

Environmental Exposure Assessment – Practical guidance

REACH IN PRACTICE

6th International Fresenius Chemicals Policy Conference

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**Federal Environment
Agency**

Section Chemicals

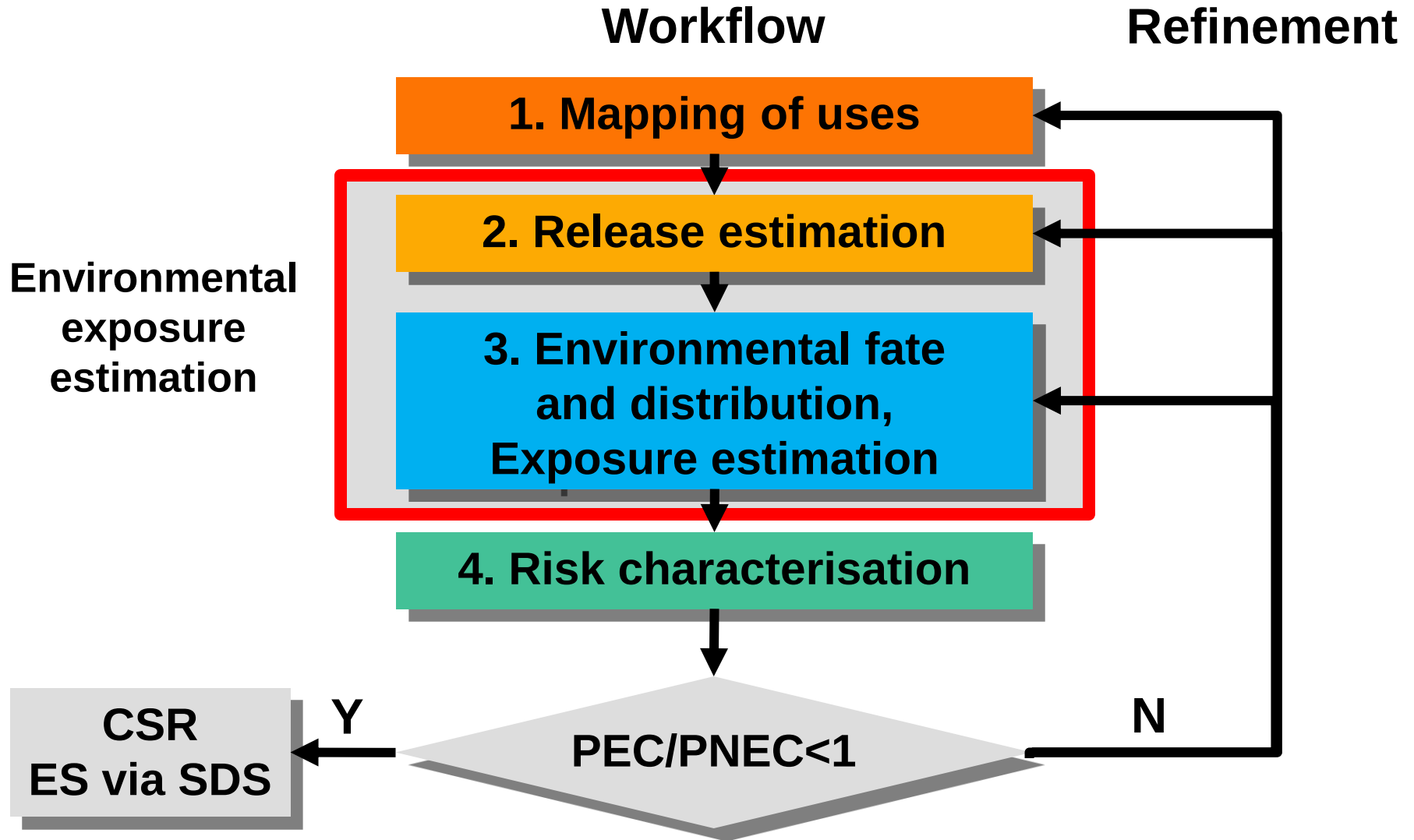
Wörlitzer Platz 1

06844 Dessau-Roßlau



- 1. Key steps of environmental exposure assessment, appropriate tools and input data, aspects to consider**
- 2. Exemplification**

Workflow of environmental exposure estimation - overview



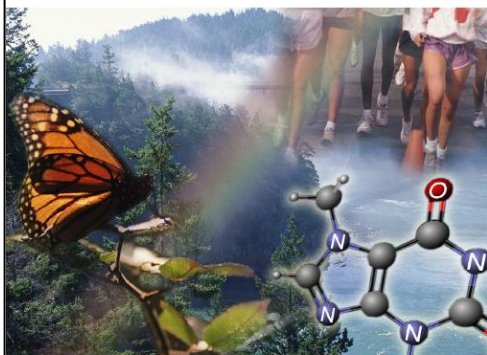
Workflow of exposure estimation (1): mapping of uses

Sources

Own knowledge

Use mapping by
industry sector
associations

 ECHA
Guidance on
information requirements and
chemical safety assessment
Chapter R.12: Use descriptor system



..... 2009
(DRAFT Version 2.0)_07.11.09

Guidance for the implementation of REACH

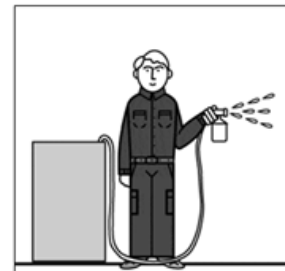
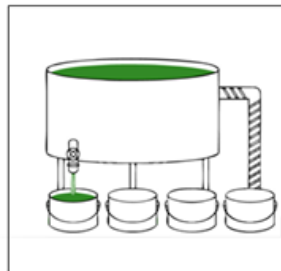
Workflow

1. Mapping of uses

identified uses
life cycle stages
use descriptors
maximum daily
use
annual use
OC, RMM

Mapping of identified uses

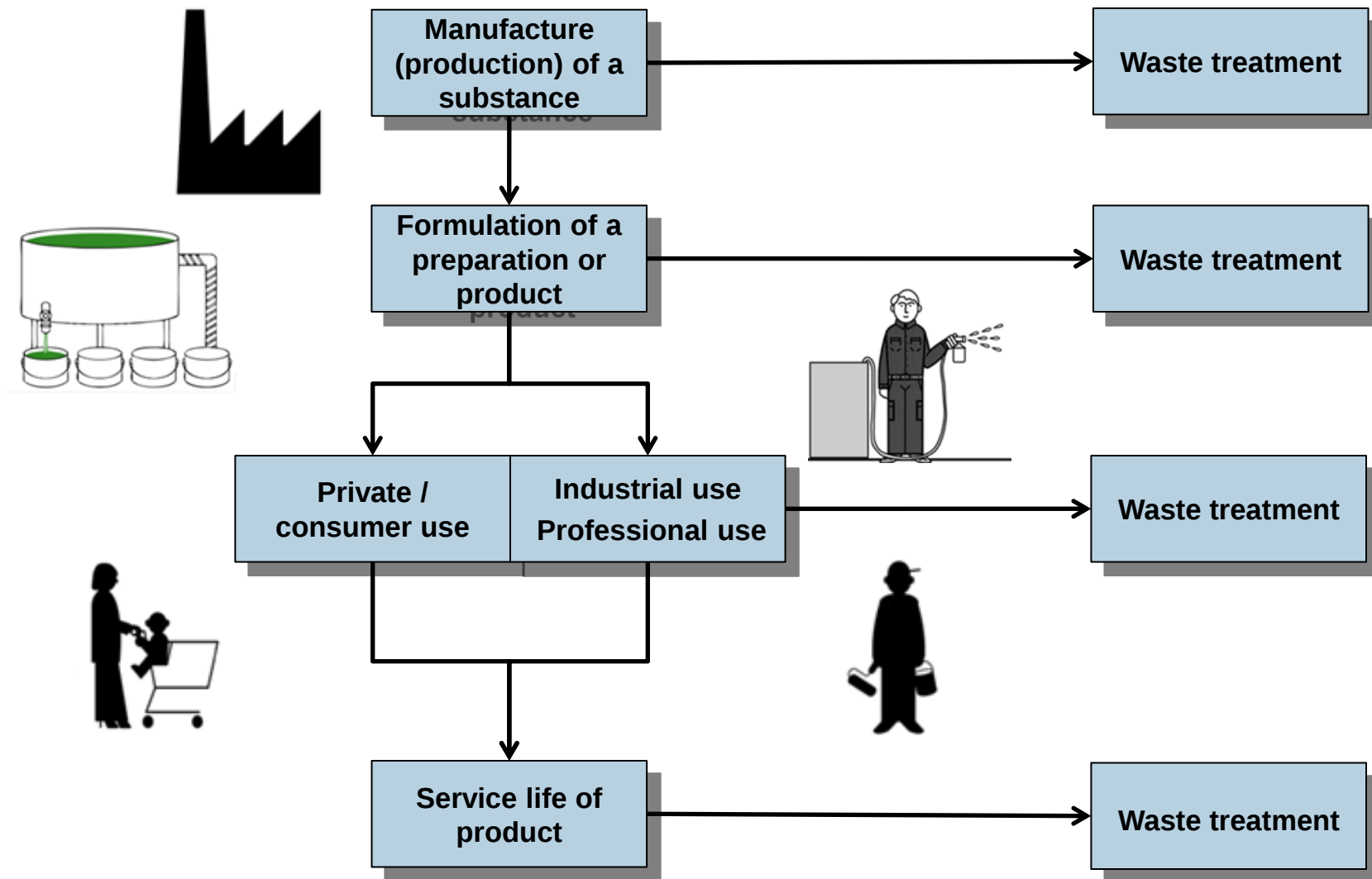
- Several industry sectors / industry associations conducted activities in mapping of uses (e.g. AISE, CEPE, Concawe, EFCC, ESIG, ETRMA, Eurometaux, FECC, FEICA, PEST)
- Different levels of detail
- Results will be available in
 - Use (descriptor) mapping library
 - Generic Exposure Scenario (GES) libraries



An overview of the activities relevant to the REACH libraries:

<http://cefic.org/en/reach-for-industries-libraries.html>

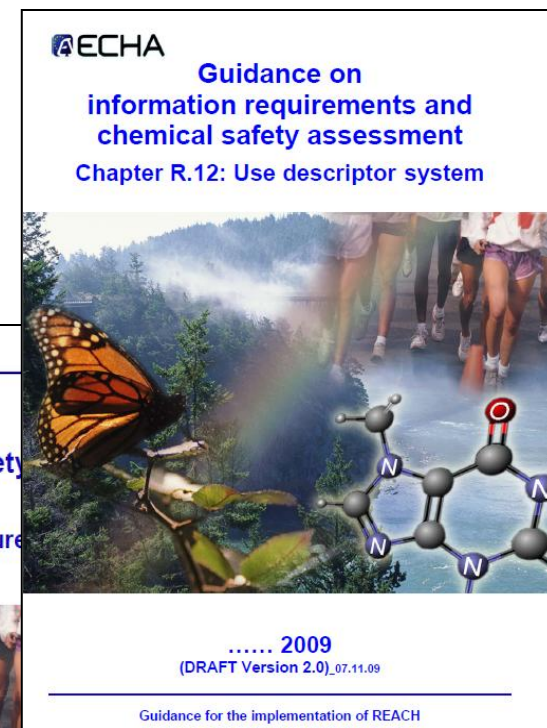
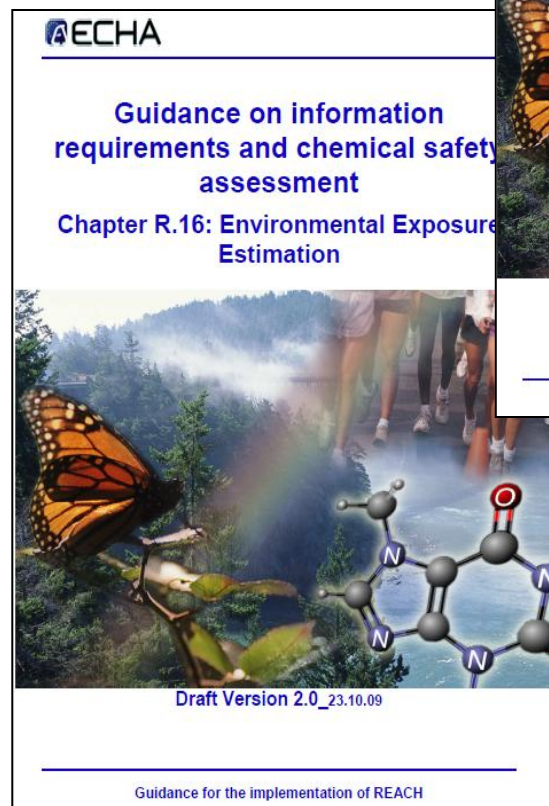
Relevant life cycle stages



Pictures: Source: ereach, Graphics: Hanne Simone; modified

Use Descriptor System

- SU: Sector of use
- PC: Chemical Product category
- PROC: Process category
- AC: Article category
- **ERC: Environmental Release Category**

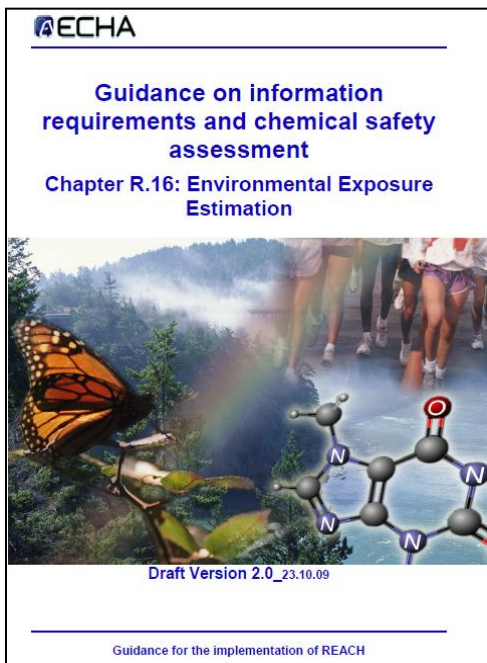


Aspects to consider

- Currently revision of guidelines
 - R12 Use descriptor system
 - R16 Environmental exposure assessment
 - R18 Estimation of exposure from waste life cycle stage
 - part D in particular Exposure scenario format
- Adaption of the use mapping to the new guidance documents ?
- Less experience within DU in describing their use with use descriptors

Workflow of exposure estimation (2): Release estimation - default

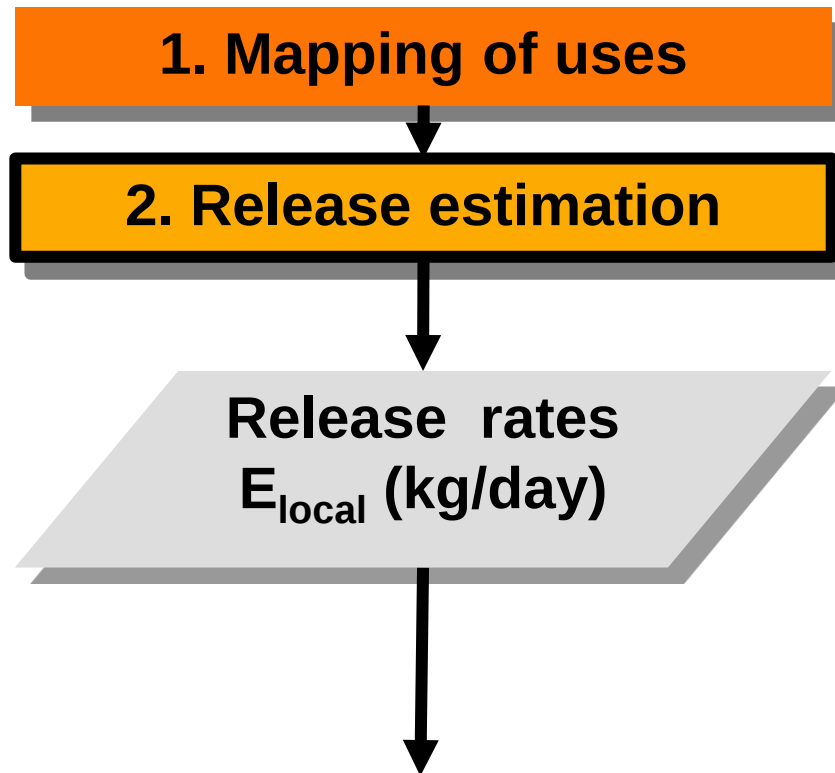
Sources



Tools



Workflow



Input data

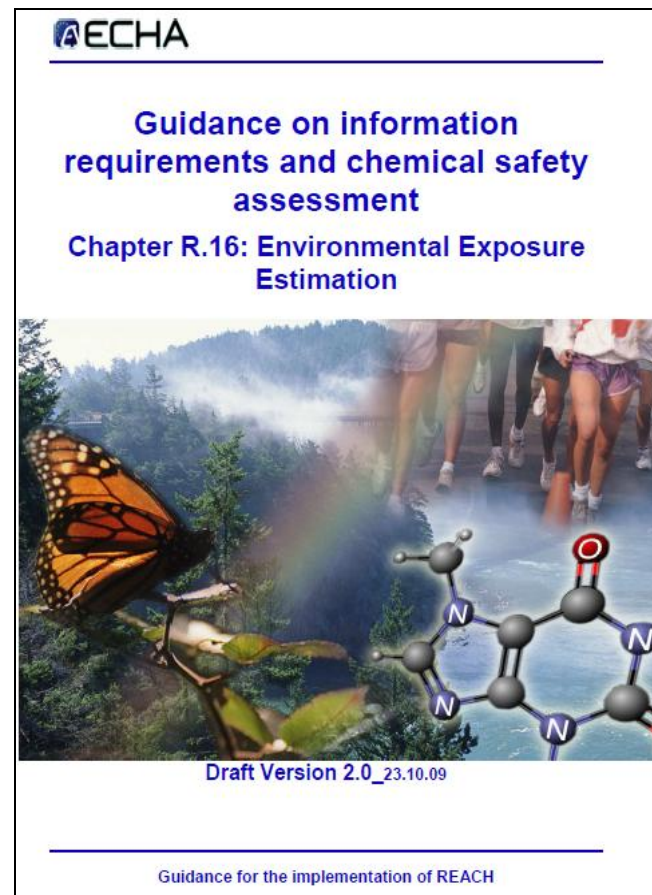
Tonnages:
max. daily use /
max. annual use,
average annual
use

**Default
release factors:**
ERC

**Default
emission days**

Environmental release category - ERC

- Describe broad conditions of use
- Default release factors for emission to water, air, soil
- Reflecting the following characteristics of a use:
 - Life cycle stage
 - Level of containment
 - Technical fate of the substance in that use
 - Dispersiveness of the use
 - Indoor or outdoor use
 - Release promoting conditions

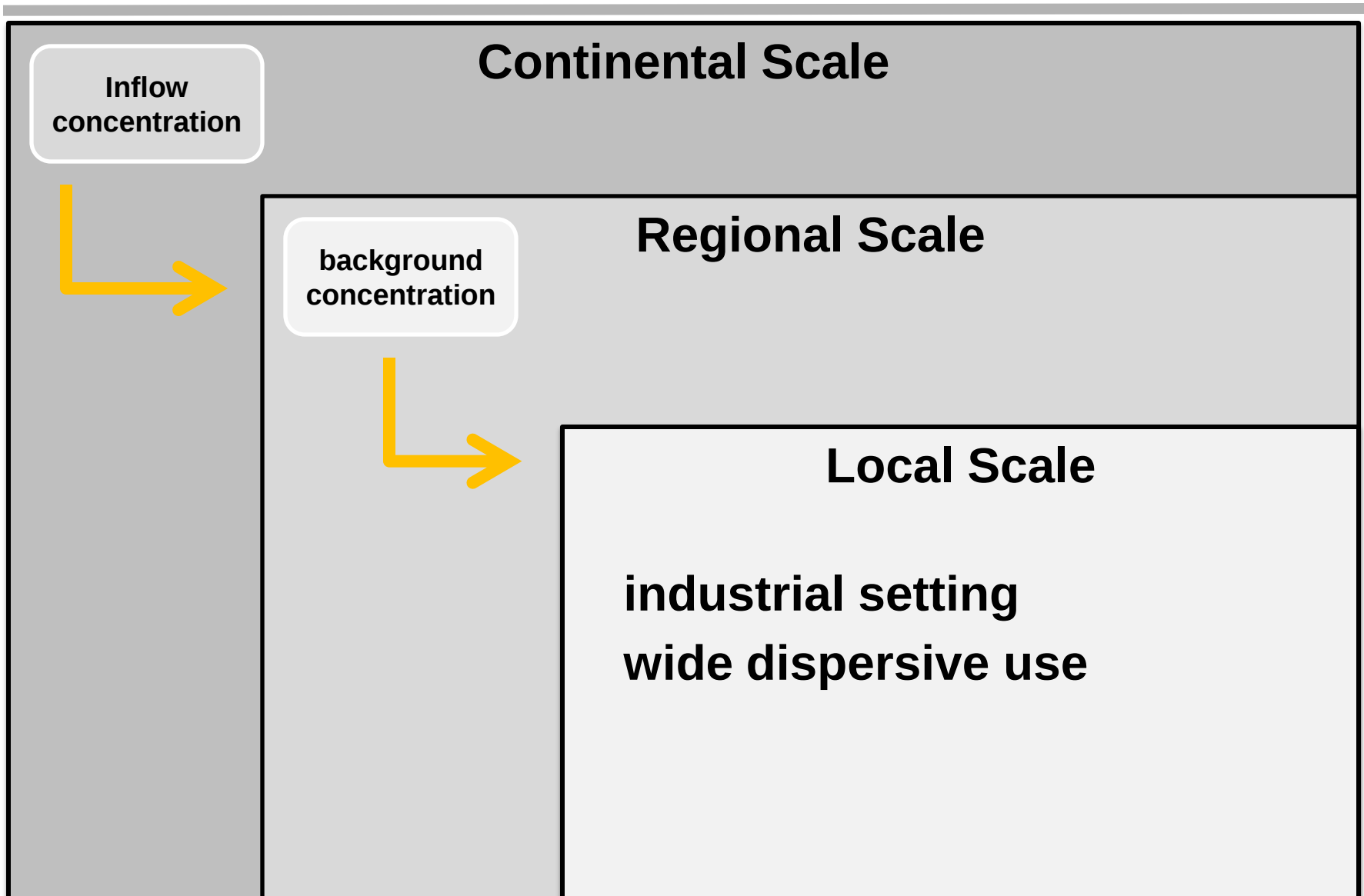


ERC	Life cycle Stage	level of containment	technical fate	Dispersiv-ness	indoor / outdoor	rele ase
1	Manufacture	open-closed		Industrial	Indoor	n.a
2	Formulation	open-closed	not included into matrix	Industrial	Indoor	n.a.
3	Formulation	open-closed	Inclusion into/onto matrix	Industrial	Indoor	n.a.
4	End use	open-closed	processing aid, not becoming part of arti.	Industrial	Indoor	n.a.
5	End use	open-closed	Inclusion into/onto matrix	Industrial	Indoor	n.a.
6a	End use	open-closed	Intermediate	Industrial	Indoor	n.a.
6b	End use	open-closed	reactive processing aid	Industrial	Indoor	n.a.
6c	End use	open-closed	monomers for polymers	Industrial	Indoor	n.a.
6d	End use	open-closed	monomers for rubbers or thermosets	Industrial	Indoor	n.a.
7	End use	closed system	processing aid	Industrial	Indoor	n.a.
8a	End use	open-closed	processing aid	wide disperse	Indoor	n.a.
8b	End use	open-closed	reaction on use	wide disperse	Indoor	n.a.
8c	End use	open-closed	Inclusion into/onto matrix	wide disperse	Indoor	n.a.
8d	End use	open-closed	processing aid	wide disperse	Outdoor	n.a.
8e	End use	open-closed	reaction on use	wide disperse	Outdoor	n.a.
8f	End use	open-closed	Inclusion into/onto matrix	wide disperse	Outdoor	n.a.
9a	End use	closed system	processing aid	wide disperse	Indoor	n.a.
9b	End use	closed system	processing aid	wide disperse	Outdoor	n.a.
10a	Service life	open	Inclusion into/onto matrix	wide disperse	Outdoor	Low
10b	Service life	open	Inclusion into/onto matrix / removal proc.	wide disperse	Outdoor	High
11a	Service life	open	Inclusion into/onto matrix	wide disperse	Indoor	Low
11b	Service life	open	inclusion into/onto matrix / removal proc.	wide disperse	Indoor	High
12a	Service life	open-closed	Losses from matrix during article processing	Industrial	Indoor	Low
12b	Service life	open-closed	Losses from matrix during article processing	Industrial	Indoor	High

Environmental release category - ERC

No	ERC	Default release factors resulting from the conditions of use described in the ERCs.		
		to air	to water (no STP)	to soil
1	Manufacture of chemicals	5%	6%	0.01%
2	Formulation of preparations	2.5%	2%	0.01%
2	Formulation in materials	30%	0.2%	0.1%
4	Industrial use of processing aids	100%	100%	5%
5	Industrial inclusion into or onto a matrix	50%	50%	1%.
6A	Industrial use of intermediates	5%	2%	0.1%
6B	Industrial use of reactive processing aids	0.10%	5%	0.025%
6C	Industrial use of monomers for polymerisation	5%	5%	0%
6D	Industrial use of auxiliaries for polymerisation	35%	0.005%	0.025%
7	Industrial use of substances in closed systems	5%	5%	5%
8A	Wide dispersive indoor use of processing aids, open	100%	100%	n.a.
8B	Wide dispersive indoor use of reactive substances , open	0.10%	2%	n.a.
8C	Wide dispersive indoor use, inclusion into or onto a matrix	15%	1%	n.a.
8D	Wide dispersive outdoor use of processing aids, open	100%	100%	20%

Scales for release estimation



Local release estimation

industrial setting



Maximum daily use (t/day)

$$Q_{\text{daily}} = \frac{\text{total registrant's tonnage EU (t/year)}}{\text{default number release days (days/year)}}$$

Environmental
compartments

$$E_{\text{local IU, env. comp. } i} = Q_{\text{daily, IU}} \times RF_{\text{IU, env. comp. } i}$$



Average daily use over a year (tonnes/365days)

$$Q_{\text{daily}} = \frac{\text{total registrant's tonnage EU level}}{(10 * 2000 * 365)} * 4$$

$$= \text{total registrant's tonnage EU level} * (5,5 * 10^{-7})$$

wide dispersive use

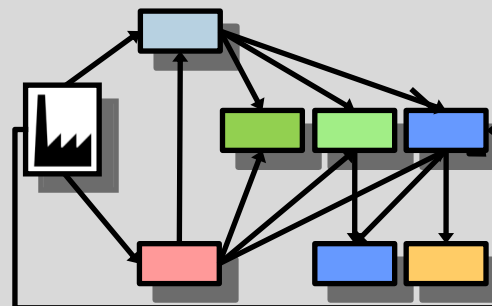
RF: release factor, IU: identified use

Pictures: Source: ereach, Graphics: Hanne Simone; modified

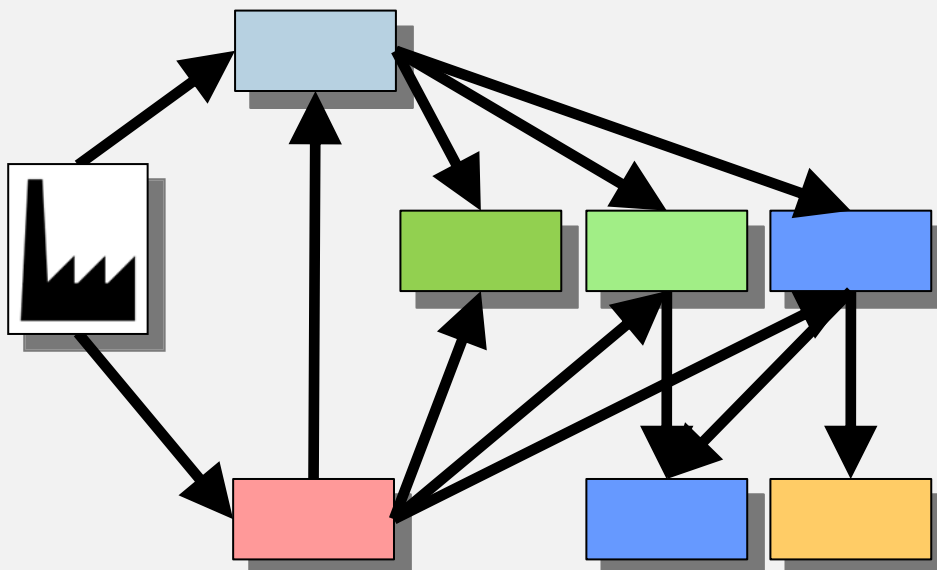
Regional release estimation

Regional Scale

background
concentration



Local Scale



Workflow of exposure estimation (2): Release estimation - Refinement

Sources

OECD ESDs

Industry sector
knowledge
SPERCs library,
GES library,
RMM library

Max releases set
in permits,
BREFs

Release
measurements

Workflow

1. Mapping of uses

2. Release estimation

Release rates
 E_{local} (kg/day)

Input data

Tonnages:
max. daily use /
max. annual use,
market data

Release factors:
sector specific
emission factors

release days

OC / RMM

$$E_{\text{local}} = Q_{\text{daily}} \times RF \times (1 - F_{\text{RMM}})$$

Emission Scenario Documents (ESD)

- Developed by OECD
- Provide information to make estimates of emissions into the environmental compartments
- Normally they do not deal with subsequent fate and behaviour of the substance because standard fate models exist for the environmental exposure assessment
- Cover parts of the life cycle of the substances



Emission Scenario Documents (ESD) - published

Series No. 1	Guidance Document on Emission Scenario Documents	2000
Series No. 2	Wood preservatives	2000
Series No. 3	Plastic Additives (production and formulation)	2004, revised 2009
Series No. 4	Water Treatment Chemicals	2004
Series No. 5	Photographic Industry	2004
Series No. 6	Rubber Additives	2004
Series No. 7	Textile Finishing Industry	2004, revision in process
Series No. 8	Leather Processing	2004
Series No. 9	Photoresist Use in Semiconductor Manufacturing	2004, revised 2008
Series No. 10	Lubricants and Lubricant Additives	2004
Series No. 11	Automotive spray application	2004, revision in process
Series No. 12	Metal finishing	2004
Series No. 13	Antifoulants	2005
Series No. 14	Insecticides for Stables and Manure Storage Systems	2006
Series No. 15	Kraft Pulp Mills	2006
Series No. 16	Non-Integrated Paper Mills	2006
Series No. 17	Recovered Paper Mills	2006
Series No. 18	Insecticides	2008
Series No. 19	Complementing Guideline for Writing ESDs: The Life-Cycle Step "service-life"	2009
Series No. 20	Adhesive Formulation	2009
Series No. 21	Formulation of Radiation Curable Coatings, Inks and Adhesives	2009
Series No. 22	Coating Industry (Paints, Lacquers and Varnishes)	2009
Series No. 23	Pulp, Paper and Board, Industry	2009
Series No. 24	Transport and Storage of Chemicals	2009

Special Environmental Release Category - SPERC

- Refine ERC-based emission estimation
- Based on good practice information supplied by sector groups, trade associations and on ESDs
- Provide
 - typical emission factors
 - typical risk management measures
 - Efficiency of risk management measures
 - Amount of substance used safely
- SPERCs are documented in SPERCs fact sheets
- Will be made available via CEFIC ES library soon

SPERCs

- Acceptance of SPERCs within authorities depend on traceability of value derivation
- Documentation of input data and made assumptions are essential

A-/B-tables

- If industry continuous using A-/B-tables, they should document the assumptions on which the values are based on (e. g. are RMM considered or not, which OC conditions are assumed), a link to the TGD 2003 is not enough

RMM general

- Communication of required effectiveness of RMM without specification of the RMM is not enough
- >> REACH requires the description of OC / RMM leading to a certain release factor or release rate and not only the indication of the release rate itself
- Narrative description of possible types of RMM that can be used to achieve a certain effectiveness is not enough
- >> may be difficult for DU to proof, if registrants release estimation is applicable for DU situation

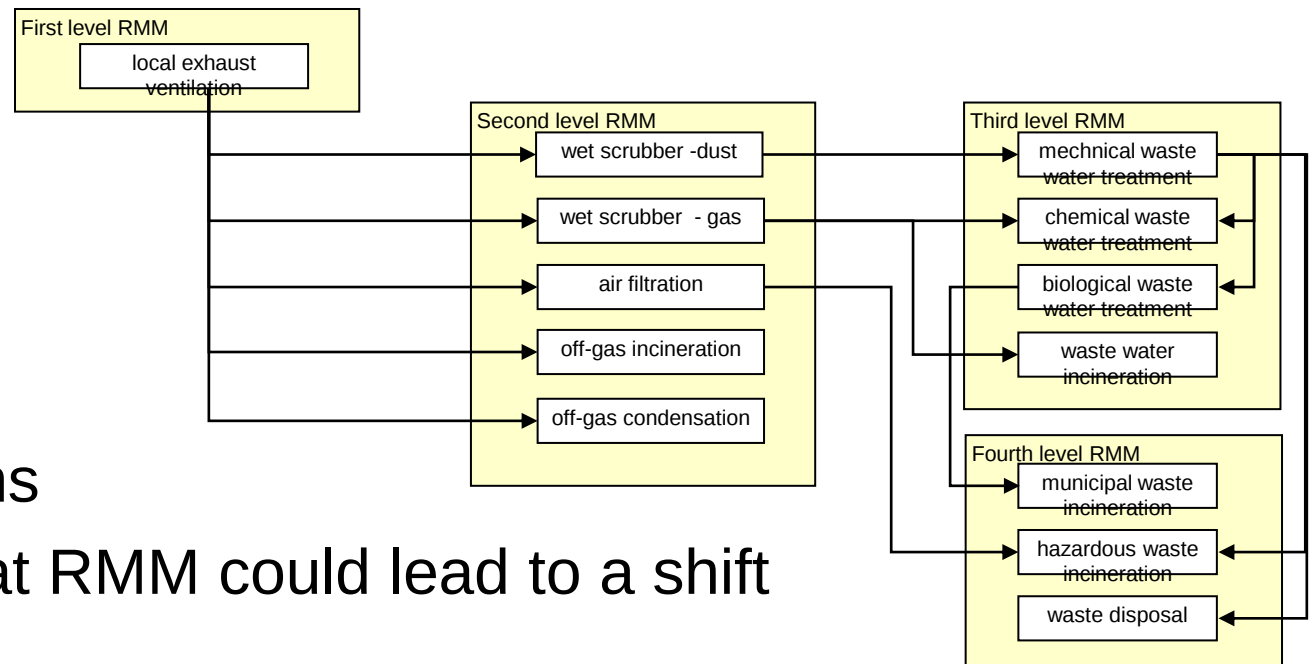
Effectiveness of RMM

- Suitable for the considered substance

Aspects to consider

RMM library

- Effectiveness stated as low, moderate, high without further definition in some cases
- For some RMM no source of effectiveness is mentioned

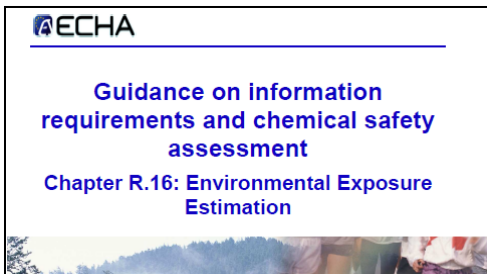


Shift of emissions

- Be aware that RMM could lead to a shift of emission

Workflow of exposure estimation (3): Exposure estimation - default

Sources



Tools



EUSES (2.0.3)

Simple Box
Simple Treat



Workflow

1. Mapping of uses

2. Release estimation

3. Environmental fate and distribution,
Exposure estimation

PECs

Input data

Substance
properties
(IUCLID)

Default
environmental
settings
(e.g. river flow
rate, discharge
volume STP,
area of
environment)

Minimum information for environmental fate and distribution estimation:

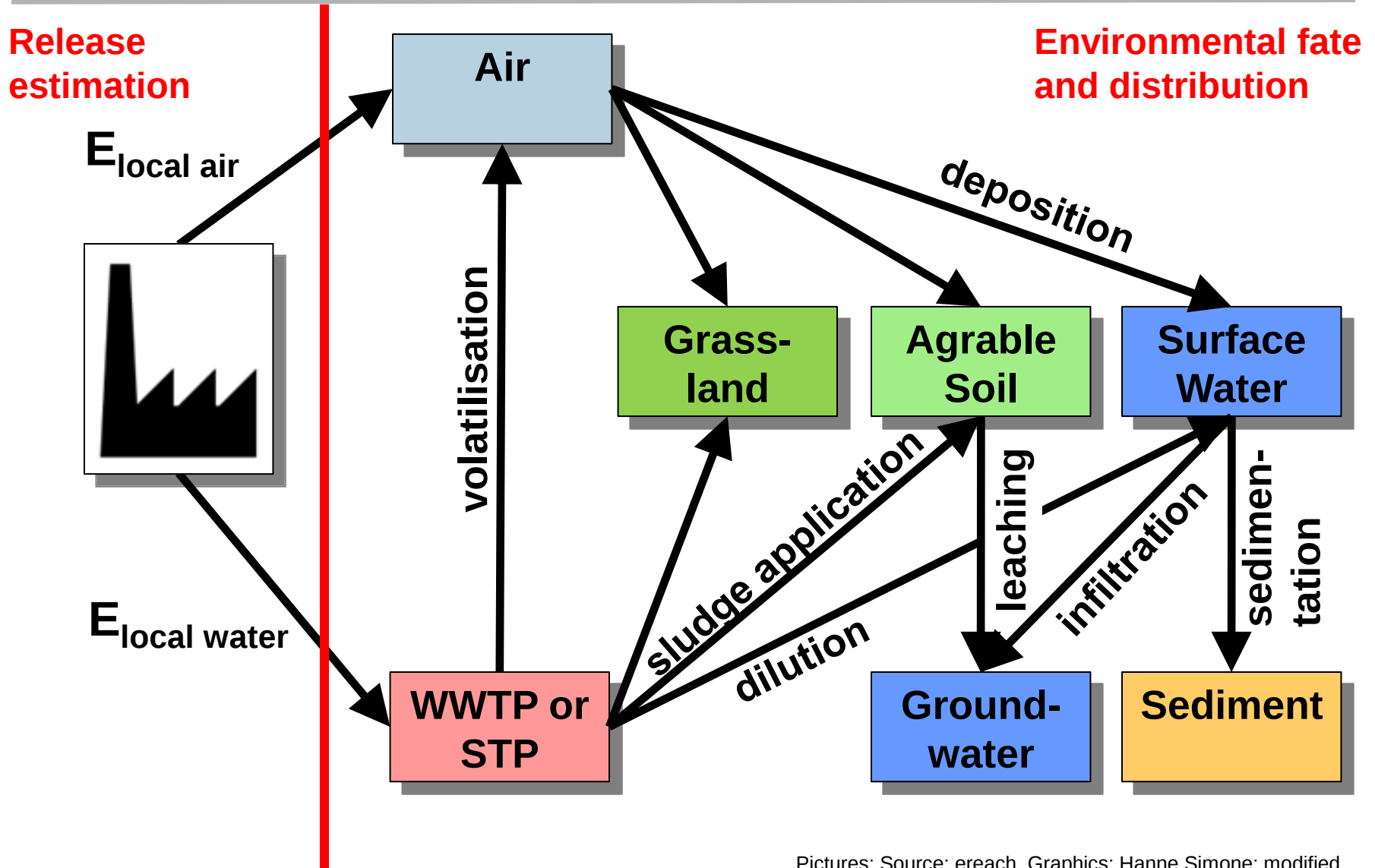
- Vapour pressure
- Water solubility
- Molecular weight
- Melting point
- Boiling point

- Partition coefficient n-Octanol / Water (K_{ow})

- Information on ready biodegradability

Local exposure estimation: distribution

Industrial setting



Pictures: Source: ereach, Graphics: Hanne Simone; modified

Workflow of exposure estimation (3): Exposure estimation - Refinement

Sources

Federal Agency

In Germany for
example:

Bundesanstalt
für Wasserbau,

Bundesanstalt f.
Gewässerkunde

Refined Tests

Workflow

1. Mapping of uses

2. Release estimation

3. Environmental fate and
distribution,
Exposure estimation

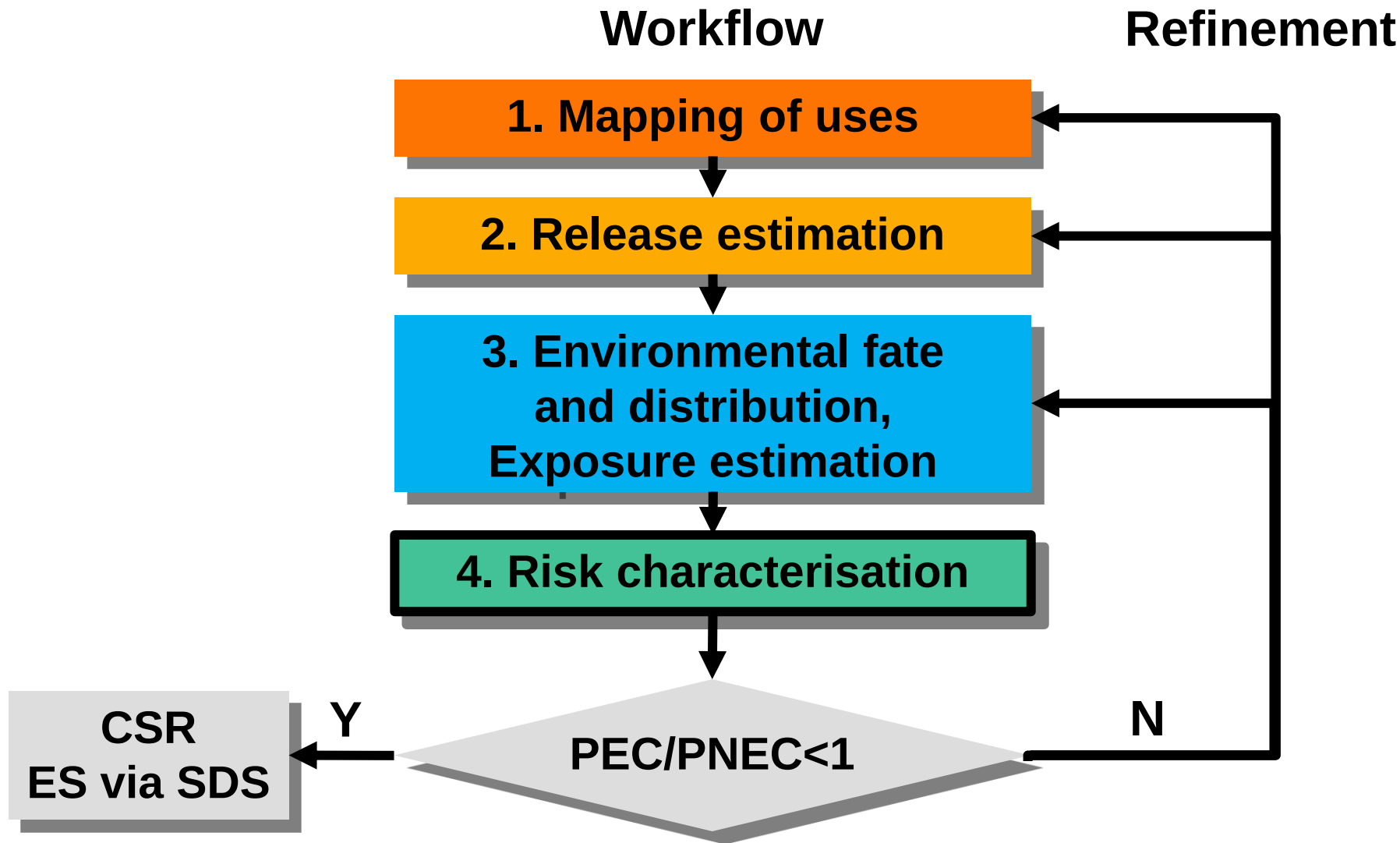
PECs

Refinement

More specific
environmental
settings
representative
onsite data

Refined
Substance
properties:
biodegradation
in surface water,
sediment, soil,
STP

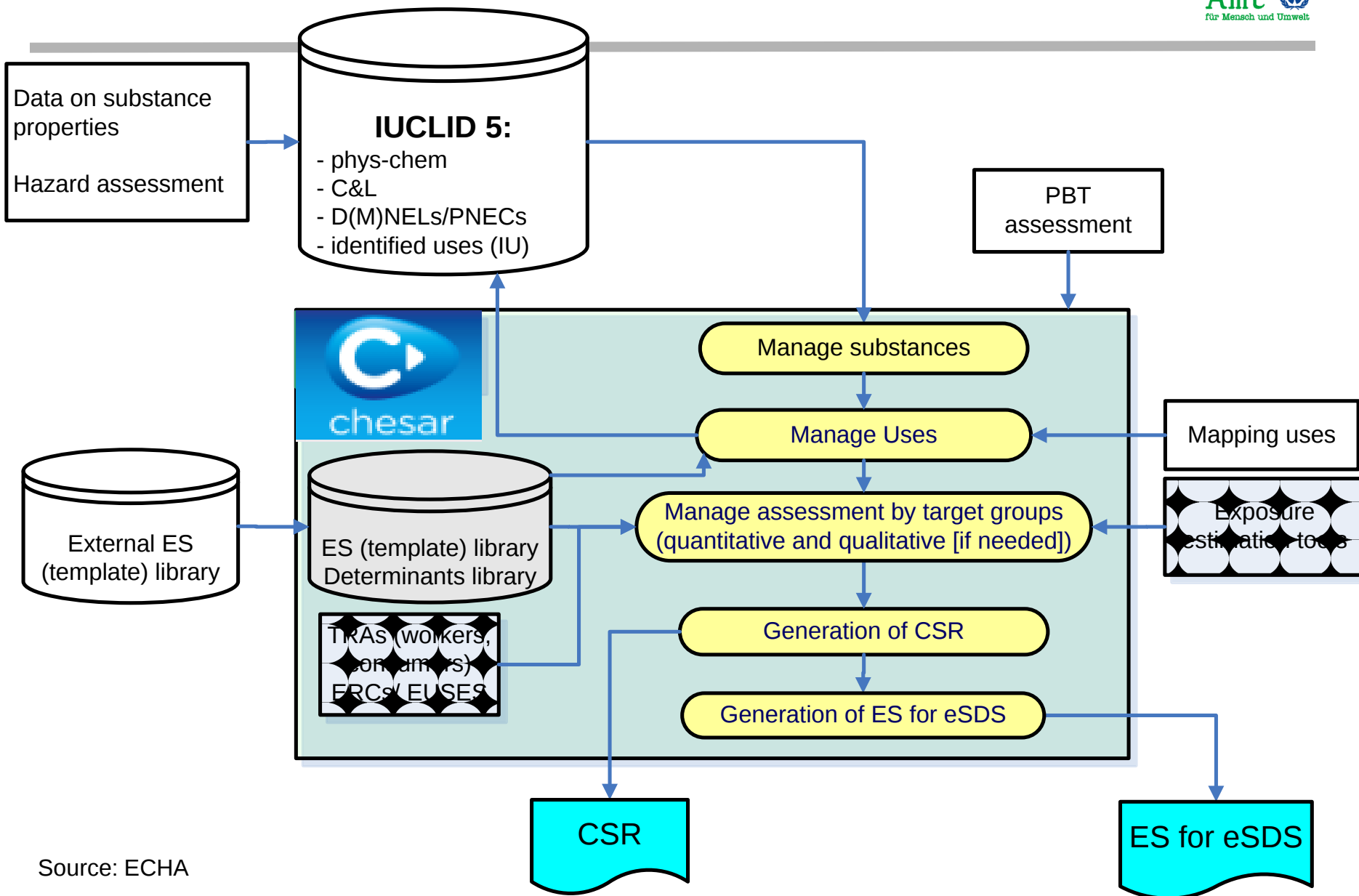
Workflow of exposure estimation (4): Risk characterisation



1. Key steps of environmental exposure assessment, appropriate tools and input data, aspects to consider

2. Exemplification

Chesar-Tool



Source: ECHA

Nannett Aust , 6th International Fresenius Chemicals Policy Conference, 7. / 8.12.2009, Cologne

FileEditToolsWindowLife CycleHelp

chesar

Life Cycle TreeWorker ViewConsumer ViewEnvironment ViewAdmintab WindowSubstanceProperties Window

Life Cycle Steps

PC

PROC

Environment Label

ERC

SU

AC

Tonnage

Remark

Manufacture

continuous, closed process

closed, continuous manufacturing

Dyes

Mixing/Blending

mixing of chemicals

loading/unloading

filling of drums/containers

Industrial end-use stage: Textile Dyeing

Dipping of Article

transfer of substance

Professional end-use stage: t-shirt print

offset printing

Consumer end-use stage: Water based paint

do-it-yourself paint

Service life stage (consumers) [edit]

PC 9a

PROC 2

continuous, closed process

ERC 1

12300

PROC 5

multistage process

ERC 2

5500

PROC 8a

PROC 9

open batch process

ERC 4

SU 5

2500

PROC 13

PROC 8b

wide dispersive indoor

ERC 8c

SU 5

1000

PROC 10

Wide dispersive outdoor

ERC 8a

2000

0

Life cycle stage label

Consumer end-use stage: Water based p

Environment Label

Wide dispersive outdoor

Environmental Release Category (ERC)

ERC 8a: Wide dispersive indoor use of processing ...

Further specification (environment)

Tonnage (tonnes/year)

2000

Remark

OK

Cancel

Build life cycle tree

Worker LinksConsumer Links

31

FileEditToolsWindowLife CycleHelp

chesar

Life Cycle Tree xWorker View xConsumer View xEnvironment View xAdmintab Window xSubstanc...

Life Cycle StepsPCPROCEnvironment LabelERCUSAC TonnageRemark

Manufacture

continuous, closed process

closed, continuous manufactur...

Dyes

Mixing/Blending

mixing of chemicals

loading/unloading

filling of drums/containers

Industrial end-use stage: Te...

Dipping of Article

transfer of substance

Professional end-use stage: ...

offset printing

Consumer end-use stage: W...

do-it-yourself paint

Service life stage (consumer...

ERC 1

ERC 2

ERC 4

ERC 8c

ERC 8a

PROC 2

PROC 5

PROC 8a

PROC 9

PROC 13

PROC 8b

PROC 10

continuous, closed process

multistage process

open batch process

wide dispersive indoor

Wide dispersive outdoor

8300

12300

8300

5500

2500

1000

2000

0

Remark

Consumer AssessmentEnvironment A...Worker AssessmentMan Via Environment...

Environment

Water

Fresh Water

Pelagic

EUSES

EUSES

Marine Water

Pelagic

EUSES

Sediment

EUSES

Method

EUSES 2.1

EUSES 2.1

EUSES 2.1

EUSES 2.1

EUSES 2.1

EUSES 2.1

Exposure

157.0 [mg.l-1]

1180.0 [mg.kgdt-1]

15.7 [mg.l-1]

118.0 [mg.kgdt-1]

RCR

15.7

39.33333333333333

3.139999999999999

OC/RMMReleasesExposureJustification

Product characteristics

Pattern of release to the environment

Amounts used

Maximum annual use at a site

Maximum daily use at a site

Frequency and duration of use

Environment factors not influenced by risk management

Receiving surface water flow rate

Other given operational conditions affecting environmental exposure

Technical conditions and measures at process level (source) to prevent release

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Organizational measures to prevent/limit release from site

Conditions and measures related to municipal sewage treatment plant

Incineration of the sludge of STP STP

Discharge rate of STP

Municipal STP

Conditions and measures related to external treatment of waste for disposal

Conditions and measures related to external recovery of waste

Continuous

= 2500.0 tonnes/year

= 25.0 tonnes/day

= 18000.0 m3/day

= 2000.0 m3/day

Yes

OC/RMMReleasesExposureJustification

Water

Calculation type

Release estimatio...

Tonnage

Release Factors (%)

Release rates (kg/...

Default release

ERC 4

25.0

100.0

25000.0

Set release factor

25.0

0.0

0.0

Set release rate

25.0

0.0

0.0

Air

Calculation type

Release estimatio...

Tonnage

Release Factors (%)

Release rates (kg/...

Default release

ERC 4

25.0

100.0

25000.0

Set release factor

25.0

0.0

0.0

Set release rate

25.0

0.0

0.0

Soil

Calculation type

Release estimatio...

Tonnage

Release Factors (%)

Release rates (kg/...

Default release

ERC 4

25.0

5.0

0.0

Set release factor

25.0

0.0

0.0

Set release rate

25.0

0.0

0.0

Annual total releases

Total Release To

Release rates (kg...

Water

2509172.602739726

Air

3252500.0

Soil

125347.34246575...

Calculate

Perform default exposure assessment

33

Chesar

File Edit Tools Window Life Cycle Help

Life Cycle Tree

Worker View

Consumer View

Environment View

Admin Tab Window

Substanc...

Life Cycle Steps	PC	PROC	Environment Label	ERC	SU	AC	Tonnage	Remark
Manufacture							8300	
continuous, closed process			continuous, closed process	ERC 1			12300	
closed, continuous manufactur...		PROC 2						
Dyes	PC 9a						8300	
Mixing/Blending			multistage process	ERC 2			5500	
mixing of chemicals		PROC 5						
loading/unloading		PROC 8a						
filling of drums/containers		PROC 9						
Industrial end-use stage: Te...			open batch process	ERC 4	SU 5		2500	
Dipping of Article		PROC 13						
transfer of substance		PROC 8b						
Professional end-use stage: ...			wide dispersive indoor	ERC 8c	SU 5		1000	
offset printing		PROC 1						
Consumer end-use stage: W...								
do-it-yourself paint	PC 9a							
Service life stage (consumer...								

Consumer Assessment

Environment A...

Worker Assessment

Man Via Environment...

	Method	Exposure	RCR
Environment			
Water			
Fresh Water			
Pelagic			
EUSES	EUSES 2.1	157.0 [mg,l-1]	15.7
Sediment			
EUSES	EUSES 2.1	1180.0 [mg,kgdwt-1]	39.333333333333336
Marine Water			
Pelagic			
EUSES	EUSES 2.1	15.7 [mg,l-1]	3.1399999999999997
Sediment			
EUSES	EUSES 2.1	118.0 [mg,kgdwt-1]	
FoodChain			
Fresh Water Food Cha...			

OC/RMM

Justification

Releases

Exposure

Product characteristics	
Pattern of release to the enviroment	Continuous
Amounts used	
Maximum annual use at a site	= 2500.0 tonnes/year
Maximum daily use at a site	= 25.0 tonnes/day
Frequency and duration of use	
Environment factors not influenced by risk management	
Receiving surface water flow rate	= 18000.0 m3/day
Other given operational conditions affecting environmental exposure	
Technical conditions and measures at process level (source) to prevent release	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Organizational measures to prevent/limit release from site	
Conditions and measures related to municipal sewage treatment plant	
Inceneration of the sludge of STP STP	No
Discharge rate of STP	= 2000.0 m3/day
Municipal STP	Yes
Conditions and measures related to external treatment of waste for disposal	
Conditions and measures related to external recovery of waste	

EUSES - Maximum daily use at a site

Value: = 10 tonnes/day

Standard Phrases:

Internal Note:

Included to CSR: ☐

Explanation for CSR:

eSDS Flag: ☐

Explanation for eSDS:

OK

Cancel

$$E_{\text{local}} = Q_{\text{daily}} \times \text{RF}$$

Refinement option a:
refine maximum daily use

File Edit Tools Window Life Cycle Help

Life Cycle Tree

Worker View

Consumer View

Environment View

Admintab Window

Substanc...

Life Cycle Steps

PC

PROC

Environment Label

ERC

SU

AC

Tonnage

Remark

Manufacture

continuous, closed process

Dyes

Mixing/Blending

Industrial end-use stage: Te...

Professional end-use stage: ...

Consumer end-use stage: W...

Service life stage (consumer...

Environment Label

ERC 1

ERC 2

open batch process

wide dispersive indoor

Wide dispersive outdoor

ERC

ERC 1

ERC 2

ERC 4

ERC 8c

ERC 8a

SU

SU 5

SU 5

SU 5

AC

AC

AC

AC

AC

AC

Tonnage

8300

12300

8300

5500

2500

1000

2000

0

Remark

Consumer Assessment

Environment A...

Worker Assessment

Man Via Environment...

Environment

Water

Fresh Water

Pelagic

Sediment

Marine Water

Pelagic

Sediment

EUSES

Method

EUSES 2.1

EUSES 2.1

EUSES 2.1

EUSES 2.1

EUSES 2.1

EUSES 2.1

EUSES 2.1

EUSES 2.1

Exposure

1.26 [mg.l-1]

9.46 [mg.kgdt-1]

0.126 [mg.l-1]

0.946 [mg.kgdt-1]

RCR

0.126

0.315333333333333...

0.0252

OC/RMM

Releases

Exposure

Justification

Water

Air

Soil

Calculation type

Release estimation...

Tonnage

Release Factors (%)

Release rates (kg/...

Default release

ERC 4

10.0

100.0

10000.0

Set release factor

10.0

2.0

200.0

Set release rate

10.0

0.0

0.0

Annual total releases

Total Release To

Release rates (k...

Water

50438.35616438...

Air

2637500.0

Soil

125343.9726027...

Calculate

$$E_{\text{local}} = Q_{\text{daily}} \times \text{RF}$$

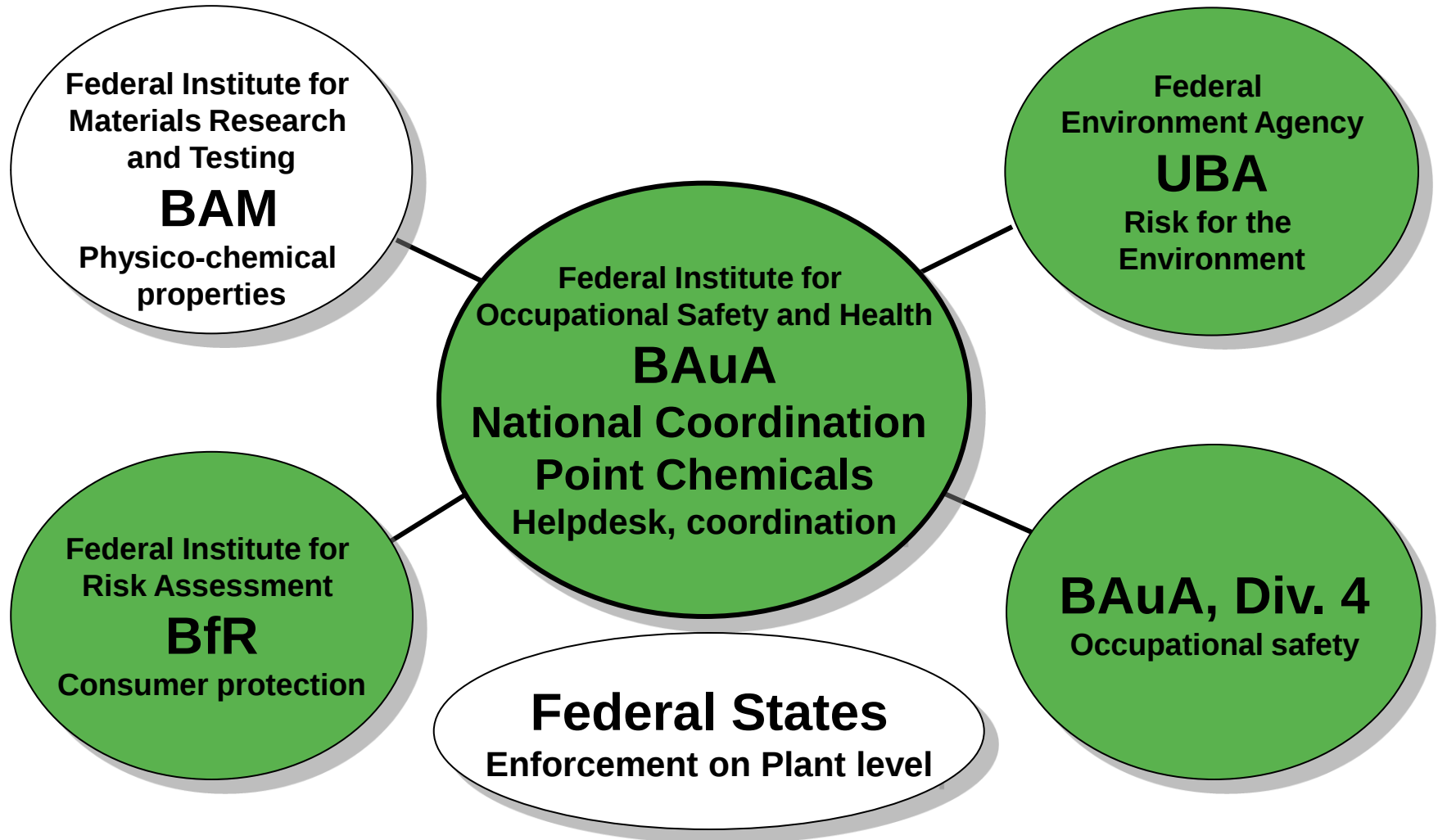
Refinement option b:
refine release factor

Thank you for your attention



Back-up slides

Division of responsibilities within competent authorities in Germany



Key activities UBA (1)

- Identification and assessment of substances for which regulatory activities are necessary
 - Evaluation of critical substances and groups of substances
 - Consultation for political institutions and groups
 - Preparation of information for the general public (background papers, press releases)
 - Identification of SVHC-candidates, preparation of regulatory activities (preparation of Annex-XV-dossiers)
 - Identification of candidates for substance evaluation (development of criteria for identification)

Key activities UBA (2)

- Advancement of the criteria / concepts for the assessment of chemicals
 - for the PBT-assessment, revision of Annex XIII
 - for the use of (Q)SAR-information and read across
 - for the ecotoxicological assessment (toxic threshold of concern, endocrine disruptor) incl. revision of guidelines
 - for the **environmental release and exposure assessment**
- Interface between REACH and industrial plant regulations
- Interface between REACH and water protection regulations
- Interface between REACH and waste regulations
- Optimisation of the availability of existing monitoring data

1. Check relevance of waste stage
2. Derive waste streams from identified uses
 - municipal waste (landfill, incineration).
end of life articles, non-hazardous waste from manufacturing and downstream use, consumer use of preparations
 - material recycling (assess different recycling processes)
relevant for substances in articles like paper, plastic, rubber, mineral construction materials
 - hazardous waste (incineration, co-incineration, phys.-chem.-treatment, recovery)
waste from RMM (manufacturing and downstream uses), production waste (manufacturing, uses), contaminated packaging, clothes, rags, classified consumer preparations)
3. Build generic exposure scenario

Environmental release category - examples

ERC	Life cycle Stage	level of containment	technical fate	Dispersiv-ness	indoor / outdoor	rele ase
1	manufacture of organic or inorganic substances					
2	mixing and blending of substances into preparations: paints, DIY products, cleaning products, fuels					
3	mixing and blending of substances into or onto a matrix: plasticizers, stabilizers					
4	use of processing aid: solvents used in chemical reactions, lubricants in metal working fluids					
5	inclusion into / onto a matrix: dyes in textile fabrics, heat stabilizer in plastic processing					
6a	use of intermediates / manufacture of another substance: synthesis of agrochemicals, monomers					
6b	reactive processing aid: use of bleaching agents in paper industry					
6c	use of monomers for production of polymers: vinyl chloride monomer in production of PVC					
6d	use of process regulators in production of resins, rubbers, polymers: vulcanization agents rubber product.					
7	use of substances in closed systems: liquid in hydraulic systems					
8a	use of processing aids by the public: detergents in fabric washing, automotive care products					
8b	use of reactive substance by the public: bleaching agent in fabric washing					
8c	use of non-processing aids by the public: binding agent in paints and coatings, dyeing of textile fabrics					
8d	outdoor use of processing aid by the public: automotive care products, solvents in paints					
8e	outdoor use of reactive substance by the pub.: hydrogen peroxide for surface cleaning (building materials)					
8f	outdoor use of non-processing aid by the public: binding agent in paints and coatings or adhesives					
9a	indoor use in closed systems: cooling liquids in refrigerators, oil-based electric heaters					
9b	outdoor use in closed systems: lubricants in motor oil, break fluids in automotive brake systems					
10a	outdoor use of long-life articles: metal, wooden, plastic constructions, building materials					
10b	use long-life articles / materials with high release: brake pads. abrasive processing: sanding of bridges					
11a	indoor use of long-life articles: flooring, furniture, toys, construction materials, footwear, paper products					
11b	use long-life articles / materials with high release: release fr. fabrics during wash., removal of indoor paint					
12a	industrial processing of articles with abrasive techniques: cutting of textile, machining of polymers					
12b	industrial processing of articles with abrasive techniques, high release: sanding operations					

Regional release estimation

- Regional releases are used as background concentration for the local environment
- Sum of emission from all sources in the region

Tonnage at regional level for each use (t/day)

Tonnage Regional_{IU} = 100 % tonnage at EU level (industrial setting)
= 10 % tonnage at EU level (wide dispersive uses)

$$\begin{aligned} & \text{Total Regional Release}_{IU,comp} \text{ (kg/day)} \\ &= \text{Tonnage Regional}_{IU} \times RF_{IU,comp.} \times 1000 / 365 \end{aligned}$$

RF: release factor, IU: identified use

Emission Scenario Documents (ESD) - under development

Electronics industry
Printing industry
Manufacture of thermal and carbonless copy paper
Application of Radiation Curable Coatings, Inks and Adhesives
Chemicals in oil well production industry
Chemical vapour deposition in semiconductor industry
Industry surfactants
Use of metal working fluids
Use of adhesives
Chemicals used in water-based washing operations in industrial and institutional laundries
Industrial use of industrial cleaners inkl. ES for representative cleaning processes
Plastic additives, use of end products
Blending of fragrance oils into consumer and commercial products

Operational Conditions / Risk Management Measures

- GES library: developed by industry associations including description of specific sectors' situations
- RMM library (CEFIC): general overview of abatement technique
- Best available technique reference documents (BREFs) under IPPC directive



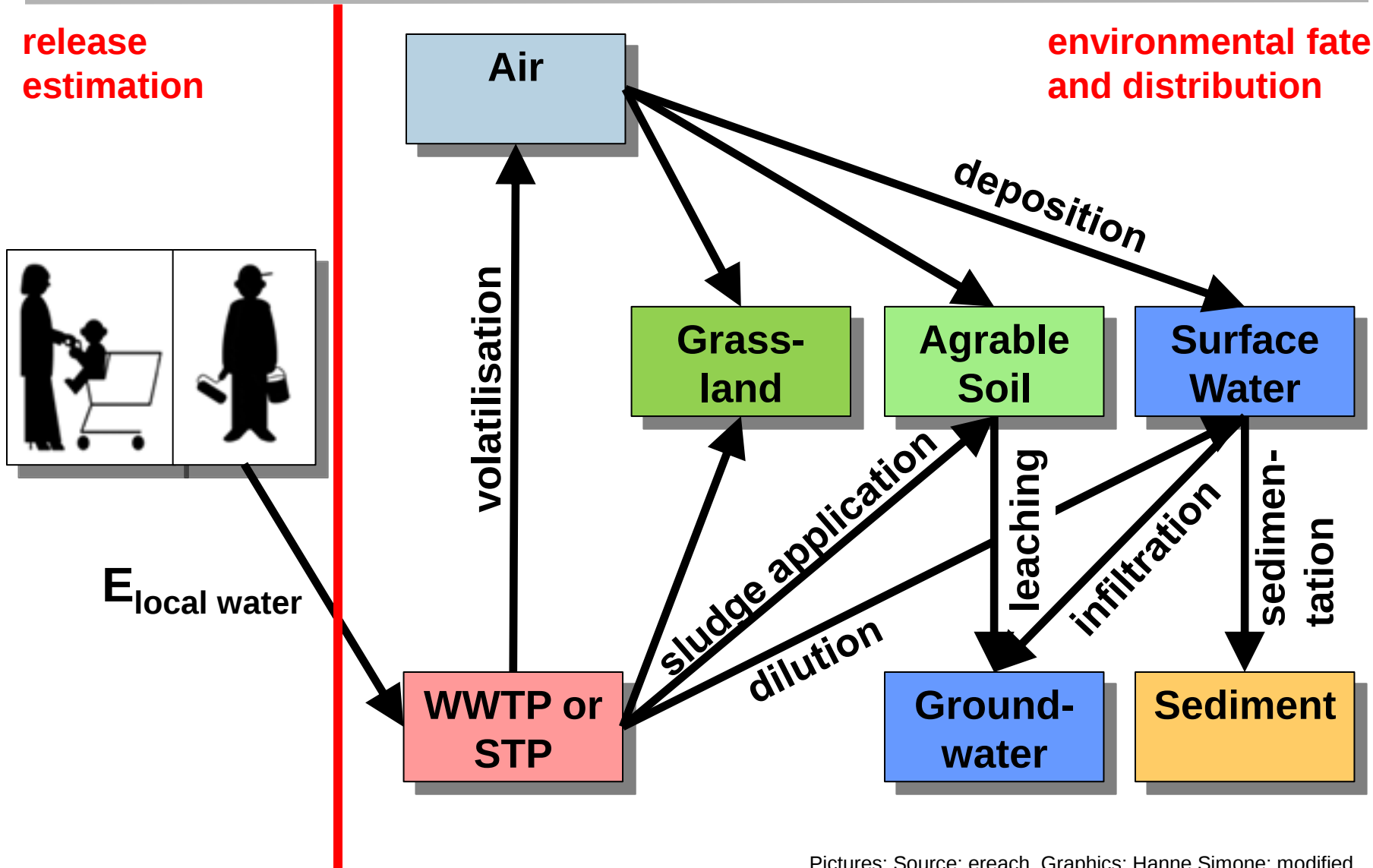
	Production of Iron and Steel	BREF (12.2001)
	Production of Polymers	BREF (08.2007)
	Production of Speciality Inorganic Chemicals	BREF (08.2007)
	Pulp and Paper Industry	BREF (12.2001)
	Slaughterhouses and Animals By-products Industries	BREF (05.2005)
	Smitheries and Foundries Industry	BREF (05.2005)
	Surface Treatment of Metals and Plastics	BREF (08.2006)

Local exposure estimation: distribution

Wide dispersive use

release
estimation

environmental fate
and distribution

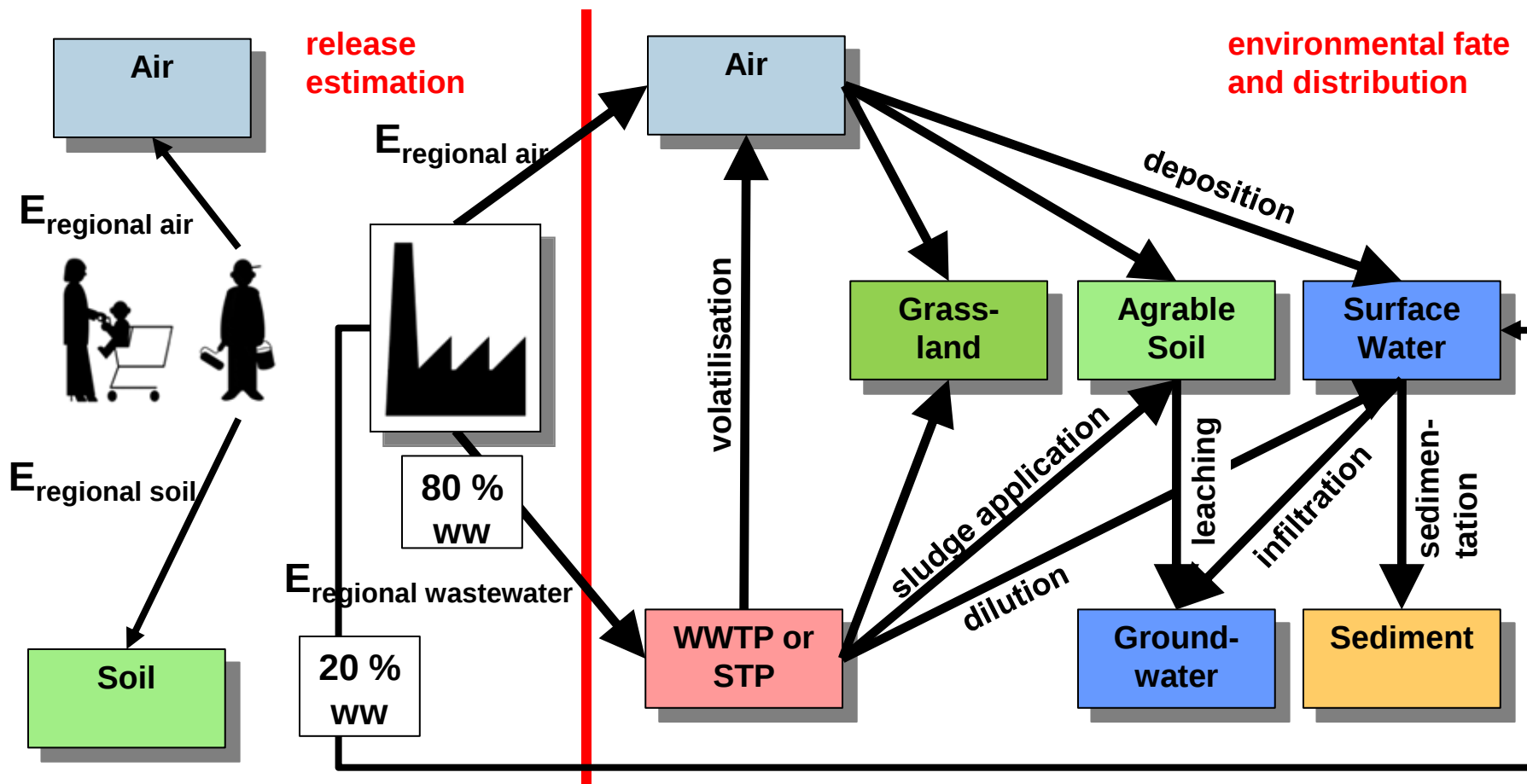


Pictures: Source: ereach, Graphics: Hanne Simone; modified

Regional exposure estimation: distribution wide dispersive use and industrial setting

10 % tonnage at EU level

100 % tonnage at EU level



Pictures: Source: ereach, Graphics: Hanne Simone; modified

Exposure Scenario - part 2.2 Control of environmental exposure - industrial setting

Product characteristics	
Amounts used	
Maximum daily use at a site	$\leq$ (default by release module) Can be overwritten during iteration
Maximum annual use at a site	$\leq$ filled by default by release module Can be overwritten during iteration
Percentage of tonnage used in region	= 100 % (default)
Frequency and duration of use	
Pattern of release to the environment	Continuous (default) intermittent
Environment factors not influenced by risk management	
Receiving surface water flow rate	$\geq$ 18000 (default) m ³ /d
Other given operational conditions affecting environmental exposure	
Technical conditions and measures at process level (source) to prevent release	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Organizational measures to prevent/limit release from site	
Conditions and measures related to municipal sewage treatment plant	
Municipal Sewage Treatment Plant (STP)	Yes (default) No
Discharge rate Municipal Sewage Treatment Plant (STP)	$\geq$ 2000 (default) m ³ /d
Incineration of the sludge of the Municipal STP	No (default) Yes
Conditions and measures related to external treatment of waste for disposal	
Conditions and measures related to external recovery of waste	

Exposure Scenario - part 2.2 Control of environmental exposure - wide dispersive

Product characteristics	
Amounts used	
Average daily use over a year for wide dispersive use	$\leq$ filled by default by release module Can be overwritten during iteration
Frequency and duration of use	
Environment factors not influenced by risk management	
Receiving surface water flow rate	≥ 18000 (default) m ³ /d
Other given operational conditions affecting environmental exposure	
Technical conditions and measures at process level (source) to prevent release	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Organizational measures to prevent/limit release from site	
Conditions and measures related to municipal sewage treatment plant	
Municipal Sewage Treatment Plant (STP)	Yes (default) No
Discharge rate of the Municipal STP	≥ 2000 (default) m ³ /d
Incineration of the sludge of the Municipal STP	No (default) Yes
Conditions and measures related to external treatment of waste for disposal	
Conditions and measures related to external recovery of waste	

Summary of release pattern

		STP	SW/ marine water incl. sedi- ment via STP	SW/ marine water incl. sedi- ment direct	air indirect via STP	air direct	soil indirect via STP (grass- land, arable. soil)	soil direct	GW (under arable soil)
local scale	indus- trial setting	X	X	N	X	X	X	N	X
local scale	wide dis- persive use	X	X	N	X	N	X	N	X
regio- nal scale		N	X (80 %)	X (20%)	X	X	X	X	X