



Opera

Operational Procedure for Emission Reduction Assessment www.operatool.eu

An integrated assessment methodology to plan local cost-effective air quality policies harmonized with national and European actions.



In cooperation with:



Outlook

Background

Objectives

Expected deliverables

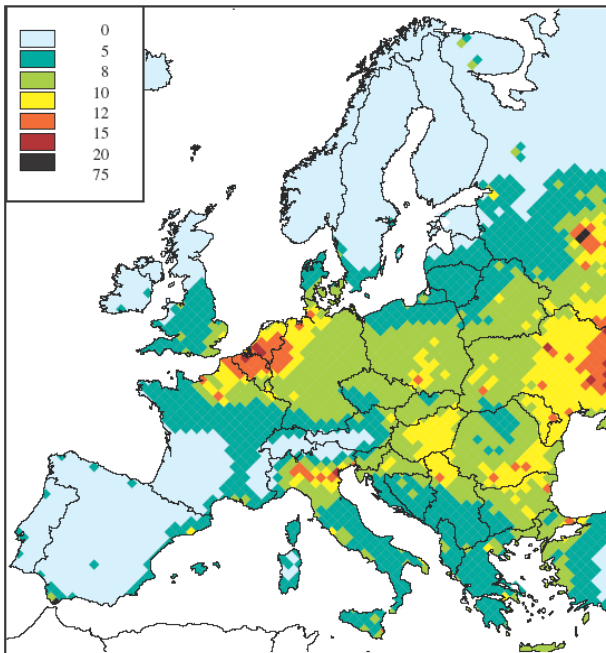
Actors

RIAT and RIAT+

Background

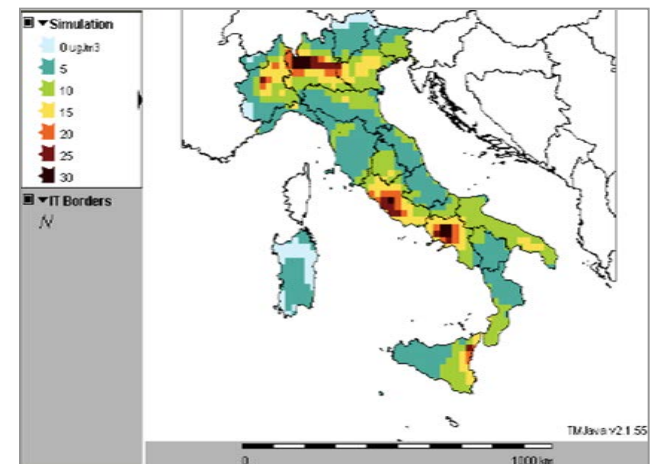
European scale

- Rains/Gains by IIASA



National scale

- Rains Italy by ENEA
- RAINS-Netherlands
- FRES-Finland
- UK-IAM



Objectives

- Set-up a methodology to assist local (sub-national) authorities in:
 - preparing, implementing and monitoring air quality plans to reduce population exposure to PM₁₀, NO_x and O₃ pollution and ecosystems exposure to NO_x and O₃.
 - integrating regional air quality plans with national and European plans
 - assessing the synergies between actions to reduce the burden of poor air quality and actions to limit climate change impacts
- Develop an integrated assessment tool (RIAT+) to support the proposed methodology
- Apply the tool on the Emilia-Romagna (Italy) and Alsace (France) regions
- Define guidelines for regional authorities to apply the methodology and tool
- Disseminate the guidelines and tool to local authorities, technical organizations and to the public at national and European levels

Expected results

- A methodology and tool (RIAT+) to support local authorities in designing and assessing efficient air quality plans.
- RIAT+ application to Emilia Romagna and Alsace and assessment of air quality plans in these two regions.
- A register including existing and new emission reduction measures (technical and non-technical) applied in the areas of the proposal. (Each action will be defined by its abatement efficiency and cost and will be linked to site specific implementation strategies).
- Guidelines for local administrations and environmental agencies (this is a national priority for Italy) to integrate local planning to national and European air quality policies.
- A full documentation, workshop and courses to support new users implementing the methodology to other European regions.

Actors

□ Consortium

- ▣ ARPA-ER (IT): coordinator, ER system application
- ▣ UNIBS, Università di Brescia (IT): integrated assessment
- ▣ TerrAria srl (IT): software system implementation
- ▣ CNRS (FR) and University of Strasbourg: Alsace system application

□ Stakeholders

- ▣ EC IES-JRC
- ▣ Regione Emilia Romagna (IT)
- ▣ ASPA (FR)

RIAT (2009-2010)



RIAT

Regional Integrated Assessment Tool

A DSS for air quality planning developed by



DII, Università di Brescia (I) and TerrAria srl (I)



*with consultancy of DEI - Politecnico di Milano (I) -
and Les White Associates Ltd (EN)*

RIAT+: the follow-up of RIAT

Methodology

System architecture

Source-receptor models

Output

Decision problem

$$\min_{\theta} J(\theta) = \min_{\theta} [\text{AQI}(\theta) \quad C(\theta)]$$

Internal Costs

Air Quality Index: PM₁₀, PM_{2.5}, NO₂, Ozone

$$\theta \in \Theta$$

Set of feasible decisions

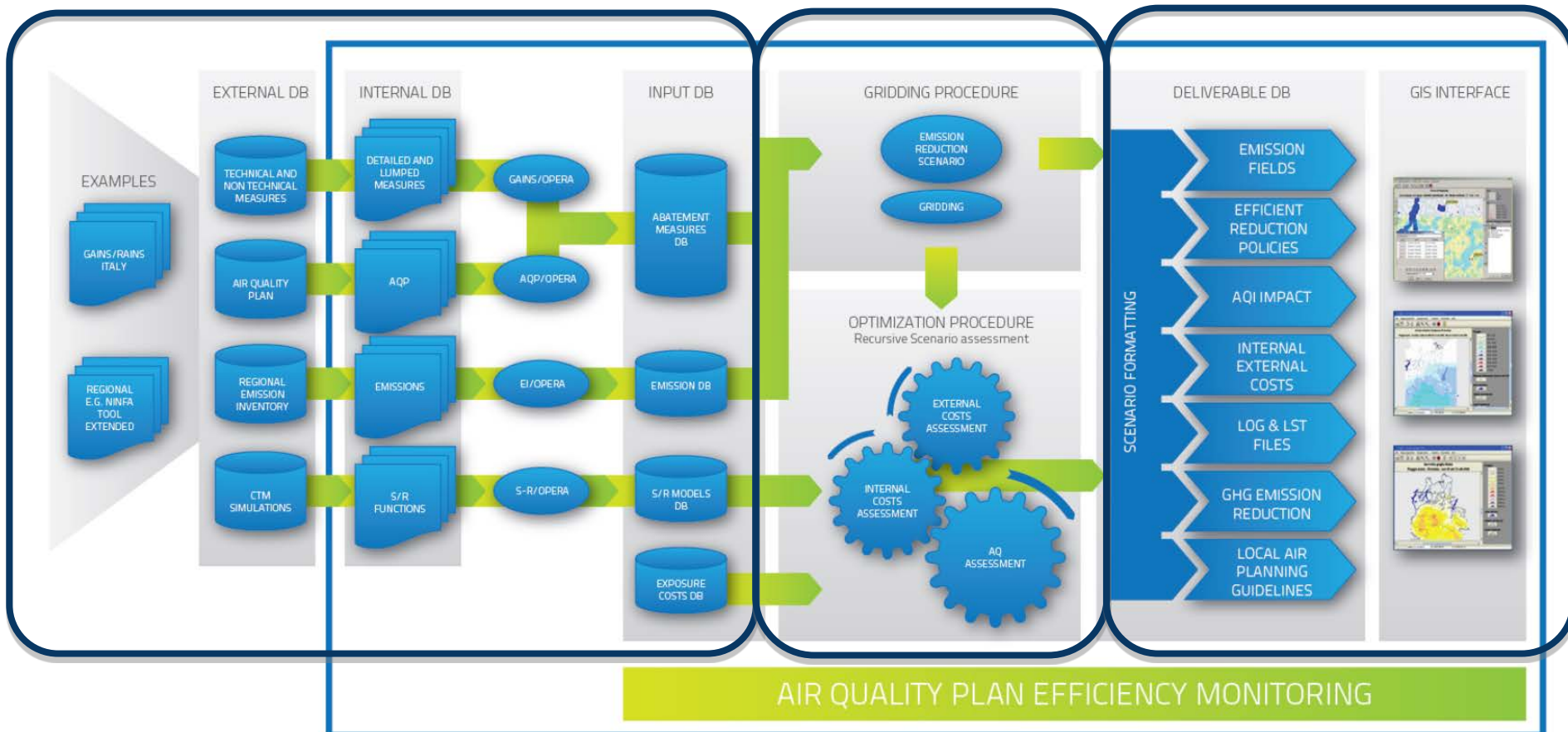
Set of decision variables (precursor emission reduction measures)

RIAT+ system architecture

Data interface

Internal procedures

Deliverable databases



Databases

- Emissions:
 - ▣ Emission factors
 - ▣ Activity rates
- Abatement measures:
 - ▣ Abatement efficiency
 - ▣ Application rate
 - ▣ Costs
- Emission-AQI relationship:
 - ▣ Deterministic model simulations

AQI identification

- AQI-emission simulation model:
 - ▣ Deterministic model >> too high computational costs
- Model reduction: surface response
 - ▣ ANNs identified processing CTM model simulations

Source-receptor models: ANN

- Input data: precursor emissions
- Target data: AQI

ANNs inputs:
quadrant precursor emissions

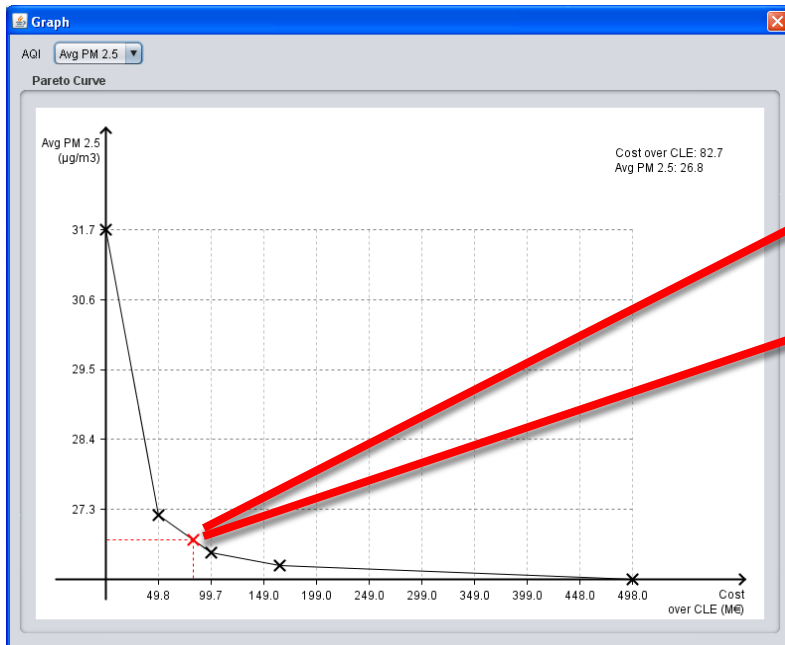
ANNs output:
AQI



- Identification pattern: CTM simulations

RIAT output

Pareto Boundary



Effective policy

Output window showing regional cost over CLE, regional average AQI, and emission reduction (respect CLE). Red arrows point from the Pareto graph to these sections.

Regional cost over CLE
costOverCle[Meuro] = 49.83

Regional average AQI
aqi_pm10[microg/m3] = 30.148
aqi_pm25[microg/m3] = 27.232
aqi_aot[ppb*h] = 32659.0
aqi_somo[ppb*t] = 3183.6

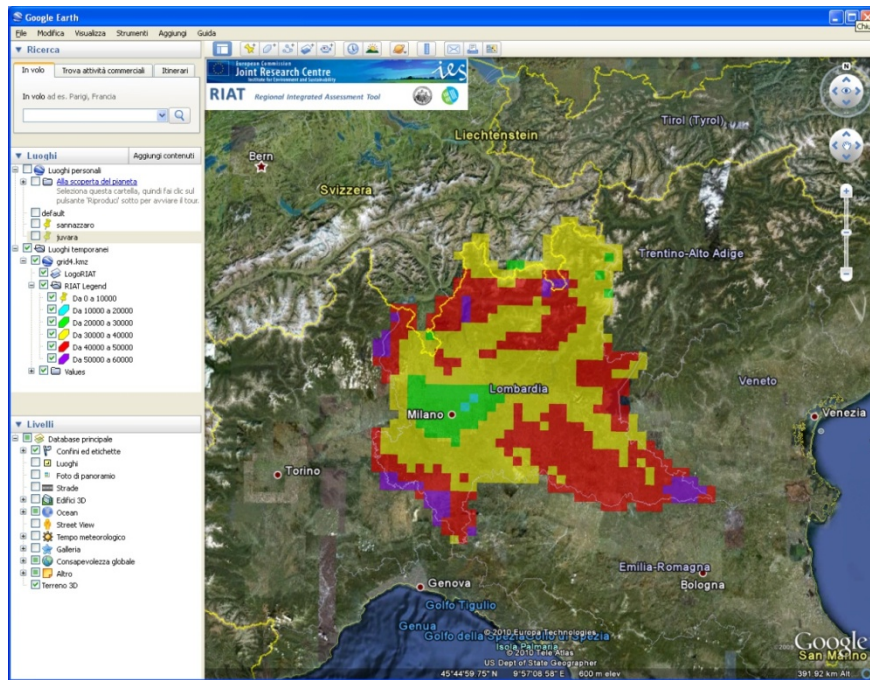
Emission reduction (respect CLE)
redOptNox[ton] = 84900.0
redOptVoc = 167000.0
redOptNh3 = 8640.0
redOptPm10 = 66300.0
redOptPm25 = 37600.0
redOptSO2 = 113000.0
remNox[ton] = 80400.0

Result Table window showing a table of measures and their application rates. A red arrow points from the 'Emission reduction' section to this table.

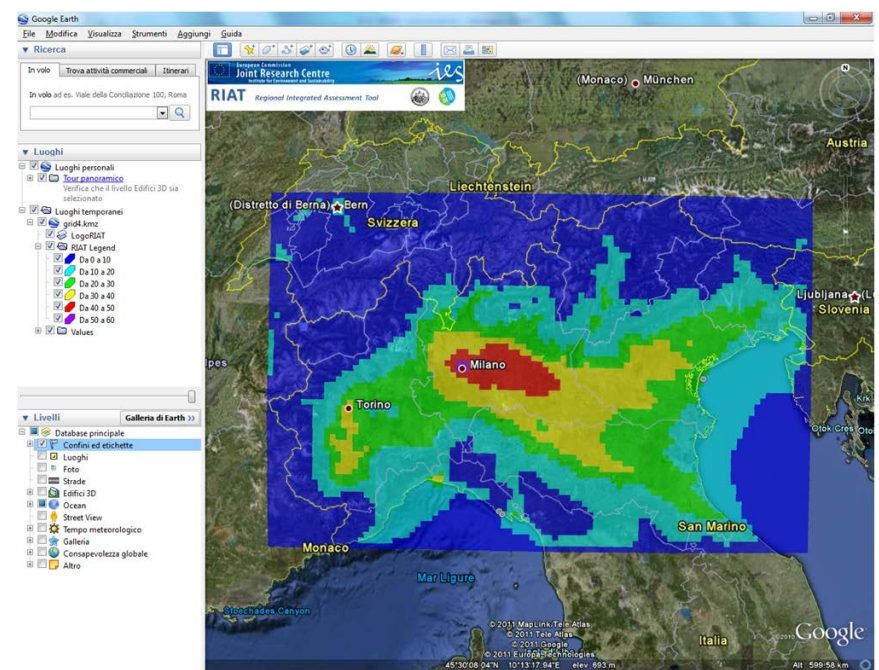
ms	sec	act	tec	Io...	Application rate (-1 to +1)	C
1	Agriculture: Livest...	No fuel use	Feed modification (all ...	1		0
1	Agriculture: Livest...	No fuel use	Hay-silage for cattle ...	1		0
1	Agriculture: Livest...	Other cattle - li...	Covered outdoor stora...	1		0
1	Agriculture: Livest...	Other cattle - li...	Combination of CS_L...	1		2
1	Agriculture: Livest...	Other cattle - li...	Covered outdoor stora...	1		0
1	Agriculture: Livest...	Other cattle - li...	Low ammonia applica...	1		0
1	Agriculture: Livest...	Other cattle - li...	Low ammonia applica...	1		1
1	Agriculture: Livest...	Other cattle - li...	Animal house adaption...	1		0
1	Agriculture: Livest...	Other cattle - li...	Combination of SA_LNA	1		0
1	Agriculture: Livest...	Other cattle - s...	Low ammonia applica...	1		5
1	Agriculture: Livest...	Other cattle - s...	Low ammonia applica...	1		1
1	Agriculture: Livest...	Dairy cows - liq...	Covered outdoor stora...	1		2
1	Agriculture: Livest...	Dairy cows - liq...	Combination of CS_L...	1		5

RIAT output

Emission maps



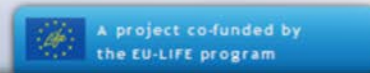
AQI maps



Test cases

- Emilia-Romagna and Alsace application
- Standard DSS for sub-national air quality planning in EU
- Guideline
- Technical and non-technical measure databases
- CO2 budget for effective policies

OPERA website: www.operatool.eu



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Operational Procedure for Emission Reduction Assessment

An integrated assessment methodology to plan local cost-effective air quality policies harmonized with national and European actions.

The goal of the project is to develop a methodology, a software (RIAT+) and the relative guidelines to support local authorities for the planning of regional policies integrated with national and European actions in order to comply with National and EU air quality standards, considering potential synergies with actions to reduce GHG emissions. This project will be performed in the context of existing agreements between national and regional administrations to reach a common goal in a consistent and efficient way.

[Click here to download the project summary, the brochure and the information panel.](#)