

# Overview of Land Use, Land Use Change and Forestry sector (LULUCF) in EU

**Giacomo Grassi**

European Commission - Joint Research Centre,  
Institute for Environment and Sustainability  
Climate Change Unit - Ispra (VA), Italy

**Brussels, 28 January 2010**

## 1. Introduction

Why LULUCF is important?

Why LULUCF is complex?

How emissions/removals are estimated?

How LULUCF is included in UNFCCC/KP?

Rules under discussion within UNFCCC for post 2012

## 2. Overview of LULUCF sector in EU

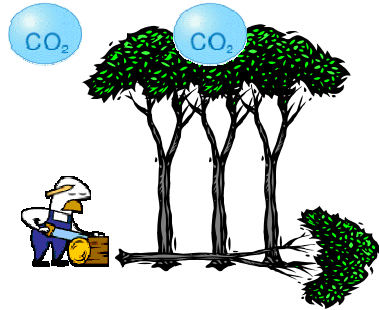
Convention reporting

KP reporting

Conclusions on EU reporting

# 1.INTRODUCTION

part of the cause



Globally LULUCF + Agriculture ~30%  
current emissions and future  
mitigation potential

At EU level, LULUCF offsets 8% of  
total emissions, while Agriculture  
represents 10% of total emissions

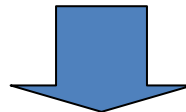
part of the solution



The mitigation options of LULUCF may include:

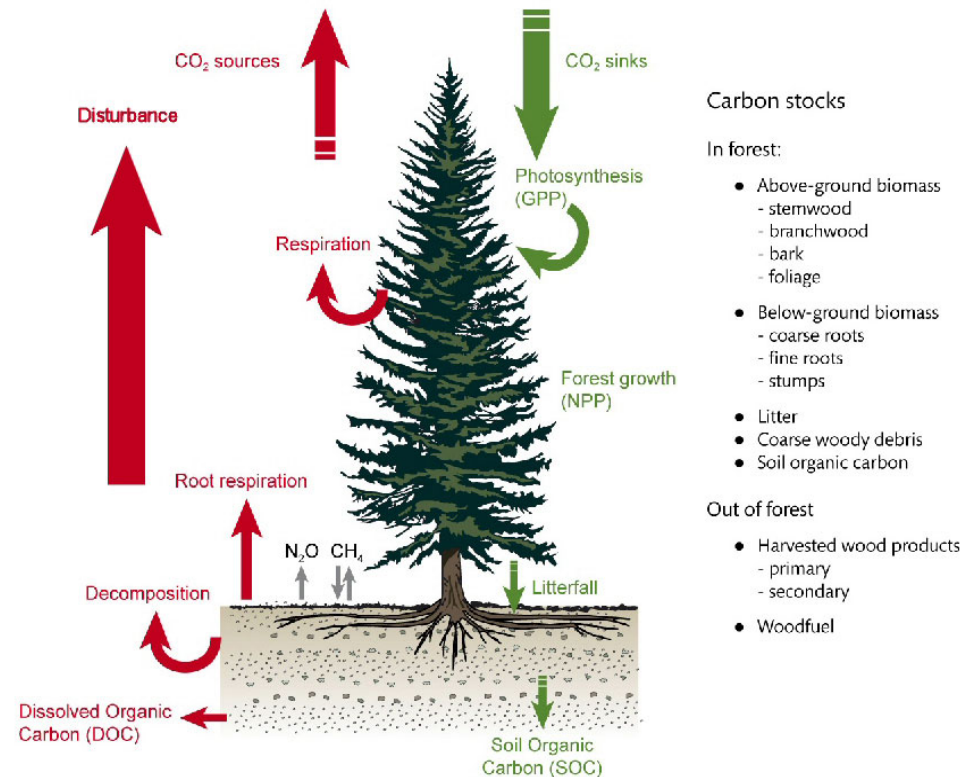
1. **C removals/sink** (new forests, increased C stocks in existing forests)
2. **Reduction of emissions** (reduce deforestation and forest degradation)
3. **C substitution** (renewable source of energy replacing fossil fuel, wood replacing more carbon-intensive products) – links with other sectors

LULUCF offers potential synergies between mitigation, adaptation, biodiversity ...



**LULUCF has always been a key element in climate policy debate**

It represents a highly complex and dynamic biological system with multiple sinks (removals) and sources (emissions)



This complexity raises a number of questions, including:

- **Additionality:** can we distinguish the human-induced effect from a highly variable background?
- **Saturation:** how long will last the sink capacity?
- **Uncertainty:** are we confident of emission/removal estimates ?

Estimates of emissions/removals (GHG) follow **IPCC methodological guidance** for:

- consistent representation of areas
- estimating changes in the carbon pools (*Biomass, Dead organic matter, Soil*) according to 3 Tiers of increasing complexity and certainty in estimates.
- cross-cutting issues (uncertainties, key categories, time consistency, verification,..)

The following general **principles** should be followed:

**Transparency:** all the methodologies should be clearly explained and documented.

**Consistency:** the same methodologies and consistent data sets should be used along time.

**Comparability:** countries should follow the methodologies /formats provided by the IPCC.

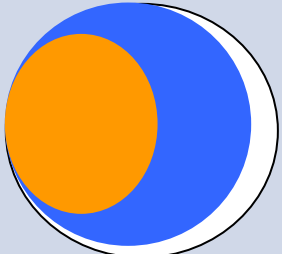
**Completeness:** estimates should include all the agreed categories, gases and C pools.




**Accuracy:** estimates should be systematically neither over nor under the true value, so far as can be judged, and that uncertainties are reduced so far as is practicable.

**“Reporting”:** inclusion of information in national annual GHG inventory, i.e. GHG estimates in standardized tables and methods in the National Inventory Report

**“Accounting”:** use of the reported information to meet commitments under KP

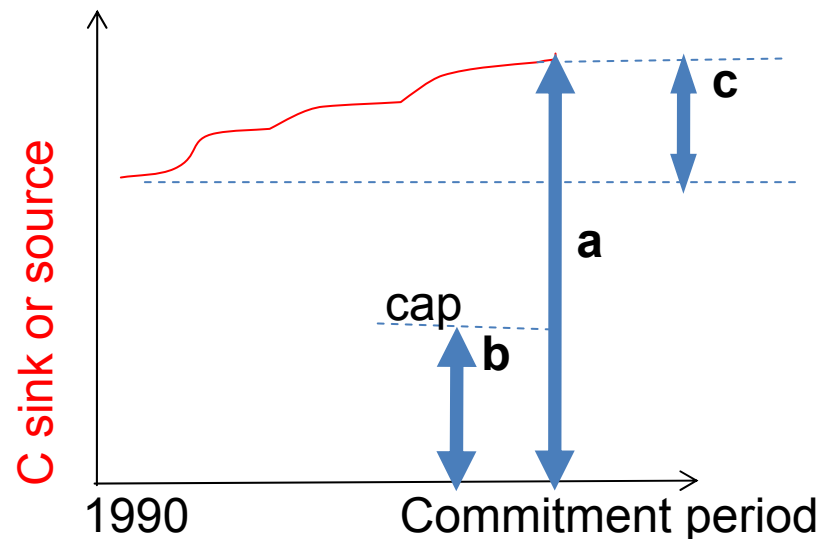
	UNFCCC	KP	
	Reporting	Reporting	Accounting
<b>AGRI CULTURE</b>	CH4 and N2O from soils, livestock, manure	= UNFCCC	relative to 1990 (net-net)
<b>LULUCF</b>	GHG from 6 <b>land uses</b> (all managed lands) <ul style="list-style-type: none"> <li>FL Forest land</li> <li>CL Cropland (CO2)</li> <li>GL Grassland (CO2)</li> <li>WL Wetland</li> <li>S Settlements</li> <li>O Other</li> </ul>	GHG <u>only</u> from direct human induced <b>activities</b> <ul style="list-style-type: none"> <li>AR Aff/Reforestation</li> <li>D Deforestation</li> <li>FM Forest management</li> <li>CM Cropland manag. (CO2)</li> <li>GM Grazing land manag. (CO2)</li> <li>RV Revegetation</li> </ul>	very complex <ul style="list-style-type: none"> <li>Mandatory, gross-net</li> <li>→ Voluntary, gross-net + cap</li> <li>Voluntary, relative to 1990 (net-net)</li> </ul>



-  Total GHG in a country
-  GHG reported under UNFCCC
-  GHG accounted for under KP

## How the different accounting rules work?

Activity	Accounting rule	What is accounted as credit (debit) ?
AR, D	Gross-net	the absolute sink (source) during commitment period (a)
FM	Gross-net with CAP	the absolute sink (source) during commitment period, up to a certain country-specific “cap” (b)
CM, GM, RV	Net-net compared to 1990	the difference between the sink (source) during commitment period and the sink (source) in 1990 (c)





## Limits of the current LULUCF accounting rules

- A complex compromise, product of the special circumstances at Kyoto (*targets agreed before the rules*) and the LULUCF complexities
- Unlikely to give real incentives for mitigation actions in forestry (due to the “cap”)
- Is not complete nor consistent regarding activities and gases, and not comparable to other sectors. E.g. the C substitution for energy is addressed inconsistently

Easy to blame current LULUCF rules

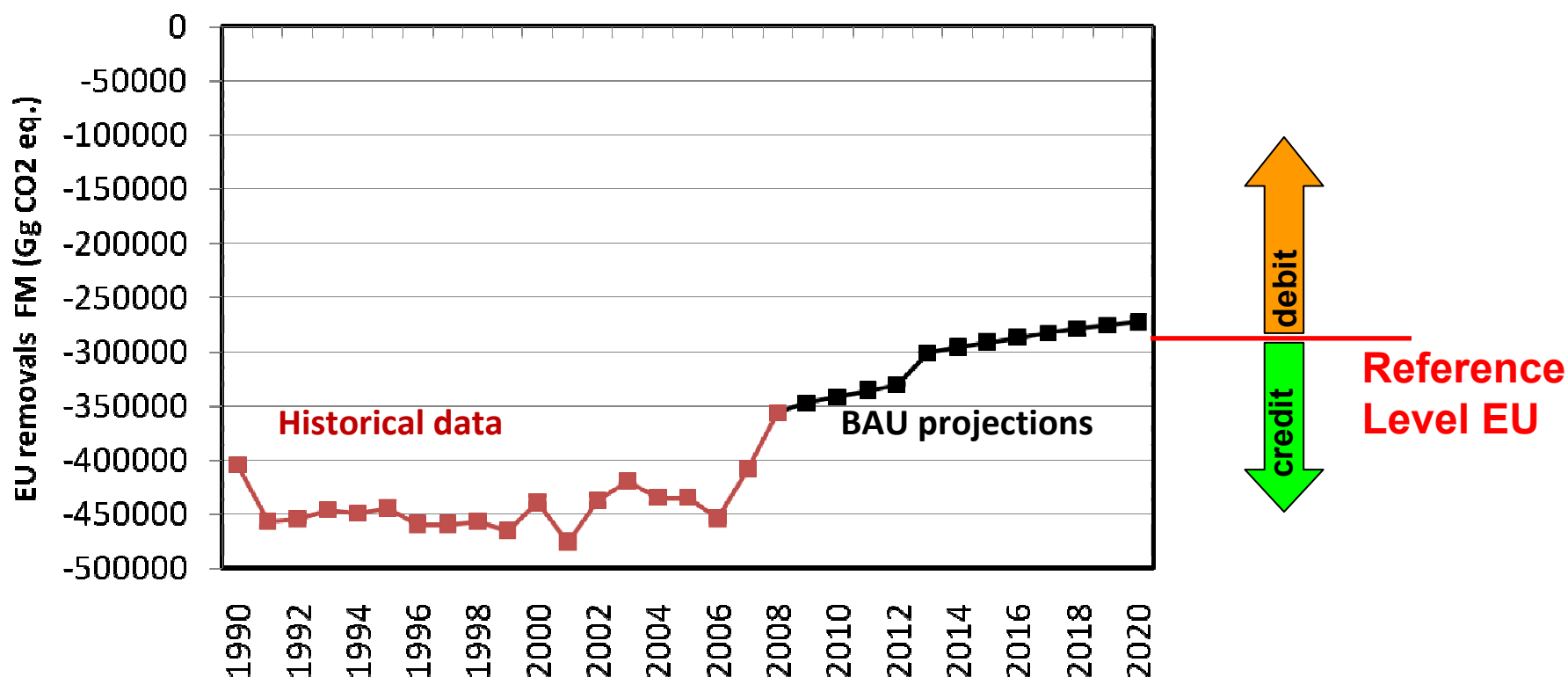
HOWEVER, LULUCF was key for the entry into force of the KP...  
(current LULUCF rules were the “price to pay” to have a climate treaty?)

## Big LULUCF issues under discussion for post 2012 climate regime:

- a) Accounting rules for forest management (FM)
- b) Extreme events (natural disturbances, e.g. forest fires)
- c) Harvested Wood Products (HWP)
- d) Mandatory or voluntary accounting ?

## Accounting options for Forest Management under debate within UNFCCC for post 2012

1. **NET-NET accounting compared to past** (e.g. average sink 2013-2020 – sink 2008-2012)
2. **GROSS-NET with discount** (e.g. 85%)
3. **REFERENCE LEVEL**: *CO<sub>2</sub> emissions/removals against which future emissions/ removals will be compared, generating emission "credits" or "debts"*.  
RL may be either based on historical period or on BAU projections

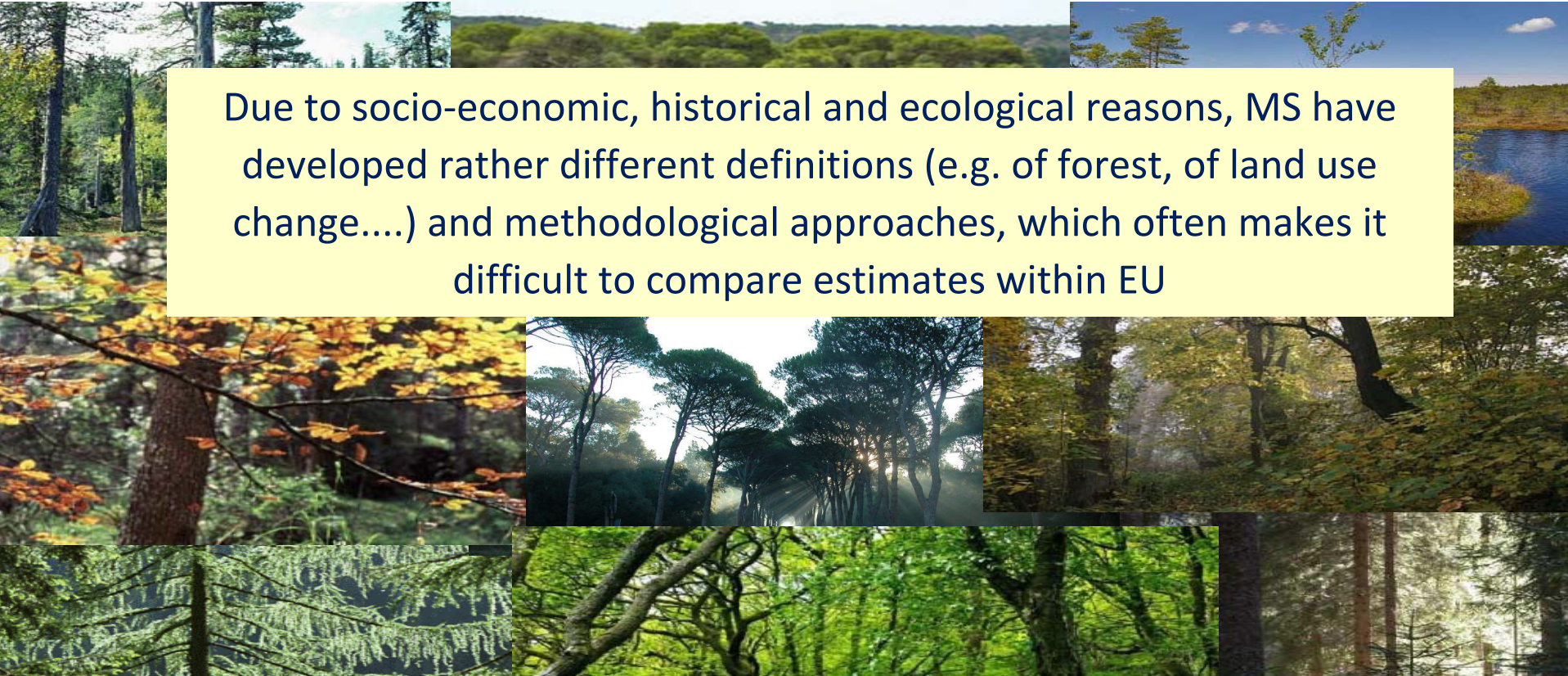


## 2. OVERVIEW OF LULUCF IN EU

## The EU GHG inventory is the sum of MS inventories

(and the JRC is responsible for the LULUCF sector of the EU inventory: QA/QC of MS inventories, efforts for improving / harmonizing MS inventories ...)

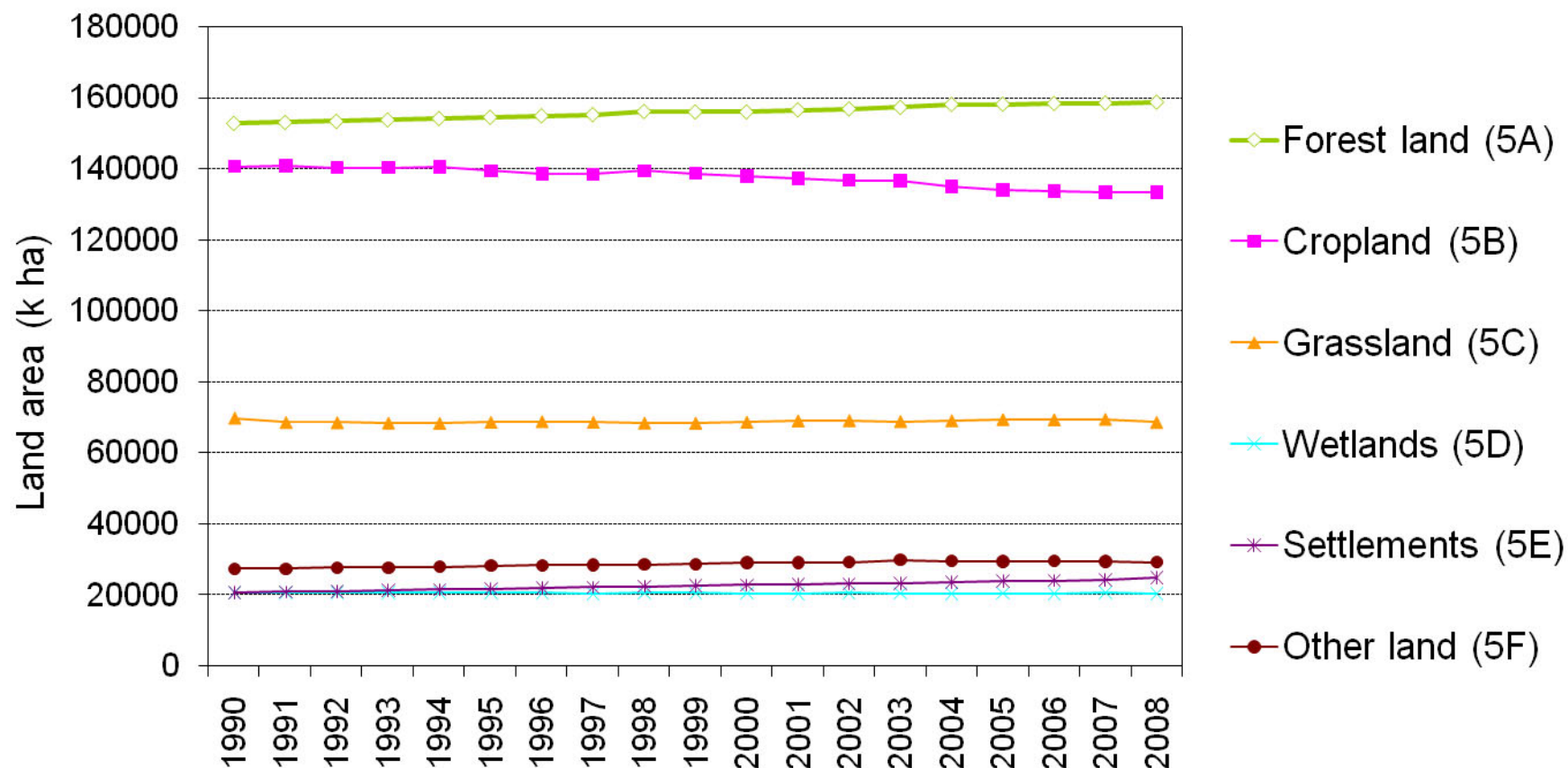
### Are LULUCF estimates fully comparable among MS?



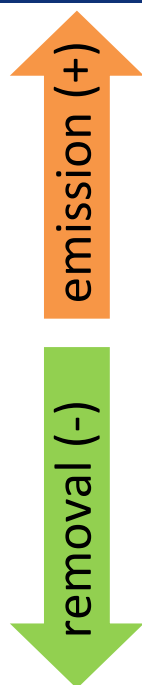
Due to socio-economic, historical and ecological reasons, MS have developed rather different definitions (e.g. of forest, of land use change....) and methodological approaches, which often makes it difficult to compare estimates within EU

This heterogeneity is a richness in term of biodiversity and culture, but represents a challenge when developing an EU inventory!

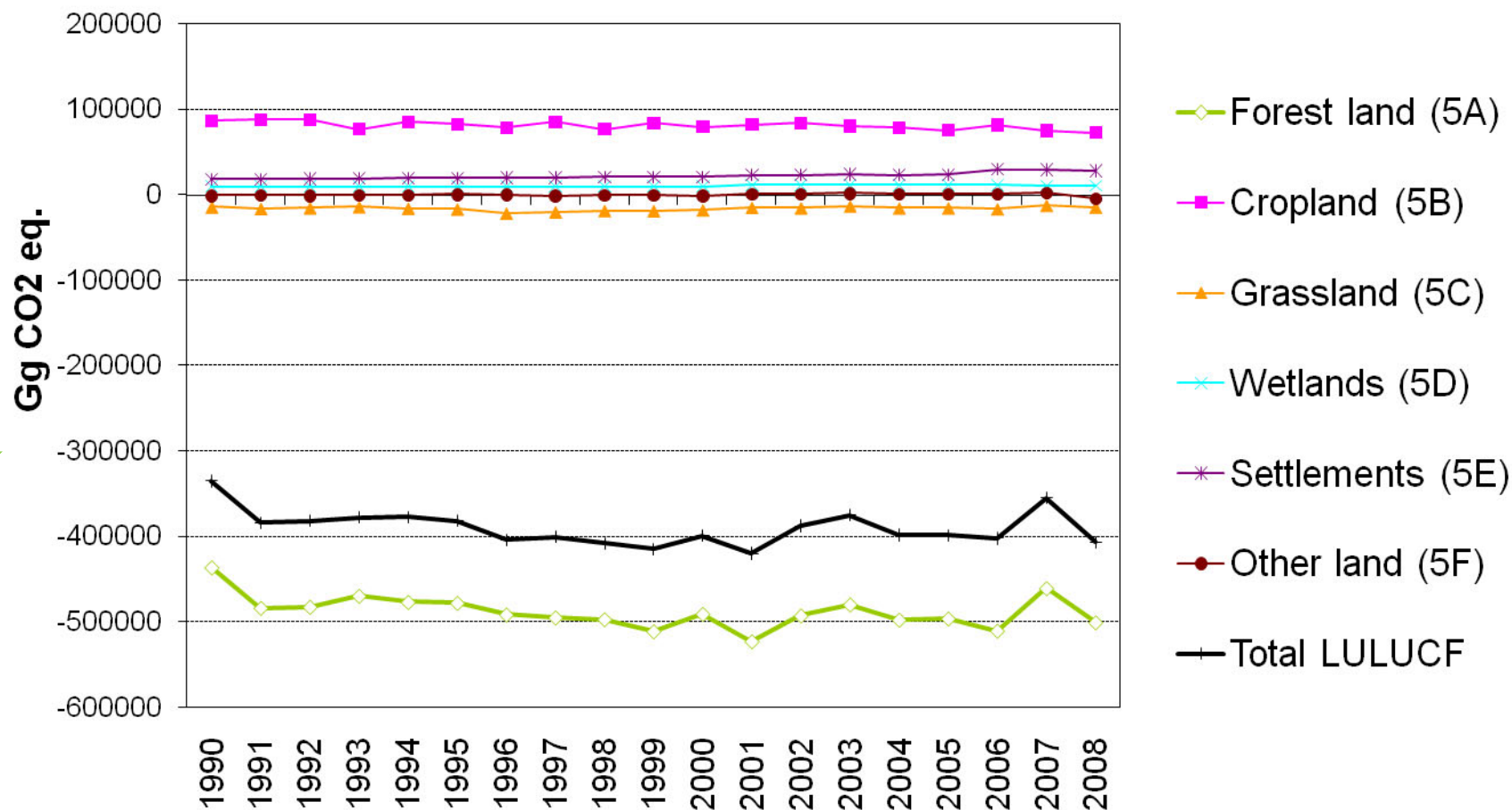
## EU: trend in AREA of land use categories



At EU level, total forest area increased from about 153 Mha to 158 Mha (+3.5%)



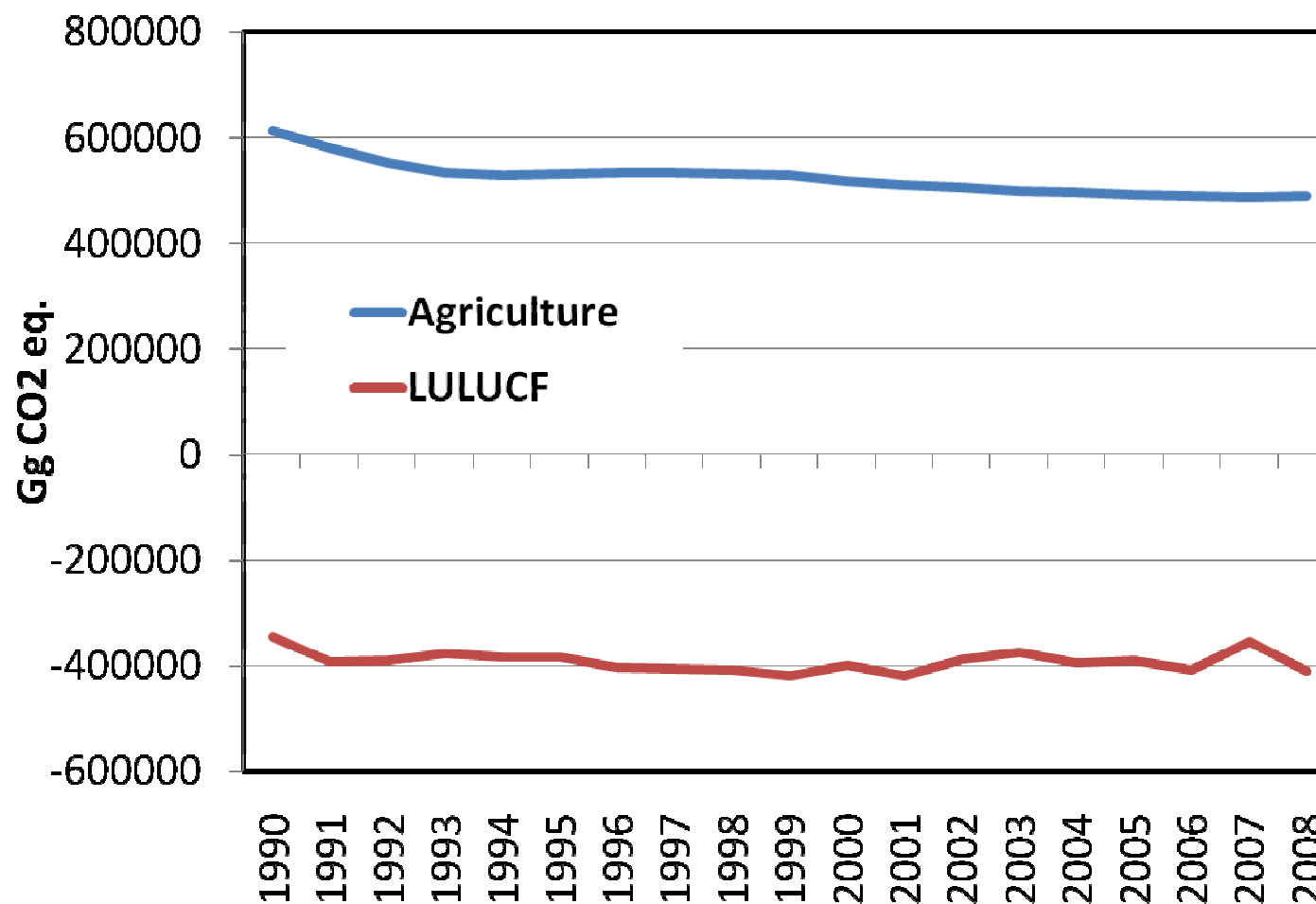
## EU: trend in EMISSIONS/REMOVALS in LULUCF



“**HOTSPOTS**”: small areas characterized by big emissions or removals:

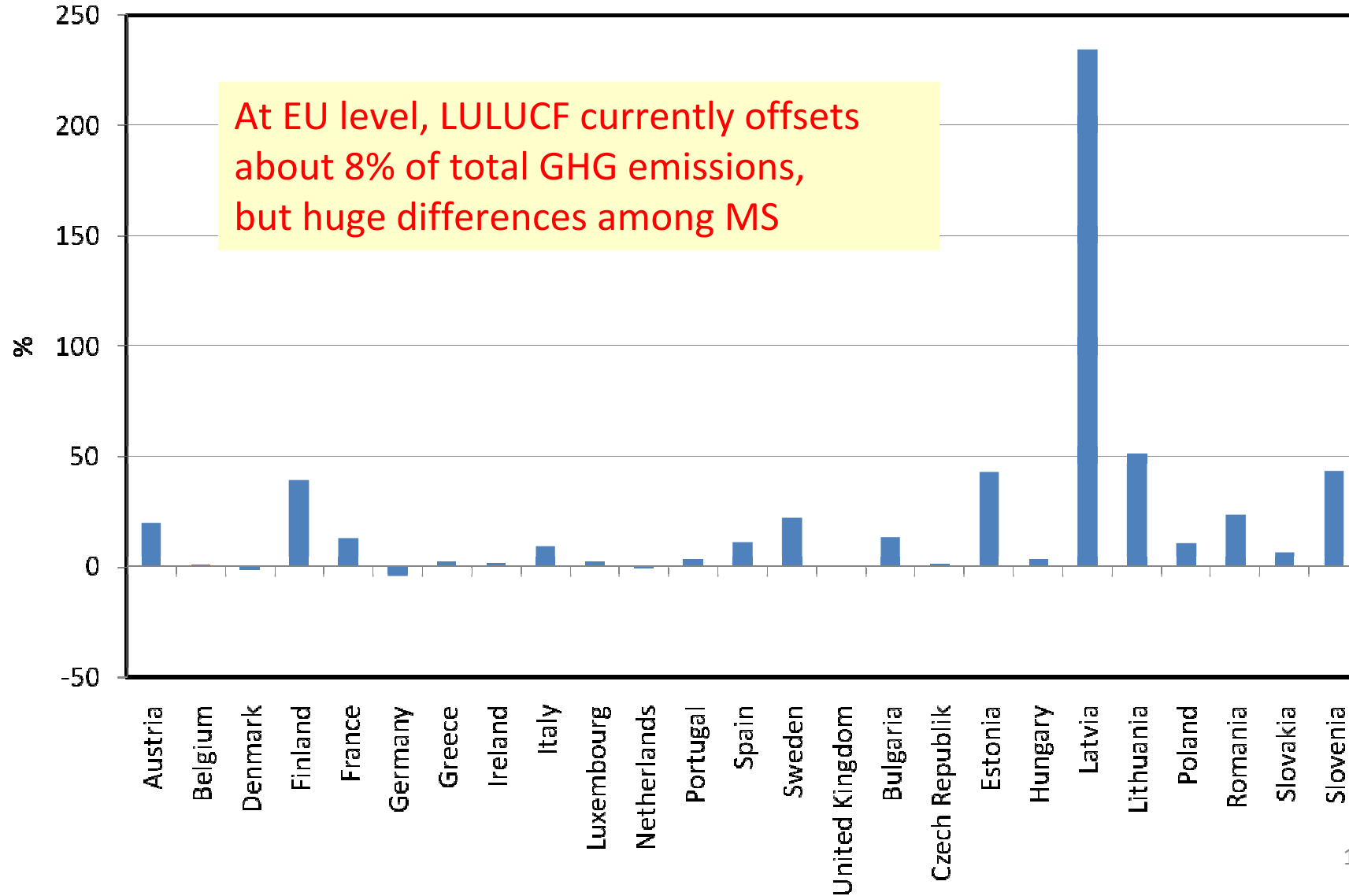
- **Land use changes** (emissions and removals): 7% of the total area, 26% of GHG in LULUCF
- **Organic soils** (only emissions): 4% of the total area, 18% of GHG in LULUCF (especially 5B)

## Emissions (+) and removals (-) from Agriculture and LULUCF at EU level





## % contribution of LULUCF to total GHG emissions in 2008



## Completeness of reporting – land use categories

Party	Reporting category							
	Forest land		Cropland		Grassland		Wetland	
	5.A.1. F-F	5.A.2. L-F	5.B.1. C-C	5.B.2. L-C	5.C.1. G-G	5.C.2. L-G	5.D.1. W-W	5.D.2. L-W
Austria	R	R	R	E	E	R		E
Belgium	R	R	E	E	E <sup>T</sup>	R		R
Denmark	E	R	E	R	E	E	E	R
Finland	R	R	E	E	E	R		E
France	R	R	E	E	E	R		E
Germany	R	R	E	E	E	E	E	E
Greece	R	R	R	E	E	E		E
Ireland	R	R	R	E	E	R	E	E
Italy	R	E	E	E	R	E	E	E
Luxembourg	R	R	E	E		E		E
Netherlands	R	R <sup>T</sup>		E	E	E		E
Portugal	R	R <sup>L</sup>	R	E		R		E
Spain	R	R	R			R		
Sweden	R	R	E	E	E	R	E	
UK		R	E	E	E	R		
Bulgaria	R	R	E	E		R	E	E
Cyprus	R							
Czech Rep.	R	R	E	E	E	R		E
Estonia	R		E		E	R	R	E
Hungary	R	R	E	E	E	R		
Latvia	R	R	E		E		E	E
Lithuania	R	R					E	E
Malta	R		R					
Poland	R	R	E		E	R	E	E
Romania	R							
Slovakia	R	R	E			R		
Slovenia	R	R	E	E	E	E		

(Information for the yr 2008, from 2010 GHG inventories)

R= Removals, E = Emissions. The first column of each category denotes land remaining in the same land category; the second column denotes land converted to that land category.

Shaded areas indicate the “**key categories**” (i.e. those most relevant in the GHG inventory of a country and whose accurate estimation should be prioritized)

Still many gaps, both situation is improving

## Uncertainties

Not all MS provide complete estimates of uncertainties. Aggregating the available information at EU level suggest an uncertainty of *about* 25-30% for forests and 35-40% for the whole LULUCF sector

## Recalculations

Recalculations of past data may arise from changes in methods, new C pools, or new data (e.g. new forest inventories). Recalculations occur in all sectors, but are more significant in LULUCF.

## Verification activities

Verification is important to build confidence in the overall results, especially if models or specific assumptions are used.

E.g. comparison with independent estimates, with estimates obtained with different methods, with official international reports (e.g. FAO), with data from scientific community: discussion of common trends and causes of divergences.

Currently, there is little information on LULUCF verification activities by EU MS.

The attention to verification activities will increase in coming years.

Estimates under KP basically builds on reporting to UNFCCC, but require additional supplementary information

## “Elected” KP activities, key categories (K) and accounting frequency

Member State	AR	D	FM	CM	GM	RV	Accounting frequency
Austria	K	K					end of CP
Belgium							end of CP
Denmark	K		K	K			Annually
Finland	K	K	K				end of CP
France	-	-	-				Annually
Germany	K	K	K				end of CP
Greece	K		K				end of CP
Ireland	K						end of CP
Italy			K				end of CP
Luxembourg							end of CP
Netherlands	K	K					end of CP
Portugal	K	K	K	K			end of CP
Spain	K		K	K			end of CP
Sweden			K				end of CP
UK	K	K	K				end of CP
Bulgaria	K						end of CP
Czech Republic			K				end of CP
Estonia	K	K					end of CP
Hungary	K		K				Annually
Latvia	K		K				end of CP
Lithuania							end of CP
Poland	K	K	K				end of CP
Romania							end of CP
Slovakia	K	K					end of CP
Slovenia			K				end of CP

## EU emissions/removals and accounting under KP

Surprisingly high emissions reported for from **D** (1% of 1990 total GHGs), higher than removals from **AR**!

Simulating the effect of the 2008 numbers over 1<sup>st</sup> CP (and considering all the accounting rules), the **credits from KP-LULUCF for EU would be around 1% of 1990 total GHGs** (much lower than real sink mainly due to FM cap).

Based on the **reviews of 2010 KP submission**, several MS had problems of:

1) **incomplete estimates** (1 MS not reporting ARD, 1 MS not reporting 1990 CM)

2) **incomplete supplementary information** required for KP LULUCF, e.g.:

- demonstrating that a pool is not a source (most MS, especially for FM soil);
- methodology to develop land use change matrix (especially new MS);
- demonstrating direct human induced nature of AR (very controversial);
- how harvest is distinguished from deforestation;

Several improvement occurred in recent years, but LULUCF remains a very complex and uncertain sector.

In terms of the reporting principles:

**TRANSPARENCY:** needs to be improved under KP for the “supplementary information”.

**COMPARABILITY:** within UNFCCC it means following IPCC. The fact that MS use different definitions is NOT necessarily a big problem. Some harmonization is ongoing and will help.

**TIME-SERIES CONSISTENCY:** essential, it is challenging for 1990 data and land use changes.

**COMPLETENESS:** has improved significantly in last yrs, further efforts are needed (new MS). Under the KP the most common problem of completeness regards soil under FM.

**ACCURACY:** difficult to assess. As long IPCC guidance is followed, estimates may be assumed to be “accurate”... But high uncertainties, incompleteness, frequent recalculations and little verification efforts may challenge this assumption.

Accuracy should not be considered a static objective, but rather a long-term process of continuous improvement. The most important steps are *completeness* and *verification*.

**Trees have always been at the centre of climate negotiations**

**THANKS!**

**... but don't lose the forest (climate agreement) by the trees...**

