Methods and Data Documentation

Remote Training on the Building of Sustainable National Greenhouse Gas Inventory Management Systems

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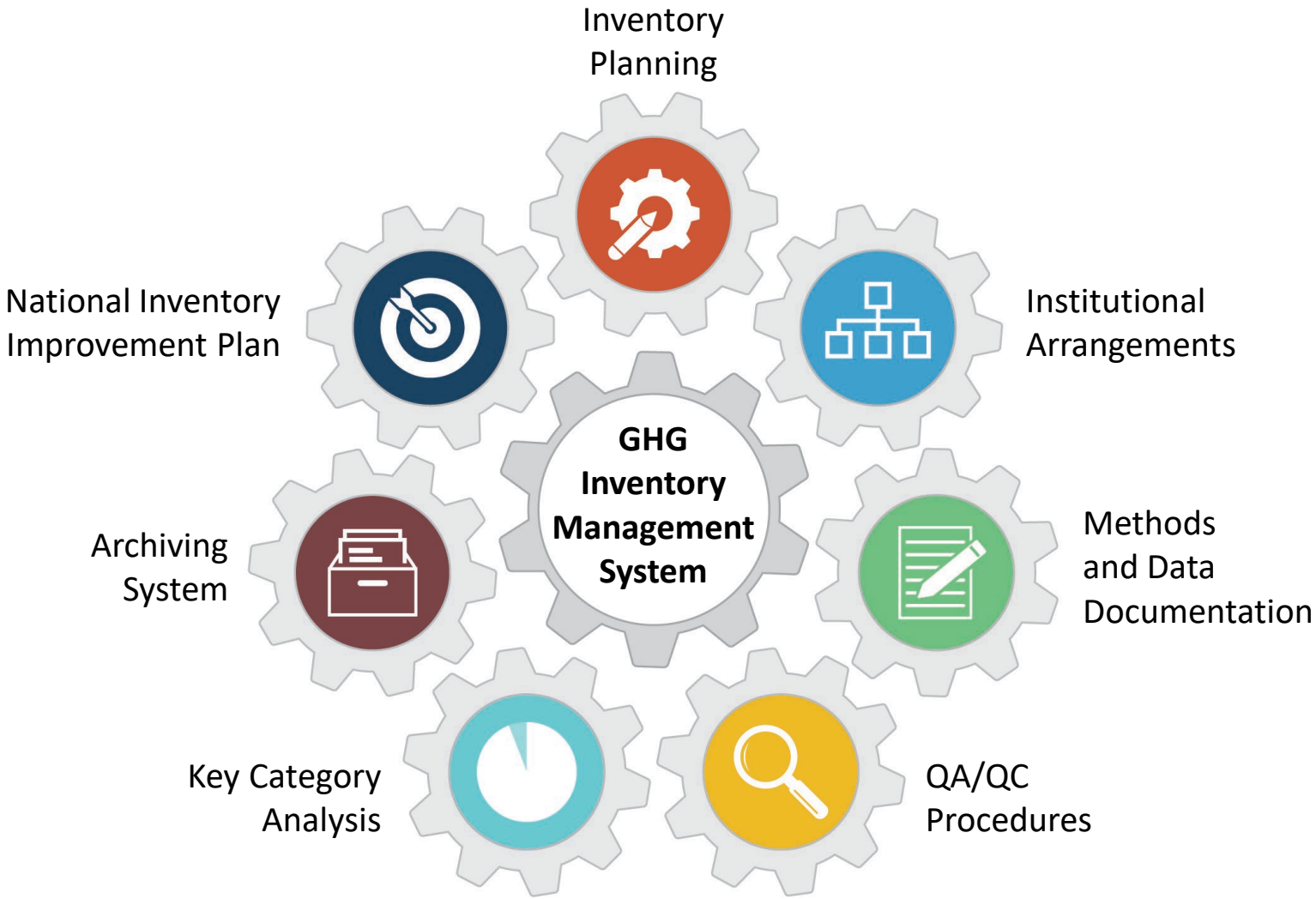
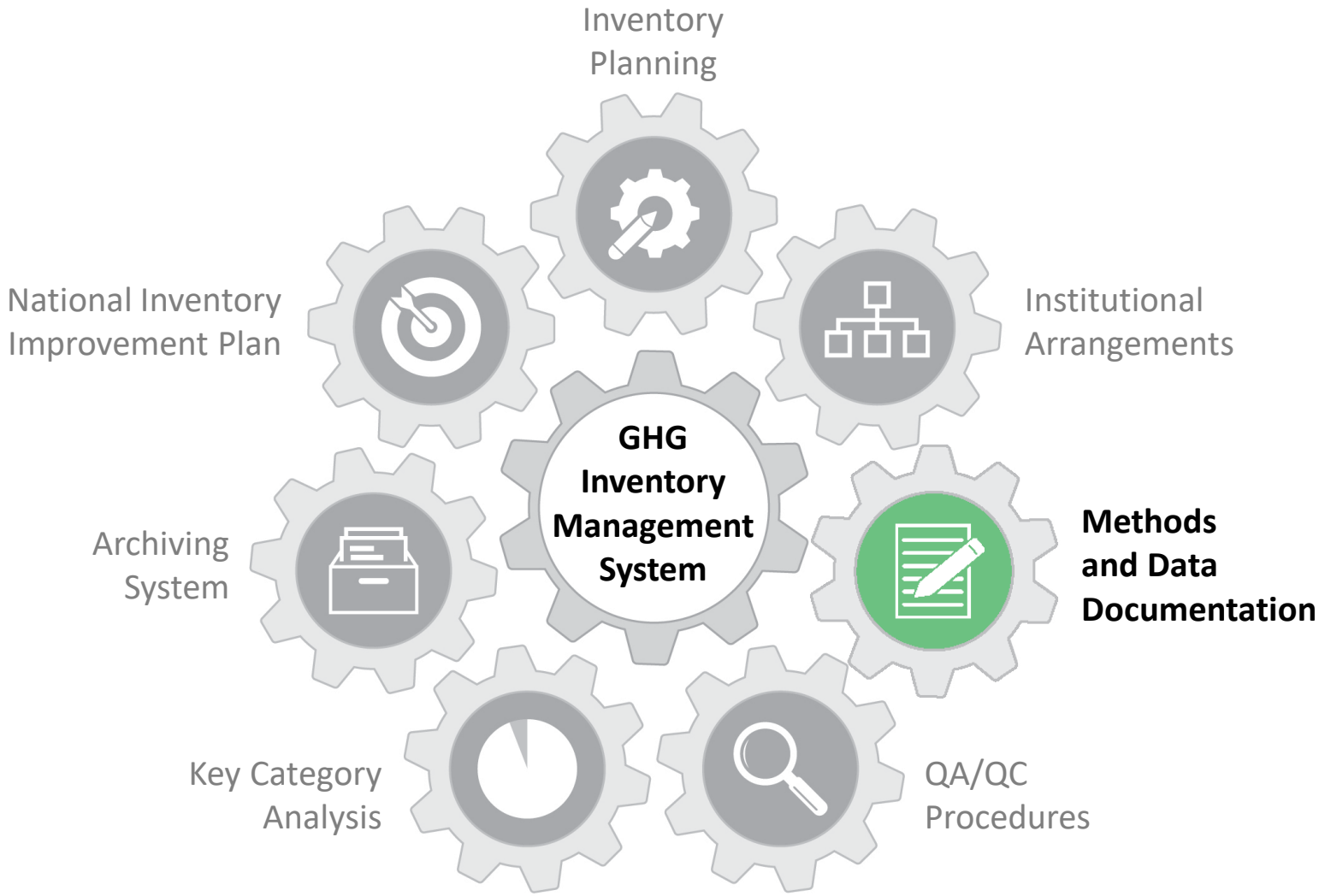
Developing a Sustainable National GHG Inventory System



Methods and Data Documentation



National GHG Inventory Compilation Cycle

- Inventory inception meeting
- Start with previous inventory, if available
- Review and implement improvement plan
- Identify Activity Data and choose methodologies

- Collect Activity Data, Emission Factors
- QC all data

- Estimate emissions & removals
- Implement QC procedures
- Revise estimates, based on new data and QA/QC findings
- Ensure time series consistency
- Conduct uncertainty & key category analyses

- Document methodological approaches, recalculations, and references
- Write inventory report

- Conduct & document QA/QC procedures, such as basic peer review
- Address QA/QC findings

- Finalize inventory
- Develop improvement plan
- Publish/submit inventory for UNFCCC reporting on time

- Save all compilation files and references to create an inventory archive
- Backup the archive

4

Overview

Introduction to Methods and Data Documentation

What to Document

Review of the Template

But before we turn to data documentation…

..let‘s take a small deviation on data collection

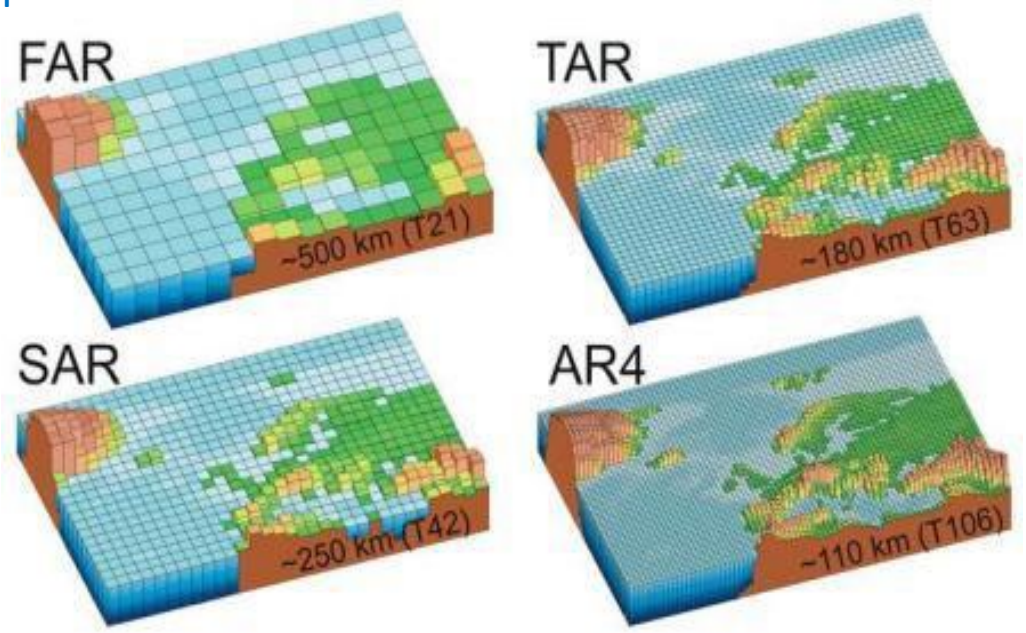
Barriers to Obtaining Available Data

- Lack of awareness of what data might be available
- Lack of structured data sharing processes
- Timeliness – key datasets are not available when needed
- Sharing data may be viewed as losing ownership/expertise/power by individuals, departments, or organisations
- Restrictions on statistics data prior to official release
- Commercially sensitive data – e.g., from individual companies or installations
- Keeping up with the policy cycle – new measures and targets can be developed and implemented very quickly, sometimes without consulting data and technical experts

Making the Most of Limited Data

- Availability of suitable data WILL be an issue
- Do not be afraid to use data that has gaps, is new, or does not provide total coverage – *as long as you understand these issues*
- In many cases, data will provide an indication of direction of travel rather than a definitive answer for whether a target has been met or the exact mitigation effect of a policy
- In the absence of comprehensive data, limited data is better than nothing
- Try using the data you have before you decide to start collecting new data

FAR. Making a start – but resolution poor…



AR4. Improvements made over time. Much better data and modelling. Resolution much better

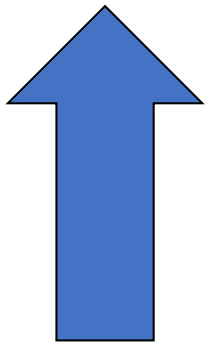
Source: World Meteorological Association
https://www.wmo.int/pages/themes/climate/climate_models.php

Overcoming Data Barriers

- Start by undertaking a **systematic review of available data** to establish who may hold the data that you require
- Establish a **working group of key data providers**, where data, its availability, data provision processes, and any other issues can be discussed
- Consider implementing **agreements** (e.g., memorandum of cooperation/ understanding, data supply agreement) with key data providers outlining what they will share and when
- **Aggregate data** to a level where it is no longer deemed commercially sensitive – e.g. grouping data in order that individual sites and companies can no longer be identified

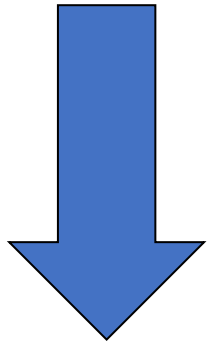
What mechanisms can be used to secure data collection?

Increasing ease

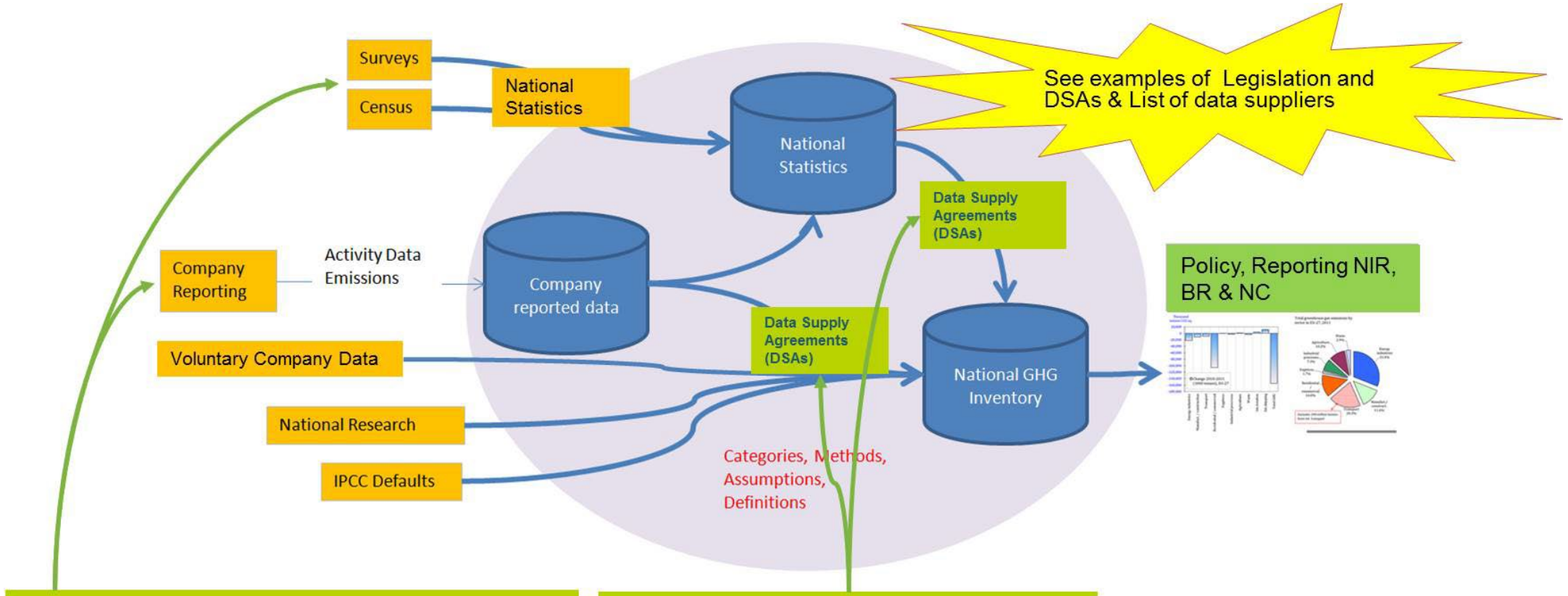


- Informal agreements
- Agreements for data supply (DSA)
- Regulation

Increasing formality



Data collection – UK Example



Legislation

non GHGI specific
- Industrial Pollution (IPPC)
- Statistics of Trade Act (UK energy statistics from DECC)

GHGI specific
- Greenhouse Gas Emissions Trading System
- National Emissions Inventory Regulations 2005

Data Supply Agreements (DSAs)

- Quality, format, security and timeframe for preparation of the inventory.
- Government Agencies & Departments, Industry, Trade associations.

UK Data Supply Agreement (DSA)

Key elements:

- Defines scope and format of data
- States time for delivery of data
- Sets out the requirements for commercial confidentiality
- Requests information about uncertainty

Helps receiving the right data at the right time!

Annual Data Requirements			
Data Required	*Key Data Provider*	*Deadline each year*	*Comments*
Access to the SEPA SPRI inventory for previous years data	SEPA	15 August*	Electronic version of Scottish Pollutant Release Inventory (SPRI), including emissions where below reporting threshold. Could you please include site details such as address, post codes, grid references and permit numbers please.
Previous years EU-ETS installation-specific fuel use and characterisation data for all sites in Scotland	SEPA	15 August	EU ETS activity data, calorific values, carbon factors, oxidation factors and carbon emissions by fuel and installation for fossil fuels, 2005-onwards EU ETS activity data, calorific values, carbon factors, oxidation factors and carbon emissions by fuel and installation for bio fuels, 2005-onwards EU ETS activity data, carbon factors, and carbon emissions by installation for process emissions, 2005-onwards Note: Confidentiality of data will be respected and any issues that prevent the data being provided these will be highlighted at the earliest opportunity and aggregated data provided where applicable

UK Data Supply Agreement (DSA) - continued

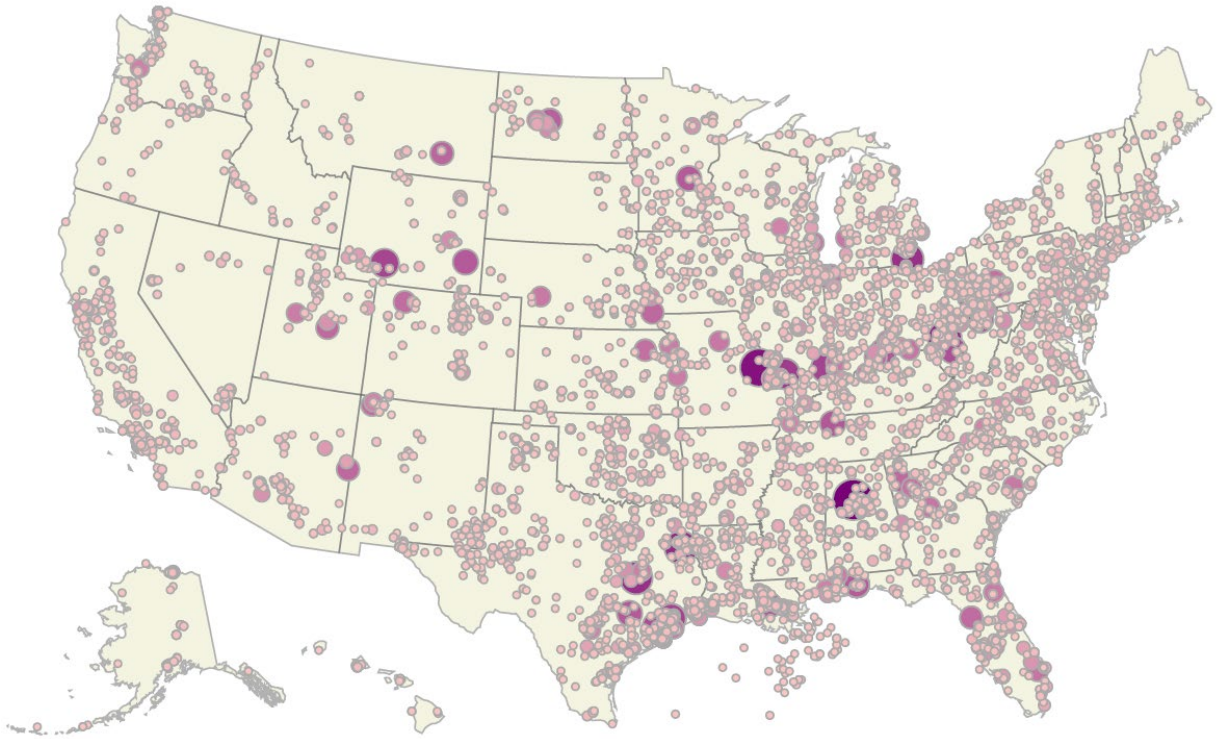
The DSA collects additional information relevant for uncertainty estimation and QA/QC:

1. How are the data that you provide compiled by your organisation?
2. Do you conduct any data quality checking and if so, could you provide an outline of the process?
3. What is your estimate for the level of uncertainty associated with the data?

1. How are the data that you provide compiled by your organisation?
e.g. "Data are compiled using company systems for financial / energy / emissions data reporting for regulatory / company performance monitoring." "Data are aggregated from across X operating sites, provided by site SHE managers."
2. Do you conduct any data quality checking, and if so, could you provide an outline of the process?
e.g. "Data are sense-checked against annual data from last year, for each site and overall.", "We have a checklist of sites / emission sources /companies that we use to ensure that all data are included." ,"Emission and energy use estimates are benchmarked against production output at each site." ,"Our organisation has a quality assurance system accredited to ISO9001 and ISO14001, and these data fall within the scope of that accreditation."
3. What is your estimate for the level of uncertainty associated with the data that you provide to the NAEI/GHGI?
e.g. "Our carbon dioxide emission estimates are within a 2% error margin, due to the close control over fuel quality." "Our estimates for pollutant X stem from emission monitoring trials which have an uncertainty on the standard method cited as plus or minus 15%.", "We are reliant on data from many other third parties and are unable to provide a reliable estimate for the data uncertainty."

US Example: Greenhouse Gas Reporting Program (GHGRP)

- Annual facility-level data is used across several Inventory sectors (Energy, IPPU, and Waste)
  - Transparent, verified data starting in 2010 and 2011 to current reporting year (e.g., 2021)



Learn more at epa.gov/ghgreporting

US Example: Greenhouse Gas Reporting Program (GHGRP)

- GHGRP data facilitates a range of improvements to the Inventory
  - More timely annual activity data (e.g., cement clinker production)
  - Country-, technology-, process-specific emission and other activity factors (e.g., petrochemicals and industrial gas subsectors)
  - Emissions data (i.e., direct use of net emissions from municipal landfills)
  - QA/QC and uncertainty
  - Better understanding of industry trends and emission reduction efforts (e.g., use of lower-emitting technologies at oil and gas wells, landfills, nitric acid, aluminum production)

Learn more at epa.gov/ghgreporting

Back to methods and data documentation!

Poll Questions #1-#3

- The Menti questions will be in English on the next 3 slides.

Please use the Mentimeter link in the chat!

Why document methods and data?

Good documentation of methods and data helps to:

- Improve consistency and efficiency of GHG inventory compilation
- Train new team members
- Instill transparency in the inventory
- Improve reproducibility for yourself and inquiries (e.g. government, expert, peer reviews, or public inquiry)
- Serve as starting point for future inventories
- Satisfy documentation good practice set out in IPCC Guidelines and required under UNFCCC reporting requirements

Method and data documentation continues to be an important part of Inventory Guidelines

From Volume 1, Chapter 1. Introduction of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories

Transparency: There is sufficient and clear documentation such that individuals or groups other than the inventory compilers can understand how the inventory was compiled and can assure themselves it meets the *good practice* requirements for national greenhouse gas emissions inventories. Documentation and reporting guidance is provided in Chapter 8, Reporting Guidance and Tables, of Volume 1 and in the respective chapters of Volume 2-6 (see also Volume 1, Chapter 6, QA/QC and Verification).

Consistency: Estimates for different inventory years, gases and categories are made in such a way that differences in the results between years and categories reflect real differences in emissions. Inventory annual trends, as far as possible, should be calculated using the same method and data sources in all years and should aim to reflect the real annual fluctuations in emissions or removals and not be subject to changes resulting from methodological differences. (See Chapter 2: Approaches to Data Collection, Chapter 4: Methodological Choice and Identification of Key Categories, and Chapter5: Time Series Consistency in Volume 1.)

Method and data documentation supports compliance with the good reporting practice set out in the 2006 IPCC Guidelines

From Volume 1, Chapter 8. Reporting Guidance and Tables

8.2.7 Time series

It is good practice to complete all the reporting tables (summary, sectoral, cross-sectoral) for each year in which an inventory is available

8.4 Other Reporting

[…]

Additional documentation is needed to ensure the transparency of inventories as part of an inventory report document. An inventory report should clearly explain the assumptions and methodologies used to facilitate replication and assessment of the inventory by users and third parties. Transparency can be ensured through following the guidance on documentation of each category described in the sectoral Volumes 2-5, and for Tier 1 methods by completing the worksheets. Countries using higher tier methods should provide additional documentation in addition to, or instead of the worksheets. Such explanatory information should include cross references to the tables.

The documentation should include a description of the basis for methodological choice, emission factors, activity data and other estimation parameters, including appropriate references and documentation of expert judgements.

[…]

What Should Be Documented?

Method Choice
Equation, reference, justification for selecting method

Activity Data
Type of activity data, values, units, year (s) of data, references, QA/QC procedures performed on data

Emission Factors
Sources/references, values, reasoning for emission factor choice, spreadsheets, models, justification for factor

Uncertainty
Category, relative lower and upper bound, and lower and upper emission estimate

Document All Methods and Data by Inventory Year for Easy Retrieval and Use

Example: Methodology table in Mexico's NIR

Sector/ categoría / subcategoría/ fuente de emisión (IPCC 2006)	CO_2		CH_4		N_2O		HFC		PFC		SF_6	
	Tier applied	Emisison Factor	Método aplicado	FE	Método aplicado	FE	Método aplicado	FE	Método aplicado	FE	Método aplicado	FE
[1] Energía	T1, T2, IE, NA	D, CS, IE, NA	T1, IE, NA, NE	D, IE, NE	T1, IE1, IE2, NA, NE	D, NE, IE1, IE2, NA, NE	NA	NA	NA	NA	NA	NA
[1A] Actividades de quema de combustible	T2, IE, NA	CS, IE, NA	T1, IE, NA	D	T1	D	NA	NA	NA	NA	NA	NA
[1A1] Industrias de la energía	T2	CS	T1	D	T1	D	NA	NA	NA	NA	NA	NA
[1A1a] Actividad principal producción de electricidad y calor	T2	CS	T1	D	T1	D	NA	NA	NA	NA	NA	NA

Example: Activity data table in Mexico's NIR

Año	Fuel consumption for power generation by the Federal Energy Commission			
	Coal (ton)	Fuel Oil (m^3)	Diésel (m^3)	Natural Gas (m^3)
1990	3,497,055	15,622,968	397,399	3,758,143,934
1991	3,608,526	15,774,062	437,806	4,416,882,891
1992	3,742,715	15,553,522	313,301	4,095,960,795
1993	4,750,467	15,770,768	298,584	3,527,452,861
1994	5,898,340	18,815,088	338,584	4,269,119,594
1995	6,443,741	16,503,635	265,943	4,532,356,028
1996	7,842,563	17,033,637	242,747	4,522,899,875
1997	7,888,872	19,502,937	337,820	4,928,758,184
1998	8,098,801	21,412,925	492,955	5,860,699,029

Example: Category description tables in Germany‘s NIR

3.2.10.3.1 Category description (1.A.3.c)

KC	Category	Activity	EM of	1990 (kt CO_2-eq.)	(fraction)	2020 (kt CO_2-eq.)	(fraction)	Trend 1990-2020
L/T	**1 A 3 c, Railways**	**fossil fuels**	**CO_2**	**3,122.1**	**0.2%**	**783.1**	**0.1%**	**-74.9%**
-/-	1 A 3 c, Railways		CH_4	17.6	0.0%	0.3	0.0%	-98.5%
-/-	1 A 3 c, Railways		N_2O	7.7	0.0%	2.0	0.0%	-74.3%

Gas	Method used	Source for the activity data	Emission factors used
CO_2	Tier 1 [a], CS (Tier 2)	NS	D [a], CS
CH_4	CS (Tier 2)	NS	D [b, c, d]
N_2O	CS (Tier 2)	NS	D [d], CS
NO_x, CO, NMVOC, SO_2	CS (Tier 2)	NS	CS

Source: Federal Environment Agency (2022), **National Inventory Report for the German Greenhouse Gas Inventory 1990 – 2020**

Methods and Data Documentation in the National Inventory Compilation Cycle

- Save all compilation files and references to create an inventory archive
- Backup the archive

- Inventory inception meeting
- Start with previous inventory, if available
- Review and implement improvement plan
- Identify Activity Data and choose methodologies

- Finalize inventory
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- Collect Activity Data, Emission Factors
- QC all data

- Conduct & document QA/QC procedures, such as basic peer review
- Address QA/QC findings

- Estimate emissions & removals
- Implement QC procedures
- Revise estimates, based on new data and QA/QC findings
- Ensure time series consistency
- Conduct uncertainty & key category analyses

- Document methodological approaches, recalculations, and references
- Write inventory report

Methods and Data Documentation Template

How This Template Will Help

The Methods and Data Documentation Template will help the inventory team:

- Document general information about each source/sink
- Identify method choice and provide descriptions
- Document activity data
- Document emission factors
- Identify improvements

Who completes this template: Sector/Category Leads
How to use this template if using the IPCC Inventory Software?: Export activity data and emission factors from the IPCC software and copy them into the template

Case study: How to document this information?

- The category 1A3bi "Cars" leads to emissions from CO_2, CH_4, and N_2O from the combustion of diesel and gasoline.
- Emissions from CO_2 was a key category according to both the level and trend analysis in the previous GHG inventory.
- For CO_2, activity data is taken from the national energy balance as well as transport modelling, which allows breaking down fuel consumptions into vehicle categories.
- For CO_2, country-specific emission factors for diesel and gasoline are used.
- For CH_4 and N_2O, emissions, vehicle population, trip duration, and number of trips from the transport model are used, together with default emission factors per vehicle type from the 2006 IPCC Guidelines.
- The transport model provides accurate data for current vehicle types. For models and trips in the 1990s, data is based on expert judgements.

Step 1: Provide Category Information

Category 1: [Insert category sector, code, and name, e.g., "Energy: 1A3Bi Cars"]

[Enter Text]

Table 3-1. General information

Key category in the previous GHG inventory: Record Yes or No if the **category** was a key category in the previous inventory.	[Enter Text]		
Greenhouse gases and tiers, as reported in the previous inventory:			
Gases reported Record the GHG emitted/removed. Example: CO_2, CH_4, or N_2O	Key category Record Yes if the GHG named at left was a key category in the previous inventory. Otherwise, record No.	Activity data Tier Record the tier level used for activity data. Example: Tier 1, 2, or 3	Emission factor Tier Record the tier level relating to the emission factor. Example: Country-specific or default factor
Category description/definition: Record the (sub)category description in line with the 2006 IPCC Guidelines and a clear reference to the section or table in the 2006 IPCC Guidelines. This content can also be used directly in your national inventory document (NID) for reporting under the Paris Agreement.			

Who completes this table: Sector/Category Leads

Example of Table 3-1

Energy: Fossil Fuel Combustion (CRF Source Category 1A3bi)

Table 3-1: Category Information

Key category in the previous GHG inventory:	Yes		
Greenhouse gases and tiers, as reported in the previous inventory:			
Gases reported	*Key category*	*Activity data Tier*	*Emission factor Tier*
CO_2	Yes	Tier 2	Country-specific
CH_4	No	Tier 1	IPCC default, Table 3.2.2
N_2O	No	Tier 1	IPCC defaults, Table 3.2.2
Category description/definition: Emissions from fuel consumption (diesel, gasoline) in cars according to the guidance in Volume 2, chapter 3 of the 2006 IPCC Guidelines.			
Relevant national circumstances: The direct combustion of fuels for road transport using cars accounts for 11.4 % of total national GHG emissions in 2019. At present, no biofuels are used at the national level, but might become of relevance in the coming years.			

Who completes this table: Sector/Category Leads

Step 2: Describe Method Choice

Table 3-2. Methodology

Greenhouse gas: Record the specific gas or gases to which the below methodology relates. Example: CH_4	[Enter Text]
Equation and parameters: Present the equation for the estimation of emissions/removals under this category and describe variables and describe its key parameters. Where several equations apply or equations are complex, a reference to the source complemented by any relevant assumptions about its application will suffice. Example: First order decay model as in Equation 3.1 of Chapter 3 of Volume 5 (Waste) of the *2006 IPCC Guidelines* using default activity data and default parameters. Assumptions: No CH_4 capture takes place.	
[Enter Text]	
Reference: List the source of the equation, including full title, chapter, and page number/equation number. Example: Equation 3.1 of Chapter 3 of Volume 5 (Waste) of the *2006 IPCC Guidelines*.[3]	
[Enter Text]	
How and why this method was chosen: Describe why this methodology is most appropriate for your country and how it was chosen. Appropriateness should be based on the IPCC decision trees, including considerations like data availability and cost-effectiveness. Describe the institutions/departments involved in the choice. Example: There is very little information on historical waste disposal amounts and waste composition available, therefore, a Tier 1 approach was chosen, allowing the use of default factors.	
[Enter Text]	
Known limitations: Describe any known limitations to the methodology. Example: Using a Tier 1 approach will not allow accurate estimation of CH_4 generation from historical or current waste disposal.	
[Enter Text]	

Who completes this table: Sector/Category Leads

Example (a) of Table 3-2

You would fill an additional table for CO_2, which is calculated using a different methodology

Table 3.2: Methodology for Emissions from Cars, 1.A.3.b.i

Greenhouse gas:	CH_4 and N_2O
Equation and parameters:	
Equation 3.2.3 from Volume 2, Chapter 3 of the IPCC 2006 GL	
Reference:	
For the CH_4 and N_2O estimates, car population by vehicle types and number of trips and distances per trips from the national transport model. The national transport model is kept in the Ministry of Transport, in the department of Modelling and Projections. A copy of results of the model (number of vehicles by type and age, number of trips, distances per trip) can be found on our servers under Q:\Climate\GHG inventory data\2019 submission\1.Energy\1A3 Mobile Combustion\Transport model	
How and why this method was chosen:	
The transport modelling data is the most precise data available at the national level. CH4 and N2O emissions from this category are not key categories and country-specific emission factors are not available.	
Known limitations:	
No known limitations	

Who completes this table: Sector/Category Leads

Example (b) of Table 3-2

Table 3.2: Methodology for Emissions from Cars, 1.A.3.b.i

Greenhouse gas:	CO_2
Equation and parameters:	
Equation 3.2.1 from Volume 2, Chapter 3 of the IPCC 2006 GL	
Reference:	
Activity data: fuel consumption from transport modelling, aligned with real total consumption from the energy balance Emission factors (country-specific emission factors for diesel and gasoil)	
How and why this method was chosen:	
The approach uses the most accurate data currently available with regards to activity data (fuel consumption from transport modelling, aligned with real total consumption from the energy balance) and emission factors (country-specific emission factors for diesel and gasoil)	
Known limitations:	
No known limitations	

Who completes this table: Sector/Category Leads

Step 3: Document Activity Data (1 of 3)

Table 3-3. Activity data general information, values, and QA/QC – CH4 and N2O emissions

Type of Activity data: *Example: Clinker produced*	Car population by vehicle types, number of trips and distances per trips, vehicle efficiencies by vehicle type, fuel types used by vehicles types. All data is provided through the national transport model
Reporting unit: *This should be the unit in which the data are reported for estimating emissions/removals. Example: metric tons.*	Number of vehicles by vehicle type, l fuel consumption / 100 km driven, % shares of fuels (diesel, gasoline) used per vehicle type, number of trips per vehicle type, distance per trip per vehicle type in km
Appropriateness to national circumstances: *State how these specific activity data were chosen. Example: The National Cement Association compiles production data from all of its members.*	The transport model is the most accurate data available at the national level and based on registration data as well as data from large insurance companies.
Time series covered: *Record the years for which the activity data are available. Example: 2001-2013*	1990-2019
Reference (if applicable): *If the activity data are from a publication, record the full reference. Example:* 2013. National Cement Association Annual Report	N/A
Date of provision *Record the date of receipt of the activity data. Example: August 29, 2016*	27.08.2021
Source of data *Record the source of the activity data, e.g. the institution and department that provided it. Example: National Cement Association*	Ministry of Transport, Department of Modelling and Projections
Contact details *Record the name, email address, and phone number of the contact person at the entity which provided the data. If applicable, ensure that this information is recorded in Template 2. Institutional Arrangements, or that Template 2 refers to this template. Example: John Smith, john.smith@example.com, +12 3456 7890*	john.smith@example.com*, +12 3456 7890, Ministry of Transport, Department of Modelling and Projection*
Basis for data provision: *State the basis upon which data are provided, e.g., voluntary provision, legal requirement, data sharing agreement, or a memorandum of cooperation or understanding. (If you used the Confidential Business Information (CBI) Agreement or Memorandum of Cooperation (MoC) supporting templates from EPA's Toolkit for Building a National GHG Inventory System, cite the final MoC or CBI agreement developed from use of those or other templates here.) Example: Voluntary provision*	Memorandum of Understanding, signed 13.06.2014

Who completes this table: Sector/Category Leads

Step 3: Document Activity Data (2 of 3)

Table 3-3. Activity data general information, values, and QA/QC

Adjustments applied to activity data: Explain any adjustments applied to the original activity data received from the data source to make it usable for the calculation, e.g., unit conversion or gap-filling. Example: The data were provided in kg and recalculated to t.								
Activity data values: Extend or modify the years as necessary to cover your time series.								
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
Q								
2017	2018	2019	2020	[insert as needed]				
The activity data values in the rows above are derived from these files: List all files from which the activity data values above come. Indicate where these files are located and whom to contact in order to access these files.								
Quality control measures Indicate in the following rows what quality control measures you have applied to the activity data indicated above. Add additional rows if you need to describe additional QC activities. Before adding any additional quality control measures, refer to Template 4. QA/QC. For suggestions about quality control activities, see chapter six of volume 1 of the 2006 IPCC Guidelines.[4] In case of data gaps or problems with time series consistency, refer to chapter five of volume 1 of the 2006 IPCC Guidelines.[5]								
Comparison with trend: Describe the results of the comparison of the new activity data with the previous trend, e.g. what developments were expected based on projecting the trend of past activity data								
values, what developments happen in the real activity data? Example: Trend indicated a further increase by 3%. Real development is an increase by 5%.								
Comparison with other datasets (e.g., IEA or FAO) Compare both level and trend of your activity data with the data in other datasets. Describe the result of the comparison (e.g., to which extent your data deviates from the level and trend of the other dataset). Example: Good alignment of trend with the International Energy Agency (IEA) or Food and Agriculture Organization of the United Nations (FAO) database(s)								
Are all data entered correctly into models, spreadsheets, etc.? Record Yes or No. If No, describe the corrective actions taken. Example: No, 2013 value								

Who completes this table: Sector/Category Leads

Step 3: Document Activity Data (3 of 3)

Activity data values:
Extend or modify the years as necessary to cover your time series.

1990	1991	1992	1993	1994	1995	1996	1997	1998
100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000

1999	2000	2001	2002	2003	2004	2005	2006	2007
100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000

2008	2009	2010	2011	2012	2013	2014	2015	2016
100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000

2017	2018	2019	*[insert as needed]*					
100,000	100,000	100,000						

The activity data values in the rows above are derived from the files listed here:	:\Climate\GHG inventory data\2019 submission\1.Energy\1A3 Mobile Combustion\Road transport\AD

Quality control measures
Indicate in the following rows what quality control measures you have applied to the activity data indicated above. Add additional rows if you need to describe additional QC activities. Before adding any additional quality control measures, refer to Template 4. QA/QC. For suggestions about quality control activities, see chapter six of volume 1 of the 2006 IPCC Guidelines.[3] In case of data gaps or problems with time series consistency, refer to chapter five of volume 1 of the 2006 IPCC Guidelines.[4]

Comparison with trend: *Describe the results of the comparison of the new activity data with the previous trend, e.g. what developments were expected based on projecting the trend of past activity data values, what developments happen in the real activity data? Example: Trend indicated a further increase by 3%. Real development is an increase by 5%.*	The time series seems flat, check original data, pot. Transfer error?
Comparison with other datasets (e.g., IEA or FAO) *Compare both level and trend of your activity data with the data in other datasets. Describe the result of the comparison, e.g. to which extent your data*	IEA data shows strongly increasing trend 1990-2020

Step 4: Document Emission Factors (1 of 2)

Table 3-4. Emission factors/carbon stock change factors (EF/SCF) general information, values, and QA/QC

Type of EF/SCF: *Record a descriptive title for the EF/SCF.*	
Reporting unit: *This should be the unit in which the EF/SCF is reported for estimating emissions/removals.*	
Appropriateness to national circumstances: *State how this specific EF/SCF was chosen.*	
Time series covered: *Record the years for which the EF/SCF is available.*	
Reference (if applicable): *If the EF/SCF is from a publication, record the full reference.*	
Date of provision: *Record the date of receipt of the EF/SCF.*	
Source of EF/SCF: *Record the source of the EF/SCF, e.g., the institution and department that provided it.*	
Contact details: *Record the name, email address, and phone number of the contact person at the entity which provided the EF/SCF.*	

Who completes this table: Sector/Category Leads

Step 4: Document Emission Factors (2 of 2)

Table 3-4. Emission factors/carbon stock change factors (EF/SCF) general information, values, and QA/QC

Type of EF/SCF: *Record a descriptive title for the EF/SCF.*	Country-specific EF for CO2 for diesel
Reporting unit: *This should be the unit in which the EF/SCF is reported for estimating emissions/removals.*	kg CO2/t diesel
Appropriateness to national circumstances: *State how this specific EF/SCF was chosen.*	The EF was developed based on statistical sampling over the period 2018-2020.
Time series covered: *Record the years for which the EF/SCF is available.*	2018-2020
Reference (if applicable): *If the EF/SCF is from a publication, record the full reference.*	Statistical Offices. 2021. Characteristics of fuels in Lower Carbonia.
Date of provision: *Record the date of receipt of the EF/SCF.*	21.03.2021
Source of EF/SCF: *Record the source of the EF/SCF, e.g., the institution and department that provided it.*	See under Reference
Contact details: *Record the name, email address, and phone number of the contact person at the entity which provided the EF/SCF.*	See under Reference

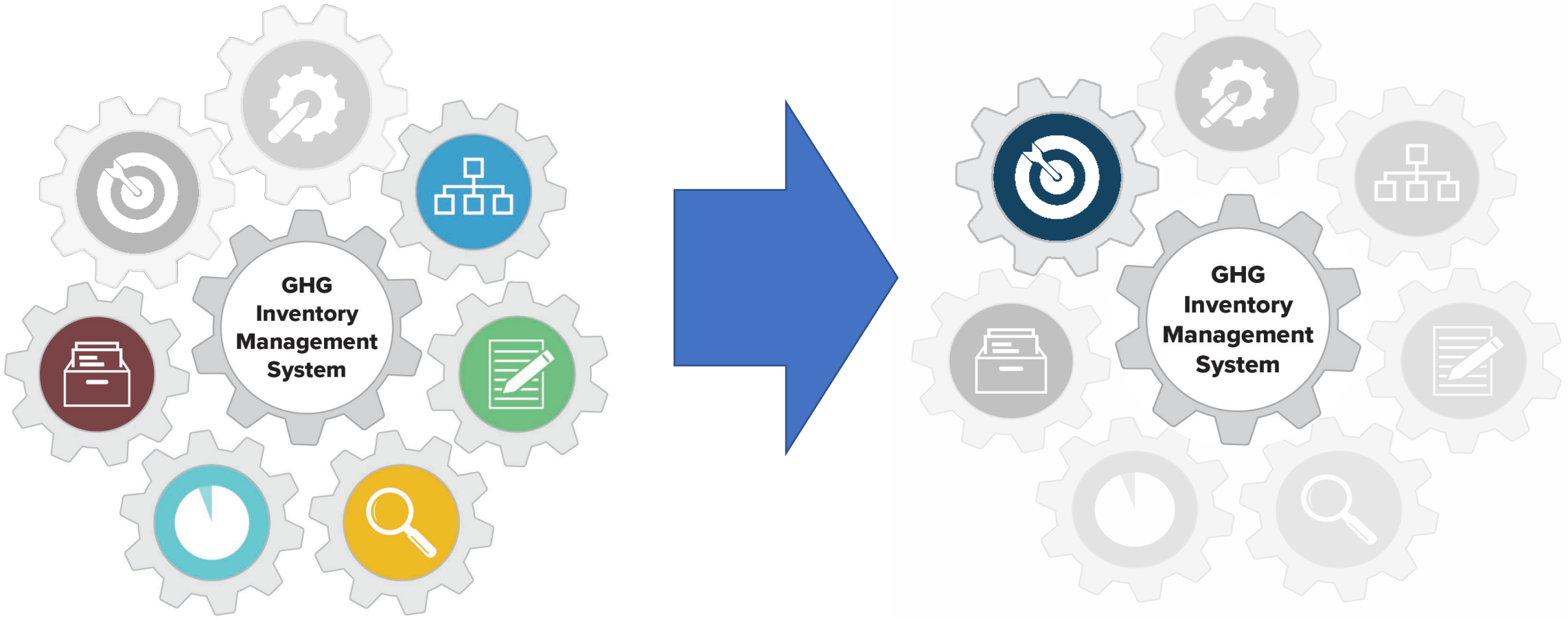
Who completes this table: Sector/Category Leads

Step 5: Identify Potential Methods and Data Improvements

Improvement No.	Category sector *Example: Energy, AFOLU, IPPU, or Waste*	Category code and name *Example: 1A3Bi Cars*	Key category in the previous GHG inventory: *Record Yes or No*	Relevant GHG inventory principle *Example: Transparency, Accuracy, Completeness, Consistency, or Comparability*	Potential Improvement *Record in detail what the improvement entails, i.e. what will be changed and what impact this will have.*
1	Cars	1.A.3.b.i	Yes (CO2), No (CH4, N2O)	Accuracy	CH4 and N2O emissions: Data on vehicle models and trips in the transport related to 1990-1999 data is based on expert judgements. In order to increase accuracy, these expert judgements should at least be validated in some form. Suggest discussing options for relevant studies with the Ministry of Transport
2					
3					
4					
5					
6					
7					
8					
9					
10					

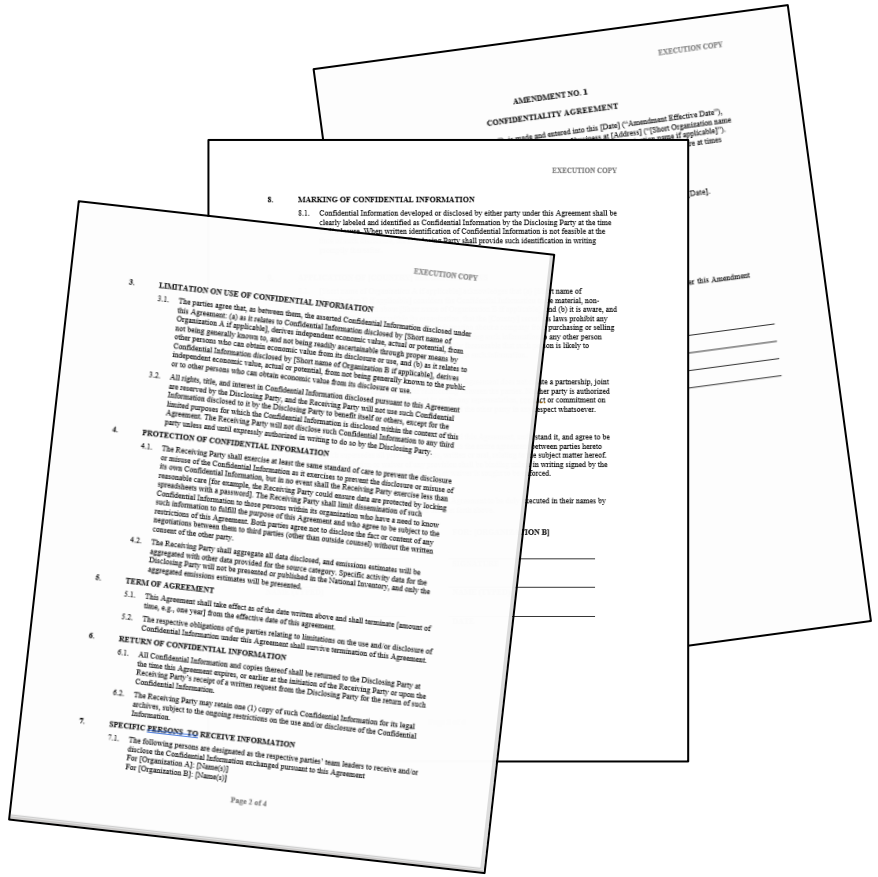
Who completes this table: Sector/Category Leads

Improvements Tie Into National Inventory Improvement Plan Template (Template 7)



Supporting Template: Confidentiality Agreement and Amendment Template

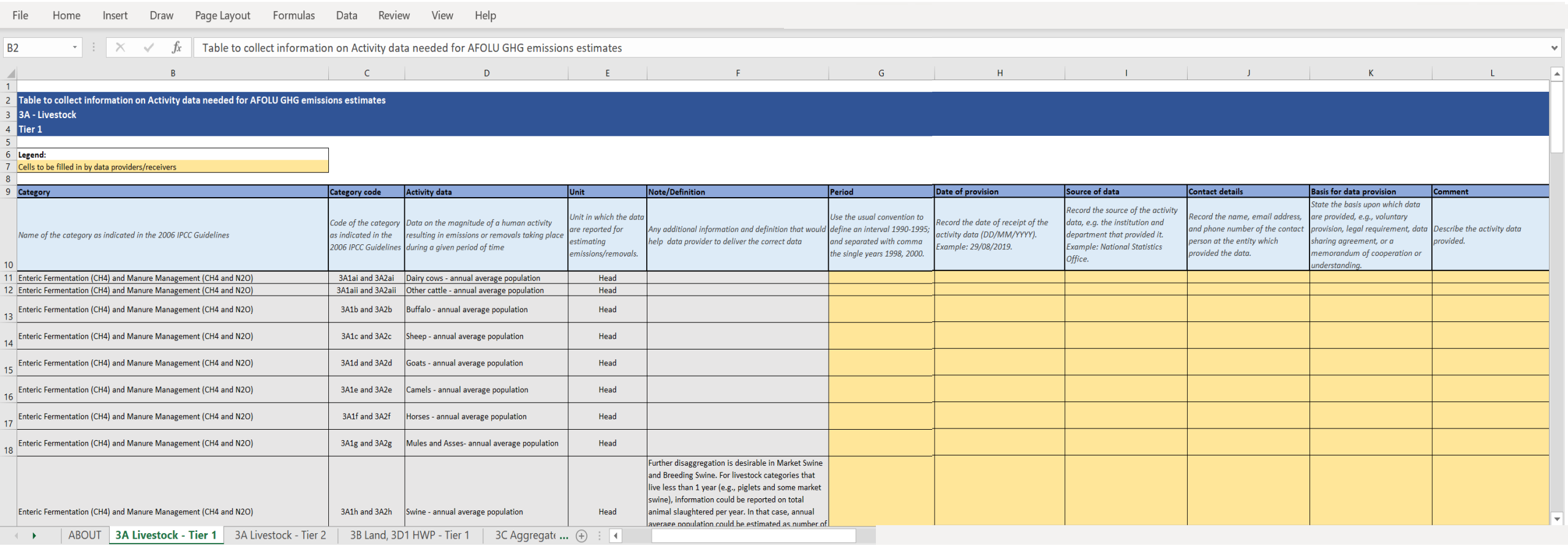
- A confidentiality agreement or contract can be useful when working with a data provider that is supplying confidential information for the inventory.
- Customize the template to the specific agreement you would like to develop and to allow for your country-specific circumstances related to the use of confidential business information.



FAO GHG Data Management Tool (GHG-DM Tool)

Excel spreadsheets containing a comprehensive list of activity data (AD) and parameters needed to complete Tier 1 (and some Tier 2) estimations of all categories within AFOLU, Energy, IPPU, and Waste.

- Helps GHG inventory compilers manage AD and parameters, and communicate data needs with data providers



File Home Insert Draw Page Layout Formulas Data Review View Help

B2 | Table to collect information on Activity data needed for AFOLU GHG emissions estimates

Table to collect information on Activity data needed for AFOLU GHG emissions estimates
3A - Livestock
Tier 1

Legend:
Cells to be filled in by data providers/receivers

Category	Category code	Activity data	Unit	Note/Definition	Period	Date of provision	Source of data	Contact details	Basis for data provision	Comment
Name of the category as indicated in the 2006 IPCC Guidelines	*Code of the category as indicated in the 2006 IPCC Guidelines*	*Data on the magnitude of a human activity resulting in emissions or removals taking place during a given period of time*	*Unit in which the data are reported for estimating emissions/removals.*	*Any additional information and definition that would help data provider to deliver the correct data*	*Use the usual convention to define an interval 1990-1995; and separated with comma the single years 1998, 2000.*	*Record the date of receipt of the activity data (DD/MM/YYYY). Example: 29/08/2019.*	*Record the source of the activity data, e.g. the institution and department that provided it. Example: National Statistics Office.*	*Record the name, email address, and phone number of the contact person at the entity which provided the data.*	*State the basis upon which data are provided, e.g., voluntary provision, legal requirement, data sharing agreement, or a memorandum of cooperation or understanding.*	*Describe the activity data provided.*
Enteric Fermentation (CH4) and Manure Management (CH4 and N2O)	3A1ai and 3A2ai	Dairy cows - annual average population	Head							
Enteric Fermentation (CH4) and Manure Management (CH4 and N2O)	3A1aii and 3A2aii	Other cattle - annual average population	Head							
Enteric Fermentation (CH4) and Manure Management (CH4 and N2O)	3A1b and 3A2b	Buffalo - annual average population	Head							
Enteric Fermentation (CH4) and Manure Management (CH4 and N2O)	3A1c and 3A2c	Sheep - annual average population	Head							
Enteric Fermentation (CH4) and Manure Management (CH4 and N2O)	3A1d and 3A2d	Goats - annual average population	Head							
Enteric Fermentation (CH4) and Manure Management (CH4 and N2O)	3A1e and 3A2e	Camels - annual average population	Head							
Enteric Fermentation (CH4) and Manure Management (CH4 and N2O)	3A1f and 3A2f	Horses - annual average population	Head							
Enteric Fermentation (CH4) and Manure Management (CH4 and N2O)	3A1g and 3A2g	Mules and Asses- annual average population	Head							
Enteric Fermentation (CH4) and Manure Management (CH4 and N2O)	3A1h and 3A2h	Swine - annual average population	Head	Further disaggregation is desirable in Market Swine and Breeding Swine. For livestock categories that live less than 1 year (e.g., piglets and some market swine), information could be reported on total animal slaughtered per year. In that case, annual average population could be estimated as number of						

ABOUT | 3A Livestock - Tier 1 | 3A Livestock - Tier 2 | 3B Land, 3D1 HWP - Tier 1 | 3C Aggregat ...

https://www.fao.org/climate-change/our-work/what-we-do/transparency/tools-resource/en/

Questions? Contact ETF@fao.org

Action Plan from Methods and Data Documentation

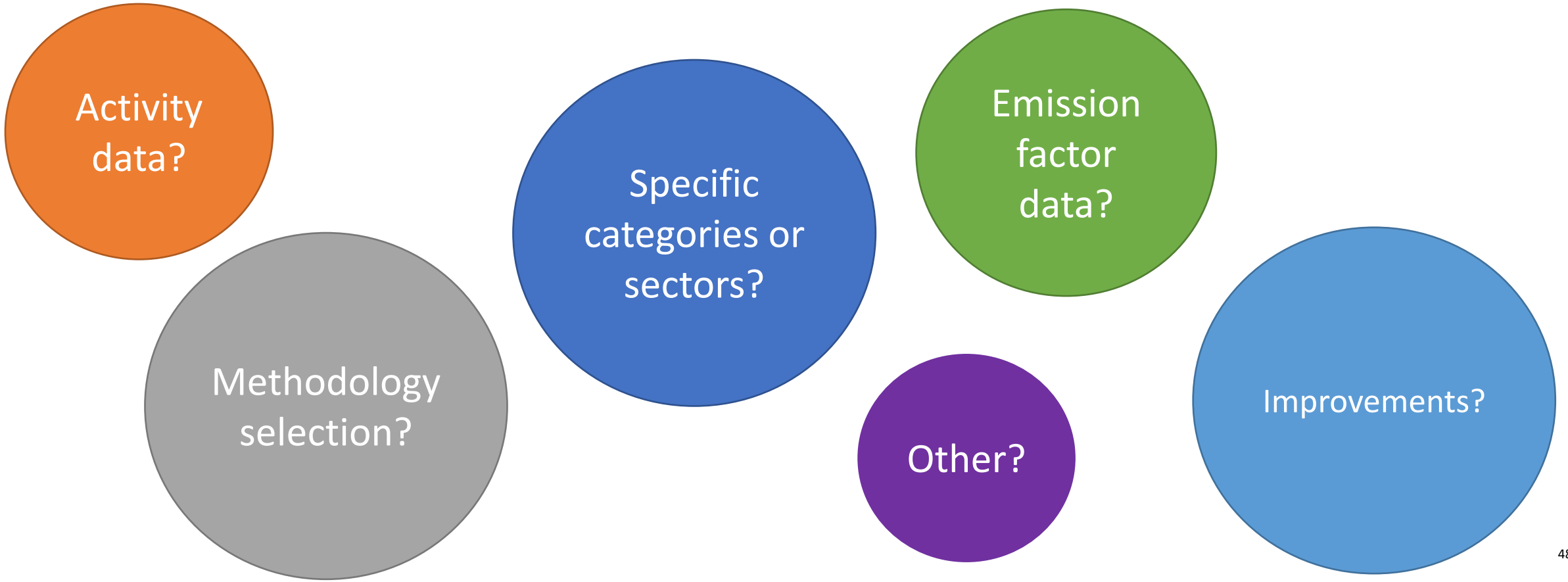
1. Gather general information about the categories in your sector.
2. As you identify the method choice for each category, document it.
3. As you collect activity data and emission factors, methodically document information about that data.
   - Document QC measures as you review the data.
4. Identify potential improvements to methodologies and data.

Poll Questions #4

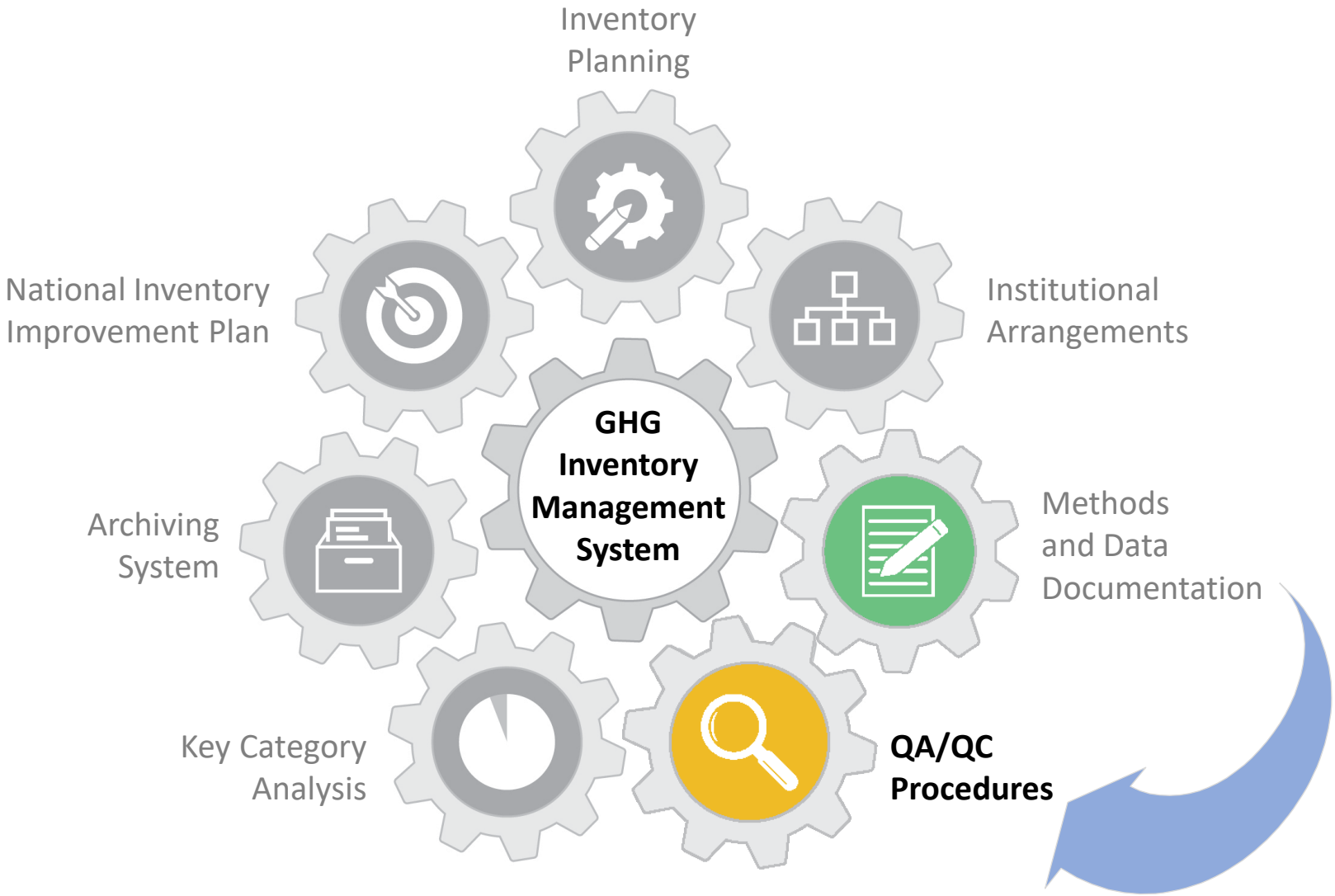
Please use the Mentimeter link in the chat!

Discussion Question (Mentimeter)

What would you like to document better in the inventory or your particular sector? What do you think will be more difficult? Easier?



Next template…



Thank You For Your Attention!

For questions & more information, email:

ghgi.transparency@epa.gov

Toolkit for Building National GHG Inventory Systems

https://www.epa.gov/ghgemissions/toolkit-building-national-ghg-inventory-systems