

#### HOW TO REGISTER ENVI-MET BUSINESS

#### Introduction

Simulation the dispersion of passive and active pollutants is one of the most complex tasks when using ENVI-met. The calculation of the transport and deposition of pollutants requires everything a full microclimate simulation needs to be run successfully plus additional information concerning the pollutant emissions.

This Knowledgebase should help you to find your way in this process.

#### **STEP 1: CREATE AN EMISSION SOURCE**

To include pollutant dispersion into your simulation there are several steps which have to be followed. First of all, the Source has to be created and defined in the *DatabaseManager*.

- Open the DatabaseManager and create a new user-defined pollutant source ①. Remember, in your project you might use the global User Database or you can decide to use an individual project database (see the base tutorials on our website).
- 2. Give the Source a unique ID (2)
- 3. Set the Source Geometry ③.

ENVI-met distinguishes between point, line or area sources. Which type you select depends on the nature of your objects. For example, chimneys are typical point sources while street lanes are line sources. Area sources are more seldom but can be imagined e.g. as type of landcover that emits pollutants.

4. Define emission the rates for the selected species (④, ⑤):
Important: If you decide to use the Single Pollutant Mode in your simulation, you need to insert the hourly emission data in the Species: User database.
Even if your species is one of the defined species in the rows below ⑤, e.g. PM10 you still need to enter your data in the Species: User row.
The physical or chemical properties of the User pollutant will be set in the .SIM configuration file.

The rows for NO, NO2, Ozone, PM10 and PM2.5 (5) are only used in Multi Pollutant Mode.

If you want to use Multi Pollutant Mode you can enter the hourly emission data for the predefined 5 pollutants in the assigned rows (5).
 You still can use a 6<sup>th</sup> User-Defined pollutant in the simulation.

Note, that Multi Pollutant Mode is only available in the full versions of ENVI-met.

Sources		×
System Sources	Database-ID: [01] Name: <u>Emission</u> Color:	
	Parameter	Value
	Description	Emission
	Default Height	0.50000
	Source Geometry	Line 📕 3
<b>A</b>	Special ID	0
	Emissionprofile (Species: User)	) 10,40.00000,20.00000,10.00000,10.00000
	Emissionprofile (Species: NO)	0.00000,0.00000,0.00000,0.00000,0.0000
	Emissionprofile (Species: NO2)	) 0.00000,0.00000,0.00000,0.00000,0.0000
5 4	Emissionprofile (Species: Ozon	n 0.00000,0.00000,0.00000,0.00000,0.0000
-	Emissionprofile (Species: PM10	0.00000,0.00000,0.00000,0.00000,0.0000
	Emissionprofile (Species: PM2.	. 0.00000,0.00000,0.00000,0.00000,0.0000
Edit Emissionprofile (Species:	User)	
Time	Emission (Species: Us	Emission rates user defined species for 24 hours of the day. Units are
8:00h	10.00000	μg/s (Point source), μg/(s*m) (Line
9:00h	20.00000	Source) or µg/(m <sup>2*</sup> s) (Area Source).
10:00h	30.00000	
11:00h	40.00000	
12:00h	50.00000	
13:00h	60.00000	
		OK Cancel
Edit data on the right		
Data loaded from file: D:\enviprojects\SourcesTutorial\projectdatabase.edb		

Save your edits in the used database (User Database or Project Database).



# STEP2: LOCATING YOUR SOURCE IN SPACES

After adding one or more pollutant sources to your system, they are available for selection in SPACES ①.

Make sure that you have selected the right project in SPACES in order to have the right sources available. If you have changed or added new sources, just re-select the project in SPACES to reload your recent data.

The pollutants are located under the topic Sources and the chosen database ①. Now you can select your source and digitize it at those grid cells, where the pollutants shall be emitted ②.

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# STEP 3: CREATE THE CONFIGURATION FILE (.SIM)

When creating the SIM-File with the *ProjectWizard*, follow the usual steps for each simulation (refer to our homepage for various video tutorials on this).

Then, go to the Pollutant Dispersion section to adjust the pollutant settings.

SourceTutorial.SIM - ENVIwizard							×
Welcome Area Input file Names and folders	Pollutant dispersion Specification of pollutant dispersion	and reaction	n				
Time and Date, Output Meteorology: Basic settings	General settings		2		1	No pollutants used	8
Meteorology: Simple forcing Meteorology: Further settings	Operation mode:	Sing	gle pollutant	Multi pollutants	In Single	collutant mode, only defined pollutant is used.	
Model timing Soils and Plants	NO-O3-NO2 chemistry:	No	o chemistry	Use active chemistry	Using act Multi pollu	ve chemistry requires tants mode.	
Pollutant dispersion     Experts Settings     Einish and save	Update interval for emission rate	s: (s): 600.	.00		Chemistry ENVI-met	is not supported in Basic	
	User-defined pollutant						۲
	Name of pollutant source:		SourceTest	identify the pollutant		3	
	Chemical species or type of pol	llutant:	NO2 (Nitrogen	doxide)		• 4	
Edit as text www.envi-met.com					< <u>B</u> ack	Next > Ca	ancel

1. Uncheck the button "No pollutants used" ① to make the settings visible.

- Choose the operation mode for the simulation: Single Pollutant or Multi Pollutants Also, define if you want to use Active Chemistry or not.
   Obviously, active chemistry will only be available if you have *Multiple Pollutants* selected. Ilf Chemistry is activated, the released pollutants can react with each other and create new products. At the moment, this is limited to the NO-NO2-Ozone reaction cycle.
- Define the User-defined pollutant.
   If you use Single Pollutant Mode the only pollutant present in your simulation will be the User-Defined pollutant. It is therefore essential that you specify its properties here (3 and 4) and provide hourly emission data in the Database Manger.
- 4. If you use Multi Pollutant Mode, you can specify an additional 6<sup>th</sup> pollutant adding to the 5 fixed pollutants in ENVI-met. Do not specify a pollutant that is already included in the 5 pre-defined pollutants (NO, NO2, PM10, PM2.5 and Ozone) because ENVI-met will treat this pollutant independently of the others and will not understand that e.g. PM10 is defined in the fixed pollutants AND in the user defined pollutants.
- 5. Give your user defined pollutant a name 3
- Define the chemical species or type of pollutant to be emitted as User Source ④.
   If particulate matter is selected as type of pollutant, you also need to give the particle diameter and density.

Save the .SIM file as usual.

## RUNNING THE SIMULATION

The simulation will be executed as usual.

## VISUALIZE THE RESULTS

The pollutant specific data are all stored in the **Pollutants** folder of your simulation output folder.

In *Leonardo*, use the DataNavigator to select a file from the pollutant output folder ①.

Then, select the information you want to visualize ②. Depending whether you have run a Single Pollutant mode simulation or a Multiple Pollutants mode simulation, you have different data for one or 6 different species in your file.

File Set A File Set B	2D Map	3D Map	Options
File map Set	A Tutorial_Multi_ 04:00 0	output\pollutan	ts\ 1
12:00 14:00	16:00 1	8:00 20:00	22:00
SourceTutorialMu	ulti_POLU_12.(	00.01 23.06.20	17.EDX
Double-Click: (no     Data File A	action)		
SourceTutorialM 20 x 20 x 19 grid File type: Polluta	ulti_POLU_12 s nt Data	.00.01 23.06.20	017.EDT

File Set	A 2D Map 3D Map Options							
👻 Assign M	ap Layers and Elements							
Source:	File Set A File Set B							
Data:	<unchanged></unchanged>							
Contour:	Pot. Temperature (K)							
Symbol:	Relative Humidiy (9/9) Vertical Exchange Coef. Impuls (m <sup>2</sup> /s							
2-	SourceTest Concentration (µg/m3)							
Vector:	SourceTest Source (µg/s) SourceTest Deposition velocity (mm SourceTest Total Deposed Mass (µg SourceTest Reaction Term () NO Concentration (µg/m3)							
Special:	NO Source (µg/s)							
Arrows:	NO Total Deposed Mass (µg/m2) NO Reaction Term () NO2 Concentration (µg/m3) NO2 Source (µg/s) NO2 Deposition velocity (mm/s) NO2 Total Deposed Mass (µg/m2)							
▼ Define T	NO2 Reaction Term ()							
Type of 2D vi	ew: X-Y X-Z Y-Z							
Handle topog	raphy: (No topography in file)							
Position of vie	ew plane: k= 0							



## Then follow the usual steps for preparing a LEONARDO 2D or 3D map