German Country Report

Tour de Table

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Agenda

- Introduction,
- Legal framework
  - Planned amendments in legal framework
- Large-scale federal remediation projects
- Recent national research programmes
  - SAFIRA II, RUBIN, KORA, REFINA
- Summary

Legal framework - Germany

Federal Law since 1999

Federal Soil Protection Act

* Definitions, Obligations, Values

Federal Soil Protection and Contaminated Sites Ordinance

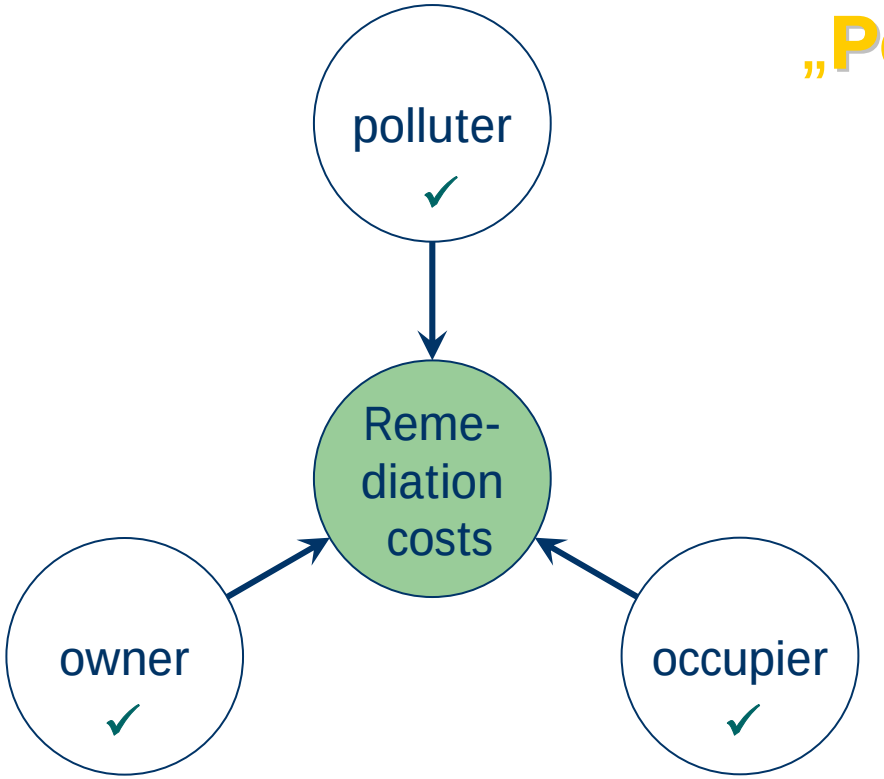
* Derivation of Values, Pathways, Methods

Promulgation of Methods and Standards for Derivation of Test Thresholds and Measures Thresholds pursuant to the Federal Ordinance on Soil Protection and Contaminated Sites

Contents of the Soil Protection Act

- Common standards for the investigation, assessment and remediation of harmful soil changes and contaminated sites
- Requirements for the handling of excavated and shifted soil material
- Precaution against the occurrence of harmful soil changes
- Annex 1: Sampling, analysis, quality assurance
- Annex 2: action values, tests and prevention
- Annex 3: Remediation survey and cleanup plan

Who has to pay for?



„Polluter pays principle“

It is incumbent on the authority in Germany to choose among polluter, owner or occupier.

Alternatives:

- Remediation programmes
- Project and research funding
- Public private partnership
- Brownfield redevelopment
- Other solutions e.g. „Länder“-funds

Planned amendments in the legal framework

- to update the Federal Soil Protection act and Contaminated Sites Ordinance which entered into force in July 1999,
- to take the experience gained over several years with the implementation,
- to adapt its technical and methodological requirements to the advanced state of knowledge.

Regarding Investigation ...

- Requirements on investigation/analysis methods will be updated → fundamental revision of Annex 1 (Ordinance)
- Revisions are necessary for the areas of sampling, soil gas measurement and leachate forecast.
- Information on measurement uncertainty

Regarding Assessment…

- The trigger and action values in Annex 2 will be reviewed in terms of their timeliness, particularly with respect to their human toxicological basis.
- Values for additional substances will be added on a moderate scale. In so doing, the following aspects in particular will be taken into account:
  - toxicological relevance,
  - frequency of occurrence at contaminated sites and in cases of known soil contamination,
  - a sound data base for derivation of values,
  - availability of a suitable method of detection.
- For the soil–plant pathway will be supplemented by values for additional organic pollutants
- For the soil–human being pathway, trigger values for antimony, cobalt and thallium and for select explosive-typical compounds will be added.

Remediation, protective and restrictive measures

- Whether and how *Natural Attenuation* processes should be taken into account in the regular procedure for dealing with contaminated sites
- For *Accidents* a different procedure will be incorporated into the Ordinance as “exemption” in the case of accidents.

Large-scale Federal remediation projects

- 22 large-scale projects whereby the financing of the remediation is shared by the Federal Government (75%) and the “Länder” (25%). The total costs were more than 3 billion Euros

Remediation and redevelopment of former mining areas

- Until 2007 a total budget of 7.8 billion Euros will be spend for the **lignite remediation** programme only. The current prolongation of the agreement, (2008 to 2012), provides for a total budget of nearly 1 billion Euros
- Another focus in mining rehabilitation lies on former **uranium mining**. The financial responsibility belongs to the Federal Government only. The remediation programme will continue until 2015 with an expected budget of 6.2 Euros. Two-thirds of necessary actions are finalised so far.

Current Statistics

category [1]	survey	suspected contaminated sites	abandoned waste disposal sites	abandoned industrial sites	contaminated sites	remediation (finalised)	Risk assessment (finalised)	remediation (ongoing)	supervision / monitoring (ongoing)
lfd. Nummer		1	1.1	1.2	2	3	4	5	6
Baden-Wuerttemberg	12/2005	11.572	2.285	9.287	9.452	1.456	623	1.502	74
Bavaria	03/2006	16.035	11.166	4.869	3.471	1.450	1.398	1.032	52
Berlin	07/2006	3.849	1.056	3.379	k.A.	681	62	122	67
Brandenburg	03/2006	21.165	7.498	13.667	3.756	1.431	86	3.328	38
Bremen	06/2006	3.333	40	3.293	552	367	41	467	149
Hamburg	6/2006	1.925	306	1.644	2.833	423	135	424	118
Hesse	07/2006	740	315	425	837	468	287	546	158
Mecklenburg-Western Pomerania	12/2005	6.652	2.799	3.853	385	1.130	374	849	530
Lower Saxony	06/2005	69.071	9.311	59.760	1.559	1.169	277	1.015	95
North Rhine-Westphalia	01/2004	48.459	19.163	29.568	10.701	2.186	2.090 919	3.774	1.669
Rhineland-Palatinate	06/2005	13.415	10.563	2.852	1.365	405	167	712	206
Saarland	08/2005	1.941	1.668	289	740	461	33	42	156
Saxony	03/2006	22.125	7.139	14.986	5.624	1.016	724	2.146	1.204
Saxony-Anhalt	05/2005	19.421	5.738	13.683	1.927	118	49	978	9
Schleswig-Holstein	12/2005	17.498	2.395	15.103	2.233	257	104	874	k.A.
Thuringia	03/2006	15.559	4.826	10.733	2.321	604	604	722	39
		272.760				13622		18533	

In Germany about 500 Million € public money will be spend each year (++)

Revitalization of Contaminated Land and Groundwater at Megasites

– SAFIRA II Research Program 2006 - 2012 –

UFZ Center for Environmental Research
Leipzig-Halle GmbH

SAFIRA II - Objectives

- The development, implementation, and operation of an integrated decision support and management system
- The integration of socio-economic approaches
- The preparation of an open platform for innovative methods and technologies

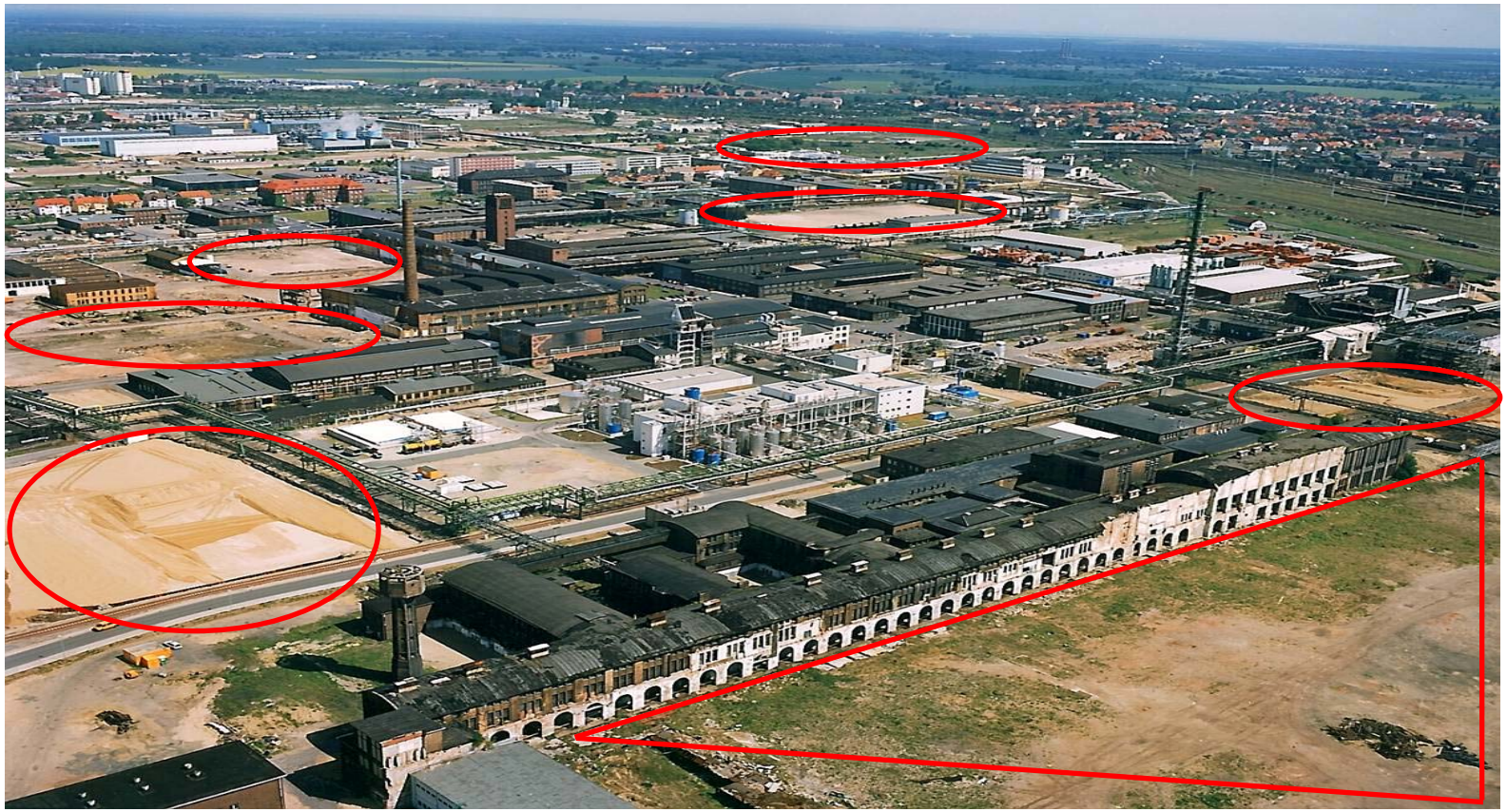
Megasite Types

Industrial Megasites (B)

Urban Meg

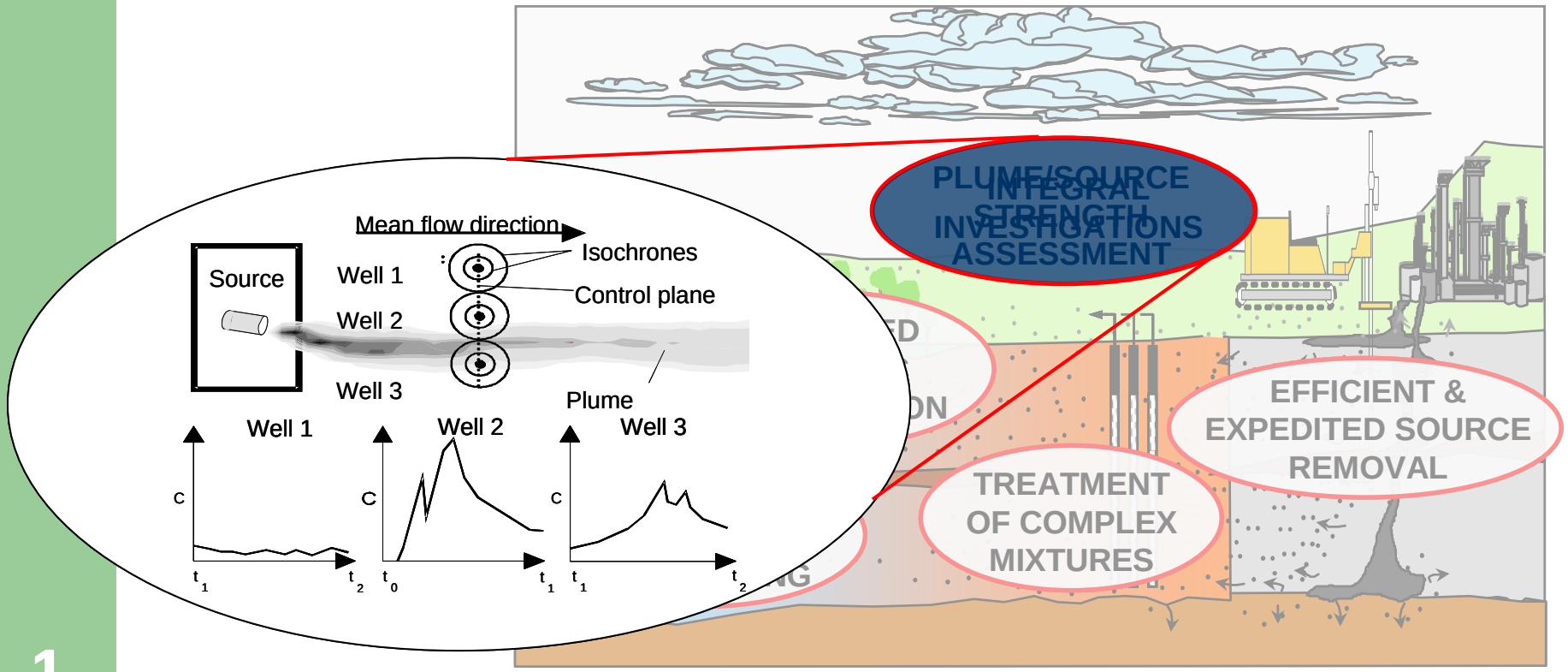
Rural Megasites (C)

Megasite Restoration in practice



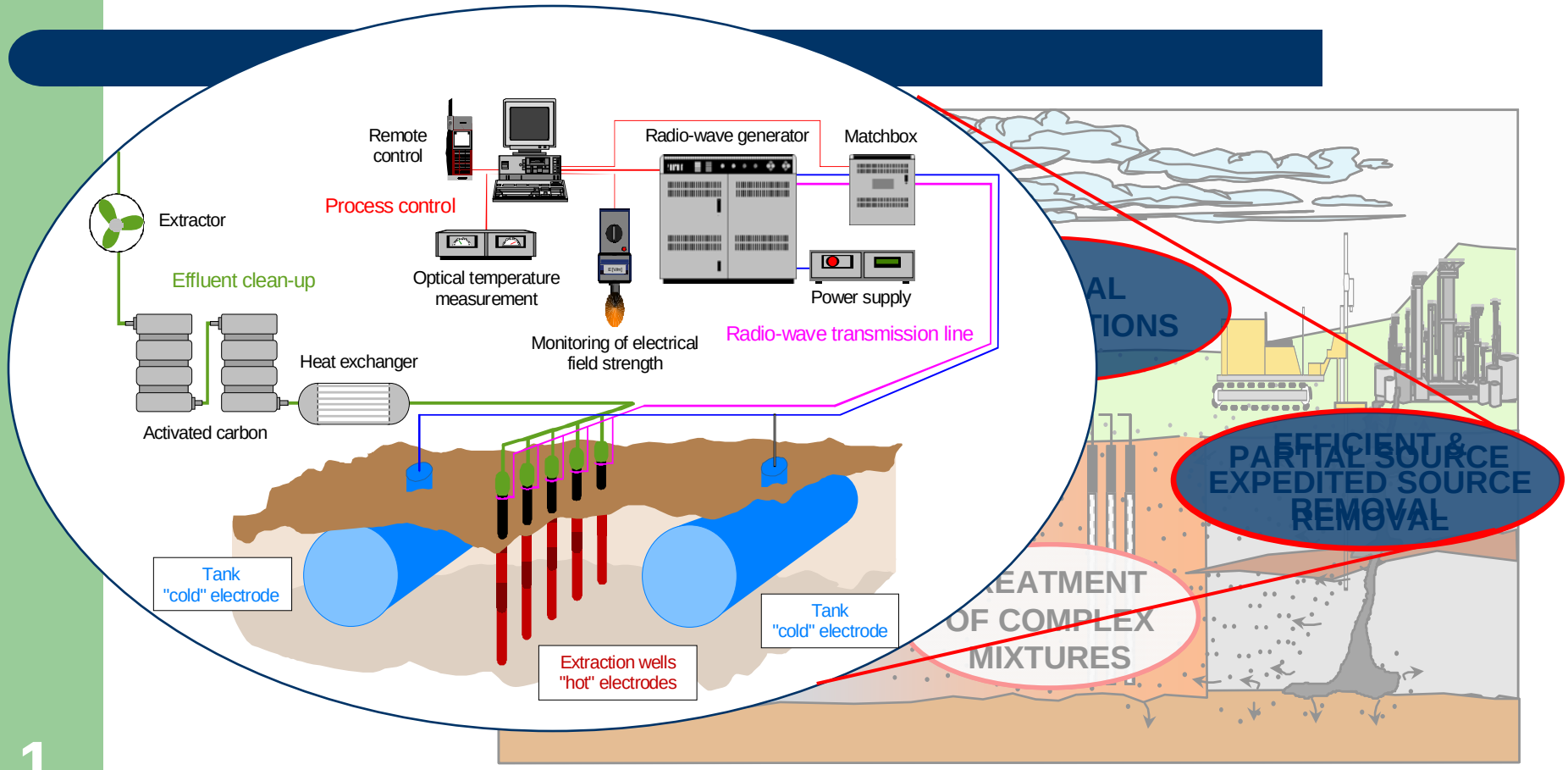
Challenge: Source Identification, Source Strength Assessment, Plume Delineation

⇒ **Integral and High Resolution Groundwater Investigations (Immission Pumping Tests (IPV), „direct-push“-Techniques)**



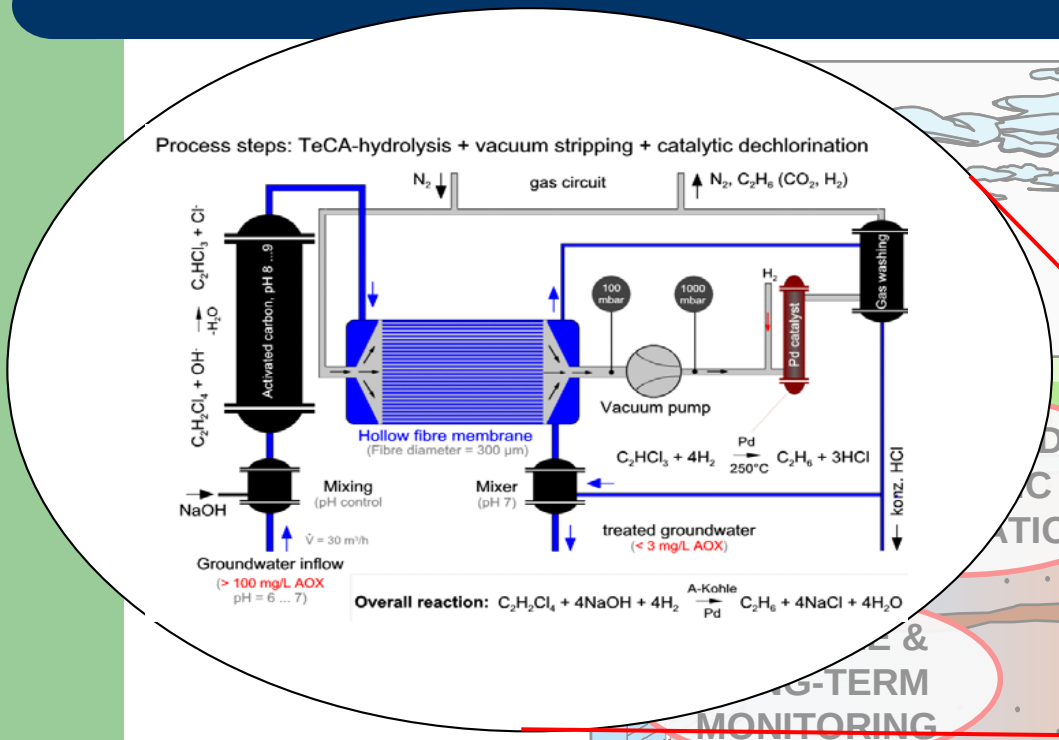
Challenge: Cost Efficient Source Removal

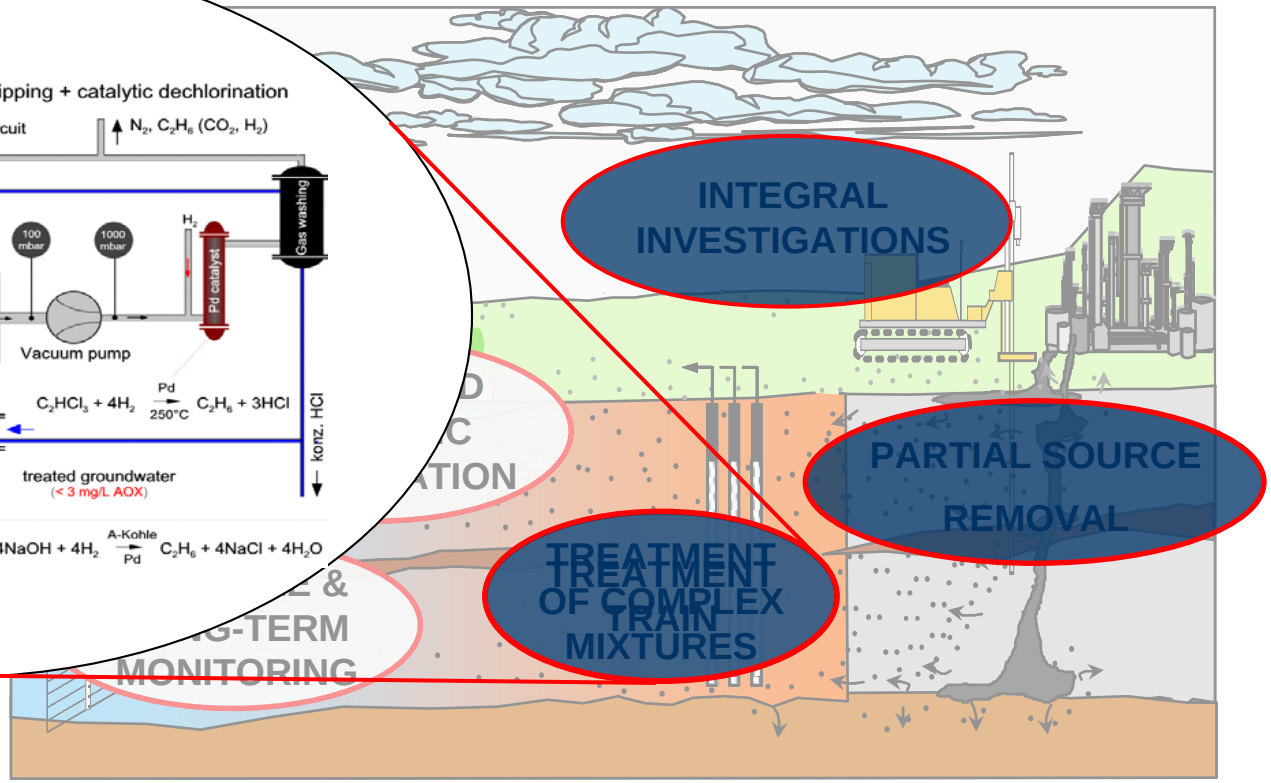
⇒ **Expedited (partial) Source Removal by Thermal Methods (MOSAM, RF-TOOL)**



Challenge: Effective Treatment of Complex Contaminated Groundwater

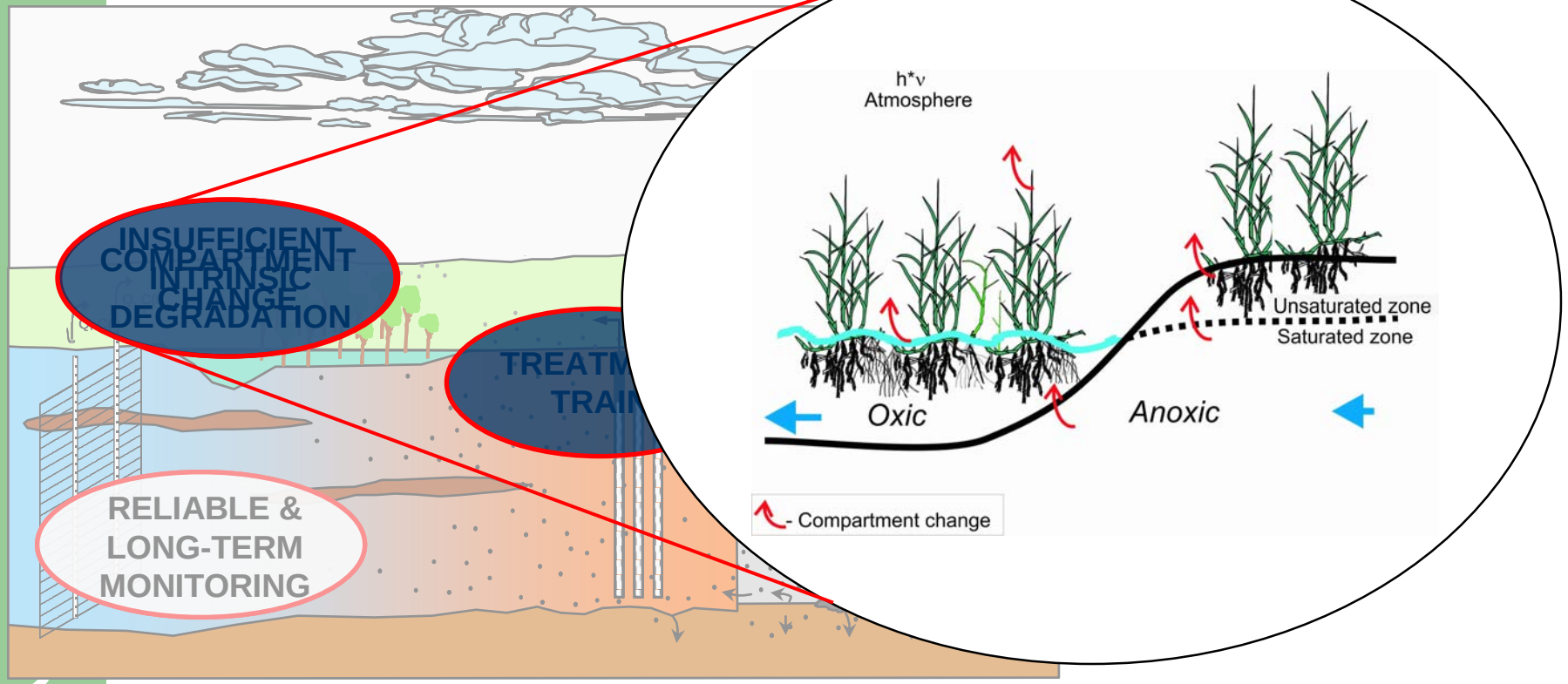
⇒ **Modular, Flexible Treatment Facilities ("TREATMENT TRAIN APPROACH")**





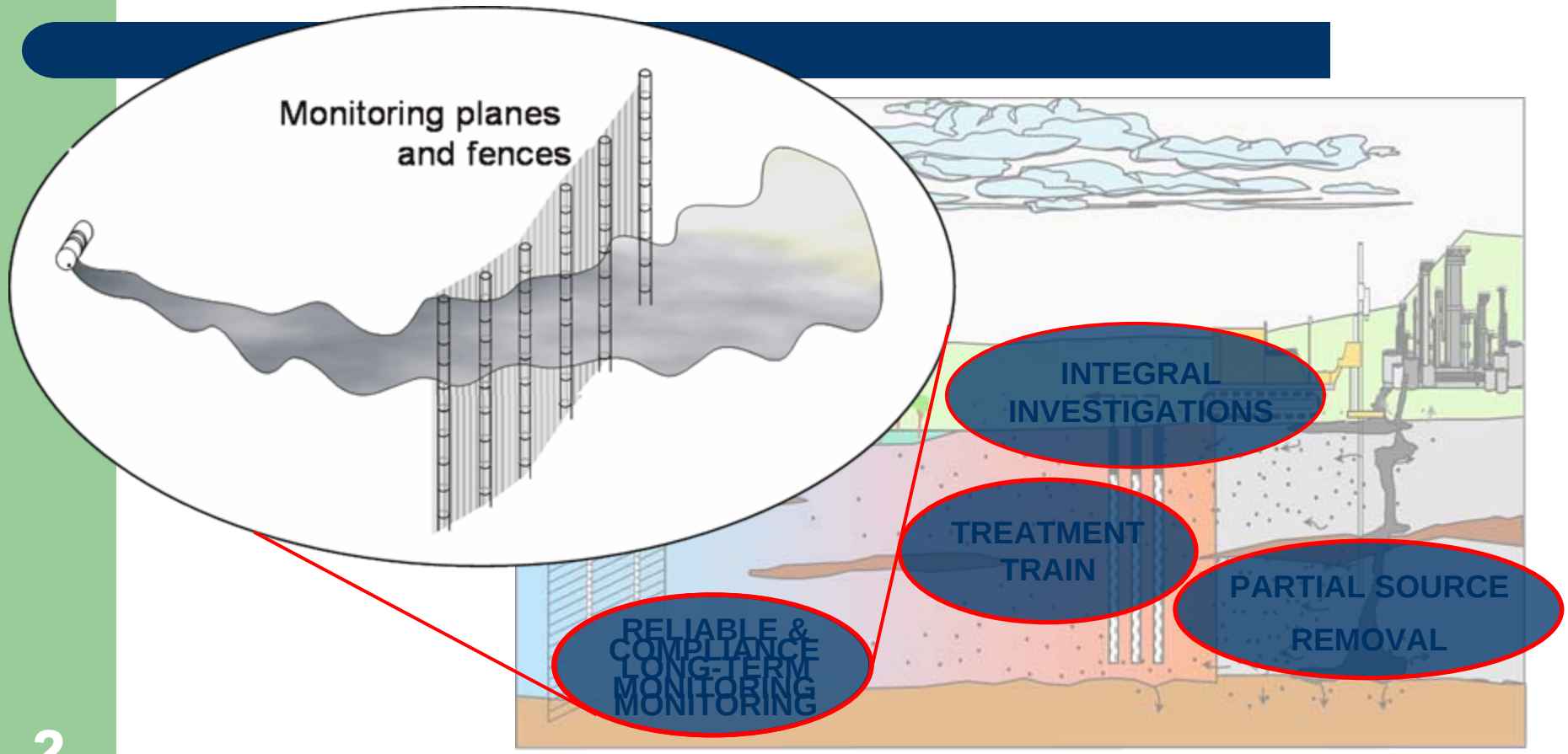
Challenge: Semi-active and passive *in-situ* Treatment of Contaminated Groundwater

⇒ **Enhancement of DegradationRates**
"COMPARTMENT TRANSFER APPROACH"



Challenge: Performance Control and Compliance Monitoring

⇒ **Minimal Invasive and Reliable On-line Monitoring "COMPLIANCE MONITORING"**



RUBIN — The German permeable reactive barrier network (2000-2009)

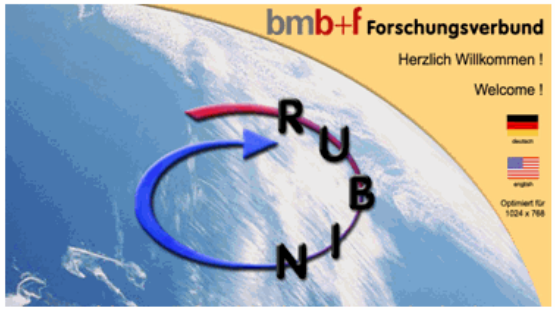
RUBIN

Universität Lüneburg

THE GERMAN PERMEABLE REACTIVE BARRIER NETWORK „RUBIN“ (2000-2005) Results/Lessons Learned/Outlook

Prof. Harald Burmeier
Dr. Volker Birke
Co-ordination group of RUBIN
University of Lüneburg

www.rubin-online.de



Gefördert vom bmb+f Bundesministerium für Bildung und Forschung

14 PRBs at least 4 planned; PRBs with “directed GW flow“ prevail (10 in total, “classical“ F&G, “Drain and Gate“ and modified F&G systems (partly applying pumping), ISV, DHR)
Reactors/gates often installed/accessible nearby the surface – control is preferred!
Elemental Iron (ZVI) and activated carbon (AC): preferred reactive materials

Missions / Goals

- Gaining data from as much as possible different cases and applications for assessing benefits, drawbacks and applicability of treatment walls
- Information on design, construction and operating
- Impact and benefits regarding the environment
- Testing already installed treatment walls
- Reduction of pollutants pertaining to long term aspects
- Rentability
- Developing and establishing quality standards
- PRB handbook and guidance, protocols for planning, constructing, erecting, operating, monitoring under German regulations and laws

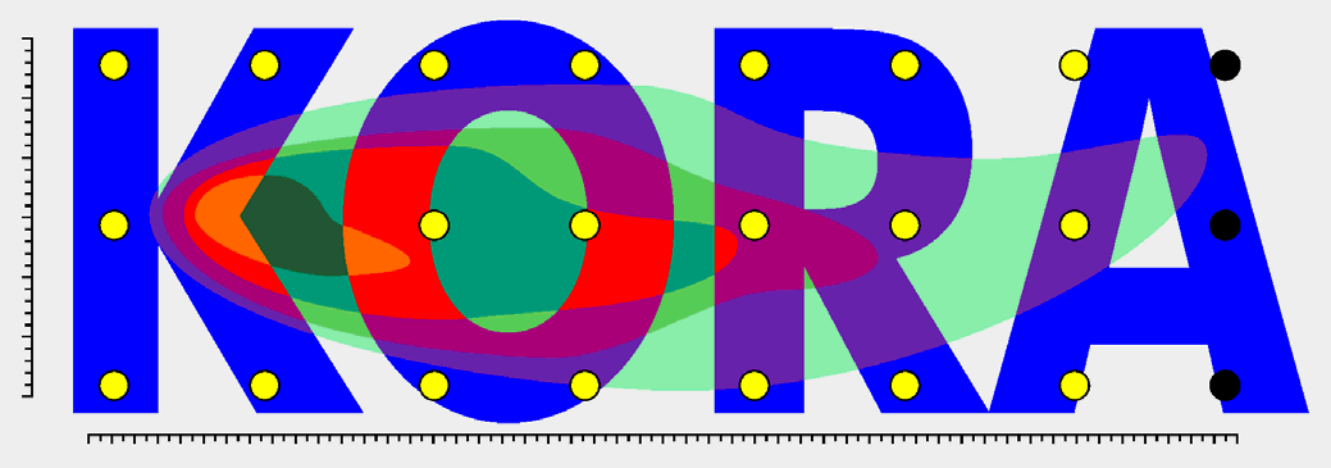
Conclusions

- PRBs with a specifically directed GW flow such as „*Drain and Gate*“, „*Trench and Gate*“ **look promising**!
- PRBs equipped with *ISV* which were inserted into accessible *shafts* **look promising**!
- PRBs employing activated carbon (AC) **look promising**!

RUBIN will continue!

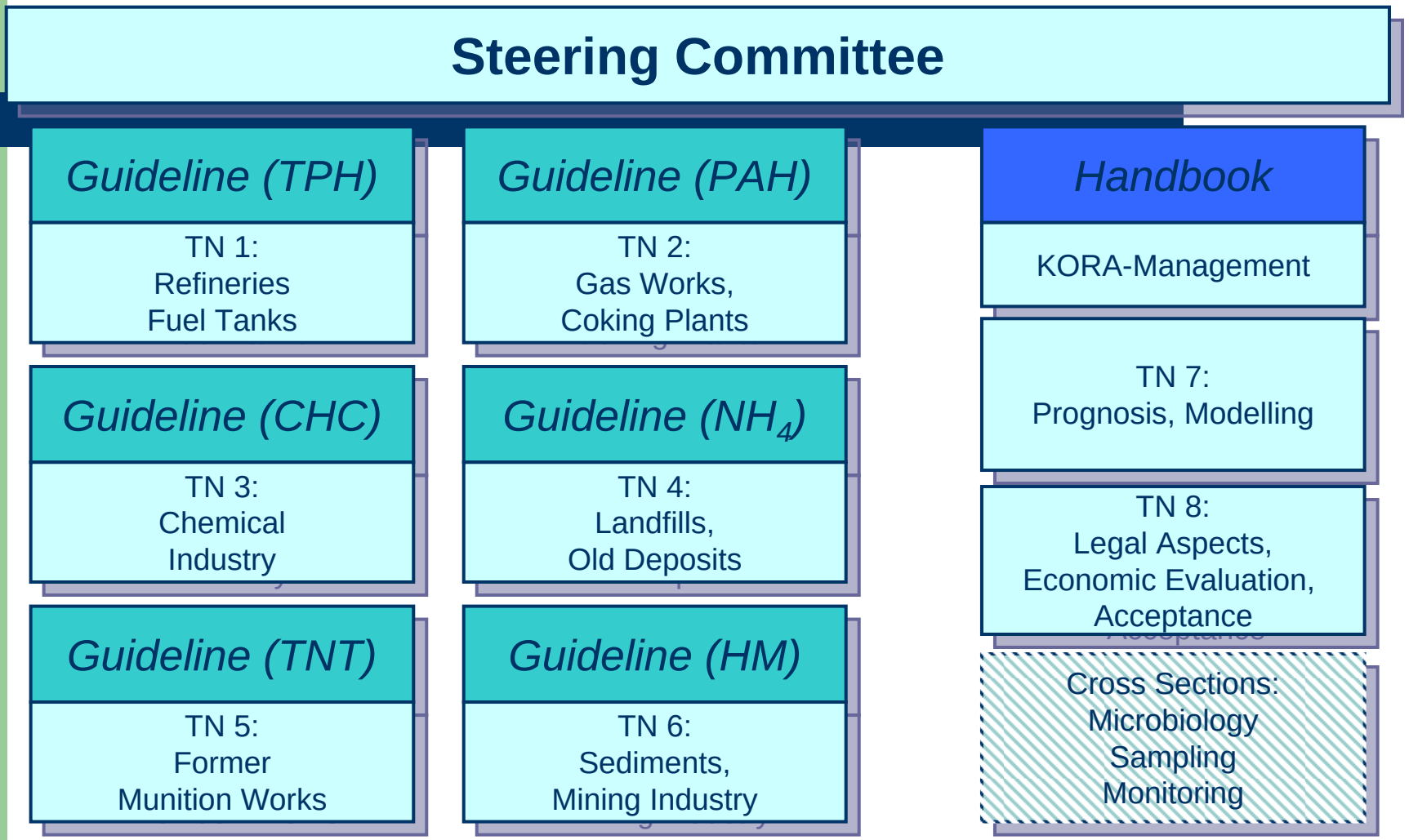
- New full scale projects: EC-PRBs and CRBs charged with GAC or ZVI, current „hot spot“: bio reactor PRB at Offenbach
- More R&D pertaining to
  - a) iron clogging and performance
  - b) sorption of contaminants on activated carbon
- Nano particles

KORA — (2002-2008)



Retention and Degradation Processes Reducing Contaminations in Groundwater and Soil

Organization structure of KORA



Guidelines (branch specific)

Target audience

- Problem owners
- Engineering companies
- Responsible authorities

Goals

- Assessment of the site specific NA potential
- Hints and recommendations for design and performance of MNA measures
- Designation of reference sites

Recommendations

Target audience

- Competent federal authorities, Ministries
- "Deciders"

Goals

- Hints and recommendations for Consideration of Natural Attenuation-Processes in the management of contaminated sites
- Compilation of experiences with and design of Methods for the assessment of NA

REFINA – (2004-2008)

German R&D Program for the Reduction of Land Consumption and for Sustainable Land Management

REFINA

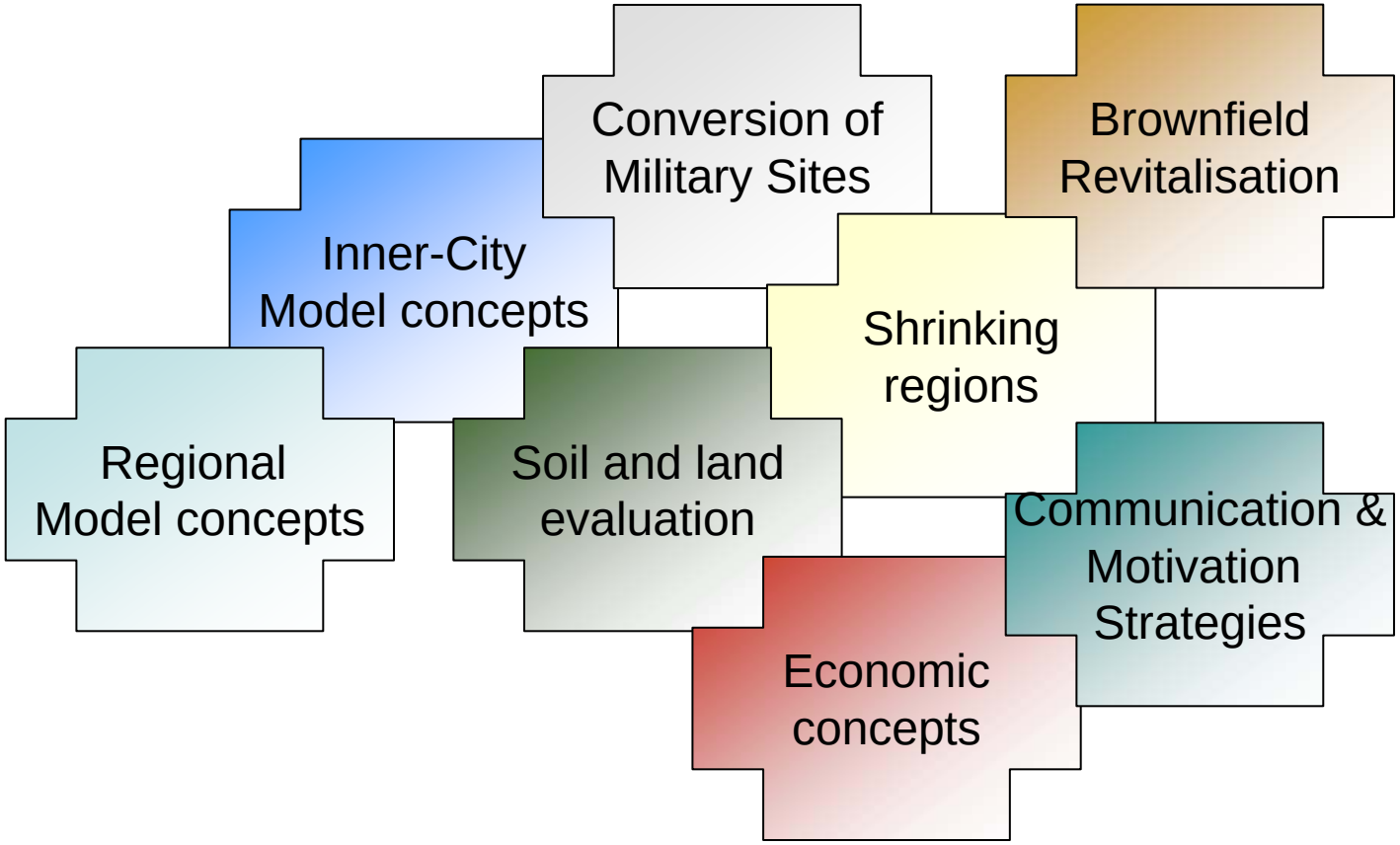
Challenges in Land Management in Germany

- Maintenance of the regional economic power
- Reducing land consumption rates / preserve greenfield sites
- Re-using abandoned and derelict sites
- Ensuring the infrastructure for
  - Transportation and mobility, Housing, Trade, Water supply, waste water, waste, energy, cleanness, Education, communication, Health care
- Decreasing social segregation
- Stimulating inner city investment
- Managing the urban-rural fringe
- **=> important to engage municipalities**

Aim of REFINA

- Innovative concepts for the reduction of land consumption
- To reconcile with
  - Environmental protection and nature conservancy
  - Economic growth
  - Socially compatible housing
  - Quality of urban building and mobility
- **Concerted action** between BMBF, BMU (Ministry Environment), BMVBS (Ministry Transport, Building, Urban development) Identify boundaries and risks of a growing land consumption
  - Develop strategies for a reduction of land consumption
  - Use chances optimally
- BMBF-U.S. EPA, Bilateral working group

REFINA Topics



Thank You

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