Environmental Newsletter

Prepared by WG-5 Environment

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Soil Monitoring and Resilience

Introduction

This Environmental Newsletter provides EIGA members, including site managers, directors, technical managers, company environmental specialists, and National Trade Associations, with key information on the provisions of the new **Directive (EU) 2025/2360 on soil monitoring and resilience** (the "Soil Monitoring Law"), which establishes a framework for monitoring, assessing, and supporting soil health and managing contaminated sites across the EU. This is particularly relevant given the industrial sector's impact on land use and the increased regulatory attention on local environmental issues.

Scope

The new Soil Monitoring Law sets the long-term objective of achieving healthy soils by 2050 to ensure they can provide multiple ecosystem services and contribute to climate, biodiversity, and food security objectives.

Unlike global environmental issues like greenhouse gas emissions (GHG), soil health and water use are local environmental issues. The Directive, like the EU Water Framework Directive (WFD), requires a geographically specific approach. EIGA members must be aware that soil health issues, like water scarcity, can increasingly impact operational permits, especially for new plants or operations in vulnerable areas.

The Directive lays down a framework and measures on:

- Monitoring and assessment of soil health.
- Soil resilience and support for improvement.
- Management of contaminated sites.

Member States must bring into force the necessary laws, regulations, and administrative provisions to comply with this Directive by **December 17, 2028**.

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Soil Health Monitoring Framework

The Directive mandates a solid and coherent **soil monitoring framework** across the Union.

Soil Districts and Units

Member States must establish **soil districts** for administrative purposes and **soil units** for the technical purpose of designing monitoring and reporting.

- **Soil Units** are delineated to reflect a certain degree of homogeneity, taking into account the **soil district**, soil type (based on a reference map), and land use categories.

- The system for determining the number and location of sampling points must be a stratified random sampling scheme, optimized on variability, to provide an estimation of the area of degraded soils with a maximum error percentage of 5% at the soil unit level.

Soil Descriptions and Criteria

Soil monitoring and assessment rely on **soil descriptors** for physical, chemical, and biological characteristics.

Aspect of Soil Degradation	Soil Descriptor	Criteria Type
Union Level Criteria (Part A)	Electrical conductivity (Salinisation)	Non-binding Sustainable Target Value
	SOC concentration (Loss of Soil Organic Carbon)	Non-binding Sustainable Target Value
	Bulk density in subsoil (Subsoil compaction)	Non-binding Sustainable Target Value
Member State Level Criteria (Part B)	Extractable phosphorus (Excess nutrient content)	Maximum Value (set by MS)
	Soil erosion rate (Soil erosion)	Maximum Value (set by MS)
	Heavy metals/Organic Contaminants (Soil contamination)	Reasonable assurance that unacceptable risk does not exist

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No Criteria (Part C)	Total nitrogen content, Soil acidity, Loss of soil biodiversity	Monitored to facilitate future criteria development

For soil contamination, the Commission, in cooperation with Member States, will establish an indicative list of soil contaminants (including PFAS and pesticides) for monitoring.

Timeline for Obligations

- The first soil measurements must be performed by **December 17, 2030**.
- New soil measurements must be performed **every six years**.
- The first soil health assessment must be carried out by **December 17, 2031**.

Obligation	Applies to	Due Date
Transposition into national law	Member States	17 December 2028 (art.26)
Establish soil health monitoring and assessment systems across all soil districts.	Member States	17 December 2028 ?
Define thresholds for basic soil parameters (chemical, physical, biological) within the same three-year transposition period.	Member States	17 December 2028
Establish publicly accessible registers of potentially contaminated/ contaminated areas.	Member States	17 December 2029 (art.17)
Ensure first soil measurements	Member States	December 17, 2030. (art.9, point 8)
Ensure new soil measurements	Member States	Every six years (art.9, point 9)
Consider baseline reports and monitoring measures implemented in accordance with Directive 2010/75/EU as well as other investigations as soil investigations, if such reports, measures and investigations meet the requirements of this Directive.	Member States	*(art. 15)*
Implement a risk-management framework based on the polluter-pays principle.	Member States	17 December 2028
Conduct first soil health assessments based on soil monitoring.	Member States	17 December 2031 (art.10)
Repeat soil health assessments.	Member States	every six years (art.10)

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Obligation	Applies to	Due date
Possible mandatory soil investigations if the site is identified as contaminated or potentially contaminated under Member State criteria: • past or current operation of a potentially contaminating activity; • IED sites • SEVESO sites • Activities referred to in Annex III to Directive 2004/35/EC; • occurrence of a potentially contaminating event, accident, calamity, disaster, incident or spill liable to cause soil contamination; • relevant information resulting from the soil health monitoring	Industrial Sites	
Conduct first soil measurements	Industrial Sites	**17 December 2030** (art.9)
Conduct new soil measurements every 6 years.	Industrial Sites	*(art.9, point 9)*
Risk-management actions for contaminated sites	Industrial Sites	From 17 Dec 2028 onward
Compliance with permit conditions on soil sealing, removal, land take.	Industrial Sites	After national transposition
Summary Checklist for Industrial Sites**:** • Conduct initial risk based site assessment. • Follow soil sampling methodology Annex II, Part A. • Analyze physical, chemical, and biological soil indicators (AnnexI) - Include PFAS, pesticides, and other emerging contaminants. • Evaluate impacts on soil health descriptors. • Propose mitigation measures. • Ensure no unacceptable contamination risks remain. • Prepare long term monitoring and reporting plans. • Map and update georeferenced soil health data.	Industrial Sites	

Descriptors for monitoring and assessing soil health (art. 7 & Annex I, Parts A,B,C)

Annex I Part A - Union level Criteria:
- Salinisation (Electrical conductivity)
- Loss of Soil Organic Carbon (SOC)
- Subsoil compaction (Bulk density in subsoil)

Annex I Part B - Member State Level Criteria (to be set by MS):
- Excess nutrient content (Extractable phosphorus)
- Soil erosion (Soil erosion rate)
- Soil contamination (heavy metals)
- Reduction of soil water retention and infiltration
- Loss of SOC (SOC stocks)

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Annex I Part C – Without criteria - Monitored to facilitate future criteria development:

- Aspect of soil degradation (Soil descriptor)
- Excess nutrient content in soil (Total nitrogen content)
- Acidification (pH)
- Topsoil compaction (Bulk density in topsoil)
- Loss of soil biodiversity (DNA metabarcoding for fungi and bacteria)
- Specific soil contamination (PFAS, pesticides)

Indicators for monitoring soil sealing and soil removal (art. 7 & Annex I,Part D)

Annex I, Part D: soil sealing and soil removal indicators:

- Aspect of soil degradation (Soil sealing and soil removal indicators)
- Soil sealing and soil removal (Total sealed soils and areas that underwent soil removal)

Sampling (art.9 & Annex II, Part A)

The monitoring is based on sampling points determined using a stratified random sampling scheme, based on the soil units, with a maximum error percentage of 5% at the soil unit level. The methodology for sampling is set in Annex II, Part A.

- Member States are exempt from sampling sealed soil and areas that underwent soil removal. (art.9,point 3)
- For Annex I, Part C soil contamination descriptors, sampling can be limited to a relevant subset of sampling points.
- For the loss of soil biodiversity descriptor, measurements must be carried out on at least **5%** of the total sampling points (art.9,point 3)

Determination of sampling points (sampling survey) for soil health assessment (Annex II, Part A)

- Sampling must use a stratified random method, based on the best available information about how soil properties vary.
- The number and position of sampling points must reflect this variability, so that the results have a maximum error of 5%.

Field sampling (Annex II, Part A):

Composite Samples

- A composite sample shall be a mixture of at least 5 subsamples.
- Each sample or subsample should be taken to a depth of at least 30 cm, when possible.
- All subsamples must be mixed thoroughly to create one uniform composite sample.

Bulk Density Samples

- Bulk density must be measured using undisturbed samples.
- Samples must be taken at the relevant depth, which includes taking samples below 30 cm for subsoil.

Requirements for laboratories and methodologies

	Requirement
Laboratories	Laboratories performing measurements must apply quality management system practices in accordance with EN ISO/IEC-17025 or equivalent standards. *(art. 9, point 7)*
Methodologies	Use of standardized EU methodologies listed in Annex II. (Equivalent methodologies are permitted if a validated transfer function is available; *art. 9, point 6)*

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Long Term Monitoring Program

Monitoring Frequency:

- Full soil-health reassessment every 6 years, aligned with the Member States' mandatory reporting cycle to the European Commission and the European Environment Agency.
- More frequent monitoring must be carried out for:
    - High-risk areas,
    - Previously contaminated sites, or
    - Locations where significant changes in land use or soil condition are expected.

Prepare Sampling Plan and Methodology (Annex II, Part A)

- Describe:
    - Sampling points and their geographic distribution,
    - Mapping of soil units and stratification,
    - Procedures for selecting sampling locations.

- Sampling must follow the Annex II rules, including:
    - Stratified random sampling,
    - Representation of soil variability within soil units,
    - Maximum sampling uncertainty (coefficient of variation) of ≤ 5%.

Laboratory Requirements and Monitoring Methods (Annex II, Part B)

Ensure that all analyses are performed in accredited laboratories using standardised and approved monitoring methods defined in Annex II, Part B.

Monitoring Indicators (Annex I, Parts A–D)

The long-term monitoring programme must cover the full set of indicators defined in Annex I, including:

- Part A: Physical soil parameters
- Part B: Chemical soil parameters
- Part C: Biological indicators
- Part D: Indicators for soil degradation processes (e.g., erosion, sealing, salinisation)

These indicators must be regularly evaluated to track changes in soil condition over time.

Soil health assessment against national trigger values

- Monitoring results must be compared against national trigger values, which Member States must establish during transposition of the Directive.
- Where results exceed these trigger values or show declining trends, additional investigation or corrective actions may be required (e.g., risk assessment, remediation planning).

Land Take Mitigation Principles

The Directive sets principles to mitigate the impact of new soil sealing or soil removal:

- **Avoiding or Reducing Loss:** Minimize the area of soil affected, select areas where loss is minimal (e.g., brownfields), and carry out sealing/removal in a way that minimizes impact (e.g., keeping sealing as reversible as possible).

- **Offsetting Loss:** Aim to offset the loss by encouraging the de-sealing of sealed soils and the reconstruction of areas that underwent soil removal.

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Management of Contaminated Sites

The Directive requires a risk-based and stepwise approach for the identification and investigation of potentially contaminated sites and the site-specific risk assessment and management of contaminated sites.

- By **December 17, 2029**, Member States must establish this approach.

- By **December 17, 2029**, Member States must also set up and maintain a national register of potentially contaminated sites and contaminated sites, which will be made public as an online georeferenced spatial database.

Conclusions

The implementation of the Soil Monitoring Law, coupled with the existing pressure from stakeholders and regulators regarding local resource management, requires EIGA members to adopt a comprehensive approach to soil management. Furthermore, industrial gas companies must proactively prepare to comply with the new requirements for soil monitoring and contaminated site management to ensure continued operational compliance, particularly in soil-stressed areas.

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