PROGRESS, LESSONS LEARNED AND BEST PRACTICES FOR REPORTING ON CROPLAND AND GRAZING LAND MANAGEMENT

JRC LULUCF WORKSHOP 28-29/05/2019
PRESENTATION OUTLINE

- Introduction to the project
- Progress and planned improvements
- Most common issues identified vs. good practice examples
- Outlook – new requirements according to EU LULUCF Regulation
Project “Evaluation of EU reporting systems for cropland and grazing land management emissions and removals” (DG Clima Service request № 2016/10)

GOALS AND GENERAL APPROACH

Monitoring of reporting progress

2016 submissions
Analysis of crucial reporting elements

Identification of steps to have EU system ready for post-2020 accounting

2017 submissions

2018 submissions
Provision of MS specific guidance and feedback
- Good practice examples
- Guidance and recommendations
- Improvements on basis of IPCC GL

Desk review of:
- submissions under Dec. 529,
- NIRs,
- CRFs,
- review reports
STATUS OF RECOMMENDATIONS IN 2018

- Total No. of recommendations: 248
  - Open: 101
  - Solved: 32
  - Partly solved: 248 - 101 - 32 = 115

Bar chart showing the distribution of recommendations:
- Transparency: 200
- General issues: 150
- Emission factors: 50
- National system: 25
- Activity data: 15

Pie chart showing the status of recommendations:
- Open: 40.5%
- Solved: 13.1%
- Partly solved: 46.4%

Legend:
- Open
- Solved
- Partly solved
● 76 planned improvements
● From 0 to 9 planned improvements per MS
● Planned improvements not necessarily correlated with quality of reporting (e.g. single well reporting MS try to further improve, while some MS with need for improvement have no/few such plans)

Planned improvements

- 38% AD
- 26% general method
- 10% management assessment
- 26% EF

Planned improvements for pools

- 30% AGB
- 67% min soil
- 3% org soil
PROGRESS ACROSS THREE YEARS OF ASSESSMENT

- 1/3 of recommendations already implemented - progress in CM/GM reporting obvious

- Planned improvements for CM/GM reporting
  - several planned
  - partly already completed within the three years

- Evidence of awareness for needed improvements in most MS
BEST PRACTICE EXAMPLES FOR SOME OF THE IDENTIFIED ISSUES
## ISSUE “LACK OF TRANSPARENCY”

<table>
<thead>
<tr>
<th>Issue</th>
<th>Suggested approach:</th>
<th>Some good practice examples:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of definitions of CM/GM</td>
<td>Comprehensive description of the methodological approaches</td>
<td><strong>Ireland and UK:</strong> transparent descriptions and illustrations of methods and results</td>
</tr>
<tr>
<td>Very basic descriptions of methodologies</td>
<td></td>
<td><strong>Slovakia:</strong> transparent description of the QC approaches</td>
</tr>
<tr>
<td>No stratified reporting of subcategories</td>
<td></td>
<td><strong>Luxembourg:</strong> very clear description of the CM and GM definitions</td>
</tr>
<tr>
<td>Lack of information on the national system</td>
<td></td>
<td><strong>Sweden:</strong> very transparent definition of the pools</td>
</tr>
<tr>
<td>Missing references/sources</td>
<td></td>
<td><strong>Italy:</strong> transparent description of key categories</td>
</tr>
</tbody>
</table>

- Reporting of subcategories
- Approaches and sources for activity data, emission factors and estimates
- Information on key categories and significant pools
- Provision of conceivable explanation and definition of CM and GM – what is included since when and what is excluded

**Issue Suggested approach:**

- **Comprehensive description of the methodological approaches**
  - Reporting of subcategories
  - Approaches and sources for activity data, emission factors and estimates
  - Information on key categories and significant pools
  - Provision of conceivable explanation and definition of CM and GM – what is included since when and what is excluded

**Some good practice examples:**

- Ireland and UK: transparent descriptions and illustrations of methods and results
- Slovakia: transparent description of the QC approaches
- Luxembourg: very clear description of the CM and GM definitions
- Sweden: very transparent definition of the pools
- Italy: transparent description of key categories
ISSUE “NON CONSIDERING OF LAND-USE CHANGES PRIOR TO BASE YEAR”

- Potential time series consistency problem up to 2009
- Problematic issue for net/net accounting of CM and GM (also for the base period 2005-2009 according to LULUCF Regulation)

IPCC KP Supplement:
“Historical data on land use and management practices in 1990 (or the appropriate year(s)) and in years prior to 1990 are needed to establish the 1990 base year net emissions and removals of soil carbon from CM...”
“If area and activity data are not available for 1970 to 1990, countries can establish the base year 1990 carbon stock change using the most appropriate time series to estimate the 1990 value, in a manner consistent with guidance provided in Section 5.3, Chapter 5, Volume 1 of 2006 IPCC Guidelines. It is good practice to use a time period equivalent to 20 years that includes 1990 or as close to 1990 as possible.”

Historical land use changes considered (pre-base year)

<table>
<thead>
<tr>
<th></th>
<th>CM</th>
<th>GM</th>
</tr>
</thead>
<tbody>
<tr>
<td>yes</td>
<td>52%</td>
<td>55%</td>
</tr>
<tr>
<td>no</td>
<td>44%</td>
<td>4%</td>
</tr>
<tr>
<td>NI</td>
<td>4%</td>
<td>41%</td>
</tr>
</tbody>
</table>

**Note:**
- CM: Cropland Management
- GM: Grazing Management
- NI: Not Identified
ISSUE “NON CONSIDERING OF LAND-USE CHANGES PRIOR TO BASE YEAR”

Issue

- Potential time series consistency problem up to 2009
- Problematic issue for net/net accounting of CM and GM (also for the base period 2005-2009 according to LULUCF Regulation)

Suggested approaches:

- Use of available data and information sources for these historic years, like:
  - Orthophotos
  - Satellite images
  - Statistics
  - Expert judgment
- Transfer of the existing plot system for LULUC assessment (e.g. from NFIs) to the historic images and assessment of the land use and land-use change in the pre-base year period
- Extrapolations adjusted with surrogate parameters (information from agricultural statistics, expert knowledge) for the LULUC trends for the historic years

Some good practice examples:

- Baltic countries, Finland and Sweden:
  - fixed NFI grid used
  - Grid transferred to historical digital orthophotos, satellite images
- Complemented by statistical data and further data sources
- all land uses and land-use changes in the country (and stratification into mineral and organic soils) are assessed with such system

IPCC KP Supplement:
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ISSUE “TRACKING OF MANAGEMENT CHANGES IN CROPLAND AND GRASSLAND”

- Relevant for estimating soil C stock changes in CM rem. CM and GM rem. GM
- In combination with default or country specific “reference soil C stocks“ and “soil C stock change rates“ or models

<table>
<thead>
<tr>
<th>Issue</th>
<th>Consideration of management information</th>
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<tbody>
<tr>
<td></td>
<td>CM</td>
</tr>
<tr>
<td>yes</td>
<td>54%</td>
</tr>
<tr>
<td>no</td>
<td>20%</td>
</tr>
<tr>
<td>partly</td>
<td>3%</td>
</tr>
<tr>
<td>NI</td>
<td>23%</td>
</tr>
</tbody>
</table>

| Consideration of management information |
| GM                                           |
| yes                                          |
| 36%                                          |
| no                                           |
| 19%                                          |
| partly                                      |
| 6%                                           |
| NI                                          |
| 39%                                          |
## ISSUE “TRACKING OF MANAGEMENT CHANGES IN CROPLAND AND GRASSLAND”

<table>
<thead>
<tr>
<th>Issue</th>
<th>Suggested approaches:</th>
<th>Some good practice examples:</th>
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</thead>
</table>
| ● Relevant for estimating soil C stock changes in CM rem. CM and GM rem. GM | ● Identification/Classification of management types with different default or country specific C stock change rates  
  ● survey through agricultural experimental plot data and soil monitoring results  
  ● Use of IACS/LPIS and agricultural statistics for related management information  
  ● Models to estimate the C flux to soils  
  Check for potential synergies with Agriculture sector | ● Austria, Belgium, Denmark, Estonia, Finland, Ireland, Latvia, Luxembourg, Slovakia, Spain, Sweden use the IACS/LPIS system for (e.g.):  
  - Determination of management/land-use changes in/between cropland and grassland  
  - Area of organic agriculture  
  - Areas of different crop types  
  - Determination of geographical locations of CL and GL areas  
  - Conversions to/from other land uses than CL and GL  
  - Distribution of crops/grassland on organic soils  
  - Verification of data from other sources |
ISSUE “TRACKING OF MANAGEMENT CHANGES IN CROPLAND AND GRASSLAND”

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<tr>
<td>● Relevant for estimating soil C stock changes in CM rem. CM and GM</td>
<td>● Identification/Classification of management types with different default or country</td>
<td>● Portugal: use of data sources for agriculture/environmental incentives of the Rural</td>
</tr>
<tr>
<td>● In combination with default or country specific „reference soil C</td>
<td>specific C stock change rates</td>
<td>Development Programme under EU CAP to stratify into different management types</td>
</tr>
<tr>
<td>stocks“ and „Soil C stock change rates“ or models</td>
<td>● survey through agricultural experimental plot data and soil monitoring results</td>
<td>● Belgium, Denmark, Finland and Sweden:</td>
</tr>
<tr>
<td></td>
<td>● Use of IACS/LPIS and agricultural statistics for related management information</td>
<td>- use of country specific models to estimate the soil C stock changes due to changes in CM</td>
</tr>
<tr>
<td></td>
<td>● Models to estimate the C flux to soils</td>
<td>and/or GM</td>
</tr>
<tr>
<td></td>
<td>Check for potential synergies with Agriculture sector</td>
<td>- CL and/or GL stratified according to management, climate, crop and soil types various</td>
</tr>
<tr>
<td></td>
<td></td>
<td>data sources (e.g. agricultural Statistics, IACS/LPIS)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- C flux to soil assessed by the crop type information together with the C input from</td>
</tr>
<tr>
<td></td>
<td></td>
<td>manure</td>
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</table>
Evidence that the default IPCC C stocks and growth rates of perennial cropland biomass lead to over-estimations for European countries

No defaults for perennial biomass in grasslands
### ISSUE “COUNTRY SPECIFIC PERENNIAL BIOMASS”

#### Issue
- Evidence that the default IPCC C stocks and growth rates of perennial cropland biomass lead to over-estimations for European countries
- No defaults for perennial biomass in grasslands

#### Suggested approaches:
1. Monitoring of changes (e.g. within the NFI assessments)
2. Studies to derive country specific C stocks, growth rates and rotation periods (in combination with specific LULUC data)
3. Delegate the assessment to farmers clearing some of their perennial crops
   - Survey with assessment lists for the farmers
   - Distributed through the stakeholder organisations to the farmers
   - Assessed parameters: type, area, weight of plants (with and/or without roots), number of plants per ha, age
   - Some financial remuneration to the farmers for the extra work

#### Some good practice examples:
- Mediterranean: Recent compilation/literature survey by Canaveira et al. 2018
- Italy: Shrubland biomass stocks/changes assessed by model, country specific BEFs and R/S ratios; based on NFI results and national research projects.
- Portugal: study on perennial cropland and grassland biomass increments
- Denmark: biomass changes of hedgerows based on measurements of Danish NFI
- Austria, Estonia, Germany, Hungary: studies for country-specific emission factors for perennial crops
- Germany: representative study of hedges and copses
- Estonia and Latvia: direct measurements at NFI plots
ISSUE “COUNTRY SPECIFIC SOIL C STOCKS AND C STOCK CHANGE RATES – MINERAL SOILS”

- Required as “reference” or typical soil C stocks to estimate soil C stock changes due to management and land-use changes
- Country specific soil C stock change rates for management types (“management factors”)

### CSSC C STOCK CHANGES

<table>
<thead>
<tr>
<th>Management Type</th>
<th>CM - mineral soil C stock</th>
<th>GM - mineral soil C stock</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>28%</td>
<td>27%</td>
</tr>
<tr>
<td>T2</td>
<td>20%</td>
<td>23%</td>
</tr>
<tr>
<td>T3</td>
<td>16%</td>
<td>34%</td>
</tr>
<tr>
<td>T1&amp;T2</td>
<td>8%</td>
<td>0%</td>
</tr>
<tr>
<td>T1&amp;T3</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>T2&amp;T3</td>
<td>28%</td>
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CM - mineral soil C stock

GM - mineral soil C stock
**ISSUE “COUNTRY SPECIFIC SOIL C STOCKS AND C STOCK CHANGE RATES – MINERAL SOILS”**

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<td>● Required as „reference” or typical soil C stocks to estimate soil C stock changes due to management and land-use changes</td>
<td>Soil C stocks</td>
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<tr>
<td>● Country specific soil C stock change rates for management types („management factors“)</td>
<td>● Soil inventories</td>
<td>● Systematic cropland and grassland soil inventories available in some MS</td>
</tr>
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<td></td>
<td>● Soil type maps combined with national/international soil C stocks or humus content information (e.g. European Soil database)</td>
<td>● Hungary: activity data (several Censuses, CLC) and information on soil types, humus content and climate were used to derive country specific soil C stocks for CL and GL</td>
</tr>
<tr>
<td></td>
<td>● JRC report: Processing a Soil Organic Carbon C stock Baseline under Cropland and Grazing Land Management</td>
<td>● Lithuania: use of European soil data base (JRC, Caprese project) to derive country specific mineral soil C stocks</td>
</tr>
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### Issue “COUNTRY SPECIFIC SOIL C STOCKS AND C STOCK CHANGE RATES – MINERAL SOILS”

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| - Required as „reference“ or typical soil C stocks to estimate soil C stock changes due to management and land-use changes  
- Country specific soil C stock change rates for management types („management factors“) | **Soil C stock change rates:**  
- Models (validated and verified for local conditions)  
- Exploration of data from (historic) long-time agricultural experimental plots  
  **Important:** *Stratification* into soil types, climate types and management types | **Soil C stock changes rates:**  
- *Use of models in some MS (slide 13)*  
- Austria: use of results from long-time experimental plots of different agricultural management types  
- Czechia:  
  - locally-specific mineral soil C content of CM estimated for each cadastral unit on basis of detailed soil carbon maps  
  - stock change factor derived from the actual share of organic agriculture and specific tillage types  
  - Based on LPIS and agriculture statistics |
ISSUE “COUNTRY SPECIFIC SOIL C STOCKS AND C STOCK CHANGE RATES – ORGANIC SOILS”

- Challenge in all countries with significant shares of organic soils
- Organic soils represent frequently a significant pool in such countries
- Difficult to assess
**ISSUE “COUNTRY SPECIFIC SOIL C STOCKS AND C STOCK CHANGE RATES – ORGANIC SOILS”**

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<th>Suggested approaches:</th>
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<tr>
<td>• Higher tier methods are demanding, but indirect approaches and proxies for improvements of the estimates exist (e.g. soil subsidence measurements, water table depth measurements)</td>
</tr>
<tr>
<td>• Transfer of the available knowledge from research and response functions to the national conditions</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Some good practice examples:</th>
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<tr>
<td>• Denmark: New national emission factors for organic soils based on research programme to monitor the CO₂ emissions from organic soils with annual crops in rotation and permanent fertilized grassland</td>
</tr>
<tr>
<td>• Sweden: Use of a national emission factor for CL on organic soils based on literature review containing the references within the IPCC (2014) WL supplement. For representativeness, only Swedish, Norwegian and Finnish studies were considered.</td>
</tr>
</tbody>
</table>
### ISSUE “NATIONAL SYSTEM”

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| Evidence for need of strengthening of the National System in single MS due to, e.g.: | • More personal and financial resources  
• Collaboration with national institutions with related expertise  
• Reorganisation of tasks and procedural arrangements in the involved units  
• Contractual or legal arrangements  
• Collaboration with similar neighbouring countries (e.g. through international funds) | • National Systems of some countries which elected CM and GM (Denmark, Ireland, Portugal, UK)  
• Latvia: comprehensive improvements for CM and GM reporting and legal and procedural steps  
• Spain: Very transparent description and overview of the collaboration between the institutions, the data providers and the responsibilities |
OUTLOOK – LULUCF REGULATION

- Managed cropland and managed grassland will include emissions and removals for:
  - Remaining CL and GL
  - CL to GL and GL to CL
  - OL, SL, WL converted to CL or GL
  - CL or GL converted to WL, SL, OL (new inclusion of emissions/removals)

- Base year period **2005-2009**

- **Approach 3** for area assessment

- Application of **at least Tier 2 for significant pools**, encouragement to apply Tier 3
CONTACT INFORMATION

Carmen Schmid
carmen.schmid@umweltbundesamt.at

Peter Weiss
peter.weiss@umweltbundesamt.at