What's New in EMIT 3.9?
June 2022

EMIT 3.9 is the latest general release of CERC's simple, fast and comprehensive tool for compiling, editing and analysing emissions inventories. This patch is an interim release of EMIT with the following new features compared to EMIT 3.7.0b:

- New road traffic emission factors from the most recent version of Appendix 4 to chapter '1.A.3.b.i-iv Road transport[1]', of the EMEP/EEA air pollutant emission inventory guidebook 2019. Ricardo have provided correction factors for emissions of CO_2 from cars which have come into service since Euro 4. The correction factors have been included in the final emissions dataset, which has been named COPERT v5.5 in EMIT.
    - Indirect CO_2 is included with this dataset: this relates to emissions of CO_2 associated with charging electric and plug in hybrid cars and LGVs. The Indirect CO_2 emission factors have been extracted from EFT 11.
- 3D grid emissions can be exported in a format suitable for use in ADMS-Urban or CMAQ.
- The inventory property coordinate grid definition restrictions have been relaxed.
- The NAEI emission factor datasets for roads are not available in this version.

The patch is a "rollup" patch containing the following previous patches: 3.4.1, 3.4.1a, 3.4.1b, 3.4.2, 3.6.0, 3.6.0.b, 3.7a and 3.7b, 3.8, and 3.8a. This document describes the new features and model changes in EMIT since the release of EMIT 3.7b.

EMIT 3.9 cannot upgrade databases from earlier versions of EMIT. It is possible to manually transfer source data from one version of EMIT to a later version by exporting to shape file from the older version, and then importing the source data into the later version.

USERS OF ADMS-Urban, ADMS-Roads or ADMS-Airport should note that EMIT 3.9 may be used with version 3.1 through to version 5 of the models.

Installing EMIT 3.9

You must have installed EMIT by running an installation 'setup.exe' before you apply this patch. The EMIT user guide contains full instructions on how to install EMIT by running 'setup.exe'. A copy of the user guide can be found with the installation files in *.pdf* format. It is also available from www.cerc.co.uk. See Section 2.2 of the user guide for the following:

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[1] https://www.eea.europa.eu/publications/emep-eea-guidebook-2019

- Steps to take *before* running 'setup.exe', if you have previously installed an earlier version of EMIT; and
- How to run 'setup.exe'.

Steps to install the patch:
1. Make sure EMIT is not running.
2. In Windows Explorer, copy the new files contained in the *EMIT* directory into your installation directory of EMIT. When prompted, overwrite the original version of the files with the new files. The full list of files is:

    The directories *QUADContentType* and *ROADEM*
    CERCGeneric.dll
    COPERT_5.5_VSC_List.xlsx
    EMIT User Guide.pdf
    EMIT.exe
    EMIT_Res809.dll
    Empty.mde
    GridAggregator.exe
    GriddedEmissionsTo4DNetCDF.exe
    ICAO 20+ Other 2016.xlsx
    locale.ini
    netcdf.dll
    NOx_Pollutants.ptt
    PM10_Pollutants.ptt
    PM25_Pollutants.ptt
    QUADRes40C.dll
    QUADRes804.dll
    QUADRes809.dll
    regDLLOn32bitOS.bat
    regDLLOn64bitOS.bat
    Template.inv
    VSC_List.xlsx
3. Extract the contents of the ROADEM.zip file into subfolder 'ROADEM' of EMIT. After this step, the ROADEM folder will then contain a number of sub-subfolders, each sub-subfolder containing .csv files..
4. **If you have not installed ADMS 5.2+ or ADMS-Urban 4.1+, you will need to carry out this step.** In Windows Explorer, copy the files *CERCGeneric.dll*, *regDLLOn32bitOS.bat* and *regDLLOn64bitOS.bat* to your computer. Log on as administrator and in Windows Explorer drag the cercGeneric.dll file onto one of the batch files. If you have 32-bit Windows, please drag it onto the 32 bit batch file. If you have 64-bit Windows, please drag it onto the 64-bit batch file.

5. The file *VSC_List.xlsx* is provided for reference. It lists the vehicle sub-categories used for the EFT 10.1 dataset in EMIT.
6. The file *COPERT_5.5_VSC_List.xlsx* is provided for reference. It lists the vehicle sub-categories used for the COPERT v5.5 dataset in EMIT.
7. The file *ICAO 20+ Other 2016.xlsx* is provided for reference. It contains the revised ICAO aircraft emission factors. See the EMIT 3.4.2 readme for more details.
8. The files *NOx_Pollutants.ptt* , *PM25_Pollutants.ptt, PM10_Pollutants.ptt* are provided to assist ADMS users with the traffic apportionment feature in EMIT. They contain commonly-used traffic apportionment pollutants in a format that can easily be imported into ADMS.
9. Copy the directory *CERCQUAD* into *C:\Program Files (x86)\Common Files\CERC*. The full list of files is:

   unregister.bat
   Interop.CERCMapper.dll
   Interop.CERCMapperProxy.dll
   QUAD.Core.dll
   QUAD.Core.pdb
   QUAD.Public.dll
   QUAD.Public.pdb
   register.bat

10. In Windows Explorer go to the newly created CERCQUAD directory. Select the file *register.bat* and run as administrator.

About the COPERT v5.5 datasets in EMIT 3.9

The road traffic emission factor dataset extracted from the most recent version of the EMEP/EEA guidebook has been included: **COPERT v 5.5**.

The dataset takes road traffic emission factors from the most recent version of Appendix 4 to chapter '1.A.3.b.i-iv Road transport ', of the EMEP/EEA air pollutant emission inventory guidebook 2019. Ricardo have provided correction factors for emissions of CO_2 from cars which have come into service in the UK since Euro 4. The correction factors have been included in the dataset. Indirect CO_2 is included with this dataset: this relates to emissions of CO_2 associated with charging electric and plug in hybrid cars and LGVs. The Indirect CO_2 emission factors have been extracted from EFT 11.

This dataset includes factors for pollutants BENZENE, BUTADIENE, B[a]P, CO, CO2, CO2INDIRECT, N2O, NH3, SO2, VOC. Emissions factors of NO_x and PM are also available from COPERT v 5.5, but have not been extracted into this dataset.

In **COPERT v5.5**, factors are divided into urban, rural and motorway regions.

Emission factors are given for speeds 5 to 50 km/hr in 1 km/hr, and from 50 to 140 km/hr in 5 km/hr increments.
The COPERT v5.5 datasets in EMIT 3.9 contain data for 2018-2030. They contain factors for 11 vehicle classes.

COPERT v5.5 can calculate emissions based upon variable road gradients (-6 downhill to +6 uphill). Only HDV emission factors are affected by the gradient. Currently EMIT will only use the 0 gradient emission factors.

COPERT v5.5 data has been incorporated into EMIT as separate datasets for Urban, Rural and Motorway drive cycles. The Vehicle Sub-Categories included have code names Exxxx, as used in the EMIT EFT 10/11 datasets. The list of vehicle sub-categories and their descriptions can be viewed in the EMIT screen 'Data\Emission Factors\Edit Roads Factors'. The vehicle sub-categories are also listed in the file *COPERT_5.5_VSC_List.xlsx*, they include all vehicles that have non-zero fleet proportion in the standard EFT 10/11 fleet plus extra vehicles for completeness, such as pre-Euro and early Euro category vehicles.

The dataset names are *COPERT v5_5 Motorway*, *COPERT v5_5 Urban* and *COPERT v5_5 Rural*.

Viewing emission factors
The EMIT screen for viewing emission factors 'Data-Emission Factors-Roads' does not display the new EFT emission factors. Users who wish to access the emission factors can look at the underlying .CSV files which contain the data. These can be found in the EMIT installation directory, in the folder *ROADEM*. There are subdirectories for each dataset. The values in these files are in g/(vehicle km). Users should take great care not to modify the data in these files and should not access the files while EMIT is running. Emission factors for EFT 8.0.1, EFT 9.0 and EFT 10.1 are also present within this folder.

Route type data

The fleet composition data ('route types') in EMIT 3.9 has been derived using the route types already within EMIT under the EFT 10.1 datasets. The route types in EFT 11 are identical to those in EFT 10.1.

Route types are given for separate regions of the UK (Urban, rural, Motorway), with additional route types for London (Central/Inner/Outer/Motorway). The route types are available for each year 2018 to 2030.

Assumptions

Various assumptions have been made when extracting the emission factor data in order to match the vehicle descriptions provided by EMEP/EEA to those in EMIT. The assumptions include:

- Euro 3 and newer petrol LGVs and cars use Gasoline direct-injection (GDI) as opposed to port fuel injection (PFI) technology
- Euro 3 and newer diesel cars include a DPF
- The definition of a Euro 6 diesel car in EMIT is equivalent to a Euro 6 a/b/c car in COPERT
- The definition of a Euro 6c diesel car in EMIT is equivalent to a Euro 6 d-temp car in COPERT
- The definition of a Euro 6d diesel car in EMIT is equivalent to a Euro 6 d car in COPERT
- A taxi in EMIT uses emission factors for a diesel LGV N1-III (in line with EFT)
- Petrol Euro 3 hybrid car emissions are calculated by applying factors to the base category emission factors
- ZEC taxis assume Euro 6 petrol LGV N1-III emission factors
- Euro 4 Bus and HGV have EGR if no other technology is stated in their definition
- Hybrid bus emissions are calculated by applying factors supplied by Bureau Veritas to the base category emission factors
- Euro VI buses in EMIT are Euro VI A/B/C buses in COPERT 5.5
- The change in UK petrol from E5 to E10 has been applied to emission factors from the year 2022