

# Carbon sinks in Europe : stakeholders taking action to bring out the next solutions for carbon neutrality

## Conclusions / Prospects



Brussels – 05<sup>th</sup> September 2023

OFFICIAL EVENT  
PROGRAMME 2023

MAISON  
IRÈNE ET FRÉDÉRIC  
JOLIOT-CURIE



9:15 Introduction	
1. Welcome by <b>Pierre Franck Chevet</b> , <i>CEO IFPEN, President of ANCRE</i> , "ANCRE presentation" (10')	<a href="#">Pdf file</a>
2. <b>Alexandre Paquot</b> , <i>DG CLIMA Director Innovation For A Low Carbon, Resilient Economy</i> , DG CLIMA's vision: situation, solutions, institutional decisions (25')	<a href="#">Pdf file</a>
3. <b>Daphné Lorne</b> , <i>IFPEN &amp; ANCRE task leader</i> , ANCRE position paper: "What roles for research to enhance carbon sinks development in France?" (15')	<a href="#">Pdf file</a>

## 10:15 – 11:15 Round Table 1: How to preserve carbon sinks in natural areas?

Preservation/knowledge of carbon sinks in **totally or predominantly natural areas** (natural habitats, protected areas, aquatic ecosystems, etc.). This round table devoted to the "preservation/knowledge of carbon sinks in totally or predominantly natural areas" will take stock of the understanding of bio-geochemical mechanisms, of the knowledge of natural flows and will anticipate their evolution. It will also look at what additional political measures are needed given the current state of play.

**Moderator : Monique Axelos**, INRAE & ANCRE

1. <b>Nicolas Viovy</b> , <i>CEA &amp; LSCE - Climate and Environment Sciences Laboratory &amp; ANCRE</i> , "How to preserve carbon in a changing climate" (12')	<a href="#">Pdf file</a>
2. <b>Guillaume Soulet</b> , <i>IFREMER &amp; ANCRE</i> , « Costal blue carbon ecosystems and rock weathering » (12')	<a href="#">Pdf file</a>
3. <b>Liselotte Jensen</b> , <i>Policy analyst in the European Parliamentary Research Service's unit on Climate Action and Research Tracking (EPRS CART)</i> , « EU certification framework for carbon removals » (12')	<a href="#">Pdf file</a>

## 11:30 – 12:45 Round Table 2: How to harness the potential of biomass-based solutions for carbon removal?

Actions to deploy carbon stocking practices through biomass management (in agriculture, forestry, urban areas, industrial wastelands, other anthropised areas, etc.). This round table devoted to "actions to deploy new sinks via biomass" will attempt to take stock of the available stocks and to identify actions with high potential for storing carbon and CO<sub>2</sub>, such as carbon farming. It will also look at what political measures are needed at European level to encourage and support these actions.

**Moderator: Jack Legrand, CNRS, Nantes Université & ANCRE**

1. <b>Nicola Di Virgilio</b> , <i>DG AGRI - Policy officer at EU Commission DG Agriculture and Rural Development, Unit B2 Environmental sustainability</i> , « Common Agricultural Policy 2023-2027 and its role in supporting EU carbon sink » (12')	<a href="#">Pdf file</a>
2. <b>Philippe Delacote</b> , <i>INRAE, environmental economist, the Climate Economics Chair</i> , « Forest-based climate change mitigation and adaptation in Europe » (12')	<a href="#">Pdf file</a>
3. <b>Pierre Faure</b> , <i>CNRS &amp; GISFI, Interdisciplinary Laboratory of Continental Environments &amp; ANCRE</i> , « Carbon sinks from re-naturalisation of anthropized and urban environments » (12')	<a href="#">Pdf file</a>
4. <b>David Chiaramonti</b> , <i>Politecnico Torino, RE-CORD - Professor of Energy Economics, and Bioeconomy</i> , « Biochar as biomass-based solutions for carbon removal » (12')	<a href="#">Pdf file</a>

## 14:00 – 15:15 Round Table 3: How to enhance carbon capture actions, industrial processes, geological storage and long-term storage solutions

The most practical solutions of atmospheric and biogenic carbon capture and storage (industrial pathways, geological reservoirs, long-life materials, etc.). This round table is devoted to "carbon capture actions, the industrial sectors, geological storage and long-term storage deployment of new sinks via biomass". It will deal with national and EU potential, technical issues, scenarios, roadmap and political measures.

**Moderator: Adel El Gammal, GS EERA**

1. <b>Jeroen Schuppers</b> ; <i>DG RTD, Deputy Head for Advanced Energy Production</i> , "Role of European Research to achieve Net Zero Emissions" (12')	<a href="#">Pdf file</a>
2. <b>Florent Guillou</b> , <i>IFPEN, Carbon Capture Project Manager</i> , Potential and challenge of (non-fossil) carbon capture technologies, (12')	<a href="#">Pdf file</a>
3. <b>Christiane Hennig</b> , <i>IEA Bioenergy, Task 40 leader</i> , IEA Bioenergy work program on bioenergy and negative emissions (12')	<a href="#">Pdf file</a>
4. <b>Aïcha El Khamlichi</b> , <i>ADEME</i> , prospective on energy and bio-based solutions, "Carbon sinks in Net zero emission scenarios in the French Report "Transition(s) 2050" (20')	<a href="#">Pdf file</a>

- **Our 3 main objectives:**

- **State of the art:** scientific advances and knowledge, R&D activities, European policies
- **Connecting, Build bridges:** between teams from European countries, between projects, between research and institutions (commission, parliament). Strengthen dialogue between R&I players and policymakers
- **To look ahead:** future activities, European regulations, new skills, etc.

- **This is a start:**

- **To connect** European research teams
- **To notice** that community is larger than national and European projects only
- **To dialogue** between researchers and EU representatives: Today involving 3 DG's and parliament

# STATE OF THE ART

- **By 2050:** we have a collective objective of carbon neutrality that will imply reduction of annual GHG emissions AND increase of annual carbon sinks
- **But today :**  
and from several years: **annual carbon sinks are decreasing.** To reverse the trend we need :
  - ✓ to know more about natural reservoirs and carbon fluxes in ecosystems
  - ✓ to develop news solutions keeping in mind biodiversity, water, GHG emissions and others pollutants, etc.
  - ✓ regulation and support

- Interaction (positive, negatives), synergies and co-benefits
  - Objectives for LULUCF: 50, 100 and 170 MtCO<sub>2</sub>eq/y by 2030, 2035 and 2050
- Forests : **protecting, restoring (carbon sinks, biodiversity) and managing**
- Risk of permanent natural disequilibrium → take into account potential mitigation / adaptation of natural areas, but also risk of natural area destroying due to climate change or human activities (fires...)
- Technological and natural solutions exist
  - Providing they don't increase disequilibrium
- Don't forget other issues : **biodiversity, water, nitrogen, GHG gases**
- Uncertainties remain → **need of monitoring / verification**
- Every solution will be needed
  - Beware of rebound effect and false good ideas
  - Don't forget CCU

- **Lots of possible regulations but not always well-known:**
  - **Innovation Fund dedicated to technologies development and deployment**
  - **Proposal EP: QU.A.L.ITY criteria > framework (Quantification, Additionality, Long term storage, Sustainability) [See Slide #23]**
    - Carbon farming
    - Permanent Carbon Storage
    - Carbon storage in products or materials
  - **Carbon removal certification → Agriculture**
    - France: low carbon certificates
    - LULUCF, Technical solutions
  - **European regulation vs US Inflation Reduction Act (IRA)**
    - Europe : Clear and stable legislation (long term objectives)
    - US: very ambitious – subsidies → CCS, hydrogen,
    - IRA challenges Europe policies because money is in the US → how will it be used ?
    - ETS: 600 Billion Euros → A lot of money!
  - **See slides #17, #18 & #19 for details**



## European Climate Law – New Green Deal Fit for 55 package

### European Climate Law

55 % net emissions cut by 2030, compared to 1990

Climate neutrality by 2050

Emission Trading System (ETS)

ETS sectors  
61 % emissions cut,  
compared to 2005  
levels

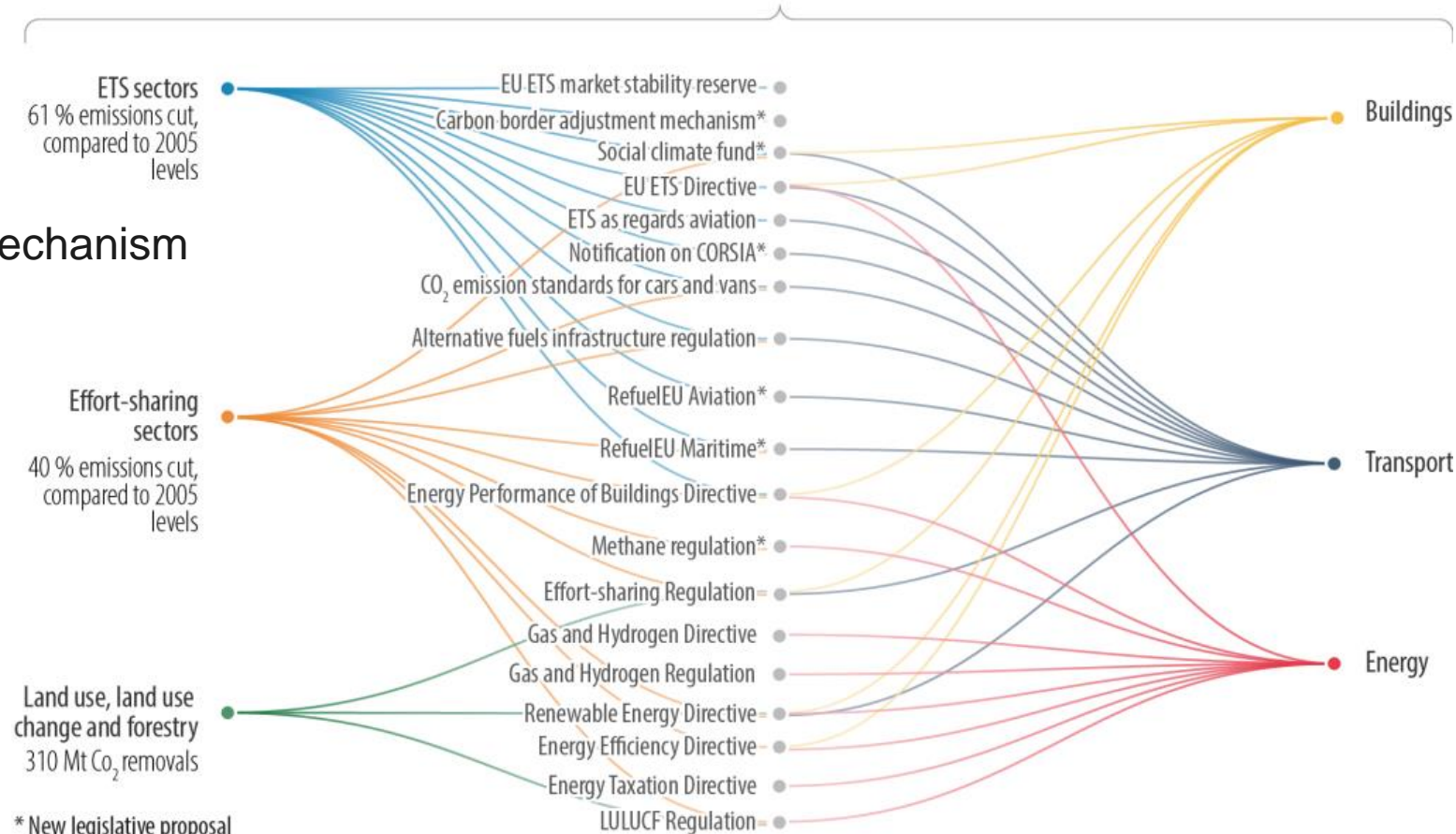
Carbon Border Adjustment Mechanism (CBAM)

Effort Sharing Regulation (ESR)

Effort-sharing  
sectors  
40 % emissions cut,  
compared to 2005  
levels

Land use, land use  
change and forestry  
310 Mt CO<sub>2</sub> removals

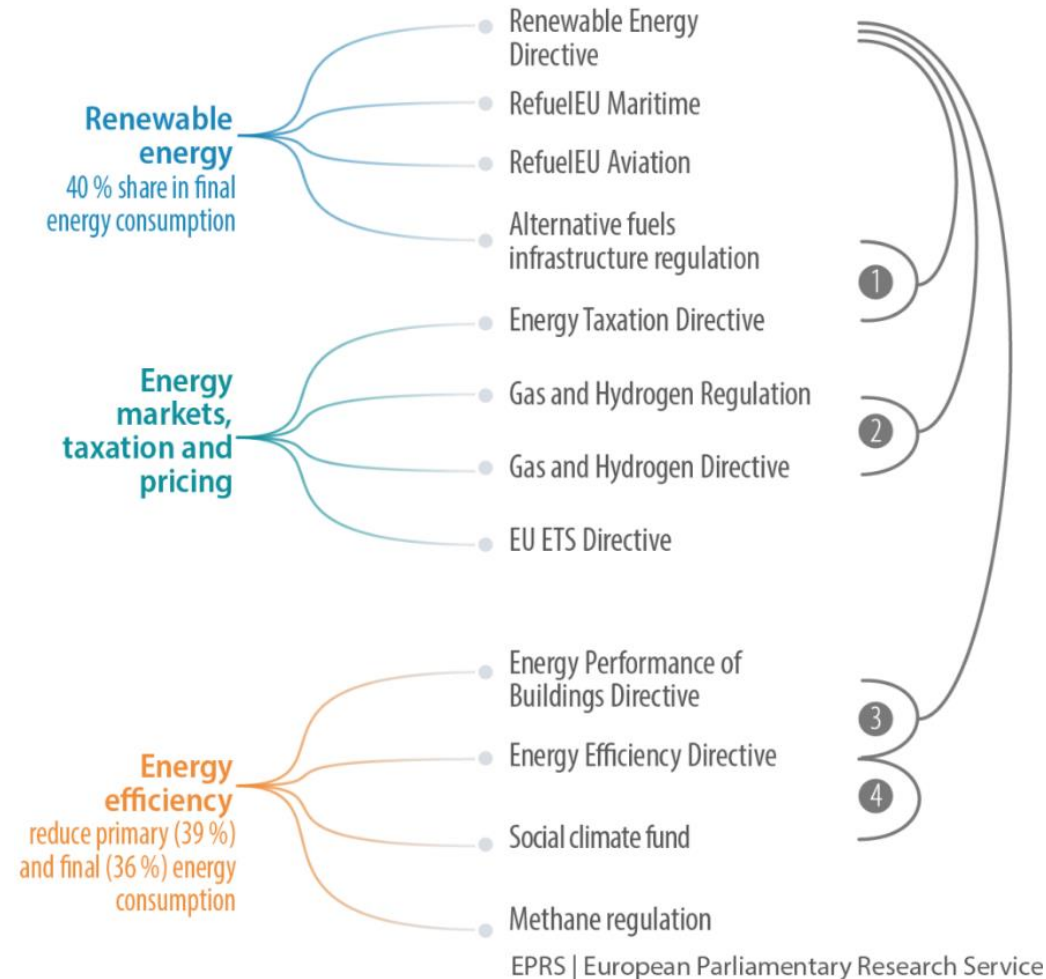
\* New legislative proposal





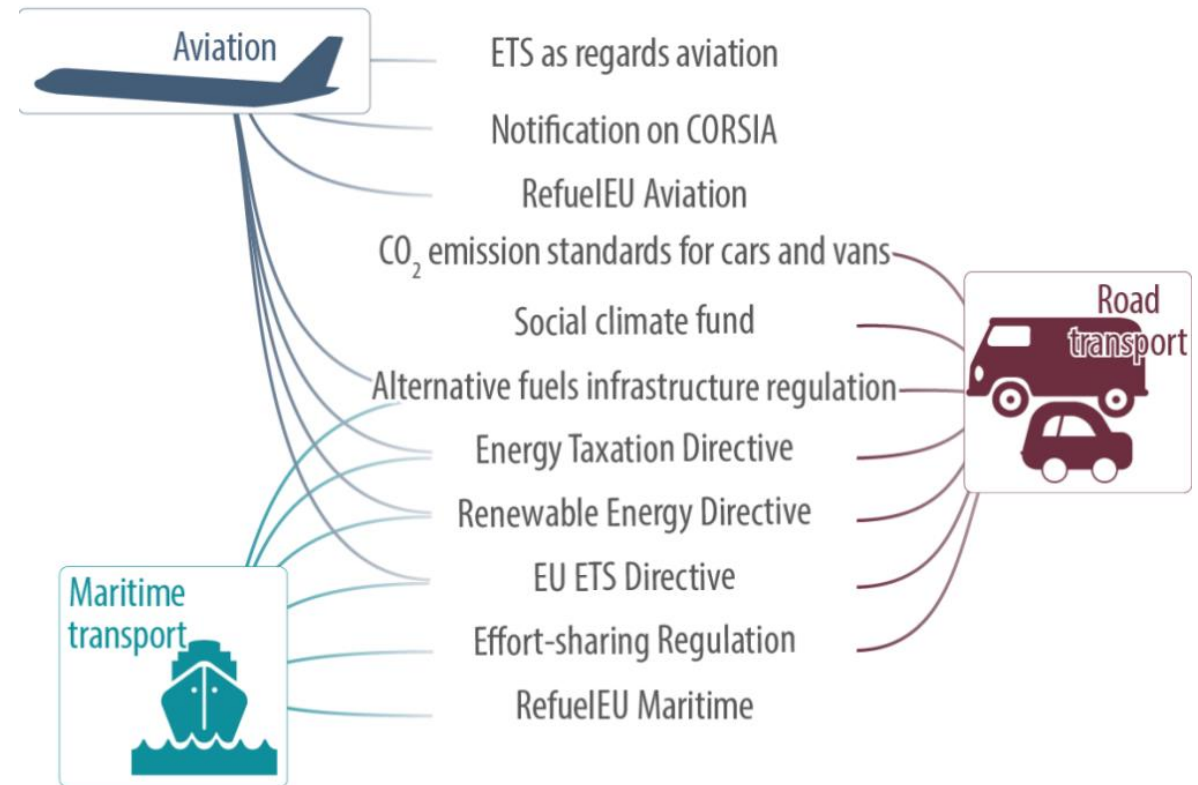
## Fit for 55 package – focus on energy and transport

### Energy: at the heart of the climate neutrality transition



### Transport: a challenging sector for climate action

6 legislative proposals to reduce transport emissions



EPRS | European Parliamentary Research Service

# CONNECTING – BUILDING BRIDGES

- **Some EU Projects and teams**

- NEGEM <https://www.negemproject.eu/>
- BIONet <https://www.ufz.de/index.php?en=49066> [See Slides #20, #21, #22]
- IAE Bioenergy Task 40 - Deployment of biobased value chains <https://task40.ieabioenergy.com/>
- USBI <https://biochar-us.org/#:~:text=USBI%20is%20building%20an%20industry,Give%20or%20volunteer%20today.>)
- ForestPath <https://forestpaths.eu/>
- Forest4EU <https://www.forest4eu.eu/>
- Many other European projects
- ...

- **Focus on collaborative work in France**

- Reference scenarios for carbon neutrality by 2050 in France: ADEME – “Transitions 2050”:  
<https://www.ademe.fr/en/futures-in-transition/>
- Position paper on “The role for research in accelerating carbon sink development in France”:  
<https://www.allianceenergie.fr/position-paper-les-puits-de-carbone-quels-roles-de-la-recherche-pour-accelerer-leur-developpement-en-france/>

- **Horizon Europe: Cluster 5, Cluster 6 → feedback on topics of interest for APP 2025-2027**

- **Research and Legislation**

- Regularly organise **Experts-DG’s meetings**
- Organise **consensus conferences**
- Reinforce the regular links with **EPRS and scientific labs**

# NEXT STEPS – LOOKING AHEAD

# NEXT STEPS (1/3) - What to focus on?

- **Maintaining the state of the art**
  - Knowledge spreading: scientific advances, R&D activities
  - European policies
- **Connecting research teams and projects**
  - It is important for teams to establish and maintain regular dialogue (sharing of information)
- **Strengthening dialogue between R&I players and policymakers**
- **Looking ahead: future R&I activities, European regulations, new skills, etc.**
- **Synergies between natural areas / areas managed by humans increases areas resilience**
- **Synergies between research teams from different fields and/or policy makers increase:**
  - Information flow → get to know initiatives better inside/outside research community
  - Publish research data and communicate to policy-makers → need to be reinforced
  - Capability to act, based on knowledge
- **DGs' instruments: laws and directives proposals, researchers need to be better informed**

- **Aims to give a boost to lifelong learning**, giving citizens and businesses the means to contribute to the ecological and digital transitions
  - Supporting innovation and competitiveness.
- **Introducing a new way of doing** with carbon capture generates a need for skills
  - To meet the needs of ecosystems
  - To meet the industry needs
  - Consideration to be given at regional, national and European level as part of the transition.
- **Existing example: Net-Zero Industry Act**
  - This concerns several EC DGs, with DG Employment in the lead (with DG EAC, DG CNNECT, DG &I, etc.)
  - New skills needed
- **Employment area may change**

[https://year-of-skills.europa.eu/index\\_fr](https://year-of-skills.europa.eu/index_fr)



# NEXT STEPS (3/3) - It is up to us !

- **Researchers and policy makers: supporting regulatory decisions based on scientific evidence**
  - Reinforce discussions with European Commission
  - From researchers to politics → methodologies, results, scientific data/evidence
  - From politics to researchers → explanation/education about legislative system, law implementation, influence of consensus between member states
  - Don't forget Industrial sector: technical and economical issues, markets, offer/demand, skills
- **Research : systemic approach need to be reinforced**
  - Measurements, Monitoring and Verification (MMV)
  - Infrastructure / Platforms for Data
  - CO2 yes! But what about Biodiversity (terrestrial, oceans; wet areas), water cycle, Nitrogen cycle, other GHG ?
  - Links between carbon storage and ecosystems (decrease CO<sub>2</sub> in atmosphere, increase biodiversity) must be better known (cooperation and trade-offs)
  - Multidisciplinary approach / Multicriteria analysis, including social analysis → Need for specific European projects and initiatives
  - EERA support : <https://www.eera-set.eu/> & <https://supeera.eu/>
  - EUBCE conference 24-27 June 2024 in Marseille
- **New skills: 2023, European Year of Skills means Skills update for new jobs**
- **This means: possible new projects and research initiatives**
- **This means: possible initiatives in EC & EP in partnership with researchers**

# BACK UP

- The European Commission's Fit-for-55 package paves the way for achieving a net reduction in emissions of 55% by 2030 compared with 1990, i.e. 2.1 billion tonnes of CO2 equivalent, and carbon neutrality by 2050.
- On 15 December 2021, the European Commission adopted a communication (ref. COM(2021) 800 final) on sustainable carbon cycles aimed at increasing carbon absorption as part of its strategy to achieve carbon neutrality by 2050. In particular, the Commission is targeting an increase in carbon storage in agricultural soils (carbon farming) and industrial carbon capture and recycling.
  - [https://climate.ec.europa.eu/eu-action/carbon-capture-use-and-storage/implementation-ccs-directive\\_en](https://climate.ec.europa.eu/eu-action/carbon-capture-use-and-storage/implementation-ccs-directive_en)
- Sustainable industrial carbon : “The resolution also states that technologies for the direct capture of CO2 from the air, combined with permanent storage, which are scientifically proven and environmentally safe, can contribute to achieving climate neutrality in the EU. MEPs also stress that solutions based on carbon capture and storage (CCS) and carbon capture and utilisation (CCU) technologies can play a role in decarbonisation.”
  - <https://www.europarl.europa.eu/news/fr/press-room/20230310IPR77223/ambition-climatique-un-nouvel-objectif-en-matiere-de-puits-de-carbone>

# Examples of regulations and proposals

## Forest and Agriculture

- **Climate ambition: EP votes for new carbon sink target (ENVI plenary session 14-03-2023)**
  - A new European target for 2030 to increase carbon sinks in the EU by 15%.
  - New nationally binding targets for 2030 in all Member States
  - Improved governance and monitoring, penalties for non-compliance
  - <https://www.europarl.europa.eu/news/fr/press-room/20230310IPR77223/ambition-climatique-un-nouvel-objectif-en-matiere-de-puits-de-carbone>
- **All EU Member States will have nationally binding targets for 2030 for LULUCF removals and emissions.**
  - <https://www.europarl.europa.eu/resources/library/media/20221110RES52801/20221110RES52801.pdf>
- **Member States may buy or sell absorption credits between LULUCF and the Effort Sharing Regulation in order to meet their targets.**
- **The European Commission adopted a proposal for an initial EU-wide voluntary framework for the reliable certification of high-quality carbon removals..**
  - [https://ec.europa.eu/commission/presscorner/detail/fr/ip\\_22\\_7156](https://ec.europa.eu/commission/presscorner/detail/fr/ip_22_7156)
- **Revising the Effort-sharing Regulation for 2021-2030: 'Fit for 55' package (2021)**
  - [https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/698812/EPRS\\_BRI\(2021\)698812\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/698812/EPRS_BRI(2021)698812_EN.pdf)
- **Soil monitoring law proposal**
  - [https://environment.ec.europa.eu/publications/proposal-directive-soil-monitoring-and-resilience\\_en](https://environment.ec.europa.eu/publications/proposal-directive-soil-monitoring-and-resilience_en)
- **Nature restoration Law**
  - <https://www.europarl.europa.eu/news/en/press-room/20230707IPR02433/nature-restoration-law-meps-adopt-position-for-negotiations-with-council>

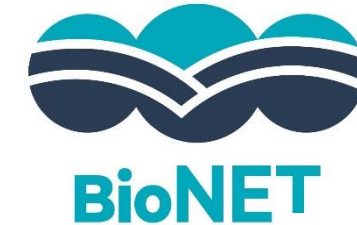
# Examples of regulations and proposals

## Technology/Industry

- **Net Zero Industry Act** : accelerated decarbonisation of sectors such as the automotive and construction industries, with increasingly stringent climate standards.
  - developing industrial solutions for the capture, storage and recycling of carbon, used for example in the production of synthetic fuels, plastics, gums, chemicals, etc. (target of at least 20% of the carbon used in chemicals and plastics to come from non-fossil sources by 2030).
  - [https://single-market-economy.ec.europa.eu/industry/sustainability/net-zero-industry-act\\_en](https://single-market-economy.ec.europa.eu/industry/sustainability/net-zero-industry-act_en)
  - In order to develop these activities, the Commission is helping to set up an internal market for carbon capture, use and storage, and is helping to create the necessary Europe-wide infrastructure for transporting CO<sub>2</sub>.
- **Innovation Fund**
  - The main instrument for financing these ambitions in the short term is the Innovation Fund financed by the EU Emissions Trading Scheme (EU-ETS).
  - [https://climate.ec.europa.eu/eu-action/funding-climate-action/innovation-fund\\_en](https://climate.ec.europa.eu/eu-action/funding-climate-action/innovation-fund_en)
  - [https://cinea.ec.europa.eu/programmes/innovation-fund\\_en](https://cinea.ec.europa.eu/programmes/innovation-fund_en)

## BioNET – Multi-level Assessment of Bio-based Negative Emission Technologies

- **Project duration:** January 2022 – December 2024
- **Funded by:** German Federal Ministry of Education and Research (BMBF)
- **BioNET:** 1 of 10 projects of the federal research program "CDRterra"



SPONSORED BY THE



## BioNET Project partners in Germany:

Helmholtz Centre for Environmental Research



German Biomass Research Centre



The Thünen Institute



University of Giessen



University of Greifswald



Zittau/Görlitz University of Applied Science



Technical University of Munich



**BioNET Project lead:** Prof. Dr. Daniela Thrän (UFZ/DBFZ)





Biomass is a multifunctional material serving many purposes.

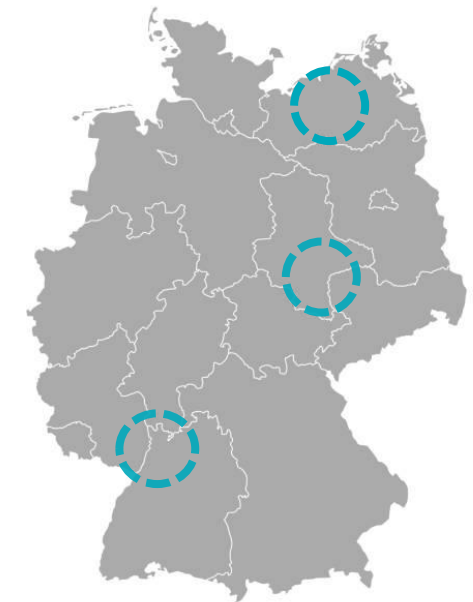
**BioNET** looks at agricultural systems, peatlands, forest and, building materials, and bioenergy with carbon capture and storage.

**BioNET** assesses which biomass-based negative emissions options can be implemented on a regional level for achieving the German net zero goal.

**BioNET** combines social science approaches with established methods of modelling competition for limited biomass and trade-off analyses.

### 3-stage approach

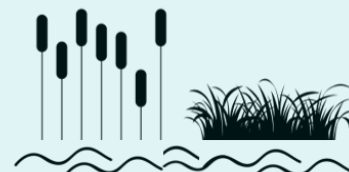
- **Provide a transparent and easily accessible database on bio-based NETs (n=24)**  
[https://www.openagrar.de/receive/openagrar\\_mods\\_00088415](https://www.openagrar.de/receive/openagrar_mods_00088415)
- Participatory approaches (**surveys, interviews, workshops**) to investigate social and institutional feasibility (case studies in Germany: Mecklenburg-West Pomerania, Central Germany, Rhine-Neckar-Region)
- Development and holistic assessment of national **scenarios** for bio-based NETs
- **Development of policy recommendations**





## Agriculture and soil management

- All-year ground cover
- Organic fertiliser and compost as soil additive
- No-till
- Land conversion of arable land into permanent grassland
- Agroforestry
- Biochar as soil additive



## Peatland and paludiculture

- Rewetting of drained peatland
- Paludiculture



## Forest management

- Permanent and temporary set-aside
- Expansion of forest area via (controlled) natural succession
- Afforestation with beech, Douglas fir, oaks, Scots pine



## Long lived building materials

- Engineered wood products for load-bearing elements
- Renewable biomass-based insulation materials
- Pyrogenic carbon capture and storage-based (PYCCS)



## Bioenergy with CCS (BECCS)

- Biogas production
- Biogas upgrading to biomethane
- Biomass combustion (from paludiculture and woody biomass)
- Biomass gasification
- Bioethanol production



### Details of the proposal -> QU.A.L.I.TY criteria at the core

- A voluntary framework
- Registries and methodology criteria to be publicly available

#### Specifics:

- quality criteria ->
- rules for verification and certification
- rules for the functioning and recognition of schemes
- > *details forthcoming in delegated acts*

- **QU**antification (Article 4) (applying a formula with variations based on activity)
  - > Net carbon removal benefit =  $CR_{baseline} - CR_{total} - GHG_{increase} > 0$
  - > LULUCF Regulation accounting rules to apply to determine  $CR_{baseline}$  and  $CR_{total}$  for carbon farming activities.
- **AD**ditionality (Article 5)
  - > Due to incentive of certification and going beyond EU or national requirements
- **LO**ng-term storage (Article 6)
  - > Monitor and mitigate risks – defined monitoring period linked to type of CR
  - > Liability mechanisms foreseen but undefined in legislative proposal
- **SUST**ainability (Article 7)
  - > Neutral impact or generate co-benefits for all the following objectives;
    - > (a) climate change mitigation beyond the net CR benefit; (b) climate change adaptation; (c) sustainable use and protection of water and marine resources; (d) transition to a circular economy; (e) pollution prevention and control; and (f) protection and restoration of biodiversity and ecosystems.
  - > Comply with sustainability criteria laid down in certification methodology for the specific CR activity



[@EP\\_ThinkTank](#)



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