Approaches for Industries to Substitute Hazardous Chemicals

Dr Anna Lennquist, ChemSec
SUBSPORT Project

HangZhou March 25 2013

Programme

- Background
  - ChemSec
  - SUBSPORT
- Substitution definitions and steps
- How to prioritize chemicals for phase-out
  - Presentation of the SIN List
- How to find alternatives
  - Presentation of the features of the SUBSPORT case story database
- How to assess and compare alternatives
  - The Green Screen for Safer Chemicals

BACKGROUND

MOVING TOWARDS SAFER ALTERNATIVES

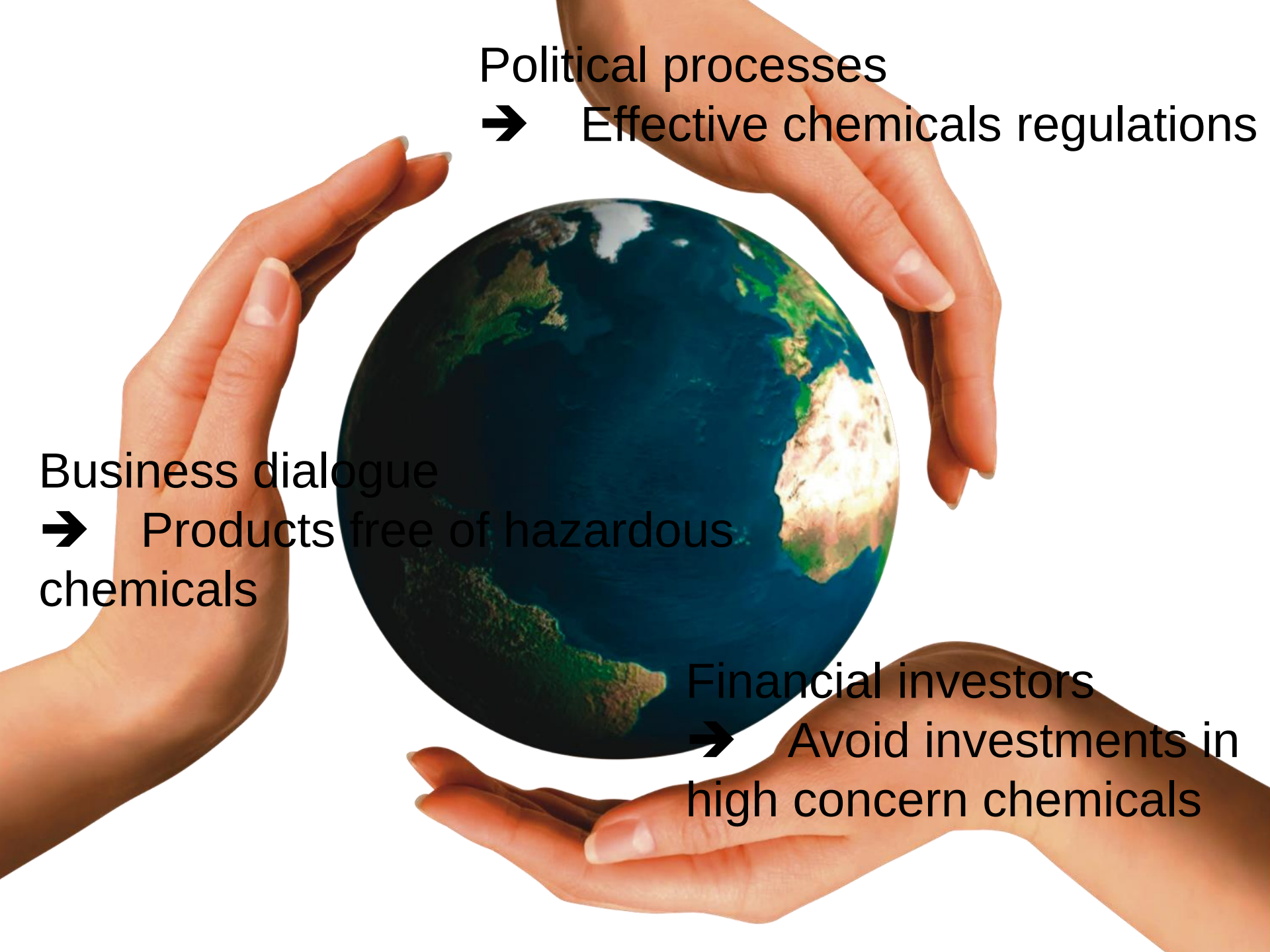
Sweden-based non-profit organisation

Founded by four NGOs representing the Swedish environmental movement

Since 2002 working internationally to eliminate the use of hazardous chemicals

Funding from governments and charity funds

Offering concrete tools and highlighting positive examples


Political processes
➔ Effective chemicals regulations
Business dialogue
➔ Products free of hazardous chemicals
Financial investors
➔ Avoid investments in high concern chemicals

The problem with hazardous chemicals in processes and products

- Increasing use of chemicals
- Largely unknown properties
- Well-studied hazardous chemicals used in products and processes
- Carcinogens, persistent chemicals, reprotoxic or hormone disrupting
- Increasingly linked to common diseases
- Human suffering, environmental problems and economic consequences

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Substitution as the key approach to reduce the problems with hazardous chemicals

- Eliminates the problem from the whole life cycle: production, use and waste
- Risk management never 100% sure
- Driver for innovation
- Increased legal requirements and governmental incentives
- Increased customer demand
- Competitive advantage

SUBSPORT: SUBstitution Support PORTal

"Develop an internet portal that constitutes a state-of-the-art resource on safer alternatives to hazardous chemicals"

Kooperationsstelle Hamburg IFE GmbH
Institut für internationale Forschung, Entwicklung, Evaluation und Beratung

istas
CCOO

Grontmij

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SUBS PORT
Substitution Support Portal

Life

Project duration 2010-2013
Funded by EU Life+, BAuA and Lebensministerium Austria

SUBSPORT outcomes

- Web portal with information to support substitution
- Database of alternatives and case stories
- Training on substitution and alternatives assessment
- Everything in four languages: English, German, Spanish and French

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SUBS PORT
Substitution Support Portal

MOVING TOWARDS SAFER ALTERNATIVES

- Home
- News
- Newsletter
- About the Project
- Substitution Steps
- Substitution in Legislation
- Identifying substances of concern
- Restricted and Priority Substances Database
- Case Story Database
- Substitution Tools
- Training

Support for Substitution

Substitution of hazardous chemicals is a fundamental measure to reduce risks to environment, workers, consumers and public health.

Legislation encourages you to substitute, this site will show you how.

Read more

Latest News

Differential Effects of Bisphenol A and Diethylstilbestrol on Human, Rat and Mouse Fetal Leydig Cell Function

Publications & Tools | 29.01.2013

A French research group (University Paris Diderot) observed a negative effect of Bisphenol A on testosterone production and INSL3 (an insulin like hormone produced mainly in gonadal tissues in males and females) expression during fetal life: It can impair the masculinisation of internal and external genitalia.

Read more

Substitution Steps

Substitution may be fast and easy or a more complex process. Generally it includes the following steps:

1. Define the problem
2. Set substitution criteria
3. Search for alternatives
4. Assess and compare alternatives
5. Experiment on pilot
6. Implement and improve

Read more

Search SUBSPORT

- Website
- Restricted and priority substances database » link
- Case story database » link

Search » Overview

External substitution websites and databases

Search

Your contribution

Provide substitution examples
Provide feedback

Training

Alternatives identification and assessment

Welcome to SUBSPORT the Substitution Support Portal!

Here you can find information to support your efforts in substituting hazardous substances. Enjoy exploring the portal and please do not hesitate to **contact** the project team for any comments or questions.

SUBSPORT is an ongoing project. Therefore we recommend to revisit the portal from time to time if you could not yet find the information you expected. To keep yourself informed about the progress of the portal and other related news you can subscribe to the **SUBSPORT newsletter**.

twitter

Financial Support by

Life

baua: Bundesanstalt für Arbeitsschutz und Arbeitsmedizin

www.subsport.eu

Case story database

Substitution methodology

Summaries of international chemicals regulation of relevance for substitution

How to identify hazardous substances

Restricted and Priority Substances Database ≈ 30 lists

How to assess alternatives, links to methods and tools

Search entry to ≈ 25 (other) substitution databases

Trainings

- About 20 held in Europe 2012
- Original format 5 hours
- Based on discussions and sharing of experiences among participants in a smaller group

SUBSTITUTION DEFINITIONS AND STEPS

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Definitions

Substitution is *"...the replacement of one substance by another with the aim of achieving a lower level of risk."*
European Chemical Industry Association
CEFIC

"The Principle of Substitution states that hazardous chemicals should be systematically substituted by less hazardous alternatives or preferably alternatives for which no hazards can be identified."
Greenpeace

"... the replacement or reduction of hazardous substances in products and processes by less hazardous or non-hazardous substances, or by achieving an equivalent functionality via technological or organisational measures."
Lohse/Lissner (2003)

Definitions

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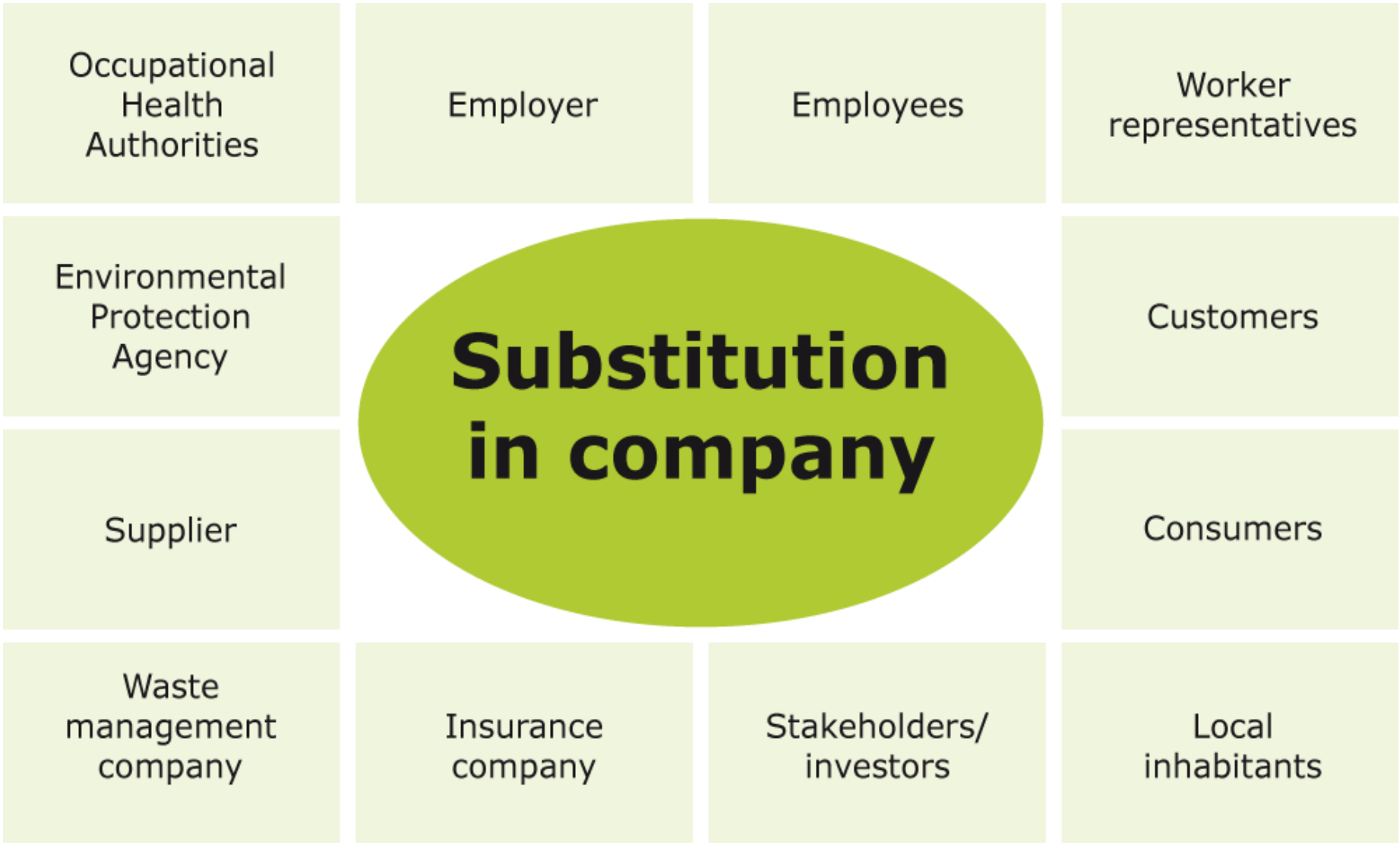
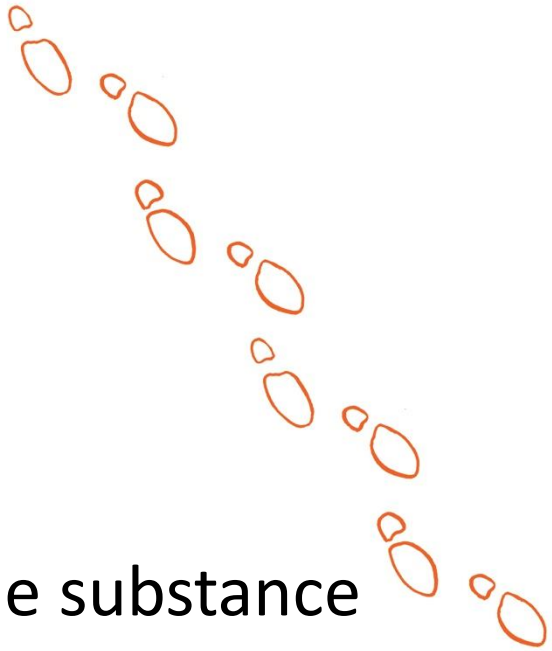
Lohse/Lissner (2003)

Stakeholders in substitution



Substitution steps



Low-hanging fruits: copy others!

Otherwise:

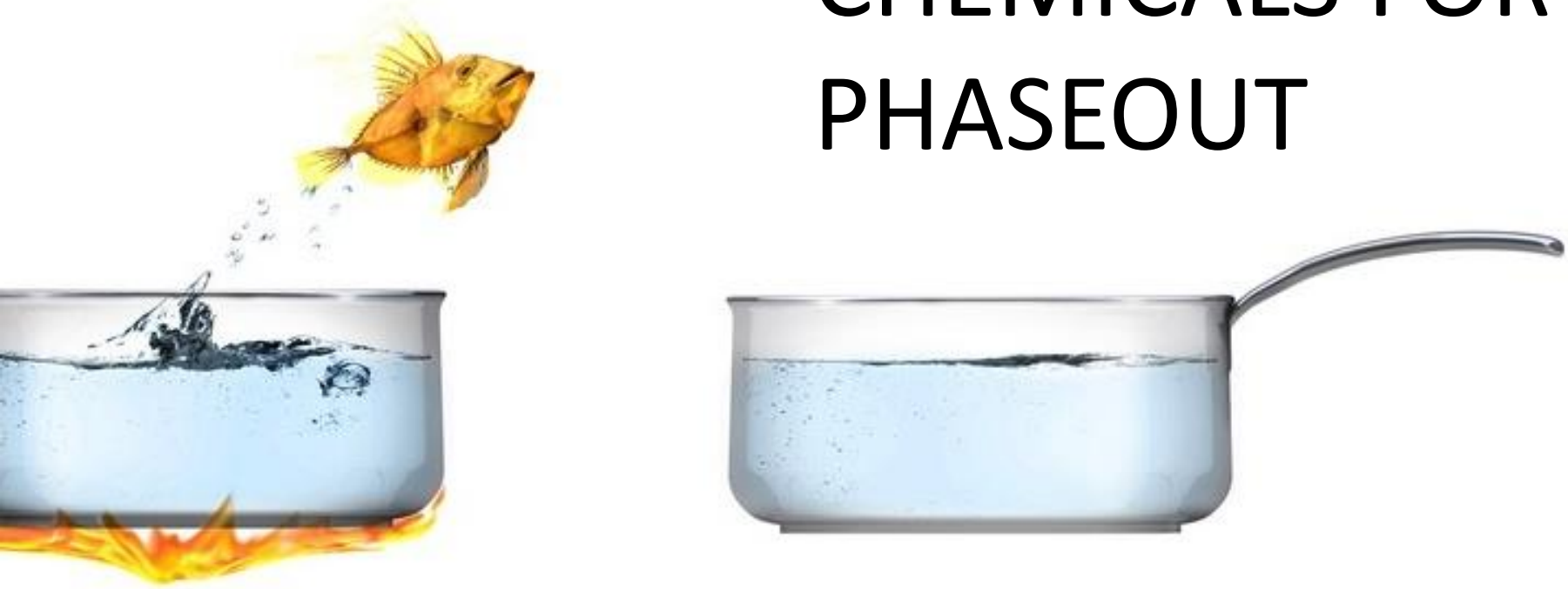
- Define the problem
- Define use, function and need of the substance
- Define criteria for the alternative
- Search for alternative solutions
- Evaluate and compare alternatives
- Test on pilot scale
- Implement substitution

Small exercise:
Take a few minutes to think about:

- In what way is substitution relevant for your work?

- In your situation, are you concerned about any specific chemicals or chemical groups that you consider to substitute?

HOW TO PRIORITIZE CHEMICALS FOR PHASEOUT



MOVING TOWARDS SAFER ALTERNATIVES

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Prioritize substances

Legal requirements

- -Priority lists
- -Restrictions
- -Bans

Other

- -Restricted substances lists (RSL)
- -Supply chain requirements
- -NGO campaigns

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MOVING TOWARDS SAFER ALTERNATIVES

Support for Substitution

Substitution of hazardous chemicals is a fundamental measure to reduce risks to

Latest News

Roadmap on Substances of Very High Concern

Publication & Tools | 15.02.2013

The European Commission has published its roadmap for the identification of substances of very high concern (SVHCs) and implementation of REACH risk management measures from now to 2020. According to a

Substitution Steps

Substitution may be fast and easy or a more complex process. Generally it includes the following steps:

1. Define the problem

Search SUBSPORT

- Website
- Restricted and priority substances database » link
- Case story database » link

Search » Overview

External substitution

SUBSPORT Restricted and priority substances database

About 30 lists

Marked by category:

- International Agreement
- EU regulatory List
- Governmental List
- NGO or Tradeunion List
- Company List

Including further information and links to each list

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PORT
Substitution Support Portal

RESTRICTED AND PRIORITY SUBSTANCES DATABASE

Search for

- (•) **Substance name** (•) Name fragment ( ) Exact name
- ( ) **CAS No.**
- ( ) **EC No.**

all substances

in

Substance lists

all 29 lists

Search Database


The SIN List
Staying ahead

Joint NGO initiative

Identifies high concern chemicals

Based on EU law: using criteria set up for *Substances of Very High Concern* in REACH.

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Joint NGO initiative

Identifies high concern chemicals

Based on EU law: using criteria set up for *Substances of Very High Concern* in REACH

➔Speed up REACH implementation and inspire other regulatory processes

➔ Offer concrete guidance for companies to focus their substitution efforts

SIN 1.0 presented in 2008, 2.0 in 2011 and 2.1 in 2013

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Basic principles

Targets substances in the scope of REACH authorisation:
not pesticides, pharmaceuticals, intermediates, substances not intentionally produced

Based on publically available data

Exclusive rather than inclusive

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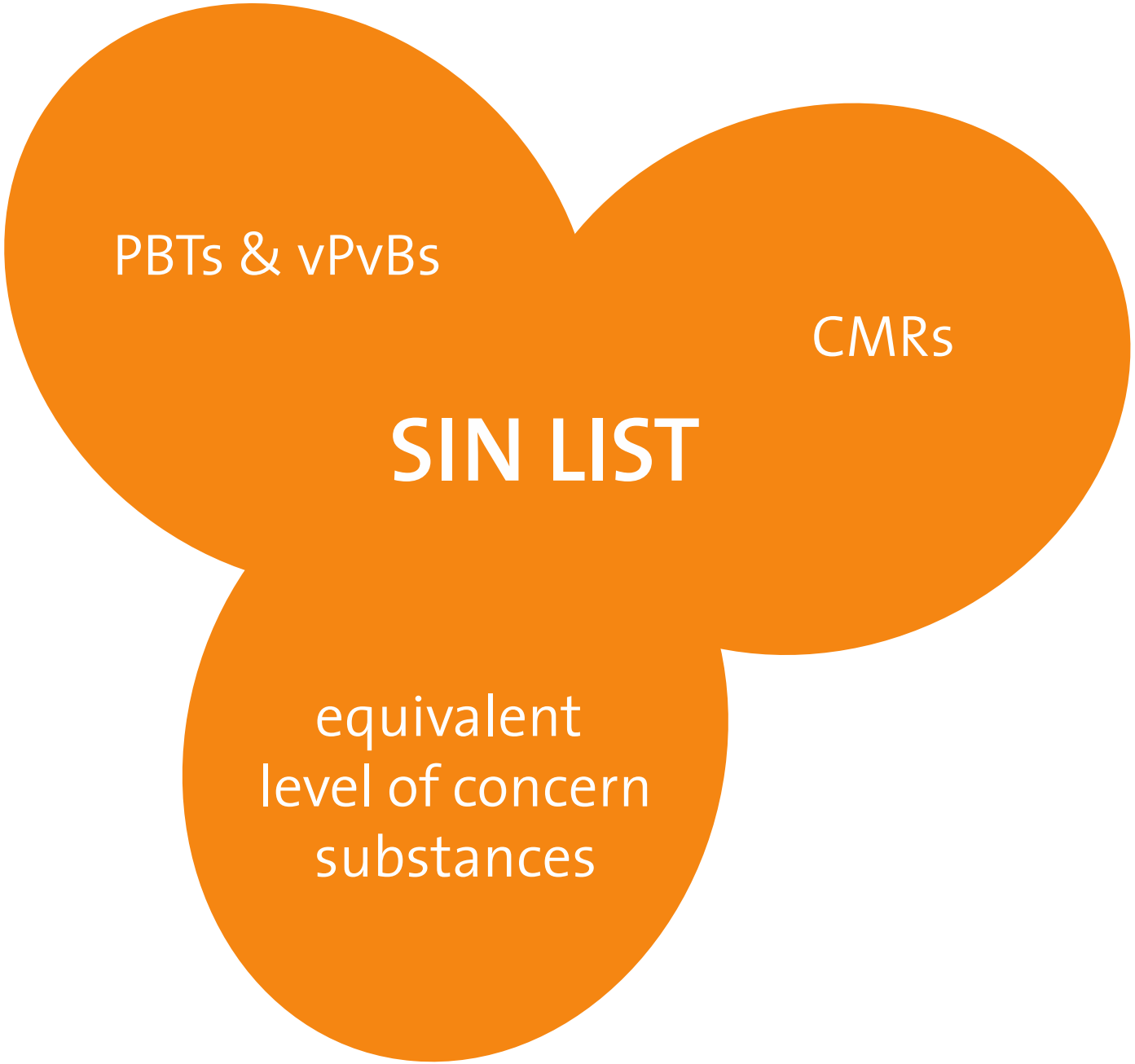
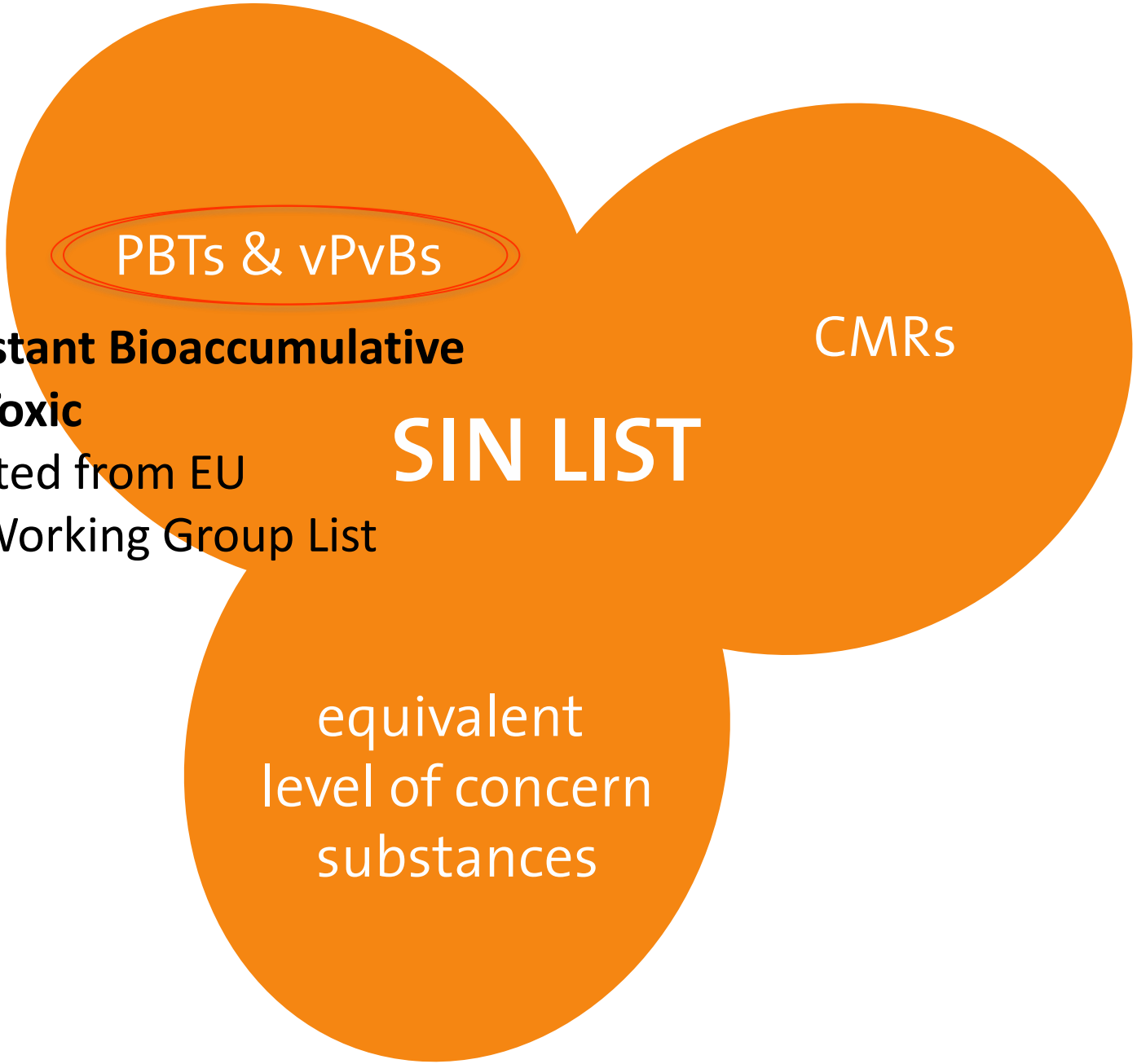
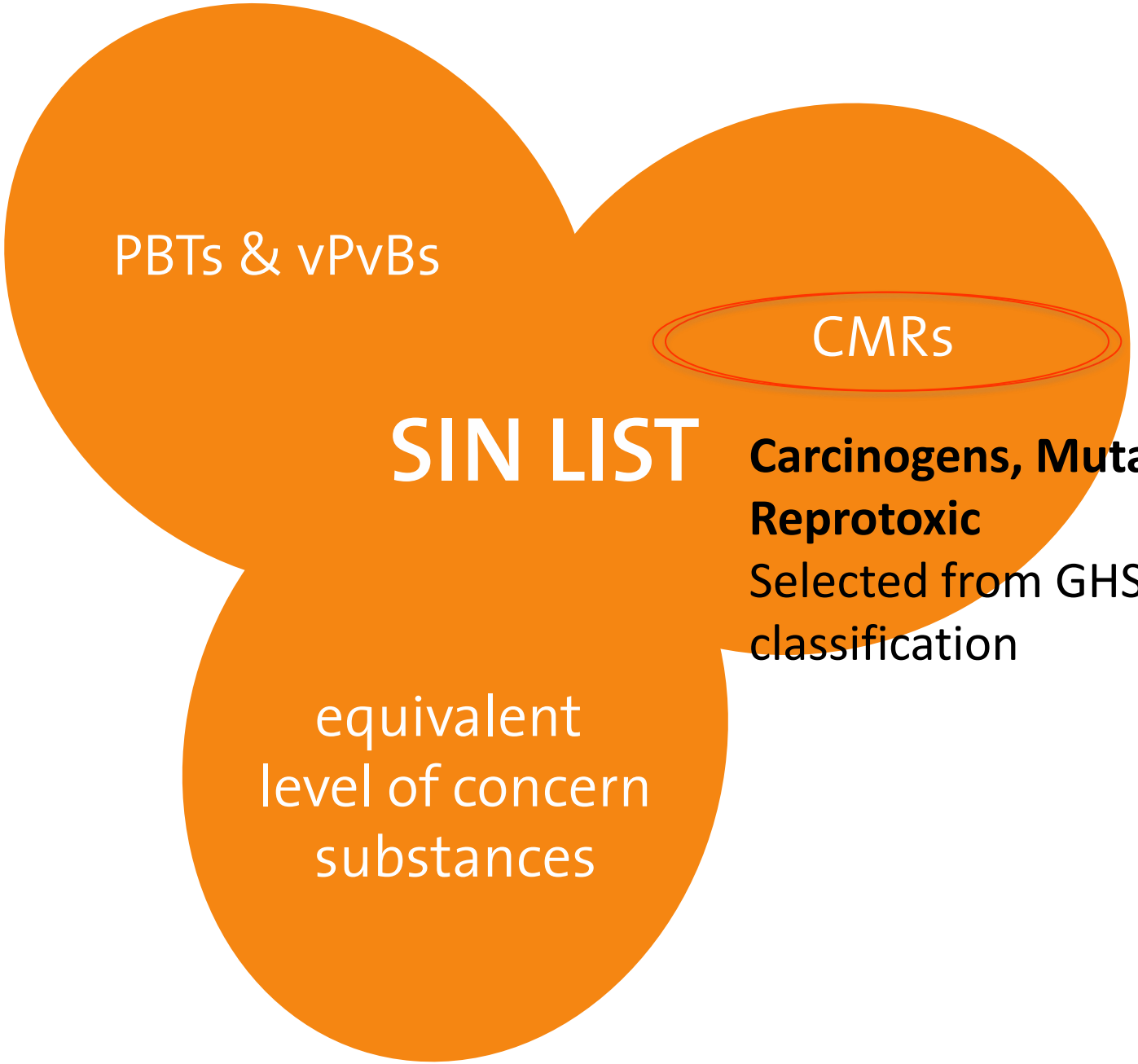
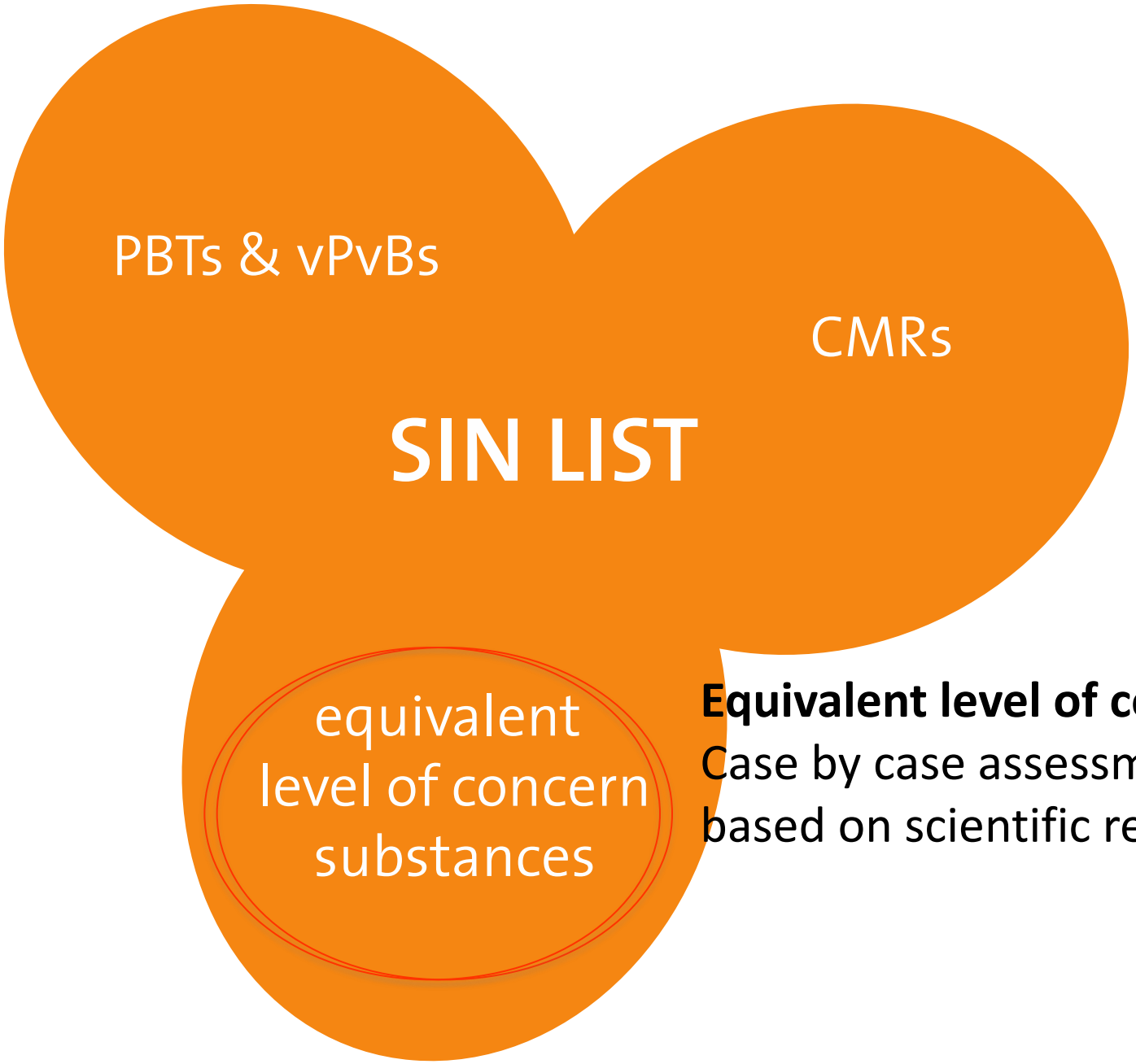

PBTs & vPvBs
CMRs
SIN LIST
equivalent
level of concern
substances



Persistant Bioaccumulative and Toxic
Selected from EU
PBT Working Group List



Carcinogens, Mutagens and Reprotoxic
Selected from GHS/CLP classification



Equivalent level of concern
Case by case assessment
based on scientific reviews

Who uses the SIN List?

Database visitors from all over the world

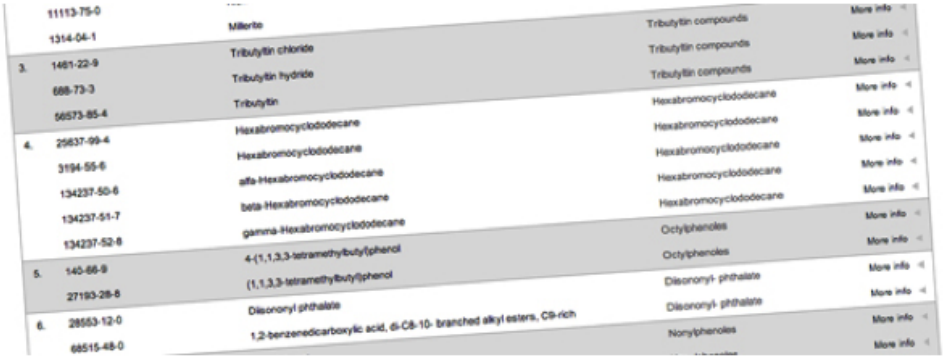
Used multinational companies by e.g. B&Q, Skanska, Dell, Carrefour, Nokia, H&M, IKEA

Being discussed and referered to in regulatory processes in the EU but also elsewhere

A main driver for innovation among chemical producers in the EU according to a recent study

Financial investors and analysts to predict future bans and minimize risks of investment

为何需要采用【慎·名单】



	11113-75-0	Millerite	Tributyltin compounds
	1314-04-1		Tributyltin compounds
3.	1461-22-9	Tributyltin chloride	Tributyltin compounds
	688-73-3	Tributyltin hydride	
	56573-85-4	Tributyltin	
4.	25637-99-4	Hexabromocyclododecane	Hexabromocyclododecane
	3194-55-6	Hexabromocyclododecane	Hexabromocyclododecane
	134237-50-6	alfa-Hexabromocyclododecane	Hexabromocyclododecane
	134237-51-7	beta-Hexabromocyclododecane	Hexabromocyclododecane
	134237-52-8	gamma-Hexabromocyclododecane	
5.	140-66-9	4-(1,1,3,3-tetramethylbutyl)phenol	Octylphenoles
	27193-28-8	(1,1,3,3-tetramethylbutyl)phenol	Octylphenoles
6.	28553-12-0	Diisononyl phthalate	Diisononyl- phthalate
	68515-48-0	1,2-benzenedicarboxylic acid, di-C8-10- branched alkyl esters, C9-rich	Diisononyl- phthalate
			Nonylphenoles

有害化学品无处不在。食品、服装、玩具、包装、电子产品和建材中都含有危险化学品，它们在产品中发挥了一定的作用。但是我们对有害化学品的了解很少，有时可以说一无所知。我们体内可以寻觅到数百种人造化学品的踪迹，我们却不清楚它们对身体健康和环境的危害。

但是我们应该知道日常生活中经常接触到的许多化学品的确是有害的。它们可能会致癌、扰乱内分泌系统和危害生殖功能。事实上，我们已经确认了378种这样的化学品。但是防毒害意识的淡薄、立法流程的缓慢、化工行业的抵制以及盲目乐观的看法都阻碍了我们立即采取有效的行动。那么我们的出路何在？用更安全的替代品取代有害化学品。【慎·名单】应运而生。

HOW AND WHERE TO FIND ALTERNATIVES

MOVING TOWARDS SAFER ALTERNATIVES

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Use, function and need

Function refers to the intrinsic property of the substance that is technologically important to the specified **use** and to satisfy the specified **need**.

Use refers to the application of the function in a process/product.

Need refers to the ultimate benefit for the user. Needs may be reflected by norms (e.g. quality or safety norms) or may be inspired by customer/users' preferences or by the efforts to overcome competition. Needs, as defined here, may be stringent and compulsory (fire safety) or optional (bright finishing, fragrance).

E.g. Phthalates in toys
Deca BDE in computer casings

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To find alternatives

- In-house knowledge
- Trade associations
- Networks, e.g Swedish national substitution group
- Reports from authorities (e.g. ECHA, US EPA)
- Web-based resources

External Substitution Websites and Databases Overview

Search the following websites and databases in one step:

- catsub.eu (Danish, English, French, German)
- cleantool.org (English, French, German, Spanish)
- istas.net/risctox/alternativas (Spanish)
- substitution-cmr.fr (French)
- turi.org

- acc2000.gencat.net/mediamb_tecno
- cleanersolutions.org
- cleanproduction.org
- cprac.org
- epa.gov/dfe
- epa.gov/lean
- iehn.org
- ihobe.net
- infocarquim.insht.es
- irsst.qc.ca/solub
- istas.net/fittema/att
- connect.innovateuk.org
- mass.gov/eea
- noharm.org
- praevention-dp-bgetem.bg-kooperation.de
- pius-info.de
- p2pays.org
- sustainablehospitals.org
- sustainableproduction.org
- umweltschutz-bw.de
- who.int/ifcs

» Back to Search

Edit this entry

Website
Restricted and priority substances database » link
Case story database » link

Search » Overview

External substitution websites and databases

Search

Your contribution

Provide substitution examples
Provide feedback

Training

Alternatives identification and assessment

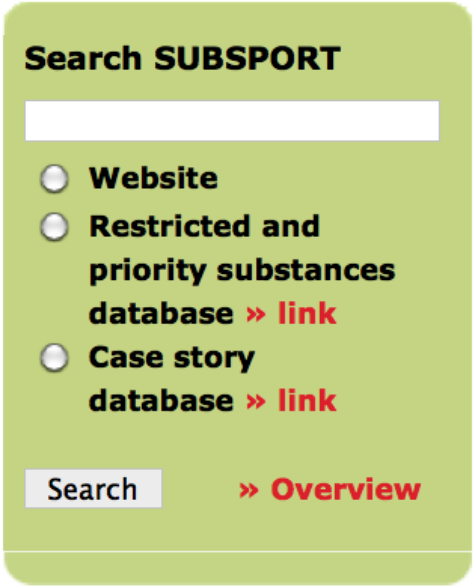
Information provided in a case story

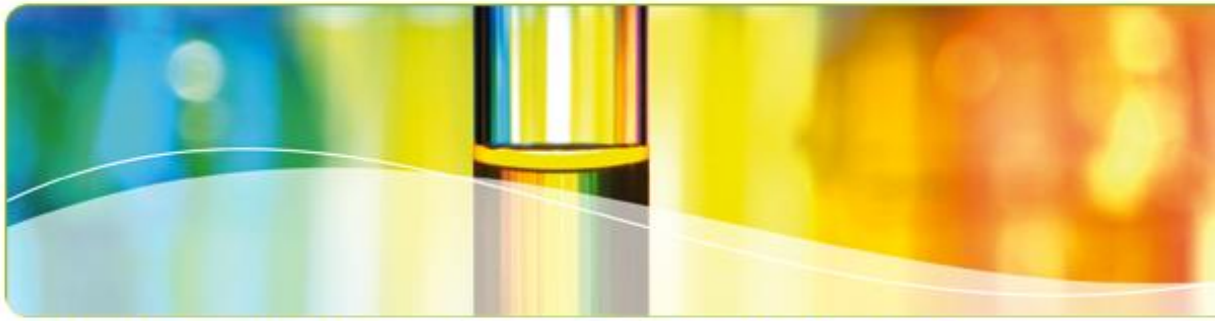
Chemical identity of the substituted substance and the alternative

Description of the substitution; reasons for substitution, if there are technical or economic aspects of the substitution

Links, contact details to further information

Simple hazard assessment and evaluation of the substitution according to SUBSPORT criteria





MOVING TOWARDS SAFER ALTERNATIVES

205-EN, General section

An alternative to phthalates: Novel plastic softener produced from castor oil and acetic acid

Abstract

Danisco has successfully developed a bio-based plastic softener on the basis of castor oil and acetic acid. According to studies the product shows no adverse effect on human health or the environment, and has found applications in production of food wrapping, medical equipment and children's toys. Novel applications are being tested, one of them being vinyl flooring.

Substituted substance(s)

» show more substance information

1. **Phthalates**

Alternative substance(s)

1. **Acetic acid**
   CAS No. 64-19-7 **EC No.** 200-580-7 **Index No.** 607-002-00-6
2. **Castor oil**
   CAS No. 8001-79-4 **EC No.** 232-293-8

» Show application information

SUBSPORT
Substitution Support Portal

MOVING TOWARDS SAFER ALTERNATIVES

191-EN, General section

Animal dolls made without synthetic materials, flame-retardants, allergens or PVC

Abstract

Animal dolls for children may contain a number of hazardous chemicals, such as flame-retardants, PVC, phthalates. Using natural materials such as organic cotton, wool and linen the amount of hazardous chemicals can be reduced.

Substituted substance(s)

» show more substance information

1. **Polyvinyl chloride (PVC)**
   CAS No. 9002-86-2
2. **Phthalates**
3. **DecaBDE**
   CAS No. 1163-19-5 **EC No.** 214-604-9
4. **Tetrabromobisphenol A (TBBPA)**
   CAS No. 79-94-7 **EC No.** 201-236-9 **Index No.** 604-074-00-0
5. **Hexabromocyclododecane (HBCDD)**
   CAS No. 3194-55-6, 25637-99-4 **EC No.** 221-695-9, 247-148-4

Other type of alternative

Using natural, organic materials instead of synthetic materials.

TO ASSESS AND COMPARE ALTERNATIVES

MOVING TOWARDS SAFER ALTERNATIVES

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Alternatives assessment

The fundament for informed substitution

Addresses the question: what is actually better?

Considers one or more of the aspects:

Hazard assessment

Functionality of alternatives

Availability of alternatives

Costs

Changes of processes

Life-cycle considerations: energy, waste/discharge etc.

Current initiatives regarding alternatives assessment

In the US discussed for different regulations, e.g in California

Part of the authorisation process under REACH in the EU

OECD ad hoc group on substitution of harmful chemicals

<u>Commonly referred experts:</u>

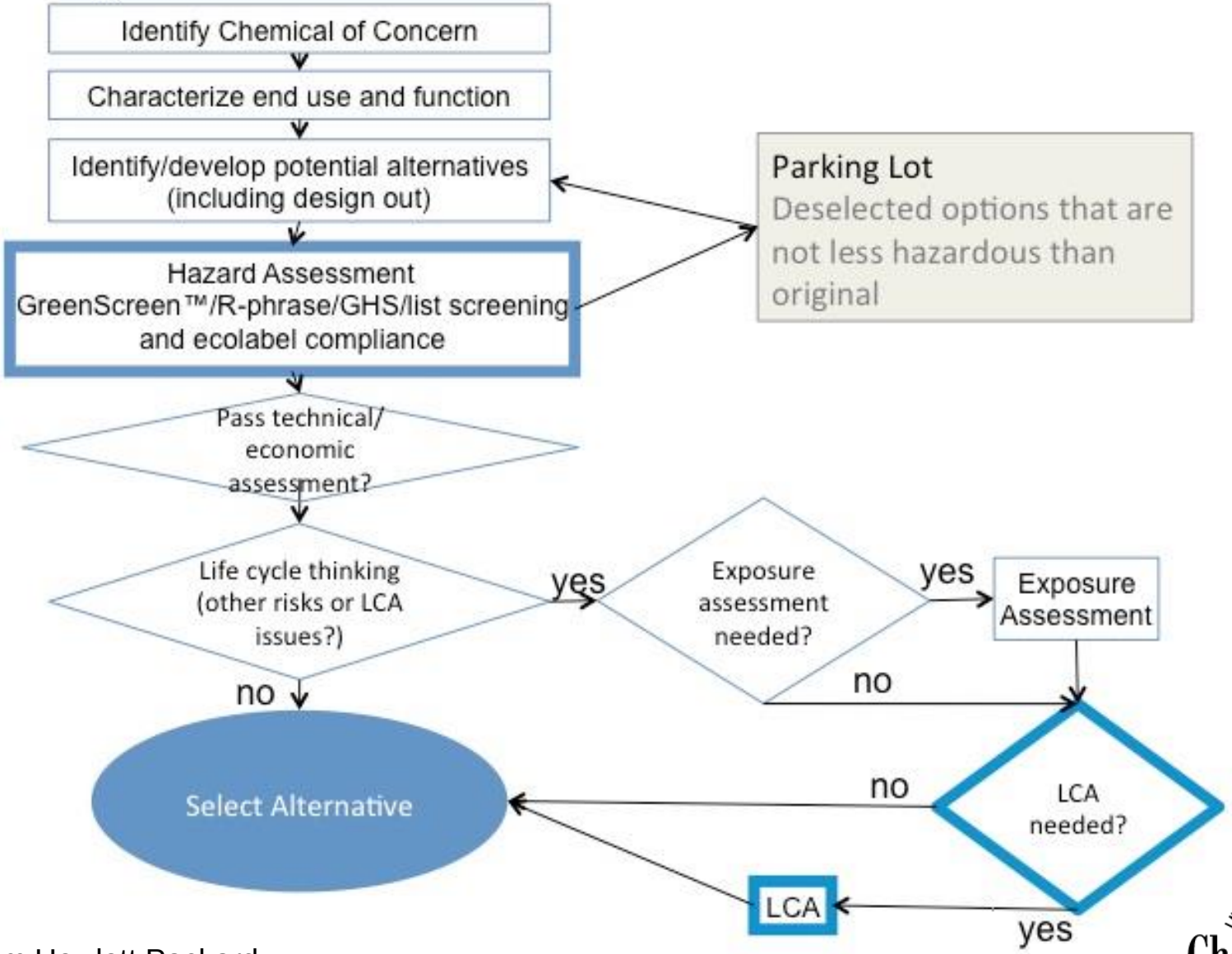
Lowell centre and Toxics Use reduction Institute, TURI, Massachusetts

US EPA Design for the Environment

Clean Production Action: the Green Screen for safer chemicals

SUBSPORT

Integrated Alternatives Assessment



Picture from Hewlett Packard

Alternatives hazard assessment

Several methods available, in SUBSPORT 10 tools are presented

Some include exposure (risk), others do not

<u>Methods that display hazards:</u>

Column Model
Pollution Prevention Options Analysis System (P2OASys)
TURI 5 Chemicals Alternatives Assessment Study
COSHH Essentials
DfE Alternatives assessment

<u>Sifting methods:</u>

Green Screen for Safer Chemicals
Quick Scan

The green screen for safer chemicals

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The green screen for safer chemicals

Developed by an American NGO: Clean Production Action

Uses all available relevant sources, including scientific literature

Evaluates the intrinsic hazard, not the risk

Evaluates chemicals (rather than materials or mixtures)

Considers models (e.g structure-activity-relationship) when data is missing

Considers degradation products

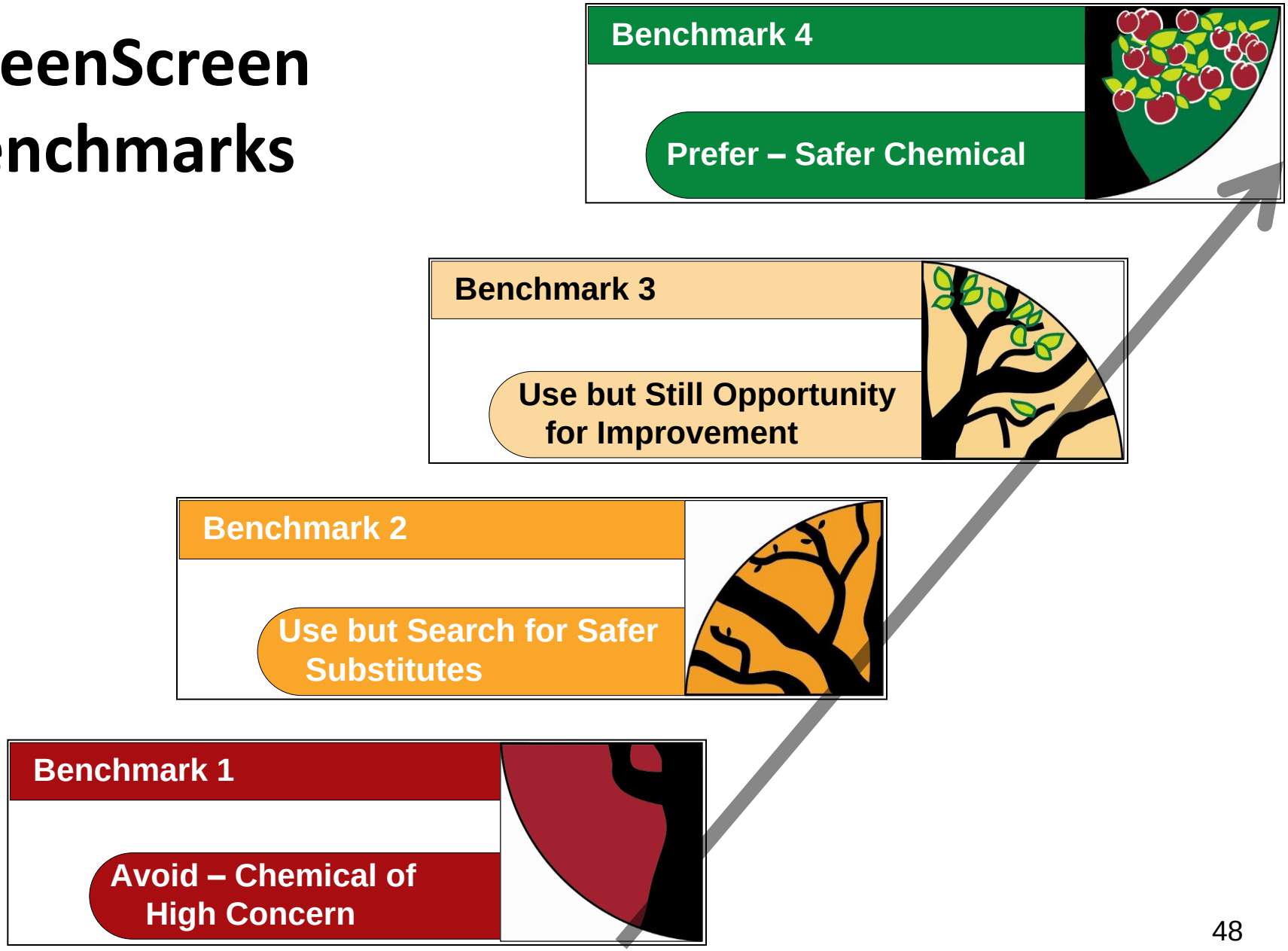
Has a methodology to consider datagaps

Freely available to use, can also buy assessments from authorised profilers

Gives the chemical a benchmark-easy to compare

http://www.cleanproduction.org/Greenscreen.v1-2.php

GreenScreen Benchmarks



Hazard enpoints

Human Health Group I	Human Health Group II	Environmental Toxicity* & Fate	Physical Hazards
Carcinogenicity	Acute Toxicity	Acute Aquatic Toxicity	Reactivity
Mutagenicity & Genotoxicity	Systemic Toxicity & Organ Effects	Chronic Aquatic Toxicity	Flammability
Reproductive Toxicity	Neurotoxicity	Persistence	
Developmental Toxicity	Skin Sensitization	Bioaccumulation	
	Respiratory Sensitization		
Endocrine Activity	Skin Irritation	*Other Ecotoxicity Studies when available	
	Eye Irritation		

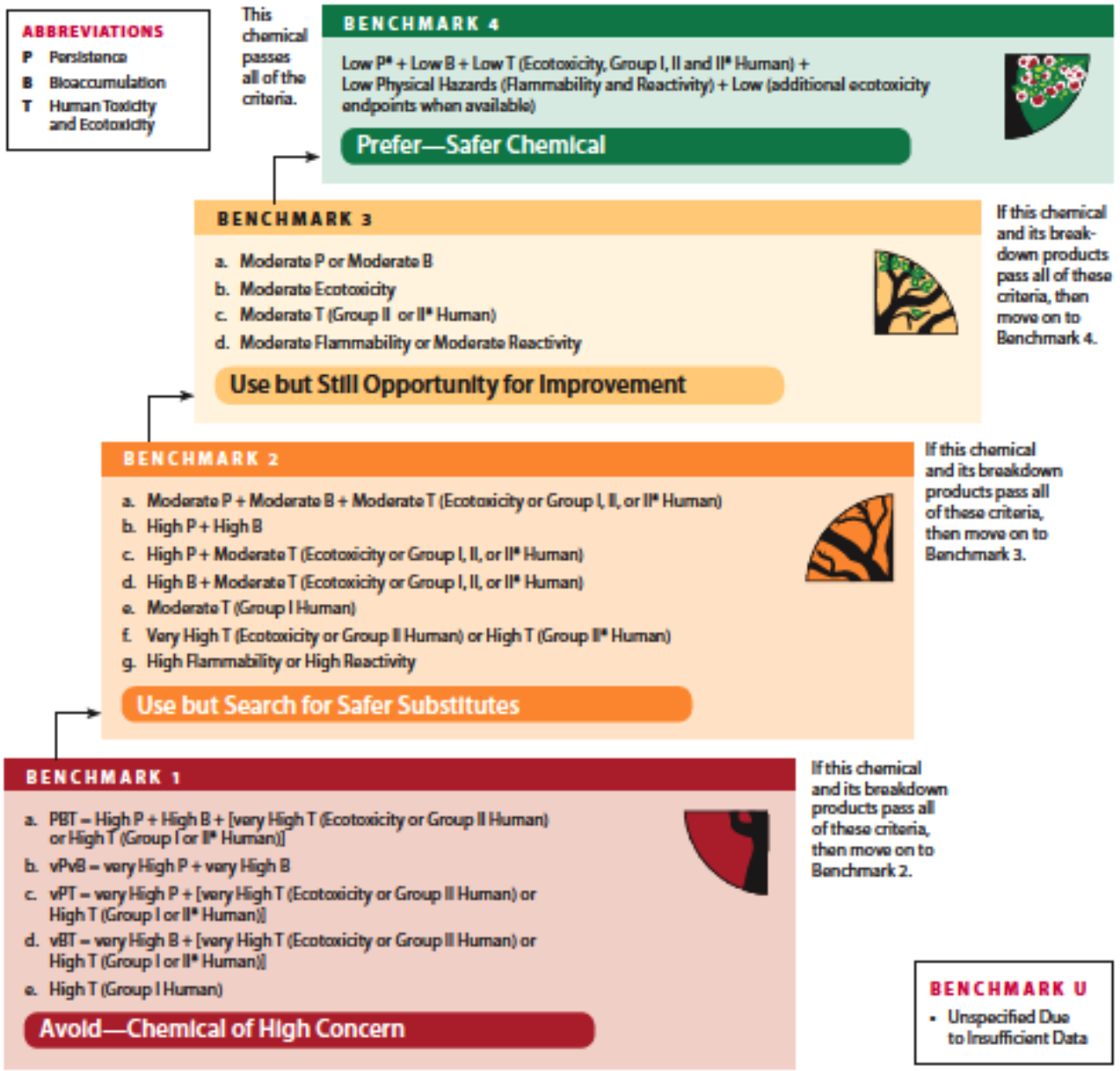
Hazard table

- The hazard endpoints are translated into hazard levels: very high (vH), high(H), moderate (M) and low (L), visualised with colours
- The level of confidence is indicated using italics (e.g modeled data) or bold letters (authorative classification)
- Datagaps are indicated with DG

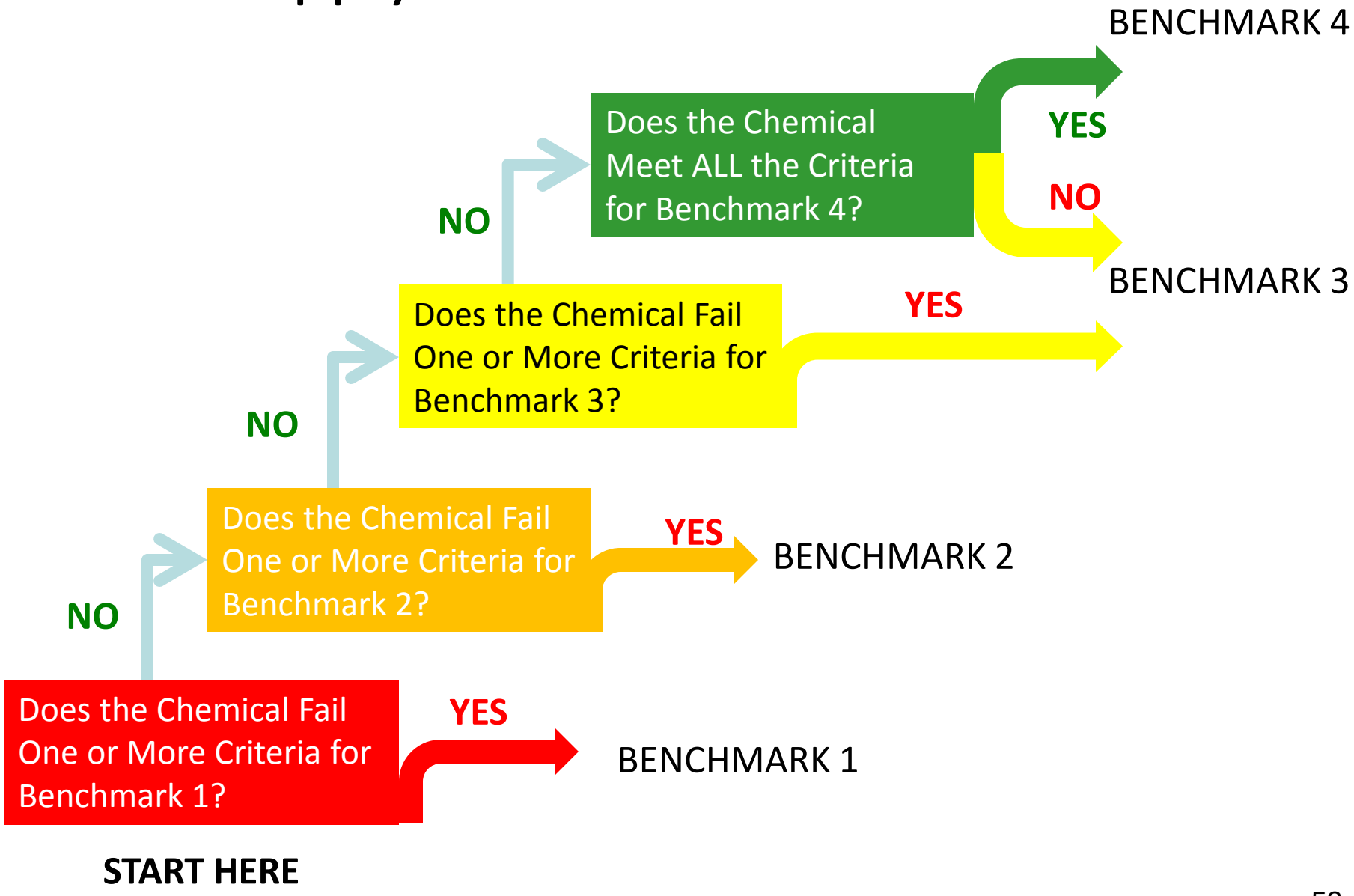
Chemical Name	Group I Human					Group II Human							Ecotox		Fate		Physical	
	C	M	R	D	E	AT	ST	N	SnS	SnR	IrS	IrE	AA	CA	P	B	Rx	F
Chemical 1	**M**	*L*	**L**	**M**	*M*	**L**	**L**	*M*	*L*	**DG**	**L**	**H**	**L**	*L*	**vH**	**M**	*L*	**L**
Chemical 2	*L*	**L**	**M**	M	**H**	**L**	**H**	**M**	**L**	**L**	**M**	*M*	**H**	**H**	**vH**	**vH**	*L*	**L**
Chemical 3	**L**	**L**	**M**	*H*	**DG**	**L**	**H**	**DG**	**L**	**DG**	*L*	**L**	*L*	**DG**	*M*	*M*	*L*	**M**

Abbreviations: C = Carcinogenicity, M = Mutagenicity, R = Reproductive Toxicity, D = Developmental Toxicity, E = Endocrine activity, AT = Acute mammalian toxicity, ST = Systemic toxicity, N = Neurotoxicity, SnS = Skin sensitization, SnR = Respiratory sensitization, IrS = Skin irritation, IrE = Eye irritation, AA = Acute aquatic toxicity, CA = Chronic aquatic toxicity, P = Persistence, B = Bioaccumulation, Rx = Reactivity, F = Flammability

GreenScreen Benchmark Criteria



How to Apply the Benchmarks



Hazard table into benchmark

BENCHMARK 1

a. PBT = High P + High B + [very High T (Ecotoxicity or Group II Human) or High T (Group I or II* Human)]

b. vPvB = very High P + very High B

c. vPT = very High P + [very High T (Ecotoxicity or Group II Human) or High T (Group I or II* Human)]

d. vBT = very High B + [very High T (Ecotoxicity or Group II Human) or High T (Group I or II* Human)]

e. High T (Group I Human)

Avoid—Chemical of High Concern

Chemical Name	Group I Human					Group II Human							Ecotox		Fate		Physical	
	C	M	R	D	E	AT	ST	N	SnS	SnR	IrS	IrE	AA	CA	P	B	Rx	F
Chemical 1	M	*L*	L	M	*M*	L	L	*M*	*L*	DG	L	H	L	*L*	vH	M	*L*	L
Chemical 2	*L*	L	M	M	H	L	H	M	L	L	M	*M*	H	H	vH	vH	*L*	L

Hazard table into benchmark

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e. High T (Group I Human)

Avoid—Chemical of High Concern

Chemical Name	Group I Human					Group II Human							Ecotox		Fate		Physical	
	C	M	R	D	E	AT	ST	N	SnS	SnR	IrS	IrE	AA	CA	P	B	Rx	F
Chemical 1	M	*L*	L	M	*M*	L	L	*M*	*L*	DG	L	H	L	*L*	vH	M	*L*	L
Chemical 2	*L*	L	M	M	H	L	H	M	L	L	M	*M*	H	H	vH	vH	*L*	L

Hazard table into benchmark

BENCHMARK 1

a. PBT = High P + High B + [very High T (Ecotoxicity or Group II Human) or High T (Group I or II* Human)]
b. vPvB = very High P + very High B
c. vPT = very High P + [very High T (Ecotoxicity or Group II Human) or High T (Group I or II* Human)]
d. vBT = very High B + [very High T (Ecotoxicity or Group II Human) or High T (Group I or II* Human)]
e. High T (Group I Human)

Avoid—Chemical of High Concern

Chemical Name	Group I Human					Group II Human							Ecotox		Fate		Physical	
	C	M	R	D	E	AT	ST	N	SnS	SnR	IrS	IrE	AA	CA	P	B	Rx	F
Chemical 1	M	*L*	L	M	*M*	L	L	*M*	*L*	DG	L	H	L	*L*	vH	M	*L*	L
Chemical 2	*L*	L	M	M	H	L	H	M	L	L	M	*M*	H	H	vH	vH	*L*	L

Benchmark: 1
Rationale: very High P+ very High B, HighT (group I Human)

Small exercise:
Benchmark “chemical A”

- First see if the chemical meets the criteria for Benchmark 1, Then if it meets the criteria for Benchmark 2.

Is Chemical A a Benchmark 1?

Group I Human					Group II and II* Human									Ecotox		Fate		Physical	
C	M	R	D	E	AT	ST		N		SnS*	SnR*	IrS	IrE	AA	CA	P	B	Rx	F
						single	repeated*	single	repeated*										
L	**M**	**L**	**L**	**L**	**M**	**H**	**H**	**M**	**M**	**L**	**L**	**H**	**H**	**M**	*M*	**L**	**L**	*L*	**L**

Benchmark 1 Criteria:

a.PBT = High P + High B + [very High T (Ecotoxicity or Group II Human) or High T (Group I and II* Human)]?

b.vPvB = very High P + very High B?

c.vPT = very High P + [very High T (Ecotoxicity or Group II Human) or High T (Group I and II* Human)]?

d.vBT = very High B + [very High T (Ecotoxicity or Group II Human) or High T (Group I or II* Human)]?

e.High T (Group I Human)?

Abbreviations: C = Carcinogenicity, M = Mutagenicity, R = Reproductive Toxicity, D = Developmental Toxicity, E = Endocrine activity, AT = Acute mammalian toxicity, ST = Systemic toxicity, N = Neurotoxicity, SnS = Skin sensitization, SnR = Respiratory sensitization, IrS = Skin irritation, IrE = Eye irritation, AA = Acute aquatic toxicity, CA = Chronic aquatic toxicity, P = Persistence, B = Bioaccumulation, Rx = Reactivity, F = Flammability

Is Chemical A a Benchmark 2?

Group I Human					Group II and II* Human									Ecotox		Fate		Physical	
C	M	R	D	E	AT	ST		N		SnS*	SnR*	IrS	IrE	AA	CA	P	B	Rx	F
						single	repeated*	single	repeated*										
L	**M**	**L**	**L**	**L**	**M**	**H**	**H**	**M**	**M**	**L**	**L**	**H**	**H**	**M**	*M*	**L**	**L**	*L*	**L**

Benchmark 2 Criteria:

a)Moderate P + Moderate B + Moderate T (Ecotoxicity or Group I, II or II* Human)?

b)High P + High B?

c)High P + Moderate T (Ecotoxicity or Group I, II or II* Human)?

d)High B + Moderate T (Ecotoxicity or Group I, II or II* Human)?

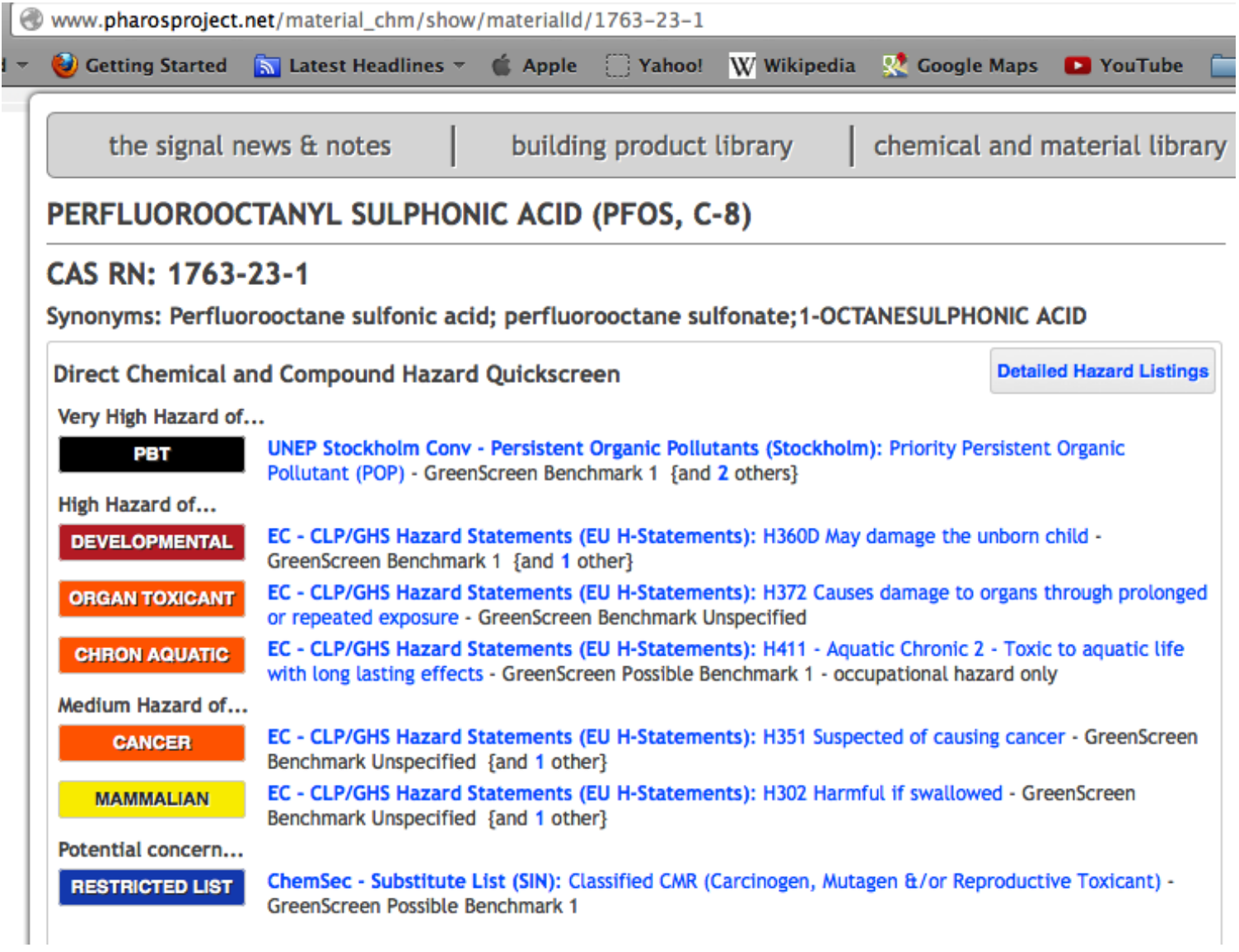
e)Moderate T (Group I Human)?

f)very High T (Ecotoxicity or Group II Human) or High T (Group II* Human)?

g)High Flammability or High Reactivity?

Abbreviations: C = Carcinogenicity, M = Mutagenicity, R = Reproductive Toxicity, D = Developmental Toxicity, E = Endocrine activity, AT = Acute mammalian toxicity, ST = Systemic toxicity, N = Neurotoxicity, SnS = Skin sensitization, SnR = Respiratory sensitization, IrS = Skin irritation, IrE = Eye irritation, AA = Acute aquatic toxicity, CA = Chronic aquatic toxicity, P = Persistence, B = Bioaccumulation, Rx = Reactivity, F = Flammability

Automated Green Screen list translators for fee: Pharos and GreenWercs



CONCLUDING REMARKS

Currently hazardous chemicals are used in common processes and products, and increasingly linked to health and environmental effects

Substitution is the most efficient approach to avoid problems caused by hazardous chemicals

Substitution is increasingly required by authorities, in the supply chain and by and citizens

INTERNATIONAL ChemSec CHEMICAL SECRETARIAT

CONCLUDING REMARKS

TIPS BEFORE STARTING SUBSTITUTION:

Define the framework for your substitution work:

-define regulatory and other criteria for prioritizing chemicals for phase-out

-define the stakeholders who will be affected by the substitution

It helps to openminded in substitution:

-consider the ultimate function and need of the chemical

-the best alternative is not necessarily another chemical

Find forums to discuss substitution

CONCLUDING REMARKS

AVAILABLE RESOURCES

✓SUBSPORT webportal for general substitution information
✓SIN List and SUBSPORT database of restricted and priority substances for prioritizing chemicals
✓SUBSPORT case story database for ideas for alternatives
✓The Green Screen for Safer chemicals for informed substitution
✓Coming up: OECD toolbox

Thanks for the attention!