

Co-operation Canada – Netherlands

Groundwater and soil management

NETHERLANDS  PARTNERSHIP

Netherlands Soil Partnership

Establish a central point for questions and challenges on soil and groundwater issues in the chain:

- Policy
- Law enforcement
- Science
- Implementation

Canadian-Dutch program next 3 years

- Organize public-private knowledge and experience network between both countries
- Connect Canadian and Dutch initiatives (projects, risks toolbox, ...)
- Financial instruments on Canadian and Dutch side
- Mutual international missions feasibility studies
- Focussed co-operation in the chain
- Set-up of window of information
- Prepare and implement demonstration projects

DUTCH DIRT

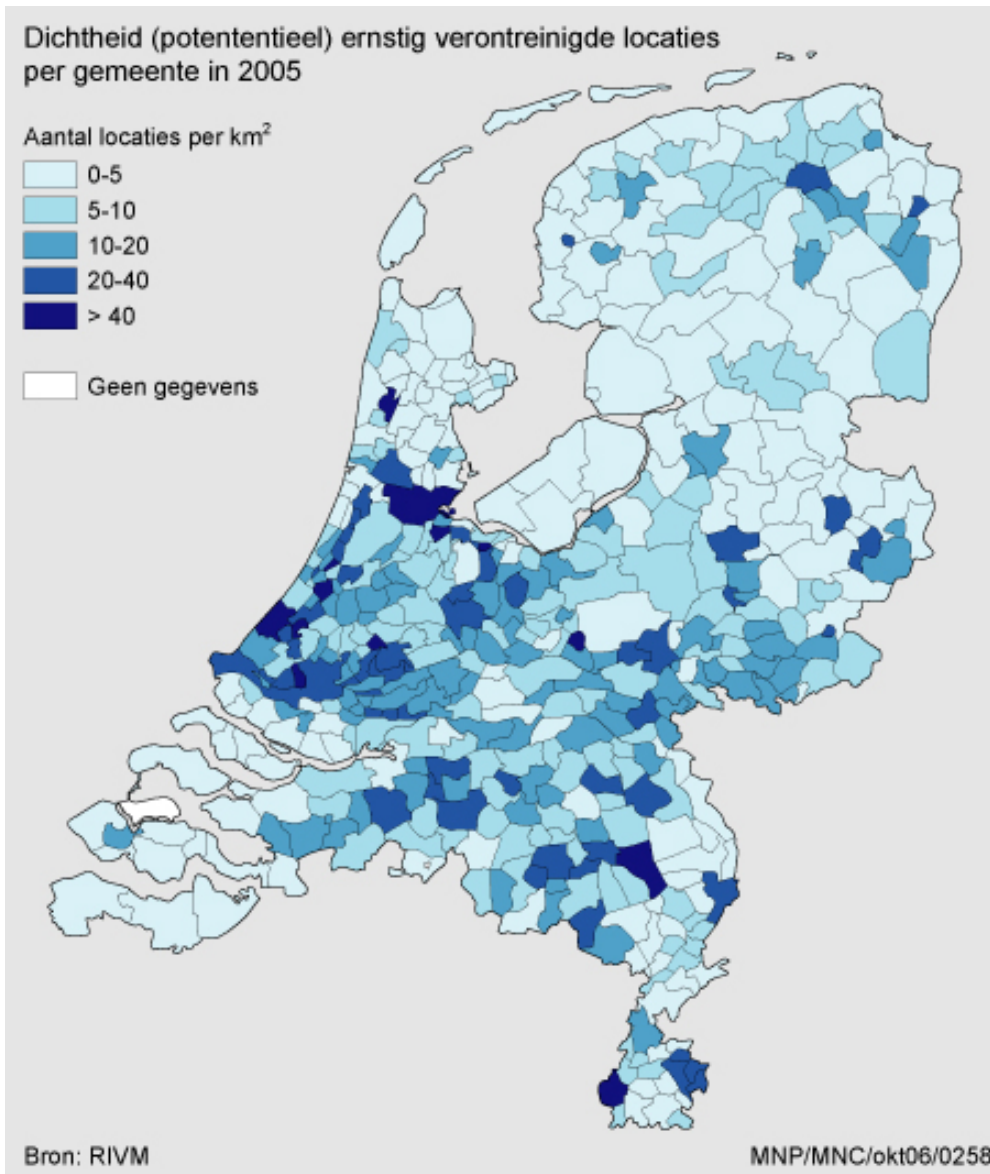
This May, **Hon Lu (TEDCO)** joined a mission on behalf of **ReNew** to report on a knowledge and experience partnership between Canada and the Netherlands for soil and groundwater technology



“One interesting difference I observed while in Holland was the intense understanding that contaminated soil was not considered a waste.” Marcia Wallace

“The shortage of soil and the limited options for landfilling make soil a valuable resource to the Dutch society”

“Soil in The Netherlands is an opportunity instead of a liability”



- Total Surface: 41.526 km²
- 450.000 sites are suspected of soil pollution
- 58.000 need remediation
- 12.000 urgent remediation (< 2015)

Brief History



- Legislation
- Inventarisation of the problem
- Remediation
- Soil Contamination perceived as risk

<1980

>1980

Lekkerkerk 1980

- No soil policy
- No funding
- No awareness



- 1983 Soil Remediation Law
- 1995 Soil Remediation in Soil Protection Law
- 2005 New Policy in Soil Protection Law
- 2007 New Policy in Soil Protection Law
- 2007 EU Water Framework Directive
- 2008 EU Soil Framework Directive (in prep.)

Why Holland In-situ Program (HIP)?



Growing attention in (sub-)urban brownfields to:

- Provide building space in a densely populated area
- 450.000 contaminated sites, 90% in urban environment

Ministry of Environment adjusted its policy for the soil remediation plan until 2030

- Adopting risk based approach: only the “immediate risk” sites to be remediated
- Risk driven clean-up plan:
 - 15.000 high priority risk sites, in 10 years
 - 60.000 risk carrying sites, in 30 years
- Shallow contamination needs to be remediated;
 - Targets made flexible (land use, costs and risks)
 - Industrial sector oriented programs
 - From 900 to 2000 sites/yr remediated

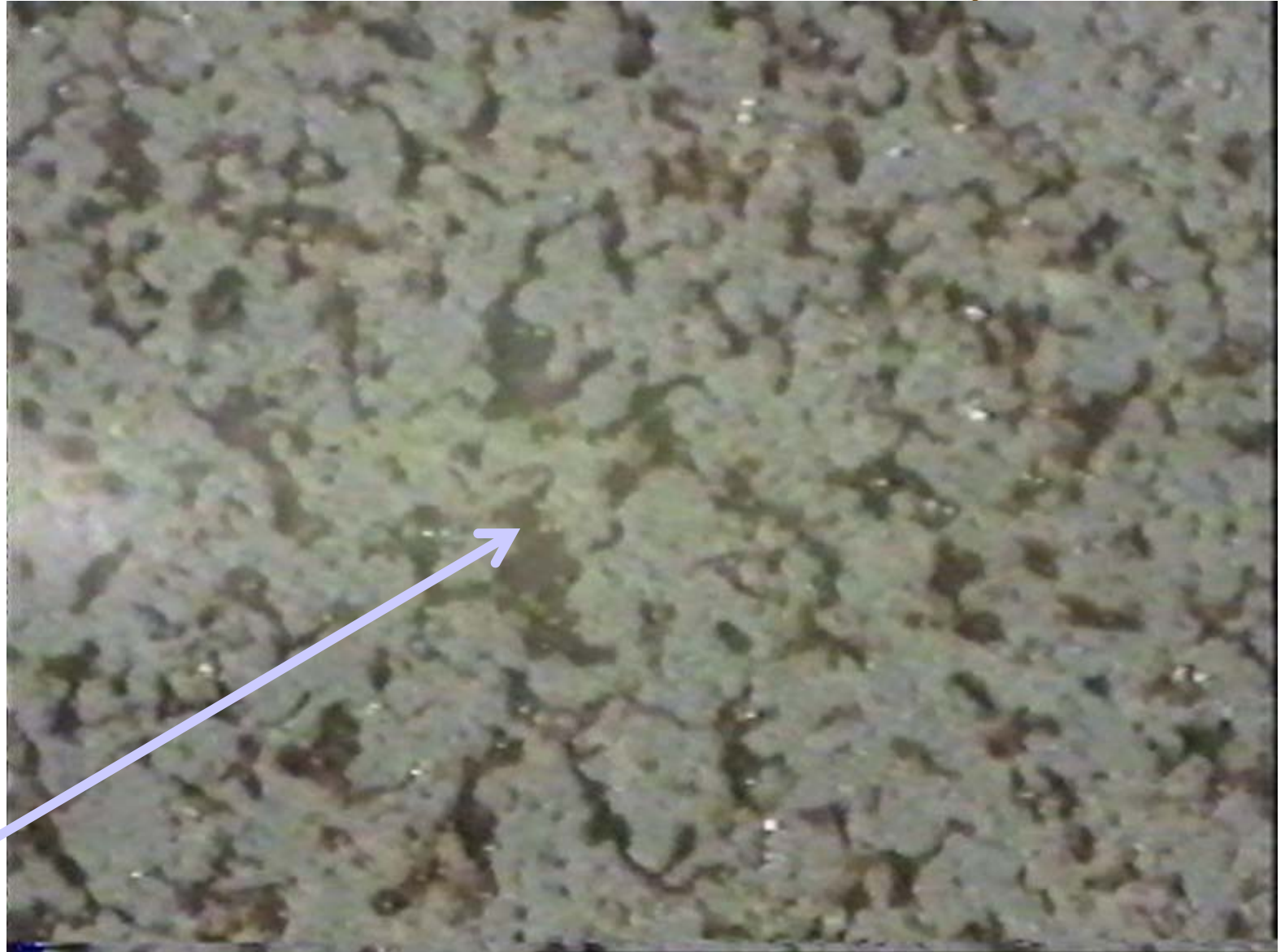
HIP setting

Bottlenecks applying in-situ techniques:

- techniques insufficiently balanced in local geo-hydrological setting
- No standardized approach to remediate common situations
- Mind set of competent authority/regulators lacks confidence in techniques:
 - “Outcome uncertain and risks difficult to manage”
 - Insufficient flexibility to deal with risks and uncertainties
 - Processes (authorisations etc.) with soil remediation too complex (many stakeholders, red tape)
 - Lack of knowledge and experience at daily practice level

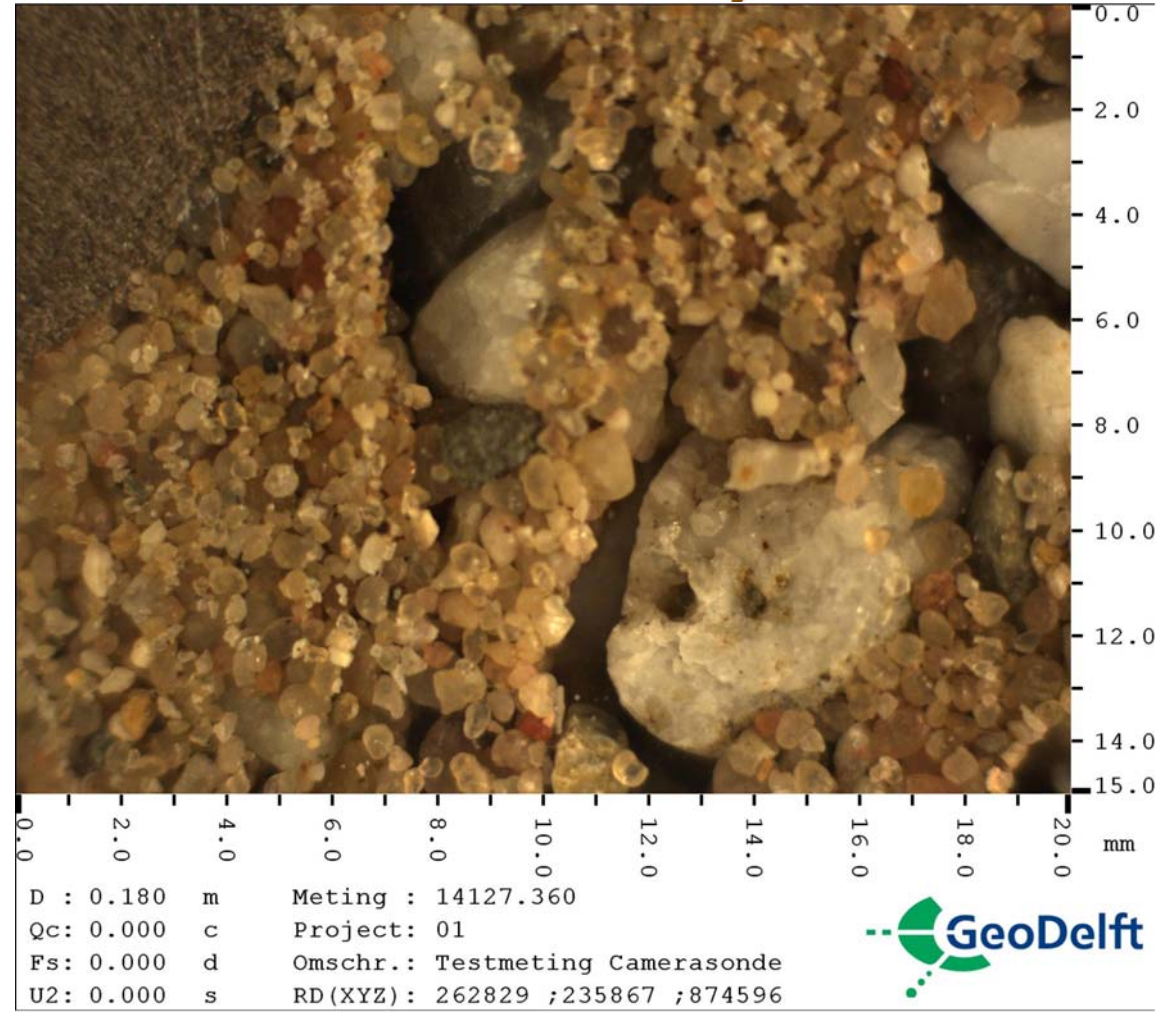
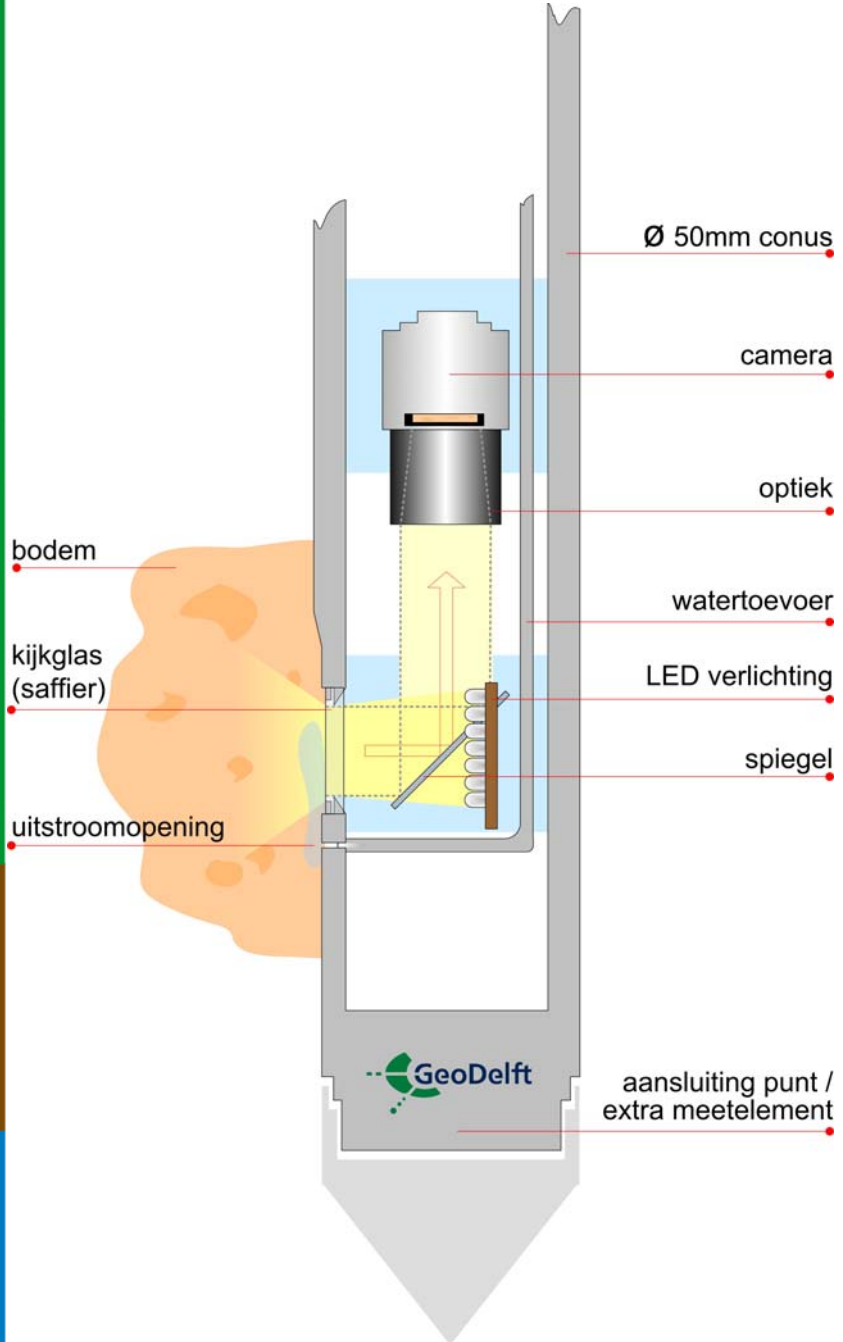
Visual detection of NAPL contamination

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creosote

Seneca will apply video probe Tool in communication



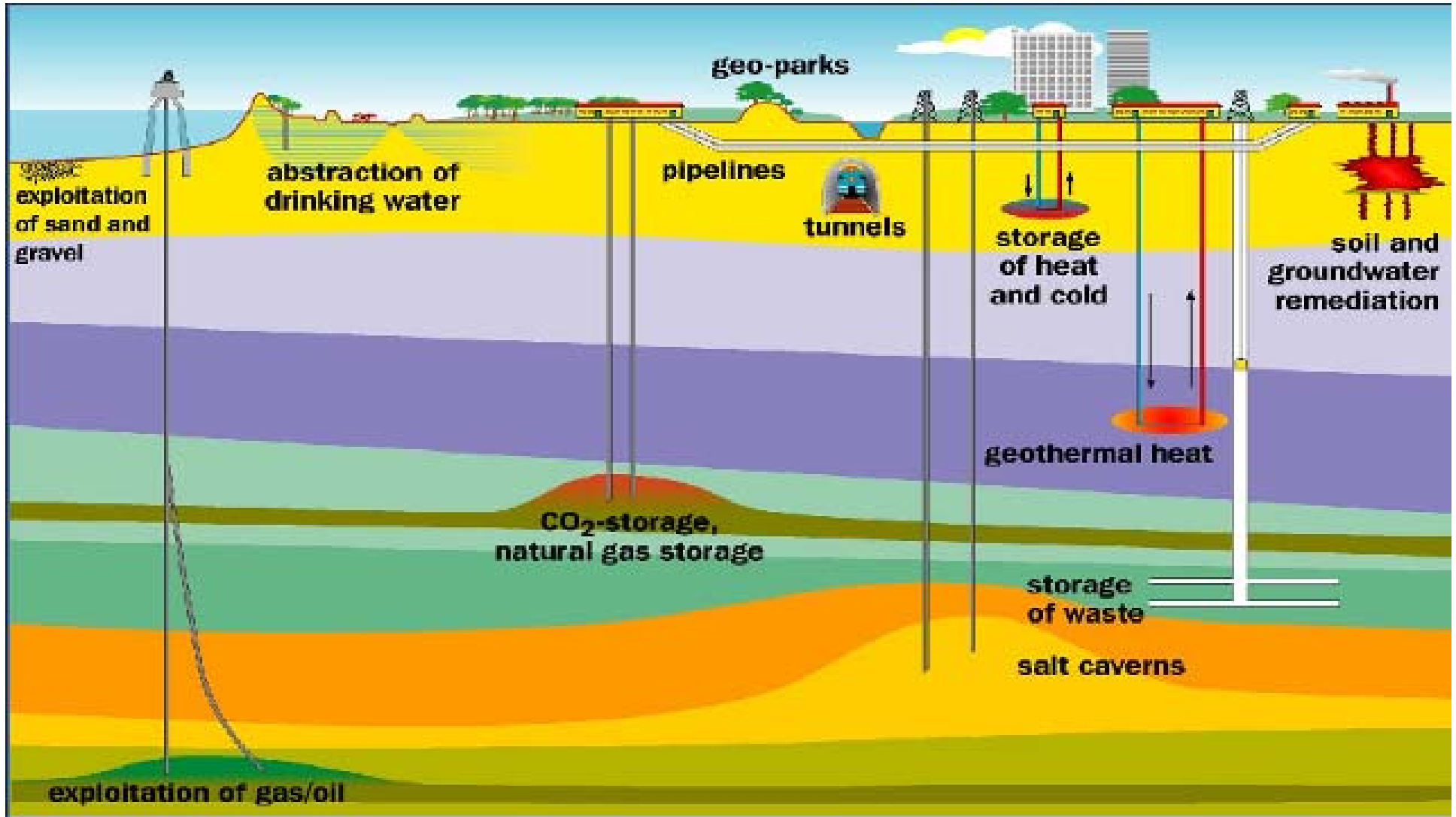
Towards reliable and accepted in-situ technologies: the “Holland In Situ Program” project (HIP).

Site Characteristics		Occurrence (% of total)
Contaminant type (C)	C.1 Chlorinated Hydrocarbons	45
	C.2 Aromatics/Oil/MTBE/Cyanide	45
	C.3 Other	10
Geo-hydrology (G)	G.1 Permeable (sandy)	45
	G.2 Layered, permeable and impermeable layers	45
	G.3 Other	10
Built Environment (B)	B.1 Urban	70
	B.2 Industrial	25
	B.3 Other	5

Archetype groups in The Netherlands

Archetype Group 1 (2500 sites)		Archetype Group 2 (2500 sites)	
C.1 Chlorinated Hydrocarbons		C.1 Chlorinated Hydrocarbons	
G.1 Permeable soil		G.2 Layered, permeable and impermeable layers	
B.1 Built Environment (Urban)		B.1 Built Environment (Urban)	
Archetype Group 3 (5000 sites)		Archetype Group 4 (3500 sites)	
C.2 Aromatic Hydrocarbons, Oil, MTBE and Cyanide		C.1 and/or C.2	
G.1 Permeable soil		G.1 and/or C.2	
B.1 Built Environment (Urban)		B.2 Built Environment (Industrial)	

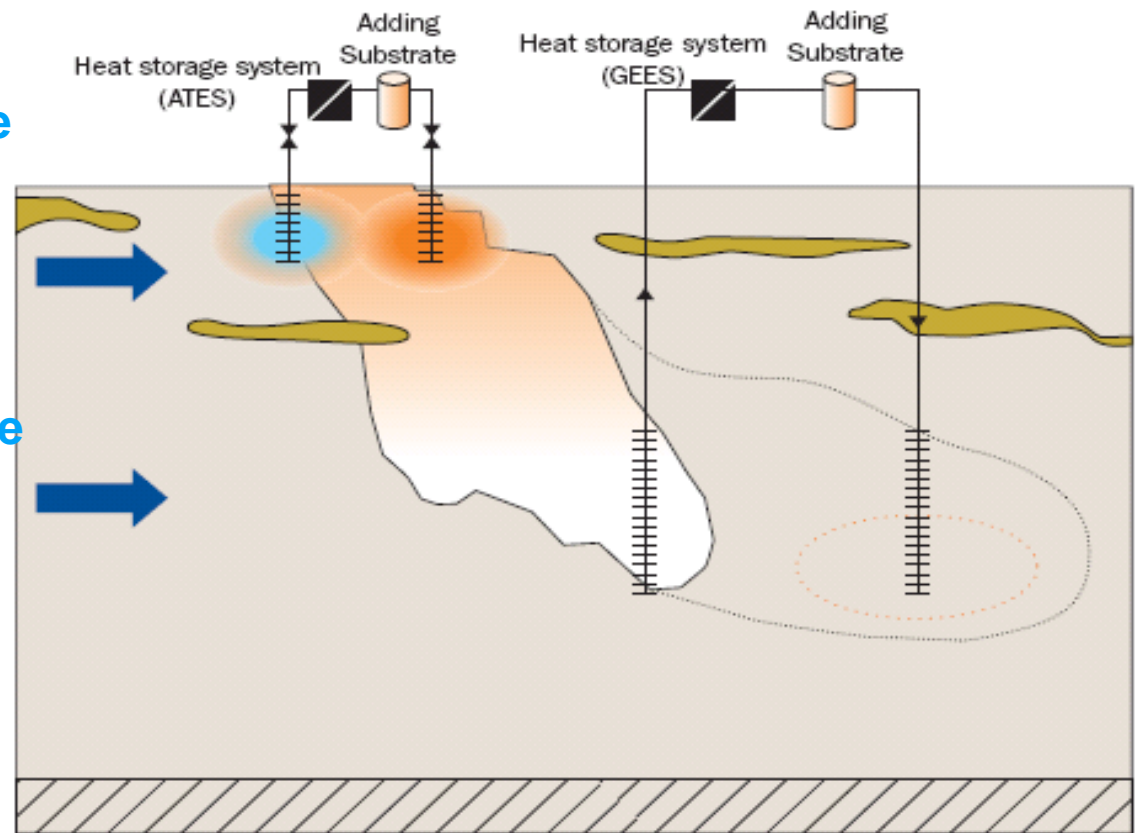
Current Subsurface Activities



Aquifer Thermal Energy Storage (ATES)

- Energy storage (heat and cold) in aquifers for climate control of buildings
- Expected growth of aquifer energy storage facilities from 900 to over 10.000 coming decades due to high energy prices
- Current research is focused on both effects and new applications:

- Combination of heat storage and groundwater remediation
- Buffering of thermal effects of cooling water discharge during warm seasons



Mega Site Approach –Rotterdam project



More Information on: <http://www.euwelcome.nl/kims/>

Water Framework Directive

WFD – Article 5: Identification of upward trends and definition of starting points for trend reversal:

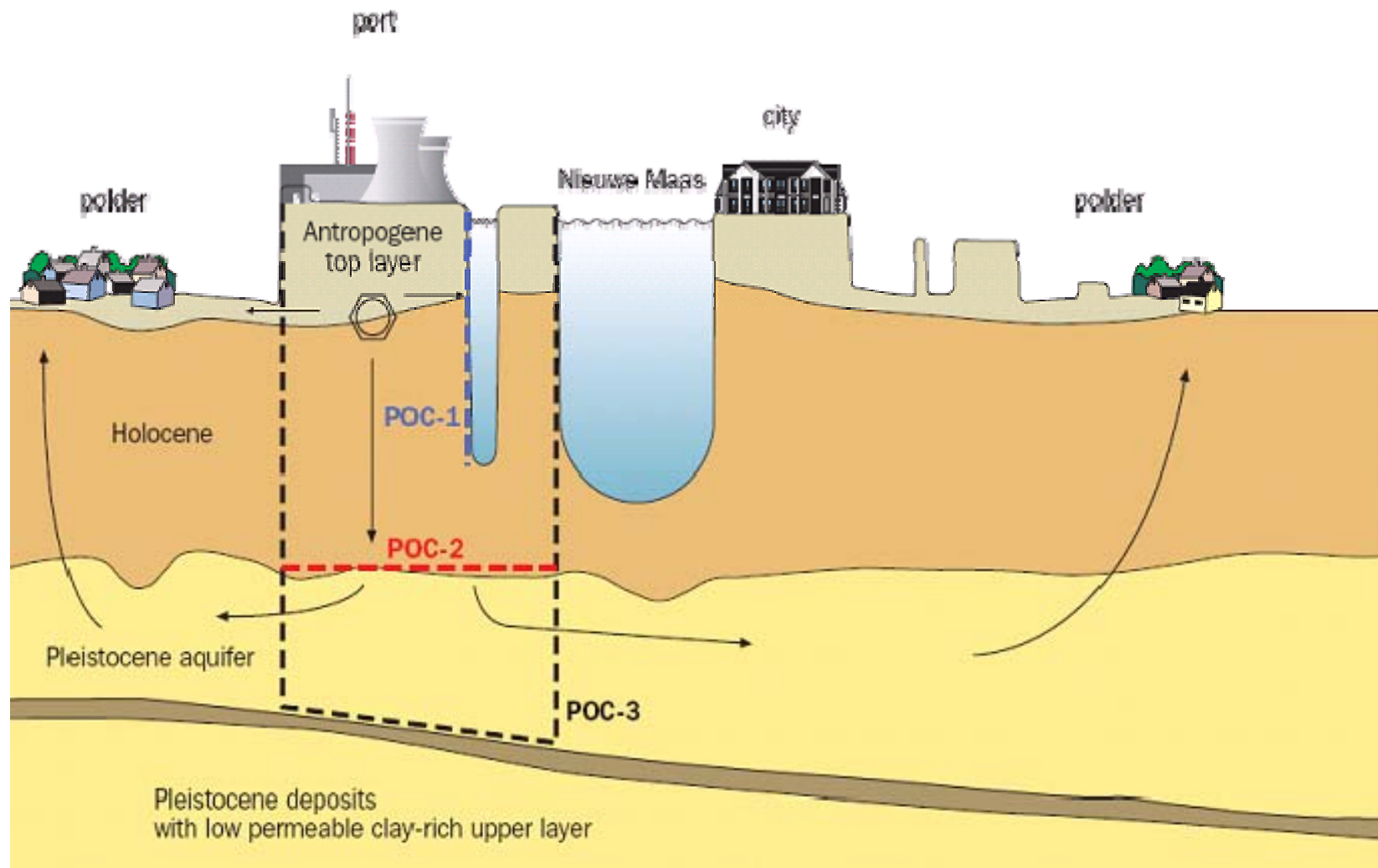
- Trend assessment for identified pollutants in order to verify:
 - No expansion
 - Do not deteriorate chemical status of the (group) of water bodies
 - No risk for human health and the environment
 - Include in River Basin Management Plans

WFD - Article 6: Measures to prevent or limit inputs of pollutants into groundwater

- Achieve the objective of preventing or limiting inputs of pollutants into groundwater, includes:
 - Program of measures
 - all measures necessary to aim to prevent inputs into groundwater of any hazardous substances.

Integrated Management Strategy

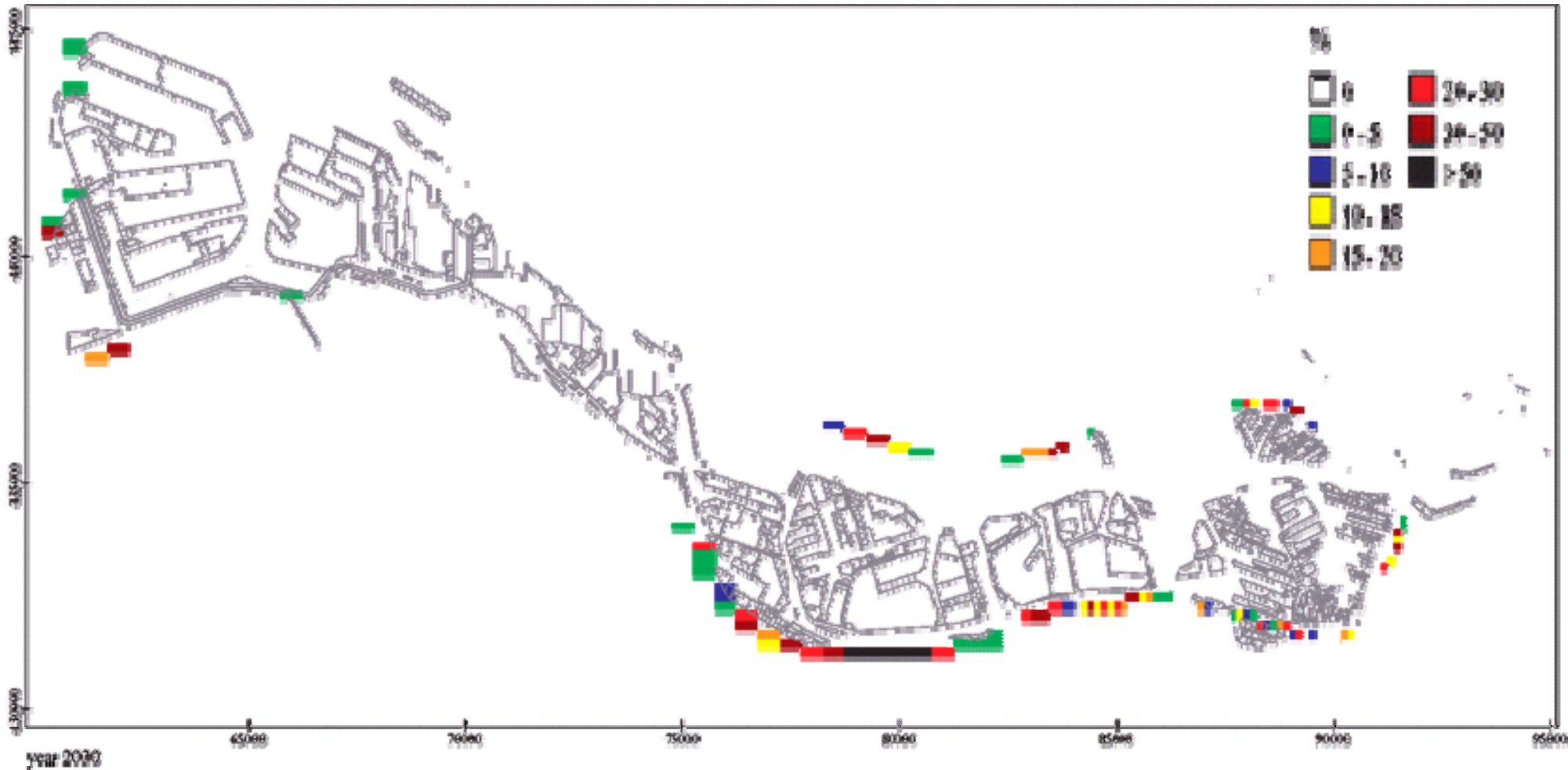
- 1 Identifying Risks (Site Characterization + Risk Assessment)
- 2 Determining the degree of contamination removal required
- 3 Selection of most cost effective scenario



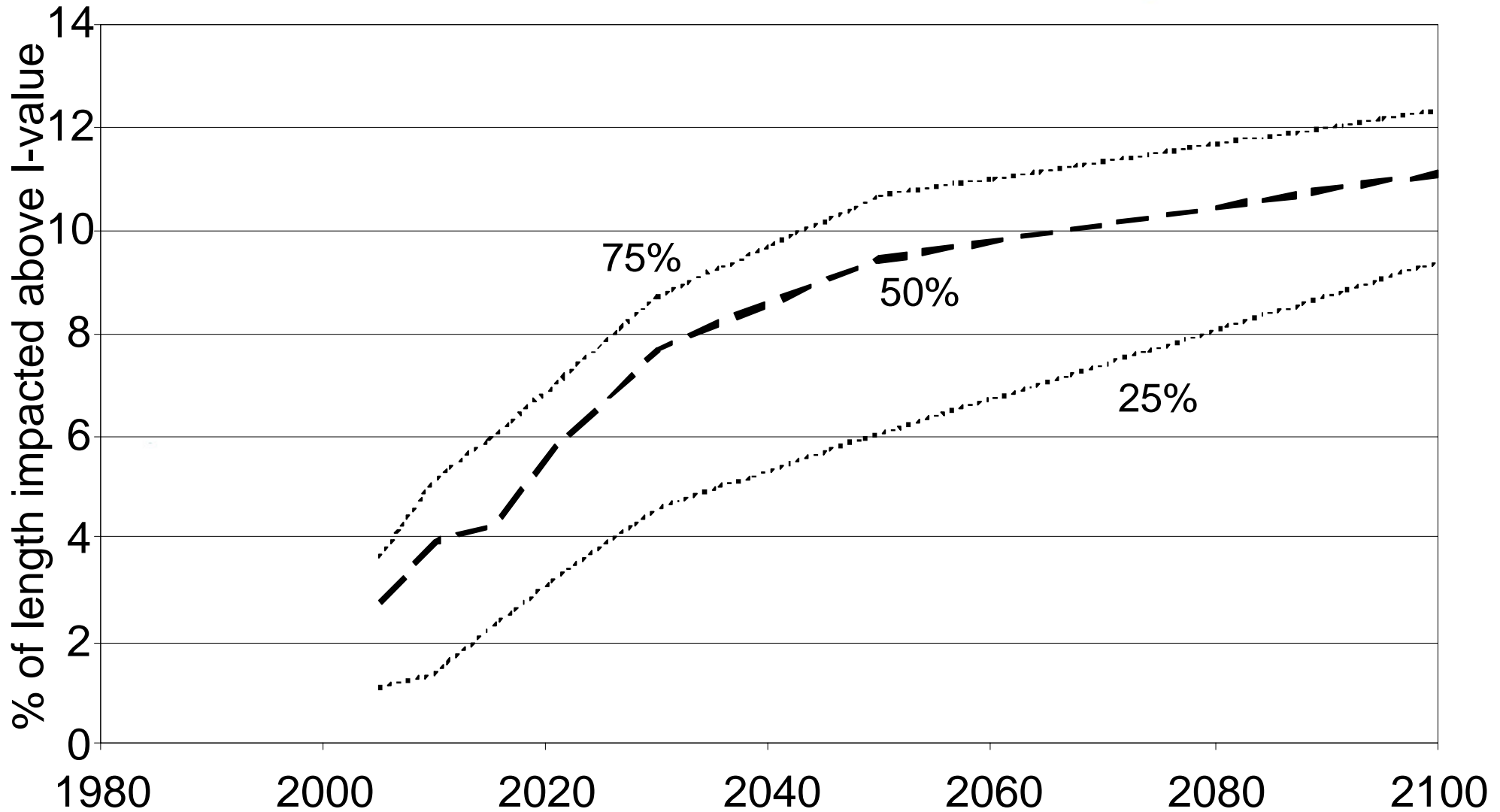


3rd plane of compliance

2030: Chance of exceeding intervention value at 3rd Plane of Compliance

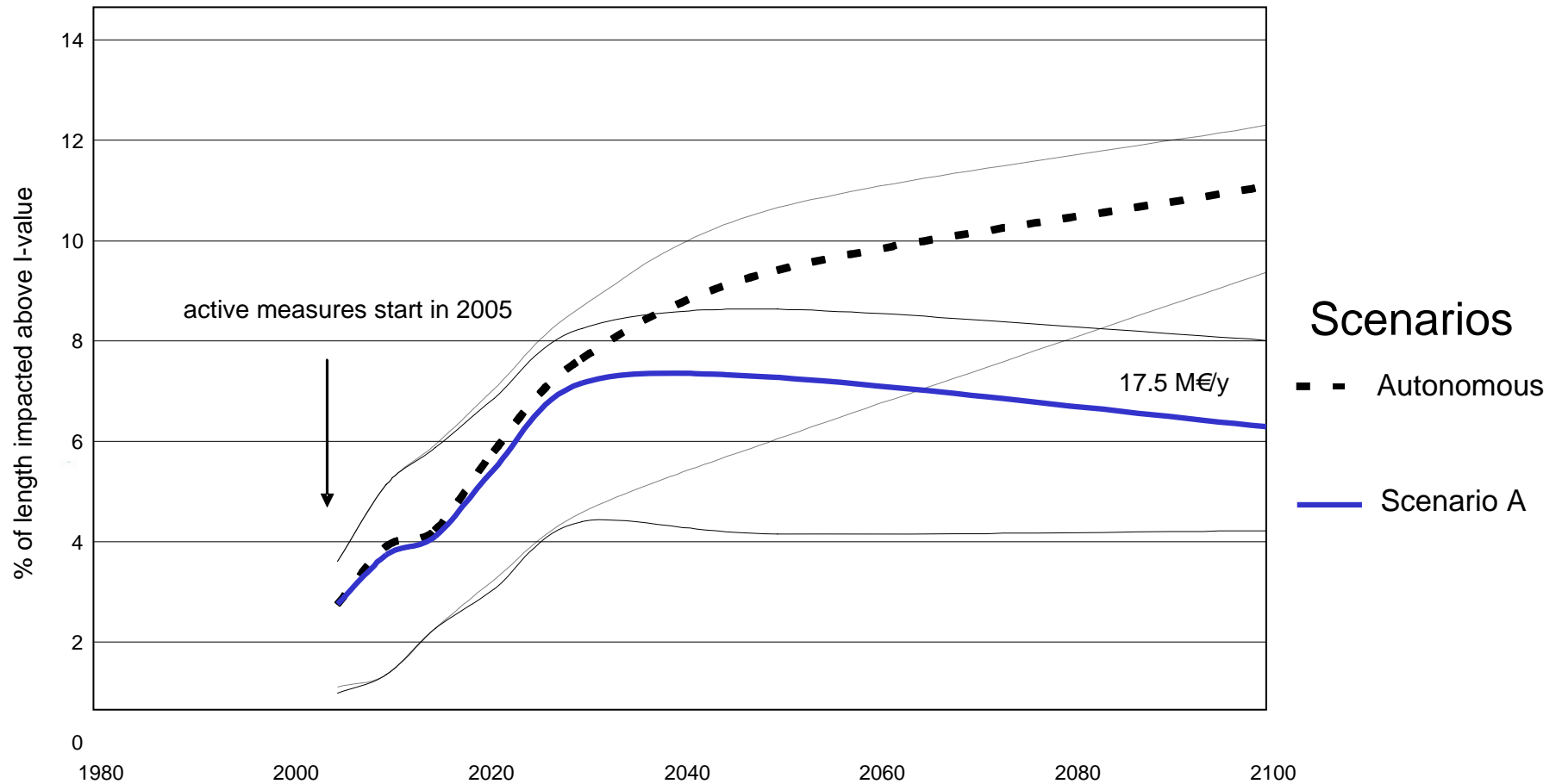


Autonomous scenario (impact on POC 3)



Scenarios for effect of risk management measures (e.g. source removal, NA, Isolation)

Effect of scenario A
(impact on 3rd plane of compliance)

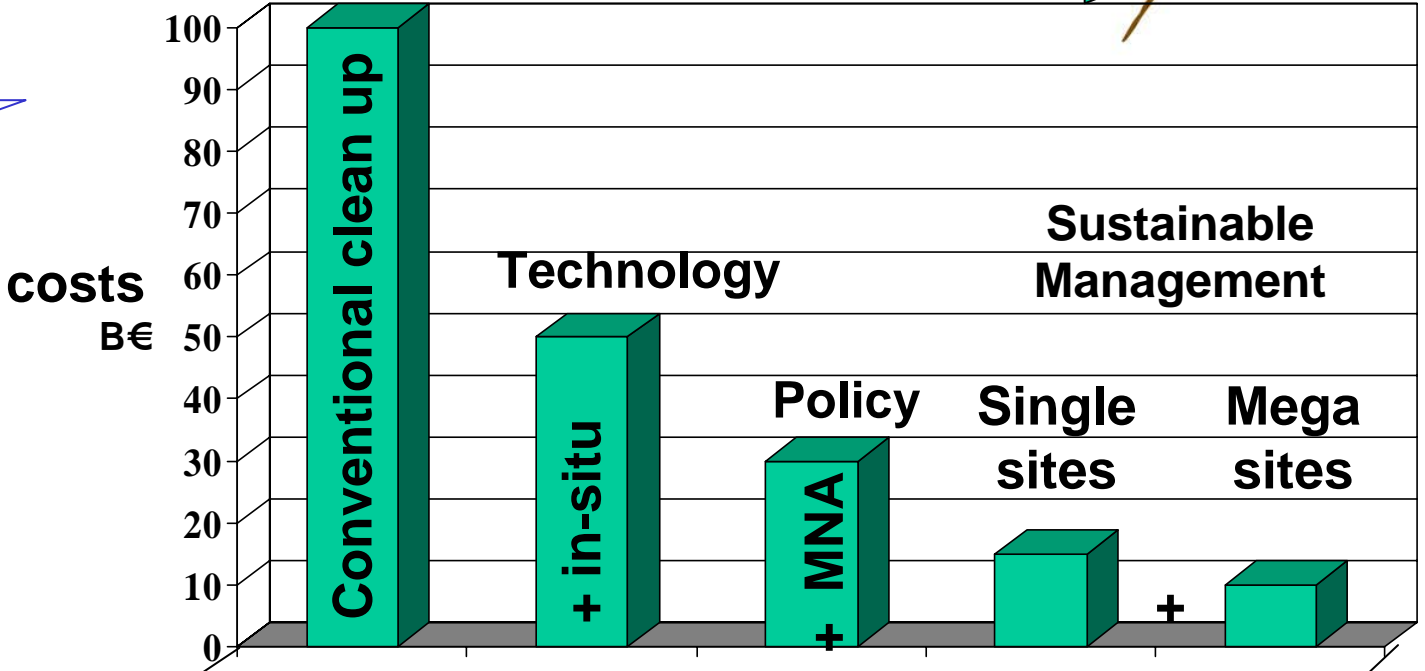


Soil and Groundwater Remediation: More than just technologies

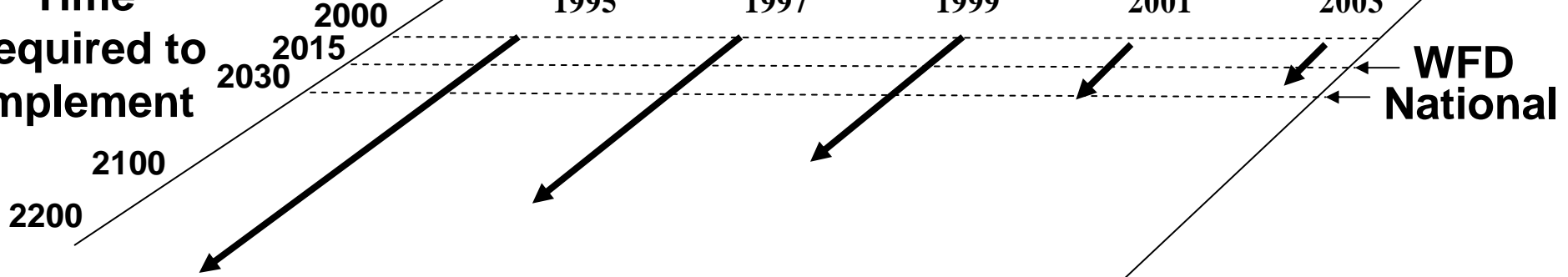
Non-sustainable **Innovation** → Sustainable

Crisis
'70 – '80

Budget NL
0,5 B€/yr



Time
Required to
implement



Thank you for your attention !

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