



Cerulogy

Intermediate crops as a pathway to low-ILUC biofuels in EU policy

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Cato Sandford & Chris Malins (Cerulogy), George Vourliotakis (Exergia)

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Intermediate crops

- ▶ Crops planted between main harvests ('productive cover crops')
- ▶ Agri-ecological advantages:
 - ▶ Ground cover, soil stabilisation, diversify rotations, soil carbon enrichment
 - ▶ Adoption has increased in line with the EU Nitrates Directive and the Common Agricultural Policy's greening requirements
 - ▶ Identified as a sustainable practice in the European Commission's Soil Strategy for 2030
- ▶ Productive intermediate crops for biofuels can provide additional income for farmers
- ▶ Types of intermediate crop for different fuel production technologies:



Oilseeds (1G biofuel)

•E.g. *Camelina sativa*: fast-growing summer oilseed; drought tolerant; low nutrient requirements

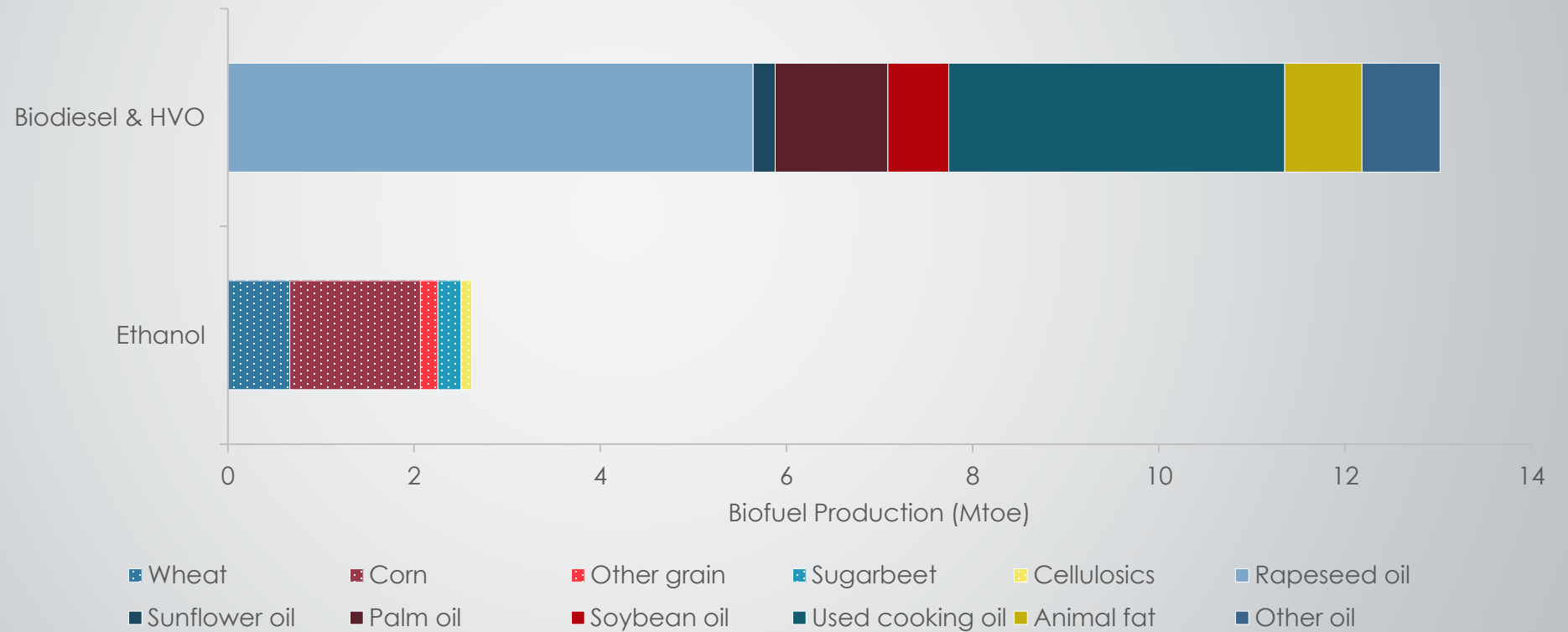


Cellulosic biomass (2G biofuel)

•E.g. *Sorghum bicolor*: deep-rooting; tolerant to drought and soil type



EU biofuel production by feedstock



Crop-based biofuels in the EU

Policy	Reference	Coverage	Crop biofuel provisions
Renewable Energy Directive (RED III)	EU Directive 2023/2413	All transport	<ul style="list-style-type: none"> ➤ Caps the % contribution of food-and-feed feedstocks <ul style="list-style-type: none"> ➤ Maximum 7% by energy ➤ Varies by Member State ➤ Exempts 'intermediate crops' that do not stimulate land demand
Delegated Directive on Annex IX	EC Directive 2024/1585	All transport	<ul style="list-style-type: none"> ➤ Additions to RED's 'Annex IX' <ul style="list-style-type: none"> ➤ Intermediate crops with short growing cycles ➤ Intermediate crops grown on severely degraded land
ReFuelEU Aviation	EU Regulation 2023/2405	Aviation	<ul style="list-style-type: none"> ➤ No food-and-feed or intermediate crops...
FuelEU Maritime	EU Regulation 2023/1805	Maritime	<ul style="list-style-type: none"> ➤ ...except for Annex IX entries





ILUC and 'low ILUC-risk'

- ▶ Indirect land use change (ILUC): increased demand for feedstock stimulates global expansion of crop land
 - ▶ Deforestation and loss of natural habitat
 - ▶ Release of carbon stored in soil and vegetation may outweigh benefits
- ▶ RED II's 'low ILUC-risk' concept gives confidence that crops grown for biofuel do not reduce food supply or cause ILUC
 1. Growing a crop on land that is unused, abandoned, or degraded;
 2. Increasing yield of an existing crop;
 3. Adding a productive 'intermediate' crop to an existing rotation



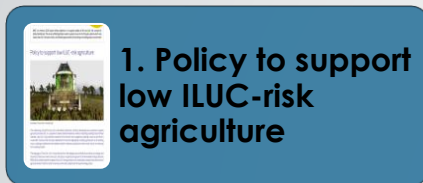
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'Low ILUC-Risk' as a Sustainability Standard for Biofuels in the EU

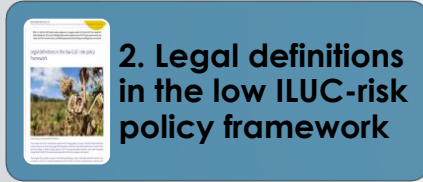
Cato Sandford ¹, Chris Malins ¹, George Vourliotakis ²  and Calliope Panoutsou ^{3,*} 

<https://doi.org/10.3390/en17102365> (2024)

BIKE Briefing Notes on the low ILUC-risk concept and implementation



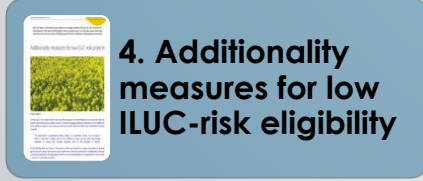
1. Policy to support low ILUC-risk agriculture



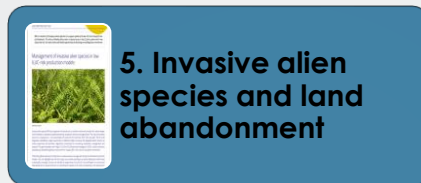
2. Legal definitions in the low ILUC-risk policy framework



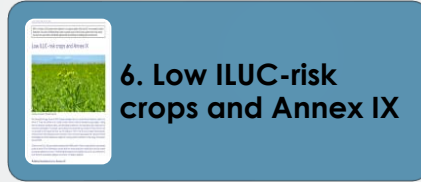
3. Low ILUC-risk in EU Member State policy



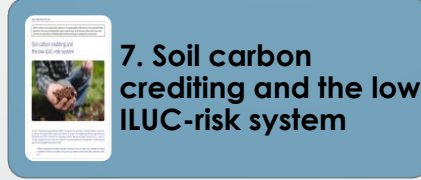
4. Additionality measures for low ILUC-risk eligibility



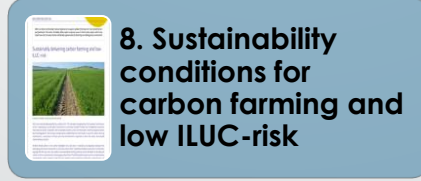
5. Invasive alien species and land abandonment



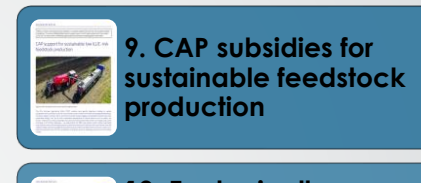
6. Low ILUC-risk crops and Annex IX



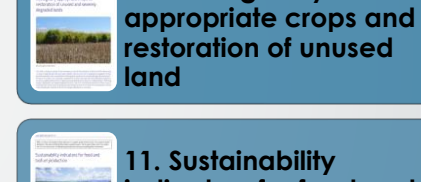
7. Soil carbon crediting and the low ILUC-risk system



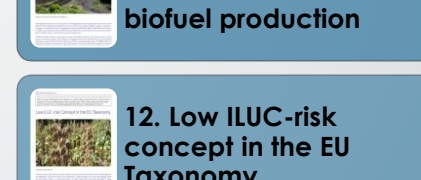
8. Sustainability conditions for carbon farming and low ILUC-risk



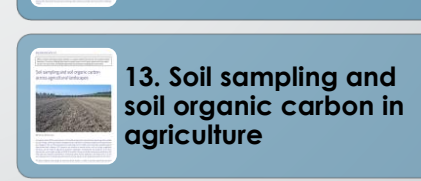
9. CAP subsidies for sustainable feedstock production



10. Ecologically appropriate crops and restoration of unused land



11. Sustainability indicators for food and biofuel production



12. Low ILUC-risk concept in the EU Taxonomy



13. Soil sampling and soil organic carbon in agriculture

Takeaways

- Key definitional issues to resolve
- Potential application to a wide variety of crops
- ILUC-risk certification an option for meeting Annex IX requirements
- Room to expand list of sustainable management practices
- Alignment of low ILUC-risk and carbon farming certification
- Rules to encourage biochar as a soil amendment
- ...



Found here: www.bike-biofuels.eu/briefing-notes/

Intermediate crops in policy

- ▶ Intermediate crops grown on existing crop land can avoid the land use change emissions and ecological impacts of agricultural expansion...
- ▶ ...IF using them for biofuels does not stimulate ILUC
 - ▶ Assessment is up to certification bodies (ISCC, RSB, ...)
 - ▶ Low ILUC-risk system already developed and well-placed for this
- ▶ Annex IX additions: conventional second harvest not possible; maintain soil carbon; or grown on severely degraded land
 - ▶ Aviation fuels → Annex IX Part A (uncapped; has its own sub-mandate)
 - ▶ Other fuels → Annex IX Part B (capped, competes with residual oils)

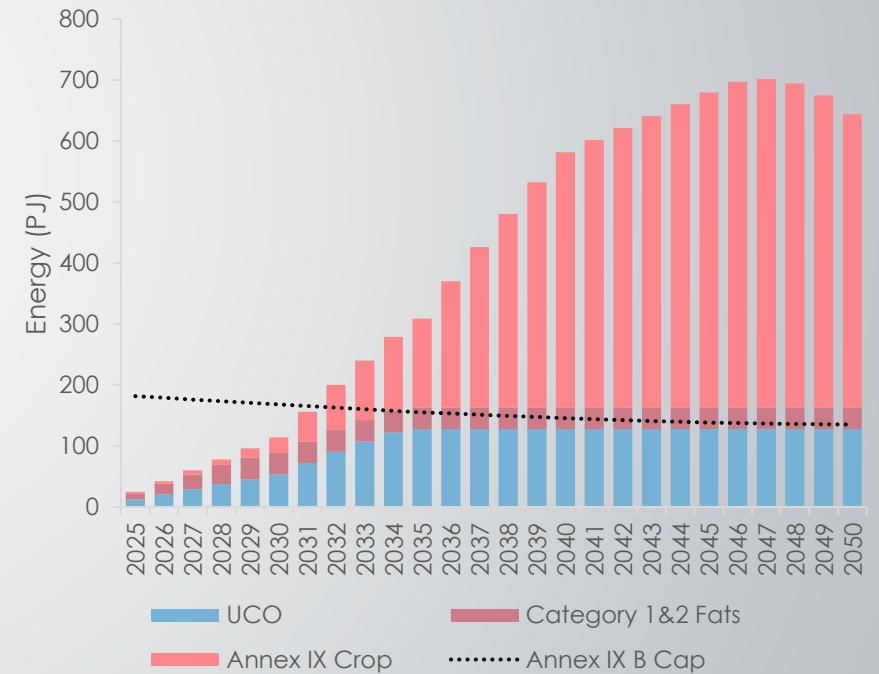


Future EU demand

- ▶ On-road electrification: biofuel demand increasingly driven by aviation and maritime segments
 - ▶ ReFuelEU Aviation & FuelEU Maritime
- ▶ Constrained availability of sustainable residual oils → high demand Annex IX-compatible oilseeds even in 2050
 - ▶ For HEFA and marine diesel
- ▶ All cellulosic crops have equal status on Annex IX (so no policy advantage for intermediate production model)



Modelled lipid demand for ReFuelEU Aviation & FuelEU Maritime targets



This shows a scenario from a forthcoming Ceruly report on the biodiversity implications of the EU's aviation & maritime climate targets

Concerns

- ▶ Technology development under Annex IX
 - ▶ Next-generation cellulose-based fuels compete with first-generation lipid fuels
- ▶ Environmental concerns associated with delivering a second harvest
 - ▶ Irrigation in dry conditions to enable economically valuable crop → water stress
 - ▶ Nitrogen application affects water bodies
 - ▶ Pesticide application impacts insect and bird numbers year-round
 - ▶ Disruption of land that would otherwise have remained fallow
- ▶ Development of geography-specific rotations and best practices is critical
 - ▶ Appropriate certification can provide assurance on environmental credentials



Conclusion

- ▶ Intermediate crops offer environmental advantages if they avoid LUC
- ▶ Favoured in EU policy
 - ▶ Exemption from the RED food-and-feed cap
 - ▶ Double-counting towards RED targets (if on Annex IX)
 - ▶ Contribution to aviation and maritime targets (if on Annex IX)
- ▶ Systems for identifying compliant Annex IX crops are under development
 - ▶ The low ILUC-risk system could play a role here
- ▶ EU demand for intermediate biofuel crops – especially oilseeds – could grow dramatically
 - ▶ As cellulosic biofuels are not yet technologically or economically mature
- ▶ Need production models that maximise environmental benefits & minimise ecological risk





Thanks!

cato@cerulogy.com

www.cerulogy.com