GOLD

The GOLD project

Networking village (3-4/10/21)
EXPO 2020, Dubai

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КАПЕ
CRES

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GOLD aims to produce clean low-ILUC biofuels by growing selected high-yielding lignocellulosic crops on contaminated lands, and, in long-term, to return these lands back to the agricultural production.

Contaminated lands polluted with organic and inorganic pollutants:

- Aproximately 2.5 million sites in Europe.
- Can not be used for food and feed production.
- Phytoremediation is a "green" and economic method of soil restoration.
- Energy crops are tolerant to pollutants, they can be cultivated to produce biofuels and decontaminate soils

Biofuels with low ILUC risks (RED II directive):

- Biofuels produced from energy crops cultivated on abandoned, unused and seriously degraded lands.
- A target of 14% for biofuels, bioliquids and biomass fuels with low ILUC risks have been set by 2030.
- Energy crops on contaminated land can provide feedstock for biofuels with low ILUC risks.

Specific objectives

- To optimize selected high-yielding lignocellulosic energy crops for phytoremediation purposes and biofuel production targeting different classes of soil-pollutants (WP1)
- To convert the produced biomass feedstock to biofuels with low ILUC risks and to ensure the extraction of the soil pollutants in concentrated form (WP2)
- To bridge the gap between the clean biofuel production and the optimized phytoremediation solutions on contaminated land (WP3)
- To disseminate and communicate the project results as well as to boost the international collaboration (WP4)
- To carry out the management and coordination of the project and to ensure its successful implementation between EU and the project partners (WP5)

GOLD builds on the idea of growing selected high-yielding lignocellulosic energy crops on contaminated lands having two-fold purposes: to produce feedstock for clean biofuels with low ILUC risks and to contribute to land decontamination by applying optimized phytoremediation solutions.

WP1

Optimization of selected **energy crops** (miscanthus, switchgrass, sorghum and industrial hemp) for **phytoremediation**.

Pilot small-scale field trials on contaminated sites with **organic** and **inorganic polluatnts** in **Europe** and **Asia**.

Development of **optimised phytoremiation solutions**.

WP2

Two conversion processes will be developed:

1st: **Gasification** (after pretretament) and **fermentation.**

2nd: Innovative **pyrolysis-based solution** upgrade of the pyrolysis products to refinery-compatible intermediates and **FT-fuels.**

The **contaminats** will be collected in a **concentrated form.**

WP3

Optimised value-chains (contaminated sites X energy crops X conversion routes) to **bridge the gap** between **phytoremediation** solutions and clean **biofuel production**.

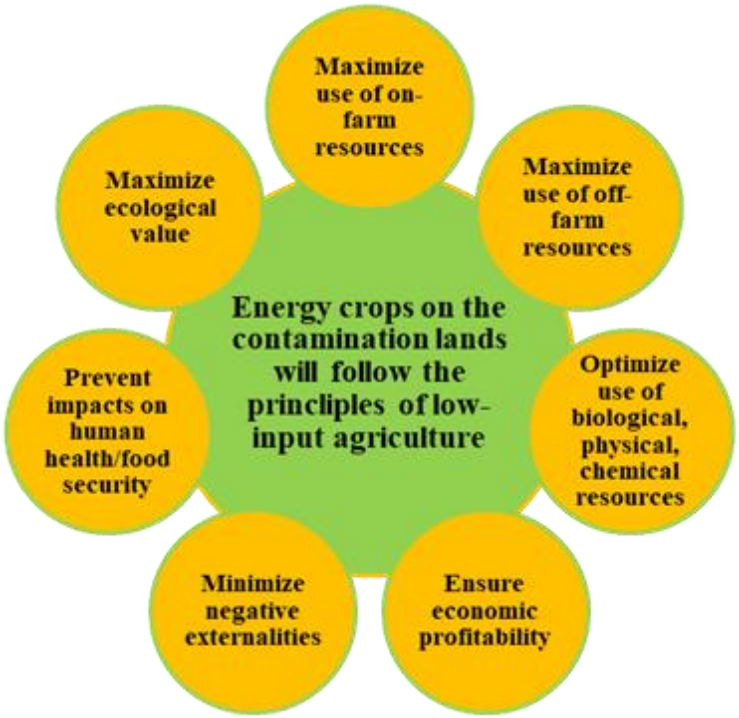
The contribution of the selected value chains towards the **SDGs** will be analysed.

Projections on **land decontamination** will be included.

Four energy crops

- Two perennial grasses (miscanthus and switchgrass)
- Two annual herbaceous (sorghum and industrial hemp)

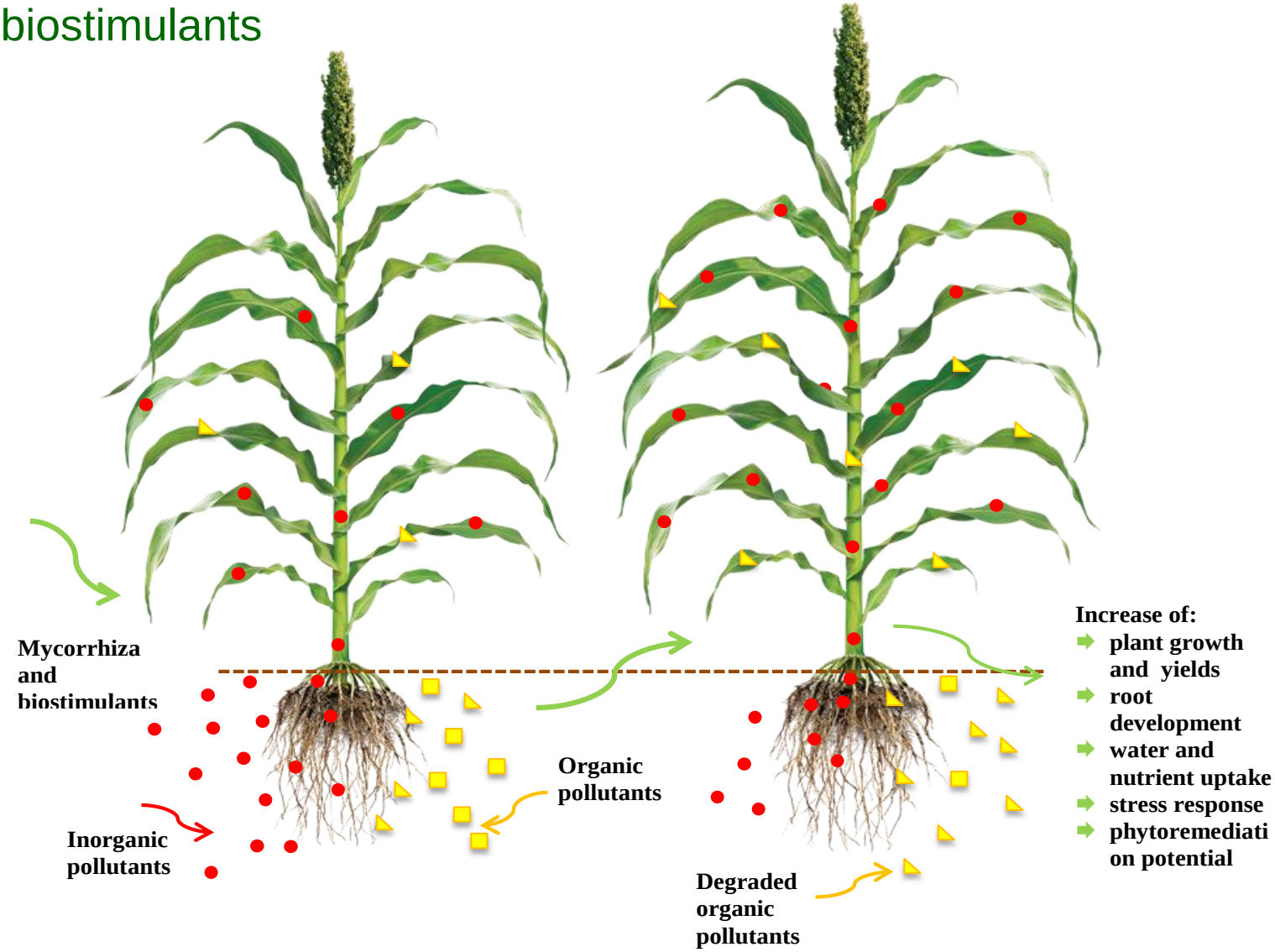
Proper agricultural management for successful phytoremediation



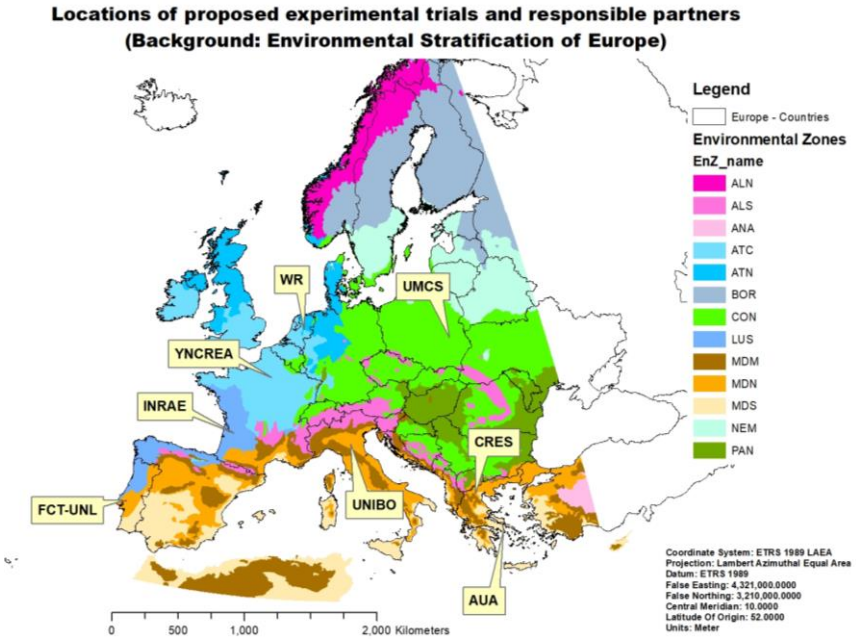
Special attention will be given to the applied agronomic management to support the plant establishment and growth under the stressing conditions of the contaminated sites taking into consideration the low-input concept .

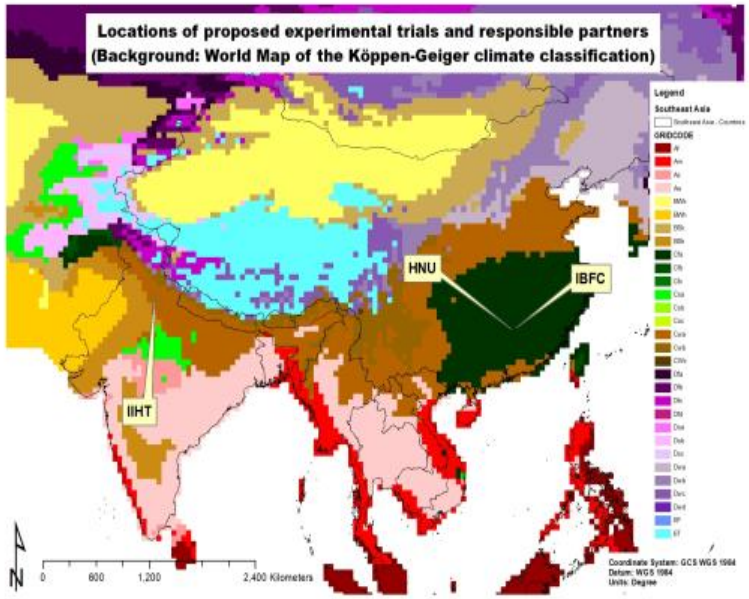
Two phytoremediation strategies; bio augmentation and phytoextraction

Two phytoremediation practices : Mycorrhiza and biostimulants



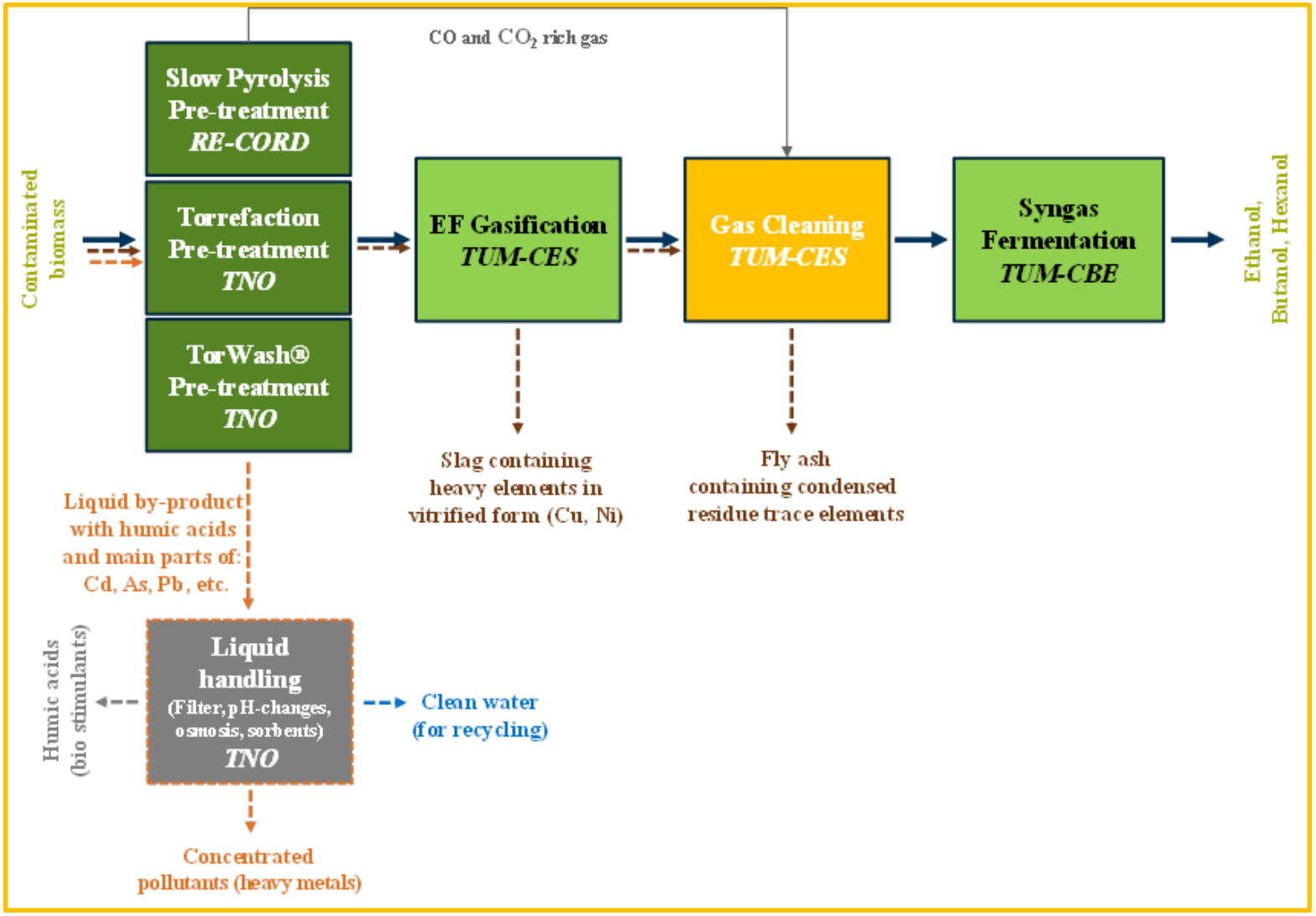
Sites of the field trials



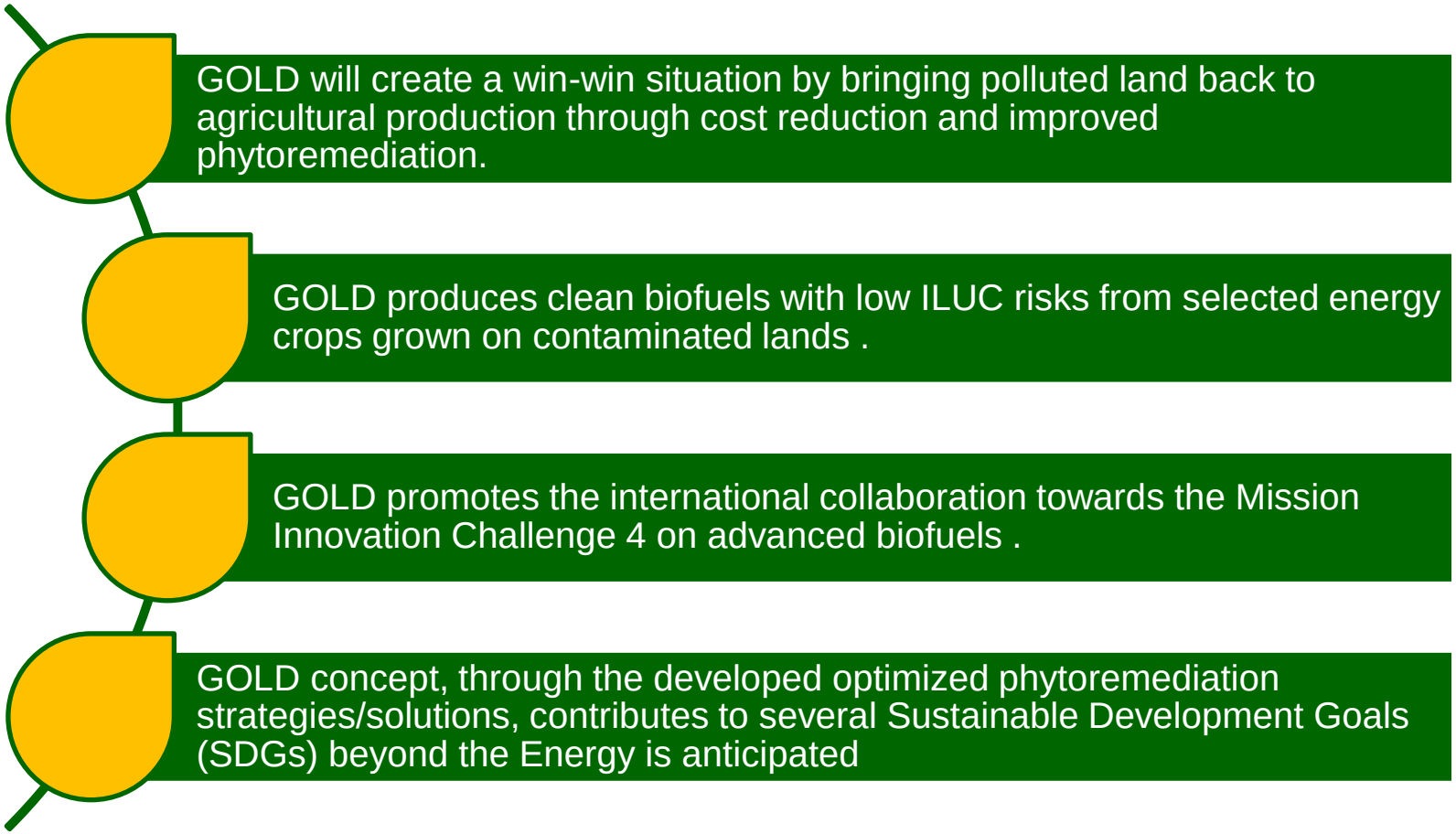


Partner/Country	Description of the contaminated sites/cases
AUA-GR	**Lavreotiki; Greece:** Area with mining and metallurgical activities resulted in a heavy soil contamination of the area with high contents for As, Cd, Cu, Pb, Sb and Zn.
CRES-GR, METER-GR	**Kozani; Greece:** Area located nearby a lignite mining area polluted with ash that contained, among others, elements in excess such as: Cr, As, and Ni and organic pollutants.
UNIBO-IT	**Bologna; Italy:** Contaminated area (along the Reno river) with heavy metals (Cd, Ni, Pb, Cu, Zn), Polychlorinated biphenyls and traces of heavy fuel oils (organics).
YRCREA-FR	**Metaleurop Nord; France: C**ontaminated area (~300 ha) with Cd, Pb, and Zn that is concentrated in the upper soil layer (0-30 cm).
UMCS-PL	**Silesia; Poland**: Contaminated area with: a) persistent organic pollutants (POPs), including pesticides and their intermediates (DDT, DDE, DDD, α-ε-HCH) and b) due to long-term metal mining and smelting with metals, mainly Pb, Zn, Cd, Cu.
IIDT-India	**New Delhi; India:** Contaminated area with heavy metals such as Pb, Hg, Cd, Ni, Cr and other toxic organic chemicals or phenolic compounds.
HUNAU & IBFC - China	**Hunan; China:** The contamination with Cd is a major problem in China. One of the biggest lakes in China is being contaminated with Cd.

1st conversion route

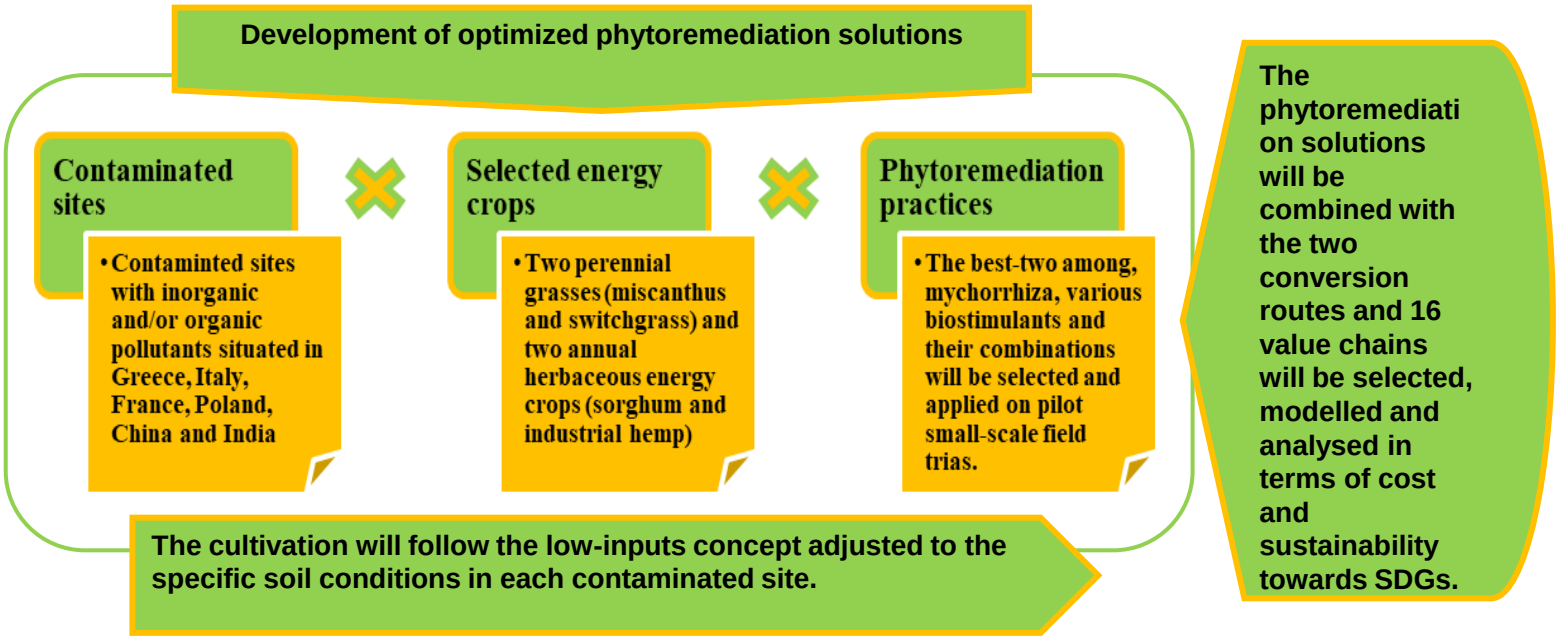


Specific Impact



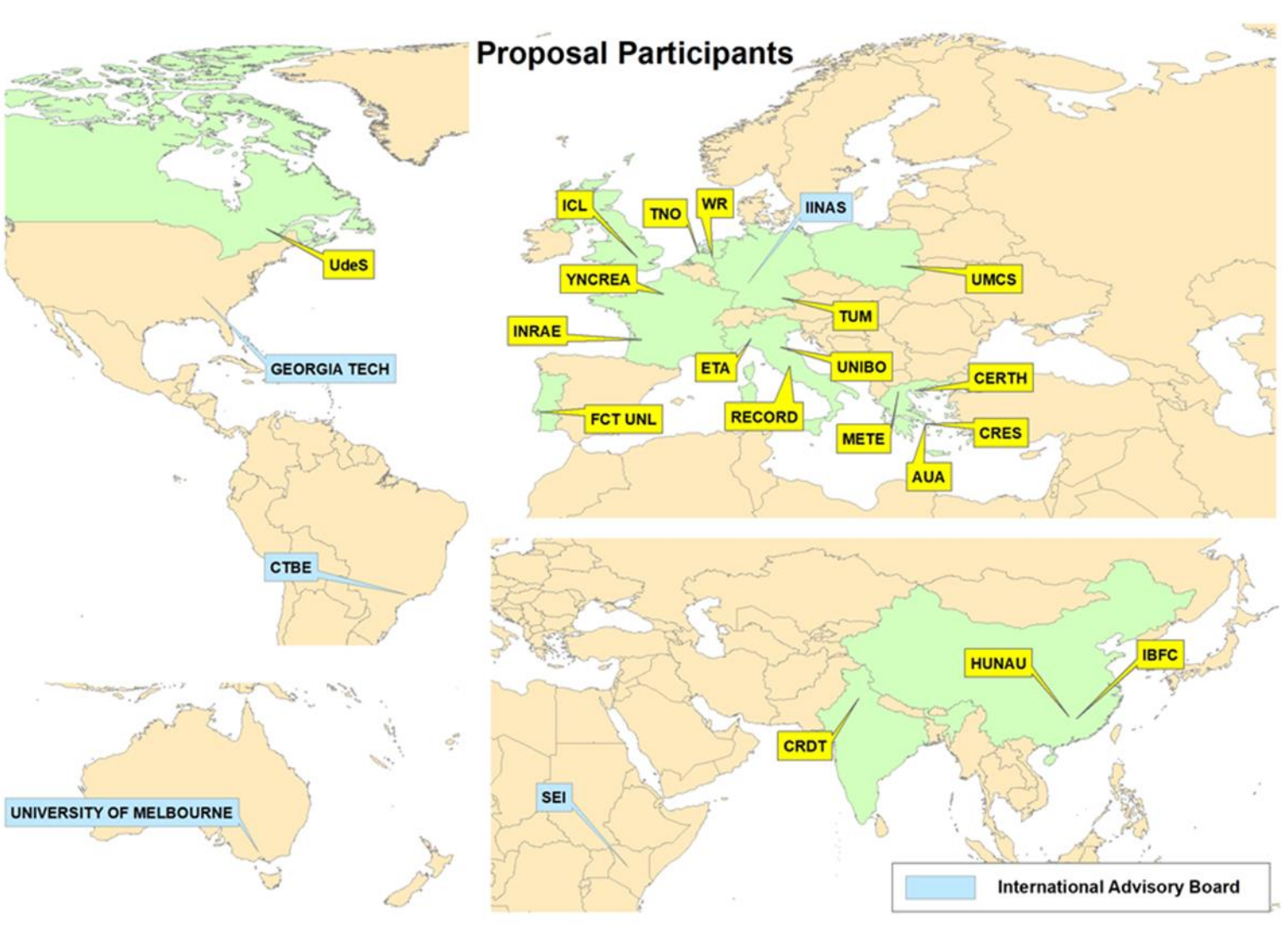
General Impact; RED II and Green Deal

Impact 1 - GOLD will create a win-win situation by bringing polluted land back to agricultural production through cost reduction and improved phytoremediation



In GOLD optimized phytoremediation solutions will be developed as the outcome of the combinations "contaminated sites X energy crops X phytoremediation practices" that will be studied in EU and non-EU countries. (44 combinations)

The consortium



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Thank you!

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AGRICULTURAL UNIVERSITY OF ATHENS

CERTH CENTRE FOR RESEARCH & TECHNOLOGY HELLAS

IBFC

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INRAE

GC LGE Laboratoire Génie Civil et géo-Environnement Lille Nord de France

M.E.T.E. A.E.

UNIVERSITÉ DE SHERBROOKE

RE-CORD

TNO innovation for life

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TUM