

Management of contaminated sites in Europe



EU environmental policies: soil protection

60-70% of our soils are unhealthy as a direct result of current management practices

- 21% of agricultural soils with Cd > limit for drinking water; 83% of an EU-wide representative soil sample have residual pesticides
- Contaminated sites pose risk to drinking water quality, biodiversity and human health

[EU Mission Board Soil Health and Food (2020)]



EPA's State and Outlook of the Environment Report (SOER) 2020

Air Pollution	Past trends (10-15 years)	Outlooks 2030
Emissions of air pollutants	Trends show a mixed picture	Developments show a mixed picture
Concentrations of air pollutants	Improving trends dominate	
Air pollution impacts on human health and wellbeing	Improving trends dominate	
Air pollution and impacts on ecosystems	Trends show a mixed picture	
Chemical Pollution		
Emissions of chemicals	Trends show a mixed picture	Deteriorating developments dominate
Impacts of chemical pollution on ecosystems		
Chemical pollution and risk to human health and well-being		
Industrial Pollution		
Pollutant emissions from industry	Improving trends dominate	Developments show a mixed picture
Clean industrial technologies and processes		
Freshwater		
Pollution pressures on water and links to human health	Developments show a mixed picture	Developments show a mixed picture
Land and Soil		
Soil condition	Deteriorating trends dominate	Deteriorating developments dominate

Local Soil Pollution in the EU policy context

- **Soil Thematic Strategy (STS, 2006):** soil protection encompassing the major soil threats, including local and diffuse contamination (revision 2021)
- **Water Framework Directive (2000):** River Basin Management Plans, requiring the identification of point sources and their impacts
- **Road Map for a Resource Efficient Europe (2011):** By 2020 remedial work on contaminated sites well underway.
- **Others with regard to soil pollution:** Industrial Emissions Directive (inventory of Industrial operations), Seveso Directive, Landfill Directive, Pesticides Directive, Sewage Sludge Directive, Mercury Regulation



EU policy context: elements under the Green Deal

- **Biodiversity Strategy 2030:**
 - BDS 2020: voluntary approaches ineffective (to restore at least 15% of degraded ecosystems)
 - BDS 2030, among others: the risk and use of chemical pesticides is reduced by 50%
 - Legally binding EU nature restoration targets (2021) to restore degraded ecosystems
 - *incl. soil pollution*
- **Farm2Fork:** to reduce the overall use and risk of chemical pesticides by 50% and the use of more hazardous pesticides by 50% by 2030



EU policy context: elements under the Green Deal

Zero pollution ambition for a toxic-free environment: (1) Chemicals Strategy and (2) Zero Pollution Action Plan for Air Soil and Water

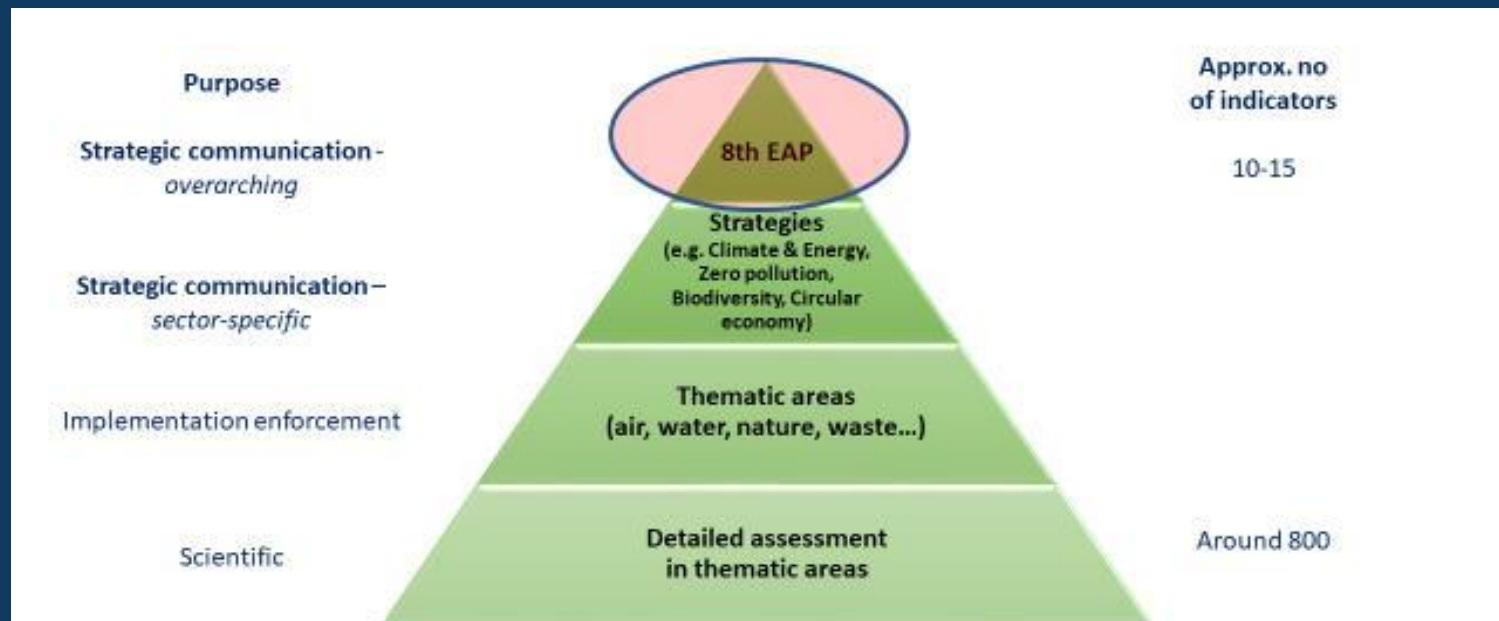
- To better monitor, report, prevent and remedy pollution from air, water, soil, and consumer products.
- To propose new legislation covering significant pollution sources, which are not yet addressed.
- To facilitate **remediation of soil pollution** via i) a monitoring framework on the state of pollution, and ii) an outlook report.



Soil Pollution in the EU policy context

- **Soil Mission Board for Soil, Health and Food** suggests to double the rate of restoration of polluted sites
- **8th Environmental Action Programme**: accelerate the Union's transition to a climate-neutral, resource-efficient clean and circular economy ➤ 8th EAP monitoring framework

8th EAP
headline
indicator set



Status of Local Soil Contamination in Europe

EEA Indicator **LSI003** “Progress in the management of contaminated sites in Europe”

Voluntary exchange of definitions, statistics, methodical background, by country, based on questionnaires among the National Reference Centres (NRC) Soil:

- Until 2018: Ad Hoc Working Group Contaminated Sites (Lead: Ana Payá Pérez, JRC, IT)
- Since 2019: WG Soil Contamination (Lead: Frank Swartjes, RIVM, NL)

Report 2017 "[European Achievements in Soil Remediation and Brownfield Redevelopment](#)"

Report 2018 "[Status of Local Soil Contamination in Europe](#)"

Indicator: [EEA 2014: Progress in management of contaminated sites](#)



EEA/Eionet history on soil contaminated sites

I. 6 data-collection exercises 2001-2006

4 management steps: preliminary study/site identification, preliminary investigation, main site investigation, implementation of risk-reduction measures

II. 2011 questionnaire , report 2014

Introduced: 'potentially contaminated sites' (PCS), 'contaminated sites' (CS) and 'sites under remediation'

➤ **Leading to updates of LSI 003 (2006/2014)**

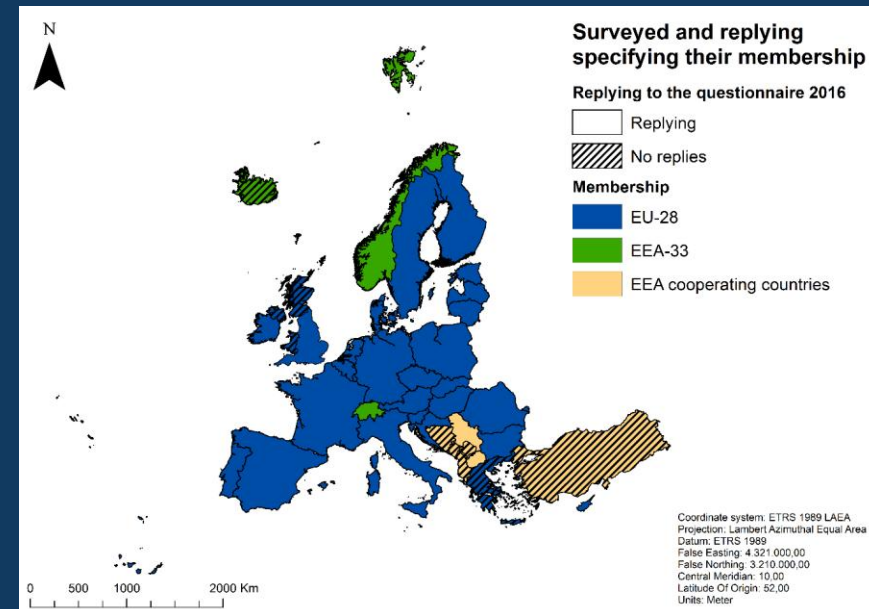
Distinguishes: polluting activities and sectors, contaminants, expenditures
27 countries report 1.17 Mio potentially contaminated sites; 30 countries have comprehensive inventories (24 national, 6 regional)

For EEA-39: 2.5 Mio potentially contaminated sites estimated, of which about 14 % (342 000 sites) has been identified (of which 15% has been remediated)

EEA/Eionet history on soil contaminated sites

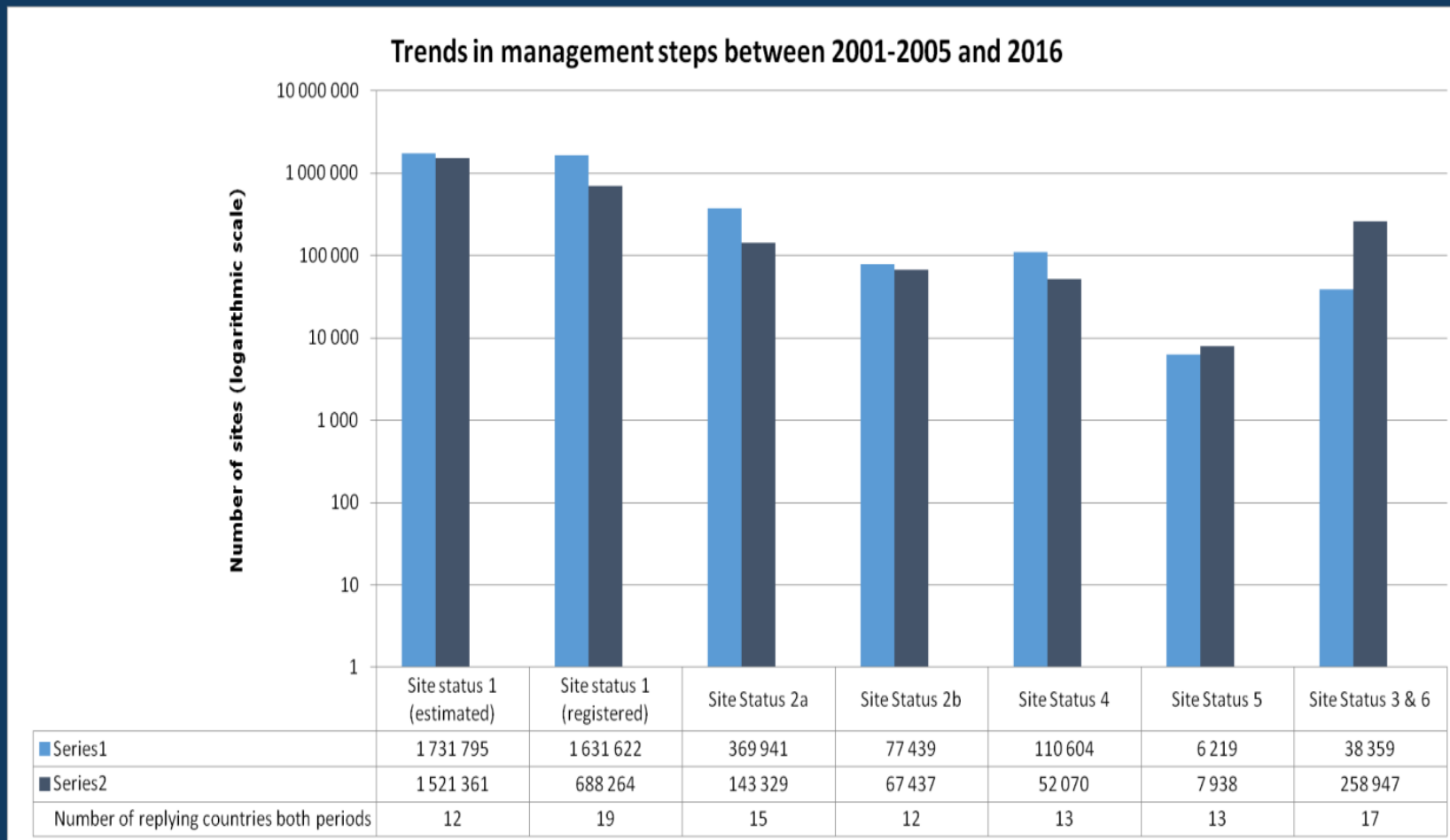
III. 2016 questionnaire

- Status 1: sites where polluting activities took/are taking place.
 - Status 2: sites in need of investigation.
 - Status 3: sites that have been investigated but no remediation is needed.
 - Status 4: sites that need or might need remediation or risk-reduction measures
 - Status 5: sites under/with ongoing remediation or RRM.s.
 - Status 6: site remediation or RRM.s completed or sites under aftercare measures
- 6 site statuses:
- 27 countries responded to the questionnaire, partially incomplete (questions, area coverage)
 - 2.8 Mio **estimated** contaminated sites
 - > 650,000 registered sites
 - > 14,000 under remediation (235,000 already remediated)
 - Comprehensive inventories exist in 28 out of 39 countries



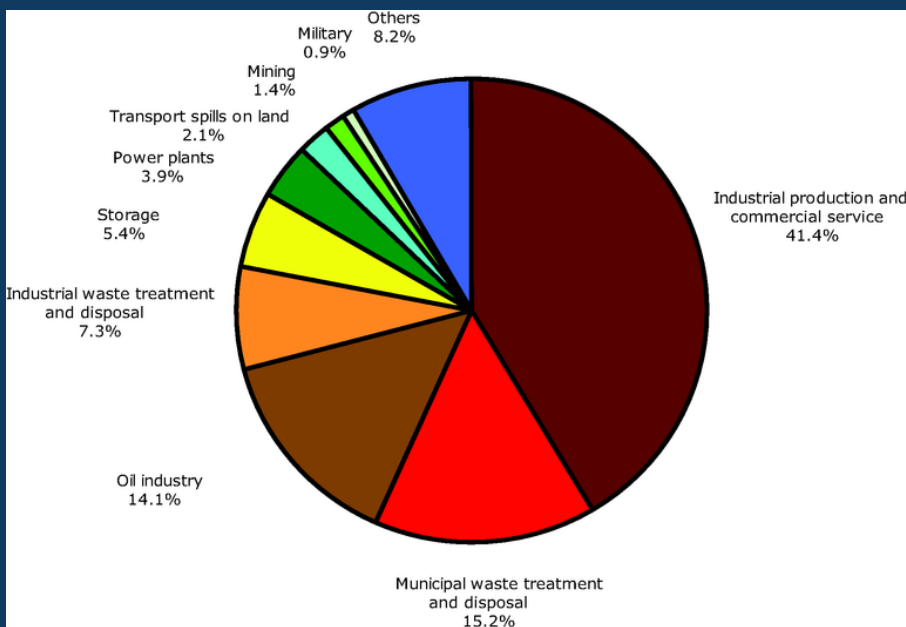
Trend of *LSI003*

Site status can be mapped throughout questionnaires, however the statistics are difficult to combine (different sub classes, gaps for different countries, incomplete registers).



Challenges and steps to improve LSI003

Potentially soil polluting activities¹⁾



1. Establishments, dangerous substances \geq “Seveso” (96/82/EC²⁾).
2. Activities listed in 96/61/EC, Annex I (IPPC)
3. Airports
4. Ports
5. Former military sites
6. Petrol and filling stations
7. Dry cleaners
8. Mining installations not covered by 96/82/EC, incl. extractive waste facilities (see 2006/21/EC³⁾)
9. Landfills of waste as defined in Council Directive 1999/31/EC¹⁸ (on the landfill of waste)
10. Waste water treatment installations
11. Pipelines for the transport of dangerous substances

¹⁾ COM/2006/0232 final: draft directive establishing a framework for the protection of soil

²⁾ Control of major-accident hazards involving dangerous substances, Annex I

³⁾ 2006/21/EC management of waste from extractive industries (nuclear and fossil fuels, metals, construction materials)



Challenges and steps to improve LSI003

Question related to these activities, and the degree to which they are covered by policies (EU and national):

Local contaminated sites	Policy	Questions
Dangerous substances	"Seveso" (96/82/EC)	any installation or activities, or chemical industry? Only emergencies (spills, leakages)
"Activities"	96/61/EC, Annex I (IPPC)	which "activities" and based on which selection criteria (emission load, ETS, see PRTR)
Airports	?	substances, policies, remediation/monitoring requirements
Ports	?	
Former military sites	?	
Petrol filling stations	?	
Dry cleaners	?	
Mining installations	not covered by 96/82/EC, incl. extractive waste facilities (see 2006/21/EC)	
Landfills of waste	as defined in Council Directive 1999/31/EC18 (on the landfill of waste)	
Waste water treatment installations	?	define, which policies
Pipelines for the transport of dangerous substances	?	is that a contaminated site?

Challenges and steps to improve LSI003

Groups of solid and liquid pollutants

(reported by 16 countries, acc.to Panagos et al. 2013):

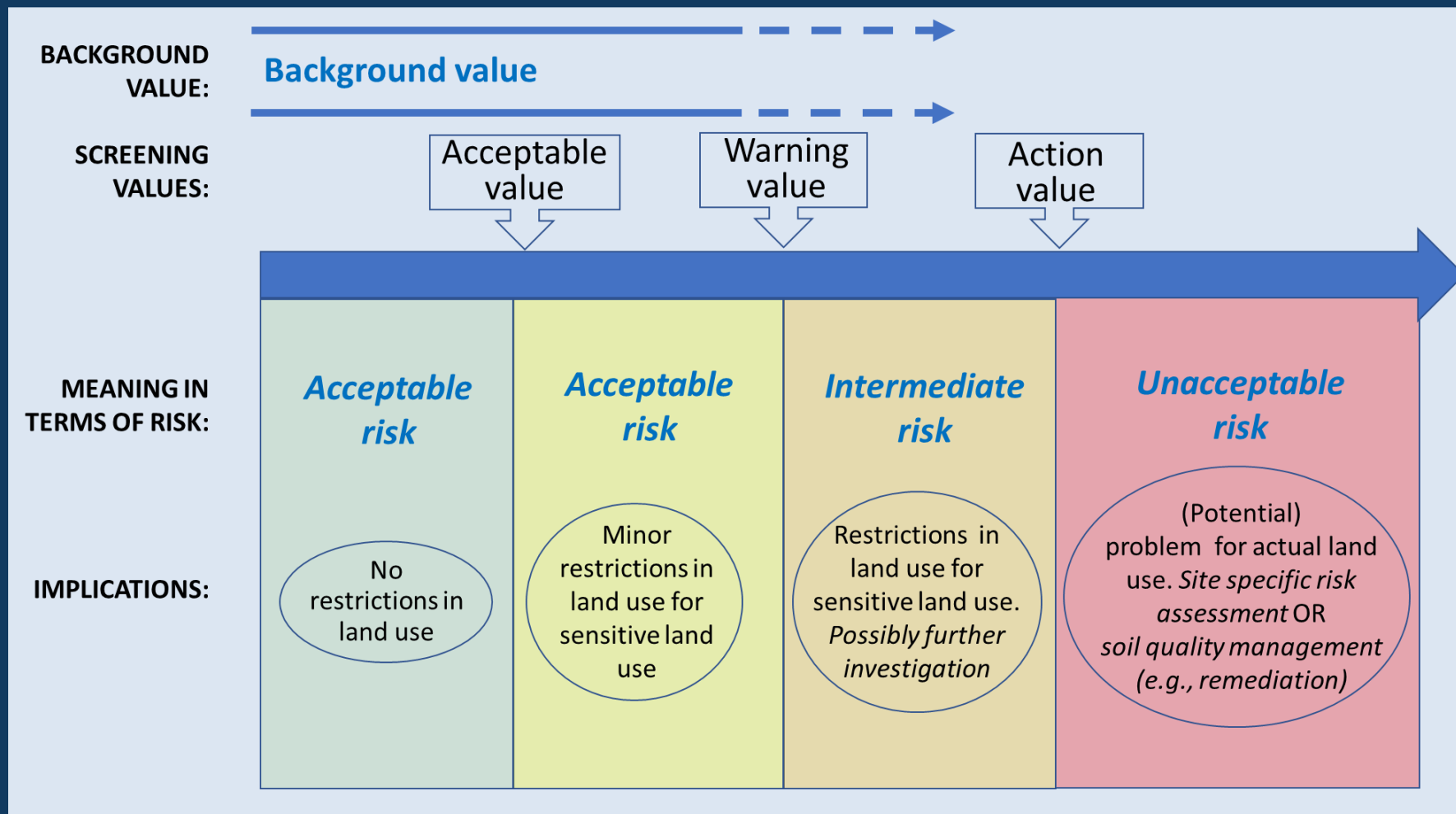
- i. chlorinated hydrocarbons (CHCs)
 - ii. mineral oil
 - iii. heavy metals
 - iv. polycyclic aromatic hydrocarbons (PAHs)
 - v. phenols
 - vi. cyanides
 - vii. aromatic hydrocarbons (BTEX: benzene, toluene, ethyl benzene, and xylene)
 - viii. others
- 60% of polluted sites

Questions: relevance of substances in soils? Dynamics? Priority substances?



Challenges and steps to improve LSI003

Harmonization: sites are identified based on different criteria



Conclusions

- Indicator *LS1003* is the only EU-wide (+neighbors, EEA-38) repository of information about contaminated sites
- The indicator can be somewhat updated using the 2016 questionnaire, but improvement of its content is developing this indicator as a monitoring instrument under the currently evolving policy frameworks
- A policy process may then support countries in further improving their detection, monitoring, and remediation activities
- Overview of challenges
 - Data from questionnaires are static
 - Large inconsistencies and gaps (definitions, statistics)
 - Revise list of polluting activities, address brownfields
 - Develop priority list of substances
 - Discuss harmonization: risk assessment and screening values (status quo: Romkens and Swartjes 2021)

