

From SHERPA to RIAT+ Quick Start Guide

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List of Contents

0	INTRODUCTION	2
1	SHERPA TOOL	3
2	RIAT+ TOOL	/







0 INTRODUCTION

The SHERPA (Screening for High Emission Reduction Potential on Air) and RIAT+ (Regional Integrated Assessment Tool Plus) tools can be used by regional/local authorities to support the analytical activities necessary to construct an air quality plan. In particular, SHERPA is a screening tool that allows rapid exploration of potential improvements in air quality resulting from the reduction measures of national/regional/local emissions and RIAT+ is able to identify what are the good measures to improve the air quality of a given region.

One of the fundamental enhancement of 2016 version of RIAT+ tool is the possibility for a new user/Region to use a "first-guess data" (emissions, Source-Receptor models, abatement measures database) to run RIAT+ on any region in EU. The "first-guess data" is provided by the software SHERPA that succeed in solving one of the major issue for the new RIAT+ user: to collect all input data.

This user guide explains how to create and set a new "first-guess data" region from SHERPA to RIAT+.







1 SHERPA TOOL

In SHERPA main screen click on "First guess RIAT+" module (Figure 1).

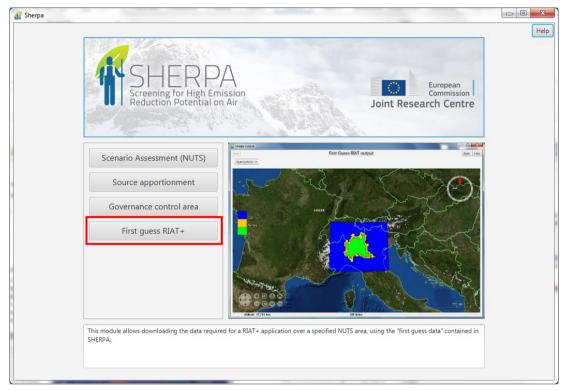


Figure 1 - "First guess RIAT+" SHERPA module.

In the next screen user must select a control area region through the map or through the NUTS list on the left. The area selected will be the Policy Application Domain (PAD) in RIAT+ tool.

On the lower part of the screen the user must enter the number of cells in each direction to enlarge the domain area and to create the grid domain for the RIAT+ elaboration (the outside domain in RIAT+).

Finally, in the last part of the screen the path of RIAT+ data directory and the name of the region must be entered.







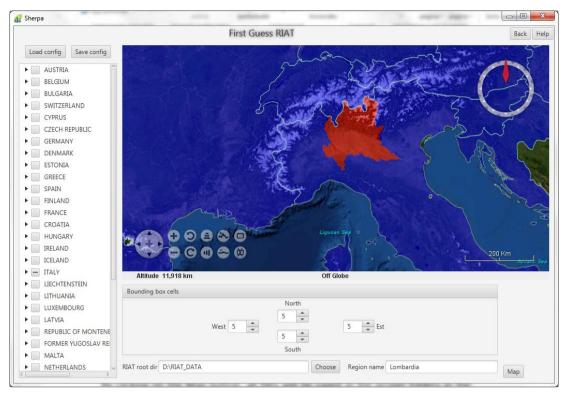


Figure 2 – Selecting the RIAT+ region

By clicking on the Map button, all files will be saved in the proper folders in the RIAT+ input data structure indicated by the user in lower text box.

The system will automatically create all the required input files for the RIAT+ tool:

- Domain file;
- Mapping file;
- Emission inventory files;
- GAINS measures database¹;
- Source-Receptor functions;
- Configurations files for RIAT+ screen.

Since the measures in the GAINS database are specific for each country, in case the area selected by the user include more than one country a windows appears and a measure DB should be selected.

At the end of the elaboration, a log file will be saved in output folder. In this file all data required in RIAT+ tool will be summarized. The output window shows this file (Figure 3).

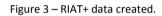
¹ Please note that emissions are in activity detailed from INERIS and the reference year is 2010. While the measure databases is from IIASA (http://gains.iiasa.ac.at/models/) and related to 2010 and 2020 years. The downloaded scenario is: PRIMES 2013 REF-CLE (ID: TSAP_Sept2013_P13_REFv3)







st Guess or		
***	*************************	
	SHERPA - Screening for High Emission Reduction Potential on Air RIAT+ FIRST GUESS	
***	***********************	
	POLICY APPLICATION DOMAIN (PAD)	
ITC	S3 selected: 12 41 - ITC42 - ITC43 - ITC44 - ITC46 - ITC47 - ITC48 - ITC49 - ITC4A - ITC4B - 4C - ITC4D -	
***	************************	
	DOMAIN	
SW (Numi Numi Cel:	Grid informations corner X: 7.75000 corner Y: 44.31250 ber X cells: 35 ber Y cells: 43 l size X: 0.12500 l size Y: 0.06250	
	Domain maps ain maps file: D:\RIAT_DATA\data_lombardia2\input\dom_domain\Domain.txt	
	ulation file: NO FILE ernal Cost file: NO FILE	
***	****	
	EMISSION INVENTORY	
Pol: NOX VOC NH3	2	
TIM1		
		OK



The output map shows the RIAT+ domain created (Figure 4).







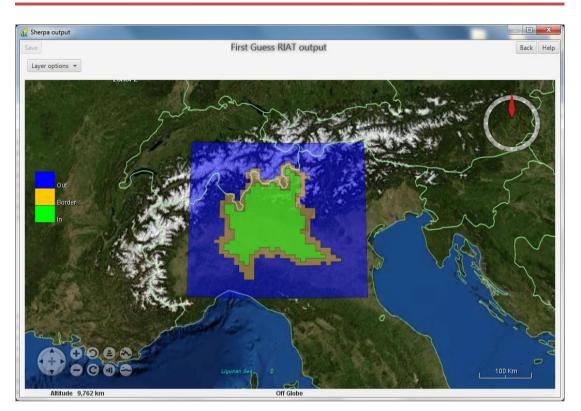


Figure 4 – RIAT+ domain







2 RIAT+ TOOL

Opening RIAT+ software, the tool will be automatically set on the new Region created by SHERPA.

The user must create a new project by clicking on the "New" button (Figure 5)

RIAT+	- I X
ile Tools Help	
Regional Integrated Assessment Tool PLUS	n Community
Project Info	
Create new project / Load saved project	
Name Delete New	Save
Description	
Project input	
Domain	
Emission Inventory	
Measures DB	
S/R Functions	
Project Status	
Input validation Preprocessing Run Settings Logs and results	
	Help

Figure 5 – Creating a new project.

Enter the name of the project and click on "OK" (Figure 6).







RIAT+	
ile Tools Help	
Regional Integrated Assessment Tool PLUS	
Project Info	
Create new project / Load saved project	
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Description	
Project Input	
Domain	
Emission Inventory	
Measures DB	
S/R Functions	
Project Status	
Input validation Preprocessing Run Settings Logs and result	is
	Help

Figure 6 – New project created

Now in the "Project input" (Domain, Emission inventory, Measure DB, S/R functions) all the configuration files have already been configured by SHERPA tool, so the user must only open all the input screens and confirm by clicking on "OK" button (following figures).





2 Domain	
Domain Configuration	
Name sherpa_domain v	Delete New Save
Grid Information	
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SW corner X 7.7500000 °deg N° X cell	35
SW corner Y 44.3125000 °deg N° Y cell	43
Cell size X 1250000 °deg Cell size Y	0625000 °deg
Domain Maps	
🔁 Domain Domain.txt	
Add Subdomain Population	
Remove Subdomain	
External Cost	
	Неір ОК

Figure 7 - Domain screen







ission Inventory Configuration				
Name sherpa_emissions	•		Delete New	Save
Detailed Municipality	Emission Data			
Detailed Gridded	Areal Sources In	aida Dogion		A
Aggregated Scenario	Area Sources I	Iside Region		
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lutant	Year	En	nission_inside_PAD.txt	
Pollutant Id				
NOx 1				
VOC 2				
NH3 3				
PM10 4				
PM25 5				
SO2 6)	
0	Outside Region	Emission		
Delete				
	Pollutant	Annual	Filename	
	NOx	Year	Emission_outside	
ission Mapping	voc	Year	Emission_outside	
	NH3	Year	Emission_outside	-
firstguess_mapping.txt	PM10	Year	Emission_outside	
	PM25	Year	Emission_outside	
] Temporal Profile	SO2	Year	Emission_outside	
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		ected Emissions		
mporal Horizon	O Yes 🤅) No		V
temporal_horizon.txt				
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Reference Year 2010 💌	Annual	Filenam	le	
		1 +		
	Year	select		

Figure 8 - Emission inventory screen

R Measures DB	×
Measures DB Configuration	
Name sherpa_dbgains	Delete New Save
Measures DB ITAL_ExportDB.xlsx	
Add / Edit Measures Edit Activity	Help OK

Figure 9 - Measure DB screen







F model Temporal Profile Annual	
Seasonality	Filename
Year	select
	select
Year	SR_PM25_Annual.nc
Year	SR_PM10_Annual.nc
Year	SR_NO2_Annual.nc
Year	select
	Seasonality Year Year Year Year Year Year

Figure 10 - S/R function screen

Now all input data are properly loaded and the tool is ready to preprocessing the data. Save the project you have just created using the "Save" button on the right side and then click on "input validation" button (it verifies the input data coherence).







RIAT+		
le Tools Help		
Regio Integ Asses Tool F	onal rated ssment PLUS	Image: State Stat
Project Info		
Create new project / Load sav	red project	
Name test		Delete New Save
Description		
Project Input		
Domain	pa_domain	
	va_emissions va_dbgains	
S/R Functions sherp	a_SR	
Project Status		
Input validation Preproc	Run Settings Logs and r	esults
		Help

Figure 11 - Save the project and validate all input data

The user can check the progression of the process clicking on the "Logs and Results" button (click OK to return to the main GUI). This run takes about half minute and it is OK when the "Preprocessing" button will be enable and in the "Run results" you can see the message in Figure 12.





Run results	10000	rd 👘			
Run Results					- -
Name	Project	Execution In	fo		Show Selected
PreRun	test	Status: Phase: Progression:	Completed successfully Input validation (on year 20 Ended	30)	Delete Selected
Configuratio	on Info				
Elaborat Elaborat	name: test tion started at: 15:25 tion time (minutes): Type: InputValidatio	0.2			
					Help OK

Figure 12 - Validation data: completed successfully.

Now the tool is ready for the Preprocessing. Click on the button.







RIAT+	
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R	Regional Integrated Assessment Tool PLUS
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Name	e test Delete New Save
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_	ion Inventory sherpa_emissions
_	sures DB sherpa_dbgains
S/R F	Functions sherpa_SR
Project Statu	tus
Input vali	Alidation Preprocessing Run Settings Logs and results
	Help

Figure 13 – Preprocessing

Also in this case, the user can check Preprocessing progression clicking on the Logs and Results button (click OK to return to the main GUI). After this, the Run Setting button in the main GUI will enable (Figure 14).

Pre-processors involved in this part produce pre-computed quadrant emissions and emission input to the optimizer; these files contain virtual pollutant emissions and virtual activity level representing the starting point for the optimization.







AT+
Tools Help
Regional Integrated Assessment Tool PLUS
roject Info
Create new project / Load saved project
Name test Delete New Save
Description
roject Input
Domain sherpa_domain
Emission Inventory sherpa_emissions
Measures DB sherpa_dbgains
S/R Functions sherpa_SR
Input validation Preprocessing Run Settings Logs and results
Help

Figure 14 - Preprocessing completed successfully.

At the end of a successfully completed preprocessing the Run Settings button will be enabled and the user could finally perform the runs on the region.

