



European Union Network for the Implementation  
and Enforcement of Environmental Law

# **IMPEL Water and Land Remediation**

## **Lille – 28-30 March 2023**

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МИНИСТЕРСТВО НА  
ОКОЛНАТА СРЕДА И ВОДИТЕ



REPUBLIKA HRVATSKA  
Državni inspektorat



MINISTRY OF AGRICULTURE  
RURAL DEVELOPMENT  
AND THE ENVIRONMENT



REPUBLIC OF ESTONIA  
MINISTRY OF THE ENVIRONMENT



Roinn Cumarsáide, Gníomhaithe  
ar son na hAeraíde & Comhshaoil  
Department of Communications,  
Climate Action & Environment



Vides aizsardzības un  
reģionālās attīstības  
ministrija



ДРЖАВЕН ИНСПЕКТОРАТ  
ЗА ЖИВОТНА СРЕДИНА





Główny Inspektorat  
Ochrony Środowiska

igamaot



GARDA NAȚIONALĂ DE MEDIU



SLOVENSKÁ  
INŠPEKCIA  
ŽIVOTNÉHO  
PROSTREDIA



Departamento de  
Planificación Territorial,  
Vivienda y Transportes

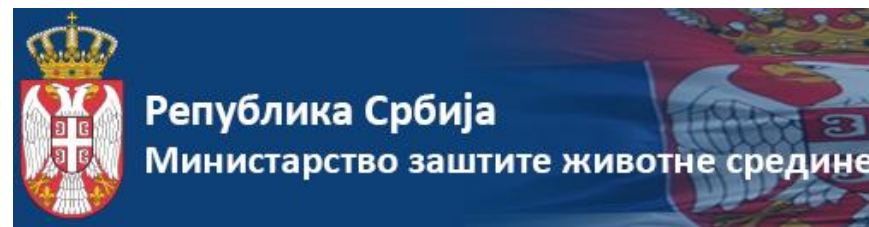


Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

Bundesamt für Umwelt BAFU



TÜRKİYE CUMHURİYETİ  
ÇEVRE VE ŞEHİRCİLİK  
BAKANLIĞI



Omgevingsdienst NL



Inspectie Leefomgeving en Transport  
Ministerie van Infrastructuur en Waterstaat

HUIS VAN DE NEDERLANDSE  
PROVINCIES



Rijkswaterstaat  
Ministerie van Infrastructuur en Waterstaat



Department of the  
Environment



SWEDISH  
ENVIRONMENTAL  
PROTECTION  
AGENCY



ČESKÁ INSPEKCE  
ŽIVOTNÍHO PROSTŘEDÍ





# WLR: WATER AND LAND REMEDIATION



## Why it is needed

This project aims to speed up the process, focusing on the remediation phase that is often the bottleneck, promoting In Situ and on-site technologies.

## Outcomes

- Support/exchange technical experience required to make progress with the Remediation phase in Europe
- Two technologies and two reports per year, until 2024. Each report (35-50 pages) has an Annex with several case studies
- 2021                    **IN SITU CHEMICAL OXIDATION AND SOIL VAPOR EXTRACTION**
- 2022                    **MULTI PHASE EXTRACTION AND SOIL WASHING**
- 2023                    **THERMAL DESORPTION AND PHYTOREMEDIATION**
- 2024                    **To be decided!**





# WLR: WATER AND LAND REMEDIATION



- Relevant international network are involved in the project





# WLR: WATER AND LAND REMEDIATION



## Results for 2021

- Final documents on ISCO has been approved by IMPEL General Assembly on 7-8 December 2021 and are now published in IMPEL website, available in many languages
- <https://www.impel.eu/projects/water-and-land-remediation/>



In preparation

In Situ Chemical Oxidation (ISCO) report (EN)



Έκθεση για την επιτόπια χημική οξείδωση (ETΧΟ), Τελική έκθεση (GR)



Ossidazione chimica in situ (ISCO) report (IT)



In situ chemische oxidatie (ISCO) (NL)



Utlénianie Chemiczne In Situ - raport (PL)



Raport privind Oxidarea Chimică in-situ (ISCO). (RO)



In Situ Kemična Oksidacija (In Situ Chemical Oxidation - ISCO) poročilo (SI)



In situ chemická oxidácia (ISCO), Záverečná správa (SK)



Yerinde Kimyasal Oksidasyon Raporu (TR)



Rapport sur l'oxydation chimique in situ (OCIS) (FR)





# WLR: WATER AND LAND REMEDIATION



## Results for 2021

- Final documents on **SVE** has been approved by IMPEL General Assembly on 7-8 December 2021 and are now published in IMPEL website, available in many languages
- <https://www.impel.eu/projects/water-and-land-remediation/>



In preparation

Soil Vapour Extraction (SVE) report (EN)



Έκθεση για την εξαγωγή ατμών εδάφους. (GR)



Rapport sur l'extraction des vapeurs du sol (EVS). (FR)



Estrazione vapori da suolo (SVE) (IT)



Bodemlucht-Extractie -report (NL)



Ekstrakcja Par z Gruntu (SVE) - raport (PL)



Raport privind extracția vaporilor din sol (SVE). (RO)



Ekstrakcija talnih hlapov (Soil Vapour Extraction - SVE) poročilo (SI)



Extrakcia pôdneho vzduchu (SVE) (SK)



Toprak Gazı Ekstraksiyonu (SVE) Raporu (TR)



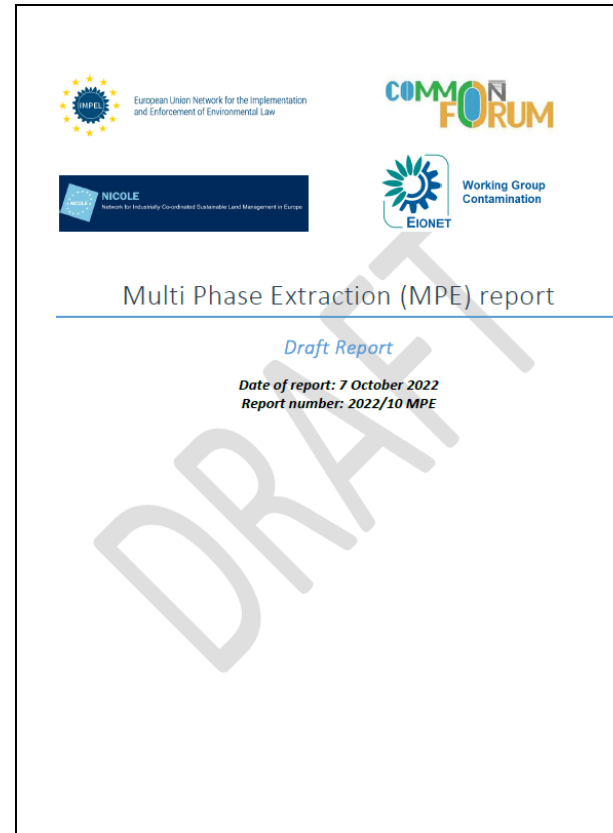


# WLR: WATER AND LAND REMEDIATION



## Results for 2022

- Final documents on **MPE** and **SOIL WASHING** has been approved by IMPEL General Assembly in December 2022 and are now published in IMPEL website, just in English. We will start the translation soon
- <https://www.impel.eu/projects/water-and-land-remediation/>







# WLR: WATER AND LAND REMEDIATION



## Activities 2023: Thermal Desorption and Phytoremediation

- **Two questionnaires** have been published in IMPEL website on 11<sup>th</sup> November 2022 – need to **get case studies** - your help is needed up to **31<sup>st</sup> March 2023**

## THERMAL DESORPTION



### TABLE OF CONTENTS

---

Context.....	3
Introduction.....	5
1. Your contact details.....	9
2. Site background.....	10
3. Laboratory-scale application.....	14
4. Pilot-scale application in field .....	15
5. Full-scale application.....	20
6. Post treatment and/or Long Term Monitoring .....	25
7. Additional information.....	26
Glossary of Terms.....	30

## PHYTOREMEDIATION



### TABLE OF CONTENTS

---

Context.....	3
Introduction.....	5
1. Your contact details.....	9
2. Site background.....	10
3. Pilot-scale application in field.....	14
4. Full-scale application .....	19
5. Enhancements to SVE/AS.....	24
6. Post treatment and/or Long Term Monitoring.....	26
7. Additional information.....	27
Glossary of Terms.....	31



# WLR: WATER AND LAND REMEDIATION



## QUESTIONNAIRES 2023

- not every question necessarily needs to be answered, if not meaningful skip;
- you may submit also in an anonymous mode, if you like or you are not allowed to report your name or the site;
- your case studies are useful, also if they have been already presented in any past conferences; English is necessary.
- Case studies will be reported in the Annex of the final document and submitters will be reported as **contributors** to the final document.
- [https://impelnetwork.sharepoint.com/:w:/s/Secretariat/EfDHSTq7XnZMsNvHypi9QR8BzO1ezZmbQ6sdwJ\\_g54sdXQ?e=zOqzNE](https://impelnetwork.sharepoint.com/:w:/s/Secretariat/EfDHSTq7XnZMsNvHypi9QR8BzO1ezZmbQ6sdwJ_g54sdXQ?e=zOqzNE) THERMAL DESORPTION
- <https://impelnetwork.sharepoint.com/:w:/s/Secretariat/EcAQu4q4ylxJuk2soX2-3osBKxK9CuDatDu4SasyDkbVsw?e=VdcWjk> PHYTOREMEDIATION



# NEARLY 30 CASE STUDIES ALREADY COLLECTED – DEADLINE 31 MARCH





# WLR: WATER AND LAND REMEDIATION



## 4. New technologies 2024?

Biopile	★
Landfarming	★
Bioremediation	★ ★ ★
Air Sparging	★ ★
In situ chemical reduction	★ ★ ★
Bioremediation	★ ★ ★
Permeable Reactive Barriers	★ ★
Groundwater Circulation Wells	★

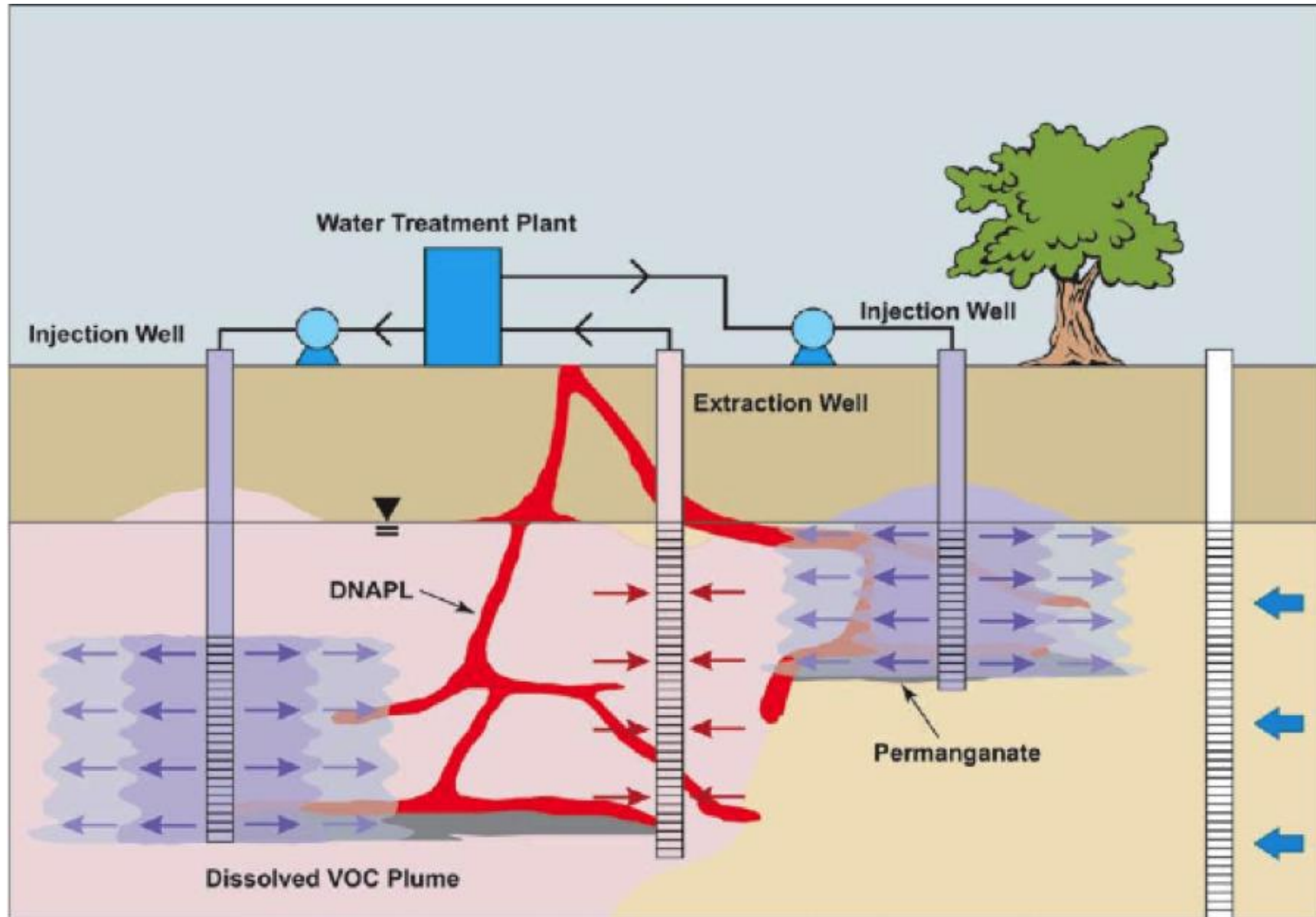


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# SVE – DESCRIPTION





# SVE – FEASIBILITY STUDY



- type/condition of surface cover (e.g., asphalt, vegetation);
- presence and extent of buried structures or utilities
- topography
- soil type distribution and depth
- depth to water table and its seasonal fluctuation
- soil moisture content and variability
- thickness of the capillary fringe
- air permeability and how it varies within the domain of interest
- organic carbon content and variability.



# SVE – IN FIELD TEST



- define the target treatment zone
- propose a conceptual model for the air distribution in the treatment zone
- sustainable airflow rates
- total gas extraction rate
- anticipated contaminant vapor removal rates
- preferred orientation of subsurface airflow
- effective radius of influence and determine if the well spacings are cost-prohibitive
- propose the depth, location, and construction specifics of the wells
- number of vapor extraction wells required
- vapor treatment technology for system off-gas



# SVE – PERFORMANCE MONITORING



- Soil gas chemical monitoring
- VOC and flow rate measurements in SVE system influent, and possibly in individual extraction wells, should be used to calculate the contaminant mass removal rates from the unsaturated soil.
- Contaminant concentrations are usually measured at off-gas treatment influent and effluent (before and after carbon canisters) to assess the effectiveness of the air emission control system.
- Groundwater chemical monitoring: remediation in the vadose zone should not be conducted independently of groundwater conditions. Unsaturated soil may be, in fact, recontaminated by capillary action and water table fluctuations.
- Physical monitoring: soil and vapor temperature, relative humidity, water levels, flow rate, vacuum/pressure measurement





# WLR: WATER AND LAND REMEDIATION



## Conclusion

- IMPEL documents **are not mandatory/legally binding**. You may still use another guideline or other monitoring procedure. Nevertheless important references for countries that does not have them.
- Final products will be disseminated by a number of national and regional authorities
- **These reports should arrive to Local authorities** (translations are crucial). NEED for use of these reports by local control/decisional authorities



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**Thank you for your  
attention**

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**To stay in contact**



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