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Common Information to European Air

IMACE - database
Integrated Management for Air and Climate Emissions

User manual

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1. Introduction

1.1 Background and objectives

The present version of the Citeair Emissions Inventory Database has been constructed parting from CollectER. The CollectER tool is designed to help national experts on air emissions to collect the relevant air emission data for delivery to the European Commission and to international conventions.

The CollectER / ReportER emission inventory software tools are developed by European Environment Agency (EEA) and its European Topic Centre on Air and Climate Change (ETC-ACC) since the year 1998. The objectives of the software are to facilitate preparation of transparent, consistent, complete, comparable and accurate data for emissions reporting procedures in accordance with the requirements of international conventions, protocols and EU legislation.

The tool was originally developed as a dBase oriented system CORINAIR94, and later as an integrated set of MS Windows tools. All tools are available free of charge from the ETC-ACC web site at (http://etcacc.eionet.eu.int/tools).

IMACE is generally based on the same concepts, but special features have been added. One major difference is that **IMACE** allows for spatially differentiating the emissions sources and for including dispersion modelling characteristics for each emission sources, so that the emissions can be put to use in air quality modelling.

Another essential feature is the built-up of the inventory in separate layers for different data sources, thus allowing to include top-down and bottom-up approaches of the emissions inventories. This layered configuration of the emissions inventory makes it possible to construct scenarios from a top-down point of view, from a bottom-up approach or a combination of both. This way also, a comparison of top-down and bottom-up approaches can be configured.

CollectER is basically a tool to report national emissions data to the European Commission whereas the objectives of **IMACE** should be broader. Specifically, it can be a tool to analyze emissions and its spatial and temporal behaviour as well as its interactions with policies, that influence these emissions and the (regional) effects on air quality. Therefore, the tool has been equipped with a scenario builder, that allows for executing specific scenarios, such as the penetration of new technologies or the introduction of new emission sources as a result of new insights.

1.2 Concepts

As already mentioned, **IMACE** uses the CollectER basis and logically also uses the same basic concepts. The emission inventory calculates emissions for each pollutant using the equation:

$$E_j = \sum_i AR_i \; EF_{i,j}$$

Where

E_j: Total emission of the pollutant j
AR_i : Activity rate or production rate of the source i
EF_{ij}: Emission factor of the source i for the pollutant j.

In this approach, the compilation of an emission inventory is typically the collection of activity data and specific emission factors.

The above formula does not represent explicitly some important aspects of the historical developments of emissions:

- Activity rates are subject to change through changes in production. To express this, specific activity data are to be supplied for each emission source, be it a generic (top-down) or specific (bottom-up) source.
- Emission rates will vary over time, due to changes in productivity and the implementation of distinct technologies with specific emissions rates for a given activity. To express this, specific technology data needs to be supplied for each emission source, which in turn is linked to specific emission factors for distinct pollutants.

All emission sources can be assigned a specific geographic location. This can be done in a specific way, assigning point sources (stacks) to a point location, or, not unusual for generic top-down emission sources, within a determined area of, say 1x1 km grid cells. Thus, emissions can be calculated for each gridcell.

$$E_{grid,j} = \Sigma_{grid,i} \; AR_i \; EF_{i,j}$$

The resulting emission inventory is then a collection of elements:

- the (geographic) location of the emission.
- the intensity (activity rate) of the source that causes the emission;
- the technology used for the source that causes the emission
- the emission factor that applies to the technology used for the activity
- the pollutant that is emitted;
- the year in which the emission takes place.

Within a relational database the above collections can be represented in the following linked tables

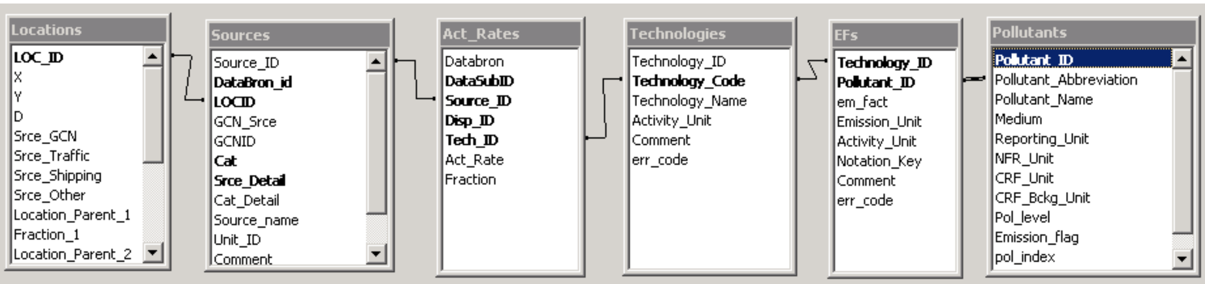


Figure 1 Core tables of the relational database

Without further abounding as to the elements within each table, it is clear that all sources in a specific area (location) are assigned specific activity rates, which in turn are related to specific technologies and, through the interconnected tables, to the emission of specific pollutants. In principle, when supplying emission factors for a set of pollutants to a certain technology, the total emissions of all pollutants can be arrived at by means of giving one sole activity rate per source.

The above set of interconnected tables forms the core of IMACE. Apart from some minor distinctions it is essentially identical to the CollectER database:

- CollectER uses two tables to link technologies to sources, whereas IMACE only uses one, namely “Act_Rates”.

- IMACE supplies a “Scenarios” table, in which data form distinct datasources can be linked to specific scenarios. The output form IMACE is managed through the Scenarios table.
- CollectER supplies an input field for the year in which activities take place. In IMACE this is done by supplying a field “databron” (meaning “data source”) in the Sources and Act_Rates tables. This “databron” field is in turn linked to the “Scenarios” table, in which each datasource can be assigned an emission year and a proyected scenario year.
- Collecter supplies a table that relate the European SNAP nomenclature and the NFR source definitions. IMACE contains a comparable table, in which types of activity (identified by a category code) are linked to the SNAP and NFR code.
- IMACE contains a table with source parameters relevant for air quality modelling (such as stack height and heat content of the emission).
- In order to facilitate generic changes in activity rates (due to “general” economic growth) an additional scaling table is included in IMACE, so that for certain projected years generic growth factors can be applied to source categories as a whole.

As in CollectER, a unit conversion table is included, in which conversion factors can be entered for emission and activity units. In this way emissions for instance can be easily transformed from one unit to another (say from kg/year to ktons/year).

1.3 Two databases – Citeair IMACE and Maribor IMACE

IMACE has been filled with an example emission inventory, **Citeair_IMACE_0**. This emission inventory reflects the actualized inventory of the Rijnmond area, including the Rotterdam metropolitan and port areas. The data are fictitious. Both a top-down and a bottom-up source inventory are included. The following sections of this chapter will expand on the contents of this database.

An additional database, **Maribor_IMACE_0** is also included. This database is the result of work with the databse in Maribor. It is the latest update. **Maribor_IMACE_0** is empty. An accompanying Microsoft Excel™ worksheet is included with (fictitious) data[1] that can be uploaded into this database.

It is recommended to use the IMACE database as a showcase for the possibilities of a filled inventory. One can view the tables and execute the scenarios. the **Maribor_IMACE_0** should be used for building ones own inventory.

1.4 Structure of the datasources

The process of improving the emissions inventory requires a periodic iteration of inputting, comparing and replacing (though strictly speaking data are never replaced but merely revaluated) the available data with newly acquired data. This process logically departs from a top-down approach. Therefore the top-down emissions data forms the basic layer of the emissions inventory. As improved data from bottom-up emissions analyses emerge, they can be put into the inventory in subsequent layers in such manner that an overall picture of the emissions can be arrived at by recombining top-down emissions from the bottom layer with the emissions data in higher layers.

[1] The data is based on data from the Institute of Public Health Maribor, Slovenia, within the project PMinter – The Interregional interaction of residential heating and traffic related measures with the PM-levels in the Slovenian - Austrian border region. The project is being implemented and is partially financed under the Operational Programme Slovenia - Austria 2007-2013

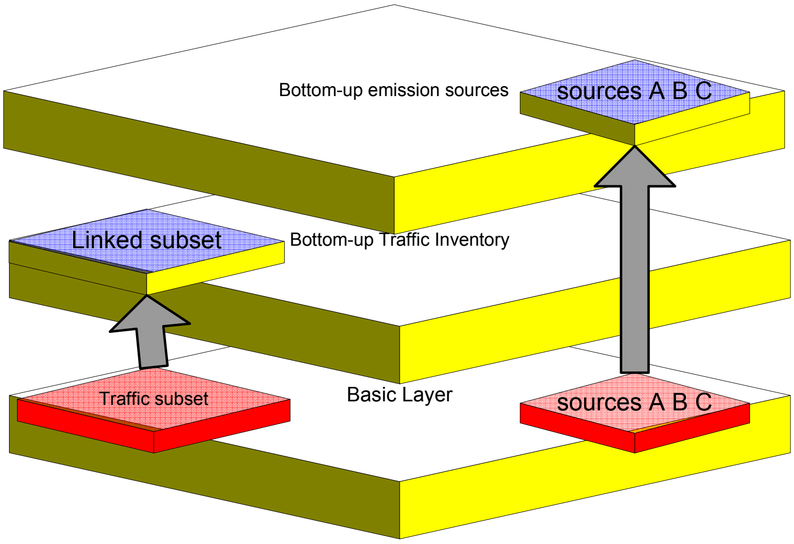


Figure 2 - Structure of data sources in the inventory

1.4.1 Basic layer – Top-down emissions inventory

The basic layer of the inventory consists of the top-down emission inventory for the region. The dataset is a subset of the national emissions inventory. Its data conform the lowest data layer in the overall database and is identified as the first data source 1 (databron_ID=1).
The set contains a large amount of generic and specific sources distributed geographically in the Rijnmond area. The generic emission sources are distributed in 1x1 km^2 and 5x5 km^2 grid cells, covering all source categories. Emissions are presented in separate activity rates for NO_x and PM_{10} emissions. The data is distributed over the relational database; it's attributes can be found in the Sources and Act_rates tables.

All sources are linked to specific locations in the Locations table. Locations in this table are related to higher level locations, such as grid cells (in the case of point source locations) and municipalities. For that purpose a 1x1 km^2 grid set and some higher level locations were defined and input in the Locations table.

Each source is assigned a source category, relating it to a type of activity. For each source category, technologies, emission factors and scaling factors for forecasting are supplied in the corresponding tables.

1.4.2 Bottom-up Traffic emissions

A second layer of emissions is conformed by the road traffic emissions inventory. This set of data is derived from the Rotterdam road traffic dataset in which traffic intensity of all major roads within the metropolitan area is included. Traffic sources of road segments are aggregated on a 1x1 km^2 grid cell level ands traffic intensity (as vehicle km) is input as activity rate. The different types of traffic are translated into specific "traffic technologies" for which EFs have been derived. The traffic emissions set is a separate datasource. Corresponding traffic emissions in the basic (top-down) layer are linked to the emissions in the traffic layer by a specific identifier in the sources table. By doing so, the user can configure scenarios in which traffic emissions from the basic layer are replaced by more detailed traffic emissions from the traffic layer.

1.4.3 Bottom-up Shipping emissions

In the same fashion a sea shipping emissions dataset was constructed. Sea shipping data were extracted from a study of the Marine research institute Netherlands (MARIN). Highly detailed Shipping traffic data were collected from vessel transponder data and emission factors were compounded for several ship types and size classes using vessel and traffic characteristics. The activity data in this shipping layer are given in nautical miles (for navigating ships) and gross tonnage (for ships at berth). Emission factors are linked to the identified ship type and size classes. As in the road traffic layer, corresponding shipping emission in the basic layer are linked tot the data in the sipping layer.

2. How to use the database

IMACE is built in Microsoft Access™. Though some other applications (such as Open Office) may be compatible with the database format, the following manual is based on use in Access.

For knowledge transferability reasons, the database is completely accessible and no restrictions are included. A drawback is that no data protection has been supplied. Data, Tables and Queries can be changed. The user should be aware that some changes may affect the functionality of the database

IMACE will open with a splash screen. The user accepts the conditions set forth in the splash screen.

2.1 Database

On opening the database the table view appears.

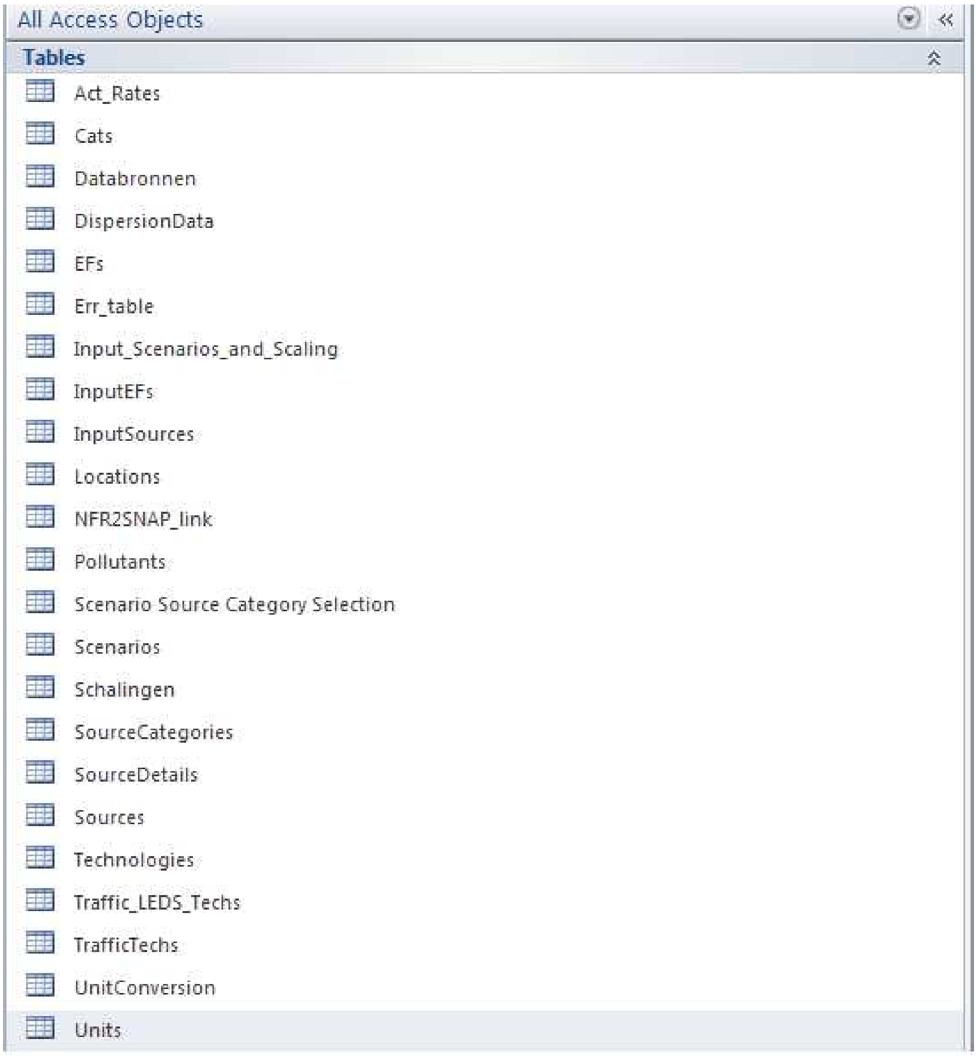


Figure 3 Table view of the Citeair database

2.1.1 Core tables

The core tables of the database are:

Locations

LOC_ID	X	Y	D	Sr	Srce	Srce	Sr	Location_Parent_	Fraction_1	Loc_Level	Comment
80002_432085_28	80002	432085	28	-1	0	0	0	80250_432250_500	1	6	
80002_432113_28	80002	432113	28	-1	0	0	0	80250_432250_500	1	6	
80002_432141_28	80002	432141	28	-1	0	0	0	80250_432250_500	1	6	
80002_432169_28	80002	432169	28	-1	0	0	0	80250_432250_500	1	6	
80002_432197_28	80002	432197	28	-1	0	0	0	80250_432250_500	1	6	
80024_432333_0	80024	432333	0	-1	0	0	0	80250_432250_500	1	6	
80030_432113_28	80030	432113	28	-1	0	0	0	80250_432250_500	1	6	
80030_432141_28	80030	432141	28	-1	0	0	0	80250_432250_500	1	6	
80030_432169_28	80030	432169	28	-1	0	0	0	80250_432250_500	1	6	
80058_432141_28	80058	432141	28	-1	0	0	0	80250_432250_500	1	6	
80250_432250_500	80250	432250	500	0	0	0	0	80500_432500_1000	1	5	Grid500

Figure 4 Dataview of Locations table

Locations have a unique identifier (LOC_ID) and describe coordinates (x,y; Dutch national coordinate system) and diameter of the location. The diameter is included so that area emissions can be allocated correctly.

Location records are nested. Six hierarchical levels have been defined, ranging from point (and small area) sources (level 6), 500x500m grid cells (5), 1x1km and 5x5km grid cells (4), municipalities (3), regions (2) and the entire province (1).

Each record is assigned a parent, a location with a higher hierarchical level. This way, emissions can be aggregated to larger areas.

Sources

Source_ID	DataBron_id	LOCID	GCN_Src	GCNID	Cat	Srce_Detail	Cat_Detail	Source_nam	Unit_ID	Comment	err_code
22167	1	80002_432085_	-1	1300_080002_432085_0028	1300	04	2.B		49		0
22168	1	80002_432113_	-1	1300_080002_432113_0028	1300	04	2.B		49		0
22169	1	80002_432141_	-1	1300_080002_432141_0028	1300	04	2.B		49		0
22170	1	80002_432169_	-1	1300_080002_432169_0028	1300	04	2.B		49		0
22171	1	80002_432197_	-1	1300_080002_432197_0028	1300	04	2.B		49		0
22172	1	80024_432333_	-1	1200_080024_432333_0000	1200	0103	1.A.1.b		49		0
22173	1	80030_432113_	-1	1300_080030_432113_0028	1300	04	2.B		49		0
22174	1	80030_432141_	-1	1300_080030_432141_0028	1300	04	2.B		49		0
22175	1	80030_432169_	-1	1300_080030_432169_0028	1300	04	2.B		49		0
22176	1	80058_432141_	-1	1300_080058_432141_0028	1300	04	2.B		49		0

Figure 5 Dataview of Sources table

The Sources table includes all emission sources, uniquely defined by (Source_ID). Sources from different data sources are distinguished by the (Databron_id) identifier. All sources are linked to a location by the (LOC_ID) identifier. All Sources are assigned a Srce_detail and Cat code, linking the source to a specific source category. The Unit_ID refers to the activity unit in which the source activity is expressed.

Though not needed for the scenarios included in this version of IMACE, the following fields can be useful.

The field (GCN Srce) determines if the source belongs to the basic layer of top-down emissions. The field (GCNID) links sources from different layers to each other. When available, sources from other datasources (such as from the road traffic dataset) are assigned a corresponding “GCNID”, linking the source to a specific source of the top-down inventory (see Figure 2 - Structure of data sources in the inventory). Thus combinations and comparisons can be built with special queries.

Act_Rates

Databron	Source_ID	Disp_ID	Tech_ID	Act_Rate	Fraction
1	22167	HC0_h10	GCN_1300	0,000	1
1	22168	HC0_h10	GCN_1300	0,000	1
1	22169	HC0_h10	GCN_1300	0,000	1
1	22170	HC0_h10	GCN_1300	0,000	1
1	22171	HC0_h10	GCN_1300	0,000	1
1	22172	HC21190_h900	GCN_1200	1,864	1
1	22172	HC18430_h900	GCN_1200	0,015	1
1	22172	HC21190_h900	GCN_1200	0,017	1
1	22172	HC3850_h900	GCN_1200	0,008	1
1	22172	HC3950_h900	GCN_1200	0,008	1
1	22172	HC4970_h900	GCN_1200	0,012	1

Figure 6 – Dataview of Act_Rates Table

The table provides activity rate data for the emission sources. Activity rates (Act_rate) are linked to the sources table by (Source_ID) and to the technologies table by (Tech_ID).

The field (Fraction) refers to the fraction in which a certain technology is applied to a specific source. A source could be composed by a collection of different technologies.

The field (Disp_ID) links the sources and activity rates to the dispersion parameters table. This table supplies the data needed for input in air quality models

Technologies

Technology_	Technology_Code	Technology_Name	Activity_Un	Comme	err_code
122	0804S01	Shipping_Berth	47		115
119	0804S02	Shipping_Berth	47		115
118	0804S03	Shipping_Berth	47		115
120	0804S04	Shipping_Berth	47		115
126	0804S05	Shipping_Berth	47		115
125	0804S06	Shipping_Berth	47		115
121	0804S07	Shipping_Berth	47		115
124	0804S08	Shipping_Berth	47		115

Figure 7 – dataview of Technologies table

The table includes all identified technologies. The activity unit refers to the specific unit in which the activity rate is expressed. See the Units table.

EFs

Technology	Pollutant_ID	em_fact	Emission_Unit	Activity_Unit	Notation_Key	Comment	err_code
0804S10	NOX	607	mg	Gtuur			115
0804S10	PM10	21,9	mg	Gtuur			115
0804S11	CO2	0,02899	kg	Gtuur			115
0804S11	NOX	607	mg	Gtuur			115
0804S11	PM10	21,9	mg	Gtuur			115
0804T1S1	NOX	0,96	kg	Zeemijl			115
0804T1S1	PM10	0,034	kg	Zeemijl			115
0804T1S2	NOX	2,41	kg	Zeemijl			115
0804T1S2	PM10	0,13	kg	Zeemijl			115
0804T1S3	NOX	5,99	kg	Zeemijl			115

Figure 8 – Data view of Emission factors table

The table contains the Emission factors for different pollutants as defined per specific technology. EFs are linked to each pollutant by (Pollutant_ID) and technology by (Technology_ID). The pollutants table is a direct copy of CollectER.

Important auxiliary tables

Cats Sourcedetails Sourcecategories	The tables contains source category data. Source categories can be identified by SNAP code, NFR code and the Dutch source code categorization. For detailed description of the SNAP and NFR codes, the tables Sourcedetails (SNAP) and Sourcecategories (NFR) can be viewed. The table Cats links the Dutch source codes to a SNAP and a NFR code.
Units	Contains all dimensions in which activity rates and emissions rates can be expressed. A flag is provided to distinguish between emission and activity rate units.
UnitConversion	Needed for converting emission and activity rate units. The table is used for reporting scenarios in the desired units and for converting specified activity rates to emission rates.
Schalingen (Scaling)	Contains data for scaling emissions for forecasts. This way, one figure can be used for scaling the emissions of one year to a forecasted year. The scaling is based on the technology used by emission sources and, apart from the technology identifier (LED), requires the input of the pollutant and the year of forecast (Jaarscenario) for which it applies. The year of edition (EditieJaar) refers to the year in which the emission data was supplied, so the scaling factors can be related unequivocally to a specific year of a dataset.
Disp	The table contains relevant dispersion parameters of the sources. The table is needed for the output of emission tables to be used in the Operational Priority Substance (OPS) model.

2.1.2 Scenario tables

The Scenarios table includes all basic scenarios that can be derived from the database.
The identifier (Databron_ID) is needed to access the correct data source layer.
Each scenario contains an identifier for the selection of the pollutant and for the selection of the year for which a scenario is requested.
From the Scenarios table the identifier (Scenarionummer) will be used to execute the queries to obtain data from the database.

The Scenario Source Category Selection table includes a Flag (Flagselected) for the selection of source categories in executable Scenarios. Selecting the field for the source category records causes corresponding emissions to be included in scenarios (See Scenarios).

The input tables will be discussed in the section concerning the input of new data layers.

Scenarios

ScenarioNumm	ScenarioJaar	EditieJaar	Pollutant	Databron_ID	Scenario
15	2015	2009	PM10	1	Top-Down Rijnmond PM10 2009 Year Forecast 2015
16	2020	2009	PM10	1	Top-Down Rijnmond PM10 2009 Year Forecast 2020
17	2009	2010	NOX	2	Rijnmond Traffic 2009 NOX
18	2009	2010	PM10	2	Rijnmond Traffic 2009 PM10
19	2009	2010	CO2	2	Rijnmond Traffic 2009 CO2
20	2009	2010	NO2	2	Rijnmond Traffic 2009 NO2
21	2011	2010	NOX	2	Rijnmond Traffic Year Forecast 2011

Scenario Source Category Selection

FlagSelected	LED Code	Source Detai	Source Category	Description Detail	Description LED
☑	1000	04	2	Production processes	Industrie:
☑	1100	0406	2.D.2	Processes in wood, paper pulp, food, drink and o	industrie: voedings- en genotmiddelen
☑	1200	0103	1.A.1.b	Petroleum refining plants	industrie: olie raffinaderijen
☑	1300	04	2.B	Production processes	industrie: chemische industrie
☑	1400	04	2.A	Production processes	industrie: bouwmaterialen e.d.
☑	1500	04	2.C	Production processes	industrie: basismetaalindustrie
☑	1700	04	2.C.5	Production processes	industrie: metaalbewerkingsindustrie
☑	1800	04	2.D	Production processes	industrie: overig
☑	2000	04	1	Production processes	Energie:
☑	2100	0101	1.A.1.a	Public power	energie: electriciteitscentrales
☑	2200	05	1.A.1.c	Extraction and distribution of fossil fuels and ge	energie: winning en distributie energiedrage
☑	2210	050201	1.A.1.c	Land-based activities	energie: winning en distributie energiedrage

Figure 9 – Data view of Scenarios and Scenario Source Category Selection Tables

2.2 Getting results from the database

<u>General procedures</u>

Select the query's view of the database

Queries

- Qry0_Input_NewScenarios
- Qry1_Input_NewLocations
- Qry2_Input_NewSources
- Qry3_Input_NewTechs
- Qry4_Input_EFs
- Qry5_Input_ARs
- Qry6_Input_Disp
- Qry7_Input_NewScaling
- Qry_Disps_Selected
- Emissions per Scenario
- Emissions per Scenario - Municipalities
- Emissions per Scenario - Municipalities per Source category
- Emissions per Scenario - Totals
- Emissions per Scenario - Totals for selected Source categories
- Emissions per Scenario - Totals per source category
- Emissions per Scenario per Selected Source Categories
- OPS for Scenarios
- Qry_Emissions_per_Locatie_Lvl4
- Qry_Emissions_per_Locatie_Lvl5
- Qry_Emissions_per_Locatie_Lvl6
- Qry0_Input_NewSources_Selection
- Qry_Emissions_Lvl4to6_Grouped

Figure 10 – Query view of the database

Queries have been prepared to obtain results from the database. Those queries will request the scenario number for which results should be obtained. The number of the scenario can be looked up in the Scenarios table.

2.2.1 How to execute a query

All Scenario queries are executed in the same manner. Here this will be shown for the query Emissions per Scenario.

1. Select the query Emissions per Scenario and press [Enter]
2. A dialogue pop-up box will appear requesting the number of the scenario – fill in a number and press [Enter]
3. A second dialogue pop-up box will appear asking in which units results should be expressed – Choose a number (pe. 5 for tons/year) and press [Enter]

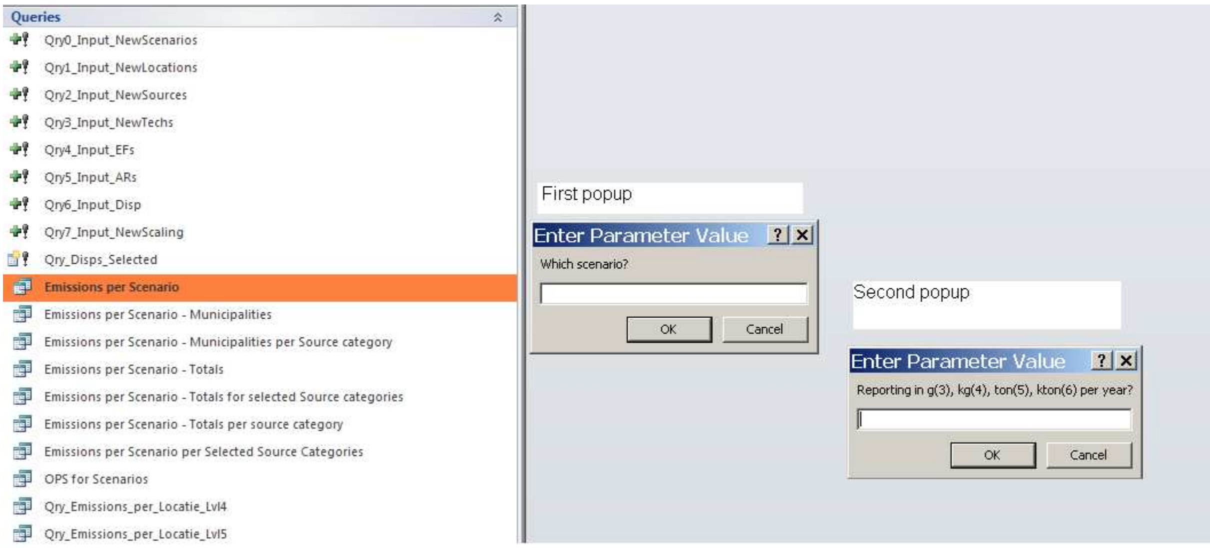


Figure 11 – Executing a result query

The query will now execute. Depending on available processing power this may take some time (After some moments a progress bar will appear in the bottom of the screen). The user will not be able to do any operations in Access in the mean time. The execution of any query can be cancelled by pressing [Esc]. In that case the query will not be executed and control will be returned to the user.

<u>Results</u>
When a query is completely executed, a results table will appear.

2.2.2 Selecting and copying records

The user can scroll through the results, make selections by highlighting them and copy the selected records. Selection of all the records can be done by selecting from the Menu Edit/Select All.

Copy the selection (Edit/Copy).
The selection can be pasted in for instance an Excel worksheet.

Be aware, that some datasets may be larger than can be contained in an Excel worksheet!

2.2.3 Exporting data

Direct export of query data can be done, selecting the preferred query in the query view by right mouse clicking it. In the dialog box select the type of export file and a name for the file. The query will execute in the usual manner and data will be exported to the specified file.

2.2.4 Overview of the Scenario Queries

The following is an extract of the Scenarios table and shows the scenarios that have been included in the example database. Note that each scenario can be identified by a scenario number. The table also shows the data source number and the year of the datasource (editiejaar). ScenarioJaar shows the year for which the scenario is intended.

For the queries it will be handy to print a hardcopy of the table.

Scenarios					
Scenario Nummer	Scenario Jaar	Editie Jaar	Pollutant	Data bron_ID	Scenario
1	2009	2010	NOX	1	Top-Down Rijnmond NOx 2010
2	2010	2010	NOX	1	Top-Down Rijnmond NOx 2010 Year Forecast 2010
3	2015	2010	NOX	1	Top-Down Rijnmond NOx 2010 Year Forecast 2015
4	2020	2010	NOX	1	Top-Down Rijnmond NOx 2010 Year Forecast 2020
5	2009	2010	PM10	1	Top-Down Rijnmond PM10 2010
6	2010	2010	PM10	1	Top-Down Rijnmond PM10 2010 Year Forecast 2010
7	2015	2010	PM10	1	Top-Down Rijnmond PM10 2010 Year Forecast 2015
8	2020	2010	PM10	1	Top-Down Rijnmond PM10 2010 Year Forecast 2020
9	2008	2009	NOX	1	Top-Down Rijnmond NOx 2009
10	2008	2009	PM10	1	Top-Down Rijnmond PM10 2009
11	2010	2009	NOX	1	Top-Down Rijnmond NOx 2009 Year Forecast 2010
12	2015	2009	NOX	1	Top-Down Rijnmond NOx 2009 Year Forecast 2015
13	2020	2009	NOX	1	Top-Down Rijnmond NOx 2009 Year Forecast 2020
14	2010	2009	PM10	1	Top-Down Rijnmond PM10 2009 Year Forecast 2010
15	2015	2009	PM10	1	Top-Down Rijnmond PM10 2009 Year Forecast 2015
16	2020	2009	PM10	1	Top-Down Rijnmond PM10 2009 Year Forecast 2020
17	2009	2010	NOX	2	Rijnmond Traffic 2009 NOX
18	2009	2010	PM10	2	Rijnmond Traffic 2009 PM10
19	2009	2010	CO2	2	Rijnmond Traffic 2009 CO2
20	2009	2010	NO2	2	Rijnmond Traffic 2009 NO2
21	2011	2010	NOX	2	Rijnmond Traffic Year Forecast 2011
22	2011	2010	PM10	2	Rijnmond Traffic Year Forecast 2011
23	2011	2010	CO2	2	Rijnmond Traffic Year Forecast 2011
24	2011	2010	NO2	2	Rijnmond Traffic Year Forecast 2011
25	2015	2010	NOX	2	Rijnmond Traffic Year Forecast 2015
26	2015	2010	PM10	2	Rijnmond Traffic Year Forecast 2015
27	2015	2010	CO2	2	Rijnmond Traffic Year Forecast 2015
28	2015	2010	NO2	2	Rijnmond Traffic Year Forecast 2015
29	2019	2010	NOX	2	Rijnmond Traffic Year Forecast 2019
30	2019	2010	PM10	2	Rijnmond Traffic Year Forecast 2019
31	2019	2010	CO2	2	Rijnmond Traffic Year Forecast 2019
32	2019	2010	NO2	2	Rijnmond Traffic Year Forecast 2019
33	2008	2010	NOX	3	Sailing Marine Traffic 2008 NOX
34	2008	2010	PM10	3	Sailing Marine Traffic 2008 PM10
35	2008	2010	NOX	4	Marine Traffic at Berth 2008 NOX
36	2008	2010	PM10	4	Marine Traffic at Berth 2008 PM10
37	2008	2010	CO2	4	Marine Traffic at Berth 2008 CO2
38	2008	2010	CO2	3	Sailing Marine Traffic 2008 CO2

Table 1 – Overview of scenarios in the example database (extract from Scenarios table)

2.2.5 Query overview

The following basic result queries are included in the database:

- Emissions per Scenario
- Emissions per Scenario - Totals
- Emissions per Scenario - Totals for selected source categories
- Emissions per Scenario - Totals per source category
- Emissions per Scenario per Selected Source Category
- Emissions per Scenario - Municipalities
- Emissions per Scenario - Municipalities per Source category

<u>Emissions per Scenario</u>

Gives a complete view of all sources that contribute to the emission of a certain scenario.

Emissions per Scenario

Scenario	Scenario	LOCID	X	Y	Cat	GCNID	Srce_Detai	Emission(units/yr)	Pollutant_I	DataBrc	EditieJaar	JaarScenaric
1	Top-Down Rijnmond NOx	81500_437500_1000	81500	437500	8100	8100_081500_437500_1000	020205	0,17746467676491	NOX	1	2010	2009
1	Top-Down Rijnmond NOx	81500_437500_1000	81500	437500	8200	8200_081500_437500_1000	0202	0,00174941715730476	NOX	1	2010	2009
1	Top-Down Rijnmond NOx	81500_439500_1000	81500	439500	3112	3112_081500_439500_1000	070103p	0,000297534791817084	NOX	1	2010	2009
1	Top-Down Rijnmond NOx	81500_439500_1000	81500	439500	3113	3113_081500_439500_1000	070103u	0,00620391518554316	NOX	1	2010	2009
1	Top-Down Rijnmond NOx	81500_439500_1000	81500	439500	3122	3122_081500_439500_1000	070203p	7,00345146364454E-05	NOX	1	2010	2009
1	Top-Down Rijnmond NOx	81500_439500_1000	81500	439500	3123	3123_081500_439500_1000	070203u	0,00266595708719087	NOX	1	2010	2009

Figure 12 – Result table of the Emissions per Scenario query for Scenario #1 (in tons/year)

Note that emissions are given in the units specified when executing the query.

<u>Emissions per Scenario – Totals</u>

Gives the total emission of a scenario in given reporting units

Emissions per Scenario - Totals

Scenario	Pollutant_ID	SomVanEmission(units/yr)
Top-Down Rijnmond NOx 2010	NOX	6069,00813687877

Figure 13 – Result table of Emissions per Scenario – Totals query for scenario #17

Emissions per Scenario - Totals per source category

Gives the total emissions for a certain scenario grouped by source category.

Emissions per Scenario - Totals per source category

Scenario	Pollutant_ID	Cat	Detail_ID	Category_ID	SomVanEmission(units/yr)
Rijnmond Traffic 2009 NOX	NOX	3111	070101	1.A.3.b.1	170,797649587126
Rijnmond Traffic 2009 NOX	NOX	3112	070103p	1.A.3.b.1	9,8595580618481
Rijnmond Traffic 2009 NOX	NOX	3113	070103u	1.A.3.b.1	193,087664178936
Rijnmond Traffic 2009 NOX	NOX	3121	070201	1.A.3.b.2	168,887319174825
Rijnmond Traffic 2009 NOX	NOX	3122	070203p	1.A.3.b.2	9,6870116337766
Rijnmond Traffic 2009 NOX	NOX	3123	070203u	1.A.3.b.2	89,491816444766
Rijnmond Traffic 2009 NOX	NOX	3131	070301	1.A.3.b.3	188,363946291114
Rijnmond Traffic 2009 NOX	NOX	3132	070303p	1.A.3.b.3	11,4921645169496
Rijnmond Traffic 2009 NOX	NOX	3133	070303u	1.A.3.b.3	85,7695076816764
Rijnmond Traffic 2009 NOX	NOX	3142	070203pb	1.A.3.b.2	0,611257877295604
Rijnmond Traffic 2009 NOX	NOX	3143	070203ub	1.A.3.b.2	24,4564249860813

Figure 14 – Results table of Scenario 9, grouped by source categories

The presented source categories (Cat) in the table are related to SNAP (Detail_ID) and NFR (Category_ID). The relation between Cat, SNAP and NFR is specified in the table Cats. Note that SNAP codes are specified in the table Sourcedetails and the NFR codes in the table Sourcecategories.

Emissions per Scenario per Selected Source Category

Scenarios can be done for a given selection of source categories.
For this purpose, open the Source Category Selection table and select those source categories that should be included in the scenario.

Tbl_CatSelection

FlagSelectec	LED Co	Source Detail	Source Categ	Description LED	Descri
☐	1000	04	2	Industrie:	Production processes
☑	1100	0406	2.D.2	industrie: voedings- en genotmiddelen	Processes in wood, paper
☑	1200	0103	1.A.1.b	industrie: olie raffinaderijen	Petroleum refining plants
☑	1300	04	2.B	industrie: chemische industrie	Production processes
☑	1400	04	2.A	industrie: bouwmaterialen e.d.	Production processes
☑	1500	04	2.C	industrie: basismetaalindustrie	Production processes
☑	1700	04	2.C.5	industrie: metaalbewerkingsindustrie	Production processes
☑	1800	04	2.D	industrie: overig	Production processes
☑	2000	04	1	Energie:	Production processes
☑	2100	0101	1.A.1.a	energie: electriciteitscentrales	Public power
☐	2200	05	1.A.1.c	energie: winning en distributie energiedragers	Extraction and distribution
☐	2210	050201	1.A.1.c	energie: winning en distributie energiedragers - o	Land-based activities
☐	2300	0101	1.A.1	energie: aardolieindustrie excl raffinage	Public power

Figure 15 – Selection of some source categories with the use of the FlagSelected field

After completing the desired selection, execute the Emissions per Scenario - Totals per Selected Source Categories query by selecting and pressing [Enter].

Emissions per Scenario per Selected Source Categories

Scenari	Scenario	LOCID	X	Y	Cat	GCNID	Srce_Deta	Emission(units/yr)	Pollutant_ID	Data
1	Top-Down Rijnmond NOx 2010	80002_432085_	80002	432085	1300	1300_080002_4	04	0,0134087990166832	NOX	
1	Top-Down Rijnmond NOx 2010	80002_432113_	80002	432113	1300	1300_080002_4	04	0,010459418839347	NOX	
1	Top-Down Rijnmond NOx 2010	80002_432141_	80002	432141	1300	1300_080002_4	04	0,00734171024789431	NOX	
1	Top-Down Rijnmond NOx 2010	80002_432169_	80002	432169	1300	1300_080002_4	04	0,00682106991511213	NOX	
1	Top-Down Rijnmond NOx 2010	80002_432197_	80002	432197	1300	1300_080002_4	04	0,012159365251334	NOX	

Figure 16 – Results table of selected source categories for scenario #2 in tons per year

All corresponding records will be found in the results table.

Emissions per Scenario - Totals for selected source categories

Analogous to the Emissions per Scenario – Totals query. Results will be given grouped by source category.

Emissions per Scenario - Totals for selected Source categories

Scenario	Pollutant_ID	SomVanEmi
Top-Down Rijnmond NOx 2010	NOX	3214,7875316

Figure 17 – Results table of totals for selected source categories for scenario #12 (tons/year)

Emissions per Scenario grouped by Location

Emissions take place at different location levels, as is for instance the case for point sources and 1x1 km^2 sources. Since emission locations are provided with a parent location, emissions can be totalized over higher level locations, such as municipalities. Execute the query Emissions per Scenario – Municipalities. It groups emissions on a municipality level.

Emissions per Scenario - Municipalities

Scenario	Pollutant_ID	Location_Parent_1	SomVanEmis
Top-Down Rijnmond NOx 2010	NOX		12,74869538432
Top-Down Rijnmond NOx 2010	NOX	Buiten_Rijnmond	0,314060885969
Top-Down Rijnmond NOx 2010	NOX	Centraal	3791,488913673
Top-Down Rijnmond NOx 2010	NOX	Charlois	153,2729061030
Top-Down Rijnmond NOx 2010	NOX	Delfshaven	116,3809977021
Top-Down Rijnmond NOx 2010	NOX	Feijenoord	111,0192553214
Top-Down Rijnmond NOx 2010	NOX	Heijplaat-Pernis	164,697596319
Top-Down Rijnmond NOx 2010	NOX	Hillegersberg-Schiebroek	77,06302127552
Top-Down Rijnmond NOx 2010	NOX	Hoogvliet	56,11701868442
Top-Down Rijnmond NOx 2010	NOX	IJsselmonde	6,738491225058
Top-Down Rijnmond NOx 2010	NOX	Kralingen-Crooswijk	65,55185569189
Top-Down Rijnmond NOx 2010	NOX	Noord	102,6717890971
Top-Down Rijnmond NOx 2010	NOX	Overschie	106,895201011
Top-Down Rijnmond NOx 2010	NOX	Rotterdam	421,447753207
Top-Down Rijnmond NOx 2010	NOX	Schiedam	490,5042358531
Top-Down Rijnmond NOx 2010	NOX	Vlaardingen	392,0963454454

Record: 1 of 16 No Filter Search

Figure 18 – Result table of emissions grouped by municipality

Emissions grouped by Location and activity type

In the same manner emissions can be grouped by source category.
Preselect the desired source categories by editing the Source Category Selection table;
Execute the query Emissions per Scenario – Municipalities per Source category.

Emissions per Scenario - Municipalities per Source category

Scenario	Pollutant_ID	Location_Parent	Cat	Detail_ID	Category_ID	SomVanEmission(uni
Top-Down Rijnmond NOx 2010	NOX	Centraal	1100	0406	2.D.2	0,410900867928957
Top-Down Rijnmond NOx 2010	NOX	Centraal	1200	0103	1.A.1.b	2392,81435319805
Top-Down Rijnmond NOx 2010	NOX	Centraal	1300	04	2.B	85,6873310192339
Top-Down Rijnmond NOx 2010	NOX	Centraal	1700	04	2.C.5	55,7753622140361
Top-Down Rijnmond NOx 2010	NOX	Centraal	2100	0101	1.A.1.a	418,91894988188
Top-Down Rijnmond NOx 2010	NOX	Feijenoord	1500	04	2.C	8,73067264432537
Top-Down Rijnmond NOx 2010	NOX	Rotterdam	1100	0406	2.D.2	3,39586446426378
Top-Down Rijnmond NOx 2010	NOX	Rotterdam	1300	04	2.B	0,261940390333134
Top-Down Rijnmond NOx 2010	NOX	Rotterdam	1400	04	2.A	0,604573359626963
Top-Down Rijnmond NOx 2010	NOX	Rotterdam	1500	04	2.C	0,00334426901030002
Top-Down Rijnmond NOx 2010	NOX	Rotterdam	1700	04	2.C.5	1,51897728627182
Top-Down Rijnmond NOx 2010	NOX	Rotterdam	1800	04	2.D	1,75601805246592
Top-Down Rijnmond NOx 2010	NOX	Rotterdam	2100	0101	1.A.1.a	114,12072841714
Top-Down Rijnmond NOx 2010	NOX	Schiedam	1100	0406	2.D.2	14,1906333848682

Figure 19 – Results table of source category selected emissions by municipality

Note: Some 1x1 km^2 emission sources may be located in different municipalities. In this version of IMACE all emission sources have been restricted to one parent location. Though the overall emission will be correctly given, this boundary problem may give rise to the erroneous allocation of some emissions, since those emissions should not be allocated entirely to one municipality. The extent of the induced error depends on the size of the considered municipality; The boundary error in regions that cover a large amount of square kilometres will usually be small.

2.3 How to create input files for air quality modelling

Now that the database provides detailed spatial information as well as data on disperion parameters, air quality modelling can be done with the use of the data in the database. In this sample the output table has been fitted for modelling in the Operational Priority Substances Model (OPS). The OPS application and documentation (english) is available for free at the RIVM website at http://www.rivm.nl/ops/

OPS requires, among others, emission source data in a specified source file. For the creation of these source files the query OPS for Scenarios can be used. Select the query OPS for Scenarios and press [Enter]
A dialogue box will appear requesting the number of the scenario – fill in a number and press [Enter]

For selected emissions (by source category) first edit the table Emissions per Scenario per Selected Source Category and then execute the query. The results table contains the formatted data for use in OPS.

OPS for Scenarios

EditieJaar	X	Y	Qgs	HC	H	D	S	tb	ct	Area	psd	Pollutant_ID
2010	80002	432085	4,25E-04	0,000	1,0	28	0,5	1	1300	528	0	NOX
2010	80002	432113	3,32E-04	0,000	1,0	28	0,5	1	1300	528	0	NOX
2010	80002	432141	2,33E-04	0,000	1,0	28	0,5	1	1300	528	0	NOX
2010	80002	432169	2,16E-04	0,000	1,0	28	0,5	1	1300	528	0	NOX
2010	80002	432197	3,86E-04	0,000	1,0	28	0,5	1	1300	528	0	NOX
2010	80024	432333	1,86E+00	21,190	90,0	0	0,0	1	1200	528	0	NOX
2010	80030	432113	3,15E-04	0,000	1,0	28	0,5	1	1300	528	0	NOX
2010	80030	432141	2,49E-04	0,000	1,0	28	0,5	1	1300	528	0	NOX
2010	80030	432169	3,53E-04	0,000	1,0	28	0,5	1	1300	528	0	NOX
2010	80058	432141	6,85E-05	0,000	1,0	28	0,5	1	1300	528	0	NOX
2010	80260	432673	1,17E-01	0,000	100,0	0	0,0	1	1200	528	0	NOX
2010	80400	435200	3,22E-01	0,375	10,0	0	0,0	1	6100	528	0	NOX

Figure 20 Results table of the OPS for Scenarios query

3. Inputting new data

IMACE allows for new data to be appended into the tables. For this purpose a set of input tables are supplied. With the use of a set of append queries the data from the input tables can be inserted into the database tables.

The concept of the database is, that no existing data will be substituted by new data. In order to maintain the data structure of the database, all new data has to be input as a new data source. The data source number (Databron_ID) **MUST** therefore be distinct for each set of data from a new datasource!

The process of inserting a new dataset into the table is as follows:
1. Write new data in a Microsoft Excel file Citeair_Datainput.xls.
2. Import the data from the worksheet into the Citeair Database
3. Execute the input queries one by one.

1 Write new data in a Microsoft Excel file Citeair_Datainput.xls.

Citeair_Datainput.xls consists of 3 worksheets:
- Input_Scenarios_and_Scaling
- InputSources
- InputEFs

The demo provides example data, that can be imported into the database.

Input Scenarios and Scaling sheet

Scenario Number	Scenario Name	Data Source	Year Data s	Year Scena	Pollutant	Scaling Fac	Technology Code
200	Energy Sector with CO2/Nox derived emissions	6	2010	2009	CO2	1	Energy_Gas_LowNOx_NOxderived
200	Energy Sector with CO2/Nox derived emissions	6	2010	2009	CO2	1	Energy_Gas_x_NOxderived
200	Energy Sector with CO2/Nox derived emissions	6	2010	2009	CO2	1	Energy_Gas_LowNOxNew1_NOxderived
200	Energy Sector with CO2/Nox derived emissions	6	2010	2009	CO2	1	Energy_RefineryGas_x_NOxderived
200	Energy Sector with CO2/Nox derived emissions	6	2010	2009	CO2	1	Energy_Gas_LowNOxNew2_NOxderived

Figure 21 view of Citeair_Datainput.xls input sheet Input_Scenarios_and_Scaling

Scenario Number: A unique new number by which the scenario will be identified.

Data Source: A unique new number. Any new source data require a unique data source.

In principle an existing Data source number can be used (for instance in order to add records and complete data for an existing data source). Note that the corresponding scenario will then use all data with the specified data source number).

Be aware that the sheets in Citeair_Datainput.xls contain combined data. The Data source number used in the Input Scenarios and Scaling sheet must be identical to the Data source number used in the InputSources sheet. Also, the Technology_codes should be identical to the codes used in the InputSources and InputEFs sheets.

InputSources sheet

Datasource	Year Data source	Year Scenario	Source Name	x	y	d	h	Hc	s	tb	psd	Location_ Parent_1	Source Level	Source Category	Source Detail	Technology Code	Technology Name	Activity Unit	Activity Rate
5	2010	2010	Company1_1	68076	441736	125	0	4	4	0	0		6	1.A.3.e.2	0808	ContHand1	Containerhandling	GCNg	6.98E-01
5	2010	2010	Company1_2	68112	441567	200	0	4	4	0	0		6	1.A.3.e.2	0808	ContHand1	Containerhandling	GCNg	6.98E-01
5	2010	2010	Company1_3	68060	441868	120	0	4	4	0	0		6	1.A.3.e.2	0808	ContHand1	Containerhandling	GCNg	6.98E-01
5	2010	2010	Company1_4	68045	442011	100	0	4	4	0	0		6	1.A.3.e.2	0808	ContHand1	Containerhandling	GCNg	6.98E-01
5	2010	2010	Company2_1	66964	442276	75	0	4	4	0	0		6	1.A.3.e.2	0808	ContHand1	Containerhandling	GCNg	3.56E-01
5	2010	2010	Company2_2	66916	442152	75	0	4	4	0	0		6	1.A.3.e.2	0808	ContHand1	Containerhandling	GCNg	3.56E-01

The InputSources sheet contains relevant data for the sources. They include coordinates and dispersion parameter data (x, y, d, h, Hc, s, tb, psd). For the dispersion parameters we refer to the OPS manual.

Note, that the Source category and Source detail fields can be looked up in the table Cats and the Scenario Source Category Selection tables.

Location_parent is not required for point sources and small area sources (diameter <500m), as the input query intends to find an existing location_parent in the locations table.
Though not required, Location parents can be filled in, but note that erroneous data in this column may result in erroneous output of the Emissions per municipalities queries.
Source Level is not required, as the input query will provide the level.

Note: Larger area sources can be used. This demo supports area sources of up to 500x500m and 1x1km.
Note that in that case the coordinates should be given in either of 250m or 750m points (pe. 80250, 444750) and 500m points (pe. 95500, 422500) respectively.
These coordinates represent the centre of the given area source.

ActivityUnit is the unit in which the production rate is expressed. See the Units table for options.
(Note :GCNg stands for a virtual activity rate of g/s emission).

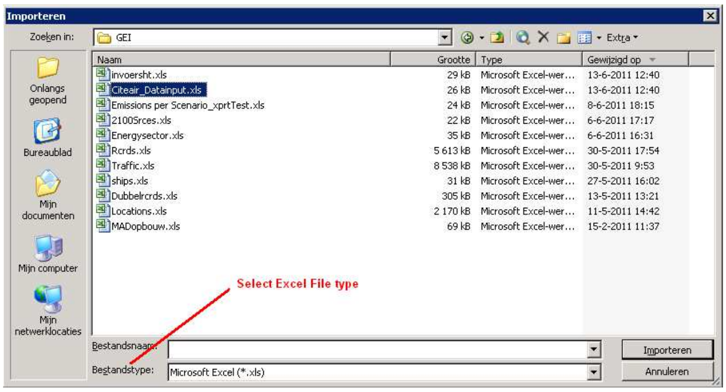
InputEFs sheet

Technology Code	Technology Name	Pollutant	Emission Factor	Emission Unit	Activity Unit	Conversion Factor
ContHand1	Containerhandling	SO2	0.15	Ton	GCNg	31.536
ContHand1	Containerhandling	Nox	1	Ton	GCNg	31.536
ContHand1	Containerhandling	PM10	0.19	Ton	GCNg	31.536
ContHand1	Containerhandling	CO2	10	Ton	GCNg	31.536

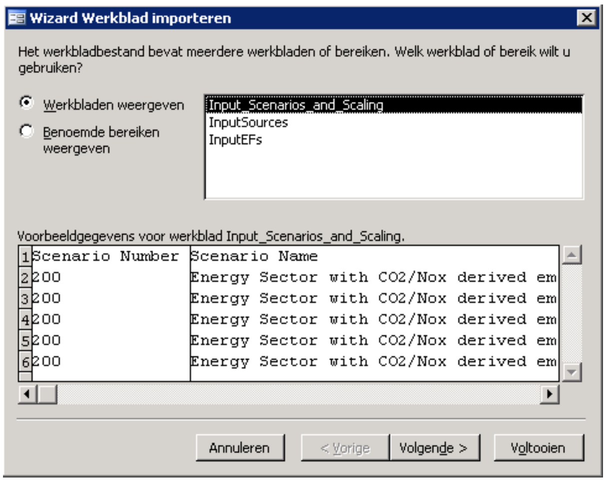
In this table emission factors are assigned to technologies for distinct pollutants. The pollutant description should be identical to the description (pollutant abbreviation) in the pollutants table.
The same applies to emission unit and activity unit, those being identical to available units in the Units table.

Note: The column conversion factor is not used in the present demo. Its function is related to the table Unitconversion.

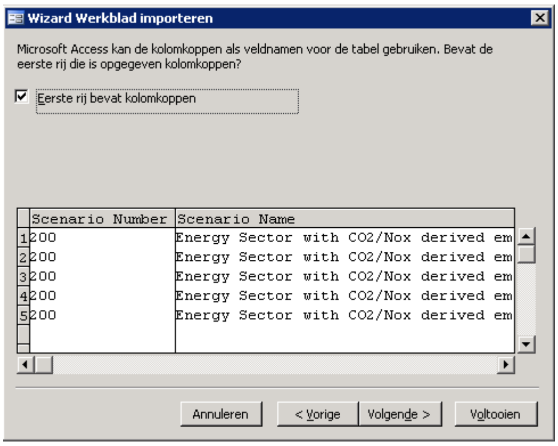
2 Import the data from the worksheet into the Citeair Database
Right click the database. A pop-up menu appears. Select **import**:
Access will ask where the data should be imported from. Choose the directory and select the worksheet. For excel sheets to be visible select the correct Type of File



The data import wizard will guide you through the importing process. Select the desired sheet of the excel inputfile. And click [**Next]**



In the next step Access asks if column headings are present. Select the check box and then [Finish]



A message may pop up asking if the existing table should be overwritten. Press [OK]

Finally, Access will report that the data has been imported in the corresponding table.

Repeat this process for all sheets in the Excel worksheet. The data will now be present in the Input tables and can be processed by the append queries.

- Input_Scenarios_and_Scaling
- InputEFs
- InputSources

> Note:
> Previous data that has been inputted into the input tables will be deleted by the importing process. Data will have to be input into the database with the use of the input queries (see next section).
> Data that has not been input in the database tables with these input queries will be deleted!
> In order to keep track of the new data it is advised that a copy of the excel worksheet be saved.

3 Execute the input queries one by one.

The query view of the database shows a number of append queries, numbered qry0 to qry7 They can be easily identified by the green plus symbol.
In order to append the data into the core tables of the database, execute the queries one by one in the order 0 to 7.

Queries

- Qry0_Input_NewScenarios
- Qry1_Input_NewLocations
- Qry2_Input_NewSources
- Qry3_Input_NewTechs
- Qry4_Input_EFs
- Qry5_Input_ARs
- Qry6_Input_Disp
- Qry7_Input_NewScaling

Access will notify the user that an append query is about to be executed. Just Press [OK]
Then, Access will show the number of records to be appended. Press [OK]

> New data can be written into IMACE directly. This however requires knowledge of how the database is functioning. A clue can be found by opening the append queries in SQL design view.

4. Additional Notes

Categorizing emissions

The Cats table is a useful tool to filter and depict emissions of specific activities. The table is built up using categories (Cat), that correspond to the dutch emission registration system. In specific queries that differentiate between Source categories, the field "Cat" is used.
When a user puts emission sources into the database (using an excel sheet and the table InputSources), he will supply data for the fields Source category and Source detail. Those data relate to the NFR and SNAP codes for a specific activity.

Source Category	Source Detail
1.A.4.b.2	020205

Fields in InputSources table

It is essential, that this combination of SNAP and CFR be present in the table Cats and is assigned to one unique Cat number.

Cats				
ID	Cat	Category_ID	Detail_ID	Omschrijving
4	8099	1.A.4.b.2	020205	Description of category

Assigned Cat to SNAP-CFR combination

The cats table contains a series of codes. One can change these codes and expand the table with new records at liberty.
Related to this table is the table Scenario Source Category Selection. As mentioned in the scenarios section, you can make a selection of source categories in this table. Be sure to also update this table When editing the Cats table.

Conversion factors

When executing scenarios, the conversion of emission and activity units is needed. For instance, for reporting purposes conversion factors are needed for converting kg to Tons. Those factors are present in the table UnitConversion. Also, conversion factors are needed to allow for calculating activity units to emission units. For instance, if an activity is given in tons of steel produced and the related emission factor is given in kg emission per ton produced, than , a conversion is needed to convert this factor. As an example, the database gives emission factors of traffic in g/km driven. The activity rate is given as Vehicle kilometre and can be found in the Units table (Unit_id = 44). Also the emission unit g (unit_id=3) is given. Now, in the table UnitConversion a conversion factor of 1 is given for the conversion of vehicle km to g (Unit_in=44, Unit_out=3, factor=1). Since conversion factors are also present for converting form g to kg, Ton en kton (Gg), the results from traffic scenarios can be given in either of these units.

Resuming, if one applies a specific activity unit, fill in this unit in the Units table and a conversion factor in the UnitConversion table.

Including Regions

The IMACE database shows, that one can order emissions by region. The IMACE database orders emissions by municipality. The Maribor database includes records in the Locations table, that allow for ordering emission sources in 1x1 km^2 grid cells and subsequently 5x5 km^2 grid cells. Locations have coordinates and an extension D (for diameter) that shows the extent of the grid cell. Also the location level varies from 6 (point sources) down to 1. Each location is an ever greater area.

Note that emission sources need to be assigned a Location_Parent (see the table Locations and the Excel sheet). When one assigns a Location_Parent, the name of this location should be present as LOC_ID in the Locations Table.

For example, The 1x1km^2 grid cell with coordinates (548000,163000) is assigned a Location Parent, that corresponds to a grid cell with identifier LOC_ID 545000_160000_5000. This corresponds to a 5x5km^2 grid cell with that name.

LOC_ID	X	Y	D	Location_Parent_1	Loc_Level	Comment
548000_163000_1000	548000	163000	1000	545000_160000_5000	4	Maribor_1000

Partial record of 1x1 grid cell in Maribor_IMACE database

LOC_ID	X	Y	D	Location_Parent_1	Loc_Level	Comment
545000_160000_5000	545000	160000	5000	Maribor	3	Maribor_5000

Partial record of corresponding 5x5 grid cell in Maribor_IMACE database

Note that the Location level (Loc_level) is 1 higher in the case of the 1x1 grid cell. Note also that the location parent of the 5x5 grid cell is named “Maribor”, which is also included in the Locations table.