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**ENVIRONMENT DIRECTORATE
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THE WORKING PARTY ON CHEMICALS, PESTICIDES AND BIOTECHNOLOGY**

**DESCRIPTIONS OF EXISTING MODELS AND TOOLS USED FOR EXPOSURE ASSESSMENT
Results of OECD Survey**

**Series on Testing and Assessment
No. 182**

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OECD Environment, Health and Safety Publications

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DESCRIPTIONS OF EXISTING MODELS AND TOOLS USED FOR EXPOSURE ASSESSMENT
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INTER-ORGANIZATION PROGRAMME FOR THE SOUND MANAGEMENT OF CHEMICALS

A cooperative agreement among FAO, ILO, UNDP, UNEP, UNIDO, UNITAR, WHO, World Bank and OECD

Environment Directorate

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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This publication was developed in the IOMC context. The contents do not necessarily reflect the views or stated policies of individual IOMC Participating Organisations.

The Inter-Organisation Programme for the Sound Management of Chemicals (IOMC) was established in 1995 following recommendations made by the 1992 UN Conference on Environment and Development to strengthen co-operation and increase international co-ordination in the field of chemical safety. The Participating Organisations are FAO, ILO, UNDP, UNEP, UNIDO, UNITAR, WHO, World Bank and OECD. The purpose of the IOMC is to promote co-ordination of the policies and activities pursued by the Participating Organisations, jointly or separately, to achieve the sound management of chemicals in relation to human health and the environment.

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FOREWORD

This document includes a table which summarises descriptions of existing models and tools used for exposure assessment, as well as responses to a 2010 survey – conducted by the OECD Task Force on Exposure Assessment - upon which the table was based. The summary table and the responses are also available in the OECD Environmental Risk Assessment Toolkit (<http://envriskassessmenttoolkit.oecd.org/>).

For each model, the summary table includes the name and description of the model, the category or type of model, the approach or way in which the model was designed, and a link to a website which contains further information on the model. The full responses to the survey provide more detailed information for those who would like to know more about the models and tools.

This document has been developed under the leadership of the Netherlands and overseen by the Task Force on Exposure Assessment.

This document is published under the responsibility of the Joint Meeting of the Chemicals Committee and the Working Party on Chemicals, Pesticides and Biotechnology of the OECD, which has agreed to be unclassified and made available to the public.

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DESCRIPTIONS OF EXISTING MODELS AND TOOLS USED FOR EXPOSURE ASSESSMENT

Results of OECD Survey

1. Background

At the first meeting of the Task Force on Exposure Assessment (TFEA) in 2009, members agreed to launch a project to identify and describe existing rapid (or screening) models and tools for exposure assessment, and to make such information available for those who wish to conduct post-SIDS (Screening Information Data Sets) assessments with exposure assessments. The Netherlands and the United States volunteered to develop a questionnaire for gathering related information on available exposure models. This questionnaire was circulated to Task Force members for completion in 2010. Although the initial target of the project was models and tools for rapid exposure assessment, the responses received could also be applicable for other purposes (e.g., models/tools for various steps of exposure assessment from priority setting to detailed assessment, and for both environmental and human health exposure assessment).

Based on the responses to the survey, a summary table was developed to help users identify an appropriate model or tool for performing an exposure assessment. For this purpose, the models and tools were categorised into groups such as a “multi-media model.”

In 2011, the TFEA agreed on the content in the summary table and to include the actual responses to the questionnaire in the OECD Environmental Risk Assessment Toolkit (<http://envriskassessmenttoolkit.oecd.org/>). The Toolkit 1) describes the general work flow of environmental risk assessment and provides examples of risk assessments, and 2) provides links to relevant tools developed by OECD and member countries.

2. Overview of the responses

All total, descriptions of 56 models and tools were provided by 12 organisations which responded to the questionnaire. For 13 models and tools, detailed descriptions are still lacking. The received responses are compiled in the Annex to this document. Models and tools that were not incorporated in this document were mostly outdated, superseded, or not available to the general population or scientific community.

Descriptions of a large variety of models and tools were received from the well-known substance property estimation program EPISUITE (EPA) to very specific and recent bioaccumulation models for human exposure via the food chain (e.g. CoZMoMAN). Regulatory acceptance of the different models also varies widely, from accepted screening models on a continental scale, to models which are just improvements of existing models and are not used widely.

The results of the survey, even with the relatively limited scope, provide an interesting insight into past and current model and tool developments.

Integrated risk assessment models (mostly for priority setting and screening assessment) include such models as CHESAR, EUSES and CHEMSTEER. The core of such models is usually a multi-media model that combines chemical fate and distribution with environmental risk assessment and exposure of humans via the environment. In some cases, additional models can be integrated in the 'model suite' to tackle specific exposure assessments for workers or consumers. Addressing all target groups (including children or other sensitive sub-groups) in a single model suite is, however, quite rare.

Many of the models in the survey belong to the class of multi-media models, sometimes extended with equations for bioaccumulation in food chains and subsequent human exposure. Exposure calculations for these target groups can all be addressed in the same model approach (e.g., RAIDAR, CoZMoMAN).

Models for consumer exposure are a bit less common and usually based on a set of simple to moderately complex algebraic equations. Models for very specific consumer exposure situations also exist, such as for wall paints.

Worker exposure models also feature in the current compilation with emphasis on control banding tools in the REACH legislation (e.g., Stoffenmanager, EMKG EXPO TOOL).

More specific and regional (dynamic) exposure models for air, water or groundwater also feature in the current collection, which most likely only reflects a fraction of the number of regional models that are available.

Some models can trigger additional elements in a risk assessment such as human exposure in specific applications (the wall paint model) or due to global pollution with persistent organic chemicals (e.g., RAIDAR, IMPS).

3. Categorisation of models and tools

The models and tools identified in the responses were categorized to help users find an exposure model or tool that suits their needs.

The categorisation is pragmatic because it is based on the models and tools that were identified in the survey, and was not a predefined system which was then applied to the models and the tools. To accommodate future updates and to help potential users recognise the type of the model in the summary table, a rather fine-grained model category system was preferred over a coarse-grained system. In addition, the categorisation is not exhaustive.

The following categories were assigned (in alphabetical order):

- atmospheric model
- bioaccumulation model
- biokinetic model
- chemical migration model
- composite model
- consumer exposure model
- database
- hydrogeological model
- hydrological model

- hydrological model
- life expectancy model
- multimedia model
- multimedia + bioaccumulation
- multimedia + food
- multimedia + residential exposure
- oceanographical model
- (Q)SAR model
- release estimation
- release estimation + occ. exposure
- skin absorption model
- statistical model
- worker exposure model

The 22 categories cover over 55 models or tools, and many categories only occur once or twice, with a clear emphasis on multimedia models (11 entries) and three types of combined multimedia models (multimedia + bioaccumulation, multimedia + food, and multimedia + residential exposure). Composite models such as EUSES often contain a multimedia core to calculate environmental fate, even increasing the importance of this type of model.

4. Summary table of available exposure models and tools

The summary table of existing models and tools used for exposure assessment is available in Table 1 and is composed of the following elements:

- Description

This is a short description, based on the ‘scope of model’ entry in the questionnaire. This includes the type of the model (priority setting, screening, detailed assessment, other) and the target group and exposure pathway.

- Category

This is a model category as outlined above.

- Approach

This is information mostly derived from the ‘scope of model’ entry in the questionnaire, but which gives information on the way the model is designed.

- Link to a full description on OECD website

This is the link to the full descriptions (i.e. received responses) on the OECD website, once the template descriptions are available on the OECD website. This item is for the table available as a part of the OECD Environmental Risk Assessment Toolkit. Since this item is a link to detailed information on each model/tool (the response to the survey) for the OECD Environmental Risk

Assessment Toolkit on the OECD website, the table of this document does not include this item. This item will be available in the OECD Environmental Risk Assessment Toolkit (<http://envriskassessmenttoolkit.oecd.org/>).

– Link to website

This is the link to the key entry on a website, which usually contains the description of the model and further links to model documentation and model download possibilities.

This summary table as well as the detailed model/tool information (i.e. received responses in the Annex) will be available on the OECD website as a part of the OECD Environmental Risk Assessment Toolkit (<http://envriskassessmenttoolkit.oecd.org/>).

The summary table is expected to be used as a reference to find a model or tool for exposure assessment. However, a user should review the information provided in this table to see if a model or tool is fit for purpose. The user can find additional information on a model or tool by looking at the model website.

Table 1 Summary table of available exposure models and tools

Model name	Owner	Description	Category	Approach	Link to website
AIST-ADMER	AIST	Estimating atmospheric concentrations of chemicals and assessing population exposure in Japan	atmospheric model		www.aist-riss.jp/software/admer/en/index_e.html
AIST-CBAM	AIST	Estimating the levels of hazardous chemicals in a food chain of Tokyo Bay.	bioaccumulation model		www.aist-riss.jp/projects/RAM/risk/CBAM_index.htm
AIST-RAMTB	AIST	Estimating water concentration distribution of chemicals in Tokyo Bay	oceanographic model		www.aist-riss.jp/projects/RAM/TB_index.htm
AIST-SHANEL	AIST	Simulating spatially resolved chemical concentrations in first-class rivers in Japan	hydrological model		www.aist-riss.jp/projects/AIST-SHANEL/
AMEM	US-EPA	Screening level model that estimates the fraction of a chemical additive that migrates from polymeric materials to air, water, and solids; under development (currently in DOS)	chemical migration model	Based on Fick's first law of diffusion; applicable to certain polymers	www.epa.gov/oppt/exposure/pubs/amem.htm
ART	TNO	Advanced worker inhalation exposure assessment	worker exposure model		www.advancedreachtool.com/

CALENDEX	Exponent	Estimates human exposure to chemical residues in foods and home-based chemical treatments, such as pest control and turf treatments		A calendar-based system that uses Monte Carlo sampling techniques to estimate the distributions of exposure, concurrent application or exposure to more than one product	Subscription required
CALTOX	Lawrence Berkeley National Laboratory	A risk assessment model that calculates the distribution of chemical in the environment, the risk of an adverse health effect due to a chemical and evaluates the distribution among different environmental compartments	multimedia model	Fugacity based mass-balance model	http://energy.lbl.gov/ied/ERA/caltox/
CARES	US-EPA	Databases to evaluate potential risk from dietary, drinking water, and residential sources and from oral, dermal, and inhalation routes of exposure	multimedia model	Calculates source and route-specific doses for an individual on the same day and combines them to obtain the aggregate dose	www.epa.gov/scipoly/sap/meetings/2002/april/cares/cares_documentation/tmanual2.pdf
ChemCAN	Trent University	Predict regionally-specific chemical concentrations in primary media	multimedia model	(level III fugacity), 24 zones in Canada	www.trentu.ca/academic/amins/envmmodel/models/models.html
ChemSTEER	US-EPA	Model for estimating (1) occupational inhalation and dermal exposures and (2) environmental releases to air, water, and land for chemicals during manufacturing, processing, and use.	composite model		www.epa.gov/oppt/exposure/pubs/chemsteer.htm

CHESAR	ECHA	REACH specific model to predict the concentration in environmental compartments, exposure of workers and exposure of consumers via food and environment. Consumer exposure to be added soon.	composite model	The prediction is based on substance properties, volumes, use pattern information and a few parameters reflecting the conditions of use.	http://chesar.echa.europa.eu/
ConsExpo	RIVM	Exposure assessment of compounds in non-food consumer products	consumer exposure model	Algebraic equations of increasing complexity	www.consexpo.nl
CoZMoMAN	University /Toronto/Oslo/Stockholm	Bioaccumulation model for humans, resulting from environmental exposure	multimedia + bioaccumulation	CoZMoMAN is a dynamic model which combines the multimedia fate and transport model CoZMo-POP2 with the bioaccumulation model ACC-HUMAN.	www.uts.utoronto.ca/~wania/downloads2.html
CSOIL	RIVM	Determination of human exposure to contaminants in soil and groundwater	composite model		www.rivm.nl/
DERMWIN	US-EPA	Estimates the dermal permeability coefficient (K_p), the dermally absorbed dose per event (DAevent) and Dermal Absorbed Dose (DAD) of organic compounds via water contact. (DERMWIN) v2.00 is included in the EPI Suite tool.	skin absorption model	Based on U.S. EPA Risk Assessment Guidance for Superfund, US EPA, Volume i: Human Health Evaluation Manual (Part E. Supplemental Guidance for Dermal Risk Assessment. Interim. 2004,	www.epa.gov/oppt/exposure/pubs/episuite.htm

E-FAST	US-EPA	Model for screening level estimates of chemical concentrations from releases to air, surface water, landfills and from consumer products. Also estimates inhalation, dermal and ingestion Potential Dose Rates and aquatic organism risks.	composite model		www.epa.gov/oppt/exposure/pubs/efast.htm
EMKG-EXPO-TOOL	BAUA	Quantitative tier 1 assessment of occupational exposure (inhalation) to hazardous substances.	worker exposure model	Based on the control banding approach of the COSHH Essentials originally developed by HSE.	www.reach-clp-helpdesk.de/en/Exposure/Exposure.html
EPI Suite TM Version 4.0	US-EPA	Screening level suite of physical/chemical property and environmental fate estimation programs	(Q)SAR model		www.epa.gov/oppt/exposure/pubs/episuite.htm
ES modifier	DHI group	Model developed mainly for Downstream-users needing to check and modify the REACH Exposure Scenario received from their suppliers.	composite model	REACH specific calculation and communication tool in the context of development of exposure scenarios	http://es-modifier.dhigroup.com/Indhold.htm
ETX2.0	RIVM	Statistical analysis of species sensitivity distributions (SSDs), meant for extrapolation of toxicity test results for risk assessment and standard setting	statistical model		www.rivm.nl/rvs/Risicobeoordeling/Modellen_voor_risicobeoordeling/ETX_2_0

EUSES 2.1	EC-JRC	EUSES is a decision-support instrument to carry out assessments of the general risks of industrial chemicals and biocides posed by substances to man and the environment.	composite model	EUSES is intended mainly for initial and refined risk assessments rather than comprehensive assessments.	http://ihcp.jrc.ec.europa.eu/our_activities/public-health/risk_assessment_of_Biocides/euses
FHX	Trent University	Holistic fate and exposure model for chemical exposure assessment of humans of different age-classes.	multimedia model	The FHX model brings together chemical emissions, fate and transport processes in the physical environment, and aquatic and terrestrial food web bioaccumulation.	www.trentu.ca/academic/amins/s/envmodel/models/models.html
FIAM	US-EPA	Prediction of airborne concentration of formaldehyde from pressed wood products in residences or buildings		This new model is still under development but will be finalized soon.	www.epa.gov/oppt/exposure/
G-CIEMS	NIES	Assessment of compounds in environmental and human exposure	multimedia model	G-CIEMS is the model of detailed geographical resolution for multimedia approach based on gridded air and catchment-river segment structure on surface media.	www.nies.go.jp/rcer_expoass/gciems/gciems.html
Generic Exposure Scenarios	CEFIC	Tool developed by sector associations to communicate generic exposure scenarios in that sector.	database		www.cefic.org/Industry-support/Implementing-reach/Libraries/

Golf green module	Upsala Univ.	Water flow and solute movement in macroporous soil, modified to predict groundwater contamination from golf green chemicals.	hydrogeological model	A physically-based, one-dimensional, numerical model	http://bgf.mv.slu.se/ShowPage.cfm?OrgenhetSida_ID=5658
HERA	AISE/CEFIC	Multiple human and environmental risk assessments on ingredients of household cleaning products according to HERA principles	multimedia model	EUSES model is being used in HERA assessment	www.heraproject.com/RiskAssessment.cfm
iAIR	AIST	Estimating indoor concentrations of chemicals emitted from consumer products			www.aist-riss.jp/software/iair/
IEUBK	US-EPA	The Integrated Exposure Uptake Biokinetic Model (IEUBK) is designed to model exposure from lead in air, water, soil, dust, diet, and paint and other sources with pharmacokinetic modeling to predict blood lead levels in children 6 months to 7 years old.	biokinetic model	The model estimates, for a hypothetical child or population of children, a plausible distribution of blood lead concentrations centered on a geometric mean concentration.	www.epa.gov/superfund/lead/products.htm
IGEMS	US-EPA	IGEMS includes models and data for ambient air, surface water, soil, and ground water	multimedia model		www.epa.gov/oppt/exposure/products/gems.htm
IK SKINPERM		Quantitative structure activity relationship for skin permeation	skin absorption model	Algorithm based tool to estimate maximal dermal absorption, can both from the gas phase and from the	Subscription required

				liquid phase estimate.	
IMPS	Trent University CAN	Regional (Baltic sea) chemical fate and bioaccumulation model to predict wildlife and human exposure to polar and non-polar organic chemicals.	multimedia + bioaccumulation	Mechanistically based, non-steady state.	Subscription required
Industry Specific Generic Scenarios	US-EPA	Industry specific methods and models for estimating occupational exposures and environmental releases for chemicals during industrial and commercial operations.	release estimation + occ. Exposure		www.epa.gov/opptintr/exposure/pubs/guidance.htm
LIFELINE software suite	LifeLine Group, Inc.	The model addresses exposures that occur from the use of pesticides on agricultural crops, in residences (homes and yards), and pesticide residues that occur in water supplies.	composite model	Based on databases of longitudinal inter and intra individual variability (eg.NCHS,NHANES) that make up the U.S. population	Subscription required
MCCEM - Multi- Chamber Concentration and Exposure Model version 1.2	US-EPA	Estimates average and peak indoor air concentrations of chemicals released from products or materials in houses, apartments, townhouses, or other residences.	multimedia model	The data libraries contained in MCCEM are limited to residential settings. However, the model can be used to assess other indoor environments (e.g. schools, offices) if the user can supply the	www.epa.gov/oppt/exposure/pubs/mccem.htm

				necessary inputs.	
METI-LIS	JEMAI	Estimating atmospheric chemical concentrations especially putting emphasis on the effect of downdraft accompanying low emission sources	atmospheric model		www.aist-riss.jp/projects/METI-LIS/
Notitia/CARES	US-EPA	See for CARES			see CARES
OECD Exposure Scenario Documents	OECD	Describes the sources, production processes, pathways and use patterns with the aim of quantifying the emissions (or releases) of a chemical into water, air, soil and/or solid waste.	release estimation	An ESD should in principle include all the following stages: (1) production, (2) formulation, (3) industrial use, (4) professional use, (5) private and consumer use, (6) service life of product/article, (7) recovery, and (8) waste disposal (incineration, landfill).	www.oecd.org/ehs/esd
PROMISE	American Chemistry Council	Designed to evaluate exposures and doses from single or multiple uses of products that contain volatile organics, not population based model	multimedia model	Algorithm based	

RAIDAR	Trent University	Holistic mass balance framework providing chemical exposure and risk assessments for humans and the environment. It is predominantly used as an evaluative model.	multimedia model	The RAIDAR model brings together chemical emissions, fate and transport processes in the physical environment, aquatic and terrestrial food web bioaccumulation, and effect (toxicity) endpoints in a	www.trentu.ca/academic/amins/s/envmodel/models/models.html
ReachScan	US-EPA	Estimates surface water chemical concentrations at drinking water utilities downstream from industrial facilities, the population affected, exceeding aquatic ecotoxicological concern concentrations	hydrological model		www.epa.gov/oppt/exposure/pubs/reachscan.htm
Risk Learning	AIST	Estimating human health risks of a specific chemical substance in environmental media (air, water, soil, etc.) or contact media (food, etc.) using carcinogenic risk and hazard quotient as risk indices			www.aist-riss.jp/projects/RL/
RiskCaT-LLE	AIST	Estimating human health risk as loss of life expectancy (LLE) from exposure to chemicals	life expectancy model		www.aist-riss.jp/software/riskcat/down.html
RiskOfDerm	TNO	Worker potential dermal exposure assessment	worker exposure model	Worker control banding tool, higher tier	www.tno.nl

SDA	Exponent	Exposure and Risk Screening Methods for Consumer Product Ingredients methodology for screening level exposure and risk assessments of chemicals used in consumer products, mainly laundry, cleaning and personal care products.	multimedia + food	Monte Carlo sampling techniques to estimate the distributions of exposure to US populations and its subpopulations	subscription needed
SHEDS	US-EPA	SHEDS is a probabilistic human exposure model. There are currently three versions of SHEDS. SHEDS-Multimedia version 3 / 4 is a probabilistic aggregate residential exposure model. The other SHEDS models address exposures to particulate matter (SHEDS-PM), air toxics (SHEDS-ATOX), and wood (SHEDS-Wood).	multimedia + residential exposure	The model estimates distributions of exposures in human populations and uncertainties in the estimates through a two-stage Monte Carlo approach.	www.epa.gov/heasd/products/sheds_multimedia/sheds_mm.html
Source Ranking Database 4.0	US-EPA	Performs a systematic screening-level review of over 12,000 potential indoor pollution sources to identify high-priority product and material categories for further evaluation. Can also identify the products that have contained a specific chemical.	database		www.epa.gov/oppt/exposure/pubs/srd.htm

Specific Exposure Scenario template	CEFIC	Data collection for exposure estimation	database		www.cefic.org/
SPERCs	CEFIC	Sector specific environmental standards for environmental exposure estimating tools	release estimation		http://cefic.org/en/reach-for-industries-libraries.html
Stoffenmanager	TNO	Control banding for worker dermal and inhalation exposure and quantitative exposure assessment for worker inhalation exposure	worker exposure model	Web-based tool	www.stoffenmanager.nl
SWIMODEL	US-EPA	Screening tool to conduct exposure assessments of pesticides found in indoor swimming pools and spas (these include the 200+ pesticides registered for swimming pool uses, as well as those which exist in water, and run-off water).	consumer exposure model	The model uses well-accepted screening exposure assessment equations to calculate the total worst-case exposure for swimmers expressed as a mass-based intake value (mg/event).	www.epa.gov/oppad001/swimodel.htm
Use Descriptor mapping	CEFIC	Data collection for sector use mapping	database		http://cefic.org/en/reach-for-industries-libraries.html
USES 4.0	RIVM	Quantitative assessment of the risks posed by new and existing chemical substances as well as agricultural and non-agricultural pesticides to man and the environment.	composite model	In addition to EUSES, USES also contains in depth models for pesticide exposure assessment	www.rivm.nl/rvs/risbeoor/Modelen/USES.jsp

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WPEM	US-EPA	Estimates the potential exposure of consumers and workers to the chemicals emitted from wall paint	Estimates an individual's inhalation exposure to airborne concentrations of a chemical released from latex or alkyd wall paint and/or primer, during and after the time when a building (residence, office, or standard box) is painted.	www.epa.gov/opptintr/exposure/pubs/wpem.htm
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ANNEX DETAILED MODEL/TOOL INFORMATION (RECEIVED RESPONSES)

Canada

Model description /tool	Information to be filled in																																																																		
Model or tool name	ChemCAN																																																																		
Scope of model / tool	Estimation of average concentrations of chemicals in air, fresh surface water, fish, sediments, soils, vegetation, and marine near-shore waters. The model is intended to provide regionally-specific estimates of chemical concentrations in the primary media and to assist in human exposure assessment.																																																																		
Type of model / tool	☒ Priority setting ☒ Screening assessment ☒ Detailed assessment ☐ Other, please specify:																																																																		
Target group(s) And exposure pathways	<table border="1"> <thead> <tr> <th>Pathway</th><th>Consumer</th><th>Worker</th><th>General population</th><th>Children</th><th>Environment</th></tr> </thead> <tbody> <tr> <td>Ingestion</td><td>☐</td><td>☐</td><td>☒</td><td>☐</td><td>☐</td></tr> <tr> <td>Inhalation</td><td>☐</td><td>☐</td><td>☒</td><td>☐</td><td>☐</td></tr> <tr> <td>Dermal</td><td>☐</td><td>☐</td><td>☒</td><td>☐</td><td>☐</td></tr> <tr> <td>Drinking water</td><td>☐</td><td>☐</td><td>☒</td><td>☐</td><td>☐</td></tr> <tr> <td>Soil</td><td>☐</td><td>☐</td><td>☒</td><td>☐</td><td>☒</td></tr> <tr> <td>Air</td><td>☐</td><td>☐</td><td>☒</td><td>☐</td><td>☒</td></tr> <tr> <td>Water</td><td>☐</td><td>☐</td><td>☒</td><td>☐</td><td>☒</td></tr> <tr> <td>Bioaccumulation/fish</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr> <td>Food chain</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr> <td>Other:</td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>	Pathway	Consumer	Worker	General population	Children	Environment	Ingestion	☐	☐	☒	☐	☐	Inhalation	☐	☐	☒	☐	☐	Dermal	☐	☐	☒	☐	☐	Drinking water	☐	☐	☒	☐	☐	Soil	☐	☐	☒	☐	☒	Air	☐	☐	☒	☐	☒	Water	☐	☐	☒	☐	☒	Bioaccumulation/fish	☐	☐	☐	☐	☐	Food chain	☐	☐	☐	☐	☐	Other:					
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Used or cited in (legal framework, project, program)	Canada - The Challenge screening assessments (http://www.chemicalsubstanceschimiques.gc.ca/challenge-defi/index-eng.php); PSL assessments (http://www.ec.gc.ca/substances/ese/eng/psap/psap.cfm)																																																																		
Owner	Canadian Environmental Modelling Centre (CEMC)																																																																		
Website	http://www.trentu.ca/cemc																																																																		
Download	available: http://www.trentu.ca/academic/aminss/envmodel/models/CC600R.html																																																																		
Key reference(s)	Webster, E., Mackay, D., Di Guardo, A., Kane, D., Woodfine, D. 2004. Regional Differences in Chemical Fate Model Outcome. Chemosphere. 55: 1361-1376. Mackay, D., Paterson, S., Tam, D.D. 1991. Assessments of Chemical Fate in Canada: Continued Development of a Fugacity Model. A report prepared for Health and																																																																		

Model description /tool	Information to be filled in	
	Welfare Canada.	
Validation or verification reference		
Contact information	Organisation: Name: Email address:	The Canadian Centre for Environmental Modelling and Chemistry ewebster@trentu.ca
Any other information	ChemCAN is a far-field, Level III fugacity model developed by the Canadian Environmental Modelling Centre (CEMC). Following input of physical-chemical properties, environmental characteristics, and emissions of a chemical substance, the model estimates average concentrations of chemicals in air, fresh surface water, fish, sediments, soils, vegetation, and marine near-shore waters. The model is intended to provide regionally-specific estimates of chemical concentrations in the primary media and to assist in human exposure assessment. ChemCAN was designed for use in Canada and contains a database of 24 regions of Canada while other regions can also be defined by the user. These regions were based on the ecozones identified by Environment Canada and with consideration of the distribution of population and industrial activity, political boundaries, drainage basins, and climate to give areas of sufficiently homogeneous ecological conditions such that meaningful assessments of chemical fate can be conducted. This model requires all of the same chemical property information as the Level III model, however, the user is given more options in entering the partitioning data for Type 1 chemicals, which is convenient and allows a wider set of data to be mined for the best values. This model is not suited to local-scale assessments such as the area around a stack.	

Denmark

Model description /tool	Information to be filled in																																																																		
Model or tool name	ES-Modifier (still under development)																																																																		
Scope of model / tool	Model developed mainly for Downstream-users needing to check and modify the REACH Exposure Scenario received from their suppliers. The tool can assist in documenting that the conditions of use as a minimum are those recommended by the supplier.																																																																		
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Food chain	☐	☐	☐	☐	☐																																																														
Other:																																																																			
Used or cited in (legal framework, project, program)																																																																			
Owner	The work was initiated as part of the industry case work in the so-called Arona network contributing to the development of the Guidance on information requirements and chemical safety assessment. The Danish EPA has funded a project for further development of the first prototype into a final tool. The project owner is the Confederation of Danish Industries, while the Danish consultancy companies DHI and HSE consult have been working as direct suppliers. Furthermore, TNO has joined the project funding their own activities.																																																																		
Website	http://es-modifier.dhigroup.com/Indhold.htm																																																																		
Download	http://es-modifier.dhigroup.com/Indhold.htm																																																																		
Key reference(s)	http://es-modifier.dhigroup.com/Materiale/ES%20modifier%20A4.pdf																																																																		
Validation or verification reference																																																																			

Model description /tool	Information to be filled in	
Contact information	Organisation:	DHI group
	Name:	Jens Tørsløv
	Email address:	jet@dhigroup.com
Any other information	Features of the ES-Modifier tool: • Demonstrate safe use for both humans and environment, and check if your own use or the uses of your customers lie within the boundaries of safe use as described in an ES received from your supplier. • Prepare consolidated, documented Exposure Scenarios for mixtures based on the individual substance ES received from suppliers. • Make use of all the exposure and emission assessment methods recommended in the official guidance documents, e.g. ECETOC TRA, Stoffenmanager, and EUSES. • Communicate exposure scenarios through the supply chain and give downstream users the possibility to adjust them to their own conditions. DHI is in corporation with TNO in the process of upgrading the ESmodifier to a more robust IT-platform resulting in a free available stand-alone version. The ES modifier will be able to communicate with the European Chemical Agency's (ECHA's) Chesar tool as well as ERM systems via XML.	

EC

Model description /tool	Information to be filled in																																																																		
Model or tool name	Chesar - Chemical safety assessment and reporting tool																																																																		
Scope of model / tool	Predicts the concentration in environmental compartments, exposure of workers and exposure of consumers; the prediction is based on substance properties, volumes, use pattern information and a few parameters reflecting the conditions of use.																																																																		
Type of model / tool	☐ Priority setting ☒ Screening assessment ☐ Detailed assessment ☐ Other, please specify:																																																																		
Target group(s) And exposure pathways	<table border="1"> <thead> <tr> <th>Pathway</th><th>Consumer</th><th>Worker</th><th>General population</th><th>Children</th><th>Environment</th></tr> </thead> <tbody> <tr> <td>Ingestion</td><td>☒</td><td>☐</td><td>☐</td><td>☒</td><td>☐</td></tr> <tr> <td>Inhalation</td><td>☒</td><td>☒</td><td>☒</td><td>☒</td><td>☐</td></tr> <tr> <td>Dermal</td><td>☒</td><td>☒</td><td>☐</td><td>☒</td><td>☐</td></tr> <tr> <td>Drinking water</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr> <td>Soil</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☒</td></tr> <tr> <td>Air</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☒</td></tr> <tr> <td>Water</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☒</td></tr> <tr> <td>Bioaccumulation/fish</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☒</td></tr> <tr> <td>Food chain</td><td>☐</td><td>☐</td><td>☒</td><td>☐</td><td>☒</td></tr> <tr> <td>Other:</td><td></td><td></td><td></td><td></td><td>sediments, marine water</td></tr> </tbody> </table>	Pathway	Consumer	Worker	General population	Children	Environment	Ingestion	☒	☐	☐	☒	☐	Inhalation	☒	☒	☒	☒	☐	Dermal	☒	☒	☐	☒	☐	Drinking water	☐	☐	☐	☐	☐	Soil	☐	☐	☐	☐	☒	Air	☐	☐	☐	☐	☒	Water	☐	☐	☐	☐	☒	Bioaccumulation/fish	☐	☐	☐	☐	☒	Food chain	☐	☐	☒	☐	☒	Other:					sediments, marine water
Pathway	Consumer	Worker	General population	Children	Environment																																																														
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Inhalation	☒	☒	☒	☒	☐																																																														
Dermal	☒	☒	☐	☒	☐																																																														
Drinking water	☐	☐	☐	☐	☐																																																														
Soil	☐	☐	☐	☐	☒																																																														
Air	☐	☐	☐	☐	☒																																																														
Water	☐	☐	☐	☐	☒																																																														
Bioaccumulation/fish	☐	☐	☐	☐	☒																																																														
Food chain	☐	☐	☒	☐	☒																																																														
Other:					sediments, marine water																																																														
Used or cited in (legal framework, project, program)	Tool for registrants under REACH supporting the Chemical Safety Assessment, the generation of a Chemical Safety Report (to be submitted to the authorities) and the generation of exposure scenarios to be communicated to downstream users.																																																																		
Owner	European Chemicals Agency																																																																		
Website	http://chesar.echa.europa.eu/																																																																		
Download	available: http://chesar.echa.europa.eu/																																																																		
Key reference(s)	http://chesar.echa.europa.eu/documents (user manuals)																																																																		
Validation or verification reference																																																																			

Model description	Information to be filled in						
Contact information	<table> <tr> <td data-bbox="418 331 699 387">Organisation:</td><td data-bbox="699 331 1501 387">European Chemicals Agency (ECHA)</td></tr> <tr> <td data-bbox="418 387 699 443">Name:</td><td data-bbox="699 387 1501 443">Helene Magaud, Andreas Ahrens</td></tr> <tr> <td data-bbox="418 443 699 533">Email address:</td><td data-bbox="699 443 1501 533">Andreas.Ahrens@echa.europa.eu Helene.Magaud@echa.europa.eu</td></tr> </table>	Organisation:	European Chemicals Agency (ECHA)	Name:	Helene Magaud, Andreas Ahrens	Email address:	Andreas.Ahrens@echa.europa.eu Helene.Magaud@echa.europa.eu
Organisation:	European Chemicals Agency (ECHA)						
Name:	Helene Magaud, Andreas Ahrens						
Email address:	Andreas.Ahrens@echa.europa.eu Helene.Magaud@echa.europa.eu						
Any other information	The tool supports the substance manufacturer or importer to systematically describe the conditions of safe use (exposure scenarios), to generate corresponding exposure estimates and risk characterisation. In a default Tier 1 assessment the exposure estimates are generated with EUSES (modified with a particular Chesar release module) and the Targetted Risk Assessment tools published by ECETOC (for workers and consumers). These tools have been plugged into Chesar. The data related to substance properties are imported from IUCLID. In addition to the use pattern information, a limited number of variable input parameters is required for a Tier 1 estimate: Environment: Use pattern (by environmental release category ERC) and annual amount of substance per use; Workers: Use pattern by process category PROC, concentration of substance in product, duration of exposure per day, presence of local exhaust ventilation, presence of PPE; Consumers*: Use pattern (by product category PC), concentration of substance in product, amount of product per application. * not yet programmed In the further development of Chesar it is foreseen to support the plug-in of other exposure estimation tools						

Germany***Worker exposure***

Model /tool description	Information to be filled in					
Model or tool name	EMKG-EXPO-TOOL					
Scope of model / tool	EMKG-EXPO-TOOL is part of the “ Easy-to-use workplace control scheme for hazardous substances ” (EMKG “ Einfaches Maßnahmenkonzept für Gefahrstoffe ”) EMKG-EXPO-TOOL is a control banding tool for quantitative tier 1 assessment of occupational exposure to hazardous substances.					
Type of model / tool	☒ Priority setting ☒ Screening assessment ☒ Detailed assessment ☐ Other, please specify:					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☐	☐	☐
	Inhalation	☐	☒	☐	☐	☐
	Dermal	☐	☐	☐	☐	☐
	Drinking water	☐	☐	☐	☐	☐
	Soil	☐	☐	☐	☐	☐
	Air	☐	☐	☐	☐	☐
	Water	☐	☐	☐	☐	☐
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☐	☐	☐
	Other:					
Used or cited in (legal framework, project, program)	REACH (EC 1907/2006) Guidance on information requirements and chemical safety assessment Chapter R.14: Occupational exposure estimation Reference: ECHA-2010-G-09-EN, Publ.date: 05/2010 http://guidance.echa.europa.eu/docs/guidance_document/information_requirements_r14_en.pdf					
Owner	BAuA Federal Institute for Occupational Safety and Health, Germany					
Website	www.baua.de					
Download	http://www.baua.de/reach/de/Themen/Expositionen/Expositionen.html or http://www.reach-clp-helpdesk.de/reach/de/Themen/Expositionen/Expositionen.html?__nnn=true					
Key reference(s)						
Validation or verification reference	Tischer M, Bredendiek-Kämper S, Poppek U 2003a. Report on BAuA project F1805. Inhalative and dermal exposure at distinct control strategies—Part 1: Control approach related evaluation of available exposure information. Dortmund: Gründruck der BAuA. Tischer M, Bredendiek-Kamper S, Poppek U 2003b. Evaluation of the HSE COSHH Essentials exposure predictive model on the basis of BAuA field studies and existing substances exposure data. Ann Occup Hyg 47(7): 557-569.					

Model /tool description	Information to be filled in	
Contact information	Organisation:	Federal Institute for Occupational Safety and Health, Germany
	Name:	Dr. Gudrun Walendzik, Dr. Martin Tischer
	Email address:	walendzik.gudrun@baua.bund.de tischer.martin@baua.bund.de
Any other information	The exposure prediction model of the German EMKG-Expo-Tool “Easy-to-use workplace control scheme for hazardous substances” is a generic tool that can be used to derive a Tier 1 inhalation exposure value for the workplace. The tool was developed to help small and medium sized companies to comply with the Chemical Agents Directive (98/24/EC) and the REACH Regulation (EC 1907/2006). The EMKG-Expo-Tool is based on the banding approach of the COSHH Essentials originally developed by HSE. The EMKG-Expo-Tool can be used as a generic tool for assessing and comparing the level of exposure with limit values [e.g. Occupational Exposure Limit (OEL), Derived No Effect Level (DNEL)]. The EMKG-Expo-Tool uses three input parameters: volatility or dustiness, amount of substance used, and control strategy. For solids, the dustiness of the substance is the principal physical property to be considered for the exposure potential. For liquids, ‘volatility’ is the key determinant. The amount used per batch or operation (small (g/ml), medium (kg/L) or large (tonnes/m3)) is regarded to be the most important factor to be considered, as it impacts how the material is packaged, transported and used. The control strategy is defined with factors that aim at exposure reduction (general ventilation, local exhaust ventilation, containment). These general control solutions are underpinned by a series of Control Guidance Sheets (CGS) which provide practical examples of control approaches for common industrial unit operations such as weighing mixing and filling. Often these unit operations can be linked to a process category of the use descriptor system. The tool predicts a lower and an upper value for the exposure range (in mg/m3) for solids and ppm for vapours). In order to arrive at a conservative estimate the upper value of the exposure range should be used for the risk characterisation, i.e. the comparison with the limit value. Microsoft Excel application is available at the above mentioned web site, a web-based application is under development	

JAPAN

Model description /tool	Information to be filled in					
Model or tool name	G-CIEMS					
Scope of model / tool	Assessment of compounds in environmental and human exposure					
Type of model / tool	☐ Priority setting ☒ Screening assessment ☒ Detailed assessment ☐ Other, please specify:					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☐	☐	☐
	Inhalation	☐	☐	☒	☐	☐
	Dermal	☐	☐	☐	☐	☐
	Drinking water	☒	☐	☒	☐	☐
	Soil	☒	☐	☒	☐	☒
	Air	☐	☐	☒	☐	☒
	Water	☐	☐	☒	☐	☒
	Bioaccumulation/fish	☐	☐	☐	☐	☒
	Food chain	☐	☐	☐	☐	☐
	Other:					
Used or cited in (legal framework, project, program)						
Owner	National Institute for Environmental Studies, Tsukuba, Japan					
Website	http://www.nies.go.jp/rcer_expoass/gciems/gciems.html (English version under development)					
Download	http://www.nies.go.jp/rcer_expoass/gciems/gciems.html					
Key reference(s)	Suzuki, N., Murasawa, K., Sakurai, T., Nansai, K., Matsuhashi, K., Moriguchi, Y., Tanabe, K., Nakasugi, O. and Morita, M., Environ. Sci. Technol. 38, 5682-5693 (2004)					
Validation or verification reference	Suzuki, N., Murasawa, K., Sakurai, T., Nansai, K., Matsuhashi, K., Moriguchi, Y., Tanabe, K., Nakasugi, O. and Morita, M., Environ. Sci. Technol. 38, 5682-5693 (2004)					

Model description /tool	Information to be filled in	
Contact information	Organisation: Name: Email address:	Research Center for Environmental Risk, National Institute for Environmental Studies, Japan N. Suzuki, Y. Imaizumi nsuzuki@nies.go.jp, imaizumi@nies.go.jp
Any other information	G-CIEMS is the model of detailed geographical resolution for multimedia approach based on gridded air and catchment-river segment structure on surface media. The model can be used to estimated exposure distribution in combination of some data data manipulation tools on the website.	

Model description /tool	Information to be filled in					
Model or tool name	AIST-ADMER (Atmospheric Dispersion Model for Exposure and Risk Assessment)					
Scope of model / tool	Estimating atmospheric concentrations of chemicals and assessing population exposure in Japan					
Type of model / tool	☐ Priority setting ☒ Screening assessment ☒ Detailed assessment ☐ Other, please specify:					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General pop lation	Children	Environment
	Ingestion	☐	☐	☐	☐	☐
	Inhalation	☐	☐	☐	☐	☐
	Dermal	☐	☐	☐	☐	☐
	Drinking water	☐	☐	☐	☐	☐
	Soil	☐	☐	☐	☐	☐
	Air	☐	☐	☒	☐	☒
	Water	☐	☐	☐	☐	☐
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☐	☐	☐
	Other:					
Used or cited in (legal framework, project, program)	This work was funded in part by the Comprehensive Chemical Substance Assessment and Management Program of the New Energy and Industrial Technology Development Organization (NEDO).					
Owner	National Institute of Advanced Industrial Science and Technology (AIST), Japan					

Model description /tool	Information to be filled in	
Website	http://www.aist-riss.jp/software/admer/ja/index_ja.html http://www.aist-riss.jp/software/admer/en/index_e.html	
Download	http://www.aist-riss.jp/software/admer/ja/index_ja.html http://www.aist-riss.jp/software/admer/en/index_e.html	
Key reference(s)	H. Higashino, et al.(2003) Development of the Atmospheric Dispersion Model for Exposure and Risk Assessment (ADMER), J.Jpn.Soc.Atmos.Environ., 38(2) pp.100-115, (in Japanese).	
Validation or verification reference	H. Higashino, et al.(2003) Development of the Atmospheric Dispersion Model for Exposure and Risk Assessment (ADMER), J.Jpn.Soc.Atmos.Environ., 38(2) pp.100-115, (in Japanese).	
Contact information	Organisation: Name: Email address:	Research Institute of Science for Safety and Sustainability(RISS), National Institute of Advanced Industrial Science and Technology(AIST) Haruyuki Higashino haru.higashino@aist.go.jp
Any other information		

Model description /tool	Information to be filled in
Model or tool name	AIST-SHANEL(Standardized Hydrology-based Assessment tool for chemical Exposure Load)
Scope of model / tool	Simulating spatially resolved chemical concentrations in first-class rivers in Japan
Type of model / tool	☐ Priority setting ☒ Screening assessment ☒ Detailed assessment ☐ Other, please specify:

Model description /tool	Information to be filled in					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☐	☐	☐
	Inhalation	☐	☐	☐	☐	☐
	Dermal	☐	☐	☐	☐	☐
	Drinking water	☐	☐	☐	☐	☐
	Soil	☐	☐	☐	☐	☐
	Air	☐	☐	☐	☐	☐
	Water	☐	☐	☐	☐	☒
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☐	☐	☐
Other:						
Used or cited in (legal framework, project, program)	This work was funded in part by the Comprehensive Chemical Substance Assessment and Management Program of the New Energy and Industrial Technology Development Organization (NEDO).					
Owner	National Institute of Advanced Industrial Science and Technology(AIST), Japan					
Website	http://www.aist-riss.jp/projects/AIST-SHANEL/					
Download	http://www.aist-riss.jp/projects/AIST-SHANEL/ Available upon request (Providing CD-ROM)					
Key reference(s)	Y. ISHIKAWA and A. TOKAI (2006) Development of Watershed Model for Chemical Risk Assessment in Aquatic System, Journal of Japan Society on Water Environment, 29(12), pp.797-807 (in Japanese)					
Validation or verification reference	Y. ISHIKAWA and A. TOKAI (2006) Development of Watershed Model for Chemical Risk Assessment in Aquatic System, Journal of Japan Society on Water Environment, 29(12), pp.797-807 (in Japanese)					
Contact information	Organisation:	AIST, Research Institute of Science for Safety and Sustainability(RISS)				
	Name:	Y. ISHIKAWA				
	Email address:	y-ishikawa@aist.go.jp				
Any other information	Only Japanese version available					

Model description /tool	Information to be filled in						
Model or tool name	METI-LIS (Ministry of Economy, Trade and Industry-Low rise Industrial Source dispersion Model)						
Scope of model / tool	Estimating atmospheric chemical concentrations especially putting emphasis on the effect of downdraft accompanying low emission sources						
Type of model / tool	☐ Priority setting ☐ Screening assessment ☒ Detailed assessment ☐ Other, please specify:						
Target group(s) And exposure pathways	Pathway	Consume	Worker	General population	Children	Environment	
	Ingestion	☐	☐	☐	☐	☐	
	Inhalation	☐	☐	☐	☐	☐	
	Dermal	☐	☐	☐	☐	☐	
	Drinking water	☐	☐	☐	☐	☐	
	Soil	☐	☐	☐	☐	☐	
	Air	☐	☒	☒	☐	☒	
	Water	☐	☐	☐	☐	☐	
	Bioaccumulation/fish	☐	☐	☐	☐	☐	
	Food chain	☐	☐	☐	☐	☐	
	Other:						
Used or cited in (legal framework, project, program)							
Owner	Japan Environmental Management Association for Industry						
Website	http://www.jemai.or.jp/CACHE/tech_details_detailobj1816.cfm http://www.aist-riss.jp/projects/METI-LIS/						
Download	http://www.jemai.or.jp/CACHE/tech_details_detailobj1816.cfm						
Key reference(s)	http://www.aist-riss.jp/main/common/fckeditor/editor/filemanager/connectors/php/transfer.php?file=/uid000001_4D4554492D4C49535F6E6F74655F6E6F7630352E706466						

Model description /tool	Information to be filled in	
Validation or verification reference		
Contact information	Organisation:	Japan Environmental Management Association for Industry?
	Name:	Norihito Ono
	Email address:	ono@jemai.or.jp
Any other information		

Model description /tool	Information to be filled in					
Model or tool name	AIST-RAMTB(Risk Assessment Model for Tokyo Bay)					
Scope of model / tool	Estimating water concentration distribution of chemicals in Tokyo Bay					
Type of model / tool	☐ Priority setting ☒ Screening assessment ☒ Detailed assessment ☐ Other, please specify:					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☐	☐	☐
	Inhalation	☐	☐	☐	☐	☐
	Dermal	☐	☐	☐	☐	☐
	Drinking water	☐	☐	☐	☐	☐
	Soil	☐	☐	☐	☐	☐
	Air	☐	☐	☐	☐	☒
	Water	☐	☐	☐	☐	☒
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☐	☐	☐
	Other:					
Used or cited in (legal framework, project, program)	This work was funded in part by the Comprehensive Chemical Substance Assessment and Management Program of the New Energy and Industrial Technology Development Organization (NEDO).					
Owner	National Institute of Advanced Industrial Science and Technology (AIST), Japan					
Website	http://www.aist-riss.jp/projects/RAM/TB_index.htm					
Download	NA					

Model description /tool	Information to be filled in	
Key reference(s)	Tributyltin, Copper Pyrithione, Ecological Risk Assessment, Margin of Exposure, Windows® system, Chemical fate model, Ecological model, 3D-Hydrodynamic model, Tokyo Bay	
Validation or verification reference	Horiguchi F, Ito N, Okawa K, Ichikawa T, Nakata K (2004). Risk assessment of TBT in the Japanese Short-neck Clam (<i>Ruditapes philippinarum</i>) of Tokyo Bay. <i>Journal of Advanced Marine Science and Technology Society</i> 10(1):1-15. Horiguchi, F., J. Yamamoto, K. Nakata, 2006a. Model Study of Environmental Concentrations of TBT in Tokyo Bay - Development of a Windows Version Prototype -, <i>Environmental Modeling and Software</i>, Elsevier. Vol. 21, Issue 2, 229-233 Horiguchi, F., K. Nakata, N. Ito, K. Okawa, 2006b. Risk assessment of TBT in the Japanese short-neck clam (<i>Ruditapes philippinarum</i>) of Tokyo Bay using a chemical fate model. <i>Estuarine, Coastal and Shelf Science</i> 70, 589-598 Nakanishi J, Horiguchi F (2006). Tributyltin (TBT) Risk Assessment Document. Maruzen (In Japanese). Nakanishi J, Horiguchi F (2007). Copper Pyrithione (CuPT) Risk Assessment Document. Maruzen (In Japanese).	
Contact information	Organisation: Name: Email address:	AIST, Research Institute of Science for Safety and Sustainability (RISS) F. Horiguchi crm-horiguchi@aist.go.jp
Any other information		

Model description /tool	Information to be filled in	
Model or tool name	Risk Learning	
Scope of model / tool	Estimating human health risks of a specific chemical substance in environmental media (air, water, soil, etc.) or contact media (food, etc.) using carcinogenic risk and hazard quotient as risk indices	
Type of model / tool	☒ Priority setting ☒ Screening assessment ☐ Detailed assessment ☐ Other, please specify:	

Model description /tool	Information to be filled in					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☒	☐	☐
	Inhalation	☐	☐	☒	☐	☐
	Dermal	☐	☐	☒	☐	☐
	Drinking water	☐	☐	☒	☐	☐
	Soil	☐	☐	☒	☐	☐
	Air	☐	☐	☒	☐	☐
	Water	☐	☐	☒	☐	☐
	Bioaccumulation/fish	☐	☐	☒	☐	☐
	Food chain	☐	☐	☐	☐	☐
	Other:					
Used or cited in (legal framework, project, program)						
Owner	National Institute of Advanced Industrial Science and Technology (AIST), Japan					
Website	http://www.aist-riss.jp/projects/RL/					
Download	http://www.aist-riss.jp/projects/RL/					
Key reference(s)						
Validation or verification reference						
Contact information	Organisation: Name: Email address:	AIST, Research Institute of Science for Safety and Sustainability(RISS) K. Yoshida k-yoshida@aist.go.jp				
Any other information	Only Japanese version available					

Model description /tool	Information to be filled in
Model or tool name	RiskCaT-LLE (Risk Calculation Tool for the LLE-based RISK Estimation)
Scope of model / tool	Estimating human health risk as loss of life expectancy (LLE) from exposure to chemicals

Model description /tool	Information to be filled in					
Type of model / tool	☒ Priority setting ☒ Screening assessment ☒ Detailed assessment ☐ Other, please specify:					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☐	☐	☐
	Inhalation	☐	☐	☐	☐	☐
	Dermal	☐	☐	☐	☐	☐
	Drinking water	☐	☐	☐	☐	☐
	Soil	☐	☐	☐	☐	☐
	Air	☐	☐	☐	☐	☐
	Water	☐	☐	☐	☐	☐
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☐	☐	☐
	Other:			Total Intake		
Used or cited in (legal framework, project, program)						
Owner	National Institute of Advanced Industrial Science and Technology (AIST), Japan					
Website	http://www.aist-riss.jp/software/riskcat/index.html					
Download	http://www.aist-riss.jp/software/riskcat/down.html					
Key reference(s)	loss of life expectancy, inter-individual variability, probability distribution, quantitative risk assessment, dose-response					
Validation or verification reference						
Contact information	Organisation: Name: Email address:	AIST, Research Institute of Science for Safety and Sustainability(RISS) M. Gamo masashi-gamo@aist.go.jp				
Any other information	Only Japanese version available					

Model description /tool	Information to be filled in
Model or tool name	AIST-CBAM (Chemical Bioaccumulation Model)
Scope of model / tool	Estimating the levels of hazardous chemicals in a food chain of Tokyo Bay.
Type of model / tool	☐ Priority setting

	☒ Screening assessment ☒ Detailed assessment ☐ Other, please specify:					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☐	☐	☐
	Inhalation	☐	☐	☐	☐	☐
	Dermal	☐	☐	☐	☐	☐
	Drinking water	☐	☐	☐	☐	☐
	Soil	☐	☐	☐	☐	☐
	Air	☐	☐	☐	☐	☐
	Water	☐	☐	☐	☐	☐
	Bioaccumulation/fish	☐	☐	☐	☐	☒
	Food chain	☐	☐	☐	☐	☐
Other:						
Used or cited in (legal framework, project, program)	This work was funded in part by the Development of Methodologies for Risk Trade-off Analysis toward Chemical Substance Management of the New Energy and Industrial Technology Development Organization (NEDO).					
Owner	National Institute of Advanced Industrial Science and Technology (AIST), Japan					
Website	http://www.aist-riss.jp/projects/RAM/risk/CBAM_index.htm					
Download	NA					
Key reference(s)	Bioaccumulation model, Chemical fate model, Eco-system model, 3D-Hydrodynamic model, Tokyo Bay, Coplaner Poly Chlorinated Biphenyl, Conger myriaster, Windows® system					
Validation or verification reference	Eriguchi T, Ichikawa T, Nakata K, Horiguchi F(2009).Development of a Bioaccumulation Model for Chemicals in Marine Organisms. -Prototype Model-.Journal of Advanced Marine Science and Technology Society15(1):15-21. Eriguchi T, Ichikawa T, Nakata K, Kobayashi N, Horiguchi F(2009).Bioaccumulation Model for Predicting Chemicals in an Estuary - Tokyo Bay Model for Conger myriaster -.Journal of Advanced Marine Science and Technology Society15(2):189-195.					
Contact information	Organisation: Name: Email address:	AIST, Research Institute of Science for Safety and Sustainability (RISS) F. Horiguchi crm-horiguchi@aist.go.jp				
Any other information						

Model description /tool	Information to be filled in																																																																							
Model or tool name	iAIR(Indoor exposure assessment tool)																																																																							
Scope of model / tool	Estimating indoor concentrations of chemicals emitted from consumer products																																																																							
Type of model / tool	☐ Priority setting ☒ Screening assessment ☐ Detailed assessment ☐ Other, please specify:																																																																							
Target group(s) And exposure pathways	<table border="1"> <thead> <tr> <th>Pathway</th><th>Consumer</th><th>Worker</th><th>General population</th><th>Children</th><th>Environment</th></tr> </thead> <tbody> <tr> <td>Ingestion</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr> <td>Inhalation</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr> <td>Dermal</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr> <td>Drinking water</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr> <td>Soil</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr> <td>Air</td><td>☒</td><td>☐</td><td>☒</td><td>☐</td><td>☐</td></tr> <tr> <td>Water</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr> <td>Bioaccumulation/fish</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr> <td>Food chain</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr> <td>Other:</td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>	Pathway	Consumer	Worker	General population	Children	Environment	Ingestion	☐	☐	☐	☐	☐	Inhalation	☐	☐	☐	☐	☐	Dermal	☐	☐	☐	☐	☐	Drinking water	☐	☐	☐	☐	☐	Soil	☐	☐	☐	☐	☐	Air	☒	☐	☒	☐	☐	Water	☐	☐	☐	☐	☐	Bioaccumulation/fish	☐	☐	☐	☐	☐	Food chain	☐	☐	☐	☐	☐	Other:										
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Used or cited in (legal framework, project, program)	This work was funded in part by the Comprehensive Chemical Substance Assessment and Management Program of the New Energy and Industrial Technology Development Organization (NEDO).																																																																							
Owner	National Institute of Advanced Industrial Science and Technology (AIST), Japan																																																																							
Website	http://www.aist-riss.jp/software/iair/																																																																							
Download	http://www.aist-riss.jp/software/iair/																																																																							
Key reference(s)																																																																								
Validation or verification reference																																																																								
Contact information	Organisation: Name: Email address:	Research Institute of Science for Safety and Sustainability(RISS), National Institute of Advanced Industrial Science and Technology(AIST) H. Shinozaki h-shinozaki@aist.go.jp																																																																						
Any other information																																																																								

The Netherlands***Consumer exposure***

Model /tool description	Information to be filled in					
Model or tool name	ConsExpo					
Scope of model / tool	Assessment of compounds in non-food consumer products					
Type of model / tool	☐ Priority setting ☒ Screening assessment ☒ Detailed assessment ☐ Other, please specify:					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☒	☐	☐	☐	☐
	Inhalation	☒	☐	☐	☐	☐
	Dermal	☒	☐	☐	☐	☐
	Drinking water	☐	☐	☐	☐	☐
	Soil	☐	☐	☐	☐	☐
	Air	☐	☐	☐	☐	☐
	Water	☐	☐	☐	☐	☐
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☐	☐	☐
	Other:					
Used or cited in (legal framework, project, program)	REACH, Guidance on IR/CSA Chapter R.15					
Owner	National Institute of Public Health and the Environment (RIVM), Bilthoven, the Netherlands					
Website	www.consexpo.nl					
Download	www.consexpo.nl					
Key reference(s)	http://www.rivm.nl/bibliotheek/rapporten/320104004.pdf					
Validation or verification reference	http://www.rivm.nl/bibliotheek/rapporten/320104006.pdf					
Contact information	Organisation:	RIVM, Centre for Substances and Integrated Risk Assessment				
	Name:	J.E. Delmaar, J. van Engelen				
	Email address:	ConsExpo@rivm.nl				
Any other information						

Worker exposure

Model description /tool	Information to be filled in																																																																		
Model or tool name	Stoffenmanager																																																																		
Scope of model / tool	Control banding for worker dermal and inhalation exposure and quantitative exposure assessment for worker inhalation exposure																																																																		
Type of model / tool	☒ Priority setting ☒ Screening assessment ☒ Detailed assessment ☒ Other, please specify: The tool also contains modules for e.g. storage of dangerous substances and the development of dangerous substance inventories																																																																		
Target group(s) And exposure pathways	<table border="1"> <thead> <tr> <th>Pathway</th><th>Consumer</th><th>Worker</th><th>General population</th><th>Children</th><th>Environment</th></tr> </thead> <tbody> <tr> <td>Ingestion</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr> <td>Inhalation</td><td>☐</td><td>☒</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr> <td>Dermal</td><td>☐</td><td>☒</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr> <td>Drinking water</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr> <td>Soil</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr> <td>Air</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr> <td>Water</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr> <td>Bioaccumulation/fish</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr> <td>Food chain</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr> <td>Other:</td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>	Pathway	Consumer	Worker	General population	Children	Environment	Ingestion	☐	☐	☐	☐	☐	Inhalation	☐	☒	☐	☐	☐	Dermal	☐	☒	☐	☐	☐	Drinking water	☐	☐	☐	☐	☐	Soil	☐	☐	☐	☐	☐	Air	☐	☐	☐	☐	☐	Water	☐	☐	☐	☐	☐	Bioaccumulation/fish	☐	☐	☐	☐	☐	Food chain	☐	☐	☐	☐	☐	Other:					
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Food chain	☐	☐	☐	☐	☐																																																														
Other:																																																																			
Used or cited in (legal framework, project, program)	Chemical Agents Directive (98/24/EC) and REACH (EC 1907/2006). Guidance on IR/CSA R.14																																																																		
Owner	Open source software sponsored by Dutch Ministry of Social Affairs and Employment																																																																		
Website	www.stoffenmanager.nl																																																																		
Download	No download, web-based tool																																																																		
Key reference(s)	Marquart H, Heussen H, le Feber M, et al. Stoffenmanager: a web-based control banding tool using an exposure process model (2008) Ann Occup Hyg; 52: 429–41. Tielemans E, Noy D, Schinkel J, et al. Stoffenmanager exposure model: development of a quantitative algorithm. Ann Occup Hyg 2008;52:443-54. J. Schinkel, W. Fransman, H. Heussen, H. Kromhout, H. Marquart, and E. Tielemans Cross-validation and refinement of the Stoffenmanager as a first tier exposure assessment tool for REACH. Occup. Environ. Med., February 1, 2010; 67(2): 125 - 132.																																																																		
Validation or verification reference	Tielemans E, Noy D, Schinkel J, et al. Stoffenmanager exposure model: development of a quantitative algorithm. Ann Occup Hyg 2008;52:443-54. J. Schinkel, W. Fransman, H. Heussen, H. Kromhout, H. Marquart, and E. Tielemans Cross-validation and refinement of the Stoffenmanager as a first tier exposure assessment tool for REACH. Occup. Environ. Med., February 1, 2010; 67(2): 125 -																																																																		

Model description /tool	Information to be filled in	
	132.	
Contact information	Organisation:	TNO Quality of Life
	Name:	Maikel van Niftrik
	Email address:	maikel.vanniftrik@tno.nl
Any other information		

Model description /tool	Information to be filled in					
Model or tool name	RISKOFDERM					
Scope of model / tool	Worker control banding tool Worker potential dermal exposure assessment (further tier model)					
Type of model / tool	☐ Priority setting ☒ Screening assessment ☒ Detailed assessment ☐ Other, please specify:					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☐	☐	☐
	Inhalation	☐	☐	☐	☐	☐
	Dermal	☐	☒	☐	☐	☐
	Drinking water	☐	☐	☐	☐	☐
	Soil	☐	☐	☐	☐	☐
	Air	☐	☐	☐	☐	☐
	Water	☐	☐	☐	☐	☐
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☐	☐	☐
	Other:					
Used or cited in (legal framework, project, program)	REACH (EC 1907/2006). Guidance on IR/CSA R.14					
Owner	European RISKOFDERM consortium funded by Framework Programme QLK4-CT-1999-01107					
Website	www.tno.nl http://product-testing.eurofins.com/					
Download	www.tno.nl http://product-testing.eurofins.com/					

Model description /tool	Information to be filled in	
Key reference(s)	Warren ND, Marquart H, Christopher Y, et al. (2006) Task-based dermal exposure models for regulatory risk assessment. Ann Occup Hyg 50:491–503. Van Hemmen JJ, Auffarth J, Evans PG, et al. RISKOFDERM: risk assessment of occupational dermal exposure to chemicals. An introduction to a series of papers on the development of a toolkit. Ann Occup Hyg (2003) 47:595–8.[	
Validation verification reference or	Warren ND, Marquart H, Christopher Y, et al. (2006) Task-based dermal exposure models for regulatory risk assessment. Ann Occup Hyg 50:491–503.	
Contact information	Organisation: Name: Email address:	TNO Quality of Life UH HSL Hans Marquart Nick Warren hans.marquart@tno.nl Nick.Warren@hsl.gov.uk
Any other information		

Model description /tool	Information to be filled in
Model or tool name	ART (Advanced REACH Tool)
Scope of model / tool	Advanced worker inhalation exposure assessment
Type of model / tool	☐ Priority setting ☐ Screening assessment ☒ Detailed assessment ☐ Other, please specify:

Model description /tool	Information to be filled in					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☐	☐	☐
	Inhalation	☐	☒	☐	☐	☐
	Dermal	☐	☐	☐	☐	☐
	Drinking water	☐	☐	☐	☐	☐
	Soil	☐	☐	☐	☐	☐
	Air	☐	☐	☐	☐	☐
	Water	☐	☐	☐	☐	☐
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☐	☐	☐
	Other:					
Used or cited in (legal framework, project, program)	REACH (EC 1907/2006). Guidance on IR/CSA R.14					
Owner	European ART consortium funded by several authorities and industry groups					
Website	www.advancedreachtool.com					
Download	No download, web-based tool					
Key reference(s)	http://www.advancedreachtool.com/science.aspx					
Validation or verification reference	http://www.advancedreachtool.com/science.aspx					
Contact information	Organisation:	TNO Quality of Life				
	Name:	Erik Tielemans				
	Email address:	erik.tielemans@tno.nl				
Any other information						

Risk Assessment

Model description /tool	Information to be filled in					
Model or tool name	EUSES 2.1					
Scope of model / tool	EUSES is a decision-support instrument to carry out assessments of the general risks of industrial chemicals and biocides posed by substances to man and the environment. EUSES is intended mainly for initial and refined risk assessments rather than comprehensive assessments. The system is fully described in the extensive EUSES documentation and is based on the EU Technical Guidance Documents (TGD, 2003) on Risk Assessment for New Notified Substances, Existing Substances and Biocides. The new EUSES 2.1 version (2008) is an update of EUSES 2.0, containing all Emission Scenario Documents for biocides.					
Type of model / tool	☐ Priority setting ☒ Screening assessment ☒ Detailed assessment ☐ Other, please specify:					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☒	☐	☒	☐	☐
	Inhalation	☒	☒	☒	☐	☐
	Dermal	☒	☒	☒	☐	☐
	Drinking water	☒	☐	☒	☐	☐
	Soil	☒	☐	☒	☐	☒
	Air	☒	☐	☒	☐	☒
	Water	☒	☐	☒	☐	☒
	Bioaccumulation/fish	☒	☐	☒	☐	☒
	Food chain	☒	☐	☒	☐	☒
	Other:					
Used or cited in (legal framework, project, program)	EU Risk assessment of Biocides. EU risk assessment for industrial chemicals, Environmental Exposure Assessment, implemented in the new CHESAR tool. See The guidance on IR/CA, Chapter 16: Environmental Exposure Estimation.					
Owner	European Chemicals Bureau, Joint Research Centre, Institute for Health and Consumer Protection. TP 582; I-21020 Ispra (VA). Italy http://ecb.jrc.it					
Website	http://ecb.jrc.ec.europa.eu/euses/					

Model description /tool	Information to be filled in	
Download	http://ecb.jrc.ec.europa.eu/euses/	
Key reference(s)	EUSES 2.0 manual and 2.1 updates, available for download via	
Validation or verification reference	http://ecb.jrc.ec.europa.eu/euses/	
Contact information	Organisation:	European Chemicals Bureau, JRC, Ispra , Italy
	Name:	Erik van de Plassche
	Email address:	erik.van-de-plassche@ec.europa.eu
Any other information		

Model description /tool	Information to be filled in					
Model or tool name	USES 4.0					
Scope of model / tool	USES 4.0 (Uniform System for the Evaluation of Substances) has been developed for quantitative assessment of the risks posed by new and existing chemical substances as well as agricultural and non-agricultural pesticides to man and the environment.					
Type of model / tool	☐ Priority setting ☒ Screening assessment ☒ Detailed assessment ☐ Other, please specify:					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☒	☐	☒	☐	☐
	Inhalation	☒	☒	☒	☐	☐
	Dermal	☒	☒	☒	☐	☐
	Drinking water	☒	☐	☒	☐	☐
	Soil	☒	☐	☒	☐	☒
	Air	☒	☐	☒	☐	☒
	Water	☒	☐	☒	☐	☒
	Bioaccumulation/fish	☒	☐	☒	☐	☒
	Food chain	☒	☐	☒	☐	☒
	Other:					
Used or cited in (legal framework, project, program)	National and EU risk assessment of dossiers for agricultural and non-agricultural pesticides.					

Model description /tool	Information to be filled in	
Owner	National Institute of Public Health and the Environment (RIVM), Bilthoven, the Netherlands	
Website	http://www.rivm.nl/rvs/risbeoor/Modellen/USES.jsp (in Dutch)	
Download	http://www.rivm.nl/bibliotheek/digitaaldepot/Uses402.zip	
Key reference(s)	http://www.rivm.nl/bibliotheek/rapporten/601450012.pdf	
Validation or verification reference	Available for submodels. See for instance for the pesticide leaching model PEARL here: http://www.pearl.pesticidemodels.eu	
Contact information	Organisation:	RIVM, Centre for Substances and Integrated Risk Assessment
	Name:	Jan Linders
	Email address:	jan.linders@rivm.nl
Any other information	The major scientific differences between EUSES and USES 4.0 are: - USES 4.0 includes a human and environmental risk assessment system for agricultural and non-agricultural pesticides. - Both USES 4.0 and EUSES estimate the concentration of new and existing substances in the top soil layer and pore water applying a one-compartment soil model taking into account degradation, volatilisation and leaching to groundwater. However, for pesticides, USES 4.0 contains the numerical soil and groundwater model PEARL . The concentration of pesticides in surface water is calculated applying the model TOXSWA, whereas for new and existing substances a simple dilution model is used. The concentration of pesticides in air downwind of a field is estimated using the PALNAT model and in air in the lee side eddy of a greenhouse using a model based on the “building influence model”. For new and existing substances USES 4.0 and EUSES both use the Gaussian plume model OPS at the local scale and the multi-media model Simplebox at the regional scales. - The regional multi-media model Simplebox in USES 4.0 is equivalent to the regional model in EUSES. In addition, however, the user may choose to add the following options: 1. Three global scales; 2. Sea water compartment 3. Temperature dependence of parameters 4. Chemical specific soil depth.	

Model description /tool	Information to be filled in					
Model or tool name	CSOIL					
Scope of model / tool	Determination of human exposure to contaminants in soil and groundwater					
Type of model / tool	☒ Priority setting ☒ Screening assessment ☒ Detailed assessment ☐ Other, please specify:					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☒	☒	☐
	Inhalation	☐	☐	☒	☒	☐
	Dermal	☐	☐	☒	☒	☐
	Drinking water	☐	☐	☒	☒	☐
	Soil	☐	☐	☒	☒	☐
	Air	☐	☐	☐	☐	☐
	Water	☐	☐	☐	☐	☐
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☒	☒	☐
	Other:					
Used or cited in (legal framework, project, program)	Dutch Soil Protection Act					
Owner	National institute of public Health and the Environment (RIVM), Bilthoven, the Netherlands					
Website						
Download						
Key reference(s)	http://www.rivm.nl/bibliotheek/rapporten/711701054.html					
Validation or verification reference						
Contact information	Organisation:	RIVM				
	Name:	F.A. Swartjes				
	Email address:	frank.swartjes@rivm.nl				
Any other information						

Model description /tool	Information to be filled in					
Model or tool name	ETX 2.0					
Scope of model / tool	Statistical analysis of species sensitivity distributions (SSDs), meant for extrapolation of toxicity test results for risk assessment and standard setting					
Type of model / tool	☒ Priority setting ☒ Screening assessment ☐ Detailed assessment ☒ Other, please specify: Ecological Quality Standards					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☐	☐	☐
	Inhalation	☐	☐	☐	☐	☐
	Dermal	☐	☐	☐	☐	☐
	Drinking water	☐	☐	☐	☐	☐
	Soil	☐	☐	☐	☐	☒
	Air	☐	☐	☐	☐	☒
	Water	☐	☐	☐	☐	☒
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☐	☐	☐
	Other:					
Used or cited in (legal framework, project, program)	REACH, Guidance on IR/CSA Chapter R.19 (Uncertainty Analysis)					
Owner	National Institute of Public Health and the Environment (RIVM), Bilthoven, the Netherlands					
Website	http://www.rivm.nl/rvs/risbeoor/Modellen/ETX.jsp					
Download	http://www.rivm.nl/bibliotheek/digitaaldepot/etx_2_0.zip					
Key reference(s)	Van Vlaardingen et al., 2004; http://www.rivm.nl/bibliotheek/rapporten/601501028.html Aldenberg, T., Jaworska, J. S., 2000. Uncertainty of the hazardous concentration and fraction affected for normal species sensitivity distributions. Ecotoxicology and Environmental Safety. 46, 1-18.					
Validation or verification reference	Posthuma L, Suter GW II, Traas TP (2002). Species sensitivity distributions in ecotoxicology. Lewis Publishers, Boca Raton, FL USA.					
Contact information	Organisation:	RIVM, Centre for Substances and Integrated Risk Assessment				
	Name:	Peter van Vlaardingen, Tom Aldenberg				

Model description	Information to be filled in	
	Email address:	peter.van.vlaardingen@rivm.nl; tom.aldenberg@rivm.nl
Any other information	Methods in the program ETX2.0 encompass species sensitivity distributions in two ways: 'risk assessment', i.e. give the fraction of species in a community that is at risk at a certain environmental concentration, or 'standard setting': give the environmental concentration (standard) to protect the community (usually the 95 th percentile).	

Sweden

Model description /tool	Information to be filled in					
Model or tool name	Golf green module in MACRO 5.1					
Scope of model / tool	A physically-based, one-dimensional, numerical model of water flow and solute movement in macroporous soil, modified to predict groundwater contamination from golf green chemicals.					
Type of model / tool	☐ Priority setting ☐ Screening assessment ☒ Detailed assessment ☐ Other, please specify:					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☐	☐	☐
	Inhalation	☐	☐	☐	☐	☐
	Dermal	☐	☐	☐	☐	☐
	Drinking water	☐	☐	☐	☐	☐
	Soil	☐	☐	☐	☐	☒
	Air	☐	☐	☐	☐	☐
	Water	☐	☐	☐	☐	☒
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☐	☐	☐
	Other:					
Used or cited in (legal framework, project, program)	National approval of plant protection agents					
Owner	Uppsala Univ. Sweden. Dep. of soil sciences.					
Website	http://bgf.mv.slu.se/ShowPage.cfm?OrgenhetSida_ID=5658					
Download	http://bgf.mv.slu.se/ShowPage.cfm?OrgenhetSida_ID=5658					
Key reference(s)	Stromqvist J. & Jarvis N. (2005). Sorption, degradation and leaching of the fungicide iprodione in a golf green under Scandinavian conditions: measurements, modelling and risk assessment. Pest Manag Sci 61:1168-1178.					
Validation or verification reference						
Contact information	Organisation:	Uppsala Univ. Sweden. Dep. of soil sciences.				
	Name:	Nick Jarvis				
	Email address:	Nick.Jarvis@mv.slu.se				
Any other information						

The United States

Model description /tool	Information to be filled in					
Model or tool name	Industry Specific Generic Scenarios					
Scope of model / tool	Industry specific methods and models for estimating occupational exposures and environmental releases for chemicals during industrial and commercial operations.					
Type of model / tool	☐ Priority setting ☒ Screening assessment ☐ Detailed assessment ☐ Other, please specify:					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☐	☐	☐
	Inhalation	☐	☒	☒	☐	☐
	Dermal	☐	☒	☒	☐	☐
	Drinking water	☐	☐	☐	☐	☐
	Soil	☐	☐	☒	☐	☒
	Air	☐	☐	☒	☐	☒
	Water	☐	☐	☒	☐	☒
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☐	☐	☐
	Other:					
Used or cited in (legal framework, project, program)	Used to evaluate new and existing chemicals under the Toxic Substances Control Act (TSCA)					
Owner	U.S. Environmental Protection Agency (U.S. EPA)					
Website	http://www.epa.gov/opptintr/exposure/pubs/guidance.htm					
Download	http://www.epa.gov/opptintr/exposure/pubs/1997cebcompilationofindustryscenarios.zip					
Key reference(s)	http://www.epa.gov/opptintr/exposure/pubs/chemsteer.htm					
Validation or verification reference	http://www.epa.gov/opptintr/exposure/pubs/chemsteerqa.htm					
Contact information	Organisation:	U.S. EPA, Office of Pollution Prevention and Toxics (OPPT)				
	Name:	Greg Macek				
	Email address:	macek.greg@epa.gov				
Any other information						

Model /tool description	Information to be filled in																																																																		
Model or tool name	ChemSTEER (Chemical Screening Tool for Exposures and Environmental Releases)																																																																		
Scope of model / tool	Model for estimating (1) occupational inhalation and dermal exposures and (2) environmental releases to air, water, and land for chemicals during manufacturing, processing, and use.																																																																		
Type of model / tool	☐ Priority setting ☒ Screening assessment ☐ Detailed assessment ☐ Other, please specify:																																																																		
Target group(s) And exposure pathways	<table border="1"> <thead> <tr> <th>Pathway</th><th>Consumer</th><th>Worker</th><th>General population</th><th>Children</th><th>Environment</th></tr> </thead> <tbody> <tr> <td>Ingestion</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr> <td>Inhalation</td><td>☐</td><td>☒</td><td>☒</td><td>☐</td><td>☐</td></tr> <tr> <td>Dermal</td><td>☐</td><td>☒</td><td>☒</td><td>☐</td><td>☐</td></tr> <tr> <td>Drinking water</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr> <td>Soil</td><td>☐</td><td>☐</td><td>☒</td><td>☐</td><td>☒</td></tr> <tr> <td>Air</td><td>☐</td><td>☐</td><td>☒</td><td>☐</td><td>☒</td></tr> <tr> <td>Water</td><td>☐</td><td>☐</td><td>☒</td><td>☐</td><td>☒</td></tr> <tr> <td>Bioaccumulation/fish</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr> <td>Food chain</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr> <td>Other:</td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>	Pathway	Consumer	Worker	General population	Children	Environment	Ingestion	☐	☐	☐	☐	☐	Inhalation	☐	☒	☒	☐	☐	Dermal	☐	☒	☒	☐	☐	Drinking water	☐	☐	☐	☐	☐	Soil	☐	☐	☒	☐	☒	Air	☐	☐	☒	☐	☒	Water	☐	☐	☒	☐	☒	Bioaccumulation/fish	☐	☐	☐	☐	☐	Food chain	☐	☐	☐	☐	☐	Other:					
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Food chain	☐	☐	☐	☐	☐																																																														
Other:																																																																			
Used or cited in (legal framework, project, program)	Routinely used to evaluate new chemicals submissions submitted under Section 5 of the Toxic Substances Control Act (TSCA); could be used for screening existing chemicals; part of tools covered in the Sustainable Futures Training.																																																																		
Owner	U.S. Environmental Protection Agency (U.S. EPA)																																																																		
Website	http://www.epa.gov/opptintr/exposure/pubs/chemsteer.htm																																																																		
Download	http://www.epa.gov/opptintr/exposure/pubs/chemsteerdl.htm																																																																		
Key reference(s)	http://www.epa.gov/opptintr/exposure/pubs/chemsteerslideshow.htm http://www.epa.gov/opptintr/exposure/pubs/1997cebcompilationofindustryscenarios.zip																																																																		
Validation or verification reference	http://www.epa.gov/opptintr/exposure/pubs/chemsteerqa.htm																																																																		
Contact information	<table border="1"> <tr> <td>Organisation:</td><td>U.S. EPA, Office of Pollution Prevention and Toxics (OPPT)</td></tr> <tr> <td>Name:</td><td>Jay Jon</td></tr> <tr> <td>Email address:</td><td>jon.jay@epa.gov</td></tr> </table>	Organisation:	U.S. EPA, Office of Pollution Prevention and Toxics (OPPT)	Name:	Jay Jon	Email address:	jon.jay@epa.gov																																																												
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Name:	Jay Jon																																																																		
Email address:	jon.jay@epa.gov																																																																		
Any other information																																																																			

Model description /tool	Information to be filled in					
Model or tool name	Exposure, Fate Assessment Screening Tool (E-FAST)					
Scope of model / tool	model for screening level estimates of chemical concentrations from releases to air, surface water, landfills and from consumer products. Also estimates inhalation, dermal and ingestion Potential Dose Rates and aquatic organism risks.					
Type of model / tool	☐ Priority setting ☒ Screening assessment ☐ Detailed assessment ☐ Other, please specify:					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☒	☐	☒	☒	☒
	Inhalation	☒	☐	☒	☒	☒
	Dermal	☒	☐	☒	☒	☒
	Drinking water	☒	☐	☒	☒	☒
	Soil	☒	☐	☒	☒	☒
	Air	☒	☐	☒	☒	☒
	Water	☒	☐	☒	☒	☒
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☐	☐	☐
	Other:					
Used or cited in (legal framework, project, program)	United States: New chemicals and Existing Chemicals under the Toxic Substances Control Act (TSCA), Sustainable Futures Training; industry, consultants, and researchers					
Owner	U.S. Environmental Protection Agency (U.S. EPA)					
Website	http://www.epa.gov/oppt/exposure/pubs/efast.htm					
Download	http://www.epa.gov/oppt/exposure/pubs/efastdl.htm					
Key reference(s)	http://www.epa.gov/oppt/exposure/pubs/efast2refs.htm http://www.epa.gov/oppt/exposure/pubs/efast2man.pdf					
Validation or verification reference	http://www.epa.gov/oppt/exposure/pubs/efastqa.htm					
Contact information	Organisation:	U.S. EPA., Office of Pollution Prevention and Toxics (OPPT)				
	Name:	Conrad Flessner				
	Email address:	flessner.conrad@epa.gov				
Any other information						

Model /tool description	Information to be filled in					
Model or tool name	EPI Suite™ Version 4.0					
Scope of model / tool	screening level suite of physical/chemical property and environmental fate estimation programs					
Type of model / tool	☒ Priority setting ☒ Screening assessment ☒ Detailed assessment ☐ Other, please specify:					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☐	☐	☐
	Inhalation	☐	☐	☐	☐	☐
	Dermal	☐	☐	☐	☐	☐
	Drinking water	☐	☐	☐	☐	☐
	Soil	☐	☐	☐	☐	☐
	Air	☐	☐	☐	☐	☐
	Water	☐	☐	☐	☐	☐
	Bioaccumulation/fish	☐	☐	☒	☒	☒
	Food chain	☐	☐	☐	☐	☐
Other:			EPI Suite™ uses a single input to run the following estimation programs: KOWWIN™, AOPWIN™, HENRYWIN™, MPBPWIN™, BOWIN™, BioHCwin, KOCWIN™, WSKOWWIN™,	EPI Suite™ uses a single input to run the following estimation programs: KOWWIN™, AOPWIN™, HENRYWIN™,	EPI Suite™ uses a single input to run the following estimation programs: KOWWIN™, AOPWIN™, HENRYWIN™, MPBPWIN™, BOWIN™, BioHCwin, KOCWIN™, WSKOWWIN™, WATERNT™, BCFBAF™, HYDROWIN™,	

Model /tool description	Information to be filled in					
				WATERNT™, BCFBAF™, HYDROWIN™, KOAWIN and AEROWIN™, and the fate models WVOLWIN™, STPWIN™ and LEV3EPI™.	MPBPWIN™, BIOWIN™, BioHCwin, KOCWIN™, WSKOW WIN™, WATERNT™, BCFBAF™, HYDROWIN™, KOAWIN and AEROWIN™, and the fate models WVOLWIN™, STPWIN™ and LEV3EPI™.	KOAWIN and AEROWIN™, and the fate models WVOLWIN™, STPWIN™ and LEV3EPI™.
Used or cited in (legal framework, project, program)	United States: New chemical and Existing Chemical analyses under Toxic Substances Control Act (TSCA); Sustainable Futures Training; also used by Office of Pesticide Programs, industry, consultants, researchers.					
Owner	U.S. Environmental Protection Agency (U.S. EPA)					
Website	http://www.epa.gov/oppt/exposure/pubs/episuite.htm					
Download	http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm					
Key reference(s)	see documentation help within EPI Suite™ http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm					
Validation or verification reference	http://www.epa.gov/sab/panels/epi_suite_review_panel.htm					

Model /tool description	Information to be filled in	
Contact information	Organisation:	U.S. Environmental Protection Agency (U.S. EPA)
	Name:	Robert S. Boethling, Ph.D.
	Email address:	boethling.robert@epa.gov
Any other information		

Model /tool description	Information to be filled in					
Model or tool name	IGEMS - Internet Geographical Exposure Modeling System					
Scope of model / tool	IGEMS brings together in one system several EPA environmental fate and transport models and some of the environmental data needed to run them. IGEMS includes models and data for ambient air, surface water, soil, and ground water, and makes the models much easier to use than their stand-alone counterparts.					
Type of model / tool	☐ Priority setting ☐ Screening assessment ☒ Detailed assessment ☐ Other, please specify:					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☒	☒	☒
	Inhalation	☐	☐	☒	☒	☒
	Dermal	☐	☐	☐	☐	☐
	Drinking water	☐	☐	☒	☒	☒
	Soil	☐	☐	☒	☒	☒
	Air	☐	☐	☒	☒	☒
	Water	☐	☐	☒	☒	☒
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☐	☐	☐
	Other:			fish ingestion	fish ingestion	fish ingestion
Used or cited in (legal framework, project, program)	United States: used to evaluate Existing chemicals and some new chemicals under the Toxic Substances Control Act (TSCA); also used by industry, academia, consultants and researchers.					
Owner	U.S. Environmental Protection Agency					
Website	http://www.epa.gov/oppt/exposure/pubs/gems.htm					

Model description /tool	Information to be filled in	
Download	IGEMS is a web-based modeling system and will soon be available at http://www.epa.gov/oppt/exposure/pubs/gems.htm	
Key reference(s)	http://www.epa.gov/oppt/exposure/pubs/gems.htm	
Validation or verification reference	http://www.epa.gov/oppt/exposure/pubs/gems.htm	
Contact information	Organisation:	U.S. Environmental Protection Agency
	Name:	Wen-Hsiung Lee
	Email address:	lee.wen-hsiung@epa.gov
Any other information	IGEMS incorporates the following models: ISCST3, ISCLT3, PROUTE, SESOIL, AT123D, and TRIAIR; current enhancements will add AERMOD	

Model description /tool	Information to be filled in					
Model or tool name	MCCEM - Multi- Chamber Concentration and Exposure Model version 1.2					
Scope of model / tool	Estimates average and peak indoor air concentrations of chemicals released from products or materials in houses, apartments, townhouses, or other residences. The data libraries contained in MCCEM are limited to residential settings. However, the model can be used to assess other indoor environments (e.g. schools, offices) if the user can supply the necessary inputs.					
Type of model / tool	☐ Priority setting ☐ Screening assessment ☒ Detailed assessment ☐ Other, please specify:					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☐	☐	☐
	Inhalation	☒	☐	☐	☒	☐
	Dermal	☐	☐	☐	☐	☐
	Drinking water	☐	☐	☐	☐	☐
	Soil	☐	☐	☐	☐	☐
	Air	☒	☐	☐	☒	☐
	Water	☐	☐	☐	☐	☐
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☐	☐	☐
	Other:					

Model description /tool	Information to be filled in	
Used or cited in (legal framework, project, program)	United States: Existing chemicals under Toxic Substances Control Act (TSCA); also used by Office of Pesticide Programs, industry, consultants and researchers	
Owner	U.S. Environmental Protection Agency	
Website	http://www.epa.gov/oppt/exposure/pubs/mccem.htm	
Download	http://www.epa.gov/oppt/exposure/pubs/mccemdl.htm	
Key reference(s)	See the help files in MCCEM at http://www.epa.gov/oppt/exposure/pubs/mccemdl.htm	
Validation or verification reference	http://www.epa.gov/oppt/exposure/pubs/mccemqa.htm	
Contact information	Organisation:	U.S. Environmental Protection Agency
	Name:	Christina Cinalli
	Email address:	cinalli.christina@epa.gov
Any other information		

Model description /tool	Information to be filled in
Model or tool name	Source Ranking Database, Version 4.0
Scope of model / tool	Contains a database of information (which is quite old) on chemicals included in products. Performs a systematic screening-level review of over 12,000 potential indoor pollution sources to identify high-priority product and material categories for further evaluation. Can also identify the products that have contained a specific chemical.
Type of model / tool	☒ Priority setting ☐ Screening assessment ☐ Detailed assessment ☐ Other, please specify:

Model description /tool	Information to be filled in					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☐	☐	☐
	Inhalation	☒	☐	☐	☒	☐
	Dermal	☐	☐	☐	☐	☐
	Drinking water	☐	☐	☐	☐	☐
	Soil	☐	☐	☐	☐	☐
	Air	☐	☐	☐	☐	☐
	Water	☐	☐	☐	☐	☐
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☐	☐	☐
	Other:					
Used or cited in (legal framework, project, program)	United States: used to select the chemicals included in the Voluntary Children's Chemical Evaluaton Program; also routinely used for prioritization and screening in addition to other databases on products under the Toxic Substances Control Act (TSCA).					
Owner	U.S. Environmental Protection Agency					
Website	http://www.epa.gov/oppt/exposure/pubs/srd.htm					
Download	http://www.epa.gov/oppt/exposure/pubs/srddl.htm					
Key reference(s)	http://www.epa.gov/oppt/exposure/pubs/srd_doc.pdf http://www.epa.gov/oppt/exposure/pubs/srd_apdx.pdf					
Validation or verification reference	http://www.epa.gov/sab/pdf/ihec9804.pdf					
Contact information	Organisation:	U.S. Environmental Protection Agency				
	Name:	Christina Cinalli				
	Email address:	cinalli.christina@epa.gov				
Any other information						

Model description /tool	Information to be filled in
Model or tool name	ReachScan
Scope of model / tool	Estimates surface water chemical concentrations at drinking water utilities downstream from industrial facilities, the populations served by those drinking water utilities, the number of days per year that an aquatic ecotoxicological concern concentration will be exceeded in the subject stream or stream segment.

Model description /tool	Information to be filled in					
Type of model / tool	☐ Priority setting ☐ Screening assessment ☒ Detailed assessment ☐ Other, please specify:					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☒	☐	☒	☒	☒
	Inhalation	☐	☐	☐	☐	☐
	Dermal	☐	☐	☐	☐	☐
	Drinking water	☒	☐	☒	☒	☒
	Soil	☐	☐	☐	☐	☐
	Air	☐	☐	☐	☐	☐
	Water	☒	☐	☒	☒	☒
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☐	☐	☐
	Other:					
Used or cited in (legal framework, project, program)	United States: ReachScan is being redesigned and will be routinely used to evaluate new chemicals and existing chemicals under the Toxic Substances Control Act (TSCA); it will also most likely be used by State and local governments, industry, academia, researchers and consultants.					
Owner	U.S. Environmental Protection Agency					
Website	http://www.epa.gov/oppt/exposure/pubs/reachscan.htm					
Download	When available, ReachScan will be available at http://www.epa.gov/oppt/exposure/pubs/reachscan.htm					
Key reference(s)	When available, references will be available at http://www.epa.gov/oppt/exposure/pubs/reachscan.htm					
Validation or verification reference	When available, references will be available at http://www.epa.gov/oppt/exposure/pubs/reachscan.htm					
Contact information	Organisation:	U.S. Environmental Protection Agency				
	Name:	Wen-Hsiung Lee				
	Email address:	lee.wen-hsiung@epa.gov				
Any other information						

Model description /tool	Information to be filled in					
Model or tool name	Formaldehyde Indoor Air Model (FIAM)					
Scope of model / tool	This new model is still under development but will be finalized soon. It estimates airborne concentration of formaldehyde from pressed wood products in residences or buildings.					
Type of model / tool	☐ Priority setting ☒ Screening assessment ☒ Detailed assessment ☐ Other, please specify:					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☐	☐	☐
	Inhalation	☒	☐	☐	☒	☐
	Dermal	☐	☐	☐	☐	☐
	Drinking water	☐	☐	☐	☐	☐
	Soil	☐	☐	☐	☐	☐
	Air	☒	☐	☐	☒	☐
	Water	☐	☐	☐	☐	☐
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☐	☐	☐
	Other:					
Used or cited in (legal framework, project, program)	United States: will be used to evaluate exposure to formaldehyde in pressed wood products under Toxic Substances Control Act (TSCA)					
Owner	U.S. Environmental Protection Agency					
Website	Model will be available at http://www.epa.gov/oppt/exposure/ in the future.					
Download	Model will be available at http://www.epa.gov/oppt/exposure/ in the future.					
Key reference(s)	References will be available at http://www.epa.gov/oppt/exposure/ in the future.					
Validation or verification reference	References will be available at http://www.epa.gov/oppt/exposure/ in the future. Model has completed an external peer review and is being updated and finalized.					
Contact information	Organisation:	U.S. Environmental Protection Agency				
	Name:	Christina Cinalli				
	Email address:	cinalli.christina@epa.gov				
Any other information						

Model /tool description	Information to be filled in					
Model or tool name	Wall Paints Exposure Assessment Model (WPEM)					
Scope of model / tool	estimates the potential exposure of consumers and workers to the chemicals emitted from wall paint which is applied using a roller or a brush.					
Type of model / tool	☒ Priority setting ☒ Screening assessment ☒ Detailed assessment ☐ Other, please specify:					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☐	☐	☐
	Inhalation	☒	☒	☒	☐	☐
	Dermal	☐	☐	☐	☐	☐
	Drinking water	☐	☐	☐	☐	☐
	Soil	☐	☐	☐	☐	☐
	Air	☐	☐	☐	☐	☐
	Water	☐	☐	☐	☐	☐
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☐	☐	☐
	Other:	painting	painting	painting		
Used or cited in (legal framework, project, program)	Canada - The Challenge screening assessments (http://www.chemicalsubstanceschimiques.gc.ca/challenge-defi/index-eng.php) United States - New Chemicals and Existing Chemicals under Toxic Substances Control Act (TSCA), and Office of Pesticide Programs, industry design and formulation of wall paints, researchers and consultants also use the model.					
Owner	U.S. Environmental Protection Agency, Office of Pollution Prevention and Toxics					
Website	http://www.epa.gov/opptintr/exposure/pubs/wpem.htm					
Download	available: http://www.epa.gov/opptintr/exposure/pubs/wpemdl.htm					
Key reference(s)	http://www.epa.gov/opptintr/exposure/pubs/wpemman.pdf					
Validation or verification reference						
Contact information	Organisation: Name: Email address:	U.S. Environmental Protection Agency, Office of Pollution Prevention and Toxics Christina Cinalli Cinalli.christina@epa.gov				

Model description	/tool	Information to be filled in
Any information	other	Wall Paint Exposure Model (WPEM) estimates an individual's inhalation exposure to airborne concentrations of a chemical released from latex or alkyd wall paint and/or primer, during and after the time when a building (residence, office, or standard box) is painted. Various default values are provided while it also requires certain inputs by the user. It was developed by the U.S. EPA's Office of Pollution Prevention and Toxics (OPPT) with the National Paints and Coatings Association (NPCA) and paint manufacturers and chemical suppliers. The purpose of the model is to allow industry product developers and health and safety officials to more easily and accurately identify chemicals in paint formulations that may pose potential exposure problems. Once the user has provided model inputs and has executed the model, the resulting outputs can be used to assess inhalation exposure and associated risk for a chemical that is currently formulated, or is being considered for formulation, in primer and/or paint. The model considers latex and alkyd wall paints because of the relatively large number of people exposed and because paint emissions (and thereby exposures) could be relatively high when compared to dry products. It is considered that when an appropriate indoor-air model is used, data generated from small-chamber testing translates well into exposure estimates. The emission algorithms used in the model, and their relationship to chemical properties, are based on chamber tests specific to interior paints. The model provides both short-term and long-term exposure measures. Short-term measures include the highest instantaneous, 15-minute-average, and 8-hour-average airborne concentration to which an individual is exposed, under the conditions represented by model inputs. Long-term measures include lifetime average daily dose (LADD) and lifetime average daily concentration (LADC).

Model /tool description	Information to be filled in					
Model or tool name	AMEM					
Scope of model / tool	The ADL Polymer Migration Estimation Model (AMEM) estimates the fraction of a chemical additive that migrates from certain polymeric materials to air, water, and solids.					
Type of model / tool	☐ Priority setting ☐ Screening assessment ☐ Detailed assessment ☒ Other, please specify: estimates the fraction of a chemical additive that migrates from certain polymeric materials to air, water, and solids.					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☒	☐	☐	☒	☐
	Inhalation	☐	☐	☐	☐	☐

	Dermal	☒	☐	☐	☒	☐
	Drinking water	☒	☐	☐	☒	☐
	Soil	☒	☐	☐	☒	☐
	Air	☒	☐	☐	☒	☐
	Water	☒	☐	☐	☒	☐
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☐	☐	☐
	Other:					
Used or cited in (legal framework, project, program)	United States: Model is being migrated to Windows from DOS. In the past, it was used in New chemicals and Existing Chemicals under the Toxic Substances Control Act (TSCA), and by others.					
Owner	U.S. Environmental Protection Agency (U.S. EPA)					
Website	http://www.epa.gov/oppt/exposure/pubs/amem.htm					
Download	http://www.epa.gov/oppt/exposure/pubs/amemdl.htm					
Key reference(s)	http://www.epa.gov/oppt/exposure/pubs/amemuserguide.pdf					
Validation or verification reference	http://www.epa.gov/oppt/exposure/pubs/amemuserguide.pdf					
Contact information	Organisation:	U.S. Environmental Protection Agency (U.S. EPA)				
	Name:	Christina Cinalli				
	Email address:	cinalli.christina@epa.gov				
Any other information						

Model /tool description	Information to be filled in
Model or tool name	IEUBK
Scope of model / tool	The IEUBK Model combines estimates of lead intake from lead in air, water, soil, dust, diet, and other ingested media, with an absorption model for the uptake of lead from the lung or gastrointestinal tract, and a biokinetic model of lead distribution, and elimination from a child's body, to predict the likely distribution of blood lead for children of ages six months through 84 months exposed to lead in these environmental media.
Type of model / tool	☐ Priority setting ☐ Screening assessment ☒ Detailed assessment ☐ Other, please specify:

Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☐	☒	☐
	Inhalation	☐	☐	☐	☒	☐
	Dermal	☐	☐	☐	☒	☐
	Drinking water	☐	☐	☐	☒	☐
	Soil	☐	☐	☐	☒	☐
	Air	☐	☐	☐	☒	☐
	Water	☐	☐	☐	☒	☐
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☐	☐	☐
	Other:					
	Used or cited in (legal framework, project, program)	United States: Superfund assessments for lead, Existing Chemicals under the Toxic Substances Control Act (TSCA), industry, consultants, researchers				
Owner	U.S. Environmental Protection Agency (U.S. EPA)					
Website	http://www.epa.gov/superfund/lead/ieubkfaq.htm					
Download	http://www.epa.gov/superfund/lead/products.htm					
Key reference(s)	http://www.epa.gov/superfund/lead/guidance.htm					
Validation or verification reference	http://www.epa.gov/superfund/lead/products/tsd.pdf					
Contact information	Organisation:	U.S. Environmental Protection Agency (U.S. EPA)				
	Name:	Mr. James Konz				
	Email address:	pbhelp@epa.gov or konz.james@epa.gov				
Any other information						

Model /tool description	Information to be filled in
Model or tool name	SWIMODEL
Scope of model / tool	The Swimmer Exposure Assessment Model was developed by EPA as a screening tool to conduct exposure assessments of pesticides found in indoor swimming pools and spas (these include the 200+ pesticides registered for swimming pool uses, as well as those which exist in water, and run-off water).
Type of model / tool	☐ Priority setting ☒ Screening assessment ☐ Detailed assessment ☐ Other, please specify:

Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☒	☐	☒	☒	☐
	Inhalation	☒	☐	☒	☒	☐
	Dermal	☒	☐	☒	☒	☐
	Drinking water	☐	☐	☐	☐	☐
	Soil	☐	☐	☐	☐	☐
	Air	☐	☐	☐	☐	☐
	Water	☐	☐	☐	☐	☐
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☐	☐	☐
	Other:					
Used or cited in (legal framework, project, program)	U.S. Environmental Protection Agency, Office of Pesticide Programs					
Owner	U.S. Environmental Protection Agency, Office of Pesticide Programs					
Website	http://www.epa.gov/oppad001/swimodel.htm					
Download	http://www.epa.gov/oppad001/swimodel.htm					
Key reference(s)	http://www.epa.gov/oppad001/swimodelusersguide.pdf					
Validation verification reference	http://www.epa.gov/oppad001/swimodelusersguide.pdf					
Contact information	Organisation:	U.S. Environmental Protection Agency, Antimicrobial Hotline				
	Name:	Antimicrobial Hotline, 703-308-0127				
	Email address:	info_antimicrobial@epa.gov				
Any other information						

Model /tool description	Information to be filled in
Model or tool name	Stochastic Human Exposure and Dose Simulation model for multimedia, multipathway pollutants (SHEDS-Multimedia)
Scope of model / tool	SHEDS-Multimedia is a physically-based probabilistic computer model that can simulate aggregate or cumulative human exposure and dose, via dietary and residential routes, to a variety of environmental chemicals. This model can be used to predict ranges of exposure in a population; to identify critical pathways, factors, and uncertainties; and to enhance dose model estimates. The purpose of SHEDS-Multimedia is to improve the understanding of

	aggregate and cumulative exposures over space and time for enhanced human health risk assessments involving chemicals such as pesticides, metals, and persistent bioaccumulative toxicants. Because it uses 2-stage Monte Carlo sampling, SHEDS-Multimedia can quantify variability in population exposure and dose estimates, and the uncertainty associated with different percentiles. Another key feature of the model is the use of a time series approach for simulating dietary and residential exposures, accounting for variability within a day from separate eating occasions and microactivities. Tracking sequential dermal hand and body exposures, and linking hand-to-mouth ingestion time series with dermal hand exposures, accounts for both replenishment and removal processes (i.e., surface contact, hand mouthing, hand washing, bathing, absorption into the skin). The newest version of SHEDS-Multimedia (version 4) also includes several longitudinal diary assembly methods, multiple chemical (as well as single chemical) algorithms for conducting cumulative and aggregate assessments, and a number of other unique or advanced features. For example, the model permits correlation of randomly sampled inputs; simulates co-occurrence of chemical usage and application scenarios; includes multiple methods for sensitivity and uncertainty analyses; and is transparent and flexible for simulating different exposure scenarios. SHEDS-Multimedia exposure profiles can be linked to physiologically-based pharmacokinetic (PBPK) models for enhanced dose and risk quantification.					
Type of model / tool	☐ Priority setting ☐ Screening assessment ☒ Detailed assessment ☐ Other, please specify:					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☒	☒	☐
	Inhalation	☐	☐	☒	☒	☐
	Dermal	☐	☐	☒	☒	☐
	Drinking water	☐	☐	☒	☒	☐
	Soil	☐	☐	☒	☒	☐
	Air	☐	☐	☒	☒	☐
	Water	☐	☐	☒	☒	☐
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☒	☒	☐
	Other:					
Used or cited in (legal framework, project, program)	U.S. EPA's Office of Research and Development, Office of Pesticide Programs, and others are applying the model for research and regulatory purposes. There are registered SHEDS-Multimedia version 3 users from at least 9 countries and 12 US states, representing academia, industry, consultants, and individual citizens.					
Owner	U.S. Environmental Protection Agency, Office of Research and Development					
Website	http://www.epa.gov/heasd/products/sheds_multimedia/sheds_mm.html					
Download	http://www.epa.gov/heasd/products/sheds_multimedia/sheds_mm.html					

Key reference(s)	Zartarian et al., “Application and Evaluation of EPA’s SHEDS-Multimedia Model to an Aggregate Permethrin Exposure Case Study,” accepted, Journal of Exposure Science and Environmental Epidemiology. Xue et al., “Methyl Mercury Exposure from Fish Consumption in Vulnerable Racial/Ethnic Populations,” accepted, Science of Total Environment. Xue et al., 2010. Probabilistic modeling of dietary arsenic exposure and dose and evaluation with 2003-2004 NHANES Data. Environmental Health Perspectives. 118: 345-350. Other SHEDS-related publications are provided at the following list http://www.epa.gov/heads/products/sheds_multimedia/files/SHEDS_related_publications.pdf	
Validation or verification reference	SHEDS-Multimedia versions 3 and 4 were peer reviewed by EPA's FIFRA Scientific Advisory Panel (SAP): http://www.epa.gov/scipoly/sap/meetings/2007/081407_mtg.htm http://www.epa.gov/scipoly/sap/meetings/2010/072010meeting.html	
Contact information	Organisation: Name: Email address:	U.S. EPA, Office of Research and Development Valerie Zartarian, Ph.D. (617) 918-1541 or Jianping (Jim) Xue, M.D., M.S. (919)541-7962 zartarian.valerie@epa.gov or xue.jianping@epa.gov
Any other information	other SHEDS models include SHEDS-Wood, SHEDS-PM, and SHEDS-ATox	

CEFIC

Model description /tool	Information to be filled in					
Model or tool name	Specific Exposure Scenario template					
Scope of model / tool	Data collection for exposure estimation					
Type of model / tool	☐ Priority setting ☐ Screening assessment ☐ Detailed assessment ☐ Other, please specify: Data collection for exposure estimation					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☐	☐	☐
	Inhalation	☐	☐	☐	☐	☐
	Dermal	☐	☐	☐	☐	☐
	Drinking water	☐	☐	☐	☐	☐
	Soil	☐	☐	☐	☐	☐
	Air	☐	☐	☐	☐	☐
	Water	☐	☐	☐	☐	☐
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☐	☐	☐
	Other:					
Used or cited in (legal framework, project, program)	REACH					
Owner	Cefic					
Website	http://cefic.org/templates/shwPublications.asp?HID=750&T=806					
Download	http://cefic.org/templates/shwPublications.asp?HID=750&T=806					
Key reference(s)						
Validation or verification reference						
Contact information	Organisation:	Cefic				
	Name:	L. Heezen				
	Email address:	lhe@cefic.be				
Any other information						

Model description /tool	Information to be filled in					
Model or tool name	Use Descriptor mapping					
Scope of model / tool	Sector association use mappings					
Type of model / tool	☐ Priority setting ☐ Screening assessment ☐ Detailed assessment ☐ Other, please specify: Use mapping for sectors					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☐	☐	☐
	Inhalation	☐	☐	☐	☐	☐
	Dermal	☐	☐	☐	☐	☐
	Drinking water	☐	☐	☐	☐	☐
	Soil	☐	☐	☐	☐	☐
	Air	☐	☐	☐	☐	☐
	Water	☐	☐	☐	☐	☐
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☐	☐	☐
	Other:					
Used or cited in (legal framework, project, program)	REACH					
Owner	Cefic for overview Mappings owned by sectors					
Website	http://cefic.org/en/reach-for-industries-libraries.html					
Download	http://cefic.org/en/reach-for-industries-libraries.html					
Key reference(s)						
Validation or verification reference						
Contact information	Organisation:	Cefic				
	Name:	M. Vinas				
	Email address:	mvi@cefic.be				
Any other information						

Model description /tool	Information to be filled in					
Model or tool name	SPERCs					
Scope of model / tool	Specific Environmental Release Classes					
Type of model / tool	☐ Priority setting ☐ Screening assessment ☐ Detailed assessment ☐ Other, please specify: Sector specific environmental standards for environmental exposure estimating tools					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☐	☐	☐
	Inhalation	☐	☐	☐	☐	☐
	Dermal	☐	☐	☐	☐	☐
	Drinking water	☐	☐	☐	☐	☐
	Soil	☐	☐	☐	☐	☐
	Air	☐	☐	☐	☐	☐
	Water	☐	☐	☐	☐	☐
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☐	☐	☐
	Other:					
Used or cited in (legal framework, project, program)	REACH					
Owner	Cefic					
Website	http://cefic.org/en/reach-for-industries-libraries.html					
Download	http://cefic.org/en/reach-for-industries-libraries.html					
Key reference(s)						
Validation or verification reference						
Contact information	Organisation:	Cefic				
	Name:	L. Heezen				
	Email address:	lhe@cefic.be				
Any other information						

Model description /tool	Information to be filled in					
Model or tool name	Generic Exposure Scenarios					
Scope of model / tool	Exposure Assessment for sectors and associations					
Type of model / tool	☐ Priority setting ☐ Screening assessment ☐ Detailed assessment ☒ Other, please specify: Tool developed by sector associations to communicate generic exposure scenarios in that sector. Existing exposure estimating tools are used in the GES					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☐	☐	☐
	Inhalation	☐	☐	☐	☐	☐
	Dermal	☐	☐	☐	☐	☐
	Drinking water	☐	☐	☐	☐	☐
	Soil	☐	☐	☐	☐	☐
	Air	☐	☐	☐	☐	☐
	Water	☐	☐	☐	☐	☐
	Bioaccumulation/fish	☐	☐	☐	☐	☐
	Food chain	☐	☐	☐	☐	☐
	Other:					
Used or cited in (legal framework, project, program)	REACH					
Owner	Cefic for the tool GES will be responsibility and ownership of sector organisations					
Website	http://cefic.org/templates/shwPublications.asp?HID=750&T=806					
Download	http://cefic.org/templates/shwPublications.asp?HID=750&T=806					
Key reference(s)						
Validation or verification reference						
Contact information	Organisation:	Cefic				
	Name:	L. Heezen				
	Email address:	lhe@cefic.be				
Any other information						

Model description /tool	Information to be filled in																																																																		
Model or tool name	CoZMoMAN																																																																		
Scope of model / tool	The CoZMoMAN is a dynamic model which combines the multimedia fate and transport model CoZMo-POP2 with the bioaccumulation model ACC-HUMAN. The physical environmental model allows the user considerable flexibility in terms of the spatial resolution of the water body. It is a non-steady state model, includes seasonality in environmental conditions, and constructs complete steady state mass budgets for air, water and particulate organic carbon between the model compartments from the environmental parameters supplied by the user. A detailed description of the physical model is provided in Wania et al. (2006). The bioaccumulation model is mechanistic, non-steady state model which considers potential routes of human exposure through aquatic and terrestrial food chains and also by air and water. A detailed description of the bioaccumulation model is provided by Czub and McLachlan (2004). The CoZMoMAN model links these two models, using the environmental concentrations from CoZMo-POP2 to drive the bioaccumulation model ACC-HUMAN. A detailed description is provided by Breivik et al. (2010).																																																																		
Type of model / tool	☐ Priority setting ☐ Screening assessment ☒ Detailed assessment ☐ Other, please specify:																																																																		
Target group(s) And exposure pathways	<table border="1"> <thead> <tr> <th>Pathway</th><th>Consumer</th><th>Worker</th><th>General population</th><th>Children</th><th>Environment</th></tr> </thead> <tbody> <tr> <td>Ingestion</td><td>☐</td><td>☐</td><td>☒</td><td>☒</td><td>☐</td></tr> <tr> <td>Inhalation</td><td>☐</td><td>☐</td><td>☒</td><td>☒</td><td>☐</td></tr> <tr> <td>Dermal</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr> <td>Drinking water</td><td>☐</td><td>☐</td><td>☒</td><td>☒</td><td>☐</td></tr> <tr> <td>Soil</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☒</td></tr> <tr> <td>Air</td><td>☐</td><td>☐</td><td>☒</td><td>☒</td><td>☒</td></tr> <tr> <td>Water</td><td>☐</td><td>☐</td><td>☒</td><td>☒</td><td>☒</td></tr> <tr> <td>Bioaccumulation/fish</td><td>☐</td><td>☐</td><td>☒</td><td>☒</td><td>☒</td></tr> <tr> <td>Food chain</td><td>☐</td><td>☐</td><td>☒</td><td>☒</td><td>☒</td></tr> <tr> <td>Other:</td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>	Pathway	Consumer	Worker	General population	Children	Environment	Ingestion	☐	☐	☒	☒	☐	Inhalation	☐	☐	☒	☒	☐	Dermal	☐	☐	☐	☐	☐	Drinking water	☐	☐	☒	☒	☐	Soil	☐	☐	☐	☐	☒	Air	☐	☐	☒	☒	☒	Water	☐	☐	☒	☒	☒	Bioaccumulation/fish	☐	☐	☒	☒	☒	Food chain	☐	☐	☒	☒	☒	Other:					
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Food chain	☐	☐	☒	☒	☒																																																														
Other:																																																																			
Used or cited in (legal framework, project, program)	CEFIC Long-range Research Initiative (LRI) programme																																																																		
Owner	University of Oslo University of Toronto Stockholm University																																																																		
Website	http://www.scar.utoronto.ca/~wania/downloads.html																																																																		
Download	http://www.scar.utoronto.ca/~wania/downloads.html																																																																		

Model description /tool	Information to be filled in
Key reference(s)	Detailed model descriptions: Czub G, McLachlan MS, 2004. A food chain model to predict the levels of lipophilic organic contaminants in humans. <i>Environ Toxicol Chem.</i> 23:2356-2366. Wania F, Breivik K, Persson NJ, McLachlan MS, 2006. CoZMo-POP 2 - A fugacity-based dynamic multi-compartmental mass balance model of the fate of persistent organic pollutants. <i>Environ Model Software.</i> 21:868-884. Breivik K, Czub G, Wania F, McLachlan MS, 2010. Towards an understanding of the link between environmental emissions and human body burdens of PCBs using CoZMoMAN. <i>Environ Int.</i> 36: 85-91. Further reading (selected), including case-studies whereby modifications to the core model(s) have been explored, which are not necessarily included in the CoZMoMAN model package: ACC-HUMAN: Undeman E, Czub G, McLachlan MS, 2009. Addressing temporal variability when modeling bioaccumulation in plants. <i>Environ Sci Technol</i> 43:3751-3756. Czub G, McLachlan MS, 2007. Influence of the temperature gradient in blubber on the bioaccumulation of persistent lipophilic organic chemicals in seals. <i>Environ Tox Chem</i> 26: 2356-2366. Czub G, McLachlan MS, 2004. Bioaccumulation potential of persistent organic chemicals in humans. <i>Environ Sci Technol</i> 38: 2406-2412. CoZMo-POP: McLachlan MS, Czub G, Wania F, 2002. The influence of vertical sorbed phase transport on the fate of organic chemicals in surface soils. <i>Environ Sci Technol</i> 36: 4860-4867. Daly GL, Wania F, 2004. Simulating the influence of snow on the fate of organic compounds. <i>Environ Sci Technol</i> 38: 4176-4186. Breivik K, Wania F, Muir DCG, Alaee M, Backus S, Pacepavicius G, 2006. Empirical and modelling evidence of the long-range atmospheric transport of decabromodiphenyl ether. <i>Environ Sci Technol.</i> 40: 4612-4618. Brown TN, Wania F, 2009. Development and exploration of an organic contaminant fate model using poly-parameter linear free energy relationships. <i>Environ Sci Technol</i> 43: 6676-6683. Linked model: Undeman E, Brown TN, Wania F, McLachlan MS, 2010. The susceptibility of human populations to environmental exposure to organic contaminants. <i>Environ Sci Technol.</i> 44: 6249-6255.
Validation or verification reference	The CoZMoMAN model has been evaluated with PCBs and the CoZMo-POP and ACC-HUMAN models have been evaluated with several chemicals.

Model description /tool	Information to be filled in	
Contact information	Organisation:	University of Oslo
	Name:	Dr. Knut Breivik
	Email address:	Knut.Breivik@nilu.no
Any other information		

Model description /tool	Information to be filled in					
Model or tool name	FHX - Farfield Human Exposure model					
Scope of model / tool	The FHX model brings together chemical emissions, fate and transport processes in the physical environment, and aquatic and terrestrial food web bioaccumulation in a holistic mass balance framework providing chemical exposure assessments for humans of different age classes. The model is currently parameterized using Health Canada exposure factor data. The model can be used for screening and priority setting. For ranking purposes, the model can use either a consistent unit emission rate for all chemicals or chemical-specific estimates of actual emission rates.					
Type of model / tool	☒ Priority setting ☒ Screening assessment ☐ Detailed assessment ☐ Other, please specify:					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☒	☒	☐
	Inhalation	☐	☐	☒	☒	☐
	Dermal	☐	☐	☐	☐	☐
	Drinking water	☐	☐	☒	☒	☐
	Soil	☐	☐	☒	☒	☐
	Air	☐	☐	☒	☒	☐
	Water	☐	☐	☒	☒	☐
	Bioaccumulation/fish	☐	☐	☒	☒	☐
	Food chain	☐	☐	☒	☒	☐
	Other:					
Used or cited in (legal framework, project, program)	Canada's Chemicals Management Plan					
Owner	Freeware software hosted at Trent University					

Model description /tool	Information to be filled in	
Website	The Canadian Centre for Environmental Modelling and Chemistry (CEMC)	
Download	http://www.trentu.ca/academic/aminss/envmodel/models/models.html	
Key reference(s)	Arnot, J. A.; Mackay, D.; Sutcliffe, R.; Lo, B., Estimating farfield organic chemical exposures, intake rates and intake fractions to human age classes. Environ. Model. Software 2010, 25, 1166-1175. Arnot, J. A.; Mackay, D., Policies for chemical hazard and risk priority setting: Can persistence, bioaccumulation, toxicity and quantity information be combined? Environmental Science & Technology 2008, 42, (13), 4648-4654.	
Validation or verification reference	The model has been evaluated with monitoring data for a few chemicals.	
Contact information	Organisation: Name: Email address:	The University of Toronto Scarborough Dr Jon Arnot jon.arnot@utoronto.ca
Any other information	Version 1.1 is coded in Visual Basic and is publically available through the website. Version 2.0 is coded in Visual Basic for Applications in Windows and is available by request from the model developer.	

Model description /tool	Information to be filled in	
Model or tool name	RAIDAR - Risk Assessment, IDentification And Ranking	
Scope of model / tool	The RAIDAR model brings together chemical emissions, fate and transport processes in the physical environment, aquatic and terrestrial food web bioaccumulation, and effect (toxicity) endpoints in a holistic mass balance framework providing chemical exposure and risk assessments for humans and the environment. It is predominantly used as an evaluative model for screening and priority setting. For ranking purposes, the model can use either a consistent unit emission rate for all chemicals or chemical-specific estimates of actual emission rates. Basis of a model-based screening tool for PBT chemicals and POPs (SCREEN-POP).	
Type of model / tool	☒ Priority setting ☒ Screening assessment ☐ Detailed assessment ☐ Other, please specify:	

Model description /tool	Information to be filled in					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☒	☐	☐
	Inhalation	☐	☐	☒	☐	☐
	Dermal	☐	☐	☐	☐	☐
	Drinking water	☐	☐	☒	☐	☐
	Soil	☐	☐	☒	☐	☒
	Air	☐	☐	☒	☐	☒
	Water	☐	☐	☒	☐	☒
	Bioaccumulation/fish	☐	☐	☒	☐	☒
	Food chain	☐	☐	☒	☐	☒
	Other:					
Used or cited in (legal framework, project, program)	Canada's Chemicals Management Plan CEFIC Long-range Research Initiative (LRI) programme (ECO13)					
Owner	Freeware software hosted at Trent University					
Website	The Canadian Centre for Environmental Modelling and Chemistry (CEMC)					
Download	http://www.trentu.ca/academic/aminss/envmodel/models/models.html					
Key reference(s)	Arnot, J. A.; Mackay, D.; Webster, E.; Southwood, J. M., Screening level risk assessment model for chemical fate and effects in the environment. Environmental Science & Technology 2006, 40, (7), 2316-2323. Arnot, J. A.; Mackay, D., Policies for chemical hazard and risk priority setting: Can persistence, bioaccumulation, toxicity and quantity information be combined? Environmental Science & Technology 2008, 42, (13), 4648-4654. Arnot, J. A.; Mackay, D.; Parkerton, T. F.; Zaleski, R.; Warren, C. S., Multimedia modeling of human exposure to chemical substances: The roles of biomagnification and biotransformation. Environ. Toxicol. Chem. 2010, 29, (1), 45-55.					
Validation or verification reference	Predictions of human exposure via bioaccumulation in the food chain are being validated using tissue banks. The model has been evaluated with monitoring data for a few chemicals.					
Contact information	Organisation:	The University of Toronto Scarborough				
	Name:	Dr Jon Arnot				
	Email address:	jon.arnot@utoronto.ca				

Model description /tool	Information to be filled in
Any other information	The RAIDAR (MFTM) model is being used in CEFIC's POPSCREEN study to predict and rank the exposures of 15,000 organic compounds (in IUCLID list and OECD HPV list etc.) to humans in regional-scale temperate environments. Estimates for “realistic” emission rates are imperative for obtaining reliable estimates of actual human exposure and research is on-going at the University of Oslo (Breivik) to develop methods to obtain more refined and reliable emission rate estimates than current methods (i.e., EU TGD). Biotransformation half-lives in mammals appears to be the second most important parameter for predicting concentrations of chemicals in humans and research on this topic is ongoing at the University of Toronto (Arnot). Version 1.0 is coded in Visual Basic and is publically available through the website. Version 2.0 is coded in Visual Basic for Applications in Windows and is available by request from the model developer.

Model /tool description	Information to be filled in					
Model or tool name	IMPS - Integrated Environmental Fate and Human Food Chain Bioaccumulation Model for Polar and Non-polar Organic Substances					
Scope of model / tool	A regional multi-media fate and transport model (MFTM) for the Baltic Sea and its drainage basin. A mechanistically based, non-steady state, chemical fate and bioaccumulation model to predict wildlife and human exposure to polar and non-polar organic chemicals. Intended for higher tier exposure assessments within the current European risk assessment framework					
Type of model / tool	☒ Priority setting ☐ Screening assessment ☒ Detailed assessment ☐ Other, please specify:					
Target group(s) And exposure pathways	Pathway	Consumer	Worker	General population	Children	Environment
	Ingestion	☐	☐	☒	☐	☐
	Inhalation	☐	☐	☐	☐	☐
	Dermal	☐	☐	☐	☐	☐
	Drinking water	☐	☐	☐	☐	☐
	Soil	☐	☐	☐	☐	☒
	Air	☐	☐	☐	☐	☒
	Water	☐	☐	☐	☐	☒
	Bioaccumulation/fish	☐	☐	☐	☐	☒
	Food chain	☐	☐	☐	☐	☒
	Other:					

Model description /tool	Information to be filled in
Used or cited in (legal framework, project, program)	CEFIC Long-range Research Initiative (LRi) programme
Owner	European Chemical Industry Council (CEFIC)
Website	http://www.cefic-lri.org/projects
Download	available: http://www.trentu.ca/academic/aminss/envmodel/models/CC600R.html
Key reference(s)	TN Brown, F Wania, Screening Chemicals for the Potential to be Persistent Organic Pollutants: A Case Study of Arctic Contaminants, Environmental Science and Technology 2008, 42, 5202-5209. G Czub, F Wania, MS McLachlan, Combining Long-Range Transport and Bioaccumulation Considerations to Identify Potential Arctic Contaminants, Environmental Science and Technology 2008, 42, 3704–3709. K Breivik, F Wania, DCG Muir, M Alaee, S Backus, G Pacepavicius, Empirical and modeling evidence of the long-range atmospheric transport of decabromodiphenyl ether, Environmental Science & Technology 2006, 40, 4612-4618. F Wania, K Breivik, NJ Persson, MS McLachlan, CoZMo-POP 2 - A fugacity-based dynamic multi-compartmental mass balance model of the fate of persistent organic pollutants, Environmental Modelling & Software 2006, 21, 868-884. T Meyer, F Wania, K Breivik, Illustrating Sensitivity and Uncertainty in Environmental Fate Models Using Partitioning Maps, Environmental Science & Technology 2005, 39, 3186-3196. L Shen, F Wania, Compilation, evaluation and selection of physical-chemical properties for organochlorinated pesticides, Journal of Chemical & Engineering Data 2005, 50, 742-768. G Czub, MS McLachlan, Food Chain Model to Predict Contaminant Levels in Humans, Environmental Toxicology and Chemistry 2004, 23, 2356-2366. G Czub, MS McLachlan, Bioaccumulation Potential of Persistent Organic Chemicals in Humans, Environmental Science & Technology 2004, 38, 2406-2412. H Xiao, N Li, F Wania, A Compilation, Evaluation and Selection of Physical Chemical Property Data for α, β and γ-Hexachlorocyclohexane, Journal of Chemical & Engineering Data 2004, 49, 173-185. K Breivik, R Alcock, YF Li, RE Bailey, H Fiedler, JM Pacyna, Primary Sources of Selected POPs: Regional and Global Scale Emission Inventories, Environmental Pollution 2004, 128, 3-16. K Breivik, F. Wania, Expanding the Applicability of Multimedia Fate Models to Polar Organic Chemicals, Environmental Science & Technology 2003, 37, 4934-4943.

Model description	Information to be filled in										
	JM Pacyna, K Breivik, J Münch, J Fudala, European Atmospheric Emissions of Selected Persistent Organic Pollutants, 1970 -1995, Atmospheric Environment 2003, 37, Supplement 1, S119-S131. SN Meijer, WA Ockenden, A Sweetman, K Breivik, JO Grimalt, KC Jones, Global Distribution and Budget of PCBs and HCB in Background Surface Soils: Implications for Sources and Environmental Processes, Environmental Science & Technology 2003, 37, 667-672. N Li, F Wania, YD Lei, GL Daly, A Comprehensive and Critical Compilation, Evaluation and Selection of Physical Chemical Property Data for Selected Polychlorinated Biphenyls, Journal of Physical and Chemical Reference Data 2003, 32, 1545-1590. MS McLachlan, G Czub, F Wania, The Influence of Vertical Sorbed Phase Transport on the Fate of Organic Chemicals in Surface Soils, Environmental Science & Technology 2002, 36, 4860-4867.										
Validation or verification reference											
Contact information	<table border="1"> <tr> <td data-bbox="458 1016 687 1048">Organisation:</td><td data-bbox="692 1016 1479 1077">European Centre for Ecotoxicology and Toxicology of Chemicals (ECETOC)</td></tr> <tr> <td data-bbox="458 1084 687 1115">Name:</td><td data-bbox="692 1084 1479 1144">Dr M Galay Burgos</td></tr> <tr> <td data-bbox="458 1151 687 1182">Email address:</td><td data-bbox="692 1151 1479 1211">malyka.galay-burgos@ecetoc.org</td></tr> <tr> <td></td><td data-bbox="692 1218 1479 1279">Prof Frank Wania</td></tr> <tr> <td></td><td data-bbox="692 1285 1479 1346">frank.wania@utoronto.ca</td></tr> </table>	Organisation:	European Centre for Ecotoxicology and Toxicology of Chemicals (ECETOC)	Name:	Dr M Galay Burgos	Email address:	malyka.galay-burgos@ecetoc.org		Prof Frank Wania		frank.wania@utoronto.ca
Organisation:	European Centre for Ecotoxicology and Toxicology of Chemicals (ECETOC)										
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	Prof Frank Wania										
	frank.wania@utoronto.ca										
Any other information	The presence of persistent organic pollutants (POPs) in remote environments such as the Arctic is of special concern and has international regulatory implications. Linking global transport calculations with a food chain bioaccumulation model has been used to delineate the combination of partitioning properties K_{ow}, K_{ow}, and K_{oa}, which result in a high potential for organic chemicals to be transported to the Arctic and to accumulate in the Arctic human food chain. A methodology has been developed to screen high production volume chemicals to identify chemicals of concern by comparing experimentally measured properties, or values predicted from chemical structure alone, to a set of screening criteria. These criteria include partitioning properties (see above) that allow for accumulation in the physical Arctic environment and in the Arctic human food chain, and resistance to atmospheric oxidation. Predictions based on structural resemblance relate to a group of known Arctic contaminants. The majority of the predicted chemicals of concern have already been detected in Arctic biota; the major general chemical classes are PCBs, PCDFs, PCDEs, chlorinated benzenes, halo-alkyl benzenes, halo-alkyl heterocycles, unclassified halogenated compounds										