BIKE

BIOFUELS PRODUCTION
AT LOW - ILUC RISK
FOR EUROPEAN SUSTAINABLE
BIOECONOMY

D 5.3

Final report of WP5

Dissemination level:

PU

Date: 31/08/2023

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No. 952872

Document control sheet

Project	BIKE – Biofuels production at low ILUC-risk for European sustainable bioeconomy
Call identifier	H2020-LC-SC3-2020–RES-IA-CSA
Grant agreement no.	952872
Coordinator	Renewable Energy Consortium for Research and Demonstration (RE-CORD)
Work package no.	Work Package 5
Work package title	EU Policy and Legal Framework Assessment
Work package leader	EXERGIA S.A.
Document title	Final report of WP5
Lead beneficiary	EXERGIA S.A.
Dissemination level	Confidential (CO)
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Issue date	31 August 2023

New version submitted: 22/11/2023

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Glossary

Acronym	*Name*
CIB	Consortium of Biogas of Italy
CBI	Climate Bond Initiatives
CSA	Coordination and Support Action
EUBCE	European Biomass Conference and Exhibition
FAO	Food and Agriculture Organization
FSDN	Farm Sustainability Data Network
HVO	Hydrotreated vegetable oil
IAS	Invasive alien species
ICMA	International Capital Market Association
ILUC	Indirect Land Use Change
RED	Renewable Energy Directive
RES	Renewable Energy Sources
SOC	Soil organic carbon

Executive Summary

The present BIKE Deliverable D5.3 constitutes the final report of the WP5 activities.

The purpose of BIKE's Work Package 5 is to assess the status of and opportunities for low ILUC-risk production systems in the EU policy and legal framework, cross-referencing the role of low ILUC-risk certification in the Renewable Energy Directive with support for these types of production systems in complementary policies.

The work of BIKE WP5 can assist the policy makers at both EU and national levels towards the delivery of a dedicated and coherent low ILUC-risk supportive policy. This is mainly done through the detailed analysis of the relevant legal, policy and institutional framework and the development and subsequent dissemination of evidence-based strategical documents that provide understanding of how interventions that are integrated across the biomass value chain stages can overcome challenges and resolve gaps in a more effective way than isolated sector-specific policies.

WP5 evolved over three axes:

- Analysis of the relevant legal, policy and institutional frameworks in the EU. The analysis considered a wider biofuels frame in order to explore synergies among policy areas;
- Synthesis of the analysed information under the perspective of both (a) highlighting the opportunities available in the various pieces of legislation to promote the low-ILUC risk concept, and (b) exploring measures and interventions to the policy frame to facilitate market uptake;
- Development of recommendations, mainly expressed through the drafting of a series of Briefing Notes on key issues pertinent to the market development of the low-ILUC risk concept.

The approach for the analysis was "dynamic" to ensure it covers areas of interest to the industry; the WP5 team organized a series of bilateral discussions with the BIKE industrial partners, namely UPM, ENI and CIB, both at the stage of the analysis areas identification, as well as at the stage of formulation of recommendation (drafting of the Briefing Notes).

The present report also presents the main findings of the three Tasks of WP5.

1. Introduction

The purpose of Deliverable D5.3 is to provide a **succinct overview** of the work performed within BIKE Work Package 5, as well as to present the **main findings**. Areas of future research are also outlined.

1.1. BIKE Work Package 5

The purpose of BIKE's Work Package 5 is to assess the status of and opportunities for low ILUC-risk production systems in the EU policy and legal framework, cross-referencing the role of low ILUC-risk certification in the Renewable Energy Directive with support for these types of production systems in complementary policies.

As well as offering a more sustainable basis to supply biofuel feedstock, **many low ILUC-risk feedstock production systems also have characteristics that are considered desirable in other areas of agricultural policy**. Successfully commercialising low ILUC-risk production systems can help Europe achieve these other policy goals – equally, valorising low ILUC-risk production models within these other policy contexts can accelerate their adoption. The successful development of a low ILUC-risk system will depend on how they are treated by the existing policy framework and whether those frameworks can be adjusted, as well as on the institutional bodies empowered to design, interpret, and implement said frameworks. A foundational task for the WP5 group is therefore to understand and highlight the key opportunities and barriers afforded by the EU and, drawn from the selected project case studies, by national policies.

Overall, the work of BIKE WP5 can assist the policymakers at both EU and national levels towards the delivery of a dedicated and coherent low ILUC-risk supportive policy. This is mainly done through the detailed analysis of the relevant legal, policy and institutional framework and the development and subsequent dissemination of evidence-based strategical documents that provide an understanding of how interventions that are integrated across the biomass value chain stages can overcome challenges and resolve gaps in a more effective way than isolated sector-specific policies.

1.2. Low ILUC-risk Interpretation

For the purposes of the BIKE project, it is useful to distinguish between three framings of the low ILUC-risk concept, from the broadest conceptual view down to the specific legal framework.

- The **sustainable agriculture framing** considers how additional agricultural production for biofuels can be delivered as part of a programme of improving the sustainability of European agricultural landscapes. In this broad framing, the focus is on agricultural options that can support increases in soil carbon sequestration, reduced agricultural input use, and greater agricultural resilience, while delivering additional feedstock that could be used for bioenergy purposes. The BIKE case studies fall within this category, and we are especially interested in this broad framing when we consider potential overlaps between low ILUC risk systems under energy and agricultural policy.
- The **additionality framing** is focused on the specific question of how additional biofuel feedstock production can be delivered in a way that avoids the displacement of existing agricultural provisioning services, and thereby avoid driving indirect land use change or impacting on markets for commodities for food and other purposes. This framing may include measures to improve feedstock production that are not associated with improvements to broader sustainability, such as delivering increased yields from monoculture crops by increasing the use

of agricultural inputs. There is also no conceptual limit on the types of feedstocks that could be produced additionally using low ILUC-risk production systems in this sense – for example this framing can be applied to cellulosic biofuel feedstocks, even though these are outside of the scope of the specific legal definition of low ILUC-risk biofuels given in the RED. This framing is relevant to the principle stated in the recitals of the RED that, 'Feedstock which has low indirect land-use change impacts when used for biofuels, should be promoted for its contribution to the decarbonisation of the economy.

- The **Renewable Energy Directive (RED) framing** is the specific but more limited definition of low ILUC-risk feedstock given by the RED II and associated delegated and implementing regulations. The RED II definition is restricted to food and feed crops (i.e., starch-rich crops, sugar crops, and oil crops grown as the main crop) produced through increased yields or on areas otherwise not used for crop production. To meet this regulatory definition biofuel feedstocks must be certified by an appropriate scheme. Certified low ILUC-risk biofuel feedstocks are exempted from limits applied by Member States to the supply of biofuels from "high ILUC-risk" feedstocks; this is currently the only regulatory benefit that automatically accrues to biofuels with low ILUC-risk status, and as palm oil is the only feedstock identified as high ILUC-risk it is currently relevant only to palm oil producers. We use this framing when discussing strictly RED-related provisions, incentives, and discretions granted within the RED II to EU Member States.

The BIKE project seeks to develop the understanding of how the specific legal measures developed in the context of the RED framing of low ILUC-risk might be developed and expanded to encourage the development of value chains that fit into a wider context of overarching EU sustainability and land use objectives – notably as expressed in the EU Green Deal[1].

1.3. WP5 Objectives

With the definitional considerations of the previous section in mind, WP5 has three broad objectives:

(i) To understand how the current EU policy landscape would impact the low ILUC-risk feedstock value chain;

(ii) To craft targeted policy recommendations aiming to promote sustainable feedstock production and use in the EU;

(iii) To develop a low ILUC risk supportive framework originating from the exploration of the application of existing and recommended measures developed considering the specific BIKE case studies of the additionality concepts.

The next section outlines how the work of WP5 was organised.

1.4. Organisation of Tasks

The WP5 research was comprised of the following Tasks[2]:

[1] See also BIKE deliverable D7.1, "Stakeholder engagement and Dissemination Plan", page 6.

[2] Wording has been condensed and paraphrased; the GA is the authoritative source for the scope of each Task.

- Task 5.1: Map the legal, institutional and policy frameworks in the EU and the case studies[3].
    - Task 5.1.1: Review legal and policy frameworks in the EU – specifically, those impacting each stage of the biofuel value chain[4].
    - Task 5.1.2: Review the institutional framework in the EU, identify key stakeholders / decision-makers and characterise their posture towards the low ILUC-risk concept.
    - Task 5.1.3: Analyse how the case studies in BIKE relate to the above policy and institutional frameworks at local/regional level.
- Task 5.2: Identify enabling policies at the EU level.
    - Identify enabling policies across the value chain stages in order to facilitate future uptake of low ILUC-risk biofuels.
- Task 5.3: Develop a supportive framework for the BIKE case studies.
    - Task 5.3.1: Develop a low ILUC-risk framework for the additionality concepts captured by the case studies.
    - Task 5.3.2: Generalise the results of the case study analysis to low ILUC-risk models more broadly, by constructing a Transferability Matrix.

In the following sections, the overall timeline of WP5 activities is presented (Section 2), whereas the overview and the main findings of the work performed in each task of the WP are discussed in Sections 3, 4, and 5 for Tasks 5.1, 5.2 and 5.3 respectively.

[3] The case studies are the purview of BIKE's Work Package 6.

[4] Land use, biomass production, conversion, and end use.

2. Timeline of activities

WP5 was originally conceived at the proposal stage to start on Month 14 and run until the end of the project. However, within the first months of the project it was clear that there was a need to commence the analysis of the policy and legal documents related to the low ILUC risk concept in parallel to the evolution of the technical work of the other BIKE WPs. Therefore, in the Amendment of the Grant Agreement, WP5 duration was changed to M7 – M36 (i.e. the end of project).

Figure 1 provides a timeline of activities performed within WP5. The following are noted:

- In essence, WP5 evolved over three axes:
    - ***Analysis*** of the relevant legal, policy and institutional frameworks in EU. The analysis considered a wider to the biofuels frame in order to explore synergies among policy areas.
    - ***Synthesis*** of the analysed information under the perspective of both (a) highlighting the opportunities available in the various pieces of legislation to promote the low-ILUC risk concept, and (b) exploring measures and interventions to the policy frame to facilitate market uptake.
    - Development of ***recommendations***, mainly expressed through the drafting of a series of Briefing Notes on key issues pertinent to the market development of the low-ILUC risk concept.
- Analysis took most of time of WP5, essentially covering a period of 18 months (M7 – M24). The synthesis and recommendations formulation phases took place on the last 3rd project year, capitalizing thus on the obtained results so far.
- Subtask 5.1.1 on the "Review legal and policy frameworks in EU" started early enough in the project so as to allow for sufficient time to the project team to understand the basic legal and policy terminology and to develop a common language of communication with the other partners involved in the BIKE technical WPs.
- Although the team closely followed the policy and legal developments in the area in the course of the project, the main analysis performed in WP5 focused on the legally binding documents currently in force. However, the relevant public discussion on the evolution of the existing framework was considered in the synthesis towards formulation of recommendations.
- The approach for the analysis was "dynamic" to ensure it covers areas of interest to the industry; the WP5 team organized a series of bilateral discussions with the BIKE industrial partners, namely UPM, ENI and CIB, both at the stage of the analysis areas identification, as well as at the stage of formulation of recommendation (drafting of the Briefing Notes).
- Part of the work of WP5 was presented in the BIKE final event organized during EUBCE 2023. The title of the presentation was "The policy context of low ILUC-risk biofuels" and touched upon the framing of the low ILUC-risk concept and how can policy support the valorisation of low ILUC-risk certification.

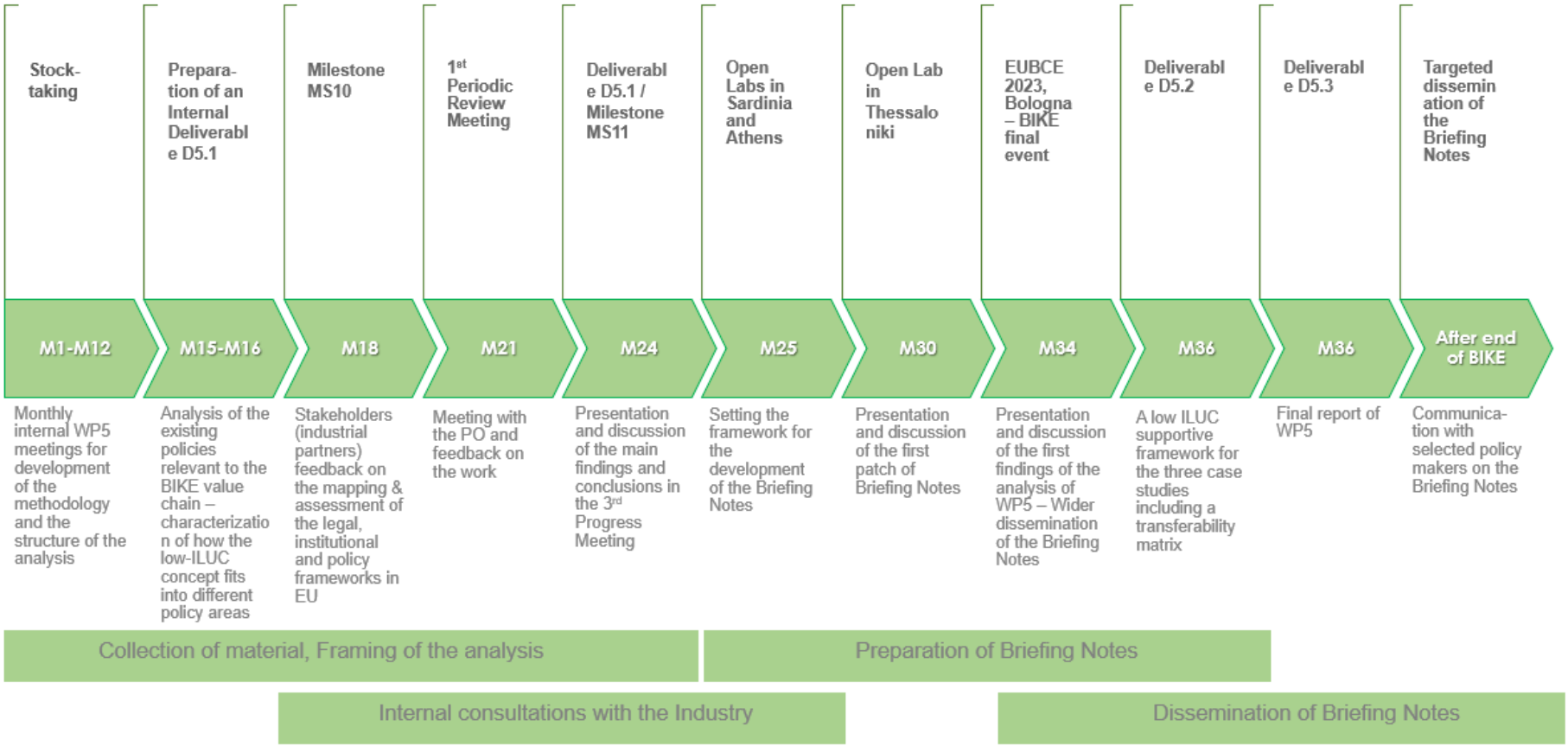

Figure 1 Timeline of activities of BIKE Work Package 5

3. Map of the legal, institutional and policy frameworks in the EU and the case studies

4.1. Policy Environment

In one form or another, the low ILUC-risk concept is over a decade old now. Early proposals for ILUC avoidance were made in 2008; the definition first entered the RED in 2015; since 2018 low ILUC-risk certification has had a defined role in the RED II, elaborated in the Delegated Regulation for ILUC-risk feedstock (2019); and the Implementing Regulation on voluntary schemes and low ILUC-risk certification (2021) lays out a basis for the inclusion of low ILUC-risk certification modules by existing biofuel sustainability standards. Despite this evolution of the policy environment supporting the shift from concept to implementation, low ILUC-risk biofuel is, arguably, not yet a mature concept. Practical certification requirements still need to be finalised (this is addressed under BIKE's WP1) and the economic value proposition of low ILUC-risk certification remains unclear. Indeed, work on low ILUC-risk pilot projects for DG ENER[5] has identified the lack of a clear value signal as a barrier to demonstrating additionality. More than either of these issues, a tension remains between the broad vision for low ILUC-risk certification that was envisaged by its progenitors and the narrowly prescribed role for low ILUC-risk biofuels as a way to avoid high ILUC-risk classification in the RED framework. The BIKE project sees the opportunity for more sustainable low ILUC-risk systems as much broader and more important than simply being a way to identify responsible palm oil production systems. Given this dissonance between the wide vision for low ILUC-risk and its narrowly prescribed role in current policy, questions remain as to the scalability of low ILUC-risk production, and hence its long-term relevance as a policy instrument.

The goal of the BIKE policy analysis exercise (Task 5.1.1) was to examine where support for low ILUC-risk production pathways can be found not only explicitly but also implicitly in the existing legislation ecosystem. That required consideration of which policy instruments might provide support for *the sort of agricultural innovation* that could achieve low ILUC-risk certification. The answer to this question is necessarily somewhat hypothetical, as alignment between the low ILUC-risk concept and policy goals in other EU legislation is not exact; nevertheless, it is possible to identify some promising complementarity and opportunity in the EU policy space.

The most promising regulatory window in the short term is the provision in the RED II itself, which gives Member States agency to regulate biofuels differently on the basis of their estimated ILUC emissions. This freedom has already been used by some Member States to curtail the use of soy oil as a biofuel feedstock[6], and accelerate the curtailment of palm oil. There is an opportunity, therefore, for low ILUC-risk certification to not only exempt genuinely sustainable feedstock from restrictions such as these, but also to benefit from positive policy support from governments who believe it could contribute to their broader environmental agenda.

Besides this, low ILUC-risk production intersects with a number of policy goals and themes outside of the energy sector. For example, introducing fast-growing cover crops during fallow periods of the crop

[5] https://iluc.guidehouse.com/

[6] Although at the time of writing we are not aware of any official statement from the Commission on these measures.

rotation can produce additional biomass for energy, while also (potentially) bringing side-benefits for biodiversity, soil health, fertiliser runoff, pesticide use, and local jobs; all of these are covered by different parts of EU law. Indeed, the CAP introduces incentives for farmers to adopt increasingly conservation-oriented land management practices such as crop rotations and catch crops, which interlock with other legislation such as the Nitrates Directive and Farm to Fork Strategy to create an enabling environment for sustainable cropping systems. These are likely to encompass production models of the kind that would be employed by low ILUC-risk projects, though the link between these and financial support will have to be integrated more explicitly into the CAP and other policy texts in order to boost confidence in the low ILUC-risk business case.

Similarly, bringing genuinely unused or unproductive land online for agricultural activity aligns well with policy goals for rehabilitating degraded soils and for invigorating rural economies with diversified activities. As the primary funding instrument for the agricultural sector, the CAP once again has a large role to play: particularly through its support of agricultural measures in "areas with natural and special constraints", which will need to be streamlined against the RED II's unused and abandoned land definitions in order to create a coherent enabling framework for low ILUC-risk. Investment in land couples with rural development programmes which seek to provide infrastructure and overcome other economic barriers in rural areas. In the context of the bioenergy sector, this could include extension services, transport infrastructure, the facilitating of downstream market linkages, and promoting agricultural livelihoods more generally. Since such measures are typically applied at the national or sub-national level, there is room to tailor them to local conditions and production models to create a favourable business narrative, and such opportunities will have to be explored in more depth.

Finally, recent EU initiatives under the Farm to Fork Strategy and elsewhere have promoted avenues for greenhouse gas abatement and draw-down through soil management in the farming sector. These intersect with the existing RED II carbon intensity bonus for biofuels grown on land with demonstrated increases in soil carbon stocks. Sustainability-oriented farming and land preparation techniques such as crop rotations and carbon enrichment can create a number of overlapping benefits at the farm level, and are natural allies to low ILUC-risk production pathways. The low ILUC-risk concept could be explicitly recognised in carbon removal strategies at both the EU and the Member State level.

While this report has focussed more on the existing provisions which may cultivate and promote low ILUC-risk value chains, within the policy landscape there are naturally potential conflicts between different sectors for the finite resources of land, water, labour, money, and administrative capacity. For instance, there is the tension between agriculture (whether for food, fibres, or bioenergy) and other land use sectors such as forestry and protected natural areas; or between the use of agricultural inputs and water for irrigation with a need to minimise environmental pollution and conserve resources. The current policy framework around low ILUC-risk feedstock – i.e., the RED II Article 29 and the Delegated Regulation on ILUC risk – applies important ecological and sustainability safeguards to forestall some of the major issues. However, it is fair to expect that expanded or intensified agricultural production, even under the banner of the low ILUC-risk concept, will have a variety of impacts on resource allocation and the natural world. The adoption of a coherent approach to land use which maximises environmental and social benefits must therefore be a matter of ongoing evaluation and refinement.

4.2. Institutional Environment

Review and analysis of the policy framework has revealed the fact that the low ILUC-risk concept touches upon several policy instruments, whose primary focus can lie on different policy areas. This situation can result in practical difficulties when the implementation of new measures dedicated to the low ILUC-risk concept policy comes at stake. Within this work package, and following the policy analysis

previously presented, the respective institutional framework has been also studied with respect to assessing institutional challenges in promoting the low ILUC-risk concept given existing institution posture and possible conflicts with their other goals.

RED has been identified as the main legislative document affecting the BIKE low ILUC-risk concept and DG ENER has primary responsibility for proposing any amendment to the role of low ILUC-risk certification within the frame of the RED. Further, and considering that the low-ILUC risk concept touches upon issues relevant to the entire biofuels value chain, there is a need for harmonization of scattered policy items under the responsibilities of various institutions. As the low ILUC-risk concept is very closely related to land use and soil health and management issues, DG AGRI can also have a vital role. DG CLIMA is also likely to be most aligned when low ILUC-risk biomass production is coupled with soil carbon regeneration and high carbon intensity reductions.

Other European institutions can also contribute the proportion of the low-ILUC risks concept with the first action being explicit consideration of the concept in their policy objectives. It is finally important to develop mutual alignments between institutions to foster linkages at a level which could promote substantive changes to policy formulation or implementation.

4.3. Access to Finance

Analysis of the current EU framework with respect to available funding for projects pertinent to the advanced biofuels area, and therefore to the low-ILUC risk concept, suggests that funding is, in general, available either (a) to finance profitable business cases in the private sector, or (b) to support relevant policies and programmes (such as for instance, the development of the needed regulatory framework) in the public sector.

Focusing on the former, which is closely related to the BIKE project concept, the currently available financing tools and instruments allow for financing of an advanced biofuel plant that already considers the supply of a low ILUC-risk feedstock, where the promoter has already internalized the parts related to sustainable feedstock supply, and there are no tools focusing on low ILUC-risk. As far as potential public programmes are concerned, it can be expected that the promotion of awareness for benefits of low ILUC-risk projects, including crop yield increases, soil health, reinforcement of farmers revenues, etc., could indeed support the wider exploitation of the low ILUC-risk concept.

Overall, and considering the specificities of low ILUC-risk projects, that can essentially touch on both the agriculture and energy sectors, it can be argued that an explicit reference of the low ILUC-risk concept in either the existing or new, dedicated, financing instruments is needed to boost funding of low-ILUC risk projects along the entire value chain.

4.4. Case Studies

The BIKE case studies have been analysed, on the basis of the up-to-date available information, with respect to the policy and institutional frameworks discussed already. The analysis aimed to further pinpoint potential enabling provisions and bottlenecks for projects on the ground, strengthening the basis for recommendations and essentially facilitating the commencement of the technical work to be performed under Task 5.3.

The analysis reveals that the over-arching EU renewable energy policy frame constitutes the main regulatory driver for the realization of the cases studies. In particular, the RED II as the main driver for the consumption of renewable fuels in transport, and the Green Deal as the basis for expanded aspirations for enhanced biodiversity appear as the main EU policies that are considered most relevant

by the case study developers. There is no evidence that the other more tangentially relevant policies identified here have been given any strong consideration by the case study developers, which supports the conclusion that at present there is no clear understanding among value chain participants about how the broader constellation of environment and energy policies may support a low ILUC-risk business model. At present, national legal frameworks appear to add little to the overall motivation for the initiation of a low ILUC-risk case, which remains predicated on the EU-level opportunity. This is consistent with the understanding that no EU Member State has yet taken advantage of the flexibility of the RED to develop a stronger support system for low ILUC-risk fuels.

Going forward, national frameworks could help to crystallise the value proposition for low ILUC-risk value chains by adding explicit incentives for non-palm-oil feedstock systems, and will influence the degree of flexibility that a low ILUC-risk case promoter can enjoy in implementation. It is also clear that the alignment of the national frameworks with the particular conditions in the local market (for example in terms of the types of the local capacity for feedstock processing, the low ILUC-risk crops that could be viable in local conditions, the local availability of unused land and any local permitting requirements) is an important parameter influencing the establishment of a viable business case.

Finally, there are no targeted funding mechanisms for low ILUC-risk cases. This leads to a situation where several case studies are related to academic projects for which it is naturally difficult to establish a clear picture of their potential marketability.

4. Identify enabling policies at the EU level

The analysis of Task 5.1 fed directly into the activities of Task 5.2, which in turn aimed at the specific identification and characterisation of enabling policies for the low ILUC-risk biofuel value chain.

For the execution of Task 5.2 on enabling policies, BIKE's WP5 developed a series of briefing notes: each one focussing on EU policy provisions relevant to the low ILUC-risk concept. Figure 2 presents a snapshot of the Briefing Notes documents available on the BIKE project website. The Briefing Notes themselves can be found at the project website (https://www.bike-biofuels.eu/briefing-notes/). Further, Table 1 below provide an overview of each Briefing Note.

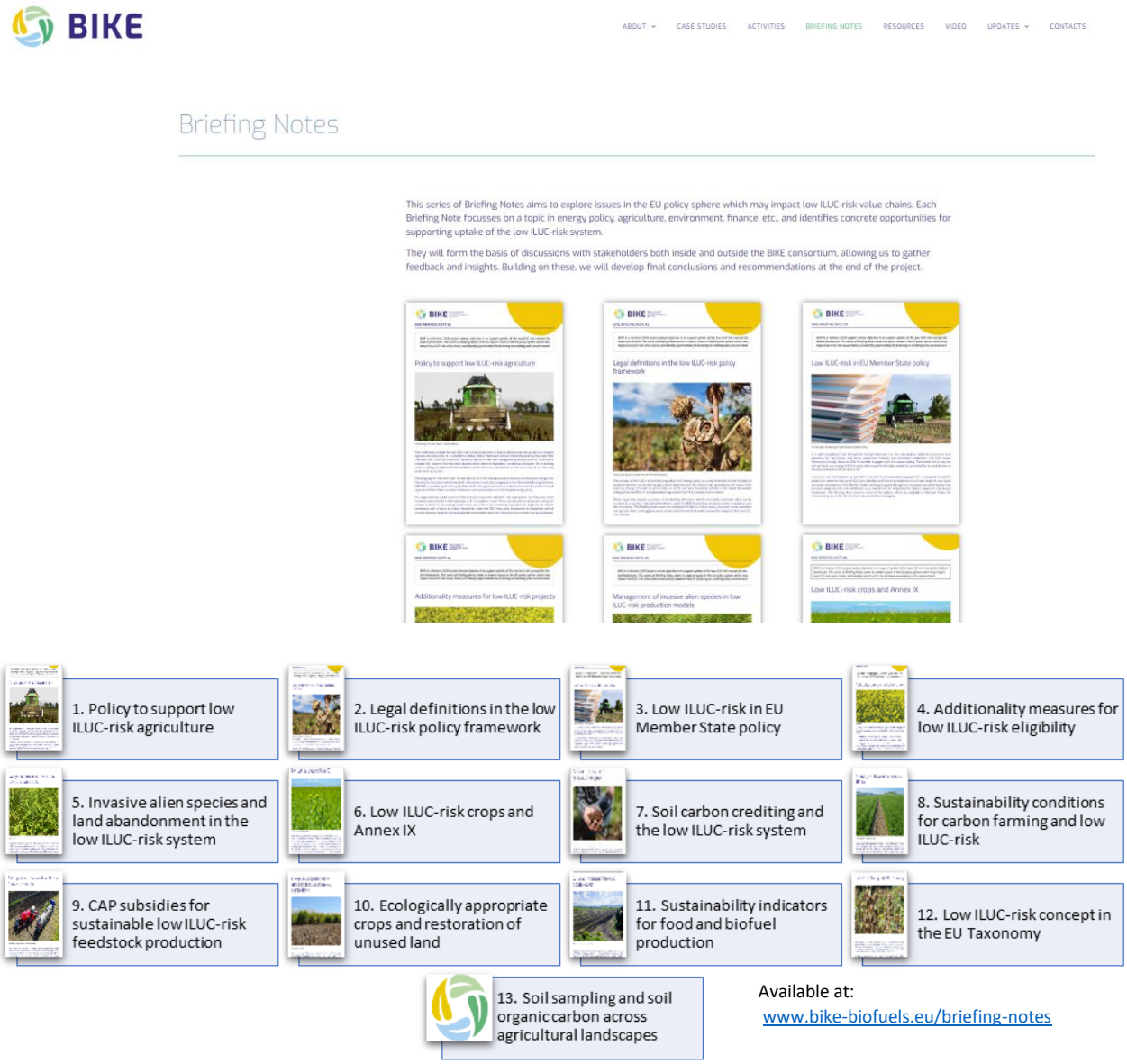

Figure 2 A snapshot of the page with the Briefing Notes documents available on the BIKE project website

Table 1 Titles of the BIKE Briefing Notes and brief overview of the content

No	Title	Overview of the Content
1	**Policy to support low ILUC-risk agriculture**	The underlying concept for low ILUC-risk biofuel production is that by developing new systems to expand agricultural production, it is possible to deliver biofuel feedstock without impacting existing food and feed markets. Low ILUC-risk production systems fall into three main categories: growing a crop on land that is unused (for instance that has been abandoned or become degraded); increasing production of an existing crop; or adding an additional intermediate crop (for instance a productive winter cover crop or an intercrop) to an existing system. The language of "low ILUC-risk" comes directly from the dialogue around biofuels and land use change, and the only EU directive in which low ILUC-risk status is explicitly recognised is the Renewable Energy Directive (RED). But considering that the goal of low ILUC-risk agriculture is to sustainably increase the productivity of agricultural land, there are clear resonances with policy objectives far beyond energy policy. No single example could represent the diversity of possible low ILUC-risk approaches, but there are some common characteristics that many low ILUC-risk options share. These include a focus on accumulating soil carbon, a focus on developing novel crops, and a focus on increasing crop diversity. Agricultural models developed with a focus on biofuel feedstock under the RED may grow to become an important part of Europe's broader agricultural landscape if a more holistic and nurturing policy environment can be developed.
2	**Legal definitions in the low ILUC-risk policy framework**	The concept of low ILUC-risk biofuels originated in EU energy policy, as a way to identify biofuel feedstocks whose production avoids driving agricultural expansion and the concomitant greenhouse emissions from land use change. It made its policy debut in 2015, and was thereafter refined in the recast Renewable Energy Directive (RED II) and associated regulations from the European Commission. These legal texts provide a system of interlocking definitions which collectively determine what can be counted as a low ILUC-risk biofuel feedstock under the RED II, and how to demonstrate compliance with the set criteria. This Briefing Note covers the principal definitions in force today, discusses some subtleties arising from them, and suggests some simple amendments that could increase the impact of the low ILUC risk concept.
3	**Low ILUC-risk in EU Member State policy**	It is well established that demand for biofuel feedstock has the potential to indirectly incentivise land clearance for agriculture, and hence undermine biofuels' environmental credentials. The EU's recast Renewable Energy Directive (RED II) actively engages with this issue, stating: "Feedstock which has low indirect land-use change (ILUC) impacts when used for biofuels, should be promoted for its contribution to the decarbonisation of the economy". 'Low ILUC-risk' certification, as defined in the RED II and associated regulations, is designed to identify production systems that avoid ILUC, and detailed certification procedures for a broad range of crop types are under development. EU Member States wishing to guarantee genuine transport decarbonisation may consider using low ILUC-risk certification as a mechanism for mitigating the indirect impacts of crop-based feedstocks. This Briefing Note explores some of the options which are available to Member States for incorporating low ILUC-risk into their national biofuel strategies.
4	**Additionality measures for**	The low ILUC-risk concept seeks to promote the production of biofuel feedstocks in a way that does not interfere with existing food and

	low ILUC-risk projects	feed markets. In technical language, feedstock production must be 'additional' to be certified as low ILUC-risk, and must result from implementation of a farm-level 'additionality measure', meaning: "the improvement of agricultural practices leading, in a sustainable manner, to an increase in yields on land that is already used for the cultivation of crops; and any action that enables cultivation on unused land, including abandoned land, for the production of biofuels" In this Briefing Note, we focus on interventions which are intended to increase crop yields on existing agricultural lands above 'business-as-usual' performance. We discuss what kinds of additionality measure are already recognised in the legislation, and offer some recommendations for expanding the list in line with principles of sustainable agriculture.
5	**Management of invasive alien species in low ILUC-risk production models**	Invasive alien species (IAS) are organisms introduced into a natural environment outside their native ranges, which threaten or adversely impact biodiversity, ecosystem services and agriculture. This may have severe economic consequences – by one estimate, IAS costs the EU more than EUR 12bn annually. The EU's IAS Regulation establishes a legal requirement on Member States to recover IAS-degraded lands (where not unduly expensive), and provides a legislative cornerstone for monitoring, eradication, management, and reversal. This goal resonates with Target 12 of the EU's Biodiversity Strategy for 2030iv, which commits to developing a dedicated legislative instrument for mapping IAS in the name of ecosystem restoration. This Briefing Note explores how EU policy on invasive species management intersects with biofuel production models. First, we highlight how IAS-risk crops are currently promoted as biofuel feedstocks with limited sustainability oversight. Second, we identify an opportunity for low ILUC-risk certification on unused and abandoned land to support farmers in controlling the spread of IAS while contributing to the bioeconomy and creating more options for biofuel feedstock production.
6	**Low ILUC-risk crops and Annex IX**	The Renewable Energy Directive ('RED II') gives privileged status to certain biofuel feedstocks, listed in its Annex IX. These are entitled to be 'double counted' towards national renewable energy targets, making them an attractive compliance option, and stimulating investment in the associated value chains and fuel conversion technologies. For example, used cooking oil and animal fats are included in Annex IX Part B, and it is primarily for this reason that their use for biodiesel or HVO in the EU has increased sixfold between 2010 and 2022. Other feedstocks which are listed in Part A of Annex IX (associated with "advanced" biofuel technologies) are further bolstered by targets for ramping up their contribution to the energy mix between now and 2030. Of the four low ILUC-risk case studies developed by the BIKE project, the two using cellulosic crops already qualify as Annex IX Part A feedstocks, and the other two involve production models which could be covered by proposed additions to Annex IX. This Briefing Note explores the suitability of low ILUC-risk certification to be an Annex IX sustainability safeguard, and a factor in feedstock eligibility.
7	**Soil carbon crediting and the low ILUC-risk system**	The EU's Renewable Energy Directive ('RED II') recognises the potential for biofuel feedstock production to enhance the carbon stock of agricultural soils as a measure for mitigating greenhouse gas emissions. Specifically, the RED II's formula for calculating biofuels' lifecycle emissions includes an 'esca ' term for "emission savings from soil carbon accumulation via improved agricultural management". These improved agricultural management practices include: "Shifting to reduced or zero-tillage, improved crop/rotation, the use of cover crops, including crop residue management, and the use of organic soil improver (e.g. compost, manure fermentation, digestate, biochar, etc.)" Each of the practices in this list also corresponds to a low ILUC-risk 'additionality measure' which could qualify biofuel feedstock for low ILUC-risk certification. This Briefing Note explores the linkages between low ILUC-risk and carbon farming practices, and suggests ways

		in which these linkages can be leveraged to maximise impact for project developers.
8	**Sustainably delivering carbon farming and low ILUC-risk**	Soils have considerable potential as a carbon sink. This has been recognised by the European Commission, which is developing a certification framework to incentivise climate-friendly land management practices that build soil carbon. At present, the Sustainable Carbon Cycles Communication and the proposed Carbon Removal Regulation are the two principal texts establishing the Commission's vision for carbon farming mechanisms; a succession of future acts and amendments is expected to hone this vision, and provide implementation details. Another Briefing Note in this series highlights the cross-over in methods and objectives between this developing soil carbon framework on one hand, and low ILUC-risk biofuel feedstock production on the other, arguing that the low ILUC-risk system and associated farming practices could contribute to building soil carbon on both unused land and existing agricultural land. This Briefing Note examines how complementary sustainability criteria imposed under the two systems could streamline certification requirements, and potentially promote stakeholder uptake.
9	**CAP support for sustainable low ILUC-risk feedstock production**	The EU's Common Agricultural Policy ('CAP') contains nine specific objectives relating to market competitiveness and resilience, farmer incomes and inclusion, and environmental and ecological stewardship. The latter category includes: "(d) to contribute to climate change mitigation and adaptation [and to] promote sustainable energy", and "(e) to foster sustainable development of natural resources such as water, soil and air". Initiatives to produce bioenergy crops that avoid stimulating indirect land-use change (ILUC) could contribute to all of these objectives – as evidenced by the BIKE case studies, which include diversifying crop rotations and environmentally positive unused land conversions. Moreover, for those farmers who are unable to adopt improved management practices because of demonstrable economic barriers or other nonfinancial constraints, low ILUC-risk certification could grant access to enabling premiums from the biofuel market. This Briefing Note explores the approaches of the CAP and low ILUC-risk systems, their overlapping goals, and similarities in the types of activities they support. From this, we conclude that integrating low ILUC-risk into the CAP framework could benefit both systems.
10	**Ecologically appropriate crops for restoration of unused and severely degraded lands**	The world is facing a scarcity of land necessary to secure the production of food: the FAO reports that "A series of [agricultural] land and water systems now face the risk of progressive breakdown of their productive capacity under a combination of demographic pressure and unsustainable agricultural practices". On top of this, there is an increasing competition from other land uses like biofuel feedstock production, as well as a global phenomenon of agricultural land abandonment driven by multiple factors. Restoring unused, abandoned, and severely degraded lands for low ILUC-risk biomass production offers a way of resolving these tensions and increasing overall productivity, while at the same time increasing the incomes and diversifying the activities of farmers (including smallholders) in rural areas. This Briefing Note highlights some environmentally appropriate opportunities for bringing unused – and possibly abandoned – lands back into use, in ways that enhance agricultural output while restoring the land's productive potential. It gives an overview of some relevant land management policies, introduces some of the risks (such as pollution and water abstraction) arising from unused land conversions, and presents some recommendations in line with the principles of sustainable agriculture.
11	**Sustainability indicators for food and biofuel**	Sustainability indicators are a critical tool for monitoring progress towards policy goals: be it the EU's Green Deal, the UN's Sustainable Development Goals, or any other local, national, regional, or global compendium of targets. For example, the EU's CAP regulations

	production	stipulate that Member States must define their ambitions in relation to the objectives of the aforementioned Green Deal, in part through a common indicator system which includes economic, environmental, and social dimensions. This Briefing Note introduces agriculture-focussed sustainability indicators, and discusses how a unified system of indicators could encompass different management practices at the farm level, as well as different end uses (e.g. crops for food or for biofuel) along with their associated value chains. The BIKE project has developed an indicator set tailored to capture the specifics of low ILUC-risk biofuel feedstock production, and this may provide some guidance in the development of a comprehensive indicator set for a range of agricultural land uses.
12	**Low ILUC-risk Concept in the EU Taxonomy**	Climate finance is a term referring to local, national, and transnational financing for climate change mitigation and adaptation. Due to the nature of the investments, it often overlaps or is used interchangeably with the terms green finance or sustainable finance. So-called 'taxonomies' have been developed to signal to investors what can be considered a climate-friendly or sustainable economic activity; these allow for increased transparency of the climate finance market, and for tracking its capital flows. Over 20 taxonomies or standards have emerged in the sector in the recent years. These can be divided into those developed by state jurisdictions – the EU, China, Japan, France, South Africa – and those developed by organisations such as the International Capital Market Association (ICMA) which published its Green Bond Principles and the Green Loan Principles, or the Climate Bonds Initiative (CBI) with its Climate Bonds Taxonomy. This Briefing Note introduces the EU's Taxonomy on sustainable finance, and explores how the details of the Taxonomy framework and screening criteria could act as enablers for the low ILUC-risk biofuel system.
13	**Soil sampling and soil organic carbon across agricultural landscapes**	Soil organic carbon (SOC) is a key indicator of soil health and agricultural productivity; optimising carbon uptake by soils through careful agricultural management also represents a significant opportunity for greenhouse gas mitigation. SOC can be estimated by soil sampling and by models which have been validated against experimental data. However, SOC dynamics are sensitive to several factors, such as climate, vegetation, soil type, and the kinds of agricultural practices undertaken; consequently, the outcomes of on-farm interventions can be highly variable and difficult to predict. Moreover, spatial and temporal variability at the field scale also introduce complexities in measuring carbon stocks, especially in the short-term: it is only over long periods of consistent agricultural practices that signals can be reliably discerned from the noise. EU policy initiatives have sought to overcome these hurdles, in order to promote agricultural practices identified as effective in building soil carbon and to reward farmers for demonstrating improved soil carbon performance (see the policy discussion in BIKE Briefing Notes #7 and #8). In this Briefing Note, we introduce soil sampling methods, and tools for modelling SOC over time and across landscapes. We highlight some limitations of EU policy protocols for monitoring and crediting SOC, and provide recommendations to make these protocols fairer and more robust. These changes are intended to incentivise more farmers to adopt climate-friendly land management practices.

As is evident from the briefing note titles, low ILUC-risk touches on a number of different policy areas, including renewable energy, agriculture and land use, environment, climate, and finance. Recommendations emerging from the briefing notes include (briefing note number in brackets):

- Recognise the potential for the low ILUC-risk concept to be adopted beyond the energy sector [1]
- Amend definitions in the RED to confirm the eligibility for low ILUC-risk certification of intermediate crops [2]
- Broaden the scope of low ILUC-risk to encompass certification of all types of crops [2]
- Clarify the term "severely degraded land" and its overlap with "unused land" [2,6]
- Highlight the flexibility given to EU Member States to incorporate low ILUC-risk into national regulations for RED compliance [3]
- Augment the list of "additionality measures" to recognise further sustainable agricultural practices [4]
- Strengthen safeguards against the spread of invasive alien species by extending the RED sustainability criteria [5]
- Recognise the potential for rehabilitation of abandoned land with low ILUC-risk cropping systems to control the spread of invasive alien species [5]
- Take advantage of existing systems for low ILUC-risk certification in assessing feedstocks against proposed new entries in Annex IX of the RED [6]
- Recognise the overlap between low ILUC-risk production models and carbon farming practices, in order to streamline certification criteria & auditing processes [7,8]
- Ensure additionality tests are mutually coherent between carbon farming and low ILUC-risk regulations, for the benefit of projects which encompass both [8]
- Introduce the language of land use change into CAP sustainability objectives [9]
- Support up-front low ILUC-risk investments with discretionary subsidies, and explore how certification could play into results-based subsidy schemes [9,11]
- Create catalogues / maps for the different land types defined in the RED [10]
- Review the potential (and conduct trials) for agricultural land rehabilitation using low ILUC-risk production methods [10]
- Develop common sets of sustainability indicators for water use, biodiversity, soil disturbance, etc. [11]
- Develop whole-value-chain sustainability indicators which are also capable of monitoring complex multi-year rotations specifically for biofuel production [11]
- Use the FSDN framework for collecting farm-level data pertinent to low ILUC-risk production [11]
- Recognise low ILUC-risk in financing platforms and programmes [1,12]
- Recognise low ILUC-risk certification in the technical screening criteria of the EU Sustainable Finance Taxonomy [12]
- Develop a carbon farming certification scheme which tracks sub-soil carbon [13]
- Provide guidelines for the assessment of on-field heterogeneity in soil sampling [13]
- Allow projects that use biochar to build soil carbon to operate under a simplified monitoring and accounting regime [13]

5. Develop a supportive framework for the BIKE case studies

The aim of Task 5.3 is to provide the analysis for the development of a low ILUC supportive framework for the four BIKE case studies of the additionality concepts. This is done through capitalizing on the outputs of the previous tasks and elaborating on the enabling conditions that can facilitate the market uptake of the low ILUC BIKE case studies (focusing on the industrial cases studied in the project). The low ILUC supportive framework is presented in the form of a Transferability Matrix, which is understood as a frame that providing information to enable an organized and – to the extent possible – smooth replication of the BIKE's work for any other potential value chain examples.

The methodology for developing a generalized low ILUC-risk framework based on the analysis of the obtained results of the BIKE case studies over three angles:

1. **Current state of play of each case,** where information is based on the analysis conducted within BIKE (WPs 2,3 and 6).
2. **Challenges** faced by the case study models. They include policy, administrative, operational, or environmental challenges for potential (or active) low ILUC-risk projects.
3. **Policy recommendations:** a number of measures are highlighted that could enhance the effectiveness or attractiveness of the case study production models.

The approach is inherently subjective but nonetheless the project team considers that it is effective both to illuminate the policy process and as a basis for critical assessment. The approach is also flexible and could be applied to many other policy processes.

Table 2 below presents a summary of the analysis of the BIKE case studies within the frame of the development of a low ILUC risk supportive framework.

Then, building on the analysis, the development of a supportive framework to elaborate on the enabling conditions that would potentially allow for the development of low ILUC-risk projects within the current European policy and market frame, is identified over three axes:

1. **Enabling policies**, tailored to the specificities of each BIKE case study, as these have been analysed within the BIKE project and considering the policy analysis performed within Deliverable D5.1[7]
2. **Supply potential for low ILUC-risk biomass**, as this can be defined via the optimally assessed conditions for additionality (yield increase and opportunities to cultivate in marginal land) are considered. In this respect, work presented within the BIKE Deliverables D2.1[8] and Deliverables D2.2[9] has been largely utilized.
3. **Demand for low ILUC-risk feedstocks,** which can be correlated with the existence of biorefineries. In this respect, work presented within the BIKE Deliverable D3.1[10] has been considered.

[7] https://www.bike-biofuels.eu/wp-content/uploads/2022/10/BIKE_WP5_D5.1_1.0.pdf

[8] https://www.bike-biofuels.eu/wp-content/uploads/2022/10/D2_1-Productivity-increase-final.pdf

[9] https://www.bike-biofuels.eu/wp-content/uploads/2022/10/Deliverable-2.2-Final.pdf

[10] https://www.bike-biofuels.eu/wp-content/uploads/2021/09/20210914_BIKE_D3.1_4.0_REC.pdf

The work presents a comparative assessment of the European countries (27 EU plus the UK) based on the combined assessment of supply and demand elements for low ILUC risk feedstock. Mapping has been done qualitatively at high-level indicating the prospects for the development of a favourable environment that could potentially allow for the production of certified low ILUC risk biomass as per the requirements of the RED II regulations in each country.

Overall, the assessment suggests that Europe can be grouped into three classes:

- **Class 1 – countries featuring a positive environment that could potentially allow for the production of certified low ILUC risk biomass as per the requirements of the RED II regulations**: Austria, Hungary, Italy, Netherlands, Slovakia, Spain, Sweden.
- **Class 2 – countries that appear to have a good basis to allow for the development of a positive environment provided targeted actions are taken**: Belgium, Bulgaria, Denmark, Finland, France, Germany, Poland, Portugal, Romania, United Kingdom.
- **Class 3 – countries where there is lack of evidence that low ILUC risk biomass can be produced, considering the existing data and the expected evolution in the short term to 2030**: Croatia, Cyprus, Czech Republic, Estonia, Greece, Ireland, Latvia, Lithuania, Luxemburg, Malta, Slovenia.

It should be noted that the above analysis has the following limitations:

- The information collected and analysed includes a mix of actual data and experiences from the BIKE case studies and trials together with statistical data and modelling estimates. While this high-level grouping provides only a superficial characterisation of the nature of the potential opportunities in each country, it provides a first mapping of favourable conditions for the future transferability of the learnings from the BIKE case studies to other countries and regions.
- Next step would be to focus on selected member states and deep dive on the "actual" prospects for the development of a low ILUC risk project: that would include the analysis at a good level of detail of key references/existing cases that could be of use to other researchers.

Table 2 Summary of the analysis of the BIKE case studies within the frame of the development of a low ILUC risk supportive framework

Summary of the analysis of the BIKE case studies	
Yield increase | Brassica carinata sequential cropping for HVO production	**Current stage:** *Brassica carinata* is used to improve the conventional crop rotation practice. Cultivation is carried out on 110 ha farmland over a period of six years (2016 to 2022). The length of summer and winter seasons is four months (January to April) and eight months (May to December) respectively. It takes three years to complete a rotation. Soybean and maize are cultivated in the summer while wheat and Brassica during the winter. In the case of UPM's case study, the rotation is between soybeans, maize, and the *Brassica carinata* productive cover crop. It is noted that the case study of UPM in Urugay has also been certified. **Challenges**: • Lack of policy value signal: for example, there are no regulatory targets – at either EU or individual MS level – for use of low ILUC-risk material. • Low ILUC-risk certification is valid for ten years whereas the UPM model takes four years to

Summary of the analysis of the BIKE case studies	
	complete a cycle; therefore there will not be a chance to produce much low ILUC-risk feedstock before certification expires • Data to support the financial barrier test can be limited and not accurate. • Baseline construction difficulties, due to various reasons, e.g. random weather variability, the project introduces a new intermediate crop into an existing rotation and there is no baseline for the new crop, etc. • Yield increase projects are required to construct a "dynamic yield baseline" based on a combination of crop-specific and farm-specific data. Some farmers and operators will not have access to sufficiently detailed records, or may have difficulty in calculating global yield trends from public datasets. • farmers and operators pursuing genuinely beneficial farm interventions at greater cost, run the risk to realise the same rewards as those who are not. • Tight rotations: *Brassica carinata* is known to have a relatively long growing period, which must be balanced against its advantages as an intermediate crop. • Prediction of the results of the additionality measure for the next 10 is challenging. • The availability of appropriate seeds is not guaranteed, and operators who are exploring the use of non-conventional crop varieties may have to take measures to ensure supply. • Challenges related to the achievement of the required Soil sampling density within the available timeframe (tight rotations). Additional complications exist in case sampling has to be performed in degraded land. **Policy measures to support market uptake**: • Change of working in the RED II so as not to exclude intermediate crops from being classified as low ILUC-risk. • Appropriate measure to promote fuels stemming from certified low-ILUC risk feedstock, e.g. Double counting of such fuels against the renewable energy targets, inclusion of intermediate crops that are appropriate for the low-ILUC risk concept in the Annex IX Part B feedstock list. • Additional recognition of the low-ILUC risk system at Member State level through the discretion offered in the RED II's Article 26. • Recognition of benefits, stemming from the implementation of the low ILUC-risk concept, beyond those recognised in EU energy policy. Such benefits include: positive ecological spillovers, enhanced soil carbon accumulation, etc. • Provision of incentives to land managers who maintain and enhance the carbon stock in their lands (as compared to those who allow stocks to degrade and deplete)
Yield increase | BiogasDone Right sequential cropping for biomethane -to-liquid conversion	**Current stage:** The Biogas Done Right Model (BDR) is based on the production of biomethane from sequential cropping methods. More specifically it concerns double cropping with a primary crop for food or feed and a secondary crop for energy production with crop rotation. The BDR model, based on cover cropping, ensures year-long soil cover and improves the soil quality for the main crop. **Challenges**: • Gas grid infrastructure is needed to allow for the implementation of BDR model. Further, information related to the exact geographic location of the grid is important to project developers (i.e. for the optimal location of the digester).

Summary of the analysis of the BIKE case studies	
	• Biogas production is not uniformly incentivised throughout the EU. Countries with advanced frameworks can offer more favourable conditions for the development of the concept. • Tight rotations pertinent to the sequential cropping can be a limiting factors. • BDR model requires significant up-front investment and therefore a supportive framework is a prerequisite for a potential investor. • The BDR model would be suitable for restoring severely degraded land to agricultural health, provided there is the relevant recognition in the related legislation (RED II and Implementing Acts) **Policy recommendations**: • Support in the form of e.g. direct government subsidy based on the units of bioenergy produced, and/or tradeable green certificates, and/or capital contribution for biomethane upgrading equipment, have been proved useful for the sector development (in Italy) and could set the paradigm for other countries (or the EU as a whole) • The BDR model can support the decentralised feedstock production (and lead to the installation of small-scale anaerobic digesters)
Unused land | Castor on degraded land for HVO production	**Current stage:** The cultivation of castor seed (*Ricinus communis*) for HVO production is carried out on 3000 hectares farmland located in Kenya, arid and semi-arid lands, where about 6000 farmers were involve in land preparation as well as planting and harvesting of castor seed. **Challenges**: • Low ILUC-risk projects on unused and abandoned land may require significant up-front investment in preparation for agricultural activity under a low ILUC-risk production system (in contrast with existing agricultural land which merely requires improvement rather than overhaul). • Based on the RED II framework, “severely degraded” and “abandon” share the same advantages. However, the criteria allows for the characterization of a land as “severely degraded”, are still not fully defined posing uncertainty over whether such lands are likely to qualify. • Proving the unused / abandoned status of land areas is a challenging task in the absence of detailed records. • Harvester attachments and efficiency should be customized on a case-by-case basis. The harvesting strategy for new adopters will have to be re-adapted to local growing conditions. Further, issues such as the toxicity of the beans (as is the case of castor oil) and its effects on the machinery, have to be carefully examined. (cleaning is required to avoid contamination of subsequent crops intended for the food and feed sector.) • If the case study model is to be more widely adopted, operators will have to decide on the best approach for their specific circumstances. • If the case study model is to be more widely adopted, operators will have to decide on the best approach for their specific circumstances (low- and no-tillage agricultural management practices). • A layer of assurance that low ILUC-risk feedstock production does not inadvertently pose an invasiveness risk, needs to be created (mitigation of invasiveness risk)

Summary of the analysis of the BIKE case studies	
	Policy recommendations: • More formal recognition of the overlap between land rehabilitation on one hand, and rescue and the principles of low ILUC-risk production systems on the other, would bring value to both. • Adopting low ILUC-risk production models, such as the castor case study, could be facilitated by partnership with such initiatives (Rural development programmes), which can help to overcome financial and non-financial barriers (e.g. providing education about new farming methods, or establishing downstream market linkages).
Unused land | Perennial grasses on marginal land for bioethanol	**Current stage:** Miscanthus cultivated on underutilised lands in the UK can constitute feedstock for a retrofitted 2G bioethanol plant. The retrofitted plant can produce up to 40,000 tonnes per annum of 2G bioethanol. By-product (lignin) is utilised in a CHP unit to generate electricity. **Challenges**: • More clarity is needed on how to demonstrate that Low ILUC-risk projects based on unused or abandoned land avoid large ecological impacts have been avoided, and that the introduction of chemical inputs is reasonably well controlled. • Owners and managers of lands which are classified as unused or abandoned may have a variety of options for what to do with them, including agricultural development, building construction, and rewilding / nature-based services. • Low-quality unused or abandoned agricultural land may be disadvantaged in terms of transport linkages (as land with low economic productivity will be last to justify infrastructure investment and upgrade). This may lead to increased transport costs, lead time, and greenhouse gas emissions. • Contrary to projects which introduce intermediate crops on existing agricultural land, projects such as perennial grasses on marginal land, which seek to start new production on unused land, or on land that has been abandoned without maintenance, may have to bring in equipment or establish irrigation systems anew. • There are two methods for establishing perennial grasses: via rhizomes and via seeds. The decision to propagate using seeds or rhizomes depends on consideration of cost, growth pace, and also availability of specialist seeds. **Policy recommendations**: • Perennial grasses are classed as cellulosic crops, but low ILUC-risk crops are currently defined as being a subset of “food and feed crops” (i.e. they have to be oil-, starch-, or sugar-rich). Relaxing this restriction would provide better changes for market scale-up. • Recognition in the relevant EU regulatory frame that such projects directly contribute to soil carbon and land rehabilitation, would support market scale-up. • Promoting low ILUC-risk models on lands that are at risk of invasive species, would enable simultaneous progress towards multiple policy goals at once.

6. Conclusions

The purpose of BIKE's Work Package 5 was to assess the status of and opportunities for low ILUC-risk production systems in the EU policy and legal framework, cross-referencing the role of low ILUC-risk certification in the Renewable Energy Directive with support for these types of production systems in complementary policies.

Within the above frame, WP5 performed an analysis of the relevant legal, policy and institutional frameworks in EU, also considering a wider to the biofuels frame in order to explore synergies among policy areas. The analysed information was then synthesized under the perspective of both (a) highlighting the opportunities available in the various pieces of legislation to promote the low-ILUC risk concept, and (b) exploring measures and interventions to the policy frame to facilitate market uptake.

Based on the results of the analysis and synthesis process, specific policy recommendations were developed, mainly expressed through the drafting of a series of Briefing Notes on key issues pertinent to the market development of the low-ILUC risk concept. This series of Briefing Notes largely aims to explore issues in the EU policy sphere which may impact low ILUC-risk value chains and are publicly available on the BIKE project website, facilitating thus the dissemination of WP5 results.

Building on the one hand on the analysis of the relevant policy landscape, and on the other hand on the specific experiences form the four BIKE case studies, WP5 elaborated a supportive framework indicating enabling conditions that would potentially allow for the development of low ILUC-risk projects within the current European policy and market frame. This piece of work also considered the technical work performed in the BIKE work packages 2 and 3, and combined (a) the identified enabling policies at European level and the leverage they provide for development of low ILUC project, (b) the supply potential for low ILUC-risk biomass via the optimally assessed conditions for additionality, and (c) demand for low ILUC-risk feedstocks for biofuels production. The outcome was to perform a mapping on the comparative assessment of the European countries (27 EU plus the UK) towards the formulation of a favourable environment to potentially support low ILUC risk projects.

The main findings of WP5 can be summarized as follows:

The recommended actions to support the market uptake of low ILUC biomass production for biofuels include a mix of facts (opportunities for biomass supply through yield increase based on statistics and modelling) and subjective observations (based on the discussions of the BIKE team with the industrial partners in the project). In this respect, key elements to be noted are:

- **Yield increases** should be calculated in a transparent and consistent manner and therefore there is a need for a Commission-approved tool which can automatically calculate the necessary variables, based on a flexible set of input parameters.
- **Double counting** of low ILUC-risk feedstocks (though not those that were not formerly classified as high ILUC-risk) would provide a value signal and is already well established under RED II
- **Carbon credits**: there is no recognition of farm-scale "carbon farming" initiatives in national land carbon inventories (such as the EU's LULUCF framework). This is a missed opportunity for farmers to valorise their carbon sequestration, and for governments to make use of an additional decarbonisation pathway.
- **Introduce indicator-oriented incentives**, following the successful example of the BiogasDoneRight concept that demonstrates how multiple measures can be combined to significantly improve land productivity for both the food and feed and the energy sector

- **Integrate low ILUC risk to rural development programmes**, as it was done in the Kenyan site of the castor bean case study, where farmers benefited from training and equipment availability and were guided in adopting the novel crop.
- Use **multi-dimensional sustainability indicator sets** to channel support for existing projects and to guide policy decisions about the future of farming. The low ILUC risk concept market uptake is relevant to both land rehabilitation goals, biofuels scale-up, and carbon farming goals. This is well recognised in the scientific literature, but EU policy frameworks have yet to synthesise a holistic vision for how to best deploy these kinds of agricultural systems.