NFR 11 - Other Sources

11.C Other Natural Sources

Short description

NFR-Code	Name of category	Method	AD	EF	Key Category
11.C	**Lightning**	T1	NS	D	

Lightning and corona discharge during thunderstorm events cause atmospheric chemical reactions to take place at high voltages and high temperatures. These reactions cause the production of NOx in the atmosphere.

Methodology

The calculation of NOx emissions from lightning uses strike counts from the German weather service and default emission factors from the EMEP/EEA guidebook.

For the complete time series, the emissions are calculated as follows:

EM = **AD** (number of lightning strikes) * **EF** (kg emission per strike)

Activity data

The number of lightning strikes in Germany is taken from a commercial system called “BLIDS” run by Siemens. The data has been cross-referenced with information from the German weather service. Consistent strike count data is available from 1992 onward and has been back-populated to cover the full time series since 1990. The following table shows the strike figures over time.

Table 1: Lightning strikes in Germany from 1990 onwards

Year	Strike count [1000 strikes]
1990	443
1991	443
1992	370
1993	274
1994	429
1995	394
1996	218
1997	255
1998	428
1999	589
2000	1,026
2001	591
2002	1,023
2003	813
2004	741
2005	802
2006	1,001
2007	1,139
2008	990
2009	917

Year	Strike count [1000 strikes]
2010	589
2011	687
2012	656
2013	542
2014	623
2015	550
2016	432
2017	443
2018	446
2019	329
2020	399
2021	512

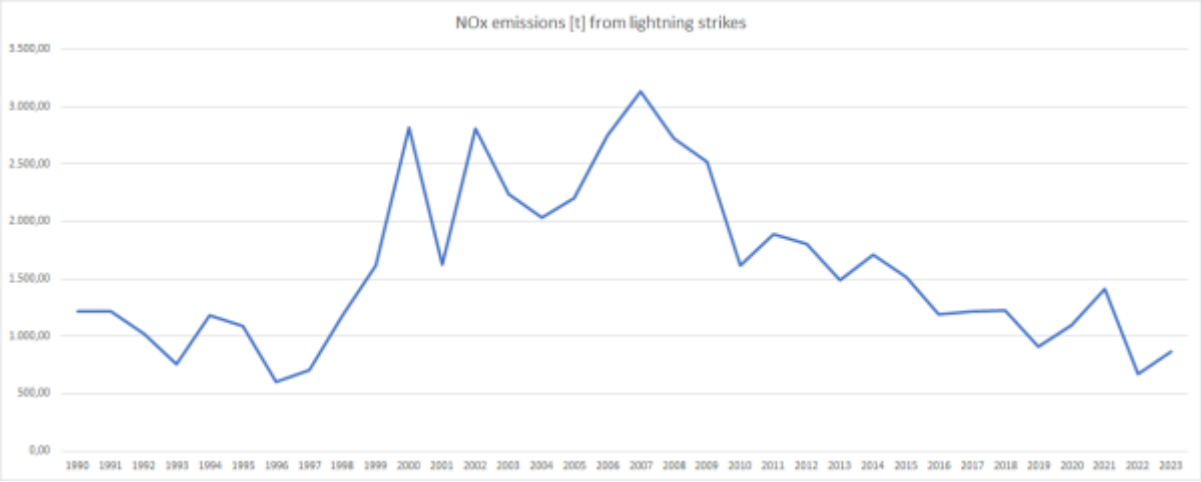
Emission factor

For the calculation of emissions in this category, the Guidebook emission factor of 2.75 kg NOx per strike is used.

Emission Trend

The emission value is solely dependent on the strike count and varies between 1 to 3 kilotons of NOx per year.

Figure 1: NFR 11.C, NOx emissions from lightning



Recalculations

As these activities and emissions are reported for the first time, no specific recalculations occur against a previous submission.

Uncertainties

The AD from BLIDS does have a low uncertainty of ± 3%. The uncertainties for the emission factors are estimated to be relatively high, being a default value. Hence the overall uncertainty for the emission estimation of NOx from lightning is qualified estimated by expert judgement to be high (>50%).

Quality checks

No sector-specific quality checks are done.

Planned Improvement

Currently no improvements are planned.