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# INTERNATIONAL ADVANCED MASTER® "MANAGEMENT OF POLLUTED SITES AND MINERAL WASTE PROCESSING/RECYCLING"



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## Context

The area of depollution is undergoing significant growth since 2000. The rehabilitation of polluted sites and soils was worth some 200 M€ in 2000, approached 500 M€ in 2010 and reached 560 M€ in 2012. After a two-year economic slowdown, a market analysis study (Xerfi Institute, 2015) projected that the turnover of the companies concerned should grow by respectively 6 % in 2016 and 4 % in 2017. The regulatory backgrounds (in perpetual evolution) of the cutting back of raw materials (especially, metals) and the land resource (often situated in urban areas) optimization bring real growth opportunities to the sector.

## Description of the training

The training program (opening in September 2018) will be specifically designed to answer to an identified expertise demand regarding mineral waste treatment schemes. It will provide tools to solve any shortcoming or challenge linked to the processing and recycling of contaminated mineral matrices (soils, sludge, sediments, excavated soil, by-products and waste) and will be aimed at developing teachings useful in proposing sustainable, integrated and economically rational solutions that address the full range issues posed by these materials since their on-site management until their evacuation, treatment and reuse.



### Methodologies for contaminated-site characterization

- Diagnoses implementation to fully understand the routes of exposure to harmful substances.
- Definition of the modalities for the site development and remediation.
  - Quantification and characterization of the contaminated mineral matrices volumes.



### Processing/recycling techniques

- Treatments by isolation and containment and/or inerting techniques.
  - Treatments by oxydation/reduction.
- Treatments by extraction (mineral processing, hydrometallurgy, thermal treatment, venting, etc.).
- Treatments by degradation (phytostabilisation, phytoremediation, etc.).



### Risks study

- Pollutant transfer processes in soils and underlying aquifers (bio-indication, etc.).
- Management tool for polluted sites and soils according to the use.
  - Experimental modeling/simulation.



### Regulatory, territorial, social and economic approaches

- Organization and spatialization of the information.
- Tools for environmental impact assessment.
- Land and regulatory aspects.
  - Financing instruments.

## Objectives

Training expert engineers in the area of the management of polluted sites and able to:

- Manage project portfolios linked to the processing/recycling of contaminated mineral matrices (soils, sludges, sediments, by-products, etc.);
- Develop a circular economy with a sustainable development approach;
- Apply the engineering of environment to the sites remediation.