365,994   | 2,846,452   | -2,519,542   |
|                                            |                          | Car 4         | 43,141    | 43,141     | 0%                      | 504.48   | 32.40       | -93%                      | 21,783,989  | 3,986,141   | -17,797,848  |
|                                            |                          | Car 5         | 74,231    | 74,231     | 0%                      | 434.16   | 32.40       | -92%                      | 32,223,283  | 6,658,780   | -25,564,503  |
| Diesel oil total                           | 148,068                  | 148,068       | 0%        | 113.49     | 32.40                   | -71%     | 755,285     | 454,676                   | -300,609    |             |              |
| LDVs Total                                 | 148,984                  | 148,984       | 0%        | 454.12     | 185.62                  | -59%     | 65,712,732  | 15,256,007                | -50,456,725 |             |              |
| 1.A.3.b.ii - Heavy Duty Vehicles (HDV)     | Diesel Oil               | pre-Cars      | 148,994   | 148,994    | 0%                      | 445.21   | 188.29      | -58%                      | 66,781,025  | 16,271,484  | -50,509,541  |
|                                            |                          | Car 1         | 891       | 891        | 0%                      | 1076.81  | 1919.23     | -43%                      | 964,197     | 988,234     | 24,037       |
|                                            |                          | Car 2         | 583       | 583        | 0%                      | 731.36   | 732.67      | 0%                        | 433,675     | 446,236     | 12,561       |
|                                            |                          | Car 3         | 4,375     | 4,375      | 0%                      | 708.25   | 645.03      | -9%                       | 3,440,614   | 2,822,621   | -617,993     |
|                                            |                          | Car 4         | 10,333    | 10,333     | 0%                      | 632.87   | 458.91      | -27%                      | 6,539,364   | 4,741,827   | -1,797,537   |
|                                            |                          | Car 5         | 4,449     | 4,449      | 0%                      | 475.90   | 382.29      | -20%                      | 2,117,219   | 1,666,881   | -450,338     |
|                                            | Gasoline                 | pre-Cars      | 34,380    | 34,380     | 0%                      | 364.36   | 185.22      | -49%                      | 8,935,974   | 4,617,617   | -4,318,357   |
|                                            | Car 6                    | 9,126         | 9,126     | 0%         | 62.79                   | 185.22   | 196%        | 573,066                   | 1,680,431   | 1,107,365   |              |
|                                            | HDVs Total               | 54,157        | 54,157    | 0%         | 404.73                  | 388.24   | -4%         | 23,082,189                | 16,885,117  | -6,197,072  |              |
|                                            | Diesel Oil               | pre-Cars      | 3,933     | 3,933      | 0%                      | 1034.81  | 737.35      | -29%                      | 4,087,249   | 2,980,379   | -1,106,870   |
|                                            |                          | Car 1         | 1,555     | 1,555      | 0%                      | 748.16   | 587.92      | -21%                      | 1,163,482   | 789,813     | -373,669     |
|                                            |                          | Car 2         | 8,876     | 8,876      | 0%                      | 817.75   | 585.42      | -28%                      | 7,258,047   | 4,486,626   | -2,771,421   |
|                                            |                          | Car 3         | 34,167    | 34,167     | 0%                      | 638.91   | 568.04      | -11%                      | 21,553,280  | 12,251,155  | -9,302,125   |
| Car 4                                      |                          | 34,287        | 34,287    | 0%         | 394.94                  | 281.86   | -28%        | 9,640,364                 | 6,885,621   | -2,754,743  |              |
| Car 5                                      |                          | 269,735       | 269,735   | 0%         | 267.22                  | 153.60   | -42%        | 74,680,233                | 39,976,610  | -34,703,623 |              |
| Trucks Total                               | 261,480                  | 261,480       | 0%        | 61.77      | 153.92                  | 149%     | 16,149,280  | 40,244,036                | 24,094,756  |             |              |
| 1.A.3.b.iii - Motorized Two-Wheelers (M2W) | Gasoline                 | pre-Cars      | 594,013   | 594,013    | 0%                      | 226.31   | 180.97      | -20%                      | 134,431,899 | 101,496,262 | -32,935,637  |
|                                            |                          | Car 1         | 5,543     | 5,543      | 0%                      | 125.59   | 155.78      | 24%                       | 696,072     | 883,289     | 187,217      |
|                                            |                          | Car 2         | 3,360     | 3,360      | 0%                      | 127.11   | 177.29      | 39%                       | 427,113     | 585,796     | 158,683      |
|                                            |                          | Car 3         | 3,375     | 3,375      | 0%                      | 125.94   | 187.68      | 50%                       | 421,961     | 687,078     | 265,117      |
|                                            |                          | Car 4         | 6,443     | 6,443      | 0%                      | 48.36    | 187.68      | 281%                      | 209,627     | 1,273,671   | 1,064,044    |
|                                            |                          | Car 5         | 85        | 85         | 0%                      | 17.47    | 187.68      | 1031%                     | 1,134       | 12,632      | 11,498       |
|                                            | M2Ws Total               | 18,185        | 18,185    | 0%         | 95.14                   | 181.68   | 89%         | 1,885,897                 | 3,452,476   | 1,566,579   |              |
|                                            | 1.A.3.b - Road Transport | Total         | 2,267,339 | 2,267,339  | 0%                      | 258.89   | 137.22      | -46%                      | 553,799,598 | 362,981,620 | -190,817,978 |

Adjustment details for 2027

| NFR Code                                   | Fuel                          | Activity Data    |           |            | Implied Emission Factor |          |            | NO <sub>x</sub> Emissions |             |              |              |         |
|--------------------------------------------|-------------------------------|------------------|-----------|------------|-------------------------|----------|------------|---------------------------|-------------|--------------|--------------|---------|
|                                            |                               | current          | adjusted  | difference | current                 | adjusted | difference | current                   | adjusted    | difference   |              |         |
|                                            |                               | in [t]           | in [t]    | in [%]     | in [g/t]                | in [g/t] | in [%]     | in [t]                    | in [t]      | in [%]       |              |         |
| 1.A.3.a.i - Passenger Cars                 | Gasoline                      | pre-Cars         | 12,282    | 12,282     | 0%                      | 636.73   | 644.11     | -9%                       | 7,814,267   | 6,680,187    | -1,134,080   |         |
|                                            |                               | Car 1            | 17,449    | 17,449     | 0%                      | 372.96   | 261.68     | -30%                      | 6,588,311   | 4,217,644    | -2,370,667   |         |
|                                            |                               | Car 2            | 30,435    | 30,435     | 0%                      | 217.43   | 141.75     | -35%                      | 6,617,570   | 4,314,140    | -2,303,430   |         |
|                                            |                               | Car 3            | 54,271    | 54,271     | 0%                      | 78.48    | 76.27      | -3%                       | 4,254,938   | 4,139,376    | -115,562     |         |
|                                            |                               | Car 4            | 315,086   | 315,086    | 0%                      | 54.96    | 51.26      | -7%                       | 17,316,320  | 16,511,881   | -804,439     |         |
|                                            |                               | Car 5            | 180,240   | 180,240    | 0%                      | 19.17    | 51.26      | 163%                      | 3,485,382   | 9,239,815    | 5,754,433    |         |
|                                            |                               | Car 6            | 114,791   | 114,791    | 0%                      | 25.65    | 51.26      | 82%                       | 3,063,235   | 5,884,372    | 2,821,137    |         |
|                                            |                               | Gasoline total   | 724,571   | 724,571    | 0%                      | 87.66    | 80.88      | -8%                       | 49,046,874  | 40,534,474   | -8,512,400   |         |
|                                            | Diesel Oil                    | pre-Cars         | 1,780     | 1,780      | 0%                      | 364.96   | 254.56     | -30%                      | 480,963     | 347,626      | -133,337     |         |
|                                            |                               | Car 1            | 3,360     | 3,360      | 0%                      | 294.17   | 271.67     | -8%                       | 1,082,288   | 910,182      | -172,106     |         |
|                                            |                               | Car 2            | 13,788    | 13,788     | 0%                      | 407.17   | 222.43     | -45%                      | 5,914,130   | 3,066,393    | -2,847,737   |         |
|                                            |                               | Car 3            | 52,128    | 52,128     | 0%                      | 808.95   | 179.65     | -78%                      | 31,696,478  | 9,364,788    | -22,331,690  |         |
|                                            |                               | Car 4            | 187,947   | 187,947    | 0%                      | 418.16   | 158.34     | -61%                      | 64,733,485  | 24,983,323   | -39,750,162  |         |
| 1.A.3.b.i - Heavy Duty Vehicles (HDV)      | Gasoline                      | Car 5            | 283,480   | 283,480    | 0%                      | 423.99   | 158.34     | -63%                      | 120,187,695 | 44,873,190   | -75,314,505  |         |
|                                            |                               | Car 6            | 184,768   | 184,768    | 0%                      | 262.61   | 158.34     | -40%                      | 48,521,163  | 29,255,985   | -19,265,178  |         |
|                                            |                               | Diesel oil total | 686,562   | 686,562    | 0%                      | 394.65   | 161.95     | -59%                      | 272,126,081 | 112,890,717  | -159,235,364 |         |
|                                            |                               | Flx Total        | 1,421,142 | 1,421,142  | 0%                      | 245.98   | 155.61     | -36%                      | 521,152,955 | 163,425,191  | -357,727,764 |         |
|                                            |                               | Diesel Oil       | pre-Cars  | 940        | 940                     | 0%       | 611.41     | 645.95                    | -7%         | 612,247      | 596,878      | -15,369 |
|                                            |                               |                  | Car 1     | 124        | 124                     | 0%       | 308.23     | 312.78                    | -1%         | 112,083      | 39,682       | -72,401 |
|                                            |                               |                  | Car 2     | 485        | 485                     | 0%       | 302.12     | 221.62                    | -27%        | 140,344      | 102,950      | -37,394 |
|                                            |                               |                  | Car 3     | 596        | 596                     | 0%       | 118.57     | 115.36                    | -3%         | 65,955       | 68,812       | 2,857   |
|                                            | Car 4                         |                  | 1,476     | 1,476      | 0%                      | 58.72    | 53.38      | -9%                       | 74,877      | 78,816       | 3,939        |         |
|                                            | Car 5                         |                  | 1,680     | 1,680      | 0%                      | 21.73    | 53.38      | 146%                      | 35,240      | 89,034       | 53,794       |         |
|                                            | Car 6                         |                  | 910       | 910        | 0%                      | 19.18    | 53.38      | 187%                      | 17,052      | 49,080       | 32,028       |         |
|                                            | Gasoline total                |                  | 6,186     | 6,186      | 0%                      | 171.55   | 167.18     | -2%                       | 1,058,799   | 1,034,211    | -24,588      |         |
|                                            | Diesel Oil                    | pre-Cars         | 2,067     | 2,067      | 0%                      | 413.41   | 386.79     | -7%                       | 860,499     | 811,163      | -49,336      |         |
| Car 1                                      |                               | 1,538            | 1,538     | 0%         | 398.47                  | 276.25   | -30%       | 680,795                   | 331,158     | -349,637     |              |         |
| Car 2                                      |                               | 3,580            | 3,580     | 0%         | 321.26                  | 153.04   | -52%       | 1,143,793                 | 687,293     | -456,500     |              |         |
| Car 3                                      |                               | 11,684           | 11,684    | 0%         | 556.30                  | 150.79   | -73%       | 6,940,879                 | 1,758,747   | -5,182,132   |              |         |
| Car 4                                      |                               | 39,050           | 39,050    | 0%         | 506.70                  | 33.69    | -93%       | 19,789,647                | 3,635,035   | -16,154,612  |              |         |
| Car 5                                      |                               | 75,789           | 75,789    | 0%         | 432.66                  | 33.69    | -92%       | 32,790,965                | 7,054,945   | -25,736,020  |              |         |
| Car 6                                      |                               | 19,625           | 19,625    | 0%         | 151.71                  | 33.69    | -78%       | 2,977,439                 | 1,026,876   | -1,950,563   |              |         |
| Diesel oil total                           |                               | 153,284          | 153,284   | 0%         | 404.66                  | 183.89   | -55%       | 65,083,900                | 26,948,714  | -38,135,186  |              |         |
| 1.A.3.b.ii - Heavy Duty Vehicles (HDV)     | Diesel Oil                    | LDV total        | 199,470   | 199,470    | 0%                      | 414.83   | 186.35     | -74%                      | 66,152,129  | 16,969,427   | -49,182,702  |         |
|                                            |                               | pre-Cars         | 736       | 736        | 0%                      | 707.33   | 191.23     | -73%                      | 790,259     | 750,425      | -39,834      |         |
|                                            |                               | Car 1            | 411       | 411        | 0%                      | 721.97   | 732.57     | 3%                        | 380,684     | 389,062      | 8,438        |         |
|                                            |                               | Car 2            | 3,325     | 3,325      | 0%                      | 797.91   | 645.79     | -19%                      | 2,820,887   | 2,147,480    | -673,406     |         |
|                                            |                               | Car 3            | 8,578     | 8,578      | 0%                      | 621.73   | 459.12     | -26%                      | 4,478,440   | 3,469,187    | -1,009,253   |         |
|                                            |                               | Car 4            | 3,823     | 3,823      | 0%                      | 474.97   | 362.49     | -24%                      | 1,932,380   | 1,347,630    | -584,750     |         |
|                                            |                               | Car 5            | 21,913    | 21,913     | 0%                      | 363.90   | 185.64     | -49%                      | 7,937,974   | 4,063,646    | -3,874,329   |         |
|                                            |                               | Car 6            | 16,686    | 16,686     | 0%                      | 68.52    | 185.84     | 219%                      | 86,215      | 272,590      | 186,375      |         |
|                                            | Beesen Total                  | 53,382           | 53,382    | 0%         | 318.80                  | 280.71   | -23%       | 19,793,981                | 15,384,828  | -4,409,153   |              |         |
|                                            | Trucks & Lorries              | pre-Cars         | 3,680     | 3,680      | 0%                      | 1034.40  | 713.35     | -29%                      | 3,730,272   | 2,659,676    | -1,070,596   |         |
|                                            |                               | Car 1            | 1,311     | 1,311      | 0%                      | 748.03   | 468.38     | -37%                      | 980,942     | 614,151      | -366,790     |         |
|                                            |                               | Car 2            | 7,087     | 7,087      | 0%                      | 817.66   | 583.45     | -30%                      | 5,746,836   | 3,580,026    | -2,166,810   |         |
|                                            |                               | Car 3            | 26,886    | 26,886     | 0%                      | 838.17   | 250.72     | -44%                      | 15,942,611  | 9,583,881    | -6,358,729   |         |
| Car 4                                      |                               | 90,082           | 90,082    | 0%         | 797.77                  | 376.34   | -30%       | 7,666,416                 | 4,679,166   | -2,987,250   |              |         |
| Car 5                                      |                               | 326,345          | 326,345   | 0%         | 364.96                  | 154.78   | -41%       | 19,280,799                | 9,516,363   | -9,764,436   |              |         |
| Car 6                                      |                               | 396,065          | 396,065   | 0%         | 66.82                   | 154.35   | 131%       | 31,985,366                | 41,798,611  | 9,813,245    |              |         |
| Trucks Total                               |                               | 598,263          | 598,263   | 0%         | 595.82                  | 179.92   | -96%       | 116,611,141               | 105,268,508 | -11,342,633  |              |         |
| 1.A.3.b.iii - Motorized Two-Wheelers (MWV) | Gasoline                      | pre-Cars         | 5,330     | 5,330      | 0%                      | 125.91   | 157.19     | 25%                       | 671,885     | 830,789      | 158,903      |         |
|                                            |                               | Car 1            | 3,257     | 3,257      | 0%                      | 126.39   | 177.86     | 41%                       | 411,617     | 579,244      | 167,627      |         |
|                                            |                               | Car 2            | 3,396     | 3,396      | 0%                      | 122.55   | 180.33     | 48%                       | 415,280     | 673,548      | 258,268      |         |
|                                            |                               | Car 3            | 6,741     | 6,741      | 0%                      | 40.22    | 180.33     | 363%                      | 271,187     | 1,336,956    | 1,065,769    |         |
|                                            |                               | Car 4            | 430       | 430        | 0%                      | 19.29    | 180.33     | 983%                      | 7,862       | 85,270       | 77,408       |         |
|                                            |                               | Car 5            | 0         | 0          | 0%                      | 0.00     |            | 0%                        | 0           | 0            | 0            |         |
|                                            |                               | Car 6            | 19,180    | 19,180     | 0%                      | 92.83    | 183.39     | 96%                       | 5,788,674   | 5,653,187    | -13,487      |         |
|                                            |                               | MWV total        |           |            |                         |          |            |                           |             |              |              |         |
|                                            | 1.A.3.b. Road Transport Total | 2,291,437        | 2,291,437 | 0%         | 233.43                  | 135.23   | -42%       | 525,549,450               | 384,486,958 | -141,062,492 |              |         |

Adjustment details for 2018

| ACTIVITY DATA                                    |                       |               |           |            |                         |          |            |                           |             |             |              |      |
|--------------------------------------------------|-----------------------|---------------|-----------|------------|-------------------------|----------|------------|---------------------------|-------------|-------------|--------------|------|
| NFR Code                                         | Fuel                  | Activity Data |           |            | Implied Emission Factor |          |            | NO <sub>x</sub> Emissions |             |             |              |      |
|                                                  |                       | current       | adjusted  | difference | current                 | adjusted | difference | current                   | adjusted    | difference  |              |      |
|                                                  |                       | in [t]        | in [t]    | in [%]     | in [g/t]                | in [g/t] | in [%]     | in [t]                    | in [t]      | in [%]      |              |      |
| 1.A.3.a.i - Passenger Cars                       | Gasoline              | pre-Cars      | 12,219    | 12,219     | 0%                      | 637.58   | 644.11     | -10%                      | 7,790,965   | 6,648,721   | -1,142,234   | -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     | -60%                      | 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   | 3,388,617   | -99,164      | -3%  |
|                                                  |                       | Car 4         | 278,738   | 278,738    | 0%                      | 55.98    | 52.30      | -7%                       | 15,683,488  | 14,576,755  | -1,106,733   | -7%  |
|                                                  |                       | Car 5         | 186,830   | 186,830    | 0%                      | 19.35    | 52.30      | -170%                     | 3,228,282   | 8,725,668   | 5,497,386    | 170% |
|                                                  | Diesel Oil            | pre-Cars      | 159,041   | 159,041    | 0%                      | 6.00     | 52.30      | -89%                      | 4,190,432   | 6,718,250   | 2,527,818    | 60%  |
|                                                  |                       | Car 1         | 699,507   | 699,507    | 0%                      | 64.40    | 68.36      | 6%                        | 45,032,966  | 47,786,817  | 2,753,851    | 6%   |
|                                                  |                       | Car 2         | 1,383     | 1,383      | 0%                      | 303.16   | 272.65     | -10%                      | 286,430     | 245,173     | -41,257      | -14% |
|                                                  |                       | Car 3         | 2,849     | 2,849      | 0%                      | 407.20   | 222.87     | -45%                      | 4,981,983   | 2,483,536   | -2,498,447   | -50% |
|                                                  |                       | Car 4         | 40,786    | 40,786     | 0%                      | 812.49   | 180.15     | -78%                      | 24,932,029  | 7,333,241   | -17,598,788  | -71% |
|                                                  |                       | Car 5         | 130,534   | 130,534    | 0%                      | 414.71   | 180.40     | -56%                      | 54,133,837  | 20,937,329  | -33,196,508  | -61% |
|                                                  | LN <sub>2</sub> Total | pre-Cars      | 251,212   | 251,212    | 0%                      | 416.25   | 180.40     | -56%                      | 104,585,786 | 40,293,731  | -64,292,055  | -61% |
|                                                  |                       | Car 1         | 228,685   | 228,685    | 0%                      | 254.87   | 180.40     | -31%                      | 58,284,140  | 35,680,446  | -22,603,694  | -39% |
|                                                  |                       | Car 2         | 666,076   | 666,076    | 0%                      | 375.66   | 163.38     | -57%                      | 247,596,063 | 188,748,684 | -158,847,459 | -56% |
|                                                  |                       | Car 3         | 1,365,181 | 1,365,181  | 0%                      | 214.34   | 154.68     | -28%                      | 262,589,060 | 156,555,421 | -106,033,639 | -40% |
|                                                  |                       | Car 4         | 911       | 911        | 0%                      | 644.51   | 645.95     | 1%                        | 596,851     | 582,652     | -14,199      | -2%  |
|                                                  |                       | Car 5         | 189       | 189        | 0%                      | 911.58   | 312.78     | -66%                      | 98,528      | 33,895      | -64,633      | -66% |
| 1.A.3.b.i - Light Duty Vehicles (LDVs)           | Gasoline              | pre-Cars      | 377       | 377        | 0%                      | 303.84   | 224.45     | -26%                      | 114,682     | 84,713      | -29,969      | -26% |
|                                                  |                       | Car 1         | 511       | 511        | 0%                      | 111.92   | 116.84     | 4%                        | 57,282      | 60,739      | 3,457        | 6%   |
|                                                  |                       | Car 2         | 1,275     | 1,275      | 0%                      | 52.02    | 54.36      | 4%                        | 65,290      | 69,278      | 3,988        | 4%   |
|                                                  |                       | Car 3         | 1,483     | 1,483      | 0%                      | 23.70    | 54.36      | 129%                      | 35,160      | 80,626      | 45,466       | 129% |
|                                                  |                       | Car 4         | 1,643     | 1,643      | 0%                      | 19.18    | 54.36      | 182%                      | 39,550      | 89,326      | 49,776       | 182% |
|                                                  | Diesel Oil            | pre-Cars      | 6,315     | 6,315      | 0%                      | 154.22   | 160.11     | 4%                        | 999,199     | 1,011,138   | 11,939       | 1%   |
|                                                  |                       | Car 1         | 1,872     | 1,872      | 0%                      | 411.51   | 386.79     | -6%                       | 771,337     | 574,742     | -196,595     | -26% |
|                                                  |                       | Car 2         | 1,285     | 1,285      | 0%                      | 389.94   | 276.25     | -29%                      | 483,129     | 272,296     | -210,833     | -44% |
|                                                  |                       | Car 3         | 2,942     | 2,942      | 0%                      | 318.18   | 153.88     | -51%                      | 965,389     | 550,789     | -414,600     | -43% |
|                                                  |                       | Car 4         | 9,383     | 9,383      | 0%                      | 558.10   | 150.74     | -73%                      | 5,689,152   | 1,411,299   | -4,277,853   | -75% |
|                                                  |                       | Car 5         | 33,232    | 33,232     | 0%                      | 508.42   | 93.81      | -82%                      | 15,929,185  | 3,117,457   | -12,811,728  | -80% |
|                                                  | LN <sub>2</sub> Total | pre-Cars      | 66,283    | 66,283     | 0%                      | 432.92   | 93.81      | -79%                      | 28,684,080  | 6,217,860   | -22,466,220  | -78% |
|                                                  |                       | Car 1         | 39,482    | 39,482     | 0%                      | 158.79   | 93.81      | -41%                      | 5,941,615   | 3,686,228   | -2,255,387   | -38% |
|                                                  |                       | Car 2         | 154,259   | 154,259    | 0%                      | 384.71   | 182.69     | -53%                      | 59,344,525  | 15,880,316  | -43,464,210  | -73% |
|                                                  |                       | Car 3         | 180,574   | 180,574    | 0%                      | 375.86   | 184.94     | -51%                      | 69,343,125  | 16,851,449  | -52,491,676  | -72% |
|                                                  |                       | Car 4         | 547       | 547        | 0%                      | 1078.15  | 1919.23    | 78%                       | 589,267     | 557,147     | -32,120      | -5%  |
|                                                  |                       | Car 5         | 237       | 237        | 0%                      | 732.78   | 732.57     | 0%                        | 173,678     | 178,368     | 4,690        | 3%   |
| 1.A.3.b.ii - Heavy Duty Vehicle Buses            | Gasoline              | pre-Cars      | 2,270     | 2,270      | 0%                      | 787.83   | 646.33     | -18%                      | 1,780,686   | 1,487,437   | -293,249     | -16% |
|                                                  |                       | Car 1         | 6,757     | 6,757      | 0%                      | 638.89   | 459.32     | -29%                      | 4,262,734   | 3,183,482   | -1,079,252   | -25% |
|                                                  |                       | Car 2         | 3,043     | 3,043      | 0%                      | 473.16   | 382.73     | -19%                      | 1,439,790   | 1,073,333   | -366,457     | -25% |
|                                                  |                       | Car 3         | 18,189    | 18,189     | 0%                      | 362.42   | 186.37     | -49%                      | 6,663,265   | 3,376,016   | -3,287,249   | -49% |
|                                                  |                       | Car 4         | 20,670    | 20,670     | 0%                      | 64.89    | 186.37     | 289%                      | 1,176,026   | 3,662,314   | 2,486,288    | 209% |
|                                                  | Diesel Oil            | pre-Cars      | 91,634    | 91,634     | 0%                      | 309.75   | 283.53     | -9%                       | 15,993,546  | 13,687,186  | -2,306,360   | -15% |
|                                                  |                       | Car 1         | 3,262     | 3,262      | 0%                      | 1034.82  | 737.35     | -29%                      | 3,375,359   | 2,485,071   | -890,288     | -26% |
|                                                  |                       | Car 2         | 1,094     | 1,094      | 0%                      | 747.82   | 488.39     | -35%                      | 918,052     | 512,378     | -405,674     | -44% |
|                                                  |                       | Car 3         | 5,544     | 5,544      | 0%                      | 817.44   | 581.68     | -29%                      | 4,532,190   | 2,781,516   | -1,750,674   | -39% |
|                                                  |                       | Car 4         | 20,583    | 20,583     | 0%                      | 629.54   | 563.68     | -10%                      | 12,967,751  | 7,277,279   | -5,690,472   | -44% |
|                                                  |                       | Car 5         | 15,912    | 15,912     | 0%                      | 358.89   | 276.23     | -23%                      | 6,334,421   | 4,386,424   | -1,947,997   | -31% |
|                                                  | LN <sub>2</sub> Total | pre-Cars      | 154,963   | 154,963    | 0%                      | 250.40   | 154.68     | -38%                      | 45,964,153  | 24,283,389  | -21,680,764  | -47% |
|                                                  |                       | Car 1         | 381,799   | 381,799    | 0%                      | 68.78    | 154.68     | 125%                      | 28,251,482  | 69,665,886  | 41,414,404   | 146% |
|                                                  |                       | Car 2         | 585,186   | 585,186    | 0%                      | 515.18   | 172.19     | -67%                      | 188,173,537 | 180,760,889 | -7,412,648   | -4%  |
|                                                  |                       | Car 3         | 4,940     | 4,940      | 0%                      | 128.95   | 186.61     | 45%                       | 622,656     | 783,451     | 160,795      | 26%  |
|                                                  |                       | Car 4         | 2,966     | 2,966      | 0%                      | 128.14   | 177.73     | 41%                       | 374,114     | 527,294     | 153,180      | 41%  |
|                                                  |                       | Car 5         | 3,221     | 3,221      | 0%                      | 128.33   | 186.64     | 45%                       | 387,596     | 639,833     | 252,237      | 65%  |
| 1.A.3.b.iii - Motorised Two-Wheelers (MOWs)      | Gasoline              | pre-Cars      | 6,241     | 6,241      | 0%                      | 48.24    | 186.64     | 284%                      | 20,126      | 1,239,686   | 1,219,560    | 598% |
|                                                  |                       | Car 1         | 1,130     | 1,130      | 0%                      | 58.41    | 186.64     | 217%                      | 23,066      | 224,682     | 201,616      | 873% |
|                                                  |                       | Car 2         | 0         | 0          | 0%                      | 0.00     | 186.64     | 0%                        | 0           | 0           | 0            | 0%   |
|                                                  |                       | Car 3         | 18,487    | 18,487     | 0%                      | 85.86    | 186.61     | 118%                      | 1,658,558   | 3,454,767   | 1,796,209    | 108% |
|                                                  |                       | Car 4         | 2,180,983 | 2,180,983  | 0%                      | 215.85   | 133.49     | -38%                      | 478,758,286 | 291,129,652 | -187,628,634 | -39% |
|                                                  | Diesel Oil            | pre-Cars      | 13,588    | 13,588     | 0%                      | 638.58   | 644.11     | -6%                       | 7,790,965   | 6,648,721   | -1,142,234   | -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     | -60%                      | 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   | 3,388,617   | -99,164      | -3%  |
|                                                  |                       | Car 4         | 278,738   | 278,738    | 0%                      | 55.98    | 52.30      | -7%                       | 15,683,488  | 14,576,755  | -1,106,733   | -7%  |
|                                                  |                       | Car 5         | 186,830   | 186,830    | 0%                      | 19.35    | 52.30      | -170%                     | 3,228,282   | 8,725,668   | 5,497,386    | 170% |
|                                                  | LN <sub>2</sub> Total | pre-Cars      | 699,507   | 699,507    | 0%                      | 64.40    | 68.36      | 6%                        | 45,032,966  | 47,786,817  | 2,753,851    | 6%   |
|                                                  |                       | Car 1         | 1,383     | 1,383      | 0%                      | 303.16   | 272.65     | -10%                      | 286,430     | 245,173     | -41,257      | -14% |
|                                                  |                       | Car 2         | 2,849     | 2,849      | 0%                      | 407.20   | 222.87     | -45%                      | 4,981,983   | 2,483,536   | -2,498,447   | -50% |
|                                                  |                       | Car 3         | 40,786    | 40,786     | 0%                      | 812.49   | 180.15     | -78%                      | 24,932,029  | 7,333,241   | -17,598,788  | -71% |
|                                                  |                       | Car 4         | 130,534   | 130,534    | 0%                      | 414.71   | 180.40     | -56%                      | 54,133,837  | 20,937,329  | -33,196,508  | -61% |
|                                                  |                       | Car 5         | 251,212   | 251,212    | 0%                      | 416.25   | 180.40     | -56%                      | 104,585,786 | 40,293,731  | -64,292,055  | -61% |
| 1.A.3.b.iv - Heavy Duty Vehicle Trucks & Lorries | Gasoline              | pre-Cars      | 2,270     | 2,270      | 0%                      | 787.83   | 646.33     | -18%                      | 1,780,686   | 1,487,437   | -293,249     | -16% |
|                                                  |                       | Car 1         | 6,757     | 6,757      | 0%                      | 638.89   | 459.32     | -29%                      | 4,262,734   | 3,183,482   | -1,079,252   | -25% |
|                                                  |                       | Car 2         | 3,043     | 3,043      | 0%                      | 473.16   | 382.73     | -19%                      | 1,439,790   | 1,073,333   | -366,457     | -25% |
|                                                  |                       | Car 3         | 18,189    | 18,189     | 0%                      | 362.42   | 186.37     | -49%                      | 6,663,265   | 3,376,016   | -3,287,249   | -49% |
|                                                  |                       | Car 4         | 20,670    | 20,670     | 0%                      | 64.89    | 186.37     | 289%                      | 1,176,026   | 3,662,314   | 2,486,288    | 209% |
|                                                  | Diesel Oil            | pre-Cars      | 91,634    | 91,634     | 0%                      | 309.75   | 283.53     | -9%                       | 15,993,546  | 13,687,186  | -2,306,360   | -15% |
|                                                  |                       | Car 1         | 3,262     | 3,262      | 0%                      | 1034.82  | 737.35     | -29%                      | 3,375,359   | 2,485,071   | -890,288     | -26% |
|                                                  |                       | Car 2         | 1,094     | 1,094      | 0%                      | 747.82   | 488.39     | -35%                      | 918,052     | 512,378     | -405,674     | -44% |
|                                                  |                       | Car 3         | 5,544     | 5,544      | 0%                      | 817.44   | 581.68     | -29%                      | 4,532,190   | 2,781,516   | -1,750,674   | -39% |
|                                                  |                       | Car 4         | 20,583    | 20,583     | 0%                      | 629.54   | 563.68     | -10%                      | 12,967,751  | 7,277,279   | -5,690,472   | -44% |
|                                                  |                       | Car 5         | 15,912    | 15,912     | 0%                      | 358.89   | 276.23     | -23%                      | 6,334,421   | 4,386,424   | -1,947,997   | -31% |
|                                                  | LN <sub>2</sub> Total | pre-Cars      | 154,963   | 154,963    | 0%                      | 250.40   | 154.68     | -38%                      | 45,964,153  | 24,283,389  | -21,680,764  | -47% |
|                                                  |                       | Car 1         | 381,799   | 381,799    | 0%                      | 68.78    | 154.68     | 125%                      | 28,251,482  | 69,665,886  | 41,414,404   | 146% |
|                                                  |                       | Car 2         | 585,186   | 585,186    | 0%                      | 515.18   | 172.19     | -67%                      | 188,173,537 | 180,760,889 | -7,412,648   | -4%  |
|                                                  |                       | Car 3         | 4,940     | 4,940      | 0%                      | 128.95   | 186.61     | 45%                       | 622,656     | 783,451     | 160,795      | 26%  |
|                                                  |                       | Car 4         | 2,966     | 2,966      | 0%                      | 128.14   | 177.73     | 41%                       | 374,114     | 527,294     | 153,180      | 41%  |
|                                                  |                       | Car 5         | 3,221     | 3,221      | 0%                      | 128.33   | 186.64     | 45%                       | 387,596     | 639,833     | 252,237      | 65%  |
| 1.A.3.b.v - Heavy Duty Vehicle Trucks & Lorries  | Gasoline              | pre-Cars      | 6,241     | 6,241      | 0%                      | 48.24    | 186.64     | 284%                      | 20,126      | 1,239,686   | 1,219,560    | 598% |
|                                                  |                       | Car 1         | 1,130     | 1,130      | 0%                      | 58.41    | 186.64     | 217%                      | 23,066      | 224,682     | 201,616      | 873% |
|                                                  |                       | Car 2         | 0         | 0          | 0%                      | 0.00     | 186.64     | 0%                        | 0           | 0           | 0            | 0%   |
|                                                  |                       | Car 3         | 18,487    | 18,487     | 0%                      | 85.86    | 186.61     | 118%                      | 1,658,558   | 3,454,767   | 1,796,209    | 108% |
|                                                  |                       | Car 4         | 2,180,983 | 2,180,983  | 0%                      | 215.85   | 133.49     | -38%                      | 478,758,286 | 291,129,652 | -187,628,634 | -39% |
|                                                  | Diesel Oil            | pre-Cars      | 13,588    | 13,588     | 0%                      | 638.58   | 644.11     | -6%                       | 7,790,965   | 6,648,721   | -1,142,234   | -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     | -60%                      | 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   | 3,388,617   | -99,164      | -3%  |
|                                                  |                       | Car 4         | 278,738   | 278,738    | 0%                      | 55.98    | 52.30      | -7%                       | 15,683,488  | 14,576,755  | -1,106,733   | -7%  |
|                                                  |                       | Car 5         | 186,830   | 186,830    | 0%                      | 19.35    | 52.30      | -170%                     | 3,228,282   | 8,725,668   | 5,497,386    | 170% |
|                                                  | LN <sub>2</sub> Total | pre-Cars      | 699,507   | 699,507    | 0%                      | 64.40    | 68.36      | 6%                        | 45,032,966  | 47,786,817  | 2,753,851    | 6%   |
|                                                  |                       | Car 1         | 1,383     | 1,383      | 0%                      | 303.16   | 272.65     | -10%                      | 286,430     | 245,173     | -41,257      | -14% |
|                                                  |                       | Car 2         | 2,849     | 2,849      | 0%                      | 407.20   | 222.87     | -45%                      | 4,981,983   | 2,483,536   | -2,498,447   | -50% |
|                                                  |                       | 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    |                         |          |            |                           |             |             |              |      |

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

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

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

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

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