



The Land Use, Land Use Change and Forestry (LULUCF) sector in the EU: overview and challenges

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OUTLINE



1. Overview of the LULUCF sector in the EU
2. Improvements and challenges
3. Conclusions



Overview of the LULUCF sector in the EU

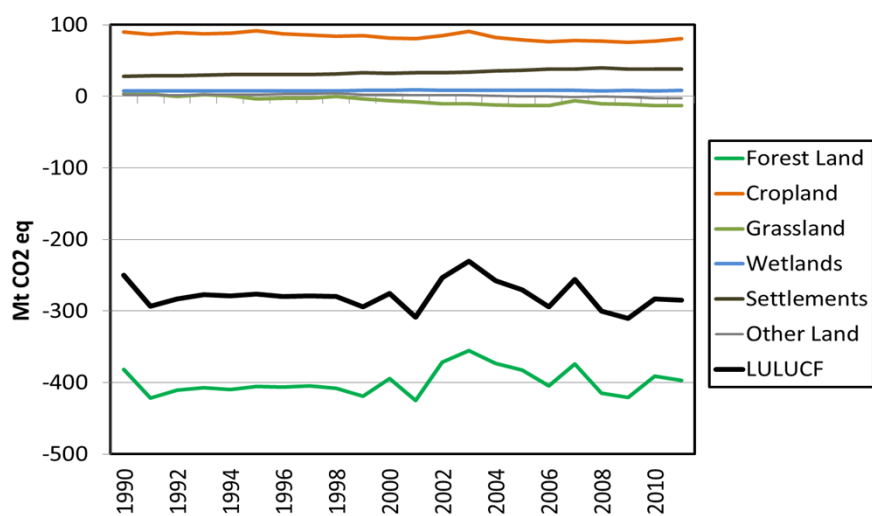
A robust and credible MRV (i.e. GHG inventories) surely is the backbone of all our efforts on climate policy – domestically and international

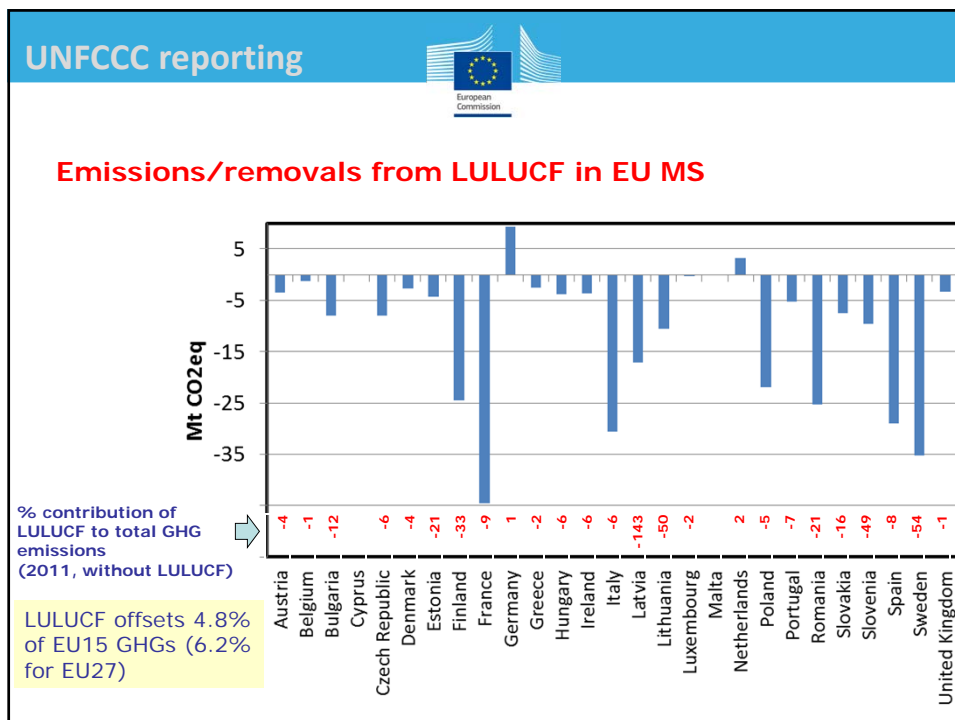
(Artur Runge-Metzger)

UNFCCC reporting

Overview

Emission trends – EU





UNFCCC reporting

Overview

The LULUCF "hotspots"

Land use changes represent 9% of EU area but account for > 20% of absolute emissions/removals of various subcategories

The sink from conversions to FL (-58 MtCO₂/yr) and GL (-26 MtCO₂/yr) slightly higher than emissions from conversions to CL (36 MtCO₂/yr) and SL (33 MtCO₂/yr).

Organic soils in FL, CL and GL represents about 5% of EU area but emissions account for > 40% of absolute emissions/removals from soil (for CL: 2% of area, 60% of emissions)

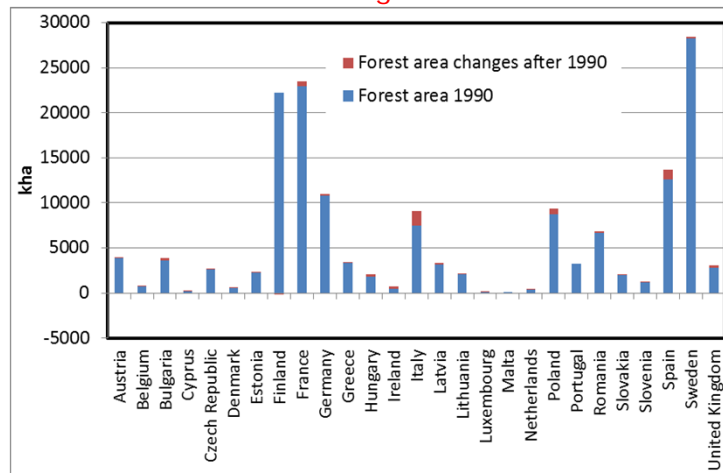
EU: 77 MtCO₂/yr from organic soils

Biomass burning: 5-15 MtCO₂/yr

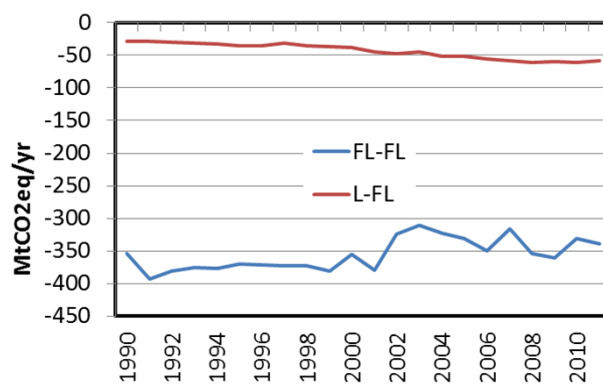
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Forest land (5A)

Forest areas and area changes

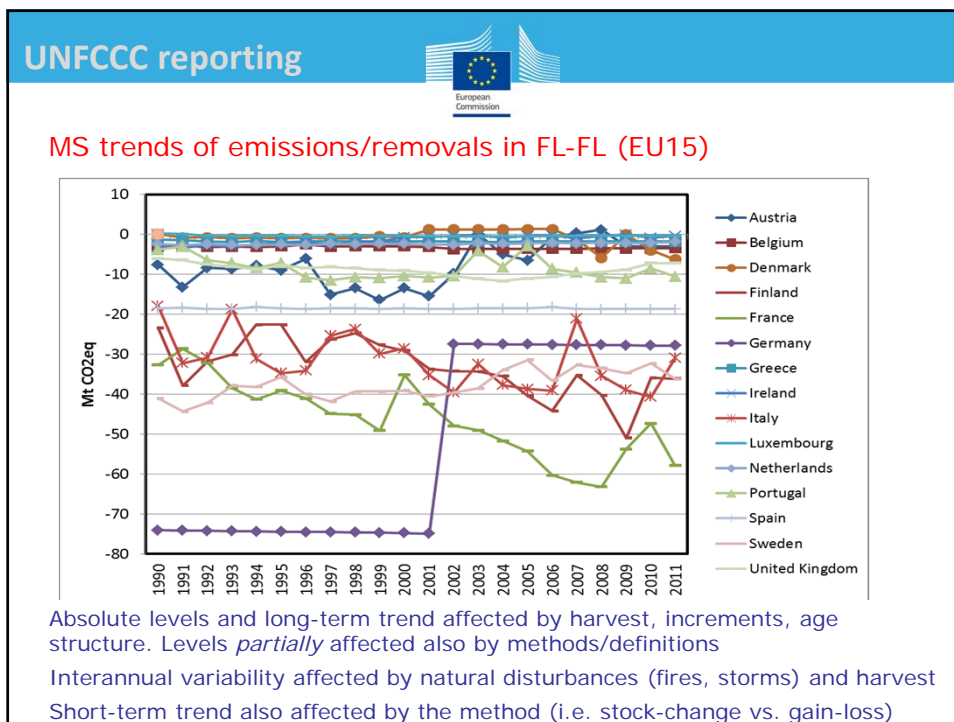
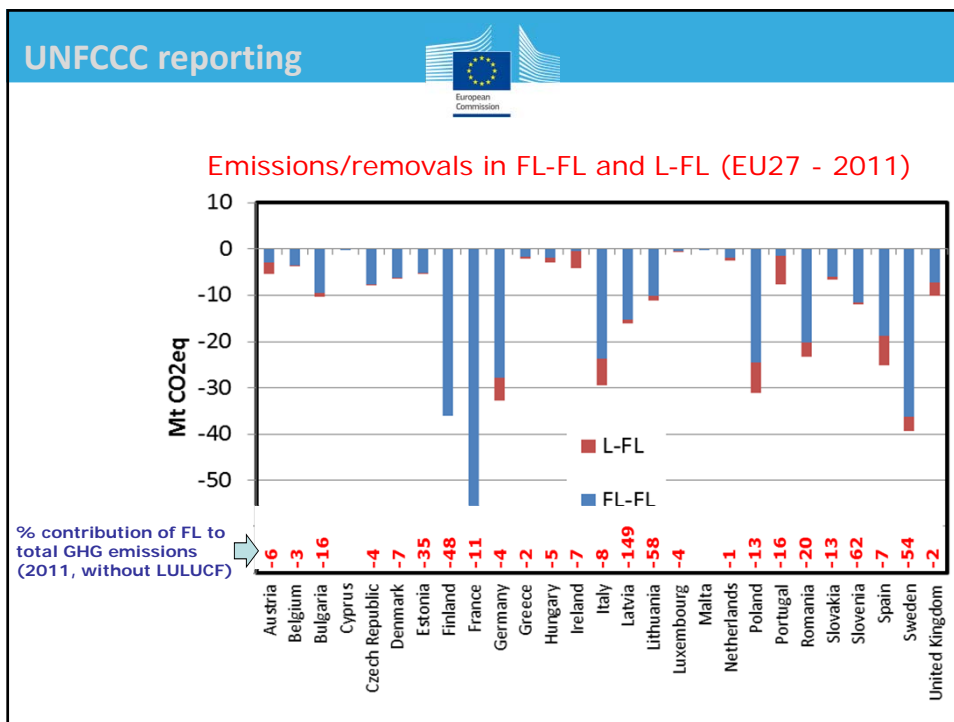


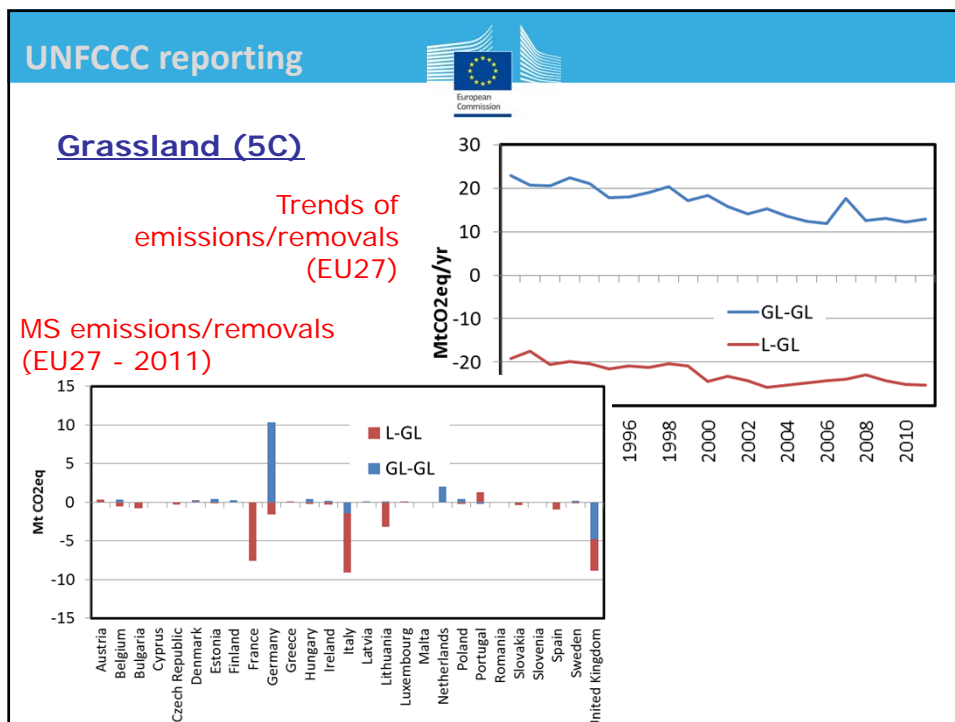
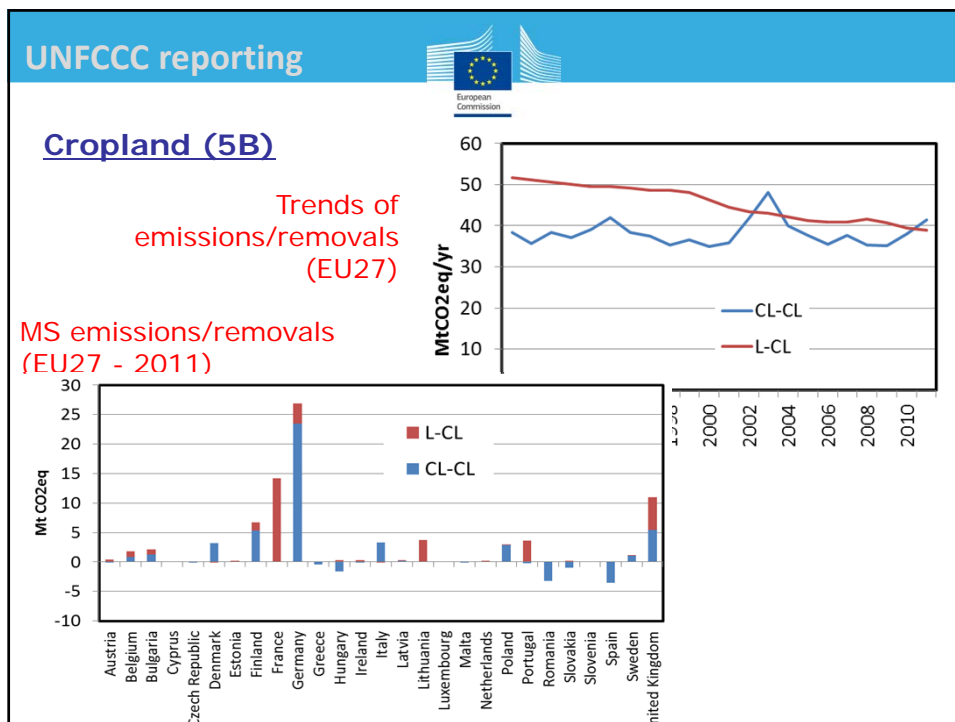
Trends of emissions/removals in FL-FL and L-FL (EU27)



FL remaining FL:

- 1990-2000: stable sink
- After 2000: decreasing sink (>harvest)





UNFCCC reporting

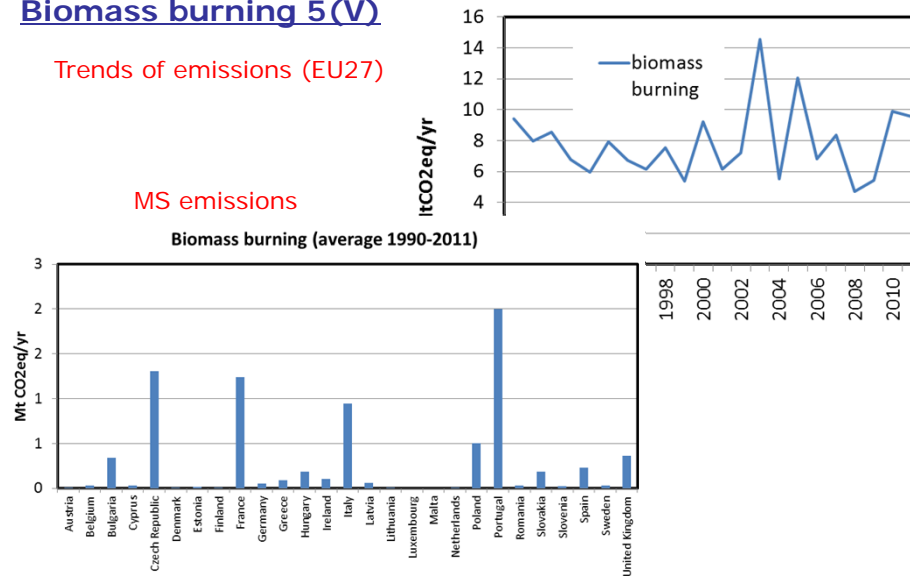


Biomass burning 5(V)

Trends of emissions (EU27)

MS emissions

Biomass burning (average 1990-2011)



KP reporting



Overview

Elected activities

FM: 17 MS
CM: 3 MS
GM: 2 MS
RV: 1 MS

EU and member states		Art 3.4 elected activities	Accounting frequency	
EU 27	EU-15	Austria	-	end of CP
		Belgium	-	end of CP
		Denmark	FM, CM, GM	annual
		Finland	FM	end of CP
		France	FM	annual
		Germany	FM	end of CP
		Greece	FM	end of CP
		Ireland	-	end of CP
		Italy	FM	end of CP
		Luxemburg	-	end of CP
		Netherlands	-	end of CP
		Portugal	FM, CM, GM	end of CP
		Spain	FM, CM	end of CP
		Sweden	FM	end of CP
		UK	FM	end of CP
	New member states	Bulgaria	-	end of CP
		Czech Republic	FM	end of CP
		Cyprus	na	na
		Estonia	-	end of CP
		Hungary	FM	annual
		Latvia	FM	end of CP
		Lithuania	FM	end of CP
		Malta	na	na
		Poland	FM	end of CP
		Romania	FM, RV	end of CP
		Slovakia	-	end of CP
		Slovenia	FM	end of CP

KP reporting				
<p>Which is the contribution of LULUCF to EU targets?</p> <p>Approx. expected LULUCF credits (-) and debits (+) during 2008-2012:</p> <p>Overall, KP-LULUCF credits for the EU should be <u>around</u> 83 MtCO₂, or 1,5% of 1990 total EU GHGs.</p>				
	AR	D	FM	other
Austria	-3	1	0	0
Belgium	0	1	0	0
Bulgaria	-1	0	0	0
Czech Republic	0	0	-1	0
Denmark	0	0	0	-2
Estonia	0	1	0	0
Finland	0	3	-4	0
France	-8	13	-8	0
Germany	-6	0	-5	0
Greece	0	0	0	0
Hungary	-1	0	-1	0
Ireland	-3	0	0	0
Italy	-7	0	-10	0
Latvia	-1	1	-1	0
Lithuania	0	0	-1	0
Luxembourg	0	0	0	0
Netherlands	0	1	0	0
Poland	-6	0	-3	0
Portugal	-9	6	-1	-6
Romania	0	1	-5	1
Slovakia	0	0	0	0
Slovenia		0	-2	
Spain	-6	0	-2	-3
Sweden	-1	3	-4	0
United Kingdom	-3	1	-1	0
EU	-56	33	-50	-10

KP reporting	
<p><u>Supplementary KP information</u></p> <ul style="list-style-type: none"> - Forest definition under KP Identical to UNFCCC except for Finland and the Netherlands - Implementation of definitions of activities In most cases, "broad" interpretation of human induced action <ul style="list-style-type: none"> - AR: most MS considered as "directly human induced AR" any expansion in forest area since 1990. - FM: most MS considered all national forest area as subject to "forest management" activity, except France (3% of forests are unmanaged) and Greece (under FM only 1/3 of its forest area). 	
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KP reporting



- Land-related information

MS	Reporting Method	Approach used for land representation
Austria	1	2/3
Belgium	1	3
Denmark	1	3
Finland	1	3
France	1	3
Germany	2	3
Greece	1	2
Ireland	2	3
Italy	1	2
Luxembourg	1	3
Netherlands	2	3
Portugal	1	3
Spain	1	2
Sweden	1	3
UK	1	2

The need to build a consistent land use change matrix and to identify and track lands over time is one of the biggest challenge for KP reporting

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KP reporting

Justification when omitting C pools

Member State	Pools	Activity	Demonstration/Reasoning
Austria	DW	AR	Due to the young age of the forests at AR areas and assuming lack of dead wood at areas of all other land uses a stock change of dead wood does not occur on AR areas.
Belgium	LT, DW	AR	As carbon stock of dead wood and litter in forest land is higher than those in other land uses in Belgium, Belgium applies conservative Tier.1 method for this carbon pool in AR activity
Denmark	SOC	FM	NFI monitoring was supplemented by an additional forest soil inventory in order to document that forest soils is not an overlooked source for CO ₂ emissions
France	LT, DW	CM, GM	Assumed not occurring
Germany	LT, SOC	FM	Small sinks are confirmed by national research project
Germany	DW	AR	Estimated (based on repeated field measurements) as not occurring
Greece	LT, DW, SOC	ARD, FM	Areas under AR include conversions from croplands by plantation. Croplands are assumed to not contain dead organic matter and therefore the litter and the dead wood pools cannot be a source for AR land, strongly supported by international literature. Carbon stock increment in soil in areas afforested has been estimated according to the Tier 1 methodology. Regarding the dead organic matter and soil under Forest Management, the Tier1 approach that there is no change in carbon stocks was followed based on international literature
Ireland	SOC	AR, D	Statistical supported data that this pool is not a source / judgement
Italy	SOC	FM	Demonstration based on country specific datasets and estimates
Luxembourg	DW	AR	Dead wood is assumed not to occur on AR areas, assumption verified in different sample plots of the second forest inventory (IFL2). Due to the young age of the forests at AR areas (since 1990) and the assumed lack of dead wood at areas of all other land uses it is assumed that a stock change of dead wood does not occur. If there was any in the young forests of AR areas it would represent a C stock increase due to the lack of dead wood in the previous land uses
Netherlands	LT, DW	AR	It is assumed that no other land use has carbon in litter and dead wood. Adequate data are lacking to quantify litter, accumulation of carbon in re/afforestation is conservatively set to zero, although expert judgment on forest age and ecosystem processes suggests a small sink. Also, the conversion of non-forest to forest involves a build-up of carbon in dead wood. However, as it is unlikely that much dead wood will accumulate in very young forests (having regeneration years in 1990 or later), accumulation of carbon in dead wood in re/afforested plots is most likely a very tiny sink that is too uncertain to quantify reliably, also reported as not a source
Spain	LT, DW	AR	Reasoning based on system functioning (following Tier 1), supported by national literature
	LT, DW, SOC	FM	Reasoning based on system functioning (following Tier 1), supported by national literature
	DW, LT	CM	Reasoning based on system functioning (following Tier 1)
Finland, Portugal, Sweden, United Kingdom			All pools are estimated and accounted (although individual change pools are often reported as included IE)



- How to distinguish harvesting from deforestation

Loss of forest cover often readily identified, but the classification as D more challenging. Most MS provided information on the criteria by which loss of tree cover can be distinguished from D, but often this information is not enough.

Criteria varies considerably among MS, and further work will be carried out in this area.



Improvements and challenges

Are LULUCF estimates transparent?

Transparency significantly improved with KP reporting, but many problems still on:

- Demonstrating the “not-a-source”
- Demonstrating the “direct human induced AR”
- Demonstrating to be able to identify and track lands

Are LULUCF estimates complete?

Completeness of reporting of land uses (UNFCCC)

Land use	sub-category	Carbon pool		
		Living biomass	Dead organic matter	Soil-min
Forest land	FL-FL	100%	64%	36%
	L-FL	100%	60%	76%
Cropland	CL-CL	76%	12%	72%
	L-CL	80%	52%	80%
Grassland	GL-GL	24%	12%	40%
	L-GL	76%	56%	84%
Wetlands	WL-WL	8%	0%	32%
	L-WL	52%	40%	48%

□ = estimate not mandatory under tier 1

■ = estimate not mandatory under tier 2

Completeness: FL > CL > GL > WL

Completeness of land use conversions > land use remaining the same

Completeness of reporting of forest activities (KP):

	Above-ground biomass	Below-ground biomass	Litter	Dead wood	Soil Min	Soil Org
AR	96%	96%	80%	44%	88%	38%
D	100%	100%	96%	96%	92%	39%
FM*	100%	100%	76%	76%	50%	53%

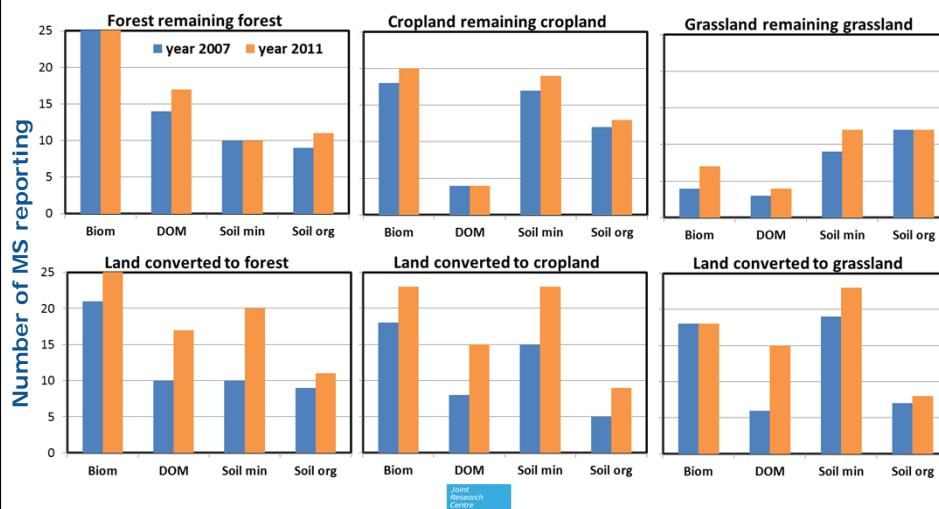
* % calculated for those countries which elected FM

The lack of proper documentation for “not a source” is one of the most common issue raised during the review

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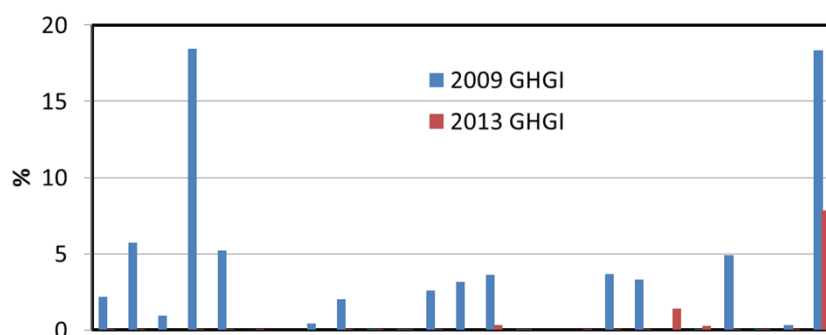
Improvement in completeness

Coverage of reporting of lands by C pool, from 2009 GHGI to 2013 GHGI



Are LULUCF estimates consistent?

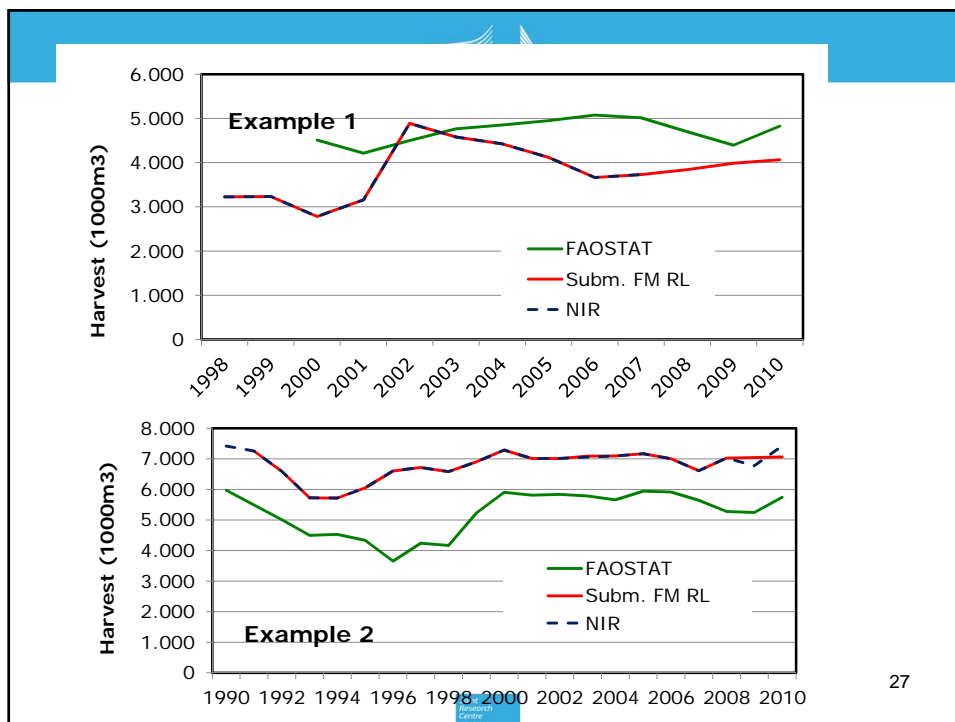
Example of improvement in time-series consistency:
% difference in total land area in 1990-last reporting yr



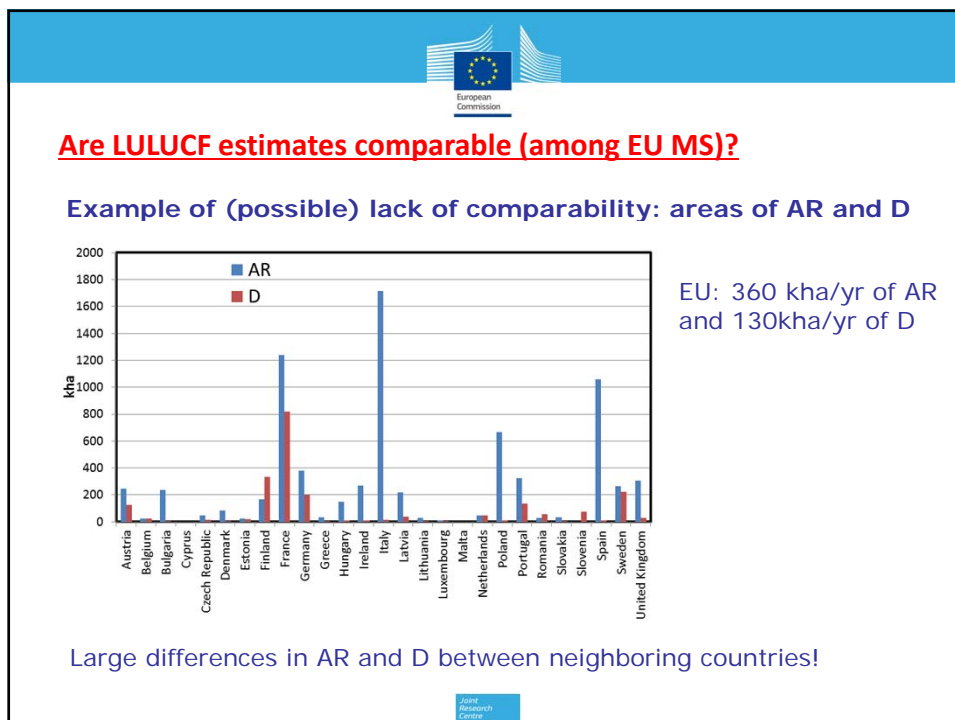
Example of lack of transparency (and consistency with other country reports): data on harvest

Harvest is the main driver of forest sink, however:

- 14 out of 28 EU countries do not report the amount of harvest (i.e. cubic meters or tons of dry biomass vs year)
- 8 out of 14 countries only report a figure, i.e. no numbers
- 6 countries report detailed numbers but, comparing these data with FAO statistics there are often differences.. (differences may be due to good reasons, but for transparency purpose it is good practice to explain the reason in the NIR...)



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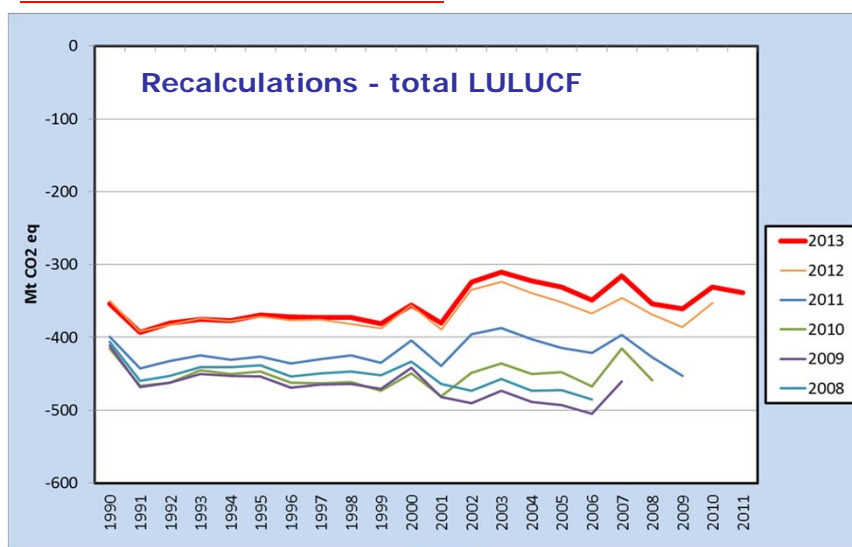
Methods used in MS' LULUCF inventories are heterogeneous. While in most cases this is unavoidable, and not necessarily a problem (as long as IPCC guidance is applied), some steps toward harmonization within the EU should be considered, e.g. on assessing forest land use changes:

DEFORESTATION area:

- Portugal 70 times higher than Spain
- France 52 times higher D values than Italy
- Latvia 35 times higher than Lithuania
- Austria 19 times higher than Slovenia or Switzerland
- Germany 17 times higher than Poland

JRC will select 2-3 pairs of MS to compare the methods used to assess D

Are LULUCF estimates accurate?



Are LULUCF estimates accurate?

Only the review process may assess accuracy. However, a comparison with a (partially or fully) independent estimate may help in identifying possible problems.

Verify your estimates!

According to IPCC, the purpose of verifying national GHG inventories is to establish their reliability and to check the accuracy of the reported numbers by independent means.

The overall goals are:

- Provide inputs to improve inventories;
- Build confidence on estimates and trends;
- Help to improve scientific understanding.

Limited information on verification is available in EU MS inventory reports!

There can be many approaches to verification (see IPCC GPG 2003 Ch. 5.7), e.g:

- Comparison with other information:

Independent peer-reviewed studies
Independent inventories (including other MS' GHG inventories),
International programmes and datasets e.g. FAO, JRC (e.g. EFFIS)

- Applying different methods:

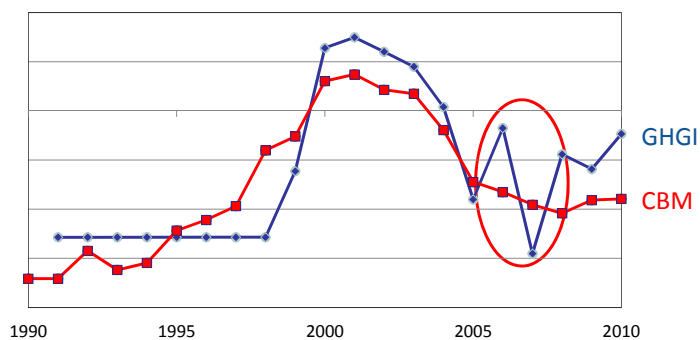
Lower tiers, higher tiers (e.g. models)
Direct measurement of GHG emissions and removals, RS

Comparing different methods *does not mean expecting full match*. There could be good reasons for differences (e.g. different assumptions, definitions, etc.). However, in principle trends should be the same.

The JRC has started to run a forest growth model (CBM) that could be used as a possible verification tool of MS's inventories.

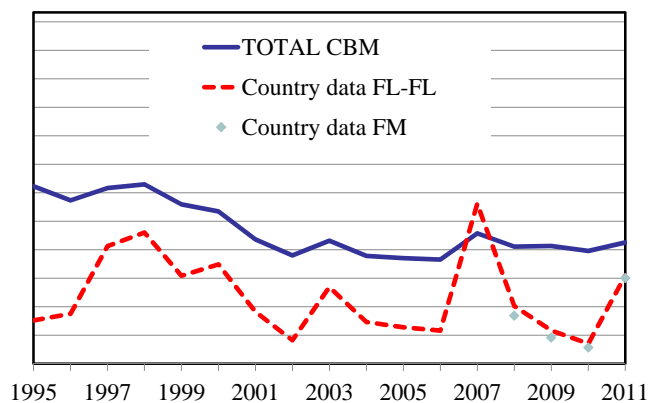
Comparison of CBM with GHG inventories

Example of similar trend and level, but different interannual variability



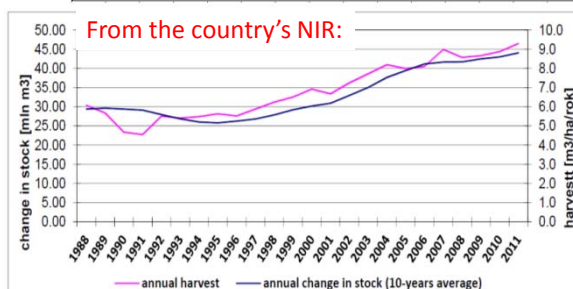
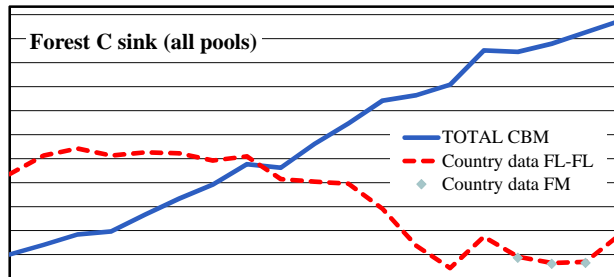
Example of similar trend, but different levels

Forest C sink (Biomass and DOM)





Example of different trend and level



→ Significant increase of harvest accompanied by an increase in C stocks ... unlikely situation



In the case stock-change method is used:

IPCC GPG, section 4.2.3.2, "to ensure that actual C stock changes are reported, and not artefacts resulting from changes in area over time, the calculations of C stock changes should be implemented in the following sequence: For each land, the C stock change should first be calculated for the year of interest, and these stock changes should then be summed for all areas. The inverse sequence, i.e., first summing up the C stocks across all areas at times t1 and t2 and then calculating the difference in C stocks, can result in errors if the area at times t1 and t2 is not the same, and thus is not recommended".

If the right sequence is not followed, significant mistakes in estimates are possible.

The JRC is available to double-check that the calculations are correct.

Conclusions



Several improvements, but quality of the GHG estimates still varies among MS.

- Transparency: improvements needed (methods used, land identification), issue often raised during reviews (lack of transparency not justifiable)
 - Comparability: methods heterogeneous among MS. Not necessarily a problem (if IPCC is applied), but further efforts in harmonization needed (Deforestation)
 - Consistency: QA/QC to be improved to avoid time-series inconsistencies (e.g. “land balance principle”) and discrepancies (e.g. NIR vs. CRF, UNFCCC vs. KP)
 - Completeness: improved. Still problems on demonstrating that unaccounted C pools (e.g. mineral soil under FM) are not sources.
 - Accuracy: improved, but difficult to assess. An inventory passing the review is assumed “accurate”. In practice, uncertainties (when available), little verification efforts, some incompleteness, and recalculations may challenge this assumption.
- Accuracy not static objective, but *long-term process of continuous improvements*

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The IPCC supplements

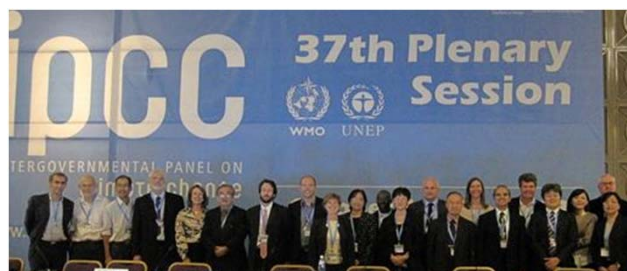


At IPCC-37 (Batumi, Georgia, 14-18 October 2013), two important methodology reports were adopted:

- “2013 Supplement to the 2006 IPCC Guidelines for National GHG Inventories: Wetlands” (2013 Wetlands Supplement);
- “2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol” (2013 KP LULUCF Supplement).

The pre-publication version of the *KP Supplement* (subject to final copyedit) is available at: <http://www.ipcc-nggip.iges.or.jp/>

Final publication of the *KP Supplement* is planned for February 2014.





Ongoing JRC activities on LULUCF

QA/QC LULUCF activities by Joint Research Centre (JRC)

(of MS submissions)

- Completeness check and gap-filling if needed
 - Comparison of IEFs (and AD) across MS
 - Check of possible inconsistencies in the time series
 - Check that KP LULUCF tables are correctly filled in
 - Check consistency with Agriculture sector
 - Ensure that any recalculation is explained in the NIR
 - Check the supplementary KP information (documentation for not-a-source, direct-human-induced, etc.)
 - To the extent possible (only when needed): detailed methodological check and assessment of issues from previous ARR
-
- Writing the LULUCF chapters of EU 15/27 NIR

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Beyond a “strict” QA/QC, JRC performs many other efforts to improve MS LULUCF inventories include:

- Workshops on LULUCF reporting, annually since 2004
(http://afoludata.jrc.ec.europa.eu/index.php/public_area%5Cevents_policy)
- Efforts for improving MS inventories, in cooperation with the scientific community, e.g. AFOLUDATA
(http://afoludata.jrc.ec.europa.eu/index.php/public_area/data_and_tools)
- EU internal review exercise (on key topics/issues i.e. following SP or requirements from MS)
- Development of ad-hoc tools/documents, e.g.:
 - decision trees on the use of notation keys
 - decision tree on pools to be reported (“not a source”)
 - ‘JRC analysis’ on MS approaches for “not a source”
- On demand support to MS (e.g. during the review process)

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European Commission's supported projects:

- **"Assistance with KP reporting"** (focus on 1st CP): new MS to be selected
- **"LULUCF MRV"**:
 - work ongoing with 7 MS: specific recommendations + CBM
 - 2-3 pair of MS to be selected for comparing methods for Deforestation
 - Task force on Yasso: 4 MS to be selected
 - Ad-hoc support (e.g. disaggregation of climatic zones)
- Developing tier-1 estimates of soil C stock (and changes)
- **"LULUCF accounting"** testing the feasibility of using existing detailed datasets (LPIS) to support future CM/GM reporting

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Next challenges:

- 2014 GHGI submission and review
- Preparing for the new requirements under the KP: Forest management reference level, HWP, Natural disturbances, etc.
- Preparing for new requirements under the EU LULUCF decision (CM and GM)

