

Regulation of chemicals

- method, drawbacks and alternatives

Marlene Ågerstrand

Department of Environmental Science and
Analytical Chemistry, Stockholm University, Sweden

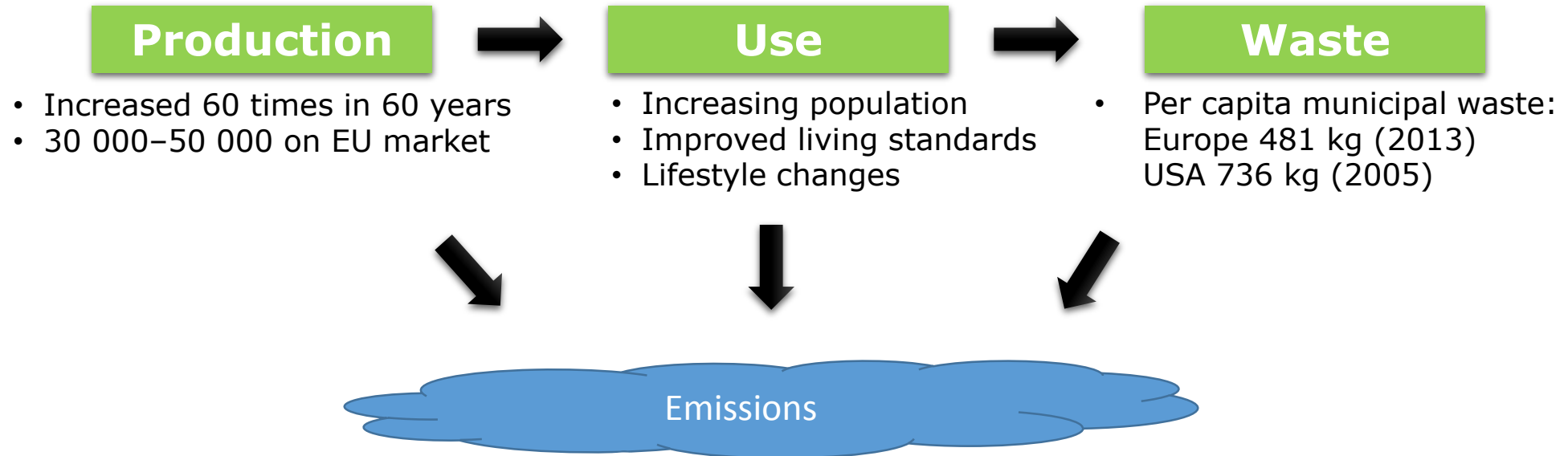
marlene.agerstrand@aces.su.se



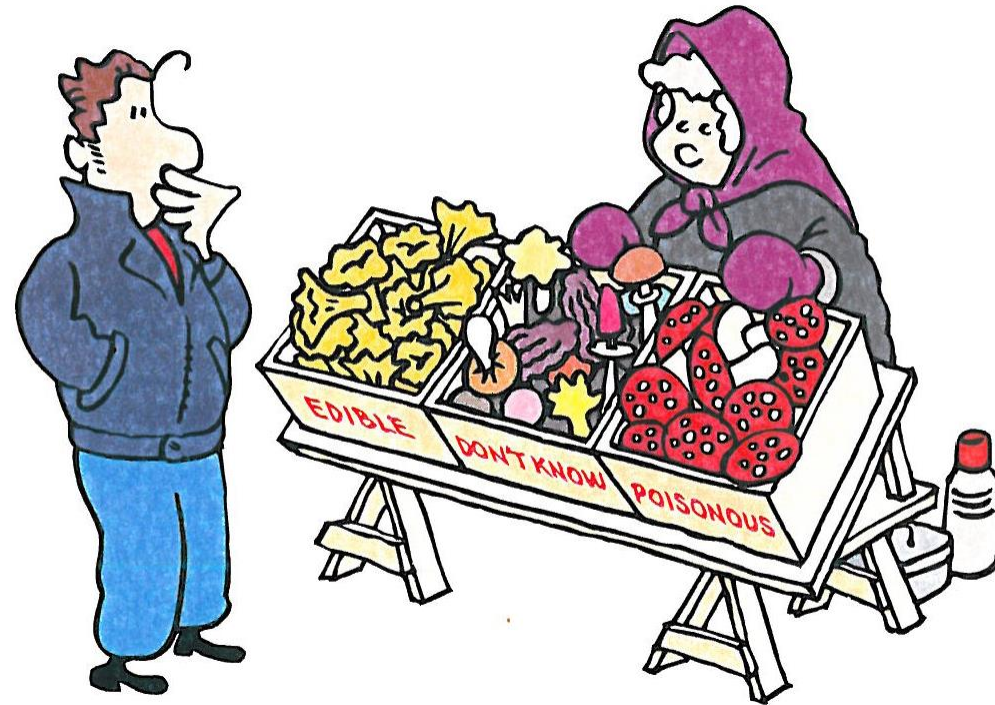
Agenda

- How many chemicals are there and what do we know about them?
- How do we hazard assess chemicals?
- Why do we still use potentially hazardous chemicals?
- Besides legislation, what additional tools can be used to minimize use of hazardous chemicals?

Dramatic increase in use of chemicals



What do we know?

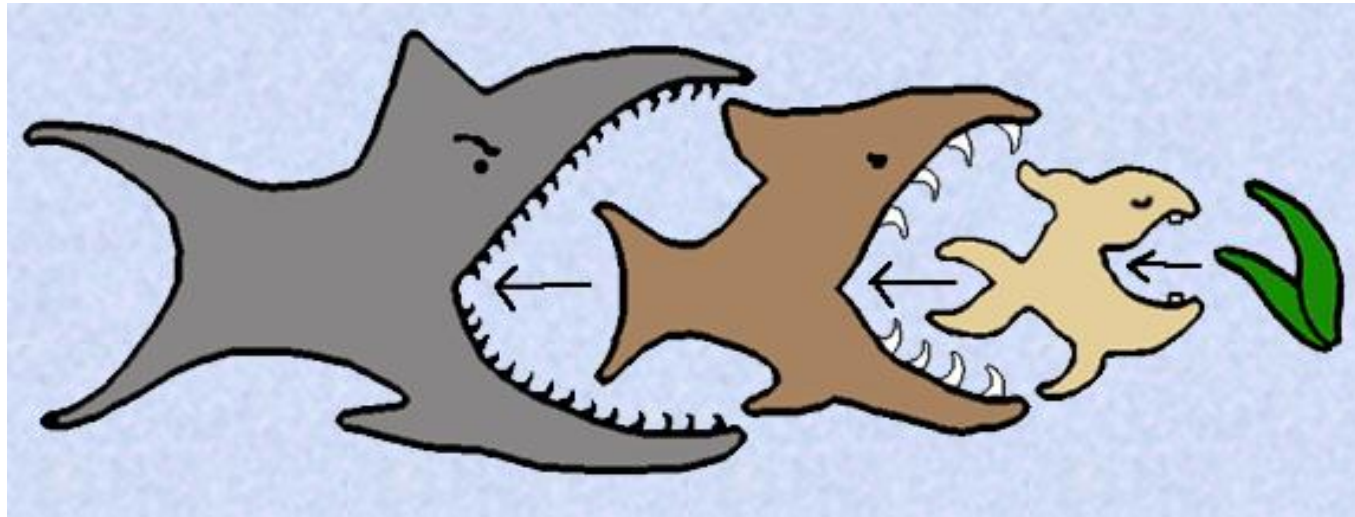


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Bioaccumulation

- Higher concentration in the organisms compared to the surrounding environment.



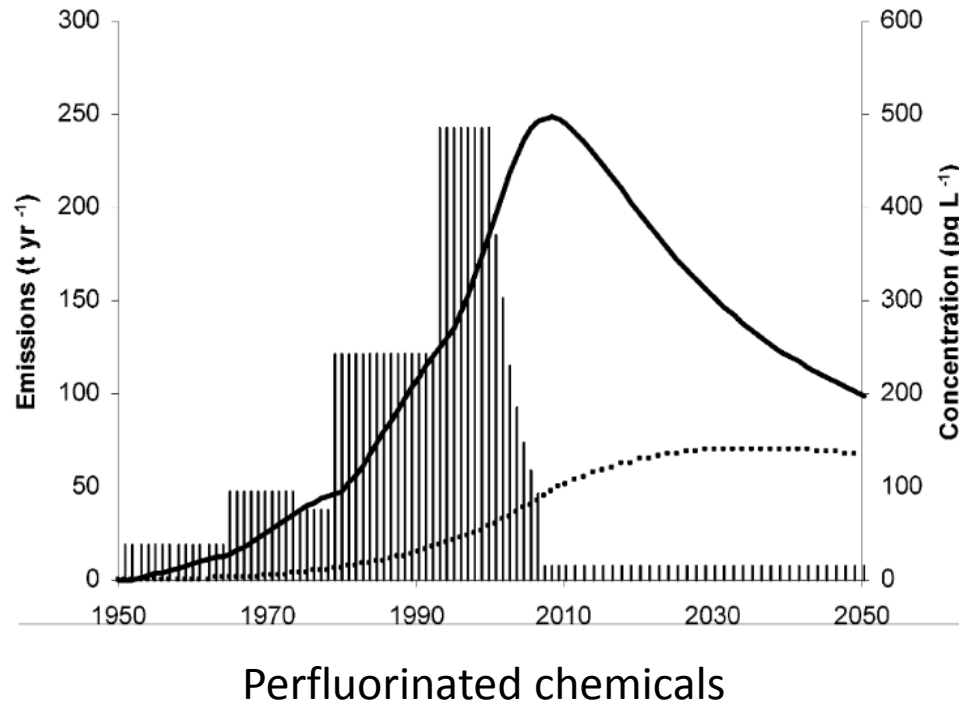
Bioaccumulation

- Higher concentration in the organisms compared to the surrounding environment.



Persistence

- resistant to environmental degradation through chemical, biological, and photolytic processes.



Toxic - degree to which a chemical can damage an organism.



Substances of very high concern (SVHC)

- Persistent, Bioaccumulative, Toxic (PBT, vPvB)
- Carcinogenic, Mutagenic, Reproduction-disturbing (CMR)
- Substances of "equivalent concern" (e.g. endocrine-disrupting)

All hazardous chemicals does not constitute a risk

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Limitations with current legislation

- Insufficient testing requirements for chemicals

Toxicity tests	<1t	>1t	>10t	>100t	>1000t
Chronic toxicity and carcinogenicity	no	no	no	no	(yes)
Reproductive toxicity (one-generation)	no	no	no	(yes)	(yes)
Subchronic (90d)	no	no	no	(yes)	(yes)
Subacute (28d)	no	no	(yes)	yes	yes
Screening for reproductive toxicity	no	no	yes	yes	yes
Acute toxicity second route	no	no	yes	yes	yes
Acute toxicity second route	no	(yes)	yes	yes	yes
Mutagenicity (<i>in vitro</i>)	no	(yes)	yes	yes	yes
Skin sensitization	no	(yes)	yes	yes	yes
Skin + eye irritation	no	(yes)	yes	yes	yes

Untested substance = Harmless

No exposure data = No exposure

Limitations with current legislation

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- We assess chemicals one at a time

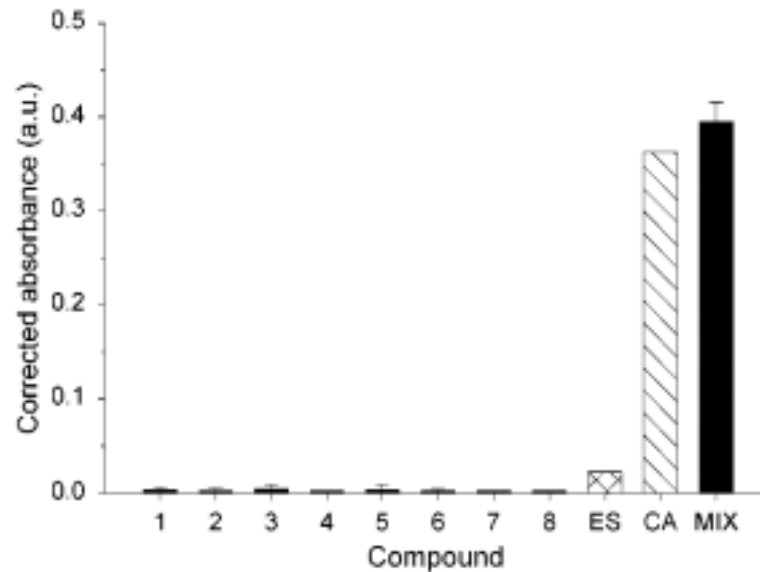


FIGURE 4. Effects of individual mixture components 1–8 at the concentrations present in 1.43 μM of the mixture. ES: *effect summation*, i.e., expected mixture effect obtained by calculating the arithmetic sum of individual effects of agents 1–8. CA: *concentration addition prediction*. MIX: *observed mixture effect*. Error bars are upper 95% confidence limits of the best estimate of mean responses. Concentrations of test agents in 1.43 μM of the mixture are depicted in Table 1.

Something from “Nothing” — Eight Weak Estrogenic Chemicals Combined at Concentrations below NOECs Produce Significant Mixture Effects

ELISABETE SILVA,
NISSANKA RAJAPAKSE, AND
ANDREAS KORTENKAMP*

*Centre for Toxicology, Department of Pharmacology,
The School of Pharmacy, University of London,
29-39 Brunswick Square, London WC1N 1AX*

Limitations with current legislation

- Insufficient testing requirements for chemicals
- We assess chemicals one at a time
- No content declaration for consumer products
- Poor regulation of chemicals in imported consumer products



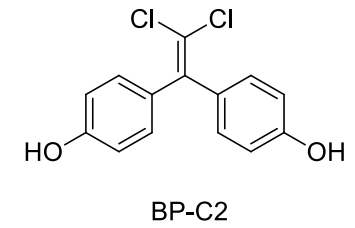
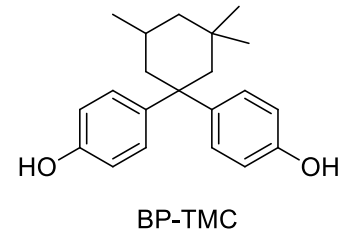
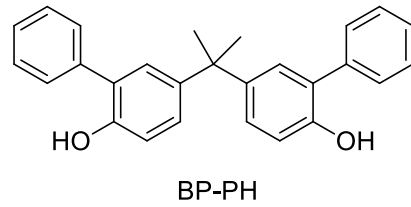
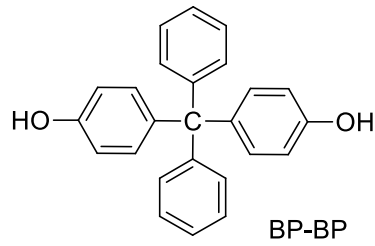
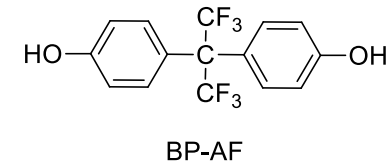
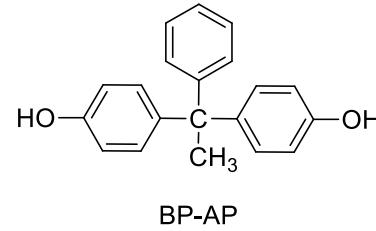
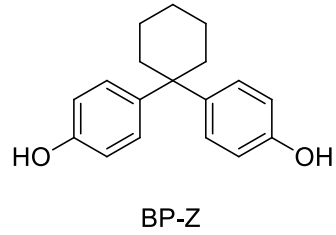
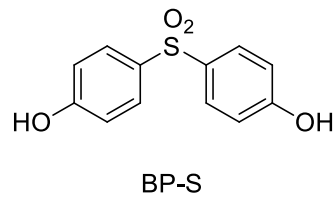
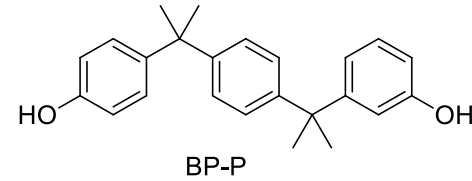
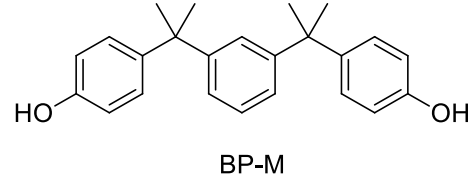
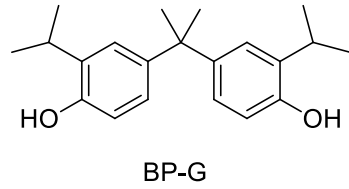
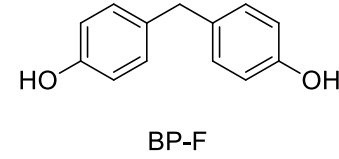
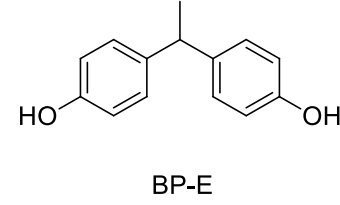
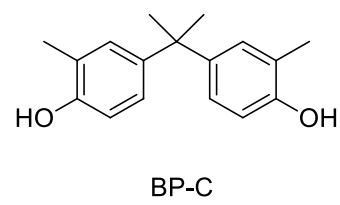
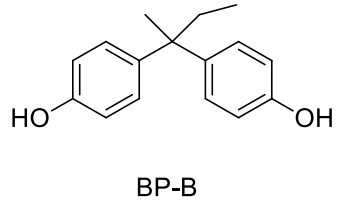
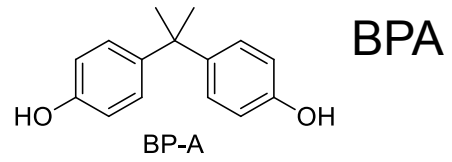
Foto: Fredrik Larsson

Limitations with current legislation

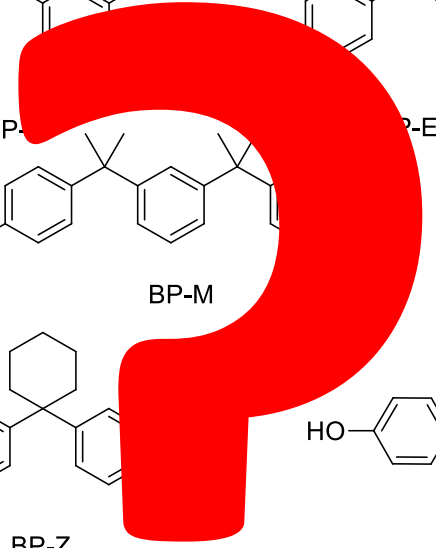
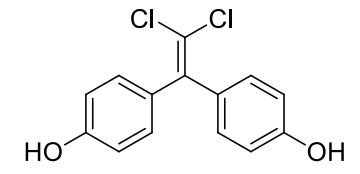
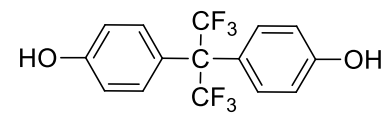
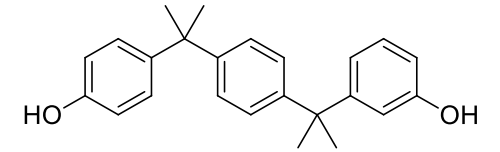
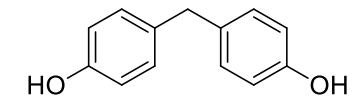
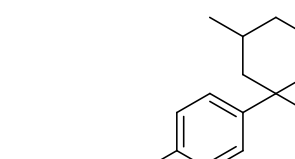
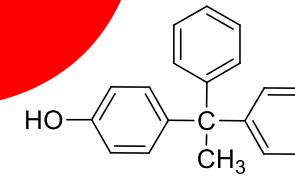
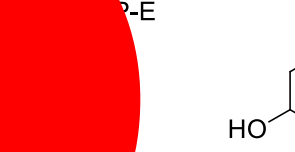
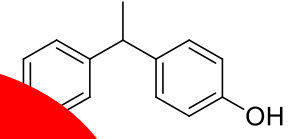
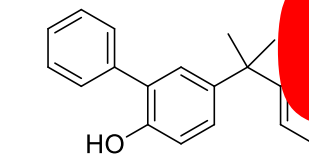
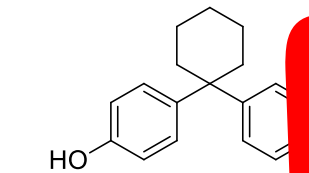
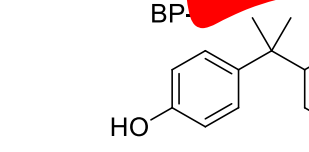
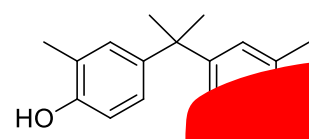
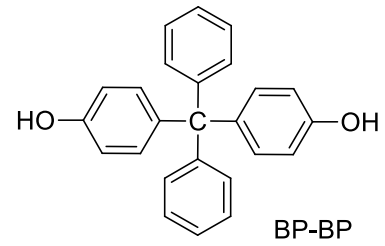
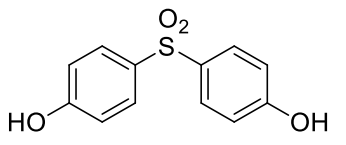
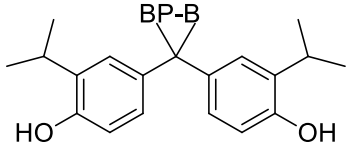
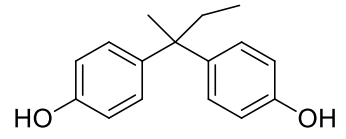
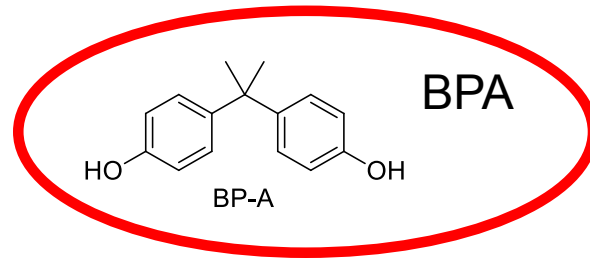
- Insufficient testing requirements for chemicals
- We assess chemicals one at a time
- No content declaration for consumer products
- Poor regulation of chemicals in imported consumer products
- Industry are responsible for assessing their own chemicals = Built-in conflict of interest?
- Slow process



Bisphenols



10 years from first
assessment to decisions
about risk reduction



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Additional tools

Excise duty

- Suggestion to the Swedish Government: *12 Euro/kg for electronic products. Max 32 Euro/item. 50 % reduction for electronic products that do not contain additive compounds of bromine, chlorine or phosphorus.*

Public Procurement

- Examples from the Swedish National Agency for Public Procurement: *Toner powder is not to be classified as: Acute toxicity, Carcinogenic, Mutagenic, Reproduction-disturbing, Hazardous to aquatic environments, Hazardous to the ozone layer.*

Additional tools - Voluntary initiatives

E.g. classification systems, environmental labelling, positive/negative lists.

- **Participation:** Many different stakeholders with clearly defined rights and responsibilities
- **Goal formulation:** Clear measurable objectives with a timetable, Criteria that fit the objectives, who decides the objectives?
- **Information:** Transparent process and results presentation
- **Evaluation and monitoring:** External evaluation, Specified evaluators, New objectives
- **Penalties for non-compliance:** Loss of privileges, Sanctions should come immediately after the infraction, "Profit" of violations must be less than the "profit" of following all the rules

Conclusions

- We don't know enough about the chemicals we are using.
- Hazardous chemicals (persistent, bioaccumulative and toxic) are used in consumer products.
- Regulating chemicals is a slow and complex process.
- Additional tools, like voluntary initiatives and procurement, can be used to minimize use of hazardous chemicals.



Thank you! Questions?

Marlene Ågerstrand
marlene.agerstrand@aces.su.se

Brominated flame retardants

Substance	Effects and properties	Regulation
DecaBDE	PBT, vPvB	Restriction proposal in EU Under review in Stockholm Convention
OctaBDE, PentaBDE	vPvB, LRET	Restricted since 2004 in EU Listed in Stockholm Convention
PBBs	PBT, vPvB, LRET	Restricted in EU Listed in Stockholm Convention
HBCD or HBCDD	PBT, LRET	Authorisation is needed in EU Listed in Stockholm Convention

Children at risk

More sensitive

- Still developing
- Breaks down certain substances inferior

Higher exposure

- Smaller body volume
- High intake of food per kg body weight
- Different behavior!



Foto: Fredrik Larsson

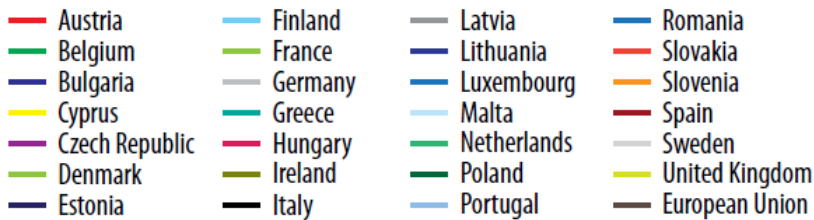
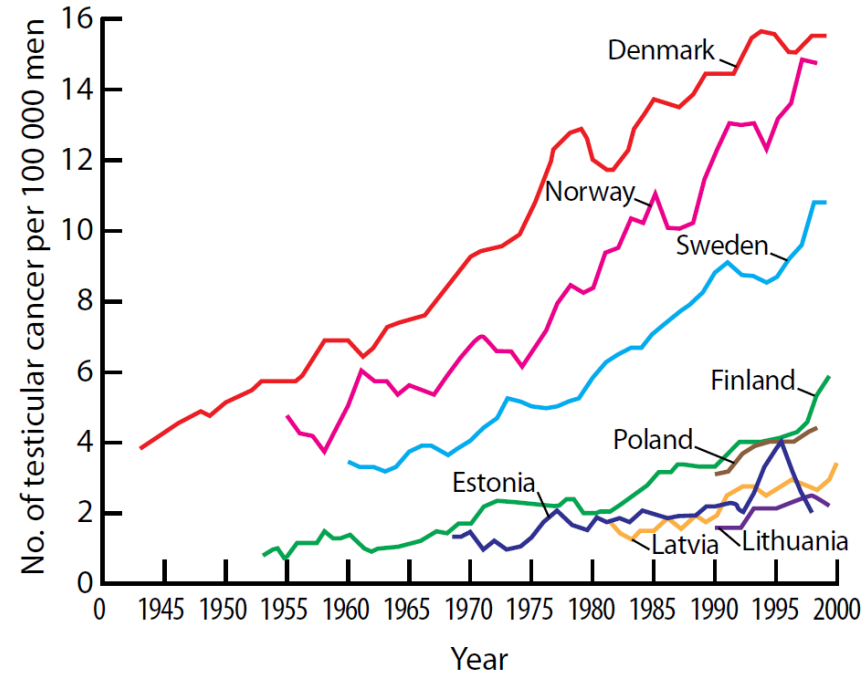
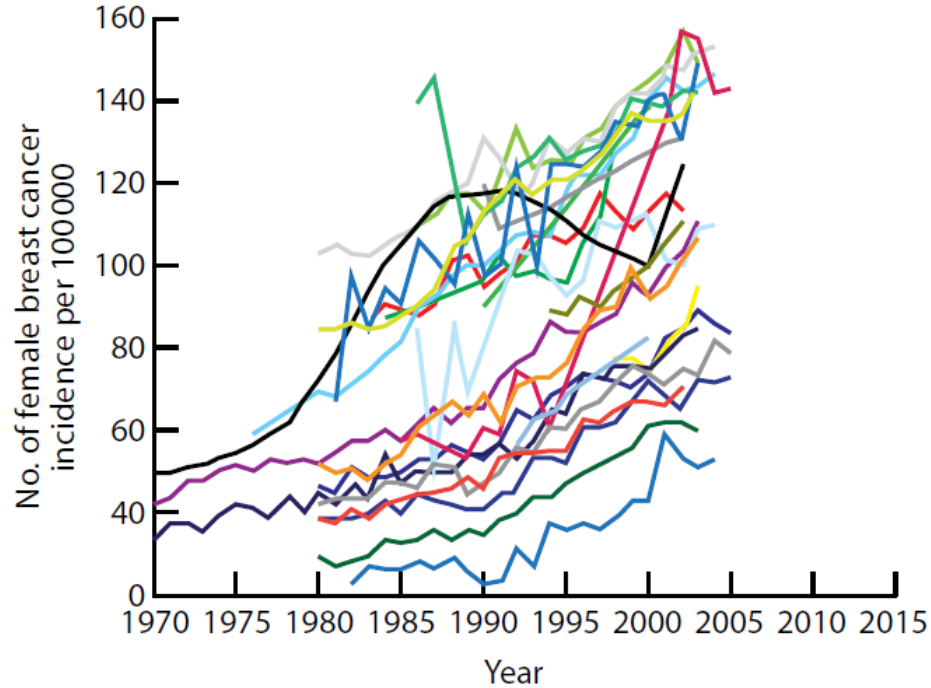
EU-legislations relevant for electronic products

- Classification, Labelling and Packaging (CLP) Regulation (EG) 1272/2008
- REACH Regulation (EC) 1907/2006
- RoHS Directive (2011/65/EU)
- WEEE Directive (2002/96/EC)
- The Stockholm Convention
- The Convention on Long-range Transboundary Air Pollution

Cost of Inaction

- Restoring PCB contaminated soil: 15 billions Euro until 2018. Costs for effects on health and ecosystems are not included.
 - Compared to REACH: 2-4 billion Euro / 10 years
- Endocrine-disrupting substances effect on male reproduction: 3.6 million Euro / year in the Nordic countries.

Increase in hormone-related cancer



Ref: United Nations Environment Programme and the World Health Organization, 2013. "State of the science of endocrine disrupting chemicals 2012".