

Annex I – The agricultural data needs – outcome of the exchange with partner DGs

1. DG CLIMA data needs based on input from DG JRC-IES, Units H03 and H04

Agriculture statistics can form the basis for estimation of greenhouse gases (GHG) in national greenhouse gas inventories. According to the IPCC methodology, internationally applied for the compilation of the inventories, national-level statistics for inter alia livestock, manure management systems, soil N management, liming and urea application as well as agriculture-related land uses such as cropland and grazing land form part of the underlying activity data used in the estimation of GHG emissions. With about 10% of total emissions, agriculture is the second largest GHG source in the EU (after energy) and a significant sector for some Member States. Therefore, agriculture will continue to be relevant for emission reductions up to 2020 and beyond. Furthermore, in light of the upcoming 2030 climate and energy framework, the place of agriculture and land-use emissions within official targets will also be discussed when preparing our concrete policy measures. Thus, the importance of those sources and the need for robust information on them are likely to grow. While DG CLIMA has overall responsibility for the EU GHG inventory and its preparation on the basis of Member States national inventories¹, under the EU national inventory system, it is the Joint Research Centre which is in charge of implementing quality assurance/quality control checks on the Member State data in the inventory sectors of agriculture and LULUCF (land Use, land-use change and forestry)², assisting DG CLIMA and the European Environment Agency with the technical preparation of the EU inventory. JRC performs these activities in close cooperation with the Member States and the research community. The specific activities of DG JRC are outlined in its annual management plan. Thus, below DG CLIMA refers to the data needs pointed out by DG JRC as they already contain a reference to data needed in the context of the annual greenhouse gas inventories.

¹ Internal EU reporting for the purposes of compiling the EU greenhouse gas inventory is governed by Regulation (EU) No 525/2013 of the European Parliament and of the Council on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change

² For more information on the EU national inventory system, see SWD (2013) 308 - Elements of the Union greenhouse gas inventory system and the EU's Quality Assurance and Control (QA/QC) programme

JRC. H04

	Data needs	Required frequency	Required level of detail	Purpose for which it will be used	Other comments (optional)
	<p>General comments related to agri-environmental indicators (AEI), GHG inventories, Gross Nutrient balance (GNB):</p> <p>In time of budgetary and resources constraints and also to reduce burden on both administrations and respondents, FSS, FADN and IACS surveys/declaration should be streamlined in order to avoid double data collection (e.g. area, livestock ...). While respecting the general rules of statistical anonymity (in particular data collected for statistics should not be used for administrative purposes), a wider use of administrative data in the collection of statistical data may be desirable. The linkage (through a unique identifier) between FSS and FADN holdings (which is available at MS level) should also be maintained at EU level to allow the population of FADN sample of farms with parameters collected through FSS. This would allow meaningful agri-environmental evaluation</p> <p>Concept and terminology should be harmonised between FSS, FADN and IACS (e.g. farmers, farm holders, agricultural area, UAA, pasture, meadows, fallows, grazing land...)</p> <p>FSS data should be made available (anonymised) at LAU2 level for agri-environmental evaluation</p>				
	Geo-referenced micro-data on agricultural and neighbouring land	3-5 years	Plot or point (geo-referencing farms is more difficult)	Agri-environmental studies	These data are already produced in the LUCAS survey, but the link with agricultural management may be improved.
	Area, harvested production, yield for spring barley CI 164	As foreseen in Reg. 543/09 — instead of optional required	National and regional	Crop yield forecasting	
	Area, harvested production for temporary grasses and grazings including C2680, C2681, C0002, C2720, C2721, C2722, C2710	As foreseen in Reg. 543/09 — instead of optional required plus additional delivery for the new	National and regional	Crop yield forecasting, biomass estimation, agri-environmental indicators	For AEI the differentiation of grassland according to the proposal of the GRASSDATE project would be important (permanent grassland: grassland out of production but

	Data needs	Required frequency	Required level of detail	Purpose for which it will be used	Other comments (optional)
		requirements as currently optional for C2680			maintained, unimproved grassland (sole use, common land), improved grassland (by N-input levels <50, 50-100, >100 kg N/ha/yr, sole use and common land). Temporary grassland: pure grass, pure legume, mixture grass-legume (share of legumes see below))
	Fertiliser application	Annually	National and regional; mineral (urea and non-urea) and organic fertiliser application rates per crop incl. temporary and permanent grassland	Annual GHG inventories, Annual inventories of air pollutants, Gross Nutrient Balance, Crop yield modelling, mitigation/adaptation	
	Share of legumes in grassland	Once in 3 years for temporary grassland; once in 10 years for permanent grassland	National and regional	Gross Nutrient Balance, annual GHG inventories, mitigation/adaptation	Share of legumes in seed does not necessarily translate to share of legumes grown, as it is a.o. dependent on external sources of nitrogen.
	Share of grazing animals	Annually	By Member State, by type of animal, time they spend grazing	Annual greenhouse gas inventories; Gross Nutrient Balance, mitigation/adaptation	SAPM2010 did not provide information by animal type. Proposed questions: a) Days grazing on holding, by animal type (days/year); b) Days grazing on common

	Data needs	Required frequency	Required level of detail	Purpose for which it will be used	Other comments (optional)
					land, by animal type (days/year); c) Hours spent on grassland per grazing day, by animal type (hours/day), a) and b) must be exclusive/additive.
	Share of manure managed in manure management systems	Once every 10 years	National (and regional), according to IPCC (2006) categories	Annual greenhouse gas inventories; relevant for Gross Nutrient Balance; relevant for Annual inventories of air pollutants, mitigation/adaptation	IPCC (2006) guidelines request the following split of Manure Management Systems: Anaerobic lagoon, Liquid system (with/without natural crust cover, other covers, to be specified), Daily spread, Solid storage and dry lot, Composting (static pile, intensive windrow, passive windrow), Anaerobic digester, Burned for fuel, Other. Relevant information is share of manure managed in the respective systems. Information on manure management system cover remains important.
	Housing systems - mixing of deep bedding	Once every 10 years	National (and regional), as in SAPM plus mixing of deep bedding	Annual greenhouse gas inventories	IPCC (2006) distinguishes GHG emissions factors between mixed and not mixed cattle and swine deep bedding systems
	Irrigation	Once every 3 years	National and regional; as in SAPM (by crop	Water use indicator; spatially explicit mapping of GNB and	

	Data needs	Required frequency	Required level of detail	Purpose for which it will be used	Other comments (optional)
			type)	GHG emissions, mitigation/adaptation	
	Histosols	Once every 3 years	National and regional; Area of cultivated histosols	Annual greenhouse gas inventories	Histosols according to the definition of FAO (1998) included in the agricultural area (arable/non-arable).
	Manure application	Once every 3 years	National and regional; asFSS2016	Gross Nutrient Balance, annual GHG inventories, Annual inventories of air pollutants	
	Animal breeds	Once every 10 years	National and regional; mainly cattle breeds, others if possible	Annual GHG inventories, mitigation/adaptation	Characterization of the livestock sector will be more straightforward on the basis of breeds; important in the context of mitigation/adaptation.
	Feed	Annually	National and regional; share of dry matter of crops, grass, concentrates or compound feed, feed additives feed by animal type	Annual GHG inventories, Gross Nutrient Balance, mitigation/adaptation	Emissions of CH ₄ from ruminants and N excretion of all animal types requires a good characterization of nutrient intake with feed.
	Production days for living animals	Once every 10 years	National and regional; production days for	Annual GHG inventories, Gross	Conversion between average annual animal numbers and total number of individual animals is crucial for

	Data needs	Required frequency	Required level of detail	Purpose for which it will be used	Other comments (optional)
			living animals (or number of cycles)	Nutrient Balance	consistent use of data from different sources (e.g. surveys, slaughtering statistics, ...)
	Rice cultivation system	Once every 10 years	National and regional; rice cultivation system according to IPCC(2006)	Annual GHG inventories	Irrigated (continuous or intermittently flooded with single/multiple aeration), rain-fed (food prone or drought-prone), deep water (below or above 100 cm), other
	Soil conservation - share of crop residues returned to the soil	Once every 3 years	National and regional; share of crop residues returned to the soil by crop type or removed for other purposes (feed, bedding, biofuel, ...)	Annual GHG inventories, Gross Nutrient Balance	

JRC. H03

These are the ideal data needs for the production of annual greenhouse gas inventories for cropland and grassland in the Land Use, Land Use Change, and Forestry (LULUCF) sector. The categories enlisted make reference to the IPCC terminology used in the 2006 IPCC Guidelines and in the subsequent supplements.

	Data needs	Required frequency	Required level of detail	Purpose for which it will be used	Other comments (optional)
	Land use	Annual	By NUTS2 or NUTS3 region.	Annual greenhouse gas inventories	Long-term cultivated, Paddy rice, Perennial/Tree crops, Set-Aside, agro-forestry, permanent grassland, temporary grassland.
	Tillage practice	Annual	By NUTS2 or NUTS3 region, possibly by crop.	Annual greenhouse gas inventories	Areas under conventional, reduced, or zero tillage.
	Crop rotation	Annual	By NUTS2 or NUTS3 region, possibly by crop.	Annual greenhouse gas inventories	<ul style="list-style-type: none"> • ratio of root crops and green maize in rotation • ratio of forage crops in rotation (crop/grass system) • ratio of leguminous crops in rotation • ratio of perennial plants in rotation
	Application rate of mineral fertilizers (kg N / ha)	Annual	By NUTS2 or NUTS3 region, possibly by crop.	Annual greenhouse gas inventories	
	N-fixing crops in rotation (see also ratio of leguminous crops in	Annual	By NUTS2 or NUTS3 region,	Annual greenhouse gas inventories	

	Data needs	Required frequency	Required level of detail	Purpose for which it will be used	Other comments (optional)
	rotation)		possibly by crop.		
	Application rate of organic fertilizers (manure) (kg N/ha)	Annual	By NUTS2 or NUTS3 region, possibly by crop.	Annual greenhouse gas inventories	
	Application rate of Sludge and slurry (kg N/ha)	Annual	By NUTS2 or NUTS3 region, possibly by crop.	Annual greenhouse gas inventories	
	Crop residues management	Annual	By NUTS2 or NUTS3 region, possibly by crop.	Annual greenhouse gas inventories	Residues remaining on field, residues removed, and residues burnt
	Grasslands management	Annual	By NUTS2 or NUTS3 region.	Annual greenhouse gas inventories	According to IPCC it regards grasslands degradation: <ul style="list-style-type: none"> • Not degraded (nominally managed) • Moderately degraded (overgrazed) • Severely degraded • Improved grasslands (sustainably managed with moderate grazing pressure)
	Irrigation	Annual	By NUTS2 or NUTS3 region, possibly by crop.	Annual greenhouse gas inventories	Irrigated, Rainfed
	Manure management	Annual	By NUTS2 or NUTS3 region, by	Annual greenhouse	Share of manure treated in different Manure Management Systems

	Data needs	Required frequency	Required level of detail	Purpose for which it will be used	Other comments (optional)
			animal type.	gas inventories	(including manure left on pastures) as identified by the 2006 IPCC GL.

2. DG JRC-Institute for Environment and Sustainability - Data Needs Agricultural Statistics

	Data needs (in the order of priority)	Required frequency	Required level of detail	Purpose for which it will be used	Other comments (optional)
	<p>General comments related to agri-environmental indicators (AEI), GHG inventories, Gross Nutrient balance (GNB)</p> <ul style="list-style-type: none"> In time of budgetary and resources constraints and also to reduce burden on both administrations and respondents. Farm Structure Survey (FSS), Farm Accountancy Data Network (FADN) and Integrated Administration and Control System (LACS) surveys/declaration should be streamlined in order to avoid double data collection (e.g. area, livestock...). While respecting the general rules of statistical anonymity (in particular data collected for statistics should not be used for administrative purposes), a wider use of administrative data in the collection of statistical data may be desirable. The linkage (through a unique identifier) between FSS and FADN holdings (which is available at MS level) should also be maintained at EU level to allow the population of FADN sample of farms with parameters collected through FSS. This would allow meaningful agri-environmental evaluation. Concept and terminology should be harmonised between FSS, FADN and LACS (e.g. farmers, farm holders, agricultural area, Utilised Agricultural Area (UAA), pasture, meadows, fallows, grazing land...) FSS data should be made available (anonymised) at LAU2 level for agri-environmental evaluation. 				
	Geo-referenced micro-data on agricultural and neighbouring land	3-5 years	Plot or point (geo-referencing farms is more difficult)	Agri-environmental studies	These data are already produced in the LUCAS survey, but the link with agricultural management may be improved.
	Area, harvested production, yield for spring barley C1164	As foreseen in Reg. 543/09 - instead of optional required	National and regional	Crop yield forecasting	
	Area, harvested production for temporary grasses and grazings including C2680, C2681, C0002,	As foreseen in Reg. 543/09 - instead of optional required	National and regional	Crop yield forecasting, biomass estimation, agri-environmental	For AEI the differentiation of grassland according to the proposal of the GRASSDATE project would be

	Data needs (in the order of priority)	Required frequency	Required level of detail	Purpose for which it will be used	Other comments (optional)
	C2720, C2721, C2722, C2710	plus additional delivery for the new requirements as currently optional for C2680		indicators	important (permanent grassland: grassland out of production but maintained, unimproved grassland (sole use, common land), improved grassland (by N-input levels <50, 50-100, >100 kg N/ha/yr, sole use and common land). Temporary grassland: pure grass, pure legume, mixture grass-legume (share of legumes see below))
	Application Rate of Fertilisers (mineral and organic (Kg N/ha))	Annually	National and regional; mineral (urea and non-urea) and organic fertiliser application rates per crop incl. temporary and permanent grassland. NUTS2 or NUTS3 is required for the production of annual greenhouse gas inventories for cropland and grassland in the Land Use, Land	Annual GHG inventories. Annual inventories of air pollutants, Gross Nutrient Balance, Crop yield modelling, mitigation/adaptation	

	Data needs (in the order of priority)	Required frequency	Required level of detail	Purpose for which it will be used	Other comments (optional)
			Use Change, and Forestry (LULUCF) sector.		
	Share of legumes in grassland	Once in 3 years for temporary grassland; once in 10 years for permanent grassland	National and regional	Gross Nutrient Balance, annual GHG inventories, mitigation/adaptation	Share of legumes in seed does not necessarily translate to share of legumes grown, as it is a.o. dependent on external sources of nitrogen.
	Share of grazing animals	Annually	By Member State, by type of animal, time they spend grazing	Annual greenhouse gas inventories; Gross Nutrient Balance, mitigation/adaptation	SAPM2010 did not provide information by animal type. Proposed questions: a) Days grazing on holding, by animal type (days/year); b) Days grazing on common land, by animal type (days/year); c) Hours spent on grassland per grazing day, by animal type (hours/day), a) and b) must be exclusive/additive.
	Share of manure managed in manure management systems	Once every 10 years (annual for the production of annual greenhouse gas inventories for cropland and grassland in the Land Use, Land Use Change, and Forestry (LULUCF) sector)	National and regional by animal type, according to IPCC (2006) categories. NUTS2 or NUTS3 required for the production of annual greenhouse gas inventories for	Annual greenhouse gas inventories; relevant for Gross Nutrient Balance; relevant for Annual inventories of air pollutants, mitigation/adaptation	Intergovernmental Panel on Climate Change - IPCC (2006) guidelines request the following split of Manure Management Systems: Anaerobic lagoon, Liquid system (with/without natural crust cover, other covers, to be specified). Daily spread. Solid storage and dry lot, Composting (static pile, intensive windrow, passive windrow), Anaerobic digester. Burned for fuel,

	Data needs (in the order of priority)	Required frequency	Required level of detail	Purpose for which it will be used	Other comments (optional)
			cropland and grassland in the Land Use, Land Use Change, and Forestry (LULUCF) sector.		Other. Relevant information is share of manure managed in the respective systems. Information on manure management system cover remains important.
	Housing systems - mixing of deep bedding	Once every 10 years	National (and regional), as in SAPM plus mixing of deep bedding	Annual greenhouse gas inventories	IPCC (2006) distinguishes GHG emissions factors between mixed and not mixed cattle and swine deep bedding systems
	Irrigation	Annual	National and regional; as in SAPM (by crop type). NUTS2 or NUTS3 level required for the production of annual greenhouse gas inventories for cropland and grassland in the Land Use, Land Use Change, and Forestry (LULUCF) sector.	Water use indicator; spatially explicit mapping of GNB and GHG emissions, mitigation/adaptation. Annual greenhouse gas inventories	Irrigated, Rain fed

	Data needs (in the order of priority)	Required frequency	Required level of detail	Purpose for which it will be used	Other comments (optional)
	Histosols	Once every 3 years	National and regional; Area of cultivated histosols.	Annual greenhouse gas inventories	Histosols according to the definition of FAO (1998) included in the agricultural area (arable/non-arable).
	Manure application	Once every 3 years	National and regional; as FSS2016	Gross Nutrient Balance, annual GHG inventories. Annual inventories of air pollutants	
	Animal breeds	Once every 10 years	National and regional; mainly cattle breeds, others if possible	Annual GHG inventories, mitigation/adaptation	Characterization of the livestock sector will be more straightforward on the basis of breeds; important in the context of mitigation/adaptation.
	Feed	Annually	National and regional; share of dry matter of crops, grass, concentrates or compound feed, feed additives feed by animal type	Annual GHG inventories. Gross Nutrient Balance, mitigation/adaptation	Emissions of CH ₄ from ruminants and N excretion of all animal types requires a good characterization of nutrient intake with feed.
	Production days for living animals	Once every 10 years	National and regional; production days for living animals (or number of cycles)	Annual GHG inventories. Gross Nutrient Balance	Conversion between average annual animal numbers and total number of individual animals is crucial for consistent use of data from different sources (e.g. surveys, slaughtering

	Data needs (in the order of priority)	Required frequency	Required level of detail	Purpose for which it will be used	Other comments (optional)
					statistics...)
	Rice cultivation system	Once every 10 years	National and regional; rice cultivation system according to IPCC (2006)	Annual GHG inventories	Irrigated (continuous or intermittently flooded with single/multiple aeration), rain-fed (food prone or drought-prone), deep water (below or above 100 cm), other
	Soil conservation - share of crop residues returned to the soil	Once every 3 years	National and regional; share of crop residues returned to the soil by crop type or removed for other purposes (feed, bedding, biofuel...)	Annual GHG inventories. Gross Nutrient Balance	
	Land use	Annual	By NUTS2 or NUTS3 region.	Annual greenhouse gas inventories	Long-term cultivated, Paddy rice, Perennial/Tree crops, Set-Aside, agro-forestry, permanent grassland, temporary grassland.
	Tillage practice	Annual	By NUTS2 or NUTS3 region, possibly by crop.	Annual greenhouse gas inventories	Areas under conventional, reduced, or zero tillage.
	Crop rotation	Annual	By NUTS2 or NUTS3 region,	Annual greenhouse gas inventories	<ul style="list-style-type: none"> ratio of root crops and green maize in rotation ratio of forage crops in rotation

	Data needs (in the order of priority)	Required frequency	Required level of detail	Purpose for which it will be used	Other comments (optional)
			possibly by crop.		(crop/grass system) <ul style="list-style-type: none"> ratio of leguminous crops in rotation ratio of perennial plants in rotation
	N-fixing crops in rotation (see also ratio of leguminous crops in rotation)	Annual	By NUTS2 or NUTS3 region, possibly by crop.	Annual greenhouse gas inventories	
	Application rate of Sludge and slurry (kg N/ha)	Annual	By NUTS2 or NUTS3 region, possibly by crop.	Annual greenhouse gas inventories	
	Crop residues management	Annual	By NUTS2 or NUTS3 region, possibly by crop.	Annual greenhouse gas inventories	Residues remaining on field, residues removed, and residues burnt
	Grasslands management	Annual	By NUTS2 or NUTS3 region.	Annual greenhouse gas inventories	According to IPCC it regards grasslands degradation: <ul style="list-style-type: none"> Not degraded (nominally managed) Moderately degraded (overgrazed) Severely degraded Improved grasslands (sustainably managed with moderate grazing pressure)

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