





|                                             |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
|---------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| ~ Submission 2020                           | > 308    | > 313    | > 319    | > 330    | > 331    | > 334    | > 335    | > 339    | > 346    | > 349    | > 354    | > 354    | > 354    | > 354    | > 359    | > 361    |
| ~ Submission 2019                           | > 313    | > 317    | > 329    | > 335    | > 336    | > 339    | > 341    | > 344    | > 350    | > 352    | > 359    | > 364    | > 368    | > 374    | > 378    | > 380    |
| ~ absolute change                           | > -5.05  | > -3.50  | > -9.68  | > -5.31  | > -5.00  | > -5.19  | > -5.11  | > -4.91  | > -4.69  | > -3.15  | > -5.07  | > -10.16 | > -13.33 | > -19.30 | > -19.11 | > -19.37 |
| ~ relative change                           | > -1.61% | > -1.10% | > -2.94% | > -1.58% | > -1.49% | > -1.53% | > -1.50% | > -1.43% | > -1.34% | > -0.89% | > -1.41% | > -2.79% | > -3.62% | > -5.17% | > -5.05% | > -5.09% |
| <b>&lt; Sulphur oxides - SO<sub>x</sub></b> |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
| ~ Submission 2020                           | > 19.7   | > 19.5   | > 19.5   | > 19.6   | > 19.6   | > 19.6   | > 19.6   | > 19.6   | > 19.6   | > 19.6   | > 19.6   | > 19.6   | > 19.6   | > 19.6   | > 19.6   | > 19.6   |
| ~ Submission 2019                           | > 25.1   | > 15.2   | > 8.5    | > 6.3    | > 5.9    | > 5.5    | > 5.1    | > 4.7    | > 4.7    | > 4.7    | > 4.7    | > 4.7    | > 4.7    | > 4.7    | > 4.7    | > 4.7    |
| ~ absolute change                           | > -5.45  | > 4.30   | > 11.08  | > 13.28  | > 13.71  | > 14.13  | > 14.55  | > 14.98  | > 14.98  | > 14.98  | > 14.98  | > 14.98  | > 14.98  | > 14.98  | > 14.98  | > 14.98  |
| ~ relative change                           | > -21.7% | > 28.2%  | > 131%   | > 209%   | > 232%   | > 257%   | > 287%   | > 322%   | > 322%   | > 322%   | > 322%   | > 322%   | > 322%   | > 322%   | > 322%   | > 322%   |
| <b>&lt; Black carbon - BC</b>               |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
| ~ Submission 2020                           | > 1.91   | > 2.01   | > 2.08   | > 1.97   | > 1.95   | > 1.93   | > 1.90   | > 1.88   | > 1.86   | > 1.84   | > 1.83   | > 1.82   | > 1.78   | > 1.79   | > 1.79   | > 1.80   |
| ~ Submission 2019                           | > 2.23   | > 2.23   | > 2.23   | > 2.23   | > 2.23   | > 2.23   | > 2.23   | > 2.23   | > 2.23   | > 2.23   | > 2.23   | > 2.23   | > 2.23   | > 2.23   | > 2.23   | > 2.23   |
| ~ absolute change                           | > -0.32  | > -0.22  | > -0.15  | > -0.26  | > -0.28  | > -0.30  | > -0.33  | > -0.36  | > -0.37  | > -0.39  | > -0.40  | > -0.42  | > -0.45  | > -0.44  | > -0.44  | > -0.44  |
| ~ relative change                           | > -14.3% | > -9.8%  | > -6.8%  | > -11.6% | > -12.5% | > -13.5% | > -15.0% | > -16.0% | > -16.7% | > -17.5% | > -18.0% | > -18.7% | > -20.1% | > -19.9% | > -19.7% | > -19.5% |
| <b>&lt; Particulate matter - PM</b>         |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
| ~ Submission 2020                           | > 3.98   | > 4.19   | > 4.33   | > 4.11   | > 4.07   | > 4.02   | > 3.95   | > 3.91   | > 3.87   | > 3.84   | > 3.81   | > 3.78   | > 3.72   | > 3.72   | > 3.74   | > 3.74   |
| ~ Submission 2019                           | > 4.65   | > 4.65   | > 4.65   | > 4.65   | > 4.65   | > 4.65   | > 4.65   | > 4.65   | > 4.65   | > 4.65   | > 4.65   | > 4.65   | > 4.65   | > 4.65   | > 4.65   | > 4.65   |
| ~ absolute change                           | > -0.67  | > -0.46  | > -0.32  | > -0.54  | > -0.58  | > -0.63  | > -0.70  | > -0.74  | > -0.78  | > -0.81  | > -0.84  | > -0.87  | > -0.93  | > -0.93  | > -0.91  | > -0.91  |
| ~ relative change                           | > -14.3% | > -9.8%  | > -6.8%  | > -11.6% | > -12.5% | > -13.5% | > -15.0% | > -16.0% | > -16.7% | > -17.5% | > -18.0% | > -18.7% | > -20.1% | > -19.9% | > -19.7% | > -19.5% |
| <b>&lt; Carbon monoxide - CO</b>            |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
| ~ Submission 2020                           | > 71.0   | > 60.3   | > 44.9   | > 40.0   | > 39.2   | > 38.3   | > 37.4   | > 36.4   | > 35.9   | > 35.6   | > 35.5   | > 35.6   | > 35.3   | > 35.5   | > 33.5   | > 33.6   |
| ~ Submission 2019                           | > 72.0   | > 59.8   | > 44.3   | > 40.2   | > 39.2   | > 38.2   | > 37.1   | > 36.8   | > 36.4   | > 36.2   | > 35.8   | > 35.6   | > 35.1   | > 35.1   | > 35.1   | > 35.5   |
| ~ absolute change                           | > -0.97  | > 0.48   | > 0.55   | > -0.21  | > 0.00   | > 0.17   | > 0.32   | > -0.41  | > -0.47  | > -0.59  | > -0.28  | > -0.05  | > 0.19   | > 0.40   | > -1.55  | > -1.90  |
| ~ relative change                           | > -1.35% | > 0.81%  | > 1.24%  | > -0.53% | > 0.01%  | > 0.44%  | > 0.87%  | > -1.11% | > -1.29% | > -1.63% | > -0.78% | > -0.14% | > 0.54%  | > 1.15%  | > -4.42% | > -5.35% |



For more information on recalculated emission estimates for Base Year and 2018, please see the pollutant specific



recalculation tables following chapter [8.1 - Recalculations](#)].

## Uncertainties

For uncertainties information, please see [main chapter](#) on civil aviation.

## Planned improvements

For information on planned improvements, please see [main chapter](#) on civil aviation.

## FAQs

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### [bibliography](#)

: 1 : Knörr, W., Schacht, A., & Gores, S. (2010): Entwicklung eines eigenständigen Modells zur Berechnung des Flugverkehrs (TREMOT-AV) : Endbericht. Endbericht zum F+E-Vorhaben 360 16 029, URL: <https://www.umweltbundesamt.de/publikationen/entwicklung-eines-modells-zur-berechnung>; Berlin & Heidelberg, 2012. : 2 : Knörr et al. (2019c): Knörr, W., Schacht, A., & Gores, S.: TREMOD Aviation (TREMOT AV) 2019 - Revision des Modells zur Berechnung des Flugverkehrs (TREMOT-AV). Heidelberg, Berlin: Ifeu Institut für Energie- und Umweltforschung Heidelberg GmbH & Öko-Institut e.V., Berlin & Heidelberg, 2019. : 3 : Gores (2019): Inventartool zum deutschen Flugverkehrsinventar 1990-2018, im Rahmen der Aktualisierung des Moduls TREMOD-AV im Transportemissionsmodell TREMOD, Berlin, 2019. : 4 : EMEP/EEA, 2019: EMEP/EEA air pollutant emission inventory guidebook 2019 - Copenhagen, 2019 : 5 : Eurocontrol (2019): Advanced emission model (AEM); <https://www.eurocontrol.int/model/advanced-emission-model>; 2019 [bibliography](#)

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<sup>1)</sup> (bible 2)

<sup>2)</sup> (bible 3)

<sup>3)</sup> (bible 1)

<sup>4)</sup> (bible 2)

<sup>5)</sup> (bible 4)

<sup>6)</sup> (bible 4)

<sup>7)</sup> (bible 5)

<sup>8)</sup> (bible 4)

<sup>9)</sup> (bible 5)