



# *Perspectives of low ILUC risk biofuel production systems in Europe*

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- ❖ to facilitate the **market uptake of EU low ILUC risk biofuels**
- ❖ to inform primarily the bioenergy and biofuels stakeholders
- ❖ to **provide policy and market stakeholders with new knowledge**
- ❖ to **remove the most prominent barriers** against the market uptake of low ILUC risk biofuels
- ❖ to support the **sustainable conversion of the biochemical and biofuels industry**



# Figures about biofuels in Europe

# EU Biorefineries

**Biodiesel plants: 170\***

**HVO plants: 16\***

**1G bioethanol plants: 55\***

**2G bioethanol plants: 5\***

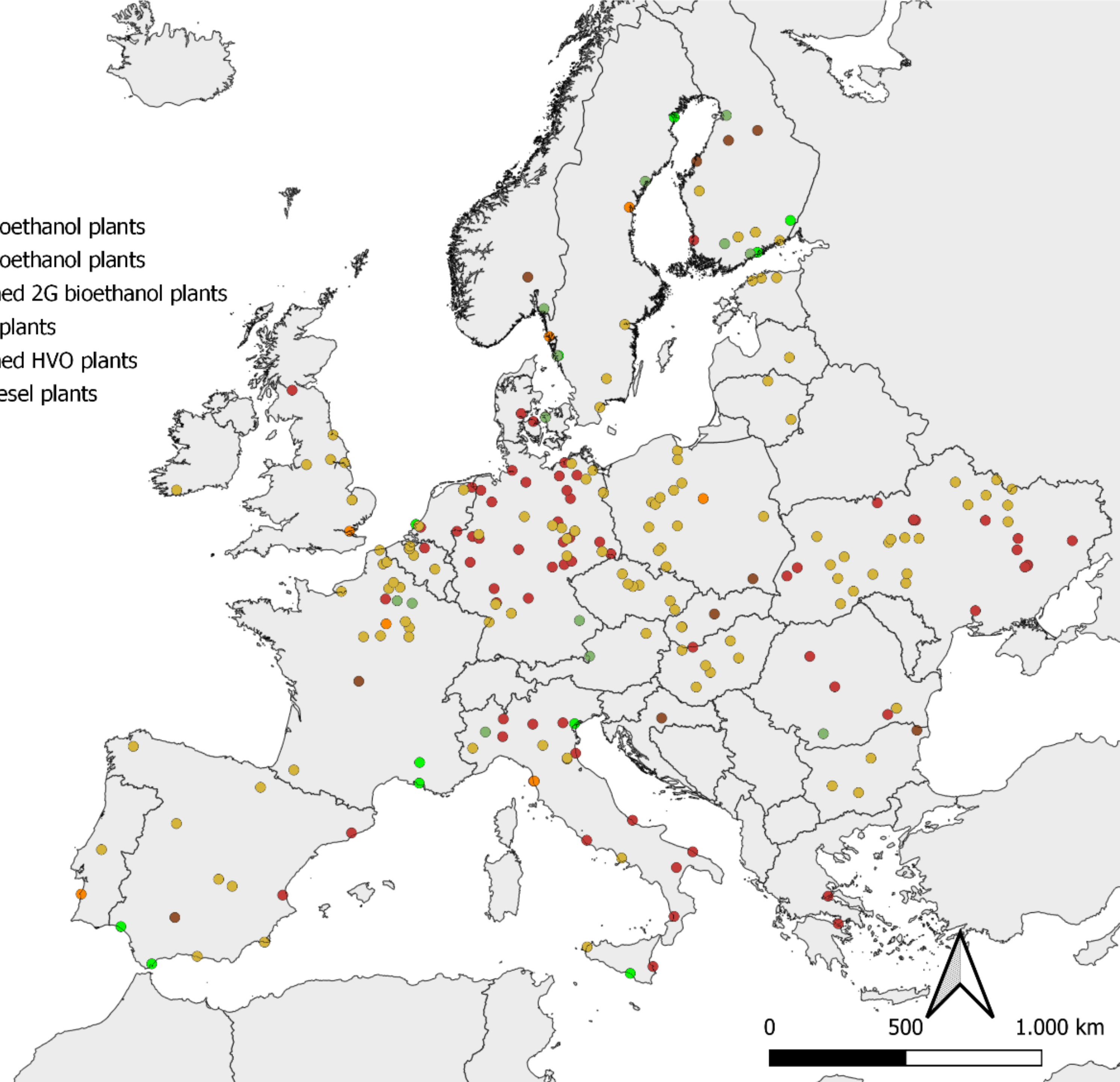
**Biogas plants: 18 900\*\* (for electricity)**

**Biomethane plants: 725\*\***

\* 2022; \*\* 2020

## Legend

- 1G bioethanol plants
- 2G bioethanol plants
- Planned 2G bioethanol plants
- HVO plants
- Planned HVO plants
- Biodiesel plants



# Where we stand



- **Biodiesel:** 12 billion liters
- **HVO:** 3.5 billion liters
- **Non advanced:** 65% (rapeseed, palm, soybean, sunflower)
- **Advanced (part A)** 4% (tall oil, pine oil)
- **Advanced (part B):** 30% (UCO, animal fats)

**160-190 TWh  
Renewable diesel**

- **1G Bioethanol:** 5.3 billion liters
- **2G bioethanol:** 50 million liters
- **Non advanced:** 99 % (wheat, corn, barley, rye)
- **Advanced (part A):** 1 % (woody biomass)

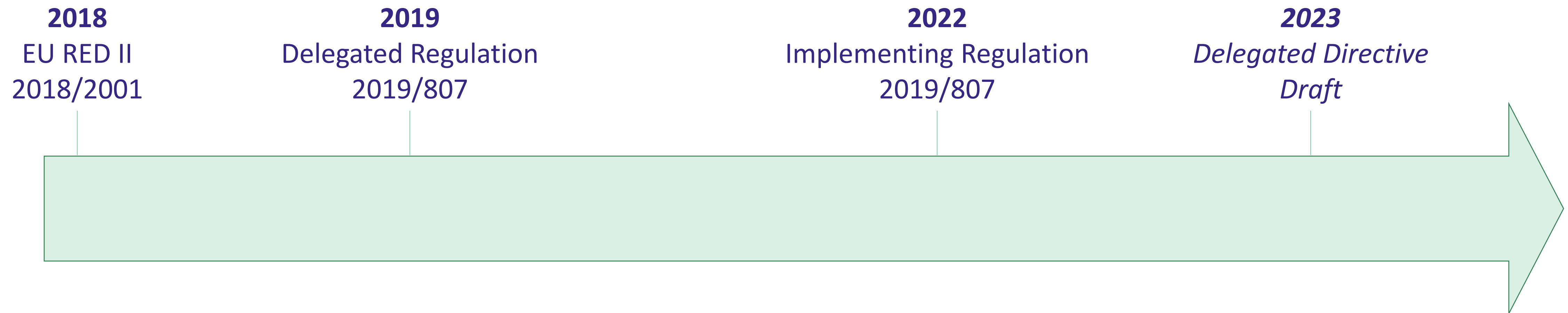
**31-33 TWh  
Bioethanol**

- **Biogas:** 15.8 billion cubic meters
- **Biomethane:** 2.4 billion cubic meters
- **Not for transport:** 85%
- **For transport:** 15%

**26-28 TWh  
Biomethane**



# An update on EU low ILUC biofuels policy framework



# Renewable Energy Directive (EU) 2018/2001

- New **40% overall RES 2030 target**;
- **Double-counting removal** for Adv. Biofuels
- **Increased subtarget**: from at least 0.2 % in 2022 to 0.5% in 2025 and 2.2 % in 2030;
- Introduced a 2.6% **sub-target for RFNBOs** in 2030;
- Further rules set on the sourcing of bioenergy, including to “**minimise**” the use of “**quality roundwood**” for energy production (D.A exp.).



| Part A  |   |        |  |
|---|---|--------|--|
| <ul style="list-style-type: none"> <li>• Algae if cultivated on land in ponds or photobioreactors</li> <li>• Biomass fraction of mixed municipal waste</li> <li>• Biowaste from private households subject to separate collection</li> <li>• Biomass fraction of industrial waste not fit for use in the food or feed chain</li> <li>• Straw</li> <li>• Animal manure and sewage sludge</li> <li>• Palm oil mill effluent and empty palm fruit bunches</li> <li>• Crude glycerin</li> <li>• Bagasse</li> <li>• Grape marcs and wine lees</li> <li>• Nut shells</li> <li>• Husks</li> <li>• Cobs cleaned of kernels of corn</li> <li>• Biomass fraction of wastes and residues from forestry and forest-based industries</li> <li>• Other non-food cellulosic material</li> <li>• Other ligno-cellulosic material except saw logs and veneer logs</li> </ul> | <table border="1"> <thead> <tr> <th>Part B</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> <li>• Used cooking oil</li> <li>• Some categories of animal fats</li> </ul> </td> </tr> </tbody> </table> | Part B | <ul style="list-style-type: none"> <li>• Used cooking oil</li> <li>• Some categories of animal fats</li> </ul> |
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# COMMISSION DELEGATED REGULATION (EU) 2019/807



*supplementing Directive (EU) 2018/2001 of the European Parliament and of the Council as regards the determination of high indirect land-use change-risk feedstock*

## General criteria for

- ✓ **certification of low indirect land-use change-risk biofuels, bioliquids and biomass fuels**
- ✓ **determining the high indirect land-use change-risk feedstock for which a significant expansion of the production area into land with high carbon stock is observed**
- ✓ **Additionality measures**

II

(Non-legislative acts)

## REGULATIONS

COMMISSION DELEGATED REGULATION (EU) 2019/807

of 13 March 2019

**supplementing Directive (EU) 2018/2001 of the European Parliament and of the Council as regards the determination of high indirect land-use change-risk feedstock for which a significant expansion of the production area into land with high carbon stock is observed and the certification of low indirect land-use change-risk biofuels, bioliquids and biomass fuels**

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources <sup>(1)</sup>, and in particular the fourth subparagraph of Article 26(2) thereof,

Whereas:

- (1) In order to address the issue of indirect land use change ('ILUC'), Directive (EU) 2018/2001 requires the Commission to adopt a delegated act to lay down provisions setting out the criteria for determining the high ILUC-risk feedstock for which a significant expansion of the production area into land with high carbon stock is observed, and for certifying low ILUC-risk biofuels, bioliquids and biomass fuels. Such provisions should accompany the report on the status of worldwide production expansion of the relevant feedstock ('report on feedstock expansion'), submitted to the European Parliament and to the Council on this date.



# COMMISSION IMPLEMENTING REGULATION (EU) 2022/996



*rules to verify sustainability and greenhouse gas emissions saving criteria and low indirect land-use change-risk criteria*

- **General rules on governance**, internal monitoring, complaints procedures and transparency of voluntary schemes
- **Audit process, audit scope**, qualifications of auditors and audit supervision
- **Specific rules on the implementation of the mass balance system**, the Union database and the establishment of GHG emissions and biological fraction of fuels
- **Specific rules on compliance with the requirements on low ILUC-risk certification**

27.6.2022

EN

Official Journal of the European Union

L 168/1

II

(Non-legislative acts)

## REGULATIONS

COMMISSION IMPLEMENTING REGULATION (EU) 2022/996

of 14 June 2022

on rules to verify sustainability and greenhouse gas emissions saving criteria and low indirect land-use change-risk criteria

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources <sup>(1)</sup>, and in particular Article 30(8) thereof,

Whereas:

- (1) Directive (EU) 2018/2001 expands the role of voluntary schemes to include the certification of the compliance of biomass fuels with sustainability and greenhouse gas (GHG) emissions saving criteria and the compliance of renewable liquid and gaseous transport fuels of non-biological origin and recycled carbon fuels with the respective GHG emissions saving criteria. Furthermore, the voluntary schemes can be used to certify biofuels, bioliquids and biomass fuels with low indirect land-use change-risk.

# COMMISSION DELEGATED DIRECTIVE (EU) amending Annex IX to Directive (EU) 2018/2001



*as regards adding feedstocks for the production of biofuels and biogas*

Ref. Ares(2022)8413323 - 05/12/2022

Part A, the following feedstocks are added: “

- Alcoholic distillery residues and wastes (fusel oils) not fit for use in the food or feed chain;
- Raw methanol from kraft pulping stemming from the production of wood pulp;
- **Non-food crops grown on severely degraded land, not suitable for food and feed crops.”**



Brussels, XXX  
[...] (2022) XXX draft

ANNEX

ANNEX

to the

COMMISSION DELEGATED DIRECTIVE (EU)

amending Annex IX to Directive (EU) 2018/2001 of the European Parliament and of the Council, as regards adding feedstocks for the production of biofuels and biogas

# New feedstock in Part B



- Bakery and confectionary residues and waste not fit for use in the food and feed chain;
- Drink production residues and waste not fit for use in the food and feed chain;
- Fruit and vegetable residues and waste not fit for use in the food and feed chain, excluding tails, leaves, stalks and husks;
- Starchy effluents with less than 20% starch content not fit for use in the food and feed chain;
- .....
- **Intermediate crops, such as catch crops and cover crops that are grown in areas where, due to a short vegetation period, the production of food and feed crops is limited to one harvest and provided their use does not trigger demand for additional land and provided the soil organic matter content is maintained.”.**

# **BIKE Project**

Low ILUC ris Biofuels – Identification and certification of case studies

# European potential production of sustainable Low ILUC risk feedstocks and crops



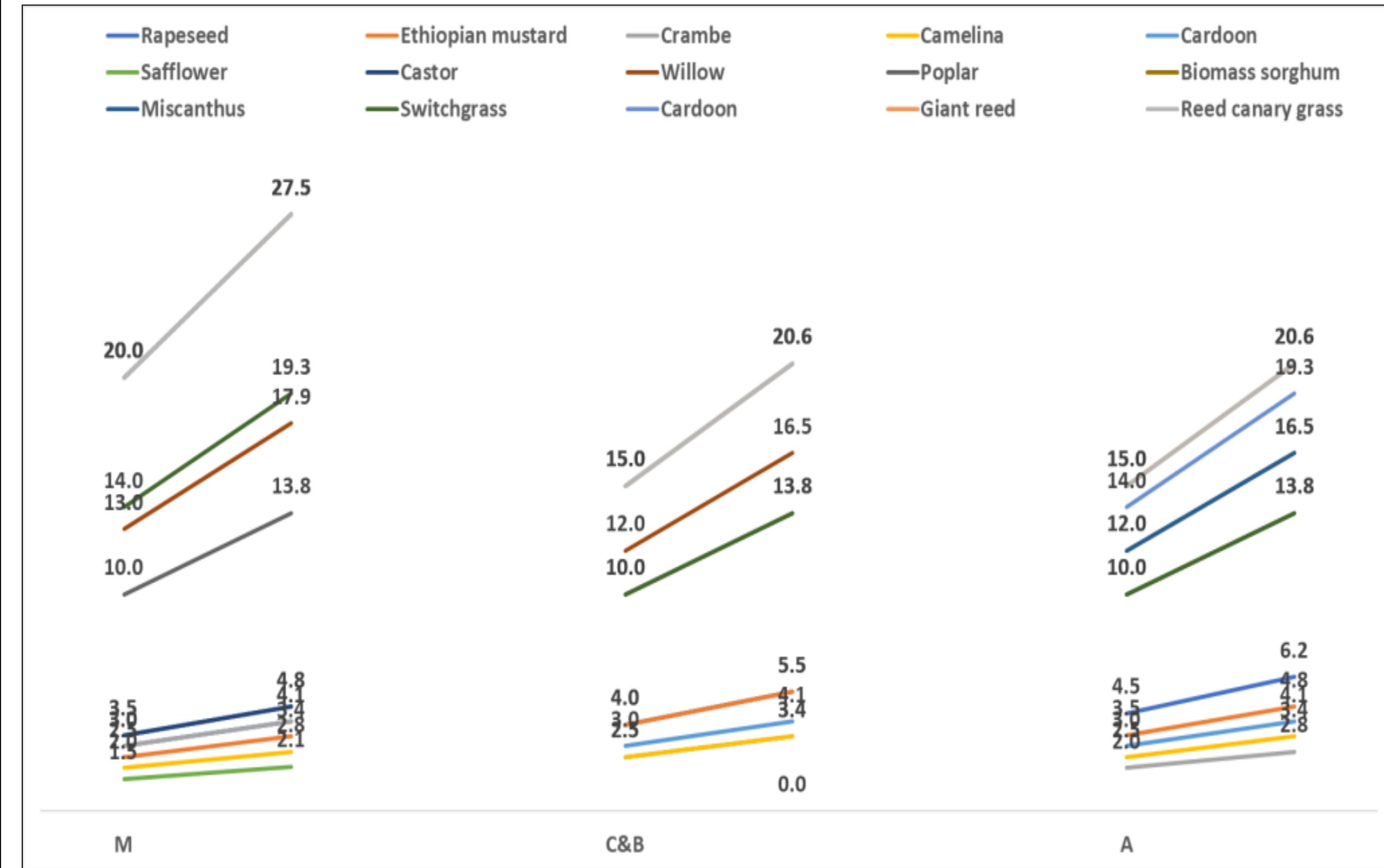
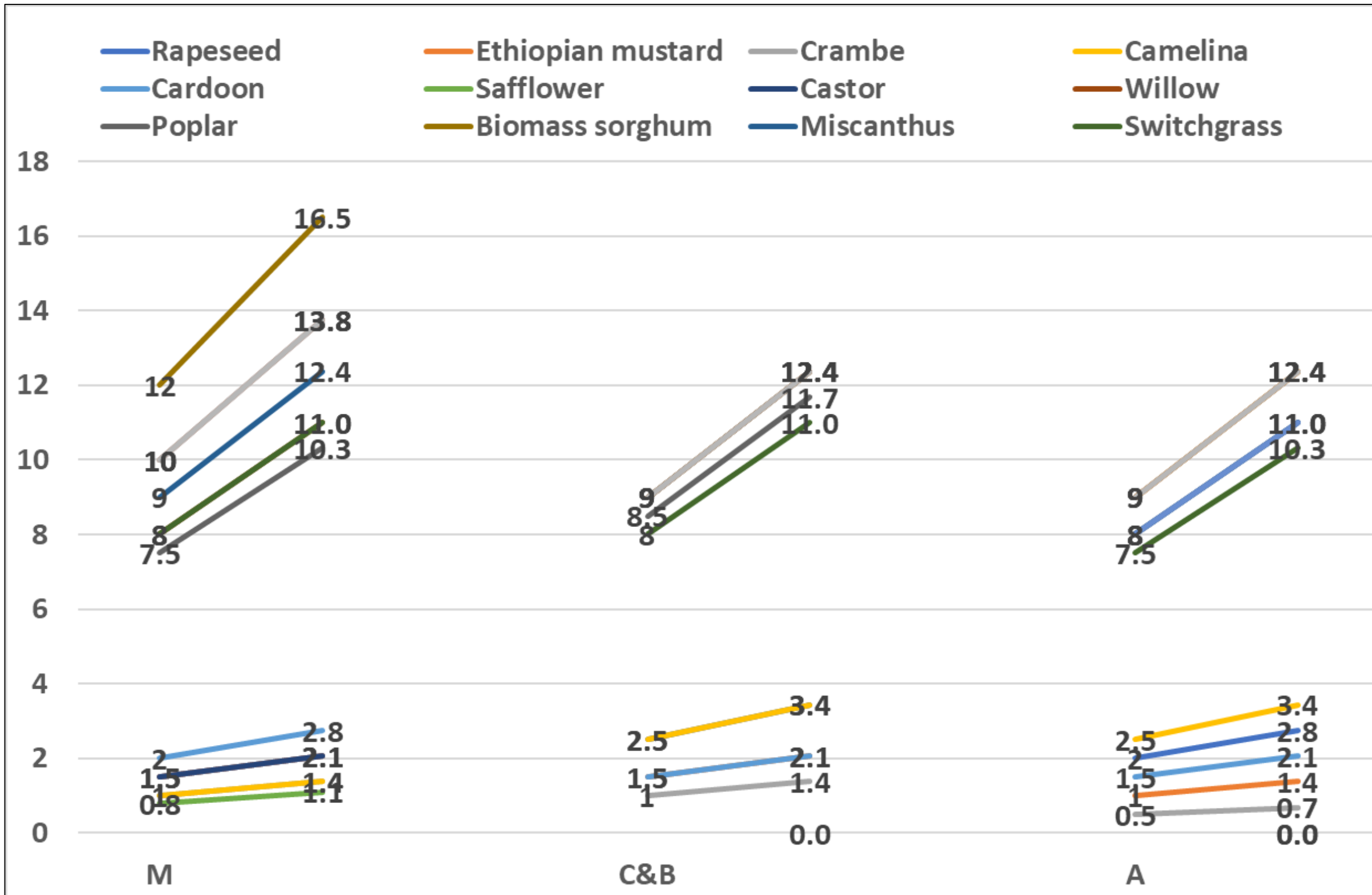
Sustainable practices that support biomass additionality production, carbon storage, and soil quality are addressed by BIKE case studies

**Cover Cropping** - reduce soil penetration resistance, improve wet aggregate and cumulative infiltration but have insignificant impacts on bulk density, dry aggregate stability, saturated hydraulic conductivity, unsaturated hydraulic conductivity, and plant available water.

**Crop rotation** - practice of growing a series of different types of crops in the same area in sequential seasons. Crop rotation gives various nutrients to the soil and replenishes nitrogen, for example, through the use of legumes, or cover crops in sequence with cereals and other crops

**Cultivation un unused, abandoned or severely degraded land** - Produce biomass feedstock for biofuels production in soils which have been **abandoned, or not used** for several years. Cultivate biomass crops for biofuels production in soils considered as **severely degraded, with low Soil Organic Carbon and soil organic matter**

# Potential Yield Increases by 2030



Yield Increases (tons) from the sustainable agricultural practices in land with natural constraints in the three European agro-ecological zones

Yield increases (tons) from the sustainable agricultural practices in farming land in the three European agro-ecological zones

M - Mediterranean

C&B - Continental and Boreal

A - Atlantic

# BIKE Identified Low ILUC value Chains



## Value Chain Type 1: cultivation in unused, abandoned or severely degraded land

- ✦ Castor oil for HVO (in Italy, Tunisia and Greece)
- ✦ Perennial crops for bioethanol production (in Italy, Greece and UK)



## Value Chain Type 2: productivity increases from improved agricultural practices

- ✦ Brassica carinata for HVO (in Italy, Greece and Uruguay)
- ✦ BDR model and further biogas to liquid conversion for F.T. diesel or MeOH production (in Italy; two sites and Greece)

Two value chain types matching the definition for additionality:

- ✦ cultivation in **unused, abandoned or severely degraded land** &
- ✦ **productivity increases** from improved agricultural practices

# Bike value chains: case studies



**CS1: Castor oil for HVO** in three sites (unused, abandoned or severely degraded lands) located in **Italy, Kenya and Greece**



**CS2: Perennial lignocellulosic crops** for advanced biofuels in three sites (unused, abandoned or severely degraded lands) located in **Italy, Greece and UK**



**CS3: Brassica carinata** for HVO in three sites (as **cover crop**, in rotation systems with conventional crops) located in **Italy, Greece and Uruguay**



**CS4: BRD model** for liquid biofuels for **road, aviation and maritime** from decentralised and distributed biomethane production through centralised FT or synthesis in three sites (in rotation systems with conventional crops) located in **Italy, Greece and UK**



# Creating a ISCC system certification module for certifying low ILUC-risk biofuels production sites



**ISCC – International Sustainability and Carbon Certification (ISCC)** is a certification system that offers solutions for the **implementation and certification of sustainable, deforestation-free and traceable supply chains of agricultural, forestry, waste and residue raw materials, non-bio renewables and recycled carbon materials and fuels.**

In total, the ISCC standard covers six principles and 96 criteria for sustainable biomass from agriculture.

ISCC certified farms/ plantations must comply with this set of sustainability criteria



**Principle 1:** Protection of biodiverse and carbon rich areas



**Principle 2:** Good Agricultural Practice



**Principle 3:** Safe Working Conditions



**Principle 4:** Compliance with Human, Labour and Land rights



**Principle 5:** Compliance with Laws and International Treaties



**Principle 6:** Good Management Practices and Continuous Improvement

**Fig 2:** ISCC principles for sustainable biomass production

# Conducted audits



**4 pilot audits** conducted in different climatic regions of the world and covered different crops



**Audit in Kenya** - Eni certified its first agri-hub with a capacity of 15,000 tons of oil seed. The pilot audit in Kenya took place at three separate smallholder farms located in the South of Kenya.



**Audit in Italy** - This pilot audit took place at the “Fattoria della Piana” by Uliva Societa Agricola S.S. in Calabria, Italy. The legal entity is operating a biogas plant and a farm supplying sustainable substrates for bioenergy production



**Audit in the UK** - The audit was conducted the Miscanthus Nursery Limited, Lower Marsh Farm in Taunton in the United Kingdom which covers a total area of 120 ha of farmland of which **95 ha are cultivated with miscanthus and 25 ha is grassland**



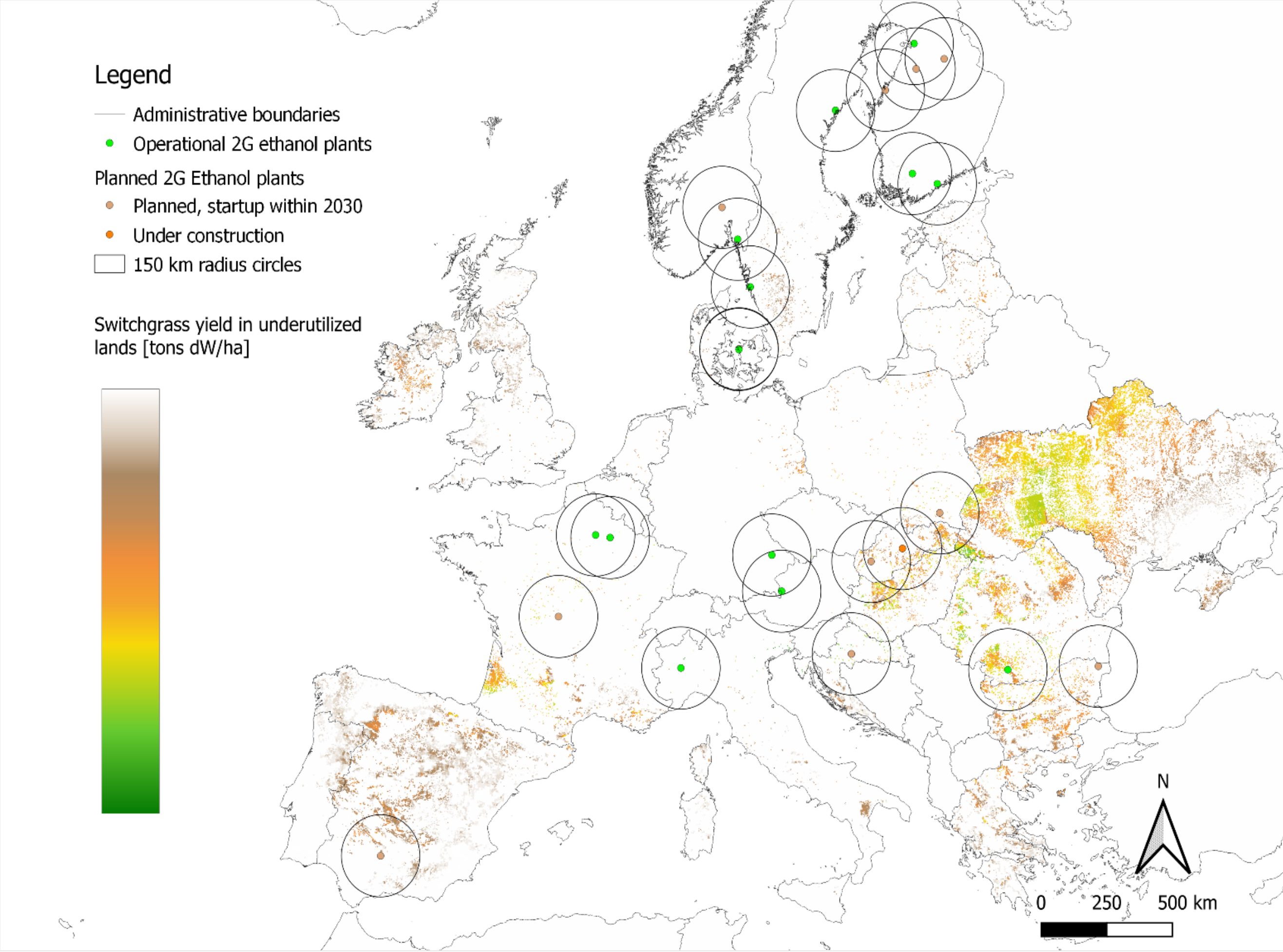
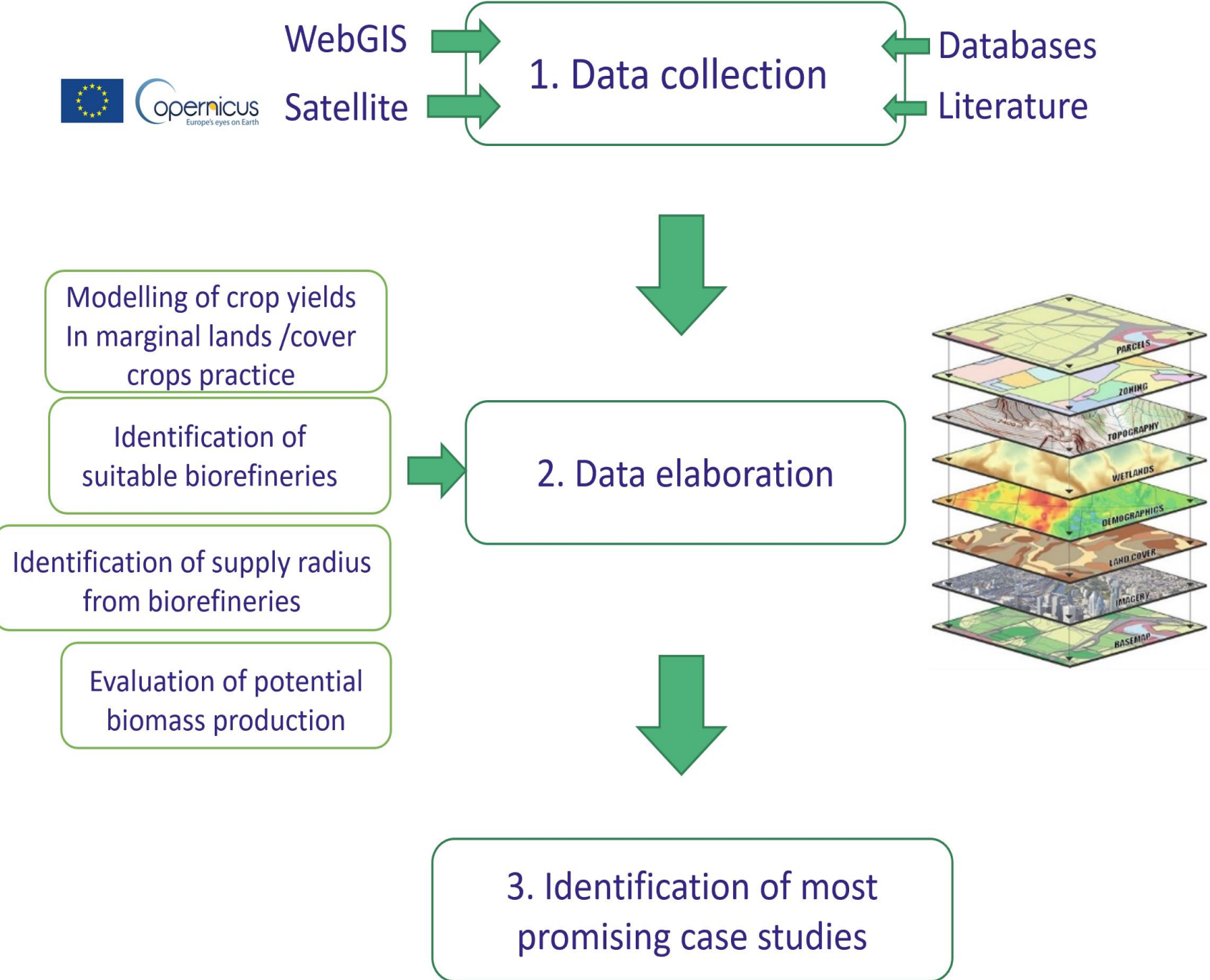
**Audit in Uruguay** - The audit was conducted at the Nalmer farm in Sánchez, Uruguay. The focus of the audit was on two fields: the first field was used last year for sustainable feedstock production, and the second field is the relevant one for the actual harvesting season.

# Assess the replication potential of Low ILUC risk biofuels value chains identified by selected case studies



## Case Studies

- CS1. Castor oil production in unused or severely degraded land
- CS2. Perennial crops production in unused or severely degraded land
- CS3. Brassica Carinata as summer or winter cover crop
- CS4. Biogas Done Right (BDR) model



# Perform a Full Sustainability Assessment of low- ILUC advanced biofuels production routes



**15 Sustainability Indicators:**

**12 – Quantitative indicators:**

(Indicator Value = Target situation – Baseline situation)

**3 – Qualitative indicators:**

(Indicator Value = Scorecard system)





# Conclusion



Liquid biofuels and advanced biofuels together are expected to contribute to more than **17% by 2050**, with advanced biofuel **expected to prevail already by 2040**.

**More than 30 billion cubic meters** of biomethane can be potentially produced by Anaerobic digestion within 2030. Of which around **8 billion cubic meters of Low ILUC risk biomethane** from cover crops.

To unlock the potential of Low ILUC risk biofuels, clear definitions of Low ILUC risk practices, baselines, sustainability and soil indicators are needed to facilitate farmers and biofuels producers

Not only avoid competition with food and feed sector, but contribute to soil restoration, improving the sustainability of EU agriculture sector.



# Thank you!

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