



# Fit for 55

Geographical Monitoring system for CO<sub>2</sub> emissions and  
Land Use Changes – the EU regulatory foundation

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*4 May 2023*

# The political context

## Climate Law

- EU objective of **climate neutrality** by 2050

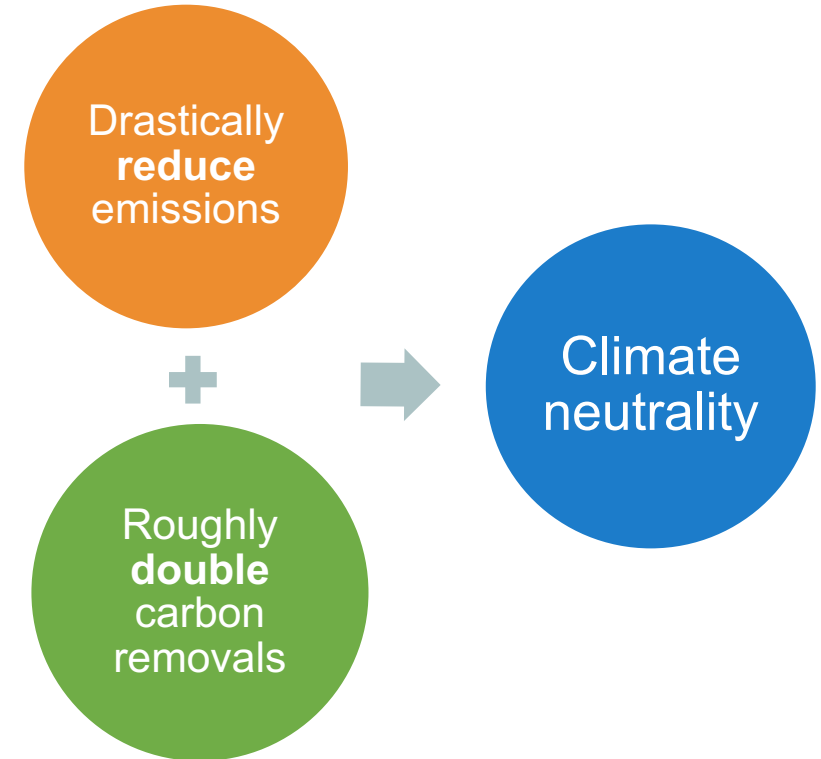
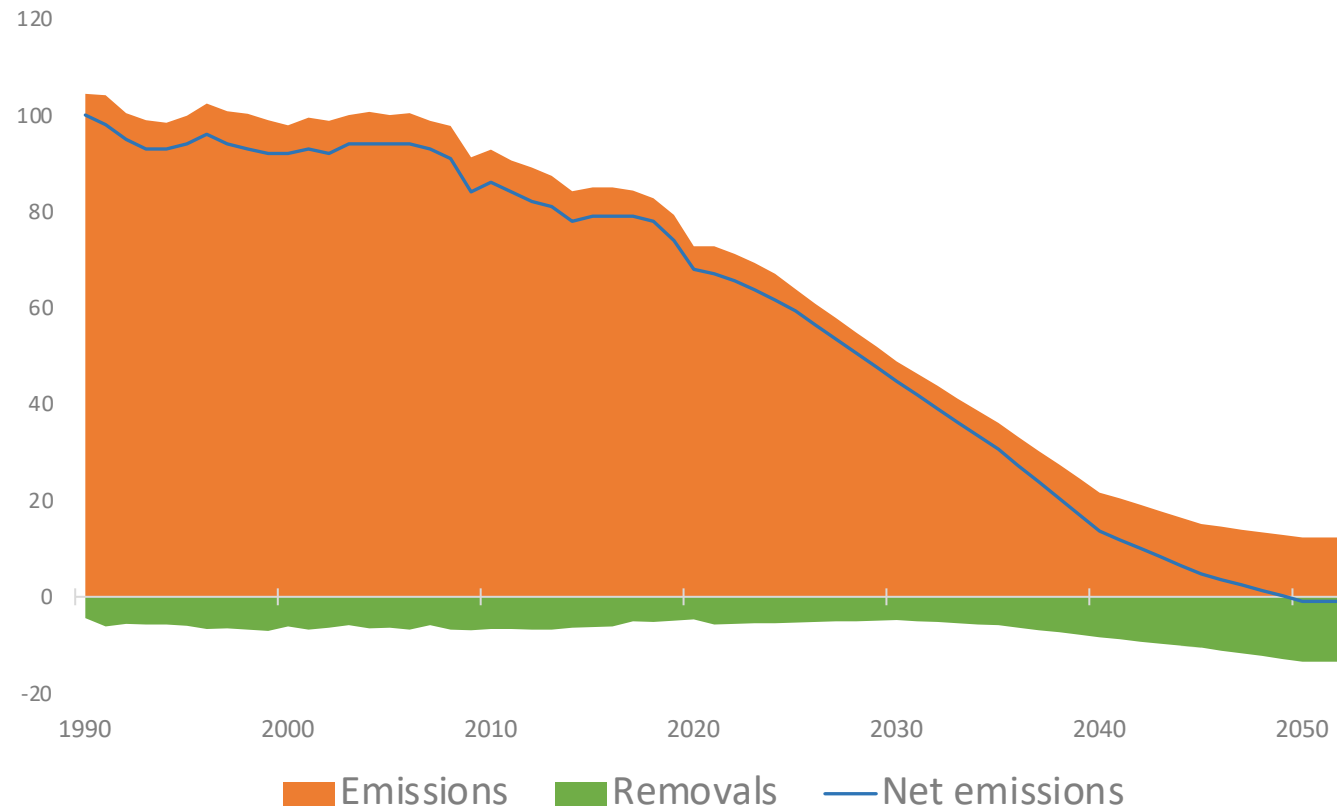
## Land Use, Land Use Change and Forestry (LULUCF) Regulation

- ambitious target for net carbon removals in soils, forests and wood products: **-310 Mtonnes by 2030**

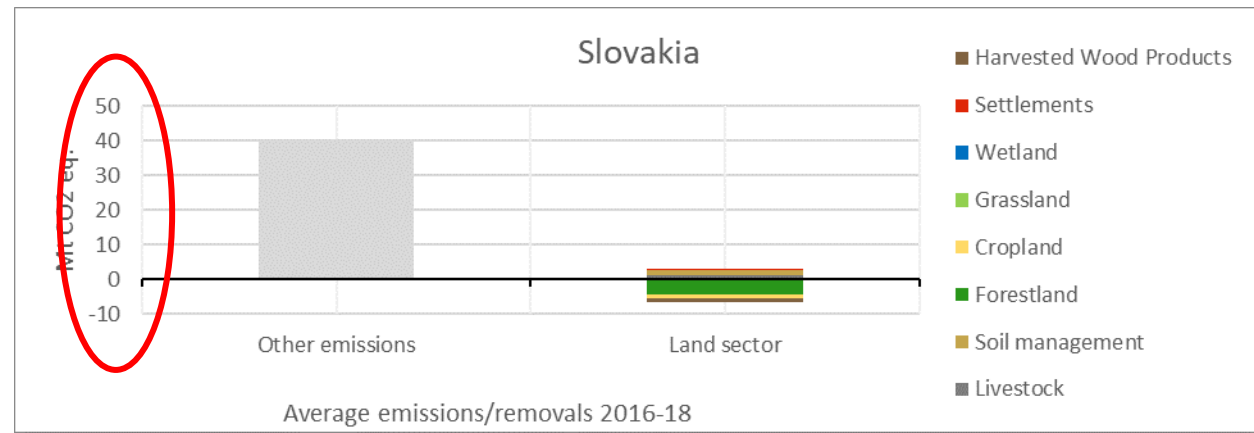
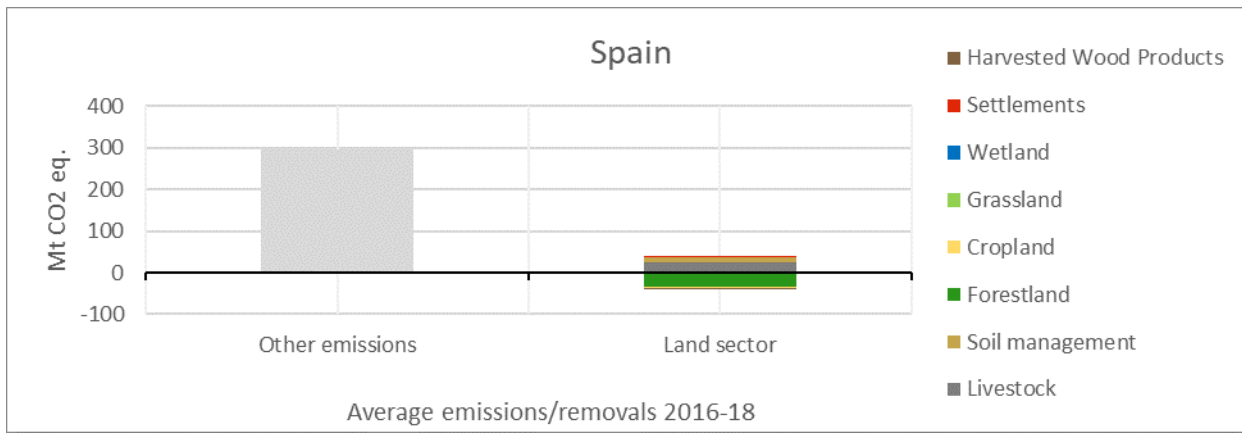
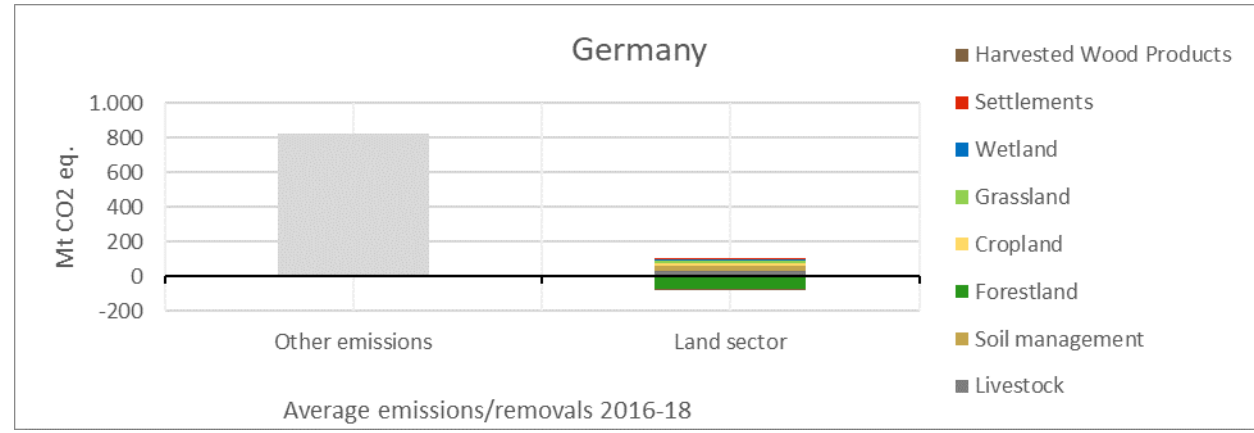
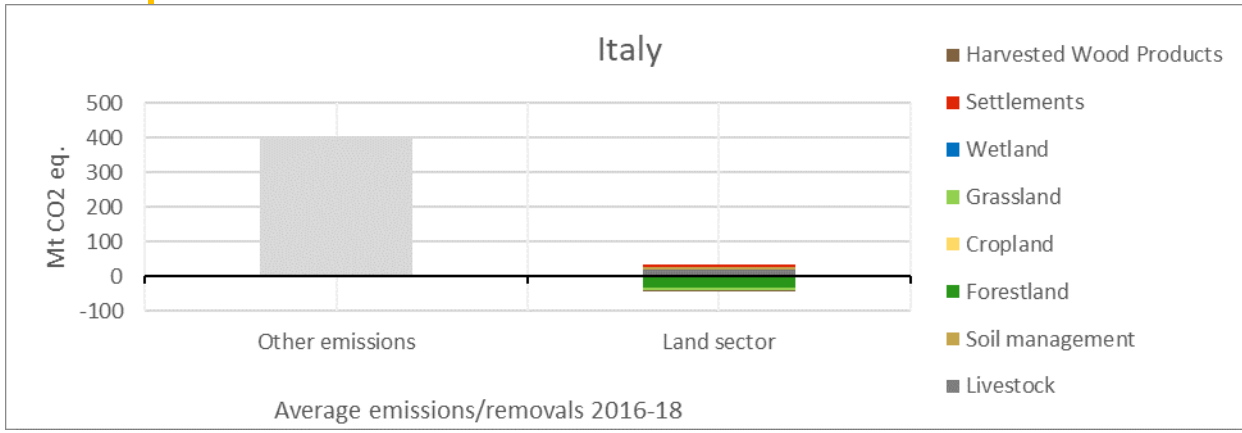
## Sustainable Carbon Cycles – ambition and implementation

- roadmap to enable carbon removals:
  - **carbon farming** should contribute to 2030 target for LULUCF
  - **industrial solutions** should remove at least -5MtCO<sub>2</sub>eq in 2030

# Why carbon removals?

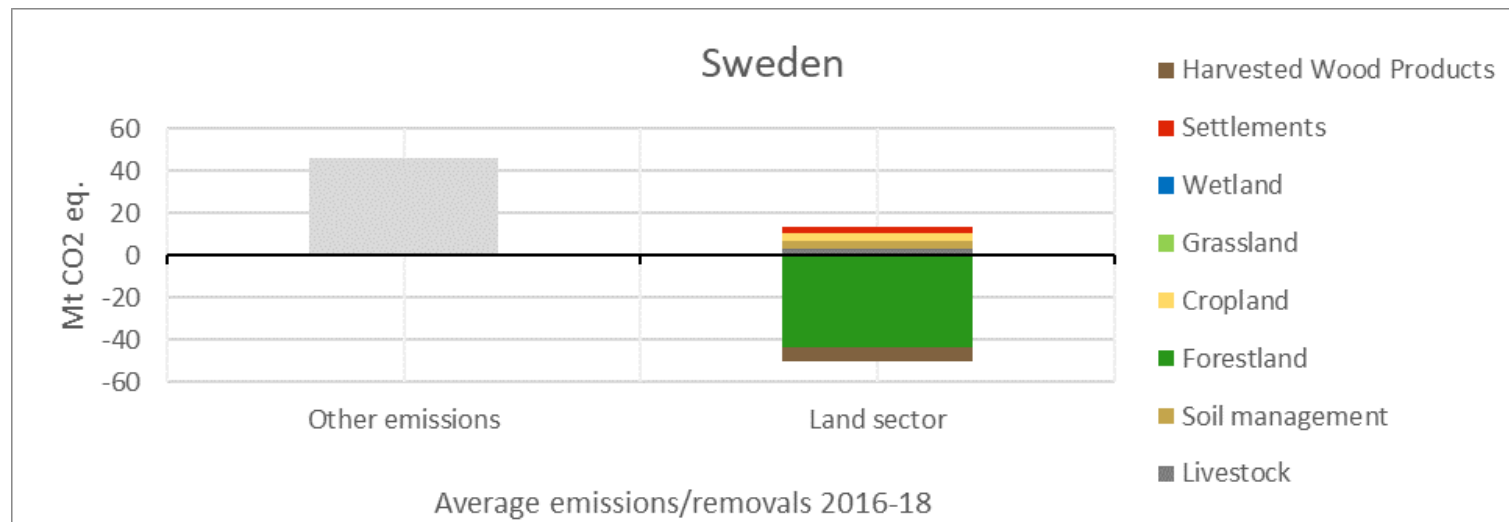
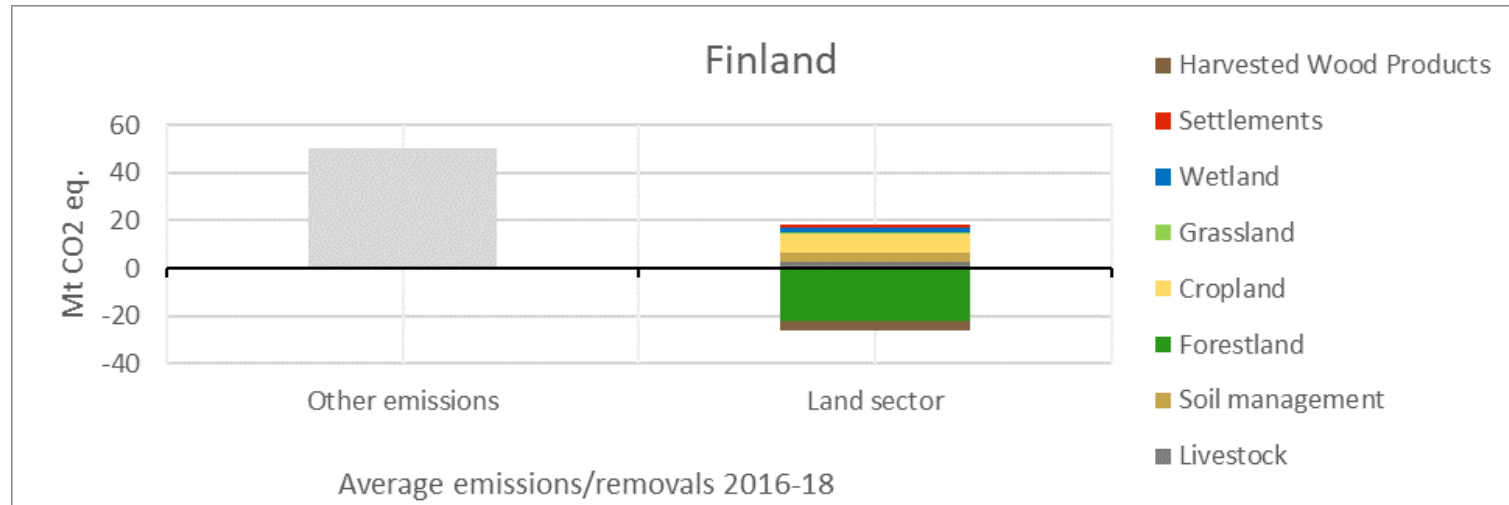


GHG projections for climate neutrality  
1990 GHG emissions = 100  
Source: EU 2030 Climate Target Plan

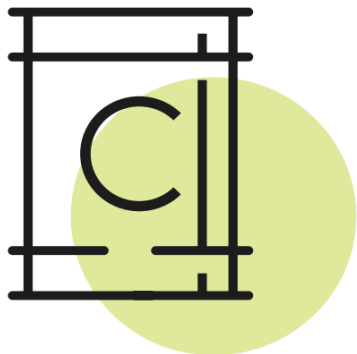


**Total emissions/removals in the land sector (coloured column, subcategories from the LULUCF and agriculture (non-CO2) sectors), and the total of other remaining emissions (grey column) by Member State**  
*Data from 2020 GHGI submission*

# The future is now...



# Different types of carbon removal activities



## PERMANENT STORAGE

*e.g. Bioenergy with Carbon Capture and Storage (BECCS), Direct Air Carbon Capture and Storage (DACCS)*

***Industrial leadership for climate-neutral technologies***

- + Large mitigation potential
- + Permanent and additional
- Needs upfront investment

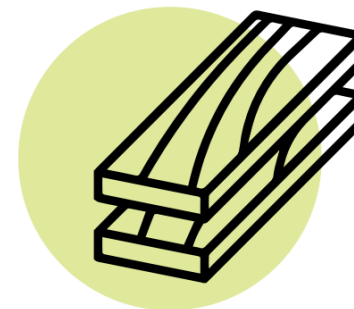


## CARBON FARMING

*e.g. Af-/re-forestation, sustainable forest management, agroforestry, soil carbon sequestration, peatland restoration*

***Realise strong synergies with biodiversity***

- + Synergies with environment
- + Business in rural areas
- Not permanent



## CARBON STORAGE IN PRODUCTS

*e.g. Use of wood-based materials in construction, long-lasting Carbon Capture and Utilisation (CCU)*

***New European Bauhaus***

- + Substitute fossil materials
- + Good for bioeconomy
- Complex certification

# Key take-aways of the LULUCF revision: Regulation (EU) 2023/839\*

## Higher ambition

- **Explicit MS targets - for first time**
- **Full territorial scope from 2026**

## Better monitoring

- **Move to Tier-2 and Tier-3 level, geographically explicit basis (use of earth observation)**

## Improved governance

- **Corrective action process**
- **Recommendations by Commission**

## EEA in the lead for implementation

- **Reinforced EEA team, Copernicus tools**

\* <http://data.europa.eu/eli/reg/2023/839/oj>

## Better monitoring

- Move to Tier-2 and Tier-3 level, geographically explicit basis (use of earth observation)

- Recital (29) ... all require enhanced monitoring of land, thereby helping to protect and enhance the resilience of nature-based carbon removals throughout the Union. The **monitoring and reporting of emissions and removals needs to be upgraded**, where applicable, using advanced technologies available under Union programmes, such as **Copernicus**, and **digital data collected under the Common Agricultural Policy**, applying the twin transition of green and digital innovation
- Recital (30) Mapping and monitoring provisions, **both in field and remote sensing monitoring**, should be introduced in order to allow Member States to have **geographically explicit information to identify priority areas** that have the potential to contribute to climate action. ...



# Estimating removals

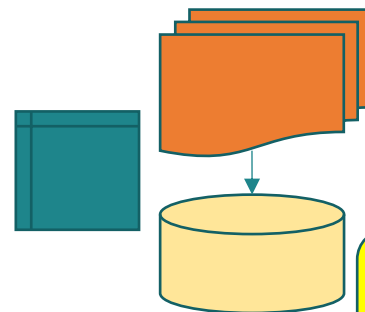
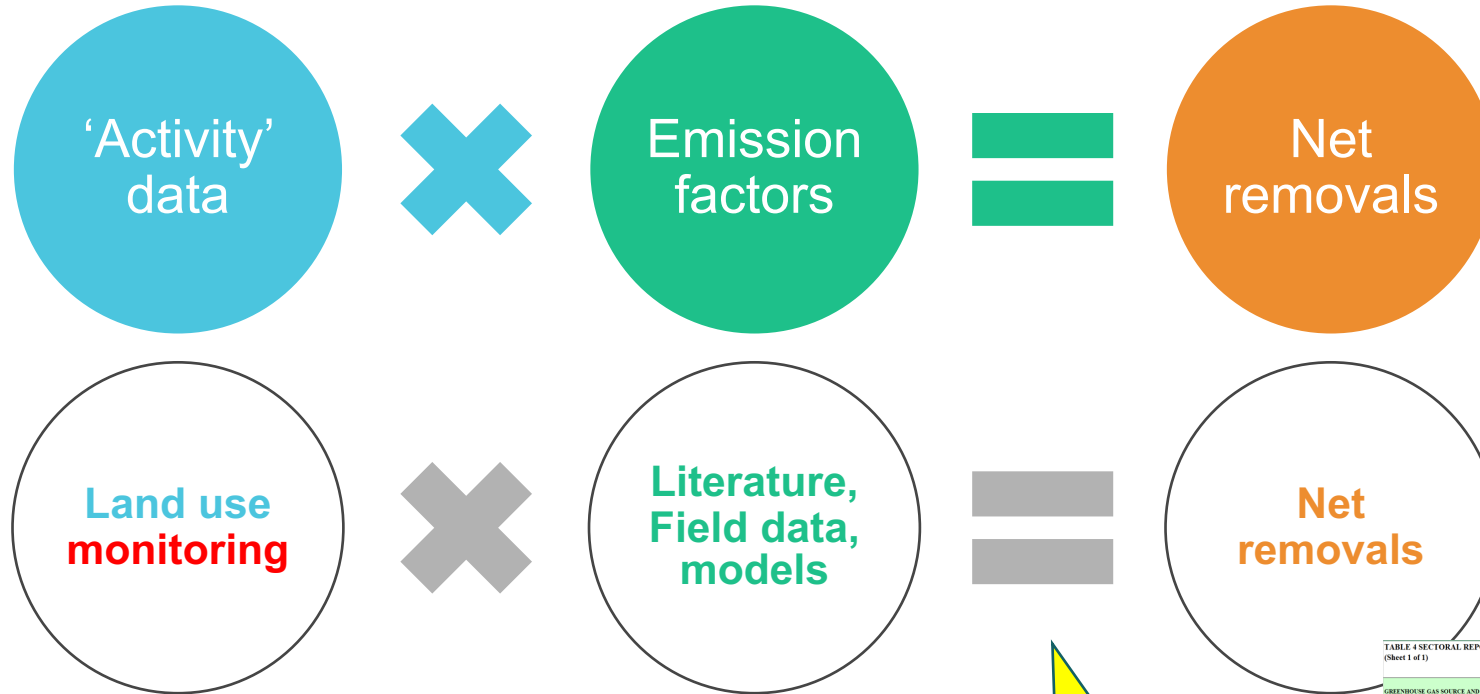


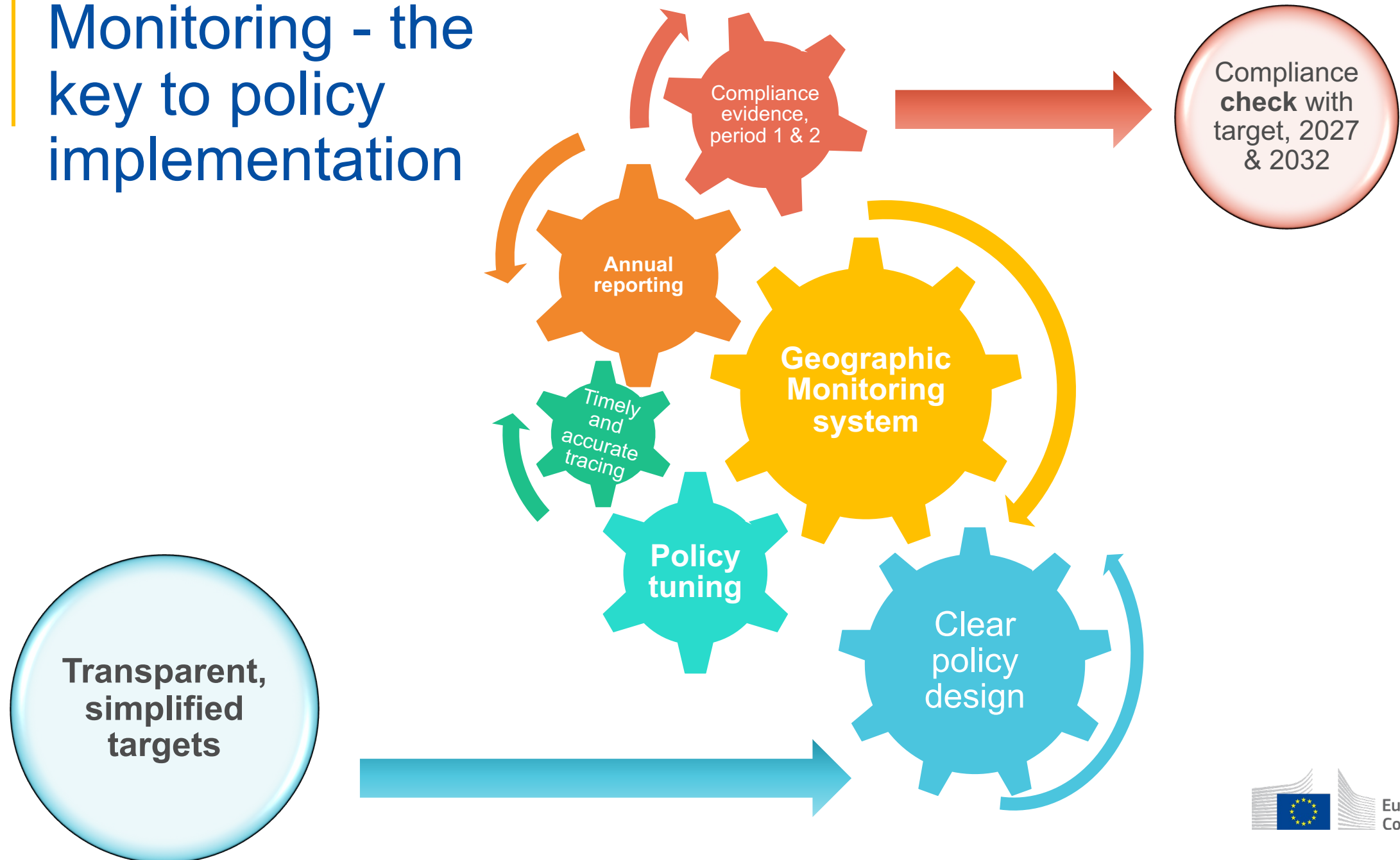
TABLE 4 SECTORAL REPORT FOR LAND USE, LAND-USE CHANGE AND FORESTRY  
(Sheet 1 of 1)

Inventory 2010  
Submission 2012-12  
EUROPEAN UNION (EU)

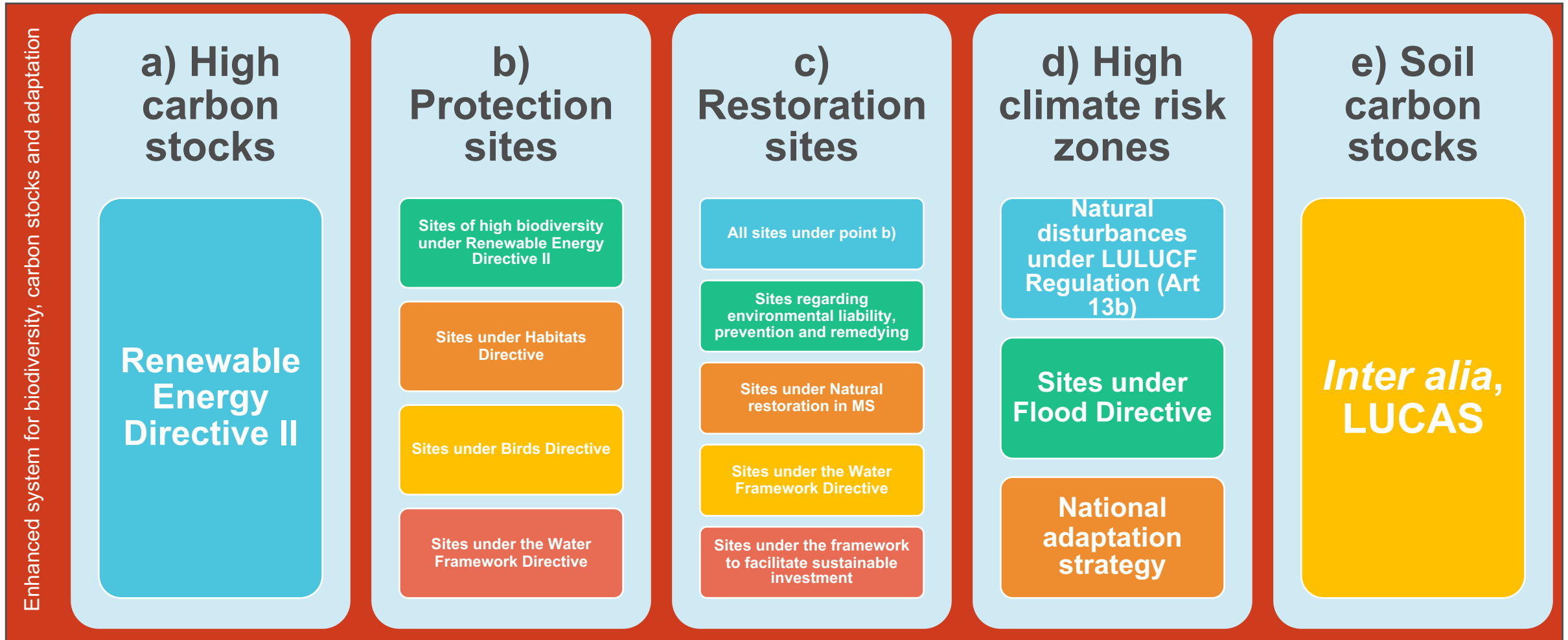
GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Net CO <sub>2</sub> emissions/removals <sup>1)</sup> in Gt	CH <sub>4</sub> <sup>2)</sup>	N <sub>2</sub> O <sup>3)</sup>	NO <sub>x</sub>	CO	NMVOC
<b>A. Forest Land Use Change and Forestry (LULUCF)</b>	-10873.91	991.06	68.01	27.21	1328.02	1381.41
<b>A. Forest land</b>	-104034.48	109.09	20.30	23.84	164.50	61.49
1. Forest land remaining forest land	-211820.04	48.01	4.34	15.58	181.24	61.84
2. Land converted to forest land	102926.43	1.10	1.87	0.28	22.24	0.35
<b>B. Cropland</b>	5776.71	41.77	11.02	2.60	181.11	8.81
1. Cropland remaining cropland	14480.01	2.85	0.36	2.11	45.73	6.20
2. Land converted to cropland	19272.94	1.09	11.55	0.49	135.37	0.61
<b>C. Grassland</b>	12313.72	184.72	1.62	0.80	218.73	2.90
1. Grassland remaining grassland	16229.76	1.74	0.84	0.18	119.09	2.89
2. Land converted to grassland	-2520.28	1.82	0.88	0.17	118.05	0.01
<b>D. Wetlands<sup>4)</sup></b>	10386.41	222.49	1.01	0.51	24.97	0.01
1. Wetlands remaining wetlands	10206.34	1.20	0.00	0.00	NA,NE,NO	NA,NE,NO
2. Land converted to wetlands	180.07	1.29	1.01	0.51	24.97	0.01
<b>E. Barren land</b>	16449.01	1.62	10.80	0.10	38.73	0.01
1. Barren land remaining barren land	16449.01	1.62	10.80	0.10	38.73	0.01
2. Land converted to barren land	0.00	0.00	0.00	0.00	NA,NE,NO	NA,NE,NO
<b>F. Other land<sup>5)</sup></b>	488.19	1.07	0.04	0.14	20.75	0.01
1. Other land remaining other land	488.19	1.07	0.04	0.14	15.72	0.01
2. Land converted to other land	0.00	0.00	0.00	0.00	5.03	0.00
<b>G. Reservoir and wetlands<sup>6)</sup></b>	-6141.12	0.00	0.00	0.00	0.00	0.00
<b>H. Other (Other gases)</b>	0.00	0.00	0.00	0.00	0.00	0.00

**"The greenhouse gas inventory shall enable the exchange and integration of data between the electronic databases and the geographic information systems ..." (Annex V)**

# Monitoring - the key to policy implementation



# Enhanced LULUCF monitoring system



Enhanced system for biodiversity, carbon stocks and adaptation

Biodiversity Strategy, Nature Restoration Law

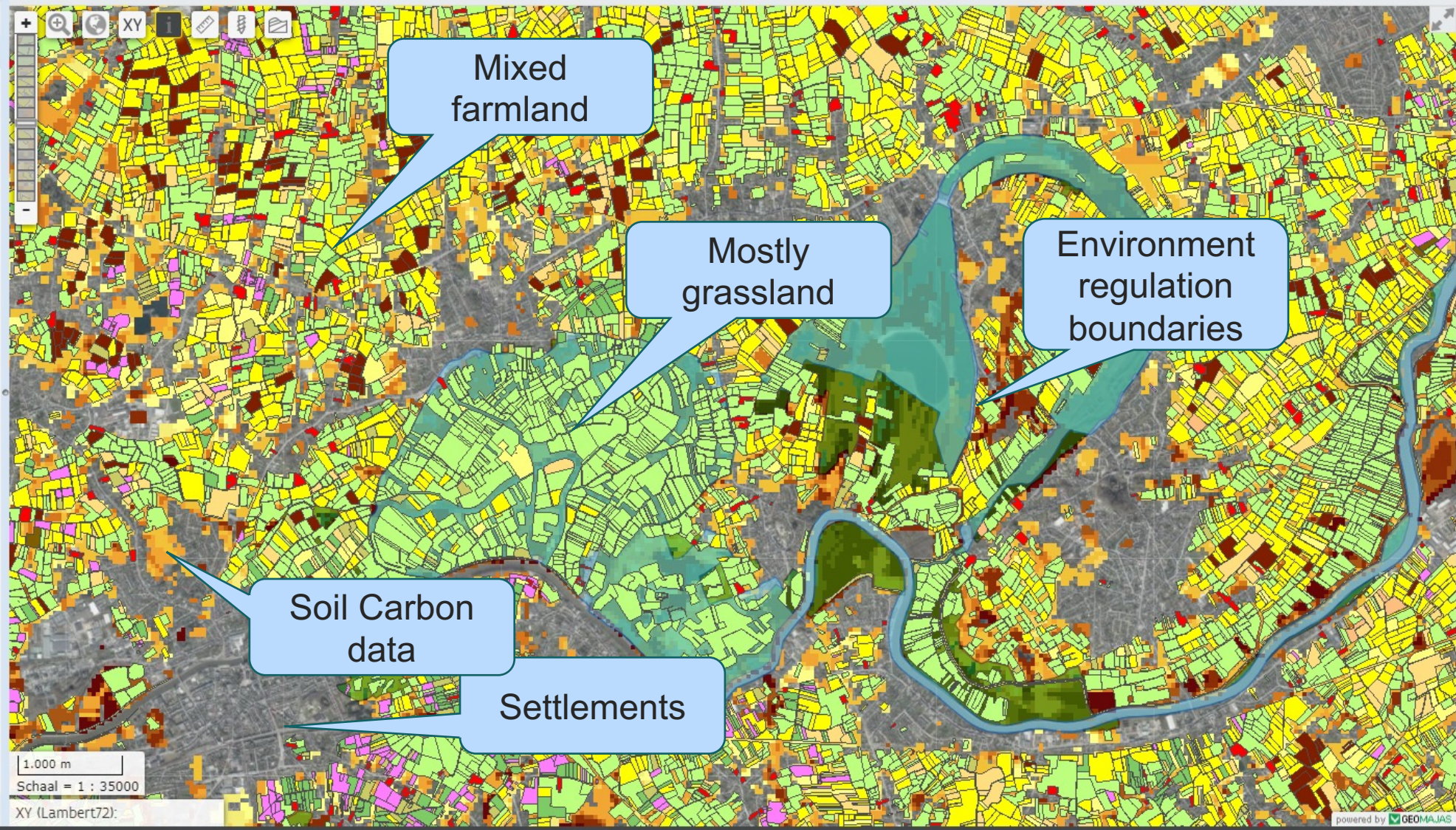
Slot 32, 9290 Berlare

Selecteer gebied | Geen thema

**Zoekregels**

**Kaartbeeld instellen**

- Landbouwgebruikspcelen (2020)**
  - Legende
    - Gewasgroep
      - Landbouwinfrastructuur
      - Groenten, kruiden en sierplanten
      - Grasland
      - Voedergewassen
      - Aardappelen
      - Suikerbieten
      - Granen, zaden en peulvruchten
      - Mais
      - Vlas en hennep
      - Overige gewassen
      - Fruit en Noten
      - Houtachtige gewassen
      - Water
- Erkende natuurreservaten**
  - Legende
    - Erkende natuurreservaten
- Vogelrichtlijngebieden**
  - Legende
- Habitatrichtlijngebieden**
  - Legende
- Soil Organic Carbon Stock Maps for Belgium: mean (40 m grid)**
  - Legende
- Orthofotomozaïek, middenschallig, winteropnamen, kleur, meest recent, Vlaanderen**
- GRB-basiskaart selectie**





# LIFE CarbonCounts

Enabling Carbon Farming via an improved knowledge system

More info [here](#)

# Carbon farming scenario analysis at the scale of agricultural parcel (Section 4)

## INPUT DATA

Farm scale: Agricultural parcels  
Regional scale: Climate, Texture, SOC Sequestration Potential Map

### Agricultural parcels (AP)

(contiguous agricultural land homogeneous by cultivation type and management)



## AP STRATIFICATION

Intersecting Climate and Texture with AP land use (derived from vector LP map)

## AP SOC SEQUESTRATION POTENTIAL

SOC sequestration potential data transfer (initial SOC level ( $SOC_0$ ), saturation SOC level ( $SOC_{SAT}$ ), SOC potential accumulation ( $SOC_{PA}$ )) to the AP database via the identity tool

## AP SOC CHANGE SCENARIOS

Merging the scenario database to the AP map via a table join based on the stratum code

### Relational database

Land plots (LP)	
ID FARM	1
ID LAND PLOT	79884018
ID CADASTRAL PARCEL	116060
ID AGRIC PARCEL	92
AREA (m <sup>2</sup> )	66928

Cadastral parcel (CP)	
ID CADASTRAL PARCEL	116060
PROVINCE	MI
MUNICIPALITY	Abbiategrosso
MAP SHEET	5
PARCEL	24



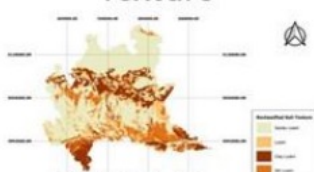
ID FARM	1
ID LAND PLOT	79884018
ID CADASTRAL PARCEL	116060
ID AGRIC PARCEL	71
AREA (m <sup>2</sup> )	108945
CLIMATE	3
TEXTURE	4
LAND USE	5
STRATUM	3_4_5
ID SOC CELL	14806
$SOC_0$ (Mg ha <sup>-1</sup> )	47.79
$SOC_{SAT}$ (Mg ha <sup>-1</sup> )	61.35
$SOC_{PA}$ (Mg ha <sup>-1</sup> )	13.35
$\Delta SOC_{ABS}$	a) ORG; b) CC+OA
$\Delta SOC_{REL}$	a) RSD+R; b) CC

Cover crops (CC) - Organic ammentant (OA) - Organic agriculture (ORG)  
Maintenance of crop residues (R) - Reduced soil disturbance (RSD)

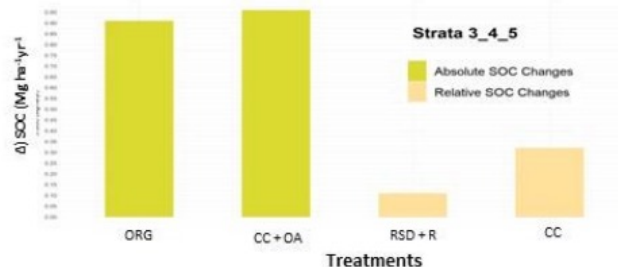
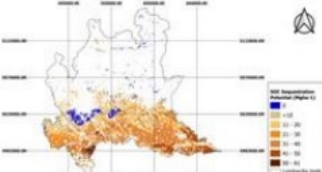
### Climate



### Texture



### SOC SEQUESTRATION POTENTIAL



## LIFE C-Farms project:

The project supports the design and implementation of targeted payments for the application of Carbon Farming practices through the development of a regulatory framework for a carbon certification system in collaboration with relevant actors and institutions.

<https://c-farms.eu/>

# Thank you!

LULUCF regulation revision: <http://data.europa.eu/eli/reg/2023/839/oj>

LULUCF Impact Assessment: <https://europa.eu/!NG7K6U>

Certification Removals Carbon proposal: <https://europa.eu/!8mGymM>



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