



Regionernes Videncenter
for Miljø og Ressourcer

Common Forum
Bilbao,
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Identifying and remediating contaminated sites/land ways forward to revise our approaches

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Do we need (yet) another approach - part 2 – continued from Stockholm? – is contaminated site management useful?

1. Does the public get the protection it expects?

2. Has the task expanded beyond solvability?

3. Is the challenge too complex?

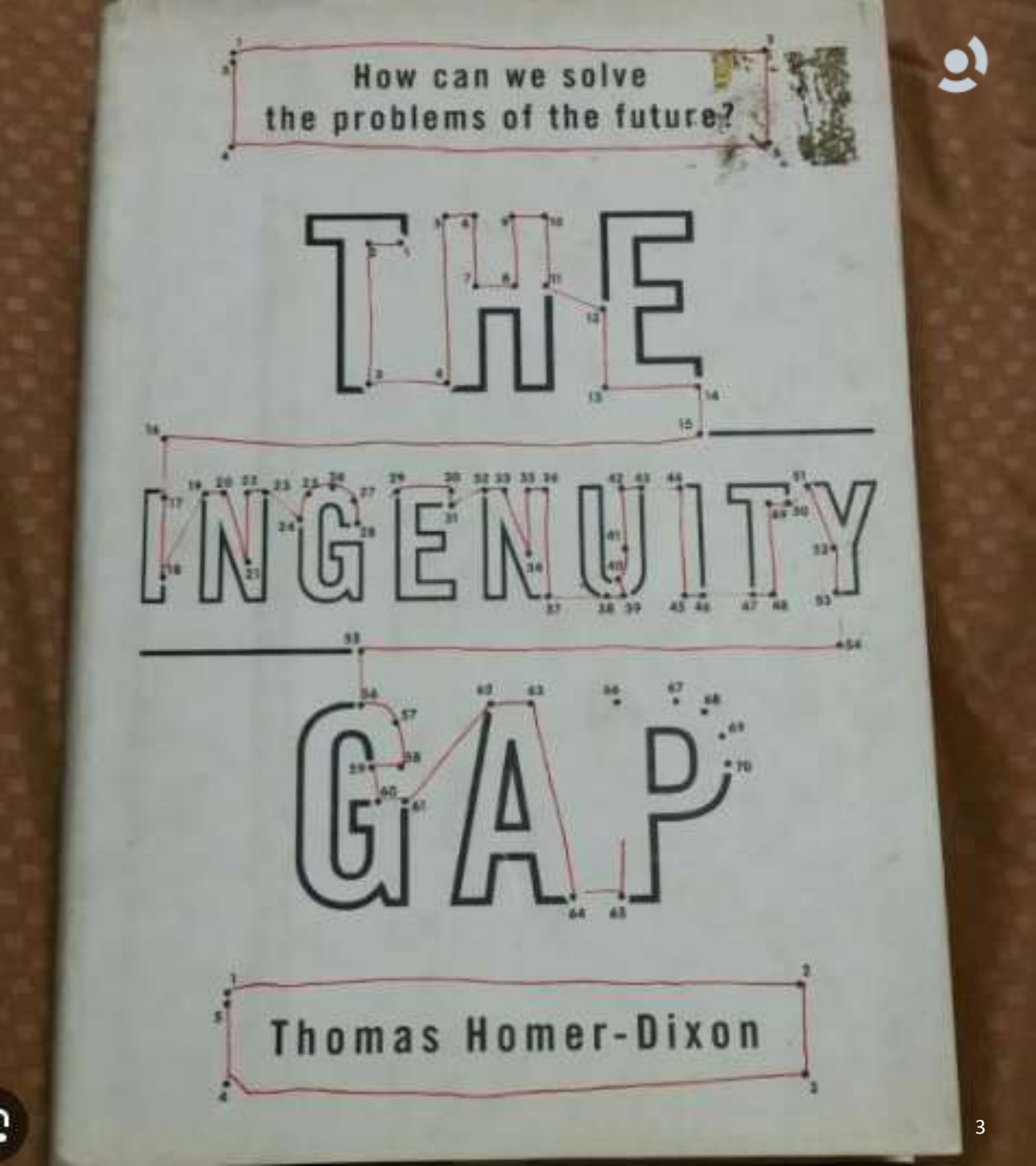
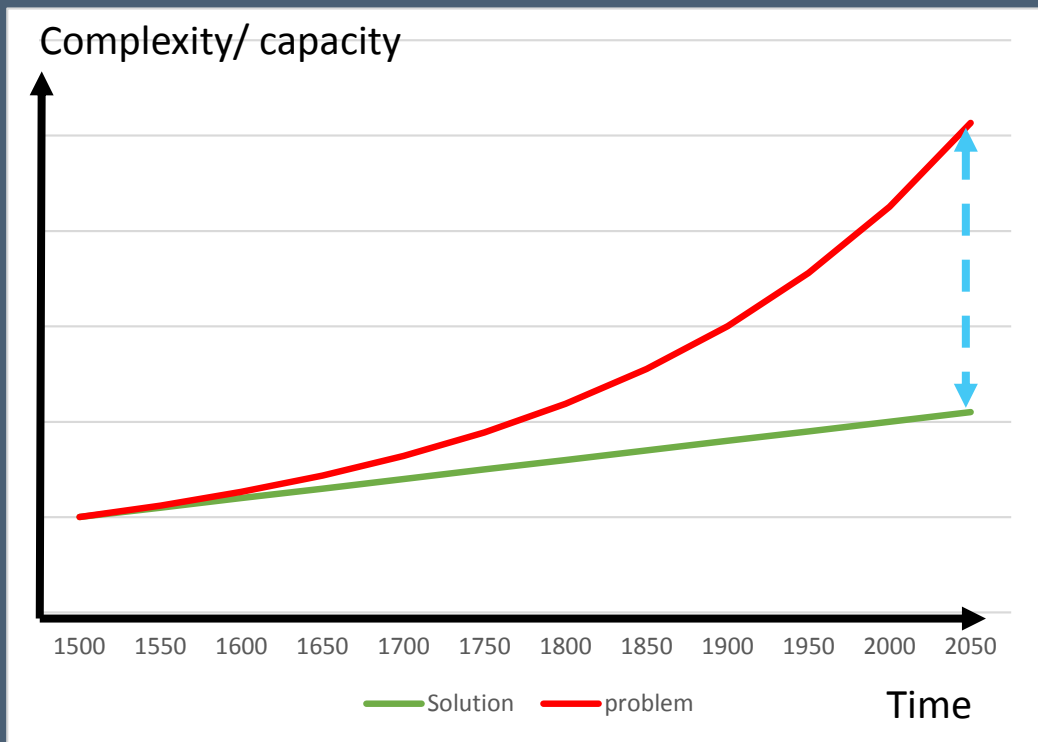
4. Has the task become circular?

Back drop in Denmark:

- 25 years with the contaminated land act
- € 1 billion spend on public program last 20 years
- the task keeps growing
- time to revisit the legal framework?

Why this talk will be less interesting

The complexity of our problems grows exponentially, our capacity to solve them grows linearly



...and less satisfying

Sounds good
and is almost always wrong.
Complex problems almost
always have complex
solutions.



IMPLEMENT

CONSULTING GROUP_

**PROBLEMS CAN BE
COMPLICATED –
SOLUTIONS CANNOT**

Introduce simple solutions to complex problems



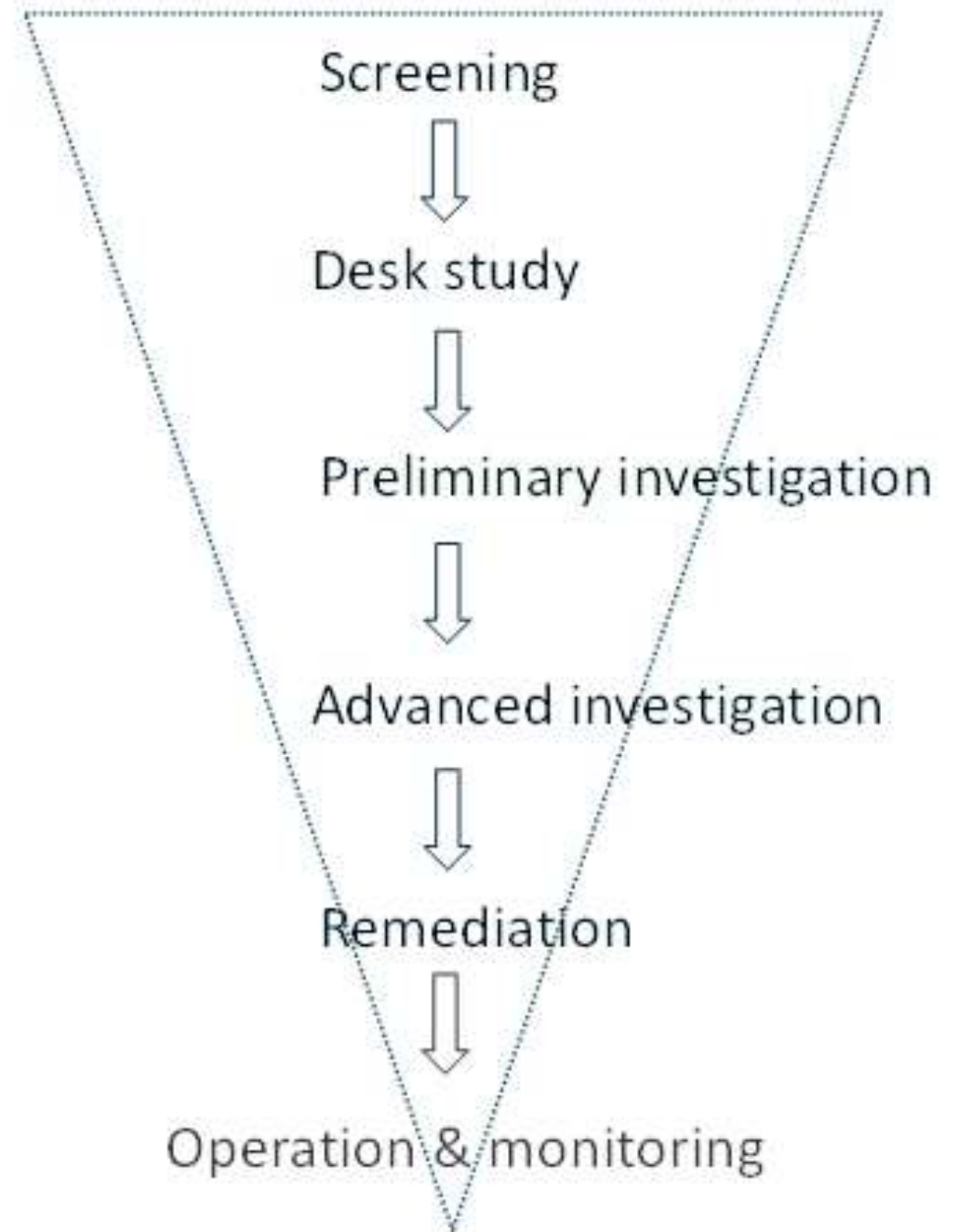
Do we need (yet) another approach - part 2 – continued from Stockholm?

- 1. Does the public get the protection it expects?
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4. Has the task become circular?

Seen differently by site managers
and program managers

Most indicators are designed for the
linear approach

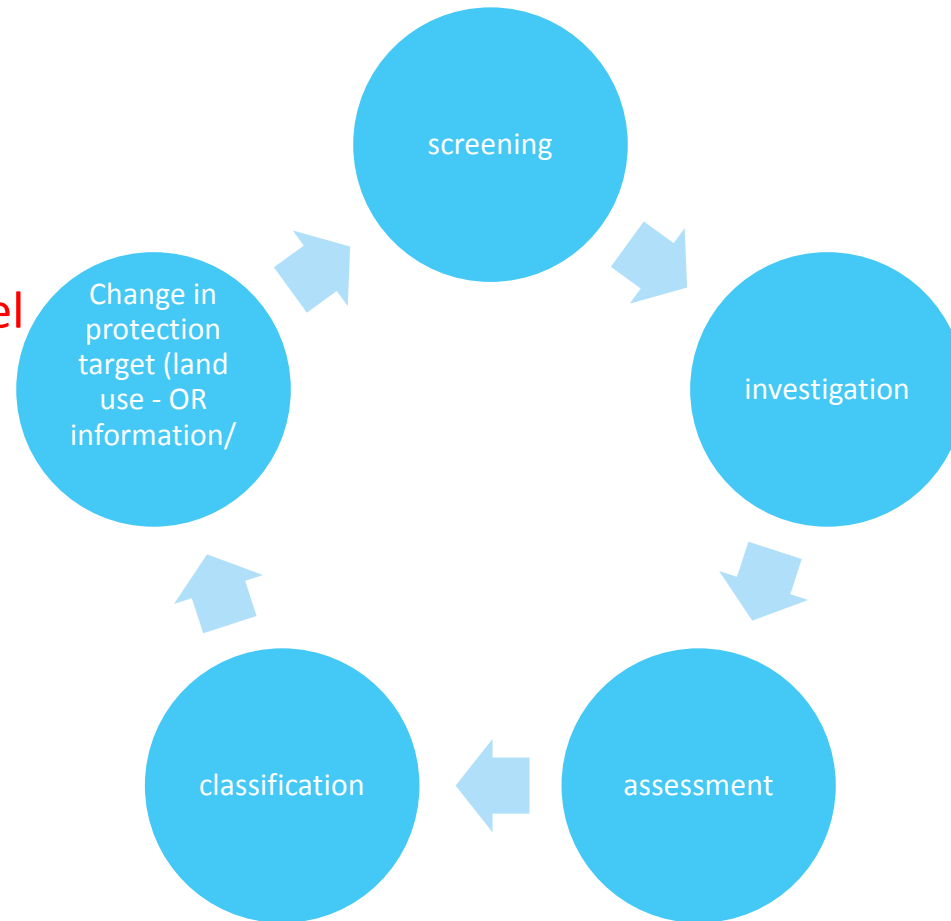




Keep voluntary private separate from public program

A circular approach is a consequence of:

- Fit-for-use principle
- Risk based approach
- Circular economy
- **Increased information level**



Circularity will primarily apply to the voluntary private projects

Benefit:
Focusing & economizing

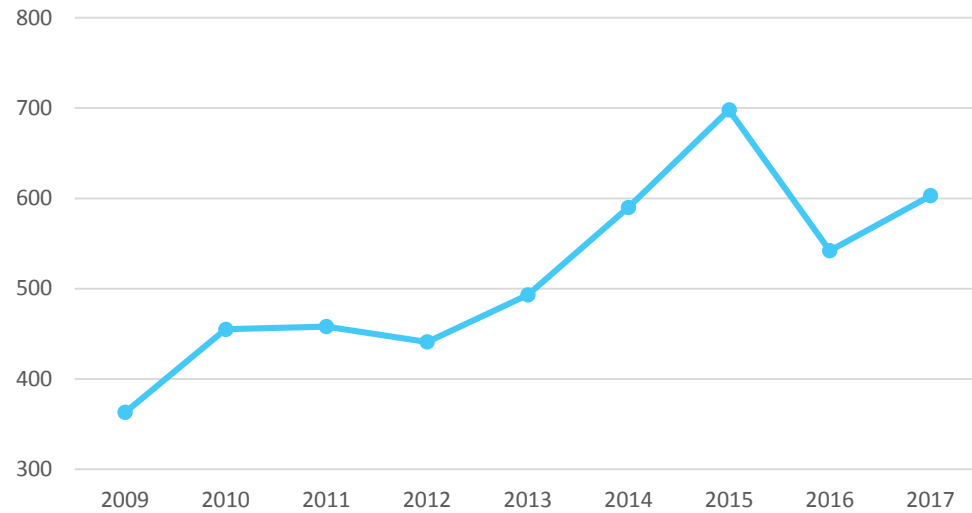
Draw back:
Perpetuity, complexity,
less robust classification

Challenge:
Stability
Trust ?
Success criteria?

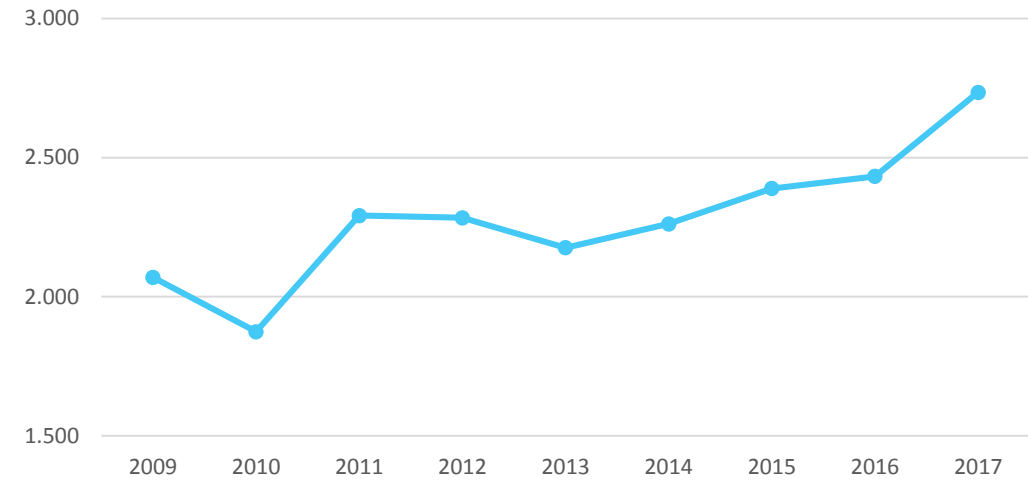


Some performance indicators for perpetual management

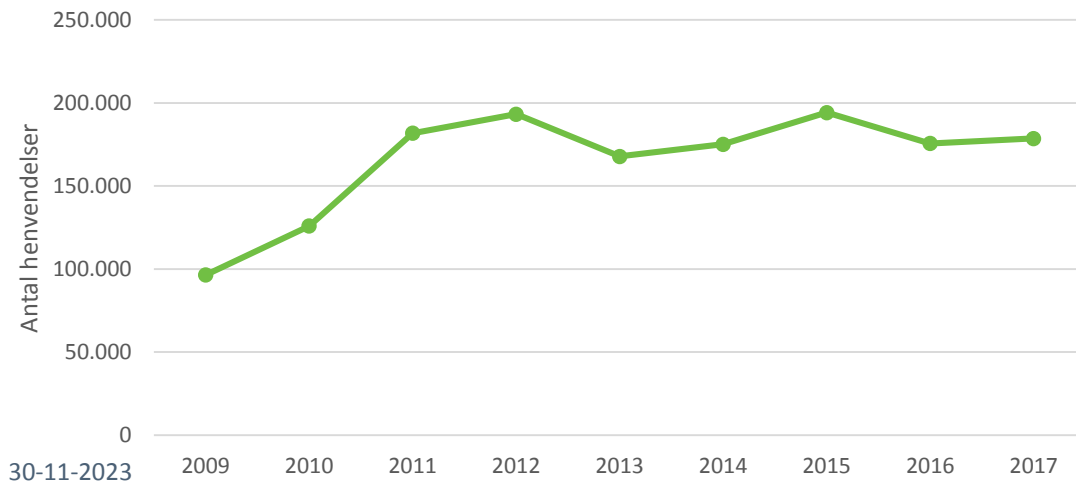
Permits for landuse change on cont. sites



Privately financed investigations and remediation

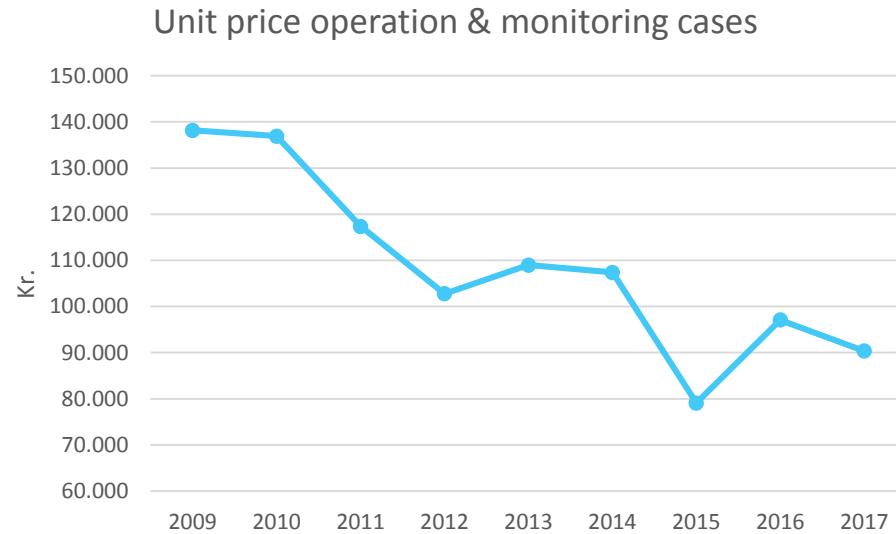


Citizen enquiries (mostly certicates)





Some performance indicators for public program perpetual operations



Some performance indicators for public program progress

Cumulative number of

- site investigations
- assessments
- remediations
- sites removed from inventory



3. Is the challenge too complex?

- Combined sources (qualitative)
- New data (quantitative)

Point
sources

Diffuse sources

Non-point
sources



Multiple sources and background levels

Guideline values and cut-off criteria should be established with respect to

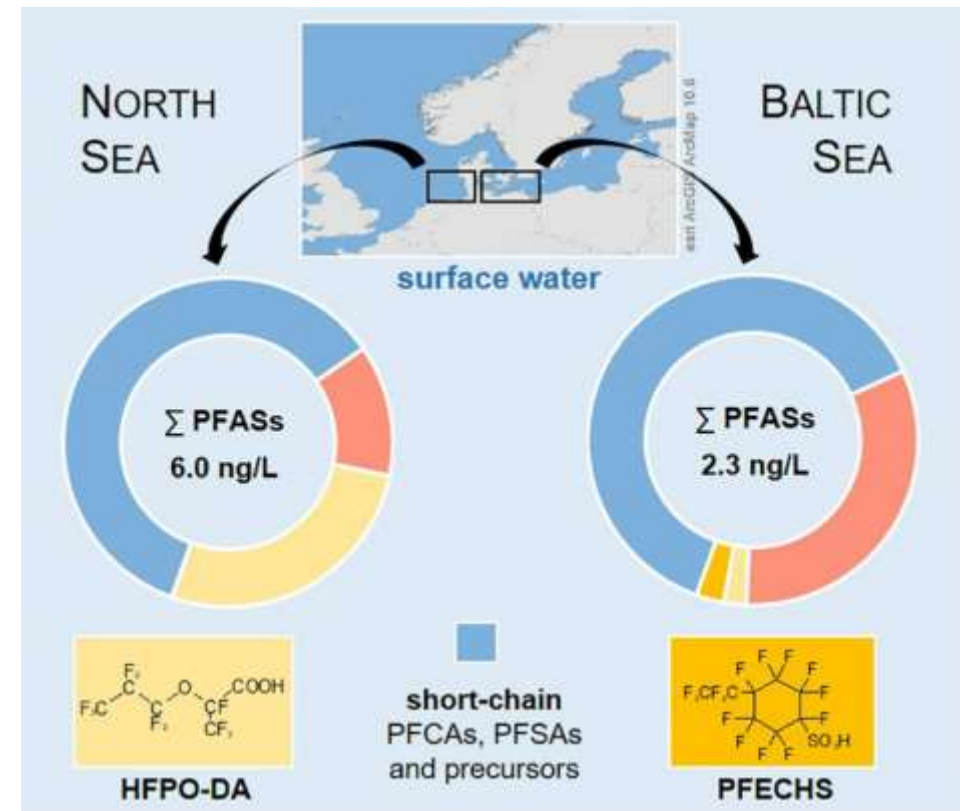
- Natural as well as anthropogenic background values 1), 2)
- Supplementary and comparable risk acceptance 3), 4)

1) Sweden – guideline in impact assessment <https://www.naturvardsverket.se/om-miljoarbetet/styrmedel/samhallsekonomiska-analyser/> and application guidelines at values for lead

2) Flanders, 3M surroundings, presented in Stockholm 2023

3) Jussi Reinikainen, How does EU's policy framework tackle prevention and management of PFAS pollution?, AquaConsoil 2023: "Huge variability between different PFAS thresholds values, including their level of health protection, even in similar contexts (e.g. fish consumption)"

4) Inspiration from ALARA principle applied by EUC and WHO to food criteria: guideline values set to upper 5 percentile of values found





Complexity derived from shifting to a circular economy ¹⁾

Class I recycled building material (RC-1) ¹⁾									
Installation methods	Property of the groundwater cover layers								
	Outside of water protection areas			Within water protection areas					
	Unfavourable	Favourable		Favourable				Water protected	
		Sand	Clay, silt clay	WSG III A= RBC III=	Clay, silt clay	Sand	Clay, silt clay	WSG III B= RBC IV=	Sand
1=	2=	3=	4=	5=	6=	7=	8=	9=	
1=	+	+	+	+	+	+	+	+	+
2=	+	+	+	+	+	+	+	+	+
3=	+	+	-	-	-	+	+	-	-
4=	+	+	+	+	+	+	+	+	+
5=	+	+	+	+	+	+	+	+	+
6=	+	+	+	+	+	+	+	+	+
7=	+	+	+	+	+	+	+	+	+
8=	+/-	+	+	+/-	+	+/-	+	+	+
9=	+	+	+	+	+	+	+	+	+
10=	+	+	+	+	+	+	+	+	+
11=	+	+	+	+	+	+	+	+	+
12=	+	+	+	+	+	+	+	+	+
13=	+/-	+/-	+	+/-	+/-	+/-	+/-	+/-	+
14=	+/-	+/-	+	+/-	+/-	+/-	+/-	+/-	+
15=	+/-	+	+	+/-	+	+/-	+	+	+
16=	+/-	+	+	+/-	+	+/-	+	+	+
17=	+/-	+	+	+/-	+	+/-	+	+	+

1) Permissible when chromium, total, ≤ 110 µg/l and PAK₁₅ ≤ 2.3 µg/l ²⁾
2) Permissible when chromium, total, ≤ 15 µg/l, copper ≤ 30 µg/l, cadmium ≤ 50 µg/l and PAK₁₅ ≤ 0.5 µg/l ³⁾
3) Permissible when vanadium ≤ 35 µg/l and PAK₁₆ ≤ 2.7 µg/l ⁴⁾
4) Permissible when vanadium ≤ 90 µg/l

Suitability of the recycled materials

Parameters	Dimension	RC-1	RC-2
pH-value		6-13	6-13
Electrical conductivity	µS/cm	2 500	3 200
Chloride	mg/l		
Sulphate	mg/l	600	1 000
Fluoride	mg/l		
DOC	mg/l		
PAK ₁₅	µg/l	4.0	8.0
PAK ₁₆	[mg/kg]	10	15
Antimony	µg/l		
Arsenic	µg/l		
Lead	µg/l		
Cadmium	µg/l		
Chrome, total	µg/l	150	440
Copper	µg/l	110	250
Molybdenum	µg/l		
Nickel	µg/l		
Vanadium	µg/l	120	700
Zinc	µg/l		

Material values for regulated substitute building materials

29.11.2022
Joint Workshop NICOLE - Common Forum
11

1) Example on decision key for material containing Chromium, Joerg Frauenstein, UBA, Athens 2022, on the German Substitute Building Materials Ordinance



New compounds, new TOX models

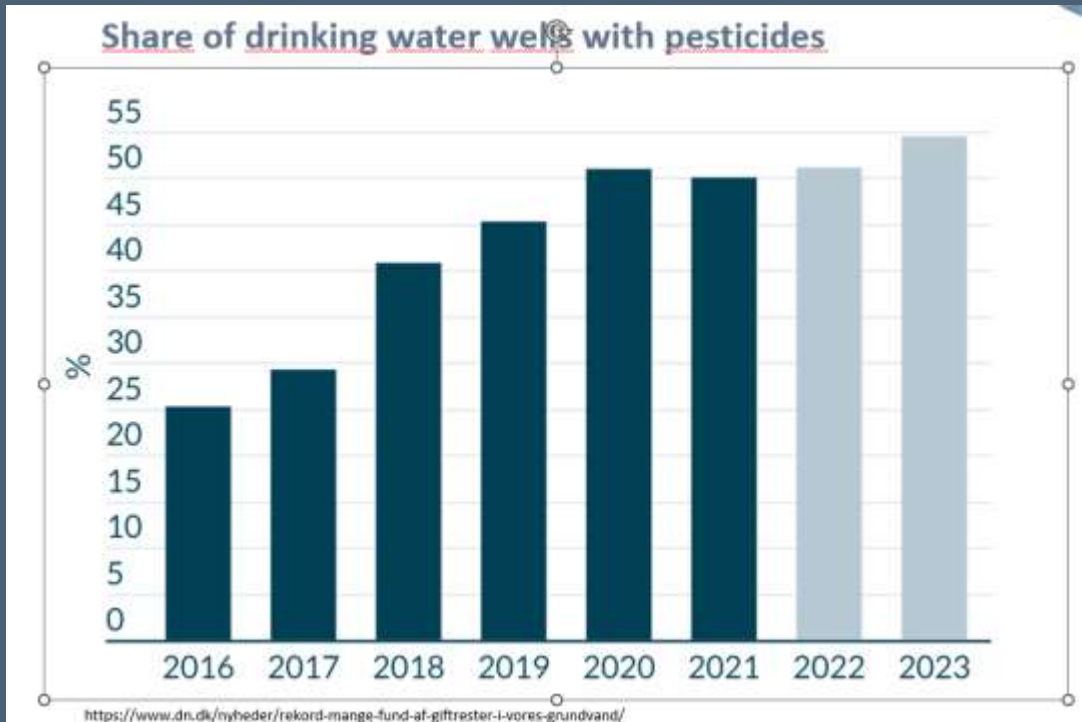


Non-targets analysis identifies
400+ chemicals in three ordinary
drinking water wells

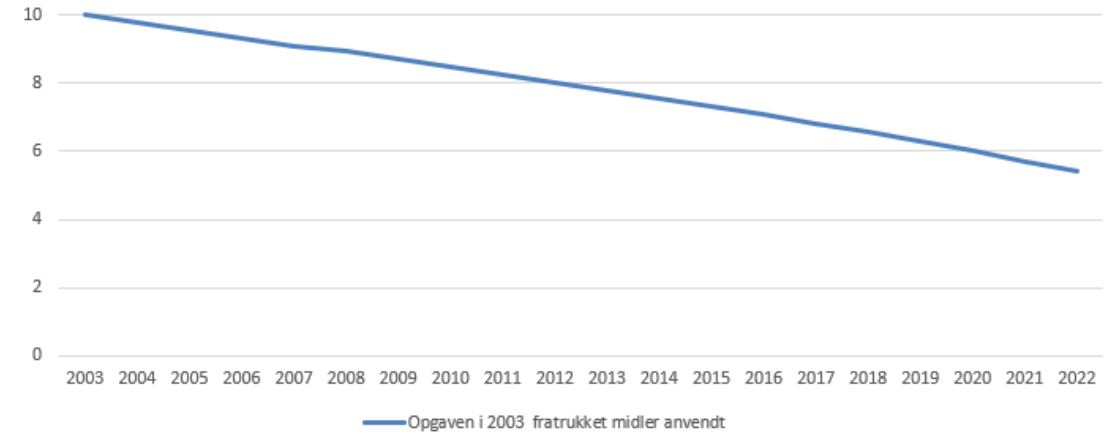
Measurements reveal more than 400 different chemicals in water from a single Danish waterworks. Several of the compounds can have adverse health effects. According to the University of Copenhagen analytical chemists behind the study, monitoring needs to be broader and not solely focused on PFAS and pesticides. The techniques to do so already exist.

- PMT modelling in place of guideline values
- Even larger databases

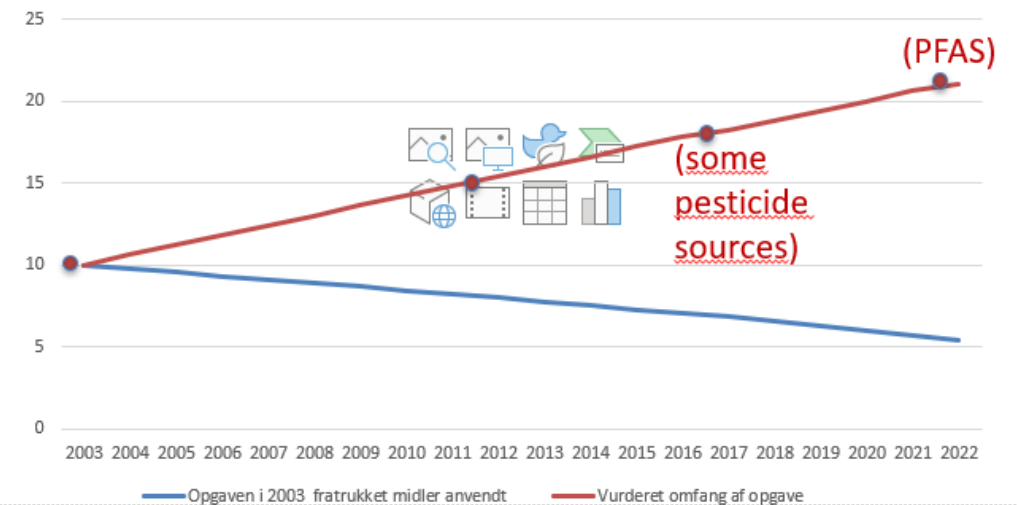
2. Has the task expanded beyond solvability?



Estimated total cost of site management targeted groundwater in 2003 reduced by the annual amount invested (billion DKK)



...and compared to the development of the estimated total cost of site management (bill. DKK)





How to narrow and focus the scope

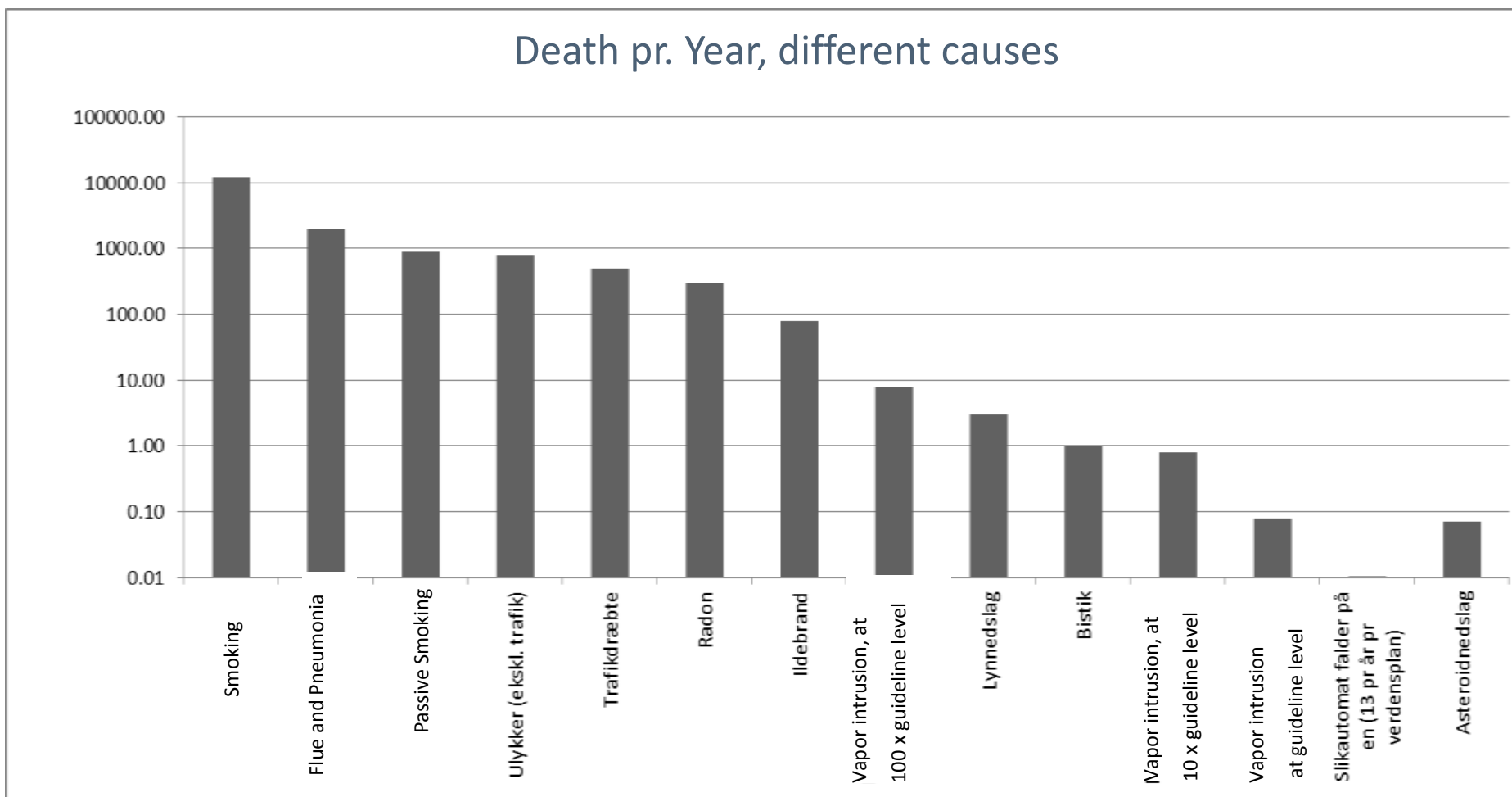
In a legal revision the precautionary principle should be weighted against

- Principle of proportionality (not the EU definition)
- Principle of sustainability (sustainable remediation)
- Regards to circular economy (further re-use of land and soil)
- Regards to total exposure from alternate sources (directing investments to where they yield the highest)

Possibly a unique challenge to Denmark and Flanders:
very limited objective landowner responsibility is an
expensive policy choice.

1. Does the public get the protection it expects?







Differences in risk perception

- Natural risk \neq anthropogenic risk
- Self inflicted risk \neq imposed risk
- Safety levels (UF1 x UF2 x UF3)
- Cost of action vs. cost of in-action
- No political desire for facing a trade-off

Vapor intrusion accept levels in DK

Radon: 1 /10.000 additional

life-time cancer deaths

TCE: Radon: 1 /1.000.000

additional life-time cancer deaths

Prioritization in risk classes is the pragmatic choice



How to make contaminated site management useful?

- **Has the task become circular**
 - Private voluntary: yes. Separate indicators.
 - Public: no but some iterative and perpetual characteristics. Need for new indicators.
- **Is the challenge too complex?**
 - A need to reduce complexity to what we can actually address
 - Large data libraries and management inevitable
 - A shift to modelled toxicity
- **Has the task expanded beyond solvability?**
 - Need for legal revision – especially countering the precautionary principle
 - Need to prioritize technocratically – if no political appetite
 - Super fund
- **Does the public get the protection it expects?**
 - Duty to inform, not only what we know, but also what is possible
 - Investments should be based on comparable risks i.e. food
 - Uncertainty seems the main issue