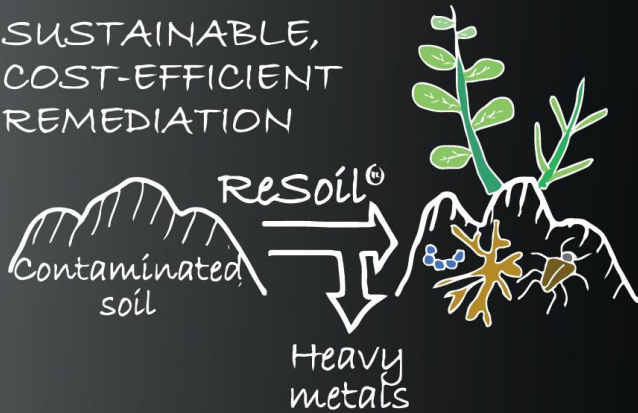


ReSoil[®]

by

ENVIT

SUSTAINABLE,
COST-EFFICIENT
REMEDiation



- **Agricultural soil**
- **Urban soil**
- **Paddy fields**
- **Brownfields**
- **Military polygons**

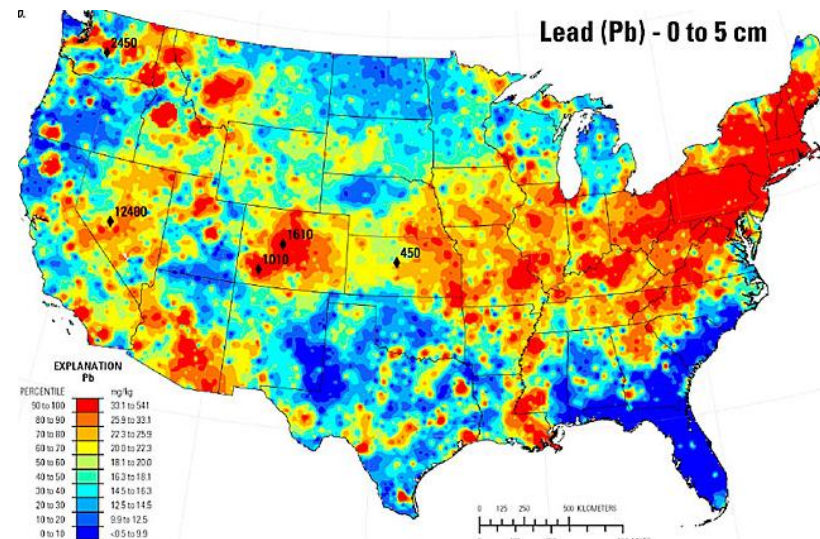
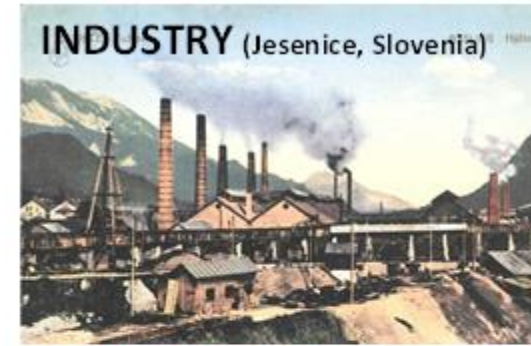
ReSoil[®] is internationally patented, groundbreaking remediation solution that enables closed-loop removal of heavy metals from contaminated soils through a zero-emission process with no wastewater, while preserving soil as a natural substrate.



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PROBLEM

- Soil contamination with heavy metals is a global problem.
- Heavy metals include toxic metals such as lead (Pb), cadmium (Cd), copper (Cu) and zinc (Zn) as well as toxic metalloids such as arsenic (As) and antimony (Sb).
- Soils absorb decades of pollution from industry, intensive agriculture, traffic, waste, etc. Heavy metals are not degradable and remain in the soil.
- According to a recent conservative estimate, there are 2.8 million potentially contaminated sites in the EU (EEA, 2023).
- In China, 1/6 of the total cultivated area is contaminated with heavy metals (Yao et al., Proc Env Sci 2012, 16, 722-729).
- In New York, 71% of garden soils exceed the limits for lead and arsenic (Cheng et al., Soil Sci 2015, 180, 167-174).
- Arsenic and lead are the 1st and 2nd most dangerous environmental pollutants (ATSDR 2017).
- Arsenic is highly toxic, long-term exposure can cause cancer.
- Lead is a neurotoxin; in the USA, the average lead-related loss of cognitive ability was 2.6 IQ points per person as of 2015 (McFarland et al. PNAS 2022, 119, e2118631119).

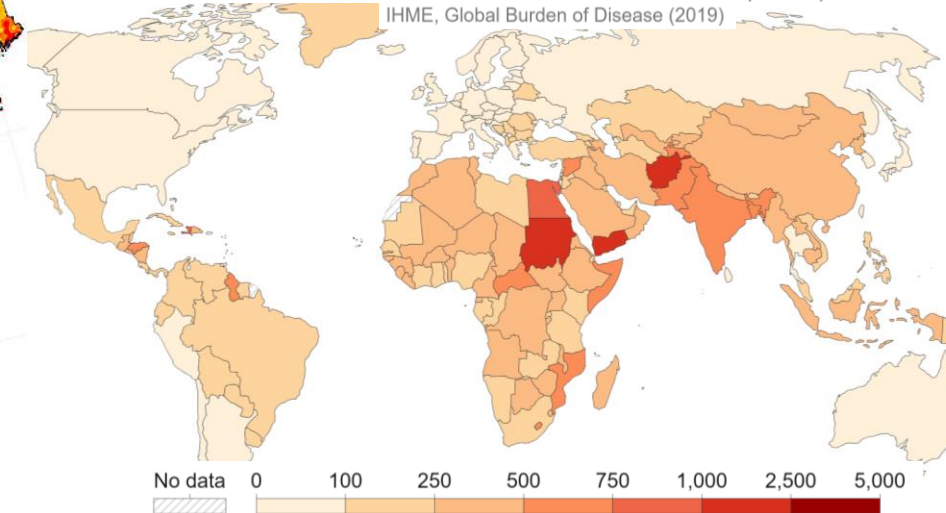


Lead distribution in surface soil of the conterminous United States (USGS 2014).

Rate of disease burden from lead exposure, 2019

Disease burden is measured in disability-adjusted life years (DALYs).

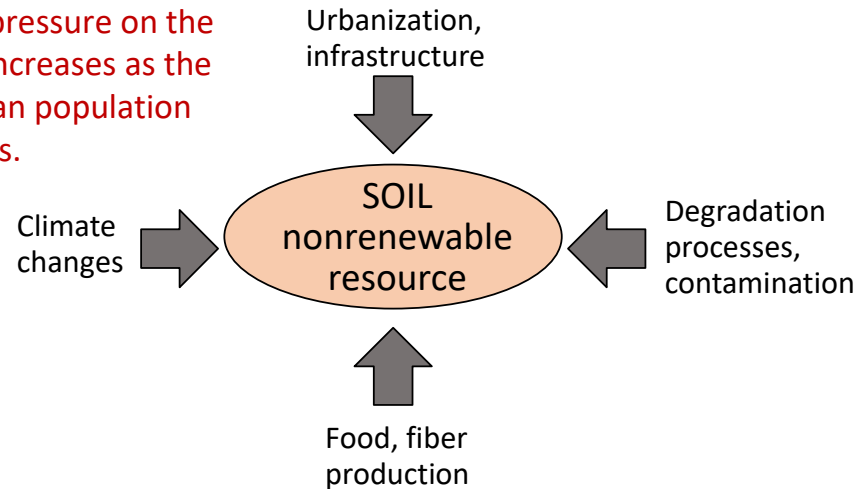
IHME, Global Burden of Disease (2019)



SOIL REMEDIATION

- The **natural area of productive soils is limited** – it is under pressure from degradation processes, climate changes and competing uses for food, energy production and urbanization.

The pressure on the soil increases as the human population grows.

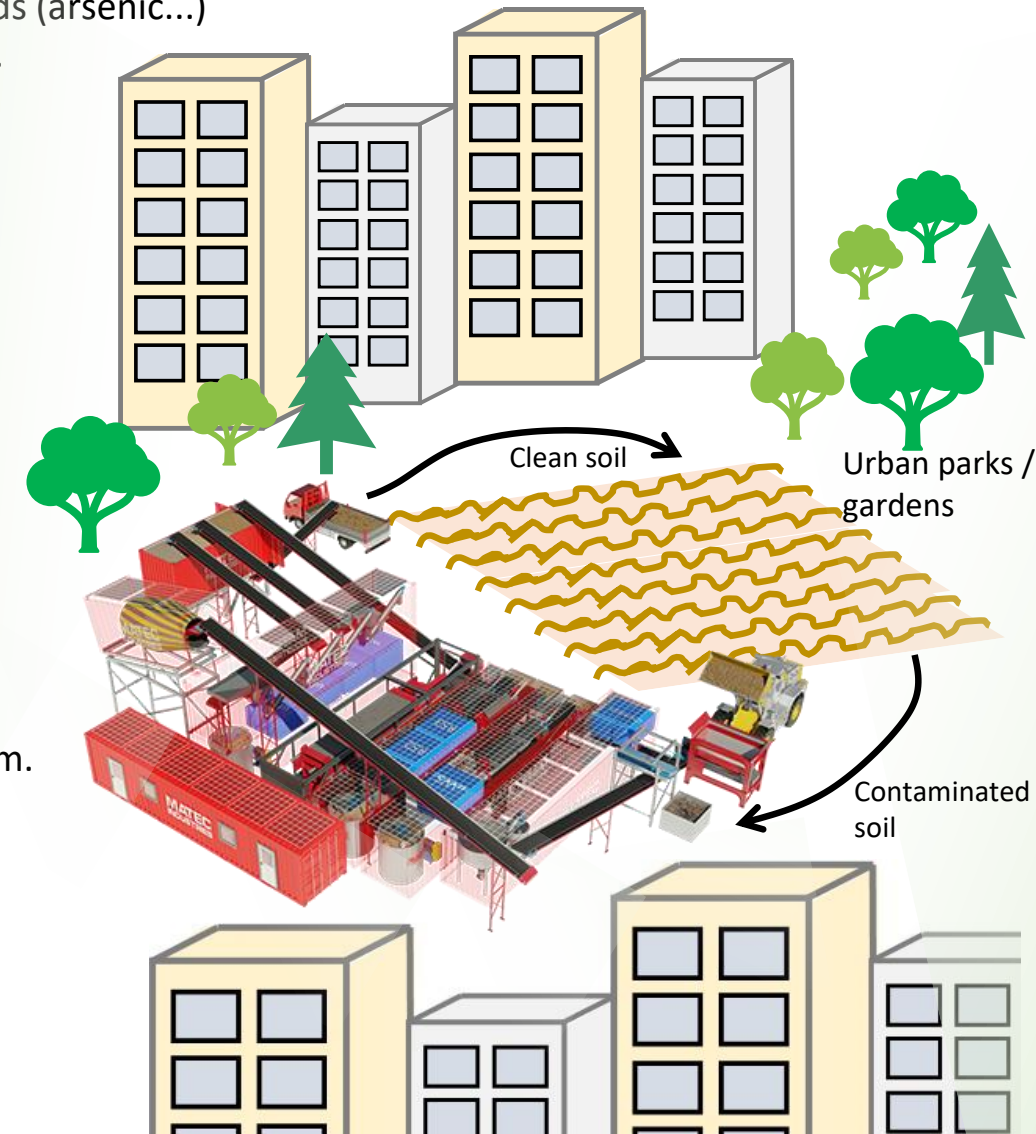


- Up to **40%** of the world's soils are contaminated or degraded in some other way, directly affecting half of humanity (*UN*).
- Contaminated soil that poses a **risk to people** and the environment must be cleaned up – remediated.
- Soil remediation** is about reducing the concentration of pollutants or hazards in the soil.
- Soil remediation should be **efficient and sustainable** enough to preserve and restore the soil for productive use and to avoid **regrettable remediation**.

ReSoil®

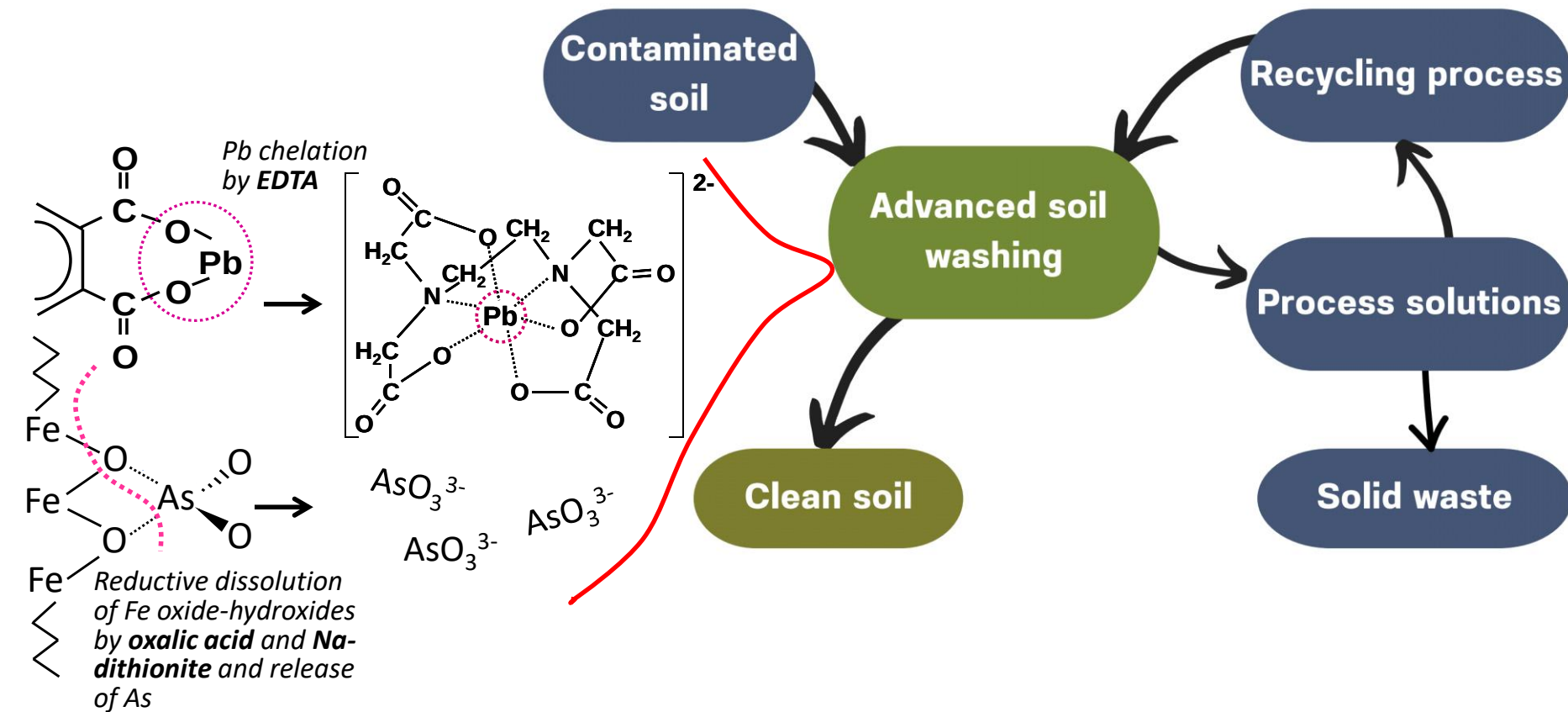
ReSoil® is the **world's only** efficient and sustainable remediation technology that simultaneously removes toxic metals (lead, cadmium...) and metalloids (arsenic...) from the soil.

On-site remediation with **mobile ReSoil®** system.



Based on a **closed-loop** soil washing
with the **chelating agent EDTA**
(ethylenediaminetetraacetate).

ReSoil®



EDTA is recycled in a pH gradient of 12.5 – 2 given by CaO and H₂SO₄.

Metals and metalloids precipitate with Fe and as hydroxides.

Excess and residual reagents are removed from the process solutions, e.g., as Ca-salts.

The **soil is rinsed** 4-times in to remove (and recycle) EDTA.

Residual **toxic emissions** from soil are curbed by adding zero valent iron (Fe⁰) to the soil slurry.



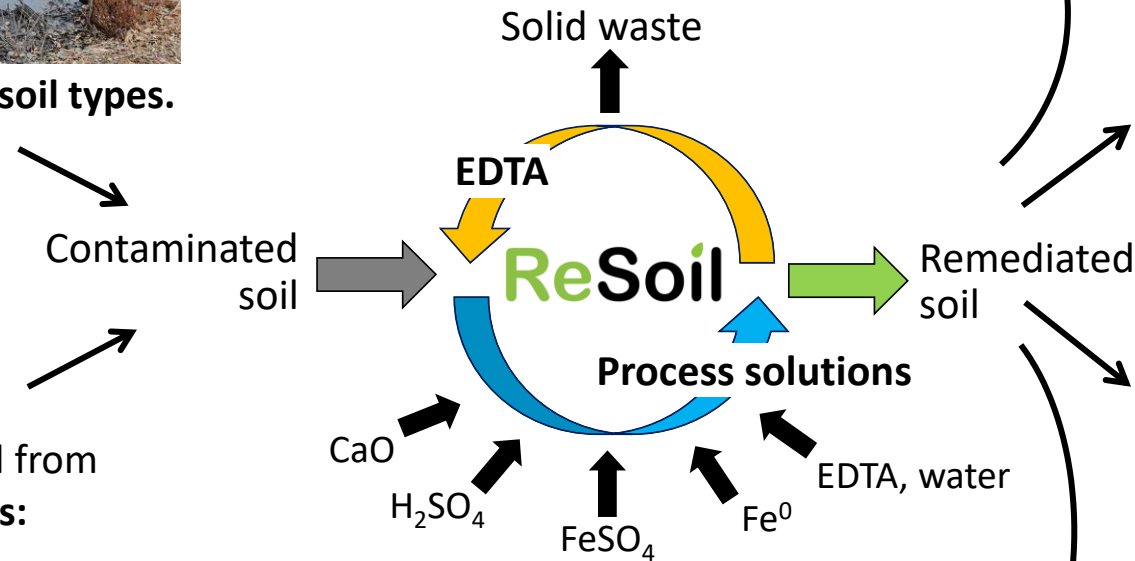
Peat soil
Photo: Øystein Løvdal

Treatment of different **soil types**.

Restoration of soil from different **land uses**:

- Urban soils
- Agricultural soils
- Paddy fields
- Brownfields
- Military polygons

Removal of up to:
95% of lead
95 % of zinc
70% of copper
65% of arsenic
55% of antimony



Plant growth is not affected, the **heavy metal concentration in the plants** is reduced by up to 99%.



The heavy metal concentrations in the **leachate** from the remediated soil are insignificant.

The **chemical, physical and biological properties** of the soil are preserved.



Mycorrhiza in the root system

ReSoil® PATENTS

EP 2720812B1 (2019), Washing of contaminated soil.
Patent family: US 9108233B2, CA 2871879C, WO 2012173576A2

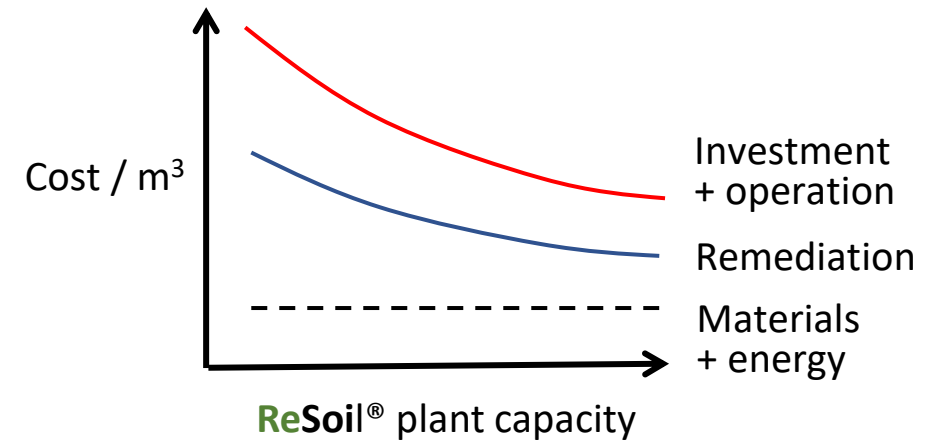
EP 3153246B1 (2018), Method for soil and sediment remediation. Patent family: US 10124378B2, CN 107096789B, CA 2942367A1

EP 3492187B1 (2021), Curbing toxic emissions from contaminated substrate. Patent family: US 10751771B2, CN109877149A, CA 3026163A1

Removal of arsenic, antimony and toxic metals from contaminated substrate. Patent application WO 2022184903

ReSoil® ECONOMICS

ReSoil® follows the principle of **economies of scale**. With the capacity of the remediation plant, the material costs become the determining factor.



Advantage: ReSoil® recycles efficient but expensive EDTA with inexpensive materials (lime and sulfuric acid).

OTHER OPTIONS

for remediation of soils contaminated with heavy metals:

AVAILABLE TECHNOLOGIES	In use by	Effective for heavy metal removal	Applicable for highly contaminated soil	Applicable for all soil types	Applicable for multi-contaminated soil	Preserves soil (Green & sustainable)	NO problematic emissions	Cost for end customer (€/m³)
Soil dig & dump	Construction companies	YES	YES	YES	YES	NO	Soil deposition	100 – 700
Engineered solutions (soil capping)	Construction companies	YES	YES	YES	YES	NO	Leaching	30 – 200
Solidification & Stabilization	Construction companies	NO	YES	NO	YES	NO	YES but difficult to achieve	40 – 100
Classical soil washing (removal of fines)	Remediation companies	YES (up to 80%)	YES, optionally	Only for light and sandy soils	YES	NO	Deposition of contaminated fines	50 – 150
Immobilization by various additives	Remediation companies	NO (reduces Bio-metal accessibility)	NO	Difficult for rich, heavy soils	Theoretically	YES	YES	20 – 60 + repeatable periodical cost
Phytoremediation	Remediation companies	Not efficient for Pb, As, Cu.	NO	YES	NO	YES	Contaminated biomass	?
ReSoil®	Remediation companies	YES (up to 95 %)	YES	YES	YES	YES	YES	70 – 150

ReSoil® outperforms currently available remediation technologies in terms of heavy metal removal, operation without wastewater and other emissions, preservation of soil properties, treatment of different soils and has an advantage in cost efficiency.

MARKET OPPORTUNITY

Global Environmental Remediation Market was valued at EUR 109,3 Billion in 2022 and is projected to reach over EUR 200,1 Billion in 2031, growing at a CAGR of > 6.7% from 2022 to 2031

TAM (Segmented by environmental medium - soil and technology - remediation of heavy metal contaminated soil) in North America, EU, Korea, China, and Japan $\approx$ **EUR 26,83 Billion**

SAM (Segmented by application) in North America, EU, Korea, China, and Japan $\approx$ **EUR 13,42 Billion**

Target Market (North America, EU, Korea, China, and Japan) $\approx$ **EUR 1,25 Billion**

COMMERCIALISATION STRATEGY

Business model is plastic extensible: B2B, licensing

REVENUE STREAMS:



Own remediation plants – development and operation of own plants



Licensing by application (finished plants) – customers license specific turnkey plants, without receiving insight into a business model



Licensing (EUR/t – IP licensing) – licensing of the full process, enables customers to set up and operate own plants

PLAN TO REACH CUSTOMERS:

Customers:

- Land developers / Remediation companies
- Metallurgical industry
- Governments in local infrastructure projects
- Municipalities
- Agricultural sector
- Recreational and military polygons

Markets:

- **Primary focus markets:** Europe, Asia, United States
- **Focus per market segment:** urban soils, military shooting ranges, paddy fields, brownfields, agricultural soil

Market traction:

- **Technology demonstrated:** Slovenia, Austria, Czech Republic, Norway
- **Pre-commercial process:** Slovenia
- **Introduction of technology:** Europe, United States, China

THE TEAM

- Envit Ltd is an **innovative SME** and a spin-out from the **University of Ljubljana**.
- The core team of six, five of whom have PhDs, has **experience in marketing, science and engineering**.
- The CEO is a reputable engineer (in the top 0.17% of world soil pollution experts, Expertscape survey) with extensive business development experience.



Domen
Leštan, CEO



Grega E.
Voglar



Simon
Gluhar



Anela
Kaurin



Neža
Finžgar



Dragan
Martinovič

