



# Key Category Analysis

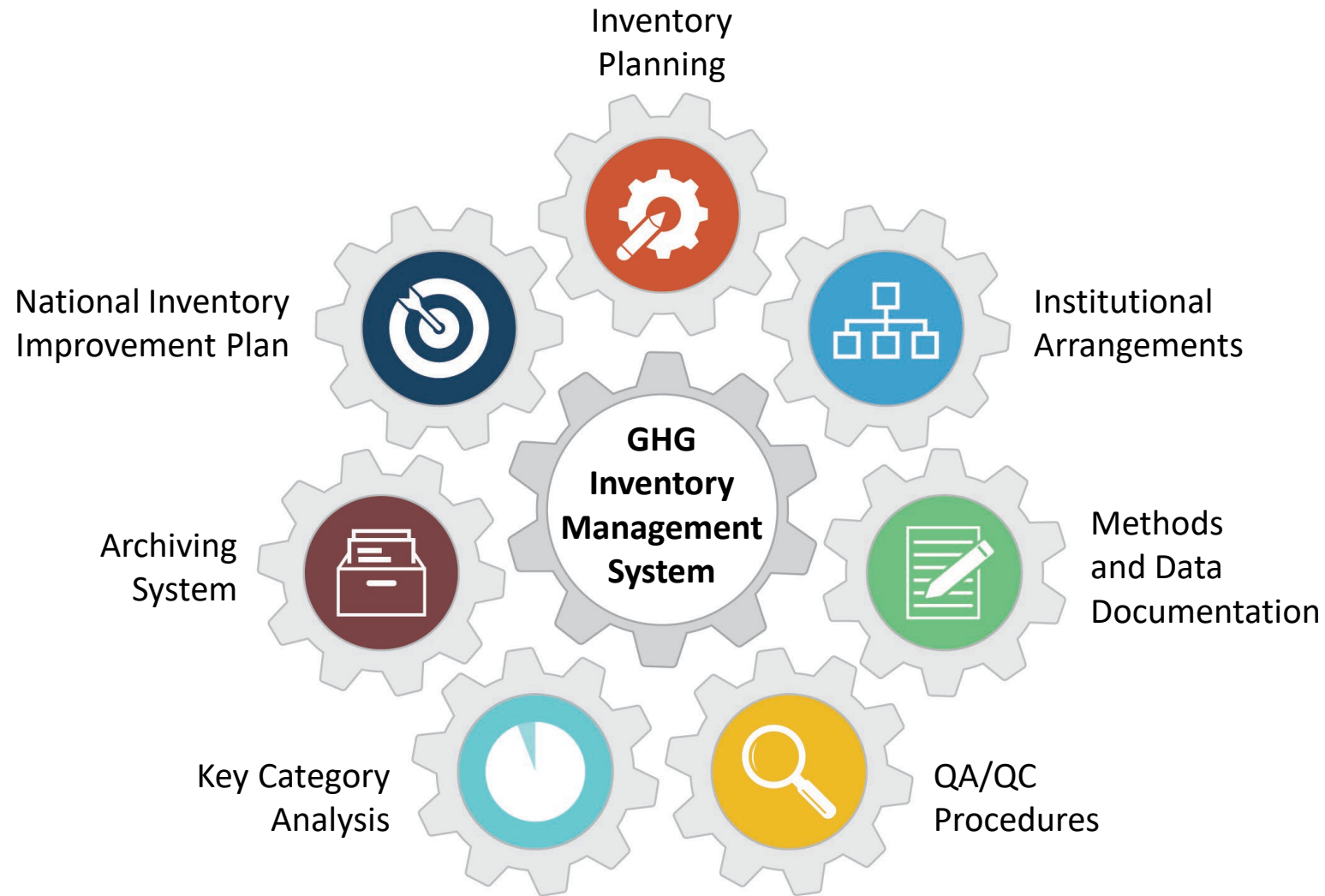
Remote Training on the Building of Sustainable National Greenhouse Gas Inventory Management Systems

**Mausami Desai**

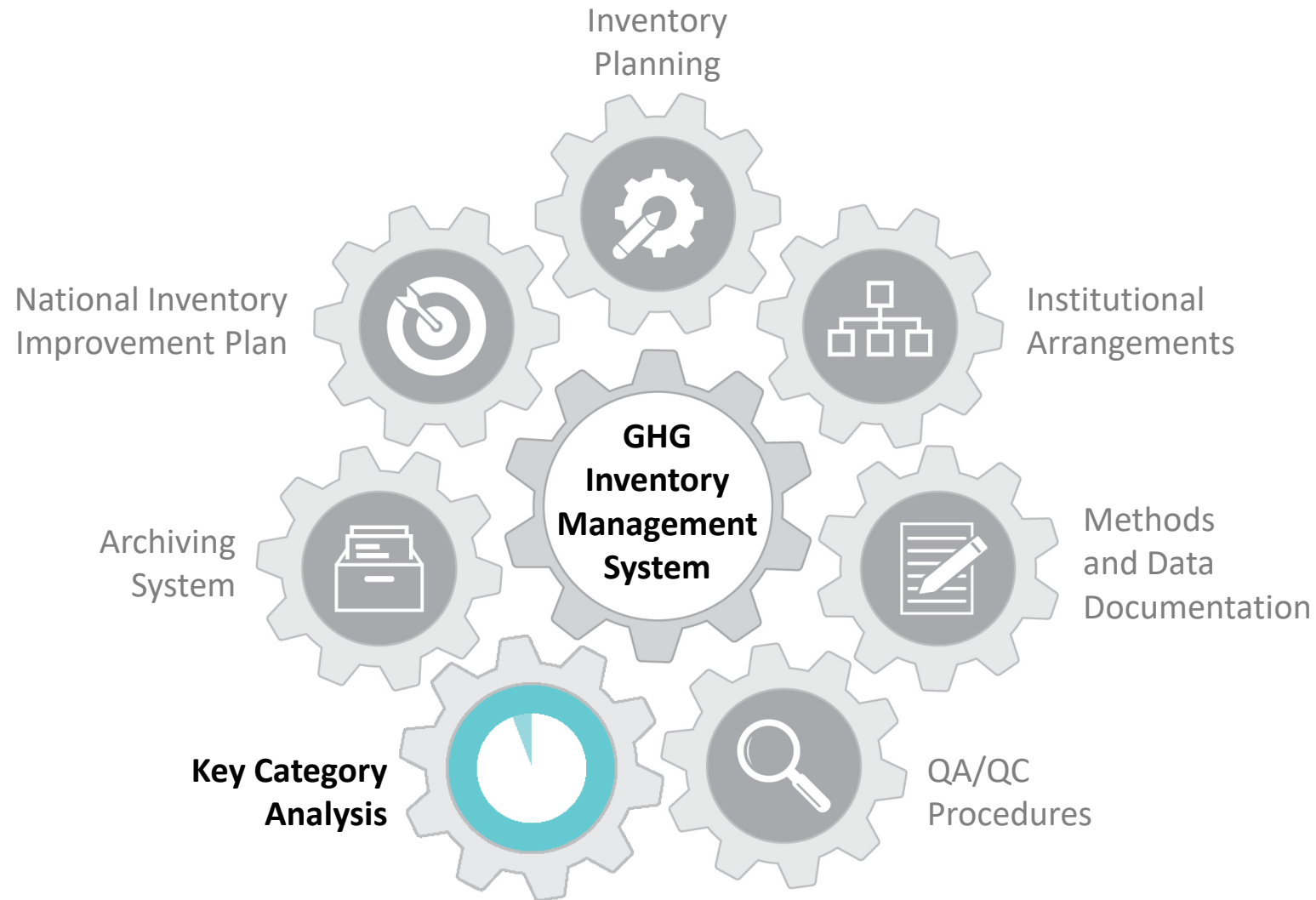
U.S. Environmental Protection Agency

October 7, 2022

# Developing a Sustainable National GHG Inventory System



# Key Category Analysis



# Poll Question #3



**Does your latest National GHG Inventory include a key category analysis?**

- a) Yes
- b) No

*Respond using Mentimeter link in the chat!*

# Poll Question #2



**Which approaches did you use to identify key categories?**

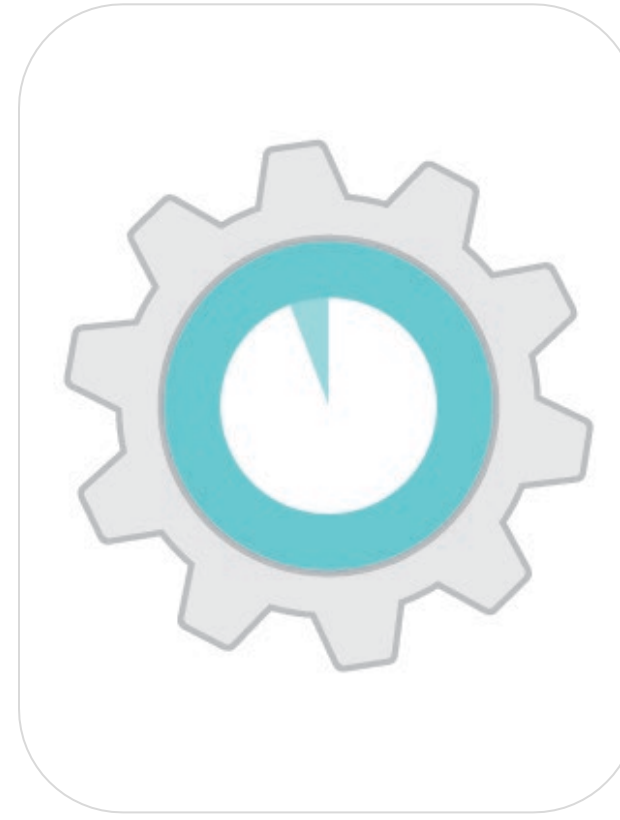
- a) Approach 1 – Level analysis
- b) Approach 1 – Level and Trend analysis
- c) Approach 2 – Level analysis
- d) Approach 2 – Level and Trend analysis
- e) Don't know

[\*Respond using Mentimeter link in the chat!\*](#)



Gg CO <sub>2</sub> eq.	Cumulative % of Emissions
300	31%
190	51%
110	62%
100	73%
90	82%
80	91%
50	95%
30	99%
6	99%
4	99.9%
1	100%

**Introduction to Key Category Analysis**



**Review of the Template & Tools**

# What is a Key Category?



2006 IPCC Volume 1, Chapter 4

A category that is prioritized within the national inventory system because its estimate has a **significant influence** on a country's total inventory of greenhouse gases in terms of the **absolute level, the trend, or the uncertainty in emissions and removals.**

# Example Key Source and Sink Categories



**Absolute level contribution  
to total emissions**



**Trend: High growth rate in  
emissions**



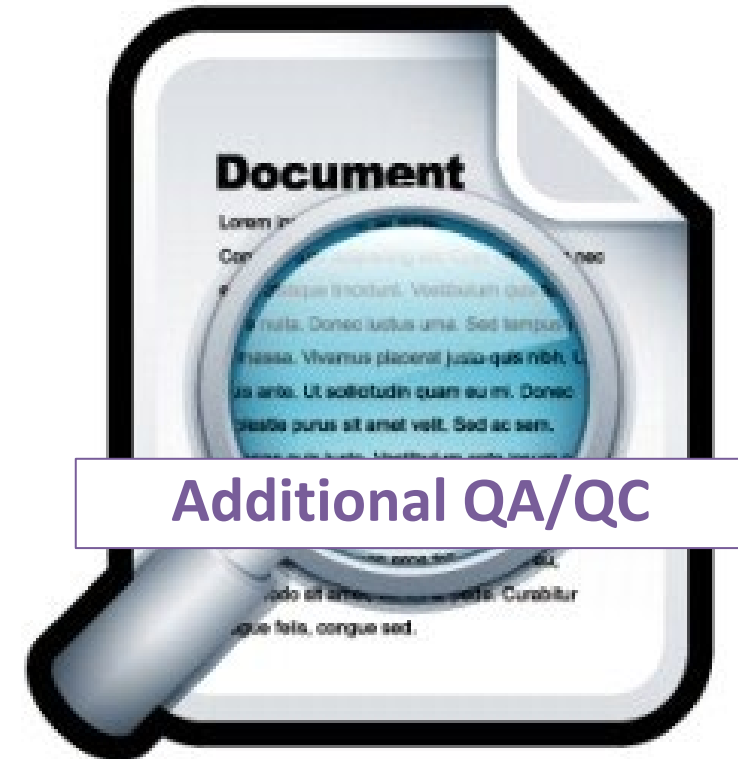
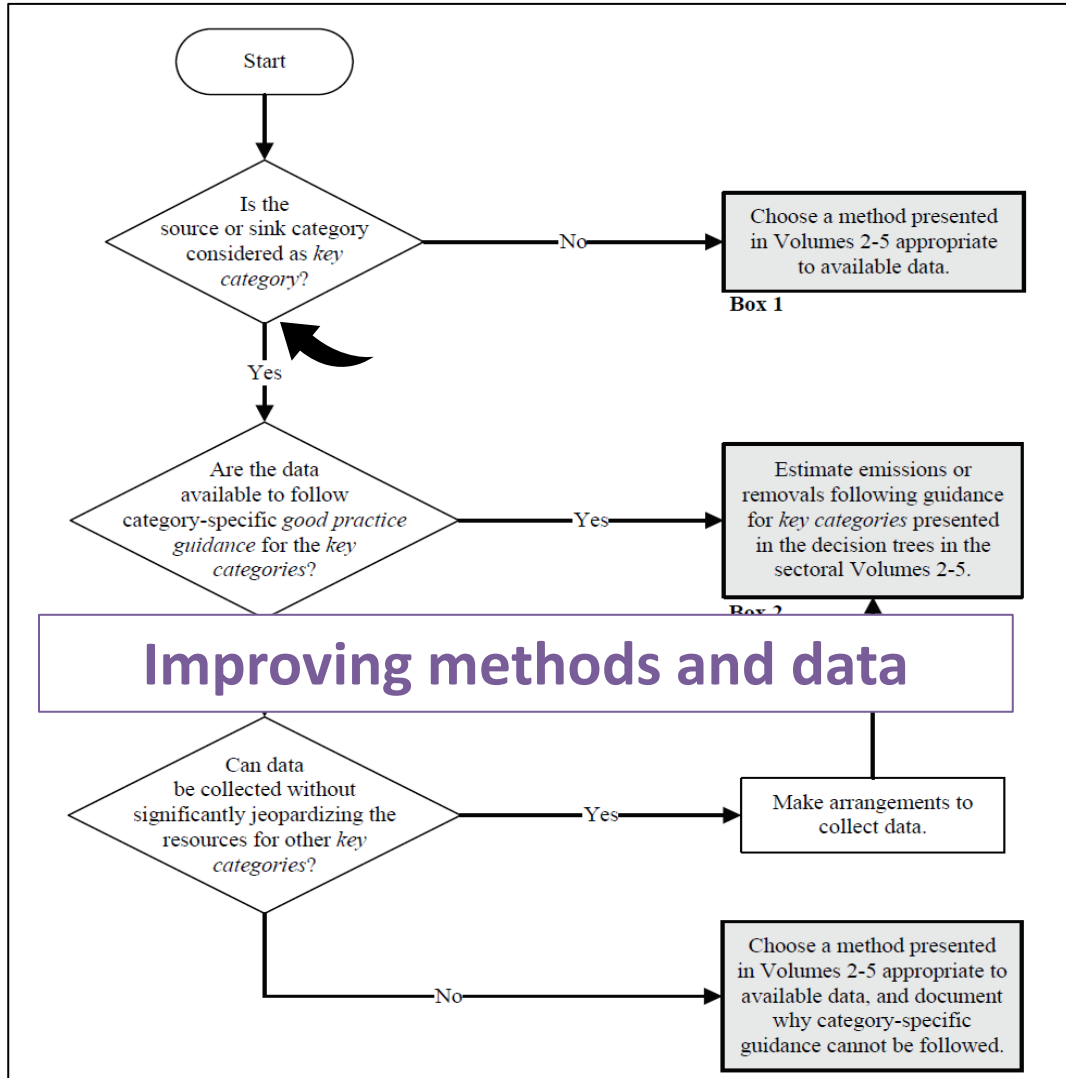
**Uncertainty in emissions or  
removals**



# Prioritizing Key Categories in National GHG Inventories



Figure 4.1 Decision Tree to choose a Good Practice method



# How to Identify Key Categories



## Quantitative Approaches



## Qualitative Approaches



# How to Identify Key Categories



## Quantitative Approaches

- Use inventory, or emission and sink estimates and uncertainty analysis results to analyze actual category contribution to both overall emissions and sinks and uncertainty.

## Qualitative Approaches



# How to Identify Key Categories



## Quantitative Approaches

- Use emission and sink estimates and uncertainty analysis results to analyze actual category contribution to both overall emissions and sinks and uncertainty.

## Qualitative Approaches

- **Completeness:** If there are known categories that are excluded from the inventory, consider qualitative criteria to identify any additional key categories.
- Other qualitative criteria include expected growth, lack of quantified uncertainty assessment, and mitigation effects

# Quantitative Assessment for Identifying Key Categories



A quantitative assessment **identifies** key categories that collectively contribute at least 95% of total national greenhouse gases in the current GHG inventory.

- ✓ **Approach 1** sorts and ranks source and sink categories according to their absolute contribution to total emissions and includes categories that collectively contribute **95%** of total emissions
  - ✓ A “level assessment” looks at a particular year
  - ✓ A “trend assessment” looks at the category trend relative to national trend in emissions
- ✓ **Approach 2** is similar, but sorts and ranks category estimates according to their absolute contribution weighted by **uncertainty**, and includes categories that collectively contribute **90%** of uncertainty weighted total emissions

**Note:** If using the IPCC Inventory Software, quantitative KCA is performed automatically by the software as data is entered – no need to process separately. Future reporting tools will also automate implementation of Approach 1 for identifying KCs.

# Quantitative Assessment: Conducting an Approach 1 Level Assessment



## **Before you get started:**

1. Identify roles - Decide who will conduct the KCA (e.g., National Inventory Coordinator).
2. Organize your inventory estimates in at disaggregation levels consistent with IPCC guidance: estimates are organized by the categories, subcategories where applicable, and gases as outlined in the 2006 IPCC Guidelines, Volume 1, Chapter 4, Table 4.1.

→ *Perform analysis including and excluding LULUCF sector*

# Quantitative Assessment: Conducting an Approach 1 Level Assessment



**Step 1)** List all inventory categories for year of level analysis (e.g., latest reported year)

Emission Category	Gas	Gg CO <sub>2</sub> eq.

# Quantitative Assessment: Conducting an Approach 1 Level Assessment



**Step 1)** List all inventory categories for year of level analysis (e.g., latest reported year)

Emission Category	Gas	Gg CO <sub>2</sub> eq.
Energy Industries (solid fuel)	CO <sub>2</sub>	300
Road Transportation	CO <sub>2</sub>	110
Iron and Steel Production	CO <sub>2</sub>	90
Iron and Steel Production	CH <sub>4</sub>	1
Forest Land Remaining Forest Land	CO <sub>2</sub>	-190
Croplands Remaining Croplands	CO <sub>2</sub>	6
Product Uses as ODS Substitutes (Aerosols)	HFC&PFC	4
Enteric Fermentation	CH <sub>4</sub>	100
Manure Management	N <sub>2</sub> O	80
Cement Production	CO <sub>2</sub>	30
Rice Cultivation	CH <sub>4</sub>	50



# Quantitative Assessment: Conducting an Approach 1 Level Assessment



**Important good practice:** The analysis should be performed at appropriate level of aggregation (i.e., at level at which you estimate IPCC categories or subcategories, per methods and decision trees).

Key Category Analysis

Approach 1: Level Assessment | Approach 1: Trend Assessment

A	B	C	D	E	F	G
IPCC Category code	IPCC Category	Greenhouse gas	1994 Ex,t (Gg CO2 Eq)	[Ex,t] (Gg CO2 Eq)	Lx,t	Cumulative Total of Column F
2.G	Other Product Manufacture and Use	SF6, PFCs	753201.6125	753201.6125	0.7526	0.7526
2.F.6	Other Applications (please specify)	HFCs, PFCs	70736	70736	0.07068	0.82328
1.A.1	Energy Industries - Solid Fuels	CARBON DIOXID...	29743.85	29743.85	0.02972	0.853
2.F.5	Solvents	HFCs, PFCs	27420	27420	0.0274	0.8804
1.B.2a	Oil	NITROUS OXIDE...	26988.6	26988.6	0.02697	0.90737
3.D.1	Harvested Wood Products	CARBON DIOXID...	-22505.91952	22505.91952	0.02249	0.92986
2.E	Electronics Industry	SF6, PFCs, HFCs...	20600.3124	20600.3124	0.02068	0.95044
1.A.3.b	Road Transportation	CARBON DIOXID...	13448.0555	13448.0555	0.01344	0.96388
4.C	Incineration and Open Burning of Waste	CARBON DIOXID...	7704.54027	7704.54027	0.0077	0.97158
4.A	Solid Waste Disposal	METHANE (CH4)	3705.3582	3705.3582	0.0037	0.97528
1.A.2	Manufacturing Industries and Construction...	CARBON DIOXID...	3516.442	3516.442	0.00351	0.97879
1.A.1	Energy Industries - Liquid Fuels	CARBON DIOXID...	3387.944	3387.944	0.00339	0.98218
2.G	Other Product Manufacture and Use	NITROUS OXIDE (...)	3349.9096	3349.9096	0.00335	0.98552
2.D	Non-Energy Products from Fuels and Solv...	CARBON DIOXID...	3342.603	3342.603	0.00334	0.98886

Refresh Data | Export to Excel

# Quantitative Assessment: Conducting an Approach 1 Level Assessment



**Step 2)** Sort in descending order by contribution to total emissions (absolute values)

Emission Category	Gas	Gg CO <sub>2</sub> eq.
Energy Industries (solid fuel)	CO <sub>2</sub>	300
Forest Land Remaining Forest Land	CO <sub>2</sub>	-190
Road Transport	CO <sub>2</sub>	110
Enteric Fermentation	CH <sub>4</sub>	100
Iron and Steel Production	CO <sub>2</sub>	90
Manure Management	N <sub>2</sub> O	80
Rice Cultivation	CH <sub>4</sub>	50
Cement Production	CO <sub>2</sub>	30
Croplands Remaining Croplands	CO <sub>2</sub>	6
Product Uses as ODS Substitutes (Aerosols)	HFC&PFC	4
Iron and Steel Production	CH <sub>4</sub>	1



# Quantitative Assessment: Conducting an Approach 1 Level Assessment



**Step 2)** Sort in descending order by contribution to total emissions (absolute values)

Emission Category	Gas	Gg CO <sub>2</sub> eq.	Cumulative %
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# Quantitative Assessment: Conducting an Approach 1 Level Assessment



**Step 3)** Sum cumulative contribution of sources and sinks in absolute, descending order until you reach 95%

Emission Category	Gas	Gg CO <sub>2</sub> eq.	Cumulative %
Energy Industries (solid fuel)	CO <sub>2</sub>	300	
Forest Land Remaining Forest Land	CO <sub>2</sub>	190	
Road Transport	CO <sub>2</sub>	110	
Enteric Fermentation	CH <sub>4</sub>	100	
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# Quantitative Assessment: Conducting an Approach 1 Level Assessment



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Iron and Steel Production	CH <sub>4</sub>	1	
		<b>TOTAL : 961</b>	

# Quantitative Assessment: Conducting an Approach 1 Level Assessment



**Step 3)** Sum cumulative contribution of sources and sinks in absolute, descending order until you reach 95%

Emission Category	Gas	Gg CO <sub>2</sub> eq.	Cumulative %
Energy Industries (solid fuel)	CO <sub>2</sub>	300	= 300/961 × 100%
Forest Land Remaining Forest Land	CO <sub>2</sub>	190	
Road Transport	CO <sub>2</sub>	110	
Enteric Fermentation	CH <sub>4</sub>	100	
Iron and Steel Production	CO <sub>2</sub>	90	
Manure Management	N <sub>2</sub> O	80	
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**TOTAL : 961**

# Quantitative Assessment: Conducting an Approach 1 Level Assessment



**Step 3)** Sum cumulative contribution of sources and sinks in absolute, descending order until you reach 95%

Emission Category	Gas	Gg CO <sub>2</sub> eq.	Cumulative %
Energy Industries (solid fuel)	CO <sub>2</sub>	300	31%
Forest Land Remaining Forest Land	CO <sub>2</sub>	190	
Road Transport	CO <sub>2</sub>	110	
Enteric Fermentation	CH <sub>4</sub>	100	
Iron and Steel Production	CO <sub>2</sub>	90	
Manure Management	N <sub>2</sub> O	80	
Rice Cultivation	CH <sub>4</sub>	50	
Cement Production	CO <sub>2</sub>	30	
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**TOTAL : 961**

# Quantitative Assessment: Conducting an Approach 1 Level Assessment



**Step 3)** Sum cumulative contribution of sources and sinks in absolute, descending order until you reach 95%

Emission Category	Gas	Gg CO <sub>2</sub> eq.	Cumulative %
Energy Industries (solid fuel)	CO <sub>2</sub>	300	31%
Forest Land Remaining Forest Land	CO <sub>2</sub>	190	= [(190/961)*100] + 31%
Road Transport	CO <sub>2</sub>	110	
Enteric Fermentation	CH <sub>4</sub>	100	
Iron and Steel Production	CO <sub>2</sub>	90	
Manure Management	N <sub>2</sub> O	80	
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Enteric Fermentation	CH <sub>4</sub>	100	73%
Iron and Steel Production	CO <sub>2</sub>	90	82%
Manure Management	N <sub>2</sub> O	80	91%
Rice Cultivation	CH <sub>4</sub>	50	95%
Cement Production	CO <sub>2</sub>	30	99%
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# Quantitative Assessment: Conducting an Approach 1 Level Assessment



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Product Uses as ODS Substitutes (Aerosols)	HFC&PFC	4	99.9%
Iron and Steel Production	CH <sub>4</sub>	1	100%

Sum to 95%

These are key categories identified by the approach 1 level assessment (including LULUCF) for the latest reported year

# Quantitative Assessment: Conducting an Approach 1 Level Assessment



**Step 3)** Sum cumulative contribution of sources and sinks in absolute, descending order until you reach 95%

Emission Category	Gas	Gg CO <sub>2</sub> eq.	Cumulative %
Energy Industries (solid fuel)	CO <sub>2</sub>	300	31%
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Iron and Steel Production	CH <sub>4</sub>	1	100%

Sum to 95%

# Quantitative Assessment: Conducting an Approach 1 Level Assessment

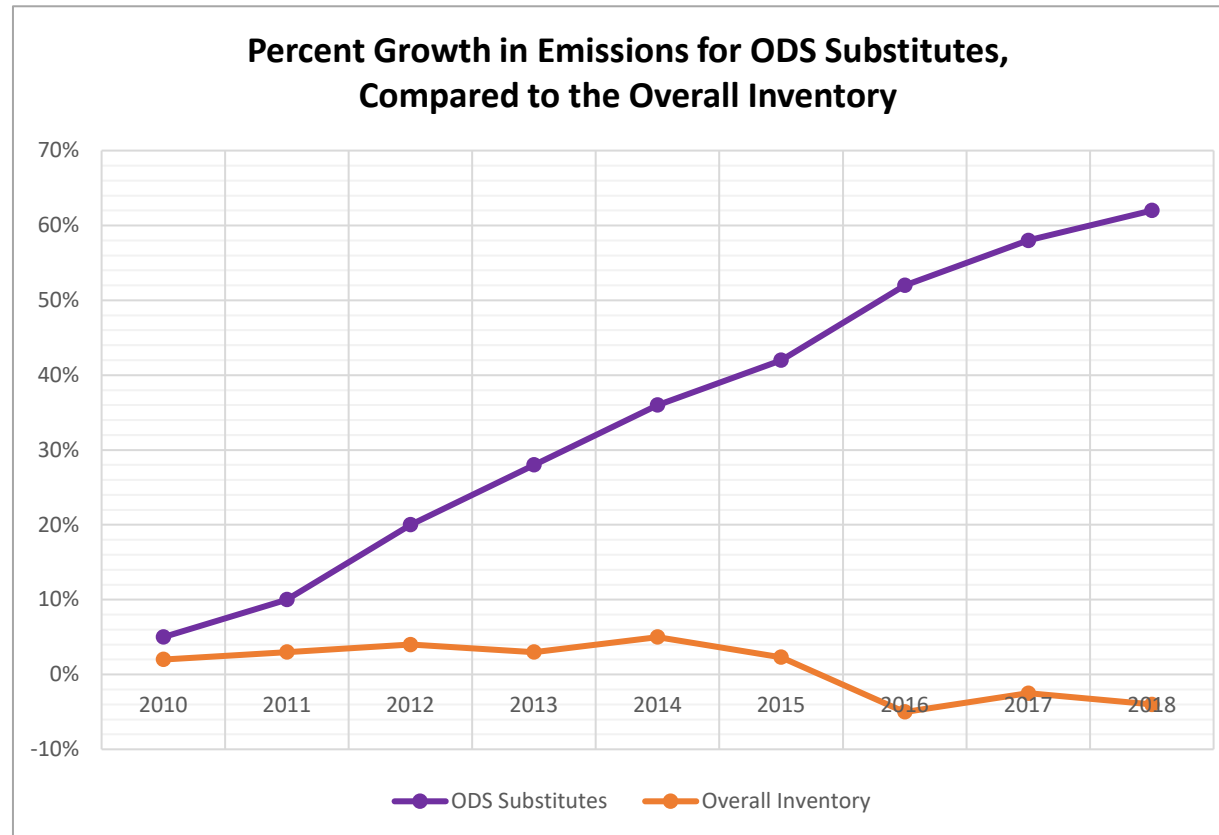


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Cement Production	CO <sub>2</sub>	30	99%
Croplands Remaining Croplands	CO <sub>2</sub>	6	99%
Product Uses as ODS Substitutes (Aerosols)	HFC&PFC	4	99.9%
Iron and Steel Production	CH <sub>4</sub>	1	100%

ETF reporting guidelines provide flexibility for developing countries, in light of their capacities, to instead use a threshold of no lower than 85% to allow focus on improving fewer categories

# Quantitative Assessment: Trend Assessment



**A trend assessment looks at a category's relative changes in emissions over time, instead of the contribution of a category to the total emission estimates for a country in a particular year.**

# Quantitative Assessment: Conducting an Approach 1 Trend Assessment (w/LULUCF)



Emission Category	Gas	1990	2018	Trend Assessment	% Contribution to Trend	Cumulative Total
		Gg CO <sub>2</sub> eq.	Gg CO <sub>2</sub> eq.			
Energy Industries (solid fuel)	CO <sub>2</sub>	200	300			
Forest Land Remaining Forest Land	CO <sub>2</sub>	-210	-190			
Road Transport	CO <sub>2</sub>	60	110			
Enteric Fermentation	CH <sub>4</sub>	80	100			
Iron and Steel Production	CO <sub>2</sub>	120	90			
Manure Management	CO <sub>2</sub>	70	80			
Rice Cultivation	CH <sub>4</sub>	45	50			
Cement Production	CO <sub>2</sub>	35	30			
Croplands Remaining Croplands	N <sub>2</sub> O	8	6			
Product Uses as ODS Substitutes (Aerosols)	HFC&PFC	1	4			
Iron and Steel Production	CH <sub>4</sub>	1.5	1			
		<b>TOTAL: 410.5</b>	<b>TOTAL: 581</b>			

# Quantitative Assessment: Conducting an Approach 1 Trend Assessment (w/LULUCF)



Emission Category	Gas	1990	2018	Trend Assessment	% Contribution to Trend	Cumulative Total
		Gg CO <sub>2</sub> eq.	Gg CO <sub>2</sub> eq.			
Energy Industries (solid fuel)	CO <sub>2</sub>	200	300	0.08		
Forest Land Remaining Forest Land	CO <sub>2</sub>	-210	-190	0.32		
Road Transport	CO <sub>2</sub>	60	110	0.42		
Enteric Fermentation	CH <sub>4</sub>	80	100	0.17		
Iron and Steel Production	CO <sub>2</sub>	120	90	0.67		
Manure Management	CO <sub>2</sub>	70	80	0.27		
Rice Cultivation	CH <sub>4</sub>	45	50	0.30		
Cement Production	CO <sub>2</sub>	35	30	0.56		
Croplands Remaining Croplands	N <sub>2</sub> O	8	6	0.67		
Product Uses as ODS Substitutes (Aerosols)	HFC&PFC	1	4	2.58		
Iron and Steel Production	CH <sub>4</sub>	1.5	1	0.75		

Follow equations in 2006 IPCC GLs, Volume 1, Chapter 4 to calculate Trend Assessment

# Quantitative Assessment: Conducting an Approach 1 Trend Assessment (w/LULUCF)



Emission Category	Gas	1990	2018	Trend Assessment	% Contribution to Trend	Cumulative Total
		Gg CO <sub>2</sub> eq.	Gg CO <sub>2</sub> eq.			
Energy Industries (solid fuel)	CO <sub>2</sub>	200	300	0.08		
Forest Land Remaining Forest Land	CO <sub>2</sub>	-210	-190	0.32		
Road Transport	CO <sub>2</sub>	60	110	0.42		
Enteric Fermentation	CH <sub>4</sub>	80	100	0.17		
Iron and Steel Production	CO <sub>2</sub>	120	90	0.67		
Manure Management	CO <sub>2</sub>	70	80	0.27		
Rice Cultivation	CH <sub>4</sub>	45	50	0.30		
Cement Production	CO <sub>2</sub>	35	30	0.56		
Croplands Remaining Croplands	N <sub>2</sub> O	8	6	0.67		
Product Uses as ODS Substitutes (Aerosols)	HFC&PFC	1	4	2.58		
Iron and Steel Production	CH <sub>4</sub>	1.5	1	0.75		

**TOTAL: 6.79**

Follow equations in 2006 IPCC GLs, Volume 1, Chapter 4 to calculate Trend Assessment



# Quantitative Assessment: Conducting an Approach 1 Trend Assessment (w/LULUCF)



Emission Category	Gas	1990	2018	Trend Assessment	% Contribution to Trend	Cumulative Total
		Gg CO <sub>2</sub> eq.	Gg CO <sub>2</sub> eq.			
Energy Industries (solid fuel)	CO <sub>2</sub>	200	300	0.08	1.2%	1.2%
Forest Land Remaining Forest Land	CO <sub>2</sub>	-210	-190	0.32	5%	6.0%
Road Transport	CO <sub>2</sub>	60	110	0.42	6%	12.1%
Enteric Fermentation	CH <sub>4</sub>	80	100	0.17	2%	14.6%
Iron and Steel Production	CO <sub>2</sub>	120	90	0.67	10%	24.4%
Manure Management	CO <sub>2</sub>	70	80	0.27	4%	28.4%
Rice Cultivation	CH <sub>4</sub>	45	50	0.30	4%	32.9%
Cement Production	CO <sub>2</sub>	35	30	0.56	8%	41.1%
Croplands Remaining Croplands	N <sub>2</sub> O	8	6	0.67	10%	50.9%
Product Uses as ODS Substitutes (Aerosols)	HFC&PFC	1	4	2.58	38%	89.0%
Iron and Steel Production	CH <sub>4</sub>	1.5	1	0.75	11%	100.0%

**TOTAL: 6.79**

Follow equations in 2006 IPCC GLs, Volume 1, Chapter 4 to calculate Trend Assessment

# Quantitative Assessment: Conducting an Approach 1 Trend Assessment



Emission Category	Gas	1990 Gg CO <sub>2</sub> eq.	2018 Gg CO <sub>2</sub> eq.	Trend Assessment	% Contribution to Trend	Cumulative Total
Energy Industries (solid fuel)	CO <sub>2</sub>	200	300	0.08	1%	1.2%
Forest Land Remaining Forest Land	CO <sub>2</sub>	-210	-190	0.32	5%	6.0%
Road Transport	CO <sub>2</sub>	60	110	0.42	6%	12.1%
Enteric Fermentation	CH <sub>4</sub>	80	100	0.17	2%	14.6%
Iron and Steel Production	CO <sub>2</sub>	120	90	0.67	10%	24.4%
Manure Management	CO <sub>2</sub>	70	80	0.27	4%	28.4%
Rice Cultivation	CH <sub>4</sub>	45	50	0.30	4%	32.9%
Cement Production	CO <sub>2</sub>	35	30	0.56	8%	41.1%
Croplands Remaining Croplands	N <sub>2</sub> O	8	6	0.67	10%	50.9%
Product Uses as ODS Substitutes (Aerosols)	HFC&PFC	1	4	2.58	38%	89.0%
Iron and Steel Production	CH <sub>4</sub>	1.5	1	0.75	11%	100.0%
				<b>TOTAL:</b>		
				<b>6.79</b>		

Sum to 95%

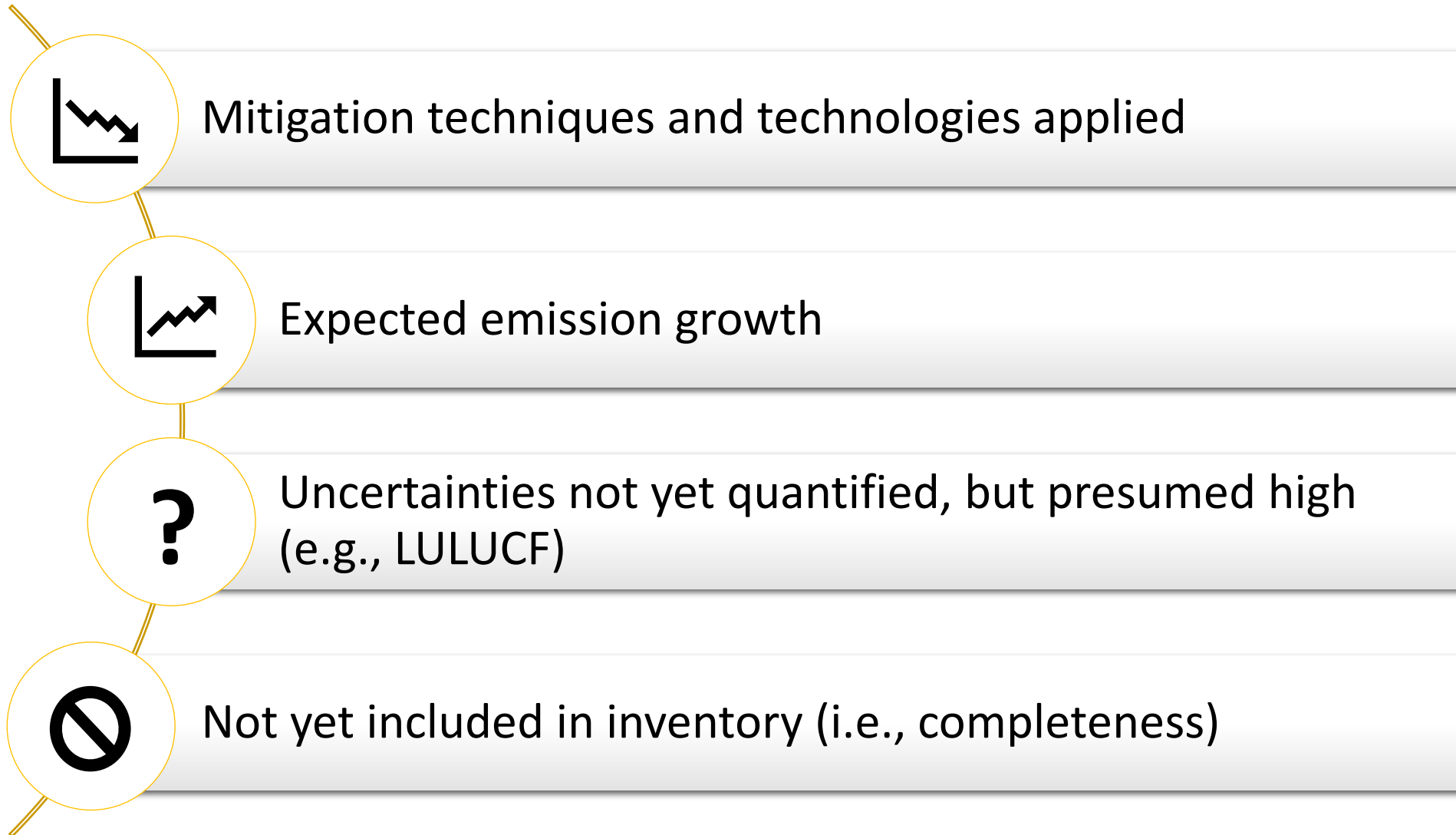
Follow equations in 2006 IPCC GLs, Volume 1, Chapter 4 to calculate Trend Assessment

# Quantitative Assessment: Considering Uncertainty when Conducting an Approach 2 Trend Assessment

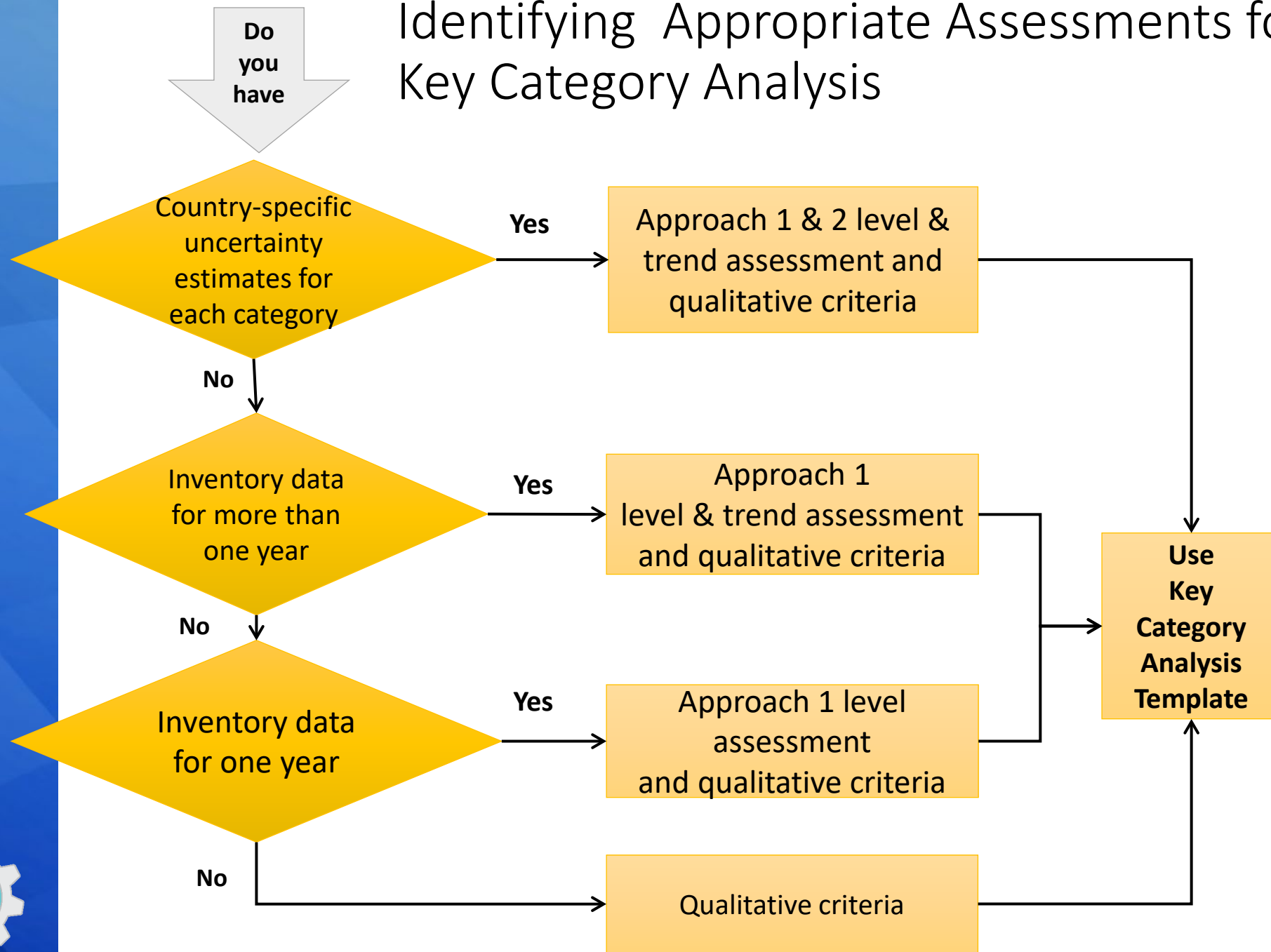


Emission Category	Gas	1990 Gg CO <sub>2</sub> eq.	2018 Gg CO <sub>2</sub> eq.	Trend Assessment	Trend Assessment Including Uncertainty	% Contribution to Trend	Cumulative Total
Energy Industries (solid fuel)	CO <sub>2</sub>	200	300	0.08	=0.08*U <sub>x,2018</sub>		
Forest Land Remaining Forest Land	CO <sub>2</sub>	-210	-190	0.32			
Road Transport	CO <sub>2</sub>	60	110	0.42			
Enteric Fermentation	CH <sub>4</sub>	80	100	0.17			
Iron and Steel Production	CO <sub>2</sub>	120	90	0.67			
Manure Management	CO <sub>2</sub>	70	80	0.27			
Rice Cultivation	CH <sub>4</sub>	45	50	0.30			
Cement Production	CO <sub>2</sub>	35	30	0.56			
Croplands Remaining Croplands	N <sub>2</sub> O	8	6	0.67			
Product Uses as ODS Substitutes (Aerosols)	HFC&PFC	1	4	2.58			
Iron and Steel Production	CH <sub>4</sub>	1.5	1	0.75			
					<b>TOTAL: TBD</b>		

# Qualitative Assessments to Conducting Key Category Analysis



# Identifying Appropriate Assessments for Key Category Analysis

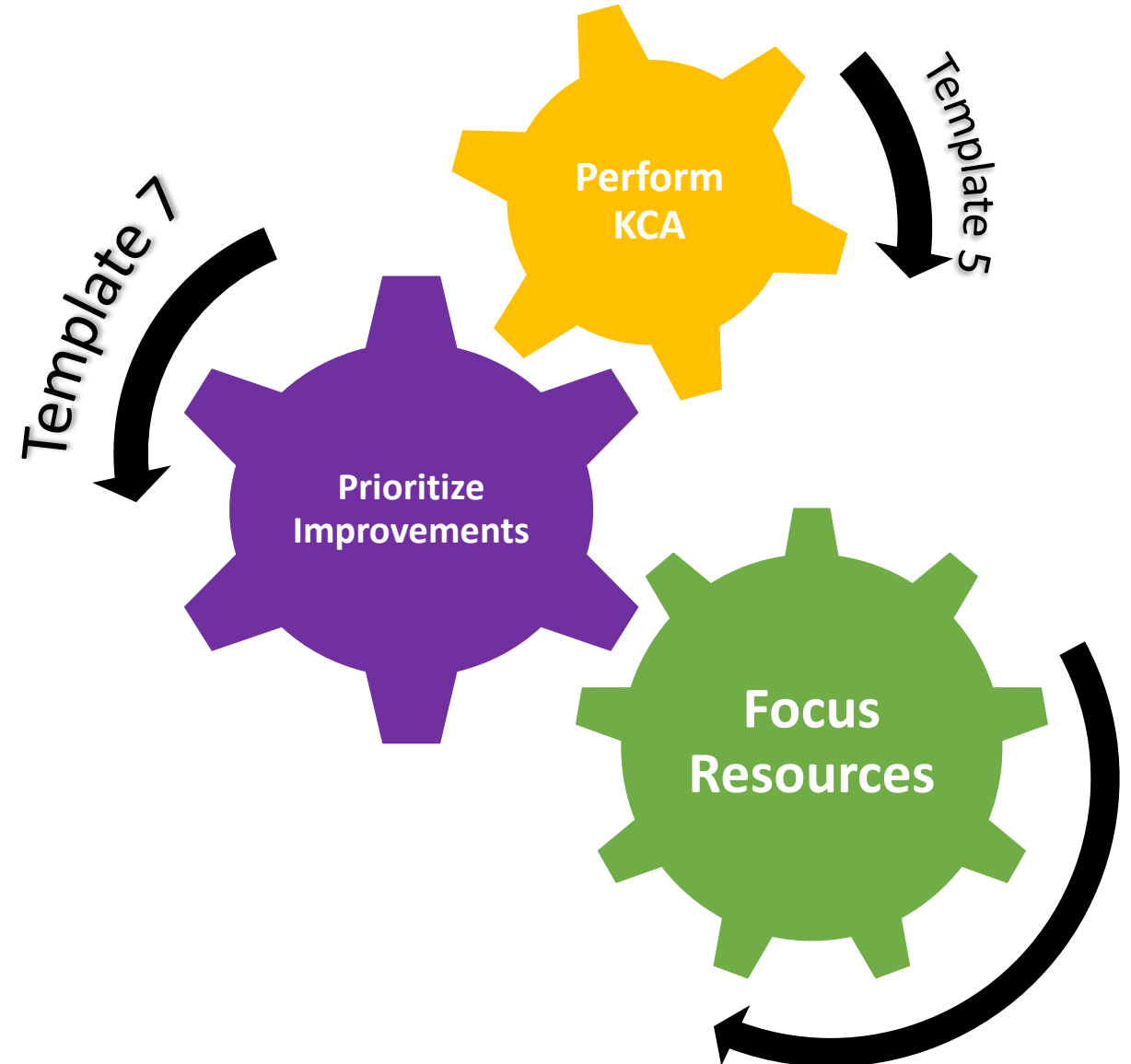
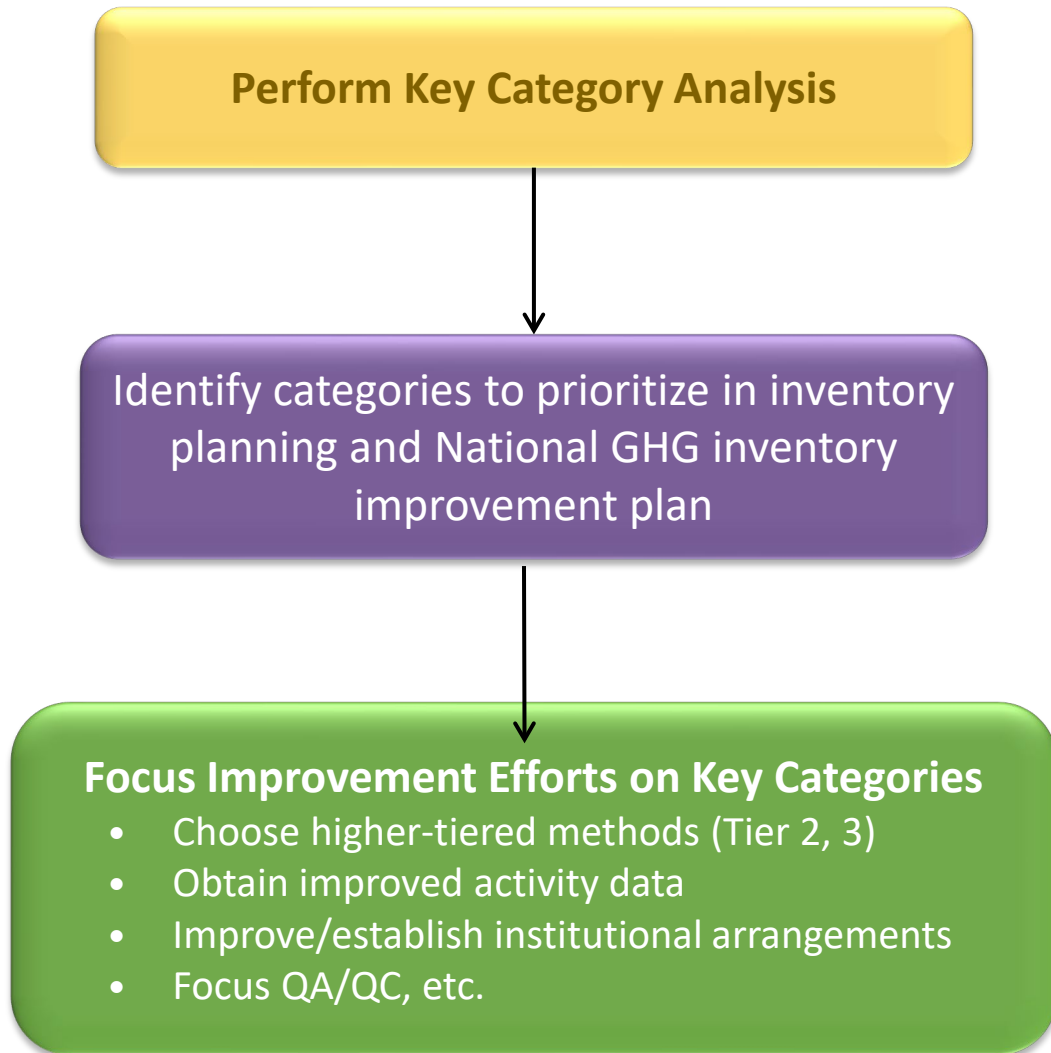


### Data Checklist

- Qualitative criteria
- Inventory data for a single year
- Inventory data for more than one year
- Country specific uncertainty for each category



# Recap: Why Do a Key Category Analysis?



# Key Categories in the National Inventory Compilation Cycle



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

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

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



- 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



## Which tools did you use to conduct the key category analysis?

- a) Spreadsheet (developed by the GHG inventory compilation team)
- b) IPCC Inventory Software
- c) Other

Describe other tools here or using the chat!

[Respond using Mentimeter link in the chat!](#)



# IPCC Inventory Software

Automates preparing a quantitative KCA analysis

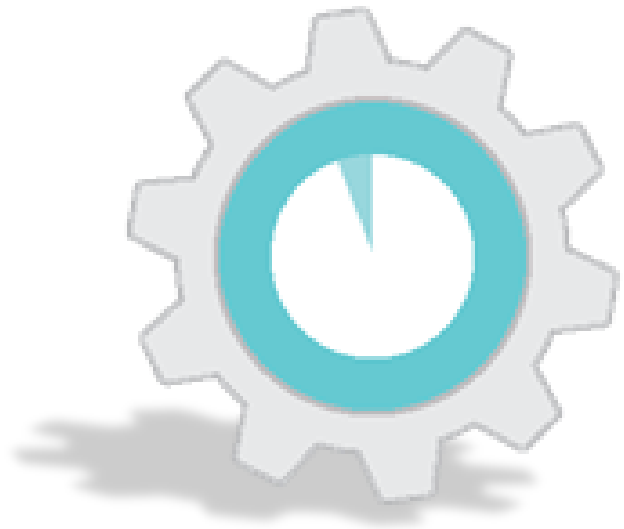
Key Category Analysis

Approach 1: Level Assessment    Approach 1: Trend Assessment

A	B	C	D	E	F	G
IPCC Category code	IPCC Category	Greenhouse gas	1994 Ex,t (Gg CO2 Eq)	[Ex,t] (Gg CO2 Eq)	Lx,t	Cumulative Total of Column F
2.G	Other Product Manufacture and Use	SF6, PFCs	753201.6125	753201.6125	0.7526	0.7526
2.F.6	Other Applications (please specify)	HFCs, PFCs	70736	70736	0.07068	0.82328
1.A.1	Energy Industries - Solid Fuels	CARBON DIOXID..	29743.85	29743.85	0.02972	0.853
2.F.5	Solvents	HFCs, PFCs	27420	27420	0.0274	0.8804
1.B.2.a	Oil	NITROUS OXIDE..	26988.6	26988.6	0.02697	0.90737
3.D.1	Harvested Wood Products	CARBON DIOXID..	-22505.91952	22505.91952	0.02249	0.92986
2.E	Electronics Industry	SF6, PFCs, HFCs..	20600.3124	20600.3124	0.02058	0.95044
1.A.3.b	Road Transportation	CARBON DIOXID..	13448.0555	13448.0555	0.01344	0.96388
4.C	Incineration and Open Burning of Waste	CARBON DIOXID..	7704.54027	7704.54027	0.0077	0.97158
4.A	Solid Waste Disposal	METHANE (CH4)	3705.3582	3705.3582	0.0037	0.97528
1.A.2	Manufacturing Industries and Construction..	CARBON DIOXID..	3516.442	3516.442	0.00351	0.97879
1.A.1	Energy Industries - Liquid Fuels	CARBON DIOXID..	3387.944	3387.944	0.00339	0.98218
2.G	Other Product Manufacture and Use	NITROUS OXIDE (..	3349.9096	3349.9096	0.00335	0.98552
2.D	Non-Energy Products from Fuels and Solv..	CARBON DIOXID..	3342.603	3342.603	0.00334	0.98886

Refresh Data    Export to Excel

# Key Category Analysis



## ***National System Templates***

Template 5: Key Category Analysis



## ***Key Category Tool***

Helps implement IPCC methods, and calculate Key Categories using Microsoft Excel or OpenOffice Calc

Note: EPA is updating this tool, so stay tuned for a new version in the near future.

# Where to Obtain the Key Category Analysis Tool



**Available Online at**

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

## 5. Key Category Analysis (KCA)

This template identifies the sources and sinks that make the greatest contribution to national GHG emissions and removals. With this analysis of key categories, a GHG inventory team can prioritize over time the resources needed to implement the more impactful improvements to a national GHG inventory.

- [Key Category Analysis](#) (12 pp, 124 K)
- [Key Category Analysis \(PDF\)](#) (12 pp, 486 K)

Supporting Tool: The **Key Category Analysis Tool** enables a GHG inventory team to determine key categories of GHG emissions and removals from GHG inventory estimates.

- [Key Category Analysis Tool](#) (1 MB)



[↑ Top of Page](#)

# The Key Category Analysis Tool



**Instructions:**

Enter Inventory, click the **Sort Key Categories** button!

1. Verify that the current year estimates in column C correctly correspond to the categories in column B.
2. Click the Sort Key Categories button to the right.

Sort Key Categories



The resulting key categories are those categories shaded in green.

**Key Category Tier 1 Level Assessment for the Current Year**

CATEGORIES	Current Year		Cumulative Percentage
	Emission Estimate (Gg CO <sub>2</sub> eq)	Level assessment	
1A1 - Fuel Combustion Activities - Energy Industries (Solid Fuel) - CH4	162,029	0.357	36%
2B9 - Chemical Industry - Fluorochemical Production - PFCs	162,029	0.146	50%
1A1 - Fuel Combustion Activities - Energy Industries (Gaseous Fuel) - CO2	113,945	0.102	60%
2C1 - Metal Industry -Iron and Steel Production - CH4	113,945	0.102	71%
1A1 - Fuel Combustion Activities - Energy Industries (Solid Fuel) - CO2	84,009	0.075	78%
2B8 - Chemical Industry - Petrochemical and Carbon Black Production - CH4	84,009	0.075	86%
1A1 - Fuel Combustion Activities - Energy Industries (Solid Fuel) - N2O	65,128	0.059	92%
2B9 - Chemical Industry - Fluorochemical Production - HFCs	65,128	0.059	98%
1A3d - Fuel Combustion Activities - Transport - Domestic Water-borne Navigation - N2O	16,127	0.014	99%
2F3 - Product Uses as Substitutes for Ozone Depleting Substances -Fire Protection - HFCs, PFCs	16,127	0.014	100%
3B2b - Land Converted to Cropland (Removals) - CO2	16,127	0.014	102%
3B5b - Forest Land Converted to Settlements (Removals) - CO2	16,127	0.014	103%
2B1 - Chemical Industry - Ammonia Production - CO2	11,076	0.010	104%
1C - Carbon Dioxide Transport and Storage - CO2	10,921	0.010	105%
2A1 - Mineral industry - Cement Production - CO2	8,122	0.007	106%
1B2b - Fugitive Emissions from Fuels - Oil and Natural Gas - Natural gas - CO2	7,371	0.007	107%
2A2 - Mineral Industry - Lime Production - CO2	7,104	0.006	107%
1A2 - Fuel Combustion Activities - Manufacturing Industries and Construction - CO2	5,111	0.005	108%
2C3 - Metal Industry -Aluminium Production - PFCs	5,111	0.005	108%
1A3c - Fuel Combustion Activities - Transport - Railways - CH4	5,041	0.005	109%
2F1 - Product Uses as Substitutes for Ozone Depleting Substances - Refrigeration and Air Conditioning - HFCs, PFCs	5,041	0.005	109%
3B2a - Cropland Remaining Cropland (Removals) - CO2	5,041	0.005	110%
3B5b - Land Converted to Settlements (Removals) - CO2	5,041	0.005	110%
1A1 - Fuel Combustion Activities - Energy Industries (Liquid Fuel) - CO2	4,943	0.004	111%
2B9 - Chemical Industry - Fluorochemical Production - SF6	4,943	0.004	111%
1 - Miscellaneous - N2O	3,775	0.003	111%
1A1 - Fuel Combustion Activities - Energy Industries (Liquid Fuel) - CH4	3,768	0.003	112%
2C1 - Metal Industry -Iron and Steel Production - CO2	3,768	0.003	112%

# Documenting KCA Results



- Save copies of the file as different versions for draft and final analyses by inserting the date or version number at the end of the file name (e.g., “KCA Tool v2.xls”).
- You may also use the 2006 IPCC Guidelines inventory software, which has a KCA module in it, or build your own spreadsheet(s) that follow the methodologies in the 2006 IPCC Guidelines.

## STEP 3: Complete the Approach 1 key category current year level assessment

- Complete Table 5-1, below, using the results from the KCA you performed in Step 2. This table will be a record of the results of the IPCC Approach 1 key category level assessment for the most recent or current year (e.g., 2019). Add as many rows to the table as necessary to provide detailed information for each category.
- If or when the inventory is updated, update the KCA.

### Approach 1 Assessment (Current Year)

Table 5-1: Key Categories Based on Contribution to Total National Emissions

IPCC Category Code	IPCC Category	Gas	Current Year Emissions (Gg CO <sub>2</sub> Eq.)	Contribution to National Emissions	Cumulative Per Cent of National Emissions

\*Represents results from the “Key Category Approach 1 Assessment for the Current Year” sheet in the EPA KCA tool.

## STEP 4: Complete the Approach 1 key category base year level assessment and trend assessment

- Complete this step if your country has GHG inventories with a time series of more than one year.
- If your country has a GHG inventory for only one year, proceed to Step 5.

The background features a central dark grey banner with white text. Surrounding the banner are several grey gears of varying sizes. Some gears contain white icons: a target, a pencil writing on a gear, a hierarchical tree structure, a folder, a document with a pencil, a magnifying glass, and a pie chart. One gear on the right side of the banner is highlighted with a teal-colored inner ring and a teal pie chart icon.

# *Key Category Analysis Documentation Template*

# How this Template Will Help!



## The *Key Category Analysis Tool and Template* will help the inventory team:



- Identify, document, and summarize all key categories identified using latest Inventory based on approaches available
  - Approach 1
  - Approach 2 (reflects uncertainty)
  - Qualitative criteria
- Document inventory improvements for the future

# Step 1: Level Assessment (Current Year)



## Approach 1 Level Assessment (Current Year)

Table 5.1: Key Categories Based on Contribution to Total National Emissions in Current Year [year, e.g., 2019]

IPCC Category Code	IPCC Category	Gas	Current Year Emissions (Gg CO <sub>2</sub> Eq.)	Contribution to National Emissions	Cumulative Per Cent of National Emissions
1A1	Fuel Combustion Activities - Energy Industries (Gaseous Fuel)	CO <sub>2</sub>	7,500	30%	30%
1A3e	Fuel Combustion Activities - Transport - Other Transportation	CH <sub>4</sub>	5,000	20%	50%
2C3	Metal Industry -Aluminum Production	PFC	4,800	19%	69%
1A3a	Fuel Combustion Activities - Transport - Domestic Civil Aviation	CO <sub>2</sub>	1,000	3%	72%
3C1	Biomass Burning	N <sub>2</sub> O	700	3%	75%
...	...	...	...	...	...

Who completes this table: Key Category Analysis Lead



# Steps 2-7: Key Categories from Conducting Level Assessment for Base Year, Trend Assessment using Approach 1 (Approach 2 if feasible) and Qualitative Criteria



- Repeat process in remaining tables within template to list key category identified from each assessment

- Approach 1
  - Level Analysis (current year)
  - Level Analysis (base year)
  - Trend Analysis
- Approach 2
  - Level Analysis (current year)
  - Level Analysis (base year)
  - Trend Analysis
- Qualitative

Table 5-2: Key Categories Based on Contribution to Total National Emissions in Base Year [year, e.g., 2000]

IPCC Category Code	IPCC Category	Gas	Base Year Emissions (Gg CO <sub>2</sub> Eq.)	Contribution to National Emissions	Cumulative Per Cent of National Emissions
1A1	Fuel Combustion Activities - Energy Industries (Gaseous)	CO2	7,200	32%	32%

**Approach 1 Level Assessment (Base Year)**

Table 5-3: Key Categories Based on Contribution to Overall Trend in Net National Emissions

IPCC Category Code	IPCC Category	Gas	Base Year Emissions (Gg CO <sub>2</sub> Eq.)	Current Year Emissions (Gg CO <sub>2</sub> Eq.)	Contribution to Trend	Cumulative Contribution to Trend
1A1	Fuel Combustion Activities - Energy Industries (Gaseous)	CO2	7,200	7,500	31%	31%

**Approach 1 Trend Assessment**

**Who completes this table: Key Category Analysis Lead**

# Step 8: Key Category Analysis Summary



**Table 5-8: Summary of Key Categories Identified and Methodology**

IPCC Category Code	IPCC Category	Greenhouse Gas (CO <sub>2</sub> , CH <sub>4</sub> , etc)	Identification Criteria (L1, T2, Q, etc)	Comments
1A1	Fuel Combustion Activities - Energy Industries (Gaseous)	CO2	L1, T1	None

**Who completes this table: Key Category Analysis Lead**

# Step 9: Improvements to GHG Inventory



**Table 5-9: Improvements to the GHG inventory**

Improvement #	Sector	Source Category and IPCC Tier Used	Potential Improvement	Steps Needed to Implement This Improvement
1	Energy	Transport-Railways (CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O)	Currently no estimates, need to include	Find source for activity data and if available, data on uncertainty
2	IPPU	Cement Production (CO <sub>2</sub> )– Tier 1	Move to Tier 2 because this category is a key category	Establish IA with data provider for clinker production data
3	IPPU	Aluminum Production (PFCs)	Apply and document category-specific QC and send to expert for additional QA	Select applicable category specific QC procedures (e.g., comparing AD to other available data, comparing EFs to defaults and those for production in region, if available). Collect relevant data Conduct comparisons Prepare documentation outline

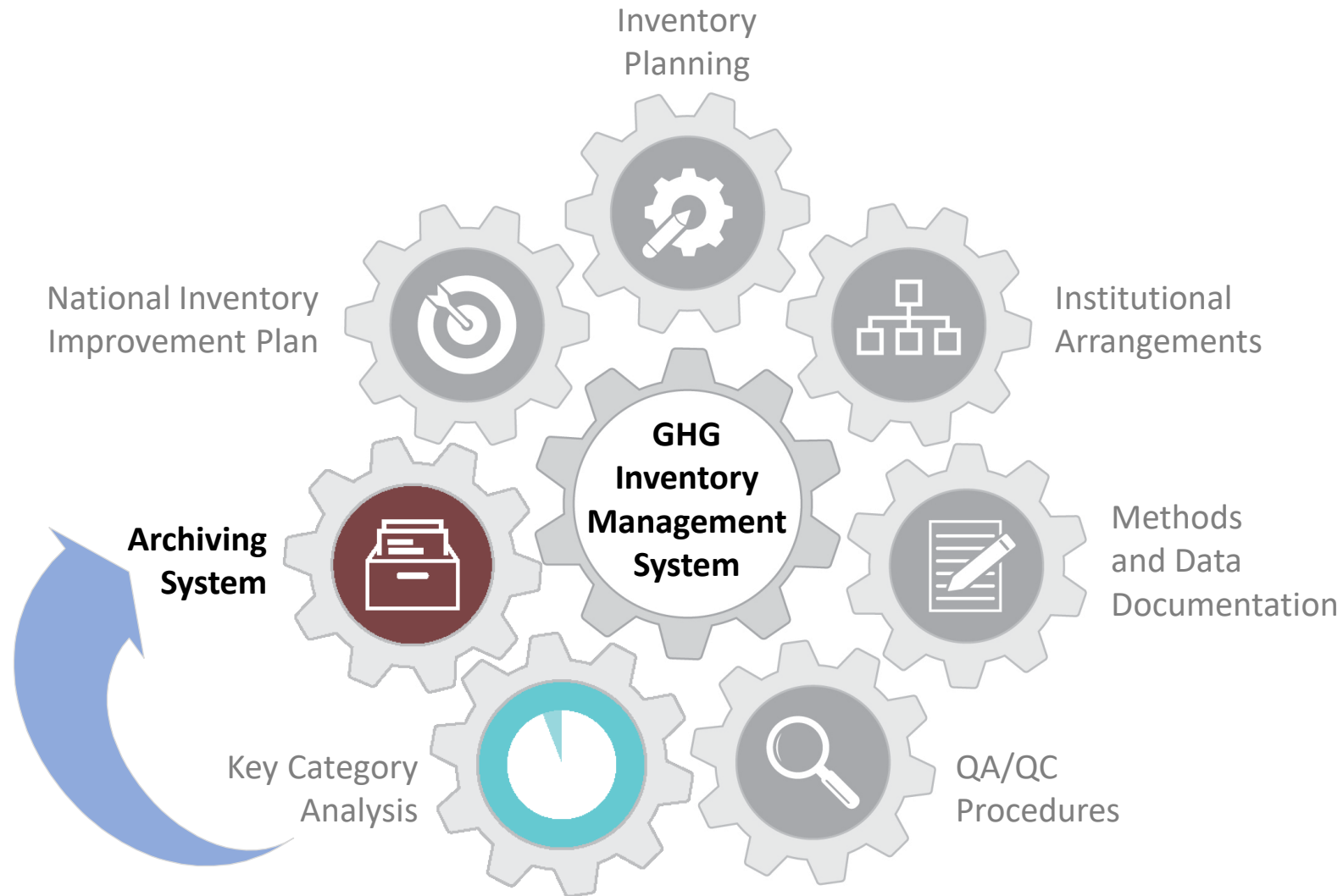
**Who completes this table: Key Category Analysis Lead**

# Action Items from KCA



1. Assign specific responsibilities for who will do the KCA
2. Collect all emissions estimates and uncertainty analyses
3. Ensure analysis is at appropriate level of disaggregation
4. Conduct the Key Category Analysis
5. Document KCA results in the template
6. Identify inventory improvements based on KCA results
7. Archive analysis and KCA data for future inventories, review, and staff training

# Next template...





**Thank You For Your Attention!**

**Mausami Desai**

[ghgi.transparency@epa.gov](mailto:ghgi.transparency@epa.gov)



**Toolkit for Building National GHG Inventory Systems**

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