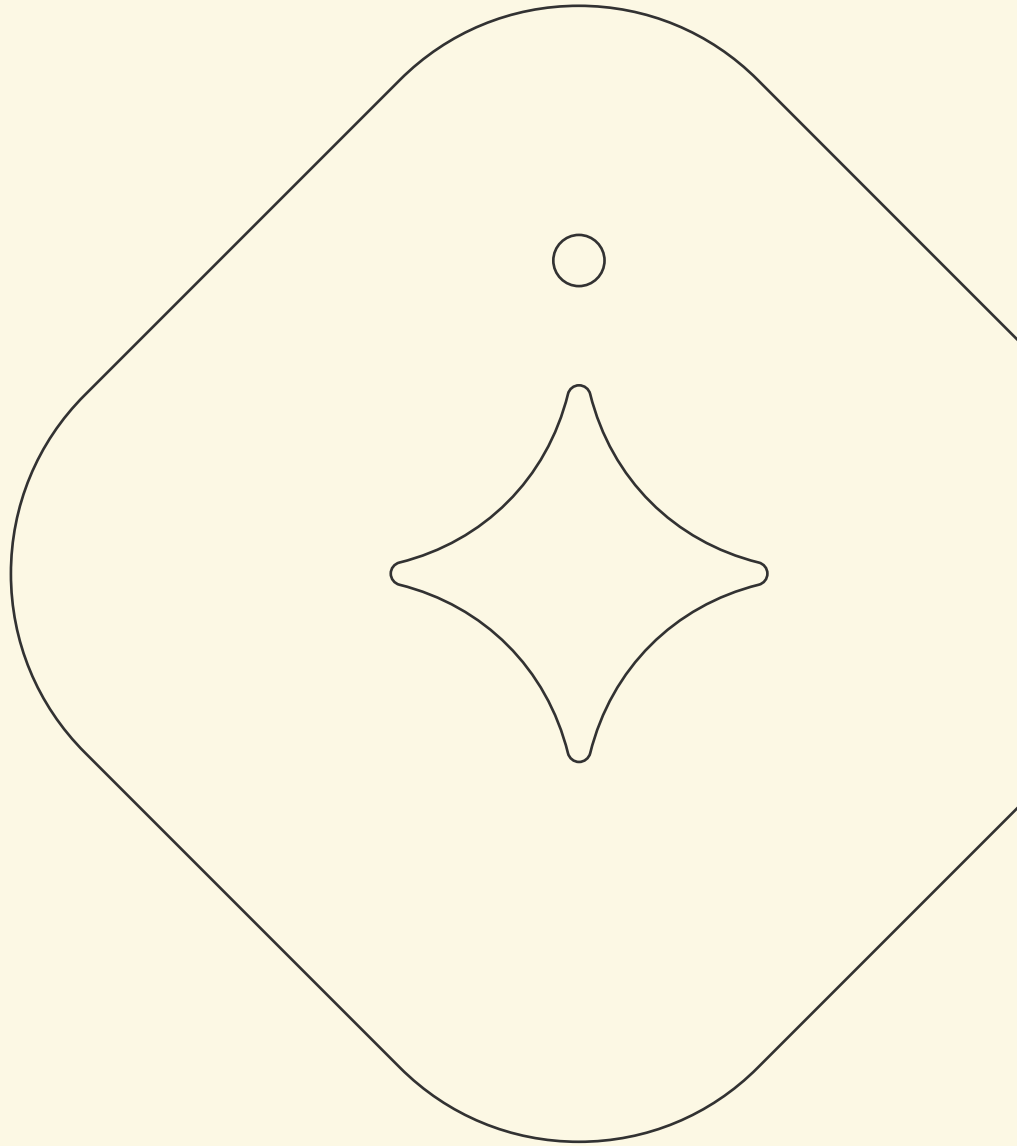
Virtual Roundtable

Sustainable Biofuels from Low-Producing Lands

The webinar will begin shortly.

Mærsk Mc-Kinney Møller Center
for Zero Carbon Shipping

Welcome & Introduction



On Today's Agenda:

15:00 Welcome & introduction

Torben Nørgaard, MMMCZCS
Roberta Cenni, MMMCZCS
Gerard Ostheimer, CEM Biofuture Campaign

15:15 Expert presentations

Tiziana Pirelli, PhD. Tiziana Pirelli, PhD.
FAO/GBEP - Coordinator of the Global Bioenergy Partnership

Giulia Gregori, Strategic Planning and Corporate Communication, Novamont

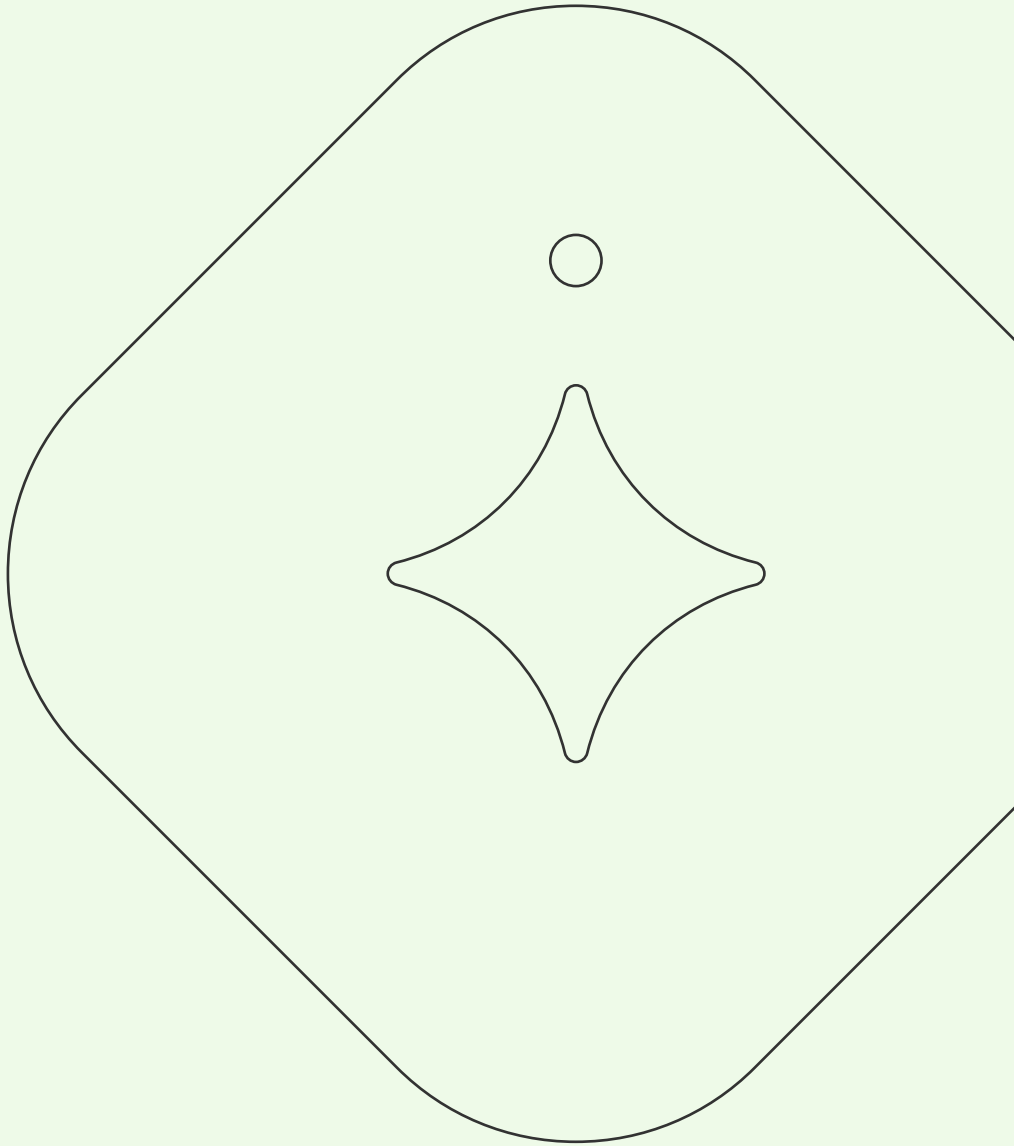
Blanca de Ulibarri, EU LCA Project Manager at RSB

15:45 Panel discussion & audience Q&A

Moderated by: Gerard J. Ostheimer, PhD, Manager, CEM Biofuture Campaign

16:20 Concluding remarks

16:30 Adjourn

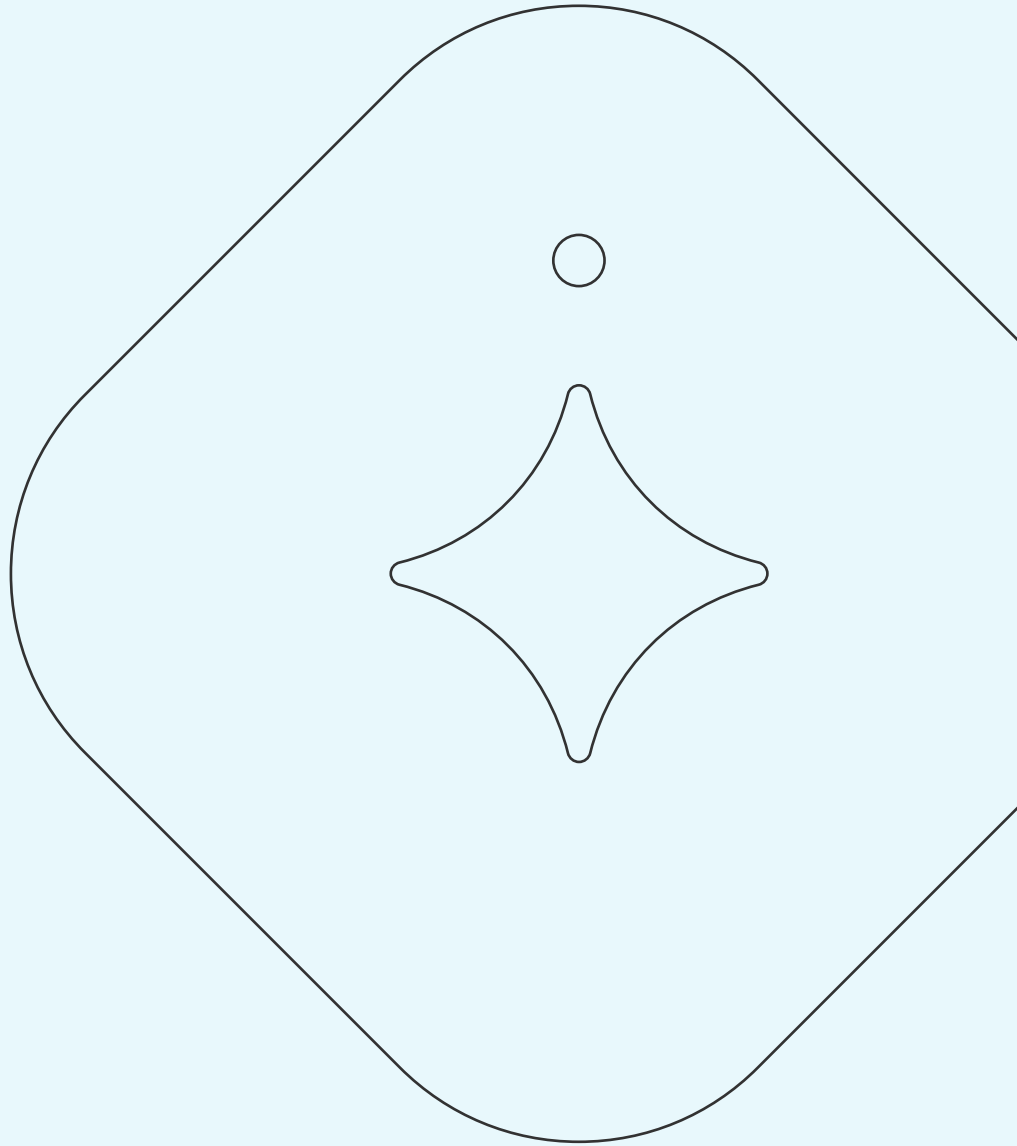



Mærsk Mc-Kinney Møller Center
for Zero Carbon Shipping
Join at
slido.com
#biofuels

Why are Low-Producing Lands a Topic for Shipping?

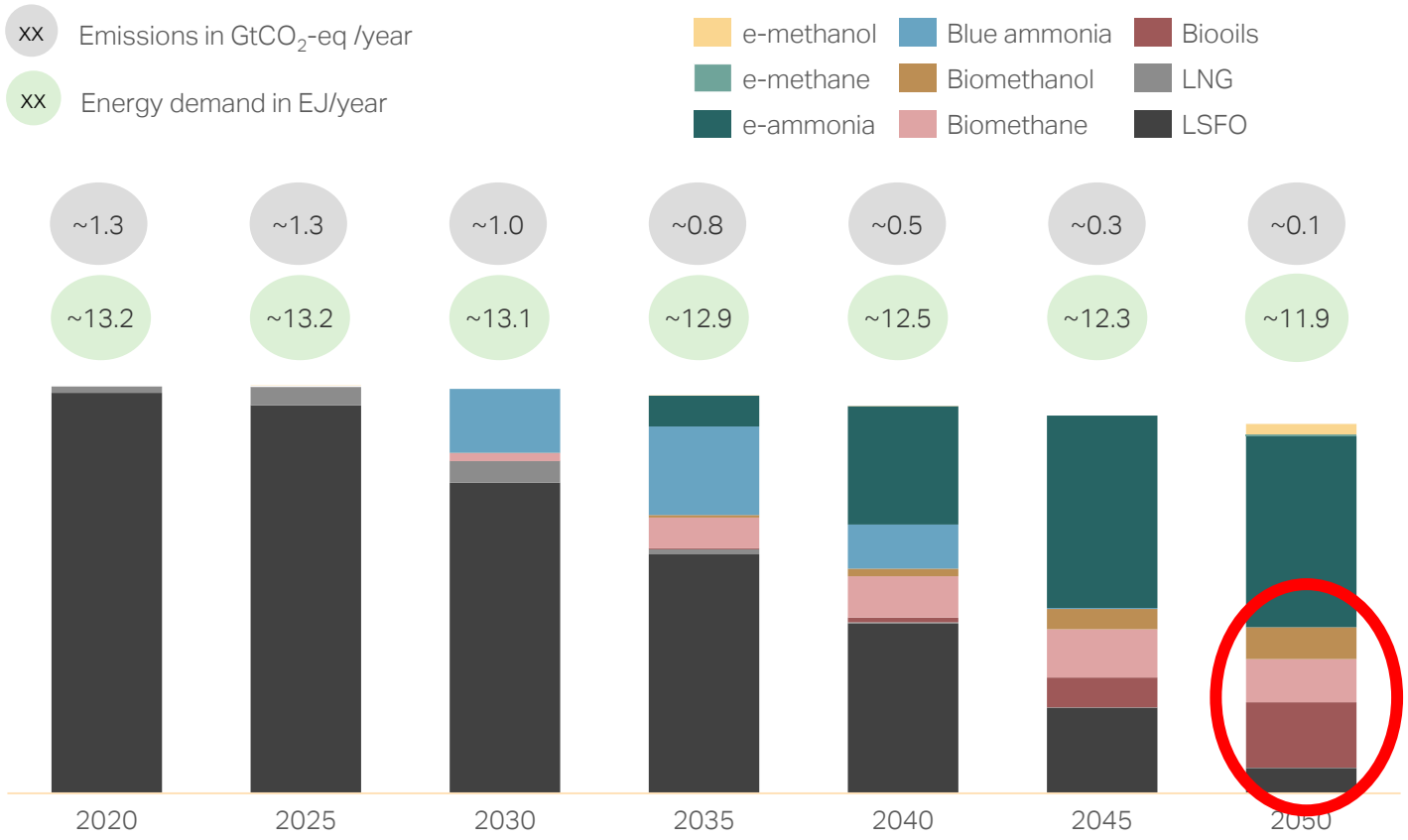
1) Demand on biomass for biofuels is higher than supply

2) EU regulations incentivize use of biomass from low-producing lands via RED II



A zero-carbon future for shipping is most likely a multifuel future

Scenario: Activating all critical levers and introducing a flat global carbon levy of USD 230/tCO_2-eq



- By 2030, biofuels may need to supply ~40% of the energy required by shipping (4-5 EJ)

Source NavigaTE

Results from former Biomass Availability studies published in these series of Webinars

Biomass demand is forecast to exceed biomass availability, H. Wenzel, SDU, 1st Webinar, June 2022

Global biomass potentials

Biomass potential (EJ/y)	Year of publication	Reference
160 – 270	2010	Haberl et al. [8]
100 – 300	2011	Chum et al. [2] (IPCC Bioenergy working group)
≤ 190	2013	Haberl et al. [9]
≈ 150	2017	International Energy Agency [10]
≈ 100	2018	IPCC [14]
≈ 100	2018	Danish Climate Council [15]
Potential: 150 – 170 With a safety margin ≈ 100	2021	International Energy Agency [16]
40 – 60	2021	Energy Transition Commission [17]
Residues: 5 – 50 Dedicated crops: 50 – 250	2022 2022	IPCC [27]

Consensus converging towards 100 EJ/y ≈ 10 GJ/cap/y by 2050

≈ 600 kg of straw…

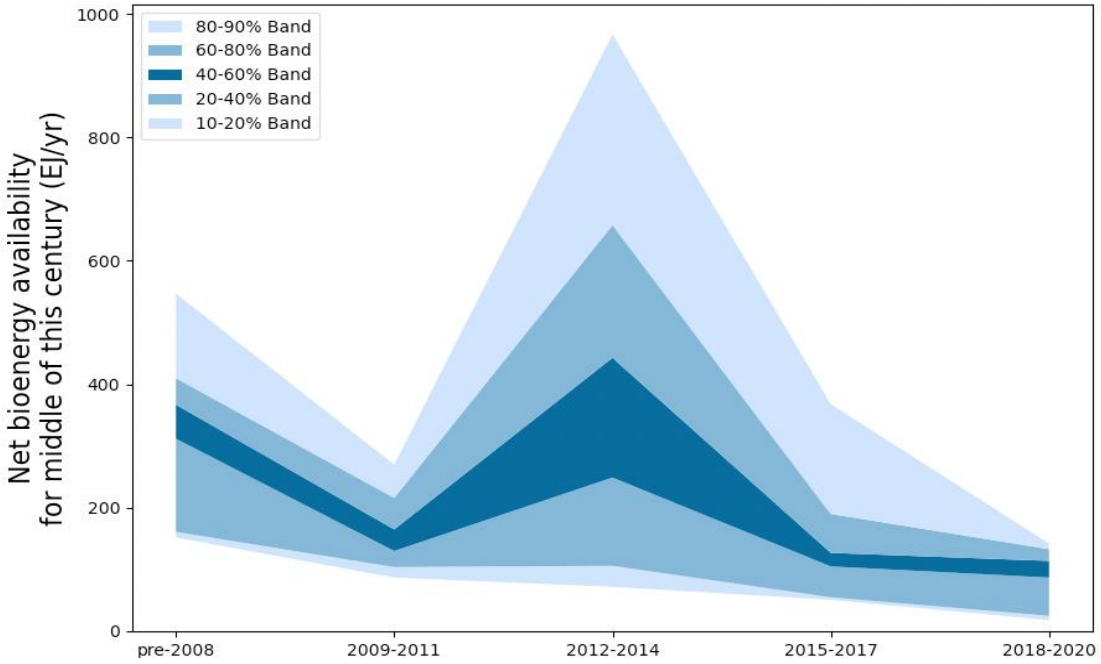
Global primary energy demand development

- 570 EJ/y (2015) – of which 470 EJ fossil
- BAU forecast 800 EJ/y by 2040 (IEA, 2018)
- BAU forecast 900 EJ/y by 2050 (WEC, 2013)

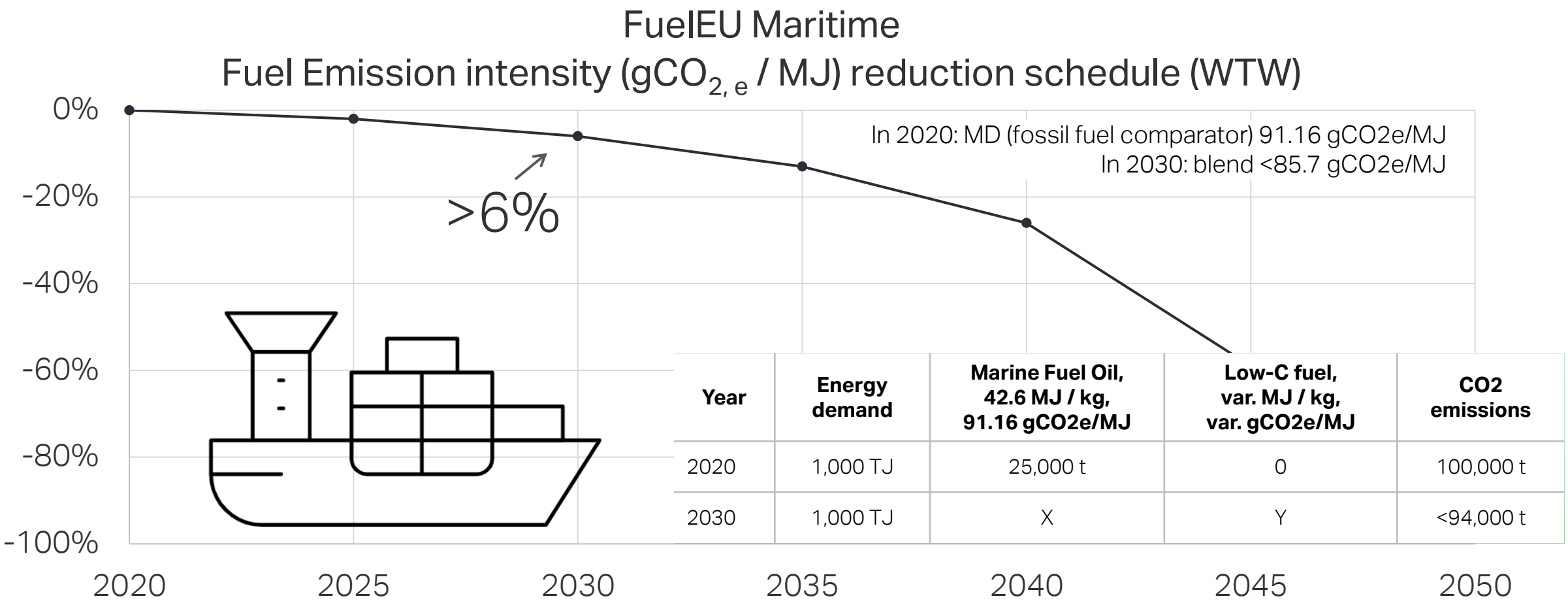
- …including feedstock for all materials/chemicals and derived from biomass => above 1000 EJ/y

SDU

Biomass potential assessments are becoming less optimistic over time, E. Coleman, K. Daehn, F. Allroggen, MIT. 2nd webinar, December 2022



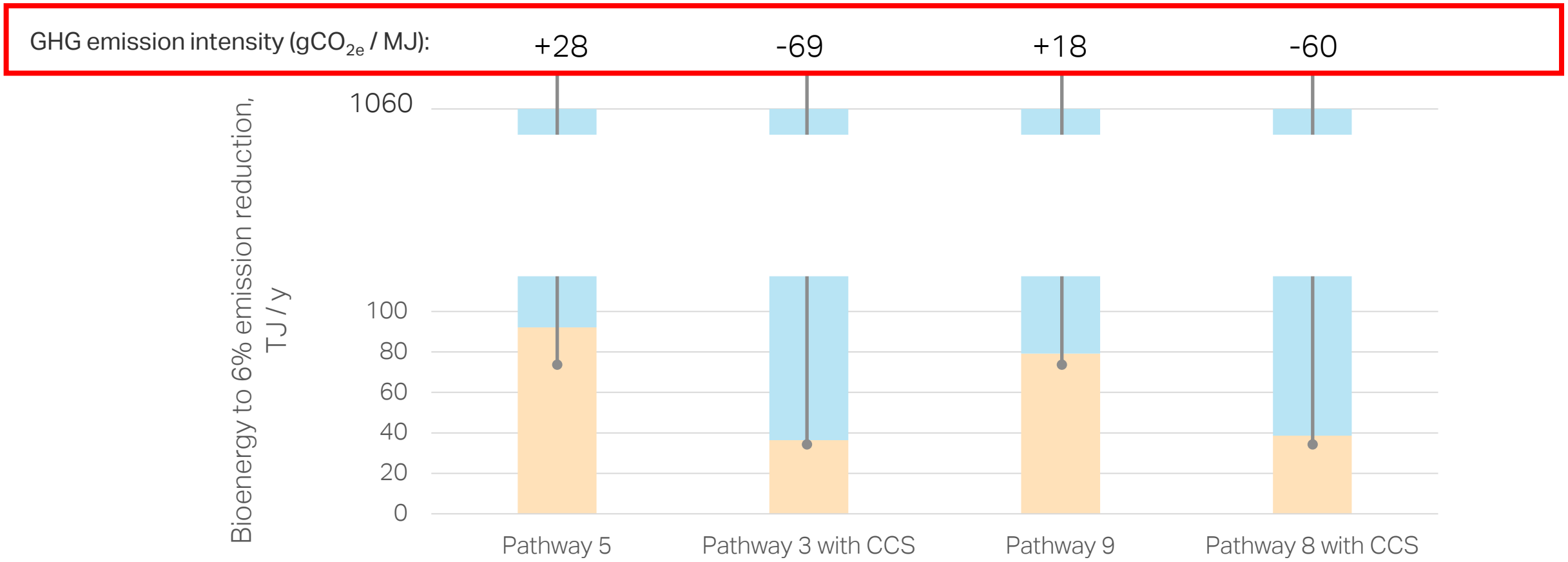
Results from an MMMCZCS assessment of biofuel demand for compliance with FuelEU Maritime



Year	Energy demand	Marine Fuel Oil, 42.6 MJ / kg, 91.16 gCO2e/MJ	Low-C fuel, var. MJ / kg, var. gCO2e/MJ	CO2 emissions
2020	1,000 TJ	25,000 t	0	100,000 t
2030	1,000 TJ	X	Y	<94,000 t

What does GHG emission intensity it mean for fuel demand?

Archetype fleet consumes 25,000 t / y (~1,000 TJ) and emits 100,000 t CO_{2e}/y.
Alternatives to reduce emissions by 6%:



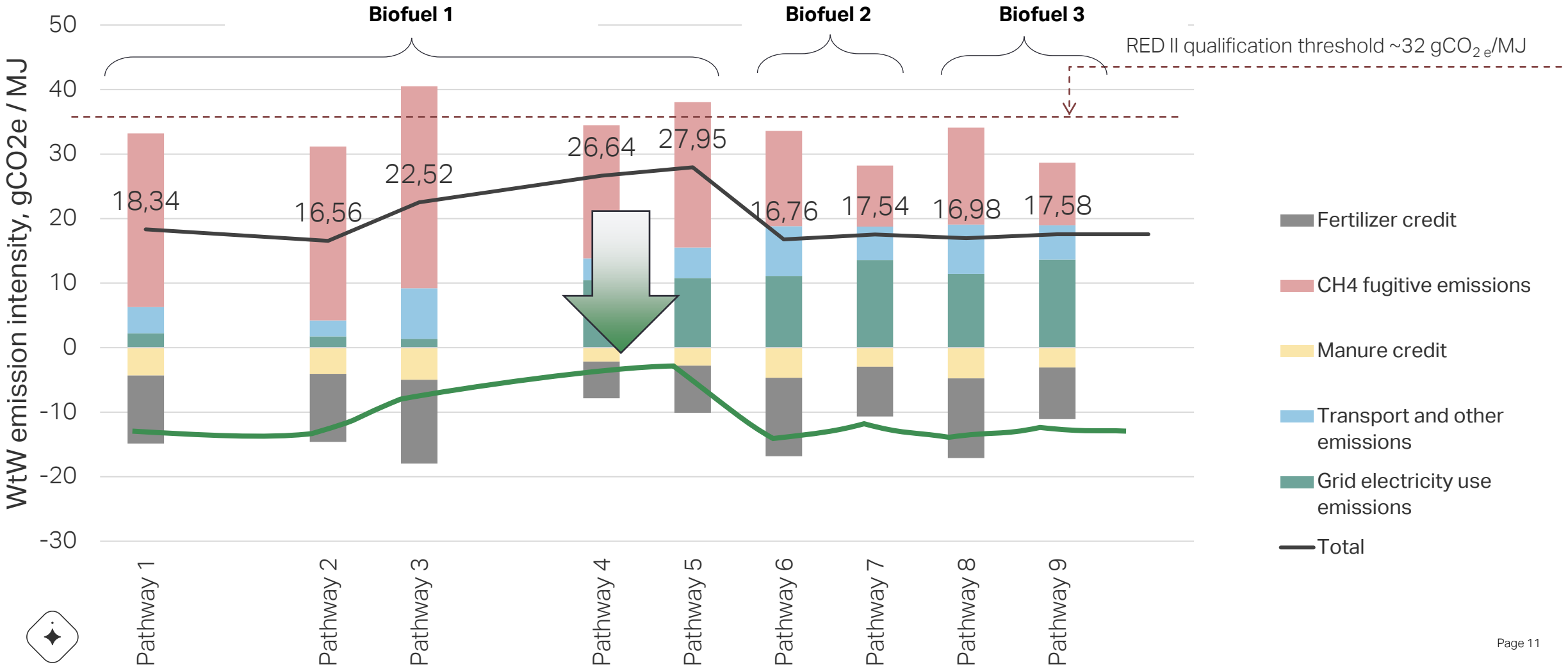
Suppose the fuel is LBM: ~1,900 t / y ~ 600 Nm3 biogas / h

~ 770 t / y ~ 250 Nm3 biogas / h

Calculation of WTW GHG emission intensity:
Per RED II: components of a life cycle fuel emissions: $GHG_{WtW} = GHG_{WtT} + GHG_{TtW}$

GHG_{WtT}	Emissions associated with fuel manufacture / transport / bunker
$E_{feedstock}$	Emissions from feedstock preparation, includes dLUC
$E_{transport}$	Emissions from transportation
$E_{Processing}$	Emissions associated with utilities consumed for processing (anaerobic digestion, upgrading, liquefaction, synthesis, compression, etc.)
$E_{material}$	Emissions from consumables during processing
$E_{fugitive}$	Methane emissions throughout
$-E_{manure}$	Credit due to avoided emissions for mismanagement of biogenic residues
$-E_{fertilizer}$	Credit due to avoided emissions from fertilization
$-E_{CCS}$	Credit due to Carbon Capture and Sequestration
$-E_{DL,\ SCA}$	Credit due to restoration of degraded land, and soil carbon accumulation
GHG_{TtW}	Emissions associated with fuel combustion (methane only)
$E_{fugitive}$	On-board methane emissions

Restoration of *(certified)* degraded land can give value to biofuel users….



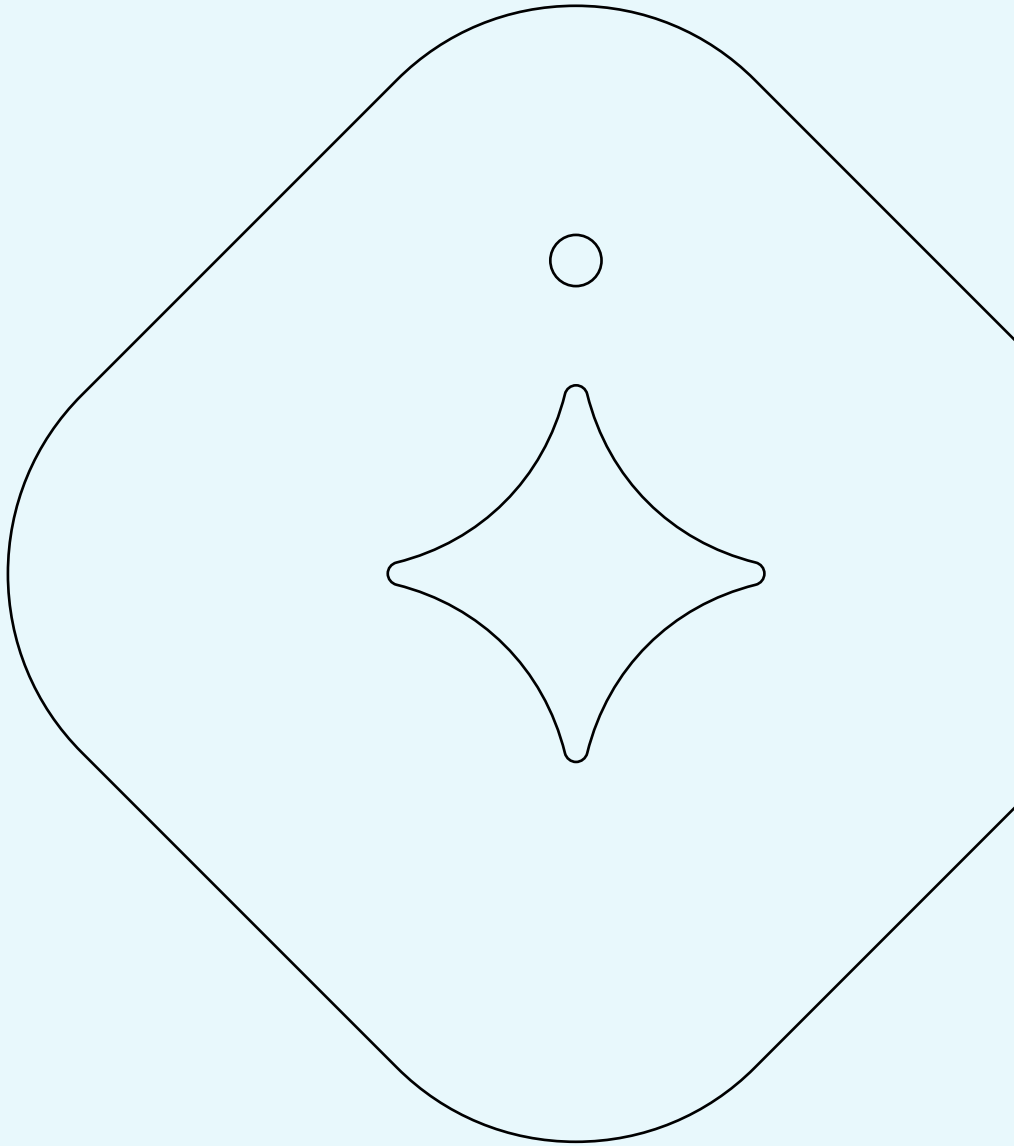
*"Typical Frames": Typical fugitive emissions; Electrical power as in FR mix; Heat from Biogas; No export of excess heat, no CCS

…because it "**enhances food security, improved air and water quality, climate change resilience, job creation, and more…** "

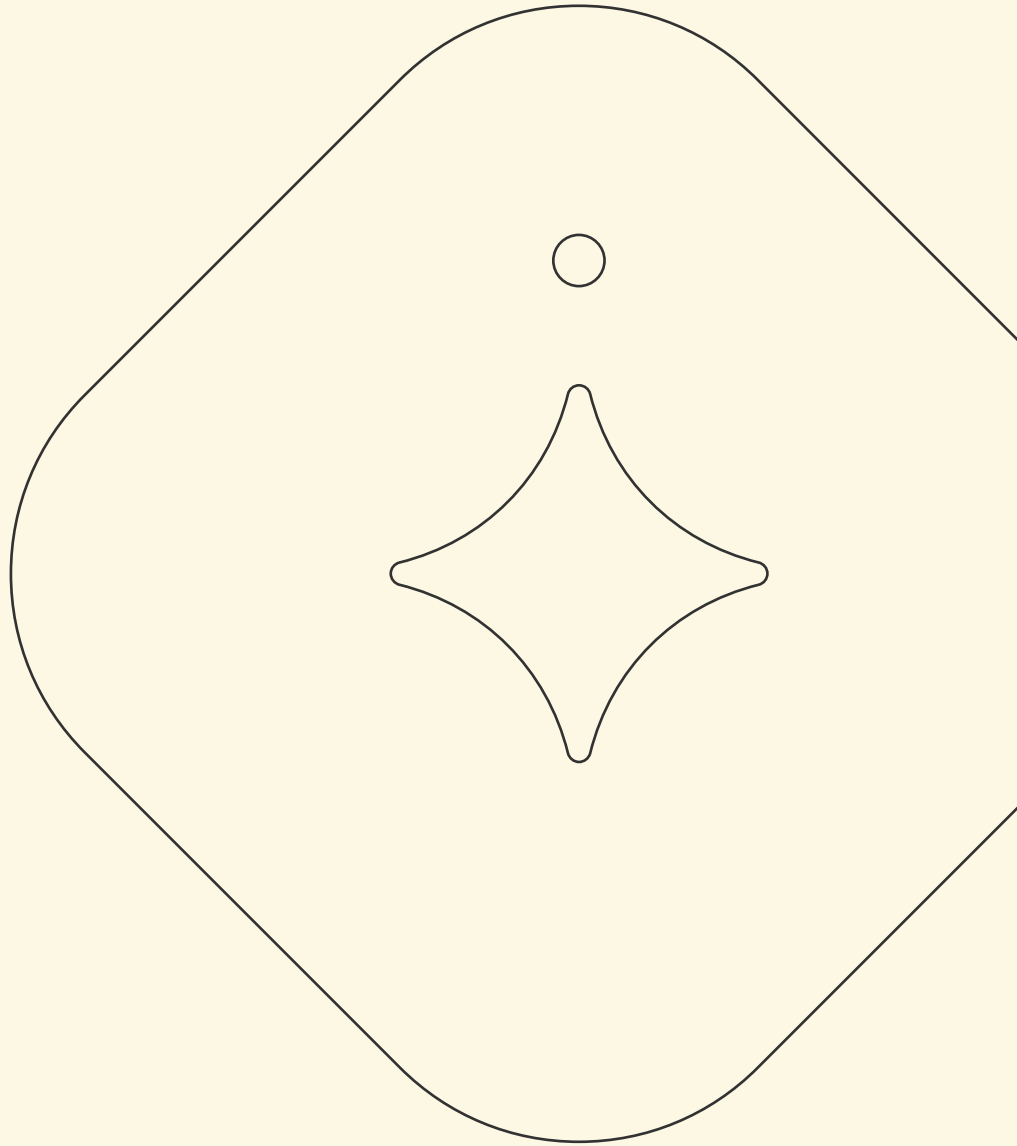
https://www.globalforestwatch.org/blog/people/restoration-its-about-more-than-just-the-trees/

Food for Thought:

- Can we create value for all out of this opportunity?
- How do we do it?



Expert Presentations



Participants:

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Giulia Gregori
Strategic Planning and Corporate Communication,
Novamont

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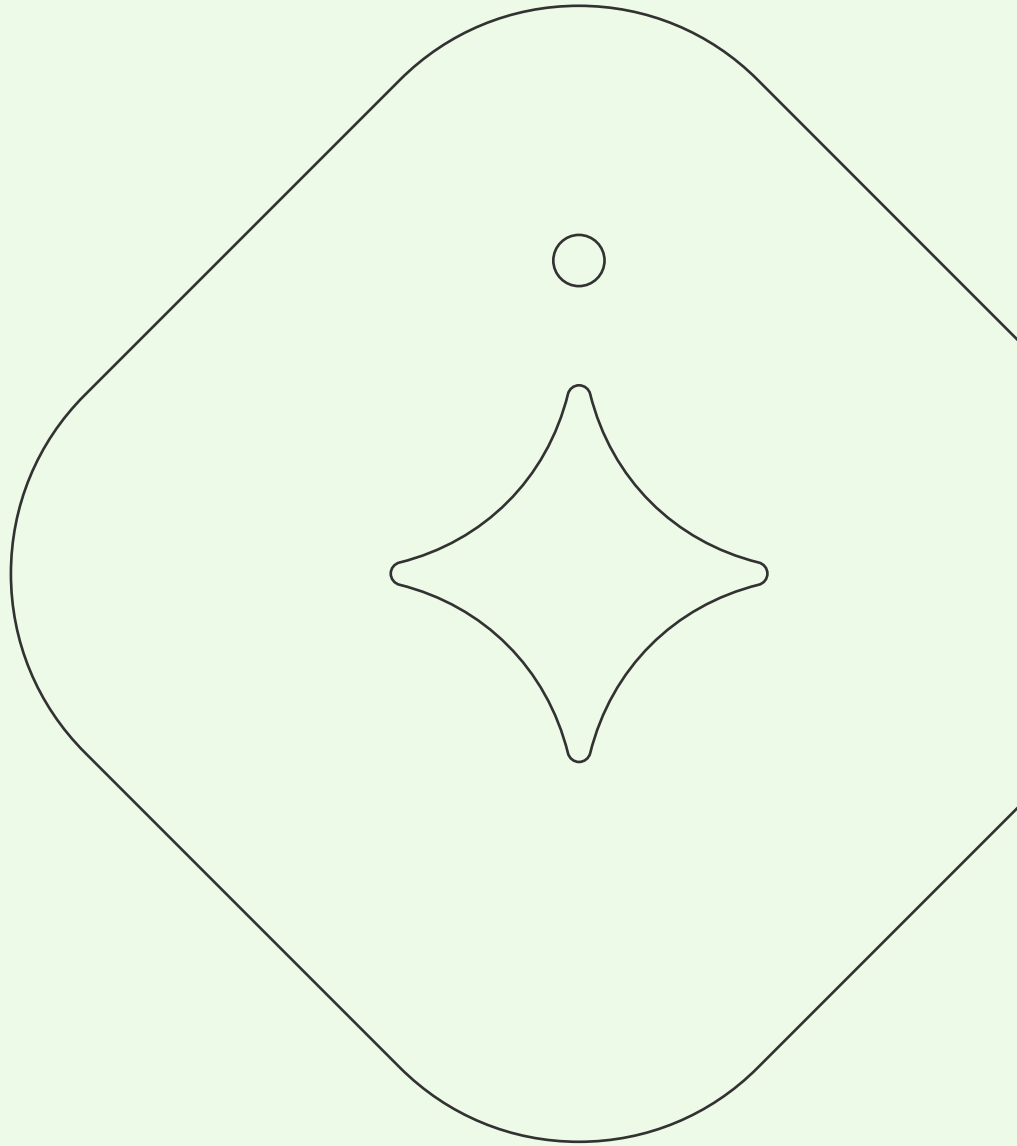
EU LCA Project Manager
RSB

Gerard Ostheimer -
Moderator
Managing Director, Clean Energy Ministerial (CEM)
Biofuture Campaign

Food and Agriculture Organization of the United Nations (FAO) / GBEP

Tiziana Pirelli, FAO/GBEP - Coordinator of the Global Bioenergy Partnership.



Marginal land for bioenergy: an opportunity for supporting sustainable development?

Photo credits: FAO

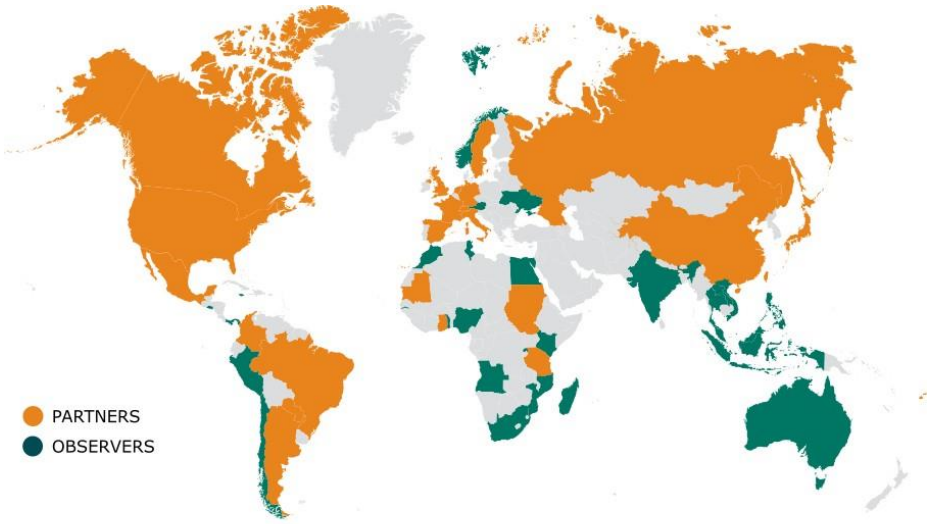
Tiziana Pirelli
Global Bioenergy Partnership
Food and Agriculture Organization of the United Nations (FAO)

Maersk Mc-Kinney Moller Center & CEM Biofuture Platform Initiative Workshop on
"Producing Biomass on Degraded Lands"
29 June 2023

The Global Bioenergy Partnership

The Global Bioenergy Partnership (GBEP)

- International initiative established to implement the commitments taken by the **G8 in 2005** and receiving renewed mandates from **G7 and G20** since then.
- **Argentina and Italy** are the co-Chairs. FAO is a founding partner and hosts its Secretariat at FAO HQ in Rome.
- **39 Partners** (including 23 countries and 16 international organizations and institutions) **and 48 Observers** (Governments and International Organizations)



AFREC ENERGY · ECREEE · EUBIA · European Commission · Food and Agriculture Organization of the United Nations · IDB · iea · IICA · IRENA International Renewable Energy Agency · UNCTAD · UNDESA · UNDP · UN environment · UNIDO · UNITED NATIONS FOUNDATION · WCRE

AfDB · ADB · CEPAL ECLAC · EEA · gef · ICAO OACI IKAO · IFAD · Organization of American States · UEMOA · UNECE · World Agroforestry Centre · WBCSD · WORLD BANK · World Bioenergy Association

GBEP Sustainability Indicators for Bioenergy

GBEP has developed the most widely recognized and agreed

set of indicators for the assessment and monitoring of bioenergy sustainability.

Key Characteristics

- Science based
- For all forms of bioenergy
- Voluntary – not legally binding
- AIM: To facilitate the harmonization of sustainability assessments and
- To support policy formulation

ENVIRONMENTAL

1. Life-cycle GHG emissions
2. Soil quality
3. Harvest levels of wood resources
4. Emissions of non-GHG air pollutants, including air toxics
5. Water use and efficiency
6. Water quality
7. Biological diversity in the landscape
8. Land use and land-use change related to bioenergy feedstock production

SOCIAL

9. Allocation and tenure of land for new bioenergy production
10. Price and supply of a national food basket
11. Change in income
12. Jobs in the bioenergy sector
13. Change in unpaid time spent by women and children collecting biomass
14. Bioenergy used to expand access to modern energy services
15. Change in mortality and burden of disease attributable to indoor smoke
16. Incidence of occupational injury, illness and fatalities

ECONOMIC

17. Productivity
18. Net energy balance
19. Gross value added
20. Change in consumption of fossil fuels and traditional use of biomass
21. Training and re-qualification of the workforce
22. Energy diversity
23. Infrastructure and logistics for distribution of bioenergy
24. Capacity and flexibility of use of bioenergy

GBEP Sustainability Indicators for Bioenergy

Implemented in 14 Countries

Sustainable feedstock production for biofuels on marginal, underutilized and contaminated land

- FORBIO (2016-2018): Fostering Sustainable Feedstock Production for Advanced Biofuels on Underutilized Land in Europe;

- BIOPLAT-EU (2018-2021): Promote the Sustainable Use of Underutilized Lands in Europe for Bioenergy Production through a web-based platform;

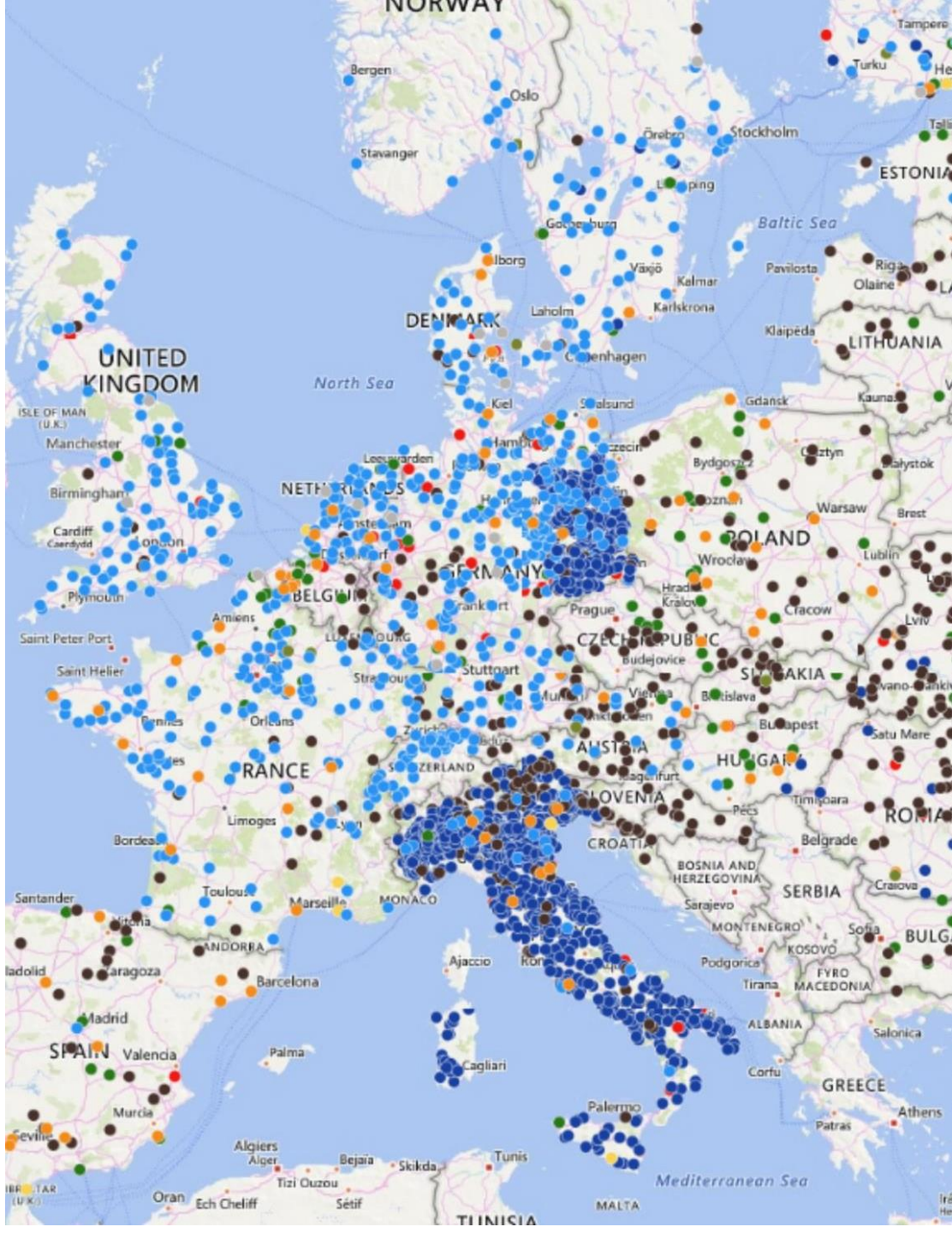
- BIKE (2020-2023): Biofuels production at low-iLUC risk for European sustainable bioeconomy

BIOPLAT-EU

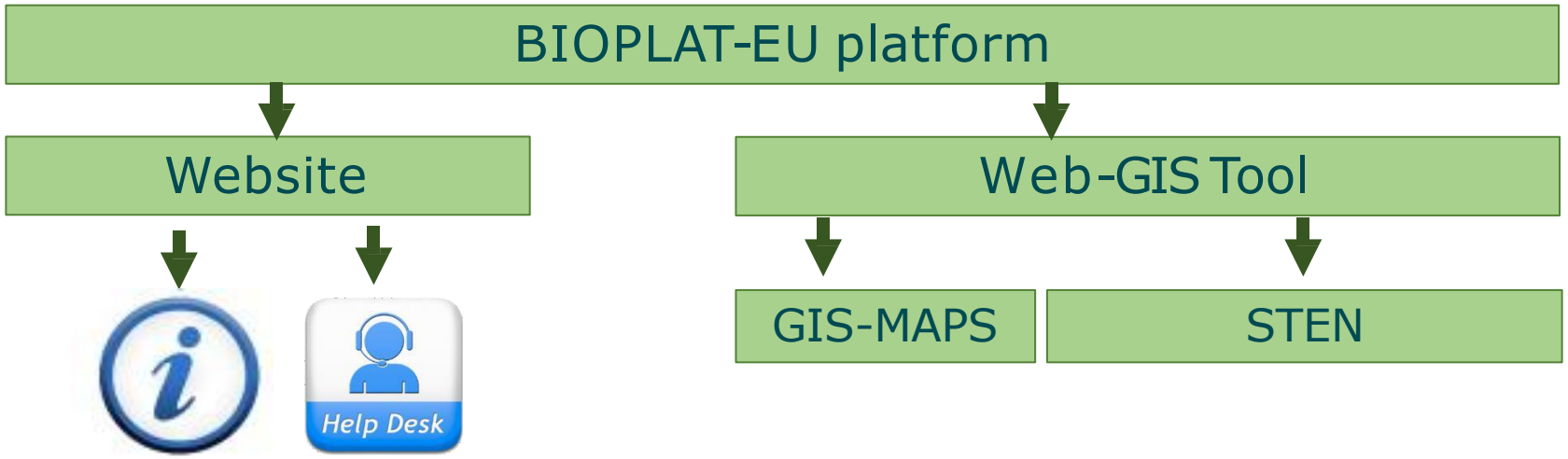
- EU- H2020 project
- Implementation period: 2018-2021 (3 years)
- 6 Partner countries
- Geographical outreach: EU countries +Ukraine
- Main objective: promote the use of Marginal, Underutilized and Contaminated (MUC) lands for NON-FOOD biomass production
- Main activity: develop an online platform to serve as a decision-making tool for bioenergy investors and policy makers;

BIOPLAT-EU PLATFORM: characteristics

- The first GIS web-based interface specific to MUC lands at EU level
- Freely accessible online (https://webgis.bioplat.eu/#/map) in 8 languages (en, it, es, de, fr, hu, ua)
- 2 levels of use: basic – advanced
- Aims to serve as a source of information and data on bioenergy related themes



BIOPLAT-EU PLATFORM:
structure and components



Web-GIS tool: the GIS component

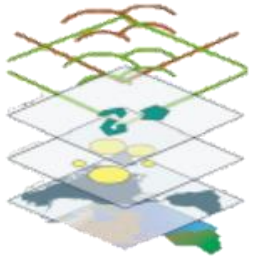
Identification and mapping of MUC Lands in EU for the cultivation of non-food biomass for bioenergy production

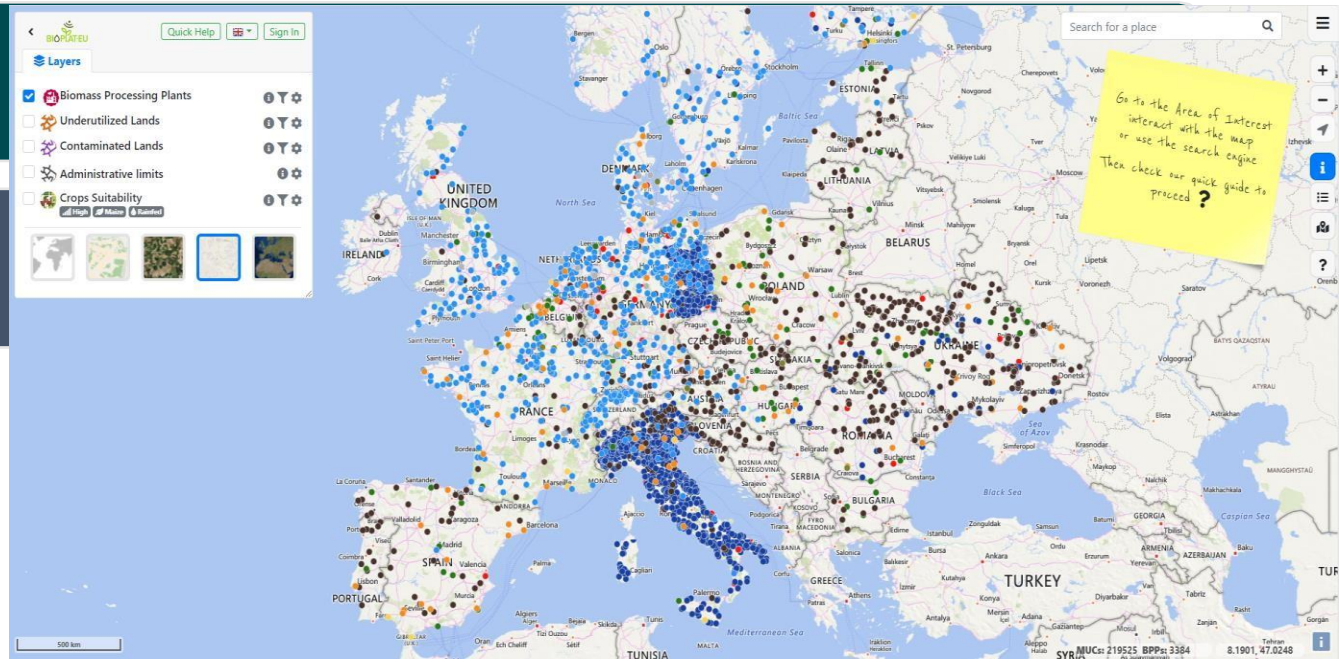
Map of MUC lands produced by using a remote-sensing time series analysis, by considering portions of land not used in the past 5 years, and excluding: all steep slopes (>15°), protected areas (Natura 2000) and forests;

Map of existing biomass processing plants, of various bioenergy pathways;

Map of suitable crops per each area (FAO);

Municipalities' borders





Web-GIS tool: the Sustainability Tool for Europe and Neighboring countries (STEN)

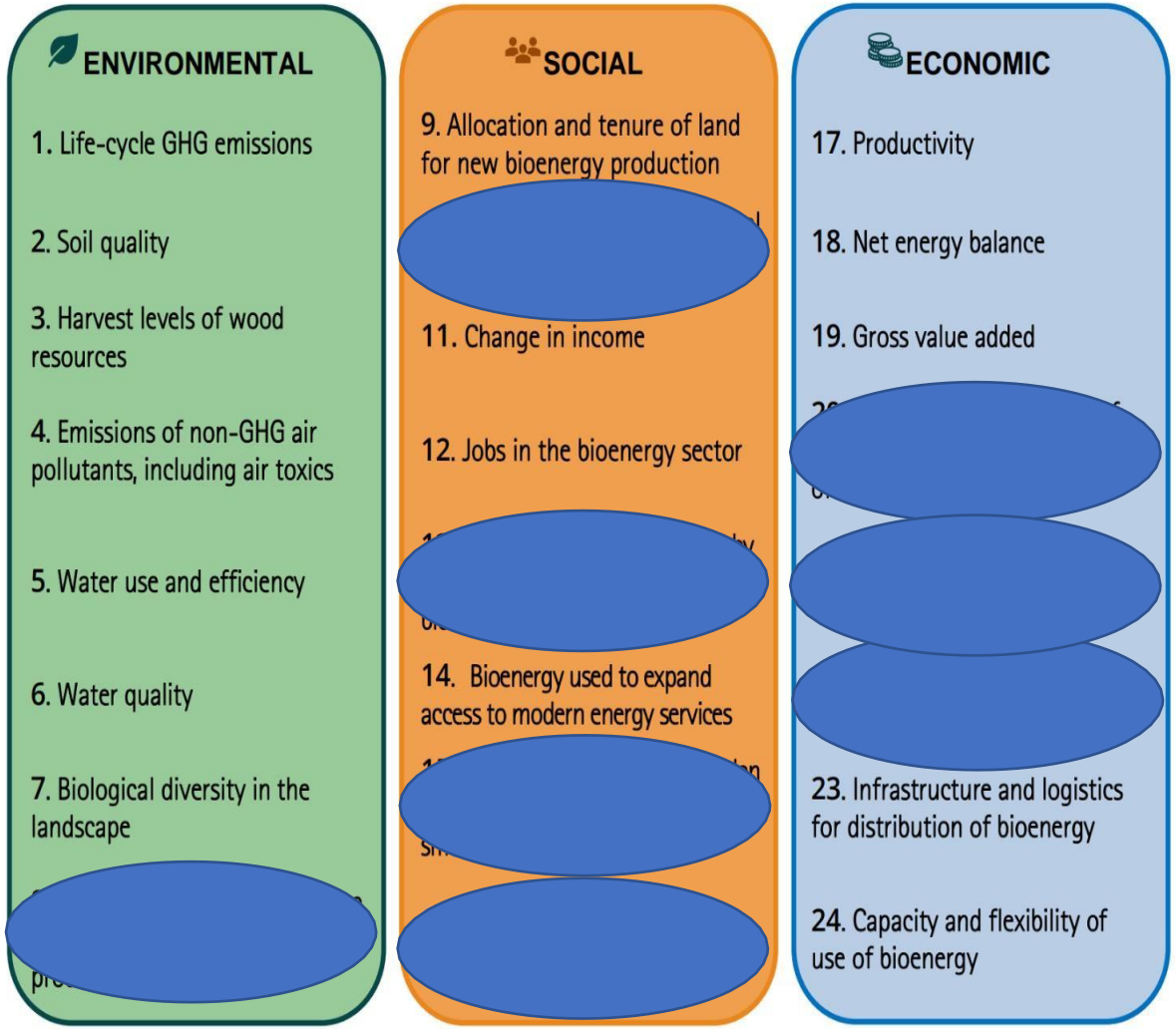
Sustainability assessment of potential bioenergy pathways with an ex-ante approach

Bioenergy pathways

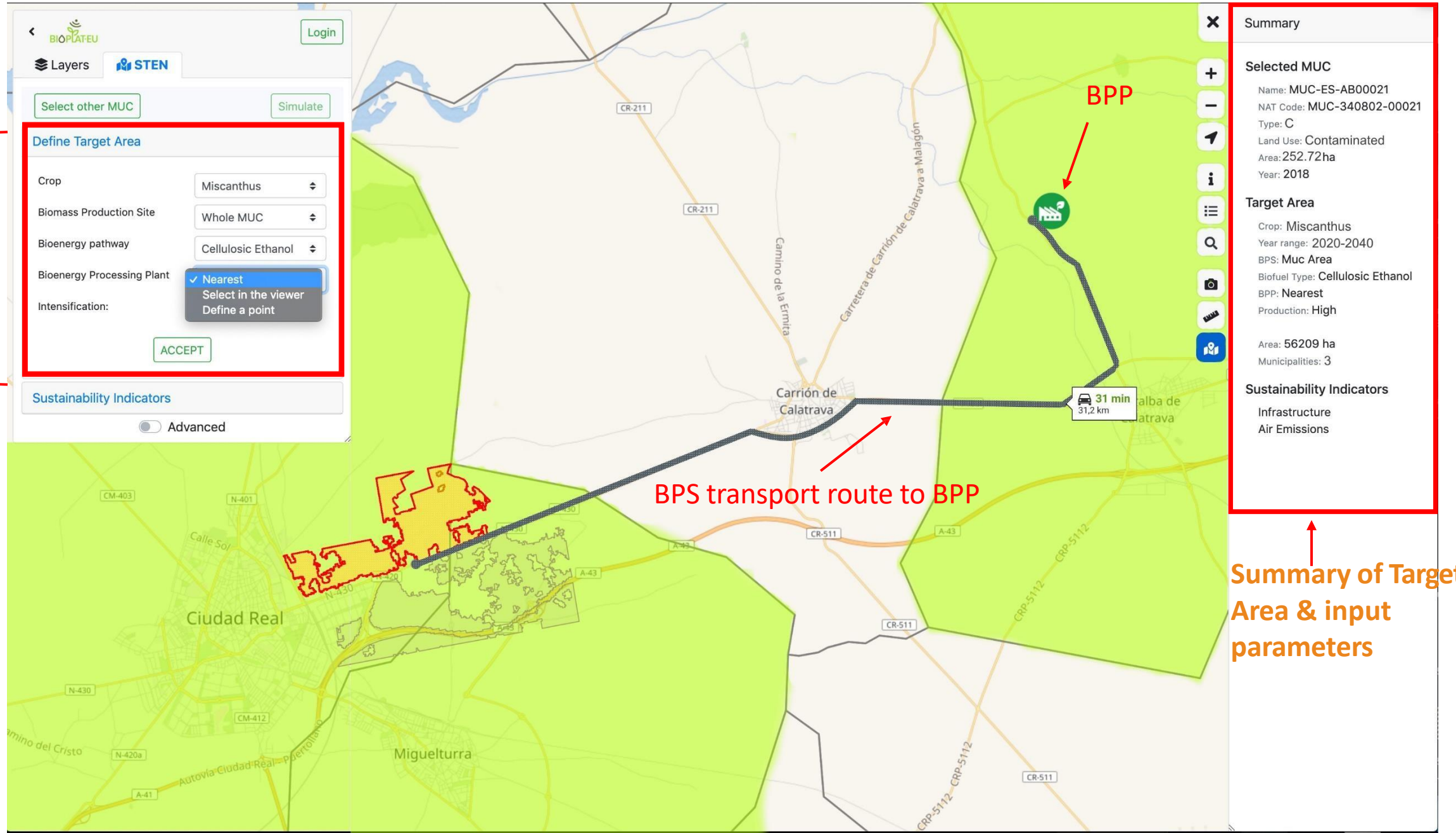
Sustainable biomass production for bioenergy

Biomass production > Logistic > Production technologies > Bioenergy

STEN indicators derived from the GBEP Sustainability Indicator for bioenergy (GSIs)



STEN: transport from BPS to BPP



BIOPLAT-EU platform: fine tuning and results discussions

- 6 partner countries: Germany, Hungary, Italy, Romania, Spain, Ukraine.
- 2 CASE STUDIES per partner country.
- Case studies range from new ideas to additional investment to existing facilities.
- Feasibility Studies on Sustainable Supply Chains for Industrial Use: preliminary financial economic feasibility of bio-energy projects described in case studies (D6.3).

Participatory approach

BIOPLAT-EU CONCLUSIONS

The cultivation of marginal land for non-food biomass production can contribute to **fostering a sustainable development**, as it allows to:

- Avoid LUC and iLUC IMPACTS: **overcome the food vs fuel paradigm**
- **Requalify** and add value to abandoned land: generate new source of income for landowners
- Ensure **feedstock supply**, locally available, for BPP
- **Requalify BPP** that halted/slowed down their productivity due to high feedstock costs;
- Stimulate the **growth of short bio-based value chains**
- Create **job opportunities**
- Spark a **new based local economy**
- Build **enabling conditions** for the repopulation of areas currently facing demographic decline

Thank you for your attention

FOR MORE INFORMATION

www.globalbioenergy.org

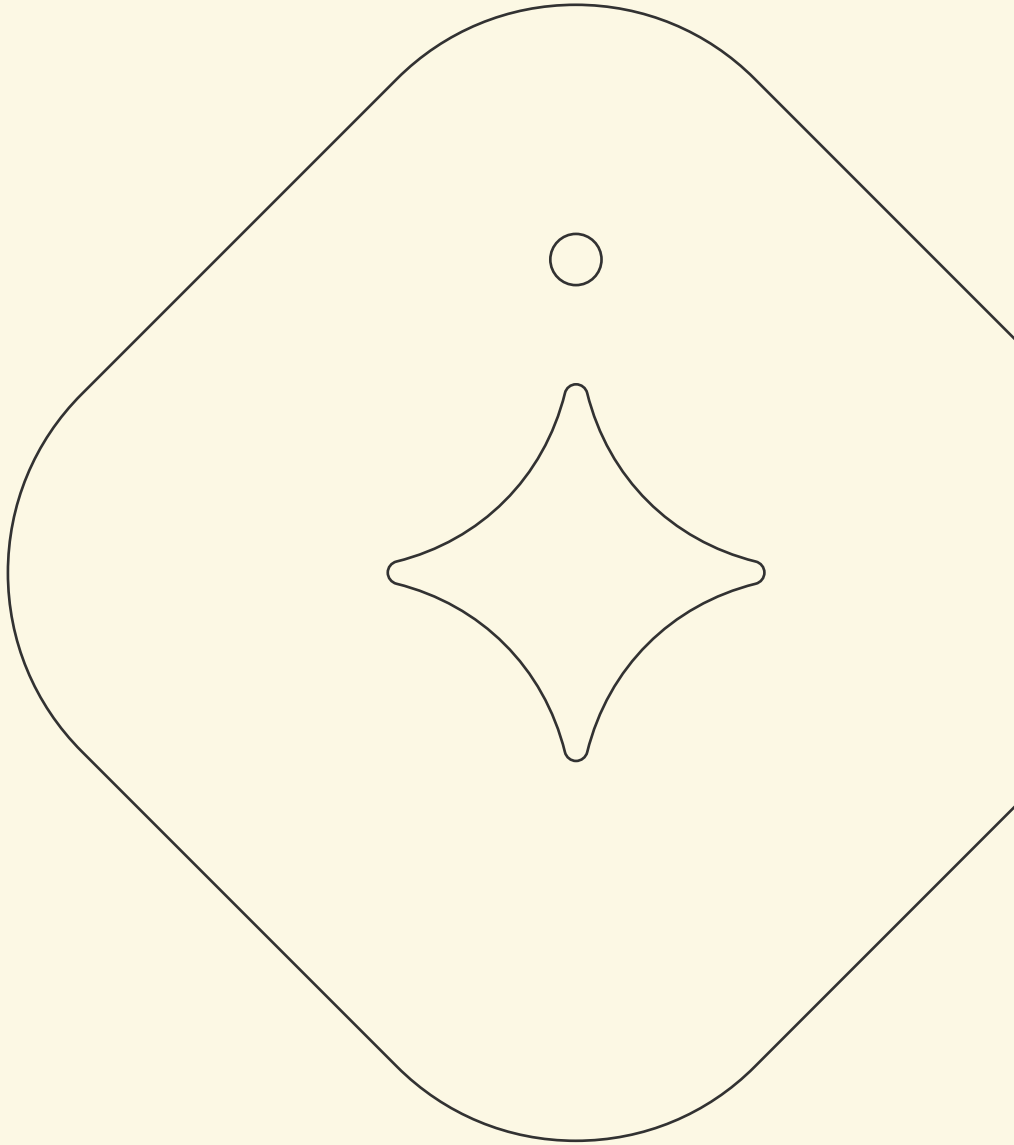
GBEP-Secretariat@fao.org

Financially supported by

MINISTERO DELL'AMBIENTE
E DELLA SICUREZZA ENERGETICA

Novamont

Giulia Gregori - Strategic Planning and Corporate Communication



NOVAMONT

Circular bioeconomy for local areas regeneration

29 June 2023

Giulia Gregori

Certified B Corporation™

Who we are

The Novamont Group is an industrial company created to pursue the ambitious project of various researchers: the integration of chemistry and agriculture.

Established in 1990, it is today a **Benefit company** certified B Corp and international leader in the production of bioplastics and the development biochemicals and bioproducts of renewable origin.

Circular bioeconomy to regenerate local areas

The three pillars of our circular bioeconomy model

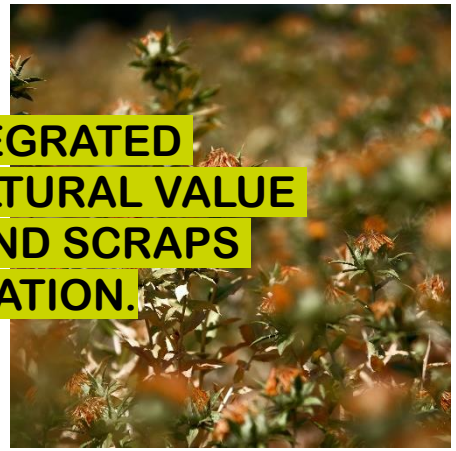
↓

THE REINDUSTRIALIZATION OF DISUSED SITES

Biorefineries built from the reindustrialization of disused or no longer competitive production sites.
Development of innovative and sustainable processes that contribute to the decarbonization of the economy.

↓

THE INTEGRATED AGRICULTURAL VALUE CHAIN AND SCRAPS VALORIZATION.



Research and innovation for the development of agricultural value chains with low environmental impact, through the valorization of marginal lands.
Research and innovation for the transformation of waste and by-products into new bioproducts.

↓

PRODUCTS AS SOLUTIONS

Products designed to close the carbon cycle and ensure that no persistent substances accumulate in compost, water, sludge, and soil, overcoming the problem of pollution.
Products also designed to be reused and recycled.

Novamont proprietary technologies

FEEDSTOCK FROM RENEWABLE ORIGINS

Oleaginous drycrops
- Specialized seeds for crushing
- Biomass treatment

OLEAGINOUS DRYCROPS

Organic fraction municipal solid waste

Agro-industrial waste (including exhausted vegetable **oils)**

SCRAPS

Absorbent Hygiene Products (pulp and paper)

Bio-co2 from fermentation

Innovation activities for the valorization of scraps and by-products into new bioproducts

RENEWABLE RAW MATERIALS

INTERMEDIATES / MONOMERS/POLYMERS

THF

AZELAIC ACID

PELARGONIC ACID

OTHER INTERMEDIATES

FDCA

Chemical processes

Biotechnological processes

BIO-BDO

OTHER BUILDING BLOCKS FROM FERMENTATION

ORIGO-BI POLYESTERS

COMPLEXED STARCH

SOLUTIONS

BIOHERBICIDES

BIOLUBRICANTS

BIODEGRADABLE COSMETIC INGREDIENTS

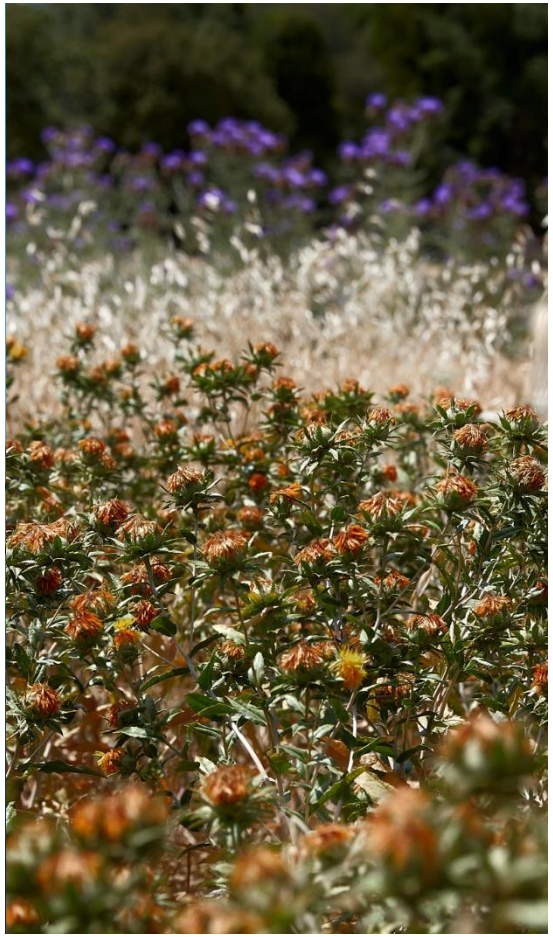
MATER-BI

Different end of life options depending from the application:
- Composting
- Biodegradation in soil
- Chemical recycling
- Mechanical recycling
- Paper waste stream

Industrialized technologies

The agricultural value chain integrated in the local areas

Development of agricultural value chains with low environmental impact



Novamont has always promoted research projects targetedon different territories according to their specificities

- **Promotion of low input oleaginous drycrops able to restore organic carbon in marginal land**
- Dissemination of sustainable agriculture through training on good soil management practices.
- Reduced environmental impact on soil and water through the use of: biodegradable mulch films, fitosanitary products based on pelargonic acid, biolubricants for agricultural machineries.
- Cascading use of all crop components to make products and co-products ranging from biochemicals to animal feed and to meet the energy needs of the industrial process
- **Collaboration with Coldiretti started more than 10 years ago in the experimental fields in central Italy**

Emilia-Romagna: Regeneration of Clay Quarry

AZIENDA:	Laterlite
COMUNE:	Rubbiano (PR)
S.A.U.:	1 ha
SPECIE COLTIVATA:	*Cynara cardunculus* L. var. *Altilis*
VARIETA':	Trinaseed

RE SOIL FOUNDATION: TO SAFEGUARD ONE OF THE MOST IMPORTANT ASSETS OF THE PLANET

Objectives:

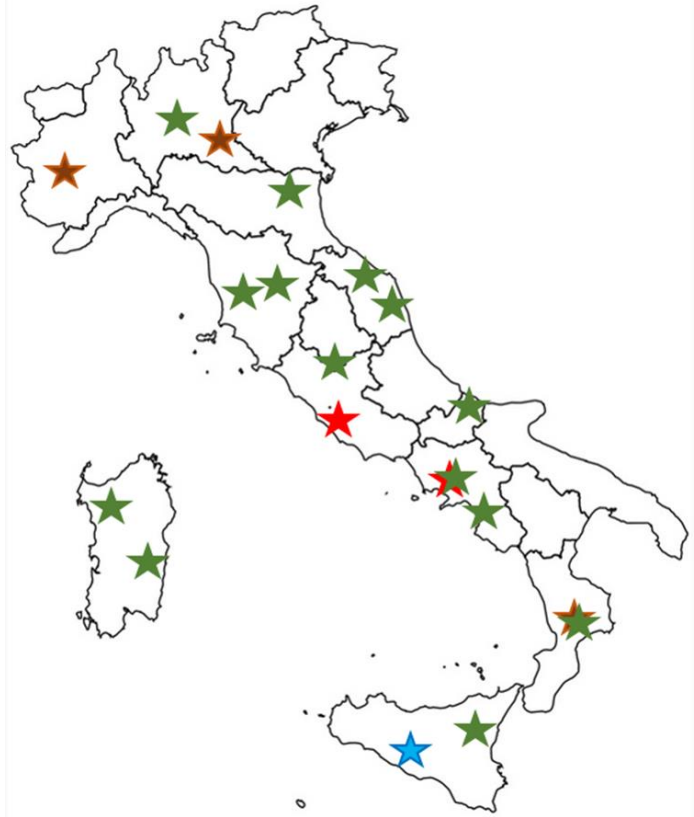
1. Promote soil conservation in Italy and in Europe, in synergy with the Mission «A Soil Deal for Europe»

PREP SOIL

2. Disseminate knowledge, scientific content and information on the subject of soil health

3. Create the conditions to develop territorial case studies and multiply them, also through the dissemination of living labs and lighthouse farms

4. Promote a policy shaping process on the topic of soil conservation



RE SOIL FOUNDATION
Regeneration for a clean and healthy soil.

ALMA MATER STUDIORUM UNIVERSITÀ DI BOLOGNA

COLDIRETTI

NOVAMONT

Politecnico di Torino

resoilfoundation.org
info@resoilfoundation.org

Founding Fathers

"The challenge of our millennium is in the balance between the technical means that humanity possesses and the wisdom in how we will make use of them".

UMBERTO COLOMBO

GIULIA GREGORI

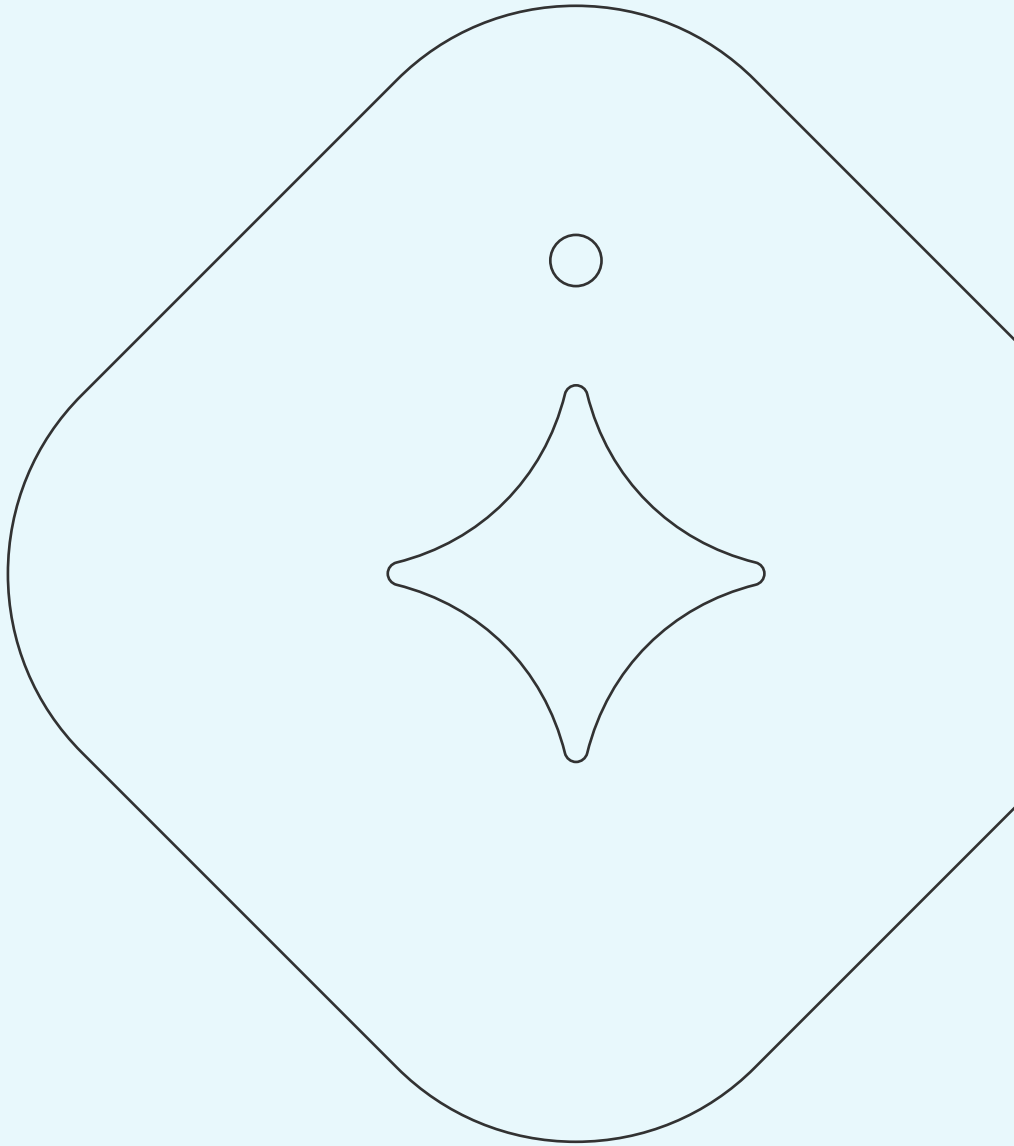
giulia.gregori@novamont.com

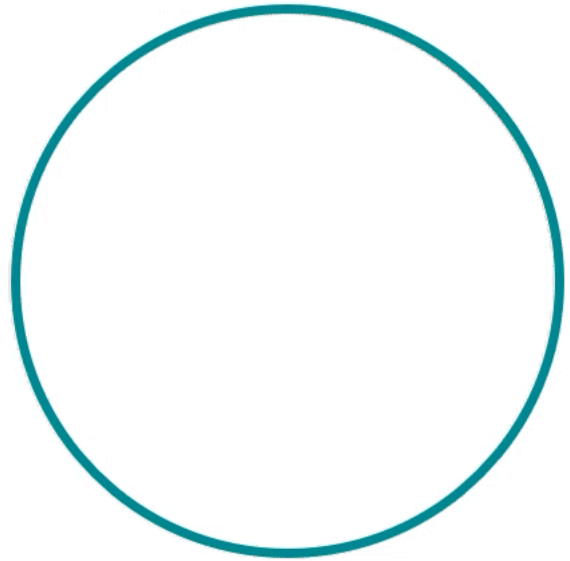
THANK YOU FOR YOUR ATTENTION

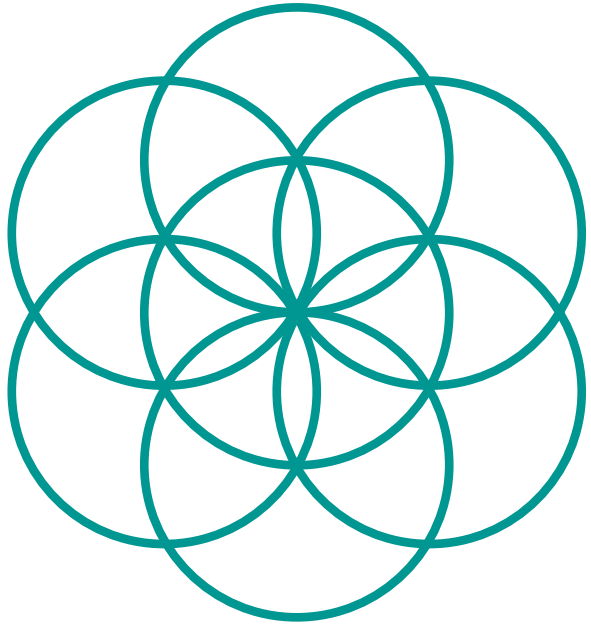
www.novamont.com

RSB – Roundtable on Sustainable Biomaterials.

Blanca De Ulibarri – Project Manager







RSB®

Roundtable on
Sustainable Biomaterials

www.rsb.org

RSB – Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping

Blanca de Ulibarri

RSB – Project Manager

Blanca.deulibarri@rsb.org

Agenda

1 Introduction to RSB

2 Low ILUC Standard

3 Q&A

Section 1

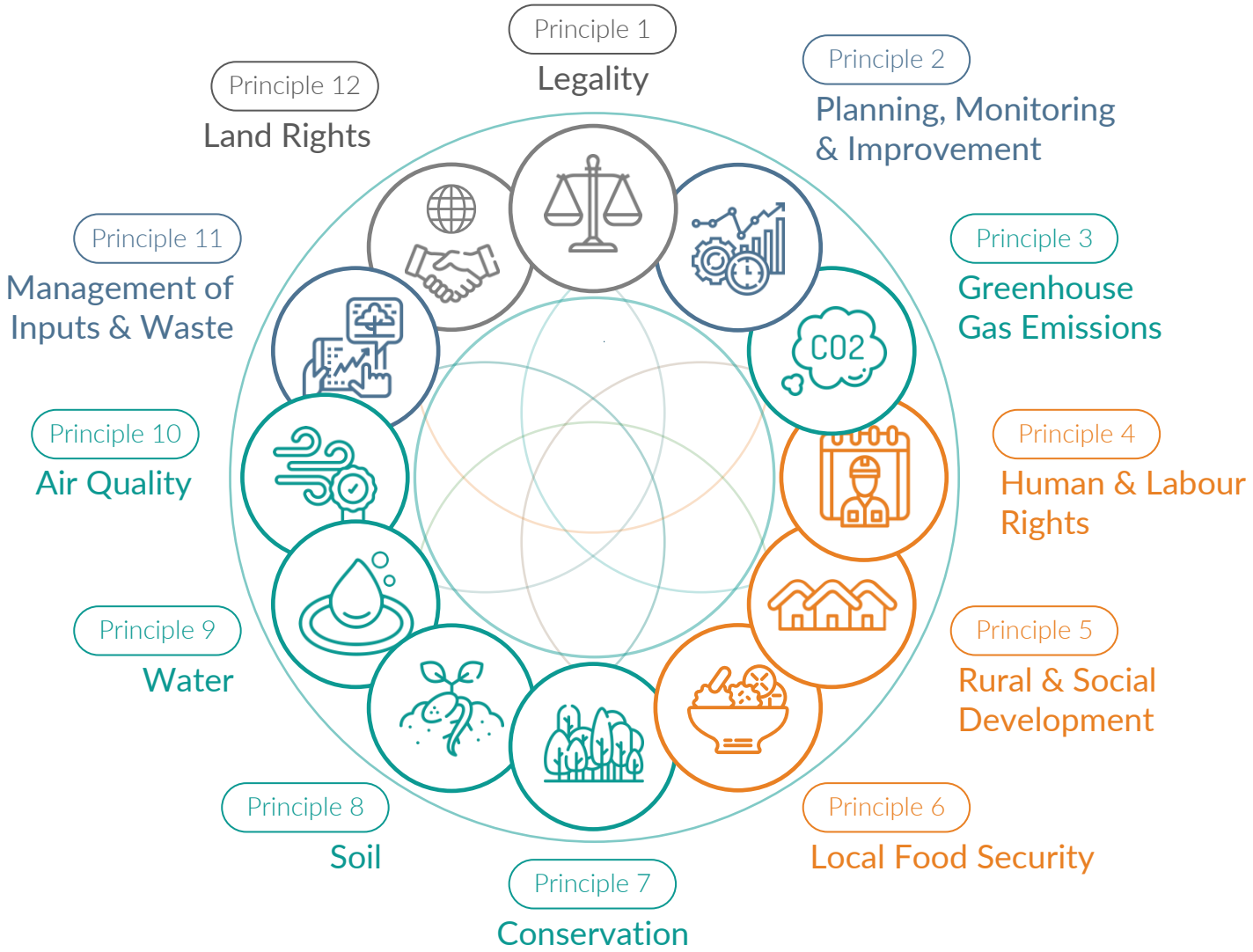
Introduction to RSB

RSB's Global Team

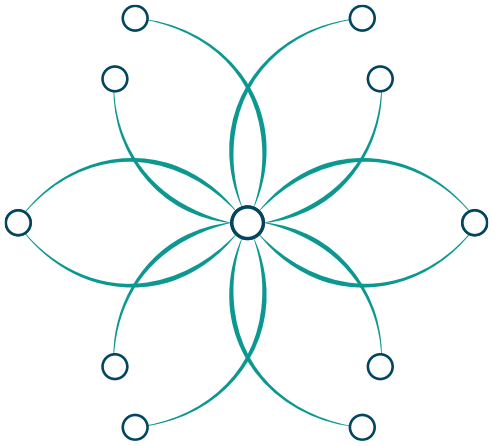
Our global membership is highly diverse
A wide range of organisations across supply chains, regions and industries

Holistic approach supporting our ambition to create positive impact

- Legal
- Management
- Environmental
- Social



Our mission



We form Impact Alliances
of diverse global industry, policy-makers
and other stakeholders

Our activities

Certification

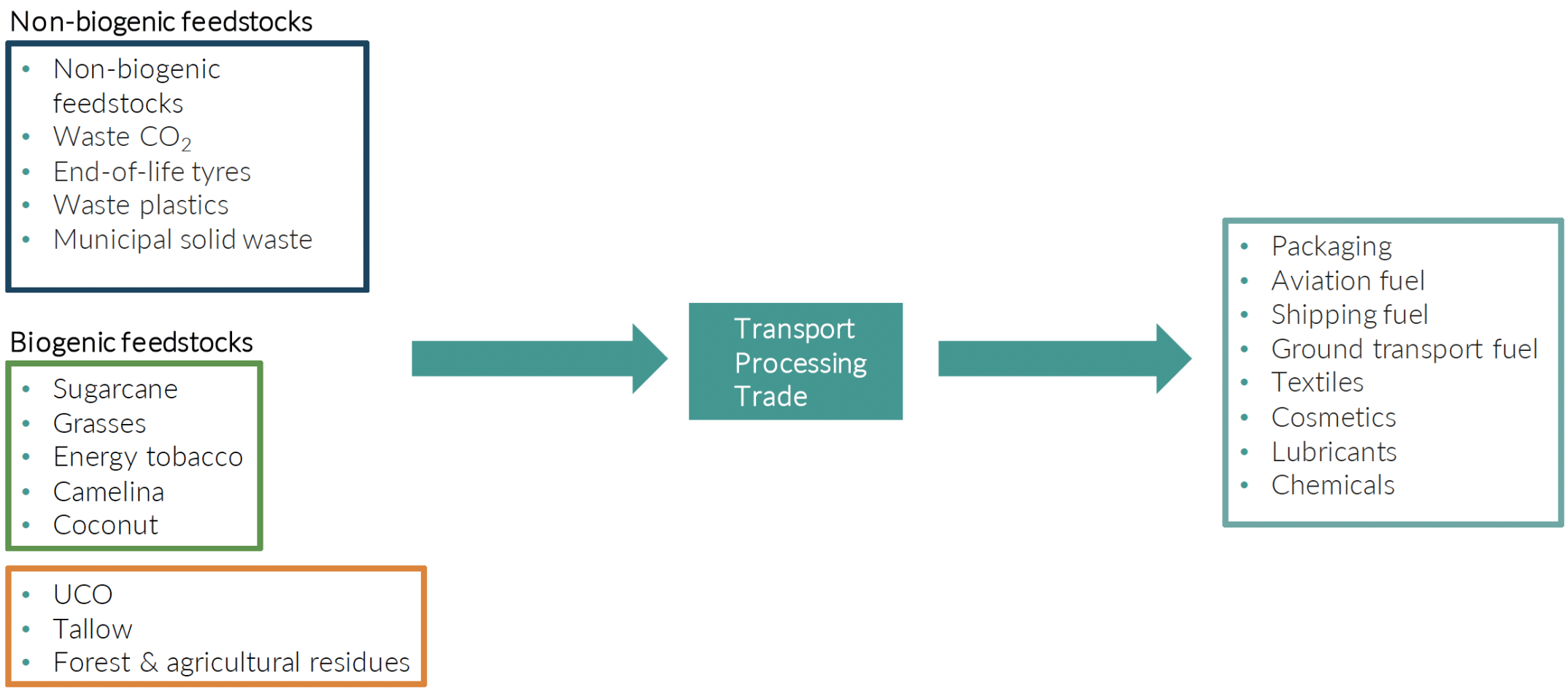
Providing clarity on what good looks like

Implementation

Building capability to make change happen

Convening

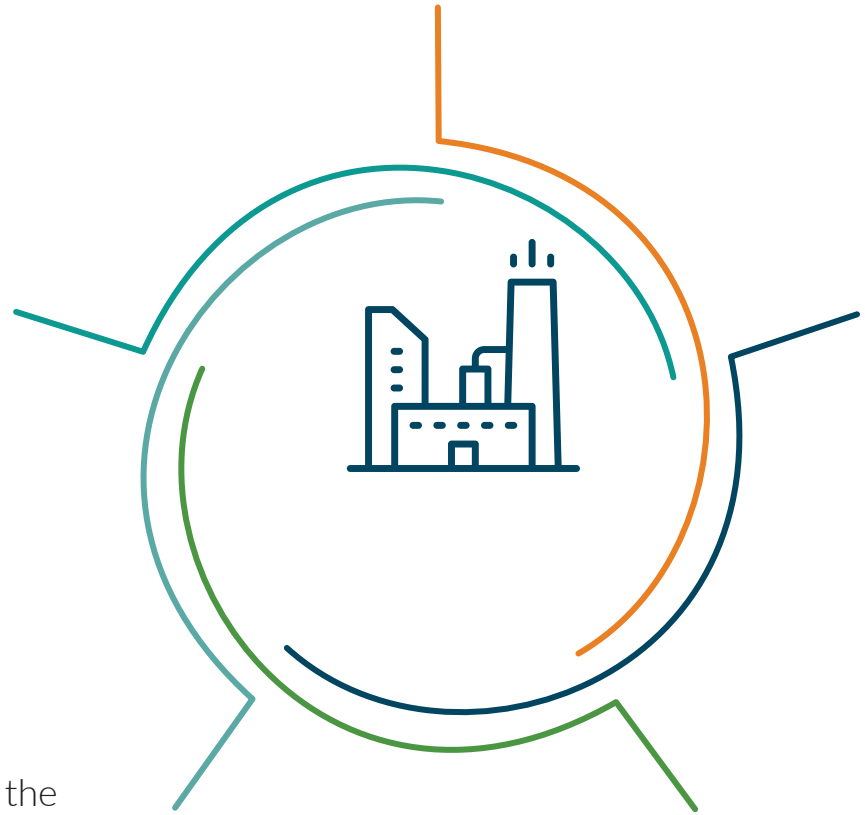
Enabling collaboration for greater impact


Non-biogenic feedstocks
Non-biogenic feedstocks
Waste CO_2
End-of-life tyres
Waste plastics
Municipal solid waste
Biogenic feedstocks
Sugarcane
Grasses
Energy tobacco
Camelina
Coconut
UCO
Tallow
Forest & agricultural residues
Transport
Processing
Trade
Packaging
Aviation fuel
Shipping fuel
Ground transport fuel
Textiles
Cosmetics
Lubricants
Chemicals

RSB Schemes

RSB Global Advanced Fuels

Fuels Certification for Voluntary Markets



RSB Global Advanced Products

Advanced products certification for voluntary markets

RSB ICAO CORSIA

For sustainable aviation fuel (SAF) according to ICAO CORSIA

RSB EU RED

Regulatory fuels selling in the EU market according to the EU Commission

JAPAN FIT

For biomass delivered to Japanese power plants according to Japanese Govt

Section 2

Low ILUC risk biomass standard

Holistic approach supporting our ambition to create positive impact

Principle 1

Legality

Principle 2

Planning, Monitoring & Improvement

Principle 3

Greenhouse Gas Emissions

Principle 4

Human & Labour Rights

Principle 5

Rural & Social Development

Principle 6

Local Food Security

Principle 7

Conservation

Principle 8

Soil

Principle 9

Water

Principle 10

Air Quality

Principle 11

Management of Inputs & Waste

Principle 12

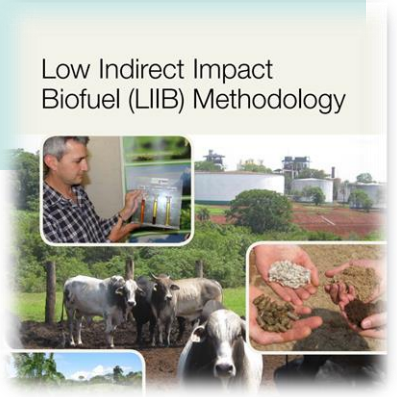
Land Rights

Legal Management Environmental Social

Low Risk Indirect Land Use Change (iLUC)

RSB developed a set of **criteria and compliance indicators** for certified operators willing to demonstrate that their operations have a **low iLUC risk**, i.e. are unlikely to cause any displacement of an equivalent biomass production to another location.

These indicators for low iLUC risk biomass and biofuels are based on the **Low Indirect Impact Biofuels (LIIB) Methodology**



RSB Low iLUC Risk Biomass

Yield increase	Unused/ degraded land	Use of waste/ residue
Operators demonstrate that **additional biomass** for biofuel/ biomaterial was produced through **an increase in yield** compared to a reference date, without any additional land conversion	Operators demonstrate that biomass for biofuel/ biomaterial was produced in **land that was not previously cultivated** or **was not considered arable land** (a reference date is also used)	Operators demonstrate that raw material used for biofuel/ biomaterial is derived from existing supply chains (e.g: food production, wood processing etc.) and **do not require dedicated production out of arable lands**

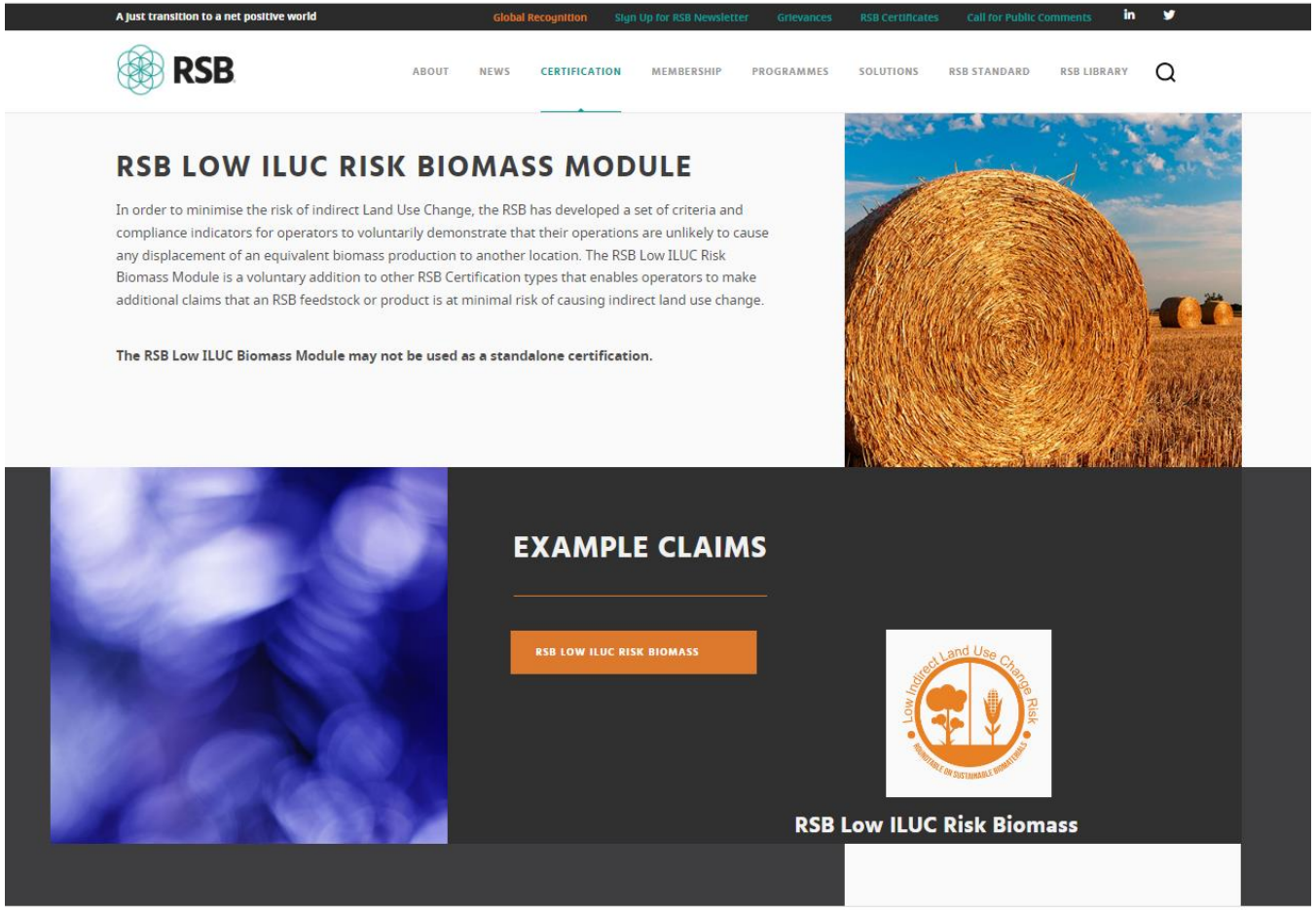
RSB Low iLUC Risk Biomass

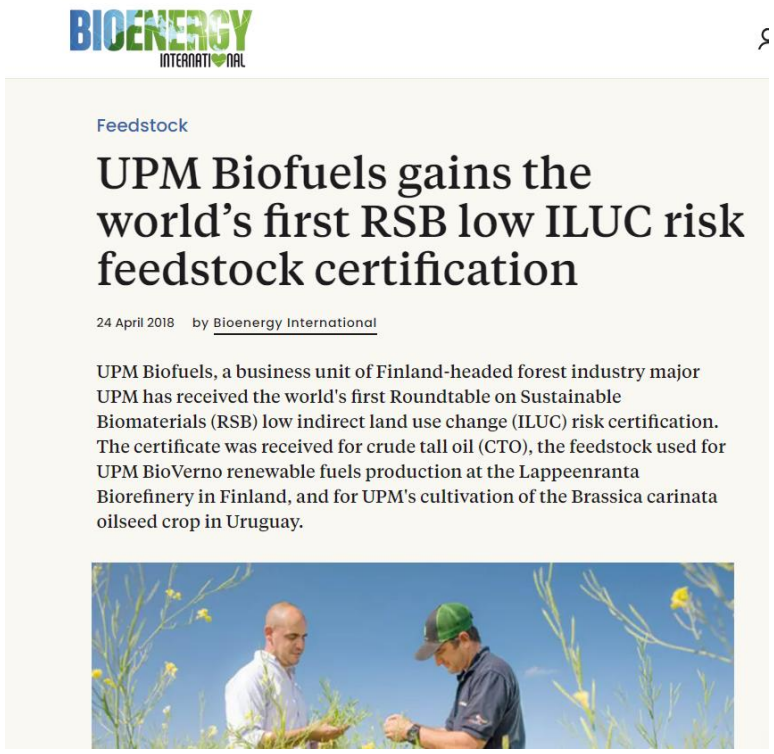
Land was not used for its provisioning services during the three years preceding the reference date.

Low Risk Indirect Land Use Change (iLUC)

- RSB iLUC indicators set is **not a stand- alone certification module** but shall be used in combination with regular RSB certification process
- It ensures that all other direct social and environmental impacts are effectively addressed
- To guarantee **sustainability claims** are independently verified
- To increase confidence of investors and stakeholders
- To gain support from civil society and the public

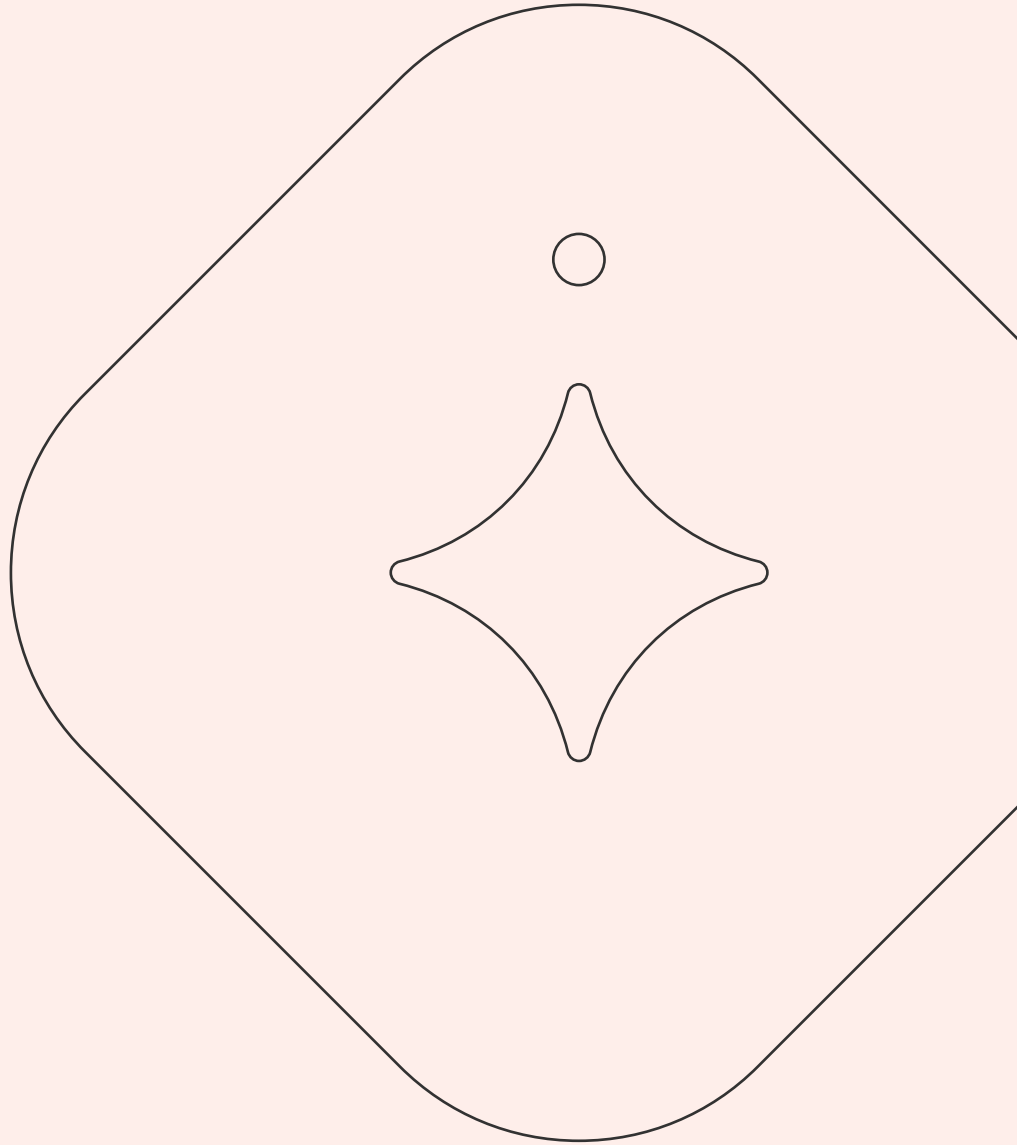
RSB Low iLUC Risk Biomass





Questions

Panel Discussion

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