

# *Latvian Railway (LDz) Group and Environment*

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Director of Development  
SJSC Latvian Railway

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UIC/LDz Polluted Soil Seminar  
Riga, Latvia

# Railway sector in Latvia

- Ministry of Transport
- State Railway Administration
- State Railway Technical Inspectorate
- Public Utilities Commission
- *Latvijas dzelzceļš (LDz) Group* (Latvian Railway) consisting of 6 companies
- JSC “Pasažieru vilciens” (domestic passenger operator, state owned company)
- JSC “Baltijas Tranzīta serviss” (freight operator, private)
- JSC “Baltijas ekspresis” (freight operator, private)
- “Gulbenes-Alūksnes bānītis” Ltd.





# 1520mm/1435mm rail networks



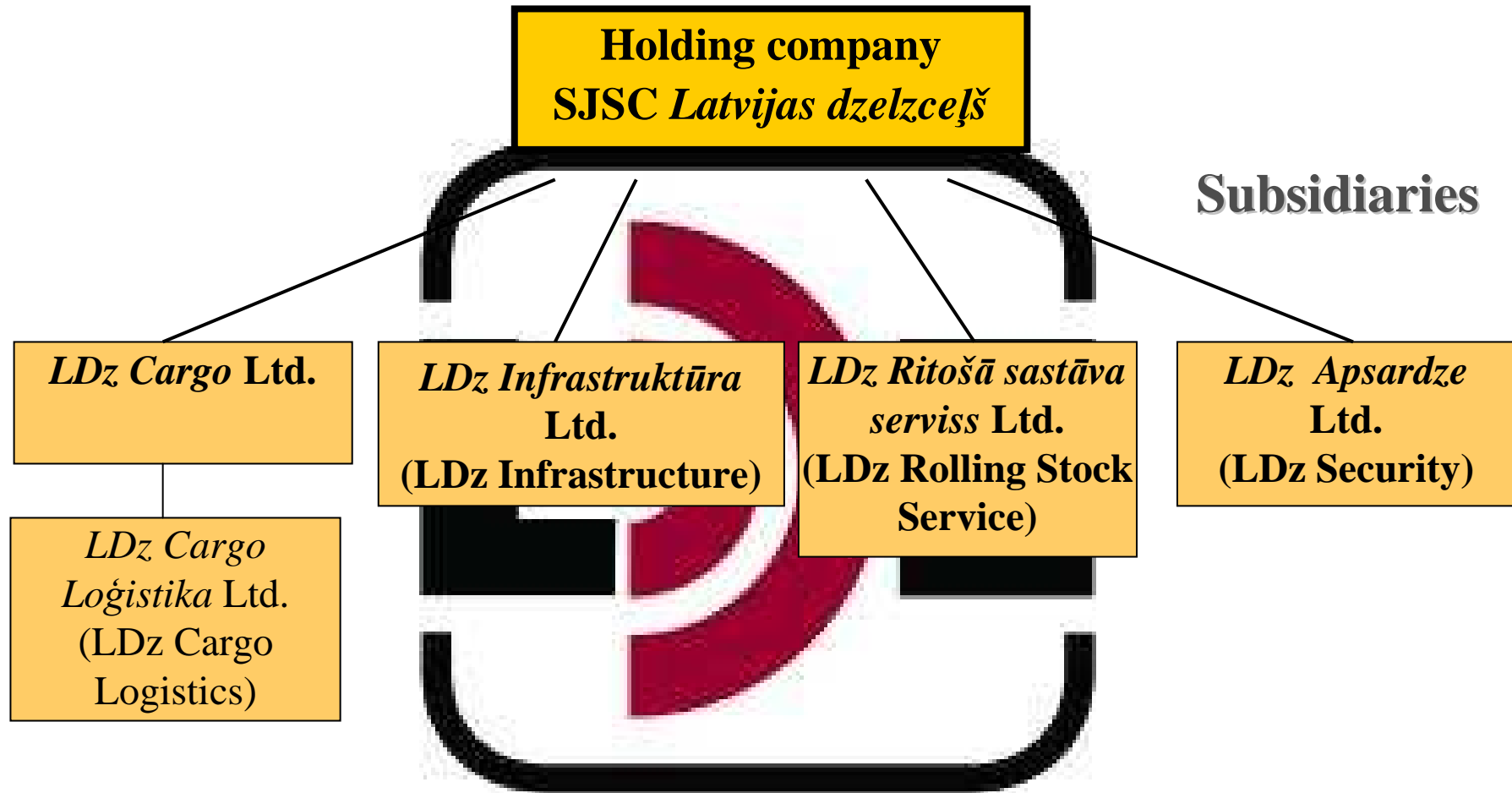
# Latvian Railway infrastructure



- Total length of lines – 1884.2 km
- Total length of 1520 mm gauge lines – 1850.8 km
- Length of electrified lines – 257.4 km



# Latvian Railway Group



## **Vision**

To become a way-ahead, credible and efficient railway undertaking

## **Mission**

To provide railway infrastructure management and transport services in the interests of Latvian national economy

## **Values**

Competence, Responsibility, Safety, Initiative,  
Cooperation



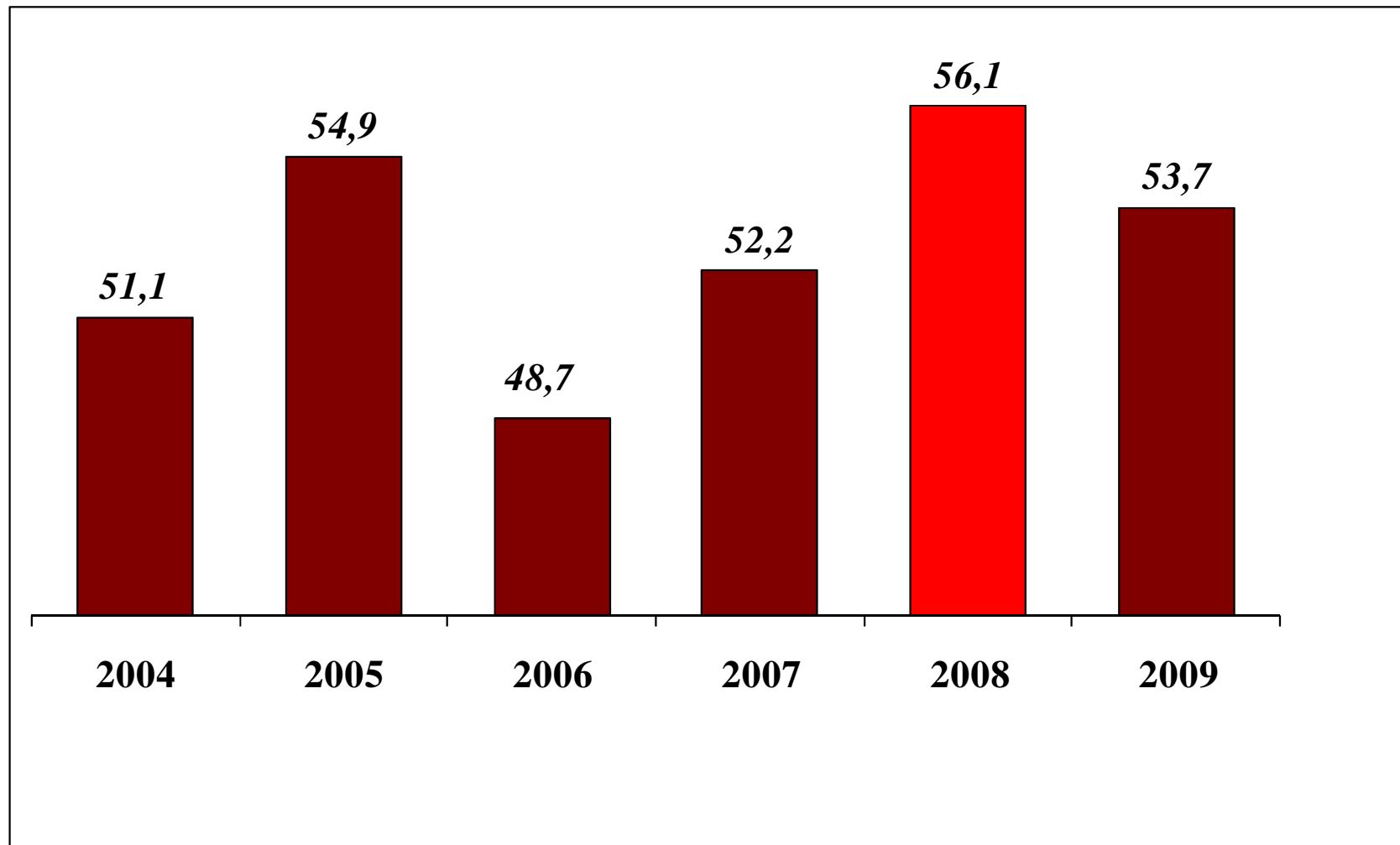
## Activities of LDz Group

- Railway infrastructure management
- Freight transportation
- Rolling stock repairs
- Main repairs and construction of rail tracks
- Railway security
- Other economic activities

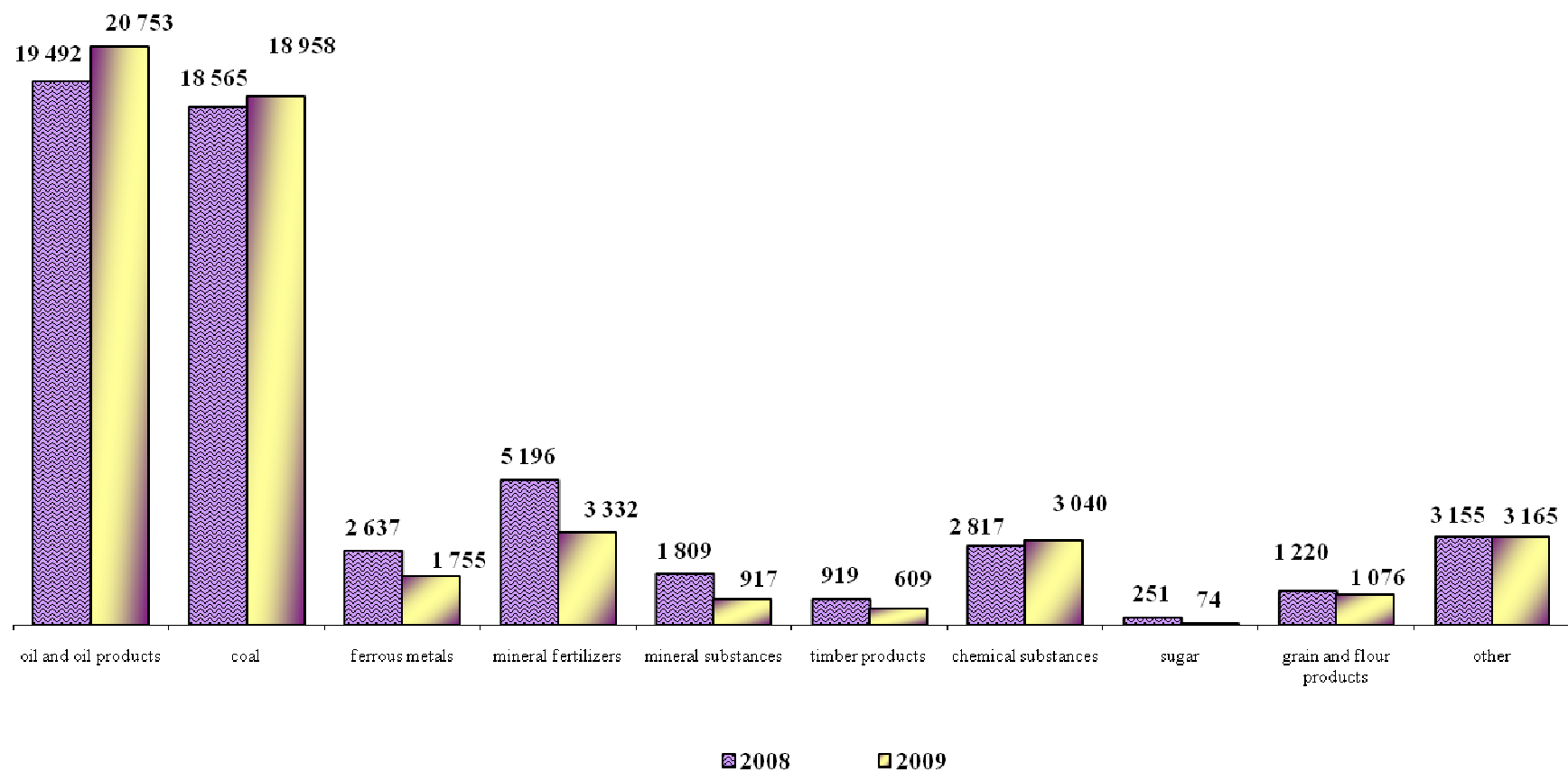




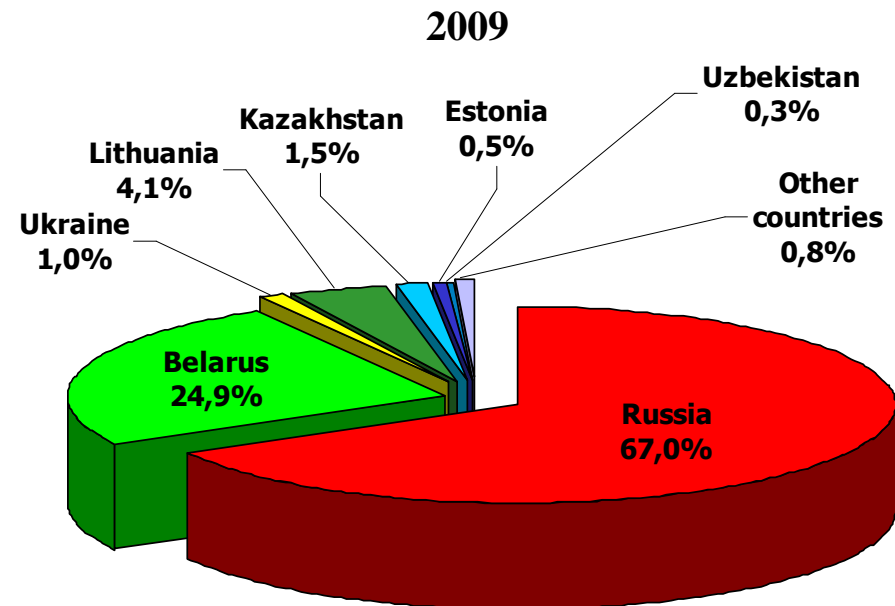
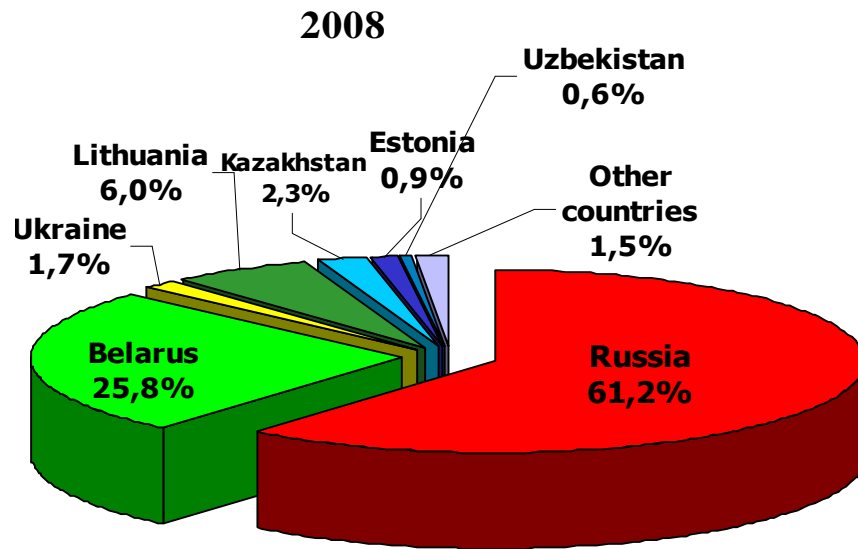
# Railway freight carriage 2004-2009 (million t.)



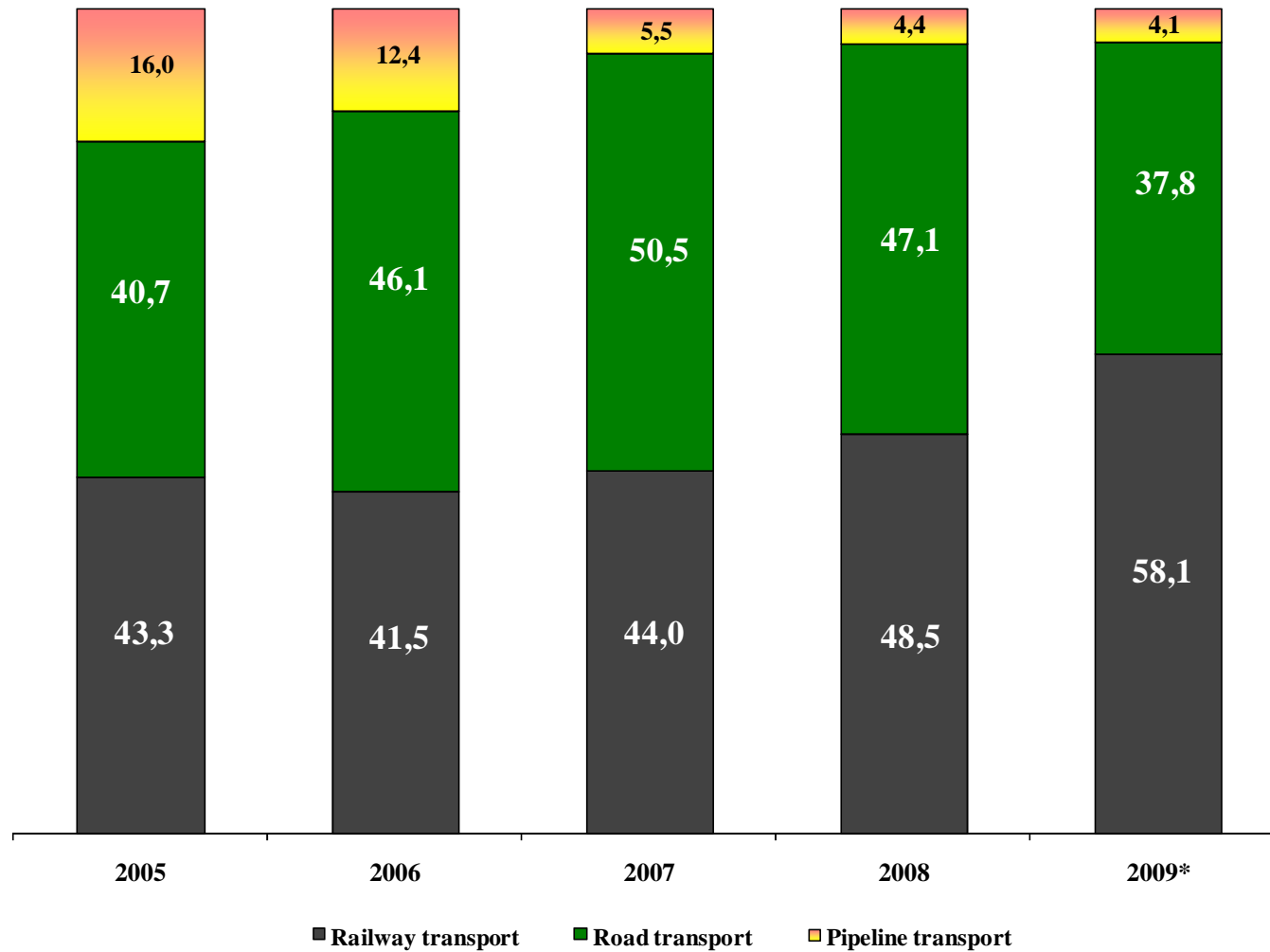
# Volume of freight by type (th. t)



# Proportion of freight by countries (%)



## Rail transport compared to other transport modes in Latvia 2004-2009 (%)



# Ecological problems



# Ecological problems



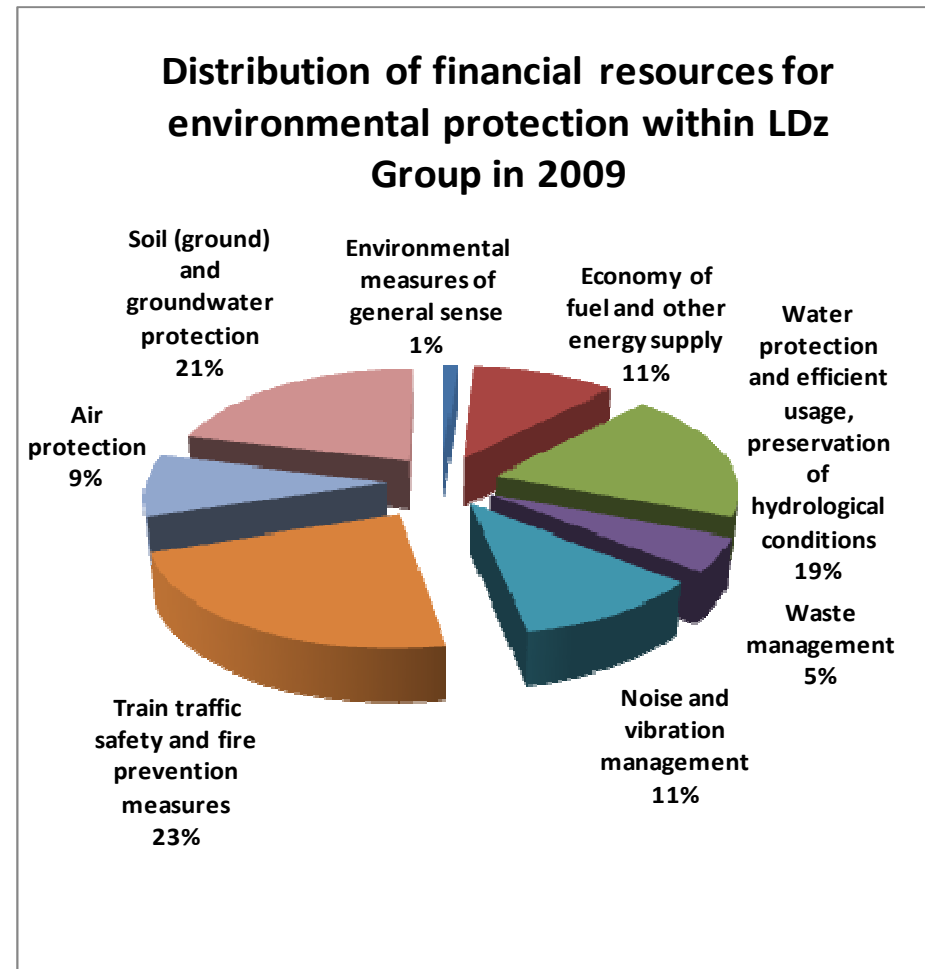
# Environmental protection within LDz Group - documents

- » Environmental protection is one of the top priorities in LDz daily operation
- » This is justified by Environmental Policy of LDz Group
- » Implementation of LDz Environmental Policy is provided by succession of corresponding LDz documents, amongst which as one of the key documents is Long-term Environmental Protection Program of LDz Group 2009-2020



# Environmental protection within LDz Group – practical measures

- Practical implementation of Environmental Policy is ongoing by yearly environmental plans, which are composed of various measures with different environmental sense. One of the top priorities of these plans are soil (ground) and groundwater protection measures





# Soil & groundwater protection

- » Environmental Policy of LDz Group regarding soil pollution and sustainable land use prescribes:
  - » the task to reduce emission of harmful substances into the environment int. al. into the soil;
  - » to take remediation of the historically polluted sites.
  
- » Long-term Environmental Protection Program of LDz Group in this respect contains the task to prevent the soil (ground) and groundwater pollution with oil products



# Soil & groundwater protection

- » Soil (ground) pollution is a visible environmental problem
- » LDz measures to protect soil (ground) and groundwater are as follows:
  - Soil (ground) and groundwater quality monitoring;
  - Renovation of locomotive servicing plants, fuel and lubricant storages;
  - Fitting up locomotives with special oil collectors to prevent track pollution with oil spills from locomotives;
  - Installation of special tight covering and drainage in locomotive standstill places before signal lights in stations, locomotive parking and maintenance places, as well as in places for treatment (discharging) of damaged wagons with dangerous goods;
  - Remediation of polluted sites.



# Soil & groundwater protection



Border station *Indra*: tight glass fiber covering (“track pan”) in locomotive standstill place before signal light

# Soil & groundwater protection



Site in station *Rēzekne-II* for treatment of damaged wagons with dangerous goods : tight glass fiber covering area with sewage treatment plant and system for collecting and temporary storage hazardous liquids of emergency leakages

# Soil & groundwater protection

## Locomotive servicing plant of LDz Rolling Stock Service in Riga

Before renovation (2007)



After renovation (2009)



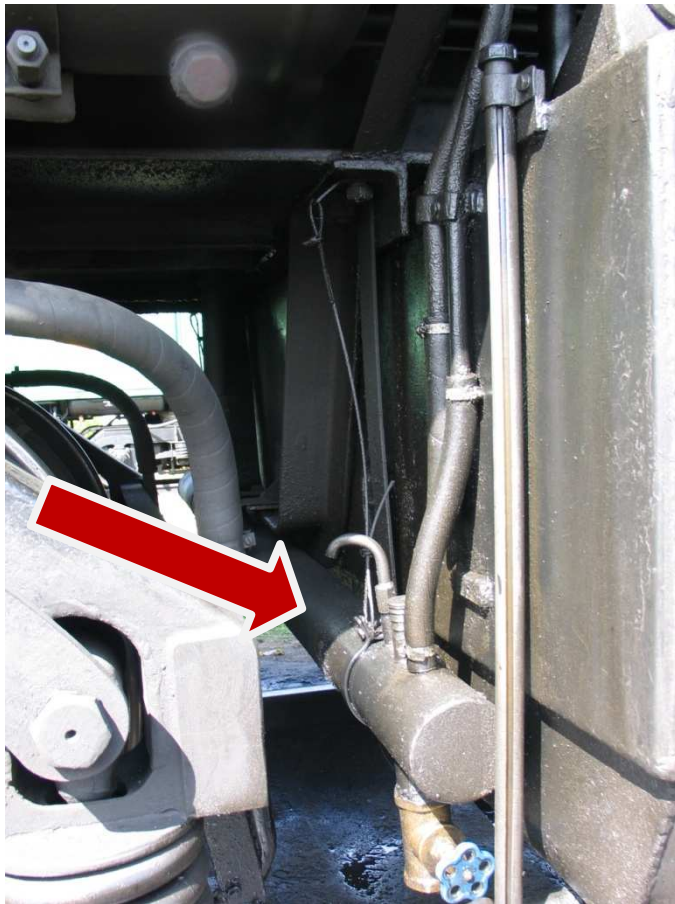
# Soil & groundwater protection



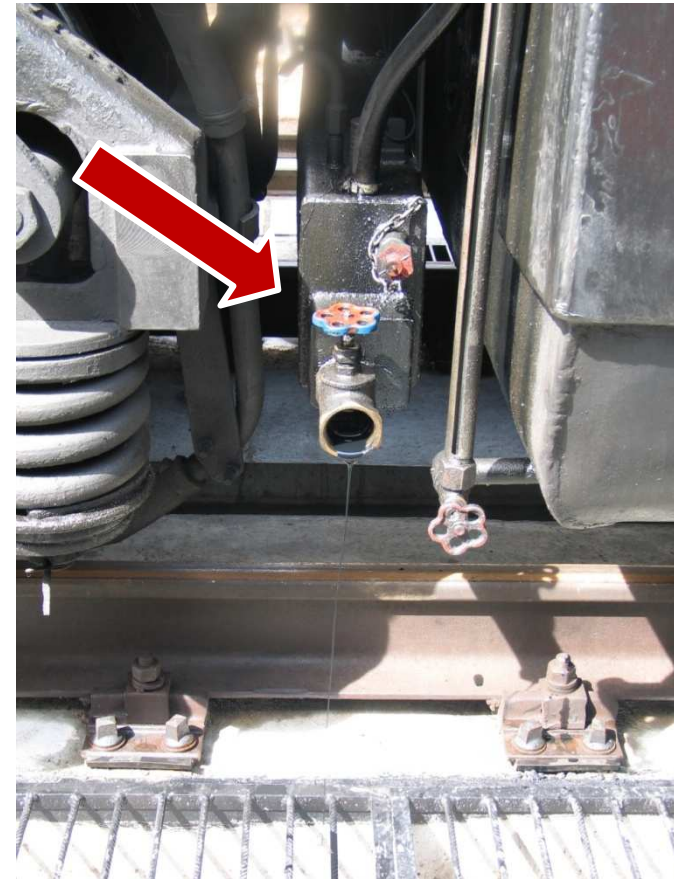
Locomotive operating section of *LDz Cargo* in Daugavpils: locomotive maintenance area with tight concrete covering and system for collecting the spilled worn-out oil

# Soil & groundwater protection

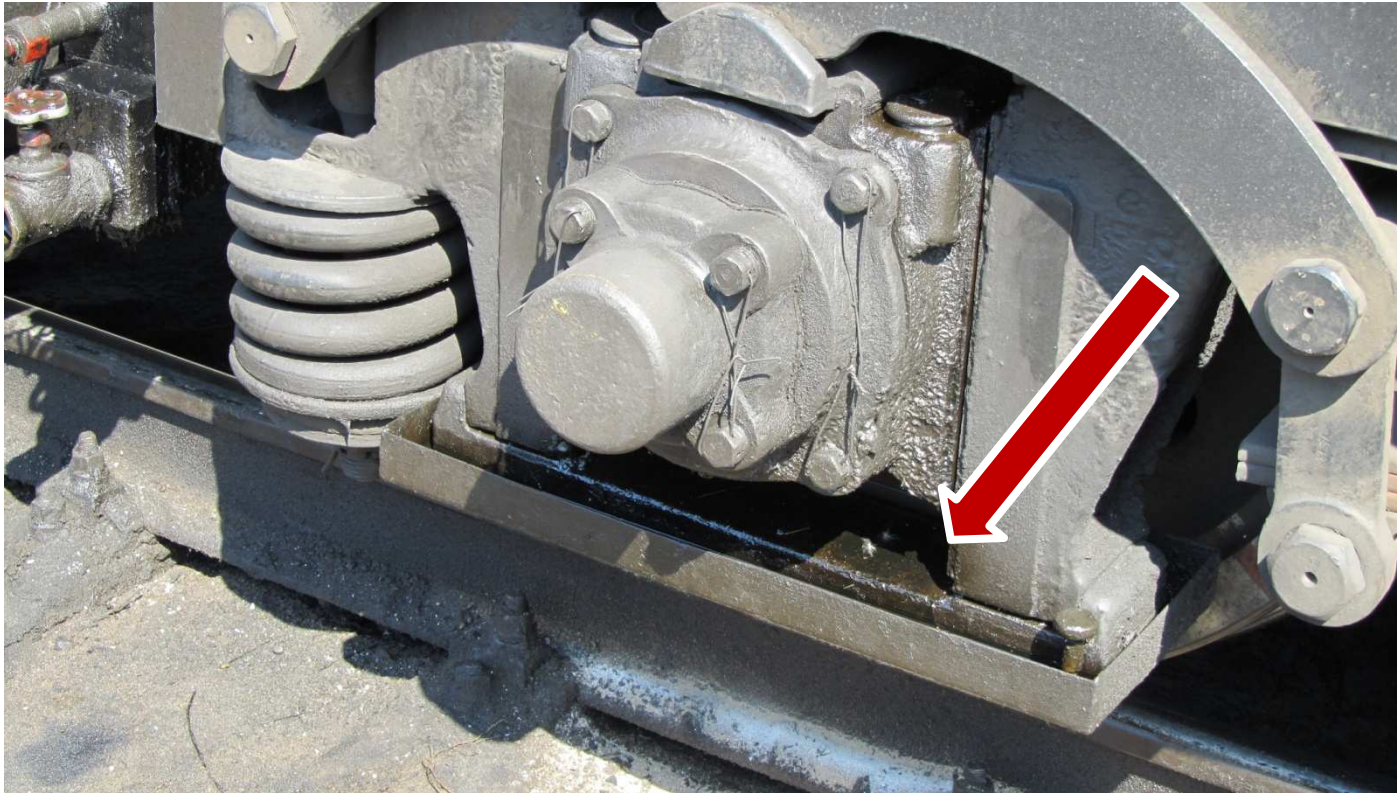
The first generation oil collector for collecting oil spills from locomotives



The second generation oil collector for collecting oil spills from locomotives



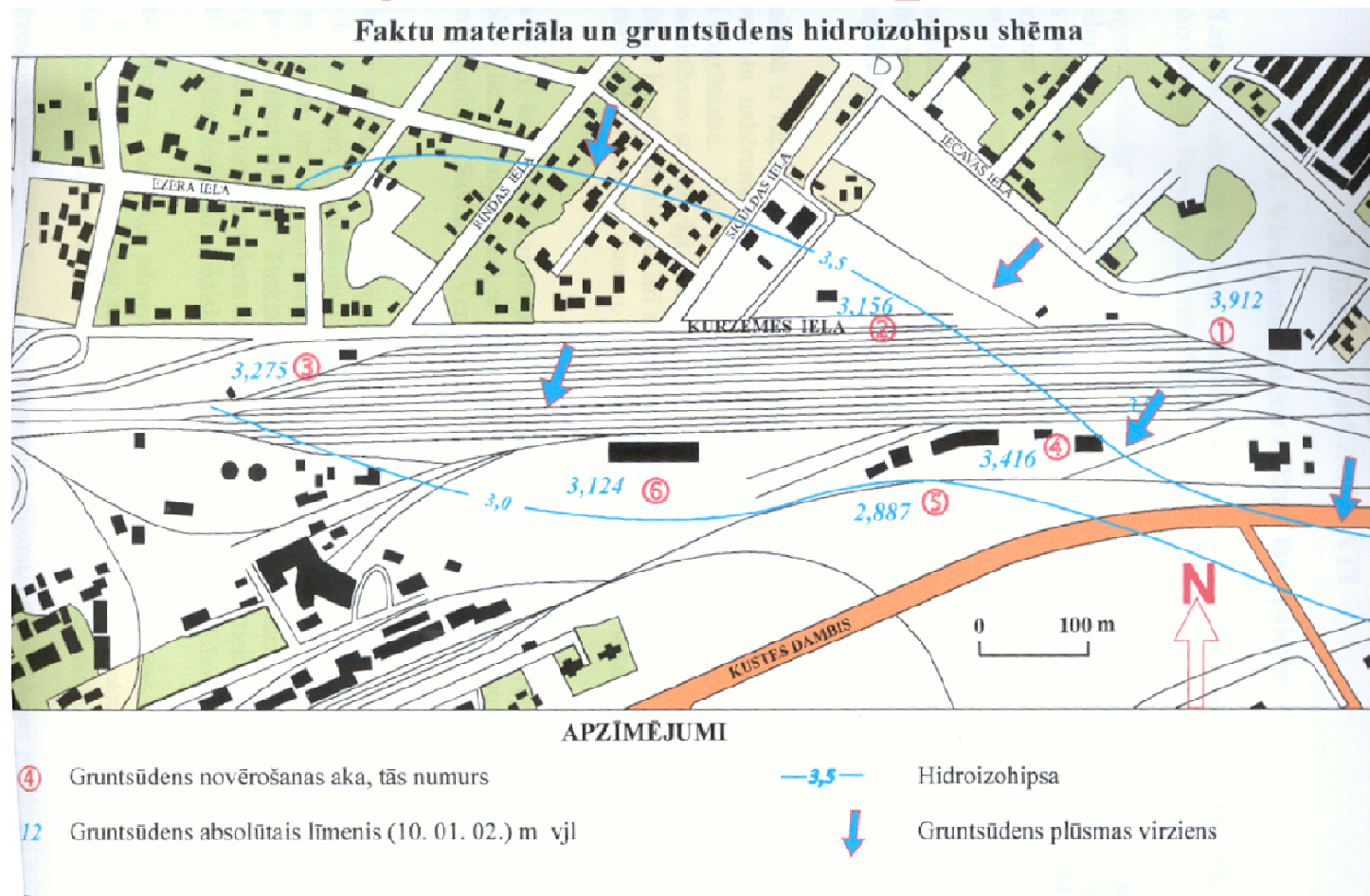
# Soil & groundwater protection



Oil collector for collecting oil spills from locomotive axle-boxes



# Soil & groundwater protection



Groundwater quality monitoring system of marshalling yard in station Ventspils (the red circles show the monitoring wells, the blue arrows show direction of groundwater flow, the blue figures at the red circles mean water table)

# Soil & groundwater protection

Groundwater quality monitoring well



Groundwater remediation (pumping) well



**Thank you for your attention!**

The background of the slide is a photograph of a landscape. It shows rolling hills or mountains in the distance, with a road or path leading through the foreground. The sky is a pale, hazy blue, suggesting an overcast day. The overall tone is muted and naturalistic.

# **INFRASTRUCTURE DEVELOPMENT AND POLLUTED AREAS**

**ROLANDS ARTURS BEBRIS**

**Director**

**Department of Environmental Protection**

**Ministry of Environment of Latvia**

**Polluted soil seminar**

**Riga, 14-15 October**

# SCOPE

- **MAIN SOURCES OF SOIL AND GROUNDWATER POLLUTION IN LATVIA**
- **INFRASTRUCTURE DEVELOPMENT AS ONE OF THE GREATEST RISKS**
- **POLICIES, LEGISLATION AND REGULATIONS**
- **COLLECTION OF INFORMATION AND DATA BASES**
- **SHARING OF RESPONSIBILITIES**
- **GREATEST HOT SPOTS IN Riga region**
- **EXPERIENCE AND RESULTS OF CLEANUP**
- **AVAILABLE RESOURCES**

# **MAIN SOURCES OF SOIL AND GROUDWATER POLLUTION IN LATVIA**

- **GENERALLY RATHER GREEN COUNTRY – OFTEN IS RANKING AMOUNG FIRST TEN IN THE WORLD**
- **TRANSPORT INFRASTRUCTURE AND LOGISTICS – OLD HISTORY**
- **LONGLY STANDING FRONTLINES DURING TWO WORLD WARS IN LATVIA**
- **FORMER SOVIET INDUSTRY BEFORE 1990**
- **FORMER SOVIET AGRICULTURE BEFORE 1990**
- **FORMER SOVIET MILITARY BASES**
- **NO PROBLEMS WITH CONTROLLED AND REDUCED ECONOMY AFTER 1990 – WITH IPPC DIRECTIVE IN INDUSTRY AND NITRATES DIRECTIVE IN AGRICULTURE – pollution reduction more than 50%**
- **TRANSPORT IS BECOMING GREENER, LOGISTICS HAVE BEEN OPTIMISED**
- **FORMER SOVIET TIME MUNICIPAL WASTE DISPOSALS, SEWAGE TREATMENT OR SEWAGE SLUDGE HANDLING NEEDS MORE THAN DECADE TO BE COMPLETELY REVISED AND APGREADED**

# **INFRASTRUCTURE DEVELOPMENT AS ONE OF THE GREATEST RISKS**

## **IF:**

- this infrastructure or parts belongs to third countries**
- if this infrastructure is been built during wartime**
- if this infrastructure is becoming old but still in use**
- if polluted territories are sold cheap and with no restrictions for use**

## **MOST POLLUTED INFRASTRUCTURE IN LATVIA:**

- Some parts of Riga Port and Liepaja Karosta channel**
- Former military airbases in Rumbula and Lielvarde**
- Fuel reservoirs' for military and transport purposes**

**Latvian Railway** does not belong to the most polluted areas: 4 polluted areas, 24 potentially polluted areas and two areas excluded from the list of potentially polluted areas: 30 areas in total

**Carriages park** mostly belongs to third countries and Baltic States can not sufficiently combat leakages and pollution during transportation

**Crud oil and diesel fuel pipelines** are old and leakages happens often

# **POLICIES, LEGISLATION AND REGULATIONS**

- Environmental Protection Policy instruments since 1994 recognizes soil and groundwater pollution as one of the local problems often in connection with infrastructure**
- Historical pollution or military occupation and soviet economy memories still is a problem**
- Contemporary pollution is strictly limited by existing legislation like: Environmental Protection Law, Pollution Law, Regulations on Polluted and Potentially polluted areas, On soil and ground quality, On surface and groundwater quality etc.**
- There are plenty of sector oriented regulations (like transport)**
- There are specific regulations on use of EU Structural co-financing to combat historical pollution**
- Latvian railway can be proud having the Railway Environmental Policy Planning since 2000 with regular evaluation of results and with new plan 2009 -2015.**

(



# COLLECTION OF INFORMATION AND DATA BASES

- Investigation of former soviet military bases started in early 90-ties by involvement of NATO experts with focus on risks and pollution (detailed investigation of Liepaja Karostas channel, Rudbarzu missiles base, Rumbula and Lielvarde military airbases, polluted industrial areas)
- Specific investigations like ES PHARE Project on obsolete pesticides or GEF Project on POPs where carried out at the end of 90-ties
- Governmental Regulations No 483 from 20th November 2001 „On investigation and registration of polluted sites” forms the system and ended with working database
- Investigation was carried out by The Regional Environmental Protection Boards and supervised by “Vides projekti” Ltd during 2000-2007.
- Database of Polluted and potentially polluted sites: [www.lvgma.gov.lv](http://www.lvgma.gov.lv), contains professional information and register of more than 3500 sites, with 2600 sites recognized as potentially polluted and 239 as polluted

# SHARING OF RESPONSIBILITIES

- **Soviet militaries and industrialists are gone**
- **Russia does not recognize any responsibility**
- **Former organizations and entrepreneurs are gone**
- **New owners after privatization are running only parts or much smaller businesses and can not take responsibility to treat all historical pollution**

**Latvian Railway has not gone and is doing a lot towards better services and environment**

**State is responsible for human health and environment in general**

**Municipalities are responsible for soil and groundwater quality and polluted sites evaluation during physical planning and development planning**

**All developers are responsible for environmentally sound and contemporary management**

# **GREATEST HOT SPOTS IN Riga region**

- **Former Rumbula military airbase with floating oil products at the territory more than 14,6 ha and more than 10000 m<sup>2</sup> polluted soils. Limited treatment is ongoing since 1997 firstly to stop filtration to the River Daugava**
- **Polluted Riga territories in Milgravis and Sarkandaugava with floating oil product layer more than 1 m is involved in cleanup exercises since 1995 to stop firstly filtration to the River Daugava**
- **Former soviet tank's repairing factory in 92 Matisa str. With floating oil in groundwater and Pb concentration 40 times exceeding limits. Treatment of 10000 m<sup>2</sup> soil will cost at least 2,5 milj LVL**
- **Cekule former depository of ammunition at the 240 ha area with old explosives even at 4 m depth. Partial cleanup in 1994 - 1999. Full recovery will cost more than 15 mil LVL**
- **Latvian railway:**
  - **railway wagon park „Vagonparks’ ‘ at Raznas str. with floating oil products**
  - **Depo Zaslauks with floating oil products**
  - **Riga Locomotives depot at Krustpils str 24 with floating oil products , recovery initiated by Latvia Railway**

# EXPERIENCE AND RESULTS OF CLEANUP

- Real cleanup during decades has been reached in Rumbula and Lielvarde airbases and in the Riga Northern Part Milgravis industrial area using Danish Environmental Agency, Latvian Environmental Fund, Riga Municipality and private co-financing
- Detailed investigations followed by technological proposals for recovery were made in Incukalns acid gudron ponds, Olaine liquid hazardous waste storage, Jelgava Cosmo plant hazardous waste disposal and in some other sites
- Common is step by step approach firstly closing the source and later reducing the effects – soil and groundwater pollution. In some cases prevention of groundwater further pollution might need actions at the distance from the polluted area, if pollution is causing risks to the drinking water resources (like River Gauja in Incukalns).
- Common approach is insulation with limited cleanup as full treatment and recovering costs too much. We have no examples of full recovering and there are no plenty of them in the western countries as well as.

# AVAILABLE RESOURCES

- **First discussions with IFI were not very successful as followed many consultancies and miserable actions**
- **Later some bilateral technological cooperation started with Nordic countries**
- **After joining EU some co-financing for cleanup projects can be attracted from EU KF, nevertheless financial period till 2013 has strictly limited co-financing and only most polluted areas can be cleaned: Incukalns acid gudron ponds, Olaine liquid waste storage, Jelgavas Cosmos industrial waste disposal, Liepaja Karostas channel. Other projects will wait after 2014.g.**
- **Full set of hazardous waste management system since 2009 allows to solve some specific issues**
- **Open EU market offers better and cheaper investigation in some specific issues like POPs, Dioxines, PHB etc.**
- **Open EU market and transportation allows to better and cheaper and environmentally soundly utilize many substances like PHB etc.**
- **Insurance as an effective tool for future**

**THANK YOU FOR ATTENTION.  
LET' S MAKE WORLD CLEANER!**

**[WWW.VIDM.GOV.LV](http://WWW.VIDM.GOV.LV)**

**rolands.bebis@vidm.gov.lv**

**[WWW.LVGMC.GOV.LV](http://WWW.LVGMC.GOV.LV)**

**[WWW.VVD.GOV.LV](http://WWW.VVD.GOV.LV)**



NL Agency  
*Ministry of Housing, Spatial Planning and  
the Environment*

# Soil environmental policies in the Netherlands – sharing experiences

by **Dr. Ton Honders**

**(Riga – 14.10.10)**

>> Focus on environment



# MENU



## 1. EUROPEAN POLICIES

## 2. DUTCH POLICIES

- TRIGGERS AND PRINCIPLES
- SOIL PROTECTION
- SUSTAINABLE LAND MANAGEMENT
- SITE REMEDIATION

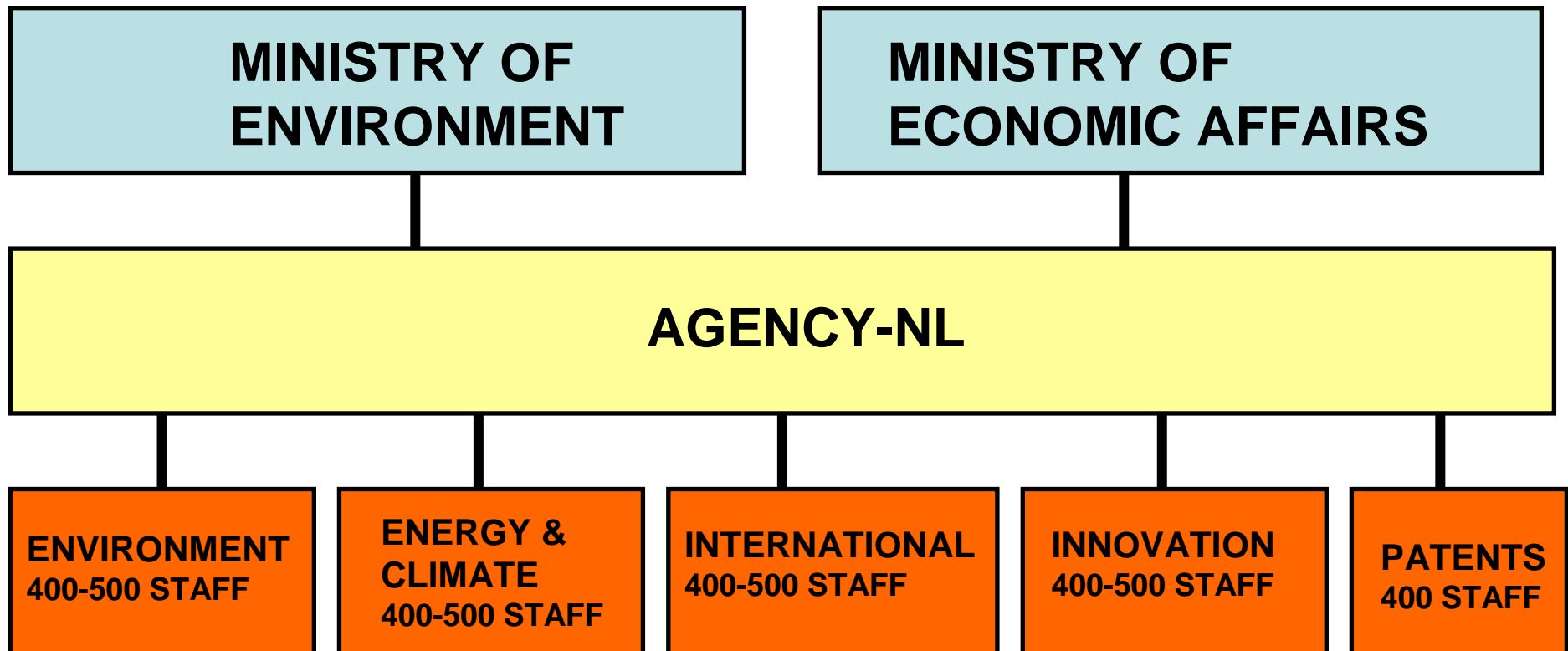
## 3. INSTRUMENTS AND IMPLEMENTATION PROCESSES

- TECHNOLOGIES
- QUALITY ASSURANCE AND QUALITY CONTROL
- DEMING CIRCLE

## 4. EPILOGUE



# INSTITUTIONAL STRUCTURE



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# EUROPEAN ENVIRONMENTAL CHALLENGES



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# EUROPEAN LEGISLATION RELATED TO SOIL



1. **(GROUND)WATER DIRECTIVE**
2. **LANDFILL DIRECTIVE**
3. **HAZARDOUS WASTE DIRECTIVE**
4. **CONSTRUCTION PRODUCTS DIRECTIVE**
5. **NATURA 2000**
6. **TREATY OF ARRHUS (ARCHEOLOGY)**
7. ...
8. ...

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# EU THEMATIC STRATEGY FOR SOIL PROTECTION



What is soil? Where does it come from? How important is soil in our daily activities? Is soil the same everywhere? Is soil at risk? The first ever SOIL ATLAS OF EUROPE uses striking maps, clearly written informative texts and stunning photographs to answer and explain these questions.


A team of leading European soil scientists have collaborated to produce this unique document. Using state-of-the-art computer mapping techniques, the SOIL ATLAS OF EUROPE shows the changing nature of soil across the European continent.


The SOIL ATLAS OF EUROPE explains the origin and role of soil, describes the different soil types that can be found in Europe and their relevance on a global scale. The atlas also discusses the principal threats to soil across Europe and the steps being taken within the European Union to protect soil resources.

The SOIL ATLAS OF EUROPE is more than just a normal atlas that simply shows the location of places. Rather, this volume presents an interpretation of an often neglected natural resource that surrounds and affects us all.


The SOIL ATLAS OF EUROPE is an essential reference to a non-renewable resource that is fundamental for life on this planet.


## SOIL ATLAS OF EUROPE







The properties of soil vary tremendously from region to region. Clay soils can hinder drainage when wet but produce wide open cracks in dry periods.







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Office for Official Publications of the European Communities  
L-2985 Luxembourg



European Commission

# EUROPEAN SOIL THEMES



## 1. SOIL DEGRADATION

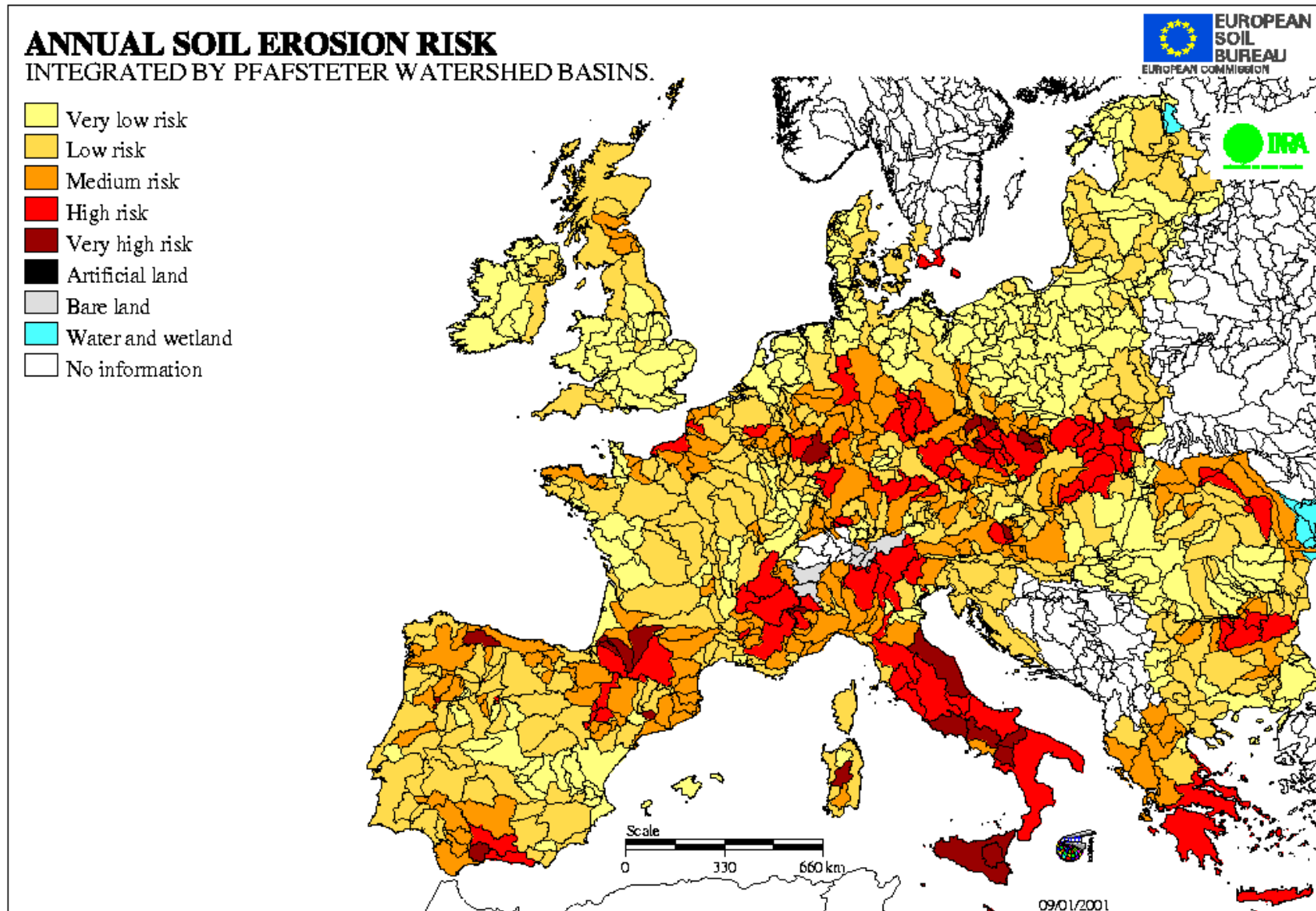
- EROSION
- ORGANIC MATTER DECLINE
- SALINISATION
- DESERTIFICATION
- LANDSLIDES
- COMPACTION
- SEALING

## 2. BIODIVERSITY

## 3. CONTAMINATION

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# EU SOIL EROSION (1)

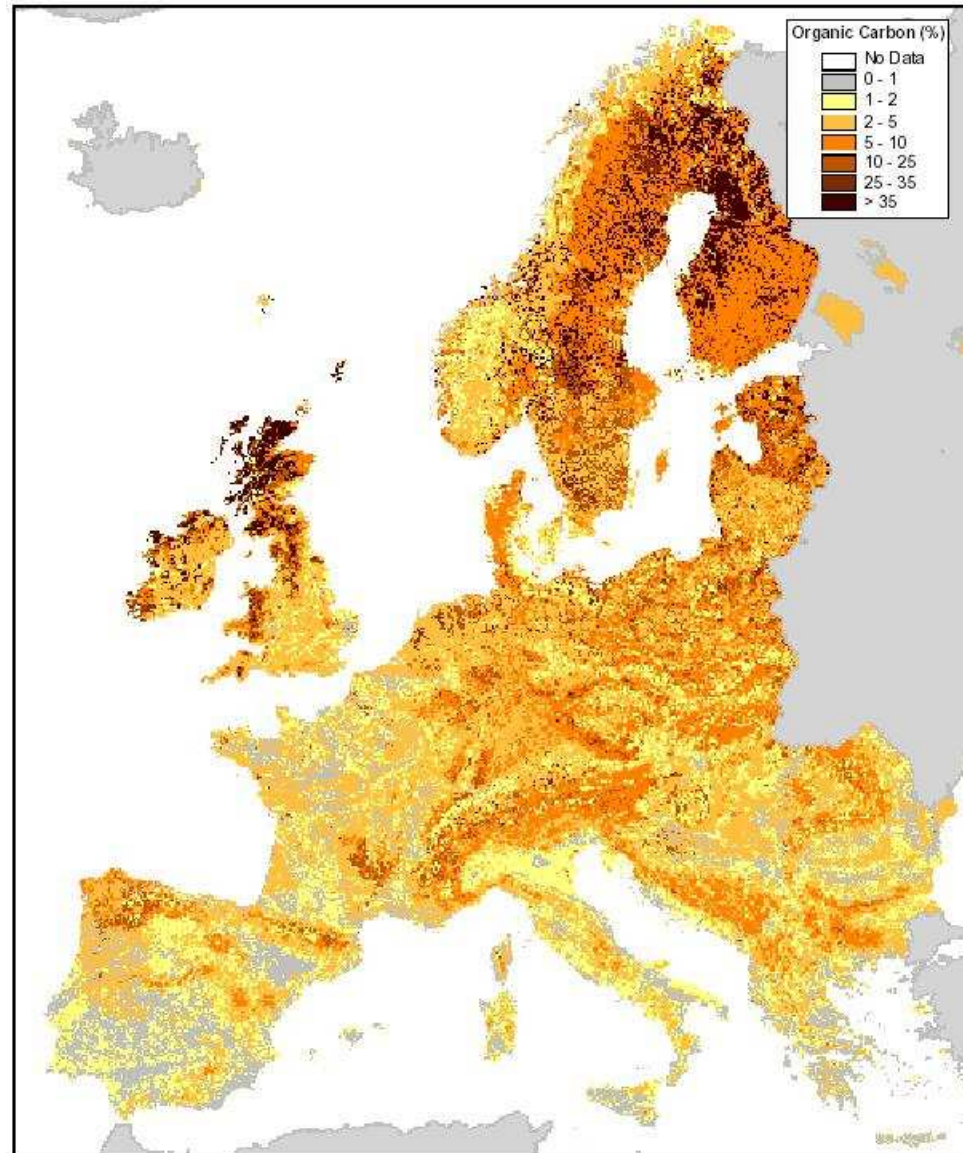


# EU SOIL EROSION (2)



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# EU SOIL ORGANIC MATTER DECLINE



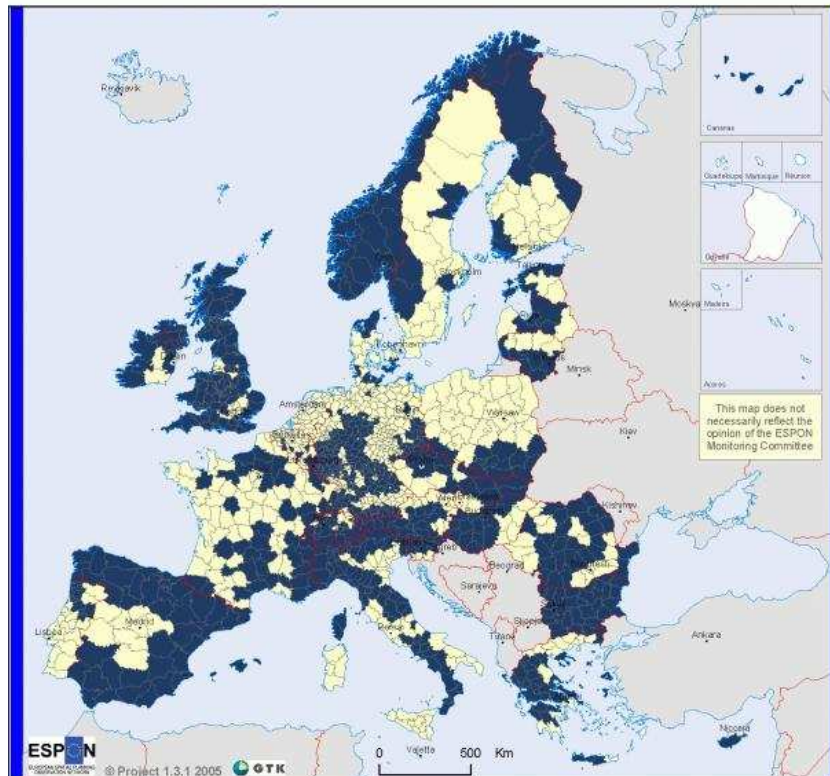


# EU SOIL DESERTIFICATION AND SALINISATION



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# EU LANDSLIDE HAZARDS



**Areas with landslide hazard**

- Low hazard
- High hazard
- Nodata
- Non ESPON space

Origin of the data: © EuroGeographics Association for the administrative boundaries  
Source: ESPON Data Base

Areas with landslide hazards, based on national expert opinion of the European Geological Surveys.



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# EU COMPACTION AND SEALING



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# SOIL ENVIRONMENTAL POLICIES



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# LAND USE IN THE NETHERLANDS



LAND USE	%
AGRICULTURE / NATURE	80
RESIDENCE	10
INDUSTRY	3
INFRASTRUCTURE / (RAIL)ROADS	2
RIVERS / LAKES	5



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# CHALLENGES



## 1. SPATIAL PLANNING PRESSURES:

- RAPID URBAN DEVELOPMENT
- INFRASTRUCTURAL PROJECTS (HARBOURS, HIGHWAYS, RAILROADS)
- PRESERVATION OF NATURAL AREAS

## 2. ENVIRONMENTAL PRESSURES:

- INTENSIVE LAND-USE / LAND-TURNOVER
- HIGH GROUNDWATER LEVELS
- INDUSTRIALISED (HISTORIC AND PRESENT)

## 3. SOCIAL PRESSURES:

- PUBLIC AWARENESS FOR ENVIRONMENTAL ISSUES
- MANY STAKEHOLDERS
- “COMPLEX” SOCIETY

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# POLICY TRIGGERS



## 1. ECONOMICAL

- ENABLE SPATIAL DEVELOPMENTS (e.g. BROWNFIELDS)
- RESOURCE PROTECTION (e.g. GROUNDWATER)
- PROTECTION OF AGRICULTURAL PRODUCTION

## 2. ENVIRONMENTAL

- HUMAN HEALTH
- NATURE PRESERVATION
- PUBLIC AWARENESS

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# POLICY PRIORITIES



1. PREVENT AND LIMIT

“1”

2. MANAGEMENT & CONTROL

“10”

3. REMEDIATION

“100”

COSTS



**WHILST MAINTAINING ECONOMIC AND  
SOCIAL ACTIVITIES**

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# SOIL PROTECTION



- 1. TECHNICAL GUIDELINES AVAILABLE**
- 2. EMBEDDED IN NATIONAL PERMITTING PROCEDURES (FOR COMPANIES)**
- 3. OR EU LEGISLATION (e.g. AGRICULTURE AND LANDFILLING)**
- 4. SOME EXAMPLES**

# SOIL PROTECTION IN INDUSTRIAL ENVIRONMENTS



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# SOIL PROTECTION IN RURAL ENVIRONMENTS



## REGULATED USE OF FERTILISERS AND PESTICIDES

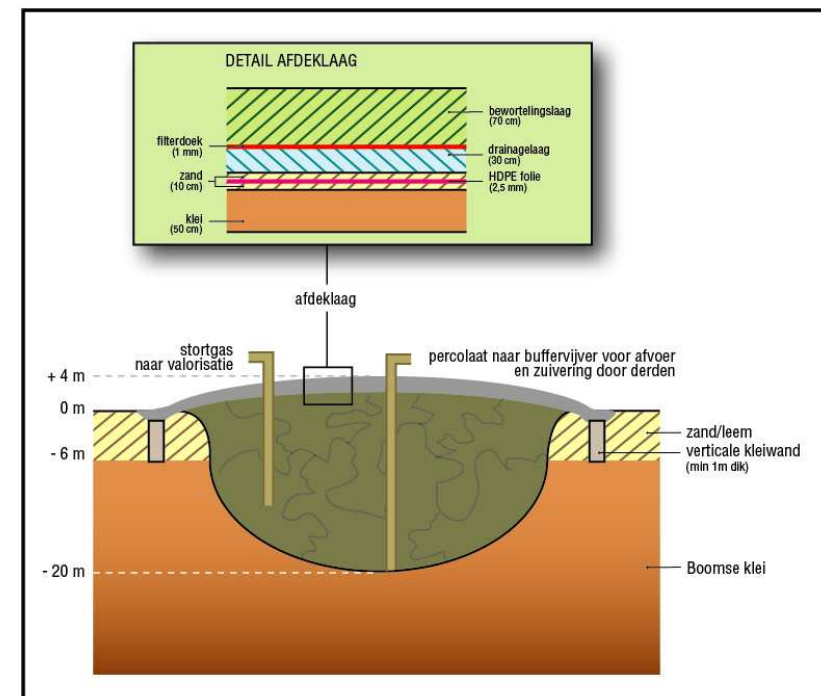
- **LEVEL OF GROUNDWATER PROTECTION**  
= 0.1 ug / l (PESTICIDES)  
= 5 mg / l (NITRATE)



# SANITARY LANDFILLING



- **MEASURES:**
  - **COMPLIANCE WITH EU LEGISLATION**
  - **ISOLATION / SEALING**
  - **CRITERIA FOR COLLECTION / REUSE / DISPOSAL**



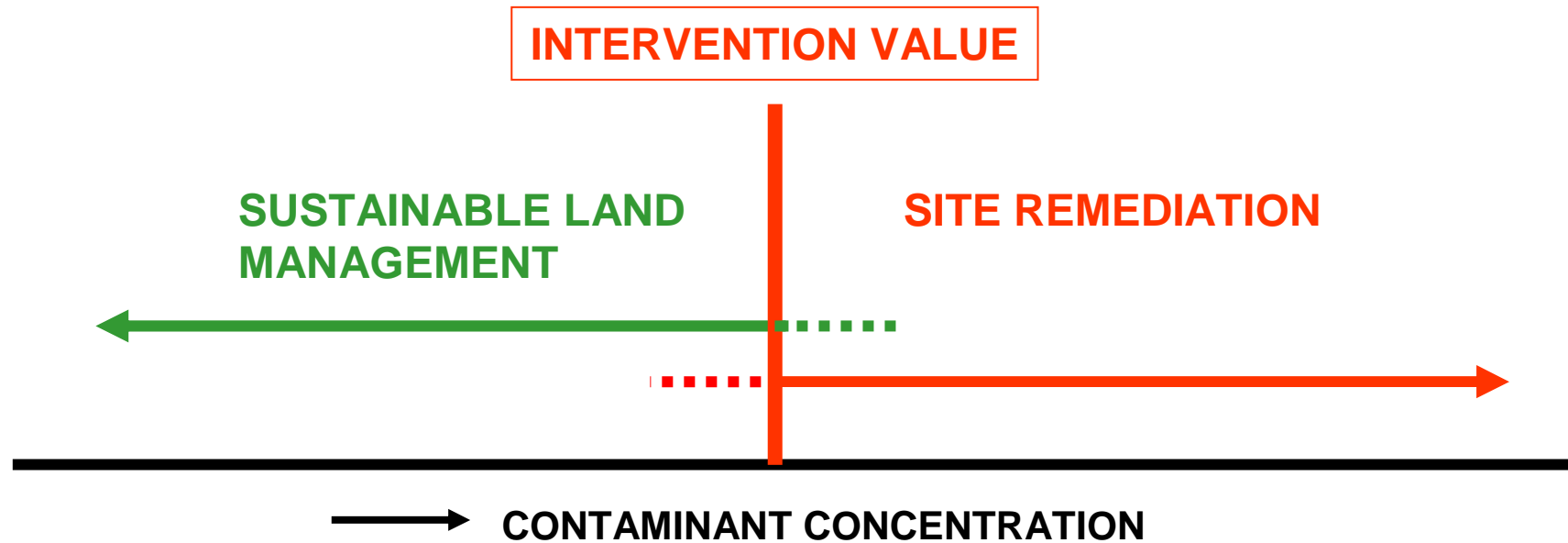
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# DISPOSAL OF AQUATIC SEDIMENTS



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# THE DUTCH SYSTEM FOR SUSTAINABLE LANDMANAGEMENT AND SITE REMEDIATION

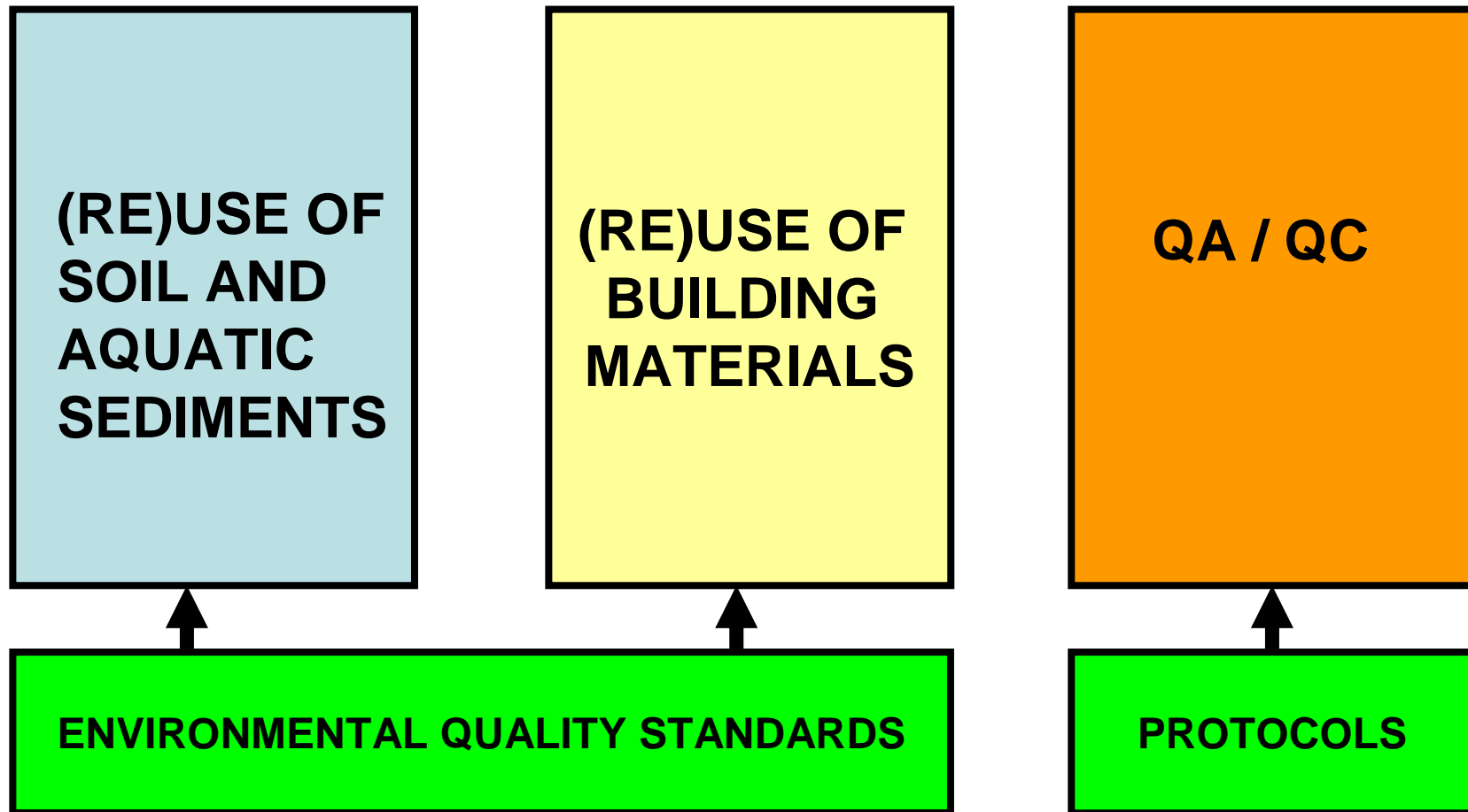


(SOIL QUALITY DECREE)

(SOIL PROTECTION ACT)

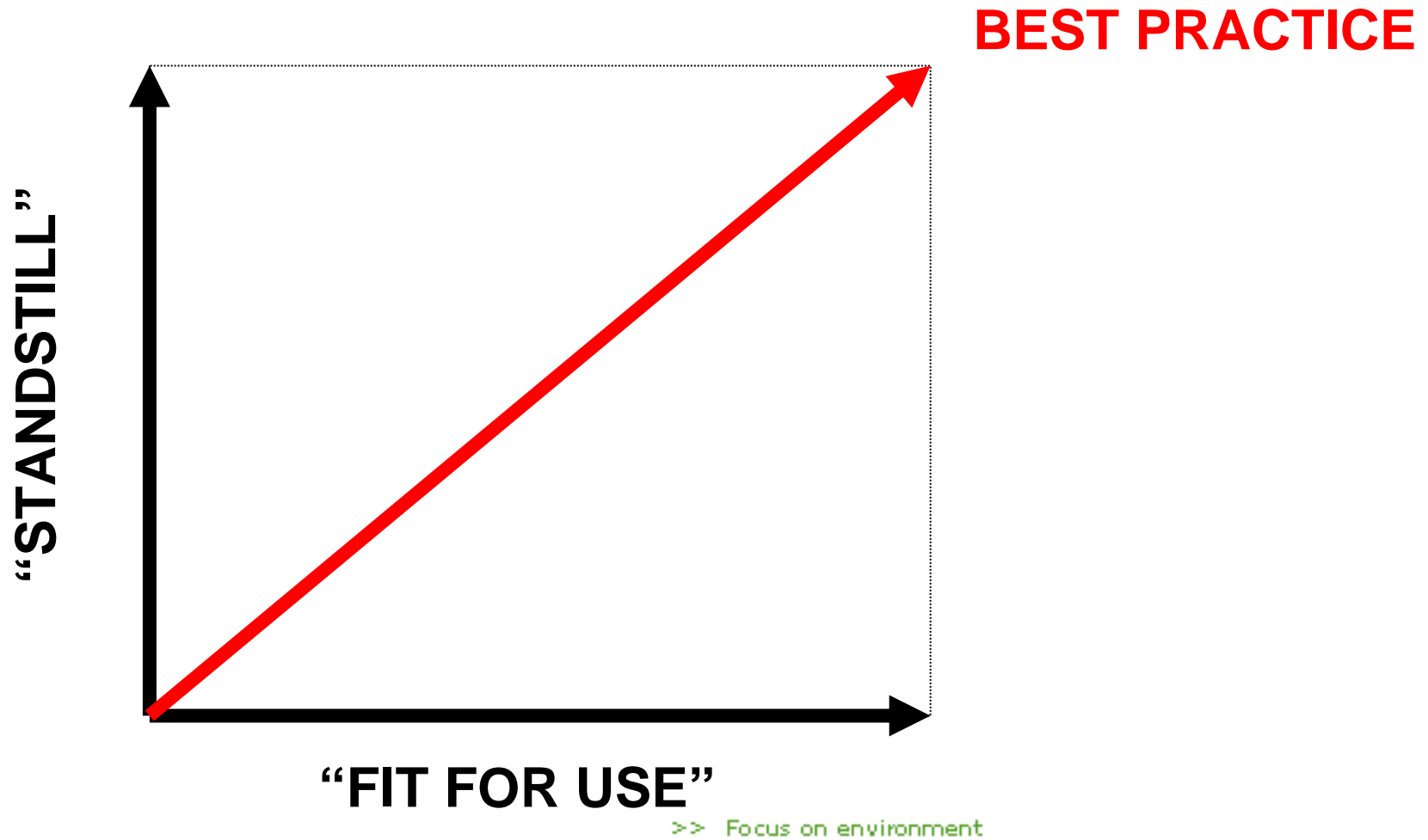
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# LEGISLATION - “SOIL QUALITY DECREE”



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# BASIC PRINCIPLES OF SUSTAINABLE LANDMANAGEMENT





# “FIT FOR USE PRINCIPLE” – RISK-BASED SOIL QUALITY STANDARDS

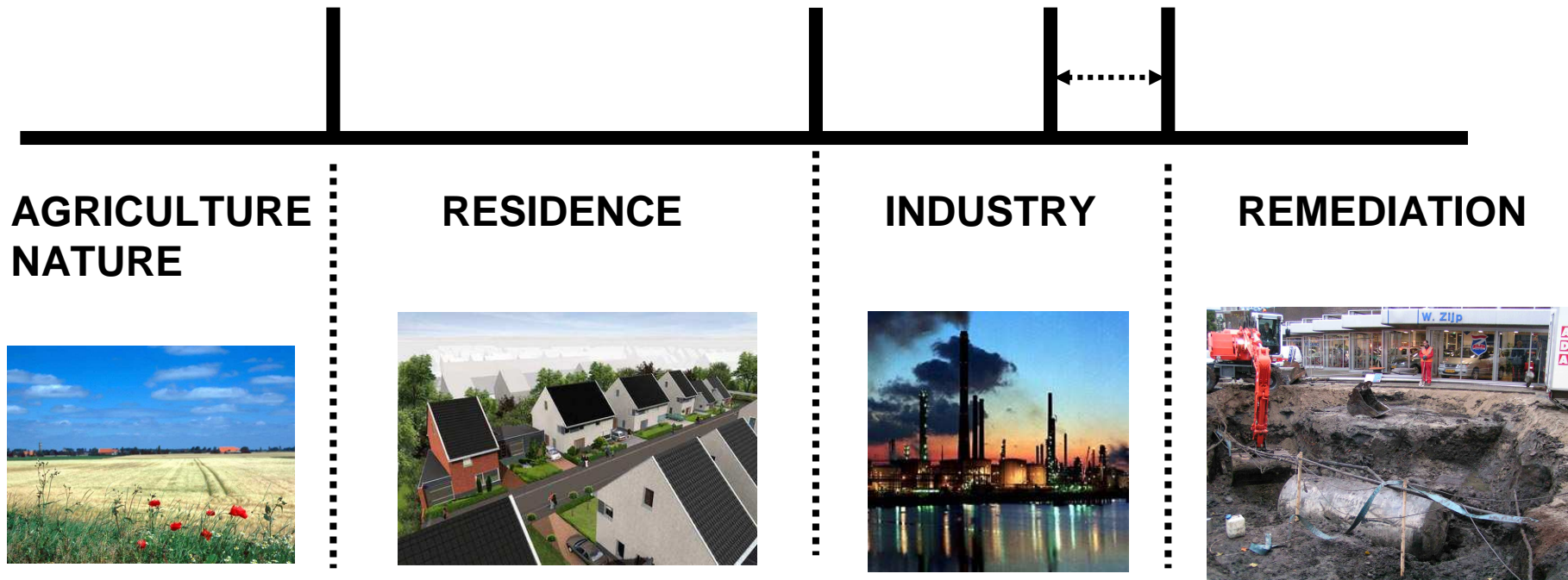


BACKGROUNDVALUE

RESIDENCE

INDUSTRY

INTERVENTIONVALUE



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# SITE REMEDIATION

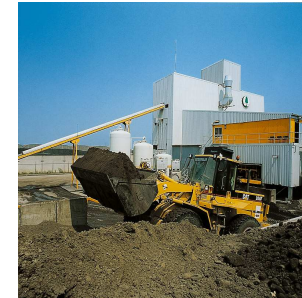
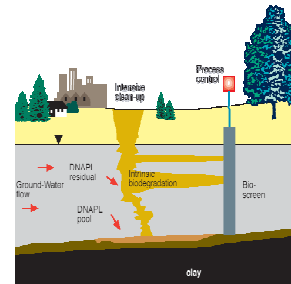


SOIL QUALITY  
HIGHLY CONTAMINATED

APPLICATION



YES



REMEDATION

TREATMENT

LANDFILL



NO



REMEDATION

INDUSTRY

RESIDENCE

NATURE

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# STANDSTILL PRINCIPLE (1)



SOIL QUALITY  
INDUSTRY



INDUSTRY

YES



APPLICATION



INDUSTRY



INDUSTRY

NO



RESIDENCE



NATURE

>> Focus on environment

# STANDSTILL PRINCIPLE (2)



**SOIL QUALITY  
RESIDENCE**



**RESIDENCE**



**RESIDENCE**

**YES**



**RESIDENCE**

**APPLICATION**



**INDUSTRY**

**NO**



**NATURE**

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# STANDSTILL PRINCIPLE (3)



SOIL QUALITY  
CLEAN

APPLICATION



YES (NOT PREFERRED)



YES



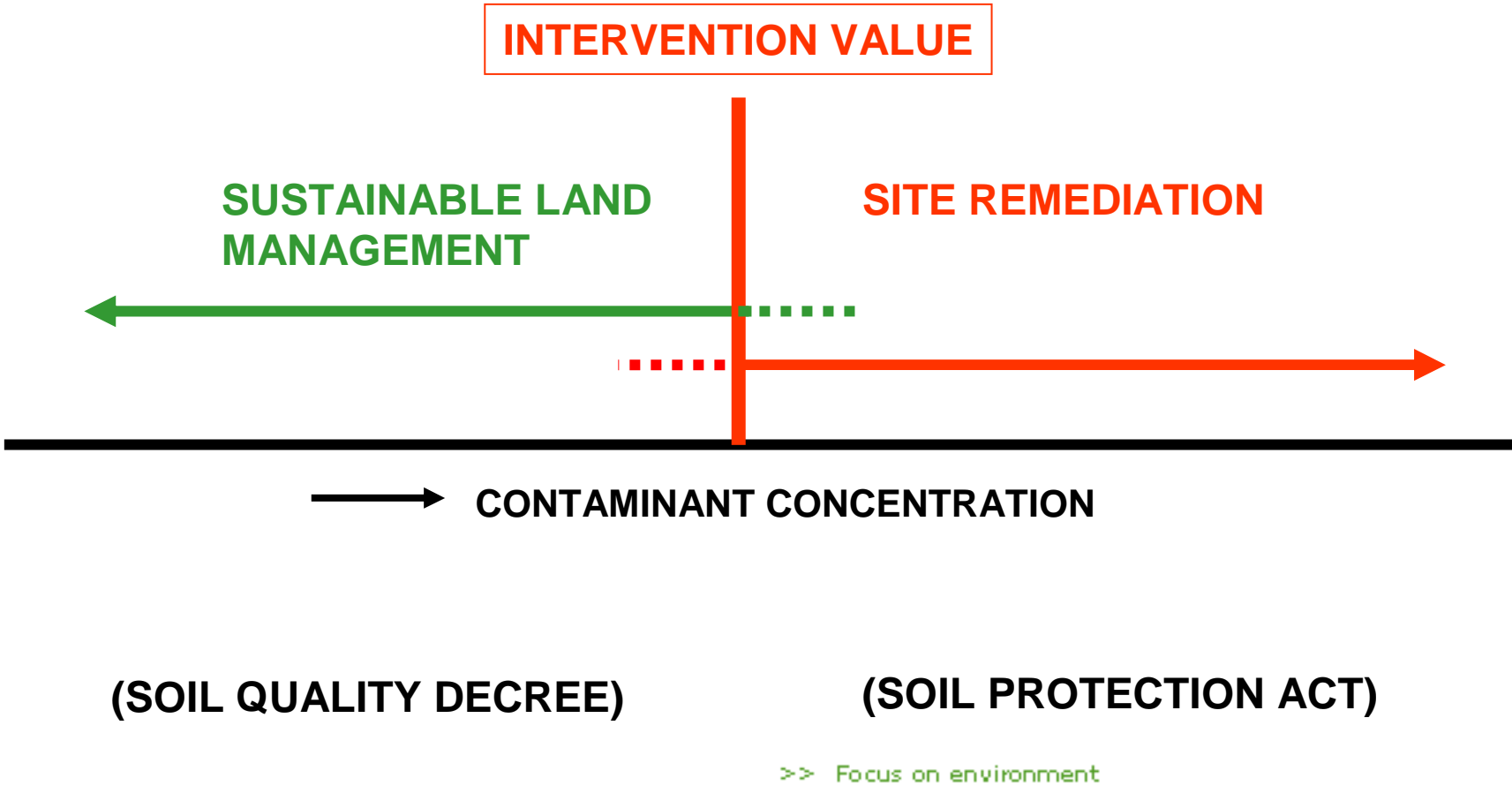
YES (PREFERRED)



NATURE

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# THE DUTCH SYSTEM FOR SUSTAINABLE LANDMANAGEMENT AND SITE REMEDIATION



# SITE REMEDIATION

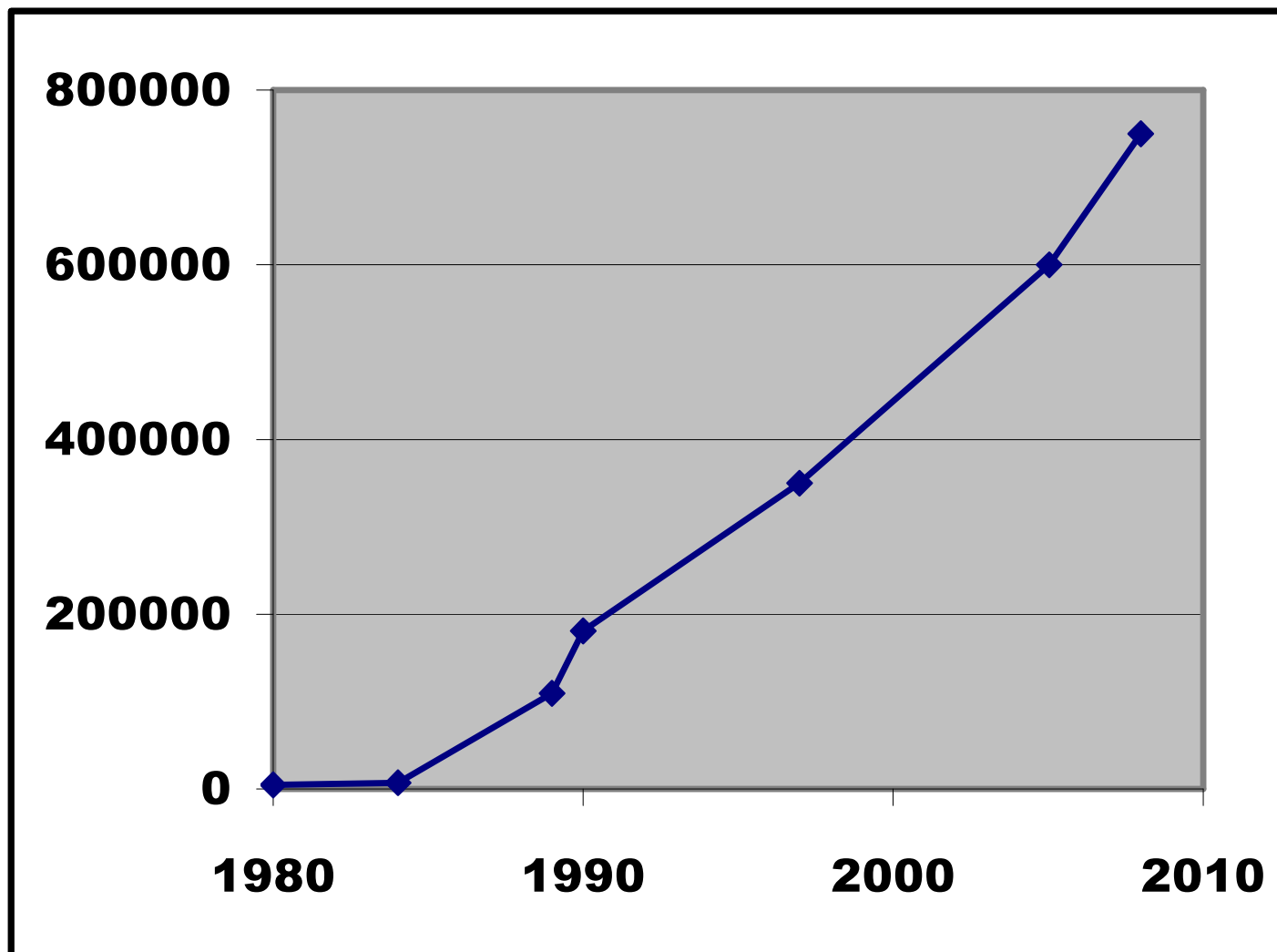


**1. SITE INVENTORY**

**2. ACHIEVEMENTS**

**3. PRESENT POLICIES**

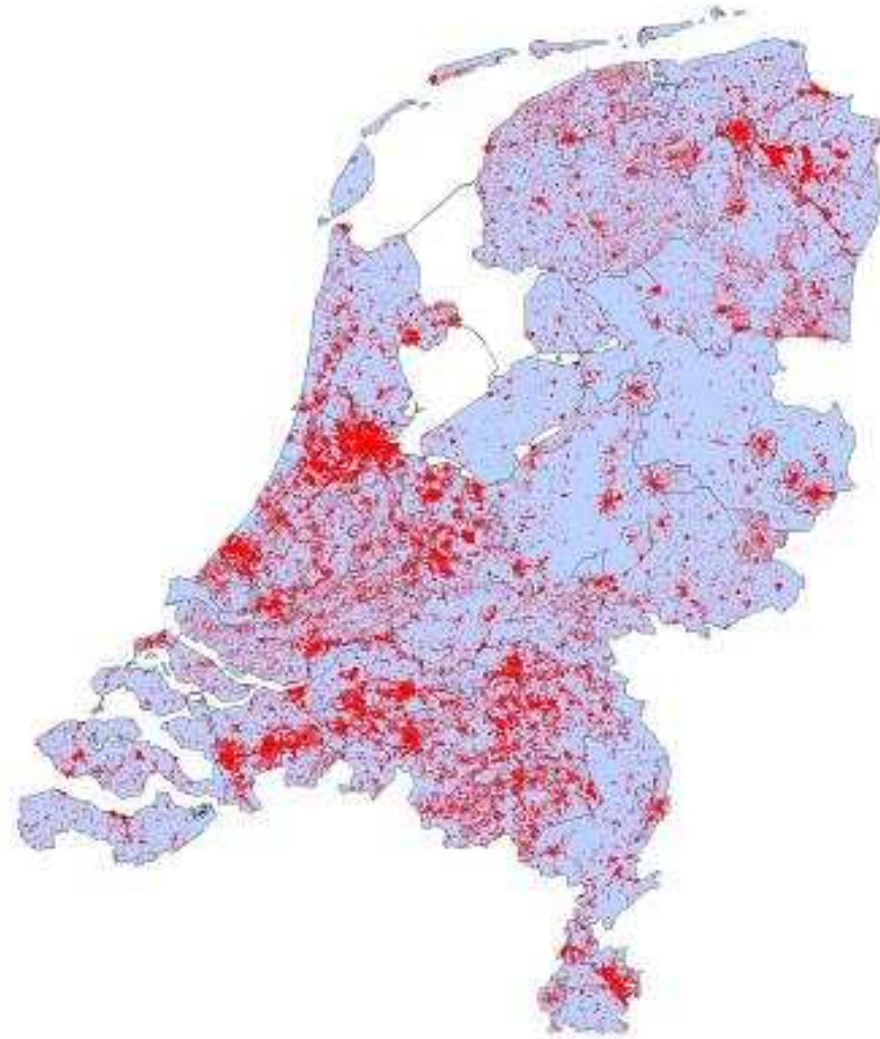
# BUILD-UP INVENTORY OF POTENTIALLY CONTAMINATED SITES



>> Focus on environment

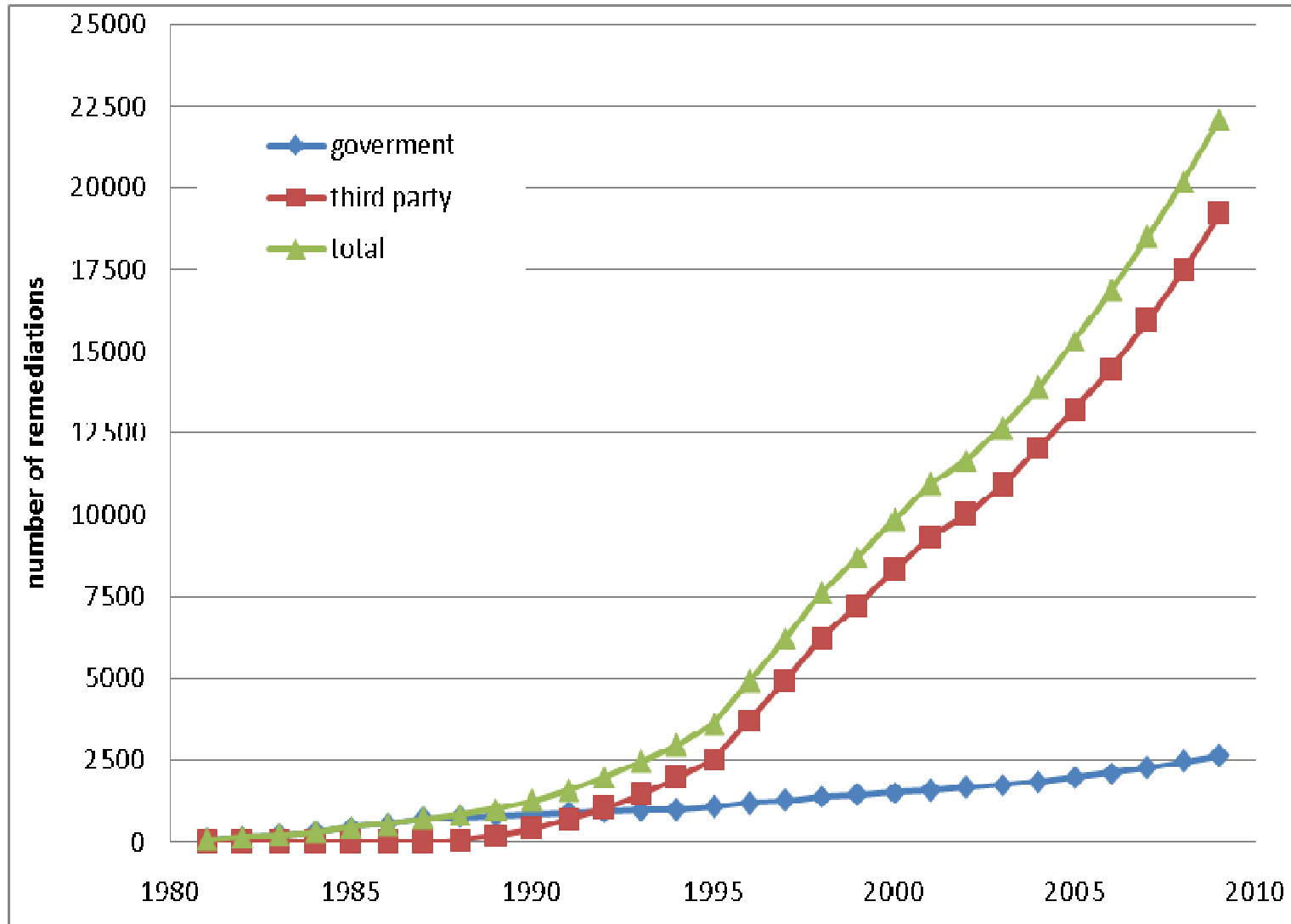


# INVENTORY OF POTENTIALLY CONTAMINATED SITES



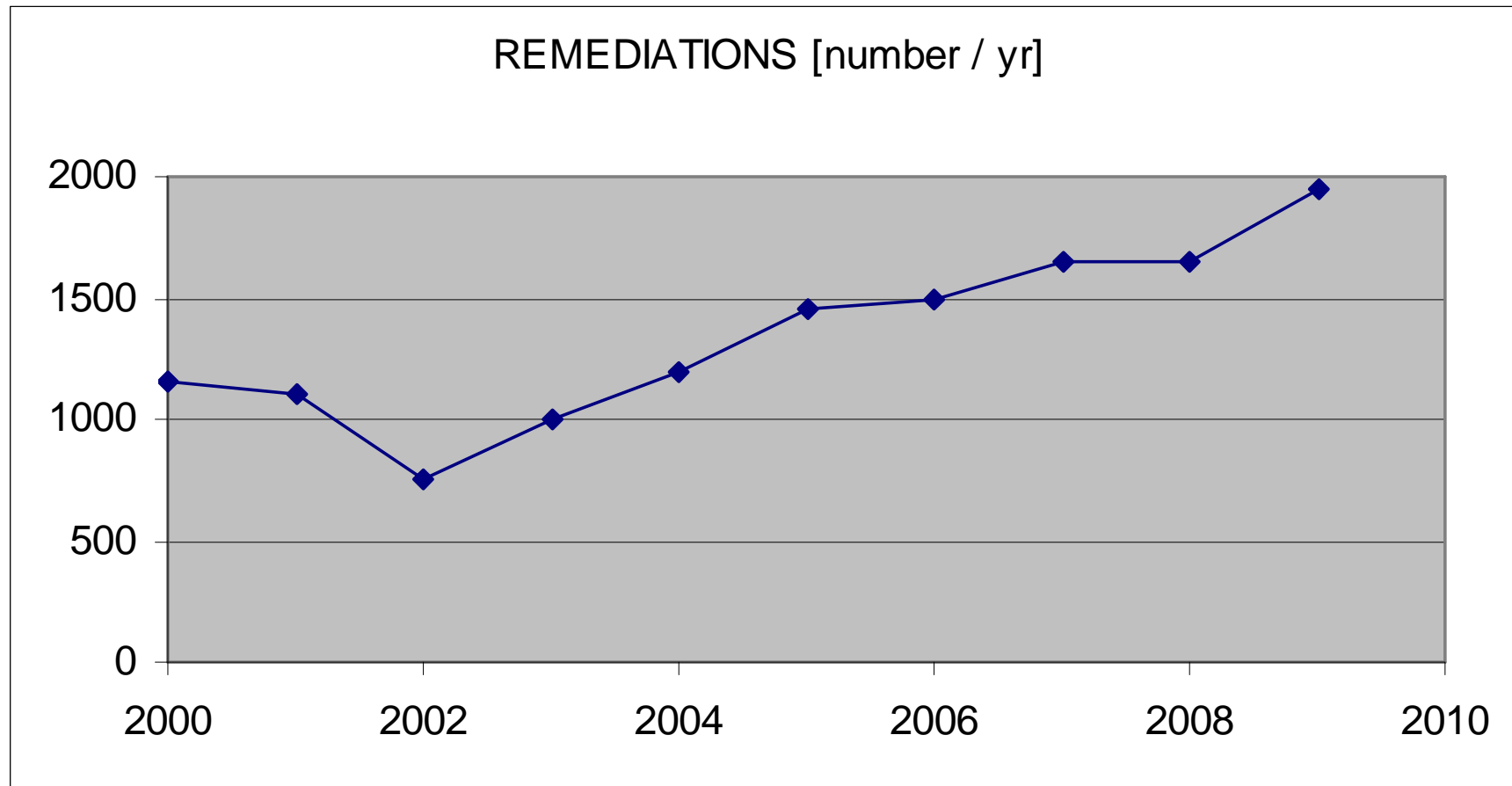
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# NL NUMBER OF SITE REMEDIATIONS



>> Focus on environment

# NL NUMBER OF SITE REMEDIATIONS



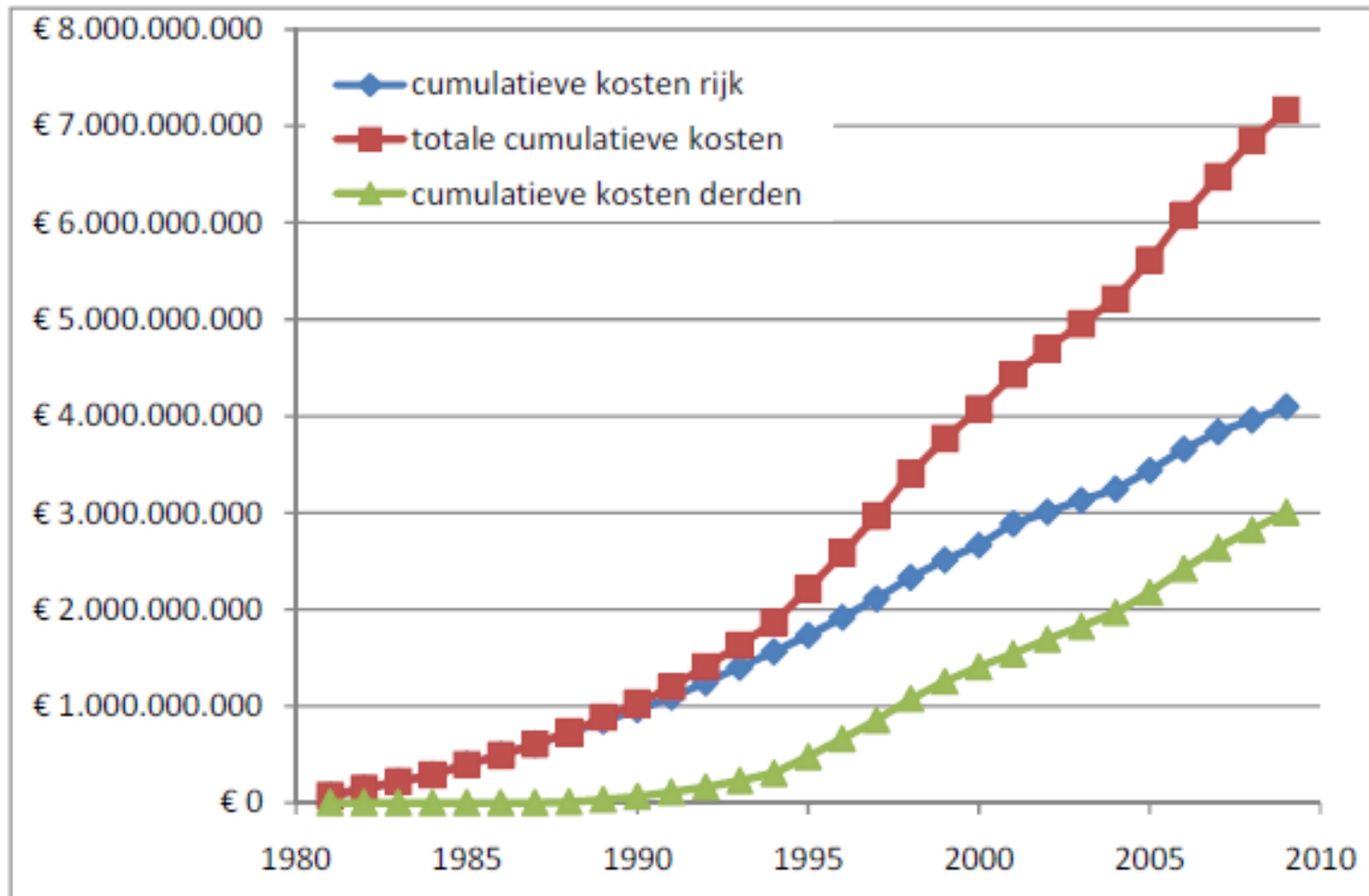
>> Focus on environment



# TYPES OF REMEDIATION (BALLPARK FIGURES)

<b>1.TOPSOIL ONLY</b>	<b>= 60 %</b>
<b>2. SUBSOIL ONLY</b>	<b>= 10 %</b>
<b>3.TOP&amp;SUB-SOIL</b>	<b>= 30 %</b>

# SITE REMEDIATION – CUMULATIVE COSTS



>> Focus on environment

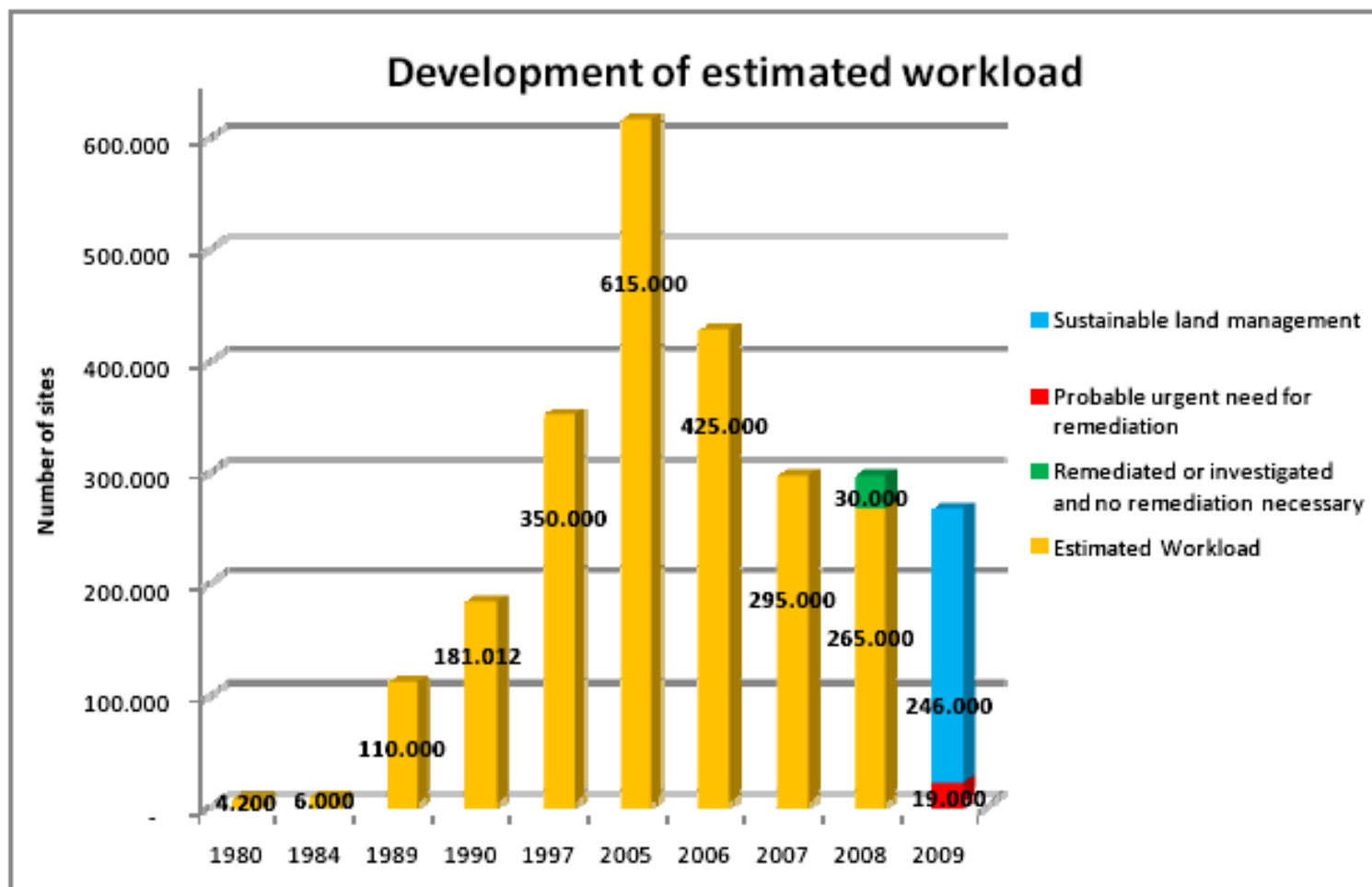


# NL REMEDIATION COST FACTORS



>> Focus on environment

# BREAK-DOWN OF CONTAMINATED SITE INVENTORY



>> Focus on environment



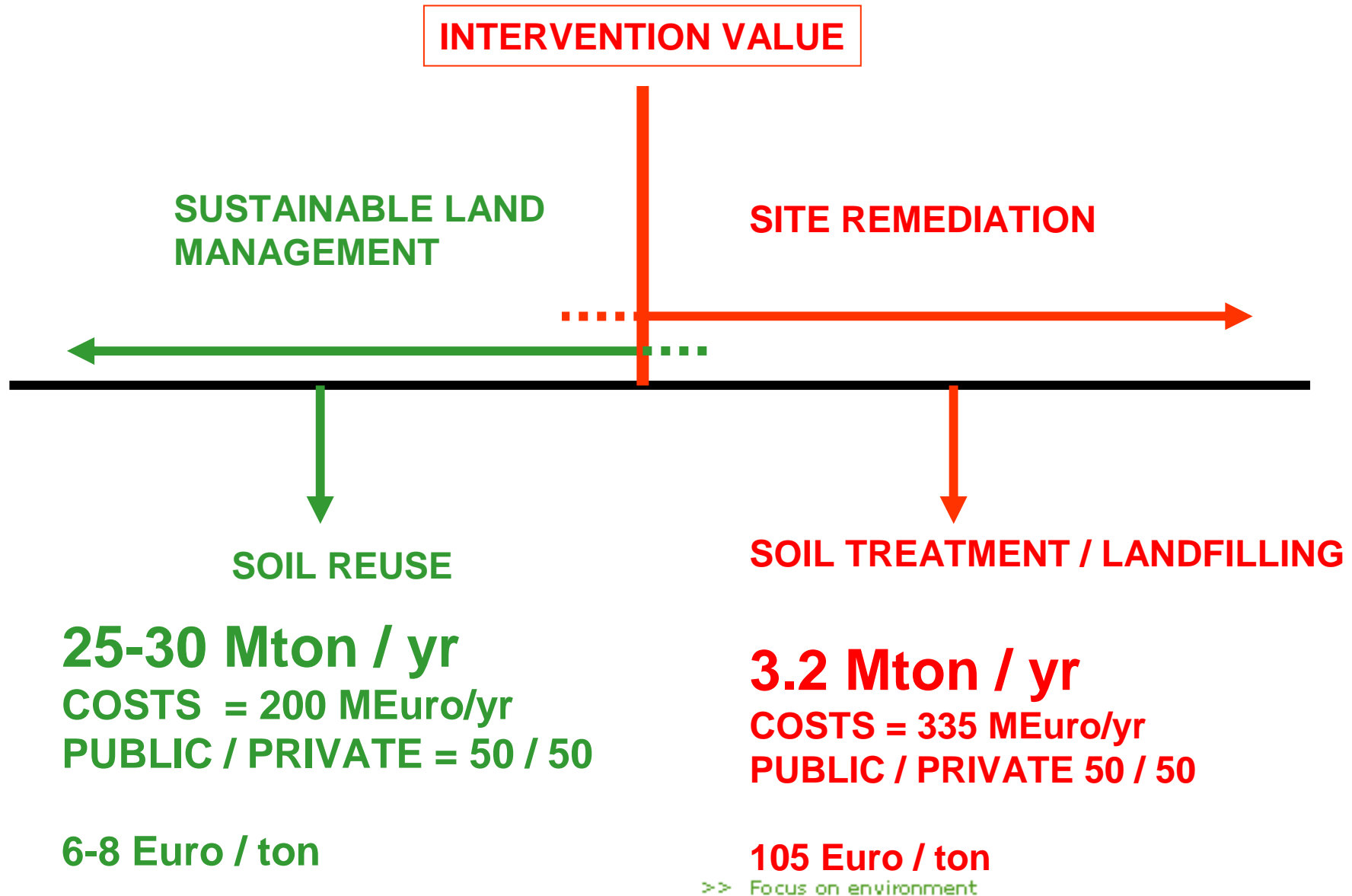
# REMEDICATION – POLICY OBJECTIVES

<b>SITE</b>	<b>NUMBER</b>	<b>TIMEFRAME</b>
<b>URGENT REMEDIATION</b>	<b>5000-7000</b>	<b>2010-2015/20</b>
<b>SUSTAINABLE LANDMANAGEMENT</b>	<b>?</b>	<b>2010-2030</b>

>> Focus on environment



# QUANTITIES AND COST FACTORS (1)



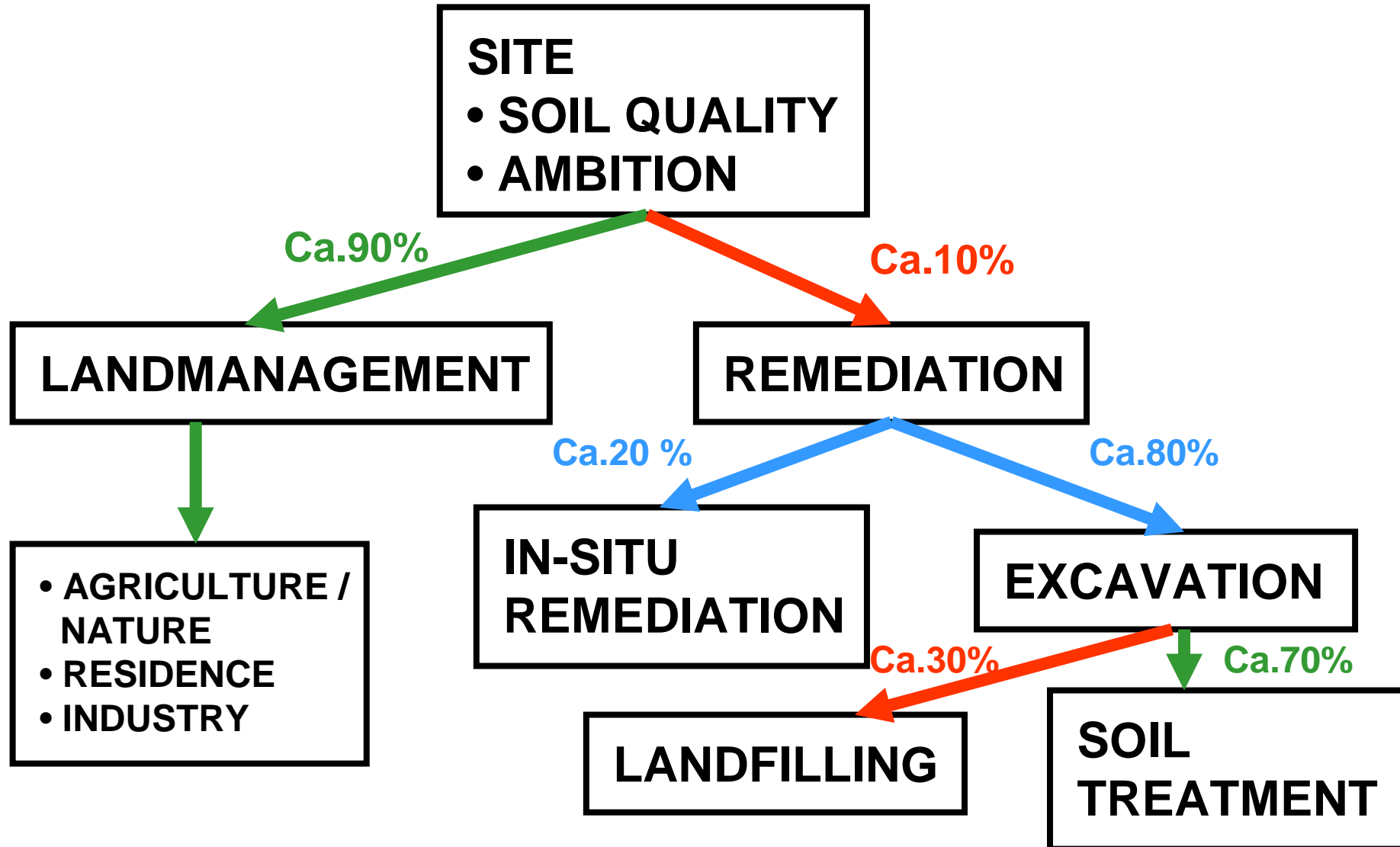


## QUANTITIES AND COSTS FACTORS (2)

<b>POLICY</b>	<b>M Euro / year</b>	<b>Euro / CAPITA.yr</b>
<b>SUSTAINABLE LAND MANAGEMENT</b>	<b>200</b>	<b>12</b>
<b>SITE REMEDICATION</b>	<b>335</b>	<b>20</b>
<b>TOTAL</b>	<b>535</b>	<b>32</b>

>> Focus on environment

# THE DUTCH SYSTEM – THE “SOIL DECISION TREE”



>> Focus on environment

# A PROGRAMMATIC APPROACH



## 1. EXAMPLES:

- FUEL STATIONS (SUBAT) / 1990-2005
- DRY CLEANERS (BOSATEX) / 2005-2020
- SBNS (RAILWAYS) / 1996- ?

## 2. ADVANTAGES:

- PUBLIC / PRIVATE COST SHARING
- LONG TERM APPROACH
  - CLEAR PROCEDURES / GUIDELINES
  - FRAMEWORK CONTRACTS

# INSTRUMENTS AND TECHNOLOGIES



## 1. SITE INVESTIGATION

- NUMEROUS PROTOCLS
- SOIL QUALITY MAPPING AND SUSTAINABLE SOIL MANAGEMENT PLAN

## 2. RISK-ASSESSMENT INSTRUMENTS

- SITE REMEDIATION
- SUSTAINABLE LANDMANAGEMENT

## 3. SITE REMEDIATION / SOIL TREATMENT

- NUMEROUS IN-SITU TECHNOLOGIES
- ROBUST EX-SITU SOIL TREATMENT TECHNOLOGIES

# QUALITY ASSURANCE AND QUALITY CONTROL



**LEGISLATION**



**TECHNICAL  
GUIDELINES**



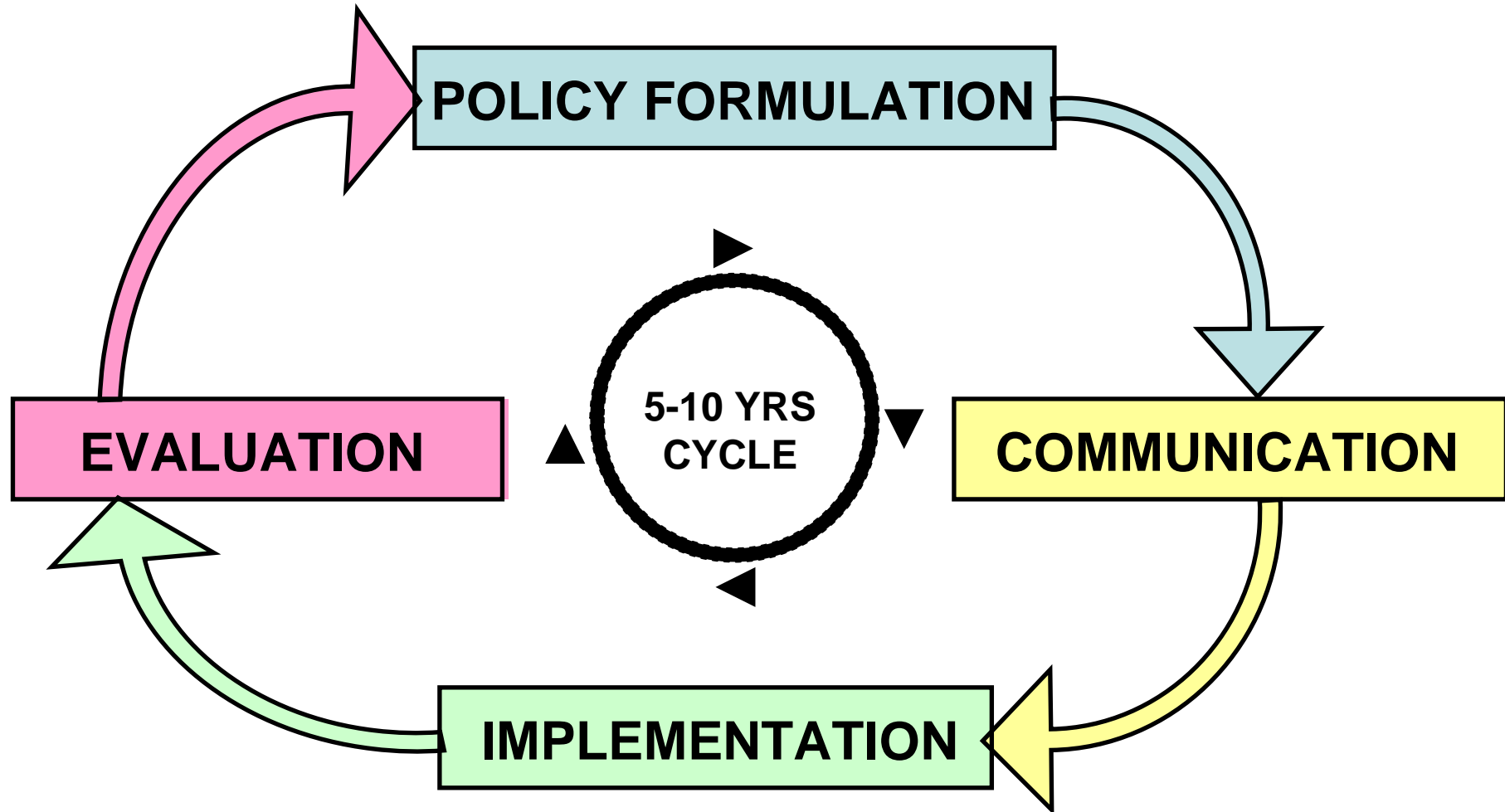
**CERTIFICATION  
SCHEMES**

>> Focus on environment



# “DEMING CIRCLE”

## PUTTING LEGISLATION INTO PRACTICE AND PRACTICE INTO LEGISLATION



>> Focus on environment



# EPILOGUE – POLICY AXIS

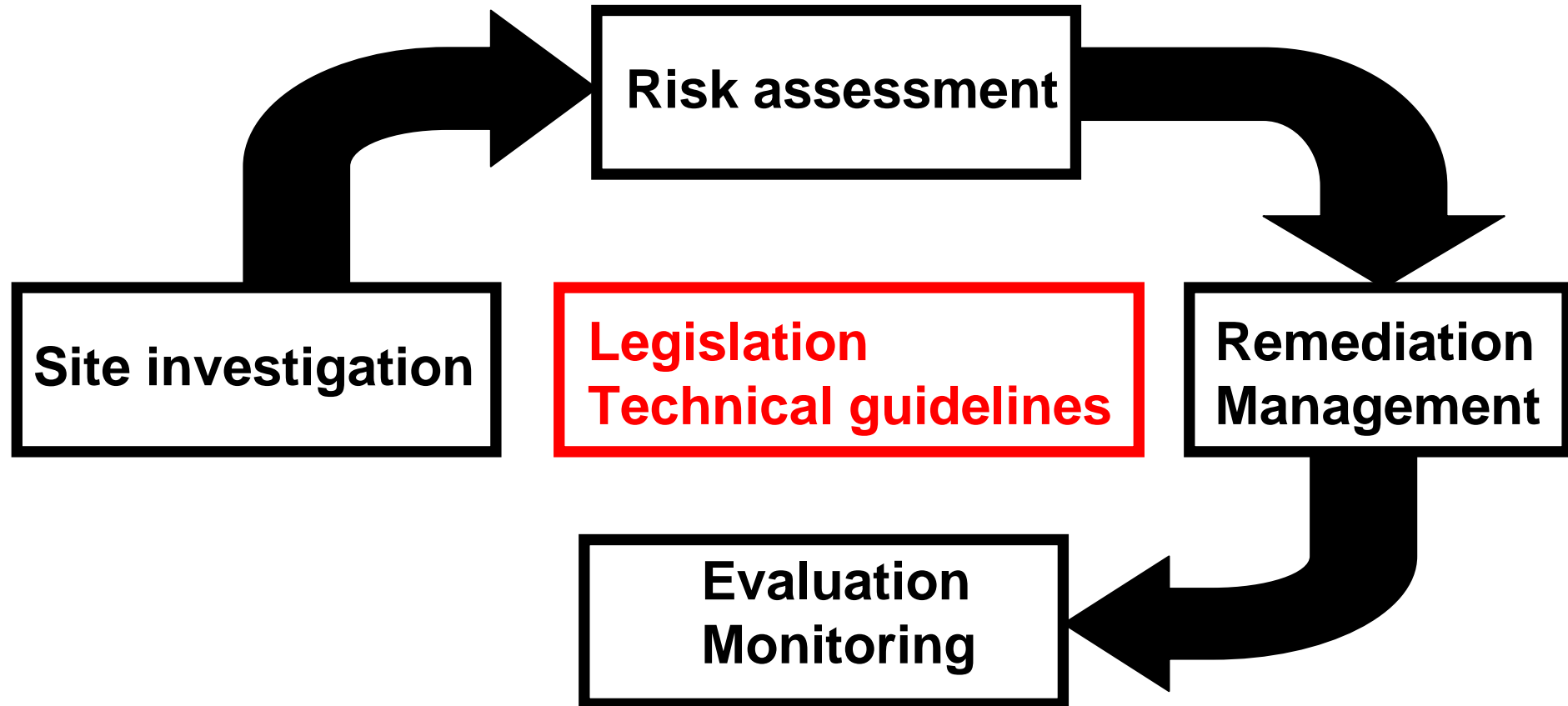
**DEFINE AN APPROPRIATE BLEND OF  
POLICIES ON:**

- **SOIL PROTECTION**
- **SUSTAINABLE LANDMANAGEMENT**
- **SITE REMEDIATION**

**BASED ON A COST / BENEFIT ANALYSIS**



# THE TECHNOLOGY CIRCLE



>> Focus on environment



# EPILOGUE – TECHNOLOGY AXIS

- 1. SITE INVENTORY / PRIOROTISING PROBLEMS (e.g. AGRICULTURE, BROWNFIELDS, GROUNDWATER)**
- 2. RISK ASSESSMENT INSTRUMENTS**
- 3. LOW COST PROVEN TECHNOLOGIES ARE AVAILABLE**



# EPILOGUE – INSTITUTIONAL AXIS

- 1. CLEAR LEGISLATION AND TECHNICAL GUIDELINES**
- 2. CLEAR RESPONSABILITIES**
- 3. GUIDED IMPLEMENTATION**
- 4. MONITOR RESULTS**

# QUESTIONS ?



## FURTHER INFORMATION:

- [www.vrom.nl](http://www.vrom.nl)
- [www.rivm.nl](http://www.rivm.nl)
- [www.bodemplus.nl](http://www.bodemplus.nl)
- TON.HONDERS@AGENTSCHAPNL.NL

>> Focus on environment



**BACKGROUNDVALUE**

**RESIDENCE**

**INDUSTRY**

**INTERVENTIONVALUE**

**SUSTAINABLE LAND MANAGEMENT**

**SITE REMEDIATION**

**AGRICULTURE  
NATURE**



**RESIDENCE**



**INDUSTRY**



**REMEDIATION**



>> Focus on environment

# **Risk Management System for Affected Areas**

Bertil Grundfelt  
Kemakta Konsult AB

[bertil@kemakta.se](mailto:bertil@kemakta.se)

# Outline

## Background

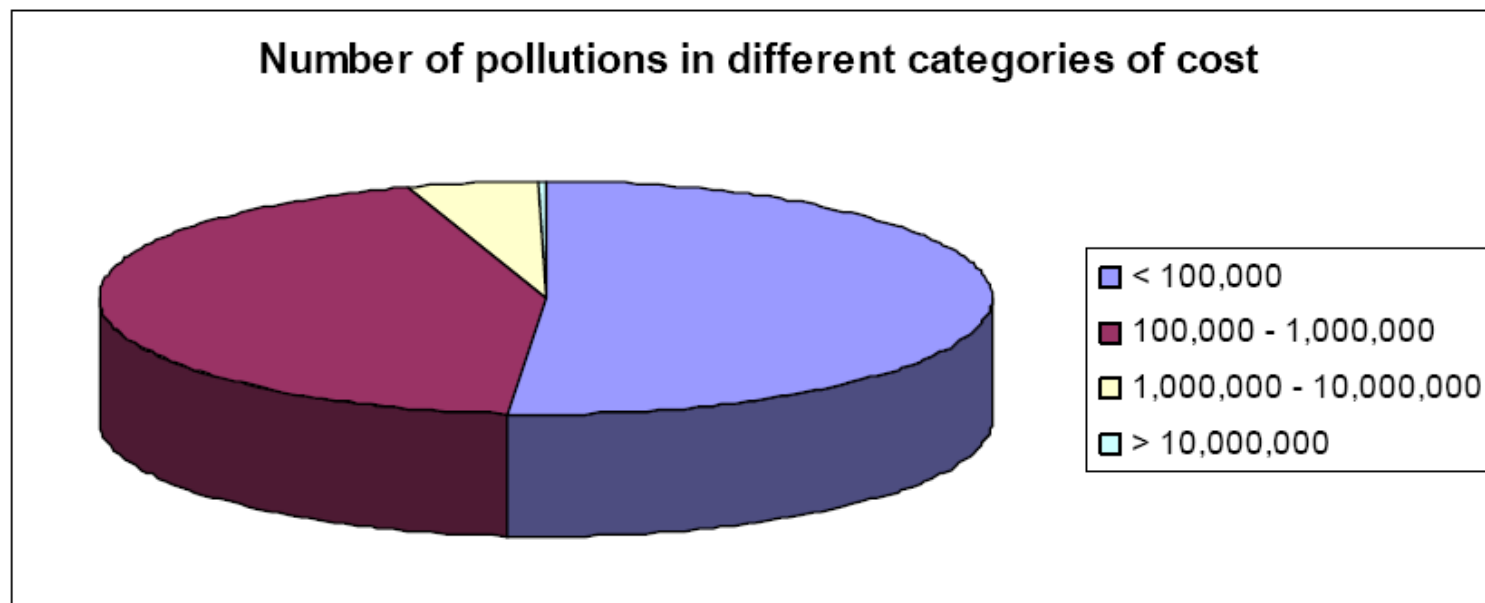
- Remediation costs in the railway system

## Management system

- Chain of activities for contaminated land
  - Responsibilities and driving forces
  - IAS 37 - Standard for financial reporting
  - Examples of practical ways of working
- 
- NICOLE – Network for Industrially Contaminated Land in Europe

# Remediation cost per object

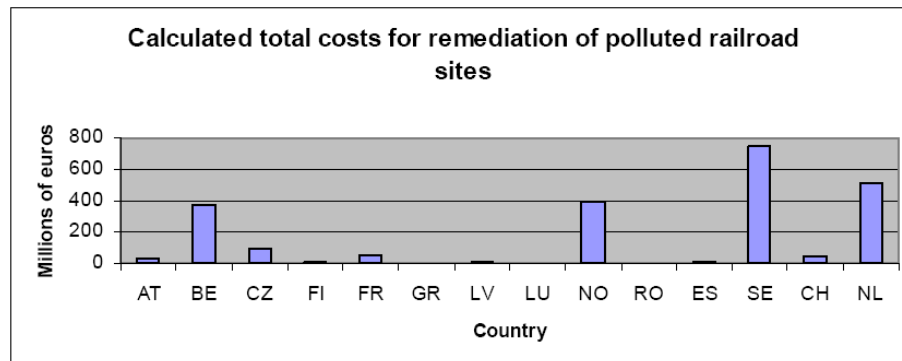
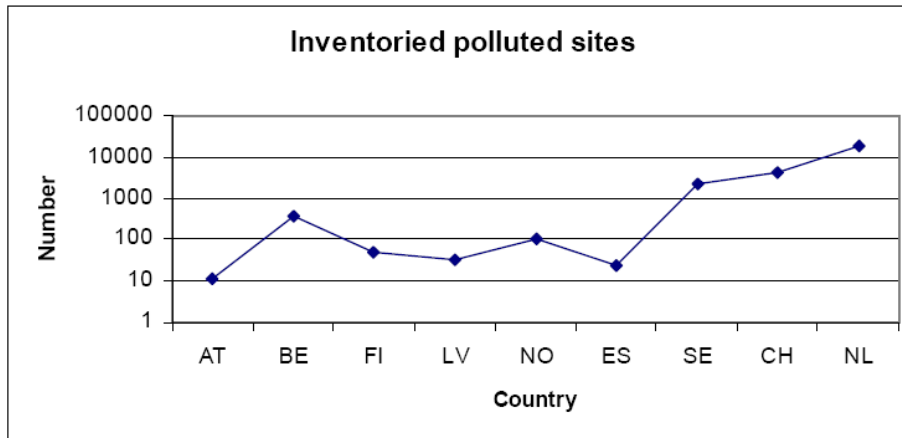
Most sites in the cost class <100,000 € followed by the cost class 100,000 – 1,000,000 €.



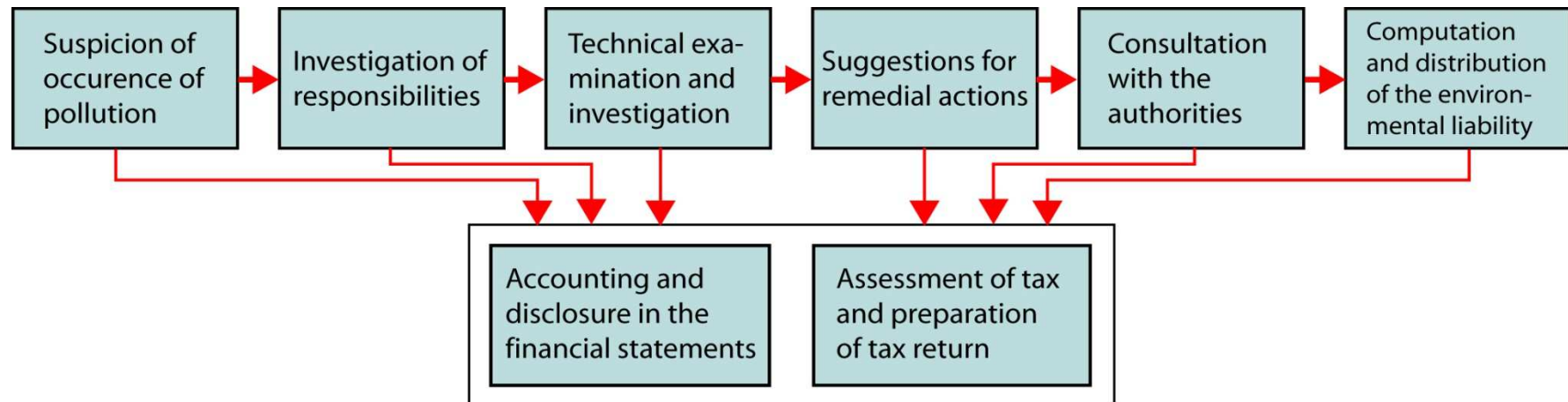


# Total remediation costs

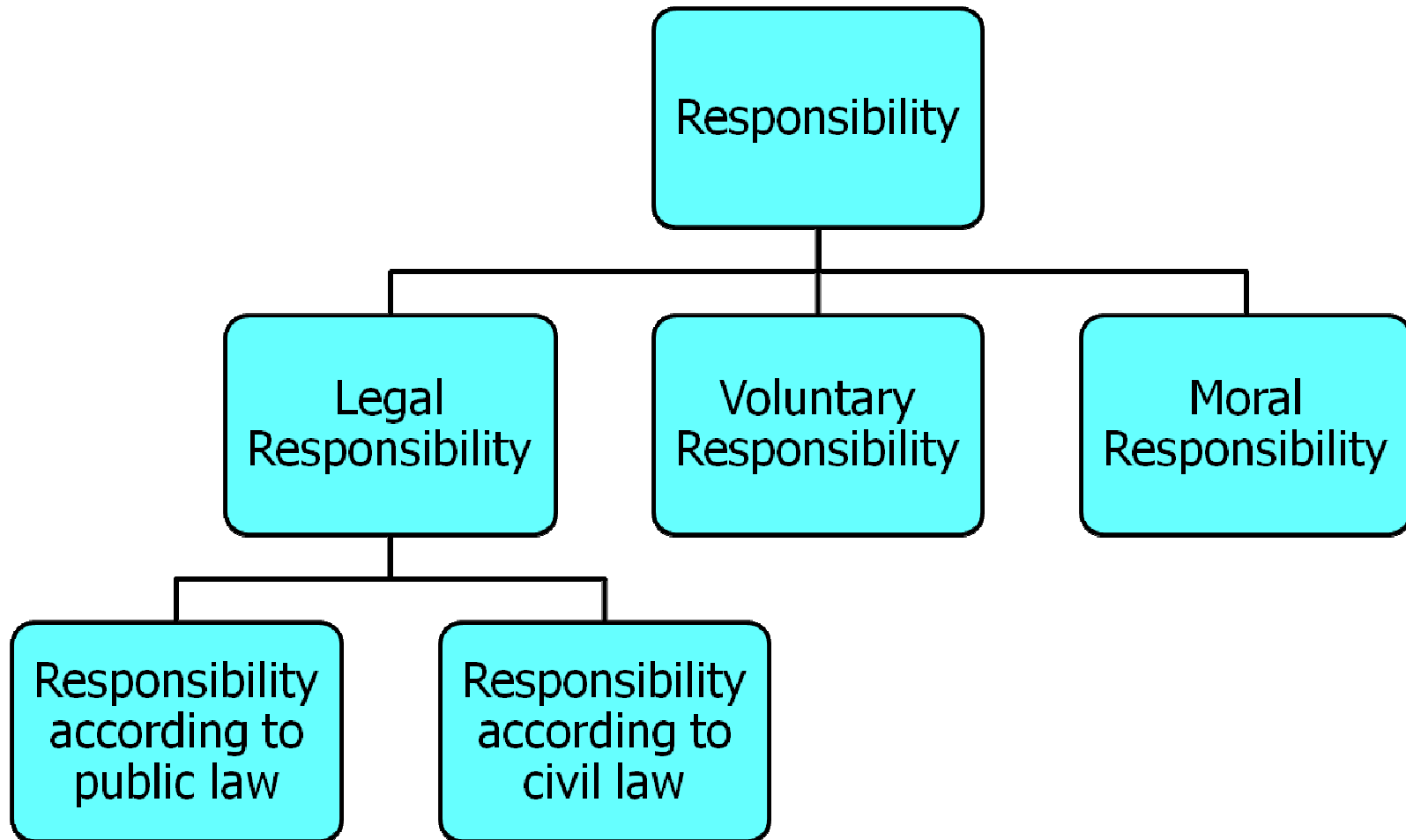
The calculation of the total costs vary strongly between the different railway companies: **from € 0.1 million to about € 750 million** with an average of about € 165 million.



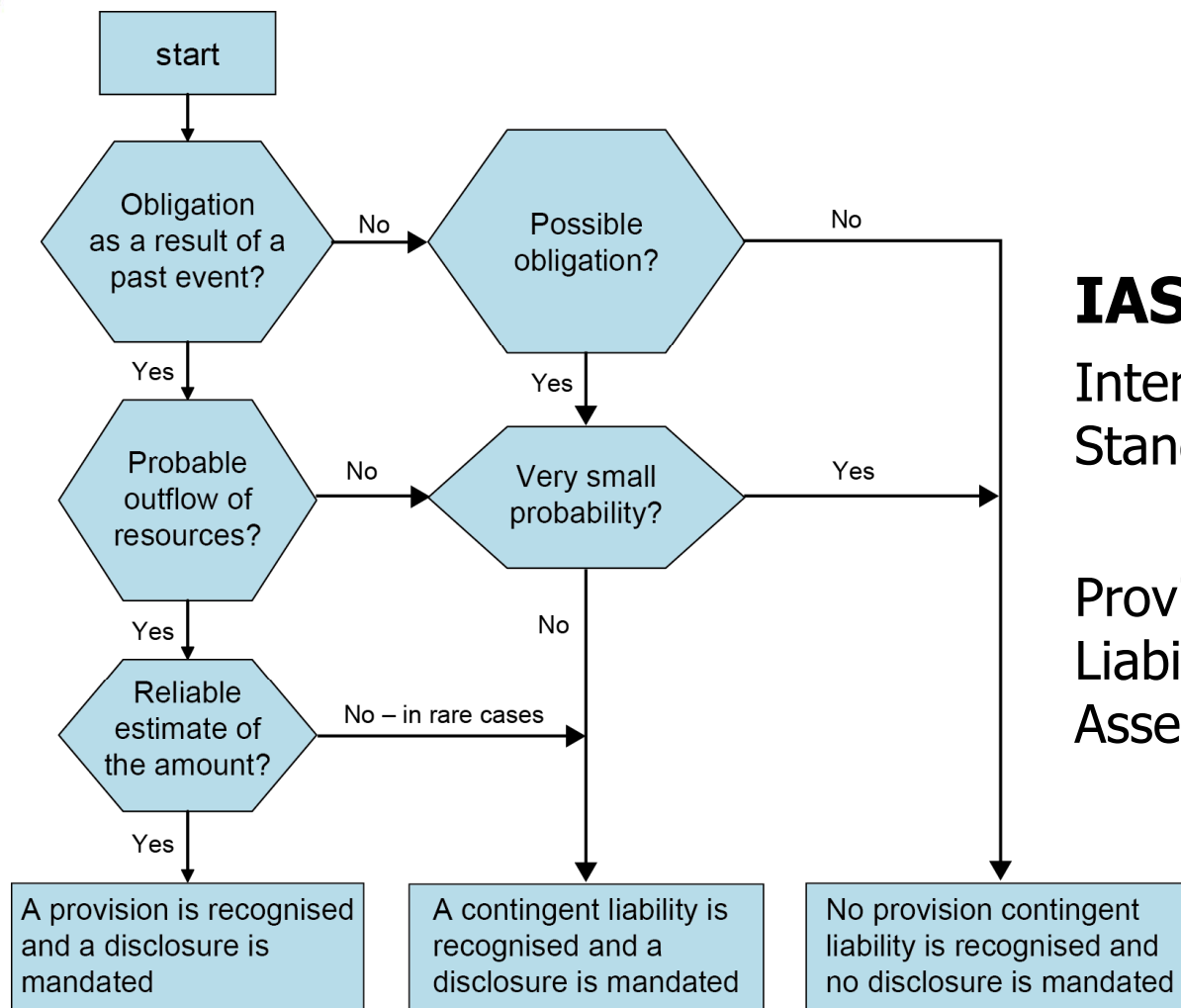
# Chain of activities



# Responsibilities and driving forces



# Decision scheme in IAS 37



## IAS 37

International Accounting Standard:

Provisions, Contingent Liabilities and Contingent Assets

## Need to assess:

- Is there an obligation?
- Probability of outflow
  - >50 % → Provision and disclosure
  - <50 % → Contingent liability and disclosure
  - Remote probability → No need to report
- Estimate the amount of the obligation
  - Reliable estimate → Provision
  - No reliable estimate → Contingent liability (Only very rare cases)



# Practical handling 1

- Many facilities for fuelling and washing of vehicles
- Time-planned target for “all facilities remediated”
- Large similarities between the facilities
- Standard sequence for each facility:
  - Mapping
  - Investigation
  - Remediation
- Spreadsheet with the status for each facility
  - Stage in the sequence
  - Updated estimate of outflow probability
  - Updated estimate of the cost
  - Costs weighted by probability and summed



## Practical handling 2

- Major industrial group with about 20 business units some of which are companies
- Activities at about 30 sites
- Risk of land contamination reported to the environmental manager
- Report always prompts responsibility investigation
- Standardised report for each site for which there is an established responsibility
- Site reports updated each year and submitted to the audit committee



## Overall conclusions of the study

- Suspected and identified pollution not always reported as required by regulations
  - Education of company management important
- Reporting avoided due to uncertain responsibility, uncertain amount, uncertain taxation routines
- "Environmental economy" has little effect on companies
  - Ongoing academic research on methods for companies to report also positive environmental values
  - Liabilities for environmental damage according to the environmental liability directive
- Land pollution very rarely an important environmental aspect in environmental management systems
  - Should be included in the initial environmental review of the organisation's environmental aspects





# NICOLE

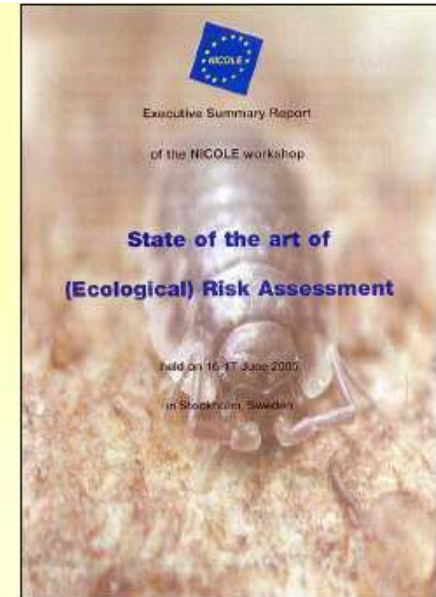
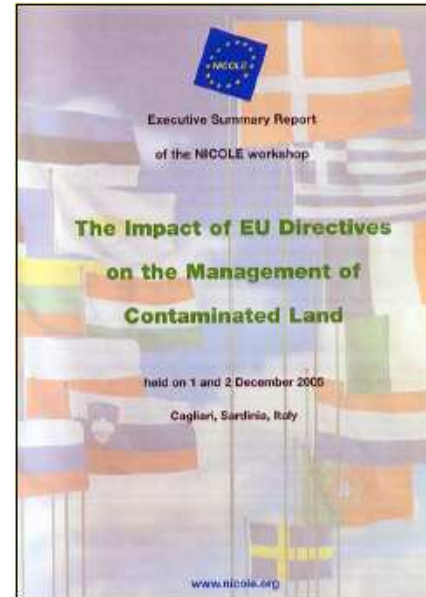
Network for Industrially Contaminated Land in Europe



- NICOLE is the principal forum that European business uses to develop and influence the state of the art in contaminated land management in Europe
- Missions:
  - Provide a European forum for exchange of knowledge and ideas about contaminated land management (share best practice)
  - Communicate with stakeholders inside and outside Europe to promote its views
  - Identify research needs and promote collaborative research that will enable European industry to identify, assess and manage contaminated sites more efficiently and cost-effectively and within a framework of sustainability



- Workshops on Contaminated Land Management
- Meetings of the Industry and Service Provider Subgroups
- Topical working groups



- Contributing technically to EU working groups and maintaining contacts with the European Commission on policy and research related issues
- Maintaining contacts with colleague networks
- Publication of papers and workshop proceedings
- Project development
- NICOLE works in partnership – it does not lobby!



# For more information:



NICOLE Secretariat:  
Marjan Euser  
Deltares, the Netherlands  
Phone: +31 88 3357843  
Email: [marjan.euser@deltares.nl](mailto:marjan.euser@deltares.nl)  
Internet: [www.nicole.org](http://www.nicole.org)



## Next event:

Technical meeting 4-5 November 2010 in Brussels, Belgium

**Emerging and persistent contaminants: PFOs, CFCs and  
Dioxane**

**Treatment technologies for large quantities of  
oil contaminated soils**

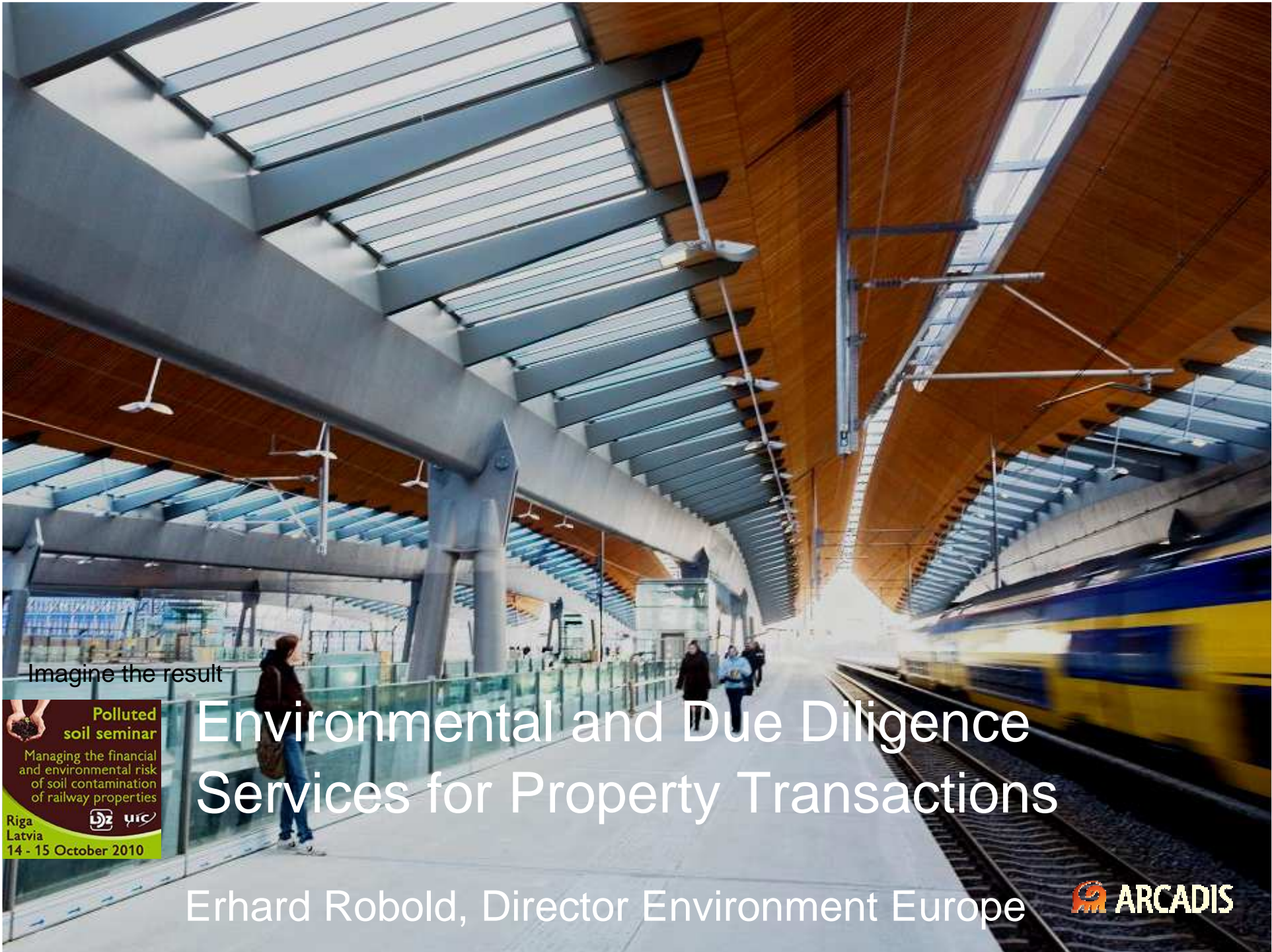


# NICOLE working groups



- Groundwater
- Soil
- Waste
- Brownfields
- Sustainable Remediation





Imagine the result

**Polluted soil seminar**  
Managing the financial and environmental risk of soil contamination of railway properties  
Riga Latvia  
14 - 15 October 2010



# Environmental and Due Diligence Services for Property Transactions

Erhard Robold, Director Environment Europe



# Agenda

Company Introduction

Transactional and Asset Management Services

Due Diligence Services

Some Examples



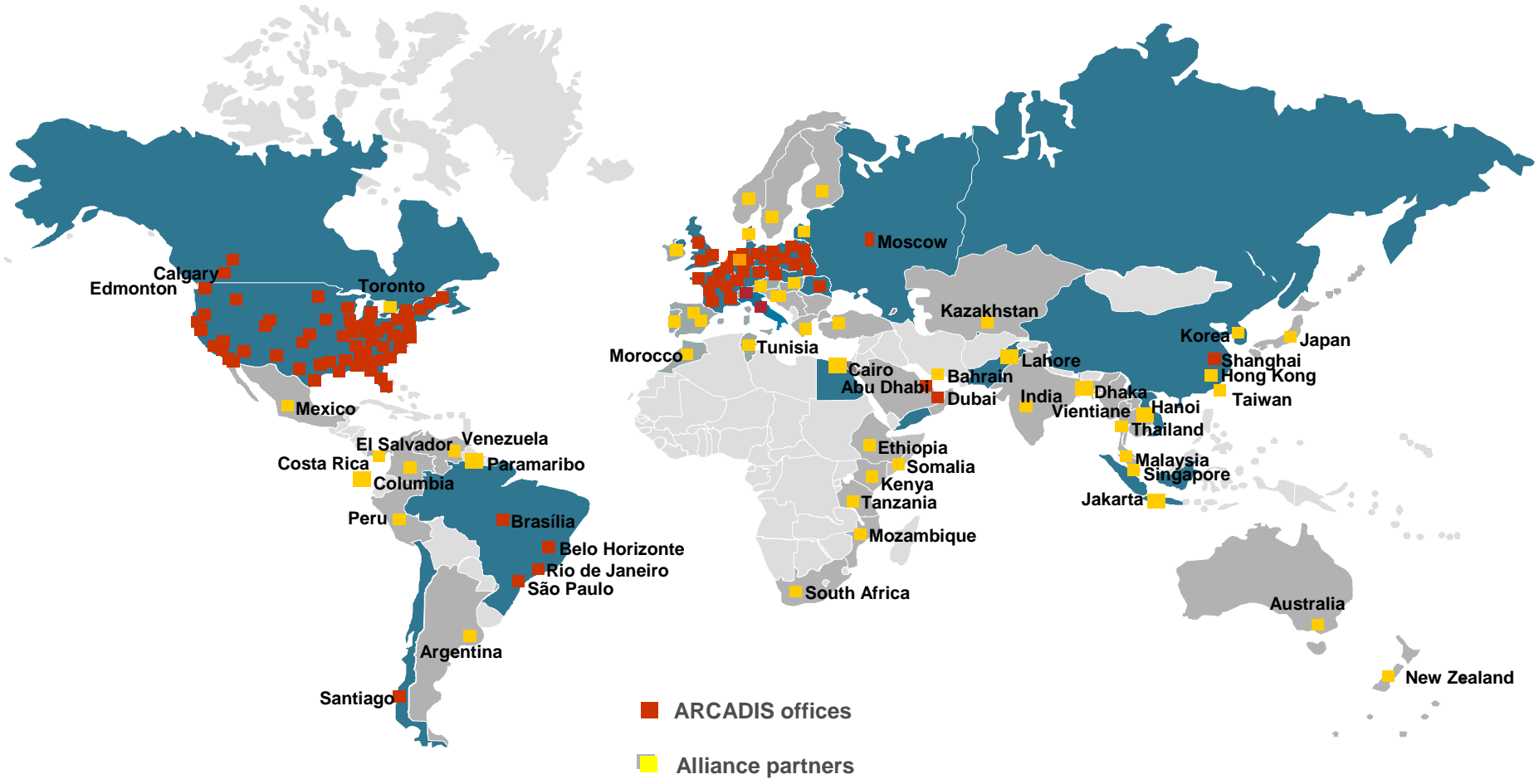
# ARCADIS Company Profile

- ARCADIS is an international firm providing design, consultancy, engineering & management services
- In infrastructure, environment and buildings
- Active in the whole value chain
- 15,000 employees
- Revenues 2009 € 1.8 billion
- Europe top 3
- Worldwide top 10



**High level professional services for the human habitat**

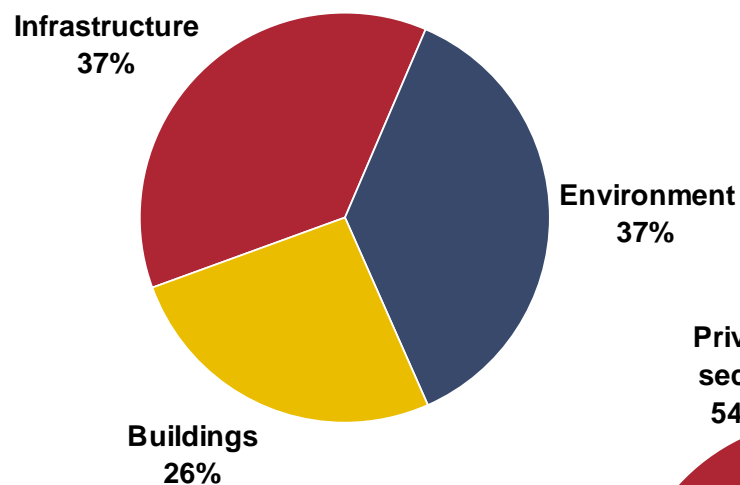
# ARCADIS Global Footprint



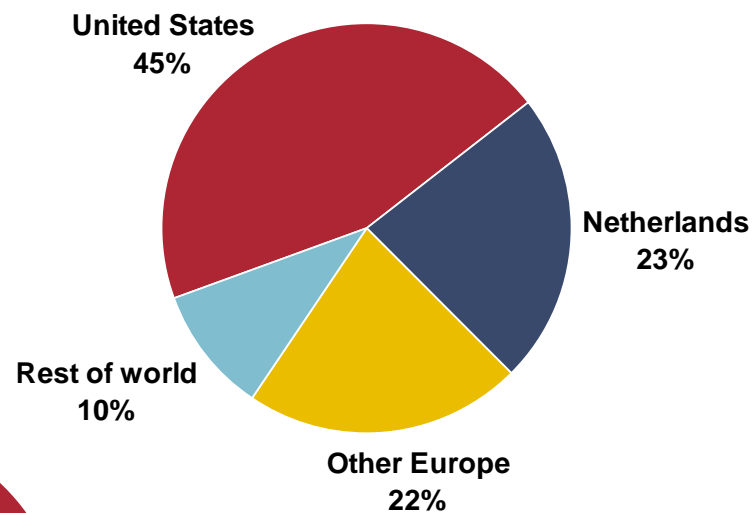


# Distribution of revenues

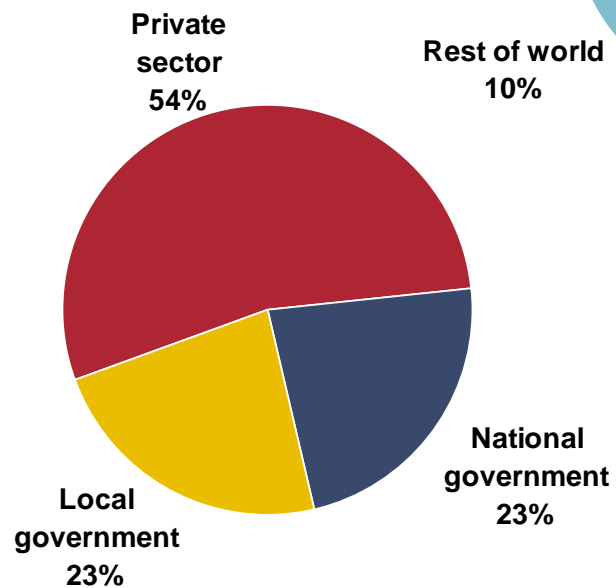
## Activities



## Geography



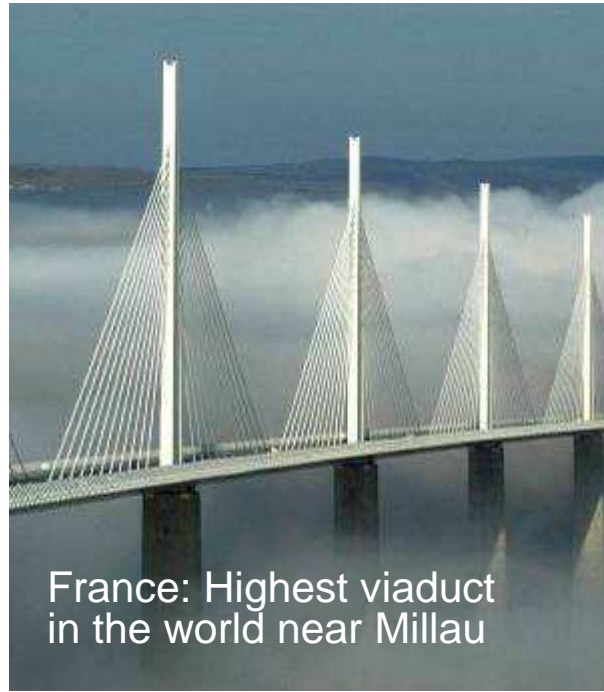
## Clients



# Infrastructure Specialist Rail and Bridges/Tunnels



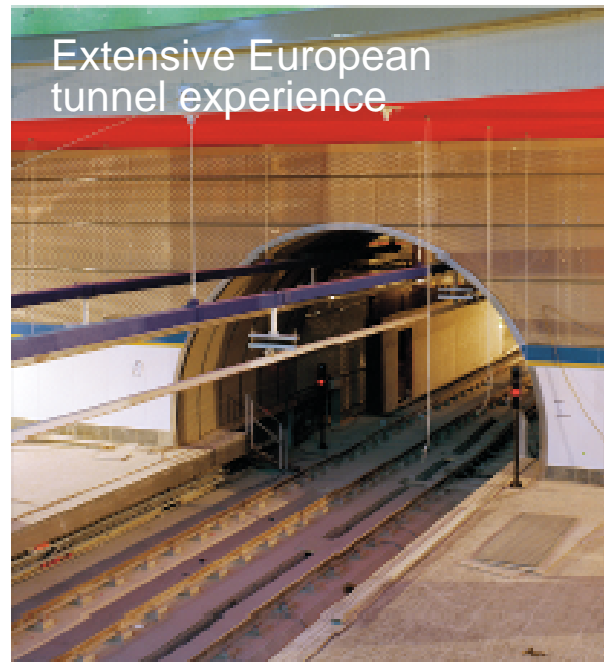
Netherlands: High speed rail line Amsterdam-Paris



France: Highest viaduct in the world near Millau



France: High speed rail systems expansion



Extensive European tunnel experience

# Infrastructure Specialist Rail and Bridges/Tunnels



• Upgrade of Rotterdam metro safety system and build-out of other light rail networks



Poland - Warsaw-Nasielsk line  
Aiming to make rail more competitive with other forms of transportation

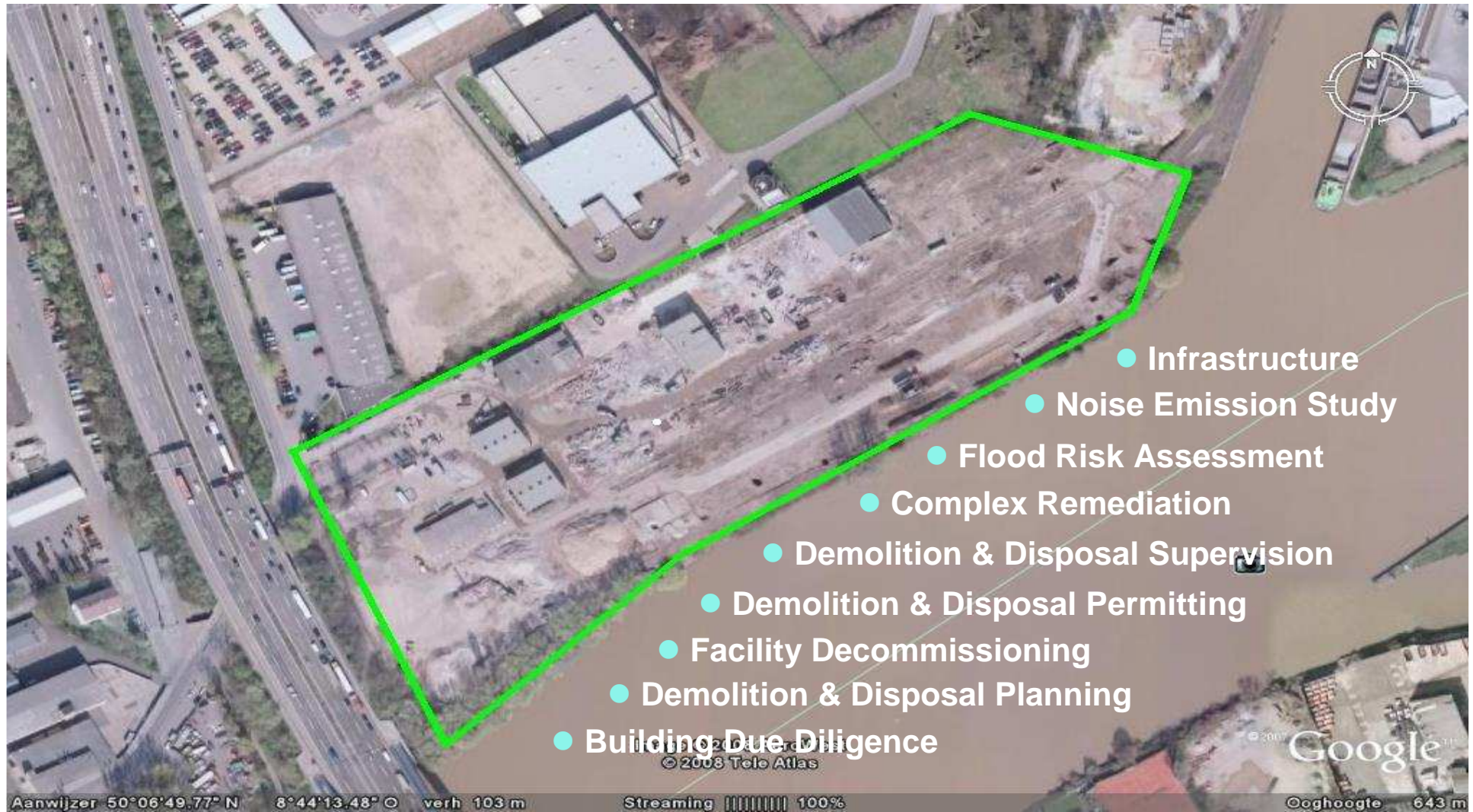


Station design  
Urban & landscape design

# Environmental Services – from a contaminated site ....



# ..... site divestment.....

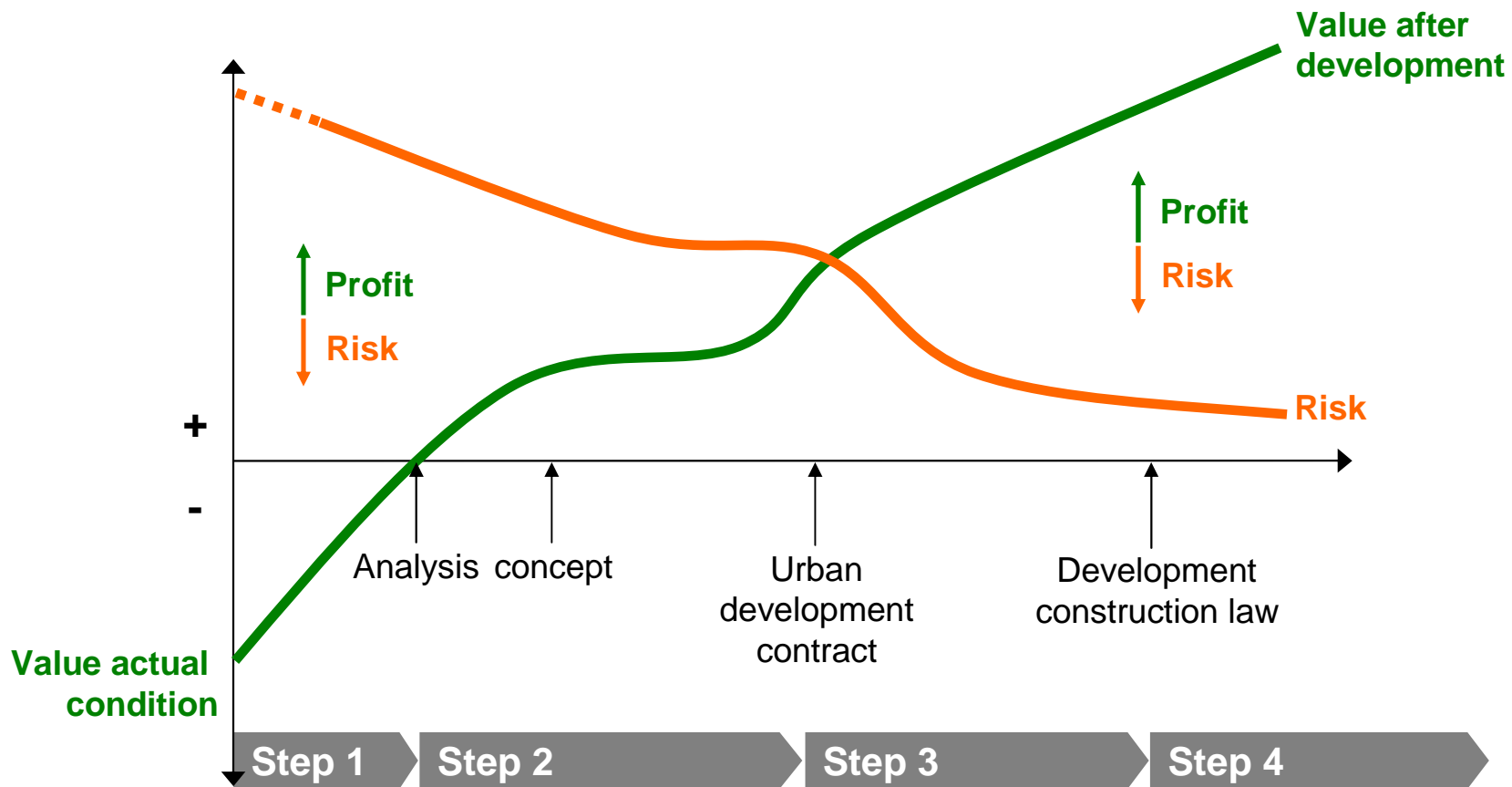


- Infrastructure
- Noise Emission Study
- Flood Risk Assessment
- Complex Remediation
- Demolition & Disposal Supervision
- Demolition & Disposal Permitting
- Facility Decommissioning
- Demolition & Disposal Planning
- Building Due Diligence

.... and redevelopment!



# Transactional Services - Reduce Risks – Optimize the Added Value



# What is Due Diligence?



- A process of systematically evaluating information to identify risks on issues relating to a proposed transaction.
- An evaluation, in financial terms, of the various critical aspects of a transaction by a group of paid advisors to the principals.
- It is a form of assurance
  - The client is putting capital at risk because they believe that the transaction will occur.



# Due Diligence - Impacts on large sales & acquisitions



- Increasing need for fully integrated accounting / technical / environmental / legal Due Diligence team.
- Early involvement of environmental Due Diligence team in definition of auditable liability costs and corporate financial disclosure.
- Increased sophistication needed for environmental cost estimation strategies.
- During transactions the following DDAs may be performed:
  - Financial DD
  - Economic DD
  - Tax DD
  - Legal DD
  - Technical DD
  - Environmental H&S DD
  - etc.

# What does the client do with the results?



## **The Client is the Buyer:**

- Does he still want to do the deal (deal breakers) ?
- Can he get indemnifications for the liabilities and future costs?
- Can he reduce the purchase price because of liabilities and future costs?

## **The Client is the Seller:**

- Present the site to potential buyers
- Show positive issues

# Typical Issues

## Compliance issues

- Cost for installing/maintaining/operating of equipment or working time to be in compliance with regulations

## Soil and Groundwater Contamination

- Cost for investigation and remediation

## Hazardous Building Materials

- Cost for abatement

## Auditor need to know regulations, e.g.:

- General permit requirements
- Air emissions, ODC (ozone depleting subst.)
- Waste water
- Waste
- Noise
- Storage and handling of hazardous materials
- Hazardous building materials (Asbestos, ...)
- Occupational H&S
- (Fire protection)
- Soil and groundwater contamination

# EHS regulations

# What is Phase I, Phase II, ...



Phase I: Document review and site inspection, data room visit.

Phase II: Intrusive site investigations such as Drilling for soil and/or groundwater sampling, sampling of hazardous building materials.

Phase III: Detailed investigation of contamination identified in Phase II, e.g. delineation, identification of contamination center, extend of contamination.

(Technical  
and)

## Environmental Due Diligence - Phase 1



### Inspection of documents

- Data room
- Historical evaluation
- Non-intrusive Due Diligence (ESA Phase I)

### Site visit

- Quick check incl. geotechnical assessment
- Intrusive Due Diligence (Phase II) where necessary
- Structural, mechanical and electrical, FLS

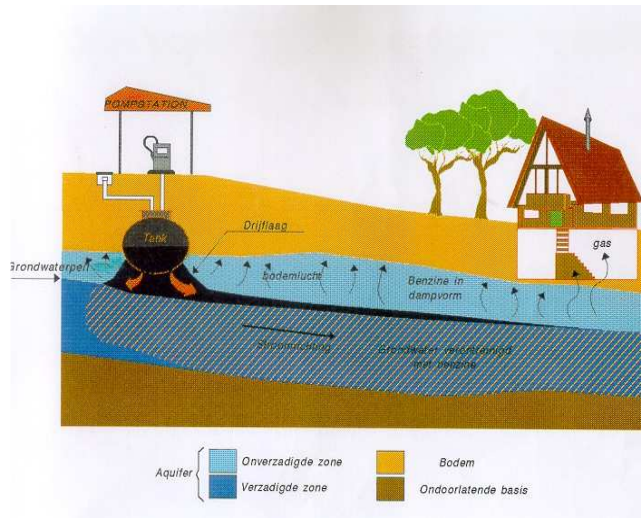
Cost Estimate for renovation / remediation  
or maintenance cost for continuous  
operation

Preparation of reports

Photo documentation



# Contamination caused by former and ongoing Operations



- What potential contaminants are present? (Check hazardous material inventory)
- Leaking ASTs, USTs, sewer system, Oil/water separator.
- Spills caused by loading or transport operations spills.
- Improper sealing of floors in storage or production areas.
- Underground installations such as pipes, channels, hydraulic and supply pipes, etc.
- In general: Everything that contains liquids can leak: Proper precautions and maintenance programs in place?

# Executive Report-Format



Baubegleitendes Controlling  
Projekt XXX  
Projektnr. 9120.xxx

Sample Valuation - Monitoring No. 02  
Samplecity 9120.xxx

## 1 Executive Summary

	costs	deadlines	quality
<b>Project A</b>			
component E	👍	👍	👍
component F	👍	👍	👍
component M	👍	👍	👍
component A	👍	👍	👍
component H	👍	👍	👍
component TG	👍	👍	👎

**Legende:** Without any problems 👍 Problems expected 🟡 problematical 🚩

**Costs:**  
Entsprechend der Leistungsstandfeststellung zum TT.MM.JJJJ ergeben sich voraussichtlich Restherstellungskosten für das Musterprojekt in Höhe von xxx.000.000 €. Mit dem einbehaltenen Entwicklungsumsatz von xxx.000.000 € ergibt sich eine Vertragserfüllungsbürgschaft in Höhe von xx.000.000 €. Gegenüber dem Begehungstermin vom TT.MM.JJJJ war am TT.MM.JJJJ kein großer Baufortschritt zu erkennen.

**Deadlines:**  
Entsprechend den Bauablaufterminplänen TT.TT.MM.JJJJ für das Musterprojekt ergeben sich für das Musterprojekt keine Verzögerungen. Die Fertigstellungstermine der einzelnen Gewerke werden zum jetzigen Zeitpunkt als nicht kritisch betrachtet.

**Quality:**  
Die Qualitäten sind als gut zu bezeichnen.  
Hinweis: Im 2. UG der Tiefgarage sind Undichtigkeiten im Außenwandbereich aufgetreten.

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### 5.5 Walls

Load-bearing internal walls are constructed in in-situ concrete. Internal partition walls will be constructed in dry-lining. According to the construction programme the dry-lining work is planned to start in week 48 / end of mm.yyyy.

### 5.6 Windows

All operable windows are planned as tip-turn windows with thermal insulation glazing. The installation of the windows is planned to start at the completion of the structural shell in the middle of October.

### 5.7 Doors

The entrance door consists of a double leaf wind lobby door. Detailed information on the material will be produced in the course of the further working drawings. The external doors are planned to be installed starting dd.mm.yyyy. It is intended to install the internal doors in the period from dd.mm.yyyy to dd.mm.yyyy.

### 5.8 Floors

Information on the finishings is not yet available.

### 5.9 Fire Precaution

The fire safety concept has been requested. The building can be laddered from all sides. The rescue route is secured. The approach for the fire brigade is ensured via the access to the parking spaces. All other fire protection details can first be evaluated when the fire safety concept is inspected, and is dependent on the internal fit out.

### 5.10 Staircases

The three-flight concrete stairs with open gaps between will be constructed in precast elements. At the time of the site inspection the structural shell of the staircases were completed up to the 2nd floor level. The installation of the precast components and the formation of joints at connections have been carried out properly. All entrances are suitable for the handicapped.

### 5.11 Internal Finishes

Information on the finishings is not yet available.

### 5.12 External Areas

The external works have not yet been finally awarded. A design concept is currently being developed for the area of the public pavements alongside the streets.

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# Due Diligence – Phase II



When to recommend a Phase II ?

Advantages/Disadvantages:

- ++ Knowledge of subsoil & groundwater situation
- ++ Identification of potential contamination
- ++ Cost estimates /Cost certainty
- Contamination to be reported to Authorities
- Clean-up may have to be done

# Some Rules



- Qualified technical specialists with local knowledge and sensitivity to local/national issues/regulatory climate.
- Maintain databases of projects that can be relied upon for environmental information
- Being flexible about the content and format of the environmental due diligence reports.
- Adhering to a basic set of standards for the site inspection, the records review process, and reporting.
- Rigorous quality control review by a qualified environmental professional with experience in the country where the transaction is taking place.

# Team Characteristics



“Hats” which the team members must wear:

- Diplomat
- Psychologist
- Corporate Liaison
- Detective
- Lawyer
- Engineer
- Saint

# Confidentiality and Conflict of Interest



Confidentiality is essential:

- to third parties
- to employees of the client and the target company

What is a conflict of interest?

- Any involvement of ARCADIS that could lead to a result that is unfavorably biased for the client.
- Check before writing a proposal.

# Need an Established Structure to Compete Effectively



## Delivery

- Apply top experience on all projects
- Ensure that product is consistent and advisory

## Consistency

- Standard proposals
- Standard work products
- Training
- Designated responsibilities

## Efficiency

- Experienced teams
- Standardized approaches
- Regionally established
- Short cycle times

## Transactional Services; e.g. – Poland



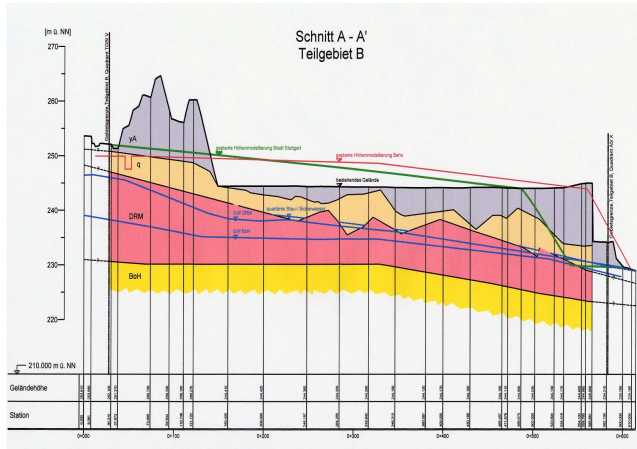
Env audit incl EHS compliance and possible contamination liability assessment of PKP Intercity, PKP Wars and PKP Przewozy regionalne

- For the privatization process (transport of people and materials):
- Assessment of all assets and sites potential contamination and env risk.
- Review of fulfillment of environmental duties directed by Polish env regulations.
- for Price Waterhouse Coopers and ING Securities S.A.

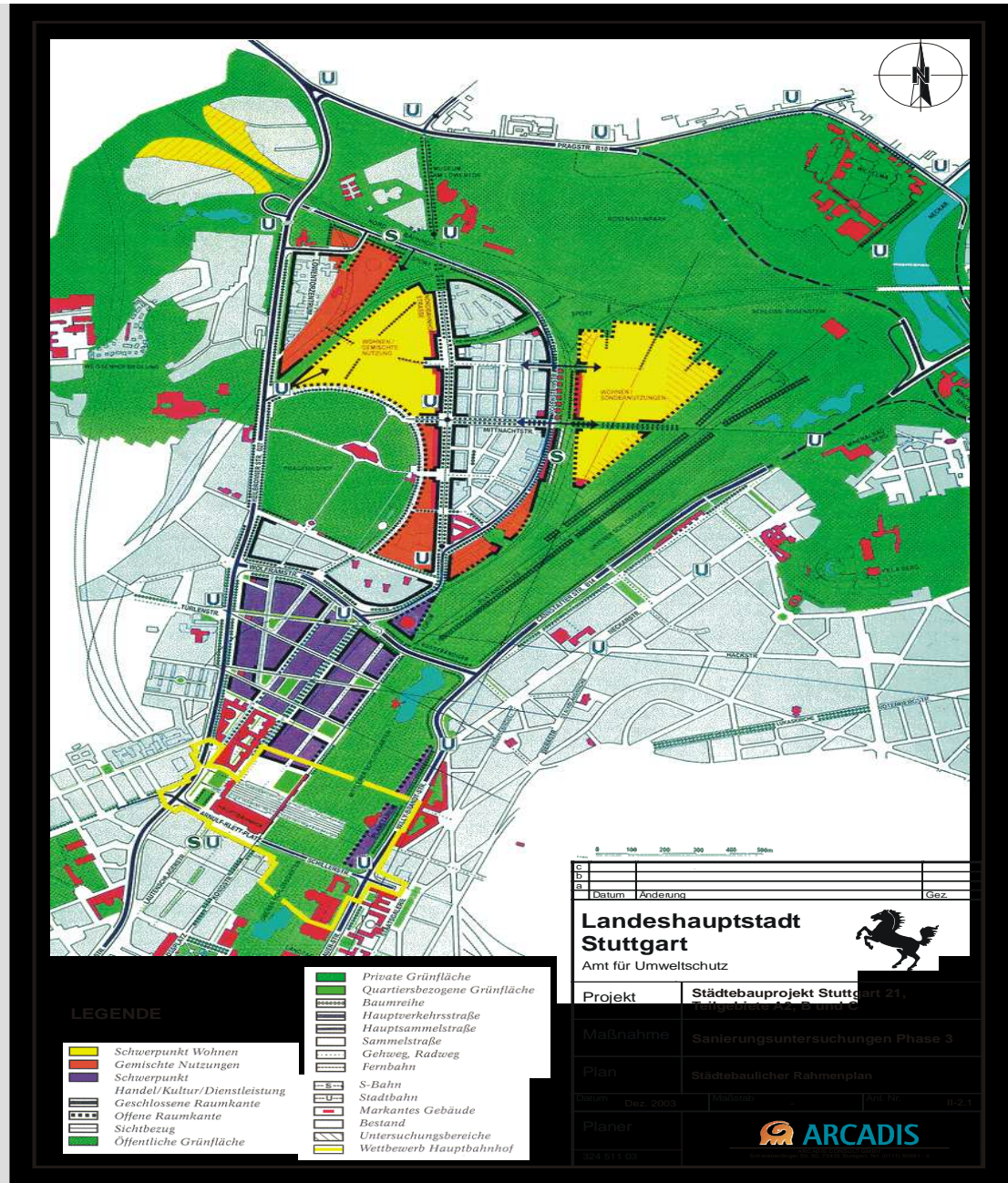
Env Compliance Report for Zakładu Naprawy Taboru Kolejowego (railway maintenance facility) GATX Rail Poland Sp. z o.o. in Gdansk, Ostróda and Płock.

- The subject was the fulfillment of the env duties, which are the consequence of the polish env regulations, both past and present.

# Transactional Services; e.g. – Germany - Stuttgart 21(1) Property Transfer to Municipality

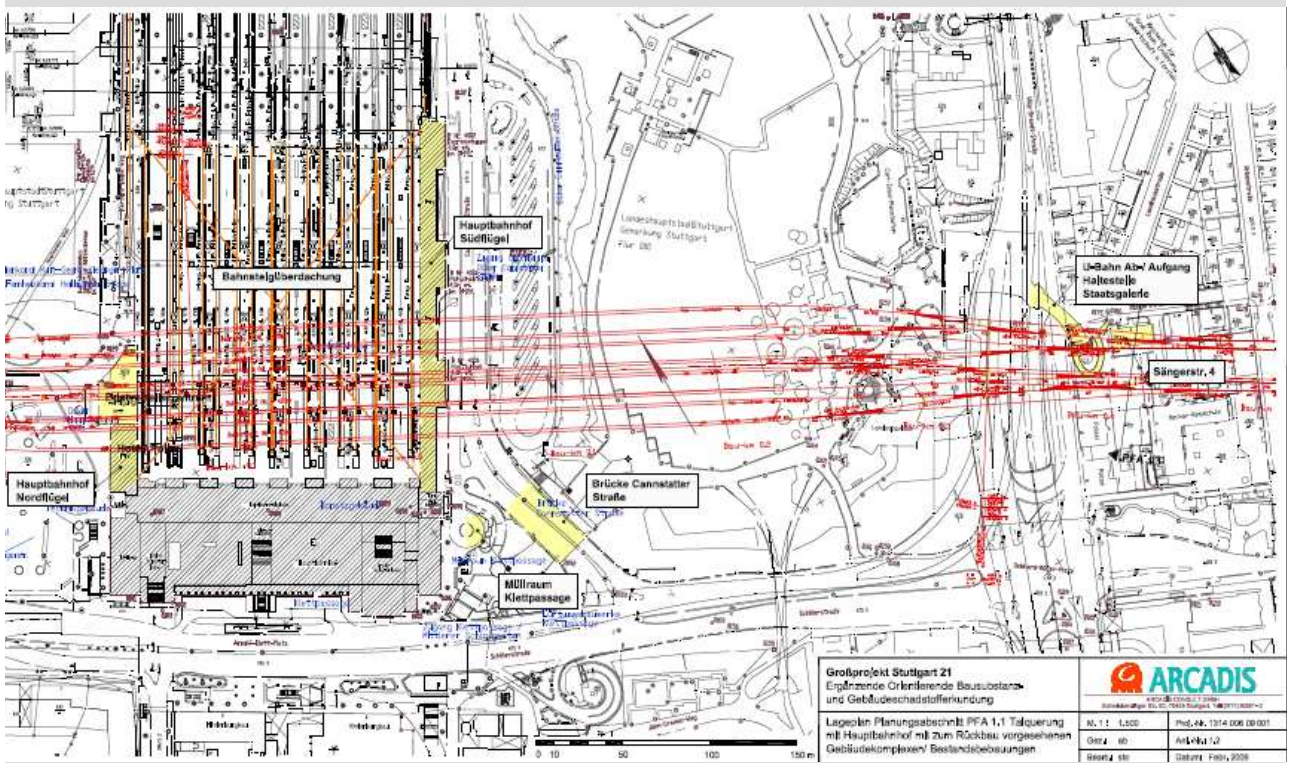


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# Transactional Services; e.g. – Germany - Stuttgart 21(2)

## Investigation of Hazardous Building Materials

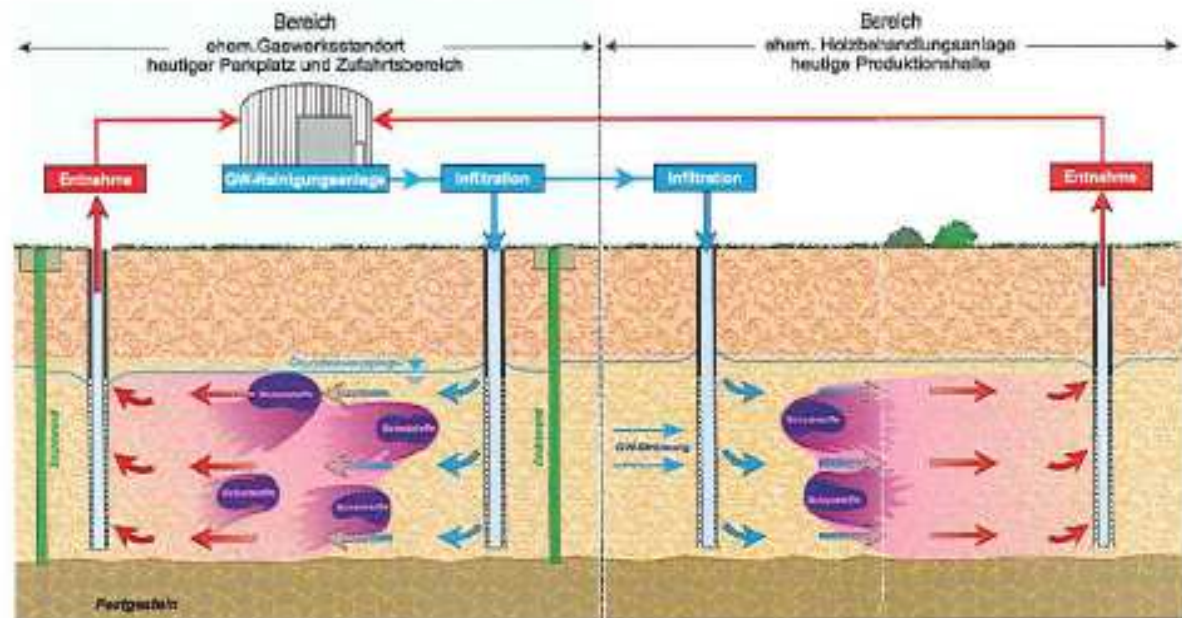




# Post Transactional Services; e.g. – Germany -Bad Cannstatt



## Groundwater remediation on a sold property



...thank you for your attention!

Imagine the result



# HOW TO HANDLE CONTAMINATED SOIL BEFORE AND DURING RAILWAY CONSTRUCTIONS

## BEST PRACTICE

Mads Dige Toft



2010-10-14  
HOW TO HANDLE CONTAMINATED SOILS BEFORE AND DURING RAILWAY CONSTRUCTIONS

# AGENDA

- Polluted areas
- The scenario
  - Gathering soil samples
  - Intermediate soil dumps
  - Soil disposal
- Considerations
  - What to do before and during excavating
  - Who will do what?
  - Time and logistics



# WHERE CAN WE EXPECT CONTAMINATED SOIL?

- Station areas
  - Service areas (tanking, maintenance .....
  - Where locomotives stop
  - Accidents
  - Exhaust gasses
  - Soil disposal
- Outside station areas
  - Contaminated soil is rare
  - Disposed soil from station areas





## THE SCENARIO

- Determine if the soil is contaminated or not
- Where to deposit the soil
- Time and logistics
- Documentation

# PROBLEMS TO CONSIDER

- Will you analyse the soil before the construction work?
  - What to do?
    - Historic investigation of possible known or potential sources for contamination
    - Dialogue with authorities
    - Gathering samples for analysis before start of construction work
    - Making material for contractor – Excavation plan
- Will you analyse the soil during the construction work?
  - The difference is that you gather samples during the construction work

# GATHERING SAMPLES BEFORE EXCAVATING

- Necessary to stop traffic
- Typically 1 sample each 5-8 meters





# GATHERING SAMPLES BEFORE EXCAVATING

## PRO AND CONS

- + You know the amount of contaminated soil
- + You can start excavating and remove the soil directly from the spot
- If you have heavy contaminated soil next to clean soil. Where is the boundary? Supervision while excavating?
- If the project is changed the samples can become inadequate



# GATHERING SAMPLES AFTER EXCAVATING

- Necessary to have areas to stack soil in piles
- Time to gather samples
- Time for analysis
- Expect the soil to be there for 5 days before the soil can be moved and deposited



# GATHERING SAMPLES AFTER EXCAVATING

## PRO AND CONS

- + Homogenization of soil
- + Minor or no supervision while excavating
- + Changes in the project does not affect
- Temporary depot for soil
- Time



# SOIL ANALYSIS

- Logistic. Where/who can make the analyses?
- Time
- Analysis parameters
  - Hydrocarbons
  - Metals (Pb, Ca, Cu, Zi)
  - PAH (Polycyclic aromatic hydrocarbons)
  - Pesticides?





## AREAS FOR INTERMEDIATE SOIL DUMP

- For new and old materials
- For stacking up soil in piles
- Reloading soil from railway wagons to trucks
- Bigger is better ...!
- Authorities

# AREAS FOR INTERMEDIATE SOIL DUMP

- Important because of the logistics
- Projects move in a bad way if the intermediate dumps are too few and/or too small
- Bigger is better – A truck with 6 axles needs 500 m<sup>2</sup>
- Intermediate dumps are necessary both when soil is analyzed before or during the project
- Stacking in piles requires space



# AREAS FOR INTERMEDIATE SOIL DUMP

- Also necessary for other materials
  - Sleepers
  - Ballast stones
  - Concrete and asphalt scrap



# WHERE TO LOCATE INTERMEDIATE AREAS

- Adjacent to the track





# WHERE TO LOCATE INTERMEDIATE AREAS

- Station areas
- Industrial areas
- Concrete or asphalt layered areas is preferred
  - Prevents to make the contamination level higher in the ground because of the intermediate stacking of soil



# WHERE TO LOCATE INTERMEDIATE AREAS

- Agricultural areas



## ALTERNATIVE ....

- External soil dumps.
  - Intermediate/permanent
- Still necessary to have areas for reloading – most times





## SOIL DISPOSAL

- Decontamination or certified receivers
- Rebuild in the project

# DEPOSITION OF SOIL

- Heavy contaminated soil
  - Decontamination
  - The price is solely determined by the analyses
- Moderate contaminated soil
  - Disposal in gravel pits, noise barriers or recycle it in the project (requires permission from authorities)
- Clean soil
  - Disposal in gravel pits (cheapest) or recycle it in the project (requires normally permission from authorities)



# DISPOSAL OF SOIL

- Rebuild contaminated soil in the project .....if it's possible?
  - Strengthening of railway dams
  - Landscape modeling
  - Do it aesthetic!
  - Authorities





## CONSIDERATIONS

- What to do before the excavations
- What to do during the excavations
- Be aware of .....

# WHO WILL PLAN AND DO THE ENVIRONMENTAL WORK

- Owner or adviser makes project material
- Owner of contractor?
  - Pros and cons





# BEFORE EXCAVATING

- Authorities
- Find intermediate areas
- ... or find external dumps
- Check the amount of soil that has to be handled – Don't forget the amount originating from sewer and drainage work



# BEFORE EXCAVATING

- Detailed project material
- Consider all kinds of situations
- The good project will minimize extra expenses
- Expect that the contractor knows the project material better than you



# DURING CONSTRUCTION WORK

- Who is responsible for:
  - Gathering soil samples
  - Contact to authorities
  - Owner or contractor?
- Manage the contractor and make sure that he acts as described in the project material
- Act quick



# DURING CONSTRUCTION WORK

- If the soil cannot be handled quickly, it can obstruct the project. Examples:
  - Missing permissions from authorities (also noise and dust)
  - Intermediate areas are too small
  - The expenses are small compared to the whole budget



# BEWARE

- Environmental work is normally considered as a minor thing in a project
- Contaminated soil is often the reason why budgets is exceeded
- What you can't see is unknown
  - Unless preliminary surveys are made



# SUMMARY

- Plan the detailed project
- Contact authorities
- Collect data
- Minimize extra expenses



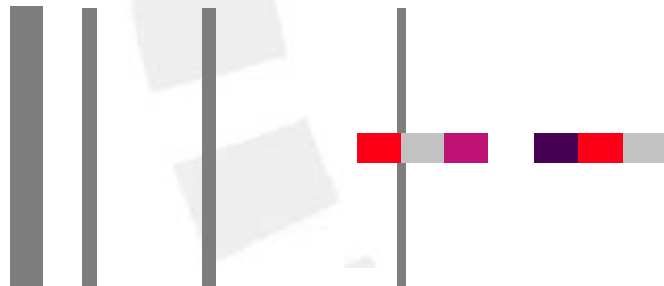
# THANK YOU

**RAMBOLL**

2010-10-14  
HOW TO HANDLE CONTAMINATED SOILS BEFORE AND DURING RAILWAY  
CONSTRUCTIONS

Riga, 14 October 2010

# MANAGEMENT OF CONTAMINATED SITES IN GAS STATIONS MODERNIZATION PROGRAM





# Who are we?

**SNCF Technical Direction**



**Environmental Department**

The scientific environmental experts team

Our role:

- To control the consulting firms realizing the environmental studies
- To advise the Project Supervisor or the suppliers.
- To manage all the environmental issues.
- To be auditor/guarantor of all aspects of regulations.

# Why gas stations modernization program?

## The gas stations sites in 2000



# Why gas stations modernization program?

## The gas stations sites in 2000



# Why gas stations modernization program?

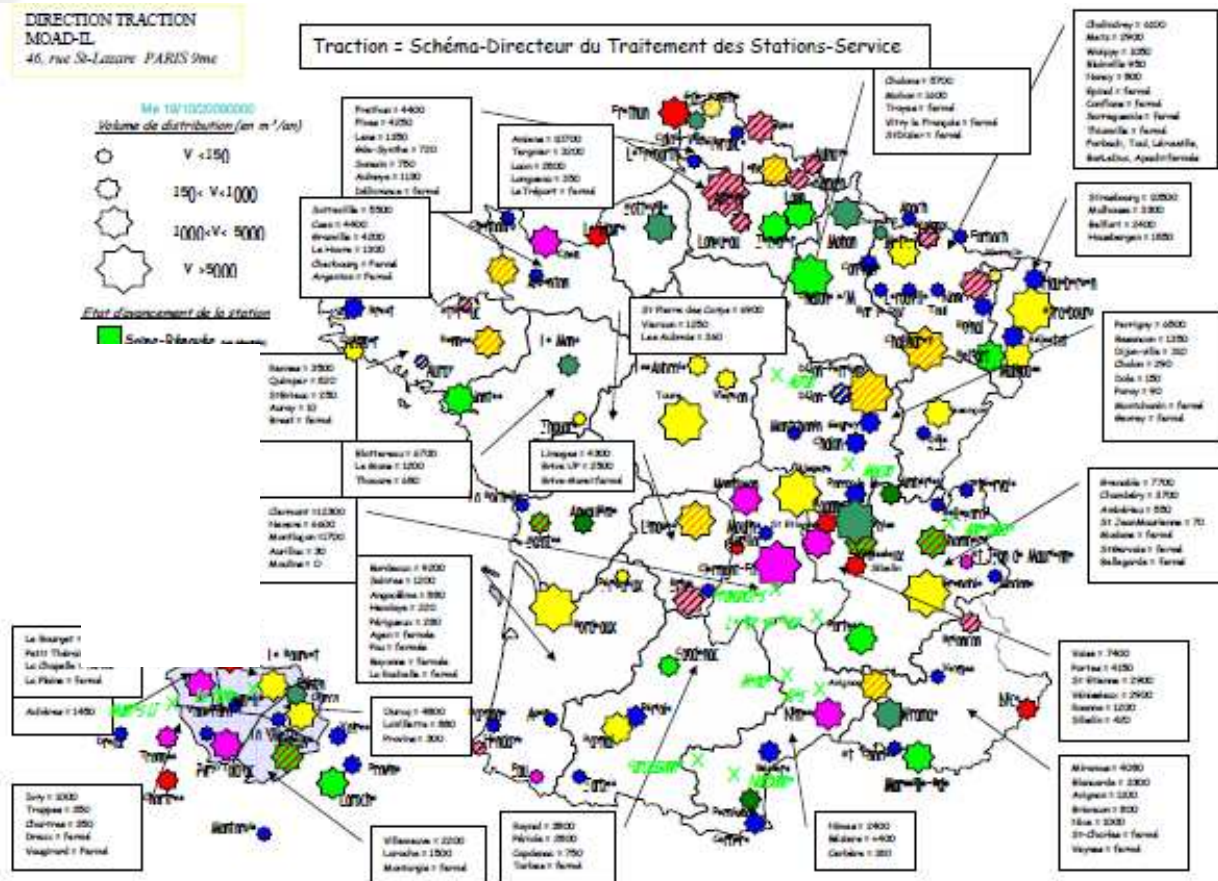
## Furthermore...

- The production/needs evolution
  - The lines electrification,
  - The evolution of FRET
- The increased costs
- The environmental responsibility for the company



# Why gas stations modernization program?

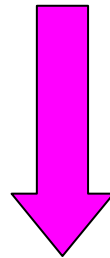
## The gas stations network in 2000



# Why gas stations modernization program?



A growing old 60's – 90's gas stations park



**THE ENVIRONMENTAL PRESSURE**



# The program evolution

- 2000 – 2007

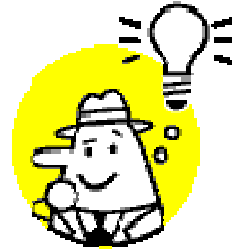


Emergency management site by site



Costs and times overruns

- 2008 – 2015



CUTEEE Program = industrialization of gas station modernization



Costs and times control

# What does mean “CUTEEE”?

---

**CUTEEE**

=

**C**hantier d'**U**rgence **T**raction **E**conomie d'**E**nergie  
et **E**nvironnement

*Energy Saving and Environment Emergency Works*



# The CUTEEE goals

1. The rationalization of old gas stations network (from 120 to 70 stations) and ranking of priority sites
2. The modernization of the gas stations park
3. The environmental risk management



# The CUTEEE principal scenarios

1. Gas station modernization

2. Gas station creation

3. Gas station suppression

The most complex scenarios:

- Very important constraints
- Direct impact on site activity



Realization by phases



# The CUTEEE budgets and times

---

**Gas stations modernization budget: 100 M Euros**

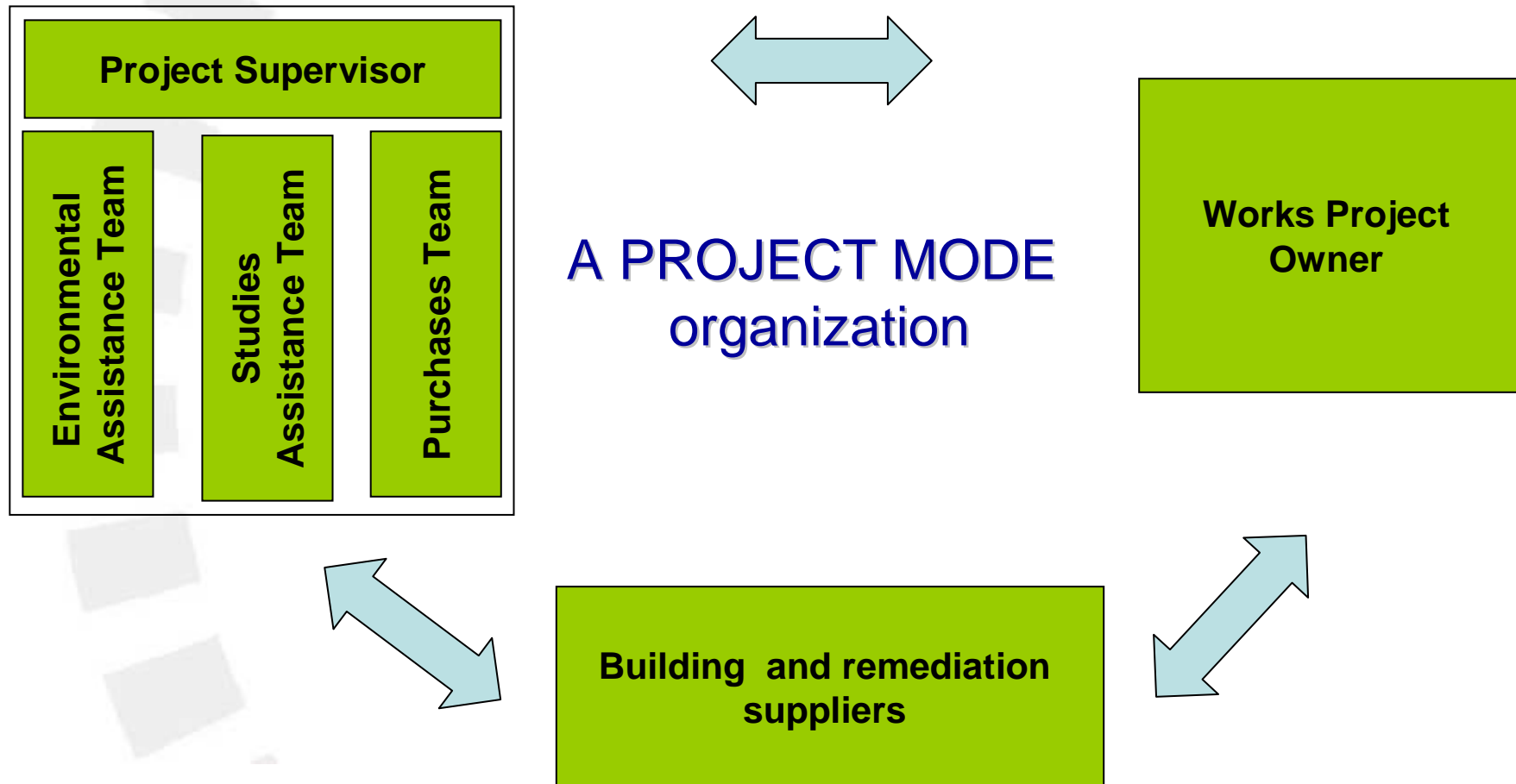


**Sites remediation budget: 60 M Euros**



**Times: 7 years (2008 - 2015)**

# The CUTEEE organization



# *Environmental risk management approach*

## **The steps of the environmental risk management:**

- 1. The environmental study**
- 2. The cost/benefit balance**
- 3. The Request For Information (RFI)**
- 4. The Remediation Market**
- 5. The project realization**
- 6. The work receipt**



# Environmental risk management approach

## 1. THE ENVIRONMENTAL STUDY

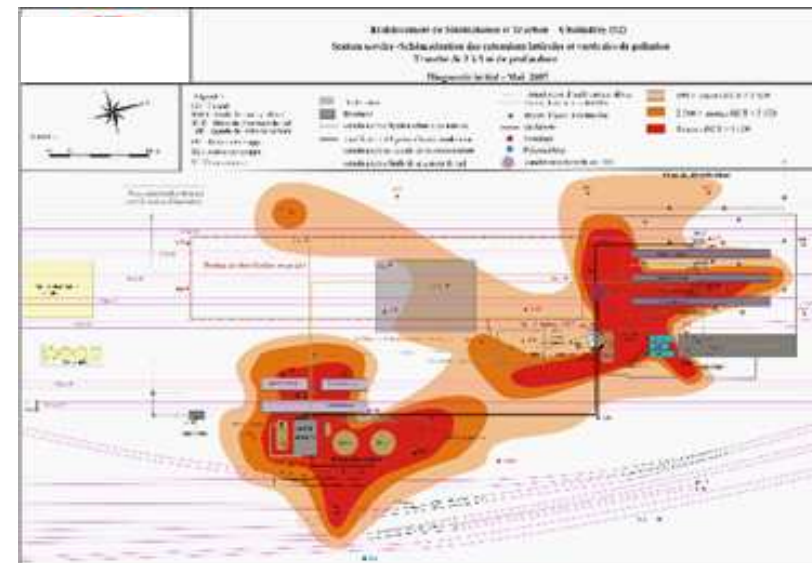
French environmental policy method:

1. Detailed historical and documentary study and field inspection of the site.
2. Soil survey/piezometers + soil/groundwater sampling + chemical analysis (gas oil tracer: C10-C40).



**Soils and groundwater  
pollution map**

The environmental study times: 3 months

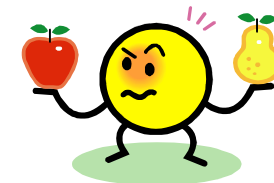


# Environmental risk management approach

## 2. THE COST/BENEFIT BALANCE

Development of remediation scenarios depending of:

- Pollution level.
- Kind of project (gas station dismantlement or renovation).
- Operating constraints of the railway infrastructure.
- Kind of remediation (in-site or ex-site treatments).

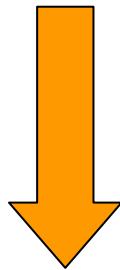


The cost/benefit balance times: 9 months

# Environmental risk management approach

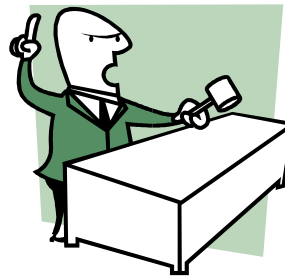
## 2. THE COST/BENEFIT BALANCE

Before project phase:  
6 months studies



In the project phase:  
3 months studies for choosing

**The best strategy**



6 scenario options

3 scenario options

**1 final  
choice**

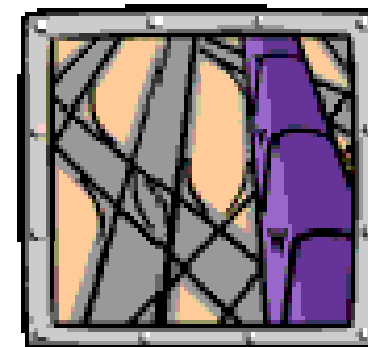


# Environmental risk management approach

## 2. THE COST/BENEFIT BALANCE

### How is the final strategy chosen?

- Cost (compared with the spending priority sites list).
- Operating constraints of the railway infrastructure.
- Future use of the site.
- Regulatory framework.
- Third-party environmental risk.



# Environmental risk management approach

## 3. THE REQUEST FOR INFORMATION (RFI)

Definition of:

- *Perimeter of the remediation.*
- *Kind of remediation.*
- *Targets in terms of thresholds and volumes of remediation.*



# Environmental risk management approach

## 4. THE REMEDIATION MARKET

The market strategy:

Choice of the cheapest supplier of a known suppliers panel specialized on soils remediation.

The market times: 4 months



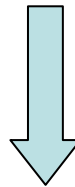
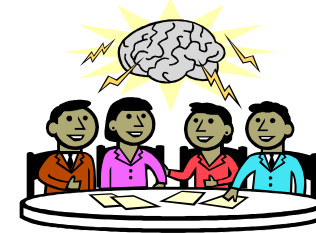
# Environmental risk management approach

## 5. THE PROJECT REALIZATION

Before the remediation works:

Debate between the Project Supervisor (assisted by IGLGEnv) and the supplier to quantify the unforeseen.

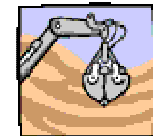
For exemple: discovery of larger volumes of polluted soils.



Establishment of work breakpoints to acquisition of additional input data to decide if to exceed the initial budget or target only the most impacted areas.

(Cost/benefit balance update).

# Environmental risk management approach



# Environmental risk management approach

## 6. THE WORKS RECEIPT

Characterization of residual pollution to calculate the risk associated.

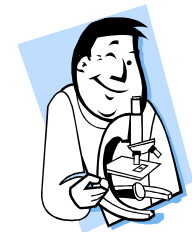
Realized by a third party consulting firm independent from SNCF and the suppliers.



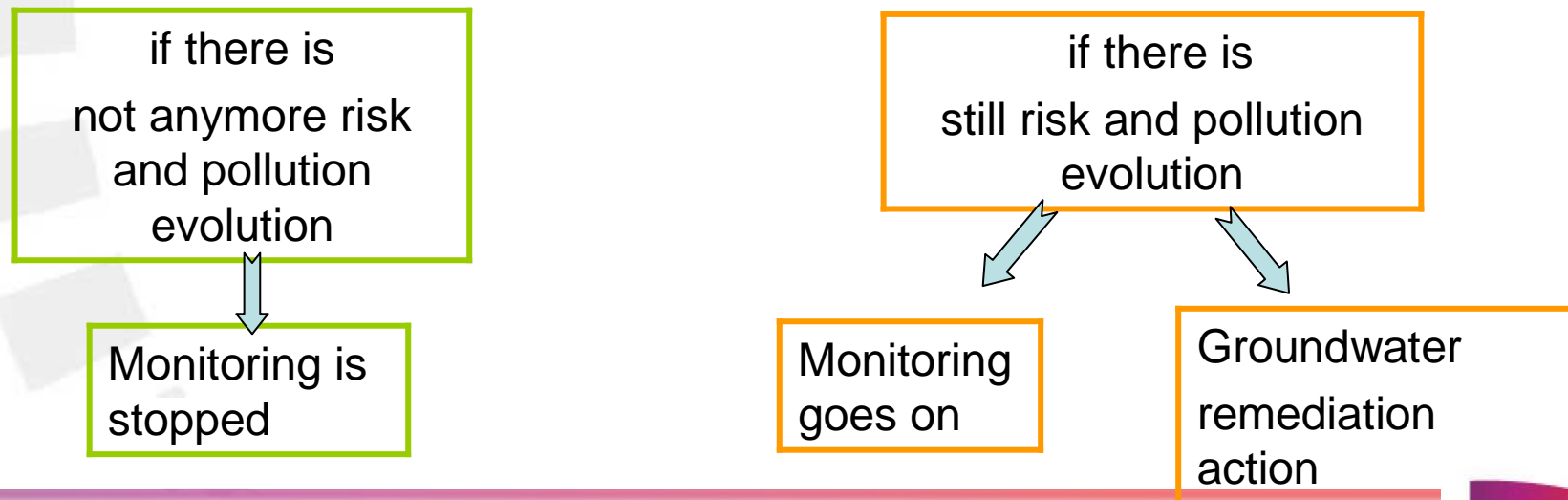
# Environmental risk management approach

## 6. THE WORKS RECEIPT

- Realization of chemical analysis of unexcavated soils
- Risk Calculation
- Groundwater Monitoring and/or other precautions:



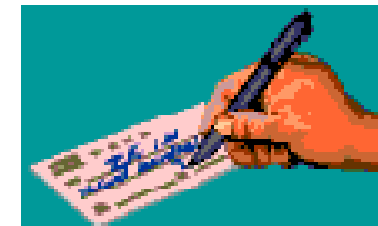
### After the quadrennial review



# Environmental risk management approach

## What remains to be done:

1. To organize :
  - a) *the memory backup (traceability) of remediation works and residual pollution.*
  - b) *Later remediation works (after 2015)*
2. To decide which entity has to provision any later remediation works.  
The Real Estate Direction?





# In situ remediation applied research

## Why the program:



## The exorbitant costs of some sites

The polluted soils excavation  
=  
major constraints to railway  
operations, removal and  
laying of rails, preparation  
works  
=  
30 – 60 % of additional  
remediation costs



The in-situ remediation  
=  
a lot of difficulties due to  
•Railway site nature.  
•Pollutant nature (degraded fuel).  
•Site activity.  
=  
Low reliability  
Poor results

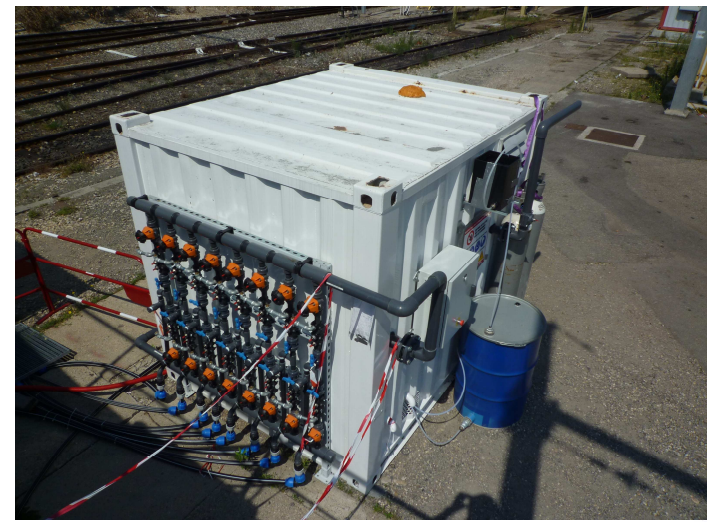
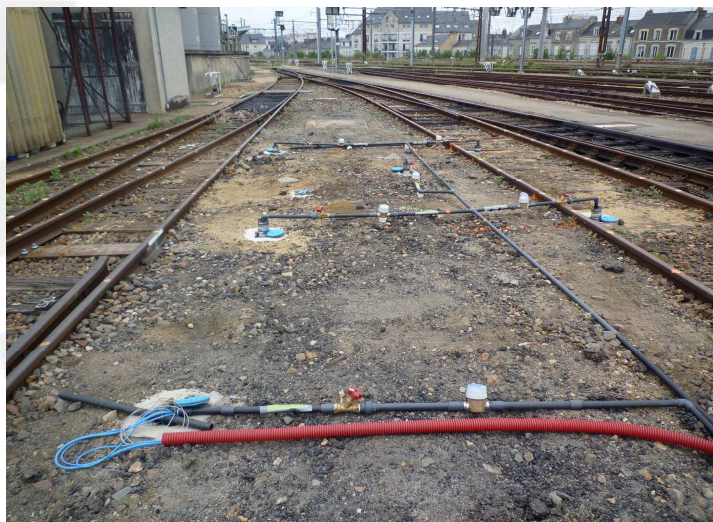
# In situ *remediation applied research*

## The program approach:

- 2 pilot sites.
- 3 techniques tested
  - Biological treatments (in the vadoes zone):
    - *Bioventing + nutrients,*
    - *Bioventing + nutrients + hot air injections (50° - 60°C).*
  - *Pollutes soils chemical oxidation:*
    - *Hydrogen peroxide injections,*
    - *Ozone gas injections.*
  - *Polluted soils flushing.*



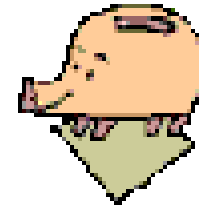
# In situ remediation applied research



# *In situ remediation applied research*

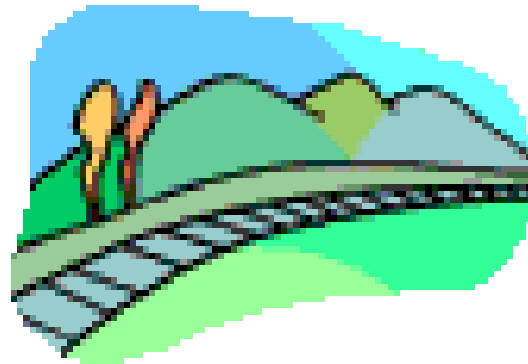
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The goal



How to master better the techniques in order to buy them better





Thank You

A decorative graphic featuring the text "Thank You" in a pink, cursive font. The text is framed by a green vine that curves around it, ending in a pink flower with a yellow center and green leaves.

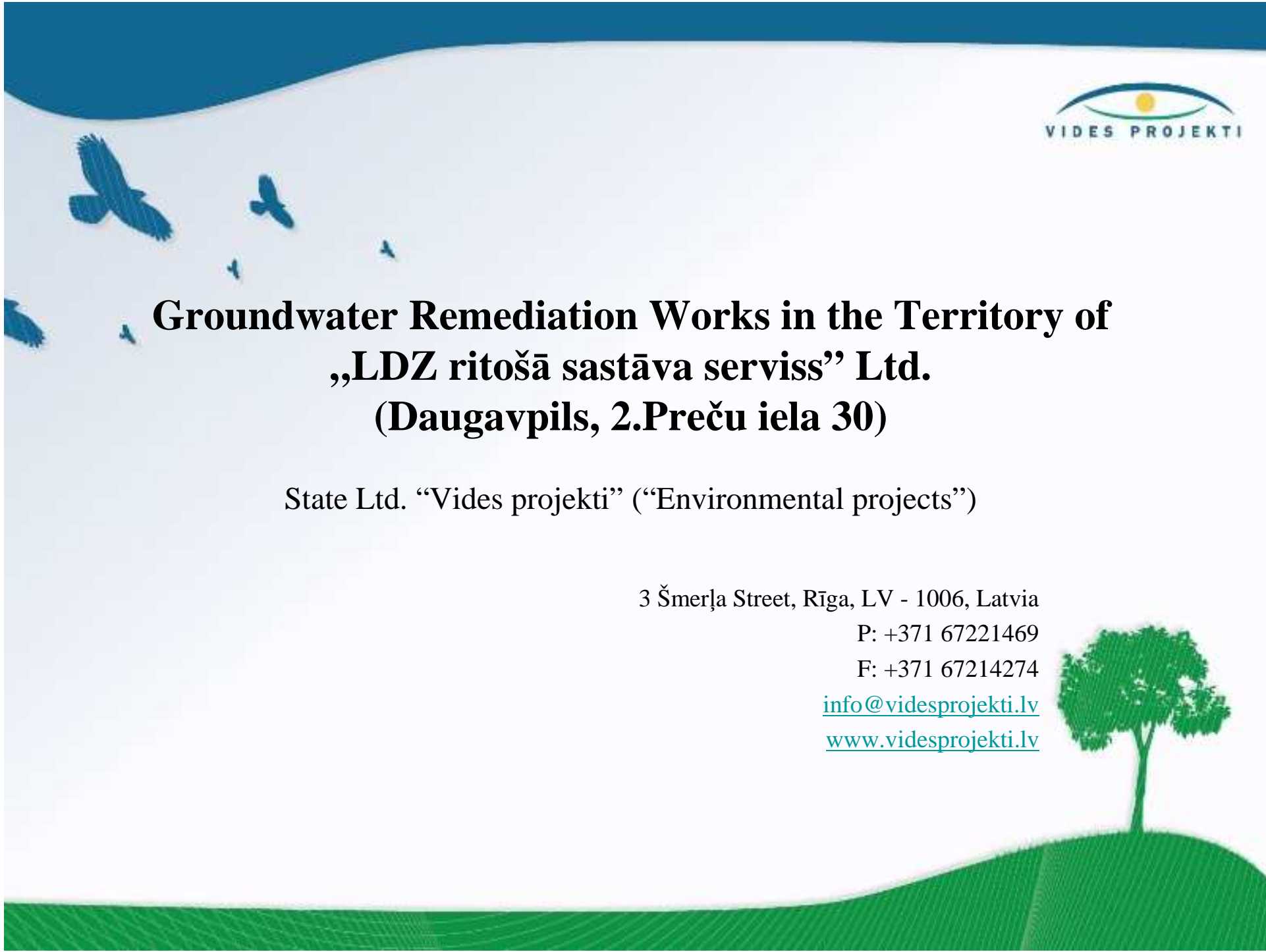
# In situ *remediation applied research*

Technique	Results
Bioventing + nutrients	we do not have results yet
Bioventing + nutrients + hot air injections	
Hydrogen peroxide injections	Pollution reduction : 34% Action ray: 0,6 m
Ozone gas injections	Pollution reduction : 27% Action ray: 0,5 - 1 m
Soils flushing	Pollution reduction : 50 – 60%

# In situ *remediation applied research*

## The program approach:

- Biological treatments (in the vadoes zone) = the pollutants are broken down by bacteria, usually aerobic.  
Bioventing = aerating soils to stimulate the biological activity to maximize the biodegradation.
  - *Bioventing + nutrients (Nitrogen, phosphorus, sulfur and other nutrients to support good microbial growth),*
  - *Bioventing + nutrients + hot air injections (50°- 60 °C).*
- Pollutes soils chemical oxidation = the pollutants are changed into harmless chemicals
  - *Hydrogen peroxide injections,*
  - *Ozone gas injections.*
- Polluted soils flushing = extraction of pollutants using water eventually with a solvent. Contaminants that are dissolved in the flushing solution are leached into groundwater which is extracted and treated.



**Groundwater Remediation Works in the Territory of  
„LDZ ritošā sastāva serviss” Ltd.  
(Daugavpils, 2.Preču iela 30)**

State Ltd. “Vides projekti” (“Environmental projects”)

3 Šmerļa Street, Rīga, LV - 1006, Latvia

P: +371 67221469

F: +371 67214274

[info@videsprojekti.lv](mailto:info@videsprojekti.lv)

[www.videsprojekti.lv](http://www.videsprojekti.lv)



# Groundwater Remediation Works



**Daugavpils, site location map**

# Groundwater Remediation Works

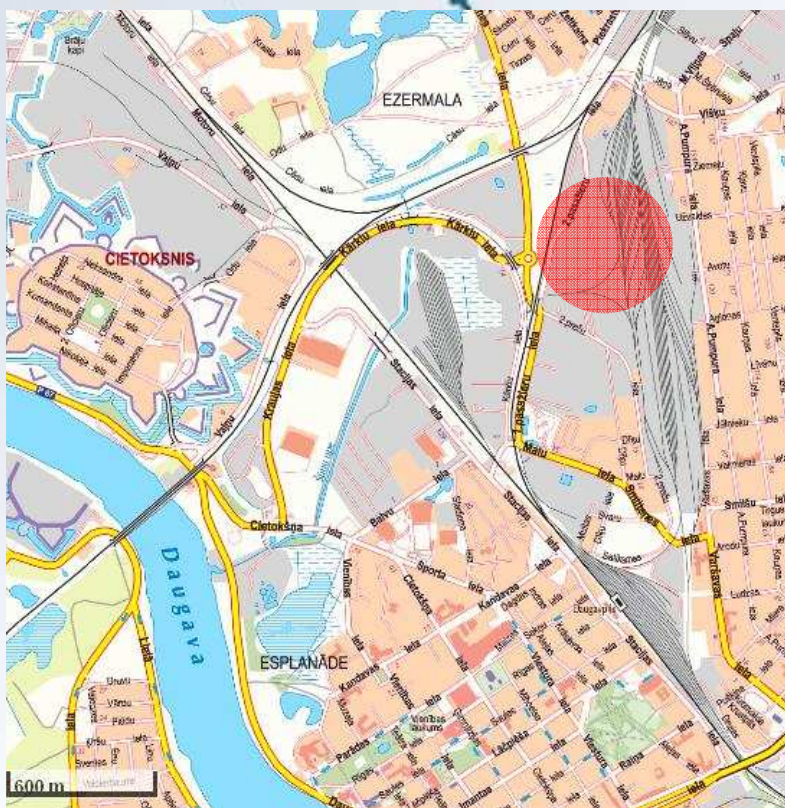


**“LDZ ritošā sastāva serviss”,  
site location map**

- „LDZ ritošā sastāva serviss” Ltd is located in the city of Daugavpils between the industrial and residential areas;
- Area of the industrial territory is 122 789 m<sup>2</sup>;
- Operation of the company is related to diesel-electric locomotive repair and technical maintenance, equipment with diesel, oil, water and dry sand;
- For equipment of locomotives 60 759 tons of diesel are used annually.



# Groundwater Remediation Works



“LDZ ritošā sastāva serviss”,  
site location map

In the company’s territory there are:

- **23 oil product storage reservoirs** in all for storage of diesel and motor oil. Diesel is stored in 6 over-ground reservoirs, 5 of which have capacity 2000 m<sup>3</sup> each, but 1 has capacity of 1000 m<sup>3</sup>. From 2004 to 2005 hydro isolation was installed under 6 reservoirs and their base was changed;
- **Motor oil** is stored in small reservoirs indoors;
- **Diesel pumping station**;
- **Fuel section**.



# Groundwater Remediation Works

## Polluted areas database

- The territory has been registered in the state polluted areas database and has been included in the Operation Programme 2007 – 2013. A separate section of the Operation Programme contains the polluted areas that are related to transportation services.
- Currently company complies with all environmental protection requirements and formation of new pollution is impossible.
- The company with its own finance resources without attracting the EU or National co-financing gave an opportunity to cleanup a historically polluted area.

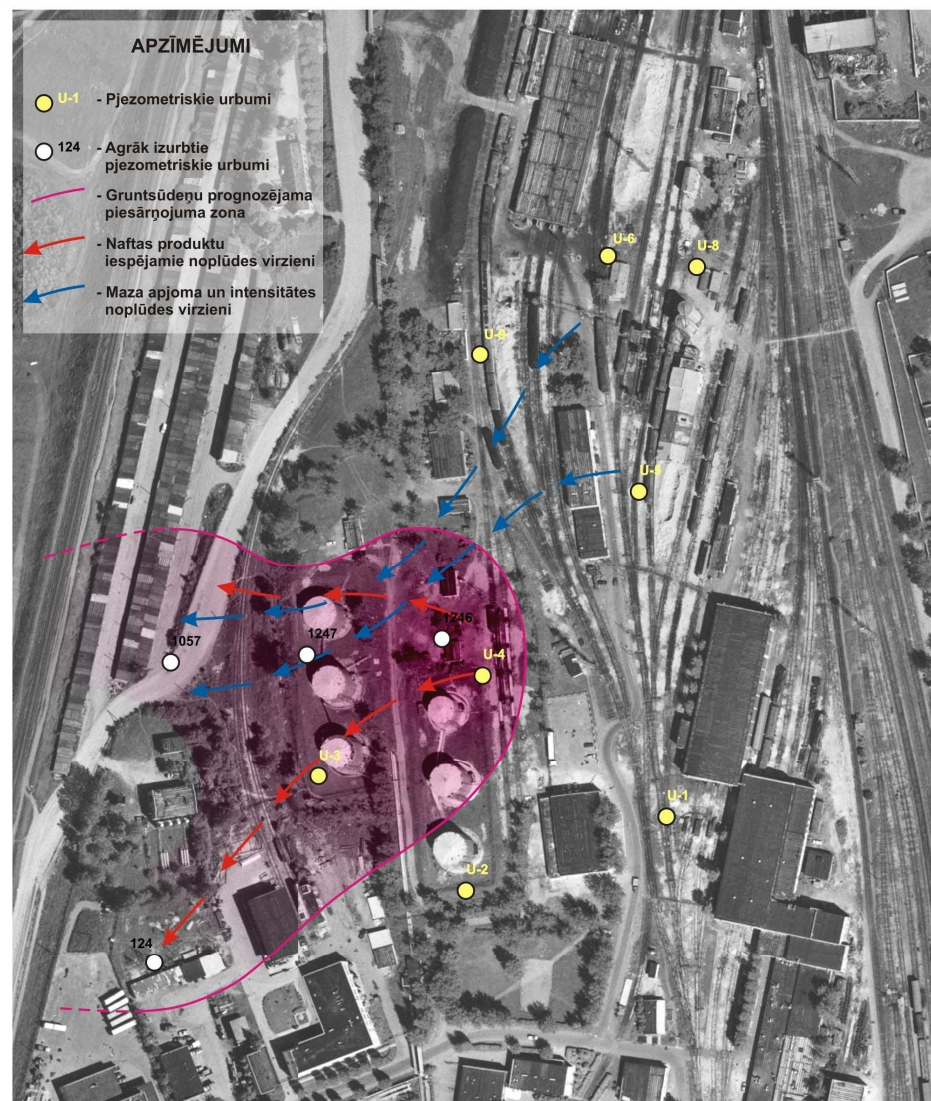


# Groundwater Remediation Works

## Pollution research I

- In the period from 2000 to 2004 research work on the soil and groundwater pollution was performed in the territory (“Balt-Ost-Geo” Ltd);
- In 2006 the State Ltd „Vides projekti” carried out additional research and monitoring in the existing 20 research wells;
- The territory polluted with oil products: floating oil layer atop the groundwater occupies **35 400 m<sup>2</sup>**;
- Thickness of the floating oil product layer atop the groundwater in this territory reaches **0.1 to 1.08 m**. Largest density was stated in the central part of territory, where the pumping station and fuel storage over-ground reservoirs are located.





M 1:2500

Results of groundwater pollution research, 1998-2004



# Groundwater Remediation Works

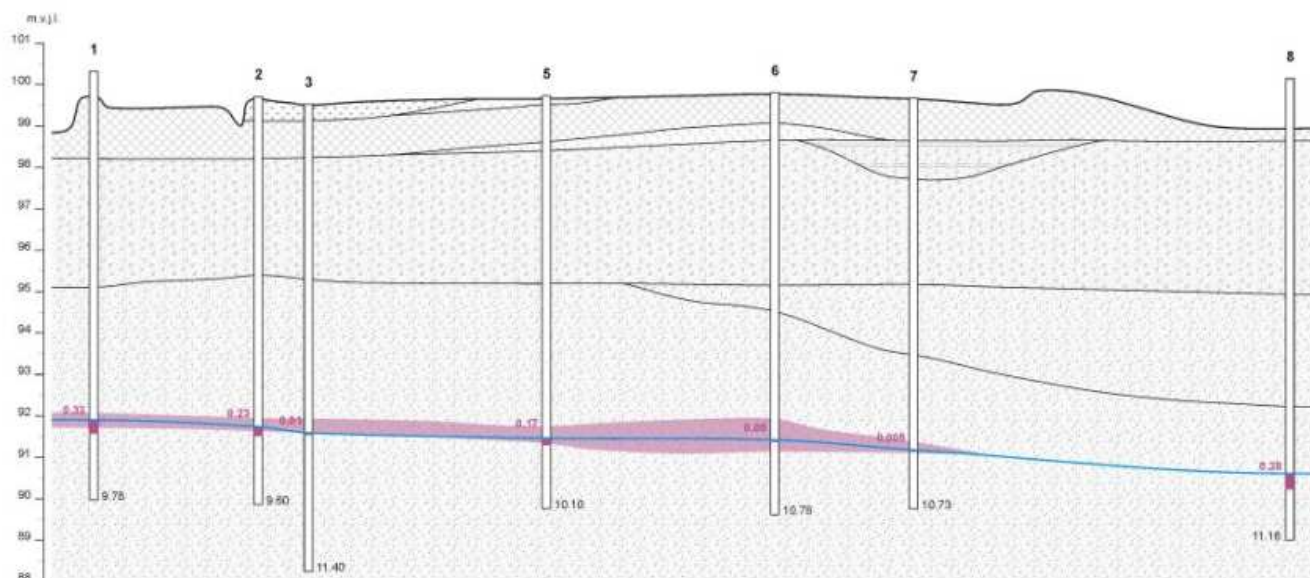
## Pollution research II

- The total free floating oil product fractions were estimated of **1085.3 m<sup>3</sup>**, the actual amount of “pure oil” products was estimated to be **488.4 m<sup>3</sup>**, ~ 45 % from the layer, because in the lowest part of the floating layer there is only oil product emulsion;
- The water containing part of geological cut is formed by fine limnoglacial sand with gravel addition.
- Filtration coefficient varies from **2.5 m/twenty-four hours** to **8.3 m/twenty-four hours**.
- At the western part of the polluted territory the water containing sand is coarse-grained with gravel addition.










# Groundwater Remediation Works

## Geological and hydro geological conditions



M hor. 1:500  
vert. 1:100

-  - Uzbertā grunts, smiltis ar sādzes atkritumiem, piesūcināts ar mazutu
-  - Vidēji rupja vai grantaina uzbertā grunts
-  - Apgane, smiltaina, apbēta
-  - Grantaina smiltis, gaļspēlīga vai brūngana ar oļiem, sausa

-  - Grantaina smiltis, gaļspēlīga vai brūngana ar oļiem, sausa, vietām mālaina
-  - Vidēji rupja smiltis ar grants graudiņiem
-  - Rupja smiltis ar grants graudiņiem
-  - Rupja smiltis ar grants graudiņiem, vietām ar naftas produktiem piesūcināta grunts

-  1 - Urbuma un IS numurs
-  9.33 - Naftas produktu slāņa biežums, m (2003.g.)
-  9.78 - Urbuma dziļums
-  - Gruntsūdens līmenis





# Groundwater Remediation Works

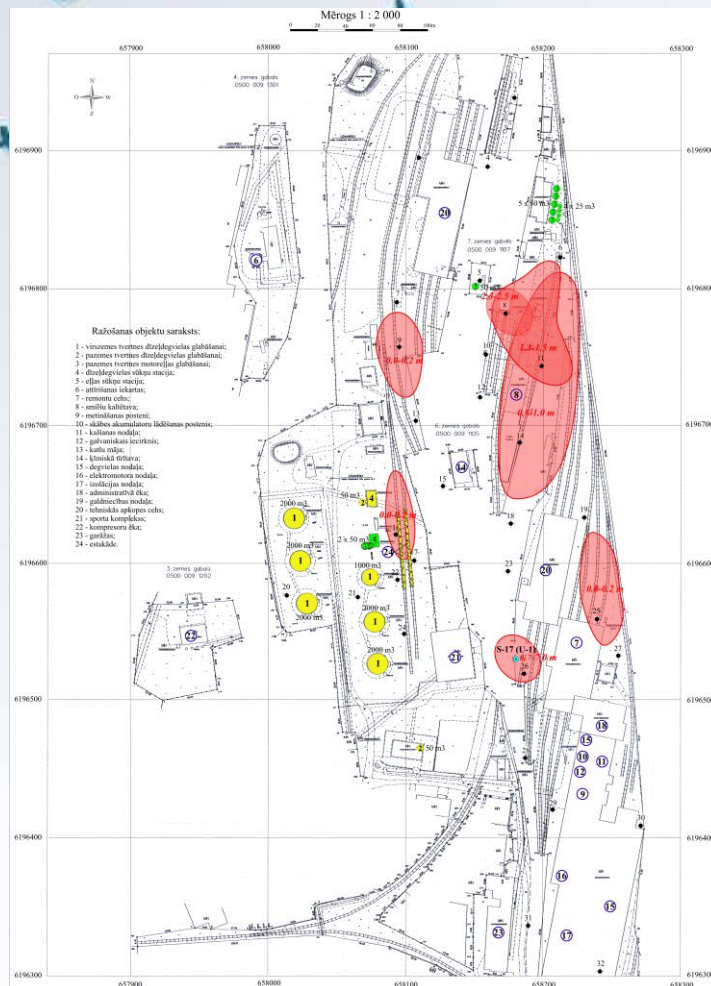
## Pollution research III

- The groundwater level in the territory is in the depth of **8.0 to 12.5 m** and the floating oil product layer above it – **7.9 to 11.4 m**.
- The largest amount of oil products leaked during the 1980ies;
- Oil products consist of diesel with various decomposition level and various physical properties. The diesel fraction aged > 10 years consists of viscous products and kinetic rate of 8.4 sSt;
- Depending on the age of oil it is possible that they contain **humic acid**. Humic acids are formed in the result of splitting of the oil product bacteria. They are more dense and viscous in comparison with the oil products with their gel-type consistency.



# Groundwater Remediation Works

## Soil pollution



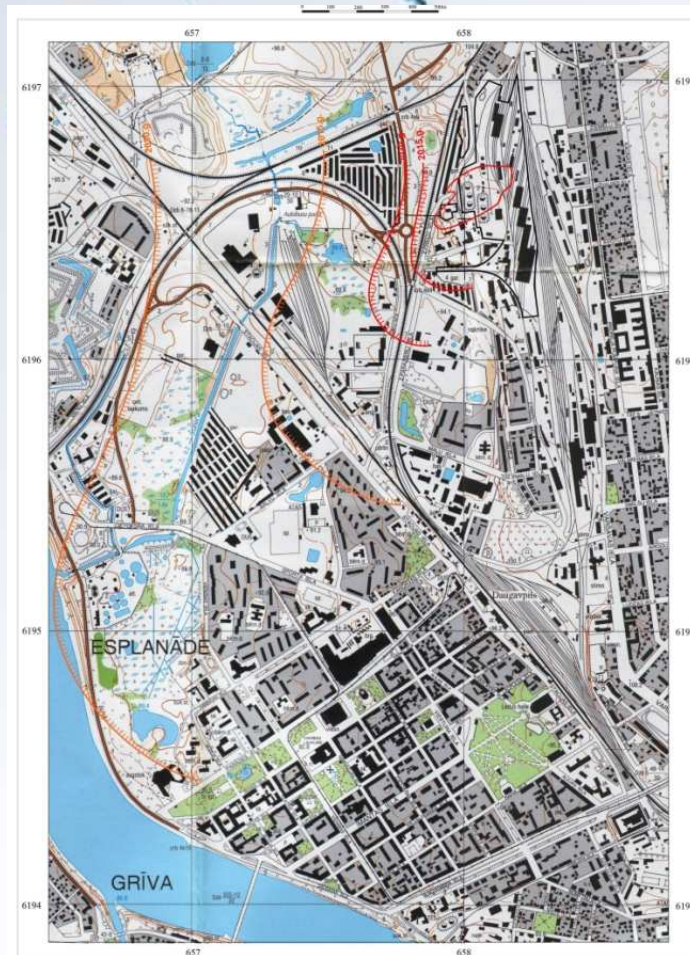
- Within the company's territory in various places oil product pollution was stated also in the upper layers of the soil.

- Owner of the territory has changed the more intensively polluted soil with clean soil, and the soil pollution cannot be regarded as a new groundwater pollutant, therefore the work task does not provide for soil purification.



# Groundwater Remediation Works

## Oil products migration in 2015 and 2030



- The estimate of the free oil product fraction migration taking into account the rock filtration coefficient, oil product viscosity and slope of the groundwater flow indicated that migration speed in **southwest** direction is **12.8 m** per year, but in **western** direction – **6.3 m** per year;



# Groundwater Remediation Works

## Strategy of decontamination works

- In 2006 “Feasibility Study for Remediation of the Territory of “Latvijas Dzelzceļš”” was developed for elimination of the floating oil layer (State Limited Liability Company “Vides projekti”).
- It has been coordinated with Daugavpils Regional Environmental Board.
- The tasks provided in the work task are:
  - liquidation of the oil product floating fraction located atop groundwater;
  - localization of the fraction that has dissolved in groundwater.



# Groundwater Remediation Works

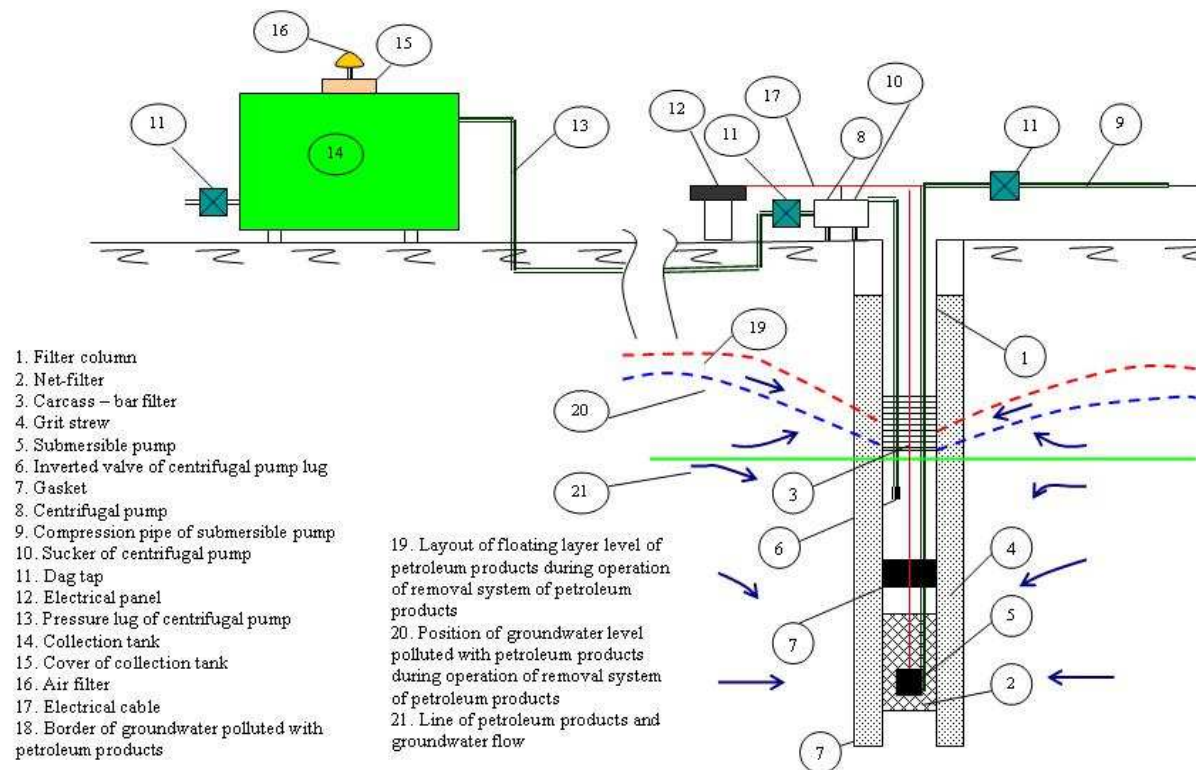
## Structure and amount of decontamination works

- Taking into account the hydro geological conditions, composition of oil products it is planned to use “double pumping” method to liquidate the oil product floating layer.

# Groundwater Remediation Works

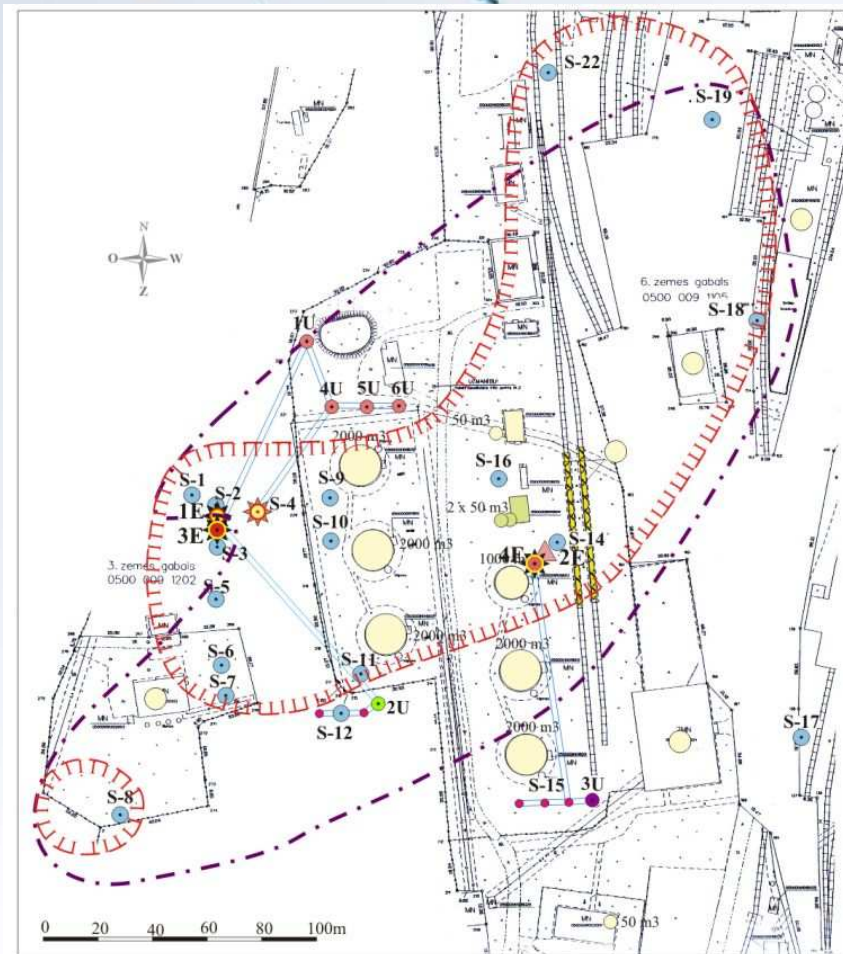
## Double pumping method

Elimination scheme of Petroleum products  
(double pumping method of the well)



# Groundwater Remediation Works

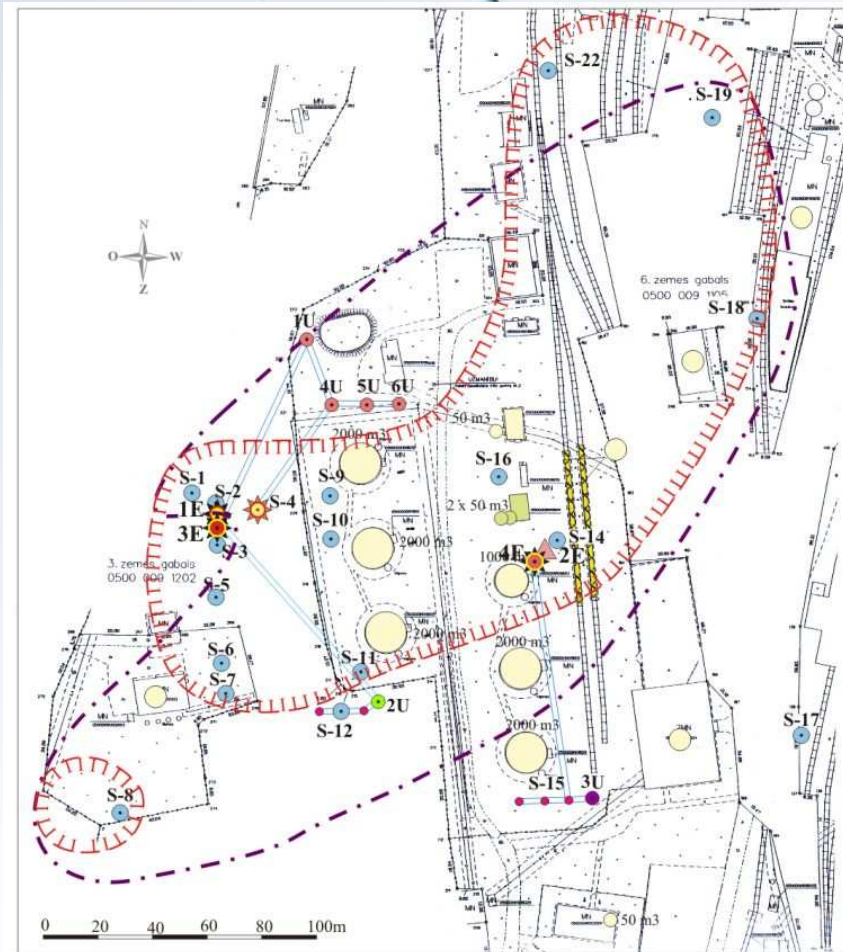
## Pumping systems



- The first 2 pumping systems (1E and 2E) for pumping out of oil products were installed in 2007 followed by an experimental pumping.
- In 2008 additional 3 systems were gradually installed (3E, 4E and S-4).
- Depth of exploitation boring wells is 16.0 - 23 m.
- *For pumping of water and oil products from the upper part „Auto Pump” is used, but pumping out of water from the lower part of the boring well is carried out by immersion pump.*

# Groundwater Remediation Works

## Pumping systems II



- Water pumped out by immersion pump is drained to absorption system.
- Infusion of the water back into the horizon stimulates running of oil products to the pumping system as the pressure gradient in the direction towards depression funnel increases.
- Absorption system uses 7 absorption boring wells.





# Groundwater Remediation Works

## Measurements

- During the exploitation process regular lower and upper pump debit measurements are taken from all exploitation boring wells, as well as from oil product sediments in the settling reservoirs.
- Measurement of the level and floating layer thickness is carried out in observation boring wells that are located within range of the depression funnel.
- The task is burdened by the necessity to carry out periodical cleaning of the pipelines and absorption boring wells due to sedimentation of iron oxide. In the work area concentration of iron (II) oxide ( $\text{Fe}^{2+}$ ) in the groundwater is 1 mg/l, but the total iron concentration 10 mg/l; that hinders water flow and reduces debit.
- Quality of water, drained in to absorption system, is regularly controlled in laboratory.

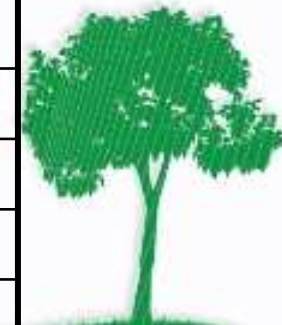
# Groundwater Remediation Works



## Results

- Within the framework of the project implementation simultaneous operation of five pumping systems for a period of seven years has been planned to provide for pump-off in the pollution area epicentre.
- Since 2007 pump-off systems have been established. Double pumping method is used to pump-off oil products.
- Total **100.52 m<sup>3</sup>** of relatively “pure” oil products have been pumped-off in **2007 - 2009**.

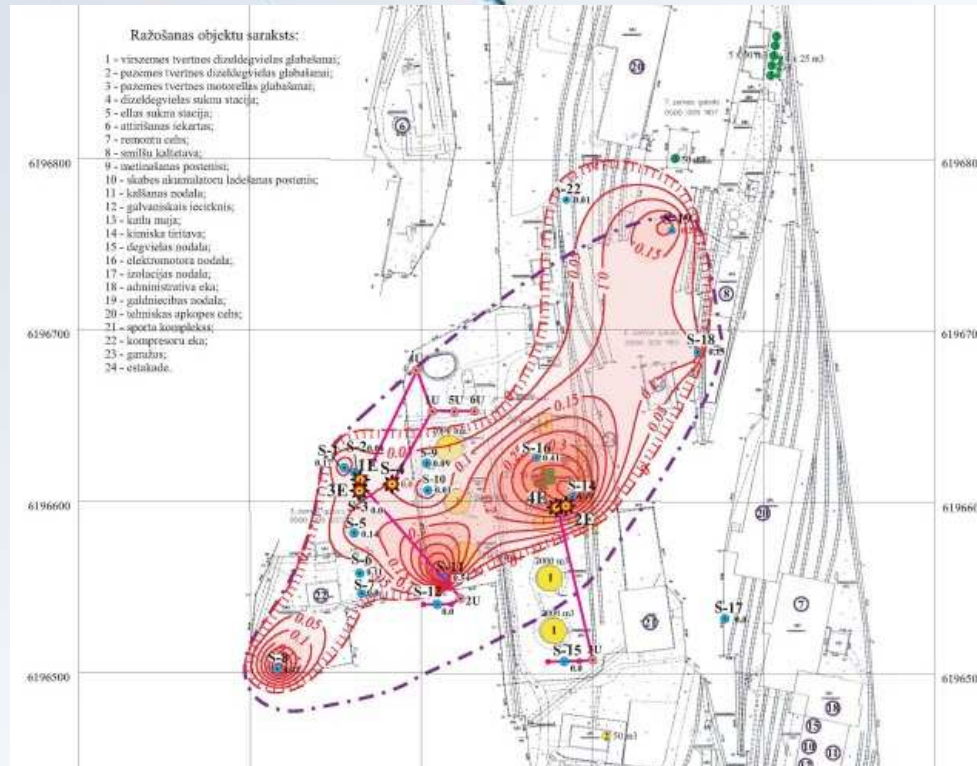
Year	Pumped-off water and oil product mix, m <sup>3</sup>	Pumped-off “pure” oil products, m <sup>3</sup>
2007	1209,4	4,9
2008	6072,4	42,56
2009	6406,7	53,06
<b>Total:</b>		<b>100,52</b>



# Groundwater Remediation Works



## Results II



**Thickness map of the floating layer of oil products, November 12, 2009**

- The polluted territory has decreased by **1.7 ha**.
- In 2009 maximum thickness of the floating layer in the pollution area epicentre according to monitoring data was **0.2 m**.
- Remediation works are going on in 2010 concurrently prognostic estimates are made, and proposals for improvement of the programme and defining of attainable goals are developed.



**Thank you for your attention!**

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*Polluted Soil Seminar, Riga*



## Phasing out hazardous substances upstream by eco procurement



**Malin Kotake  
Trafikverket**



*Polluted Soil Seminar, Riga*



## Outline of presentation

- Why is Trafikverket in the Infraguider project?
- Infrastructure material and products in a lifecycle perspective
- Lessons learned, examples from Trafikverket
- What does REACH do for us and what do IM:s need to manage themselves?
- How can eco procurement prevent future contamination and future costs?
- Results of the Infraguider project



## InfraGuidER – scope and goal

- Coordinated Action to improve environmental performance of railway infrastructure
- Identifying IM:s key environmental functions
- Identifying environmentally significant material flows
- Harmonising eco procurement requirements for significant materials





# Trafikverkets interest in InfraGuidER

- Life cycle management of infrastructure material and products is a significant aspect
- Prevent future contamination and future costs, reduce climate change and improve environmental performance
- Infrastructure material is on an international market
- Difficult for one single IM to influence the market
- Goal from the Swedish government to increase environmental requirements in public procurement – part of EU's IPP (Integrated Product Policy)
- Good example of "UIC code 345 Environmental Specification for new rolling stock"





## **Banverkets environmental strategy**

**- life cycle management of infrastructure material**

”Develop and implement environmental requirements for procurement of strategic infrastructure material”

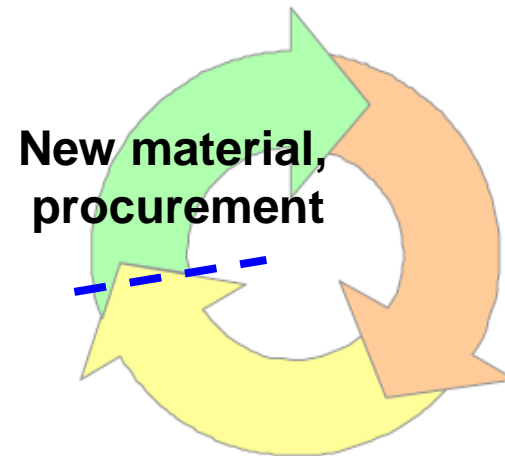
”The use of materials in the railway transport system shall be *energy and resource efficient* and the pollution of nature from *environmentally harmful substances* in the infrastructure shall decrease”





# Infrastructure lifecycle

New infrastructure



Use of infrastructure



Infrastructure maintenance



Recycling, reuse,  
waste management





*Polluted Soil Seminar, Riga*



# Significant environmental aspects

Natural resources



Hazardous substances



Climate change and energy efficiency



## Lessons Learned 1 – Thermal insulation

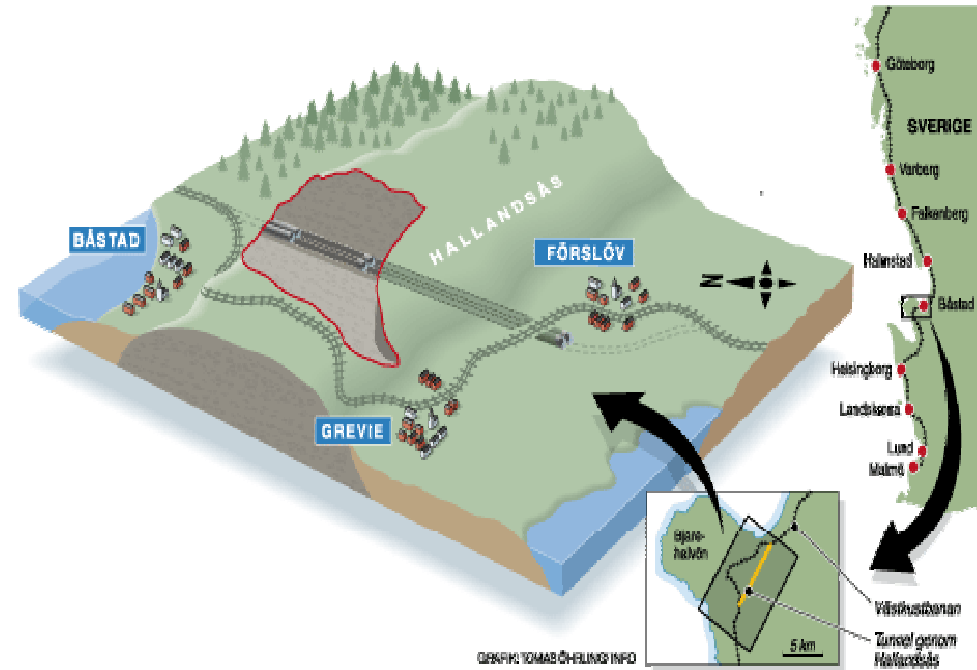
- Between the years of 1977-1997
- 130 ton of HBCD, Hexabromocyclododecane (now on REACH candidate list)
- 390 tonnes of freones, CFC and HCFC (now forbidden by law)



- Environmental impact
- High costs for waste disposal, classified as hazardous waste
- Polluted soil, HBCD under the insulation

# Lessons Learned 2 - Hallandsås project

- 1997 project was stopped
- Rocha Gil a substance used for chemica injection containing acrylamide had leaked into water
- Dead fishes, dead cows
- Problems with workers health
- Huge economic consequences including a 6 year delay



- All chemicals are now reviewed before usage
- 1500 products per year



# The REACH Regulation EC 1907/2006

- Registration, evaluation, authorization and limitation of chemicals

- REACH provides information



- The rest is up to you!



## The Candidate List, Annex XIV

- with substances of very high concern (Art. 57 REACH)

- Carcinogenic, mutagenic and toxic for reproduction
- Persistent, bioaccumulative and toxic
- Endocrine disrupting
- Eventually phase out the use of substances on the candidate list
- Very slow process



More than 1500 substances of very high concern on the EU market

Today 38 is on the candidate list – 2013 about 150-200 substances



# Benefits of Eco Procurement

- Improve environmental performance
- Prevent future environmental impact and costs
- Lower costs in a LCC-perspectiv
- Goals – help to fulfill
- Laws and regulations – comply with current and future legislation





# Eco-Procurement Guidelines of Infraguider

- Integrates eco-procurement into ordinary business procurement process
- Comply with EC Directive 2004/18/EC on public procurement
- Is inspired by:
  - European Comissions handbook "Buying Green" – a handbook on environmental public procurement
  - EU´s Integrated Product Policy, IPP, which states that environmental procurement should increase
  - Ecodesign Directive (2009/125/EC)
  - UIC Code 345



# Infraguider model

- Identifies environmental performance indicators (EPI:s) for significant materials/products
  - Ballast
  - Sleepers
  - Steel/Rail
  - Concrete
  - Cables
  - Electric and electronic components
  - Chemical products
- Suggests a model including
  - Mandatory supplier requirements (selection criteria)
  - Mandatory requirements for the product (technical specification)
  - Award criteria



## Summary and Conclusions

- Energy efficiency/Carbon footprint, **hazardous substances** and natural resources are significant aspects
- Focus on controlling the inflow to avoid future costs and environmental pollution
- REACH will help, but not do the job for you
- Include environmental aspects in product design, technical specifications and in the procurement process
- Start a dialoge to communicate requirements with suppliers
- Always consider Life cycle perspective
- **Infraguider will contribute!**





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***EU project InfraGuidER outcomes dissemination:  
eco-procurement guidelines for phasing out hazardous  
substances***



*Paolo Contestabile  
UIC Rail System Department Project Manager*

# Fact 1: Main identified challenges for long term mobility

## > Scarcity of energy resources

- Higher energy prices
- Need for alternative energy sources
- Need to improve energy efficiency

## > Climate change

- Share of CO<sub>2</sub> free energy sources will grow
- Adaptation of railway system to changing climate
- Need for alternative traction concepts

## > Limited natural resources

- Scarcity of certain materials with increasing prices
- Ecological footprint of materials and recycling become more important

## > Stronger regulation

Tougher legislation on impacts with possible health effects



# Fact 2: the UIC sustainable mobility long term vision

The European railways will seek to supply customers and society with attractive solutions meeting challenges of mobility **and** sustainable development

Through responsible business leadership they maintain and expand their leading position while continuously improving **sustainability performance**

Strategic targets 2030 and visions 2050

- > Climate Protection
- > Energy Efficiency
- > Exhaust Emissions
- > Noise & Vibrations



# Fact 3: Drivers for the RSF Track & Structures Sector

## Increase RAMS

- > Expenditures for **Switches and Crossings (S&Cs)** is **30%** of the total track **maintenance and renewal budget**. Total expenses for S&Cs maintenance and renewal works paid out by UIC European railway members estimated in **1.8 Billion € per year**

## Handle environmental issues

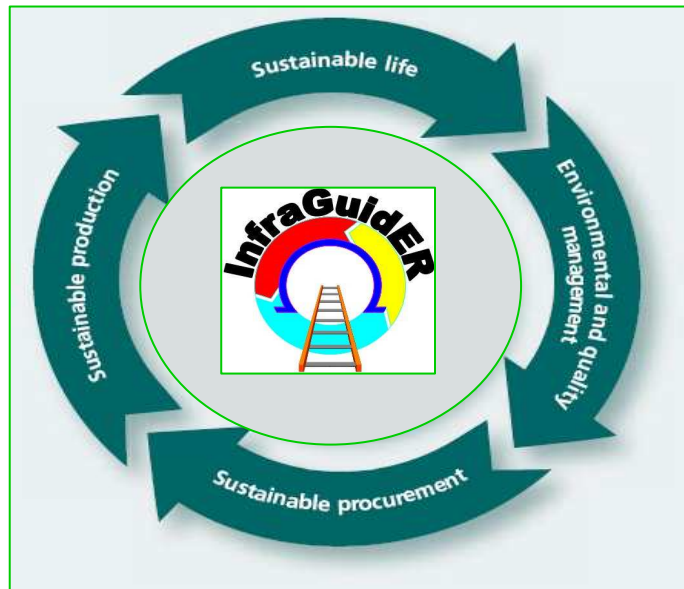
- > HSE related aspects



# InfraGuidER answers: *Infrastructure Guidelines for Environmental Railways performance*



- > proposal for integration of product environmental performance into the procurement process, defining a common language between stakeholders
- > framework for harmonising sustainable procurement criteria along the supply chain
- > advantages of including environmental costs in product LCCs



**How will UIC foster innovation and best practice exchange for railways?**





# Interfaces and Fields of Co-operation



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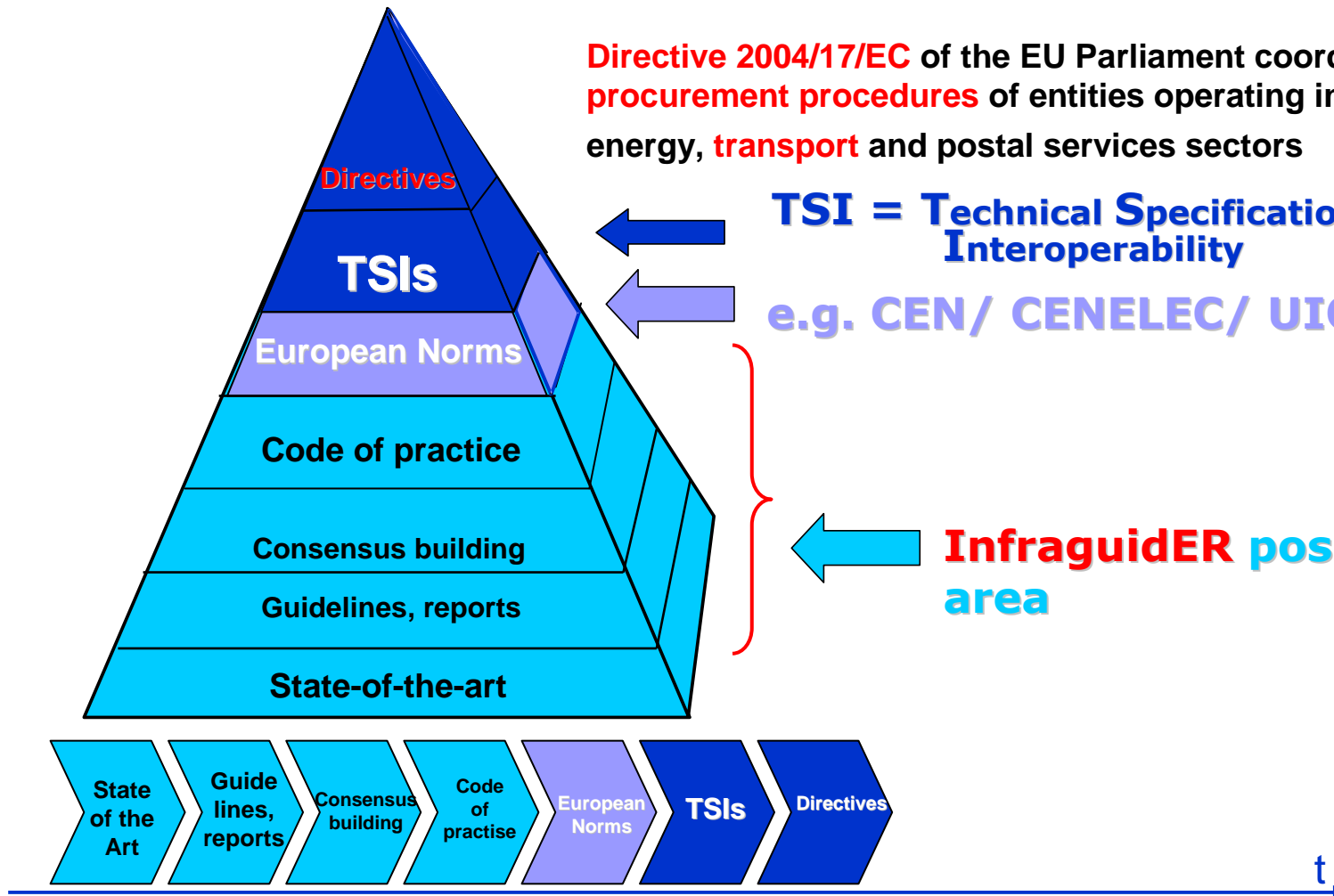
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**Directive 2004/17/EC** of the EU Parliament coordinating **the procurement procedures** of entities operating in the water, energy, **transport** and postal services sectors

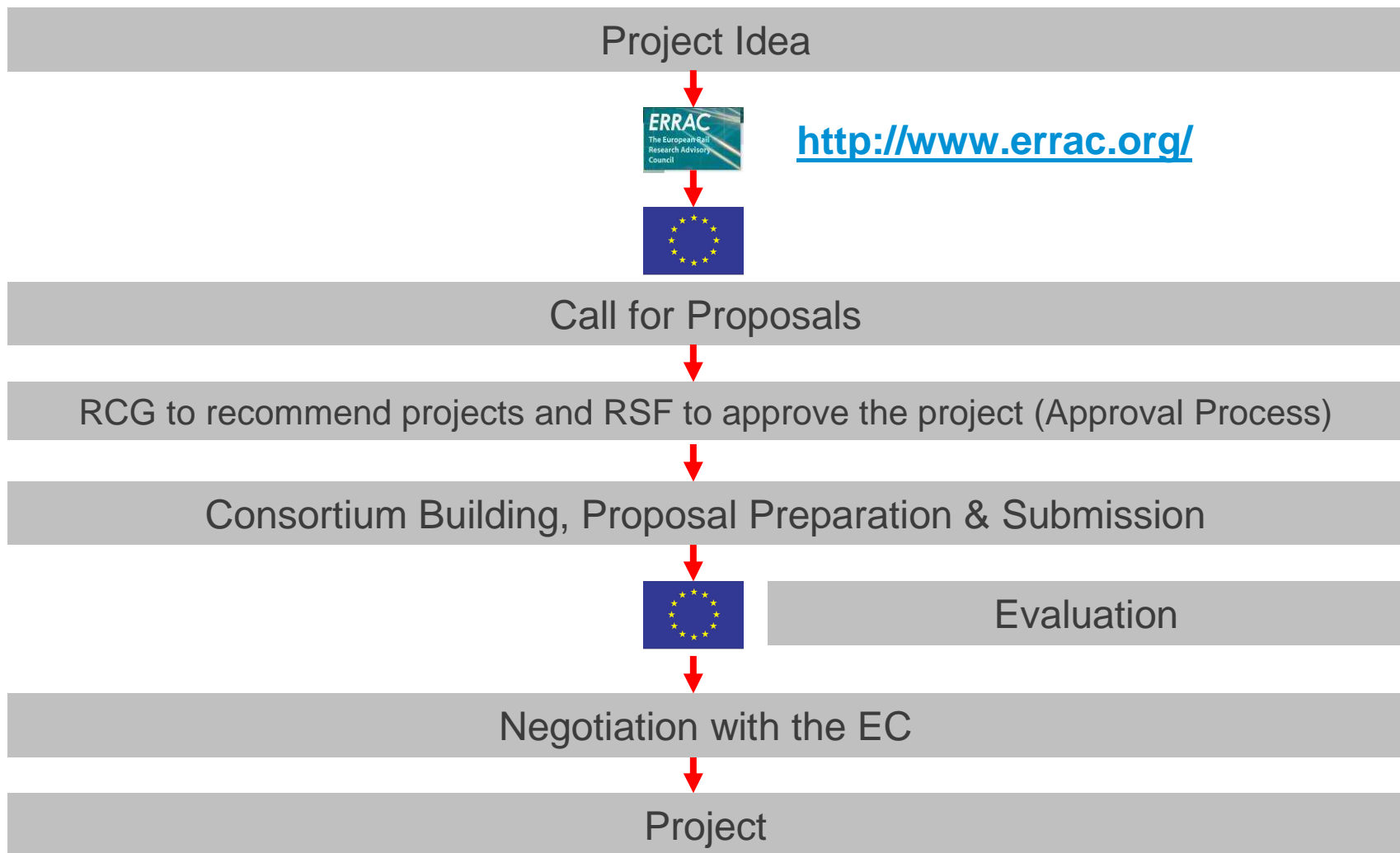
**TSI = Technical Specifications for Interoperability**

e.g. CEN/ CENELEC/ UIC (transition)

**InfraguidER positioning area**



# The Rail System Forum European Projects



# Invitation Final conference, Brussels 24<sup>th</sup> Nov 2010

<http://www.infraguider.eu/>  
<http://www.uic.org>



## “Environmental specifications for railway infrastructure”

### *Proposal for a set of guidelines to assess the environmental impact of railway infrastructure*

- > Project achievements about rail infrastructure relevant materials components and services environmentally sound management.
- > Discuss about its outcomes implementation with project partners, other European IMs and Suppliers!
- > Innovative eco-procurement guidelines and a requirement based model proposal for product ranking will be introduced
- > The integration of eco-procurement into ordinary procurement cost effectively benefits IMs on purchase decisions, predicting the environmental impact of materials/services whose lifecycle costs make the difference
- > Implementing eco-procurement policy also favors compliance with future green purchasing European legislation and concretely answers customers’ sustainability expectations

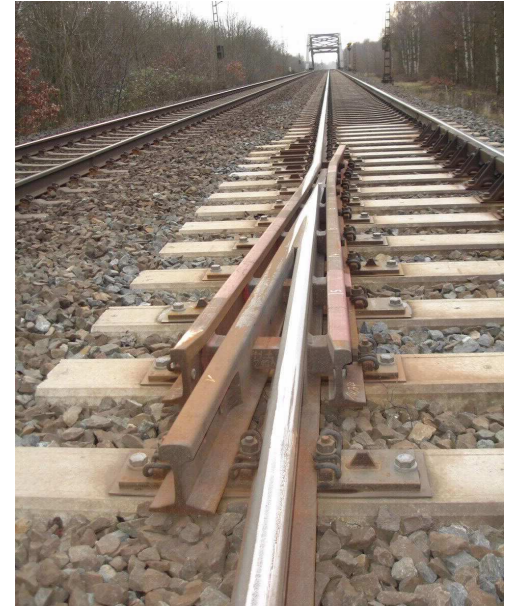


<http://www.infraguider.eu/>

**Pētniecībai, kuras rezultāti ir šādi,  
finansējums saņemts, piedaloties  
Eiropas Kopienas Septītajā  
pamatprogrammā FP7/2007-2013,  
uz ko attiecas piešķiruma nolīgums  
Nr. 218662**

*The Research activity which has lead to such  
results benefited from the funding scheme FP7  
(2007-2013) of the European Union within the  
Grant Agreement nr. 218662*





■ ■ ■ Thank you for your kind attention

**QUESTIONS???**

*Paolo Contestabile*

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# ***Discussion on the future perspectives of sustainable land use by the railways***

Next step in our Network

# What's up, Quo Vadis

- **Interactive search for sustainable land use within railway companies**

## **UIC network soil, march 2007**

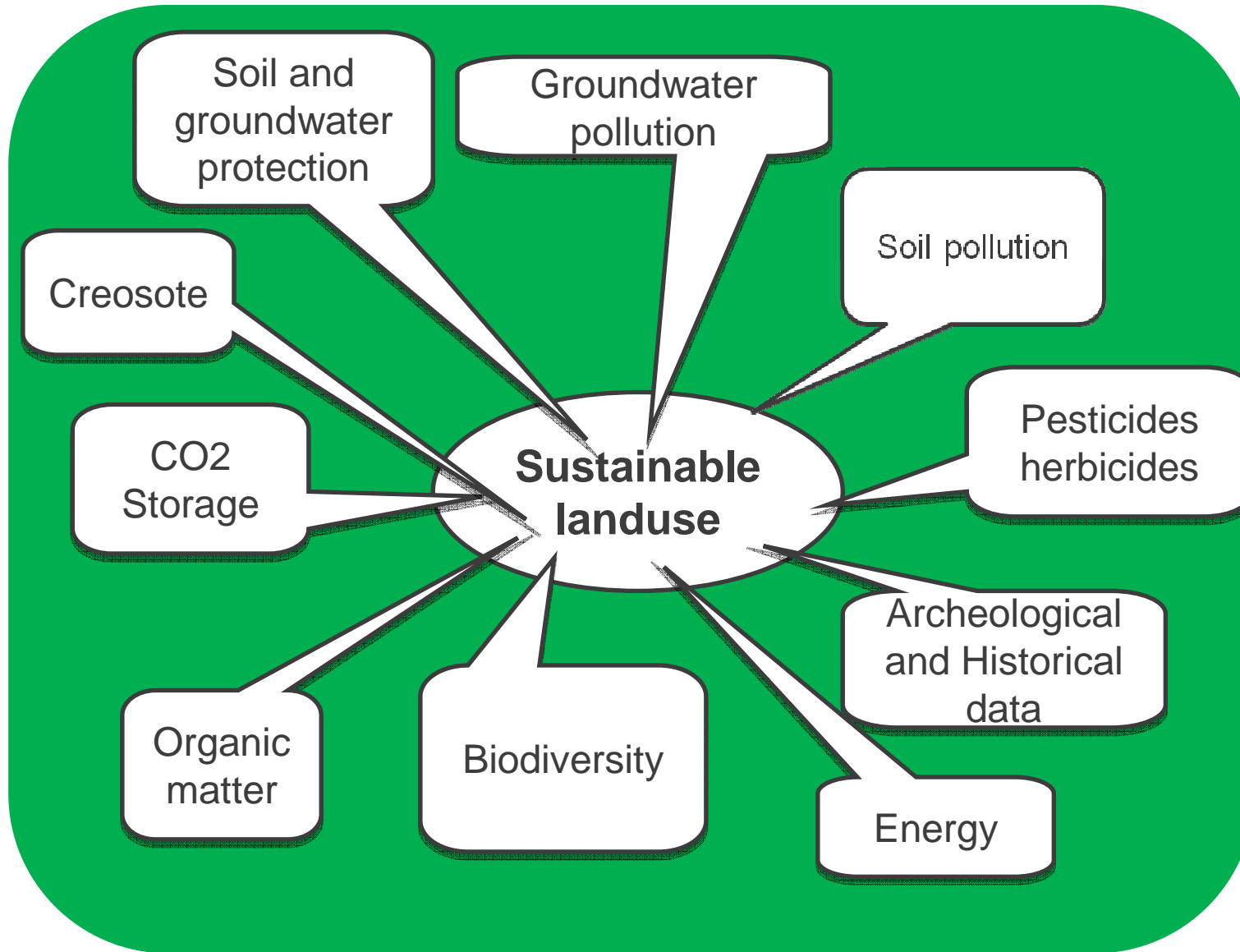
- > 1. focus on angle of technical impact of possible EU directive on soil**
- 2. exchange of technical experiences**

**Shifting to a more broader approach  
by introducing sustainable use of land**



# Sustainable landuse

- > *Managing the land (soil and groundwater) so that the quality of the land will be protected for mankind and environment and with the possibility of social and economic development.***



# The Network Future challenges

- > 1. do we consider sustainable landuse to be a fundamental value of the railways**
- > 2. what can the concept means for railway strategy  
how to deal with conflicting issues like f.i. biodiversity and the use of creosotes, or herbicides**
- > 3. how to make sustainable landuse clearly visible and understandable for the management**

■ ■ ■ **Thank you for your active participation**

*Your Network Team Harold, Rolf and Jan*