What kind of barriers can hazardous substances cause for the circular economy, and case demolition and recycling of construction materials

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Managing hazardous substances in circular economy

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EDSCE 2019 Conference, Helsinki, Finland
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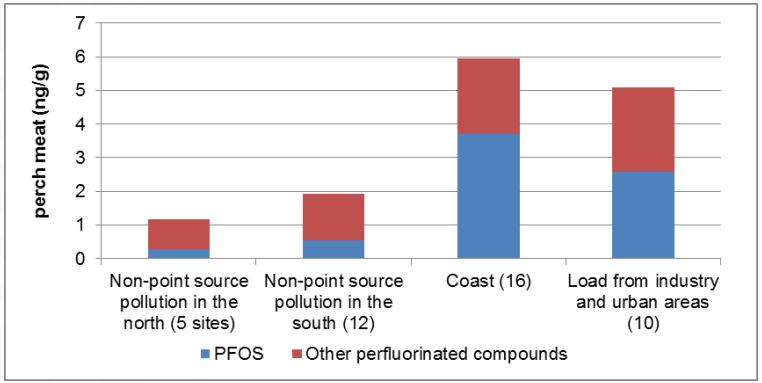
Hazardous substances

Persistent organic pollutants (POPs)

Substances of very high concern (SVHCs)



Data from Finnish Environment Institute

- Bioaccumalative, toxic and persistent
- Carsinogenic
- Mutagenic
- Endrocrine disruptors
- Can be transported by wind and water far from where they were released

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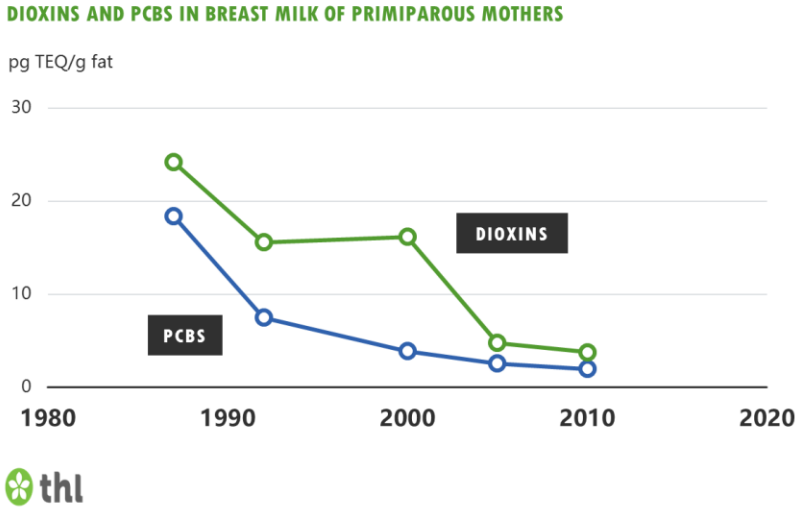
Possibilities to manage hazardous substances



Data from Finnish institute for health and welfare

- The occurrence of hazardous chemicals in humans or the environment has been reduced by regulations and restrictions.

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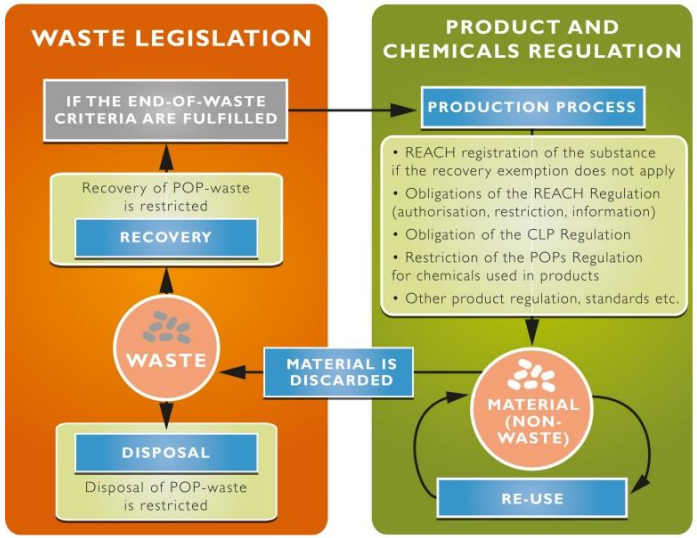
How to manage hazardous substances in circular economy?

- Balance between maximizing the recovery and recycling of waste and the protection of health and the environment
- Products with long life cycle may contain legacy chemicals
- The change from a linear to circular economy poses new challenges on chemicals and waste regulations



Safe and sustainable circular economy. Policy brief 17/2019. Government's analysis, assessment and research activities, Finland: tietokayttoon.fi (Available after 14th of Oct 2019)

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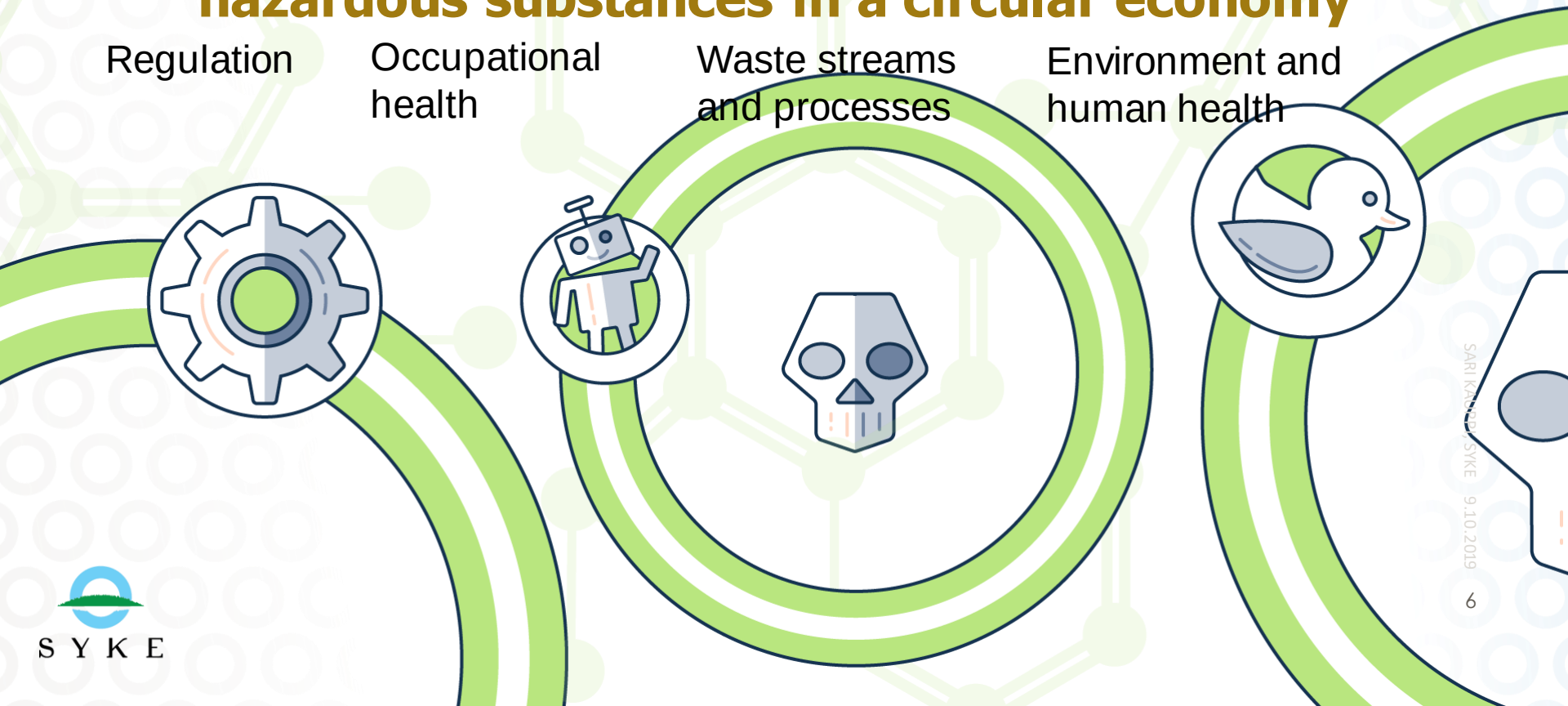
Recommendations for the management of hazardous substances in a circular economy

Regulation

Occupational health

Waste streams and processes

Environment and human health



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Knowlege

- *We are able to manage only what we understand!*
- **Quantitative information on POPs and SVHCs in products, waste streams and the environment is needed.** Statistics on chemicals must be developed so that even the new chemicals included in the list of SVHCs can be identified in the material streams.
- The European Chemicals Agency (ECHA) maintains a list of SVHCs also including substance-specific information, and in future, information about SVHCs in products – education still needed at many levels
- Help for decision makers in permitting e.g. End-of-Waste classification → brings predictability in permit decisions

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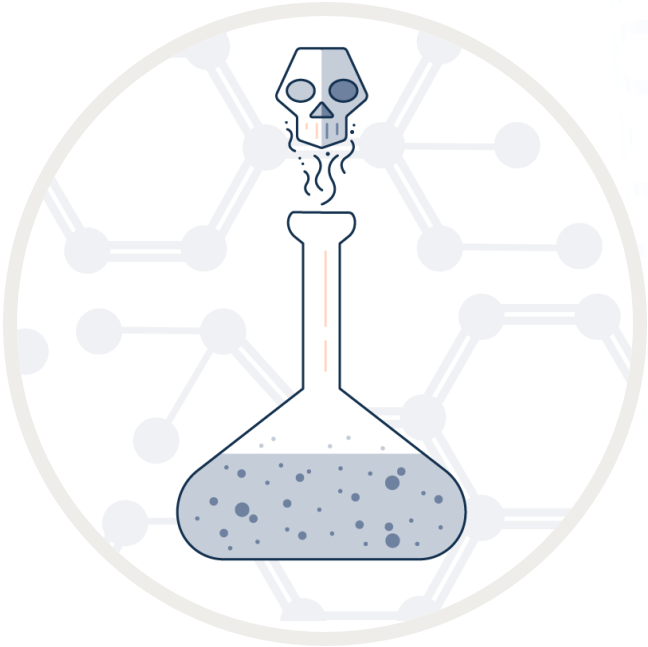
Technological development

- *We know only what we have measured!*
- Methods suitable for identifying substances in different matrices must be developed.
  - quick methods for identifying chemicals on site
  - laboratory analytics for the reliable analysis of POPs and SVHCs in different matrices
  - methods for industrial use
- Need for financial investments



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More recommendations for the management of hazardous substances in circular economy

- **Methods must be developed for improving the flow of information** on the material and chemical content of products and harmful substances **throughout the product's life cycle**, all the way to the waste phase and new life cycles.
- **Investments must be made in developing new materials**
- **Source separation of waste**
- **Risk assessment guides**
- **The part of the waste stream that contains unidentifiable chemicals should be directed to energy production**.
- **Research needed** – should reach out for the best financial, health and environmental benefits

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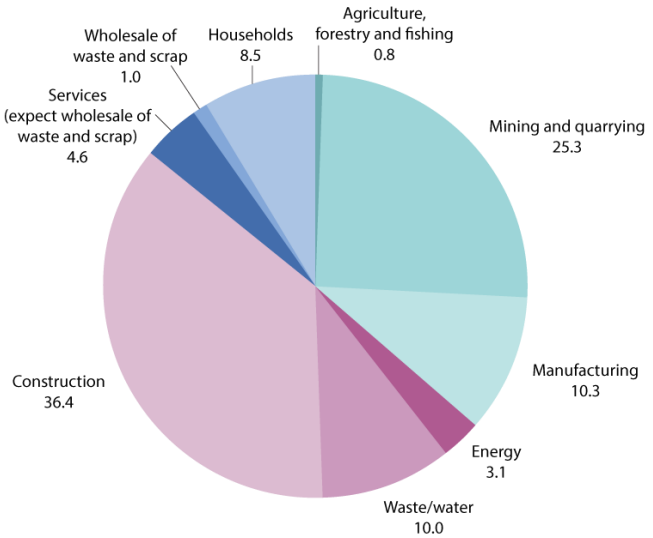
Case: Construction and demolition

Margareta Wahlström
Senior Scientist

Background

- Circular economy action plan for closing the loop: Construction and demolition is one priority area
- Tightening EU regulation puts pressure on more sustainable use of materials.
- One of actions in CE action plan relates to the development of a framework for hazardous material inventory prior to demoltion

Waste generation by economy activities and households in EU, 2016 (%)



Source: Eurostat, 2019

Why important to identify haz. materials

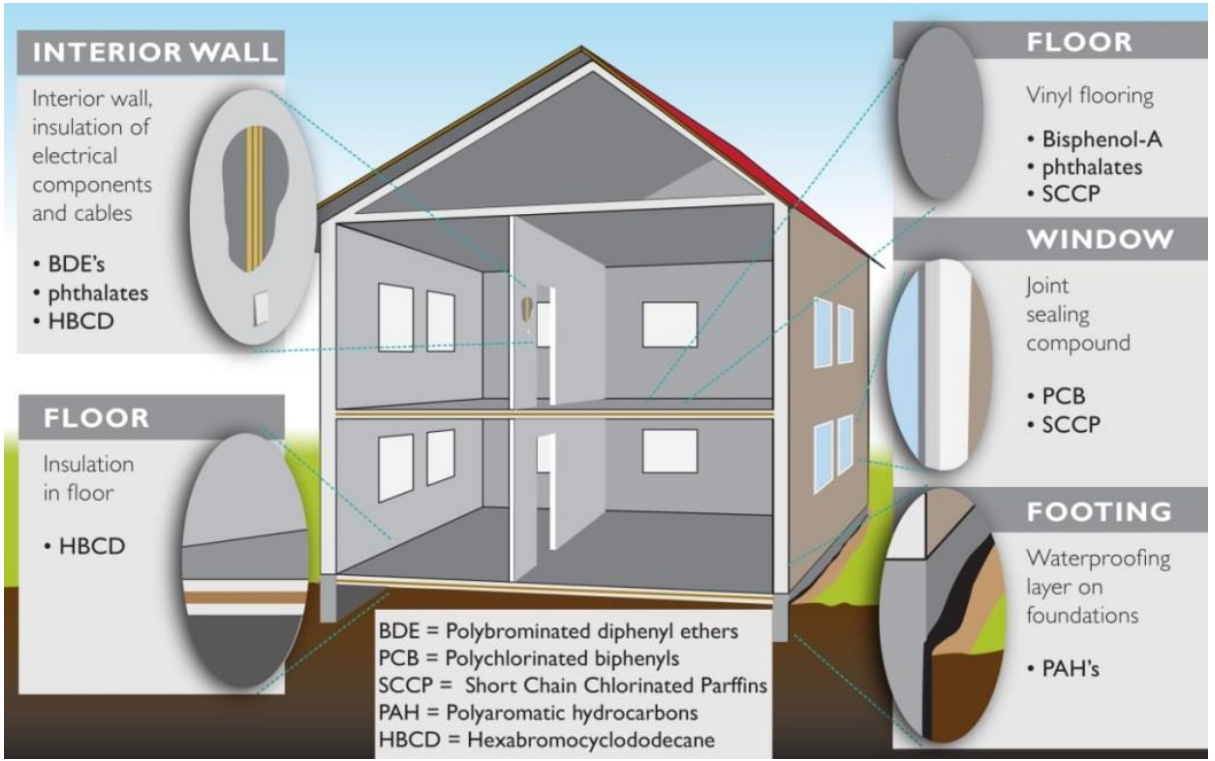
- Removal of hazardous material from material loop and controlled management of waste containing hazardous materials
- Important to ensure safe waste materials (non-contaminated) for recycling in new products
- Worker safety during demolition work

Challenge: lists of hazardous substance continuously updated, never final

From waste…

to products…

POPs in constructions - examples



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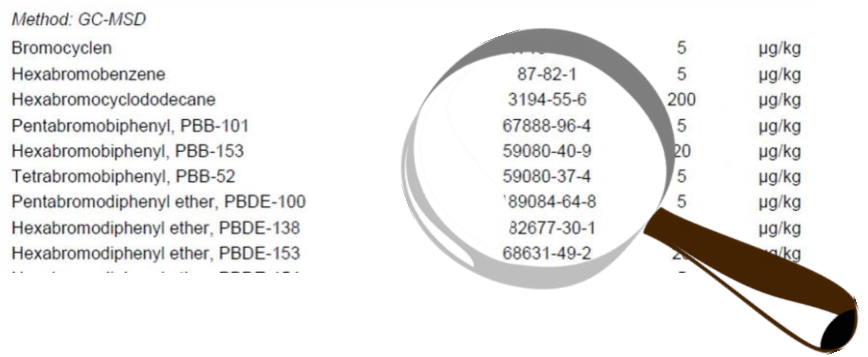
Skills for experts performing inventory on hazardous materials

- Material knowledge (when used where?)
- Knowledge on construction methods in past
- Knowledge on legislation (hazardous limits, upcoming substances…)
- Competence in “Sampling & analysis & interpretation of results”
- Informed about management options for waste
- Skills for documentation



Method: GC-MSD

Bromocyclen		5	µg/kg
Hexabromobenzene	87-82-1	5	µg/kg
Hexabromocyclododecane	3194-55-6	200	µg/kg
Pentabromobiphenyl, PBB-101	67888-96-4	5	µg/kg
Hexabromobiphenyl, PBB-153	59080-40-9	20	µg/kg
Tetrabromobiphenyl, PBB-52	59080-37-4	5	µg/kg
Pentabromodiphenyl ether, PBDE-100	89084-64-8	5	µg/kg
Hexabromodiphenyl ether, PBDE-138	82677-30-1		µg/kg
Hexabromodiphenyl ether, PBDE-153	68631-49-2		µg/kg

Steps for better management

- Need for harmonized protocol for hazardous material inventory prior to demolition
- Increasing awareness in whole value chain:
  - Historical products: when used where?
  - Future products: criteria for safe by design needed
- Innovative technologies for material changes, substitution
- Standardization on product performance, methods for measurements
- Traceability and documentation of construction products composition

Photo: Testing chamber for determination of emissions to indoor air

Thank you!

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