

Analysing opportunities and barriers for biomass from marginal and contaminated lands

Biomass from marginal and contaminated lands
has the potential to contribute to biofuels and biomethane production.
Explore definitions, mapping, and the policy context, in Task Force 3.2 report.

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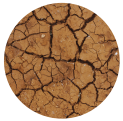
What are **marginal** and **contaminated lands**?

Today biomethane production relies on biomass sources either cultivated in agricultural areas or biowastes. The use of biomass sustainably cultivated in marginal and contaminated lands can help achieve the 35 bcm target of sustainable biomethane production by 2030 respecting the RED sustainability criteria and ILUC requirements.



MARGINAL LANDS: Lacking a clear definition in the EU, generally refer to less productive areas for traditional agriculture. JRC guidelines identify limitations like adverse climate, excessive wetness, or low soil fertility. The EU project MAGIC reviewed all available definitions since 1817.



CONTAMINATED LANDS: Per the Industrial Emissions Directive (2010/75/EU), are areas where pollutants or hazardous substances in the soil, water, or groundwater pose a risk to human health or the environment.



UNUSED, ABANDONED AND DEGRADED LANDS:
From the RED II Delegated Act on ILUC-risk feedstock:

- Unused Lands: Not used for cultivating food, feed, energy crops, or grazing for at least 5 years.
- Abandoned Lands: Previously used for food and feed crops but abandoned due to biophysical or socioeconomic constraints.
- Severely Degraded Lands: Areas with significant salinisation or, low organic matter, and has been severely eroded.

CONSIDERATIONS FOR UTILISING MARGINAL AND CONTAMINATED LANDS

Recovering lands for biomass production potentially supporting the 35 bcm biomethane target

Avoiding competition with food production by reducing the risk of ILUC (Indirect Land Use Change)

The **ILUC concept** addresses how biofuels impact land use by shifting food and feed production, causing, e.g., deforestation, emissions, and biodiversity loss. **RED II** mandated the phase-out after 2023 of "high ILUC-risk" biofuels and introduced the option to certify "low ILUC-risk" biofuels.

Preventing abandonment of lands, and reducing the risk of desertification due to climate change

Promoting carbon farming contributing to mitigate climate change

The BIP overviewed the current **state-of-the-art** of **marginal** and **contaminated lands** in the **EU**

SEVERAL INITIATIVES MAPPED MARGINAL LANDS IN THE EU:

- **MAGIC project** (2021): 29% of EU agricultural area (69.44 Mha) is marginal.
- **Vera et al.** (2021): 20.5 Mha EU marginal land suitable for biofuels by 2030; 21 Mha by 2050.
- **Hirschmugl et al.** (2021): 5.2 Mha EU underutilised land suitable for bioenergy production.
- **SEEMLA project** (2018): 46% of EU area is marginal; 22.6% suitable for biofuels.
- **Galatsidas et al.** (2018): 64 Mha EU marginal land; 53.7 Mha suitable for biomass production.
- **Iordan et al.** (2022): 16.2 Mha EU abandoned cropland in 1992-2015, where 1.1 Mha unsuitable for biofuels.

MAPPING CONTAMINATED LAND IN EUROPE IS COMPLEX DUE TO VARYING REGIONAL AND NATIONAL FACTORS

Key observations by Task Force 3.2 include:

- The JRC reported about **2.8 million potentially contaminated sites** in the **EU** and **neighboring countries**.
- EU projects GOLD, Phy2Climate, and CERESiS tested phytoremediation to restore soil and produce biomass for biofuels. They found that in the **EU27** and **UK**, there are **2.01 Mha** of **potentially contaminated land** suitable for **phytoremediation**.
- Digestate from contaminated crops may need REACH registration and CLP compliance, with handling costs considered for a viable business case.

Several EU projects made modeling exercises and are conducting small-scale experimental trials on marginal and contaminated lands:

Marginal lands		Contaminated lands
BEE	SEEMLA	GOLD
OPTIMA	MAGIC	CERESiS
WATBIO	MIDAS	Phy2Climate
FORBIO	PANACEA	
New-C-Land		

Explore the web tools that have mapped marginal and contaminated lands:

- BIOPLAT-EU tool
- H2020 MSCA RISE MAIL portal
- SEEMLA application
- JRC Soil Health dashboard
- MAGIC/MIDAS MAPS application

What is the biomass potential from marginal and contaminated lands?

A recent study conducted by the Imperial College London Consultants for Concawe estimated EU and UK biomass potential for bioenergy at **208-344 MTOE** for **2030** and **215-366 MTOE** for **2050**. In comparison, a DG RTD study estimated a potential of **224-300 MTOE** for **2050**; a JRC study **195-497 MTOE** for **2050**.

Unlocking marginal and **contaminated lands** offers **multiple opportunities** connected to **EU policies**

Energy policies (Green Deal, RED II, RePowerEU)	Common Agricultural Policy (CAP)	Farm-to-Fork and Climate Targets	Biodiversity
• Biomass supply to achieve the mandate for advanced biofuels production* (no direct food/feed competition) • Contributing to 35 bcm biomethane target with sustainable feedstock • Contributing to reduce GHG emissions using low ILUC-risk feedstock • GHG emissions crediting system for severely degraded lands recovery and soil organic carbon increase	• Recovering lands for agriculture and ensuring food security • Promoting new soil restoration techniques using catch-, cover-, inter-cropping • Using digestate to recover degraded soil and to reduce synthetic fertilisers • New business models for farmers based on biomethane/biochemicals and food & feed production	• Promoting carbon farming according to the sustainable carbon cycles target • Protecting soils, reducing soil loss by erosion, and enhancing soil organic carbon on degraded arable land • Biological carbon capture opportunities	• Recovering degraded soils • Recovering lands/areas to restore biodiversity (reafforesting, restoring native plants…) • Contributing to carbon sequestration • Restoration of contaminated areas • Restoration of peatlands and wetlands reducing oxidation of existing carbon stock

*Biofuels, bioliquids, and biomass fuels from food and feed crops are limited to 7% for the final consumption of energy in the transport sector. By 2030, advanced biofuels must meet a 5.5% sub-target of the final consumption of energy in the transport sector (in combination with RFNBOs at minimum 1%). When sustainable biomass from severely degraded lands is considered for the production of biomethane that will be used in the transport sector, there is a cap set at 1.7%. Member States may, where justified, increase this limit under the supervision of the EC (see article 27 and Annex IX part B of RED III for more details). For other sectors, only RED sustainability requirements should be met.

Policy harmonisation could contribute to creating **more opportunities** for further development of **marginal** and **contaminated lands**

There may be a large potential of low-ILUC risk biomass from marginal and contaminated lands. Key factors on their use depend on land availability and productivity, agronomic practices, and sustainability, particularly in relation to GHG emissions and carbon sinks, sustainable soils, biodiversity, water quality and quantity, rural and socioeconomic development.

RED:

1. Intermediate crops for biofuels:

- It would be beneficial to define Member States' best practices to demonstrate minimum requirements of intermediate crops for potential certification purposes.
- Intermediate crops demonstrating additionality to food/feed production and delivering other environmental benefits may provide further sustainable biomass for sustainable aviation biofuels (promoted by RED' Annex IX part A) and biomethane production (limited by RED' Annex IX part B).

2. Crops from severely degraded lands: While not yet economically profitable, crops from severely degraded lands can provide both sustainable biomass and a range of additional benefits where non-food crops are considered. Ongoing EU projects are showing promising results.

3. Certification of low-ILUC risk biomass: Novel cropping systems can further enhance biomass production from marginal and contaminated lands by demonstrating, through an appropriate certification system, that they do not increase food and feed demand and positively contribute to carbon farming and biodiversity.

Common Agricultural Policy (CAP):

Non-food and feed biomass production (i.e. low ILUC-risk projects) are not directly addressed in the CAP. CAP could consider to support initiatives preventing land abandonment or promoting carbon farming, an opportunity for new investments and jobs in rural areas.

EU Biodiversity Strategy:

The EU Soil Monitoring Law could lead to identifying and remediating contaminated lands, potentially fostering phytoremediation-based biogas or biofuels production.

Sustainable Carbon Farming:

Carbon farming lacks incentives. The EC is proposing a Carbon Removals initiative to set up rules for creating a carbon market. New opportunities may be possible soon.

The potential use of **low-ILUC biomass** for **biomethane** from **marginal** and **contaminated** lands presents challenges, yet it also offers a huge potential to contribute to the **RED targets**

Cross-sectoral opportunities may trigger new investments. Various aspects of marginal and contaminated lands require further assessment or possible policy harmonisation. Addressing these issues can establish new supply chains for both advanced biofuels for aviation and other opportunities, such as biomethane production.

Clearer definitions, better data mapping (localisation and quantification) and definitions of biomass supply potential can be considered due to the wide variability in data in the EU.

No single model fits all EU-27; integrating crops, climatic regions, and good practices is essential. National regulation should further develop novel practices in line to EU policies while accounting for differences across Member States. Member States need to carefully assess marginal/contaminated lands from grasslands, as each category is currently subject to different restrictions.

EU projects' analysis (e.g., MAGIC, MIDAS, GOLD, Phy2climate…) is still at early stage of developments; further assessment is needed, especially on phytoremediation solutions.

EU policies and support mechanisms often share objectives like carbon farming, soil recovery, and reducing GHG emissions, hence further harmonisation can create synergies. This may unlock opportunities for novel cropping systems in marginal and contaminated lands that could generate potential new business models for farmers.

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Scan the QR code and download the Task Force 3.2 report:

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About the Biomethane Industrial Partnership

The BIP is a private-public partnership comprising the **European Commission**, **Member States**, **industries**, **academia** & **civil society** who team up in several Task Forces to achieve 35 bcm biomethane by 2030.