

# VALESOR – new online tool for valuation of environmental stressors

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# VALESOR = VALuation of Environmental StressORs

<https://valesor.eu/>

Start date: **01/01/2023** → End date: **31/12/2025**  
12 partners = 11 European partners and 1 associate partner (Mike Holland, UK)

**Multidisciplinary project**, including economics, medicine, toxicology, epidemiology, environmental sciences, atmospheric dispersion modelling etc.

**General objective** : Promote a better use of economic values in public decisions aimed at reducing environmental stressors

**Final operational objective:** Develop the VALESOR tool = a multi-stressor economic valuation model

## The Valesor Consortium

### France

- Angers University
- Nantes University
- French National Institute for Industrial Environment and Risks - INERIS

- UNIVERSITE PARIS DAUPHINE (UPD)

### Sweden

- Mines Paris – PSL

- IVL Swedish Environmental Research Institute
- Umeå University
- Anthesis

### Norway

- Menon Economics

### Italy

- Joseph Spadaro, SERC
- Forastiere Francesco

### Serbia

- University of Novi Sad, Medical Faculty

### UK

- Michael Holland, EMRC

# VALESOR Structure

- 8 WP (7 WP + 1 Project Management WP)
- ≈ 30 tasks

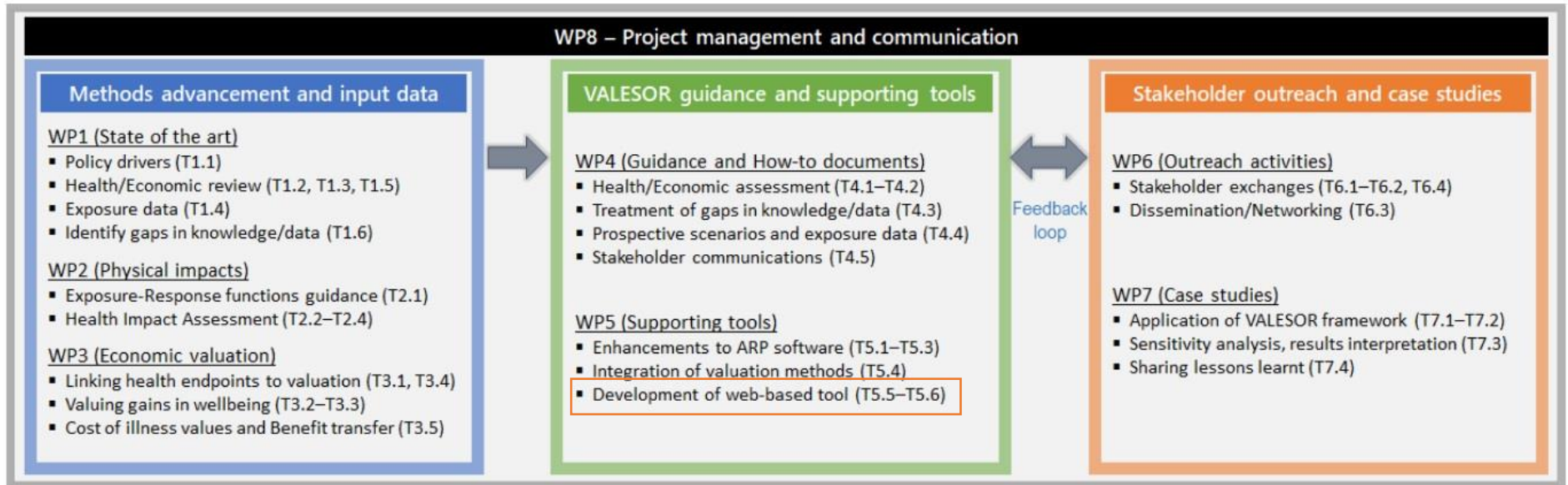


Figure 7: VALESOR WP PERT chart

# VALESOR online tool

AIR-module is Based on Alpha RiskPoll (ARP) model used for CBA within EU/CLRTAP

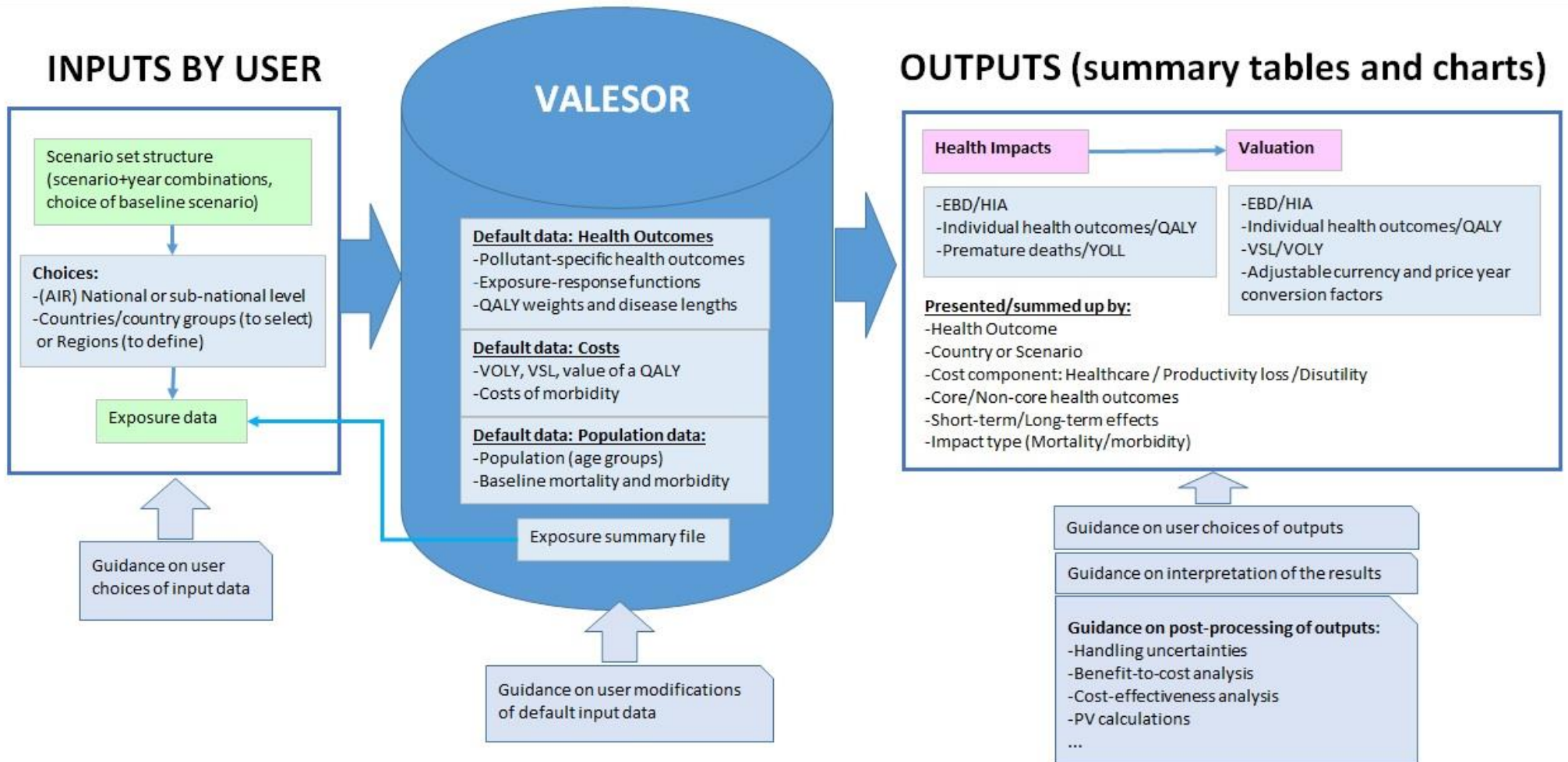
Accessible from VALESOR project website since 19/12-2025: <https://tool.valesor.eu/>

VALESOR tool calculates **health impacts** from air and chemical pollution and **economic values (damage)** using:

- Exposure data
- Population data
- Exposure-response functions
- Baseline morbidity and mortality rates
- Country-specific valuation parameters

Exposure is country-average (not gridded data)

# VALESOR tool concept



## **VALESOR AIR**

- Based on Alpha RiskPoll model
- Multi-pollutant analysis
- National or sub-national level of analysis
- 49 countries, 6 country groups
- ERFs and costs can be modified
- Population and baseline health cannot be modified (on national level)

## **VALESOR CHEM**

Framework for analysis, with a high degree of flexibility in inputs.

- Single-pollutant analysis, one region in one model run
- Exposure routes: inhalation or ingestion
- Several pollutants are explicitly included in the tool (including AIR pollutants)
- Possibility to analyse any pollutant with own data
- Country-specific data on population and/or costs can be uploaded from the database
- Very flexible model open for data modifications

# Steps in the analysis

Setting up scenario set



Definition of spatial level of analysis



Entering exposure data



(Modifications of ERFs, unit costs)



Selection of output parameters

Generating outputs



Interpretation, analysis, post-processing

**AIR**

Setting up scenario set



Selection of pollutant

(Modifications of health outcomes)

Entering exposure data



Entering/modifications of  
Population and baseline health data

Entering/modifications of unit costs



Selection of output parameters


Generating outputs



Interpretation, analysis, post-processing

**CHEM**

# AIR: Scenario set definition

 Select scenario target year(s) and assign scenario name. Press Add to save scenario definition in the list of scenarios included in the analysis. The first added scenario is considered as baseline (BL).

## Add new Scenario

Scenario name

Choose years

+ ADD

2001 - 2010



2011 - 2020



2021 - 2030



Check all

2021

2022

Baseline  
+ Air-pollution-reducing measures

## Scenarios

BAU (BL)

2023

2025

# AIR: Definition of spatial level of analysis

✓ Scenario set  
Setup scenario names and years

✓ Spatial level  
Select countries or regions

3 Input data  
Enter exposure values for pollutants

SAVE PROJECT

SELECT JSON FILE

**i** Define area for which health effects/damage are quantified.

Select spatial level of analysis

National  Sub-national

Country groups

- EECCA
- EFTA
- EU27
- UNECE Caucasus + Asia
- UNECE Europe
- Western Balkan

Select Country/Countries

Armenia

- Select all
- Albania
- Armenia
- Austria
- Azerbaijan
- Belarus

Countries included in the analysis


Armenia

Regions: same age distribution of POP as on the country level is assumed

# AIR: Entering exposure data

Spatial level  
Select countries or regions

Input data  
Enter exposure values for pollutants


 SAVE PROJECT

 SELECT JSON FILE

 EXPORT JSON

NO<sub>2</sub>  O<sub>3</sub>  PM<sub>10</sub>  PM<sub>2.5</sub>  SO<sub>2</sub>

## COMPILATION OF EXPOSURE DATASET

 Enter exposure values for pollutants included in the analysis, for each scenario and target year.

Exposure units used in VALESOR AIR for all pollutants except for O<sub>3</sub> (aligned with exposure-response functions): Annual population weighted mean concentrations in other units should be converted to units used by the tool.

VALESOR uses absolute numbers for each specified scenario and automatically calculates exposure difference in Health Impact Assessment.

VALESOR operates with country/region-average exposure values. Available gridded concentration/exposure data should be (weighted with population data and) aggregated.

We recommend that users check entered exposure values against applicable exposure ranges for the ERFs included in VALESOR AIR, as specified in the original study. If their exposure ranges implies additional uncertainties and should be communicated together with the results of the analysis.

Entering large exposure datasets can be facilitated by Import via Excel.

Exposure modelling/measurements

Annual population weighted mean concentration,  $\mu\text{g}/\text{m}^3$ .

IMPORT VIA EXCEL

 GET APPLICABLE EXPOSURE RANGES

Region	BAU-2023 (BL)	BAU-2025 (BL)
Armenia	<input type="text" value="17"/>	<input type="text" value="12"/>

# AIR: Check other input data

- < COLLAPSE TABS
- ↻ Exposure Data
- + Health Outcomes
- \$ Cost Values
- 👤 Population and Baseline Health

i Structure of cost values in VALESOR follows classification of health outcomes into morbidity and mortality impact types. Morbidity cost values for each individual health outcome are presented in the table below by costs component; these are lifetime costs of each new case of disease. Mortality cost metrics (VOLY, VSL) are opened by button VOLY, VSL AND VQALY. Choice between VOLY and VSL as mortality valuation metric is made on the Output page.

Country-specific values should be used when carrying out analysis within a single country. However, when analysis concerns a common policy across multiple countries (e.g. across the EU, or UNECE Member States) it is common practice to use a value averaged across the countries that are covered by the analysis. This practice has been followed in numerous analyses for the EU and is recommended to be followed in VALESOR.

Pan-European cost value set refers to values averaged across all 49 countries included in VALESOR.

Cost values displayed as 0 indicate data gaps and should be interpreted as 'non-available' rather than actual zero costs.

Select Region

☰ Armenia

📄 GET COST VALUES

VOLY, VSL AND VQALY

i COST VALUES: METHOD AND DATA SOURCES

Cost unit: Euro

Damage Type	Total, Morbidity	Health Care	Productivity Loss	Disutility
ALRI in children	60 €	30 €	10 €	20 €
Asthma in adults	20320 €	500 €	1560 €	18260 €
Asthma in children	54740 €	700 €	1560 €	52480 €
Bladder cancer	216750 €	4270 €	1380 €	211100 €
Breast cancer	216720 €	3670 €	1950 €	211100 €
COPD	15500 €	1640 €	870 €	12990 €

# AIR: Output page: Selections (upper panel)

Scenario set  Setup scenario names and years

Spatial level  Select countries or regions

Input data  Enter exposure values for pollutants

4 Output  Select and filter output and see results

HIDE FILTERS ▲

<p>Type of output <input type="checkbox"/></p> <p><input checked="" type="radio"/> Health impacts</p> <p><input type="radio"/> Valuation</p>	<p>Type of assessment <input type="checkbox"/></p> <p>Environmental Burden of Disease <input checked="" type="checkbox"/> Health Impact Assessment</p>	<p>Individual Health Outcomes or QALY <input type="checkbox"/></p> <p><input checked="" type="radio"/> Individual health outcomes</p> <p><input type="radio"/> QALY</p>	<p>Value of ERF <input type="checkbox"/></p> <p>HIGH</p> <p><b>CENTRAL</b></p> <p>LOW</p>	<p>Output table <input type="checkbox"/></p> <p>COUNTRIES AGGREGATED</p> <p>COUNTRIES SEPARATELY</p>
<p>Mortality (valuation) metric <input type="checkbox"/></p> <p>Premature Deaths <input checked="" type="checkbox"/> YOLL</p>	<p>Use counterfactuals <input type="checkbox"/></p> <p>No <input checked="" type="checkbox"/> Yes</p>			

## Additionally for valuation:

- Cost value set (country-specific or region-averaged)
- Currency and price year conversion factors

# AIR: Output page: Selections (left panel, filter list)

## Health Outcome Filters



### Select pollutants to show

Pollutants

NO<sub>2</sub>, PM<sub>2.5</sub>



All Cause or Cause Specific Mortality



All Cause  Cause Specific

Long-term / short-term impacts(NO<sub>2</sub>)



Long Term

Short Term

Long-term / short-term impacts(PM<sub>2.5</sub>)



Long Term

Short Term

Core / Non-Core



Core

Non-Core

Impact type

Mortality

## Health outcomes



NOTE that the tool will show TOTAL of results calculated for separate health outcomes (if Valuation or QALY-based impact analysis is selected) only when all health outcomes selected for analysis refer to one pollutant. There is a risk of double-counting of same impacts (same damage type, same exposure window) from different pollutants, if selected simultaneously – therefore, results for health outcomes attributable to different pollutants are not summed up automatically. Calculation of TOTAL including health outcomes from different pollutants can be done outside of the tool, if the risk of double-counting is considered insignificant.

Special concern is long-term all-cause mortality from PM<sub>2.5</sub> and NO<sub>2</sub>. For this couple of outcomes, VALESOR provides combined ERF and displays results calculated with this ERF when both outcomes are marked and deaths/VSL is selected. NOTE that these results are not automatically added to the main table; if a user wants to use these instead of the results calculated for PM<sub>2.5</sub> and NO<sub>2</sub> separately, the numbers should be processed outside of the tool.

	Pollutant	Health Outcome	Exposure window	Age	Core
<input type="checkbox"/>	NO <sub>2</sub>	ALRI mortality	Long-term	30+	Core
<input type="checkbox"/>	NO <sub>2</sub>	COPD mortality	Long-term	30+	Core
<input checked="" type="checkbox"/>	NO <sub>2</sub>	Natural mortality	Long-term	30+	Core
<input type="checkbox"/>	NO <sub>2</sub>	Respiratory mortality	Long-term	30+	Core
<input type="checkbox"/>	NO <sub>2</sub>	Circulatory disease mortality	Long-term	30+	Non-Core
<input type="checkbox"/>	NO <sub>2</sub>	IHD mortality	Long-term	30+	Non-Core
<input type="checkbox"/>	NO <sub>2</sub>	Lung cancer mortality	Long-term	30+	Non-Core
<input type="checkbox"/>	NO <sub>2</sub>	Natural mortality	Short-term	All	Core
<input checked="" type="checkbox"/>	NO <sub>2</sub>	Incidence of acute lower respiratory infections in children	Long-term	0 - 12	Core
<input checked="" type="checkbox"/>	NO <sub>2</sub>	Incidence of asthma in adults	Long-term	19+	Core
<input checked="" type="checkbox"/>	NO <sub>2</sub>	Incidence of asthma in children	Long-term	0 - 18	Core
<input checked="" type="checkbox"/>	NO <sub>2</sub>	Respiratory hospital admissions	Short-term	All	Core
<input type="checkbox"/>	PM <sub>2.5</sub>	Acute Lower Respiratory Infection (ALRI) mortality	Long-term	30+	Core
<input type="checkbox"/>	PM <sub>2.5</sub>	Cerebrovascular mortality	Long-term	30+	Core
<input type="checkbox"/>	PM <sub>2.5</sub>	Circulatory mortality	Long-term	30+	Core

# Examples of the generated outputs

## Health impacts

DOWNLOAD TABLE AS CSV

INTERPRETATION OF THE RESULTS

Pollutant	Health outcome	Exposure window	Core	Age	Unit	BAU-2023 (BL)	BAU-2025 (BL)
PM <sub>2.5</sub>	Natural mortality	Long-term	Core	All	YOLL	51,798	45,826
PM <sub>2.5</sub>	Incidence of Lung Cancer	Long-term	Core	30+	Cases	288	274
PM <sub>2.5</sub>	Incidence of asthma in children	Long-term	Core	0 - 18	Cases	2,039	1,841
PM <sub>2.5</sub>	Incidence of COPD	Long-term	Core	30+	Cases	1,959	1,856
PM <sub>2.5</sub>	Incidence of IHD events (i.e. Acute Myocardial Infarction)	Long-term	Core	30+	Cases	4,966	4,659
PM <sub>2.5</sub>	Incidence of Stroke	Long-term	Core	30+	Cases	1,043	981

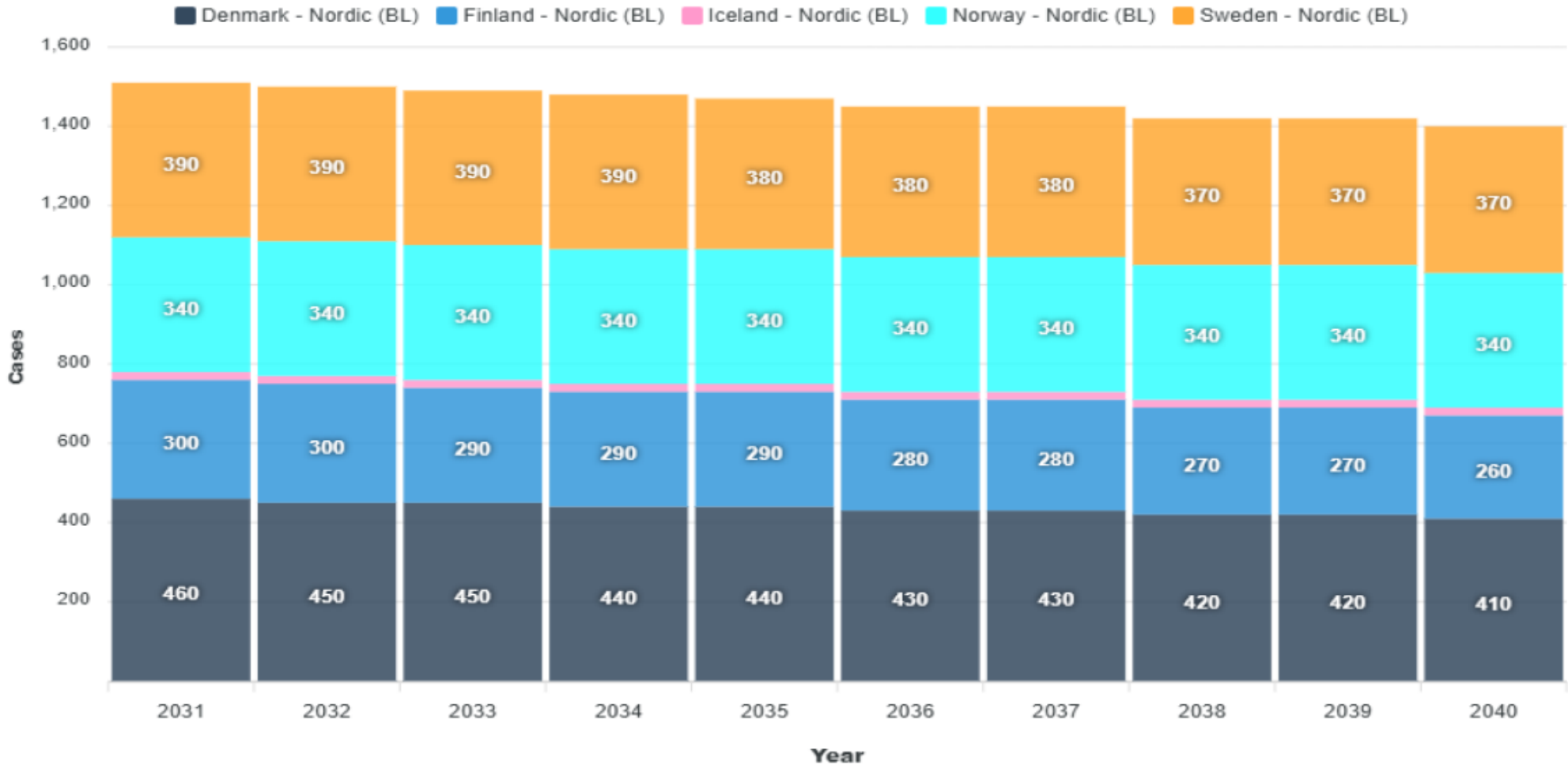
## Damage

PM <sub>2.5</sub>	Incidence of Stroke	Long-term	Core	30+	175,127,000	164,768,000
PM <sub>2.5</sub>	Cardiovascular hospital admissions	Short-term	Core	All	0	0
Total					2,461,469,000	2,205,193,000
From which:	Healthcare				30,852,000	28,989,000
	Productivity loss				9,601,000	8,945,000
	Disutility				520,013,000	485,429,000
	Mortality				1,901,004,000	1,681,829,000

# Examples of the generated outputs

## Lung cancer cases in the Nordic countries 2031-2040

PM<sub>2.5</sub>, Incidence of Lung Cancer (Long-term)



# Technical solutions to decrease the risk of double-counting

- (AIR) Possibility to use combined ERF for all-cause mortality from PM2.5 and NOx;
- (AIR) If more than one pollutant is selected in outputs – results are not summed up or presented as charts – only as tables without a “Total” row;
- (AIR, CHEM) Particle fractions (PM2.5 and PM10) are separated, only one can be selected in one calculation run;
- (AIR, CHEM) All-cause and cause-specific mortality outcomes are separated, only one mortality type can be selected in one calculation run;
- (AIR) Hierarchical structure of cause-specific mortality outcomes;
- (AIR, CHEM) User guidance as text (in Interpretation of the results).

# VALESOR online tool

**Value of the tool:** Provides both health impact estimates and damage estimates (valuation) for user-defined scenarios, using as inputs the most recent scientific results and the latest data from open databases.

The data is transparent; all the sources are documented.

Tool documentation: 1) user manual; 2) detailed methodology guidelines; 3) input data files (Excel)

- Exposure data ← aggregated data from CAMs, at two resolution levels
- Population data ← UN population prospects, by 1-year age group
- Baseline morbidity and mortality rates ← UN, IHME (GBD), WHO
- Country-specific valuation parameters ← Extensive literature review and results of two own VALESOR surveys on Willingness-to-Pay
- Exposure-response functions ← Most recent research results, including HRAPIE-2 outcomes published in late November 2025.

# AIR health outcomes, PM2.5

Pollutant	Core?	Health_outcome	Exposure window	Show age	ERF_L	ERF_C	ERF_H
Fine particles (PM <sub>2.5</sub> )	Core	Natural mortality	Long-term	30+	1.064	1.095	1.127
Fine particles (PM <sub>2.5</sub> )	Core	Natural mortality	Short-term	All	1.0059	1.0068	1.0077
Fine particles (PM <sub>2.5</sub> )	Core	Circulatory mortality	Long-term	30+	1.102	1.127	1.152
Fine particles (PM <sub>2.5</sub> )	Core	IHD mortality	Long-term	30+	1.102	1.143	1.186
Fine particles (PM <sub>2.5</sub> )	Core	Cardiovascular mortality	Short-term	All	1.0061	1.0092	1.0123
Fine particles (PM <sub>2.5</sub> )	Core	Respiratory mortality	Long-term	30+	1.079	1.136	1.197
Fine particles (PM <sub>2.5</sub> )	Core	Respiratory mortality	Short-term	All	1.0029	1.0073	1.0116
Fine particles (PM <sub>2.5</sub> )	Core	COPD mortality	Long-term	30+	1.08	1.138	1.198
Fine particles (PM <sub>2.5</sub> )	Core	ALRI mortality	Long-term	30+	1.095	1.204	1.325
Fine particles (PM <sub>2.5</sub> )	Core	Cerebrovascular mortality	Short-term	All	1.0012	1.0072	1.0132
Fine particles (PM <sub>2.5</sub> )	Core	Cerebrovascular mortality	Long-term	30+	1.101	1.146	1.192
Fine particles (PM <sub>2.5</sub> )	Core	Lung cancer mortality	Long-term	30+	1.053	1.093	1.135
Fine particles (PM <sub>2.5</sub> )	Core	Incidence of asthma in children	Long-term	0-18	1.1	1.34	1.63
Fine particles (PM <sub>2.5</sub> )	Core	Incidence of COPD	Long-term	30+	1.13	1.18	1.23
Fine particles (PM <sub>2.5</sub> )	Core	Incidence of IHD events	Long-term	30+	1.05	1.13	1.22
Fine particles (PM <sub>2.5</sub> )	Core	Incidence of Stroke	Long-term	30+	1.12	1.16	1.2
Fine particles (PM <sub>2.5</sub> )	Non-core	Incidence of Dementia	Long-term	60+	1.04	1.17	1.25
Fine particles (PM <sub>2.5</sub> )	Non-core	Incidence of Diabetes	Long-term	30+	1.03	1.1	1.18
Fine particles (PM <sub>2.5</sub> )	Core	Incidence of Lung Cancer	Long-term	30+	1.1	1.16	1.23
Fine particles (PM <sub>2.5</sub> )	Core	Cardiovascular hospital admissions	Short-term	All	1.0017	1.0091	1.0166

# CHEM health outcomes

CAS	Pollutant	Health_outcome	ERF_type	Core?	Exp_route	Impact_type	ERF_C
—	Nickel refinery dust	Incidence of lung cancer [T]	UR	Non-core	Inhlation	Morbidity	0.00024
106-99-0	1.3-Butadiene	Incidence of leukemia [T]	UR	Non-core	Inhlation	Morbidity	0.00003
12035-72-2	Nickel subsulfide	Incidence of lung cancer [T]	UR	Non-core	Inhlation	Morbidity	0.00048
14797-55-8	Nitrate	Incidence of stomach cancer [E]	RR	Non-core	Ingestion	Morbidity	1.91
18540-29-9	Chromium (VI) compounds	Incidence of lung cancer [T]	UR	Non-core	Inhlation	Morbidity	0.018
50-32-8	Benzo(a)pyrene	Incidence of lung cancer [T]	UR	Non-core	Inhlation	Morbidity	0.087
50-32-8	Benzo(a)pyrene	Incidence of general cancer [T]	SF	Non-core	Ingestion	Morbidity	2,0
542-88-1	Bis(chloromethyl)ether	Incidence of respiratory tract tumor [T]	UR	Non-core	Inhlation	Morbidity	0.062
630-08-0	Carbon monoxide (CO)	Acute myocardial infarction hospital admissions [E]	RR	Core	Inhlation	Morbidity	1.056
7440-38-2	Inorganic arsenic	Incidence of lung cancer [E]	RR	Core	Ingestion	Morbidity	1.0053
7440-38-2	Inorganic arsenic	Lung cancer mortality [E]	RR	Core	Ingestion	Mortality	1.0059
7440-38-2	Inorganic arsenic	Incidence of kidney cancer [E]	RR	Non-core	Ingestion	Morbidity	1.006
7440-38-2	Inorganic arsenic	Bladder cancer mortality [E]	RR	Core	Ingestion	Mortality	1.0106
7440-38-2	Inorganic arsenic	Incidence of bladder cancer [E]	RR	Core	Ingestion	Morbidity	1.0074
7440-38-2	Inorganic arsenic	CHD mortality [E]	RR	Non-core	Ingestion	Mortality	1.0407
7440-38-2	Inorganic arsenic	CVD mortality [E]	RR	Non-core	Ingestion	Mortality	1.0158
7440-38-2	Arsenic	Incidence of lung cancer [T]	UR	Non-core	Inhlation	Morbidity	0.0043
7440-38-2	Arsenic	Incidence of lung cancer [T]	SF	Non-core	Ingestion	Morbidity	21.3
7440-38-2	Arsenic	Incidence of bladder cancer [T]	SF	Non-core	Ingestion	Morbidity	17.6
75-01-4	Vinyl chloride	Incidence of liver angiosarcomas. angiomas. hepatomas. and	UR	Non-core	Inhlation	Morbidity	0.0000088
75-01-4	Vinyl chloride	Incidence of liver angiosarcomas. angiomas. hepatomas. and	SF	Non-core	Ingestion	Morbidity	1.4
75-21-8	Ethylene oxide	Incidence of breast cancer [T]	UR	Non-core	Inhlation	Morbidity	0.005
79-01-6	Trichloroethylene	Incidence of renal cell carcinoma. non-Hodgkin's lymphoma.	UR	Non-core	Inhlation	Morbidity	0.0000048
80-05-7	Bisphenol A	Incidence of diabetes type 2 [E]	RR	Non-core	Ingestion	Morbidity	1.28
8007-45-2	Coke Oven Emissions	Incidence of respiratory cancer [T]	UR	Non-core	Inhlation	Morbidity	0.00062
92-87-5	Benidine	Incidence of bladder cancer [T]	UR	Non-core	Inhlation	Morbidity	0.067
92-87-5	Benidine	Incidence of bladder cancer [T]	SF	Non-core	Ingestion	Morbidity	230
71-43-2	Benzene (inh_μg/m3)	Incidence o Leukemia [T]	SF	Non-core	Ingestion	Morbidity	0.027
71-43-2	Benzene (inh_μg/m3)	Incidence of leukemia [T]	UR	Non-core	Inhlation	Morbidity	0.000002
71-43-2	Benzene (inh_ppm-years)	Incidence o Leukemia [T]	SF	Non-core	Ingestion	Morbidity	0.027
71-43-2	Benzene (inh_ppm-years)	Incidence of Leukemia [E]	RR	Core	Inhlation	Morbidity	1.0097

## Potential users

- Authorities/decision-makers at different levels (national, local, EU, UNECE)
- Scientists and academia
- Consultants within environment and health areas
- NGO, industries

Case study reports:

[https://valesor.eu/download/18.1d34c6bf19c989180c023233/1773159186415/VALESOR\\_D.7.2\\_Case%20studies%20reports.pdf](https://valesor.eu/download/18.1d34c6bf19c989180c023233/1773159186415/VALESOR_D.7.2_Case%20studies%20reports.pdf)

# Thank you for your attention!