

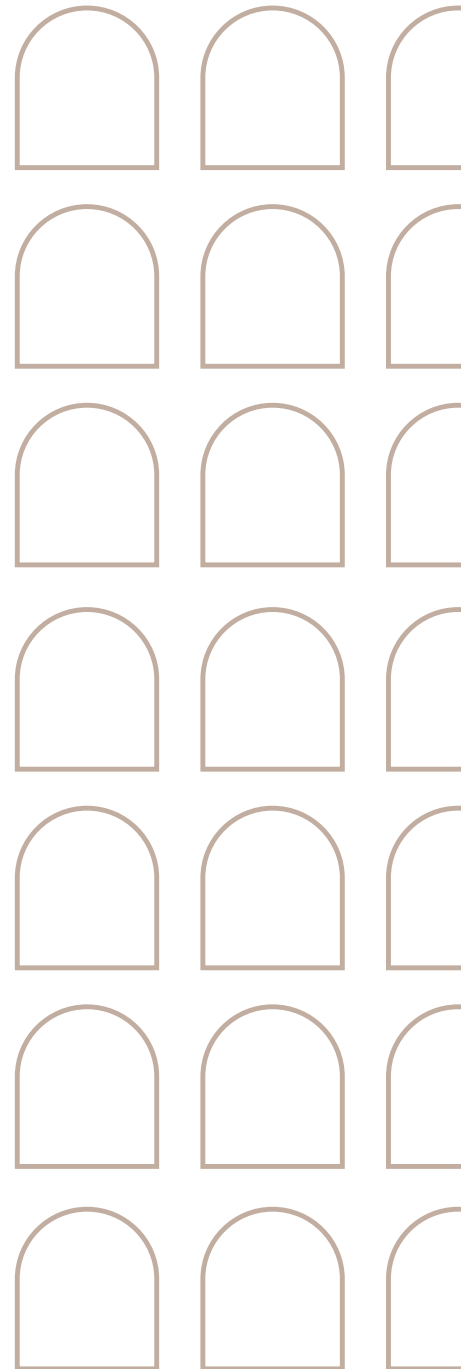
STG Policy Papers

POLICY BRIEF

CERTIFYING LAND-USE BASED CARBON DIOXIDE REMOVALS – OUTLINE OF A STRAWMAN PROPOSAL

Authors:

Artur Runge-Metzger, Linde Zuidema, Peter Vis and Jos Delbeke



EXECUTIVE SUMMARY

Science is clear that to reduce the impacts of climate change increasing amounts of carbon dioxide (CO₂) will have to be removed from the atmosphere, even if all greenhouse gas (GHG) emissions were to be completely eliminated. Land-based activities, such as forest, agricultural or soil management, have the potential to remove and/or store significant amounts of carbon.

However, a number of concerns exist around the measurability and the non-permanence of natural carbon sinks, with related risks of 'greenwashing' due to reversals, leakages, and double-counting. These concerns will need to be addressed satisfactorily when developing a robust, transparent, and dynamic EU-wide CO₂ removals certification system. It should be developed step-by-step and allow for learning-by-doing. Initial focus should be on those land-based CO₂ removal options for which high-quality monitoring capability already exists, such as afforestation, reforestation, agro-forestry and biochar.

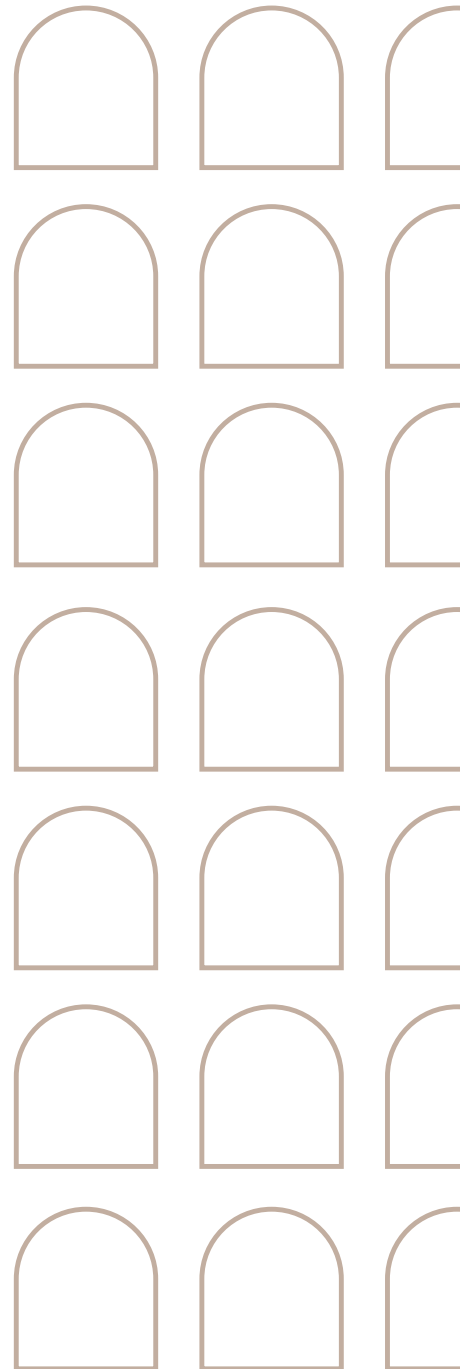
Transparency will be key. Each CO₂ removal certificate – representing a tonne of CO₂ removed from the atmosphere for a specified period of time – will have to carry a minimum set of information including geo-references, period of validity, methodologies used and on-going monitoring requirements to be followed. Additional information, for example, in terms of promoting biodiversity, could highlight co-benefits.

The governance of an EU-wide certification system will have to clarify roles and responsibilities of different public and private actors, establishing sufficient checks and balances in developing methodologies and their use, keeping track of issuance, ownership, and transactions in the central EU registry, as well as regulating public access.

If successful, an EU-wide CO₂ removal certification system could set a new international standard. In the EU, it would lay the foundation for creating performance-based incentive systems, which can be created via standards, direct public support like under the Common Agriculture Policy, voluntary markets, and compliance markets such as the EU emissions trading system.

Authors:

Artur Runge-Metzger | former Director at the European Commission
Linde Zuidema | Research Associate, EUI School of Transnational Governance
Peter Vis | Senior Research Associate, EUI School of Transnational Governance
Jos Delbeke | EIB Professor of Climate Policy, EUI School of Transnational Governance



1. POLICY CONTEXT

Keeping global average temperature increase to below 1.5° Celsius will require deep cuts in global GHG emissions within the next decades. In parallel, increasing amounts of CO₂ will have to be captured and removed from the atmosphere from land-based, technology-based, and hybrid options¹ to reach this goal. According to the IPCC's 6th Assessment Report, in modelled pathways that report carbon dioxide removals and that limit warming to 1.5°C (>50%) with no or limited overshoot, total cumulative net negative CO₂ emissions including carbon dioxide removals deployment across all options are 20–660 GtCO₂.² In fact, beyond 2050, global climate mitigation action in a 1.5° Celsius scenario will be almost entirely about removing increasing amounts of CO₂ from the atmosphere. In addition, new viable solutions to further reduce residual GHG emissions will have to be found.

The EU's mitigation pathways compatible with the goal to stay below 1.5°C warming indicate an estimated contribution of land-based net removals of around 500 million tonnes of CO₂ per year by 2050³. The EU Green Deal and the EU Climate Law both emphasise the need for urgent investments in land-based removal options. In particular, solutions generating the highest CO₂ removals, such as growing trees, require significant lead time until they develop their full removal potential. As part of a broader climate package, in July 2021, the European Commission proposed – for the first time – a separate land-based CO₂ removals target of 310 million tonnes of CO₂-equivalent by 2030.

The EU-wide target is to be implemented through binding national targets requiring Member States to step up their land use policies⁴.

Scaling up land-based removals will in many cases, such as tree planting, need significant up-front investments and incur land management costs and/or opportunity costs from reduced yields⁵ or competing uses of biomass⁶. Thus, the extent to which land managers are willing to change their current land management practices will depend on the scope and scale of financial rewards for CO₂ removals. In this context, the Commission has announced as a first step to develop an effective regulatory framework for the certification of CO₂ removals by the end of 2022⁷.

Developing an EU removals policy will not have to start from scratch. Land-based CO₂ removals are already accounted for in the annual national GHG inventories under the United Nations Framework Convention on Climate Change (UNFCCC) which are based on methodologies of the Intergovernmental Panel on Climate Change (IPCC). These international obligations have been transposed and further developed in EU legislation⁸. Internationally, within the UN context, methodologies have been established to validate and verify land-based mitigation under the Clean Development Mechanism for afforestation and reforestation and Reducing Emissions from Deforestation and Forest Degradation (REDD+)⁹.

In parallel, voluntary 'net-zero' commitments in the corporate sector have increased the demand for 'land use' credits in the voluntary

1 Minx J.C. et al.

2 IPCC (2022). Working Group III contribution to the IPCC AR6. Technical Summary. Geneva. https://report.ipcc.ch/ar6wg3/pdf/IPCC_AR6_WGIII_FinalDraft_TechnicalSummary.pdf; IPCC (2018). Summary for Policymakers. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty, <https://www.ipcc.ch/sr15/>

3 European Commission (2021). *Sustainable Carbon Cycles for a 2050 climate-neutral EU*. Technical Assessment. SWD(2021) 451 final, https://ec.europa.eu/clima/system/files/2021-12/swd_2021_451_parts_1_to_3_en_0.pdf?msckid=6ca740ddb44711ec8b87c2d0f783d96c; European Commission (2018). *In-Depth Analysis in Support of the Commission Communication*, COM (2018) 773 ("Long Term Strategy for the EU: 'A Clean Planet for All'"), https://knowledge4policy.ec.europa.eu/publication/depth-analysis-support-com2018-773-clean-planet-all-european-strategic-long-term-vision_en

4 European Commission (2021), *Proposal for a Regulation of the European Parliament and of the Council amending Regulations (EU) 2018/841 as regards the scope, simplifying the compliance rules, setting out the targets of the Member States for 2030 and committing to the collective achievement of climate neutrality by 2035 in the land use, forestry and agriculture sector, and (EU) 2018/1999 as regards improvement in monitoring, reporting, tracking of progress and review*, COM(2021) 554 final, https://ec.europa.eu/clima/eu-action/european-green-deal/delivering-european-green-deal/land-use-forestry-and-agriculture_en

5 COWI, Ecologic Institute and IEEP (2021), *Technical Guidance Handbook – setting up and implementing result-based carbon farming mechanisms in the EU*, https://ec.europa.eu/clima/eu-action/forests-and-agriculture/sustainable-carbon-cycles/carbon-farming_en

6 Material Economics (2021). *EU biomass use in a net-zero economy. A course correction for EU biomass*. Stockholm. Page 47. <https://materialeconomics.com/latest-updates/eu-biomass-use>

7 European Commission (2021). *Communication: Sustainable Carbon Cycles*, COM(2021) 800 final, https://ec.europa.eu/clima/system/files/2021-12/com_2021_800_en_0.pdf

8 Official Journal of the European Union (2018). Regulation (EU) 2018/841 *Inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework*, <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018R0841&from=EN>

9 UNFCCC, *Mechanisms under the Kyoto Protocol*, <https://unfccc.int/process-and-meetings/the-kyoto-protocol/mechanisms-under-the-kyoto-protocol/the-clean-development-mechanism>; UNFCCC, *What is REDD+?*, <https://unfccc.int/topics/land-use/workstreams/redd/what-is-redd>

carbon market¹⁰. This resulted in a growing number of private start-ups providing services to link supply and demand. In this context, the public debate on land-based CO₂ removals has been heating up, particularly with numerous governance issues being raised with respect to ensuring environmental integrity¹¹. In response, an increasing number of initiatives have started attempting to address issues by developing and testing a plethora of competing and complementary methodological approaches¹².

There is a clear potential and need to scale up land-based CO₂ removals in the EU by providing a long, loud and legal framework that will incentivise land managers to increase carbon removals with social and environmental integrity. Drawing from existing experiences, this policy brief outlines a way forward with respect to the certification and governance of land-based CO₂ removals, laying a solid foundation for structuring public and/or private financial incentives.

2. BASIC PRINCIPLES OF CERTIFICATION

The transparency and credibility of a certification framework for CO₂ removals should be the cornerstones on which a robust CO₂ removal management systems and policy framework for financial incentives is built. If done well, this could trigger another example of the 'Brussels effect'¹³, setting a standard that will increasingly be applied internationally.

For an EU wide certification system to develop as a credible and widely-used system it should:

1. Mirror as closely as possible the key characteristics of land-based CO₂ removals. Thus, each certificate will have to accurately reveal in a transparent manner information

about key quality characteristics;

2. Be consistent with the overall national land use, land use change and forestry inventory system, and thus to the nationally-determined contributions as pledged under the Paris Agreement. In this way, any artificial inflation in the issuance of certificates or double-counting should become quickly detectable;
3. Be capable of recognising and promoting synergies and co-benefits with other important policy objectives, notably biodiversity protection and increasing ecosystem resilience. It should help avoiding 'quick sugar fixes', such as ensuring, for instance, that the right tree species is planted at the right place for the right purpose;
4. Be governed by robust institutional arrangements ensuring an effective and efficient functioning of the system, including the development of methodologies, accreditation, verification and validation, and minimising administrative costs.

Regardless of these basic principles, a new certification system will not be perfect right from the beginning. Thus, a practical and cautious stepwise-approach is recommended that builds dynamism into its initial design. This will allow for starting simple, learning-by-doing and letting the system improve over time. The initial focus should be on those land-based solutions for which relatively robust high-quality monitoring, reporting and verification (MRV) methodologies exist, for example, afforestation, reforestation, agro-forestry and biochar. For other land-based solutions, including soil organic carbon, robust MRV methodologies will have to be developed

¹⁰ Ecosystem Marketplace (2021). *State of the Voluntary Carbon Markets 2021*, <https://www.ecosystemmarketplace.com/publications/state-of-the-voluntary-carbon-markets-2021/>

¹¹ Governance issues include: data quality/uncertainties; interannual variability; additionality; baseline-setting; double-counting; non-equivalence; system boundary; leakage; permanence; risk of reversals; liability; environmental and social effects; public oversight administrative costs. See, e.g., Umwelt Bundesamt (2021). *Certification of Carbon Removals – Part 1*, https://www.umweltbundesamt.at/studien-reports/publikationsdetail?pub_id=2405&cHash=e6af7d1855770f2d-c555831b8a74fade; German Environment Agency (2022). *Nature-based solutions and global climate protection*, https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/2022-01-03_climate-change_01-2022_potential_nbs_policy_paper_final.pdf. Carbon Market Watch (2021), *Recommendations on forests in voluntary carbon markets*, <https://carbonmarketwatch.org/publications/recommendations-on-forests-in-voluntary-carbon-markets/>; Stabinsky D. and Doolley K. (2021). *Forests can't handle all the net-zero emissions plans – companies and countries expect nature to offset too much carbon*, <https://theconversation.com/forests-cant-handle-all-the-net-zero-emissions-plans-companies-and-countries-expect-nature-to-offset-too-much-carbon-170336>

¹² Examples of standards developed in the Europe include: Moorfuture, Woodland Carbon Code, Label bas-carbone, and Puro; For a review of existing carbon removal certification mechanisms and methodologies, see: Umwelt Bundesamt (2021). *Certification of Carbon Removals – Part 2*, https://www.umweltbundesamt.at/studien-reports/publikationsdetail?pub_id=2406&cHash=408350d9540b00320c64a5211133f86f

¹³ Bradford, A. (2020). *The Brussels Effect: How the European Union Rules the World*. <https://oxford.universitypressscholarship.com/view/10.1093/oso/9780190088583.001.0001/oso-9780190088583>.

swiftly. In this way, certification will lay the basis to reward an increasing number of land-based mitigation efforts.

3. CERTIFICATE INFORMATION

For all governance issues related to land-based CO₂ removals practical solutions must avoid the risk of greenwashing or negative environmental (such as carbon leakage, biodiversity loss, water quality) or social effects (such as adverse impacts on local communities and livelihoods).

It is recommended as a minimum to reflect the following key characteristics of land-based carbon removals in the information carried by each CO₂ removal certificate:

- **Location and type of land-based CO₂ removal:** In different locations in the EU a broad variety of different land use management practices can be deployed in different combinations and at very different scales, from individual plots up to entire jurisdictions. A certificate therefore needs to contain geo-references in terms of the location and the areas covered, as well as information on the management practices applied. This basic information will allow for regular checks over time which will be an essential element for various stages of the governance process as described below.
- **Additionality and MRV:** To determine the quantity of CO₂ removed and hence the number of certificates issued (each certificate representing a tonne of CO₂ stored), the additional removals of a project are compared to a baseline. Comparisons can be made against a historical reference, or theoretical scenarios simply extrapolating the existing situation (business-as-usual) or anticipating future levels of removals on the basis of changing assumptions (forward-looking). The 'additionality test' can further include both financial and regulatory parameters. In view of these diverging approaches, it is recommended that the certificate makes reference to the methodology that was used to establish

the baseline and to determine the number of allowances. In addition, the certificate should provide information on the method used for monitoring and validating changes in carbon storage over time.

- **Permanence:** Due to natural dynamics, the period for which the actual CO₂ removals remain stored in soils and vegetation can differ greatly between various land-based solutions and across different biogeographical contexts. In addition, longevity of removals can also depend on ownership and land tenure arrangements. The tenure of farms and forests changes over time, and today's owner or tenant might only be able to commit to applying certain land management practices for a certain period of time. Even today's farmer or forester might want or be forced to change farm practices due to market conditions or new legal obligations. Therefore, it is recommended for each certificate to carry an expiry date or a period of validity (*de facto* introducing tonne-years as described by the IPCC¹⁴). In this way, certificates issued based on agro-forestry, afforestation or the application of bio-char will be valid for a longer period, while those issued on the basis of changing crop rotation would be valid for a much shorter time period. This would allow land users that have rented a stretch of cropland to let the certificate expire at the end of the rental period. Also, knowing the exact temporal validity of each certificate will allow *ex-ante* to create a permanent tonne of removals by lining-up a succession of time-limited certificates over time. As a result, managing removal certificates would become analogous to managing various intermittent renewable energy sources to maintain a stable supply of electricity to the grid or a portfolio of financial products, like shares and bonds to maintain a steady flow of income.
- **Other characteristics:** Climate change affects biodiversity, and conversely, changes in biodiversity affect the climate

14 IPCC (2000). Watson R.T., et al. Special Report on Land Use, Land Use Change and Forestry, https://archive.ipcc.ch/ipccreports/sres/land_use/index.php?idp=74

system¹⁵. An isolated focus on carbon therefore risks neglecting other important ecosystem services that land and forests provide for nature and people and – in fact – could undermine the intended long-term outcome for the climate. For example, forests with a higher mix of tree species generally store more carbon and are more resilient to climate change, thus also more likely to sequester and store carbon for a longer period of time. To allow a system to value important co-benefits, it is recommended that certificates carry or refer to information on the extent to which a change in management practices has contributed to environmental or social aspects, or how potential negative impacts are identified and mitigated. These could include a wide range of impacts, including on biodiversity, improvements to soil and groundwater quality or benefits for local communities. Allowing certificates to be linked to certain additional non-carbon aspects could increase their value and drive good practice.

4. GOVERNING THE CERTIFICATION PROCESS

Robust institutional arrangements for an effective and efficient functioning of an EU certification system can promote a high degree of environmental integrity while keeping transaction costs manageable. In view of the characteristics described above and in Annex I, the governance of an EU-wide certification system is particularly recommended to:

- **Assign clear responsibilities** for involved public and/or private bodies, establishing effective checks and balances, including on the (i) development of standards and methodologies, (ii) accreditation of certification bodies, (iii) ex-ante validation of removals, (iv) ex-post verification of removals, (v) risk management and liability, notably if removals are reversed, and (vi) stakeholder involvement, such as the
- **Define the process of assessing and validating methodologies**, for example with respect to establishing baselines, additionality and monitoring approaches aiming at assuring overall quality and avoiding ‘greenwashing’. In a first pragmatic step, standard methodologies could be established for a limited number of practices per bio-geographical region, such as afforestation, reforestation, agroforestry, bio char, zero tillage, cover crops. Uncertainty and annual fluctuations should be taken into account, for instance by discounting a percentage of the removal to reflect the degree of confidence in the actual removal. The set of methodologies is recommended to remain dynamic allowing the system to develop and adapt over time with growing experience and technological innovations.
- **Define monitoring process** employing best available monitoring approaches incorporating most recent technological and digital developments. Existing monitoring and reporting under the Land Use, Land Use Change and Forestry (LULUCF) Regulation, the land parcel information system under the Common Agricultural Policy, national forest inventories, as well as data from the COPERNICUS space observations provide an excellent basis for building a reliable monitoring system in the coming years which will become more granular over time. Ideally, certification and regular monitoring over time at holding level is recommended to be based on scientific sampling methods.
- **Provide security and transparency** on the issuance, ownership, transactions and final use of certificates. Collecting this information centrally in the EU registry will avoid double-counting and ensure both consistency with national inventories and coherence across key parts of EU climate legislation, including the EU Emissions

¹⁵ See, e.g., IPCC & IPBES (2021). *Biodiversity and Climate Change – scientific outcome*, https://ipbes.net/sites/default/files/2021-06/2021_IPCC-IPBES_scientific_outcome_20210612.pdf

Trading System (EU ETS), the Effort Sharing and LULUCF sectors, that are already use the EU registry. This will allow assessment of the overall compliance with obligations under the Paris Agreement. When expanding the EU registry to CO₂ removal certificates, the use of blockchain technology should be considered to ensure secure transactions within the context of a potentially large number of participating legal entities¹⁶.

- **Allowing public access** to relevant non-sensitive information on certificates is fundamental to ensure effective accountability and increase public confidence in the system.

5. LOOKING BEYOND CERTIFICATION: PUTTING A VALUE ON CO₂ REMOVAL CERTIFICATES

The described robust and credible certification system will lay a solid basis for structuring financial incentives for landowners: by putting a value on the CO₂ removal certificate, CO₂ removals could be turned into a revenue stream for them. In future, an incentive framework should be designed to ensure a level playing field across the EU. It should be able to detect and address carbon leakage and other distributional, negative environmental or social side effects (such as on food security). It should reward landowners on the basis of their performance and thereby incentivise them to increase their efforts to enhance CO₂ removals through distinct land management changes. Turning CO₂ removals into a viable revenue stream will also require governments and the financial sector to become pro-active in developing tools to finance the significant up-front investments, such as is required for tree-planting, before actual 'carbon revenues' are realised. To cover the resulting risks, the insurance industry should develop novel insurance products to cover the negative consequences of unintended reversals, like forest fires¹⁷.

In future, it will still need to be decided how exactly CO₂ removal certificates could be utilised in the wider context of the EU's climate policy. In principle, there are four potential policy instruments that could be deployed incentivising a sufficient supply of certified CO₂ removals.

- 1. Setting carbon removal standards:** The EU could propose under the Common Agricultural Policy new cross-compliance provisions that would require landowners to enhance CO₂ removals and to protect carbon sinks on their land. Such actions could be based upon the certification regulatory framework for CO₂ removals. Similarly, EU legislation could oblige companies to use CO₂ removal certificates, for instance those that use biomass¹⁸ or within the context of corporate reporting standards when justifying their claims about offsetting emissions along the value chain. Also, in the context of the EU taxonomy, it could be considered to define environmentally sustainable economic activities in the agriculture and forestry sector on the basis of the generation of a minimum number of CO₂ removal certificates.
- 2. Provision of direct public support:** A number of publicly-funded pilot schemes are already in operation. Under the new Common Agriculture Policy 2023-2027, Member States can deploy eco-schemes to directly reward landowners for a change in management practices under innovative carbon farming schemes, both for practice-based and result-based schemes. This would provide additional incentives. However, current CAP financial resources will be insufficient in the longer-term to put the EU on track to climate neutrality in 2050. Even for reaching the required amounts of CO₂ removals in 2030 and 2040, it might be necessary to set up a new specific and substantial pillar of support in the next round of CAP reform. Another possibility for generating additional public support could be to use the certification system as

¹⁶ See, e.g., the project Climate Warehouse (established by the World Bank), <https://www.theclimatewarehouse.org/about/mission>

¹⁷ See, e.g., Swiss Re (2021), *The Insurance rationale for carbon removal solutions*. <https://www.swissre.com/institute/research/topics-and-risk-dialogues/climate-and-natural-catastrophe-risk/expertise-publication-carbon-removal-technologies.html>

¹⁸ As suggested in European Commission (2020), Impact Assessment accompanying the document Communication [...] Stepping up Europe's 2030 climate ambition, investing in a climate-neutral future for the benefit of our people, SWD(2020) 176 final part 2/2

a basis for the allocation of State aid to CO₂ removal activities at national level.

- 3. Voluntary carbon market:** Voluntary markets already exist but use different certification schemes and this results in very different carbon prices. It can be expected that many suppliers in the voluntary carbon market would wish to meet the newly set EU certification framework in order to be able to match demand from those willing to pay higher carbon prices in exchange for more credibility and environmental quality.
- 4. Compliance carbon markets:** In the EU, a new connection of certified removals to the EU ETS could be created over time¹⁹. In California and New Zealand, practical experience of allowing removals to be used for compliance in carbon markets has already been gathered. A possible connection could take account of the fact that under the latest revision of the existing EU ETS the number of allowances to be issued is expected to go down to zero well before 2050. At that point in time, any remaining GHG emissions from processes in agriculture and industry that technically cannot be reduced will need to be matched by either previously banked allowances, or, alternatively, an equivalent number of CO₂ removal certificates to balance those residual emissions and achieve 'net-zero'.

6. CONCLUSION

The forthcoming proposal for a regulatory framework for the certification of carbon dioxide removals is another watershed moment in terms of EU climate change policymaking. For more than 30 years, the European Union's climate policies have concentrated on emission reductions and avoidance. Only recently has the EU's Climate Law reframed future ambition around the goal of 'net-zero' in 2050, and the higher ambition for 2030 has been similarly reset. As any remaining emissions by 2050 will have to be balanced by removals and in the years thereafter atmospheric CO₂ levels will have to be lowered year-by-year, there now

urgently needs to be a policy for defining and certifying such removals. Removals need to be added to the climate policy toolbox, without undermining the effectiveness of policies that are already in place. Recent initiatives already make useful steps in that direction, as recognition of removals are included in the reform of the Common Agricultural Policy and in the proposal to enhance the Land Use, Land Use Change and Forestry 'sink' to 310 million tonnes of CO₂ removals by 2030. What is needed now is a regulatory framework for the certification of CO₂ removals.

The EU ETS was Europe's first major climate instrument that came into operation in 2005, and it is still designed only to reduce or avoid greenhouse emissions, whether through fuel switching, the development of emissions-free renewable technologies, or to incentivise decarbonised technologies for industry. Ultimately, it was assumed that if emissions from the sectors covered by the EU ETS reduce their emissions to zero, the system would have fulfilled its purpose and be discontinued. However, on the basis of present analysis, there will still be legacy greenhouse emissions in 2050 and beyond, including from some industrial processes where process emissions are intrinsic to the production process, and possibly from civil aviation. Outside today's EU ETS, also significant amounts of GHG emissions from agricultural activities will have to be balanced by removals.

A determined push for removals must therefore become a central plank of the EU's future policy toolbox. It is difficult to create new policy instruments from scratch. While new policy tools can build on experiences both in Europe and across the globe, it can really be said that 'this is where the action is'. It is central to start a process as soon as possible and improve the policy through gaining practical experience.

¹⁹ La Hoz Theuer et al (2021). *Emissions Trading Systems and Net Zero: Trading Removals*. International Carbon Action Partnership (ICAP), Berlin. https://www.adelphi.de/en/system/files/mediathek/bilder/ICAP_NetZeroPaper_final.pdf

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School of Transnational Governance
European University Institute
Via Camillo Cavour 65, Firenze, FI 50129
Email: stg.publications@eui.eu

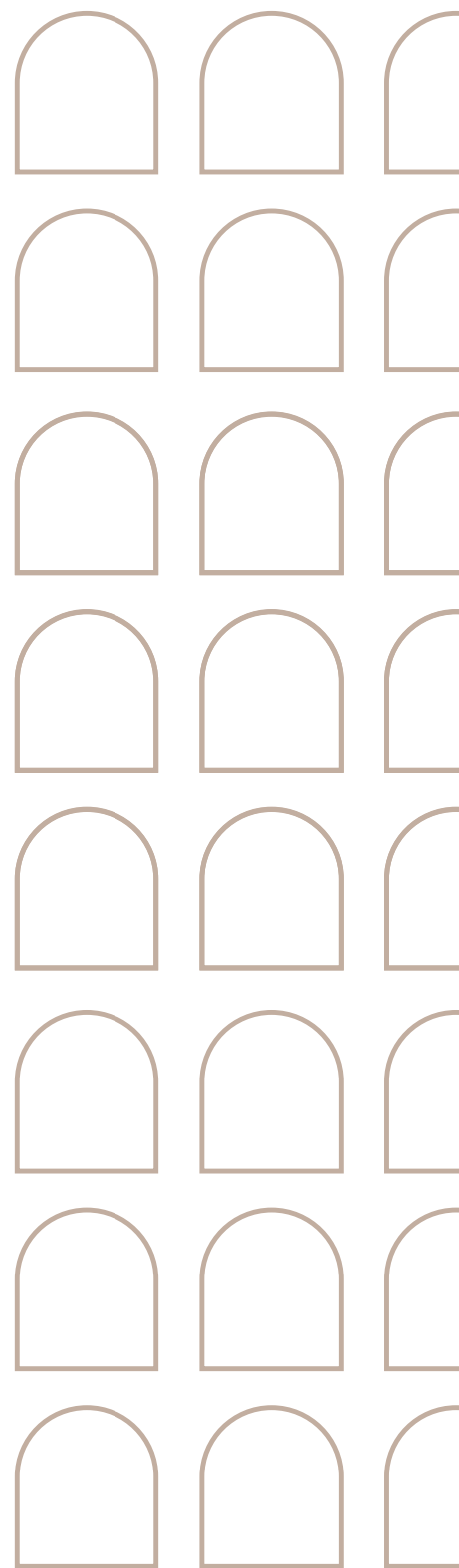
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