EUROPEAN
COMMISSION

Brussels, 15.12.2021
SWD(2021) 451 final

PART 3/3

# COMMISSION STAFF WORKING DOCUMENT

## Sustainable carbon cycles for a 2050 climate-neutral EU
## Technical Assessment

*Accompanying the*

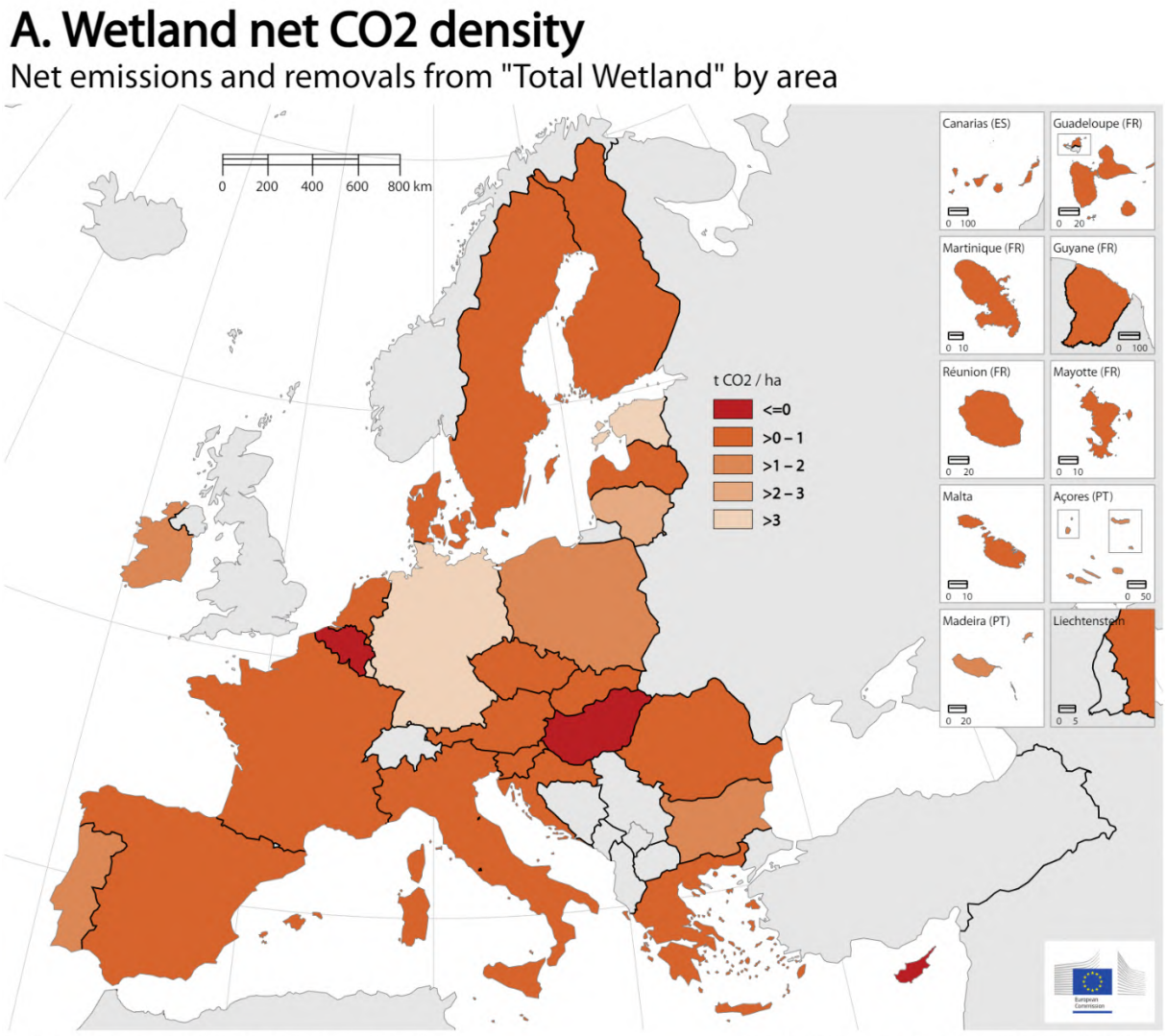
**Communication from the Commission to the European Parliament and the Council**

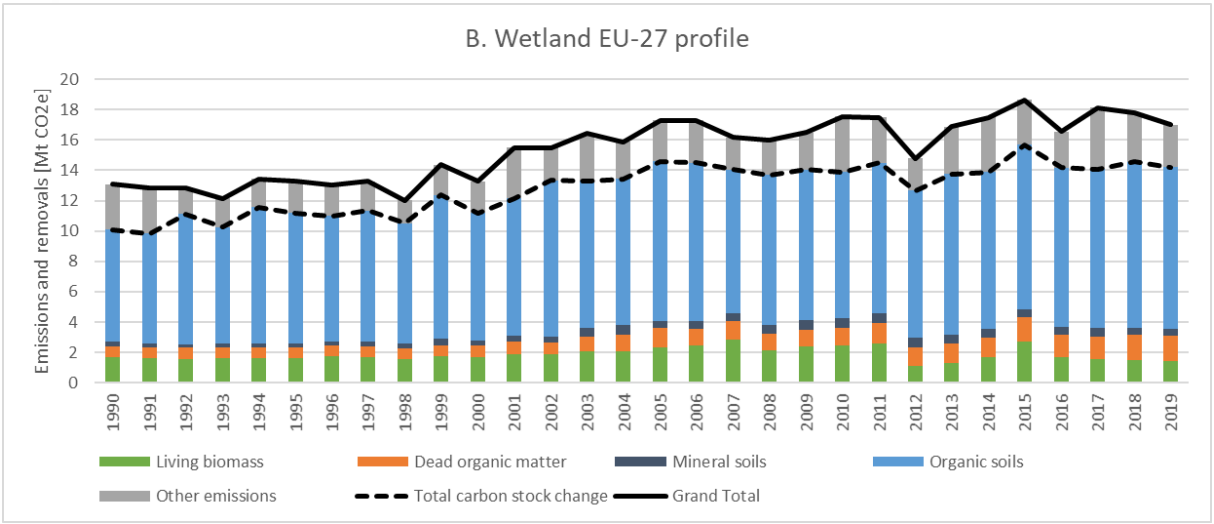
**Sustainable Carbon Cycles**

{COM(2021) 800 final} - {SWD(2021) 450 final}

## Contents

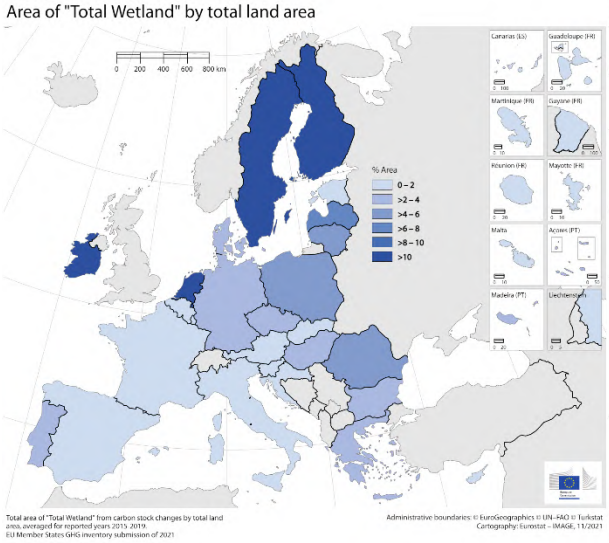
## Wetland


A. Wetland net CO2 density
Net emissions and removals from "Total Wetland" by area
0 200 400 600 800 km
t CO2 / ha
<=0
>0 – 1
>1 – 2
>2 – 3
>3
Canarias (ES)
Guadeloupe (FR)
Martinique (FR)
Guyane (FR)
Réunion (FR)
Mayotte (FR)
Malta
Açores (PT)
Madeira (PT)
Liechtenstein
Total carbon stock changes of all applicable carbon pools for "Total Wetland" by total area of "Total Wetland", averaged for reported years 2015-2019.
EU Member States GHG inventory submission of 2021
Administrative boundaries: © EuroGeographics © UN–FAO © Turkstat
Cartography: Eurostat – IMAGE, 11/2021


B. Wetland EU-27 profile
Emissions and removals [Mt CO2e]
20
18
16
14
12
10
8
6
4
2
0
1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019
Living biomass
Dead organic matter
Mineral soils
Organic soils
Other emissions
Total carbon stock change
Grand Total

**C. Wetland area share**

Area of "Total Wetland" by total land area

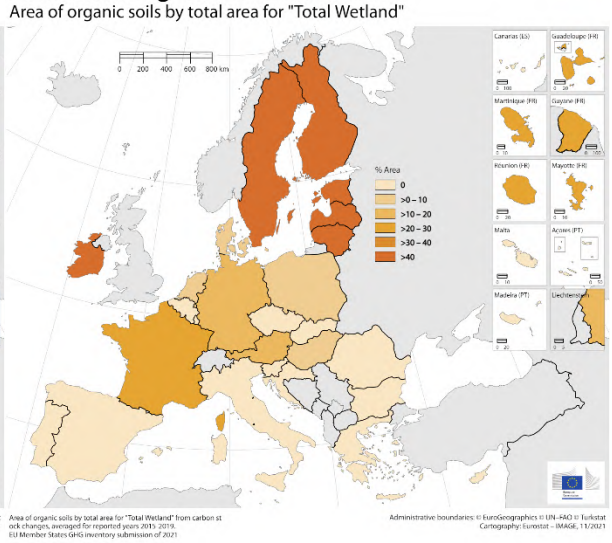



Total area of "Total Wetland" from carbon stock changes by total land area, averaged for reported years 2015-2019.
EU Member States GHG inventory submission of 2021

Administrative boundaries: © EuroGeographics © UN-FAO © Turkstat
Cartography: Eurostat – IMAGE, 11/2021

**D. Wetland organic soil area share**

Area of organic soils by total area for "Total Wetland"




Area of organic soils by total area for "Total Wetland" from carbon st ock changes, averaged for reported years 2015-2019.
EU Member States GHG inventory submission of 2021

Administrative boundaries: © EuroGeographics © UN-FAO © Turkstat
Cartography: Eurostat – IMAGE, 11/2021

**Notes**

Wetland includes land that remains under wetland land use and land uses that were converted to wetland; emission estimates also include peat extraction. While on average wetland reports net carbon stock change emissions at the level of the EU, Belgium, Cyprus and Hungary report net carbon stock change removals for the last reported years:. Malta and Slovakia do not report carbon stock changes from wetland. Depending on the reporting methodology, emissions and removals from drainage and rewetting may be included in carbon stock change estimates or reported separately (included under other emissions in the EU-profile).

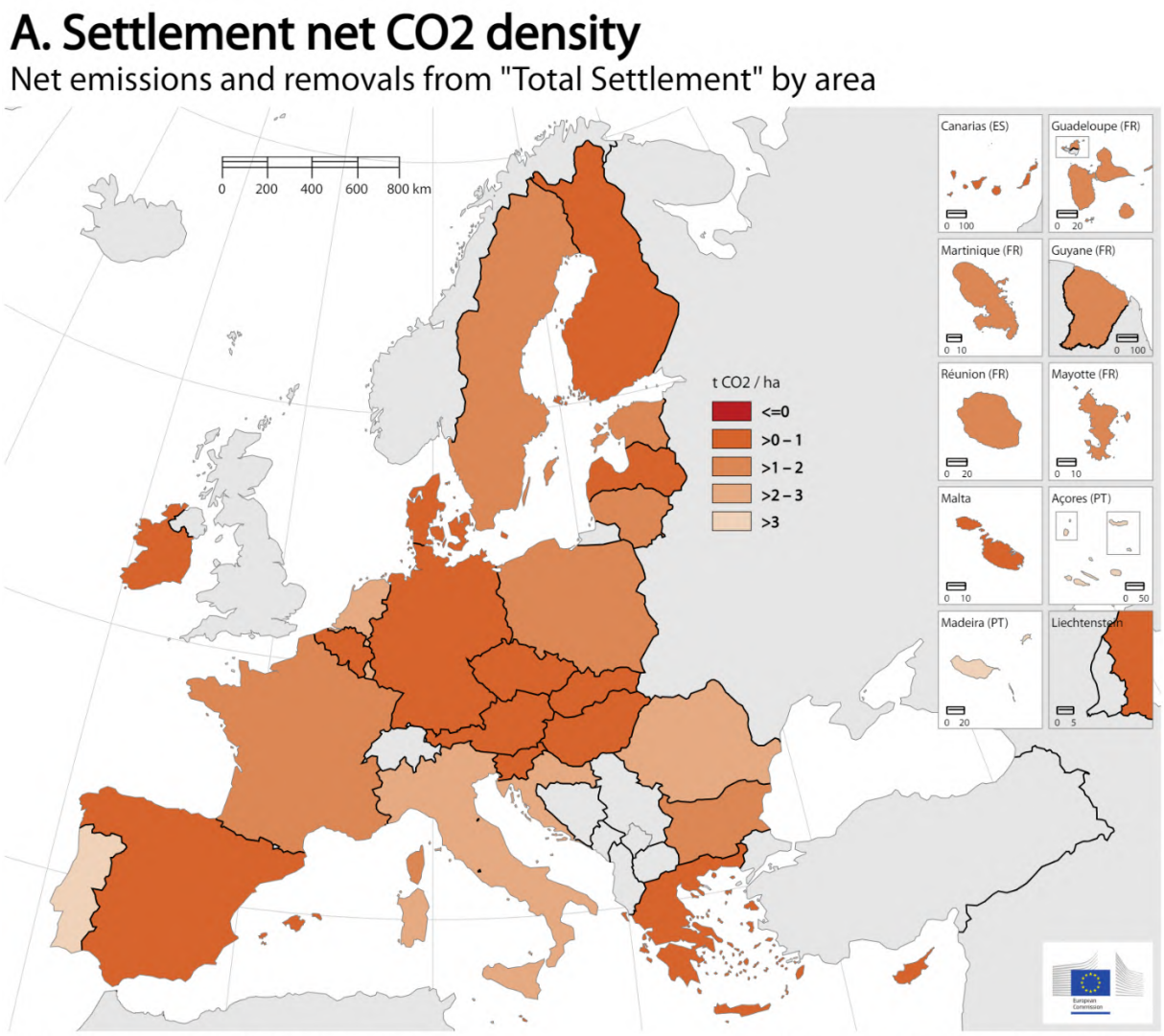
The EU average of net carbon stock change density is +0.6 t $CO_2$/ha. Ireland, Lithuania and Luxembourg show net carbon stock change density emissions above 2 t $CO_2$/ha; Germany reports 5.8 t $CO_2$/ha and Estonia 36.3 0t $CO_2$/ha. Cyprus reports -1.6 t $CO_2$/ha.

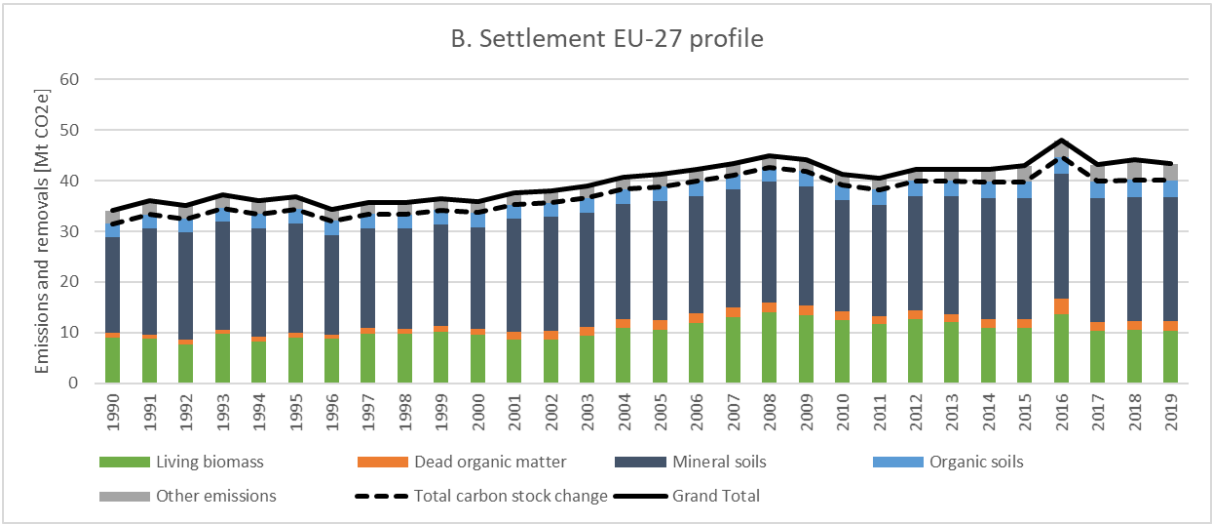
The EU profile ranges between 12 and 18 Mt $CO_2$eq with an increasing trend over the 30-year period. All carbon pools show net emissions with an average of 9.4 Mt $CO_2$eq for organic soils, 1.9 Mt $CO_2$eq for living biomass, 1.0 Mt $CO_2$eq for dead organic matter and 0.5 Mt $CO_2$eq for mineral soils. Other emissions contribute with 2.5 Mt $CO_2$eq. All compartments show variations and contribute to the overall increase of net emissions.

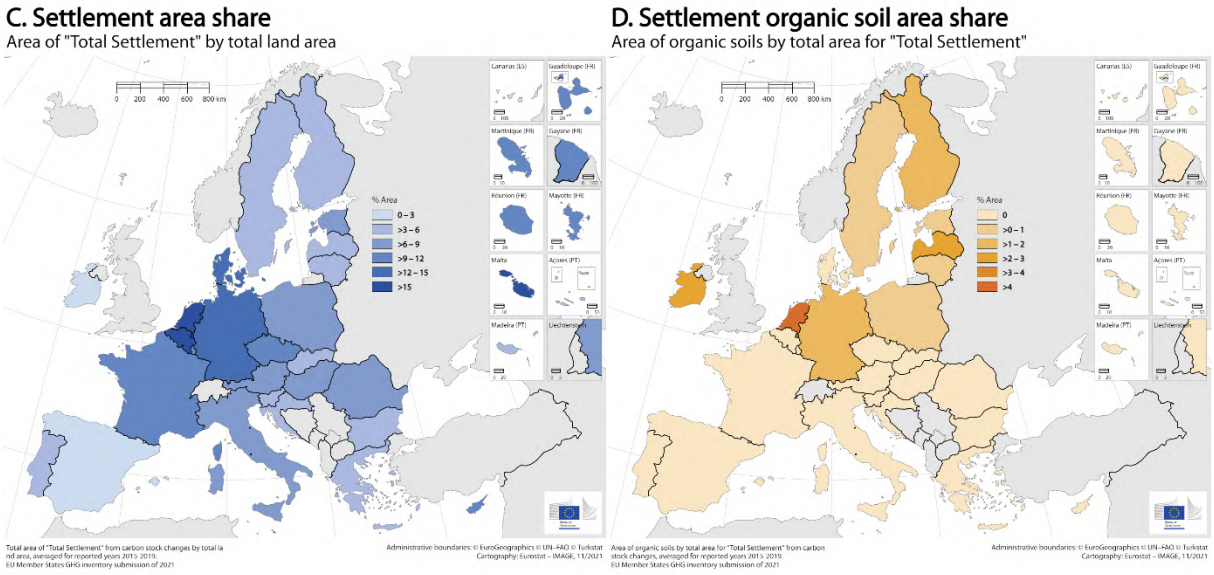
The EU average area share of wetland is 5.6%. Estonia, Spain, Cyprus, Luxembourg, Malta, and Slovenia have wetland area shares below 1%; Ireland the Netherlands, Finland and Sweden report shares above 15%.

The EU average area share of wetland on organic soils is 68.7%. All 13 Member States with wetland on organic soils are located in central and northern Europe, the Baltics and Ireland. Highest area shares are in Estonia (98.7%), Ireland (99.9%), Latvia (90.2%), Lithuania (96.5%), Finland (100%) and Sweden (100%).

## Settlement


A. Settlement net CO2 density
Net emissions and removals from "Total Settlement" by area
0 200 400 600 800 km
t CO2 / ha
<=0
>0 – 1
>1 – 2
>2 – 3
>3
Canarias (ES)
Guadeloupe (FR)
Martinique (FR)
Guyane (FR)
Réunion (FR)
Mayotte (FR)
Malta
Açores (PT)
Madeira (PT)
Liechtenstein
Total carbon stock changes of all applicable carbon pools for "Total Settlement" by total area of "Total Settlement", averaged for reported years 2015-2019.
EU Member States GHG inventory submission of 2021
Administrative boundaries: © EuroGeographics © UN-FAO © Turkstat
Cartography: Eurostat – IMAGE, 11/2021


B. Settlement EU-27 profile
Emissions and removals [Mt CO2e]
60
50
40
30
20
10
0
1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019
Living biomass
Dead organic matter
Mineral soils
Organic soils
Other emissions
Total carbon stock change
Grand Total




**Notes**

Settlement includes land that remains under settlement land use and land uses that were converted to settlement. Albeit not shown in the analysis, it should be noted that the vast majority of emissions in this category result from "land converted to settlement". All EU Member States report net carbon stock change emissions for the last reported years.

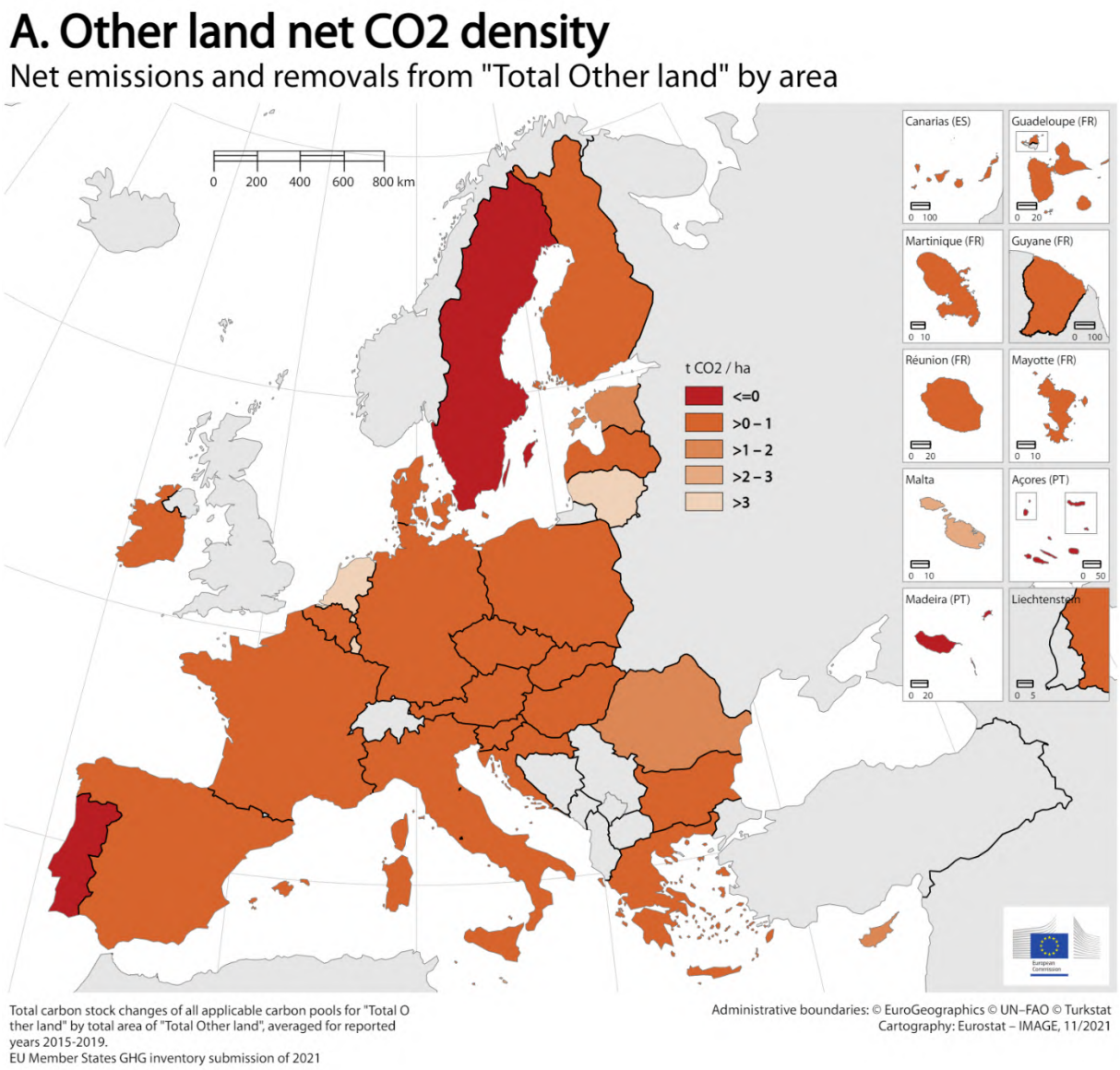
The EU average of net carbon stock change density is +1.4 t $CO_2$/ha. The Czech Republic, Denmark, Greece, Cyprus, Hungary, Malta, and Slovakia show net carbon stock change density emissions below 0.5 t $CO_2$/ha; Croatia, Italy, Luxembourg, the Netherlands and Romania report above 2.0 t $CO_2$/ha and Portugal 4.7 t $CO_2$/ha.

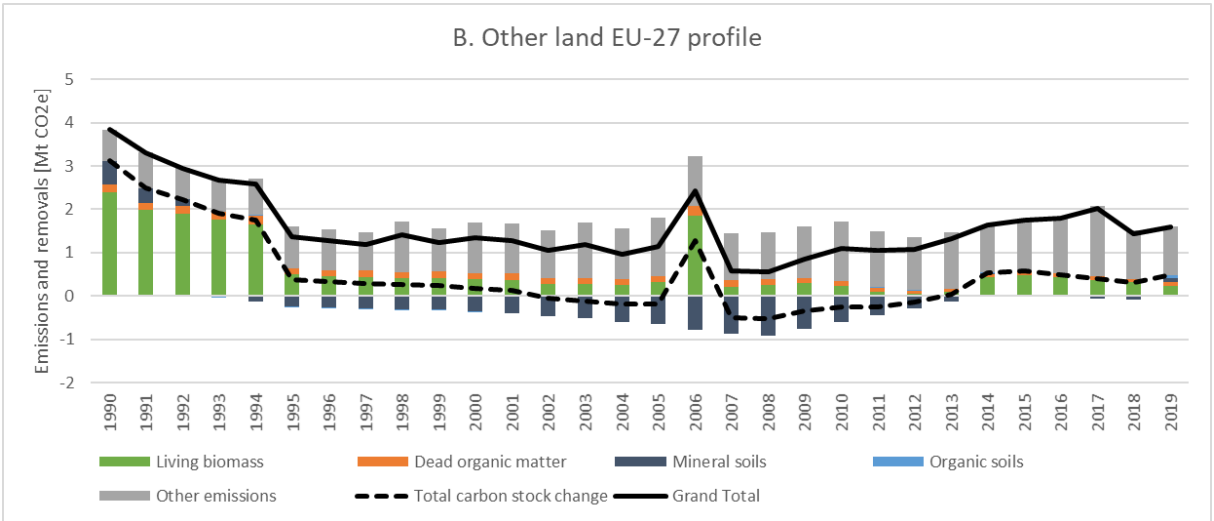
The EU profile ranges between 34 and 48 Mt $CO_2$eq with an increasing trend over the 30-year period. All carbon pools show net emissions with mineral soils (average: 22 Mt $CO_2$eq) living biomass (10.5 Mt $CO_2$eq) organic soils (2.9 Mt $CO_2$eq) and dead organic matter (1.5 Mt $CO_2$eq). Other emissions contribute with 2.5 Mt $CO_2$eq. All compartments show variations and contribute to the overall increase of net emissions.

The EU average area share of settlement is 6.8%. Bulgaria, Ireland, Greece, Spain, Latvia, Slovakia, Finland and Sweden have settlement area shares below 5%; the Czech Republic, Denmark, Germany Cyprus, Luxembourg, and the Netherlands report shares above 10%, and Malta 28.5%.

The EU average area share of settlement on organic soils is 0.6%. All nine Member States with settlement on organic soils are located in central and northern Europe, the Baltics and Ireland. Highest area shares are in Ireland (2.3%), Latvia (2.7%), and the Netherlands (6.4%).

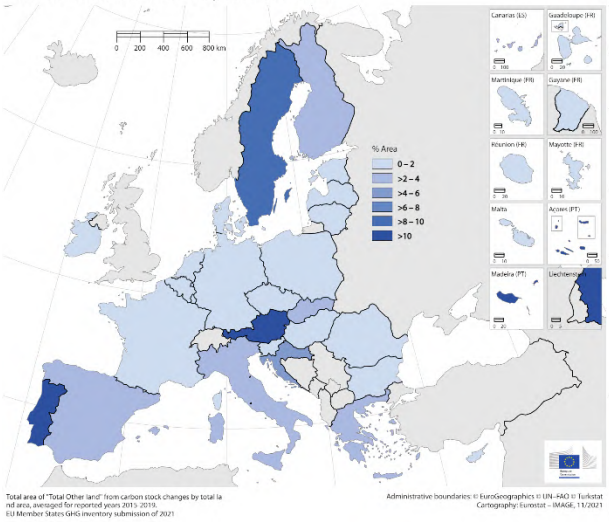
## Other land


A. Other land net CO2 density
Net emissions and removals from "Total Other land" by area
0 200 400 600 800 km
t CO2 / ha
<=0
>0 – 1
>1 – 2
>2 – 3
>3
Canarias (ES)
Guadeloupe (FR)
Martinique (FR)
Guyane (FR)
Réunion (FR)
Mayotte (FR)
Malta
Açores (PT)
Madeira (PT)
Liechtenstein
Total carbon stock changes of all applicable carbon pools for "Total Other land" by total area of "Total Other land", averaged for reported years 2015-2019.
EU Member States GHG inventory submission of 2021
Administrative boundaries: © EuroGeographics © UN-FAO © Turkstat
Cartography: Eurostat – IMAGE, 11/2021


B. Other land EU-27 profile
Emissions and removals [Mt CO2e]
5
4
3
2
1
0
-1
-2
1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019
Living biomass
Dead organic matter
Mineral soils
Organic soils
Other emissions
Total carbon stock change
Grand Total

C. Other land area share

Area of "Total Other land" by total land area

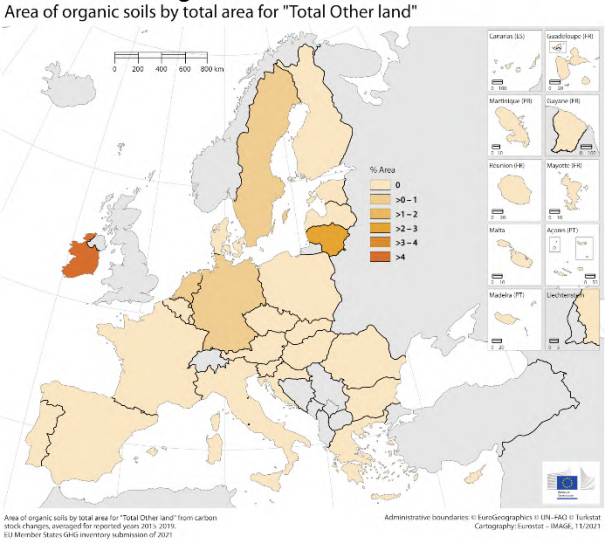



Total area of "Total Other land" from carbon stock changes by total land area, averaged for reported years 2015-2019.
EU Member States GHG inventory submission of 2021

Administrative boundaries: © EuroGeographics © UN-FAO © Turkstat
Cartography: Eurostat – IMAGE, 11/2021

D. Other land organic soil area share

Area of organic soils by total area for "Total Other land"




Area of organic soils by total area for "Total Other land" from carbon stock changes, averaged for reported years 2015-2019.
EU Member States GHG inventory submission of 2021

Administrative boundaries: © EuroGeographics © UN-FAO © Turkstat
Cartography: Eurostat – IMAGE, 11/2021

**Notes**

Other land includes land that remains under the "other land" land use definition and land uses that were converted to other land. Carbon stock changes for "other land remaining other land" are assumed steady state and thus zero. All EU Member States except Portugal and Sweden report net carbon stock change emissions for the last reported years. Belgium, Bulgaria, the Czech Republic, Denmark, Germany, France, Croatia, Italy, Latvia, Poland and Finland do not report carbon stock changes from other land.

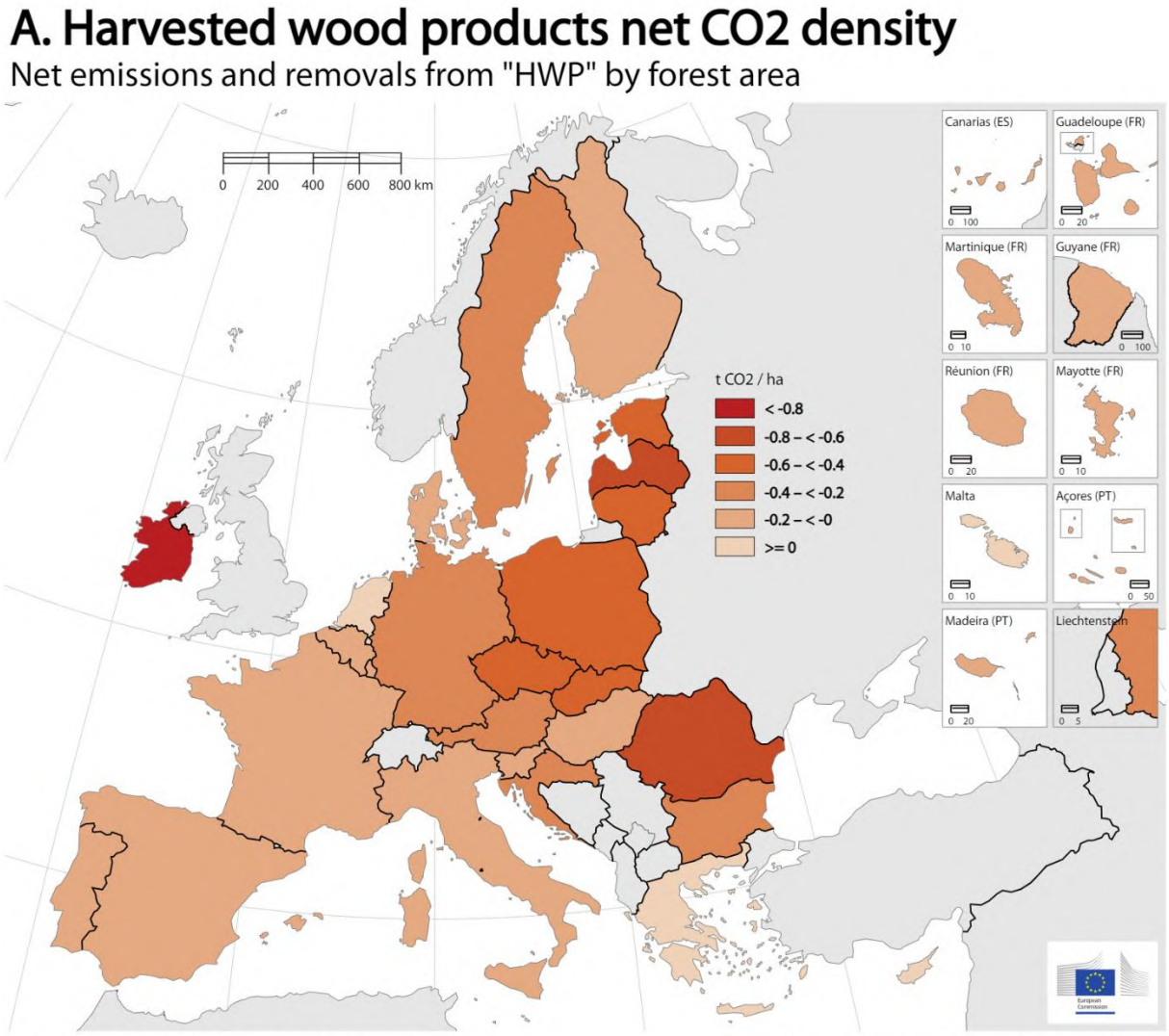
The EU average of net carbon stock change density is +0.04 t $CO_2$/ha. Portugal shows net carbon stock change density removals of -0.9 t $CO_2$/ha and Sweden -0.002 t $CO_2$/ha; Luxembourg, Malta and the Netherlands report net carbon stock change density emissions above 2.0 t $CO_2$/ha and Lithuania 12.9 t $CO_2$/ha.

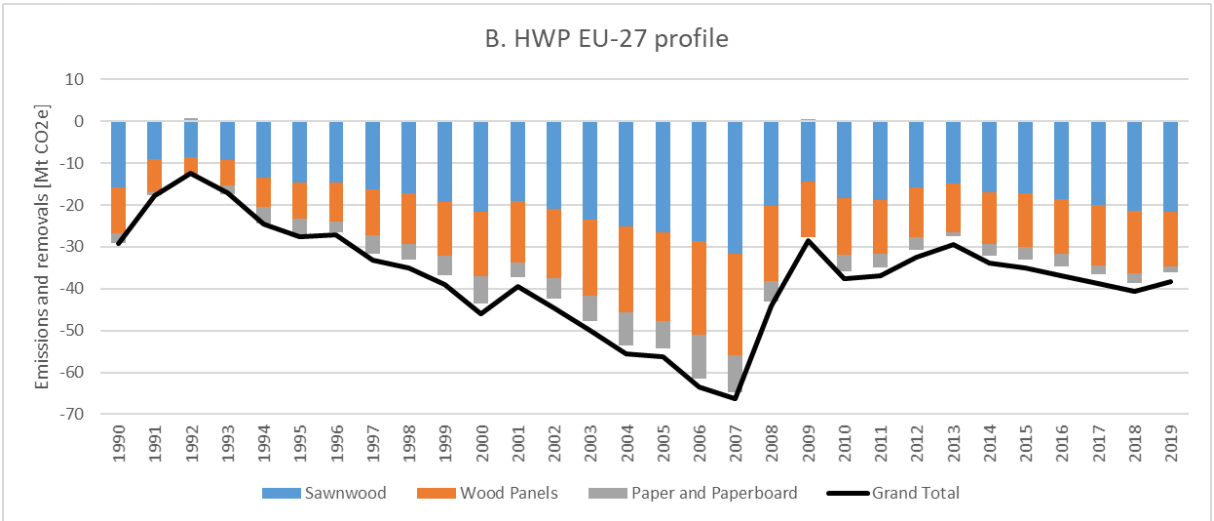
The EU profile ranges between 0.5 and 3.8 Mt $CO_2$eq with a decreasing trend in the first half and a slightly increased trend in the second half of the 30-year period. Carbon pools living biomass and dead organic matter show emissions, organic soils are near zero and mineral soils vary between small emissions and moderate removals. Other emissions contribute with, on average, 1.0 Mt $CO_2$eq. All compartments show significant variations.

The EU average area share of other land is 2.8%. Denmark, Germany, Estonia, Ireland, Cyprus, Latvia, Lithuania, Luxembourg, Hungary, the Netherlands and Poland have other land area shares below 1%; Austria, Portugal and Sweden report shares above 5%. Belgium and the Czech Republic do not report other land areas.

The EU average area share of other land on organic soils is 0.2%. Germany, Ireland, Lithuania, the Netherlands and Sweden have other land on organic soils. Highest area shares are in Lithuania (2.8%) and Ireland (22.0%).

## Harvested wood products



**Notes**

Harvested Wood Products (HWP) report net $CO_2$ emissions and removals in HWP categories sawn wood, wood panels and paper and paperboard with default half-life values of 35, 25 and 2 years, respectively. However, some Member States report differently: Latvia only provides the aggregate of sawn wood and wood panels under category "Solid wood products", Estonia adds category "Other" to its HWP total, Cyprus reports all its HWP under category "Other" and the Netherlands add "Other solid wood products to its HWP total. Therefore the grand total in the EU profile does not match the total of the bars. All EU Member States except Greece, Cyprus and the Netherlands report net $CO_2$ removals for the last reported years. Malta does not report on HWP.

HWP densities are the ratio of the total HWP and the total forest land area. Total HWP is the reported net emissions or removals from Table 4.Gs1. Total forest land area is the reported value from carbon stock change Table 4.A and corresponds to the sum of the total areas of "forest land remaining forest land" and "land converted to forest land". The EU average of net $CO_2$ density is -0.2 t $CO_2$/ha. France, Italy, Luxembourg and Portugal show net $CO_2$ density removals of less than -0.1 t $CO_2$/ha. Latvia and Romania report net $CO_2$ density removals beyond -0.6 t $CO_2$/ha and Ireland -1.0 t $CO_2$/ha. Cyprus reports net $CO_2$ density emissions of 0.1 t $CO_2$/ha and the Netherlands of 0.3 t $CO_2$/ha.

The EU profile ranges between -12 and -66 Mt $CO_2$eq with a decreasing in the first years, a steady increase until 2007, a sudden drop and since then moderate increases. HWP categories sawn wood (average: -18 Mt $CO_2$eq) and wood panels (-13 Mt $CO_2$eq) contribute highest.