



POSIDON

POLLUTED SITE DECONTAMINATION PCP



Standardization Working Group – Recommendations



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Executive Summary

Soil protection is of utmost importance for sustainable development, agriculture and environmental preservation throughout Europe. However, different regulations and standards on soil protection between European countries create inconsistencies and hinder effective environmental management. To address this issue, this report advances a series of steps towards a strategy to standardize European soil protection laws, based on the experience accumulated in the BRODISE and POSIDON projects. The standardization process will aim to harmonize regulations, promote sustainable brownfields management to improve the long-term health of European soils.

First of all, we can foresee several benefits of standardization:

- a. **More efficient preservation of the environment:** Standardized laws will ensure a consistent approach to soil protection, reducing soil degradation, erosion and pollution in a more efficient way.
- b. **Economic efficiency:** A standardized regulatory framework will streamline company compliance and promote sustainable soil management practices, potentially reducing the economic costs associated with land degradation.
- c. **Cross-border Cooperation:** Standardization will facilitate cooperation and coordination between countries, improving response mechanisms to cross-border soil contamination incidents.
- d. **Long-term sustainability:** a harmonized approach to soil protection will contribute to a better safeguard of soil health for future generations.

As we will have the opportunity to analyse, European countries currently have various laws and regulations related to soil protection. This diversity poses challenges in terms of environmental protection, land use and transboundary activities. Standardization can help to achieve greater cohesion, efficiency and environmental sustainability across the continent.

Additionally, what we have learned through the BRODISE and POSIDON projects is that the "in situ" decontamination of brownfields is possible at an affordable cost, and allows more easily standardised solutions than dig and dump remediation, which generates the additional problem of having to manage contaminated land as waste that its owners want to get rid of and public administrations do not know very well where to deposit or how to treat.

1. Analysis

1.1. Starting premises

Before entering into the background analysis, we consider it appropriate to highlight some common points and differences that will condition the harmonization strategy, and also some common challenges and trends.



Points in common

1. EU Directives: The four countries involved in POSIDON, like other EU member states, have implemented several EU directives related to soil protection. The European Soil Framework Directive (2006/21/EC) and the Water Framework Directive (2000/60/EC) are two notable directives that influence their soil protection standards.
2. Brownfields: All have legal provisions for the evaluation and remediation of contaminated sites. These provisions are usually aligned with EU requirements.
3. Land use planning: Emphasis is placed on sustainable land use planning to prevent soil degradation, maintain soil quality and protect soil from pollution.

1.1.1. Differences

1. Legal framework: The legal framework for soil protection may differ in terms of the specific laws, regulations and authorities responsible for soil protection within each country.
2. Regional variations: All four countries concerned in POSIDON have regional or provincial governments with varying degrees of authority over soil protection. This can lead to differences in regulations and enforcement.
3. Priorities: Specific priorities for soil decontamination in brownfields may vary. Two basic models are distinguished, on the one hand the functional model in which decontamination is carried out depending on the use that the soil is going to have, establishing maximum values of the presence of contaminants in the soil for each of the uses, and on the other hand, known as the Dutch model in which maximum limits for the presence of contaminants are established for all types of soils, regardless of the use they are going to have.
4. Soil types: The nature of the soils may differ significantly between different locations, so that the acceptable values for the presence of certain substances are different.
5. Decontamination practices: Decontamination practices vary so that “ex situ”, “in situ” and “on site” decontamination practices are not the same, each with specific soil management requirements.
6. Cultural and historical factors: Cultural and historical factors can influence attitudes and approaches towards soil protection.
7. Climatic considerations, water regime and water table or tidal levels, which in some way influence soil protection priorities, particularly with respect to the control of possible contamination of aquifers and the impact of extreme climatic events.
8. Language and legal terminology: Differences in language and legal terminology can lead to variations in the way laws and regulations are formulated and interpreted.



1.1.2. Common challenges and trends

Understanding the key issues related to brownfields in the 27 member states of the European Union (EU) involves considering common challenges and trends in brownfield management. Below are some general questions regarding brownfields in the EU:

1. **Contamination Assessment and Remediation:** Identifying and assessing contamination at abandoned sites is a primary concern. Many EU countries have established procedures and standards to assess pollution levels and plan remediation activities.
2. **Regulatory frameworks:** Harmonizing brownfield regulations across the EU is a challenge. Although there are common directives, each Member State has its own legal framework, which makes cross-border collaboration and coherence in the management of brownfields difficult.
3. **Financial support:** Adequate financing for brownfield redevelopment is an important issue. Member states may differ in the availability of financial incentives, grants or subsidies to encourage private investment in brownfield industrial projects.
4. **Local and regional involvement:** Local and regional authorities often play a crucial role in the identification, assessment and redevelopment of brownfield sites. Collaboration between these authorities and national governments may vary.
5. **Urban Revitalization:** Many brownfields are located in urban areas. Issues related to urban planning, affordable housing, and sustainable development often intersect with brownfield redevelopment.
6. **Sustainable use of recovered sites:** It is essential to guarantee that the redevelopment of abandoned industrial areas is aligned with land uses, since industrial use, residential use or green areas for public use and recreation are not the same. In this way, it is convenient for urban planning to be efficient in assigning uses, taking into account that they must be specifically recovered to allow said assigned uses.
7. **Public Perception and Community Participation:** Brownfield redevelopment projects may face public opposition or concerns about environmental and health risks. Effective communication and community participation are crucial to project success.
8. **Technological Advances:** Advances in site investigation and remediation technologies can impact brownfield management. Member states may vary in their adoption of innovative techniques.
9. **Historical and cultural heritage:** some abandoned industrial sites have historical or cultural importance. Balancing heritage preservation with redevelopment needs is a challenge.
10. **Data Availability:** Access to data on abandoned sites, including historical land use, contamination records, and ownership information, can be an obstacle to effective management and redevelopment.



11. **Cross-border challenges:** Brownfields close to borders may require cooperation between neighbouring member states to address pollution that could affect both parties.
12. **Environmental considerations:** It is vital to protect soil, groundwater and ecosystems during brownfield redevelopment. Compliance with EU environmental directives is a key aspect.
13. **Climate resilience:** Climate change considerations, such as sea level rise, may impact brownfields located in coastal areas.

1.2. State of the art at European level

1.2.1. European strategy

The EU Soil Strategy 2030 (COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS EU Soil Strategy 2030 Harnessing the benefits of healthy soils for people, food, nature and climate - COM/2021/699 final – 17.11.2021) establishes a framework and concrete measures to protect and restore soils, and ensure that they are used sustainably.

It establishes a vision and objectives to achieve healthy soils by 2050, with concrete actions by 2030. Also it was foreseen a new Soil Health Law by 2023 to guarantee a level playing field and a high level of environmental and health protection, because it recognizes that, apart from some existing EU legal provisions relevant to soil protection (which we will mention in the next section) and actions undertaken under the Thematic Soil Strategy 2006 (Thematic Strategy for Soil Protection, COM(2006)231), the EU has so far been unable to provide itself with an adequate legal framework that guarantees soil the same level of protection as water, the marine environment and air. At this point we must remember that the proposal for a Directive on the matter (Proposal for a Directive of the European Parliament and of the Council establishing a framework for the protection of soil and modified - Directive 2004/35/EC- /* COM/2006/ 0232 final - COD 2006/0086) was withdrawn on May 21, 2014 because it was obsolete, and there is a recent new proposal, Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on Soil Monitoring and Resilience - COM (2023) 416 final of 5.7.2023, which will be analyze in the next section.

Regarding the restoration of degraded soils and the rehabilitation of contaminated sites (section 4.4 of the Strategy), it is indicated that, by 2050, soil contamination should be reduced to levels that are no longer expected to pose risks and that respect the limits that our planet can face, thus creating a pollutant-free environment.

The Strategy highlights that some Member States have very complete legislation at national or regional level, while others do not, and that the latter group does not have specific laws on soil pollution and remediation, applying a more ad hoc approach and does not have a record of potentially contaminated soils. Currently, reporting on progress in soil pollution management is



voluntary, irregular and based on changing methodology, different national definitions, screening values and risk assessment methodologies. In light of this lack of a level playing field, the Commission will therefore explore the need for legal provisions that make such reporting mandatory and uniform across the EU in the context of the Soil Health Act.

Furthermore, in relation to historically contaminated or orphaned places, it is a lack of a common approach in the EU, which represents an important legal void. It is critical that all Member States identify and maintain a register of contaminated sites, assess the risks and in the end remediate these sites in case of unacceptable risks.

Finally, in the aforementioned section 4.4, the Strategy proposes the following actions to be carried out by the Commission:

- Consider options to propose legally binding provisions to identify contaminated sites, establish an inventory and registry of those sites, and remediate sites that pose a significant risk to human health and the environment by 2050.
- Assess the feasibility of introducing a soil health certificate for land transactions to provide land buyers with information on the key characteristics and health of the soils on the site they intend to purchase.
- Facilitate dialogue and knowledge exchange on soil contamination risk assessment methodologies and identify best practices.
- By 2024, develop an EU priority list for pollutants of greatest concern and/or emerging pollutants that pose significant risks to European soil quality and for which surveillance and priority action are needed at European and national level.

On the other hand, Member States should establish a system of Soil quality certificates (or soil suitability certificates for the use for which it is intended) for land transactions, supported by the EU research program and mission "A Soil Agreement for Europe", if this is not included in the Soil Health Law.

1.2.2. European legislation

There is a recent **Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on Soil Monitoring and Resilience** - COM (2023) 416 final of 5.7.2023. This proposal aims to regulate soil health at EU level while giving Member States a wide degree of flexibility on how to achieve these objectives.

Taken into account that there is no dedicated EU legislation on soil this proposed directive contains **new concepts and obligations regarding soils** which will mainly affect public authorities and stakeholders in agriculture, forestry and industrial sectors.



Member States might use different legal instruments to transpose the directive and might need to amend their existing national provisions. Also, it is likely that implementing the directive will affect not only the central/national level of legislation in the Member States but also different levels of regional and local legislation.

The following articles are of particular relevance for the contaminated soils:

- Article 1 sets out the overarching objective of the directive which is to put in place a coherent soil monitoring framework that will provide data on soil health in all Member States and to ensure that EU soils are in healthy condition by 2050 at the latest, so that they can supply multiple services at a scale sufficient to meet environmental, societal and economic needs and to reduce soil pollution to levels no longer considered harmful to human health. The directive contributes to preventing and mitigating the impacts of climate change, increasing resilience against natural disasters and ensuring food security.
- Article 12 sets an overarching obligation to take a **risk-based approach** to identifying and investigating potentially contaminated sites and for managing contaminated sites.
- Article 13 requires that all potentially contaminated sites are **identified** and Article 14 requires that these sites are **investigated** to ascertain the presence of contamination. For the purpose of identifying sites, Member States shall lay down a list of potentially contaminating risk activities, that may be further classified according to their risk to cause soil contamination based on scientific evidence.
- Article 15 contains obligations regarding the management of contaminated sites. It sets out that Member States must carry out a **site-specific risk assessment** to ascertain whether the contaminated site poses unacceptable risks to human health or the environment and to take the appropriate risk reduction measures.
- Article 16 requires Member States to draw up a **register** of contaminated sites and potentially contaminated sites. It states that the register must contain the information set out in Annex VII and that it must be publicly accessible and kept up to date.
- Articles 18 contains **reporting requirements**. It states that Member States must regularly report data and information to the Commission in electronic format.

On the other hand, the following are some specific laws existing in Europe relevant to brownfields:

- a) Environmental Liability Directive (Directive 2004/35/EC on environmental liability in relation to the prevention and repair of environmental damage) This directive establishes a framework for liability for environmental damage, including damage to soil. When efforts to prevent and control the source of pollution have failed and contaminants reach the soil and pose risks to the environment and human health, the soil must be remediated and the polluter must pay for it. The Environmental Liability Directive requires certain operators to decontaminate contaminated land that poses risks to human health if the contamination



occurred as a result of activities carried out after 30 April 2007 or, if carried out before, not yet completed on that date.

- b) The Industrial Emissions Directive (Directive 2010/75/EU on industrial emissions): This directive regulates emissions from industrial installations, including emissions that can pollute brownfields. Requires operators of industrial facilities to take measures to prevent or reduce soil contamination. Specifically, it requires the operators of certain facilities to establish the state of soil and groundwater contamination at the beginning of their operations, request a permit that includes conditions to prevent soil contamination through the application of the best available techniques, and adopt the necessary measures after the definitive end of their activity and return the site to its initial state.
- c) The Environmental Impact Assessment Directive (EIA) Directive (2011/92/EU amended by 2014/52/EU). This directive requires environmental impact assessments to be carried out for certain major construction or development projects, including projects that may have a significant impact on brownfields. This helps ensure that the potential environmental impacts of brownfield redevelopment are appropriately considered. This is done before the project can begin.
- d) The Sewage Sludge Directive (Council Directive of 12 June 1986 on the protection of the environment, and in particular the soil, when sewage sludge is used in agriculture - 86/278/EEC). This directive regulates the use of sewage sludge on agricultural land, in order to protect soils from contamination. Includes specific provisions on the use of sewage sludge in brownfields.
- e) The Fertilizer Regulation: This regulation regulates the use of fertilizers on agricultural land, in order to protect soils from nutrient pollution. Includes specific provisions on the use of fertilizers on abandoned land.

These EU laws provide a common framework for soil protection across the EU. However, it is up to each country to implement these laws in a way that is appropriate for its own circumstances.

1.2.3. European voluntary initiatives

In addition to these laws, there are a number of voluntary initiatives being carried out to address brownfields in Europe. These initiatives include:

- a) The European Common Forum: This forum brings together European environmental agencies from across Europe to share information and best practices on brownfield redevelopment. It is a network of organizations working to promote the redevelopment of brownfield sites in Europe. The forum has developed a set of common principles for brownfield redevelopment, which are being used to guide the development of standardized laws and regulations.



- b) The European Investment Bank: The European Investment Bank (EIB) provides financial support for brownfield redevelopment projects.
- c) The European Commission: The European Commission has a number of initiatives to promote the redevelopment of brownfield sites, such as the European Green Deal and the Circular Economy Action Plan.

Furthermore, at an international level we can find the following initiatives:

- The ICMA: Is a leading association of local government professionals dedicated to creating and supporting thriving communities throughout the world, and specifically they have a chapter to redevelopment of brownfield land. The association has developed a set of guidance documents on brownfield redevelopment, which are being used to support the development of standardized laws and regulations.
- United Nations Environment Programme: The United Nations Environment Program (UNEP) is working to promote the development of standardized laws and regulations for brownfields. UNEP has developed a set of tools and resources to support this work.

Standardization of brownfield laws is a complex and challenging task, but it is essential to promote the redevelopment of brownfields and protect human health and the environment. The initiatives analysed previously are going forward toward this objective.

1.3. Specific situation of various EU member states in terms of brownfields regulation and requirements for the application of decontamination techniques

Please note that below are general descriptions of issues related to brownfields in the mentioned EU member states. Specific and legal details may vary within each country and are subject to change over time. It is advisable to consult the respective government agencies or legal sources for the most up-to-date information on brownfields laws and regulations in each country.

1.3.1. Germany

- Comprehensive brownfield redevelopment laws.
- Legal framework under the Federal Soil Protection Law. - (BBodSchG) “Gesetz zum Schutz vor schädlichen Bodenveränderungen und zur Sanierung von Altlasten” (Bundes-Bodenschutzgesetz - BBodSchG) - 17 March 1998: An Act for the protection and restoration of soil from wastes.
- Specific regulations of the Federal Ordinance for the Protection of Soils and Contaminated Sites. (BBodSchV) - 12 July 1999



- Financial incentives and financing programs for the revitalization of brownfields.

1.3.2. France

- Legal framework within the Environmental Code. “Code de l’Environnement”: Ordinance No. 2000-914 of 18 September 2001
- Measures to identify and evaluate contaminated land, including abandoned industrial sites.
- Requirements for risk assessment and remediation.
- National and regional programs to support the redevelopment of brownfields.

1.3.3. Spain

Spain has a strong focus on sustainable land management to combat desertification and erosion. Regional governments have significant authority over soil protection.

- Regional regulations governing the redevelopment of brownfield sites.
- Autonomous Communities responsible for the identification and management of contaminated soils.
- Emphasis on regional autonomy in the management of abandoned industrial zones.

Title VIII of Law 7/2022, of April 8, on waste and contaminated soils for a circular economy, "BOE" no. 85, of April 9, 2022, contains the regulation related to contaminated soils, maintaining the previous legal regime, which includes provisions related to potentially polluting activities in soils, the procedure for the declaration of contaminated soils and the regional and state inventories of declarations. of contaminated soils, as well as the determination of the subjects responsible for the decontamination and recovery of contaminated soils, including the possibility of decontamination and recovery by conventional means, and the voluntary decontamination and recovery of soils.

As a novelty, the State Inventory of voluntary decontamination of contaminated soils has been included, which will be fed by the records of the autonomous communities on voluntary recoveries and decontamination.

Regarding the requirements under analysis, we can mention the following:

- Article 99.3: The declaration of contaminated soil will oblige the responsible party to carry out the necessary actions to proceed with its decontamination and recovery, in the manner and within the deadlines determined by the respective autonomous communities and



which, in any case, generally **will not exceed three years**, unless a longer period is necessary for technical reasons associated with the decontamination process.

- Article 99.3, second paragraph: The scope and execution of the actions will be such that it guarantees that the remaining contamination, if applicable, translates into **acceptable risk levels** in accordance with the use of the land.
- Article 100.4: The subject responsible for decontamination and recovery cannot be required to exceed the **levels associated with the use of the land existing** at the time the contamination occurred. In the event of a change in land use that requires achieving higher levels of soil quality, it will be the promoter of the new use who must adopt additional decontamination and recovery measures.
- Article 99.4, second paragraph: Any action in an area located on land declared or delimited as contaminated land by the corresponding autonomous community will require that, prior to the start of the works, the promoter has the certificate from the Property **Registry** in which is proven that there is a registry annotation that indicates that the construction is located on soil declared contaminated.
- Article 99.5: The declaration of contaminated soil will be subject to a marginal note in the Property Registry, at the initiative of the respective autonomous community in the terms determined by the Government by law. This marginal note will be cancelled when the corresponding autonomous community declares that the land no longer has such consideration, after verifying that the decontamination and recovery operations have been carried out properly. For these purposes, the subject responsible for decontamination will present a **report** to the autonomous community that certifies it, attaching the necessary information for this purpose.
- Article 100.1 third paragraph: In the event that **urgent decontamination actions are required** to avoid further damage, said actions may be carried out without delay and without the need for a warning, request or prior administrative act. In any case, the promoter of said actions must immediately report the event that occurred and the scope and content of the actions to the competent authorities, who may require additional actions if they consider it appropriate.
- Article 101.2 second paragraph: The establishment of economic incentives that help finance the costs of decontamination and recovery, including the necessary prior and subsequent studies, must only be carried out with the prior commitment that the possible capital gains acquired by the land will revert to the subsidized **regime** amount in favour of the public administration that has granted such incentives.



For its part, Royal Decree 9/2005, of January 14, which establishes the list of potentially soil-polluting activities and the criteria and standards for the declaration of contaminated soils. «BOE» nr. 15 of January 18, 2005, establishes the following requirements:

- Article 7.3. The recovery of contaminated soils will be carried out applying the **best available techniques** depending on the characteristics of each case. Recovery actions must guarantee that they materialize **permanent solutions**, prioritizing, as far as possible, **in-situ solutions**. Treatment techniques that avoid the generation, transfer and disposal of waste.
- Article 7.4. Whenever possible, remediation will be aimed at **eliminating sources of contamination and reducing the concentration** of contaminants in the soil. In the event that recovery is not possible for justified technical, economic or environmental reasons, recovery solutions aimed at reducing exposure may be accepted, provided they include containment or confinement measures for the affected soils.

1.3.4. Italy

Italy has a comprehensive set of soil protection laws, often determined at the regional level. They focus on preventing soil erosion, maintaining agricultural soil quality, and regulating land use.

- National and regional legislation addressing the redevelopment of brownfields.
- Regional governments play an important role in identifying and managing brownfields.
- Support for the revitalization of abandoned industrial zones through regional programs.

Contaminated Sites Regulation, introduced in Italy with the Decree of the Minister of the Environment n. 471/99, has been replaced by Title V "Rehabilitation of contaminated sites" of Part IV of Legislative Decree no. 152/06 "Environmental Regulation" and its modifications, published in the Official Gazette no. 88 of April 14, 2006 Ordinary Supplement no. 96.

The law regulates the remediation and restoration activities of contaminated sites and defines the procedures, criteria and methods to eliminate sources of contamination or at least reduce concentrations of contaminants in accordance with EU principles and standards, with particular reference to the principle "Whoever pollutes pays" principle.

Regarding the requirements under analysis, we highlight the following:

- Article 242.7: **If the results of the risk analysis procedure demonstrate that the concentration of contaminants present in the site is higher** than the risk threshold concentration values (CSR), the **responsible entity submits to the region**, in the following six months from the approval of the risk analysis document, the **operational project of the remediation or safety measures**, operational or permanent, and, **where necessary**, the further environmental repair and restoration measures, in order **to minimize and bring back to acceptability the risk** deriving from the state of contamination present on the site.



- Article 242.7: With the provision of approval of the project, the **execution times** are also established, also indicating any requirements necessary for the execution of the works and the amount of the **financial guarantees** is established, in an amount not exceeding fifty percent of the estimated cost of the intervention, which must be paid in favor of the region for the correct execution and completion of the interventions themselves.
- Article 242.8: The criteria for the selection and execution of environmental, operational or permanent safety remediation and restoration measures, as well as for the identification of the best intervention techniques at sustainable costs (BATNEEC - **Best Available Technology That Does Not Entail Excessive Costs**) in accordance with community **standards**. The rules are listed in **annex 3** of part four of the Decree.
- Article 242.10: In the case of characterization, recovery, security and environmental restoration of sites with **operational activities**, the Region, without prejudice to the obligation to guarantee the protection of public health and the environment, by approving the project guarantees that the interventions mentioned above are structured in a way that is compatible with the continuation of the activity.
- Article 246 deadlines for **program agreements**:
 - The subjects obliged to the interventions referred to in this title and the interested subjects have the right to define the methods and times for carrying out the interventions through specific programmatic agreements signed, within six months following the approval of the analysis document of risks referred to in article 242, with the competent Administrations in accordance with the provisions of this title.
 - In the event that there are subjects that intend or are obliged to provide for the simultaneous recovery of a plurality of sites that affect the territory of several regions, the times and methods of intervention may be defined by specific program agreements concluded, within twelve months. **following** the approval of the risk analysis document referred to in article 242, with the interested regions.
 - In the event that there are subjects who intend or are obliged to provide for the simultaneous recovery of a plurality of sites located throughout the national territory or there are several subjects interested in the recovery of the same site of national interest, the times and methods of intervention may be defined with a program agreement to be concluded, within **eighteen months following** the approval of the risk analysis document referred to in article 242, with the Minister of the Environment and Territorial Protection in agreement with the Ministers of Health and Productive Activities, according to the State-Regions Conference.

On the other hand, the Italian accreditation system for companies in the sector is the "Albo gestori ambientali". Pursuant to article 212, paragraph 5, of Legislative Decree 3 April 2006, n. 152 (and



subsequent amendments), enrolment in the Register is a requirement for carrying out activities such as remediation of sites.

1.3.5. Portugal

Portugal emphasizes sustainable land use planning, combating desertification and protecting against soil erosion in its soil protection laws. Local authorities play a role in enforcing these regulations.

- Environmental legislation includes provisions for contaminated land, potentially covering abandoned land.
- Regional variations in regulations and programs for the redevelopment of brownfields.

Portugal does not have a specific legal regime for contaminated land. When it is necessary to carry out soil decontamination operations, they will be subject to **prior licensing** under the Legal Regime for Waste Management.

Likewise, Decree-Law no. 147/2008, of July 29, which establishes the Environmental Responsibility Regime, (Diário da República, 1st series — n° 145 — July 29, 2008. Ministry of the Environment, Territorial Planning and Regional Development) contains in its ANNEX V a common framework document to follow to choose the most appropriate measures to guarantee the repair of environmental damage, and with regard to the Repair of damage caused to the soil, it highlights that the necessary measures must be taken to guarantee, at a minimum, that the contaminants in question are to be removed, controlled, contained or reduced, so that the contaminated soil, taking into account its **current or approved future use** at the time of the damage, no longer represents a significant risk of adverse effects on human health .

The presence of these risks is evaluated through a **risk assessment process** that takes into account the characteristics and functions of the soil, the type and concentration of dangerous substances, preparations, organisms or microorganisms, their risks and their possibility of dispersion.

Future use is determined based on the land use regulations or any other relevant regulations in force at the time of the damage. If land use changes, all necessary measures are taken to prevent any risk of adverse effects on human health. In the absence of land use or other relevant regulations, the nature of the area that has been damaged should determine the allocation of the specific area, taking into account the planned development.

A natural regeneration option should be considered, **that is, an option that does not include any direct human intervention in the regeneration process.**

On the other hand, most of the environmental legal framework applicable to activities that are most likely to cause pollution requires that operators have **financial guarantees** to cover their liability in relation to pollution events, including the Environmental Liability Regime.



Whenever environmental damage occurs and this legal regime is applicable, the operator must adopt prevention and remediation measures. If the operator does not have the capacity or knowledge to carry out **on-site decontamination**, they may hire a specialized company to carry out the operation or, alternatively, remove the contaminated soil from the site or facility and deliver it to a duly authorized operator: Waste management operator.

Some efforts have been made to update land regulation laws in Portugal, but no specific legislation has yet been enacted. The Portuguese Environment Agency (APA) prepared a draft proposal in 2015 to assess soil pollution, but it has not yet become law.

1.3.6. Belgium

Belgium has a complex regulatory landscape due to its federal structure. Soil protection measures aim to preserve soil quality in both agricultural and industrial areas.

- Regional laws and regulations related to the redevelopment of brownfield sites (Flanders, Brussels, Wallonia).
- Incentives and programs for the rehabilitation of abandoned industrial zones.
- Collaboration between regional and local authorities.

In Belgium, the regions have the primary responsibility for environmental protection. Soil decontamination and protection are regulated at the regional level. The main objectives of the legislation are:

- prevention of soil pollution;
- the identification of possible sources of contamination;
- organizing investigations to establish the existence of contamination; and
- determining methods for the remediation of contaminated soils.

The legislation distinguishes between historical soil contamination, new soil contamination and mixed soil contamination. Soil decontamination experts play an important role.

In the Walloon Region, the Walloon Parliament adopted the Decree on land management and rehabilitation of March 22, 2018, whose CHAPTER IV, Section 3, regulates land rehabilitation, establishing the following main requirements:

- Articles 56 and 57: Remediation objectives at the **level determined by the administration** at the proposal of an expert, which depend on the type of contamination, new or historical.
- Article 58: A **sanitation project** based on the results of a characterization study that determines the mode of execution of the land sanitation, with a minimum content that includes, among other aspects, a description of the different relevant technical



decontamination processes and a justification of the remediation process or, where appropriate, the combination of processes recommended by the expert and their variants, demonstrating, in terms of environmental, economic and social indicators, that this remediation process complies with the best available **techniques** .

- Article 70: **Monitoring** of the actions and sanitation works carried out by an expert, and **periodic information** of the progress to the administration
- Article 71: **Final evaluation** at the end of the cleaning acts and works.
- Article 72: The administration may require the holders to **provide a guarantee** to guarantee compliance with their obligations.



2. Conclusion

2.1. Comparative analysis

In general, the laws studied establish similar standards for the protection and management of contaminated soils, and specifically, regarding the application of remediation techniques, in general, most of the standards studied contain provisions on the following aspects:

- The obligation to prepare a project that describes how the decontamination of the soil is planned, after carrying out a risk analysis, for approval by the competent authority, prior to its execution. We believe that a simplified authorization process should be considered for foreign R&D operators, so that they are facilitated to operate in all the EU countries and allowed to carry out their experimentation in a simplified way.
- The levels of decontamination that will be required, which may depend on the type of contamination (new or historical), and/or the future use that will be given to the land.
- The obligation to carry out the remediation in accordance with the best available techniques.
- The obligation to carry out the remediation within a certain period.
- The requirement of financial guarantee to cover the costs of remediation in case of environmental damage.
- Although they have not been specifically cited, the need to take into account the regulations and requirements regarding occupational risk prevention as well as health and safety on construction sites has been identified as a common point.
- The obligation for operators in charge of decontamination to be registered in a national registry, accrediting minimum levels of technical solvency in soil decontamination is sometimes seen as an administrative burden that could be reduced if the national registration were sufficient to operate in the rest of the EU countries.
- Also, the need to have a means of electronic identification to interact with the competent Administration within the framework of digital administrative files can become a bureaucratic obstacle if it is not properly managed. In this sense, we consider that it would be very useful to homogenize the system by creating a means of electronic accreditation that can be used by remediation operators to interact with all the environmental administrations of the different member states without distinction.

However, we would like to highlight some unique issues of certain state regulations that we consider of special interest for a possible harmonization of laws:



- the requirement established in the Spanish standard to have, before carrying out the decontamination work, a certificate from the property registry regarding the annotation relating to the declaration of the soil as contaminated or as potentially contaminated due to the activities that have been carried out there.
- the possibility provided for in the Italian regulation that decontamination works are carried out in a manner compatible with active activities.

2.2. Challenges

Several **difficulties** have been encountered in standardizing brownfield laws. These include:

- The diversity of brownfields: Brownfields vary widely in terms of their size, location, level of contamination and potential uses. This makes it difficult to develop a single set of laws that can apply to all brownfields.
- The different interests involved: There are several different stakeholders involved in brownfield redevelopment, including landowners, developers, businesses, environmental groups and government agencies. These stakeholders often have different interests and priorities, which can make it difficult to achieve consensus on a set of standardized laws.
- The cost of cleanup: The cost of clearing brownfields can be significant, and this can be a barrier to redevelopment. There is no systematic budget allocation and funding mechanism for brownfield cleanup, and this can make it difficult to obtain the necessary funding.
- Lack of political will: There is often a lack of political will to standardize brownfield laws. This is because brownfields are often located in areas that are not politically important and there may be more pressing environmental or economic issues that need to be addressed.

Therefore, the solutions will have to be **focused on the following challenges**:

- a. Political will: Obtaining the support and cooperation of all member states can be challenging due to different priorities and interests.
- b. Funding: Adequate funding must be secured to support ESPA activities and ensure successful implementation.
- c. Transition period: Member States will need time to adapt their existing laws and practices to the standardized framework.
- d. Accountability: Establish clear accountability mechanisms to ensure that member states comply with standardized regulations.



3. Considerations

Standardizing brownfield laws across Europe can be challenging due to several factors and complexities inherent in the diversity of European nations. Below are some difficulties associated with standardizing brownfield laws in Europe:

- 1) **Legal diversity:** European countries have different legal systems, traditions and historical contexts. Harmonizing laws between countries with different legal frameworks can be complex.
- 2) **Regional autonomy:** Many European countries delegate land use and environmental regulation to regional or local authorities. Standardization efforts must address these decentralized systems.
- 3) **Cultural and historical factors:** Different countries have different cultural attitudes towards land use, historical legacies and property rights. These factors may influence the approach to brownfield redevelopment.
- 4) **Language barriers:** The EU has 24 official languages, which can create linguistic challenges when drafting standardized legislation that is clear and accessible to all member states.
- 5) **Economic disparities:** Economic conditions and priorities differ between European countries. Some nations may have more resources than others to invest in brownfield remediation and redevelopment.
- 6) **Environmental conditions:** Brownfields in various regions may have different environmental challenges, such as varying levels of pollution and ecological sensitivity, that require customized solutions.
- 7) **Local Stakeholder Interests:** Brownfield redevelopment often involves complex negotiations with local stakeholders, including landowners, communities and businesses. Standardization may not take these local nuances into account.
- 8) **Political will:** Achieving consensus among all EU member states on a standardized law for brownfields can be difficult, as priorities, political climates and interests vary.
- 9) **Existing legislation:** Many EU member states have already established abandoned industrial laws and regulations. Harmonizing them with new standards can be challenging and require a transition period.
- 10) **Funding and resources:** Ensuring that all member states have the resources and capacity to implement standardized brownfield laws is a practical challenge.
- 11) **Technical differences:** Variations in technical standards, data collection methods, and monitoring practices may require alignment for effective standardization.



- 12) Various types of brownfields: Brownfields can vary widely in terms of size, type, and historical use. A one-size-fits-all approach may not be suitable for all situations.
- 13) Differences in environmental impact assessment (EIA): Member states have different approaches to environmental impact assessments, which can affect brownfield redevelopment projects.

To overcome these challenges, any standardization efforts should be collaborative, iterative, and considerate of the specific needs and circumstances of each member state. It would also require a strong commitment to address environmental concerns, promote sustainable development and foster cooperation between nations and regions.

In addition, the advance of solutions that allow decontamination "in situ" at an affordable cost puts us in a position to promote in a generalized way the sanitation of soils without having to excavate them to take them elsewhere.

It would allow the allocation of uses based on the quality or health of the soil, in a scalable way and linked to urban planning.

In this way, land uses would be allowed according to its quality and the sanitation measures that were agreed. For example, if the land has a quality "C" **it could only host industrial uses**, if it has a quality "B" **it could also have commercial uses**, and if it has a quality "A" **residential uses** could be allowed.

3.1. Proposed steps for standardization

- a. Establish a Central Regulatory Authority: Create a European Soil Protection Authority (ESPA) responsible for coordinating the standardization process and monitoring its implementation.
- b. Develop common soil quality standards: ESPA should work with member countries to define common soil quality standards, including contamination thresholds, erosion control measures, obligation of "in situ" decontamination and sustainable land management practices.
- c. Harmonize legal frameworks: identify commonalities and disparities in national soil protection laws and develop a standardized framework that can be adopted by member states, ensuring the implementation of the rules of the single market for decontamination R&D services/works.
- d. Cross-border cooperation: Promote cooperation between member states for cross-border land protection by establishing protocols for information exchange, joint response mechanisms and coordinated land management practices.
- e. Monitoring and Enforcement: Implement a robust system to monitor compliance with standardized regulations and enforce penalties for non-compliance.



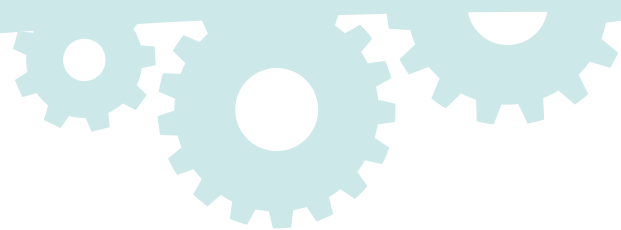
- f. Public awareness and education: launch educational campaigns to inform the public, farmers and businesses about the importance of soil protection and new standardized regulations.
- g. Research and innovation: Invest more and systematically financing public demand-driven R&D and innovation to continually improve soil protection techniques and adapt to emerging environmental challenges, through innovation procurement actions.

Standardization of European soil protection laws, strengthening "in situ" decontamination models would be fundamental step to preserve the environment, promote sustainable agriculture and facilitate cross-border cooperation. By creating a unified framework, Europe can ensure the long-term health of its soils, reduce environmental degradation and contribute to global sustainability goals.

The success of this initiative will require strong political commitment, financial support and a collaborative effort from all member states.



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