



United Nations Climate Change  
Global Climate Action



# Sectoral **A**ctivity data for Greenhouse gas **E**missions calculations (**SAGE**)

## ***Agriculture sector***

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# SAGE – now four sectors are covered

The screenshot displays the SAGE web application interface. At the top left, the logo for 'sage' is shown with the text 'Sectoral Activity data for GHG Emissions' and a 'Agriculture' tab. The top navigation bar includes a play button, a home icon, a 'Switch to' dropdown, a 'Configuration' dropdown, 'AD Collections', 'Analytic', 'Data Gaps', 'Olia', 'Logout', and 'Reset'.

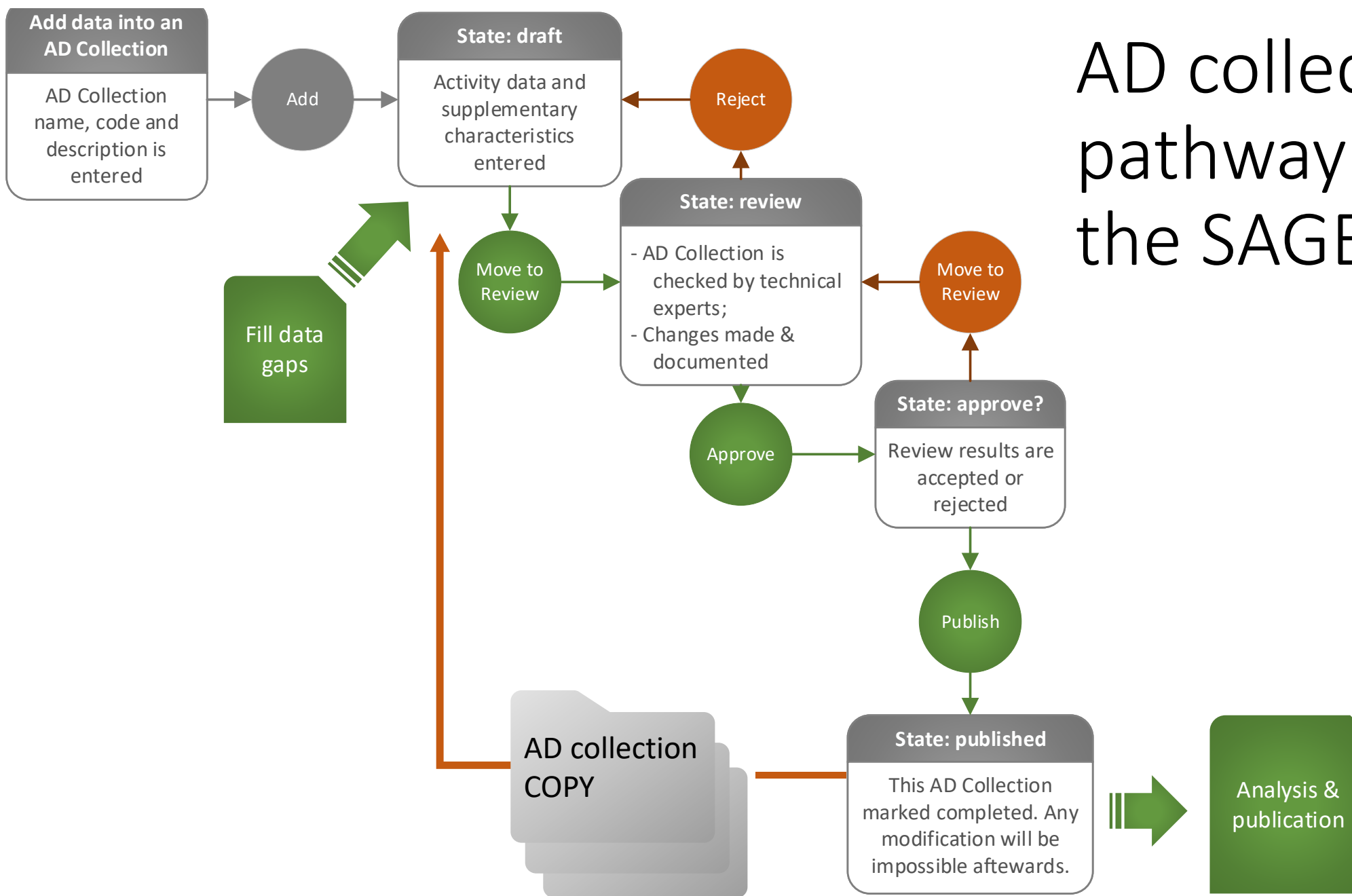
On the left side, under the heading 'Sectors', there is a list of four options: '1. Energy', '2. IPPU', '3. Agriculture', and '4. Waste'. The '3. Agriculture' option is selected, indicated by a blue radio button and a red rectangular highlight.

On the right side, under the heading 'Open', there is a list of menu items: 'Administration', 'Configuration - Basic', 'Configuration - Agriculture sector', 'AD Collections', 'Analytic', and 'Data Gaps'. The 'Configuration - Agriculture sector' item is highlighted with a red rectangular border. A tooltip is visible over this item, containing a wrench icon and the text 'Configuration - Agriculture sector'.

# Agriculture sector coverage

- In the IPCC classification, the agriculture sector and LULUCF sector are presented in the form of one sector – AFOLU. This does not match the sectoral classification under the ETF and the Paris Agreement.
- To match the categories included under the UNFCCC classification (and MPGs under the Paris Agreement) and the CRT tool, the following IPCC categories are covered under the agriculture sector in SAGE:
  - 3.A.1 – Enteric Fermentation
  - 3.A.2 – Manure Management
  - 3.C.1.b – Burning in Cropland
  - 3.C.1.c – Burning in Grassland
  - 3.C.2 – Liming
  - 3.C.3 – Urea Application
  - 3.C.4 – Direct N<sub>2</sub>O Emissions from managed soils
  - 3.C.5 – Indirect N<sub>2</sub>O emissions from managed soils
  - 3.C.6 – Indirect N<sub>2</sub>O emissions from manure management
  - 3.C.7 – Rice cultivation
  - 3.C.12 – N<sub>2</sub>O emissions from aquaculture

# AD collection pathway through the SAGE system



# Energy → IPPU → Waste → Agriculture sectors

- Preserved the philosophy and the key principles of SAGE
- Retained the functional blocks, but reconfigured them substantially to accept and process the Agriculture sector data
- Created a seamless switch between the sectors at the dashboard level
- Included ALL Agriculture sector categories listed in the IPCC GLs and reframed the category table to enable mapping the IPCC and UNFCCC categories
- Created a new sectoral subset of the database to handle the Agriculture sector data and metadata
- Included Agriculture category-specific calculations (e.g., N(T), Cfi adjustment, interim calculators for components of the GE calculation, to cold, corrections for lime water content and purity, etc.)
- Developed an efficient and flexible approach to handling multitude of parameters to enable consistency between the Agriculture categories



Global navigation links for a quick switch between components (visible in each screen)

Navigation links for the currently selected functional component

### Welcome to SAGE

#### Sectors

- 1. Energy
- 2. IPPU
- 3. Agriculture
- 4. Waste

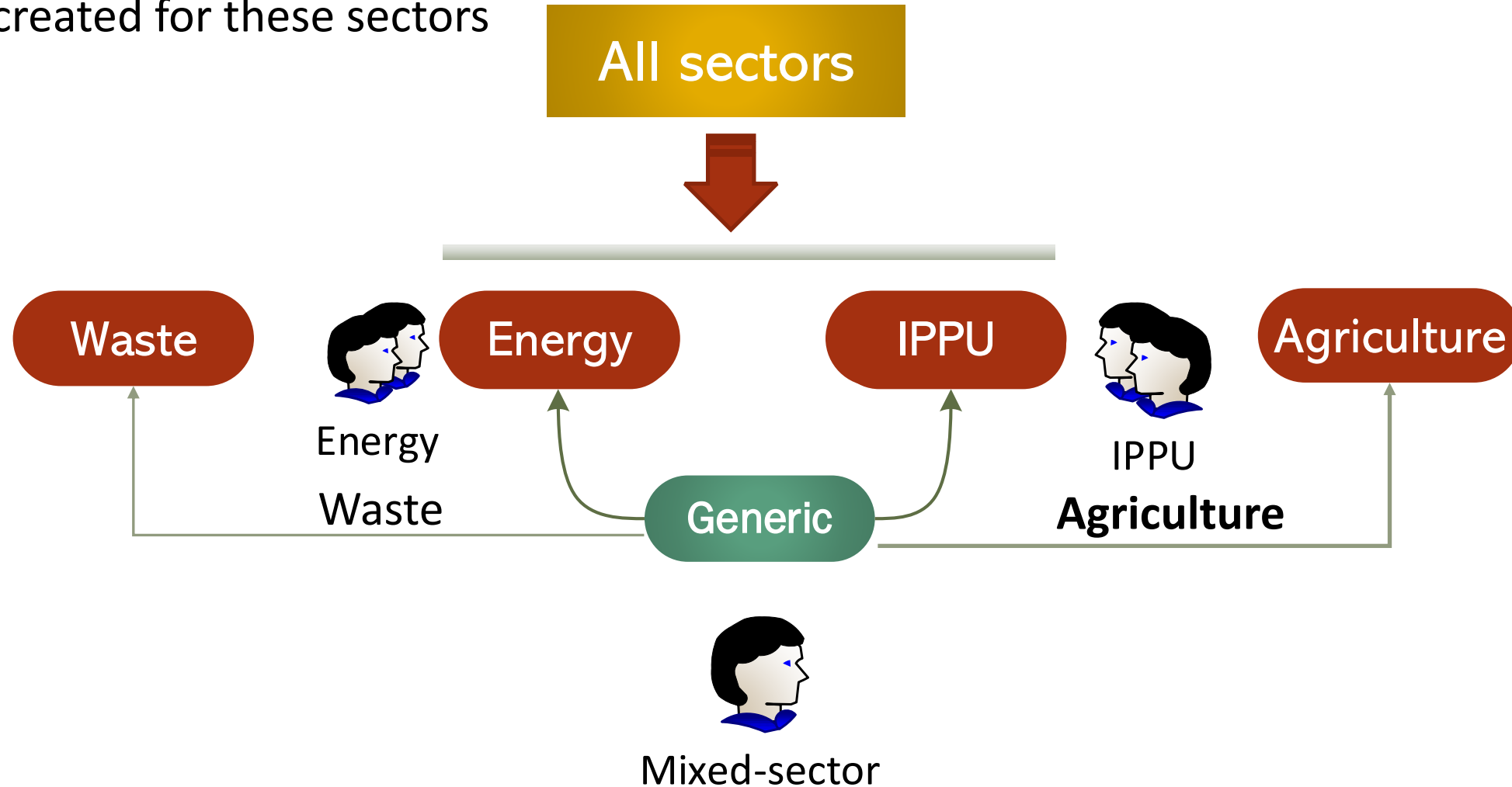
#### Open

- Administration
- Configuration - Basic
- Configuration - Agriculture sector
- AD Collections
- Analytic
- Data Gaps

Functional components in SAGE

# Changes by component - administration

- **Administrative:** the same look and feel, but there are substantial machinery changes; now permissions cover the Energy, IPPU, Waste, and Agriculture sectors and separate user groups can be created for these sectors

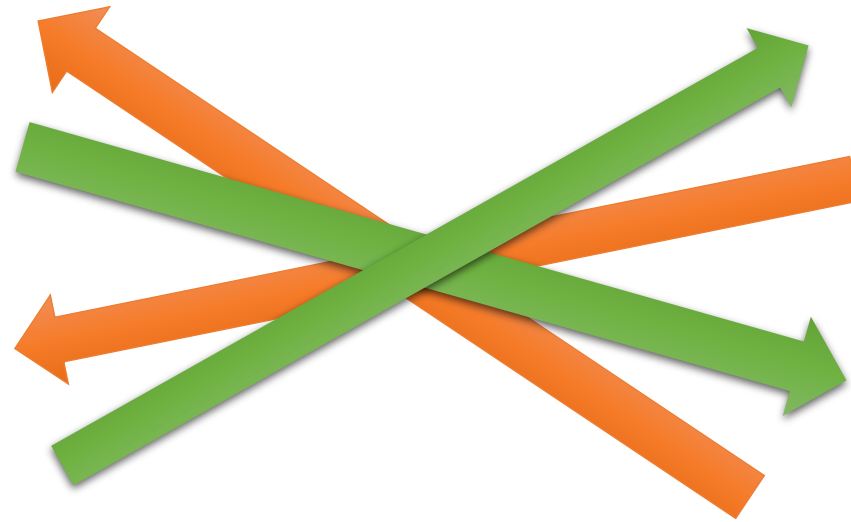


# Changes by component - configuration



# Changes by component - configuration

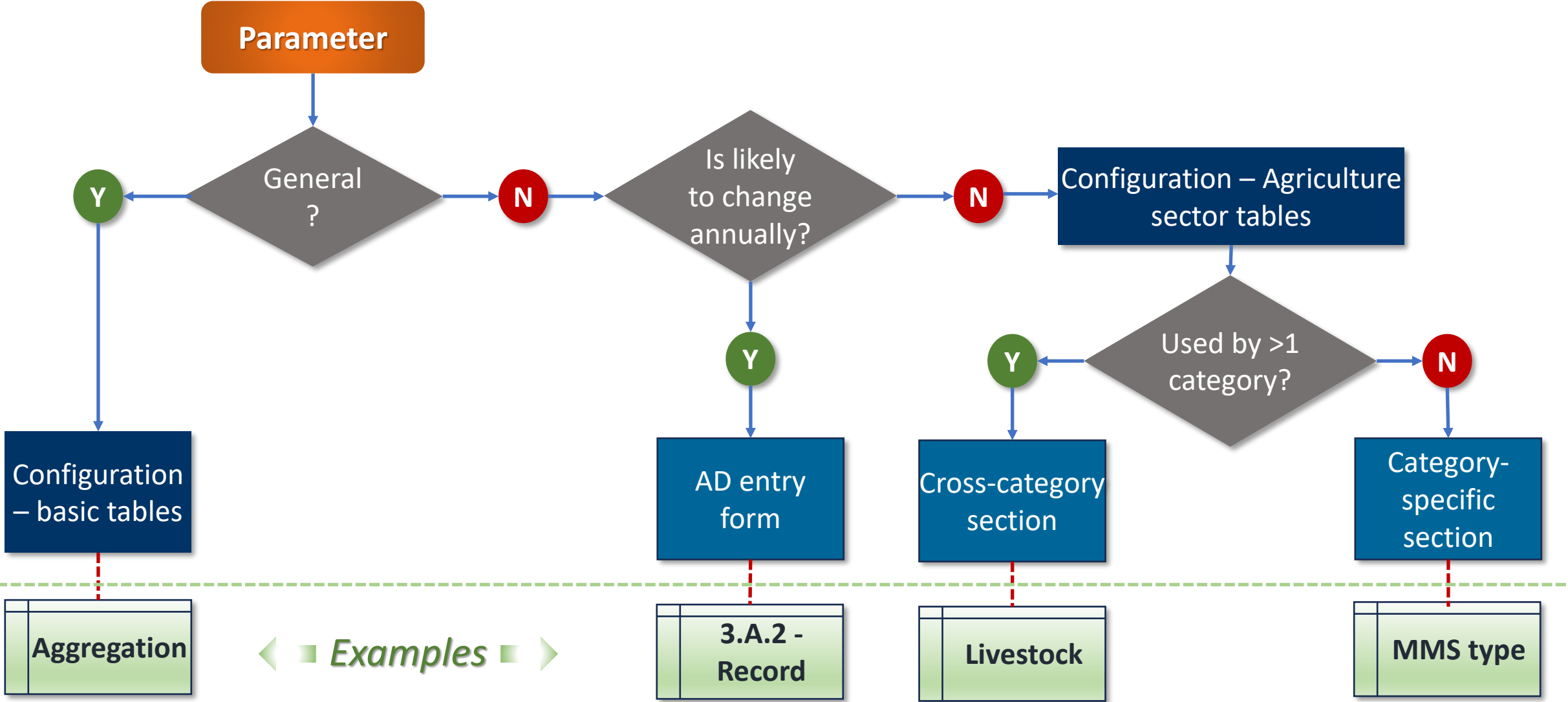
- The configuration layer is split into basic, energy, IPPU, waste, and agriculture.
- Generic tables are available in both sectors' forms
- New Agriculture tables are prototyped and implemented
- Because there were significant inconsistencies for IPCC-UNFCCC categories, new attributes were designed and implemented to harmonize and maintain 1:1 mapping between the two category lists.



# Distribution of parameters between the AD entry layer and the configuration – key challenges

- Multitude of parameters included in the 2006 IPCC GLs and the IPCC software
- The value of the parameters have different update frequencies
- Many parameters are predefined by the combination of other parameters' values
- The same parameters can be used in several different categories, so cross-category consistency becomes a real challenge
- In the IPCC tool, the cross-category consistency is partially resolved by “freezing” some portions of tabs, but it is not immediately transparent in which category/manager those frozen parameters are entered the first time
- In the 2006 IPCC GLs, default parameters for the same category sometimes are scattered between different chapters and sections of volume 4

# Distribution of parameters between the AD entry layer and the configuration in SAGE – frequency of update



# Getting to the configuration - basic tables

The screenshot shows the Sage GHG Emissions data interface. The top navigation bar includes the Sage logo, the sector 'Agriculture', and several menu items: 'Switch to', 'Configuration', 'AD Collections', 'Analytic', and 'Data Gaps'. A red arrow points to the 'Configuration' menu item. Below the navigation bar, a dropdown menu is open, showing 'Configuration - Basic' (highlighted in green) and 'Configuration - Agriculture sector'. A second red arrow points to the 'Configuration - Basic' option. On the left sidebar, the 'Configuration' section is expanded, and the 'Aggregations' option is highlighted with a red box and a red arrow. Below the sidebar, the 'Changes' section is visible, showing a table with columns 'id', 'date', 'action', 'user name', and 'details'. The table is currently empty, displaying 'no records found'.

**Configuration**

- + Dashboard
- + General
- + **Aggregations**
- + Countries
- + Country details
- + Institutions
- + Units

**Configuration - Basic**

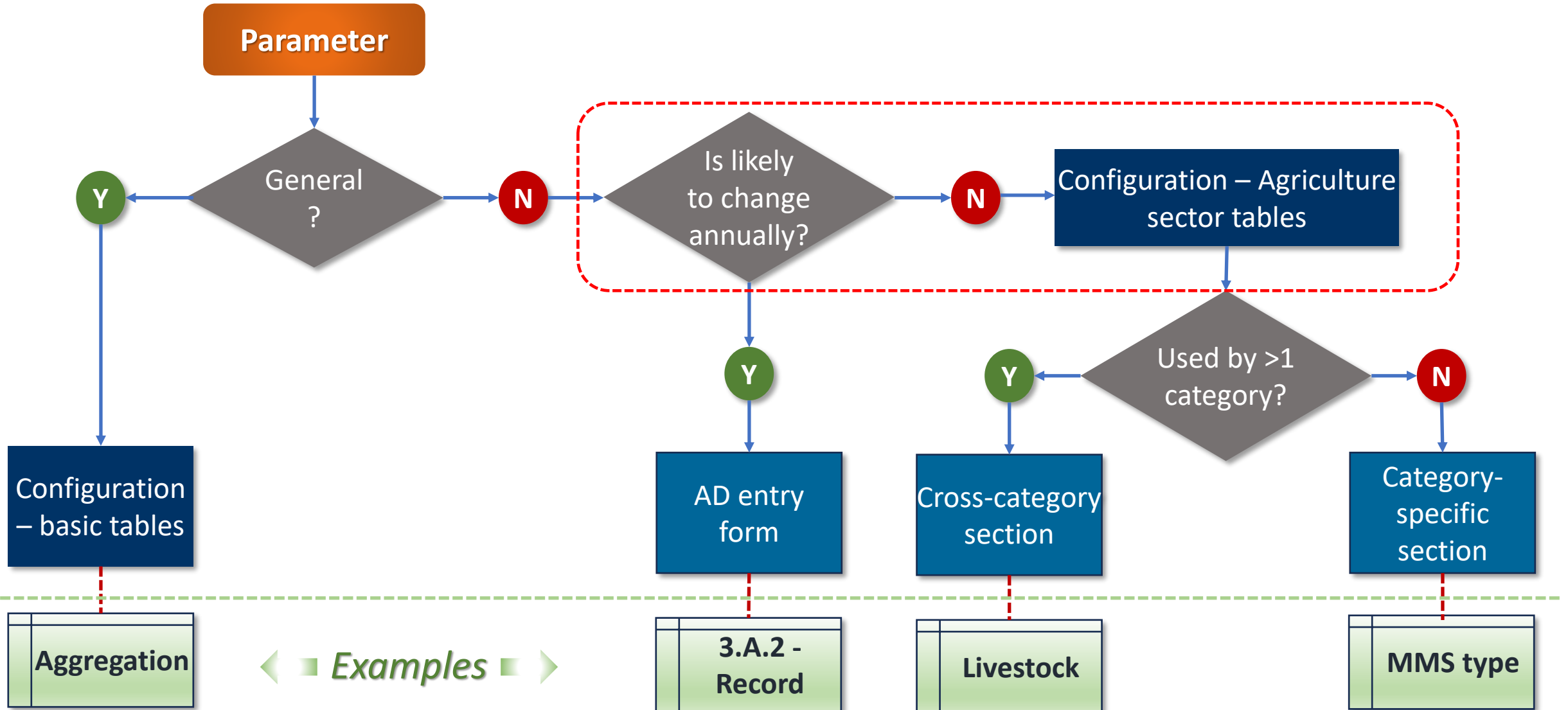
**Configuration - Agriculture sector**

Changes

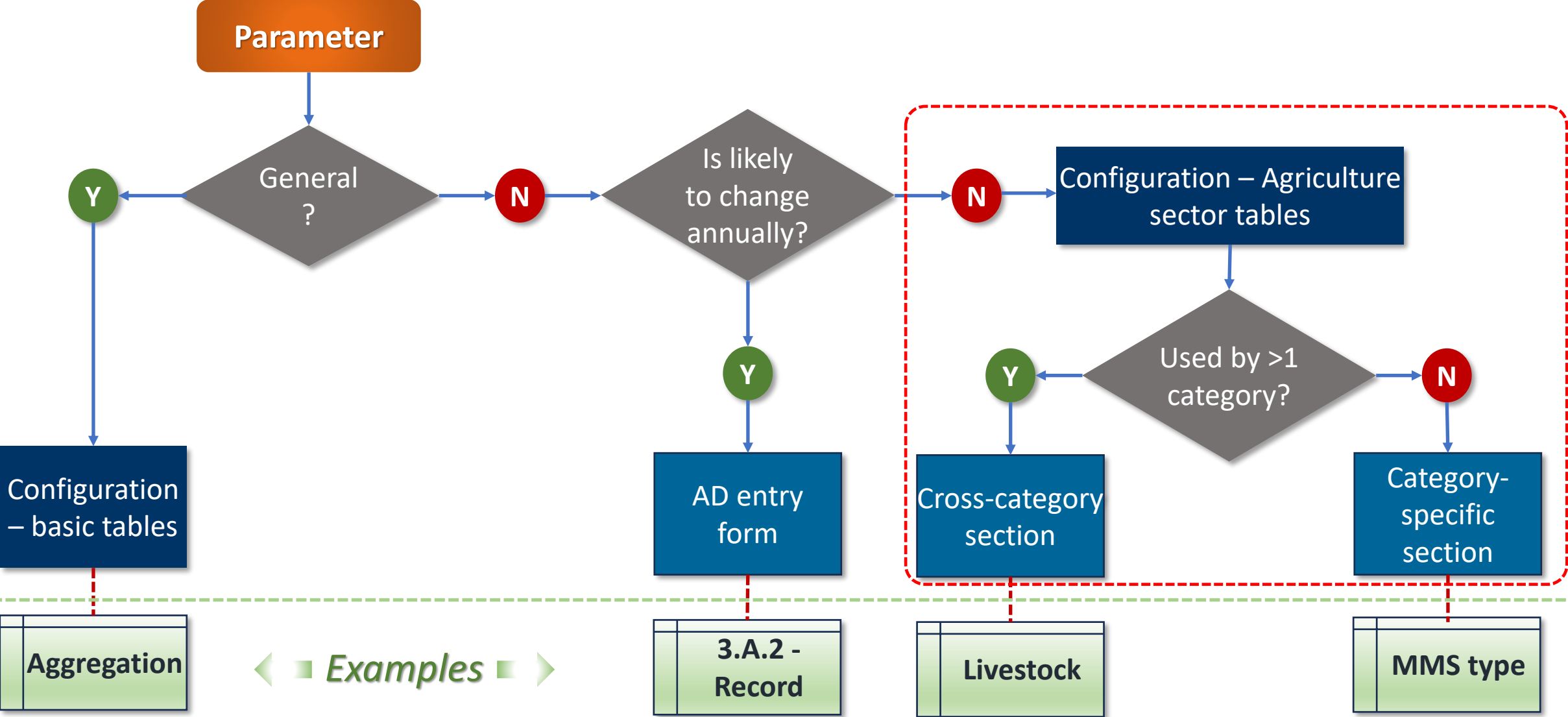
show 20 records, starting from # 1 (total 0) Search Clear ><

id	date	action	user name	details
no records found				

# Challenge: different frequencies of update

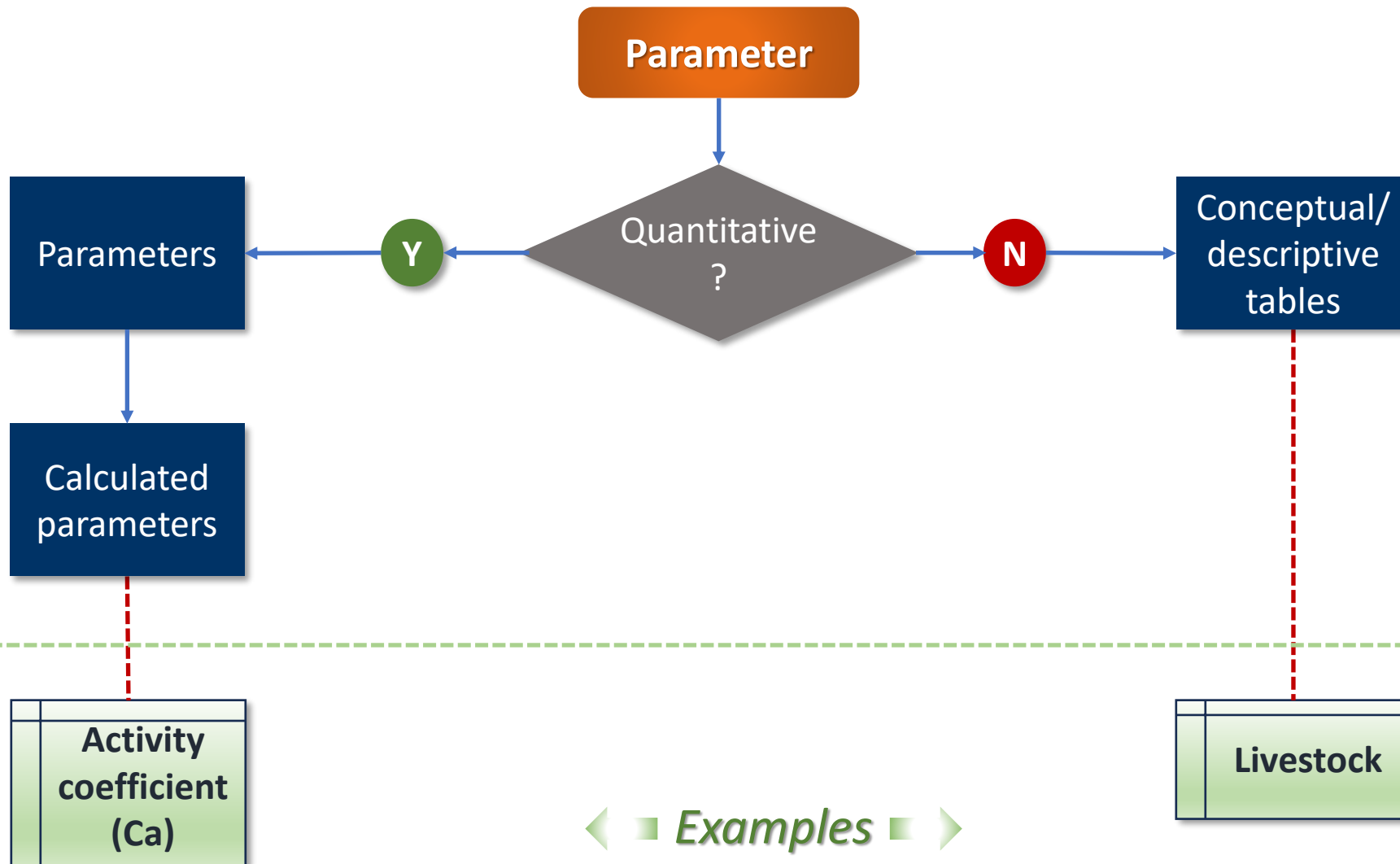


# Challenge: a parameter can be used by one or more categories





# Separating entries for quantitative and qualitative parameters





# Example of Parameter types list in SAGE (3.A category)

The screenshot shows the SAGE web application interface. The top navigation bar includes the 'sage' logo, 'Sectoral Activity data for GHG Emissions', and a 'Configuration' dropdown menu. The left sidebar contains a tree view with categories like 'Dashboard', 'Categories', 'Livestock', 'Land use', 'Region', 'Climate zones', '3.A parameters', 'Feeding class', 'MMS types', 'MCF for MMS', 'Parameter types', and 'Calculation parameters'. The main content area displays the 'Parameter types - List' page, which includes a table of parameter types and a search bar. The table has columns for 'id', 'code', 'name 1', 'variable name', and 'units'. The search bar shows 'show 30 records, starting from # 1 (total 37)'. The 'Configuration - Agriculture sector' option is highlighted in the dropdown menu.

Configuration

Dashboard

Categories

Livestock

Land use

Region

Climate zones

- 3.A parameters

+ Feeding class

+ MMS types

+ MCF for MMS

+ Parameter types

+ Calculation parameters

Agriculture

Switch to

Configuration

AD Collections

Analytic

Data Gaps

Olia

Parameter types - List

Configuration - Basic


Configuration - Agriculture sector


List Export Info

> >> show 30 records, starting from # 1 (total 37) Search Clear <<

Disable selected Enable selected

<input type="checkbox"/>	id	code	name 1	variable name	units
<input type="checkbox"/>	5	activ-coef	Activity coefficient (MJ/day/kg)	Ca	number
<input type="checkbox"/>	103	n-excretion-year	Annual N excretion rate	Nex	kg
<input type="checkbox"/>	22	wool-prod	Average annual wool production per head		kg
<input type="checkbox"/>	12	birth-females	Birth females %		%
<input type="checkbox"/>	107	n-consumed-animal	Daily N consumed per animal	Nintake_spec	kg
<input type="checkbox"/>	102	n-excretion-day	Daily N excretion rate per animal weight (as kg N/1000kg animal	Nrate	kg
<input type="checkbox"/>	104	n-retained	Daily N retained per animal	Nretention	kg
<input type="checkbox"/>	3	digest-energy	Digestible energy	DE	%
<input type="checkbox"/>	25	dry-matter-int	Dry matter intake	DMI	kg
<input type="checkbox"/>	28	dry-matter-int-tam	Dry matter intake percent of TAM	DMI_TAM	%

 Configuration

- +  **Dashboard**
- + Categories
- + Livestock
- + Land use
- + Region
- + Climate zones
- **3.A parameters**
  - + Feeding class
  - + MMS types
  - + MCF for MMS
  - + Parameter types
  - + **Calculation parameters**
    - + 3.C.1 parameters
    - + 3.C.2 parameters
    - + 3.C.4 parameters
    - + 3.C.5 parameters
    - + 3.C.6 parameters
    - + 3.C.12 Aquaculture

**Calculation parameters - Add**

List Add Export Import Changes Info Record #133 Record #21

Year (leave empty for any):

Any

Aggregation:

Any

Climate zone:

Any

Feeding class and diet:

Any

Feeding situation:

Any

Show parameter types only for:

IPCC animal type: Select

Tier: Select

Name: Type part of the type or variable name

Livestock type:

Select

Parameter:

Select

Parameter value : (empty)

Parameter value uncertainty : (empty)

Add Cancel

# Example of required configuration parameters for 3.A (tier 1)

For Tier 1			
Configuration table type	Parameter needed	Livestock Category	
		3.A.1 (Enteric fermentation)	3.A.2 (Manure Management)
Configuration - basic	Aggregation	needed	needed
Agriculture sector – cross-sectoral	Climate zone	needed	needed
	Livestock (type, optional – subdivision)	needed	needed
Agriculture category-specific	Typical animal mass (TAM)	needed	needed
	Number of days alive (DA)	needed	needed
	Manure Management system (MMS)	NOT needed	needed
	Daily N excretion rate per animal weight	NOT needed	needed

# Recommended order of entries

Technical experts or a System Admin/ National Compiler

Sectoral data entry expert

**Step 1**

**Step 2**

**Step 3**

**Step 4**

Configuration – Basic tables

Aggregations

Institutions

General Agriculture configuration tables

Regions

Climate zones

Livestock

Land use

Category-specific configuration tables

3.A

3.C.1

3.C.2

3.C.3

3.C.4

3.C.5

3.C.6

3.C.7

3.C.12

Data entry forms (if using manual entries)

3.A

3.C.1

3.C.2

3.C.3

3.C.4

3.C.5

3.C.6

3.C.7

3.C.12

Basic configuration data

Configuration – Agriculture sector

AD Collections → Annual AD

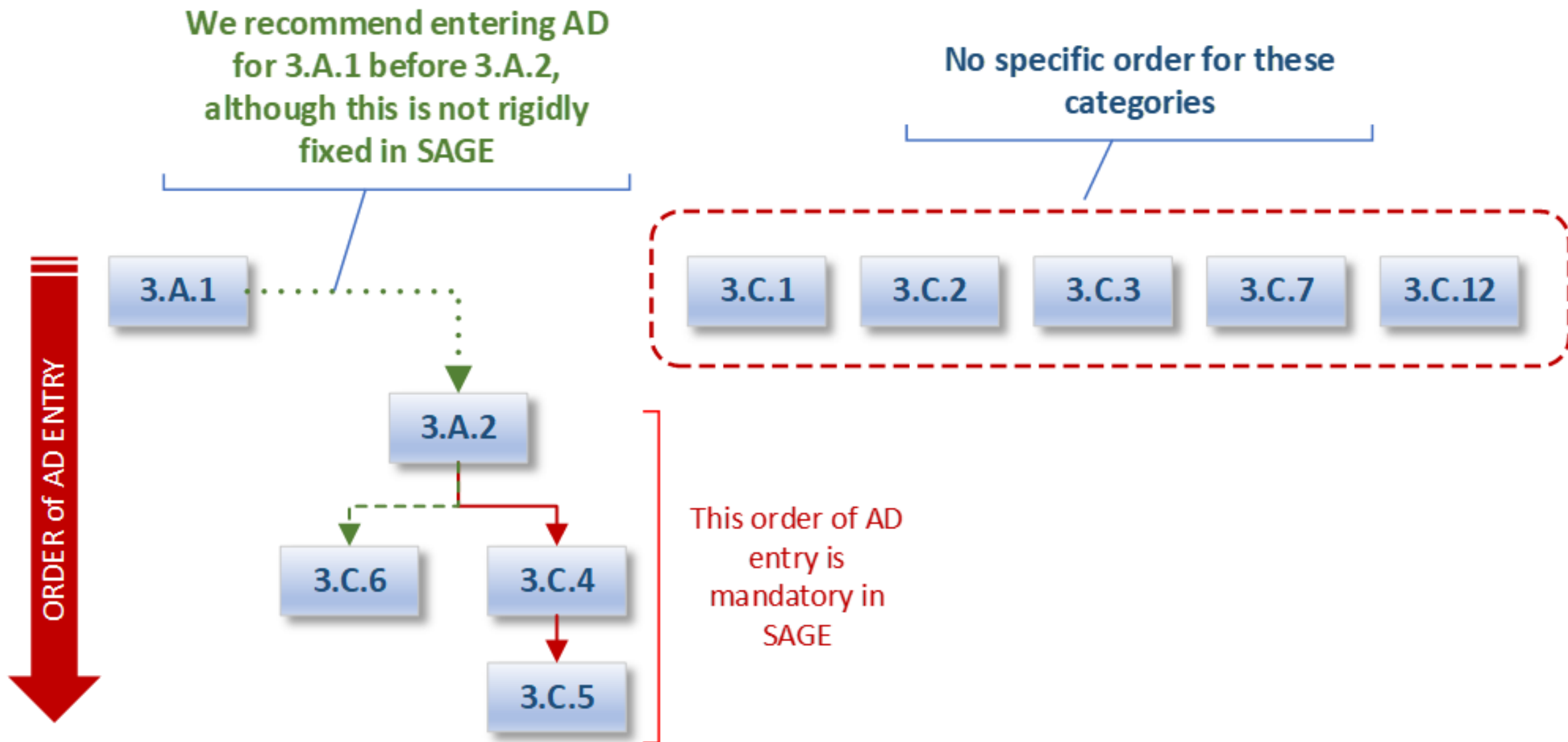
# Changes by component – AD Collections

# Changes by component – AD Collections

- All agriculture sector categories were included in the waste sectoral module
- In this sector, the amount of sector-specific configuration data used in AD calculations is significantly greater than in other, previously implemented sectors.
- To maintain consistency between categories:
  - some parameters in AD forms can be entered using the button “Set from <...> category”
  - Where applicable, adding new records is possible only by editing the pre-set records from the previously entered category data (e.g., entering 3.C.4> Managed manure available for applications to soils, fuel, or construction uses can be entered only for the relevant records in 3.A.2 category)
- For most forms included specific calculators are developed to calculate the final value of the AD from the parameters in the form and the selected values of the relevant configuration parameters (“Calculated” and “Parameters” sections in the AD form)
- A new function “Validate” introduced to check the consistency of entries between dependent categories



# Recommended order of category entries in SAGE



# New function in AD collection: **Validate**

The screenshot displays the Sage GHG Emissions tool interface. The top navigation bar includes the Sage logo, 'Sectoral Activity data for GHG Emissions', and the 'Agriculture' category. The main navigation menu on the left lists 'AD Collections', 'Dashboard', 'Explore', 'Compare', 'Validate', 'Annual AD (4)', 'Manage all', 'Draft (4)', 'Review (0)', and 'Approve (0)'. The 'Validate' option is highlighted with a red box and a red arrow. The main content area shows the 'AD Collections' page for '3.A Livestock', with a sub-tab 'Validate - 3.A Livestock' also highlighted. Below the tabs, there are search and pagination controls. The main data table has columns for 'Time-series ADC', 'year', 'aggregation', 'livestock type', 'climate', 'feed class', 'feed situation', '3.A.1 average population', '3.A.2 average population', 'valid', and 'state'. The 'valid' column contains red 'X' marks for most rows, indicating they are not yet validated, and a green checkmark for one row. The 'state' column shows 'draft' for all rows.

Time-series ADC ↑	year	aggregation	livestock type	climate	feed class	feed situation	3.A.1 average population	3.A.2 average population	valid	state
AG_TEST_202...	2022	National	Camels	Tropical Dry	Pasture	Grazing large...	100000		✗	draft
AG_TEST_202...	2020	National	Sheep > Mat...	Boreal Dry			1111		✗	draft
AG_TEST_202...	2020	National	Horses	Boreal Dry			10000	10000	✓	draft
AG_TEST_202...	2020	Middle region	Dairy Cow > ...	Boreal Moist	Ruminants o...	Stall	1000000		✗	draft
AG_TEST_202...	2022	Top region	Poultry > Tur...	Boreal Moist	Free-range			232	✗	draft
AG_TEST_202...	2020	National	Sheep > Gro...	Warm Tempe...	Free-range	Housed ewes		2466	✗	draft



AD Collections

3.C.6 - Add

List Add Export Import Changes Info Record #12

Form entry details updated

Annual AD Collection Form:

ID: Annual AD collection: AG\_TEST\_2020-2023\_2020

Category: 3.C.6 > Livestock > Manure Management > N2O and NMVOC Emissions > Indirect N2O Emissions

Aggregation: Bottom region

Statistics quality: Unknown

Tier: T1

Data collection period (months): 12

Emission type: Volatilisation

Climate zone: Cool Temperate Moist

Livestock type: Dairy Cow > Mature > High-producing

Manure management system type: Daily spread

Total N excretion (NEmms) per year: 514,650.00 kg : calculated > NA

Uncertainty details: Set from default

Total N excretion uncertainty: 20.00 % : application default > NA

Calculated

Calculated amount of N contributing to N2O emissions: 360,255.0

Parameters

Configuration default

name	code	var.name	value	units	uncert.%	description
N fraction	n-fraction	Fract	0.70	fraction	0.0	Fraction of N in manure contributing to N2O emission (Frac(GasMS) or Frac(LeachMS))

State: draft

Add Update Cancel

Common data for all categories

Category-specific settings

Data entry fields that appear after Livestock type is selected

Calculated by SAGE

Parameters used for the calculations

Save the record and add it to the collection (for new records this will be the "ADD" button; for edited records – the "Save" button)

**Using SAGE form, recommended for a single year or for small corrections:**

Create the AD collection

Go to relevant category group

Use ADD option

Fill in the form

Add

**Using Excel template, recommended for a time-series:**

Create the AD collection

Go to relevant category group

Download the template

Fill in the template for the time series

Upload the file to SAGE

**Using the previous time-series AD Collection, recommended for editing time-series:**

Create the AD collection

Go to existing AD collection that you want to use as a base

Export selected AD Collection

Modify exported data as required

Upload the file to SAGE

**New element: entering the entire published AD collection, then correcting the necessary points**

# Changes by component – Analytic & Gaps

# Changes by component – Analytic

- The application-based filters have been designed and added to the category selection process to enable more precise analyses of activity data within each category of the Agriculture sector
- The existing functions were modified to customize search parameters for the Agriculture sector categories and specific types (e.g., livestock types)
- The analytical procedures in the agriculture sector module are operated at the category/subcategory level in addition to specific waste sector parameters like livestock type, climate zone, land use, etc. to reflect the variety of scenarios for the agriculture sector

The screenshot displays the 'Agriculture' sector analytic interface. At the top, there is a navigation bar with 'Agriculture' highlighted, and several utility icons including a home button, 'Switch to', 'Configuration', 'AD Collections', and 'Analytic'. Below this, the page title is 'Historical trend - 3.A.1'. A breadcrumb trail shows '3.A > 3.C > Info', with a dropdown menu open under '3.A.1' showing '3.A.1' (selected) and '3.A.2'. Below the breadcrumb, there is a filter for 'Livestock type: (1, sum selected)'. A large dropdown menu titled 'Use livestock types (all by default):' is open, listing various livestock categories and subtypes. The categories include Buffalo, Camels, Dairy Cow, Goats, Horses, Mules and Asses, and Other Cattle. Each category has a list of subtypes, such as 'Buffalo > Growing' with further subtypes like 'Calves', 'Fattening', 'Feedlot-fed', and 'Replacement'.

# Data Gaps

- The key features of the data gaps analysis have been retained in the agriculture sector module.
- The application-based filters have been designed and added to the category selection process to enable more precise analyses of activity data within each category.
- In addition, specific agriculture sector parameters like livestock, climate, zone land use, etc. were introduced to the data gaps interface to reflect the variety of scenarios for the agriculture sector.

Find - 3.C.2

3.A ▾ 3.C ▾ Info Modeling log

Data categories: (all) ▾

Lime type: (all) ▾

Land use type: (all) ▾

Region: (all) ▾

Site: (all) ▾

*Time-series AD collection:*

Select ▾

*Year(s):*

2010-2020

# And now – let's go to the live tool

## Welcome to **SAGE** Tool site

*Sectoral Activity data for Greenhouse gas Emissions calculations (SAGE) is a data collection tool for GHG inventories*

### Purpose

SAGE is a greenhouse gas inventory data collection tool to support national climate measurement, reporting, and verification (MRV) systems, especially in developing countries, through robust data collection, intelligent processing, and storage.

SAGE is fully compatible with the 2006 IPCC guidelines for national greenhouse gas inventories and was developed to support governments in collecting activity data to ultimately meet the reporting requirements under the Enhanced Transparency Framework of the Paris Agreement.

### Features

SAGE provides an intuitive and user-friendly interface for collecting and documenting data to achieve transparent, accurate, consistent, comparable, and complete GHG inventories.

Key features include:

- Conveniently record data in the database with basic data validation
- Collate activity data, keep track of data origins and uncertainties
- Flexible selection options for entering fuels, technologies, etc. - they can be tailored to reflect national circumstances
- Support decision making on selecting optimal strategies for dealing with data gaps
- Enable data comparisons and time series analysis
- Enable data review and

### Sign up

Become part of the UNFCCC program of tracking and estimation GHG emissions!

[Contact us](#) to open SAGE account

[Video tour of SAGE](#)

**SAGE helps to save our planet!**



<https://unfccc.int/process-and-meetings/transparency-and-reporting/support-for-developing-countries/ghg-support#eq-4>