Data collection tool: Sectoral Activity data for GHG Emissions (S.A.G.E.)

User Manual

Version 3.3

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Contents

1. Background and Purpose

What SAGE does

Sectoral **A**ctivity data for **G**reenhouse gas **E**missions (**SAGE**) is a greenhouse gas (GHG) 'activity data (AD) collection' 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 UNFCCC reporting guidelines for non-Annex I parties, and with the 2006 IPCC guidelines for national greenhouse gas (GHG) AD collections. SAGE was developed to support governments collecting activity data to ultimately meet the reporting requirements under the Enhanced Transparency Framework of the Paris Agreement.

SAGE provides an intuitive and user-friendly interface for collecting data, and critical documentation to achieve transparent, accurate, consistent, comparable, and complete (TACCC) GHG AD collections. The outputs from the tool can also be used as the basis for calculating projections, and mitigation impact quantification. In the simplest terms, SAGE is a dedicated data management system with the GHG AD collection database and enabled business intelligence. It allows for inputting data collected from multiple sources, and processes it for export to GHG AD collection estimation spreadsheets or software that quantifies GHG emissions and removals. At the outset, it functions as a reliable repository for documenting, storing, processing, conducting quality control, querying GHGI activity data, and performing analytics on the available data sets.

SAGE can be run on a stand-alone computer or through the cloud using version synchronization, so that it can support multiple data collectors anytime, anywhere. Its administrative interface provides security and flexibility of views for different groups of users. Its database is robust and designed for speed and scalability.

Sectors Covered

The current version of SAGE covers the following sectors:

Energy
Industrial processes and product use (IPPU) (with extended functionality)
Waste

Key features

The key features of this version include:

- Record and store activity data (as described in the 2006 IPCC Guidelines) and parameters intrinsic to the fuel properties (e.g., fuel density or net calorific value) as a time series or on an ad-hoc basis.
- Collate activity data, keep track of data origins and uncertainties
- Automatic Conversions to the units as required in the 2006 IPCC equations for stationary combustion categories
- Category classification mapping between the IPCC and UNFCCC categories to provide flexibility of category reporting for developing countries under the UNFCCC and the ETF under the Paris Agreement
- Modular sectoral dashboard structure that allows a seamless shift between sectoral sections of the application
- Business intelligence to resolve data gap issues
- Business logic to enable default uncertainty estimates in-line with the 2006 IPCC Guidelines
- Enable Excel input/output for all configuration tables, and produce CSV files compatible with emission calculating tools (e.g., IPCC emissions calculating software tool)
- Data analytics
- Data repository
- Administrative interface for user access control and user management
- User guidance manual

Intended Users

SAGE has been designed to support developing countries working on data collection and climate change policy within national climate change teams, government statistical offices, industry associations, corporations and local government agencies. Through the use of this tool, users will increase efficacy, efficiency, and sustainability of their activity data collection and employ nationally-approved activity data for robust policy analyses.

2. Getting started

This section will guide you through the initial steps to run the SAGE software.

Accessing SAGE

Due to data security requirements, SAGE will be installed on the server according to the guidance of your country's National Inventory Compiler or the Inventory Focal Point. Please ask your country's Inventory agency for the specific link to the software. They will set up your user account and send you the details.

Welcome to SAGE

Once you have received authentication details and the access link, you can start working with SAGE. First, access SAGE's welcome page (figure 1) and, if it is your first time with SAGE, take a couple of minutes to view a video tour of the application to familiarize yourself with its key features.

Getting to know SAGE

Users without administration rights can safely explore the tool but don't click any of the following icons:

 pencil (modify)

 cross (delete)

Add

Save

Delete

If you think you're about to accidentally change data then click "Cancel" or "Clear".

SAGE Categories

SAGE (March 2023) currently covers:

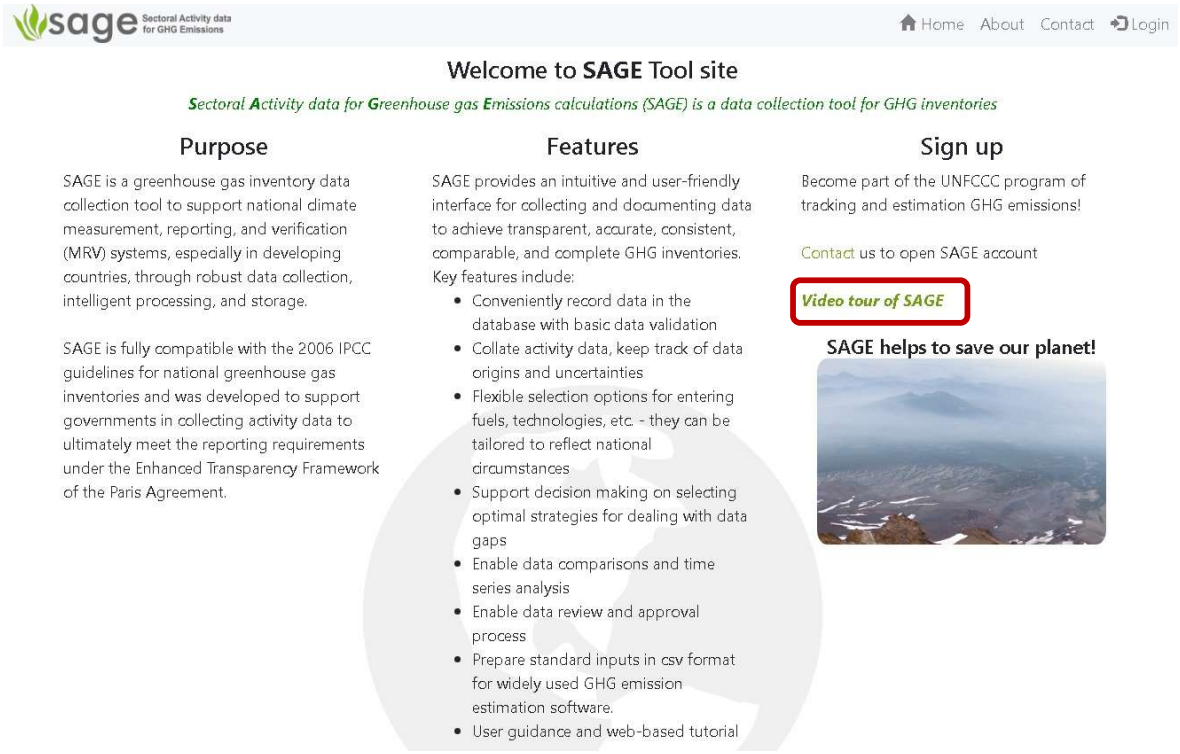
Energy: Fuel Combustion (including stationary combustion and transport), and Fugitive Emissions

IPPU: mineral industry, chemical industry, metal production, non-energy use of fuels, electric and electronic industries, ozone depleting compounds, and other industries.

Waste: solid waste disposal, biological treatment of solid waste, waste Incineration, wastewater treatment and discharge, other

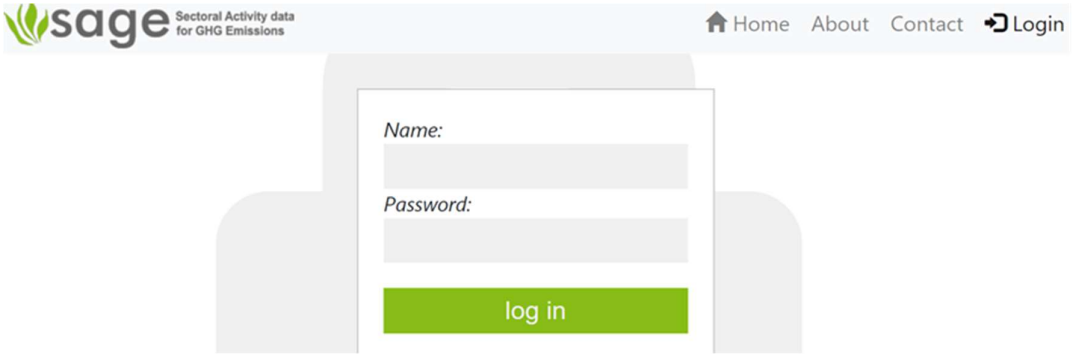
Section 5 mentions categories and Appendix D lists them all. More categories may be developed and added in future (for example, user-defined categories).

Figure 1. SAGE's welcome page *http://sage.is2000.co.nz/app/welcome*



Now you are ready to use your user code and login to enter the tool.
Click the Login button (***Figure 1***).
SAGE's authentication screen will open (***Figure 2***). Enter your credentials.

Figure 2. SAGE's authentication screen



If you leave SAGE inactive for too long then you will automatically be logged out for security.

3. SAGE Summary (Cheat) Sheets

You should read the whole manual before using the tool. You've got to page 9 so you're doing better than most people. These three summary sheets give an initial overview of SAGE, are a quick reference summary which may help as a refresher if you haven't used SAGE for a while, and may also be a useful starter (if you're not going to read the rest of the manual until you get stuck). Appendix A: Acronyms on page 159 lists the acronyms used in this document.

3.1 Activity Data (AD) Collections (see section 5 page 15 for details)

'AD collection' includes an annual activity data for the GHG Inventory that can be used for GHG emission calculations, policy analysis, NDC tracking, or building projections. Each AD collection includes the activity data for all categories included in the energy, IPPU, or waste sector with supporting information for the inventory year. To enable time-series analyses and reporting, all AD collections for the same time-series should have the same name and extension showing the AD collection year, for example, AD_name-2000, AD_name-2001, and so on.

The 'AD Collections' page lets you create, view, and manage GHG AD collections, insert, edit and delete AD data, review and approve the AD by making them available for data analysis. The AD collection management process includes data entry, drafting, review, approval and publishing.

At each stage, you can list, add, view history, export, import, review change log and get info.

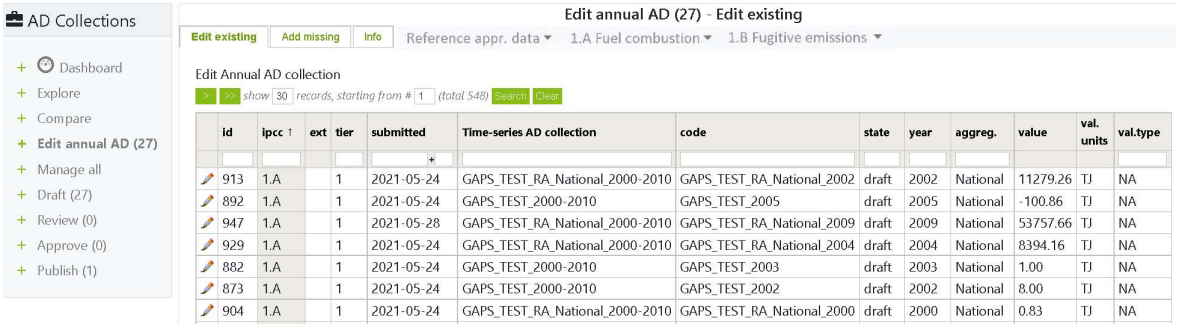
To 'manage' an AD collection, click 'Manage all' on the left and select the AD collection to work with.

AD Collection **state**:	**Draft**	AD collection is created and available for data entries
	Review	data entry is complete and AD collection is sent for technical review
	Approve	technical review is complete and the AD collection is sent for final sign-off
	Published	AD collection is successfully signed-off by an authorized person. At this stage, the AD collection is locked. AD collection is now available for data analyses and publication.
AD Collection **status**:	**enabled**	open for data entry and editing
	disabled	contents can be viewed, but not edited
	deleted	AD collection is archived and no longer can be viewed or edited.

Key points:

- An AD collection can consist of one or more annual entries arranged by IPCC categories.
- The name of an Annual AD Collection starts with the name of the relevant time-series collection followed by the year the annual collection, e.g., "ADC_2000-2010_2000" means that the collection named "ADC" belongs to the series "ADC_2000-2010" and covers the year 2000.
- Every time you open the AD collection for change or update, you must include the reason for change (for example, error fix) and a detailed message on the change (for example, who made the change and when with a specific note on the change).
- SAGE guides you through the data to input, including management of mandatory fields.
- SAGE has many features for converting between different units (energy, mass, distance, etc.).

Figure 3. Editing AD Collections



See ***Figure 7*** on page 15 to see the summarized process for managing AD collections in SAGE.

3.2 Data Gaps (see section 10 page 118 for details)

'Data Gaps' reveals data gaps in the existing AD collections,
guides users through options to fill data gaps appropriately (per UNFCCC requirements)
performs time series analysis

The Data Gaps **Dashboard** (***Figure 118***) overview indicates when each method should be used.

Click 'Switch to' at the top, then 'Data Gaps' to get to this component.

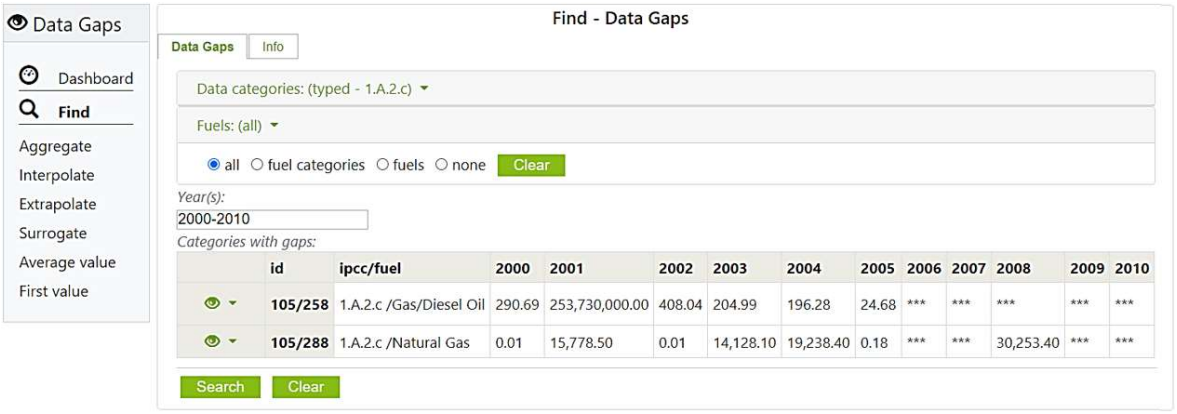
To find the gaps in the time series,
Click 'Find' (on the left)
Choose *data categories*, then use the available category-specific filters if available (e.g., fuel, product, process, etc.) to narrow down your search, or use "all" option.
Select AD collection
Select year(s) (if entering more than one year then use a comma or hyphen between years)

To fill data gaps, use SAGE to try any of the following methods:

Interpolate	to fill in internal data gaps for up to 3 points using linear regression,
Extrapolate	to estimate missing data points in the beginning and in the end of the time series using linear regression,
Surrogate method	filling gaps using statistical methods,
Average value	fill gaps using simple averages,
First value	fill gaps using the first value,

SAGE includes explanatory information for each method and provides guiding messaging and relevant dialog boxes to help navigate different gap filling techniques.

Figure 4. Finding Data Gaps



Click the eye button at the beginning of each time series with data gaps to select the preferred method to fill the gaps from the available list.

3.3 Analytic (see section 11 page 125 for details)

Users with 'Reader' access rights can use the 'Analytic' function on published data.

All other users can use the 'Analytic' function to analyze data and check data quality during the AD collection production (before it's published).

Click 'Switch to' at the top, then 'Analytic' to get to this component or use the global link "Analytic" on the top of the screen.

Analytic options are:

Total values: Select a category or categories and a year
Shows total energy consumed as a result of combusting selected fuels in selected years

Historical trends: Select a category or categories, fuel(s), and year(s)
Shows time series analysis for fuel consumption for the combination you selected

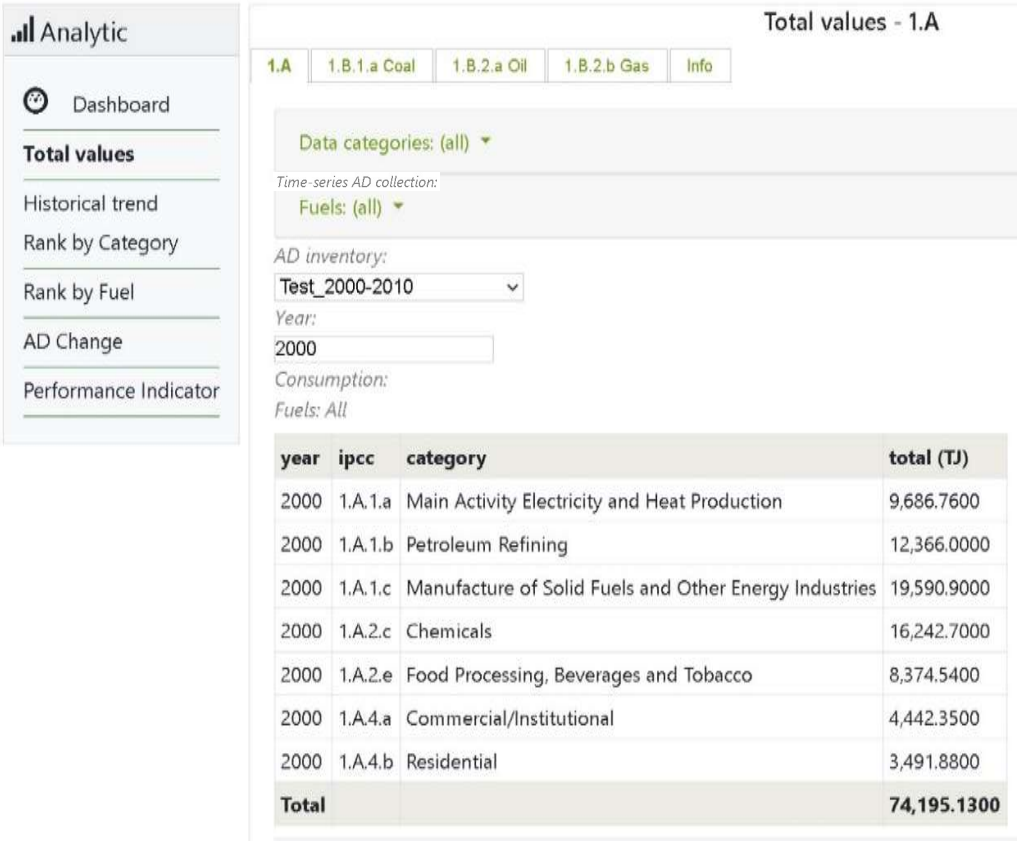
Rank by category: Select an Activity Data (AD) collection and a year
This shows the energy in TJ used ranked by IPCC category for your chosen parameters. Please note that this option is applicable to the Energy sector only.

Rank by fuel: Select an AD collection and a year
This shows the energy in TJ used ranked by fuel for your chosen parameters. Please note that this option is also applicable to the Energy sector only.

AD Change: Select an AD collection, select whether you want sub-categories summed, and a year or years
If entering years, separate each with a comma (',')
This shows year(s) as columns, IPCC categories as rows and the energy in TJ or an industry activity data (e.g., a mass of a product) as values
If you select more than one year then this allows you to compare differences (shown 'Δ')

Performance Indicator: Select data category or categories, a fuel or fuels (or other available category-specific parameters), an AD collection, whether you want sub-categories

summed, and a year or years (use a hyphen between a pair of years if you want to show a range), comparative data, comparative data name and comparative data units. This shows a time series table of consumption (summed if required), by category, fuel, AD collection, and by year(s).



year	ipcc	category	total (TJ)
2000	1.A.1.a	Main Activity Electricity and Heat Production	9,686.7600
2000	1.A.1.b	Petroleum Refining	12,366.0000
2000	1.A.1.c	Manufacture of Solid Fuels and Other Energy Industries	19,590.9000
2000	1.A.2.c	Chemicals	16,242.7000
2000	1.A.2.e	Food Processing, Beverages and Tobacco	8,374.5400
2000	1.A.4.a	Commercial/Institutional	4,442.3500
2000	1.A.4.b	Residential	3,491.8800
Total			**74,195.1300**

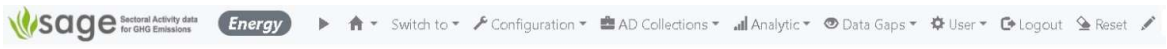
4. Navigating between SAGE components

Once you are logged in, SAGE's **Quick links** page will be displayed (***Figure 5***). This page displays the functional components of the tool (AD Collections, Analytic, and Data Gaps) and allows you to navigate between these components. This page is available to all users, but available links will depend on the specific group permissions set by your system administrator.

Across the top of the screen, there is a global navigation pane with menus
(Figure 3 shows them in the red box) – **Switch to**, **Analytic**, **Data Gaps**, **AD Collections**, and **Configuration**

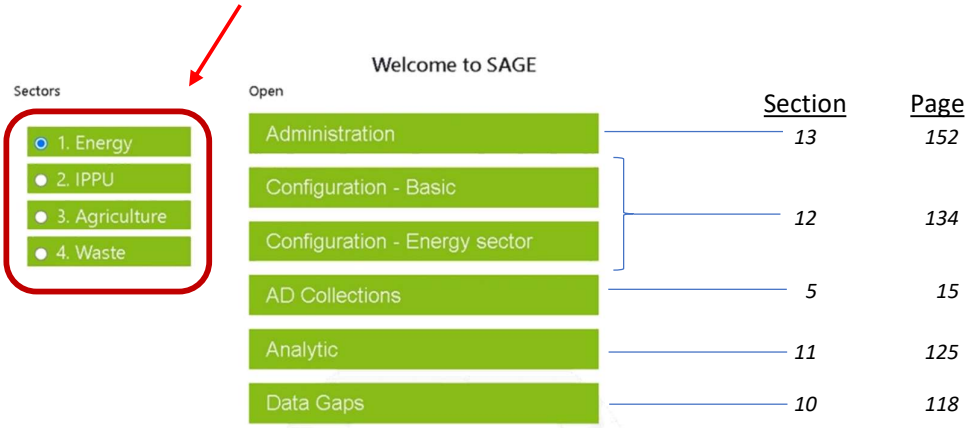
Figure 5. SAGE's quick links page

The top menu row is visible in all screens of SAGE (regardless of the component you are using).



To change the sector you are working on

1. click the ▶ button in the top menu and it will take you to the menu below.
2. click on the relevant sector.



Click any menu (along the top row) to see the list of modules available in that component of SAGE.
Click any component to go to that component.
The components shown will depend on which sector you currently have selected.
E.g., if you are in the Energy sector then Energy sector configuration and Energy sector AD collections will be available but other sector configuration and other sector AD collections will not be available.

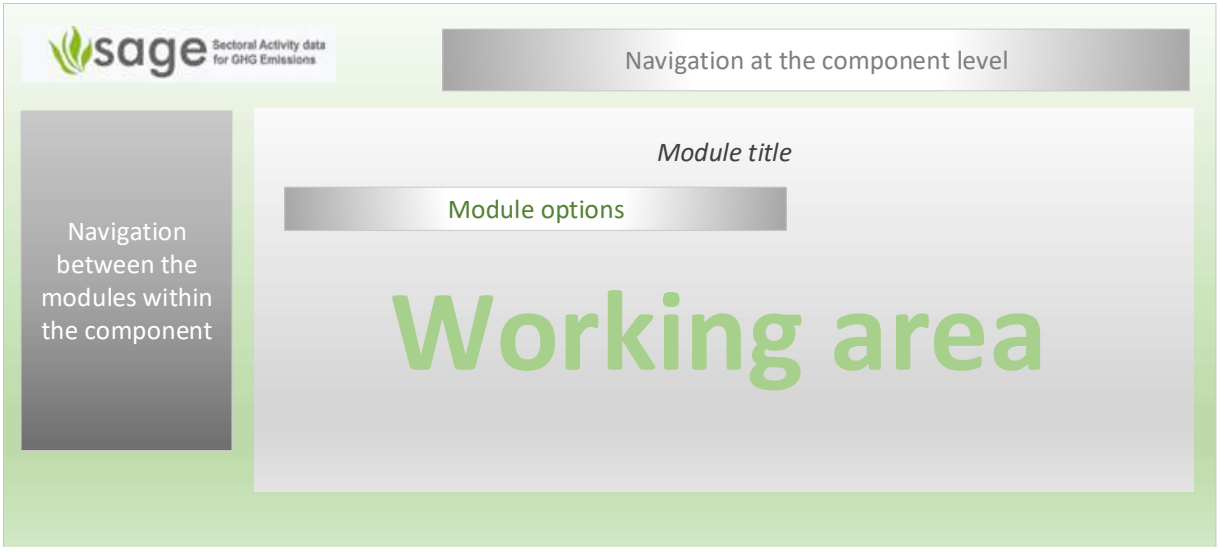
To open the list of links, click the menu:

Switch to	allows to quickly switch between key components of SAGE (AD Collections, Analytic, and Data Gaps). Depending on your requirements, there may also be Administration and/or Configuration components.
Analytic	opens the list of links to the available data analysis modules
Data Gaps	opens the menu of links for filling in data gaps in the fuel consumption time series
AD Collections	opens the list of links to Activity Data Collections management and drafting
Configuration	enables you to customize the default selection options for the currently selected sector (Energy or IPPU) to reflect your country's national circumstances

The big green buttons in the middle of the screen are also quick links to relevant SAGE modules, however, unlike the top screen navigation menus, they are available only in the **Quick links** page. When you click any quick link, SAGE will open the relevant component window. The windows for all functional components in SAGE are organized in the same way (***Figure 6***):

- the global navigation pane across the top for switching between different SAGE components is located across the top,
- the local navigation pane to switch between different modules within the component is located on the left side of the screen,
- the working area for the current module that includes the module control options (presented in a form of tabs), forms, tables and results specific for each module. These are different for different components and modules.

Figure 6. Functional interface organization



5. Activity Data (AD) Collections – Generic for all sectors

5.1 Overview

5.1.1 The overall 'AD Collections' process

Sets of data are put into 'AD Collections'.

There may be any number of 'AD Collections' for any particular time period – there may be zero, one or many AD Collections for a period.

Each AD Collection must first be created before data can be put into the AD Collection.

Once data is in an AD Collection, you can optionally try to fill data gaps.

Once satisfied with data state in an AD collection, the AD Collection can be processed through a signoff process; draft ready for review, reviewed and ready for approval, approve and ready for publishing.

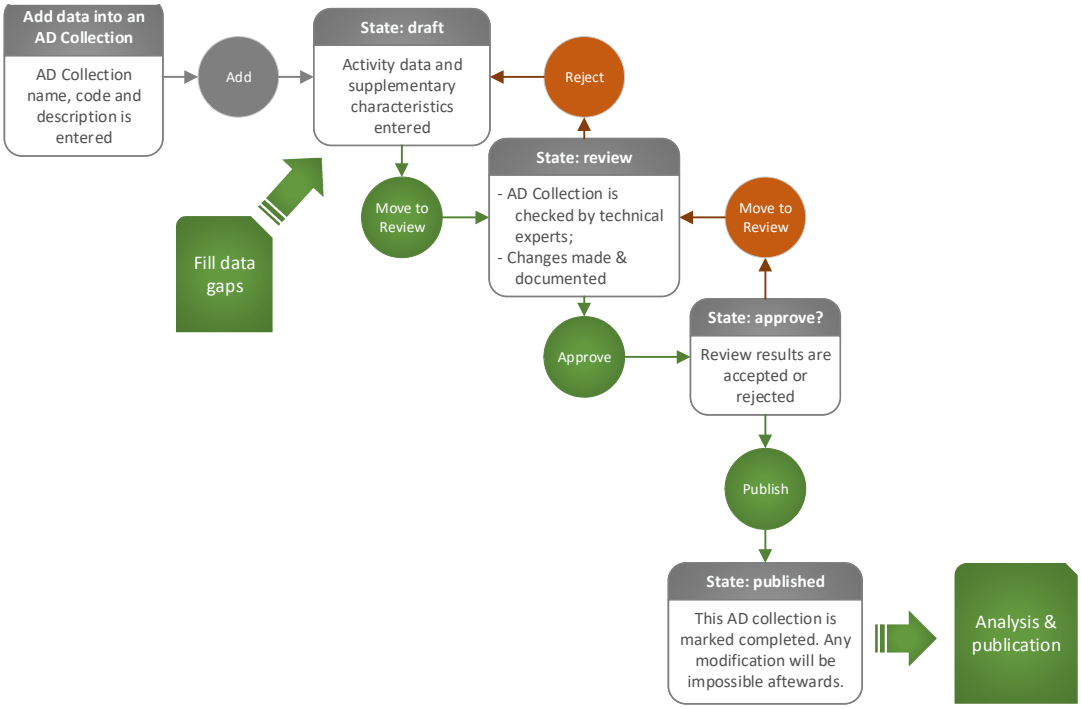
To put data into a draft 'AD collection',

data is entered,
data gaps are optionally filled,
the AD collection is reviewed, may be approved or rejected,
approved AD collection is either published or rejected,
'published' AD collection can be analyzed and put into publications

Filling data gaps can require quite different skills from the rest of the AD collection process so it has been logically separated in SAGE (and in this manual).

Figure 7 summarizes processing and management of AD collections in SAGE.

Figure 7. AD Collection pathway through the SAGE system



5.1.2 How to navigate the AD Collection

Click the **AD Collection** quick link (or use the top navigation menu panel) to open the AD Collection component.

SAGE uses the term annual activity data (AD) collection for the GHG AD collection emissions calculation. Each AD collection includes the activity data for all categories and fuels with supporting information for one AD collection year. To enable time-series analyses and reporting, all AD collections for the same time-series should have the same name and extension showing the AD collection year, for example, AD_name-2000, AD_name-2001, and so on.

The AD Collection page lets you create, view, and manage GHG AD collections, insert, edit and delete AD collection data, review and approve the AD Collection data by making them available for data analysis.

5.1.3 Dashboard

Dashboard shows Information, History and Changes:

Info:

Annual Activity Data (AD) Collections

SAGE uses the term annual AD collection to describe an annual activity data collection for the GHG inventory emissions calculation. Each annual AD collection includes the activity data for all categories and fuels with supporting information for one inventory year. To enable time-series analyses and reporting, all inventories for the same time-series should have the same name and extension showing the AD collection year, for example, **AD collection name-2000**, **AD collection name_name-2001**, and so on.

The AD collection page enables you to create, view, and manage GHG activity data collections, insert, edit and delete data, review and approve the AD collection data by making them available for data analysis. The following groups of options are available here:

- **Explore** - to view all available annual AD collections and records
- **Manage** - to create and manage annual AD collections
- **Edit annual AD** - to view, create and manage records within annual AD collections
- **Draft** - to view and export editable annual AD collections (drafts)
- **Review** - to signify that the data entry is complete and request a technical review of the collection's data
- **Approve** - to accept/reject the results of the collection's data review and request approval for annual AD collections data publication
- **Publish** - to approve annual AD collections data for viewing and analysis by all intended users

History:

Editions history

<< < > >> show 10 records, starting from # 1 (total 153) Search Clear

id	AD inventory	survey	code	year	date	num of records	state	status	edited by	edition reason	details
77	My AD 1990-2020	My AD	My AD_2018	2018	2021-05-14 22:26:33	0	draft	enabled	Admin (UNFCCC Data Collection Agency)	first draft	National AD 1990-2020, latest reporting year, created 14 May 2021
76	My AD 1990-2020	My AD	My AD_2019	2019	2021-05-14 22:26:22	0	draft	enabled	Admin (UNFCCC Data Collection Agency)	first draft	National AD 1990-2020, latest reporting year, created 14 May 2021

Changes:

Changes log

<< < > >> show 10 records, starting from # 1 (total 949) Search Clear

id ↓	date	action	user name	details
8860	2021-05-14 22:32:54	dctsur_op_ad_1a1_delete_record	Admin	rec_id=810
8859	2021-05-14 22:31:52	dctsur_op_ad_1a1_new_record	Admin	rec_id=100000000; name=100000000
8858	2021-05-14 22:26:33	dctsur_op_manage_new_record	Admin	rec_id=100000000; name=My Ad
8850	2021-05-14 17:57:10	dctsur_op_publish_export	Admin	sage_export_publ_ad.zip download processed

5.1.4 Explore

The 'Explore' menu on the left shows 4 options:

Time-series AD collection

This shows all AD collections for the entire time series, years they cover, status, etc. as below.

Explore Time-series AD collection

show 30 records, starting from # 1 (total 12) Search Clear

Time-series AD collection ↓	years range	state	Annual AD	records	categories
Uncertainty_2000-2005	2000-2005	draft	6	166	5
Test_2000-2010	2000-2010	draft	11	151	8
RA_National_2000-2010	2002-2010	draft	9	27	1

Annual AD Collection

This shows the activity data across all categories for one year, their codes, states, etc. as below.

Explore Annual AD collection

> >> show 30 records, starting from # 1 (total 77) Search Clear

Time-series AD collection ↓	code	year	state	approach	records	categories
AB_AD_2011-2020	2011-AB_AD_v1	2011	draft	sectoral	6	4
AB_AD_2011-2020	2012-AB_AD_v1	2012	draft	sectoral	6	4

Annual AD

This shows the activity data within each of the AD collections, including information as below.

Explore Annual AD collection data

> >> show 30 records, starting from # 1 (total 985) Search Clear

id ↓	submitted	Time-series AD collection	code	state	year	ipcc	tier	aggreg.	val.type	value	units
979	2021-08-26	My AD_1990-2020	My AD_2020	draft	2020	1.A.3.a.ii	3	Airport	NA	500037.93	TJ
977	2021-05-28	GAPS_TEST_RA_National_2000-2010	GAPS_TEST_RA_National_2010	draft	2010	1.A	1	National	NA	506.42	TJ

Info

The info tab shows information about how to use the 'Explore' functions.

5.1.5 Top-of-Page Tabs

Each module in the **AD Collections** component includes the following control tabs:

List displays a table with the list of records; each record has a "**pencil**" icon at the beginning (this is the edit option). The list of the individual records for each category also has a "**cross**" icon at the end (to delete a record),

Add allows new item creation (an AD collection, an AD collection record, or a record in a configuration table),

Export this is only available when either

1. a particular AD collection and a category are selected; in this case you can export the data in a .csv file
2. The Draft section allows to export the entire collection if the all of data entries in that collection are flagged as "ready" (in which case, a pencil icon appears at the beginning of the relevant collection record).
3. in the 'Publish' section; one can export the whole AD collection of SAGE as a .csv file or as a file ready for IPCC import

Import (in the current version of SAGE) importing is available by category when 'Edit annual AD' is selected

Changes contains a log of changes performed over the records within the module,

Info provides user guidance for each option in the module.

5.2 AD Collection Creation/Management Process

5.2.1 Background

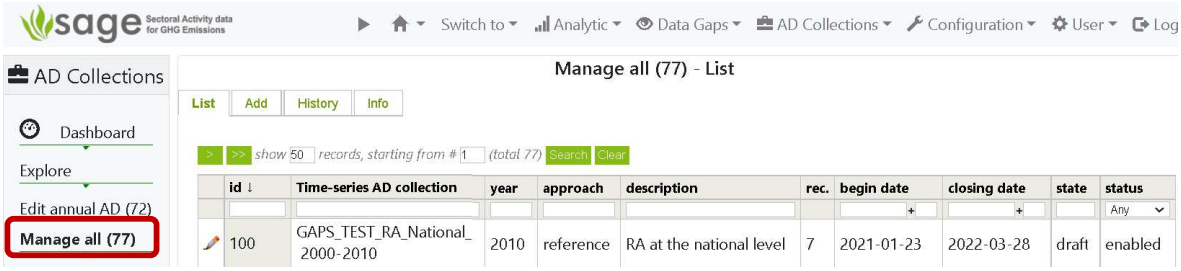
The 'Create AD Collection process is a subset of the 'AD Collections' process (see *5.1.1 The overall 'AD Collections' process* on page *15*).

Every time you open the AD collection for change or update, you must include the reason for change (for example, error fix) and a detailed message on the change (for example, who made the change and when with a specific note on the change).

5.2.2 View available AD Collections

To view all available AD collections, select the AD collection component, then click **Manage all** link in the local navigation pane. The list of all available AD collections will be displayed (***Figure 8***):

Figure 8. Manage AD collections option in the local navigation pane



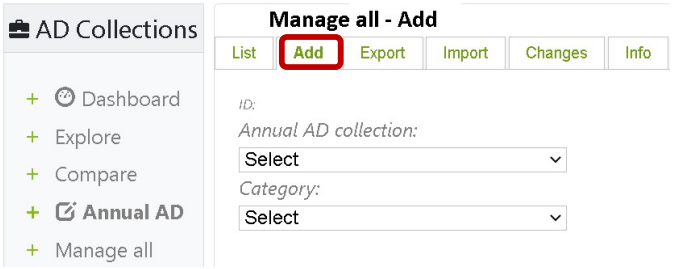
You can also check the **state** and **status** of each AD collection in this page.

5.2.3 Add new AD Collection

To add a new AD Collection:

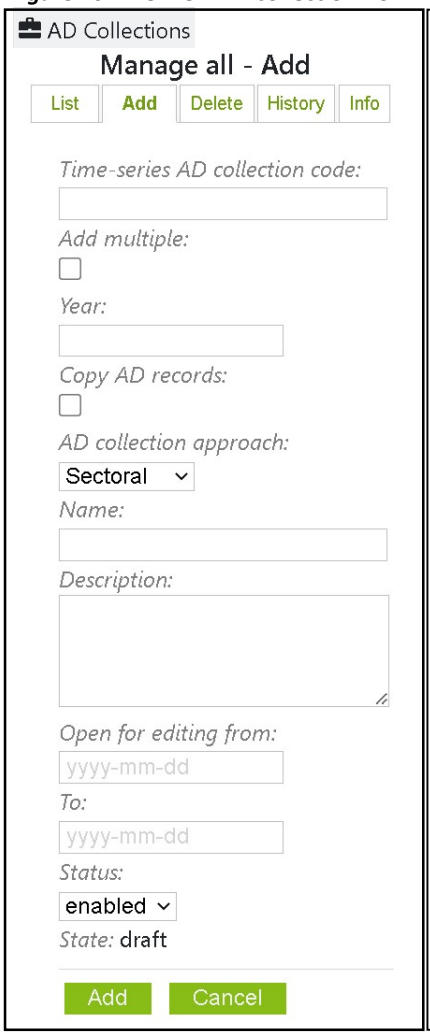
1. **Click the "Add" tab (*Figure 9*).**

Figure 9. Use tab "Add" to add a new AD Collection



2. **Use the provided 'new AD collection' form to create a new AD collection**
All fields in this form are mandatory (***Figure 10***).

***Figure 10*. The 'new AD collection' form**



Name: AD collection name
include the name and reporting year

Code: include a unique, user-defined code
Please use <INV>_<year>_<version>_<date created YYYY MM DD> an example for AD collection reported up to 2017, version 1, created 19 Jan 2021: AD_2017_v1_20210119

Add multiple: Tick this if you want to add multiple years in the range

Year(s): the year(s) of coverage
the year(s) this AD collection covers

Name: a unique, user-defined code
Waste_<#>_<year(s)>_v<version>_<date created yyyy mm dd>
E.g., for AD collection reported up to 2022, version 3, created 28 Mar 2023: <Waste>_2022_v3_20230328

Description: the AD collection description
this allows users to make notes and comments regarding the AD collection

Timeframe for data entry: in many countries, the data may be entered only within the agreed period or by the agreed date. Enter start and finish dates to specify the time frame when the AD collection is open for editing here.

Status: When a new AD collection is created, it is automatically assigned draft state, The state will change as the AD collection goes through review and approval processes. The status determines whether the record is enabled or currently disabled for data entry.

Edition details: the compiler can make any additional comments and provide further details

Reason for change: If the compiler wants to document a change in the AD collection or the AD collection is to be moved through the review and approval process then record it here.

- A time-series AD collection can consist of several annual entries.
- Each year of the time-series AD collection will have the same AD collection name that shows all years covered by that AD collection followed by a year covered by this AD collection instance, which should be reflected in the AD collection title, for example, "AD_2000-2010_2000".

5.2.4 Edit existing AD Collection

To edit existing AD collection names and details:

1. Click the "List" tab. You will see the existing table with records. Each record has a "pencil" button on the left for editing,
2. To modify the existing entry - click the "pencil" button before the record, then make your modification using the form provided, and
3. Click "Save" to save the updated record.

5.2.5 Delete existing AD Collection

To delete an existing AD collection record:

1. Click the "List" tab. You will see the existing table with records.
2. Click the “cross” at the right-hand end of the record to delete.

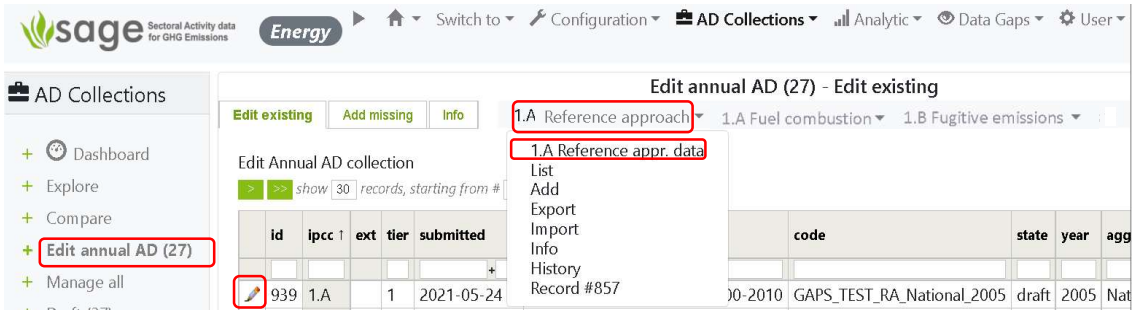
5.2.6 How to add a new data record – import from Excel

Users can import data from Excel into SAGE for all categories and fuels (*Figure 11*).

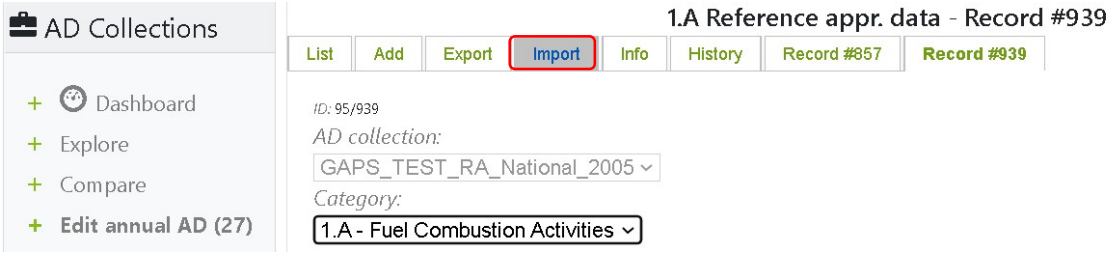
Note: *Appendix B* and *Appendix C* contain a Data Dictionary and other information related to import data.

1. **Create the file with data, ready to be imported.**
   a. **One way to do that is:**
   Click ‘AD collection’, ‘Edit annual AD’, click the AD collection, click the category

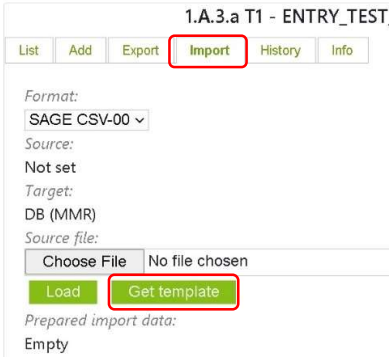
Figure 11. Import data



Click tab at top ‘Import’



The system shows the import form



Follow the instructions in the template file.

b. An alternative way is:

export a similar set of data from a similar AD collection

open that exported file (e.g., in Excel)

Delete the first 2 columns (showing 'ID' and 'AD collection ID')

Delete the first 3 rows (delete all blank rows but keep the 'header' column name row)

Change the data as appropriate

2. **Click 'AD collection', click 'Edit annual AD', click the AD collection to edit, click the category to import**

3. **Click 'import' (*Figure 12*)**

Figure 12. Import AD data

4. **Choose the import format, choose the file to import and click 'Load'**

5.3 AD Collection Export Process

Once an AD collection is published, you may want to export data.

To export data:

- Use the Export tab to export any published AD collection in a form of SAGE CSV file or in the IPCC time-series template
- choose option "single file" to export all categories in a single file (suitable for analytical or data presentation and reporting purposes)
- choose option "multiple files" to export each category in a separate CSV file (suitable for subsequent data entries)

If you want to import SAGE data into IPCC software then you will need to save the CSV file as Microsoft Excel 97-2003 Worksheet.

5.4 'AD collection' Signoff Process (draft, review, approve, publish)

5.4.1 Signoff Process Overview

The 'AD collection' signoff process is a subset of the 'AD Collections' process (see *5.1.1 The overall 'AD Collections' process* on page *15*).

Click the **AD Collections** quick link (or use the top navigation menu panel) to open the AD collection

The following modules are available here:

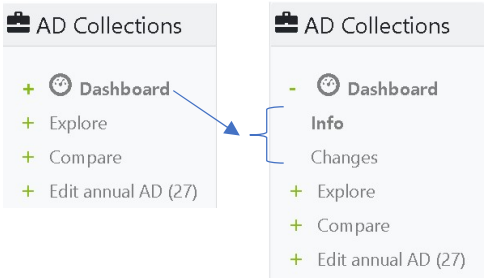
Manage	to create and manage AD collections
Draft	to enter/update data
Review	to signify that the data entry is complete and request a technical review of the AD collection data
Approve	to accept/reject the results of the AD collection data review and request approval for AD collection data publication
Publish	to approve AD collection data for viewing and analysis by all intended users

That relates to the four **states** of AD collections that show their progress in the approval process:

Draft	the AD collection is created and available for data entries
Reviewed	data entry is complete and the AD collection is sent for technical review
Approved	the technical review is complete and the AD collection is sent for final sign-off
Published	the AD collection data are successfully signed-off by an authorized person. At this stage, the AD collection is locked. It also means that the AD collection data are made available for data analyses and are ready for publication.

The AD collection **status** could be switched between "enabled", "disabled", and "deleted". When an AD collection is enabled, it is open for data entry and editing. When an AD collection is disabled, its contents can still be viewed, but not edited. When an AD collection is deleted, it is archived and no longer can be viewed or edited.

The left navigation pane sometimes shows green plusses. Click a plus to see the sub-menu of the menu:



5.4.2 Draft (enter AD collection)

This section is covered in section 6.1 AD Collections Data Entry Process on page 26.

5.4.3 Move to Review

After the AD collection data are entered and gaps are filled, you might want to send the AD collection for review.
To do so:

- In the List tab, click the pencil ("edit") icon at the AD collection you would like to send for review. The AD collection details screen will open.
- Enter the information in the **Reason for change** field (this is mandatory). This will flag why the AD collection needs a review. For example, "data entry is complete" or "issue fixed"
- Enter the information in the **Edition detail** field (this is also mandatory). You might want to note here who will be doing the review and when it will be complete.
- Scroll down and click the **Move to review** button on the bottom of the screen. SAGE will ask a confirmation for proceeding with the review.
- Click **OK** in the dialog box to proceed, otherwise, click **Cancel**.
- When the state is changed to **Review**, the data in the AD collection will be locked for editing unless an authorized user will change the AD collection status back to **Draft**.

5.4.4 Review

Once an AD collection is in the 'Review' state, authorized users (Administrators, or 'Power Users') can 'Reject' it back to 'Draft' state or 'Approve' it to be ready to approve.

5.4.5 Approve

After the review is complete, authorized users (Administrators, or 'Power Users') may accept or reject the reviewed AD collection. If it is rejected then it will become open for editing again.

- In the List tab, click the pencil ("edit") icon at the reviewed AD collection that you would like to approve. The AD collection details screen will open.
- Enter the information in the **Reason for change** field (this is mandatory). This will flag that the review results are accepted or rejected. For example, "review accepted".
- Enter the information in the **Edition details** field (this is also mandatory). You might want to note here who approved the AD collection and when. For example, "AD collection compiler has approved the AD collection on 31 January 2021".

5.4.6 Publish

After the review is approved, designated users (Administrators, or 'Power Users') may accept the reviewed AD collection or reject the reviewed version and open it for editing again. Here is what you need to do:

- In the List tab, click the pencil ("edit") icon at the approved AD collection that you would like to publish. The AD collection details screen will open.
- Enter the information in the **Reason for change** field (this is mandatory). This will flag that the review results are accepted. For example, "review accepted"
- Click 'Move to review' to reject or click 'Publish' to accept and publish

Enter the information in the **Edition details** field (this is also mandatory). You might want to note here who approved the AD collection and when. For example, " AD collection compiler has approved the AD collection on 31 January 2021".

6. Activity Data (AD) Collections – Energy

6.1 AD Collections Data Entry Process

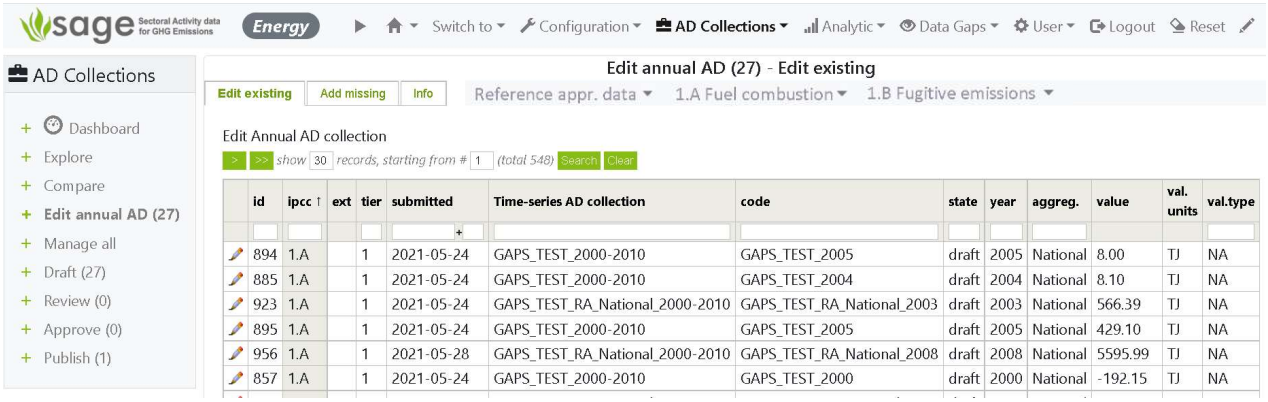
The AD collection data entry process is a subset of the 'AD Collections' process (see *5.1.1 The overall 'AD Collections' process* on page *15*).

6.1.1 Background

The AD collection drafting page enables you to view, insert, edit and delete AD collection activity data and information. But first, you have to select which AD collection you are going to work with. To do that:

Step 1 On the left, click 'Edit annual AD' to see the AD collections available for drafting. The list of AD collections available will appear. See ***Figure 13***

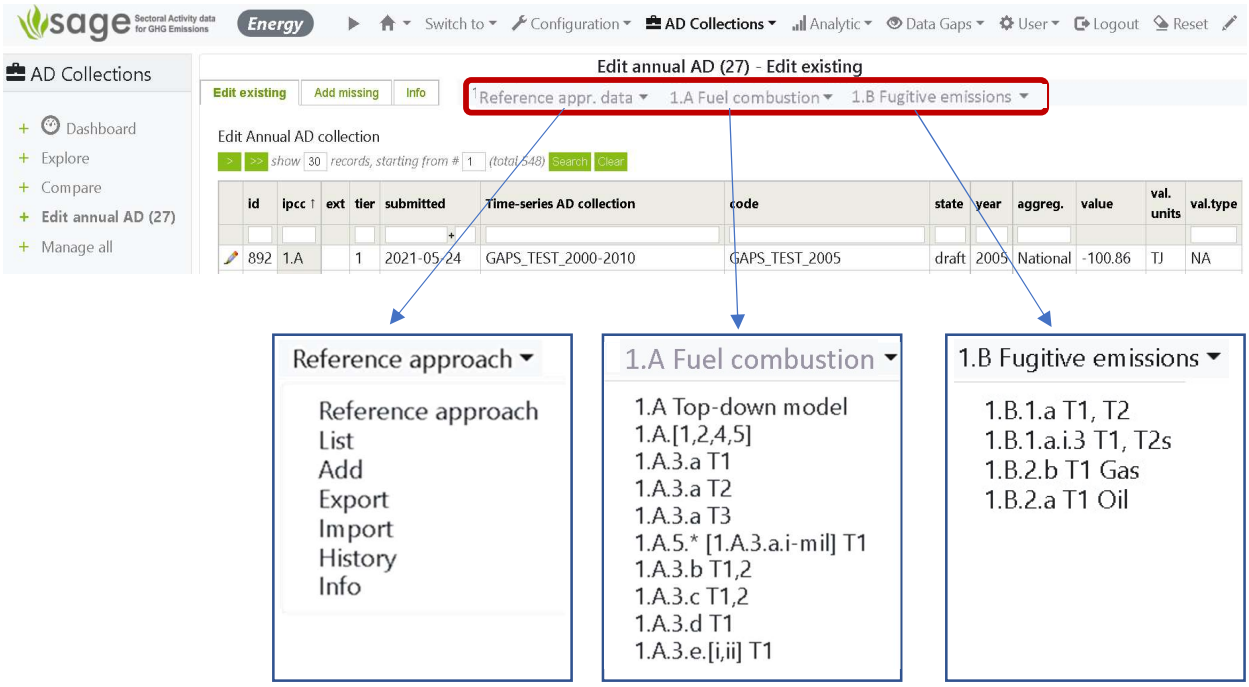
Figure 13. Select AD Collection for data entry - Energy



id	ipcc	ext	tier	submitted	Time-series AD collection	code	state	year	aggreg.	value	val. units	val.type
894	1.A		1	2021-05-24	GAPS_TEST_2000-2010	GAPS_TEST_2005	draft	2005	National	8.00	TJ	NA
885	1.A		1	2021-05-24	GAPS_TEST_2000-2010	GAPS_TEST_2004	draft	2004	National	8.10	TJ	NA
923	1.A		1	2021-05-24	GAPS_TEST_RA_National_2000-2010	GAPS_TEST_RA_National_2003	draft	2003	National	566.39	TJ	NA
895	1.A		1	2021-05-24	GAPS_TEST_2000-2010	GAPS_TEST_2005	draft	2005	National	429.10	TJ	NA
956	1.A		1	2021-05-28	GAPS_TEST_RA_National_2000-2010	GAPS_TEST_RA_National_2008	draft	2008	National	5595.99	TJ	NA
857	1.A		1	2021-05-24	GAPS_TEST_2000-2010	GAPS_TEST_2000	draft	2000	National	-192.15	TJ	NA

Step 2 At the top, click the AD collection to work on and then click the sector from the pop-up menu as below. See ***Figure 14***

Figure 14. Obtain list of records for the selected AD collection



The option tabs for record entries in the AD collection are the same as those for AD collection management, but they refer to a single record rather than the entire AD collection:

List displays a table with the list of records; each record has a "**pencil**" icon at the beginning (this is the edit option) and a "**cross**" icon at the end (to delete a record),

Add allows entry of a new activity data record that includes the fuel consumption value and relevant supplementary information (e.g., fuel characteristics, uncertainty, and comments),

Export allows exporting existing activity data to an Excel (CSV) file,

Import allows importing data from Excel templates (for all tables and records, and for entire time series),

History contains a log of changes performed on records within the module,

Info provides relevant notes and guidance helping you understand available options and how to use them

6.1.2 How to edit activity data records

To edit existing AD collection names and details:

- click the **List** tab. You will see the existing table with records. Each record has a **pencil** button on the left for editing
- to modify the existing entry - click the "pencil" button before the record, then make your modification using the form provided, and
- click **Save** to save the updated record.
- To remove a record from the list, click the **cross** icon at the end of the record.

6.1.3 How to add a new data record – manual entry

The process of adding a new activity data record is similar to adding a new AD collection. To add a new activity data record, click **Add** and then use the provided form to create a new record. This will include entering both activity data and supporting information.

This form includes three main sections – Reference approach (or top-down approach for fuel combustion), 1A Stationary Combustion, and 1B Fugitive emissions. For higher tiers (T2 and T3). SAGE provides additional entry fields to enable entries for combustion technology, operating conditions, control technology, maintenance quality, equipment age, and CO_2 captured.

When the entries are complete, SAGE calculates the value of the fuel consumption in TJ (so it is ready for entry in the IPCC equations) and saves the record in the database.

For higher tiers (T2 and T3). SAGE provides additional entry fields to enable entries as required (e.g., for combustion technology, operating conditions, control technology, maintenance quality, equipment age, and CO_2 captured).

*General information fields (all entries here are **mandatory**) (**Figure 15 and Figure 16**):*

Category	Select IPCC category for the data entry
Aggregation	Select the level of aggregation (national, regional, or facility) your data will represent. If additional aggregation levels are required (e.g., city, island, state) - they can easily be included by authorized users at the configuration level, please ask.
Statistics quality	Describe the reliability of the data used; your selection in this option will help SAGE to determine the correct default level of uncertainty for the activity data if the actual uncertainty is unknown.
Methodological tier	Identify the level of details required for the activity data entry.

Figure 15. Filling the general section in the activity data entry form - Energy

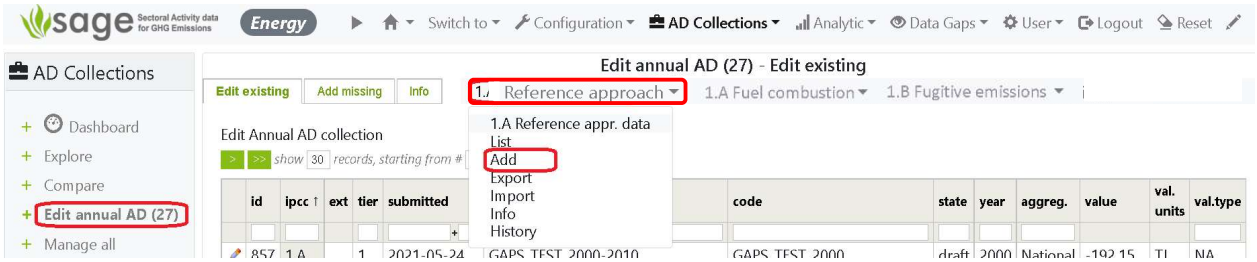
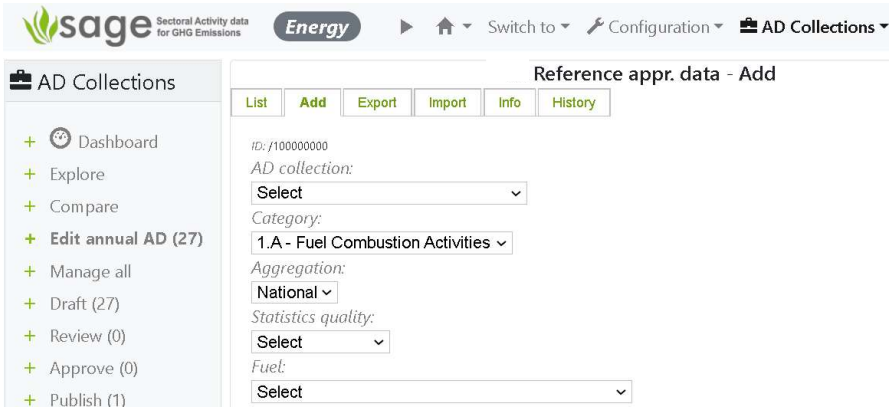
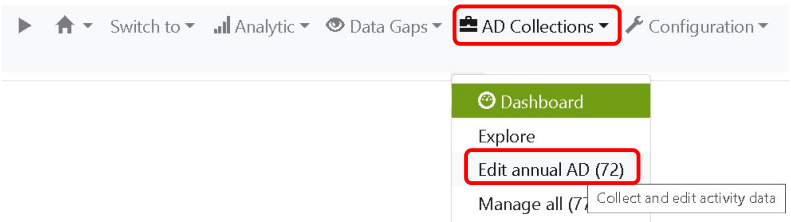


Figure 16. Filling a section in the activity data entry form - Energy



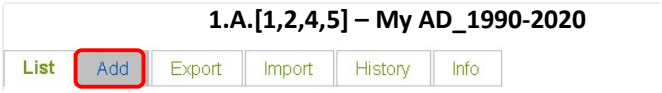
To choose the fuel and fuel characteristics:

1. Open an AD collection
   AD collection menu at the top, then *Edit annual AD* menu item

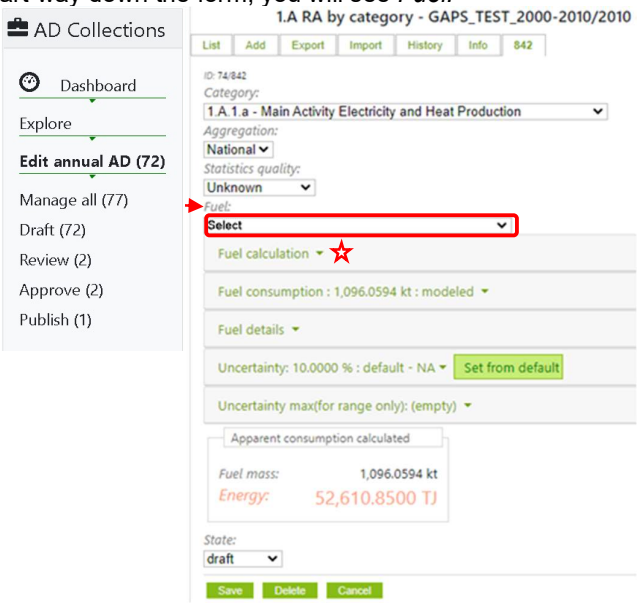


2. Find the AD collection to change and click the pencil icon on its left.

3. Near the top, click *Add* to add an item

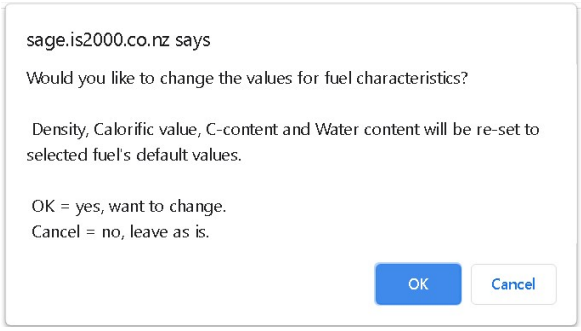


4. Part-way down the form, you will see *Fuel:*



5. Click “Select” under *Fuel* and then click a fuel type to select it

6. Now you will see the following message:



Click ‘OK’ to proceed and change the values for fuel characteristics.

7. To calculate the amount of fuel consumed on the basis of nation-wide apparent consumption, next click *Fuel calculation* (☆above in the diagram of step 4) and the following will display.

Enter the source and calculation percentage and click *Calculate*.

*Fuel consumption fields (most entries here are **mandatory**) (**Figure 17**):*

Figure 17. Fuel section in the activity data entry fields

Fuel consumption

Value
Units
Type
Source
Reference

Value - enter the fuel consumption value

Units - select the unit of measurement for the fuel consumption value you have entered. If an additional unit is required - it can be added to the list of available units by authorized users at the configuration level, please make an inquiry.

Type - indicates if the data are coming from a survey (actual measurements and observation) or they are modelled (e.g., estimated on a basis of other parameters). If the entered datapoint is calculated using extrapolation, interpolation or other modeling techniques or suggested on a basis of an expert judgement, please select "modelled"

Source, **Date issued (in format yyyy-mm-dd)**, and **Reference** - are for entering the detailed information on the data source and including additional comments (in the **Reference** field)

Uncertainty - can be selected as a default value (click **Select from default** link), in which case SAGE will provide the default value using the logical path suggested by the 2006 IPCC Guidelines. You can override this value if you have the actual (or more suitable) uncertainty data available for the entered fuel consumption.

Optional entry: if the uncertainty is not an IPCC default, and it is available in the form of a range, enter the top range figure in the field **Uncertainty max** (for range only).

Fuel (most entries here are mandatory)

This group includes intrinsic fuel characteristics used for unit conversion and emission estimates.

Fuel - select the fuel name from the list. Once the fuel is selected, SAGE will ask you if you would like to set/change all fuel characteristics to their default values. If you respond **OK** in the dialog box, all fuel characteristics will be set to their defaults. SAGE will display these values on the screen and flag them as "default". The characteristics include:

Density, which is used to recalculate volume-based units to mass (mandatory)

Calorific value to convert amount of fuel to energy value (TJ) used in most IPCC equations. You can also choose whether it is gross or net calorific value (GCV or NCV) and insert the conversion factor (if different from the 2006 IPCC default) (mandatory)

Carbon content of fuel, which also can be set as default or have a custom entry (mandatory)

Water content of fuel, which may be useful for wood-based fuels, for example (optional)

For each characteristic, if the value is not available by default, then you will need to provide the type of source, the source (actual data provider), the data published/accessed, and a reference/comment. If you chose the default characteristics then SAGE will enter this information for you automatically (***Figure 18*** - ***Figure 20***).

For calorific value, the default is the NCV value. The steps you have to follow to fill this section are:

Step 1 Select fuel from the drop-down menu of fuels. Unless the same fuel has been selected for the previous entry, SAGE will offer to set the fuel characteristics to their default values.

Step 2 in the dialogue box, click **OK** to use default values, or **Cancel** to override with different values. If you click "Cancel", you will need to enter the fuel characteristics manually, record the source for these data, and provide the reference (this is mandatory). An example of such entry for calorific value is included.

Figure 18. Fuel section in the activity data entry form – selecting fuel characteristics.

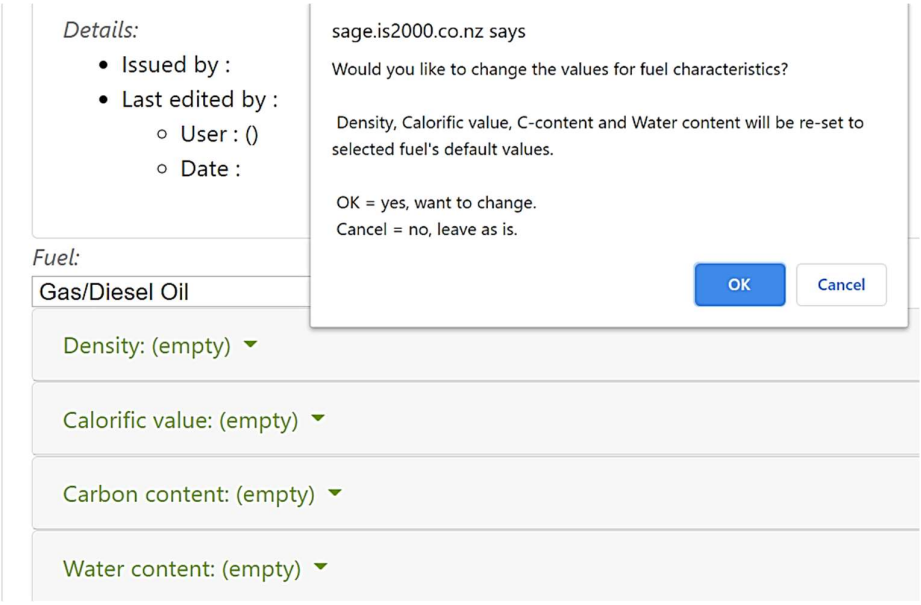


Figure 19. Activity data entry form filled with default data and calculated energy consumption value

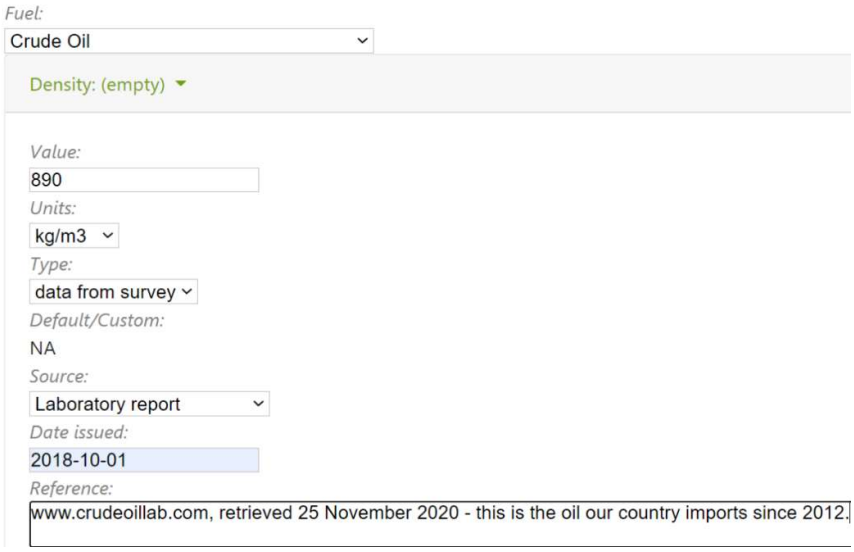
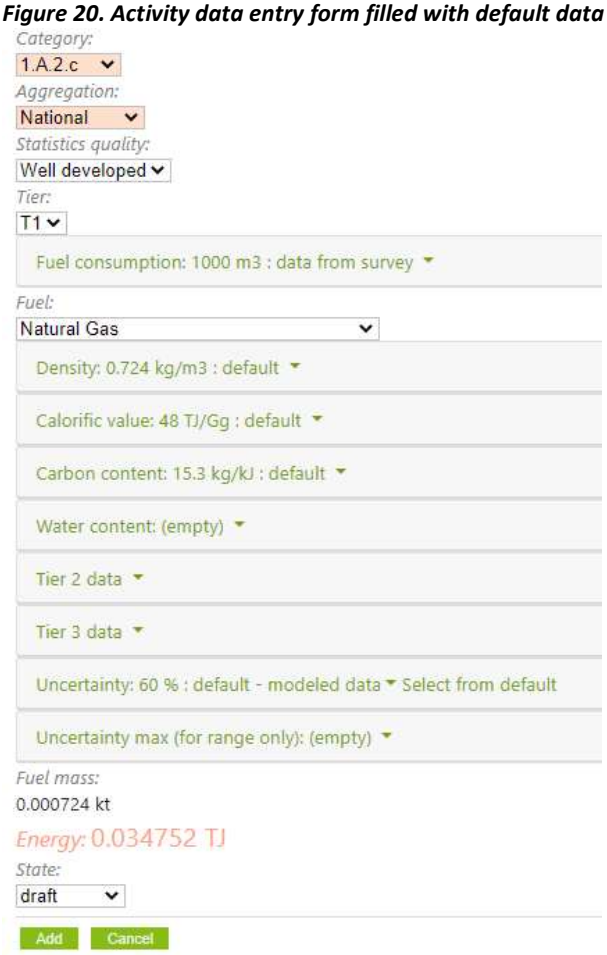


Figure 20. Activity data entry form filled with default data and calculated energy consumption value



Set methodological tier

In most categories, 2006 IPCC Guidelines require more detailed activity data for higher methodological tiers. SAGE provides additional menu options and entry fields to record these additional details.

For tier 2, the record will consist of the data and information provided for tier 1 plus the additional entry for tier 2. For tier 3, SAGE record the information provided for tiers 1 and 2 and the additional information entered for tier 3. Note that you may want to record country-specific values for fuel characteristics for higher tier estimations.

For tier 2, the additional information includes technology description (***Figure 21***). Tier 2 parameters may optionally be entered in tier 1.

For tier 3, the additional information includes **operation conditions**, **control technology**, **maintenance quality**, **equipment age**, and **CO_2 captured** (**Figure 22**). Tier 3 parameters may optionally be entered in tier 2 or tier 1.

E.g., Tier 1 may simply use default values for fuel characteristics (e.g., calorific values) and aggregated fuel type (e.g., oil)

Tier 2 may be more precise by having country-specific parameters for fuels and disaggregating fuels (not just oil, but identify specific oil fractions or/and sources)

Tier 3 may be more precise still, by having a value for each fuel for each country for different groups or individual oil wells, gas fields, or coal basins

Figure 21. Technology selection for tier 2

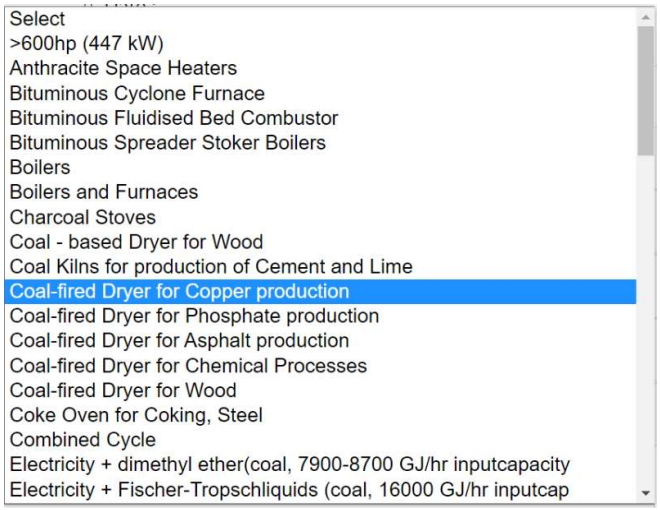


Figure 22. Additional entry fields for tier 3

Tier 3 data

Operating conditions
Control technology
Maintenance quality
Equipment age (years)
CO2 captured (tonnes)

6.1.5 How to calculate energy consumption of fuels in TJ

SAGE calculates the energy consumption from fuel consumption and fuel data automatically as soon as the data are entered. The fuel energy consumption value is displayed under the entry form and is recorded in the database.

SAGE uses the IPCC methodology to calculate consumption.

To calculate emissions using the equations in the 2006 IPCC Guidelines, the fuel consumption should be converted to its energy value in Terajoules (TJ). The following processes apply:

GCV to NCV

For the energy calculation, SAGE checks if the calorific value is entered in NCV or GCV and converts it to NCV, if necessary, using the conversion factor entered by the user or the default IPCC value:

$$NCV = GCV \cdot [\frac{NCV}{GCV} conversion\ factor]$$

Then, if the fuel consumption value is entered as a volume, the volume is converted to SI volume unit, then to mass using density in kg/m^3, and then to energy using the SAGE's in-built unit converter and calorific value converted (if necessary) to GCV:

$$Energy\ consumption\ (TJ) = Fuel\ consumption(volume) \cdot Base\ factor(SI) \cdot Density\ \cdot NCV \rightarrow TJ$$

Consumption calculation

If fuel consumption is entered in mass units, they are first converted to SI units, then the calorific value is applied:

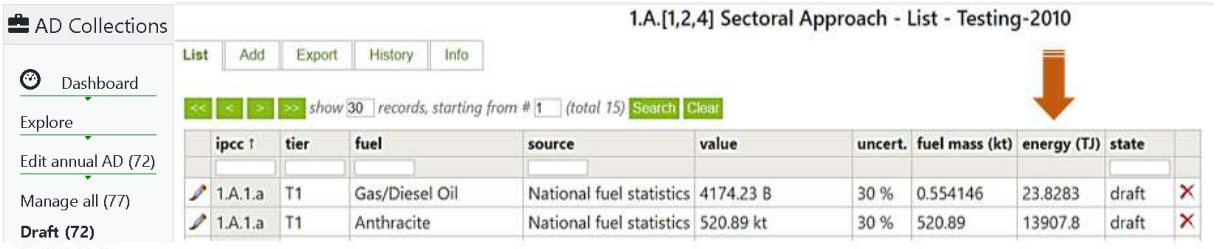
$$Energy\ consumption\ (TJ) = Fuel\ consumption(volume) \cdot Base\ factor(SI) \cdot NCV \rightarrow TJ$$

If fuel consumption is entered in energy units, they are first converted to SI base units, then to TJ:

$$Energy\ consumption\ (TJ) = Fuel\ consumption\ value\ (energy) \cdot Base\ factor(SI) \rightarrow TJ$$

The results of the calculation are displayed under the entry fields in the activity data entry form and can be viewed through the LIST tab of the AD collection draft (***Figure 23***).

Figure 23. SAGE calculates and displays the energy consumption for each activity data entry

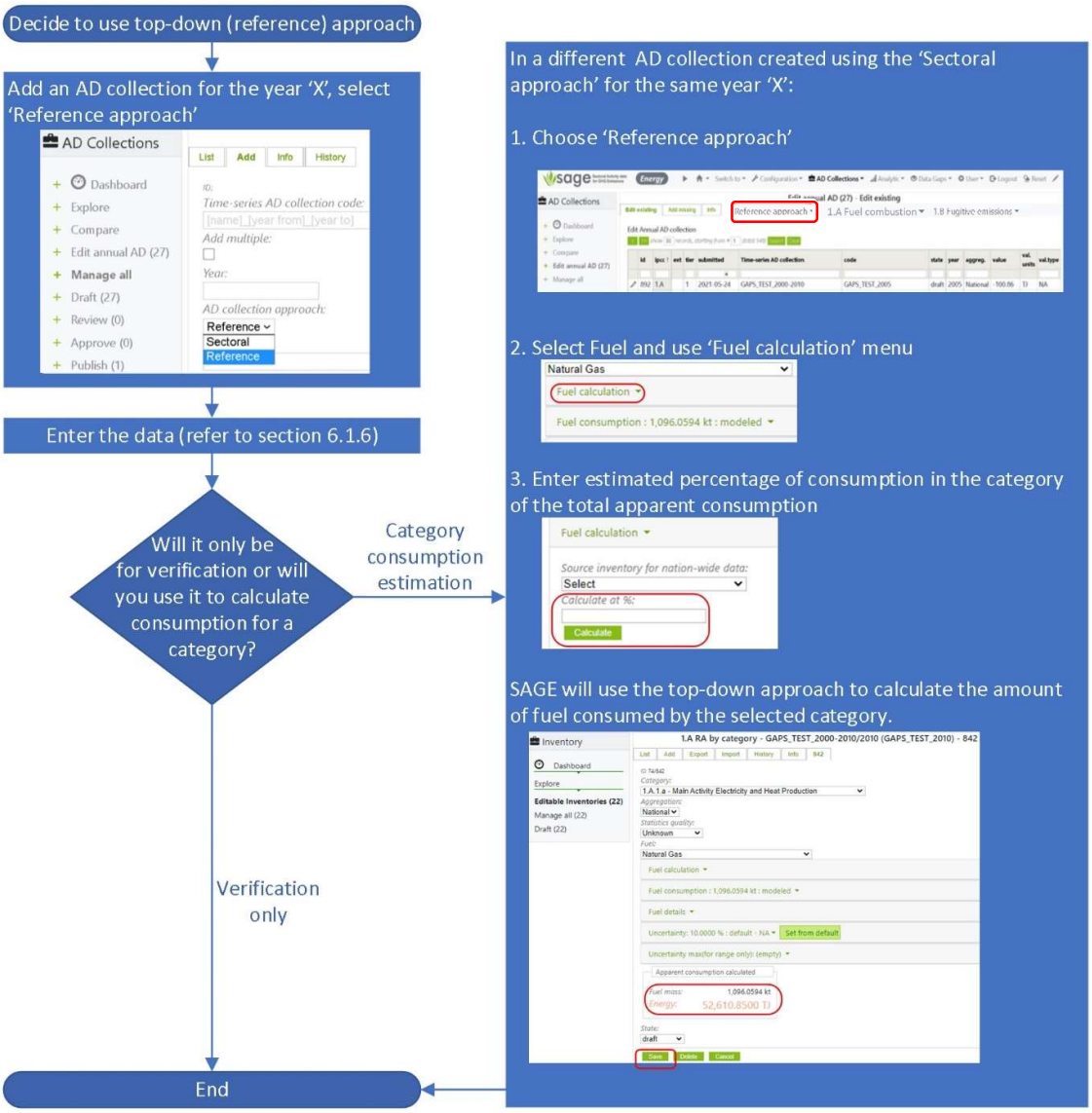


6.1.6 Estimating activity data using the top-down ("Reference") approach

The "Reference approach" is a top-down method to measure consumption. That means it measures total of a fuel produced, imported, exported, bought/sold, international bunker fuels, and stock change to determine how much of fuel was consumed in the period (apparent consumption value).

SAGE can apply the reference approach to estimating apparent consumption by fuel to **individual fuel combustion categories**. For this, SAGE needs to know the total apparent consumption for a fuel across the entire combustion sector (1.A) and the proportion of the fuel consumed in a particular category (for example, by road transport category 1.A.3.b) for a year 'X'.

This may initially seem complicated so a summary flow chart follows which may help.



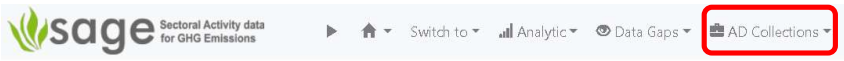
To enable comparison of fuel combustion calculated using the reference and sectoral approaches, the total apparent consumption for a fuel across the entire combustion sector (1.A) and all relevant data entries must be made in a separate annual AD collection.

SAGE applies the approach described in the 2006 IPCC GLs (v.2, chapter 6, section 6.10.1) for default uncertainty if "default" is selected by users (±5% for a given fuel if case of well-developed statistics and ±10% otherwise). However, if users know the actual uncertainties, then please enter those.

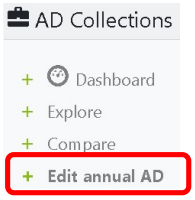
SAGE calculates and shows apparent consumption converted into kilotonnes (kt) and Terajoules (TJ).

To manage data for the reference approach:

a. **Click "AD Collections" (at the top menu)**

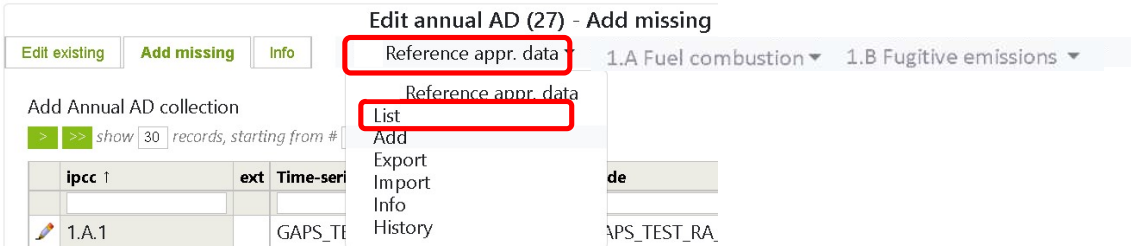


b. Click "Edit annual AD" (in the left menu)



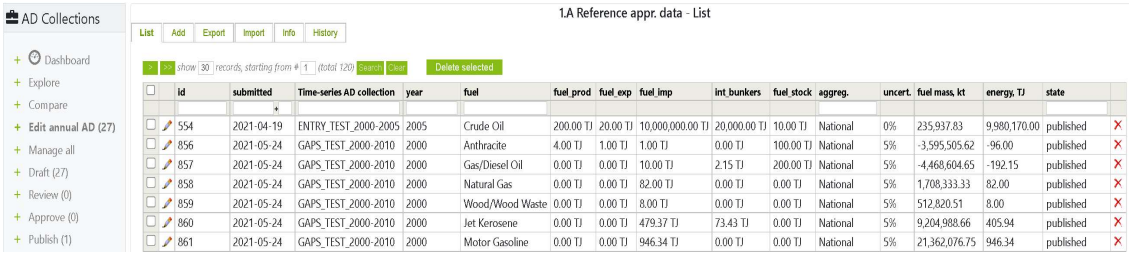
c. At the top, click "Reference appr, data", then click "List" in the pop-up menu (*Figure 24*)

Figure 24. Edit Reference appr. data



Something similar to the following will display (***Figure 25***).

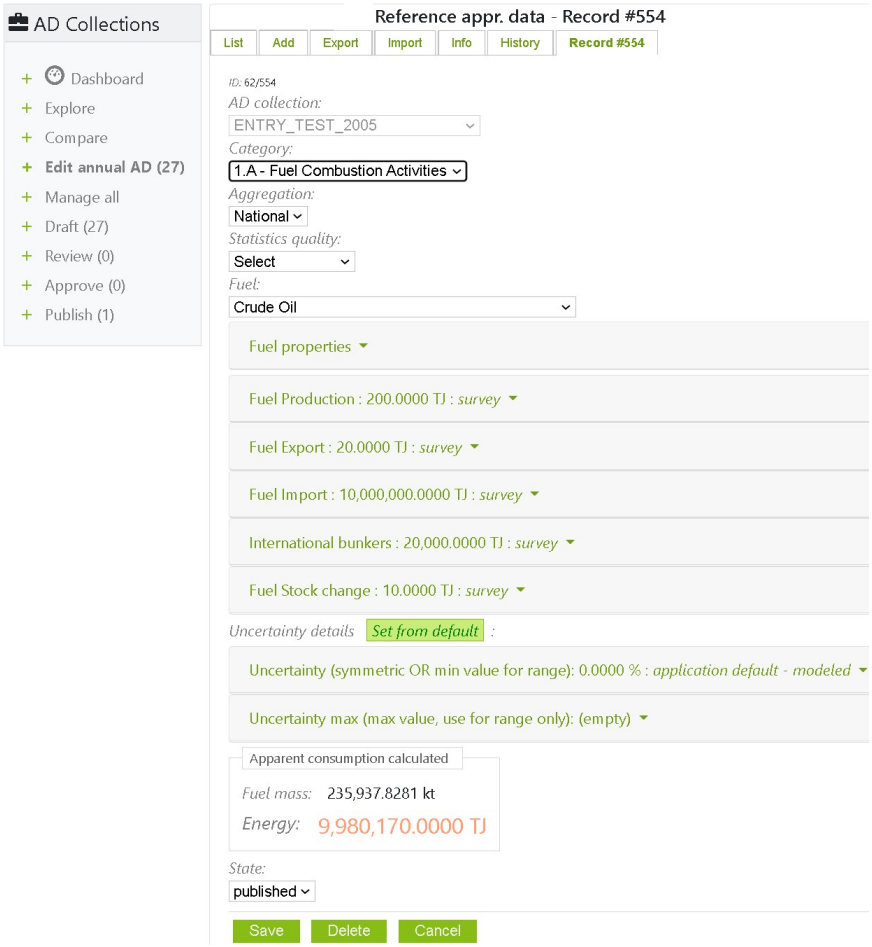
Figure 25. List AD Collections using Reference approach



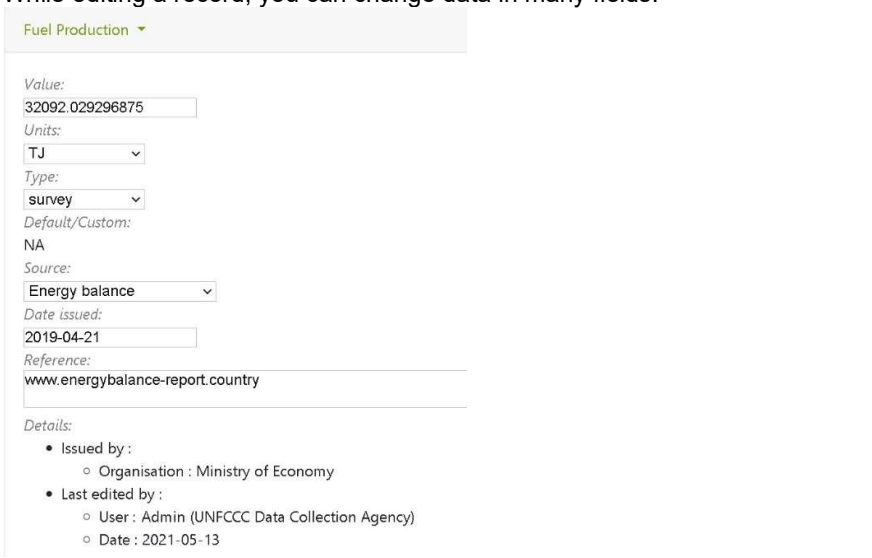
Once you're in the 'AD collection', 'Reference approach' component:

1. **To <u>show all records</u>, click the "List" tab at the top**

2. **To <u>edit a record,</u>** click the "List" tab near the top of the page and click the pencil icon (left of the particular record)



While editing a record, you can change data in many fields.

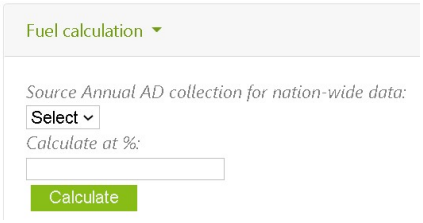


'Category', 'Aggregation' and 'Statistics quality' have restricted-selection lists (click-and-pick). For "Aggregation" selection list, only the "National" option is available because the fuel consumption calculation for the top-down approach refers to the nation-wide apparent consumption value.

Click 'OK' to set all fuel characteristics to their default values.

To update data in an area like 'Fuel Calculation', you must be in a 'Top-down model' (not a 'Reference approach'). Click the green heading 'Fuel Calculation' and the relevant required information will be shown. 'Fuel Calculation' requires a name of the AD collection containing nation-wide apparent consumption values calculated across the entire fuel combustion sector for the same year as the current entry is associated with, and the percentage of the selected fuel (e.g., gas/diesel oil) consumed by the selected category (e.g., 10):

To update data in an area like 'Fuel Production', click on the green heading 'Fuel Production' and the relevant required information will be shown. 'Fuel Production' requires a value, units, data type (survey / modelled /etc.), data source, date issued in format yyyy-mm-dd, reference and comments are all needed.



SAGE also requires the following metadata in the 'Fuel consumption' area:

- type of data origin (e.g., modeled)
- Type of data source (menu '**Source**', e.g., top-down approach)
- when the data was issued/calculated (field '**Data issued**')
- Reference and/or comments (field '**Reference and comments**')
- Uncertainty value (to use the default value, click the green button '**Set from default**')

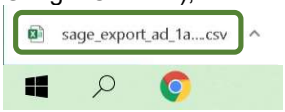
To save changes, click 'Save'.
To delete the record, click 'Delete'
To discard the changes and revert the record to what it previously was, click 'Cancel'.

3. **To <u>delete</u> a record**, click the top "List" and click the cross icon (on the right of the record)

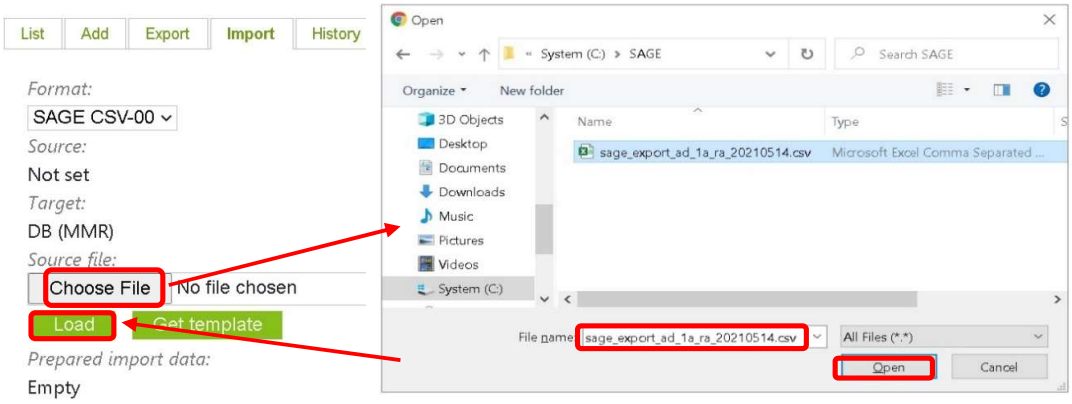
4. **To <u>add</u> a record**, click the top "Add" tab and enter data for a new record

This shows a blank record. The process to add a record is similar to the edit process except it starts with a blank record. (Edit process is described above in '5.1.4 Explore' page 17).

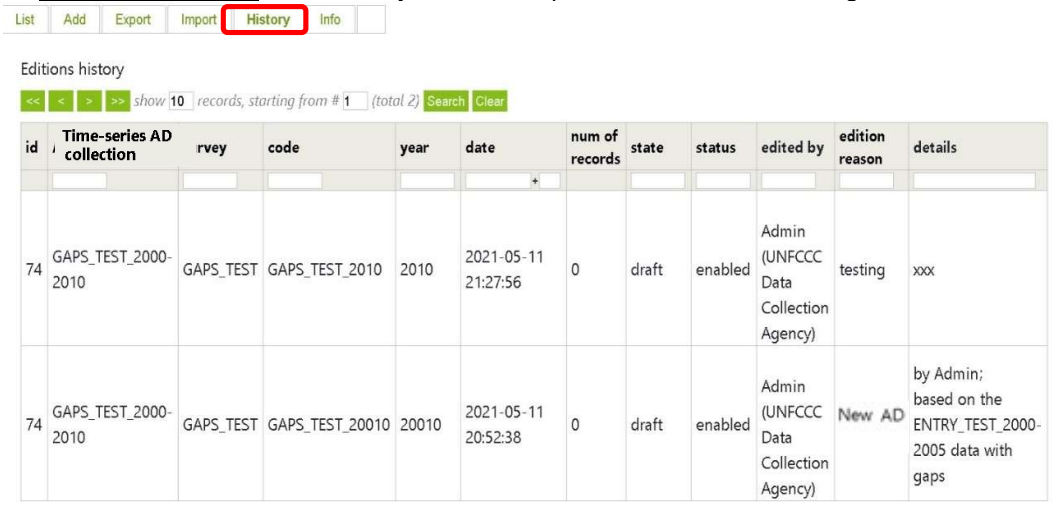
5. **To <u>Export</u> data**, click the top "Export" tab, enter file name, enter description, choose output format if needed, click "Export All".
The file will save wherever your internet browser defaults to. In many internet browsers (e.g., Google Chrome), a link to the file will probably show at the bottom of the web page.



6. **To <u>Import</u> data,** click the top "Import" tab, choose an input format if needed, click "Choose File", use the file browser to find the file, click "Open" in the file browser, click "Load" in Sage.



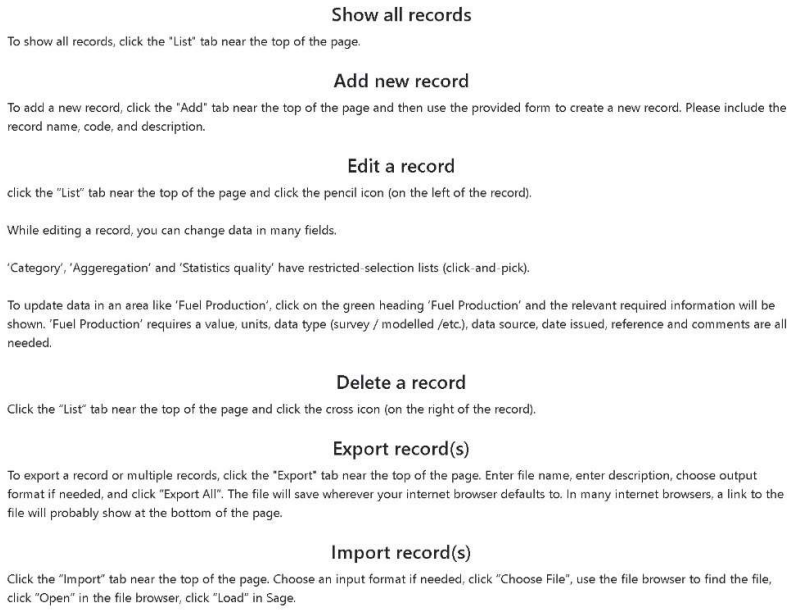
7. **To <u>see edition history</u>**, click 'History' tab at the top and it will show something similar to below.



id	Time-series AD collection	rvey	code	year	date	num of records	state	status	edited by	edition reason	details
74	GAPS_TEST_2000-2010	GAPS_TEST	GAPS_TEST_2010	2010	2021-05-11 21:27:56	0	draft	enabled	Admin (UNFCCC Data Collection Agency)	testing	xxx
74	GAPS_TEST_2000-2010	GAPS_TEST	GAPS_TEST_20010	20010	2021-05-11 20:52:38	0	draft	enabled	Admin (UNFCCC Data Collection Agency)	New AD	by Admin; based on the ENTRY_TEST_2000-2005 data with gaps

8. **To <u>see Information</u> about how to use the 'Reference Approach'**, click the Info tab at the top of the page.

It will show similar information of how to use the AD collection – Reference approach module.



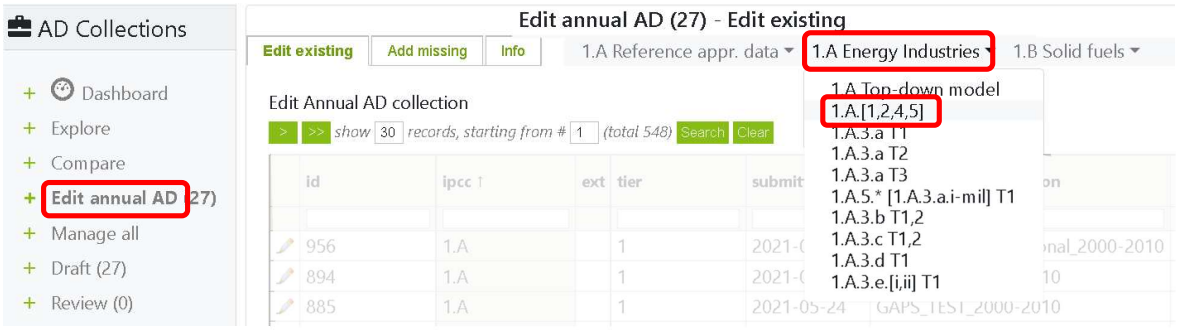
9. **To <u>show</u> the <u>last record you viewed</u>**, click the relevant tab at the top of the page.
In the case below, the last record IDs viewed were 783 and 777.
They are not necessarily sorted by 'last viewed date' or numerically.

To optionally edit that record, follow the "Edit" process above ('5.1.4 Explore' page 17).

6.1.7 Specific for 'Stationary Combustion' (St. Combustion)

To work on a 'combustion' AD collection, you can click on 'AD collection' at the top and then click pop-up menu 'Edit annual AD' (***Figure 26***).

Figure 26. Edit a 'combustion' AD



Then click '1.A (1,2,4,5) St. Combustion' in the body of the page and click pop-up menu '1.A (1,2,4,5)'.

Something similar to the following will be displayed (***Figure 27***):

Figure 27. List 'combustion' ADs

1.A.[1,2,4,5] - GAPS_TEST_2000-2010/2005 (GAPS_TEST_2005) - List

List | Add | Export | Import | History | Info

<< < > >> show 30 records, starting from # 1 (total 7) Search Clear

	id	submitted	ipcc ↑	tier	fuel	aggreg.	value	value type	source	uncert.	fuel mass (kt)	energy (TJ)	state	
✎	654	2021-05-11	1.A.1.a	T1	Natural Gas	National	1204.1199951171875 kt	modeled	National fuel statistics	10 %	1204.1199951171875	57797.76171875	draft	✕
✎	650	2021-05-11	1.A.1.a	T1	Anthracite	National	255256 t	modeled	National fuel statistics	10 %	255.25599670410156	6815.3349609375	draft	✕
✎	657	2021-05-11	1.A.1.b	T1	Gas/Diesel Oil	National	286.68798828125 kt	modeled	National fuel statistics	10 %	286.68798828125	12327.583984375	draft	✕
✎	663	2021-05-11	1.A.2.a	T1	Natural Gas	National	39.24869918823242 kt	modeled	National fuel statistics	10 %	39.24869918823242	1883.9376220703125	draft	✕
✎	672	2021-05-11	1.A.2.d	T1	Natural Gas	National	41.099998474121094 kt	modeled	National fuel statistics	20 %	41.099998474121094	1972.800048828125	draft	✕
✎	681	2021-05-11	1.A.4.b	T1	Wood/Wood Waste	National	538.1409912109375 kt	modeled	National fuel statistics	100 %	538.1409912109375	8395	draft	✕
✎	679	2021-05-11	1.A.4.b	T1	Natural Gas	National	102.03600311279297 kt	modeled	National fuel statistics	20 %	102.03600311279297	4897.72802734375	draft	✕

The 'stationary combustion' data entry form includes the following fields (see *Appendix B* for more detail of field contents options):

Category
Aggregation
Statistics quality
Tier
Fuel consumption – Value
Fuel consumption – Units
Fuel consumption – Type

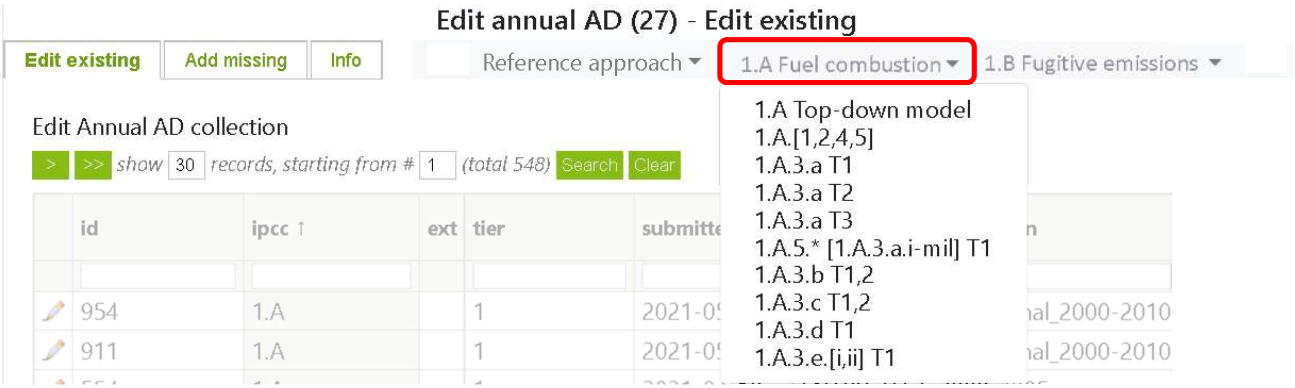
Once all data is entered, save the record.

6.1.8 Specific for 'Transport'

To work on a 'Transport' AD collection, you can click on 'AD collection' at the top and then click pop-up menu 'Edit annual AD'.

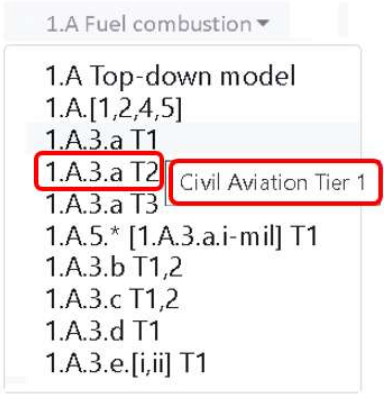
Then click '1.A (3,5) Transport' in the body of the page and, in the pop-up menu, click whichever area you want to work on (***Figure 28***).

Figure 28. List of Transport sector items



To see the category names, hover over the category ID (***Figure 29***).

Figure 29. Category name screen tips



The 'transport' data entry form includes the following fields:
(See *Appendix B* for more detail of field contents options):

Category
Aggregation
Statistics quality
Tier
Airport code
Fuel consumption total – Value
Fuel consumption total – Units
Fuel consumption total – Type
Fuel consumption total – Source
Fuel consumption total – Date issued
Fuel consumption total – Reference/comments
Fuel – Type
Fuel – Density
Fuel – Calorific value – Value
Fuel – Calorific value – Units
Fuel – Calorific value – Type
Fuel – Calorific value – Source
Fuel – Calorific value – Date issued
Fuel – Calorific value – Reference/comments
Fuel – Carbon content – Value
Fuel – Carbon content – Units

Fuel – Carbon content – Type

Once all data is entered, save the record.

6.1.9 Specific for 'Fugitive Emissions'

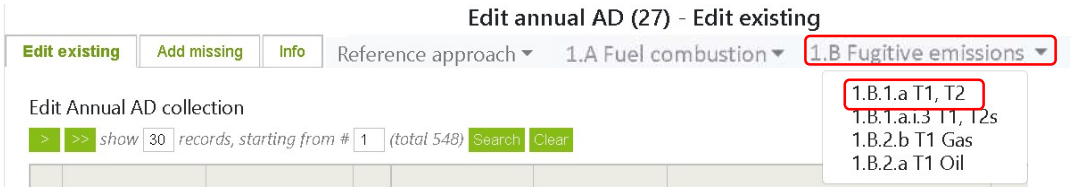
Fugitive emissions

are presented in production units (not TJ the way fuel combustion emissions are)
are calculating emissions that escaped from other processes
are not related to use of fuels ((they're not combusting anything)
therefore have a different data interface than combustion emissions

To manage fugitive emissions,

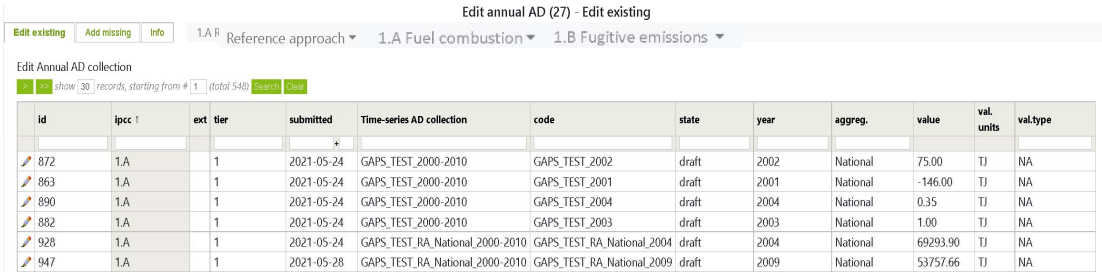
click "AD collection" tab near the top of the page,
click "Edit annual AD" sub-menu or on the left of the page (***Figure 30***)

Figure 30*. Editing Solid fuels data*



Find the AD collection to work with in the body of the page
Click the popup menu item for that AD collection (titled 1.B.[1,2] Fugitive)
Click the relevant sub-section under either "Solid fuels" or "Oil and Natural gas" (***Figure 31***)

Figure 31*. List editable inventories*



id	ipcc	ext	tier	submitted	Time-series AD collection	code	state	year	aggreg.	value	val. units	val.type
872	1.A		1	2021-05-24	GAPS_TEST_2000-2010	GAPS_TEST_2002	draft	2002	National	75.00	TJ	NA
863	1.A		1	2021-05-24	GAPS_TEST_2000-2010	GAPS_TEST_2001	draft	2001	National	-146.00	TJ	NA
890	1.A		1	2021-05-24	GAPS_TEST_2000-2010	GAPS_TEST_2004	draft	2004	National	0.35	TJ	NA
882	1.A		1	2021-05-24	GAPS_TEST_2000-2010	GAPS_TEST_2003	draft	2003	National	1.00	TJ	NA
928	1.A		1	2021-05-24	GAPS_TEST_RA_National_2000-2010	GAPS_TEST_RA_National_2004	draft	2004	National	69293.90	TJ	NA
947	1.A		1	2021-05-28	GAPS_TEST_RA_National_2000-2010	GAPS_TEST_RA_National_2009	draft	2009	National	53757.66	TJ	NA

For '**1.B.1.a T1, T2 Underground & Surface mines**', enter:

Category	underground or surface
Aggregation level	usually National but there are many options to pick from
Statistics quality	unknown or well-developed
Tier	T1 or T2
Coal waste %	0 to 100
amount	value
Mine depth	metres
Tier2 basin name	name
basin location	place
Methane flared	value
units	e.g., kg
type	pick from survey, modelled, etc.

source	pick from '2006 IPCC default', 'ICAO', etc.
issued	date in format yyyy-mm-dd
reference	reference and comments
Methane utilised	value
units	e.g., kg
type	pick from survey, modelled, etc.
source	pick from '2006 IPCC default', 'ICAO', etc.
Date issued	date in format yyyy-mm-dd
Reference	reference and comments
Uncertainty	either set from default or else enter value
units	e.g., kg
type	pick from survey, modelled, etc.
source	pick from '2006 IPCC default', 'ICAO', etc.
issued	date in format yyyy-mm-dd
reference	reference and comments
Uncertainty max (for range only)	either set from default or else enter value
units	e.g., kg
type	pick from survey, modelled, etc.
source	pick from '2006 IPCC default', 'ICAO', etc.
issued	date in format yyyy-mm-dd
reference	reference and comments
State	pick 'draft' or 'published' (only certain users can 'publish')

For '**1.B.1.a.i.3 – Abandoned underground mines**', enter:

Aggregation level	usually National but there are many options to pick from
Statistics quality	unknown or well-developed
Tier	T1 or T2
Mines number	the number of mines
Gassy mines fraction %	the percent of gassy mines
Interval of mine closure	1900-1925, 1925-1950, 1950-1975, 1975-present
Closed mines	the number of closed mines
Tier2 coal rank	pick anthracite, bituminous or sub-bituminous
Years since abandoned	enter year(s)
Methane utilised	value
units	e.g., kg
type	pick from survey, modelled, etc.
source	pick from '2006 IPCC default', 'ICAO', etc.
Date issued	date
Reference	reference and comments
Uncertainty	either set from default or else enter value
units	e.g., kg
type	pick from survey, modelled, etc.
source	pick from '2006 IPCC default', 'ICAO', etc.
issued	date in format yyyy-mm-dd
reference	reference and comments
Uncertainty max (for range only)	either set from default or else enter value
units	e.g., kg
type	pick from survey, modelled, etc.
source	pick from '2006 IPCC default', 'ICAO', etc.
issued	date in format yyyy-mm-dd

reference	reference and comments
State	pick ‘draft’ or ‘published’ (only certain users can ‘publish’)

For ‘**1.B.2.b – Natural gas**’, enter:

Aggregation level	usually National but there are many options to pick from
Statistics quality	unknown or well-developed
Tier	T1 or T2
Gas type and origin*	pick from ‘coal-bed methane’, ‘deep-cut extraction’, etc.
Activity	pick from export, flaring, import, production, venting
Value	value
Units	pick from e.g., m^3
Type	pick from survey, modelled, etc.
Source	pick from ‘2006 IPCC default’, ‘ICAO’, etc.
Date issued	date
Reference	reference and comments
Uncertainty	either set from default or else enter value
units	e.g., kg
type	pick from survey, modelled, etc.
source	pick from ‘2006 IPCC default’, ‘ICAO’, etc.
issued	date
reference	reference and comments
Uncertainty max (for range only)	either set from default or else enter value
units	e.g., kg
type	pick from survey, modelled, etc.
source	pick from ‘2006 IPCC default’, ‘ICAO’, etc.
issued	date in format yyyy-mm-dd
reference	reference and comments
State	pick ‘draft’ or ‘published’ (only certain users can ‘publish’)

For ‘**1.B.2.a – Oil**’, the only difference from the above ‘1.B.2.b – Natural gas’ is the selection for the 4th item (see * above).

Instead of “Gas type and origin”, for 1.B.2.a Oil’ the selection is

Oil type and origin	pick from ‘bitumen API gravity < 10’, etc.

7. Activity Data (AD) Collections - IPPU

7.1 AD Collections Data Entry Process

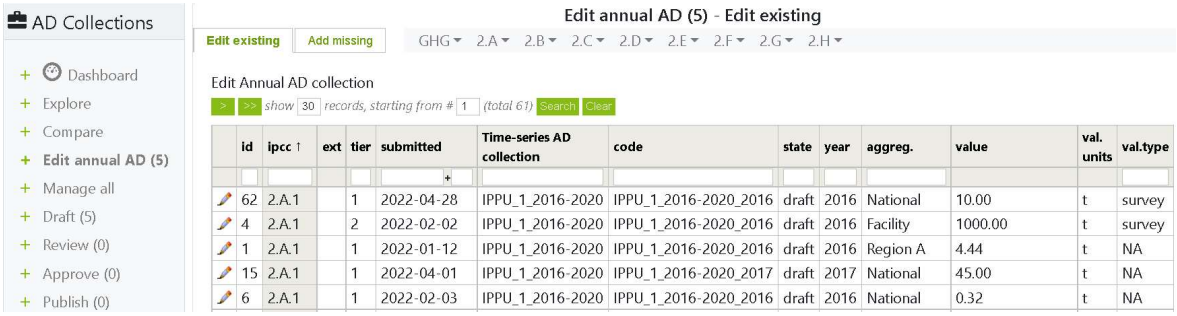
The AD collection data entry process is a subset of the 'AD Collections' process (see *5.1.1 The overall 'AD Collections' process* on page *15*).

7.1.1 Background

The AD collection drafting page enables you to view, insert, edit and delete AD collection activity data and information. But first, you have to select which AD collection you are going to work with. To do that:

In the left menu, click Draft and the system will show the list of AD collections available for drafting (***Figure 32***).

Figure 32. Select AD Collection for data entry - IPPU



The option tabs for record entries in the AD collection are the same as those for AD collection management, but they refer to a single record rather than to the entire AD collection:

List displays a table with the list of records; each record has a "**pencil**" icon at the beginning (this is the edit option) and a "**cross**" icon at the end (to delete a record),

Add allows entry of a new activity data record that includes the fuel consumption value and relevant supplementary information (e.g., fuel characteristics, uncertainty, and comments),

Export allows exporting existing activity data to an Excel (CSV) file,

Import allows importing data from Excel templates (for all tables and records, and for entire time series),

History contains a log of changes performed on records within the module,

Info provides relevant notes and guidance helping you understand available options and how to use them

7.1.2 How to edit activity data records

To edit existing AD collection names and details:

- click the **List** tab. You will see the existing table with records. Each record has a **pencil** button on the left for editing
- to modify the existing entry - click the "pencil" button before the record, then make your modification using the form provided, and

- click **Save** to save the updated record.
- To remove a record from the list, click the **cross** icon at the end of the record.

7.1.3 How to add a new data record – manual entry

The process of adding a new activity data record is similar to adding a new AD collection. To add a new activity data record, click **Add** and then use the provided form to create a new record. This will include entering both activity data and supporting information.

This form has nine category groups, shown by the tabs at the top. These are: GHG, 2A, 2B, 2C, 2D, 2E, 2F, 2G, and 2H.

Please note that GHG does not represent a particular IPPU category. It includes the capture and storage of greenhouse gases for each of the categories included in the sector. The form associated with the GHG tab, provides selection of category menu and for each category, selection of gases.

*General information fields (all entries here are **mandatory**) (**Figure 33**):*

Category	Select IPCC category for the data entry
Aggregation	Select the level of aggregation – national, regional, or facility – the list of aggregations relevant for your country will be set up in the relevant configuration table by your national inventory compiler. If additional aggregation levels are required (e.g., city, island, state) - they can easily be included by authorized users at the configuration level, please ask.
Statistics quality	Describe the reliability of the data used; your selection in this option will help SAGE to determine the correct default level of uncertainty for the activity data if the actual uncertainty is unknown.
Methodological tier	Identify the level of details required for the activity data entry.

The category you choose affects the data required in the form (e.g., GHG sector requires GHG gas details' whereas subcategories of 2.A.1 Cement production requires information about type of cement produced). The first example below is based on 'GHG' tab for recording GHG capture and storage, and the next example is based on one of the production and product use categories (2.A.1) (***Figure 34***).

Figure 33. Filling the general section in the activity data entry form - IPPU – category GHG

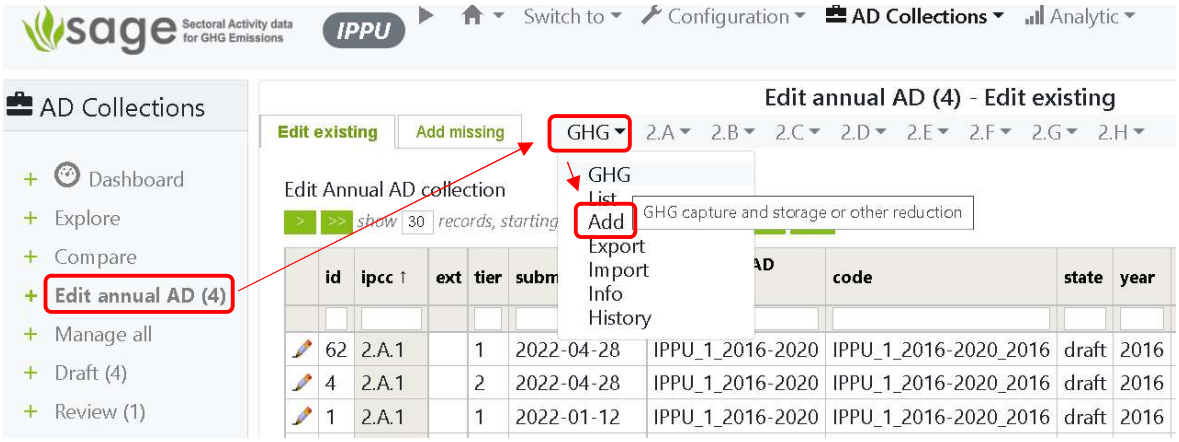
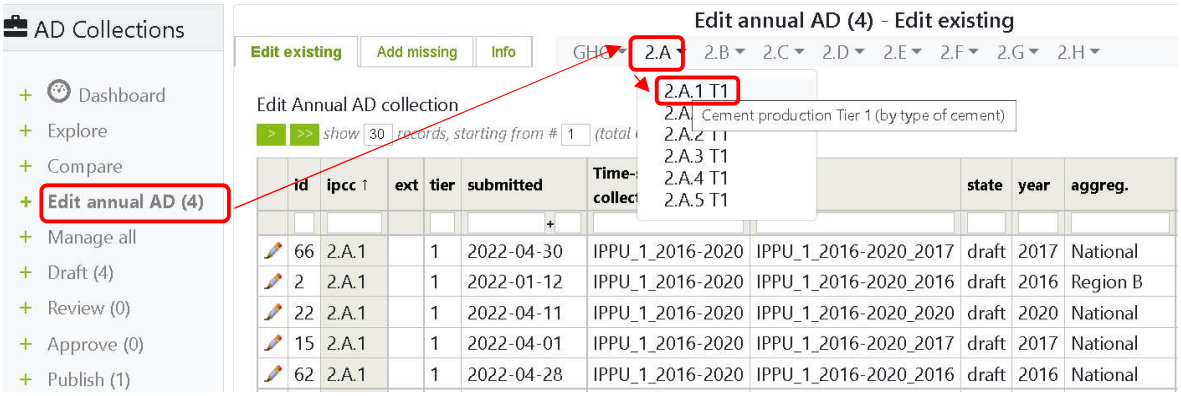
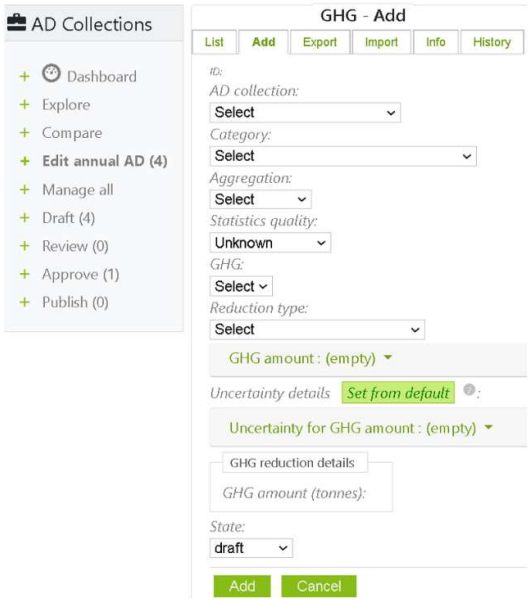


Figure 34. Filling the general section in the activity data entry form - IPPU – category 2A



Once the AD collection is selected, click 'Add' to add an item (***Figure 35***).

Figure 35. Adding activity data to IPPU – GHG category



AD collection: Choose the AD collection to add to.

Category: (2.A.1) Mandatory: Select an IPCC category for the data entry e.g., cement production

The system automatically shows the relevant fields and selectable items. Some categories (like cement production) can only produce GHG of CO_2 but some (e.g., 2.B.10 – Other) can produce a wide range of GHG's.

Aggregation: Mandatory: Select the level of aggregation (national, regional, or facility) your data will represent

Statistics quality: Mandatory: Describe the reliability of the data used

GHG: Select the greenhouse gas being reported

Reduction type: Select 'capture and store' or 'other'

GHG amount: Enter the value, units (e.g., tonnes, gigagrams), type (not applicable, survey, or modeled), source (e.g., IPCC, Expert judgement), date issued in format yyyy-mm-dd, and any reference/comments

Uncertainty for GHG amount: Enter the percentage value, type (survey or modeled), source (e.g., IPCC or expert judgement), and any reference/comments

When the entries are complete, SAGE calculates the amount of captured GHG or production (depending on category being reported) in the correct units in line with the 2006 IPCC Guidelines, and saves the record in the database. In the second example above, SAGE calculates the amount of Cement produced when button 'Add' is clicked (because category 2.A.1 was selected).

When the entries are complete, SAGE calculates the production or product usage value as required for entering into the IPCC equations and saves the record in the database.

7.1.4 How to add or edit gas Bank record

Only for the IPPU sector, only for category 2F items, there is an extra tab "Bank" (***Figure 36***).

Figure 36. IPPU – Bank

A "bank" is the amount of HFCs and other fluorinated ODS-substitutes contained in equipment in use. It is important for the inventory compiler to keep track of the bank and the flows of chemicals into and out of the bank. The following equation summarizes how the bank changes over the year due to emissions and other flows.

$Bank_y = Bank_y\text{-}1 + Addition_y - Removal_y$

Where: $Bank_y$ = Refrigerant bank on December 31st of year y, kg

$Bank_{y-1}$ = Refrigerant bank on December 31st of year y-1/January 1st of year y, kg

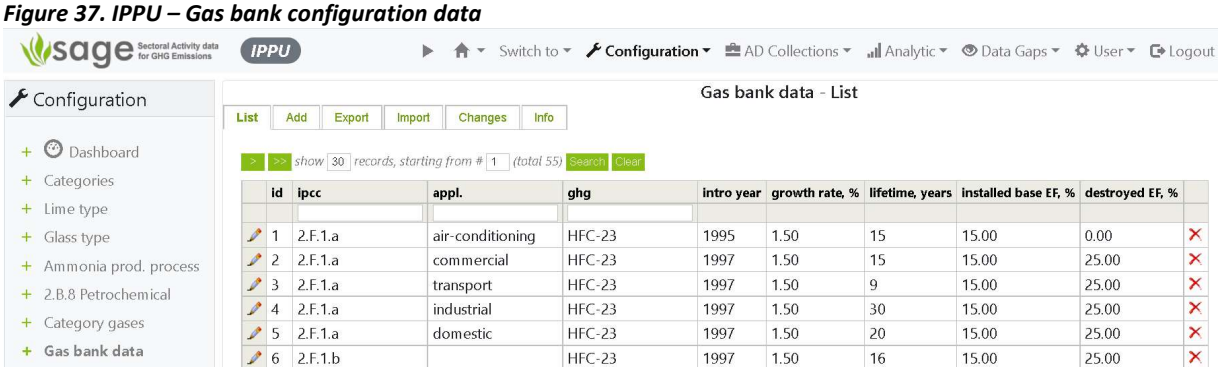
$Addition_y$ = Addition of new substances year y, kg

$Removal_y$ = Removal of substances exported, emitted or destroyed year y, kg

In the bank calculating module, SAGE reads the input data from two sources:

- The configuration table "Gas bank data" (see Figure 37 below) – for each gas, each category, and application group, provides a year of gas introduction to the national market, growth rate in new equipment, lifetime, emission factor from installed base, and % of gas destroyed at End-of-Life
- The activity data record that provides the data for a particular gas consumed in a particular category and application (***Figure 37***)

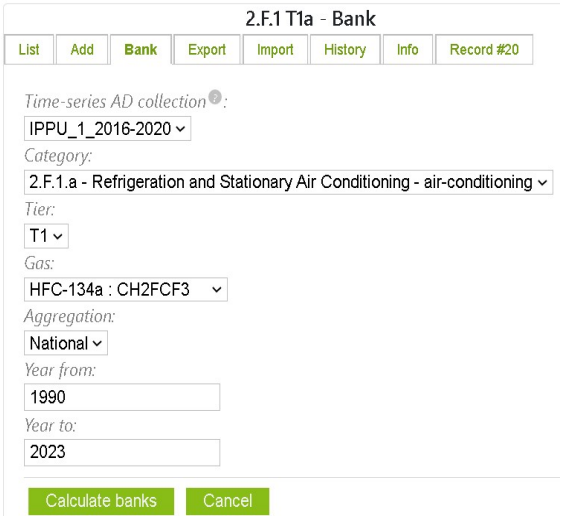
Figure 37. IPPU – Gas bank configuration data



	id	ipcc	appl.	ghg	intro year	growth rate, %	lifetime, years	installed base EF, %	destroyed EF, %	
	1	2.F.1.a	air-conditioning	HFC-23	1995	1.50	15	15.00	0.00	
	2	2.F.1.a	commercial	HFC-23	1997	1.50	15	15.00	25.00	
	3	2.F.1.a	transport	HFC-23	1997	1.50	9	15.00	25.00	
	4	2.F.1.a	industrial	HFC-23	1997	1.50	30	15.00	25.00	
	5	2.F.1.a	domestic	HFC-23	1997	1.50	20	15.00	25.00	
	6	2.F.1.b		HFC-23	1997	1.50	16	15.00	25.00	

The 'Bank entry' data entry form is similar to other AD collection data entry forms. The 'Gas' in this form is sourced from the 'Gas' chosen in the related AD collection record (***Figure 38***).

Figure 38. IPPU – Bank entry



The banks are calculated as a time series for all the years entered by the users using the methodology described in the 2006 IPCC Guidelines[1]. In the example above, the banks will be calculated from 1990 to 2023. If the "year from" entry precedes the year of the gas introduction, then the bank value for that year will be zero.

[1] https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/3_Volume3/V3_7_Ch7_ODS_Substitutes.pdf

8. Activity Data (AD) Collections - Agriculture

8.1 AD Collections Data Entry Process

The AD collection data entry process is a subset of the 'AD Collections' process (see *5.1.1 The overall 'AD Collections' process* on page 15). For all categories, all methodological tiers presented in the IPCC national GHG inventory software are included.

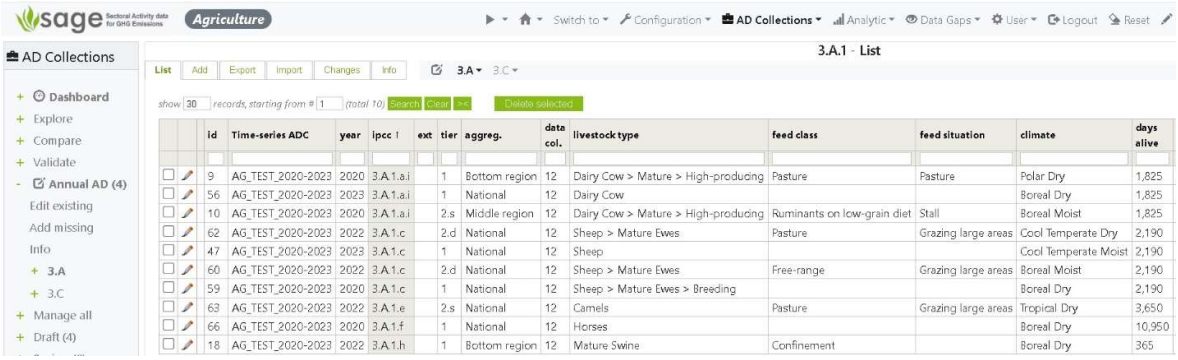
8.1.1 Background

General

The Annual AD collection page enables you to view, insert, edit, and delete AD collection activity data and information.

To view, edit, remove, and enter new records, in the left menu of the page, click Annual AD and the system will show the list of existing annual AD collections and their records available for editing. Above the table with the existing annual AD collections, you will see the major agriculture sector category groups with drop-down lists (3.A and 3.C in the IPCC classification) (**Figure 39**).

Figure 39. Displaying annual data collections – Agriculture



	id	Time-series ADC	year	ipcc	ext	tier	aggreg.	data col.	livestock type	feed class	feed situation	climate	days alive
	9	AG_TEST_2020-2023	2020	3.A.1.a.i		1	Bottom region	12	Dairy Cow > Mature > High-producing	Pasture	Pasture	Polar Dry	1,825
	56	AG_TEST_2020-2023	2023	3.A.1.a.i		1	National	12	Dairy Cow			Boreal Dry	1,825
	10	AG_TEST_2020-2023	2020	3.A.1.a.i		2.s	Middle region	12	Dairy Cow > Mature > High-producing	Ruminants on low-grain diet	Stall	Boreal Moist	1,825
	62	AG_TEST_2020-2023	2022	3.A.1.c		2.d	National	12	Sheep > Mature Ewes	Pasture	Grazing large areas	Cool Temperate Dry	2,190
	47	AG_TEST_2020-2023	2023	3.A.1.c		1	National	12	Sheep			Cool Temperate Moist	2,190
	60	AG_TEST_2020-2023	2022	3.A.1.c		2.d	National	12	Sheep > Mature Ewes	Free-range	Grazing large areas	Boreal Moist	2,190
	59	AG_TEST_2020-2023	2020	3.A.1.c		1	National	12	Sheep > Mature Ewes > Breeding			Boreal Dry	2,190
	63	AG_TEST_2020-2023	2022	3.A.1.e		2.s	National	12	Camels	Pasture	Grazing large areas	Tropical Dry	3,650
	66	AG_TEST_2020-2023	2020	3.A.1.f		1	National	12	Horses			Boreal Dry	10,950
	18	AG_TEST_2020-2023	2022	3.A.1.h		1	Bottom region	12	Mature Swine	Confinement		Boreal Dry	365

Three options on the left let you work with the entire pool of records from all available collections, categories, and years:

• Edit existing – to view and edit the existing records

• Add missing – to identify which category entries are missing for each of the agriculture sector categories for each collection according to the years each AD collection covers. These can be filtered to rationalize the viewed information. Some generic information is offered for each missing record. To complete a missing record, click a "pencil" icon. This will prompt you to enter the missing information and data and then save the record. This method is useful if one or two records are missing. To do a more systematic and extensive data entry, use category drop-down lists (3.A and 3.C, see sections 8.2.1 – 8.2.2 below).

• Info – a brief description of available options on the page.

Working with individual categories

Please note that in the IPCC classification, the agriculture sector and the land use, land-use change, and forestry sector are presented in the form of one sector – AFOLU. To match the categories included under the UNFCCC classification (and MPGs under the Paris Agreement), 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_2O Emissions from managed soils

3.C.5 – Indirect N_2O emissions from managed soils

3.C.6 – Indirect N_2O emissions from manure management

3.C.7 – Rice cultivation

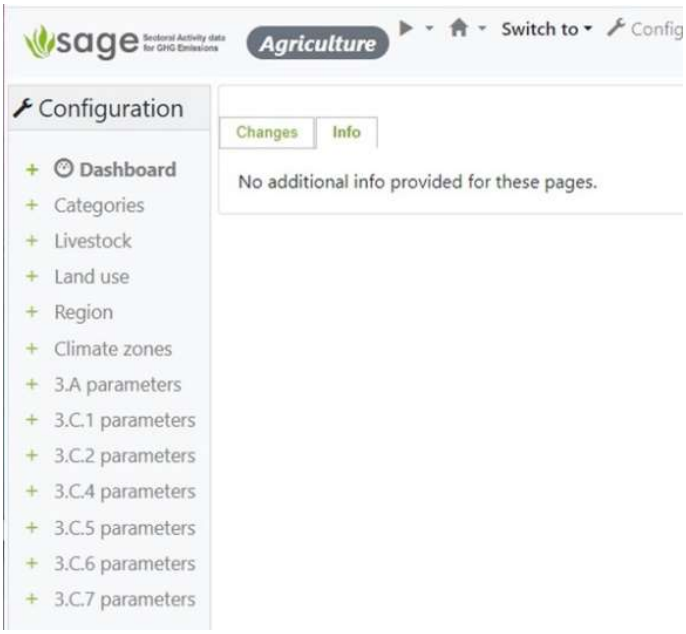
3.C.12 – N_2O emissions from aquaculture

In SAGE, these categories are grouped into several category groups that use the same background data set up in the configuration tables by technical inventory experts.

For each category, some parameters are not likely to change on an annual basis and others are expected to be changed from year to year. Parameters not likely to undergo an annual change are entered and stored in the **configuration tables**. The entries in these tables should be made only by authorized technical experts or the inventory compiler. These entries will define the available selection options in the data entry forms, and the default parameters (from the 2006 IPCC Guidelines or country-specific).

All configuration tables for the Agriculture sector are grouped by category or category family (e.g., configuration tables for 3.A.1 and 3.A.2 categories are grouped as 3.A). The tables that serve more than one category, are displayed above the category-specific tables (**Figure 40**).

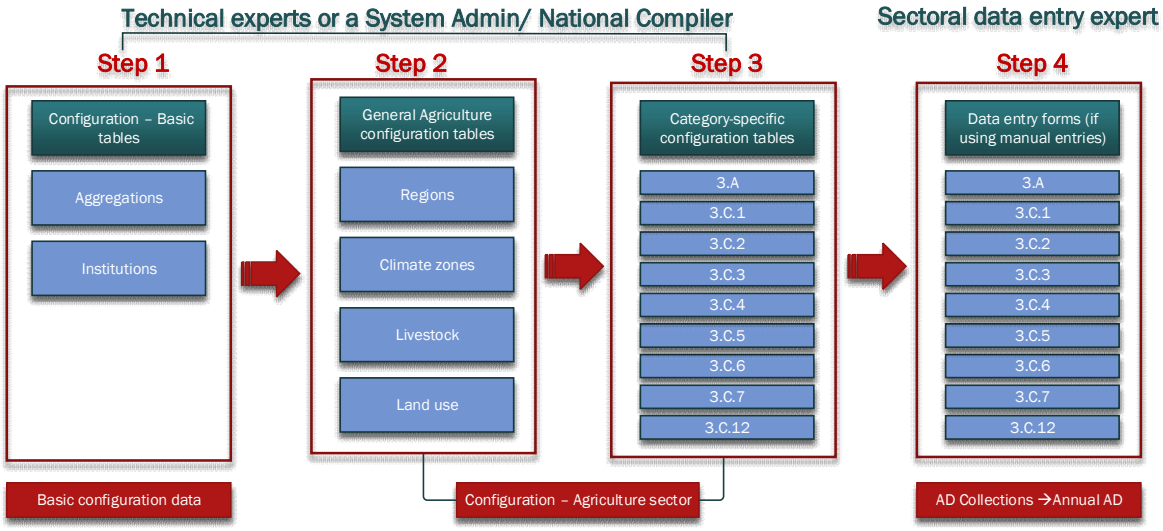
Figure 40. Agriculture sector-specific configuration tables - overview



The general configuration tables and the category-specific category tables need to be filled in and checked BEFORE the category entries are made in the relevant entry forms (see further details on the Agriculture sector configuration tables in 12.2 How to manage Configuration tables on page 136).

In the Agriculture sector, there is a dependency between some categories, therefore, some category entries should be done before the others. **Figure 41** below shows a general order of filling the activity data forms and the configuration tables. Section 8.1.3 provides general guidance for using data entry forms regardless of the category, and sections 8.1.4 to 8.1.13 provide guidance for each category group-specific configuration table requirements and data entry forms.

Figure 41. The general order of filling the configuration tables and the category data entry forms in the agriculture sector.



BEFORE YOU START:

Note that **some parameters are NOT MANDATORY** for some tiers and some field entries are not mandatory for entering the configuration parameters or the data entry forms. Those parameters and fields have an option ANY. If you do not have specific information that would allow selection of such parameter or such field entry, just select ANY. If this option is not available, then it is mandatory to select a specific value from the option selection list.

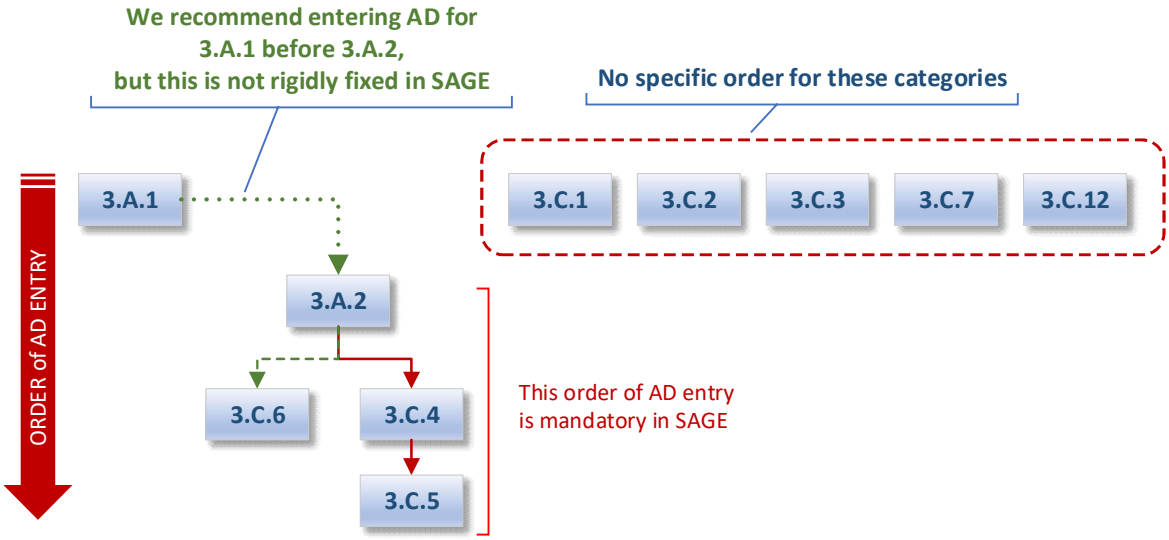
IMPORTANT:

In the Agriculture sector, different categories may use the same data entries. To maintain data consistency, enter category data in the order as follows (and as shown in ***Figure 42***).

The following are constraints for the data entry order applied in SAGE:

- Part of the data for a record in one category is taken from another category (e.g., some entries in 3.A.2 category records are used by 3.C.4 category, therefore, entries in 3.A.2 category must be done first)
- Some values in one category could be made by using entries from another category as an option (e.g., using the "**Set from 3.A.2 AD**" button for category 3.C.6)
- Consistency of values between categories may not be enforced rigidly but can be checked using the function "Validate" in the AD collections. This function displays the same variable used in different categories and shows whether their values are the same or different.

Figure 42. ***Order of category entries in SAGE***



8.1.2 How to start adding a new data record – common steps for all categories

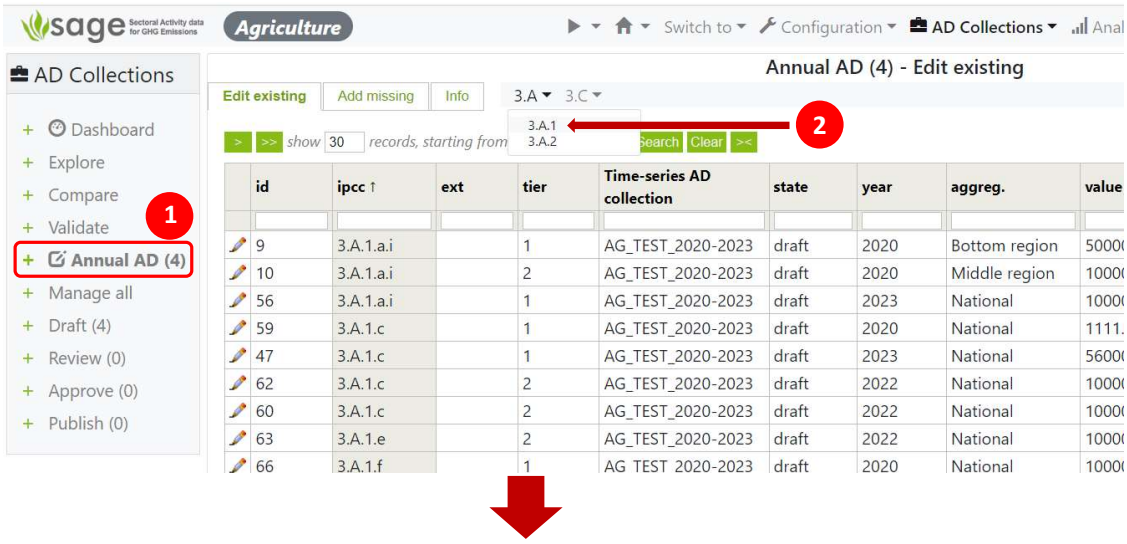
This section explains the steps and form entry options that are common for all categories in the agriculture sector in SAGE.

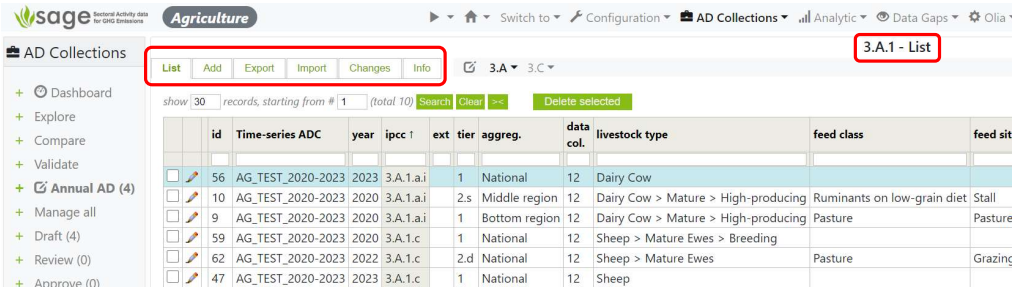
To start working with the records in the individual categories with a few common steps that are required for each category in the agriculture sector regardless of the category grouping:

- **select a category** from a relevant drop-down list above the records table (3.A and 3.C).

The example below is based on one of the waste categories (3.A.1). (***Figure 43***).

Figure 43. ***Selection of a category in SAGE (example – 3.A.1 category)***





The option tabs for record entries in the AD collection are the same as those for AD collection management, but they refer to a single record rather than to the entire AD collection:

List displays a table with the list of records; each record has a "**pencil**" icon at the start (to edit a record) and a "**cross**" icon at the end (to delete a record),

Add allows entry of a new activity data record that includes the fuel consumption value and relevant supplementary information (e.g., fuel characteristics, uncertainty, and comments),

Export allows exporting existing activity data to an Excel (CSV) file,

Import allows importing data from Excel templates (for all tables and records, and for entire time series),

Changes contains a log of changes performed on records within the module,

Info provides relevant notes and guidance helping you understand available options and how to use them

The process of adding a new activity data record is similar to adding a new AD collection.

Similar to the energy, IPPU, and waste sectors, the agriculture sector categories have generic (common) and category-specific information fields to hold category-specific parameters that change from category to category. The category you choose affects the data required in the form. Once both generic and category-specific information and data are entered, click 'Add' to add an item.

8.1.3 How to add new activity data records – common to all agriculture categories

- Select category group from the drop-down lists above the record table (3.A, 3.C, ***Figure 43*** above).
- Click tab **Add** and then use the provided form to create a new record. The category AD entry form will appear.
- In the provided category AD entry form, select the **Annual AD collection** name from the drop-down list in the form.
- Select **Category** with the required extension from the drop-down list in the form.
- Select general information options in the provided drop-down lists:
  - **Aggregation** level (e.g., *national*)
  - **Statistics quality** (either *well developed* or *unknown*)
  - Methodological **Tier** (e.g., *T1*)
  - Optional: Select **Data collection period** in months (in different countries, the agricultural data are collected within different timeframes and with different frequencies; the default value is 12 months)

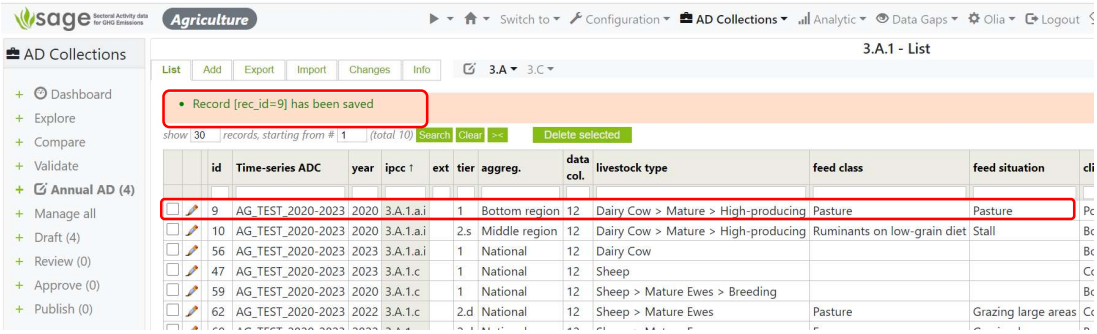
- Enter both activity data and supporting information in the provided information fields and menu items from the drop-down lists in the form
- For each entered parameter value:
    - mandatory entries:
        - **parameter value** (sometimes it can be entered from the default or the other category – SAGE will provide the button to do so)
        - **Units** of measurement (select from the drop-down list underneath the parameter field unless it is specified in the parameter name)
        - **Source** of data/information – select from the provided drop-down list.
        - source information **Type** (*survey* for actual data and *modelled* otherwise)
    - optional entries:
        - **Date issued** to let others know when this data has been published/made available/recorded in format yyyy-mm-dd.
        - **Reference and comments** to record the link to the information source and make notes that might be useful to others – for example, this record is provisional, the final value will be available on dd/mm/yy from <person/organization>.

- Enter **Uncertainty**:
    - Option 1: click the button **Select from default** – SAGE will assign the value a default uncertainty according the to 2006 IPCC Guidelines
    - Option 2: use the manual entry to enter the country-specific uncertainty value in the provided information fields and enter the source for the uncertainty data.

- Select the **State** of the record (*draft* = you might come back to it and re-check or *ready* = the record is final and ready for review).
- Click the green button **Add** on the bottom of the form
- If you wish to enter more records (e.g., for the next year) – click again tab **Add** above the record (the one near **List**), and the new form pre-filled with the previous information will appear. This is a quick way of entering several records because you only need to make small edits in the provided entries and then again click the green button **Add** on the bottom of the form without going to the main record page.

When the entries are complete, SAGE provides the summary of parameters as required for entering into the IPCC equations and saves the record in the database (***Figure 44***).

Figure 44. A records summary generated by SAGE



8.2 Category-specific data entries

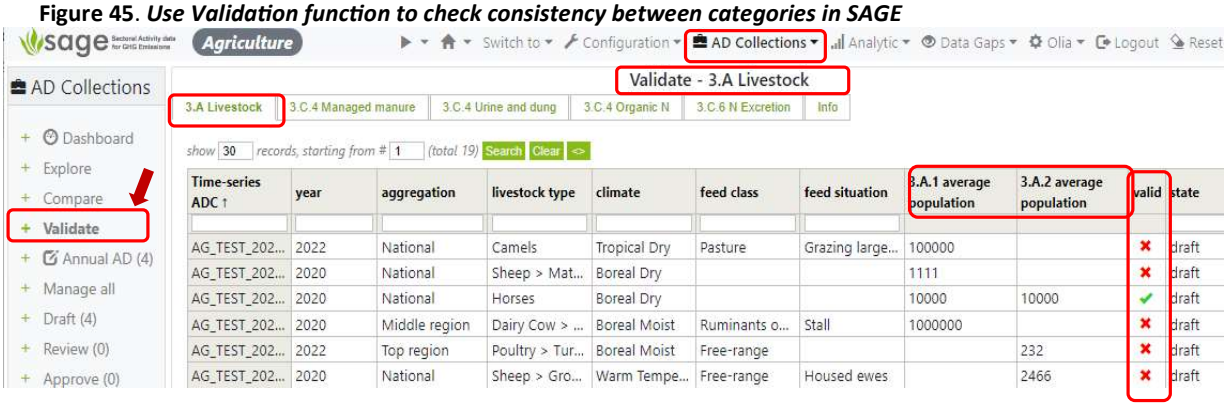
8.2.1 Category group 3.A

This category group consists of two categories – 3.A.1 – Enteric fermentation and 3.A.2 – manure management.

Consistency between categories

The livestock parameters should be consistent between categories 3.A.1 and 3.A.2. To check if the numbers are consistent, use Validation function in SAGE (***Figure 45***).

Figure 45. ***Use Validation function to check consistency between categories in SAGE***

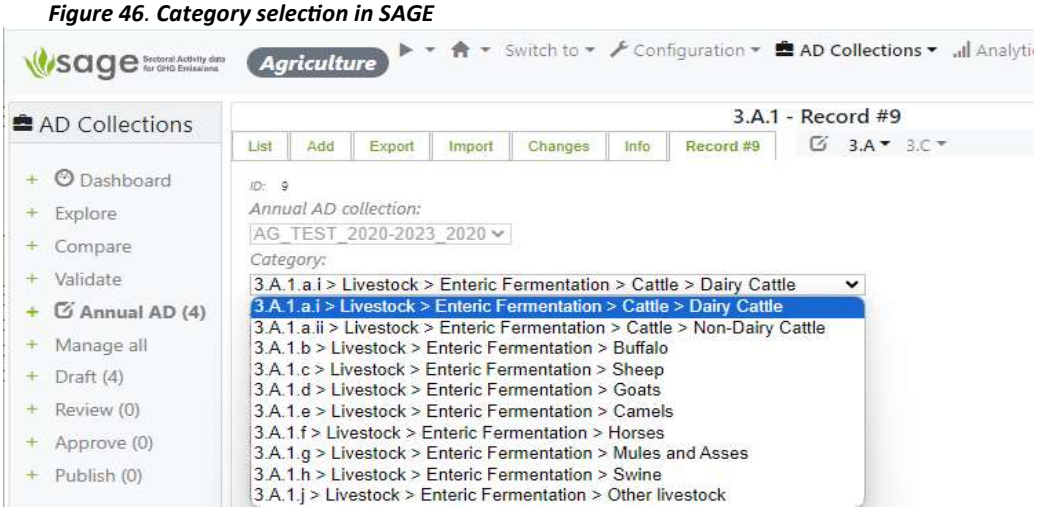


If column "valid" shows a **green tick**, the values in the corresponding line entered for 3.A.1 and 3.A.2 are consistent. A **red cross** in column "valid" shows that the entries are inconsistent or missing. The same approach can be used for checking consistency between entries in other categories.

The category selection in SAGE follows the IPCC approach and includes a combination of the process leading to GHG emissions + basic livestock type (***Figure 46***). For example,

- *3.A.1> Livestock > Enteric Fermentation> Cattle> Dairy Cattle* or
- *3.A.2> Livestock > Manure Management > Cattle> Dairy Cattle*

Figure 46. Category selection in SAGE



Category-specific fields additional to those described in section 8.1.3 include:

- Data collection period (months) (default is on the annual basis = 12 months)
- Feeding class and diet (select **Any** if unknown)
- Feeding situation (select **Any** if unknown)
- Climate zone (select specific climate zone most applicable to your country or make regional entries)
- Livestock type (contains livestock subdivisions available for the selected category)

Once Livestock category is selected, additional entry blocks appear:

- Number of animals produced annually
- Animal days alive – includes "Set from default" button for an automatic entry of default parameters that were entered in the configuration layer.
- Uncertainty block for the above parameters – includes "Set from default" button for an automatic entry of default parameters that were entered in the configuration layer.

Underneath, there are two sections on this page:

- "calculated" to show calculated values on a basis of the entered data and the data available from the configuration tables
- "Parameters" to show which parameters from the configuration layer were used for the calculation

Click "Update" button to display the complete record on the screen and, if everything is correct, press "Add" button to save your record and add it to the collection (***Figure 47***)

Note that the state of this record is currently "draft". If you are not planning to work with this record anymore and it is ready for the review, change the state to "ready" (***Figure 47)***. The example below is for the category 3.A.1, tier 1. If a higher tier is selected (T2 simplified or T2 detailed), the principal structure of the form will not change, but additional fields will appear to accommodate the data for the higher tier sectors.

When you pressed "Add" button, SAGE displays the list of all records for the category (***Figure 48***).

Figure 47. Entering the data in category group 3.A.

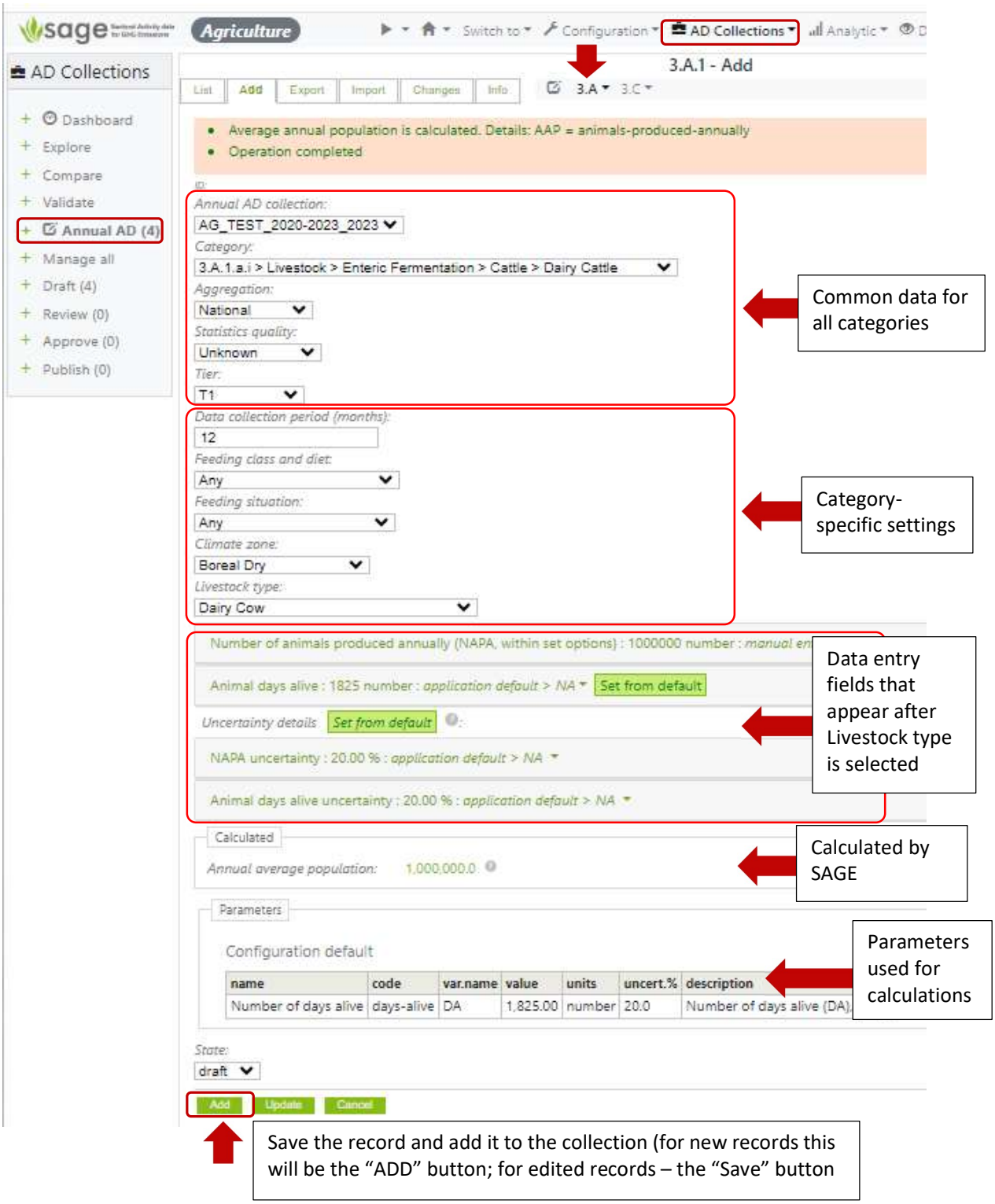
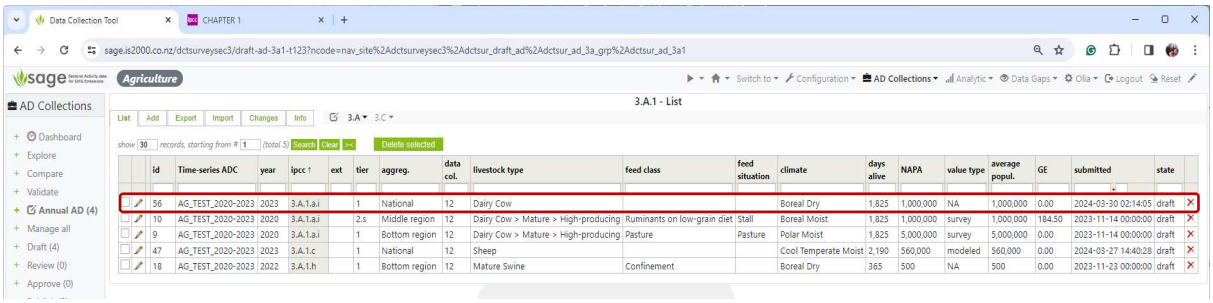


Figure 48. The list of records is updated



8.2.2 Category group 3.C

Category group 3.C consists of categories that include the data on aggregate sources and non-CO_2 emissions sources on land. In the UNFCCC classification under the ETF, some of these categories describe the agriculture sector, and some – the LULUCF (Land use, land-use change, and Forestry) sector. SAGE recognizes this subdivision. The categories that cover the **agriculture sector** data include:

Two subcategories associated with biomass burning in agricultural lands:

3.C.1.b – Burning in Cropland

3.C.1.c – Burning in Grassland

Two categories that describe special cases of application of chemicals to improve the productivity of agricultural lands:

3.C.2 – Liming

3.C.3 – Urea application

Three categories describing activities associated with direct and indirect N_2O emissions from agricultural lands:

3.C.4 – Direct N_2O emissions from managed soils

3.C.5 – Indirect N_2O emissions from managed soils

3.C.6 – Indirect N_2O emissions from manure management

One category that describes activities associated with rice cultivation:

3.C.7 – Rice cultivation

One category that describes N_2O emissions from aquaculture:

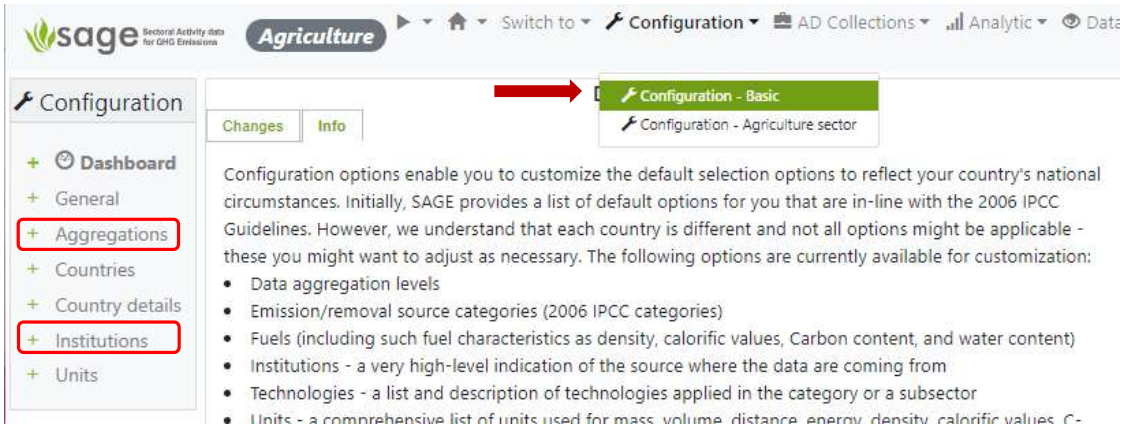
3.C.12 – N_2O emissions from aquaculture

8.2.2.1 Burning in agricultural lands (3.C.1.b and 3.C.1.c)

Step 1 The technical expert should check and update the levels of aggregations and potential data sources (tables Aggregations and Institutions) listed according to the country's national circumstances:

Configuration - basic > Tables (Aggregations, Institutions) ***(Figure 49)***

Figure 49. Configuration – basic tables; Aggregations and Institutions table links are in the red frames

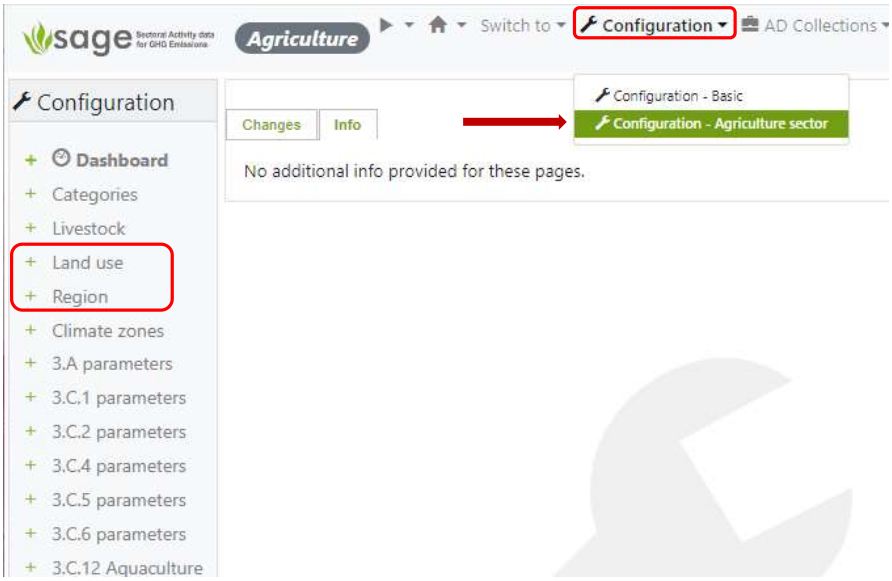


(For more details, see '12.2 How to manage Configuration tables' on page 136)

Step 2 for these subcategories requires checking and updating the following tables in the cross-category section of the configuration tables for the agriculture sector:

Configuration – Agriculture sector > Tables (Regions, Land use) ***(Figure 50)***

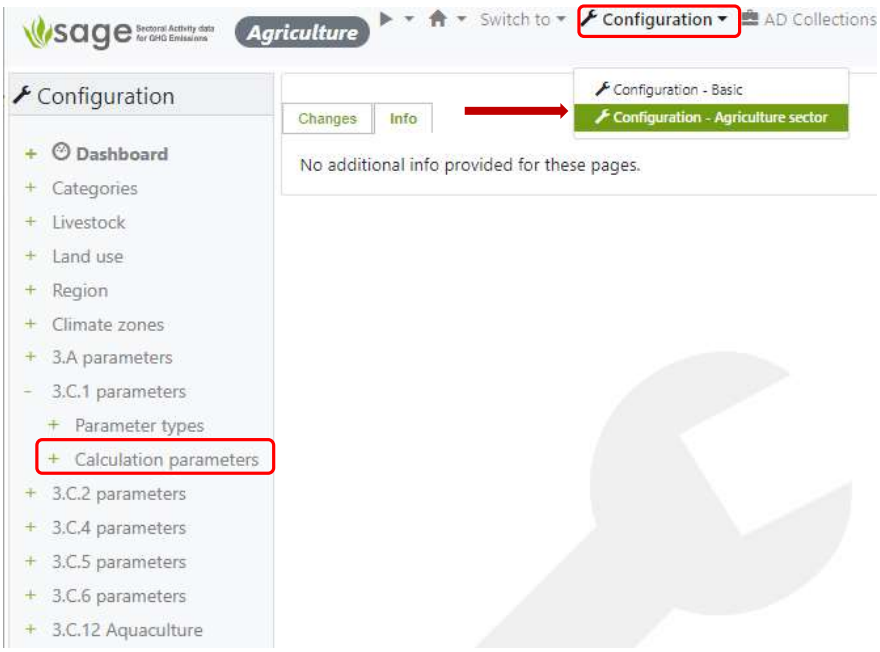
Figure 50. Configuration – Agriculture sector tables; Land use and Region table links are in the red frames



Step 3 for these subcategories requires checking and updating the calculated parameters under 3.C.1 section in the agriculture category-specific section of the configuration tables:

Configuration – Agriculture sector > 3.C.1 > Calculated parameters ***(Figure 51)***

Figure 51. Configuration – Agriculture sector category-specific tables for 3.C.1; Calculated parameters link is in the red frame



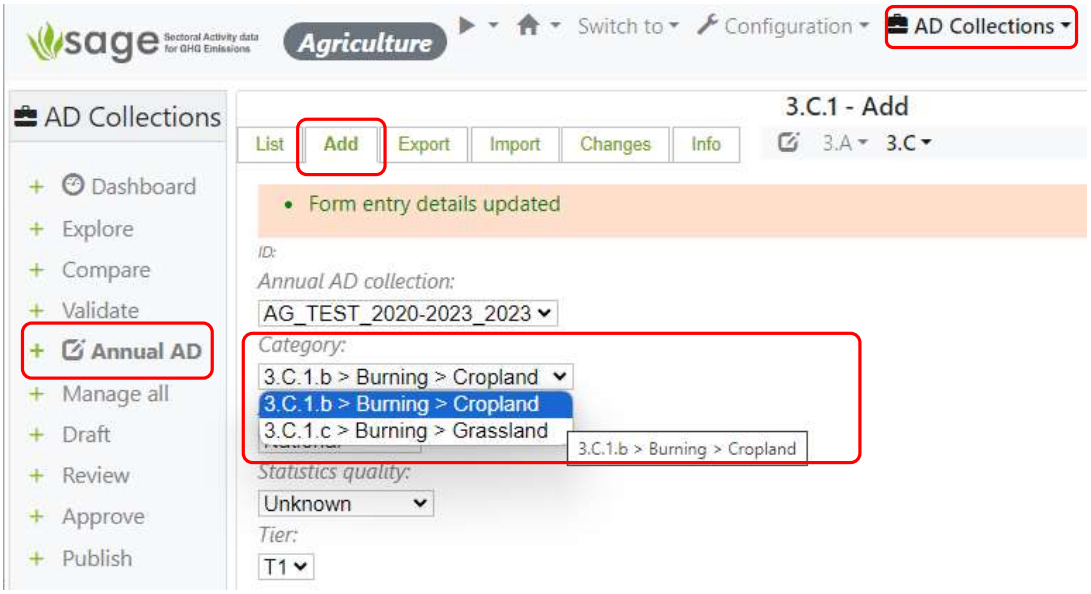
Step 4 fill in the activity data entry forms in the AD Collection block in SAGE.

For this category SAGE offers two agriculture-related subcategories categories – 3.C.1.b – Burning in cropland and 3.C.1.c – Burning in grassland.

The category selection in SAGE follows the IPCC approach and includes a combination of the process leading to GHG emissions + land use type where the process occurs (***Figure 52***). For example,

- *3.C.1.b* > Burning > *Enteric Fermentation> Cropland* or
- *3.C.1.c* > Burning > *Enteric Fermentation> Grassland*

Figure 52. Category selection in SAGE



Category-specific fields additional to those described in section 8.1.3 include:

- Region (select **Unspecified** if unknown or not applicable)
- Land unit code (enter the appropriate land use code, and ensure that the code is used consistently across the inventory)
- Current land use type (select from the provided options as applicable)
- Initial land use type (select from the provided options as applicable)
- Fire type (select **Any** if unknown)
- Burning activity type (select from the provided options as applicable)
- C pool (select from the provided options as applicable)

Please note that all selection options appear as they are set in the configuration tables. If the selection menu does not include an option that should be applicable, consult with your technical expert or the system administrator and request adding this option in the relevant configuration tables.

Once category-specific parameters are entered or selected, enter the data into the provided data fields:

- Area burnt (in ha)
- Mass of fuel available for combustion (= fuel stock), (t d.m./ha)
- Uncertainty block for the above parameters – includes "Set from default" button for an automatic entry of default parameters that were entered in the configuration layer.

Underneath, there are two sections on this page:

- "calculated" to show calculated values on a basis of the entered data and the data available from the configuration tables
- "Parameters" to show which parameters from the configuration layer were used for the calculation

Click "Update" button to display the complete record on the screen and, if everything is correct, press "Add" button to save your record and add it to the collection (***Figure 53)***

Note that the state of this record is currently "draft". If you are not planning to work with this record anymore and it is ready for the review, change the state to "ready" (***Figure 53)***. The example below is for the category 3.C.1.b, tier 1. If a higher tier is selected, the principal structure of the form will not change, but it is expected that the activity data are further disaggregated by regions.

When you pressed "Add" button, SAGE displays the list of all records for the category (***Figure 53***).

Figure 53. Entering the data in category group 3.C.1

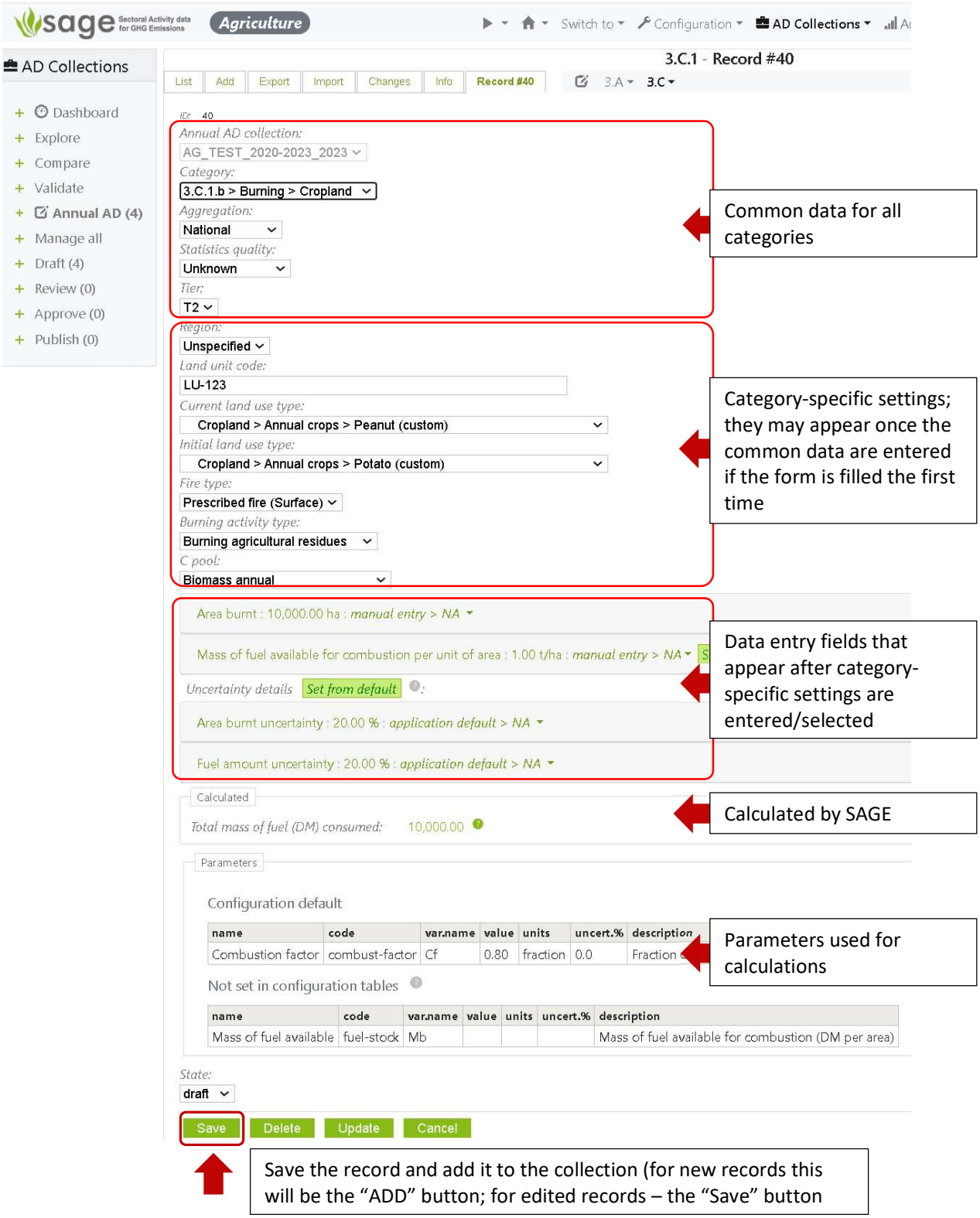
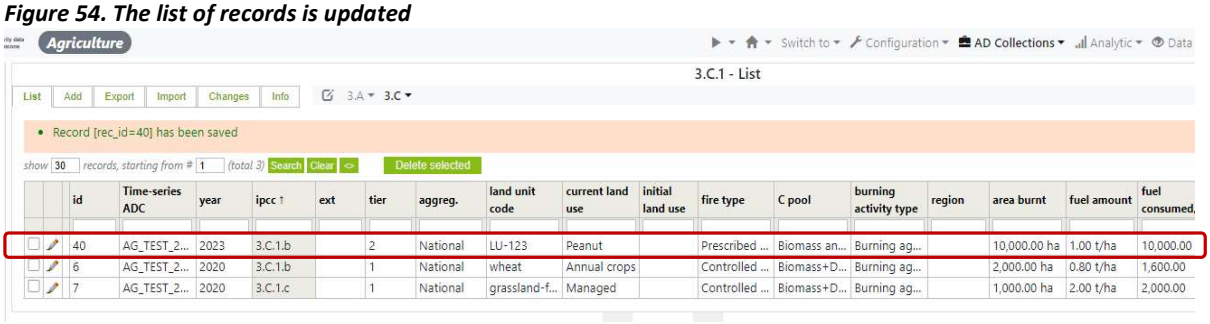


Figure 54. The list of records is updated



	id	Time-series ADC	year	ipcc ↑	ext	tier	aggreg.	land unit code	current land use	initial land use	fire type	C pool	burning activity type	region	area burnt	fuel amount	fuel consumed
	40	AG_TEST_2...	2023	3.C.1.b		2	National	LU-123	Peanut		Prescribed ...	Biomass an...	Burning ag...		10,000.00 ha	1.00 t/ha	10,000.00
	6	AG_TEST_2...	2020	3.C.1.b		1	National	wheat	Annual crops		Controlled ...	Biomass+D...	Burning ag...		2,000.00 ha	0.80 t/ha	1,600.00
	7	AG_TEST_2...	2020	3.C.1.c		1	National	grassland-f...	Managed		Controlled ...	Biomass+D...	Burning ag...		1,000.00 ha	2.00 t/ha	2,000.00

8.2.2.2 Liming and Urea application (3.C.2 and 3.C.3)

The principal steps in entering the activity data for 3.C.2 and 3.C.3 categories are the same. The differences are noted in the steps below.

Step 1 for these categories is the same as for subcategories of category 3.A. The technical expert should check and update the levels of aggregations and potential data sources (tables Aggregations and Institutions) listed according to the country's national circumstances:

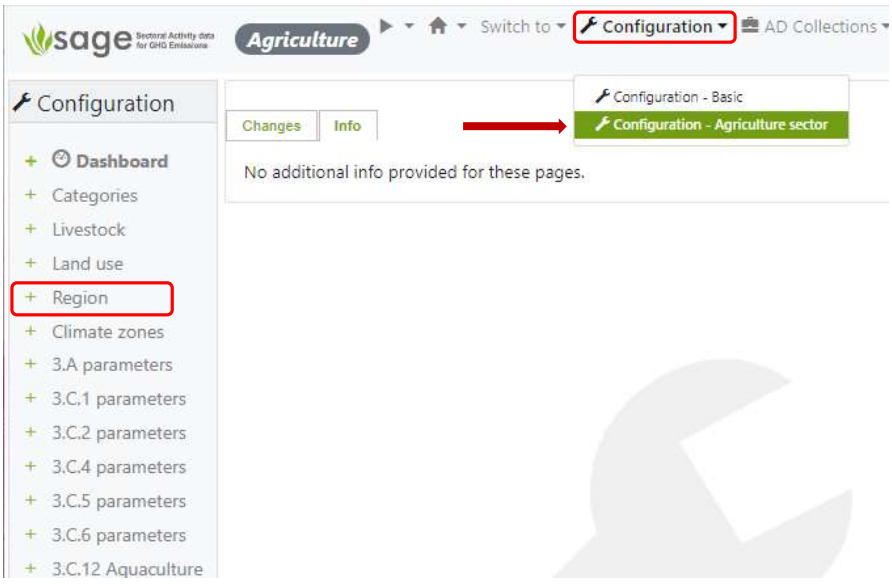
*Configuration - basic > Tables (Aggregations, Institutions) (**Figure 49**)*

(For more details, see '12.2 How to manage Configuration tables' on page 136)

Step 2 for these subcategories requires checking and updating the following tables in the cross-category section of the configuration tables for the agriculture sector:

*Configuration – Agriculture sector > Table (Regions) (**Figure 55**)*

Figure 55. Configuration – Agriculture sector tables; Region table link is in the red frame

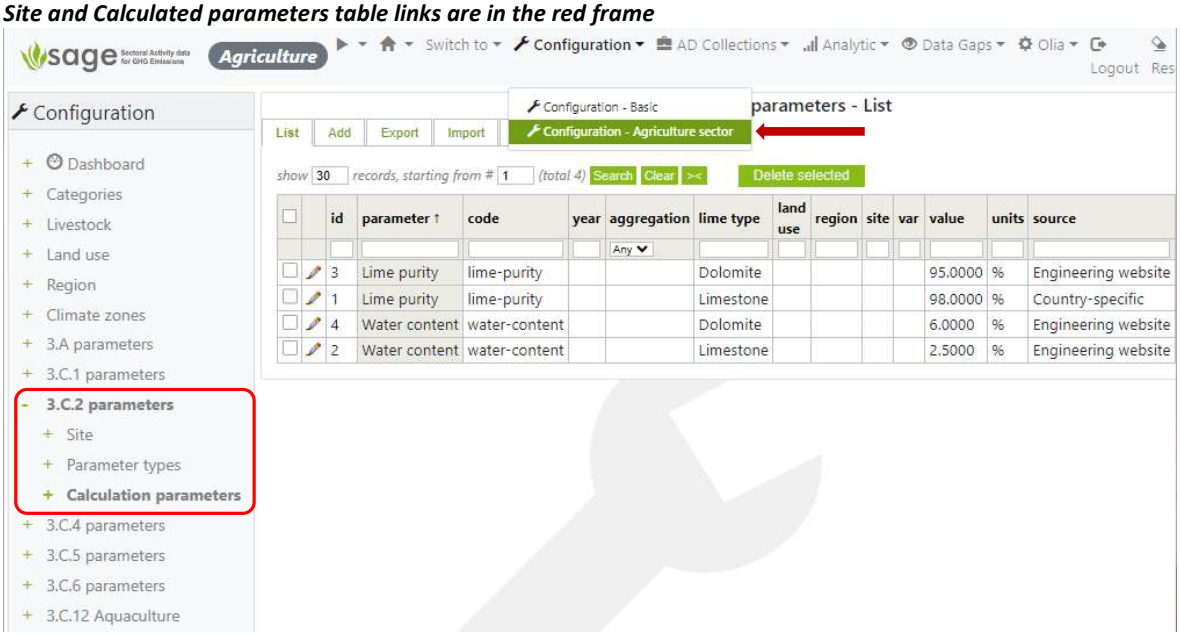


Step 3 for these subcategories requires checking and updating the calculated parameters under 3.C.1 section in the agriculture category-specific section of the configuration tables:

*For 3.C.2: Configuration – Agriculture sector > 3.C.2 > Tables (Site, Calculated parameters) (**Figure 56**)*

For 3.C.3: no additional tables

Figure 56. Configuration – Agriculture sector category-specific tables for 3.C.2
Site and Calculated parameters table links are in the red frame

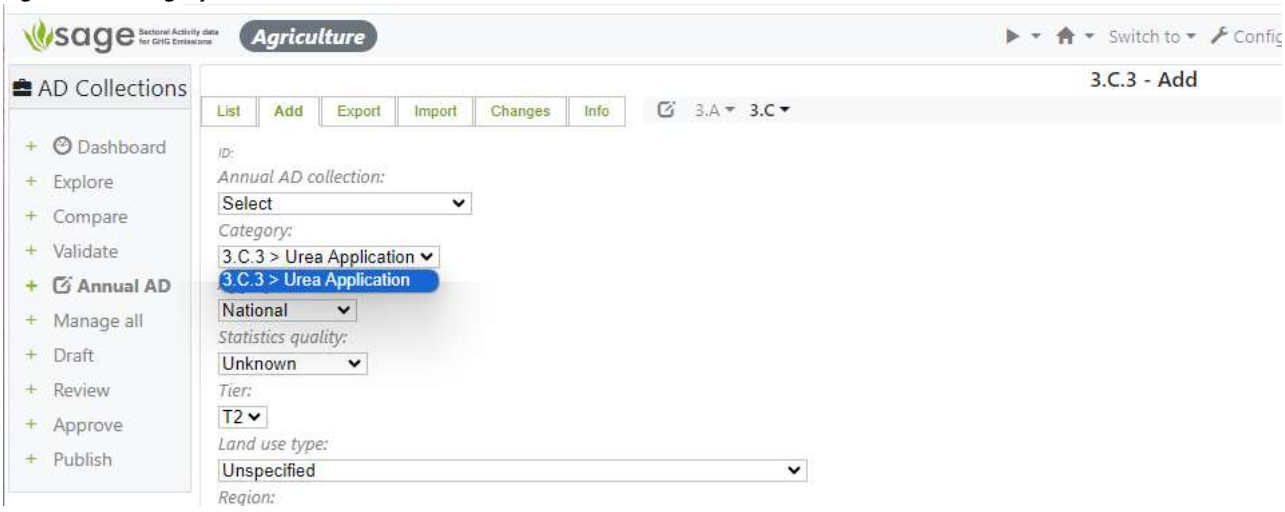


Step 4 fill in the activity data entry forms in the AD Collection block in SAGE.

For each of the two categories, the category selection in SAGE follows the IPCC approach and includes a combination of the processes leading to GHG emissions (***Figure 57***). For example,

- *3.C.2* > Liming or
- *3.C.3* > Urea application

Figure 57. Category selection in SAGE



Category-specific fields additional to those described in section 8.1.3 include:

- Region (select **Unspecified** if unknown or not applicable)
- Land use type (select from the provided options as applicable)
- Calculation approach (select from the provided options as applicable)

- For 3.C.2 only:
  - Lime type (select from the provided options as applicable)
  - For T2 and T3 – Site (select **Unspecified** if not applicable or unknown)
- For 3.C.3 only:
  - For T2 and T3 – Carbon content, % (carbon content of urea, enter **20** if country-specific value is not available)

Please note that all selection options appear as they are set in the configuration tables. If the selection menu does not include an option that should be applicable, consult with your technical expert or the system administrator and request adding this option in the relevant configuration tables.

Once category-specific parameters are entered or selected, enter the data into the provided data fields:

- Amount of chemical applied (**Lime** for 3.C.2 and **Urea** for 3.C.3)
- Uncertainty block for the above parameters – includes "Set from default" button for an automatic entry of default parameters that were entered in the configuration layer.

Underneath, there are two sections on this page:

- "calculated" to show calculated values on a basis of the entered data and the data available from the configuration tables
- "Parameters" to show which parameters from the configuration layer were used for the calculation

Click "Update" button to display the complete record on the screen and, if everything is correct, press "Add" button to save your record and add it to the collection (***Figure 58***)

Note that the state of this record is currently "draft". If you are not planning to work with this record anymore and it is ready for review, change the state to "ready" (***Figure 58***). The example below is for the category 3.C.1.b, tier 1. If a higher tier is selected, the principal structure of the form will not change, but it is expected that the activity data will be further disaggregated by region.

When you press the "Add" button, SAGE displays the list of all records for the category (***Figure 59***).

Figure 58. Entering the data in category group 3.C.3 (similar to 3.C.2)

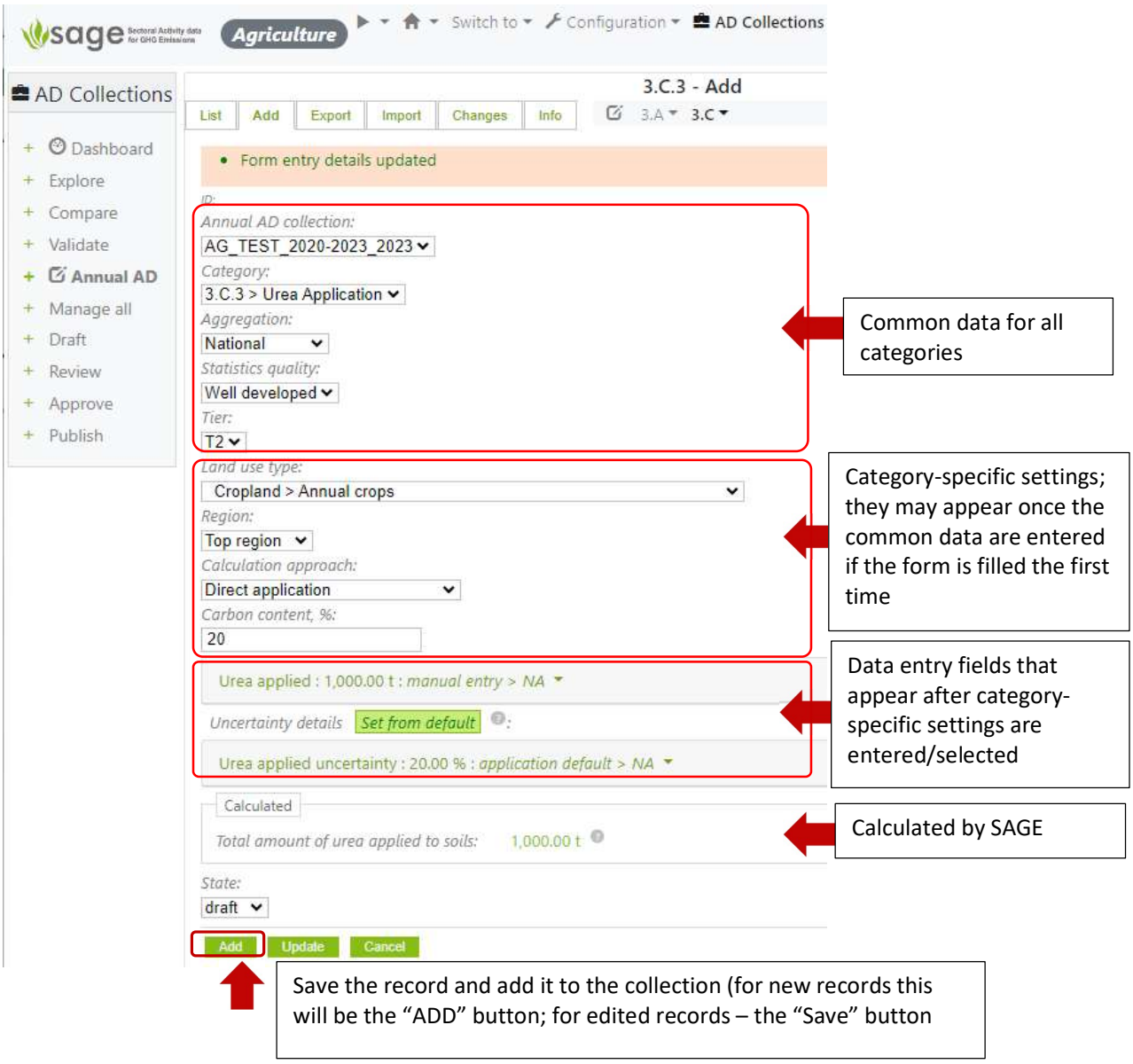
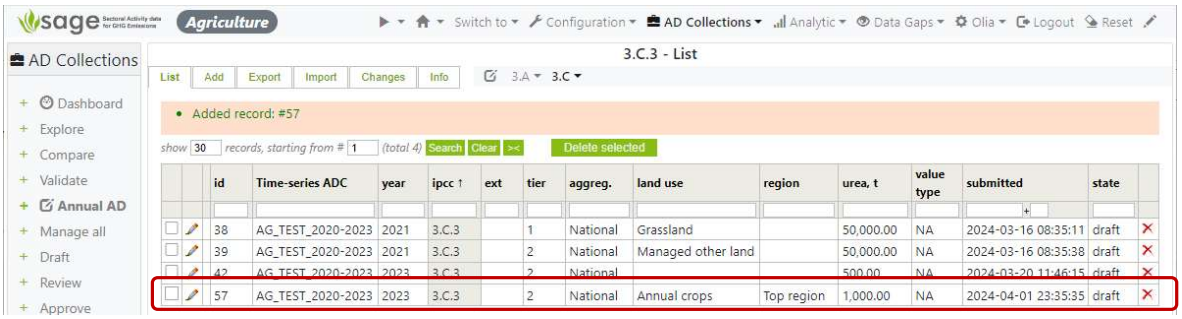


Figure 59. The list of records is updated



8.2.2.3 Direct N_2O emissions from managed soils (3.C.4)

The 3.C.4 category includes several subcategories that reflect different sources of nitrogen added to agricultural soils leading to direct N_2O emissions. The following subcategories are included:

- synthetic N fertilizers
- organic N applied as fertilizer (e.g., animal manure, compost, sewage sludge, rendering waste)
- urine and dung N deposited on pasture, range, and paddock by grazing animals
- N in crop residues (above-ground and below-ground)
- N mineralization associated with loss of soil organic matter resulting from change of land use or management of mineral soils
- Drainage of managed organic soils
- Rewetting of managed organic soils.

Each of these subcategories has a data entry form in SAGE.

Additionally, SAGE includes a special form of data entry that corresponds to the tab "Managed manure N available for application to managed soils, feed, fuel, or construction uses".

Consistency of the data between categories

The following Activity data entry forms use a substantial amount of data already entered in 3.A.2 category:

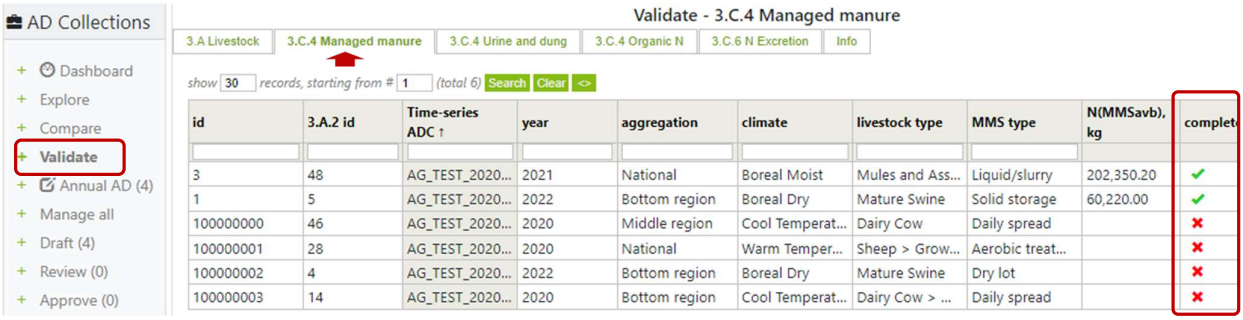
- **Urine and dung N deposited on pasture, range, and paddock by grazing anima** (abbreviated reference is **"Urine and dung")**
- **Managed manure N available for application to managed soils, feed, fuel, or construction uses (**abbreviated reference is **"Managed manure")**

To **ensure consistency** of data entries between categories, use the following approach:

- Before data entry in 3.C.4: enter the data for 3.A.1 and 3.A.2 **BEFORE** making data entries in these data entry forms in 3.C.4.
- After data entry to 3.C.4: Use SAGE function **Validate** to check if:
  - In the **3.C.4 Managed manure** tab: 3.C.4 managed manure AD record is completed for all relevant 3.A.2 records (***Figure 60***).
  - In the **3.C.4 Urine and dung** tab: amount of N from manure available to application entered in **3.C.4 Urine and dung** subcategory matches the N amount entered in 3.A.2 category (***Figure 61***).
  - In the **3.C.4 Organic N** tab: Check that the fraction of total N from all MMS except Pasture/Range/Paddock applied to soils does not exceed 100% (***Figure 62***).

More specific details on ensuring consistency of data entries between categories are in the relevant subcategory sections in this chapter.

Figure 60. Use of Validate function to check consistency between category data entries for 3.C.4 Managed manure and the relevant 3.A.2 category



id	3.A.2 id	Time-series ADC	year	aggregation	climate	livestock type	MMS type	N(MMSavb), kg	complet
3	48	AG_TEST_2020...	2021	National	Boreal Moist	Mules and Ass...	Liquid/slurry	202,350.20	✓
1	5	AG_TEST_2020...	2022	Bottom region	Boreal Dry	Mature Swine	Solid storage	60,220.00	✓
100000000	46	AG_TEST_2020...	2020	Middle region	Cool Temperat...	Dairy Cow	Daily spread		✗
100000001	28	AG_TEST_2020...	2020	National	Warm Temper...	Sheep > Grow...	Aerobic treat...		✗
100000002	4	AG_TEST_2020...	2022	Bottom region	Boreal Dry	Mature Swine	Dry lot		✗
100000003	14	AG_TEST_2020...	2020	Bottom region	Cool Temperat...	Dairy Cow > ...	Daily spread		✗

The Complete column shows if the source record from the 3.A.2 category is used to produce a new record in 3.C.4 (Managed manure).

Figure 61. Use of Validate function to check consistency between category data entries between category data entries for 3.C.4 Urine and dung and the relevant 3.A.2 category

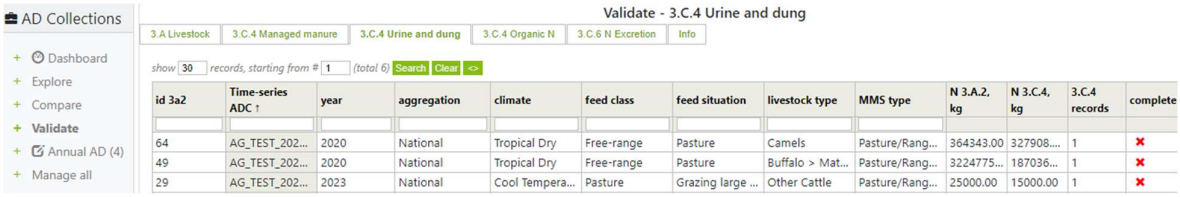
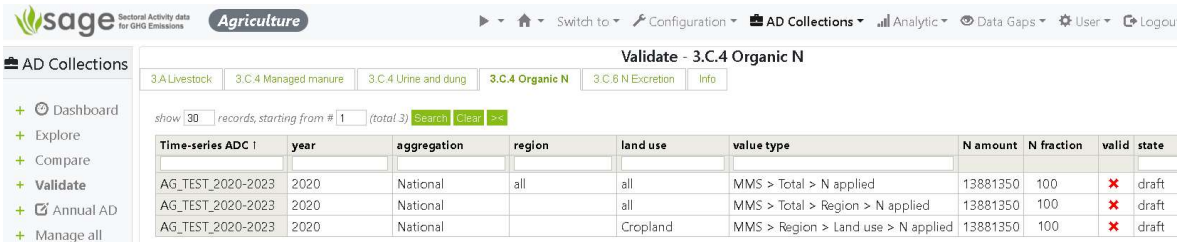


Figure 62. Check fraction of total N from MMS does not exceed 100%



Data entry steps

The process of data entries for 3.C.4 follows the same general steps as described for other agriculture categories:

Step 1 for all subcategories of 3.C.4, the technical expert should check and update the levels of aggregations and potential data sources (tables Aggregations and Institutions) listed according to the country's national circumstances:

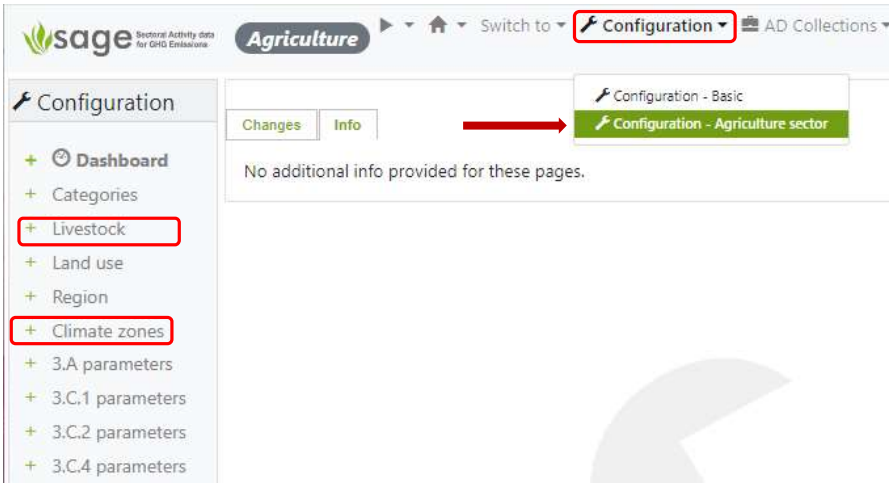
*Configuration - basic > Tables (Aggregations, Institutions) (**Figure 49**)*

Step 2 Differs for different subcategories of 3.C.4. Check and update (if needed) the following tables in the cross-category section of the configuration tables for the agriculture sector:

- for "Managed manure N available for application"

  – *Configuration – Agriculture sector > Table (Climate zone, Livestock) (**Figure 63**)*

Figure 63. Configuration – Agriculture sector tables; Climate zone and Livestock table links are in the left red frames



- for “Urine and dung to managed soils”,

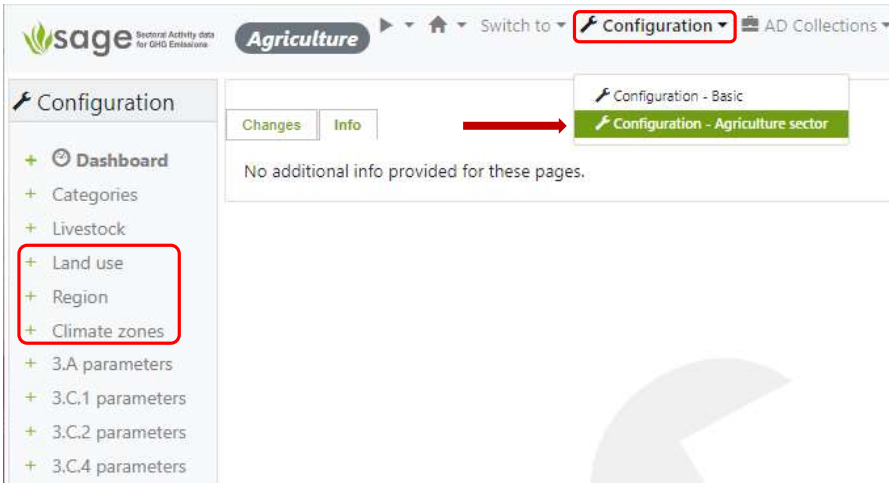
  *Configuration – Agriculture sector > Table (Climate zone, Region, Livestock, Land use) (**Figure 64**)*

Figure 64. Configuration – Agriculture sector tables; Climate zone, Region, Land use, and Livestock table links are in the red frame

- for “Synthetic N applied to managed soils” and “Organic N fertilizers”,

  *Configuration – Agriculture sector > Table (Climate zone, Region, Land use) (**Figure 65**)*

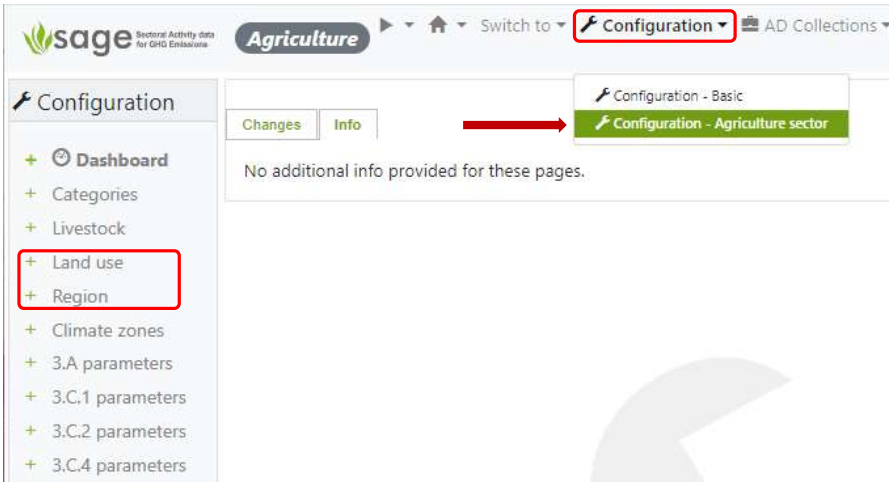
Figure 65. Configuration – Agriculture sector tables; Climate zone, Region, and Land use table links are in the red frame



- for “N in crop residuals”, “N in mineral soils”, “Drainage of organic soils”, and “Rewetting of organic soils”

  *Configuration – Agriculture sector > Table (Region, Land use) (**Figure 66**)*

Figure 66. Configuration – Agriculture sector tables; Region, and Land use table links are in the red frame

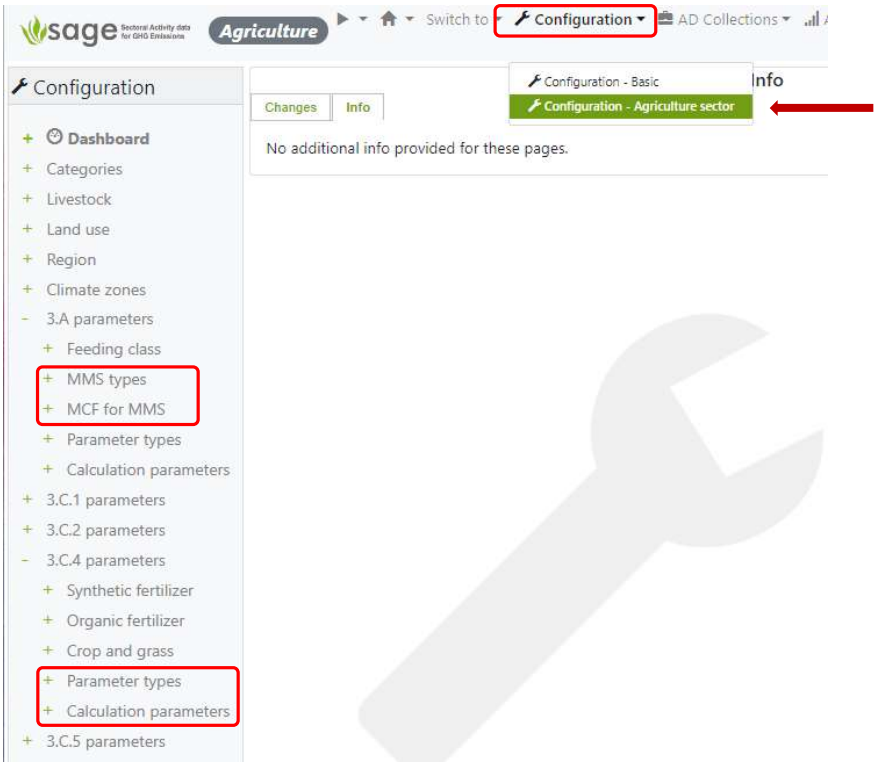


Step 3 for these subcategories requires checking and updating the calculated parameters in the agriculture category-specific section of the configuration tables:

- for “Managed manure N available for application” and “Urine and dung to managed soils”,

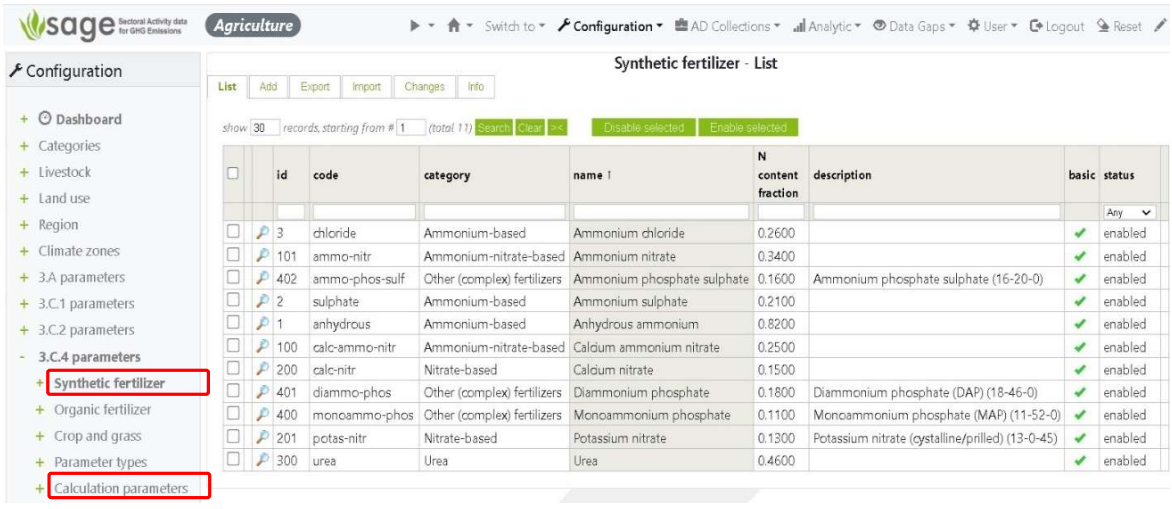
  *Configuration – Agriculture sector > 3.A> Table (MMS types) (**Figure 67**)*

Figure 67. Configuration – Agriculture sector category-specific tables for 3.C.4; MMS types (3.A.2), and Calculated parameters (3.C.4) table links in the red frame



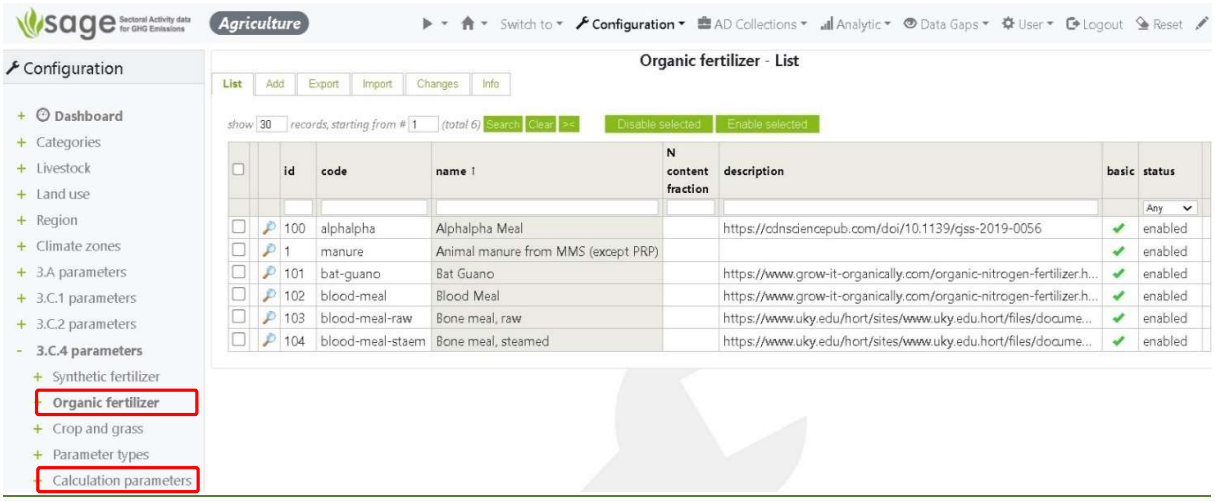
- for “Synthetic N applied to managed soils”,

Figure 68. Configuration – Agriculture Category Specific > 3.C.4 > Table (Synthetic fertilizer, Calculated parameters)



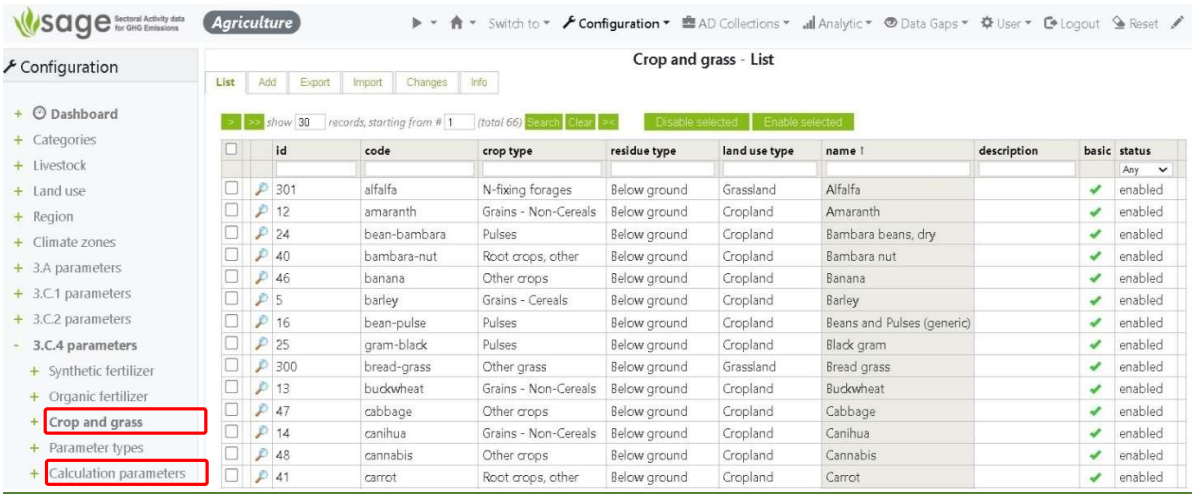
- for “Organic N fertilizers”,

Figure 69. Configuration – Agriculture Category Specific > 3.C.4 > Table (Organic fertilizer, Calculated parameters)



- for “N in crop residuals”, “N in mineral soils”, “Drainage of organic soils”, and “Rewetting of organic soils”

Figure 70. Configuration – Agriculture sector > 3.C.4 > Table (Crop and grass, Calculated parameters)



Step 4 fill in the activity data entry forms in the AD Collection module in SAGE.

Due to dependencies between categories, selecting records for editing or adding records process in 3.C.4 includes additional actions.

Entering and editing 3.C.4 – Managed manure and 3.C.4 – Dung and urine records

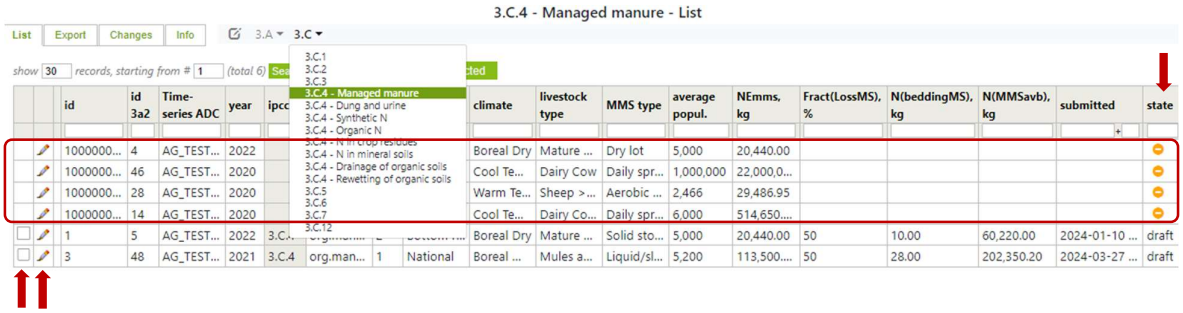
In the List page, the List tables for both Managed manure and Dung and urine may include two types of records (***Figure 71***):

- Source records that have data copied from 3.A.2 and are available for further editing and entering parameters specific for 3.C.4 (they do not have a selection box at the beginning, just the edit sign)
- Records that have already used the source records from 3.A.2 and have parameters for 3.C.4 included. These records show both the selection box and the editing sign at the beginning.

Key features for this page:

- There is no ADD button, only List, Export, Changes, and Info above the list table. This is because users can enter the information in and edit only the records that have been already sourced from 3.A.2 category to maintain consistency of entries for common parameters.
- The State column of the List table has an amber-colored sign for the records that have the parameters from 3.A.2 category, but the parameters for the 3.C.4 categories are not entered yet.
- The source records usually have very large ID numbers to distinguish them from the already edited records.

Figure 71. List table for 3.C.4 – Managed manure with pre-defined source records from 3.A.2 category



To **edit** the existing record, click on one of the records that have BOTH the selection box AND the edit sign at the beginning in the List table. These records have a "draft" value in column "State" in the list table.

To **add a new record** to 3.C.4, click on one of the records that have ONLY an edit sign and no selection box at the beginning and an amber sign in the "State" column of the List table.

Filling the AD entry forms: Managed manure and Urine and dung

The category selection in SAGE follows the IPCC approach and includes the process leading to GHG emissions (***Figure 72***). For example,

- *3.C.4 > Managed manure N available for application to managed soils, feed, fuel, or construction uses*
- *3.C.4 > Urine and dung deposited by grazing animals*

Figure 72. Category selection in SAGE

Category-specific fields additional to those described in section 8.1.3 include:

- Data collection period (months) (default is on the annual basis = 12 months)
- Climate zone (select specific climate zone most applicable to your country or make regional entries)
- Livestock type (contains livestock subdivisions available for the selected category)
- Manure management system type (select from available options)
-

– Once category-specific parameters are entered or selected, enter the data into the provided data fields:
  - Fraction of manure N lost in the MMS – includes “Set from default” button for an automatic entry of default parameters that were entered in the configuration layer.
  - N in organic bedding (kg N/animal/y) – includes “Set from default” button for an automatic entry of default parameters that were entered in the configuration layer.
  - Uncertainty block for the above parameters – includes “Set from default” button for an automatic entry of default parameters that were entered in the configuration layer.

Underneath, there are two sections on this page:

- “calculated” to show calculated values on a basis of the entered data and the data available from the configuration tables
- “Parameters” to show which parameters from the configuration layer were used for the calculation

Click the “Update” button to display the complete record on the screen and, if everything is correct, press the “Add” button to save your record and add it to the collection (***Figure 73***)

Note that the state of this record is currently “draft”. If you are not planning to work with this record anymore and it is ready for review, change the state to “ready” (***Figure 73***).

When you press the “Add” button, SAGE displays the list of all records for the category (***Figure 74***).

Figure 73. Entering the data in category group 3.C.4 Urine and dung

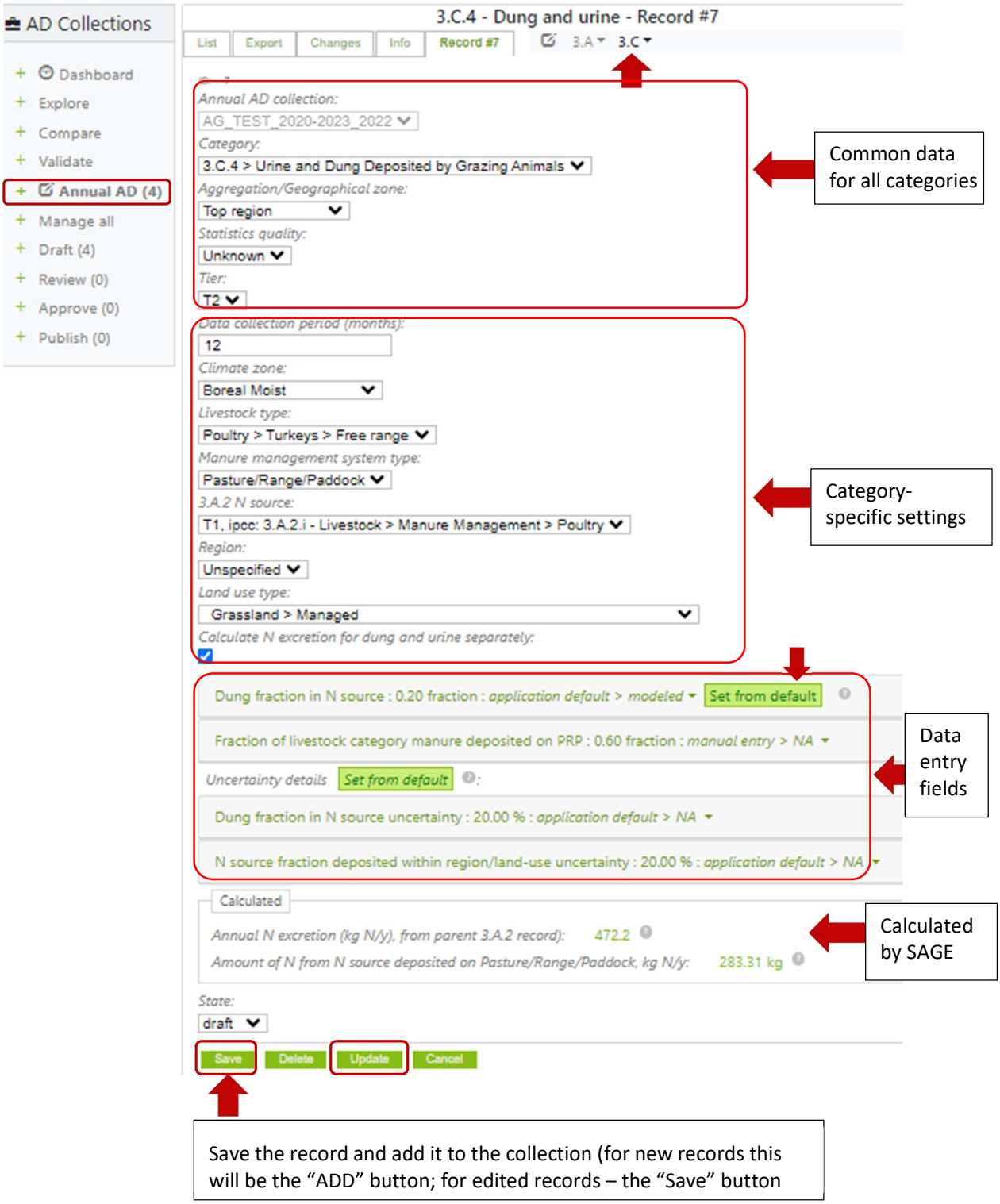
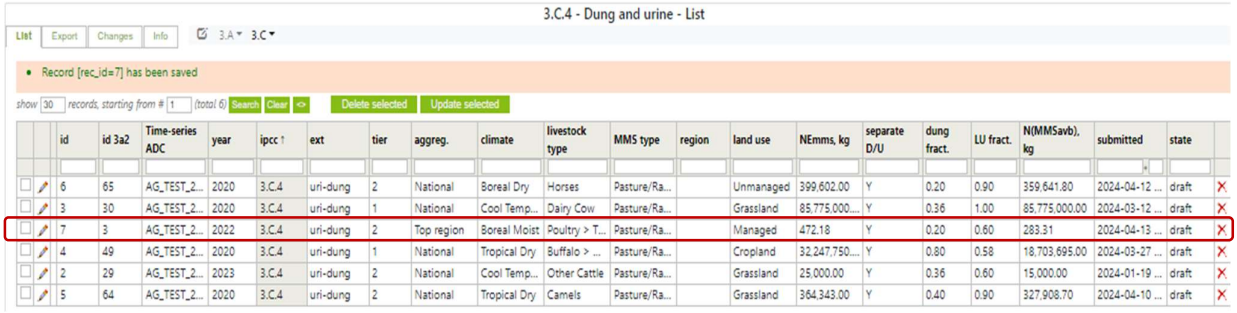


Figure 74. The list of records is updated



	id	id 3a2	Time-series ADC	year	ipcc ↑	ext	tier	aggreg.	climate	livestock type	MMS type	region	land use	NEmms, kg	separate D/U	dung fract.	LU fract.	N(MMSavb), kg	submitted	state
	6	65	AG_TEST_2...	2020	3.C.4	uri-dung	2	National	Boreal Dry	Horses	Pasture/Ra...		Unmanaged	399,602.00	Y	0.20	0.90	359,641.80	2024-04-12 ...	draft
	3	30	AG_TEST_2...	2020	3.C.4	uri-dung	1	National	Cool Temp...	Dairy Cow	Pasture/Ra...		Grassland	85,775,000....	Y	0.36	1.00	85,775,000.00	2024-03-12 ...	draft
	7	3	AG_TEST_2...	2022	3.C.4	uri-dung	2	Top region	Boreal Moist	Poultry > T...	Pasture/Ra...		Managed	472.18	Y	0.20	0.60	283.31	2024-04-13 ...	draft
	4	49	AG_TEST_2...	2020	3.C.4	uri-dung	1	National	Tropical Dry	Buffalo > ...	Pasture/Ra...		Cropland	32,247,750....	Y	0.80	0.58	18,703,695.00	2024-03-27 ...	draft
	2	29	AG_TEST_2...	2023	3.C.4	uri-dung	2	National	Cool Temp...	Other Cattle	Pasture/Ra...		Grassland	25,000.00	Y	0.36	0.60	15,000.00	2024-01-19 ...	draft
	5	64	AG_TEST_2...	2020	3.C.4	uri-dung	2	National	Tropical Dry	Camels	Pasture/Ra...		Grassland	364,343.00	Y	0.40	0.90	327,908.70	2024-04-10 ...	draft

Entering and editing 3.C.4 – Synthetic N fertilizer and 3.C.4 – Organic N records

- These two subcategories do not have dependency on 3.A category entries, so their List table shows only one type of records. For each synthetic fertilizer and each organic amendment added to soils, a separate entry form should be filled.

To **edit** the existing record, click on the edit sign at the beginning in the List table. These records have a "draft" value in column "State" in the list table.

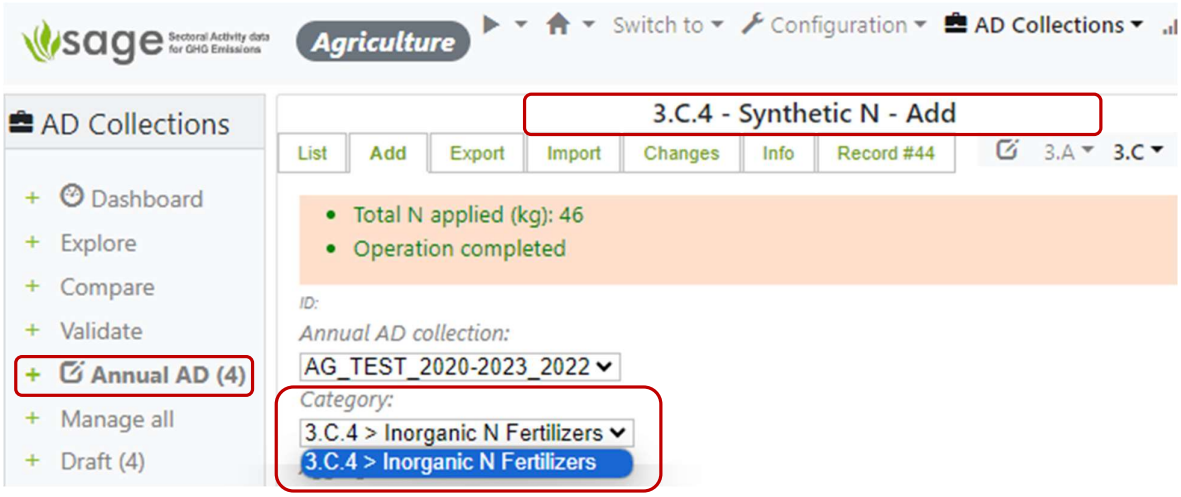
To **add a new record** to 3.C.4, click the button ADD.

Filling the AD entry forms: Synthetic N fertilizer and Organic N records

The category selection in SAGE follows the IPCC approach and includes the process leading to GHG emissions (***Figure 75***). For example,

- *3.C.4 > Synthetic N fertilizer*
- *3.C.4 > Organic N fertilizer*

Figure 75. Category selection in SAGE



Category-specific fields additional to those described in section 8.1.3 include:

- Land-use type
- Synthetic fertilizer type
-

- Once category-specific parameters are entered or selected, enter the data into the provided data fields:
  - N applied (mass/year):
    - this value could be **calculated**:
      - tick the "calculate N amount" box
      - enter the value in the "Fertilizer apply amount" field (the "N fraction in fertilizer" value will be set automatically for the specified fertilizer).
      - click the button "calculate" – the calculated amount of N will appear in the "N applied" field underneath, OR
    - The amount of N could be **entered without calculation** (leave the "calculate N amount" box unticked) and enter the value in the "N applied" field.
  - Uncertainty block for the above parameters – includes "Set from default" button for an automatic entry of default parameters that were entered in the configuration layer.

Underneath, there are two sections on this page:

- "calculated" to show calculated values based on the entered data and the data available from the configuration tables

Click the "Update" button to display the complete record on the screen and, if everything is correct, press the "Add" button to save your record and add it to the collection (***Figure 76***)

Note that the state of this record is currently "draft". If you are not planning to work with this record anymore and it is ready for review, change the state to "ready" (***Figure 76***).

When you press the "Add" button, SAGE displays the list of all records for the category (***Figure 77***).

For the Organic N subcategory, the entry steps are very similar, but instead of the Synthetic fertilizer, the Organic amendment details are needed.

Figure 76. Entering the data in category group 3.C.4 Synthetic N fertilizer

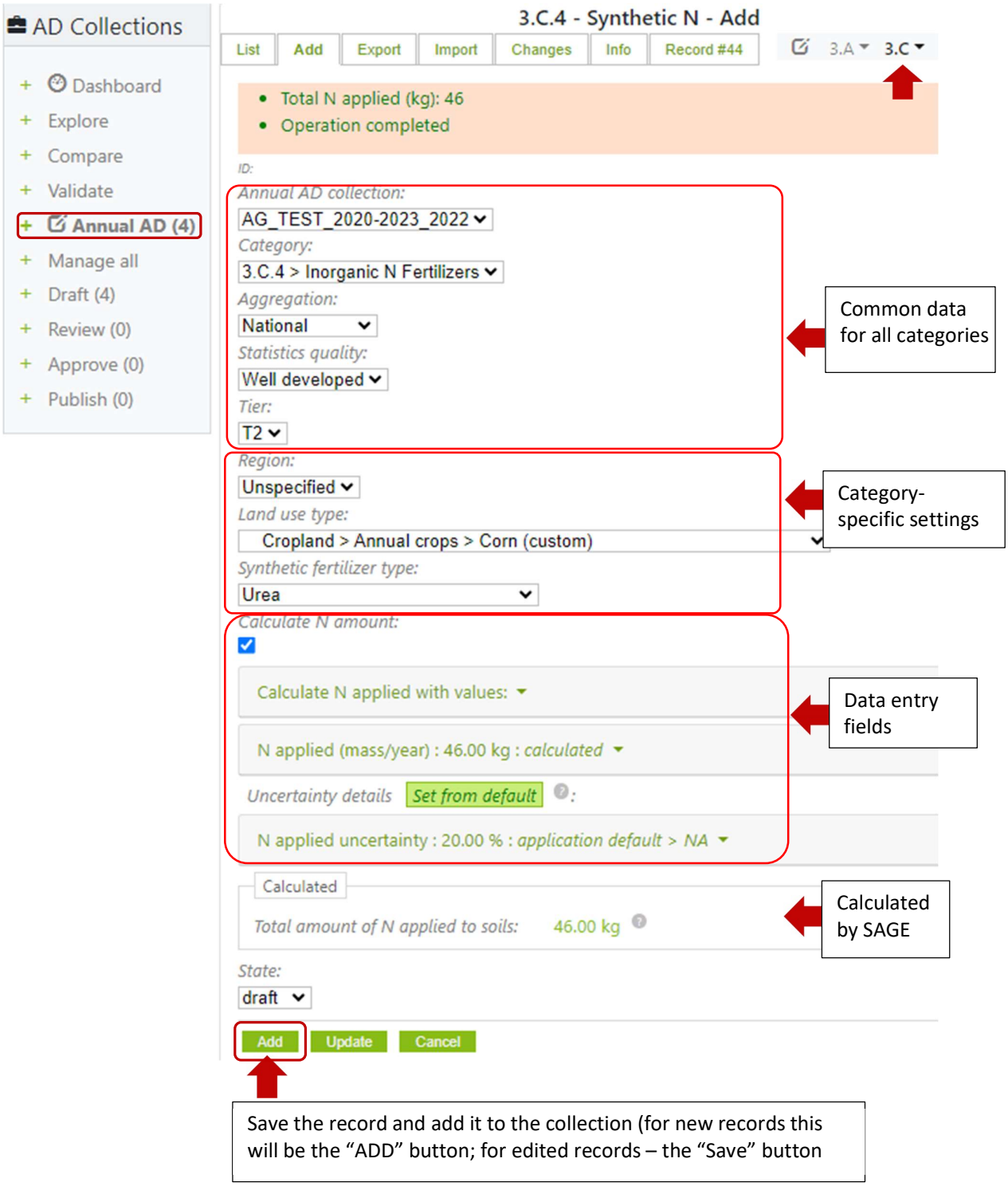


Figure 77. The list of records is updated

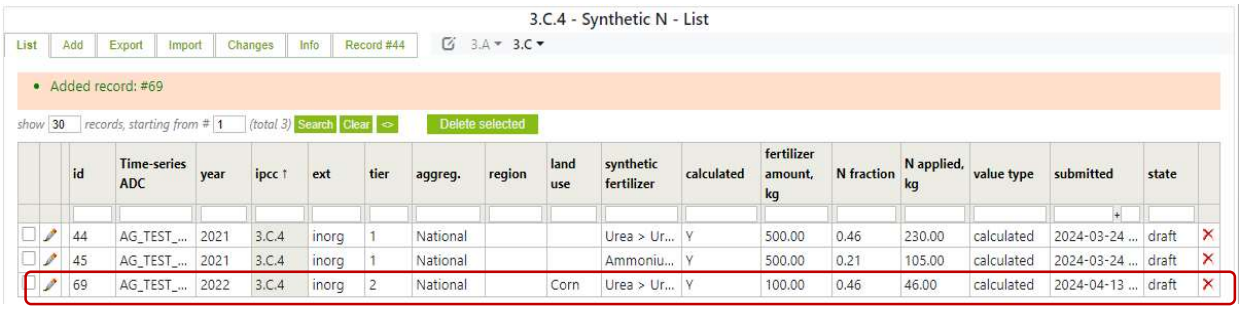
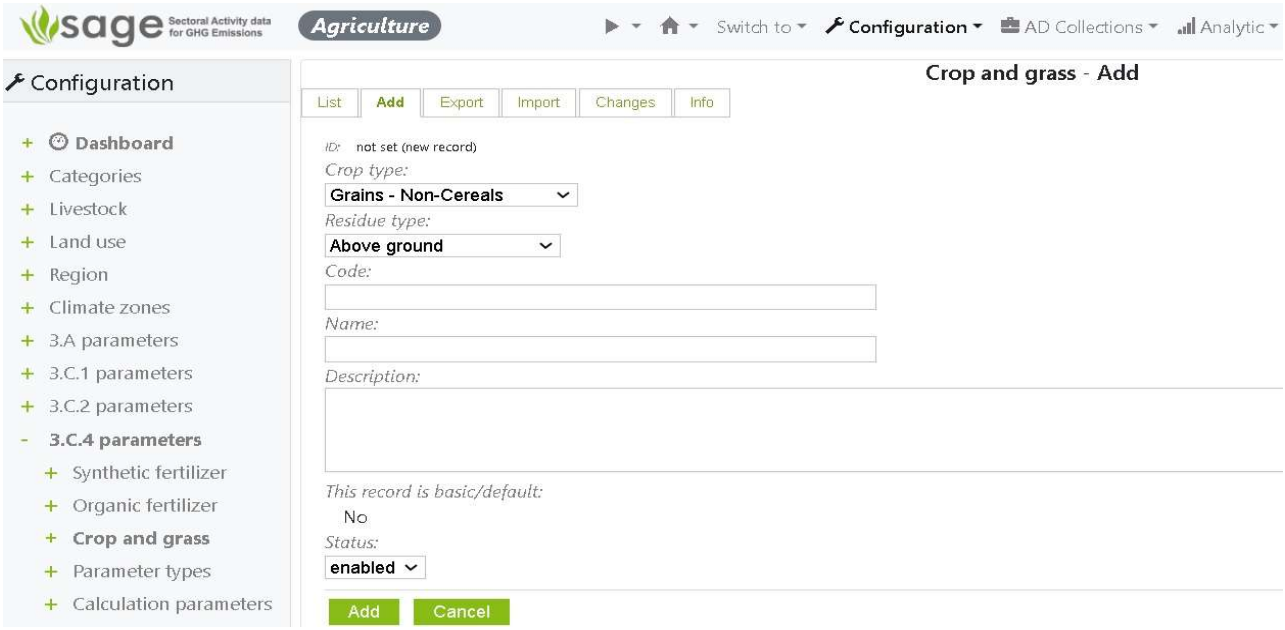


Figure 78. Entering and editing 3.C.4 – N in crop residues records



- These two subcategories do not have a dependency on 3.A category entries, so their List table shows only one type of record. For each synthetic fertilizer and each organic amendment added to soils, a separate entry form should be filled.

To **edit** the existing record, click on the edit sign at the beginning of the List table. These records have a "draft" value in column "State" in the list table.

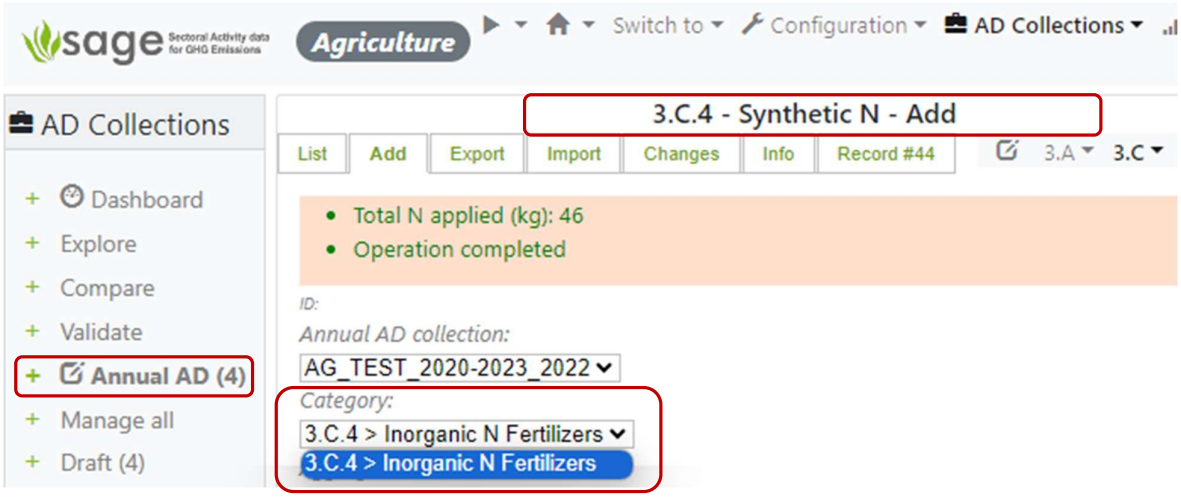
To **add a new record** to 3.C.4, click the button ADD.

Filling the AD entry forms: N in crop residues records

The category selection in SAGE follows the IPCC approach and includes the process leading to GHG emissions (***Figure 79***). For example,

- *3.C.4 > Synthetic N fertilizer*
- *3.C.4 > Organic N fertilizer*

Figure 79. Category selection in SAGE



Category-specific fields additional to those described in section 8.1.3 include:

- Land-use type
- Synthetic fertilizer type

–

– Once category-specific parameters are entered or selected, enter the data into the provided data fields:
  - N applied (mass/year):
    - this value could be **calculated**:
      - tick the "calculate N amount" box
      - enter the value in the "Fertilizer apply amount" field (the "N fraction in fertilizer" value will be set automatically for the specified fertilizer).
      - click the button "calculate" – the calculated amount of N will appear in the "N applied" field underneath, OR
    - The amount of N could be **entered without calculation** (leave the "calculate N amount" box unticked) and enter the value in the "N applied" field.
  - Uncertainty block for the above parameters – includes "Set from default" button for an automatic entry of default parameters that were entered in the configuration layer.

Underneath, there are two sections on this page:

- "calculated" to show calculated values based on the entered data and the data available from the configuration tables

Click the "Update" button to display the complete record on the screen and, if everything is correct, press the "Add" button to save your record and add it to the collection (***Figure 110***)

Note that the state of this record is currently "draft". If you are not planning to work with this record anymore and it is ready for review, change the state to "ready" (***Figure 110***).

When you press the "Add" button, SAGE displays the list of all records for the category (***Figure 80***).

For the Organic N subcategory, the entry steps are very similar, but instead of the Synthetic fertilizer, the Organic amendment details are needed.

Figure 80. Entering the data in category group 3.C.4 Synthetic N fertilizer

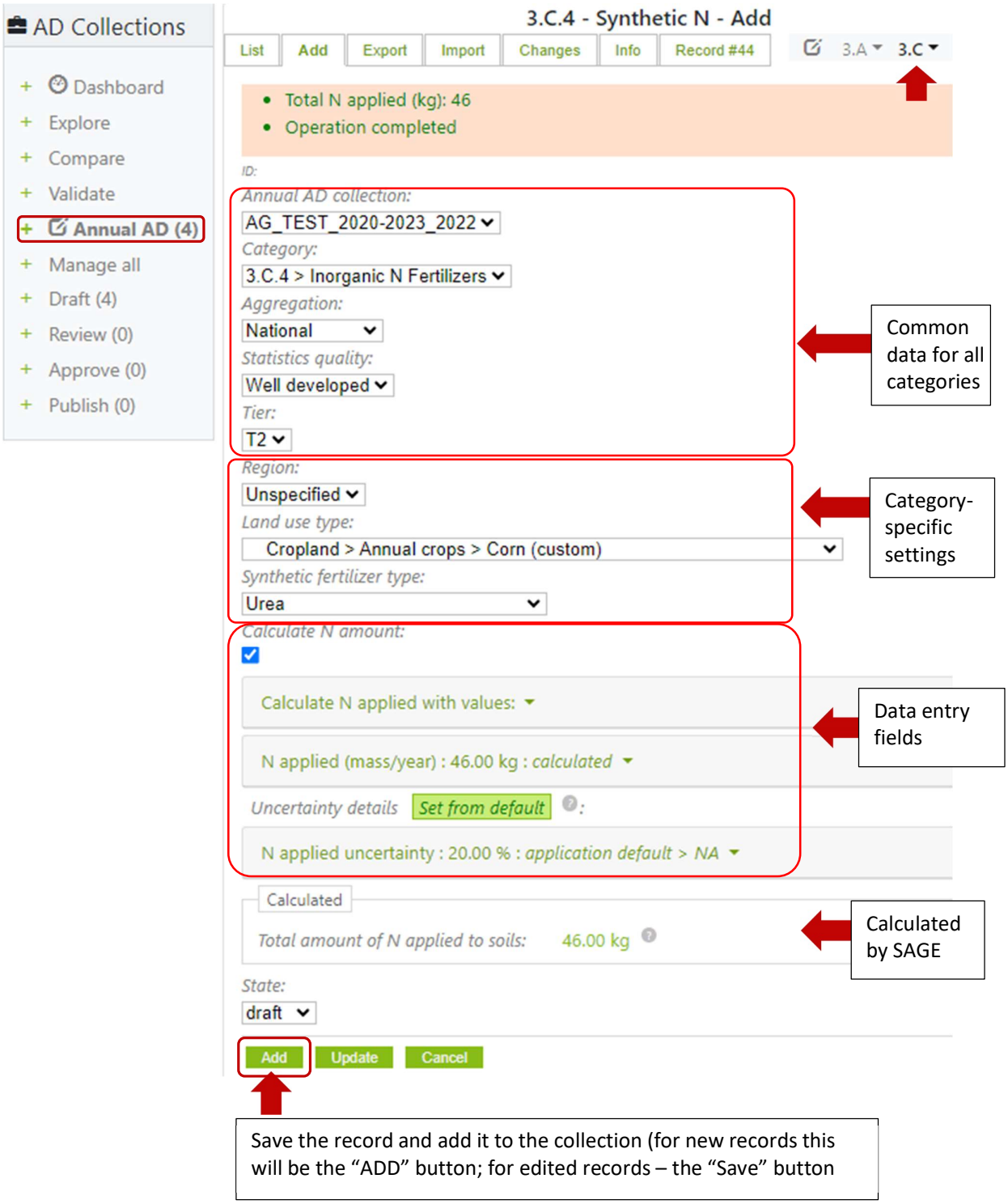
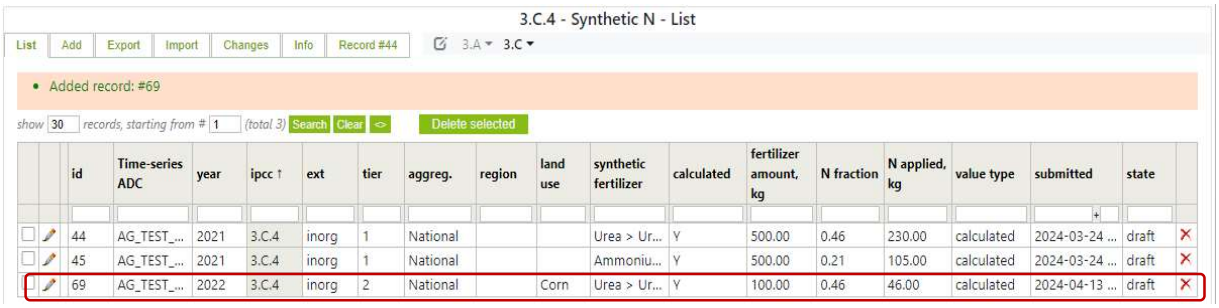


Figure 81. The list of records is updated



		id	Time-series ADC	year	ipcc ↑	ext	tier	aggreg.	region	land use	synthetic fertilizer	calculated	fertilizer amount, kg	N fraction	N applied, kg	value type	submitted	state	
☐	✎	44	AG_TEST_...	2021	3.C.4	inorg	1	National			Urea > Ur...	Y	500.00	0.46	230.00	calculated	2024-03-24 ...	draft	✕
☐	✎	45	AG_TEST_...	2021	3.C.4	inorg	1	National			Ammoniu...	Y	500.00	0.21	105.00	calculated	2024-03-24 ...	draft	✕
☐	✎	69	AG_TEST_...	2022	3.C.4	inorg	2	National		Corn	Urea > Ur...	Y	100.00	0.46	46.00	calculated	2024-04-13 ...	draft	✕

Entering and editing 3.C.4 – N in mineral soils (that is mineralized) and N in crop residues

- These subcategories do not have a dependency on 3.A category entry, so their List table shows only one type of record. Please keep the Land use type and the land uses consistent with what you are reporting for the LULUCF sector.

To **edit** the existing record, click on the edit sign at the beginning of the List table. These records have a "draft" value in column "State" in the list table.

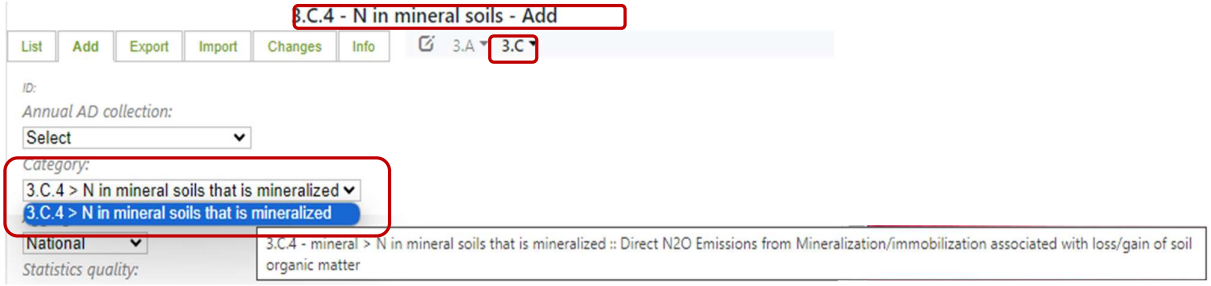
To **add a new record** to 3.C.4, click the button ADD.

Filling the AD entry forms: N in mineral soils (that is mineralized) records

The category selection in SAGE follows the IPCC approach and includes the process leading to GHG emissions (***Figure 82***). For example,

- *3.C.4 > N in mineral soils (that is mineralized)*
- *3.C.4 > N in crop residues*

Figure 82. Category selection in SAGE (example for N in mineral soils that is mineralized)



Category-specific fields additional to those described in section 8.1.3 include:

- *3.C.4 > N in mineral soils (that is mineralized)*
  - Region
  - Land unit code (if known)
  - Initial Land-use type
  - Initial crop or grass
  - Current land use type

– Once category-specific parameters are entered or selected, enter the data into the provided data fields:

- C:N ratio of organic matter– includes the “Set from default” button for an automatic entry of default parameters that were entered in the configuration layer.
- Average loss of soil carbon (mass C/year)
- Uncertainty block for the above parameters – includes “Set from default” button for an automatic entry of default parameters that were entered in the configuration layer.

- *3.C.4 > N in crop residues*
  - Region
  - Land unit code (if known)
  - Initial Land-use type
  - Crop or grass associated with the selected land use type
  - Calculation method (two options are available):
    - main method (equation 11.6, p. 14, Ch. 11, Vol. 4, 2006 IPCC GLs)
    - alternative method (equation 11.7a, p. 15, Ch. 11, Vol. 4, 2006 IPCC GLs)

– Once category-specific parameters are entered or selected, enter the data into the provided data fields:
  - Calculate harvested annual dry matter yield for crop (needed for the alternative method)
  - Harvested annual dry matter yield (specified)
  - Annual harvest area
  - Annual burnt area
  - Uncertainty block for the above parameters – includes “Set from default” button for an automatic entry of default parameters that were entered in the configuration layer.

Underneath the category parameter entry block, there are two sections on this page:

- “calculated” to show calculated values based on the entered data and the data available from the configuration tables
- “parameters” showing the list of parameters from configuration tables used for the calculations

Click the “Update” button to display the complete record on the screen and, if everything is correct, press the “Add” button to save your record and add it to the collection (***Figure 83***)

Note that the state of this record is currently “draft”. If you are not planning to work with this record anymore and it is ready for review, change the state to “ready” (***Figure 83***).

When you press the “Add” button, SAGE displays the list of all records for the category (***Figure 84***).

Figure 83. Entering the data in category group 3.C.4 N in mineral soils that are mineralized

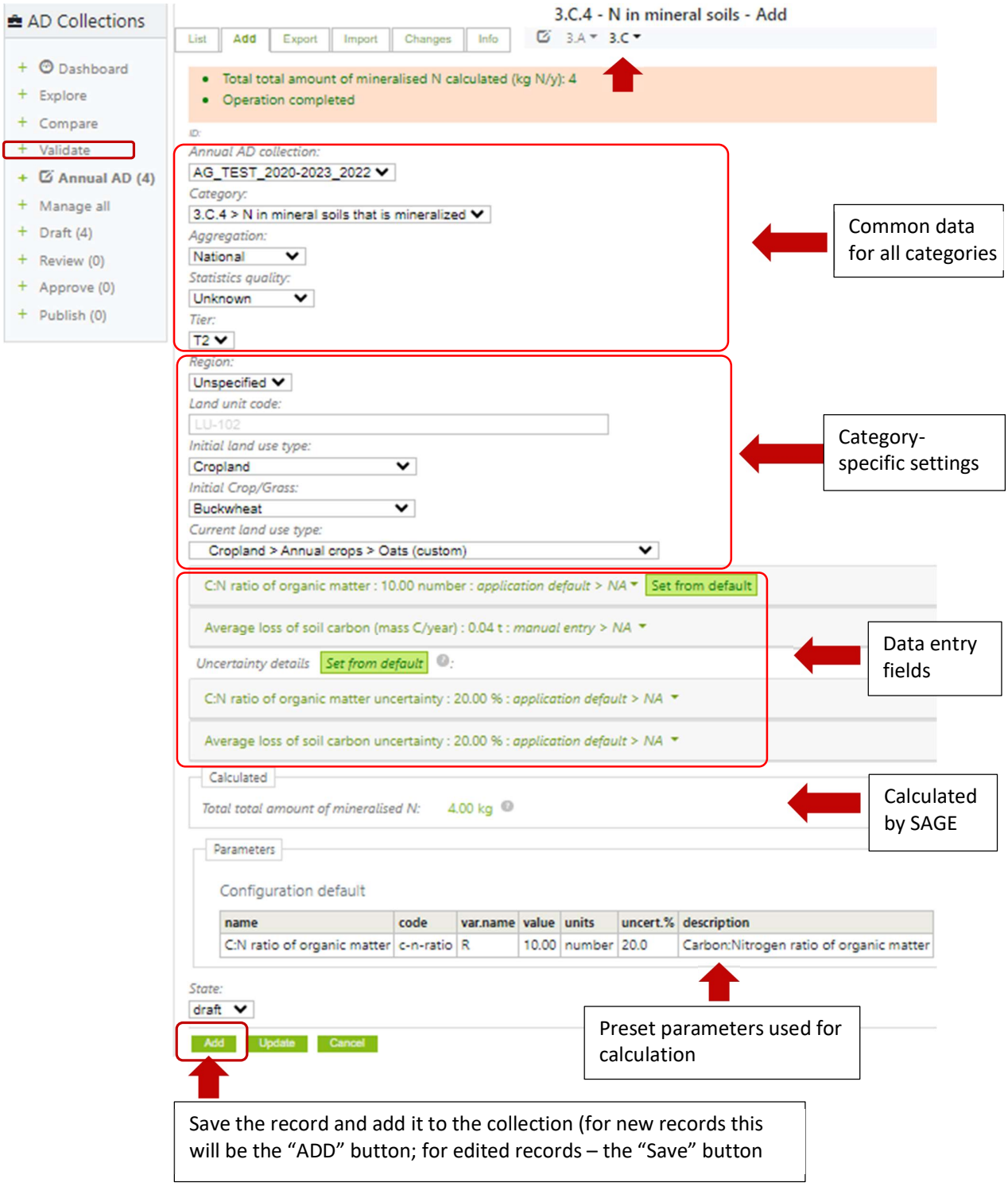
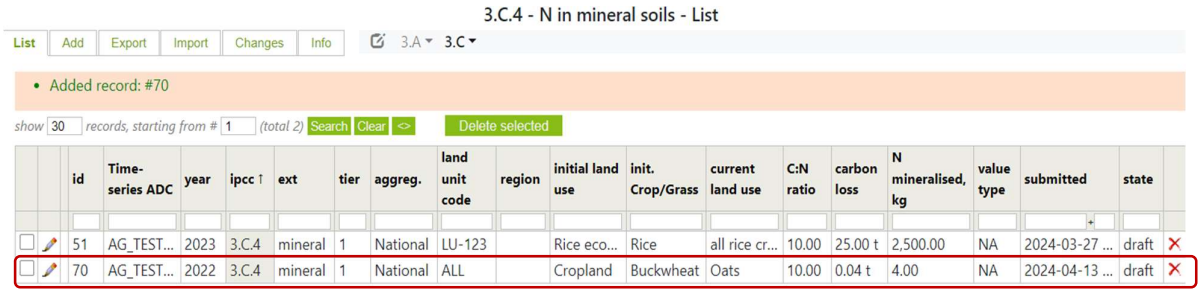


Figure 84. The list of records is updated



		id	Time-series ADC	year	ipcc ↑	ext	tier	aggreg.	land unit code	region	initial land use	init. Crop/Grass	current land use	C:N ratio	carbon loss	N mineralised, kg	value type	submitted	state	
☐	✎	51	AG_TEST...	2023	3.C.4	mineral	1	National	LU-123		Rice eco...	Rice	all rice cr...	10.00	25.00 t	2,500.00	NA	2024-03-27 ...	draft	✕
☐	✎	70	AG_TEST...	2022	3.C.4	mineral	1	National	ALL		Cropland	Buckwheat	Oats	10.00	0.04 t	4.00	NA	2024-04-13 ...	draft	✕

Entering and editing 3.C.4 – Drainage of organic soils and Rewetting of organic soils

- This subcategory does not have a dependency on 3.A category entry, so their List table shows only one type of record. Please keep the Land use type and the land uses consistent with what you are reporting for the LULUCF sector.

To **edit** the existing record, click on the edit sign at the beginning of the List table. These records have a "draft" value in column "State" in the list table.

To **add a new record** to 3.C.4, click the button ADD.

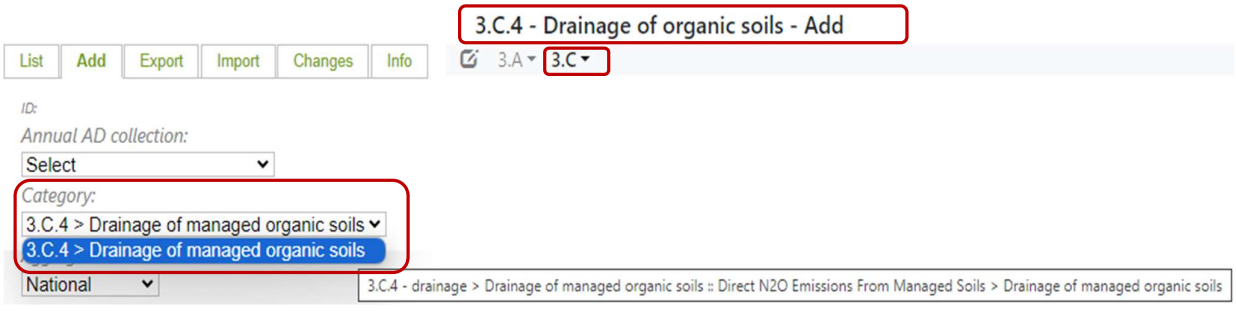
Filling the AD entry forms: Drainage of managed organic soils and Rewetting of managed organic soils

The AD entry forms for these subcategories are very similar.

The category selection in SAGE follows the IPCC approach and includes the process leading to GHG emissions (***Figure 85***). For example,

- *3.C.4 > Drainage of (managed) organic soils*
- *3.C.4 > Rewetting of (managed) organic soils*

Figure 85. Category selection in SAGE



Category-specific fields additional to those described in section 8.1.3 include:

- Region
- Land unit code (if known)
- Initial Land-use type
- Initial crop or grass
- Current land use type

–

- Once category-specific parameters are entered or selected, enter the data into the provided data fields:
    - Land area of drained organic soils
    - Uncertainty block for the above parameters – includes “Set from default” button for an automatic entry of default parameters that were entered in the configuration layer.

Underneath, there are two sections on this page:

- “calculated” to show calculated values, the net based on the entered data and the data available from the configuration tables

Click “Update” button to display the complete record on the screen and, if everything is correct, press the “Add” or the “Save” button to save your record and add it to the collection (***Figure 86***)

Note that the state of this record is currently “draft”. If you are not planning to work with this record anymore and it is ready for the review, change the state to “ready” (***Figure 86***).

When the “Add” button is pressed, SAGE displays the list of all records for the category (***Figure 110).***

For Rewetting of managed organic soils subcategory, the entry steps are very similar, but instead of the Land area of drained organic soils, the Land area of rewetted organic soils is needed.

Figure 86. Entering the data in category group 3.C.4 Drainage of managed organic soils

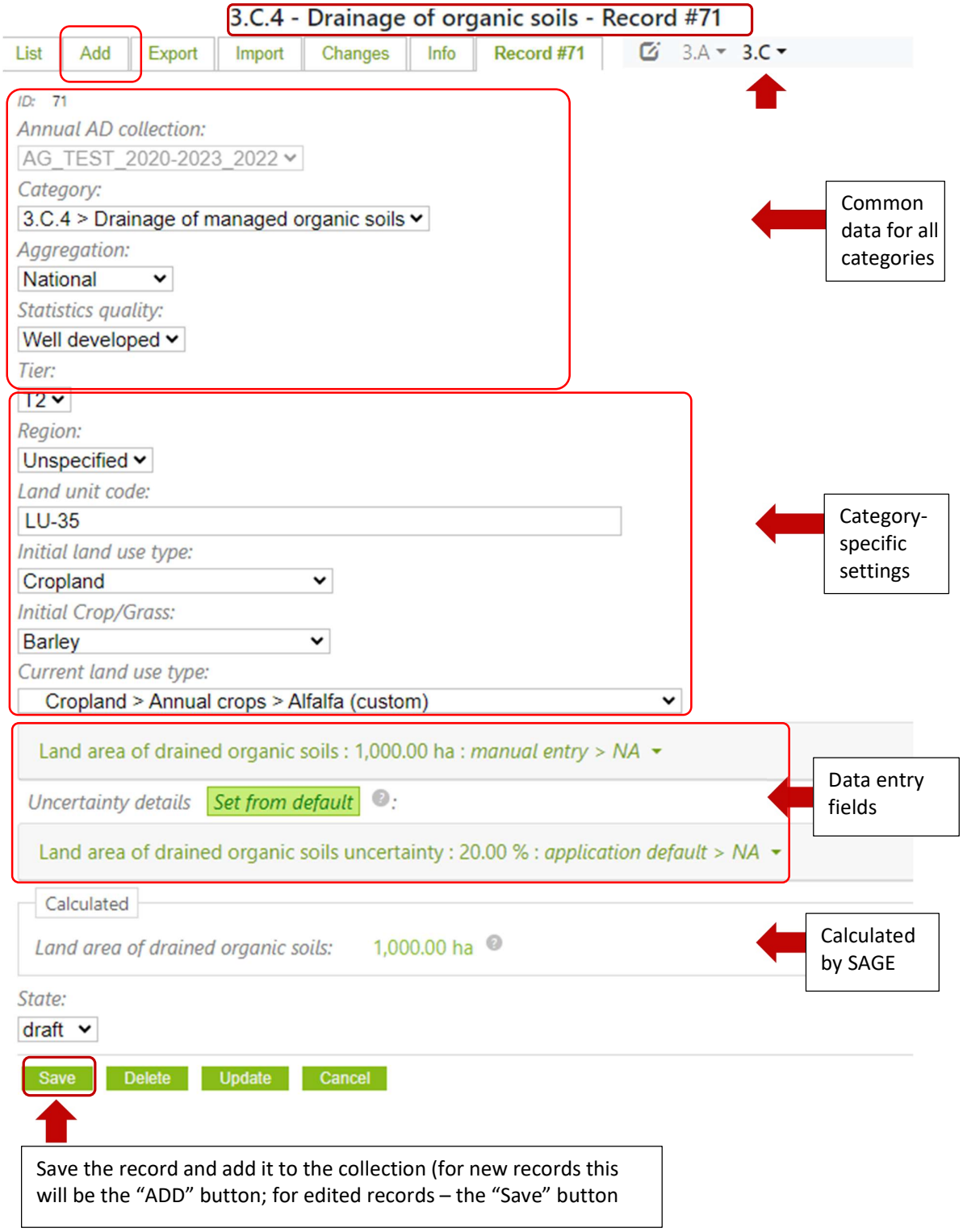
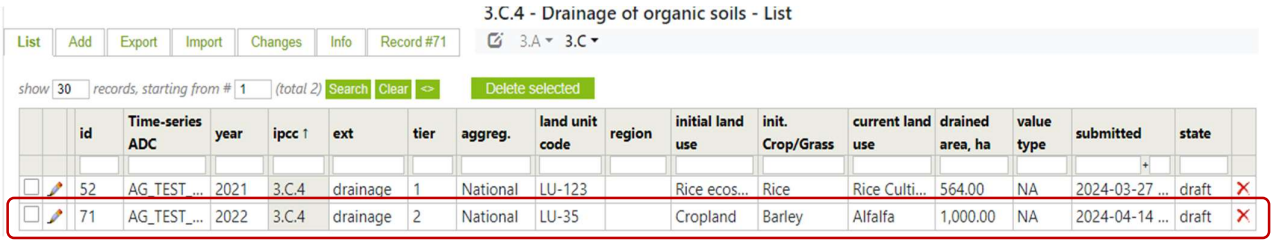


Figure 87. The list of records is updated



		id	Time-series ADC	year	ipcc	ext	tier	aggreg.	land unit code	region	initial land use	init. Crop/Grass	current land use	drained area, ha	value type	submitted	state	
☐	✎	52	AG_TEST_...	2021	3.C.4	drainage	1	National	LU-123		Rice ecos...	Rice	Rice Culti...	564.00	NA	2024-03-27 ...	draft	✕
☐	✎	71	AG_TEST_...	2022	3.C.4	drainage	2	National	LU-35		Cropland	Barley	Alfalfa	1,000.00	NA	2024-04-14 ...	draft	✕

8.2.2.4 Indirect N_2O emissions from managed soils (3.C.5)

The 3.C.5 category includes two subcategories that reflect different sources of nitrogen added to agricultural soils leading to indirect N_2O emissions. The following subcategories are included:

- N_2O from Atmospheric deposition of N Volatilized from managed soils (Atmospheric deposition)
- N_2O from N leaching/ runoff from managed soils

All parameters required by the IPCC for the Atmospheric deposition subcategory have been already entered through the relevant subcategories of 3.C.4. The parameter Frac(GASM) is set in the configuration layer of SAGE. That is why SAGE does not offer a separate AD entry form for this subcategory.

SAGE provides data entry forms for 3.C.5 N Leaching/runoff subcategory for Fos only because all other parameters were entered in category 3.C.4 (see the details in step 4 description – AD entry form below). It then applies FracLEACH-(H) coefficient to estimate the amount of N that can be lost through leaching /runoff from the total N from Fos.

Consistency of the data between categories

The Activity data entry forms for 3.C.5 use the same land use categories and subdivisions as category 3.C.4 with the same characteristics of those lands. That is why some parameters in these subcategories inherited from the category 3.C.4 (Fon, Fprp, Fsn, Fprp, Fcr, and Fsom).

The data entries for 3.C.4 category for a particular land use and land use subdivision should be complete before entering the data to 3.C.5 for this land use and land use subdivision.

Data entry steps

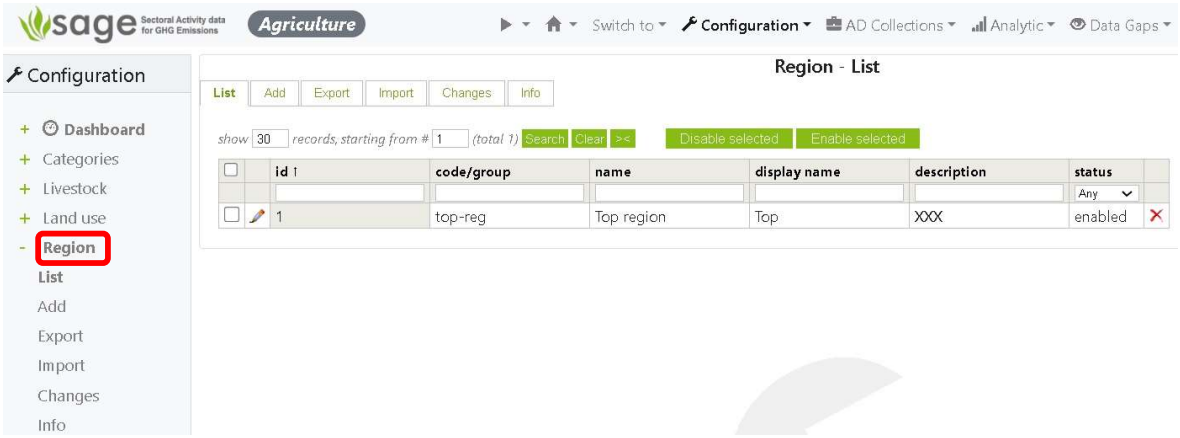
Step 1 for these categories is the same as for subcategories of category 3.A. The technical expert should check and update the levels of aggregations and potential data sources (tables Aggregations and Institutions) listed according to the country's national circumstances:

*Configuration - basic > Tables (Aggregations, Institutions) (**Figure 49**)*

Step 2 for these subcategories requires checking and updating the following tables in the cross-category section of the configuration tables for the agriculture sector:

*Configuration – Agriculture sector > Table (Regions, Land use) (**Figure 88**)*

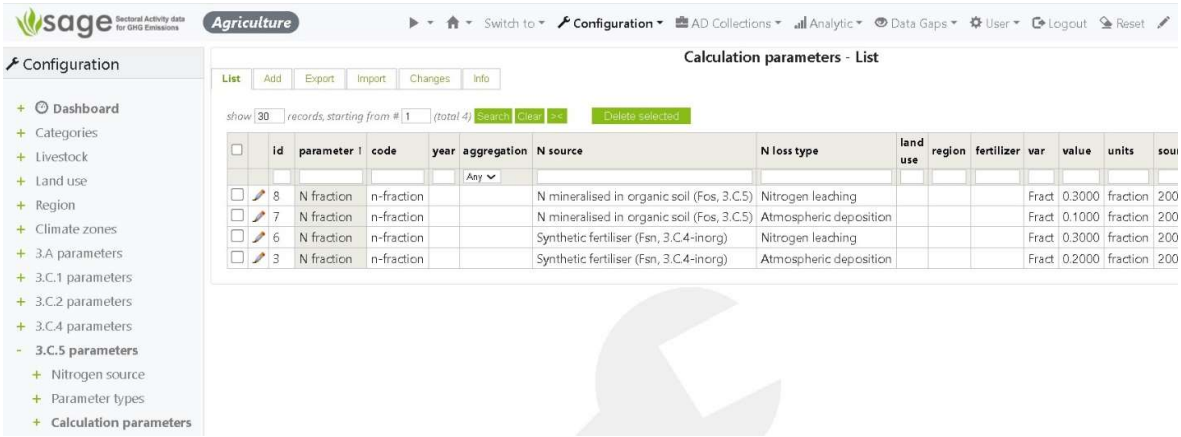
Figure 88. Configuration – Agriculture sector tables; Regions table link in the red frame



Step 3 for these subcategories requires checking and updating the calculated parameters under 3.C.5 section in the agriculture category-specific section of the configuration tables:

*Configuration – Agriculture sector > 3.C.5 > Tables (Calculated parameters) (**Figure 89**)*

Figure 89. Configuration – Agriculture category-specific 3.C.5



Step 4 fill in the activity data entry forms in the AD Collection block in SAGE.

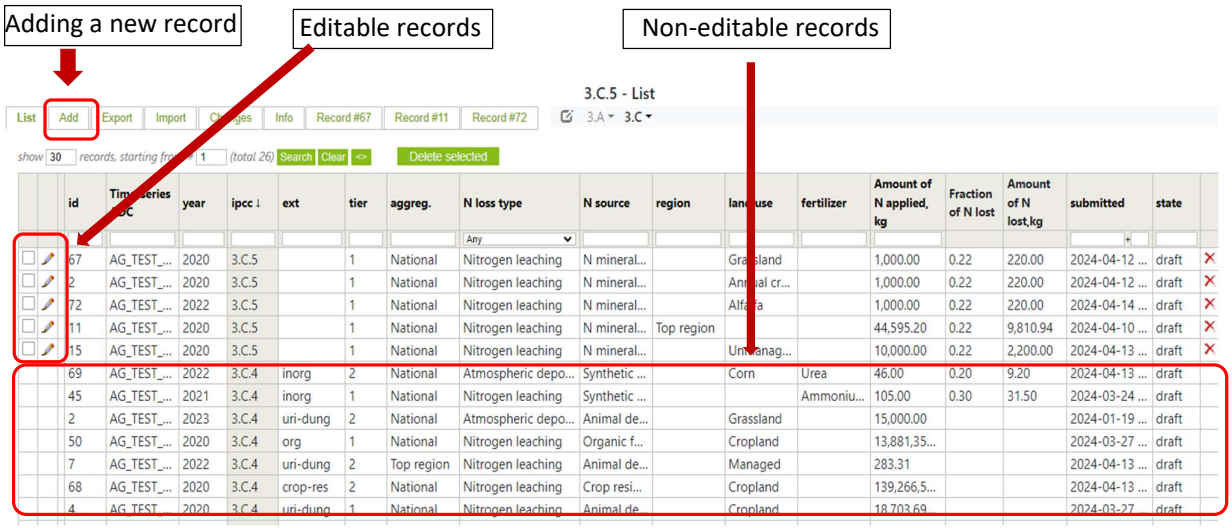
Entering and editing 3.C.5 – Indirect N_2O emissions from managed soils records

3.C.5 List page shows all records available for editing and the records that have already been entered in 3.C.4 with indication whether the record in 3.C.4 is the source of parameters for Atmospheric deposition or Nitrogen leaching/runoff. If a record may contribute to both atmospheric deposition and N leaching /runoff, it is presented twice in the table – once for each N loss type. The records copied from 3.C.4 do are provided as a reference – they are not editable.

To **edit** the existing record, click on one of the records that have BOTH the selection box AND the edit sign at the beginning in the List table.

To **add a new record** to 3.C.5, click the "Add" button above the List table (***Figure 90***).

Figure 90. List table for 3.C.5.

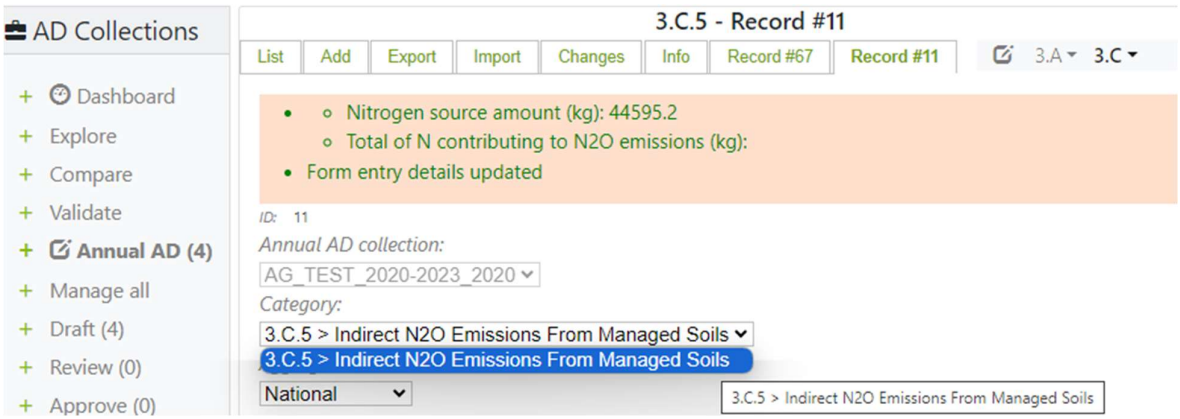


Filing the AD form for 3.C.5

Selection of the category in SAGE follows the IPCC approach and includes a combination of the processes leading to GHG emissions (***Figure 91***). For example,

- *3.C.5 > Indirect N2O emissions from managed soils*

Figure 91. Category selection in SAGE



Category-specific fields additional to those described in section 8.1.3 include:

- Region (selection of regions is predefined by entries to the 3.C.4 category)
- N loss type (= Nitrogen leaching, as explained above)
- N source (= N mineralized in organic soils, because only Fos parameter needs entering)
- Land use type (the provided option selection is consistent with 3.C.4 records)

Once category-specific parameters are entered or selected, enter the data into the provided data fields:

- Nitrogen source amount
- Uncertainty block for the above parameters – includes “Set from default” button for an automatic entry of default parameters that were entered in the configuration layer.

Underneath, there are two sections on this page:

- "calculated" to show calculated values based on the entered data and the data available from the configuration tables
- "Parameters" to show which parameters from the configuration layer were used for the calculation

Click the "Update" button to display the complete record on the screen and, if everything is correct, press the "Save" button to save your record and add it to the collection (***Figure 92***)

Note that the state of this record is currently "draft". If you are not planning to work with this record anymore and it is ready for review, change the state to "ready" (***Figure 92***). If a higher tier is selected, the principal structure of the form will not change, but it is expected that the activity data are further disaggregated by regions.

When you press the "Add" button, SAGE displays the list of all records for the category (***Figure 93***).

Figure 92. Entering the data in category group 3.C.5

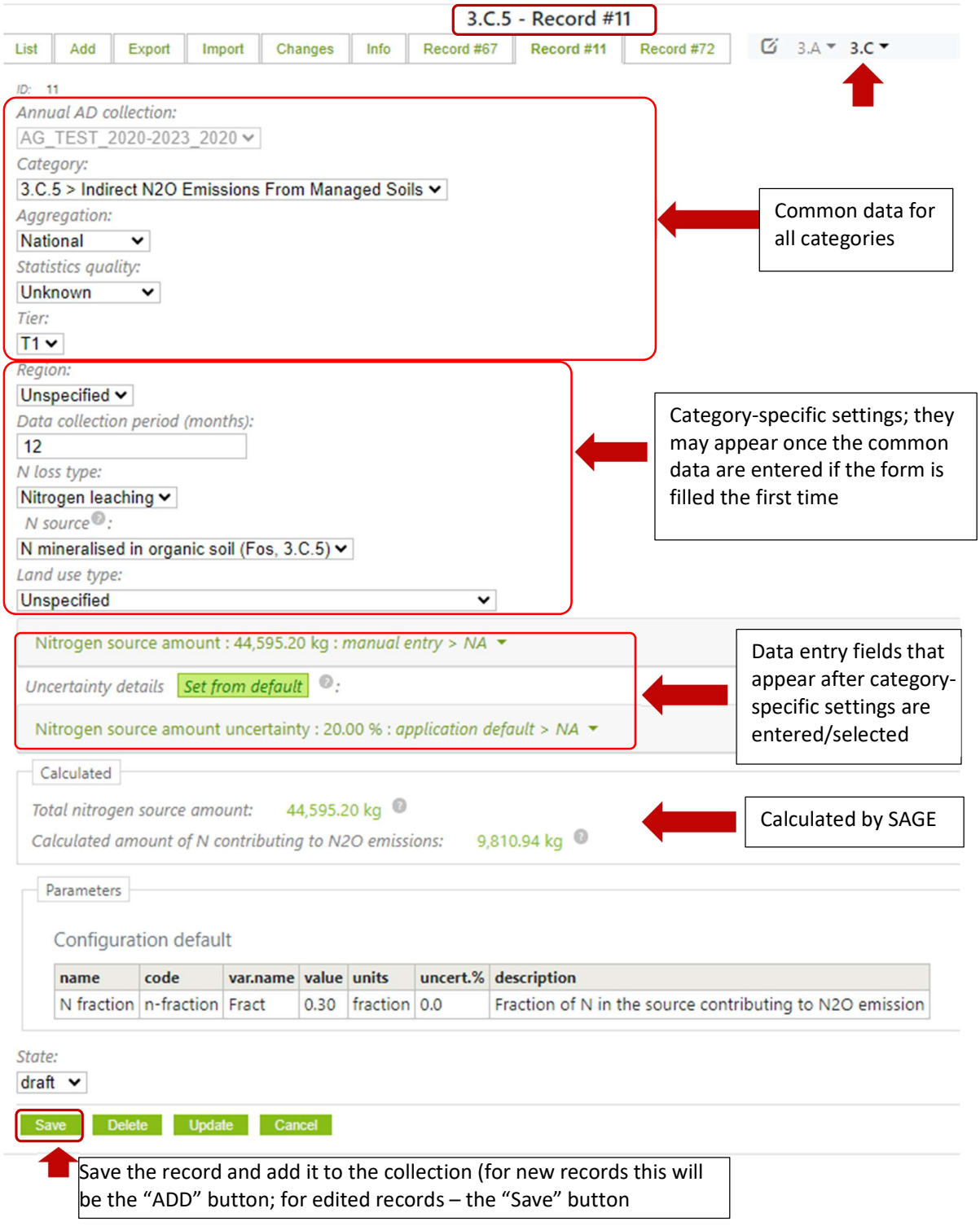
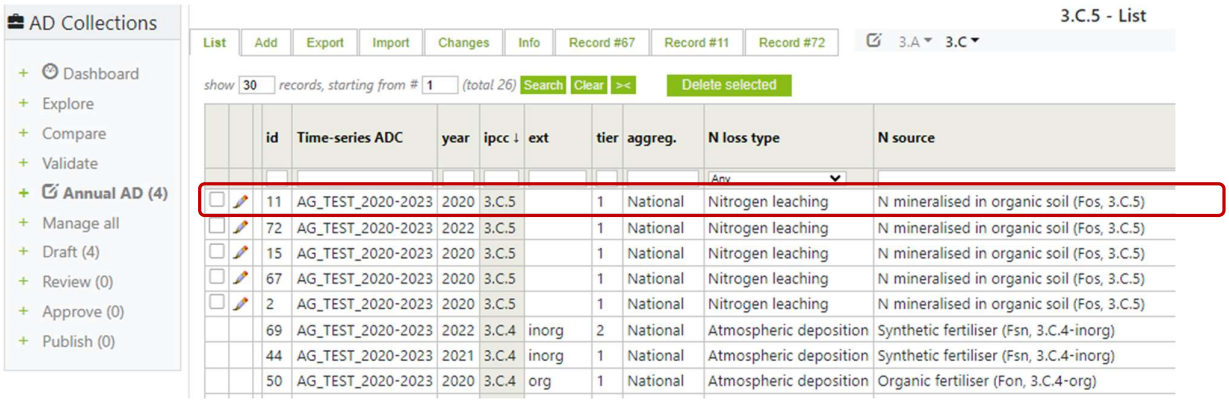


Figure 93. The list of records is updated



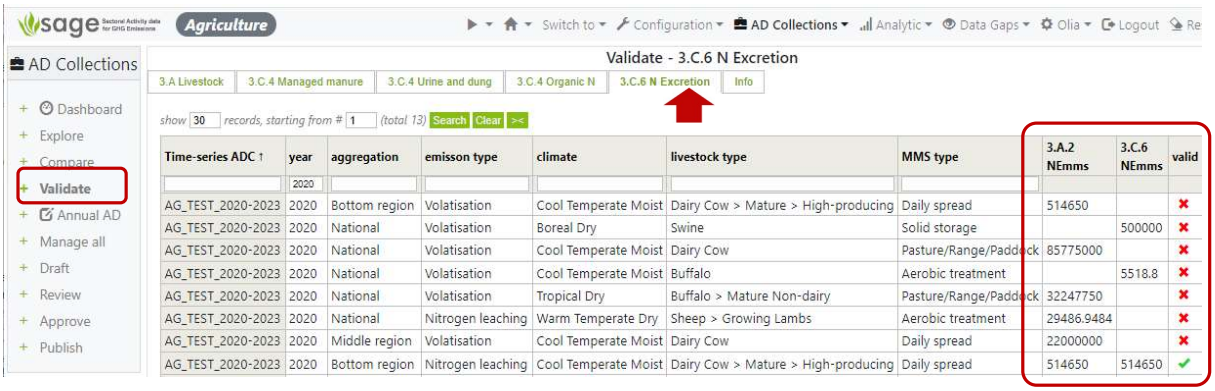
	id	Time-series ADC	year	ipcc	ext	tier	aggreg.	N loss type	N source
☐	11	AG_TEST_2020-2023	2020	3.C.5		1	National	Nitrogen leaching	N mineralised in organic soil (Fos, 3.C.5)
☐	72	AG_TEST_2020-2023	2022	3.C.5		1	National	Nitrogen leaching	N mineralised in organic soil (Fos, 3.C.5)
☐	15	AG_TEST_2020-2023	2020	3.C.5		1	National	Nitrogen leaching	N mineralised in organic soil (Fos, 3.C.5)
☐	67	AG_TEST_2020-2023	2020	3.C.5		1	National	Nitrogen leaching	N mineralised in organic soil (Fos, 3.C.5)
☐	2	AG_TEST_2020-2023	2020	3.C.5		1	National	Nitrogen leaching	N mineralised in organic soil (Fos, 3.C.5)
	69	AG_TEST_2020-2023	2022	3.C.4	inorg	2	National	Atmospheric deposition	Synthetic fertiliser (Fsn, 3.C.4-inorg)
	44	AG_TEST_2020-2023	2021	3.C.4	inorg	1	National	Atmospheric deposition	Synthetic fertiliser (Fsn, 3.C.4-inorg)
	50	AG_TEST_2020-2023	2020	3.C.4	org	1	National	Atmospheric deposition	Organic fertiliser (Fon, 3.C.4-org)

8.2.2.5 Indirect N_2O emissions from manure management (3.C.6)

This category uses a substantial amount of data already entered in 3.A.2 category. To **ensure consistency** of data entries between categories, use the following approach:

- Before data entry in 3.C.6: Follow the sequence of category data entries. Specifically, enter the data for 3.A.1 and 3.A.2 **BEFORE** making data entries in category 3.C.6.
- During data entry to 3.C.6: When possible, use the **"Set from 3.A.2 AD"** button to automatically insert the relevant values (***Figure 98. Entering the data in category group 3.C.6***).
- After data entry to 3.C.6: Use SAGE function **Validate** to check if the total amount of NEmms in category 3.A.2 is consistent with this value in category 3.C.6 (figure 80).

Figure 94. Use of the Validate function to check consistency between category data entries



Time-series ADC	year	aggregation	emisson type	climate	livestock type	MMS type	3.A.2 NEmms	3.C.6 NEmms	valid
	2020								
AG_TEST_2020-2023	2020	Bottom region	Volatisation	Cool Temperate Moist	Dairy Cow > Mature > High-producing	Daily spread	514650		✖
AG_TEST_2020-2023	2020	National	Volatisation	Boreal Dry	Swine	Solid storage		500000	✖
AG_TEST_2020-2023	2020	National	Volatisation	Cool Temperate Moist	Dairy Cow	Pasture/Range/Paddock	85775000		✖
AG_TEST_2020-2023	2020	National	Volatisation	Cool Temperate Moist	Buffalo	Aerobic treatment		5518.8	✖
AG_TEST_2020-2023	2020	National	Volatisation	Tropical Dry	Buffalo > Mature Non-dairy	Pasture/Range/Paddock	32247750		✖
AG_TEST_2020-2023	2020	National	Nitrogen leaching	Warm Temperate Dry	Sheep > Growing Lambs	Aerobic treatment	29486.9484		✖
AG_TEST_2020-2023	2020	Middle region	Volatisation	Cool Temperate Moist	Dairy Cow	Daily spread	22000000		✖
AG_TEST_2020-2023	2020	Bottom region	Nitrogen leaching	Cool Temperate Moist	Dairy Cow > Mature > High-producing	Daily spread	514650	514650	✔

The process of data entries for 3.C.6 follows the same general steps as described for other agriculture categories:

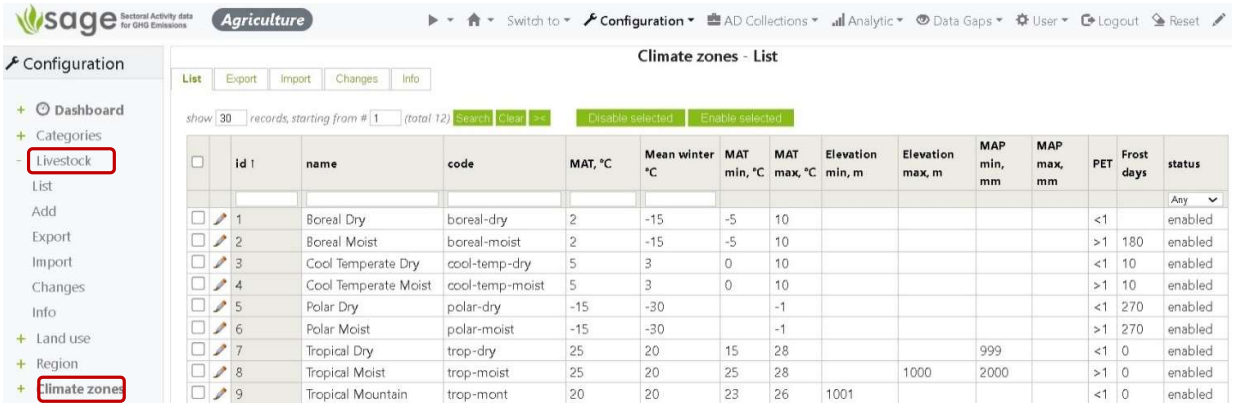
Step 1 for these categories is the same as for subcategories of category 3.A. The technical expert should check and update the levels of aggregations and potential data sources (tables Aggregations and Institutions) listed according to the country's national circumstances:

*Configuration - basic > Tables (Aggregations, Institutions) (**Figure 47**)*

Step 2 for these subcategories requires checking and updating the following tables in the cross-category section of the configuration tables for the agriculture sector:

*Configuration – Agriculture **Category Specific;** Table (Climate zone, Livestock)*

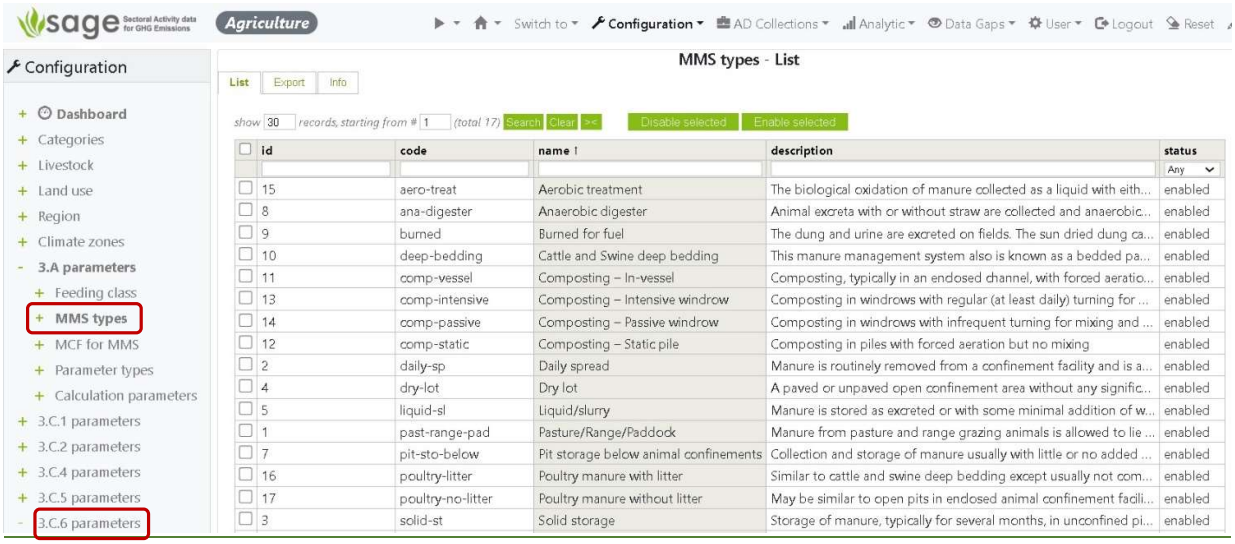
Figure 95. Configuration – Agriculture Category Specific; Table (Climate zone, Livestock) links are in the red frames



Step 3 for these subcategories requires checking and updating the calculated parameters under 3.C.1 section in the agriculture category-specific section of the configuration tables:

Configuration – Agriculture *Category Specific* > 3.A> Table (MMS types)

Figure 96. Configuration – Agriculture Category Specific > 3.A> Table (MMS types) links are in the red frames

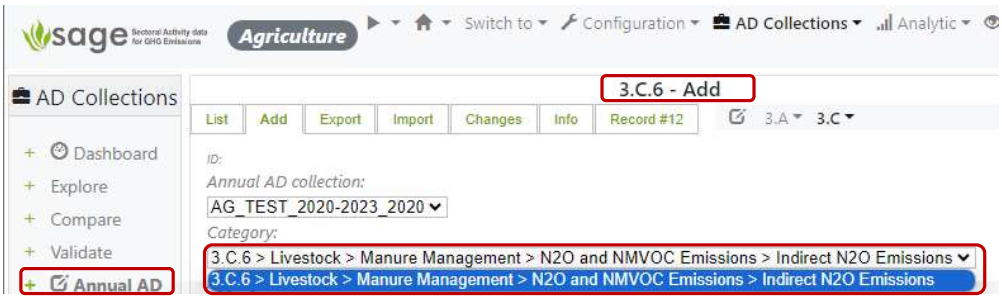


Step 4 fill in the activity data entry forms in the AD Collection block in SAGE.

The category selection in SAGE follows the IPCC approach and includes a combination of the process leading to GHG emissions + basic livestock type (***Figure 97***). For example,

- *3.C.6> Livestock > Manure Management > N_2O and NMVOC Emissions> Indirect N_2O Emissions*

Figure 97. Category selection in SAGE



Category-specific fields additional to those described in section 8.1.3 include:

- Data collection period (months) (default is on the annual basis = 12 months)
- Emission type (select **Nitrogen leaching** or **Volatilisation**)
- Climate zone (select specific climate zone most applicable to your country or make regional entries)
- Livestock type (contains livestock subdivisions available for the selected category)
- Manure management system type (select from available options)
-

– Once category-specific parameters are entered or selected, enter the data into the provided data fields:
  - Total N excretion (NEmms) per year – SAGE offers to use “Set from 3.A.2 AD” button for this value. If the data for this region/climate zone/animal type, MMS have already been entered in 3.A.2 category, please use this button to ensure consistency of data entries between categories.
  - Uncertainty block for the above parameters – includes “Set from default” button for an automatic entry of default parameters that were entered in the configuration layer.

Underneath, there are two sections on this page:

- “calculated” to show calculated values on a basis of the entered data and the data available from the configuration tables
- “Parameters” to show which parameters from the configuration layer were used for the calculation

Click the “Update” button to display the complete record on the screen and, if everything is correct, press “Add” button to save your record and add it to the collection (***Figure 110***)

Note that the state of this record is currently “draft”. If you are not planning to work with this record anymore and it is ready for review, change the state to “ready” (***Figure 110***).

When you press the “Add” button, SAGE displays the list of all records for the category (***Figure 111***).

Figure 98. Entering the data in category group 3.C.6

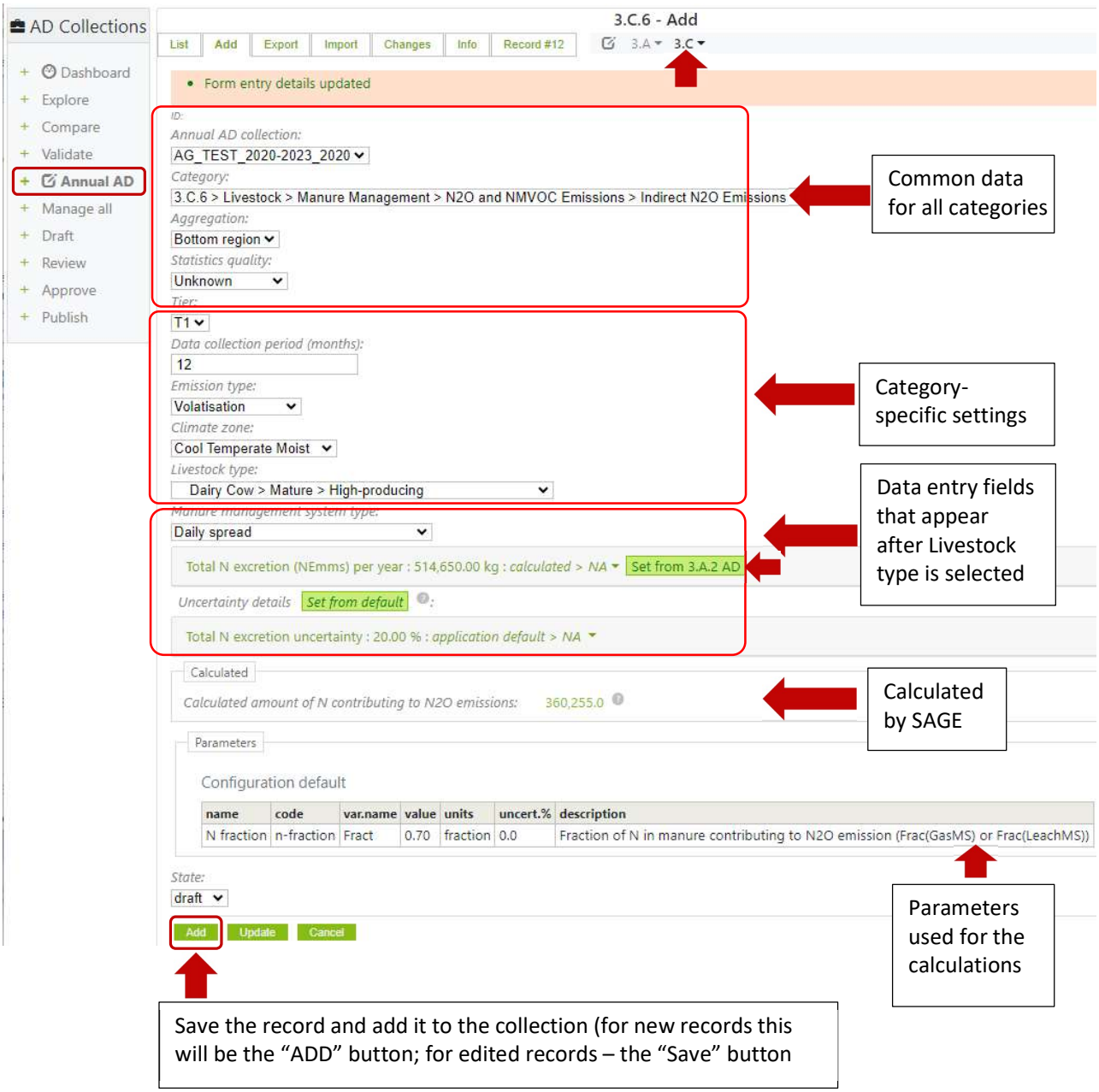
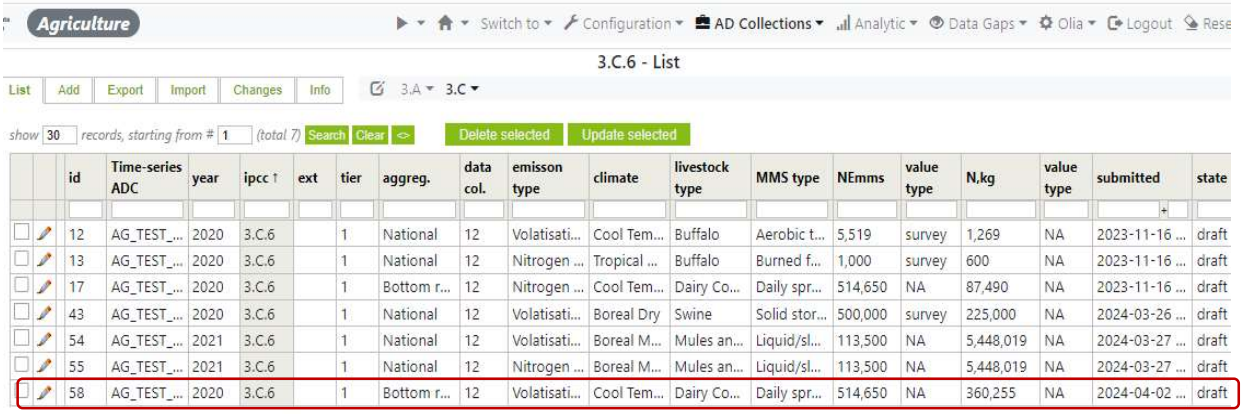


Figure 99. The list of records is updated



		id	Time-series ADC	year	ipcc ↑	ext	tier	aggreg.	data col.	emisson type	climate	livestock type	MMS type	NEmms	value type	N,kg	value type	submitted	state
		12	AG_TEST_...	2020	3.C.6		1	National	12	Volatisati...	Cool Tem...	Buffalo	Aerobic t...	5,519	survey	1,269	NA	2023-11-16 ...	draft
		13	AG_TEST_...	2020	3.C.6		1	National	12	Nitrogen ...	Tropical ...	Buffalo	Burned f...	1,000	survey	600	NA	2023-11-16 ...	draft
		17	AG_TEST_...	2020	3.C.6		1	Bottom r...	12	Nitrogen ...	Cool Tem...	Dairy Co...	Daily spr...	514,650	NA	87,490	NA	2023-11-16 ...	draft
		43	AG_TEST_...	2020	3.C.6		1	National	12	Volatisati...	Boreal Dry	Swine	Solid stor...	500,000	survey	225,000	NA	2024-03-26 ...	draft
		54	AG_TEST_...	2021	3.C.6		1	National	12	Volatisati...	Boreal M...	Mules an...	Liquid/sl...	113,500	NA	5,448,019	NA	2024-03-27 ...	draft
		55	AG_TEST_...	2021	3.C.6		1	National	12	Nitrogen ...	Boreal M...	Mules an...	Liquid/sl...	113,500	NA	5,448,019	NA	2024-03-27 ...	draft
		58	AG_TEST_...	2020	3.C.6		1	Bottom r...	12	Volatisati...	Cool Tem...	Dairy Co...	Daily spr...	514,650	NA	360,255	NA	2024-04-02 ...	draft

8.2.2.5 Rice cultivation (3.C.7)

The 2006 IPCC Methodological Guidelines for National GHG inventories considers the Rice cultivation category as an aggregate source of CH_4 emissions on land. Anaerobic decomposition of organic material in flooded rice fields produces methane (CH_4), which escapes to the atmosphere primarily by transport through the rice plants. These emissions are linked with the following elements that are parts of Activity data and are covered in SAGE:

- area of rice cultivation
- number and duration of types of crops grown
- water regimes before and during the cultivation period
- organic and inorganic soil amendments
- additional parameters that affect emissions, but are used mostly in higher-tier approaches are soil type, temperature, and rice cultivar

As for other categories of the agriculture sector, category 3.C.7 requires setting general, sector-specific cross-category, and category-specific parameters in the configuration tables before entering the data in the activity data form.

Tiers 1 and 2 for this category share the form structure, however, tier 2 methodology requires a more disaggregated approach to the activity data and using country-specific rather than IPCC default parameters and emission factors. Tier 3 includes models and monitoring networks tailored to address the national circumstances of rice cultivation repeated over time, driven by high-resolution activity data and disaggregated at the sub-national level. For this reason, the basic SAGE tool provides defaults and parameter lists for T1 and T2, the parameter lists may need to be extended if Tier 3 with a country-specific model is used which could be done through a SAGE customization project.

To enter the activity data, the same pattern of steps 1 – 4 is used for the category.

Step 1 for these categories is the same as for subcategories of category 3.A. The technical expert should check and update the levels of aggregations and potential data sources (tables Aggregations and Institutions) listed according to the country's national circumstances:

Configuration - basic > Tables (Aggregations, Institutions) ***(Figure 49)***

Step 2 for these subcategories requires checking and updating the following tables in the cross-category section of the configuration tables for the agriculture sector:

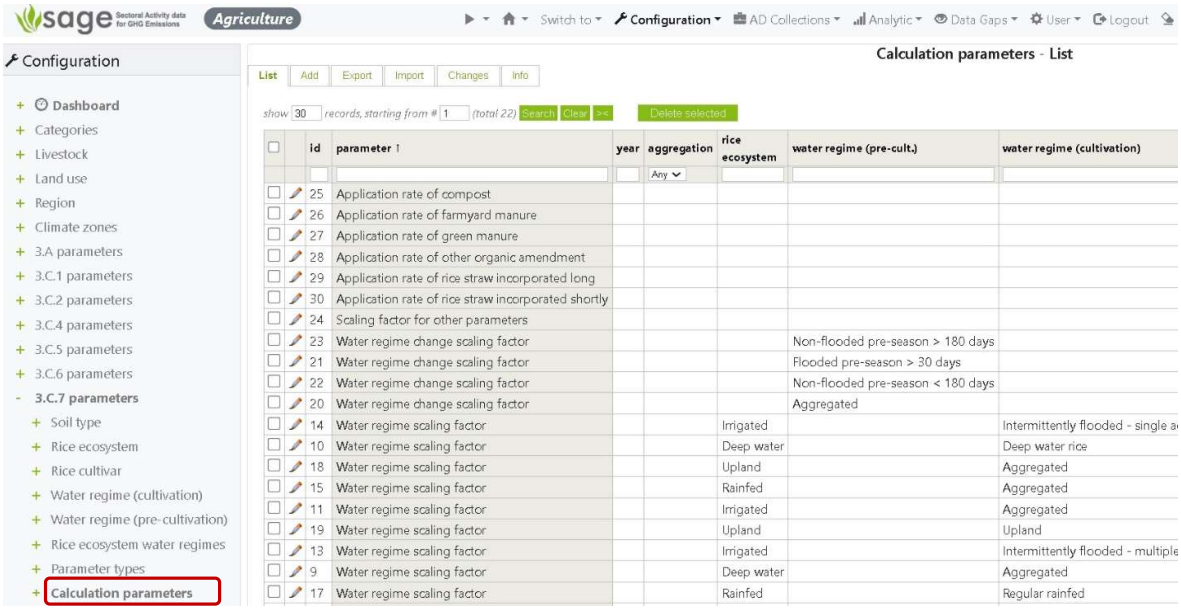
Configuration – Agriculture sector > Table (Regions, Land use subdivisions) ***(Figure 100)***

Figure 100. Configuration – Agriculture tables; Regions and Land use subdivisions table links in the red frames

Step 3 for these subcategories requires checking and updating the calculated parameters under 3.C.7 section in the agriculture category-specific section of the configuration tables:

*Configuration – Agriculture sector > 3.C.7 > Tables Rice cultivar, Water regime (pre-cultivation), Water regime (cultivation), Rice ecosystem water regimes, Calculated parameters) (**Figure 101**)*

Figure 101. Configuration – Agriculture category-specific → 3.C.7; Calculated parameters table link in the red frame



Step 4 fill in the activity data entry forms in the AD Collection block in SAGE.

The category selection in SAGE follows the IPCC approach and includes the process leading to GHG emissions (***Figure 111***). There are no default subcategories to 3.C.7 category

3.C.7> Rice cultivation

Figure 102. Category selection in SAGE

Category-specific fields additional to those described in section 8.1.3 include:

- Data collection period (use **12 months** as the default value)
- Region (select **Unspecified** if unknown or not applicable)
- Land use subdivision (select from the provided options as applicable)
- Rice ecosystem (select from the provided options as applicable)
- Water regime (cultivation) (use **Aggregated** if unknown)
- Water regime (pre-cultivation) (use **Aggregated** if unknown)
- Rice cultivar (select **Unspecified** if unknown or there is no data for further disaggregation)
- Soil type (use **Any** if no data available or unknown) – not needed for T1
- Rice crop practice (use **Unspecified** if no data is available or unknown)

Please note that all selection options appear as they are set in the configuration tables. If the selection menu does not include an option that should be applicable, consult with your technical expert or the system administrator and request adding this option in the relevant configuration tables.

Once category-specific parameters are entered or selected, enter the data into the provided data fields:

- Annual harvest area (**ha**)
- Rice cultivation period (days)
- Uncertainty block for the above parameters – includes "Set from default" button for an automatic entry of default parameters that were entered in the configuration layer.

Underneath, there are two sections on this page:

- "calculated" to show calculated values on a basis of the entered data and the data available from the configuration tables
- "Parameters" to show which parameters from the configuration layer were used for the calculation

Click the "Update" button to display the complete record on the screen and, if everything is correct, press the "Add" button to save your record and add it to the collection (***Figure 103***)

Note that the state of this record is currently "draft". If you are not planning to work with this record anymore and it is ready for review, change the state to "ready" (***Figure 103***).

When you press the "Add" button, SAGE displays the list of all records for the category (***Figure 104***).

Figure 103. Entering the data in category group 3.C.7

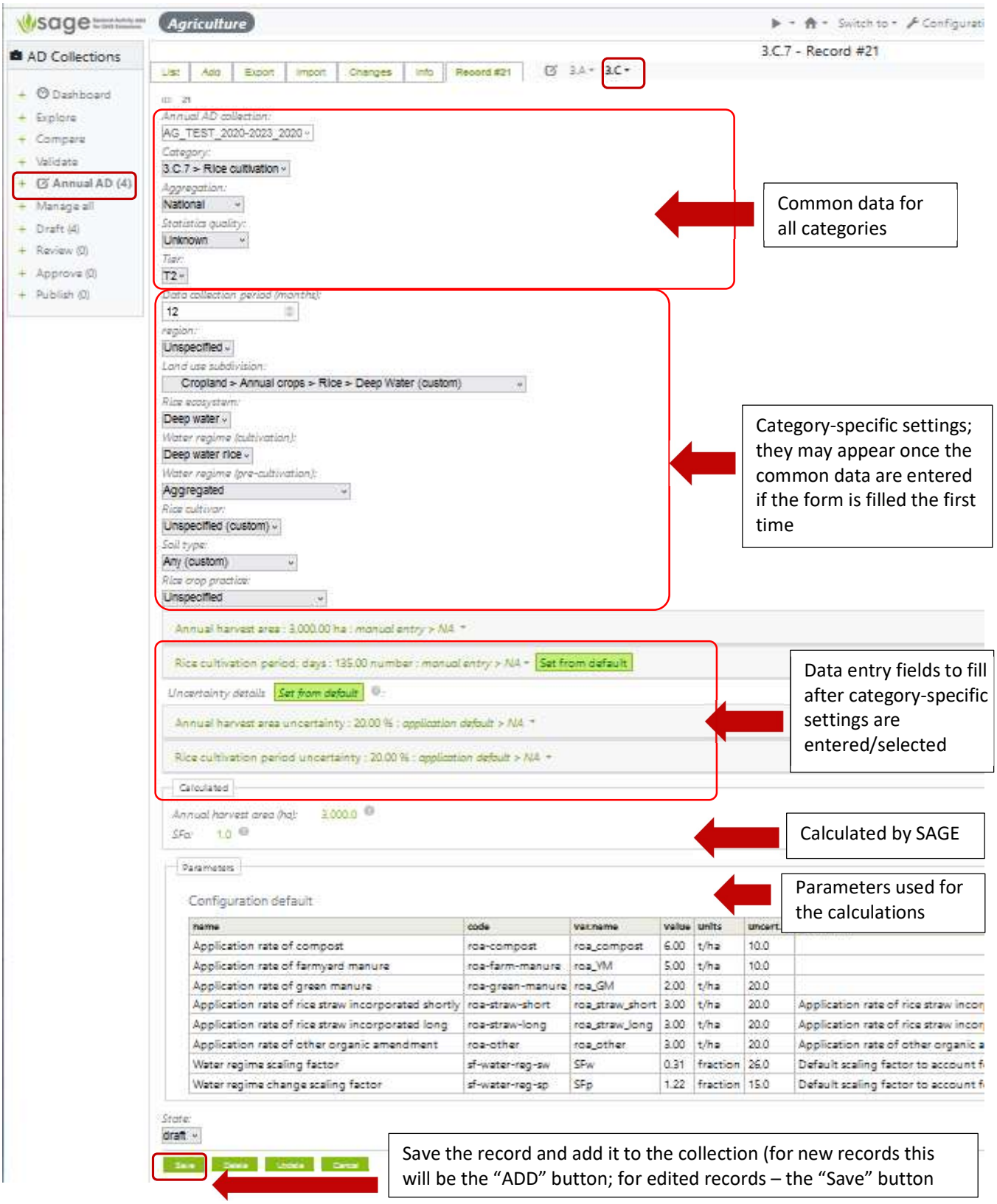
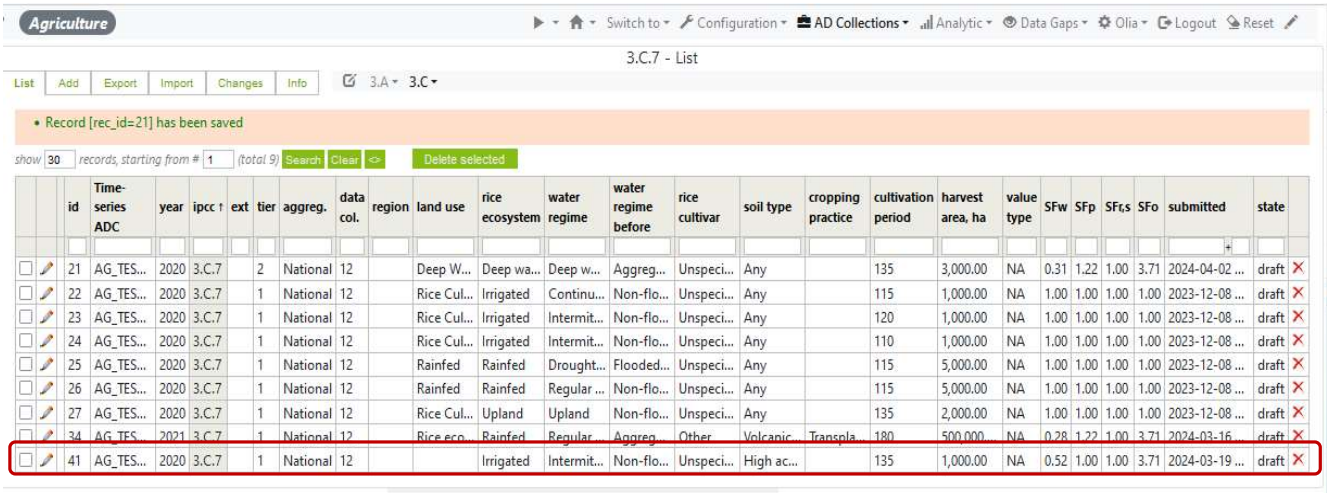


Figure 104. The list of records is updated



	id	Time-series ADC	year	ipcc ↑	ext	tier	aggreg.	data col.	region	land use	rice ecosystem	water regime	water regime before	rice cultivar	soil type	cropping practice	cultivation period	harvest area, ha	value type	SFw	SFp	SFr,s	SFo	submitted	state
	21	AG_TES...	2020	3.C.7		2	National	12		Deep W...	Deep wa...	Deep w...	Aggreg...	Unspeci...	Any		135	3,000.00	NA	0.31	1.22	1.00	3.71	2024-04-02 ...	draft
	22	AG_TES...	2020	3.C.7		1	National	12		Rice Cul...	Irrigated	Continu...	Non-flo...	Unspeci...	Any		115	1,000.00	NA	1.00	1.00	1.00	1.00	2023-12-08 ...	draft
	23	AG_TES...	2020	3.C.7		1	National	12		Rice Cul...	Irrigated	Intermit...	Non-flo...	Unspeci...	Any		120	1,000.00	NA	1.00	1.00	1.00	1.00	2023-12-08 ...	draft
	24	AG_TES...	2020	3.C.7		1	National	12		Rice Cul...	Irrigated	Intermit...	Non-flo...	Unspeci...	Any		110	1,000.00	NA	1.00	1.00	1.00	1.00	2023-12-08 ...	draft
	25	AG_TES...	2020	3.C.7		1	National	12		Rainfed	Rainfed	Drought...	Flooded...	Unspeci...	Any		115	5,000.00	NA	1.00	1.00	1.00	1.00	2023-12-08 ...	draft
	26	AG_TES...	2020	3.C.7		1	National	12		Rainfed	Rainfed	Regular ...	Non-flo...	Unspeci...	Any		115	5,000.00	NA	1.00	1.00	1.00	1.00	2023-12-08 ...	draft
	27	AG_TES...	2020	3.C.7		1	National	12		Rice Cul...	Upland	Upland	Non-flo...	Unspeci...	Any		135	2,000.00	NA	1.00	1.00	1.00	1.00	2023-12-08 ...	draft
	34	AG_TES...	2021	3.C.7		1	National	12		Rice eco...	Rainfed	Regular ...	Aggreg...	Other	Volcanic...	Transpla...	180	500,000...	NA	0.28	1.22	1.00	3.71	2024-03-16 ...	draft
	41	AG_TES...	2020	3.C.7		1	National	12			Irrigated	Intermit...	Non-flo...	Unspeci...	High ac...		135	1,000.00	NA	0.52	1.00	1.00	3.71	2024-03-19 ...	draft

8.2.2.5 N_2O emissions from aquaculture (3.C.12)

Category 3.C.12 does not provide rigidly fixed subcategories; the activity names within the category that would define the subcategory names are user-defined. To maintain time series consistency, SAGE provides the expandable activity listing table in the configuration layer for 3.C.12.

To enter the activity data, the same pattern of steps 1 – 4 is used for the category.

Step 1 for these categories is the same as for subcategories of category 3.A. The technical expert should check and update the levels of aggregations and potential data sources (tables Aggregations and Institutions) listed according to the country's national circumstances:

*Configuration - basic > Tables (Aggregations, Institutions) (**Figure 49**)*

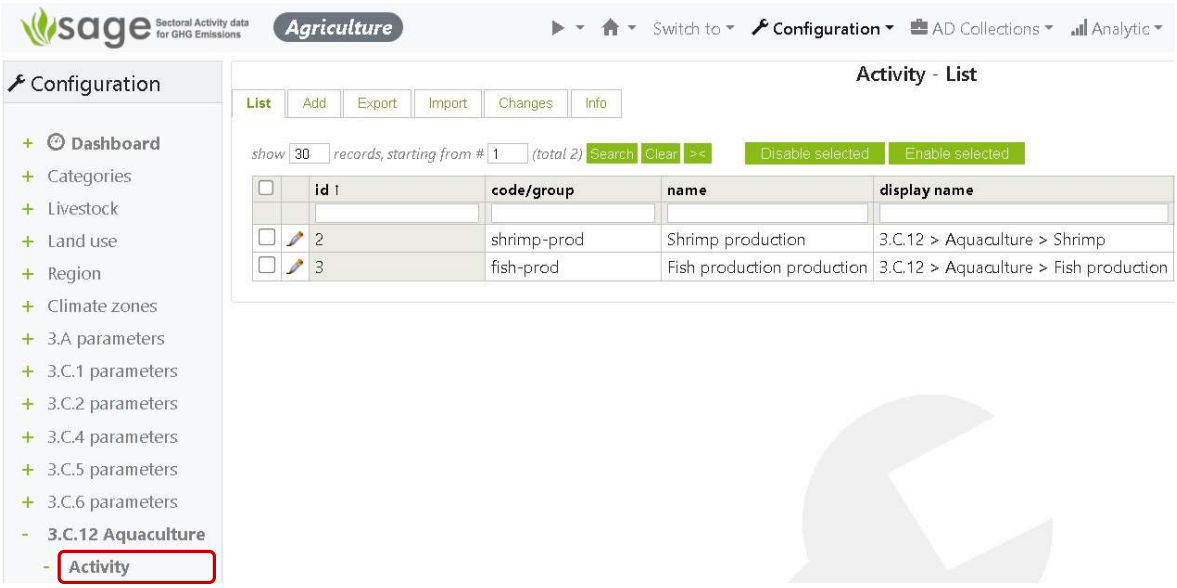
Step 2 for these subcategories requires checking and updating the following tables in the cross-category section of the configuration tables for the agriculture sector:

Figure 105. Configuration – Agriculture sector > Table (Regions)

Step 3 for these subcategories requires checking and updating the calculated parameters under 3.C.12 section in the agriculture category-specific section of the configuration tables:

*Configuration – Agriculture sector > 3.C.12 > Table (Activity name) (**Figure 106**)*

Figure 106. Configuration – Agriculture sector > 3.C.12 > Table (Activity name)

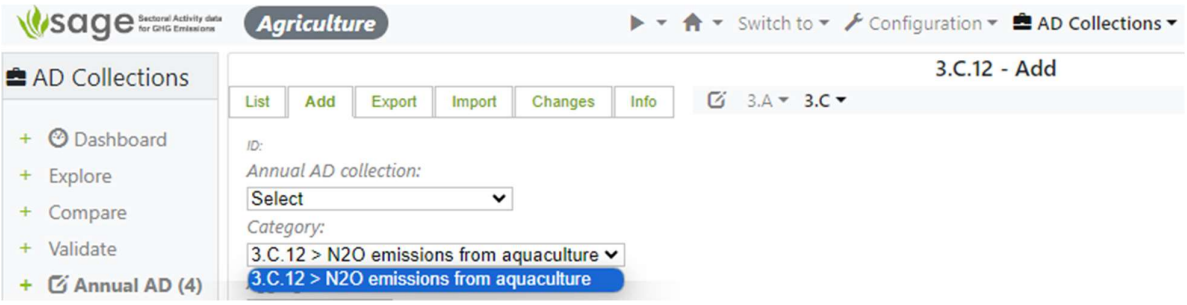


Step 4 fill in the activity data entry forms in the AD Collection block in SAGE.

The category selection in SAGE follows the IPCC approach and includes the process leading to GHG emissions (***Figure 107***) with user-defined subcategories 3.C.12 category

3.C.12> N2O emissions from agriculture><Activity name>

Figure 107. Category selection in SAGE



Category-specific fields additional to those described in section 8.1.3 include:

- Region (select **Unspecified** if unknown or not applicable)

Please note that all selection options appear as they are set in the configuration tables. If the selection menu does not include an option that should be applicable, consult with your technical expert or the system administrator and request adding this option in the relevant configuration tables.

Once category-specific parameters are entered or selected, enter the data into the provided data fields:

- Total mass of aquaculture production per year (mass units)
- Uncertainty block for the above parameters – includes “Set from default” button for an automatic entry of default parameters that were entered in the configuration layer.

There are no calculated fields on this page:

Click the "Update" button to display the complete record on the screen and, if everything is correct, press the "Add" button to save your record and add it to the collection (***Figure 108***).

Note that the state of this record is currently "draft". If you are not planning to work with this record anymore and it is ready for review, change the state to "ready" (***Figure 108***).

When you press the "Add" button, SAGE displays the list of all records for the category (***Figure 109***).

Figure 108. Entering the data in category group 3.C.12

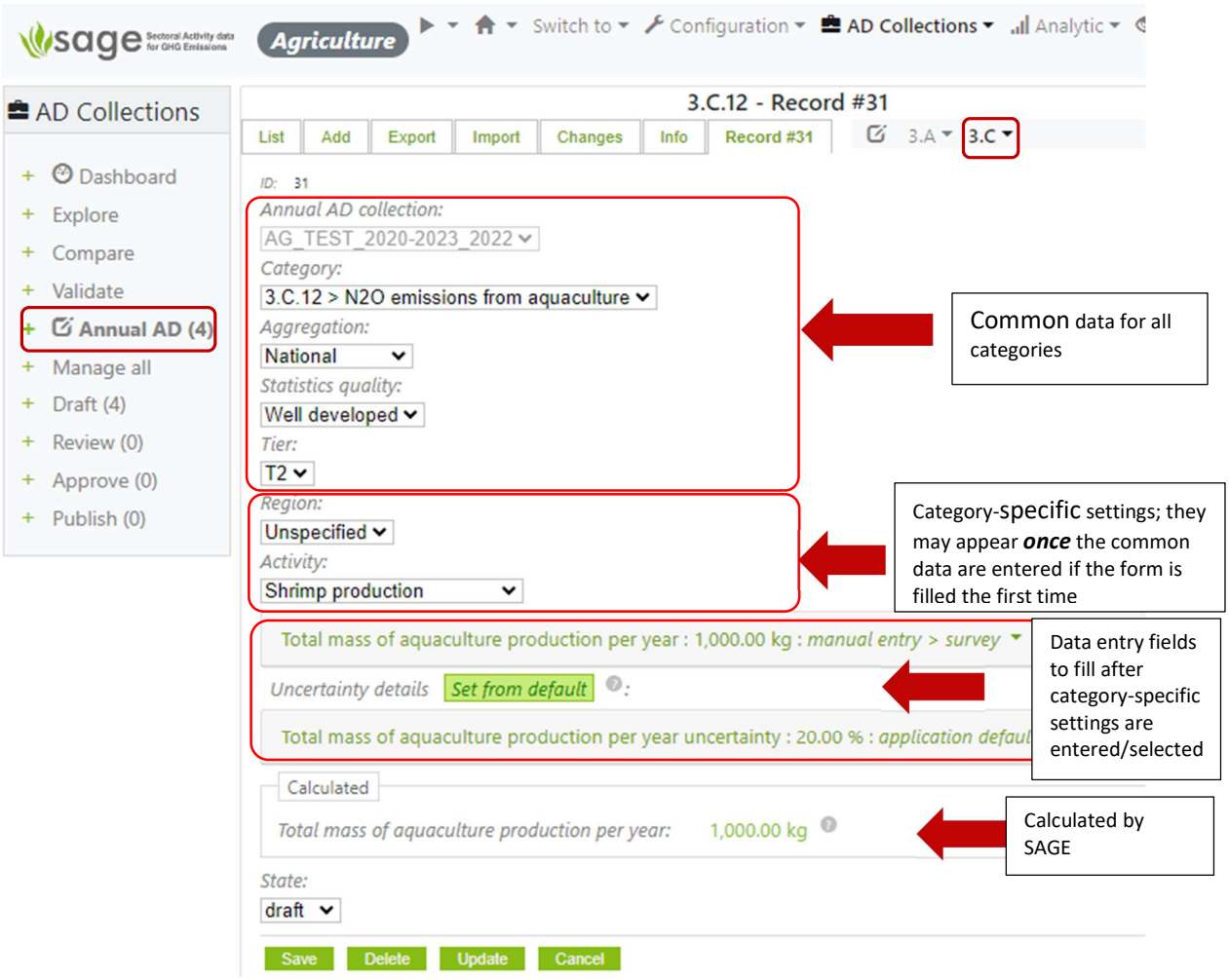
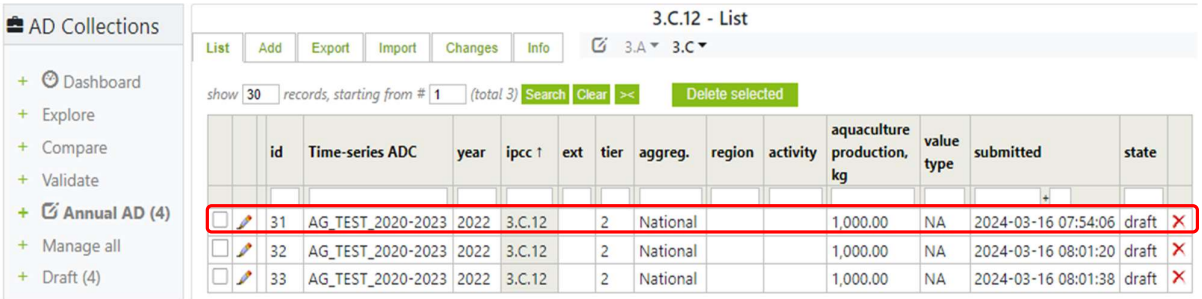


Figure 109. The list of records is updated



9. Activity Data (AD) Collections - Waste

9.1 AD Collections Data Entry Process

The AD collection data entry process is a subset of the 'AD Collections' process (see *5.1.1 The overall 'AD Collections' process* on page *15*).

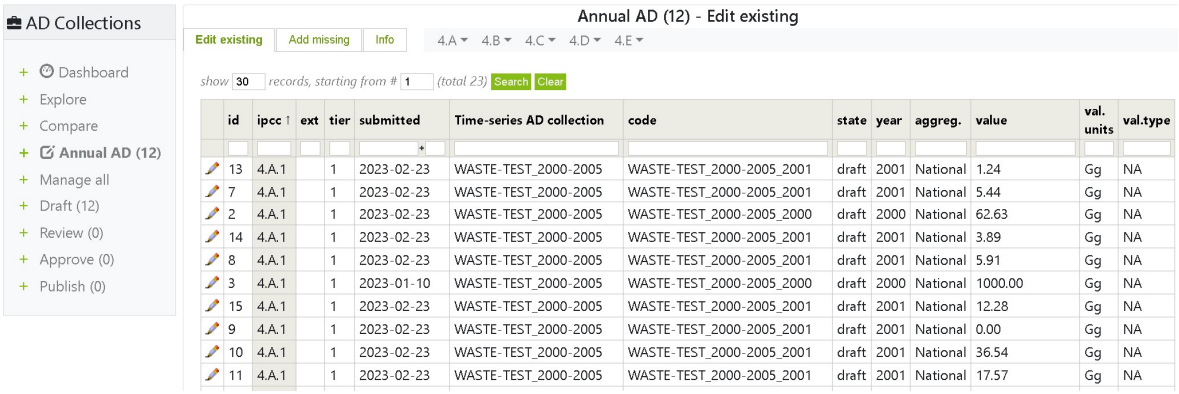
9.1.1 Background

General

The Annual AD collection page enables you to view, insert, edit and delete AD collection activity data and information.

To view, edit, remove and enter new records, in the left menu of the page, click Annual AD and the system will show the list of existing annual AD collections and their records available for editing. Above the table with the existing annual AD collections, you will see the major waste sector category groups with drop down lists (4.A, 4.B, 4.C, 4.D, and 4.E), (**Figure 110**).

Figure 110. Displaying annual data collections – Waste



	id	ipcc	ext	tier	submitted	Time-series AD collection	code	state	year	aggreg.	value	val. units	val.type
	13	4.A.1		1	2023-02-23	WASTE-TEST_2000-2005	WASTE-TEST_2000-2005_2001	draft	2001	National	1.24	Gg	NA
	7	4.A.1		1	2023-02-23	WASTE-TEST_2000-2005	WASTE-TEST_2000-2005_2001	draft	2001	National	5.44	Gg	NA
	2	4.A.1		1	2023-02-23	WASTE-TEST_2000-2005	WASTE-TEST_2000-2005_2000	draft	2000	National	62.63	Gg	NA
	14	4.A.1		1	2023-02-23	WASTE-TEST_2000-2005	WASTE-TEST_2000-2005_2001	draft	2001	National	3.89	Gg	NA
	8	4.A.1		1	2023-02-23	WASTE-TEST_2000-2005	WASTE-TEST_2000-2005_2001	draft	2001	National	5.91	Gg	NA
	3	4.A.1		1	2023-01-10	WASTE-TEST_2000-2005	WASTE-TEST_2000-2005_2000	draft	2000	National	1000.00	Gg	NA
	15	4.A.1		1	2023-02-23	WASTE-TEST_2000-2005	WASTE-TEST_2000-2005_2001	draft	2001	National	12.28	Gg	NA
	9	4.A.1		1	2023-02-23	WASTE-TEST_2000-2005	WASTE-TEST_2000-2005_2001	draft	2001	National	0.00	Gg	NA
	10	4.A.1		1	2023-02-23	WASTE-TEST_2000-2005	WASTE-TEST_2000-2005_2001	draft	2001	National	36.54	Gg	NA
	11	4.A.1		1	2023-02-23	WASTE-TEST_2000-2005	WASTE-TEST_2000-2005_2001	draft	2001	National	17.57	Gg	NA

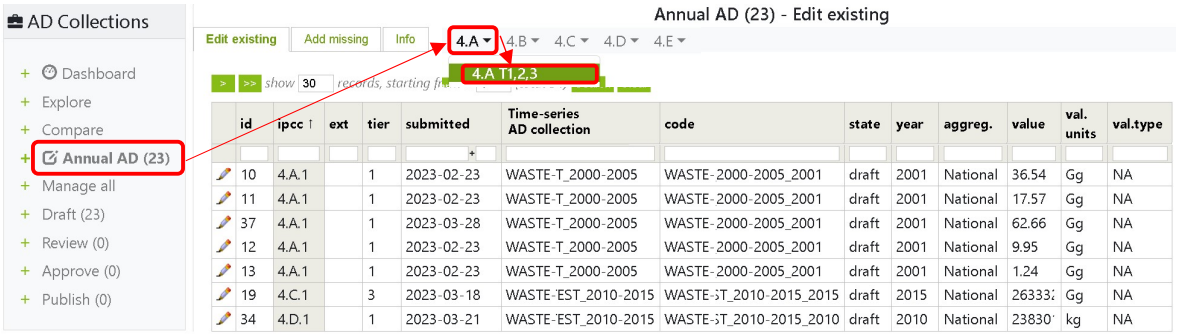
There are 3 tabs above the data table that allow to work with the entire pool of records from all available collections, categories and years:

- Edit existing – to view and edit the existing records
- Add missing – to identify which category entries are missing for each of the waste sector categories for each collection according to the years each AD collection covers. These can be filtered to rationalize the viewed information. Some generic information is offered for each missing record. To complete a missing record, use a "pencil" icon. This will prompt you to enter the missing information and data and then save the record. This method is useful if one or two records are missing. ***To do a more systematic and extensive data entry, use category drop-down lists (4.A, 4.B, 4.C, 4.D, and 4.E, see sections 7.3.2 – 7.3.3 below).***
- Info – a brief description of available options on the page.

Working with individual categories

To start working with the records in the individual categories, select a category from a relevant drop-down list above the records table (4.A, 4.B, 4.C, 4.D, and 4.E). *The example* below is based on one of the waste categories (4.A.1). (***Figure 111***).

Figure 111. Selecting a waste sector category – category 4.A.1



The option tabs for record entries in the AD collection are the same as those for AD collection management, but they refer to a single record rather than to the entire AD collection:

List displays a table with the list of records; each record has a "**pencil**" icon at the beginning (this is the edit option) and a "**cross**" icon at the end (to delete a record),

Add allows entry of a new activity data record that includes the fuel consumption value and relevant supplementary information (e.g., fuel characteristics, uncertainty, and comments),

Export allows exporting existing activity data to an Excel (CSV) file,

Import allows importing data from Excel templates (for all tables and records, and for entire time series),

Changes contains a log of changes performed on records within the module,

Info provides relevant notes and guidance helping you understand available options and how to use them

9.1.2 How to edit activity data records

To edit existing AD collection names and details:

- Select category group from the drop-down lists above the record table (4.A, 4.B, 4.C, 4.D, and 4.E, ***Figure 111***).
- In the **List** tab, you will see the existing table with records. Each record has a **pencil** button on the left for editing. "List" view opens by default when a category is selected from the drop-down list.
- To modify an entry, click the "pencil" button to the left of the record, then make your modification using the form provided, and
- To save the updated record, click **Save**.
- To remove a record from the list, click the **cross** icon to the right of the record.

9.1.3 How to add a new data record – manual entry

The process of adding a new activity data record is similar to adding a new AD collection. As explained above, this form has five category groups, shown by the tabs at the top. These are: 4A, 4B, 4C, 4D, and 4E.

Note that similar to the energy and the IPPU sectors, the waste sector categories have generic (common) and category-specific information fields parameters to hold category-specific parameters that change from category to category. The category you choose affects the data required in the form. Once both generic and category-specific information and data are entered, click 'Add' to add an item.

To add new activity data records:

- Select category group from the drop-down lists above the record table (4.A, 4.B, 4.C, 4.D, and 4.E, ***Figure 111***).
- Click tab **Add** and then use the provided form to create a new record.
- Select **Annual AD collection** name from the drop-down list in the form
- Select **Category** with the required extension from the drop-down list in the form
- Select general information options in the provided drop-down lists:
    - **Aggregation** level (e.g., *national*)
    - **Statistics quality** (either *well developed* or *unknown*)
    - Methodological **Tier** (e.g., *T1*)
- Enter both activity data and supporting information in the provided information fields and menu items from the drop-down lists in the form
- For each entered parameter value:
    - select **Units** of measurement (from the drop-down list underneath the parameter field)
    - select **Source** of data/information from the provided drop-down list.
    - source information **Type** (*survey* for actual data and *modelled* otherwise)
    - optional entries:
        - **Date issued** to let others know when this data has been published/made available/recorded in format yyyy-mm-dd.
        - **Reference and comments** to record the link to the information source and make notes that might be useful to others – for example, this record is provisional, the final value will be available on dd/mm/yy from <person/organization>.
- Enter **Uncertainty**:
    - Option 1: click the button **Select from default** – SAGE will assign the value a default uncertainty according the to 2006 IPCC Guidelines
    - Option 2: use the manual entry to enter the country-specific uncertainty value in the provided information fields and enter the source for the uncertainty data.
- Select the **State** of the record (*draft* = you might come back to it and re-check or *ready* = the record is final and ready for the review).
- Click green button **Add** on the bottom of the form
- If you wish to enter more records (e.g., for the next year) – click again tab **Add** above the record (the one near **List**), and the new form pre-filled with the previous information will be appear. This is a quick way of entering several records, because you only need to make small edits in the provided entries and then again click green button **Add** on the bottom of the form without going to the main record page.

When the entries are complete, SAGE provides the summary of parameters as required for entering into the IPCC equations and saves the record in the database ***(Figure 112)***.

Figure 112. *An example of SAGE-generated summary and output parameters for category 4.A.1.*

Parameters

Generic

name	value	units
% Paper in industrial waste	0.0000	%
C to CH4 conversion factor	1.3333	fraction
DOCf	0.5000	fraction
Methane fraction	0.5000	fraction
OX	0.0000	fraction
Reaction delay time	6.0000	number
Starting year	1,950.0000	number
Wood % in industrial waste	0.0000	%

Emissions

name	value	units
DOC	0.2000	fraction
Methane generation rate constant (1/years)	0.0500	fraction
Methane generation rate constant (1/years)	0.1000	fraction
Methane generation rate constant (1/years)	0.0650	fraction
Methane generation rate constant (1/years)	0.1700	fraction

Below we provide an overview of generic parameters and category-specific parameters for each major waste sector category and show where to find them in the data entry form.

*General information fields (all entries here are mandatory) (**Figure 113**):*

Annual AD collection Select Annual AD collection from the drop-down list

Category Select Waste category for the data entry

Aggregation Select the level of aggregation – national, regional, or facility – the list of aggregations relevant for your country will be set up in the relevant configuration table by your national inventory compiler. If additional aggregation levels are required (e.g., city, island, state) - they can easily be included by authorized users at the configuration level, please ask.

Statistics quality Describe the reliability of the data used; your selection in this option will help SAGE to determine the correct default level of uncertainty for the activity data if the actual uncertainty is unknown.

Methodological tier Identify the level of details required for the activity data entry. Note that when higher tiers (T2 or T3) are selected, additional information fields may become visible and mandatory for entry.

Uncertainty details Enter the percentage value, type (survey or modeled), source (e.g., IPCC or expert judgement), and any reference/comments. The uncertainty details could be entered manually or set from default by clicking the button “Set from default”. If this option is used, SAGE calculates the uncertainty using the logic and default parameters from the 2006 IPCC Guidelines.

Category-specific parameters

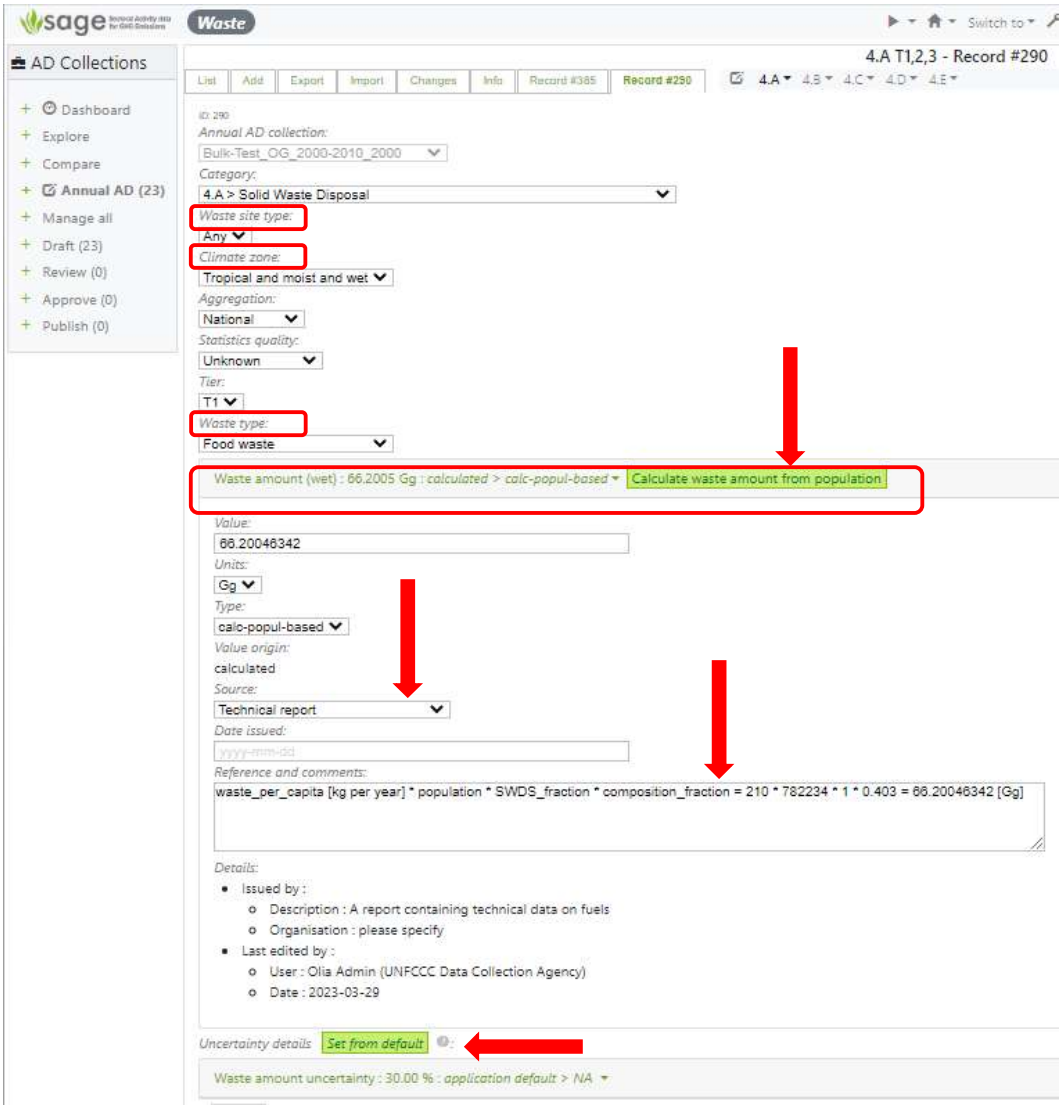
4.A category-specific entries

Subcategories of 4.A require information about climate zone, the type of waste being deposited, west sites, and waste amounts *(**Figure** 112)*. Please note that in case of 4.A, information on methane oxidation at SWDS is entered in the configuration tables.

Waste site type	Select waste site type from the drop-down list. If the waste site type is not known, select option "Any" (selected by default). For higher tiers, this parameter is mandatory.
Climate Zone	Select climate zone for the data entry
Waste type	Select the waste type – the selection is based on the following groups of waste: municipal solid waste (MSW), industrial waste, liquid fossil waste, other waste, and sludge – the list of available waste types relevant for your country will be set up in the relevant configuration table by your national inventory compiler. If additional waste types are required - they can easily be included by authorized users at the configuration level, please ask. Please note that an option total (bulk) waste for MSW is available for new entries for this category along with individual waste types.
Waste amount	Enter the amount of waste of the selected type deposited to the selected waste site. If "total (bulk)" option is selected for MSW, SAGE offers to calculate individual waste types using country's population and distribution of the MSW across different waste types. These parameters are set up for you in the waste configuration tables for 4.A category. The distribution of MSW among different waste site types is also set up in the relevant configuration tables.

Please note that for all numerical entries, you will need to provide the metadata – units of measurement, source of the data are mandatory entries. Additional references, dates of data acquisition and data entry in format yyyy-mm-dd, and notes can also be entered in the relevant fields of the form.

Figure 113. *Adding activity data to Waste – Category-specific information fields for 4.A*



4.B category-specific entries

Category 4.B Biological treatment of solid waste requires information similar to 4.A and additionally, amount of recovered methane, the information on the collection frequency, and waste weight bases (wet/dry) (***Figure 114***). The reference field provided in the data entry form can be used to record the information on coverage (e.g., whether composting at households is included or not).

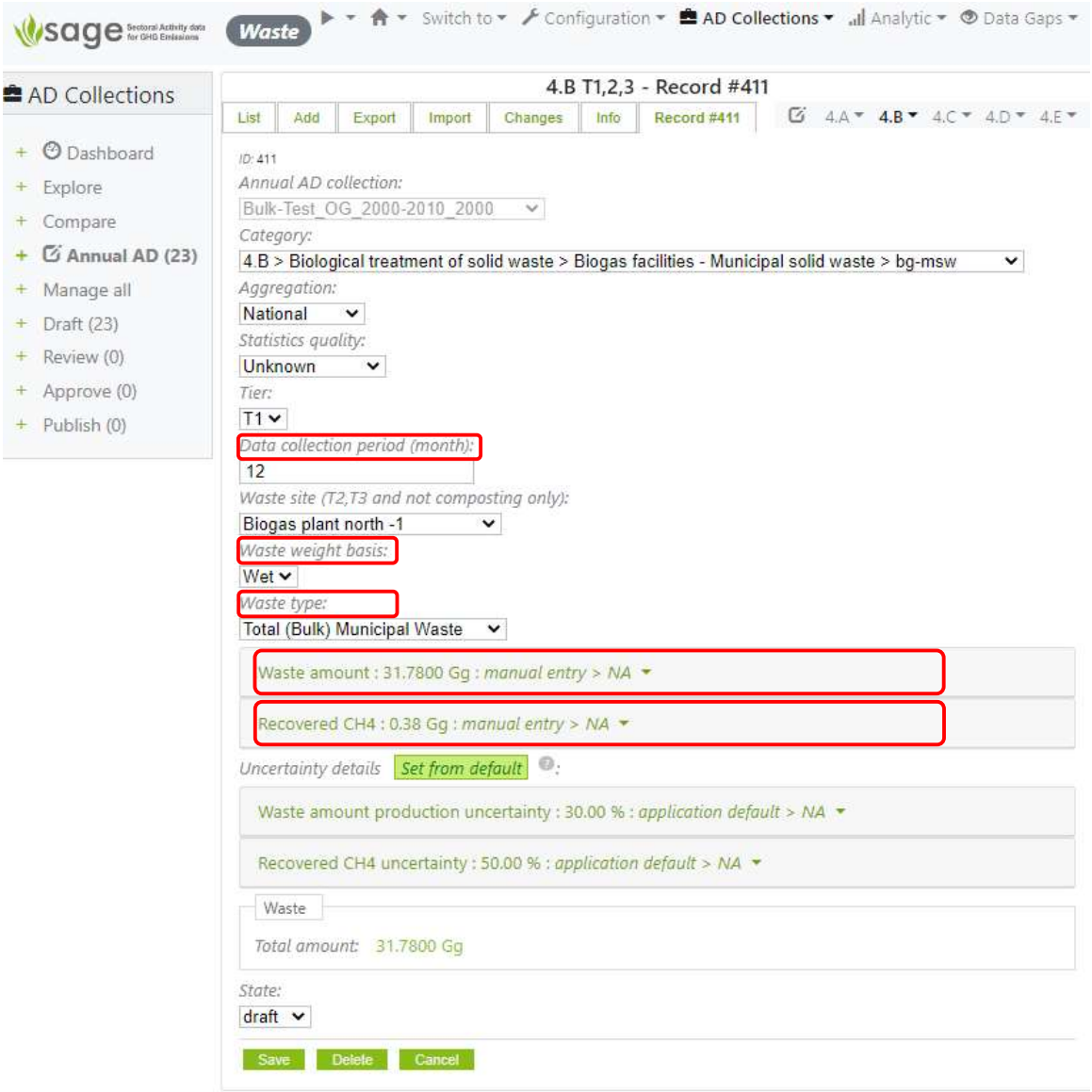
According to the 2006 IPCC Guidelines, anaerobic digestion of solid waste can be assumed to be zero where no data are available.

According to the 2006 IPCC Guidelines, higher tiers require similar parameters for calculating emissions, but in case of

- **Tier 1**: Tier 1 uses the IPCC default emission factors.
- **Tier 2**: Country-specific emission factors based on representative measurements are used.
- **Tier 3**: The method would be based on facility or site-specific measurements (on-line or periodic).

Therefore, for T2 and T3 entries, the waste site type is a mandatory entry.

Figure 114. *Adding activity data to Waste – Category-specific information fields for 4.B*

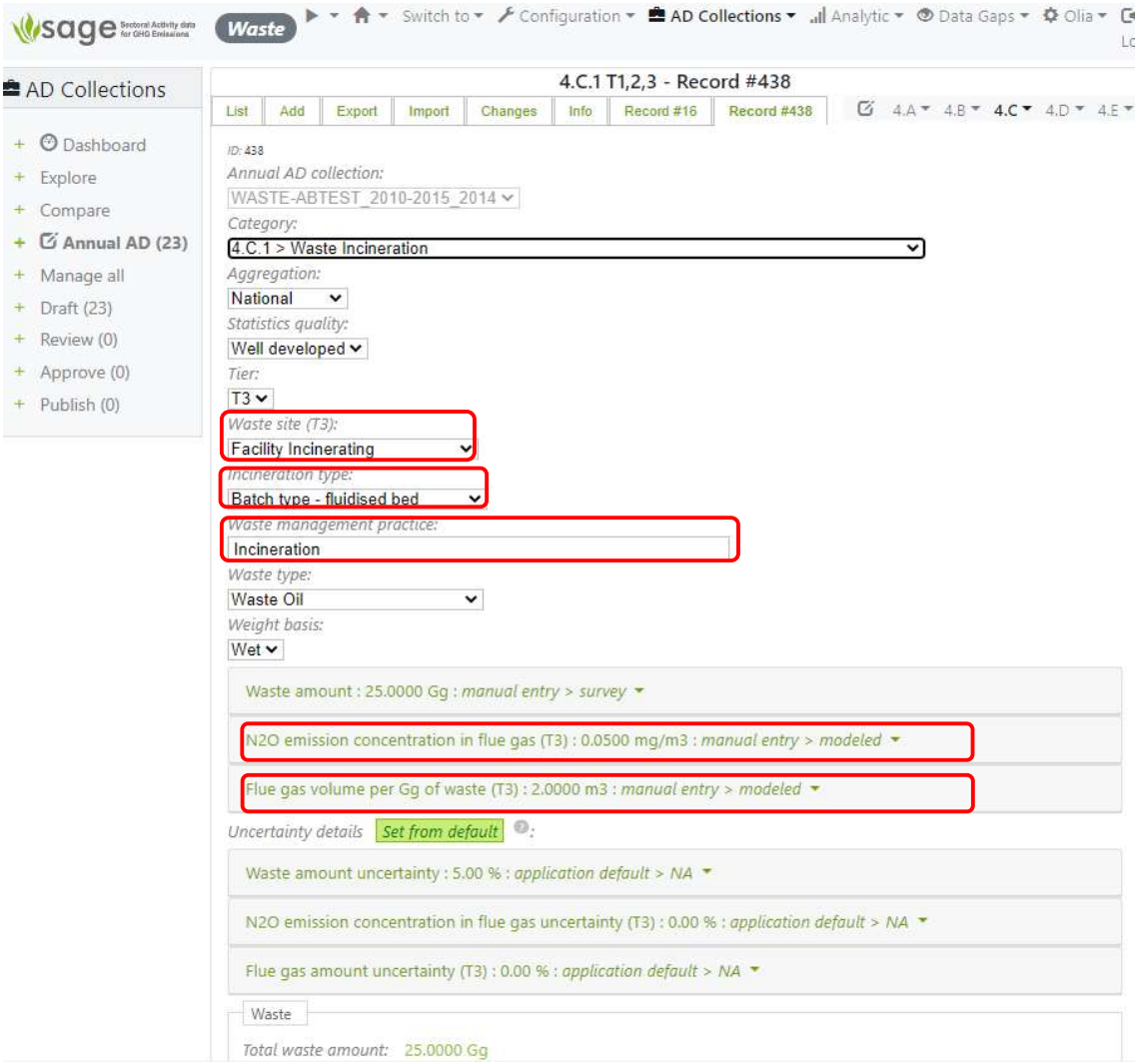


4.C category-specific entries

Subcategories of categories 4.C Incineration and open burning of waste require information similar to 4.A and 4.B. Additionally, for higher tiers, information on the incineration type/technology and waste

management practice is required for waste incineration entries, and for Tier 3 entries, N_2O concentration in flue gas volume per Gg of waste is also needed ***(Figure 115)***.

Figure 115. *Adding activity data to Waste – Category-specific information fields for 4.C*



4.D category-specific entries

Subcategories of categories 4.D Wastewater treatment and discharge are conceptually different from categories 4.A – C that describe different types of treatment of solid waste. Therefore, category-specific information fields for 4.D are also differ from 4.A – C. They include information on organics in wastewater, nitrogen and sludge removed from wastewater, methane recovered, as well as information on discharge pathways and whether industrial wastewater discharge is collected in sewers ***(Figure 116)***.

Industrial discharge collected in sewers Wastewater from industrial or commercial sources that is discharged into the sewer may contain protein (e.g., from grocery stores and butchers). The default for this fraction is 1.25, this parameter is mandatory.

TOW Total organics in wastewater in the inventory year; this parameter is mandatory.

Discharge pathway	Select the different pathways for wastewater treatment and discharge – the list of available pathways relevant for your country will be set up in the relevant configuration table by your national inventory compiler. If additional pathways are required - they can easily be included by authorized users at the configuration level, please ask. Please note that an option total (bulk) waste for MSW is available for new entries for this category along with individual waste types.
N removed with sludge	Enter the amount of nitrogen removed with sludge (default value is zero).
Total sludge removed	Enter the amount of sludge removed for incineration, landfills, and agricultural land (default value is zero).

Note that SAGE offers an option to calculate the total organics in wastewater on a basis of country's population, which is set up in the basic configuration table 'Country Details'.

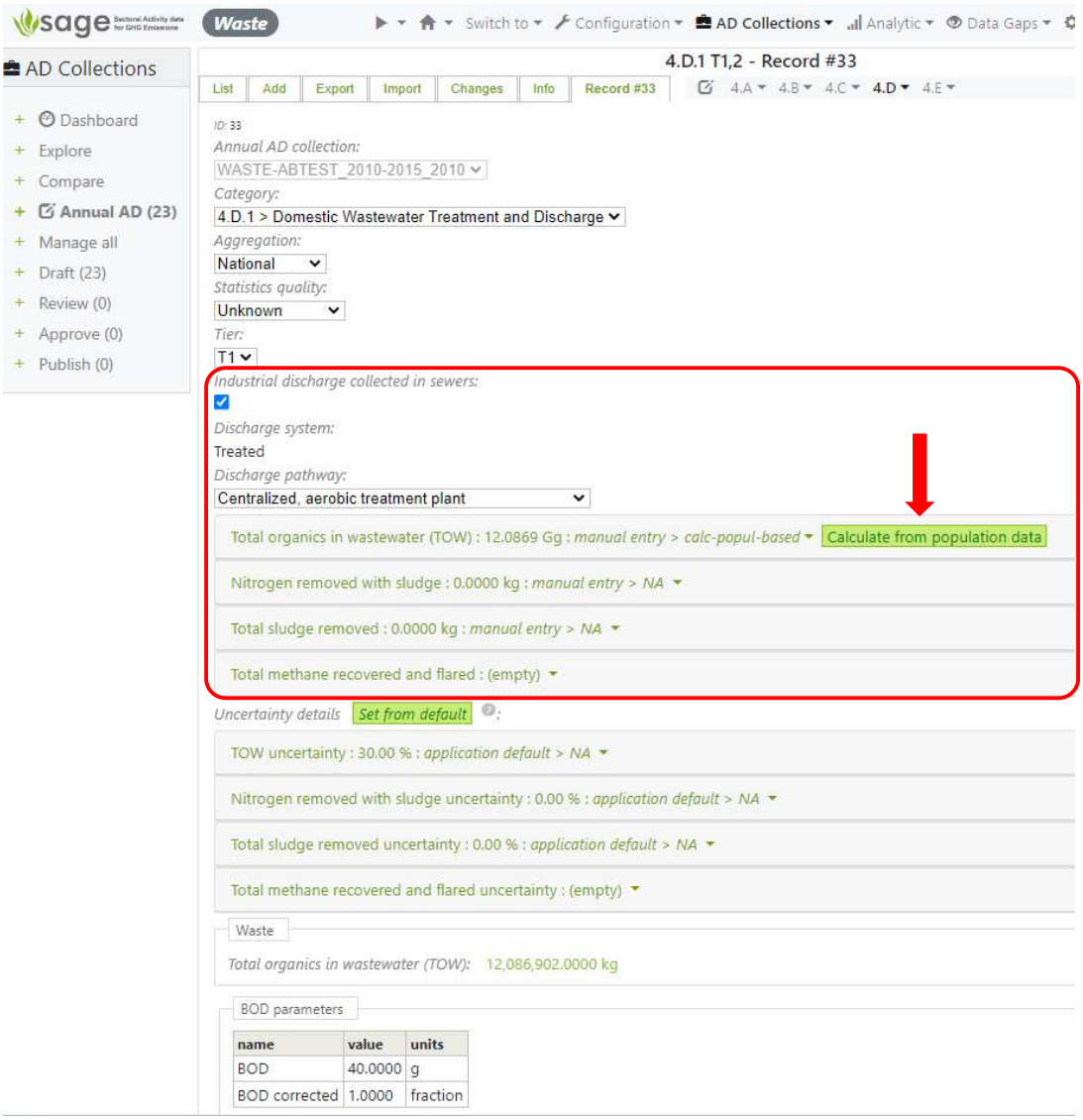
Other important information regarding wastewater treatment and discharge categories is available from the configuration tables in SAGE. The following groups of parameters does not need to be entered through the AD entry form because they are already stored in the **SAGE configuration layer**:

- ***CH_4*** *configuration table includes the default methane correction factors (MCF) values for the different types of discharge pathway systems together with the maximum methane producing capacity.*
- *The **BOD** table is for the national technical experts to enter the country-specific values of BOD (with uncertainty), and an appropriate BOD correction factor (it is 1 if industrial wastewater is not discharged in the sewers together with domestic wastewater and 1.25 if it is).*
- *The **Income group** table is to describe how different discharge pathway systems are used by the population of different income groups and the degree of utilization of each pathway.*
- *The **N_2O** table shows default 2006 IPCC values for the key N_2O parameters and their uncertainties applicable to the 4.D category:*
    - *Fraction of nitrogen in protein*
    - *Factor to adjust for non-consumed protein, based on available protein*
    - *Factor to adjust for non-consumed protein, based on consumed protein*
    - *Factor to allow for co-discharge of industrial nitrogen into sewers. For countries with significant fish processing plants, this factor may be higher. Expert judgment is recommended.*
- *The **Industrial wastewater** table shows default 2006 IPCC values for the for industries generating wastewater:*
    - *Industries*
    - *Wastewater Generation amount*
    - *Chemical oxygen demand (COD)*
    - *Nitrogen content of wastewater (this value could be 0)*

Where 2006 IPCC values were not available, they were sourced from research papers and engineering websites.

For each of parameters, their default IPCC value can be overwritten with the country-specific value.

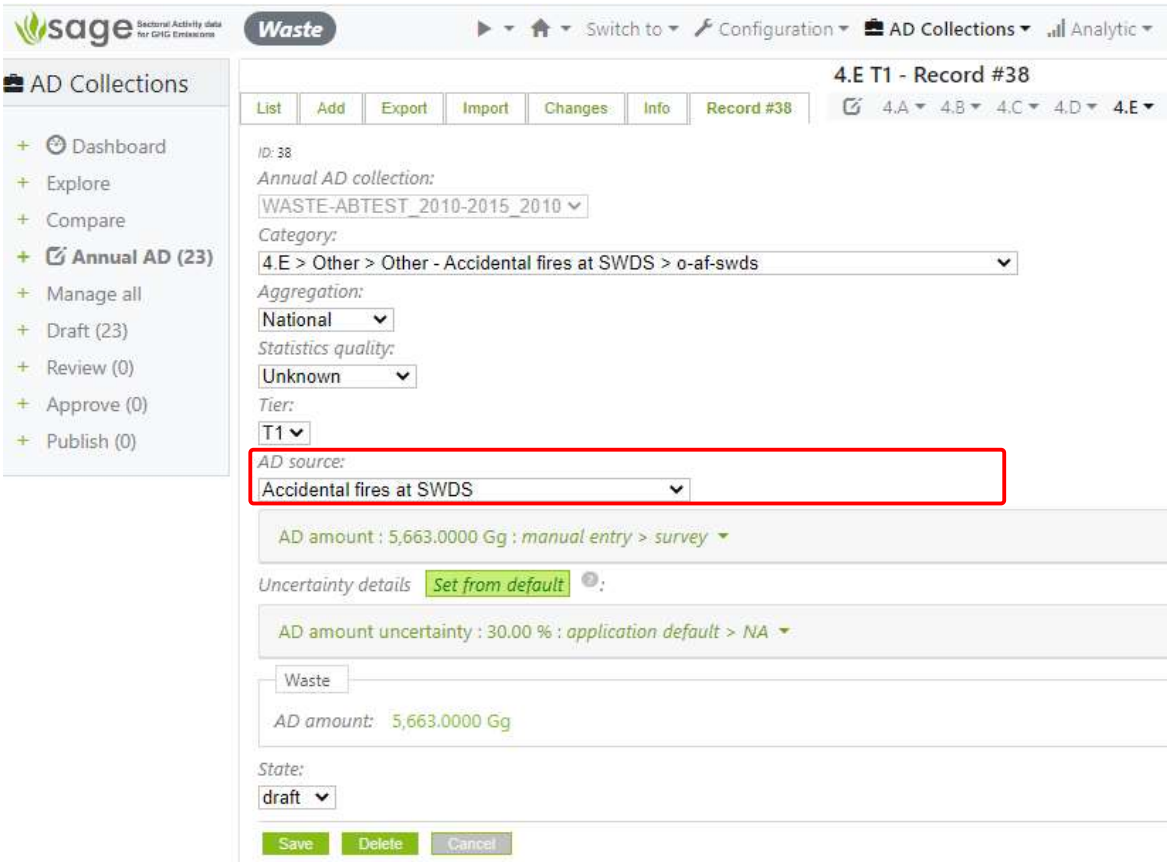
Figure 116. *Adding activity data to Waste – Category-specific information fields for 4.D.*



4.E category-specific entries

Category 4.E includes emission sources that were not covered in categories 4.A – D. SAGE provides a list of potential subcategories in the corresponding configuration table (the data are obtained from the UNFCCC Locator tool across all available countries). The only category-specific information field includes AD source. ***(Figure 117)***.

Figure 117. *Adding activity data to Waste – Category-specific information fields for 4.E.*



10. Time series Data gaps

10.1 Background

Data gaps can cause many problems when trying to analyze time series.
Filling gaps using appropriate methods can often resolve such problems.

The **Data Gaps** module enables time series analysis for any user-selected category (or any combination of categories), reveals data gaps, and guides users through applying different options to fill the data gaps according to the 2006 IPCC Guidelines. SAGE includes the following methods:

Interpolation	to fill in internal data gaps for up to 3 points using linear regression,
Extrapolation	to estimate missing data points in the beginning and in the end of the time series using linear regression,
Expert judgement	filling the gaps on a basis of an expert's advice,
Surrogate method	filling gaps using statistical methods.

SAGE includes explanatory information for each method and provides guiding messaging and relevant dialog boxes to help users navigating through different gap filling techniques.

Figure 118. The Data Gaps dashboard information

Dashboard - Dashboard

About Data Gaps

When building time series for your AD collection, it is **good practice** to use the same collection period and methods consistently over the time series. However, for some categories, activity data may be unavailable for a few years or the entire time series, which creates the issue of data gaps. SAGE will help you to fill these data gaps and create a complete time series whenever possible.

Overall, there are several approaches to gap-filling:

If you know that fuels are combusted in a category **X** for the entire time series, but can't distinguish this category from category **Y** for any of the years, then report all fuels combusted under both categories X and Y under a higher level category Z and make a note that fuels used in X and Y are reported under Z, and **explain transparently** why you did it that way.

For example:
You are aware that your country has heat plants, electricity generation facilities, and a few plants that combine heat and power generation. However, only the total amount of fuels combusted by all heat and power-producing plants is known, and it is impossible to disaggregate further for the entire time period, you can report the total amount of fuels used from all these plants under the category "1.A.1.a - Main Activity Electricity and Heat Production", and make a note that the reliable data for different types of electricity and heat-producing plants are not available and therefore, they are included under 1.A.1.a.

If a few data points are missing

If for some category, you have the activity data for **some years of the time series, but other year's data are currently missing**, 2006 IPCC Guidelines suggest using one of the following data filling techniques (or their combination):

- When activity data could not be obtained for the base year or the most recent year in the AD collection, it may be possible to **extrapolate** these missing values from the closest detailed estimates. The key assumption for this method is that the observed trend in the category data that are available during the period remains constant over the period of extrapolation. SAGE will check it for you and advise if the extrapolation method is applicable.
- Similarly, when activity data could not be obtained for some years inside the time series, it may be possible to **interpolate** these missing values from the closest detailed estimates. The key assumption for this method is that the overall trend appears stable, and it is unlikely that actual emissions for the missing years are very different from the values predicted through interpolation. SAGE will check the overall stability of the historical trend before applying this method.
- The **Surrogate** method compares your data set to an underlying activity or other indicative data (the proxy data) that exhibit a similar trend over the same time period and may explain the time variations of the category. If the two data sets are suimilar for all available years, SAGE will use the proxy data to estimate the activity data values to fill the gaps in the time series. For example, the product output could follow the same trend as the amounts of fuels used to power its production and, therefore, be used as proxy data. Power consumption in residential areas could be related to the number of people living there, so these population data could be also used as a proxy.
- To apply the Surrogate method, SAGE will invite you to insert a data set that you think might have a similar trend as your actual activity data, then SAGE will check if the behavior of both sets for all years where the data are available is indeed similar. If the two data sets are not correlated, SAGE will let you know and suggest using another data set, if possible.

And if more data points are missing ...

It is not advisable to use the Interpolation, Extrapolation, or the Surrogate method if the data gaps are substantial (over 1-3 consecutive data points). If this is the case, here is what you could do:

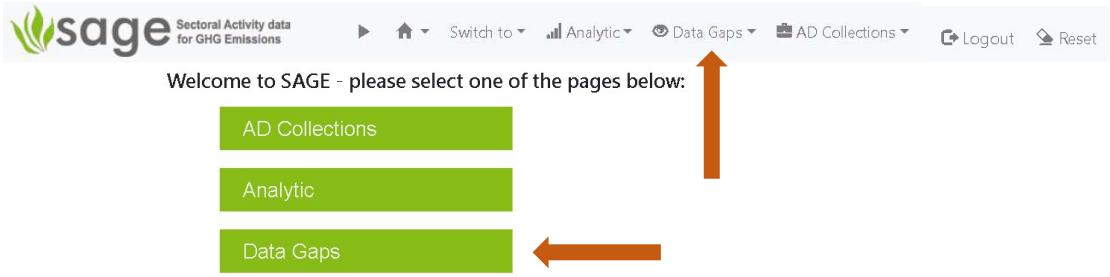
- For **up to 5** missing consecutive data points, you could use the constant values which is an average of the surrounding two data values immediately before and after the gap. This is only advisable if it is very likely that in the missing years, the values should be approximately the same, that is, there were no reasons for them to undergo growth, decline, or strong fluctuations. This has to be transparently documented in the AD collection.
- For longer gaps, it might be advisable to use the most conservative estimate from the later year closest to the data gap and use it as a constant value for the gap years. This has to be transparently documented in your AD collection and the planned actions to investigate actual data values for the missing years should also be described. To maintain AD collection transparency and accuracy, the update on progress in implementing these actions should be included in each subsequent AD collection and the time series should be recalculated as soon as the actual data become available.
- It is also possible to use **Expert Judgement** to fill some gaps. The facility for this option is provided in the AD collection **Draft** module. You can enter the fuel consumption values according to the expert judgement and document it by selecting the **"Expert judgement"** option in **"Source"** list and providing a detailed explanation and the reference to the Expert's opinion. Please see **"Annex 2A.1 A protocol for expert elicitation"** section in chapter 2, Vol. 2 of the 2006 IPCC Guidelines for further guidance.

10.2 How to fill data gaps in a time series

1 Before performing the data gap filling, please read the Data Gaps **Dashboard** information; it gives a brief method overview and the guidance when each method should be used (**Figure *118***).

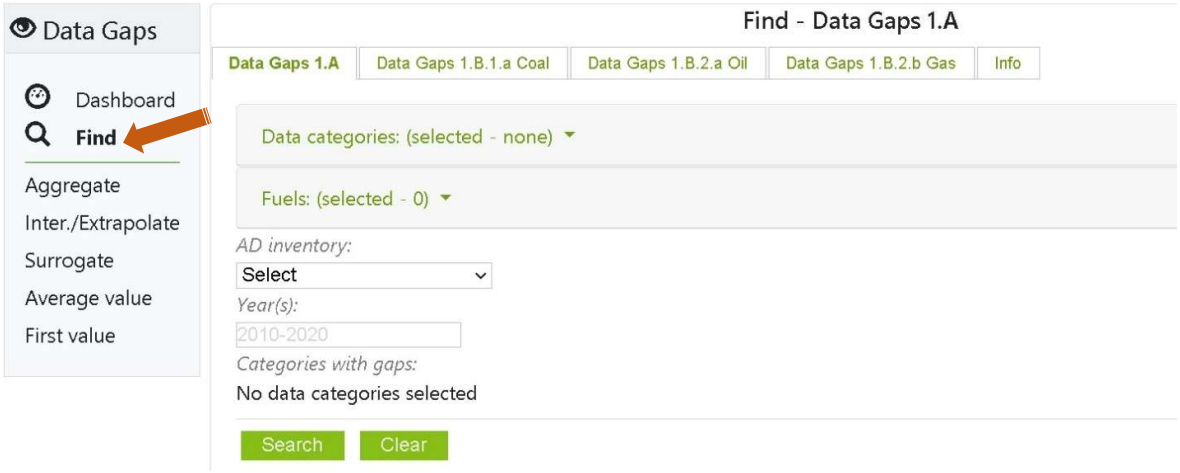
2 click the **Data Gaps** menu in the global navigation pane across the top of the screen or use a quick link (***Figure 119***)

Figure 119. *Go to Data Gaps*



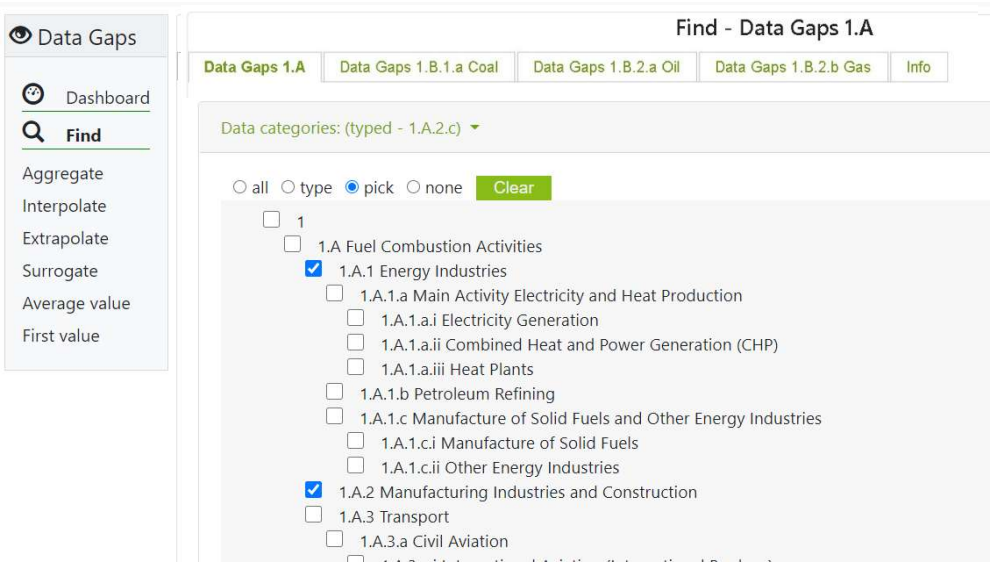
3 click **Find** to find the gaps in the time series (***Figure 120***)

Figure 120. *Click Find to make selection for the data gaps search*



4 select category (or categories) in which you'd like to search for data gaps. You can pick a single category or several categories, or type a category list in the field provided. If you are not sure which category has data gaps, select "all". In this case, SAGE will search all categories (***Figure 121***).

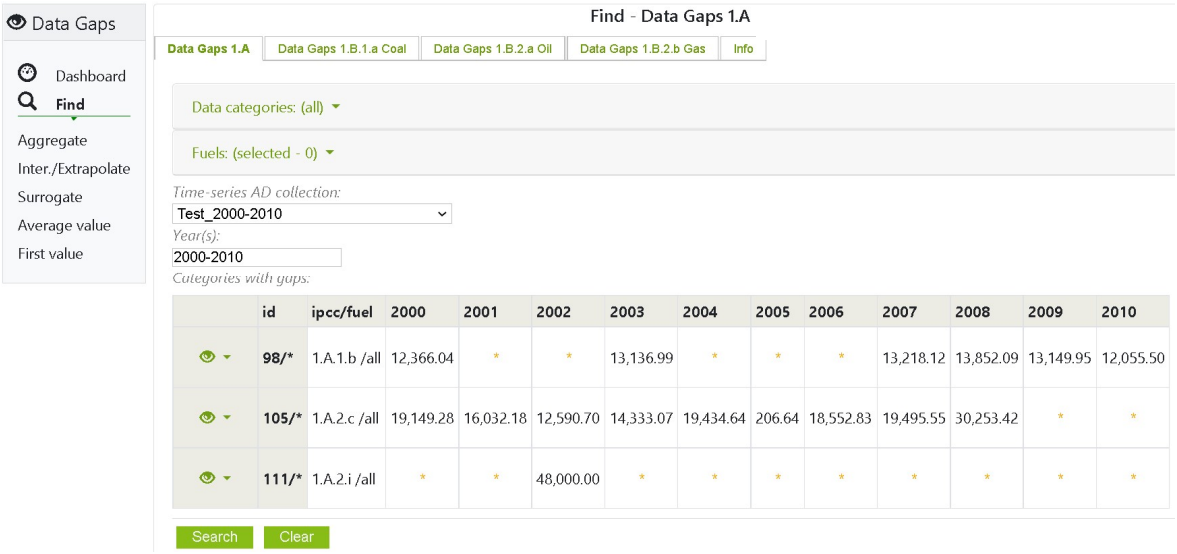
Figure 121. *Selecting categories for data gap search*



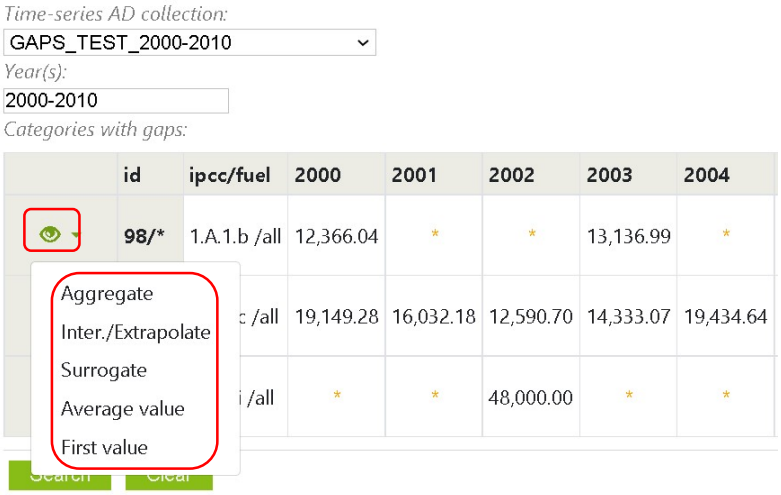
5 select fuel (or fuels) for which you'd like to search for data gaps. You can pick a single category or several categories, or type a category list in the field provided. If you are not sure which category has data gaps, select "all". In this case, SAGE will search all categories (***Figure 122***, all fuels are selected).

6 select the AD collection year (or years) in which you'd like to search for data gaps. You can type a single year, a list of years separated by commas, or a period (e.g., 2000-2010 as in ***Figure 122***). The years with gaps are shown as *

Figure 122. *Selecting fuels and years for data gap search*



7 Click the 'eye' icon at the beginning of each time series with data gaps to select the preferred method to fill the gaps from the available list. It shows the built-in gap filling options (external options are also possible but are not described here).



8 Select one of the 5 data gap filling options from the popup menu (above) and follow relevant instructions for that method as below in the relevant 'Gap filling option' section below:

Whichever gap filling method you choose, SAGE will default some selections to try and assist.

Gap filling option 1: Aggregate

If you use the "Aggregate" method to 'fill' data gaps it simply means you can report one category under an alternative category (because the dis-aggregated information is not available).

Aggregate data to the nearest higher category

When building time series for your AD collection, it is **good practice** to use the same collection period and methods consistently over the time series. However, for some categories, activity data may be unavailable for a few years or the entire time series, which creates the issue of data gaps. SAGE will help you to fill these data gaps and create a complete time series whenever possible.

Overall, there are several approaches to gap filling:

If you know that fuels are combusted in a category **X** for the entire time series, but can't distinguish this category from category **Y** for any of the years, then report all fuels combusted under both categories X and Y under a higher level category Z and make a note that fuels used in X and Y are reported under Z, and **explain transparently** why you did it that way.

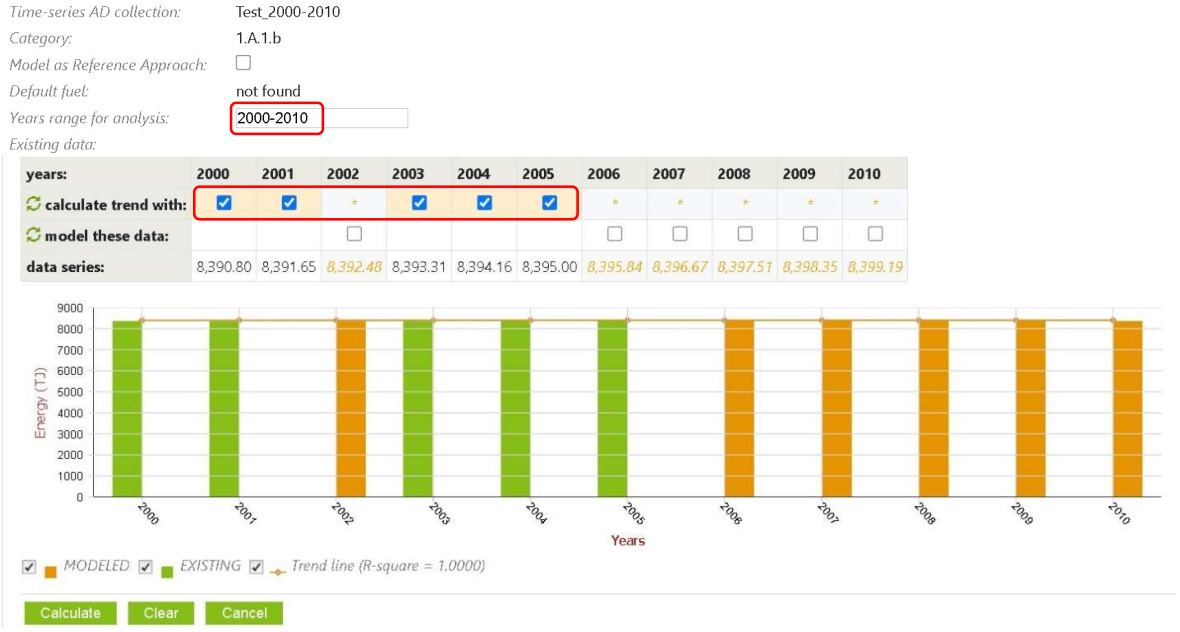
For example:

You are aware that your country has heat plants, electricity generation facilities, and a few plants that combine heat and power generation. However, only the total amount of fuels combusted by all heat and power-producing plants is known, and it is impossible to disaggregate further for the entire time period, you can report the total amount of fuels used from all these plants under the category "1.A.1.a - Main Activity Electricity and Heat Production", and make a note that the reliable data for different types of electricity and heat-producing plants are not available and therefore, they are included under 1.A.1.a.

Gap filling option 2: Interpolate / Extrapolate

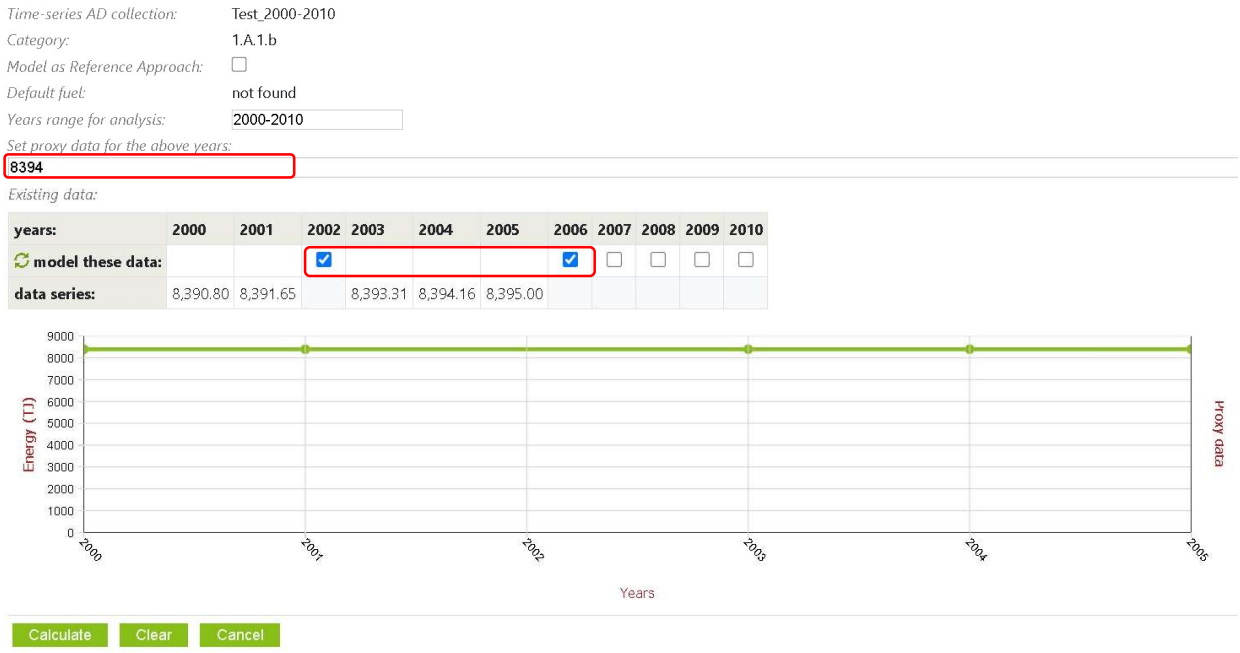
To use the “Interpolation / extrapolation” method, simply choose which values to use and which gaps to interpolate (within a series of available data) or extrapolate (beyond the end[s] of available data).

You can use the check boxes at the bottom of the page (“Modeled”, “Existing” and “Trend line”) to show/hide the modeled values, existing values and trend line. If that looks sensible then click ‘Calculate’ If that looks good the click ‘Save modeled data’ (otherwise click ‘Clear’ or ‘Cancel’).



Gap filling option 3: Surrogate

Enter the proxy value to use, select the years to use that value for, click Calculate. If that looks good, click ‘Save modeled data’.



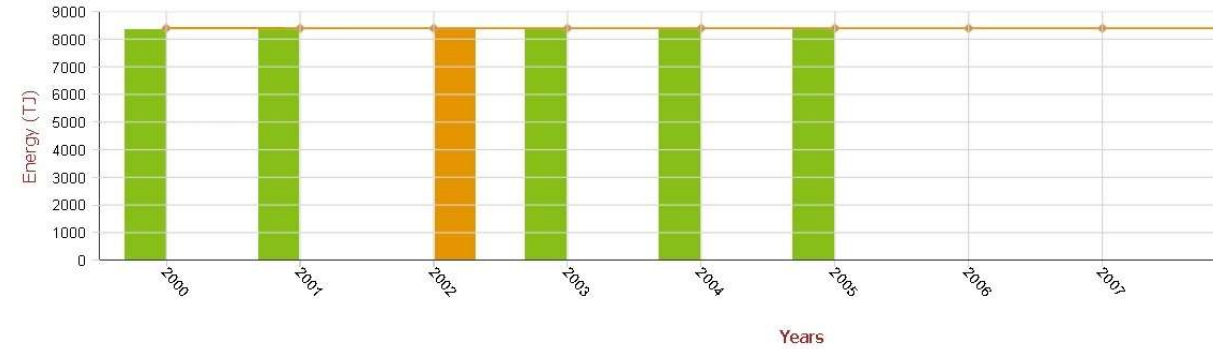
Gap filling option 4: Average value

Choose the years of data to use values from, view the modeled value, if it looks sensible, click 'Calculate' and if you're happy with that, click 'Save modeled data'.

Years range for analysis: 2000-2010

Existing data:

years:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
calculate average with:	☑	☑	*	☑	☑	☑	*	*	*	*	*
model these data:			☐								
data series:	8,390.80	8,391.65	*8,392.98*	8,393.31	8,394.16	8,395.00	*8,392.98*	*8,392.98*	*8,392.98*	*8,392.98*	*8,392.98*

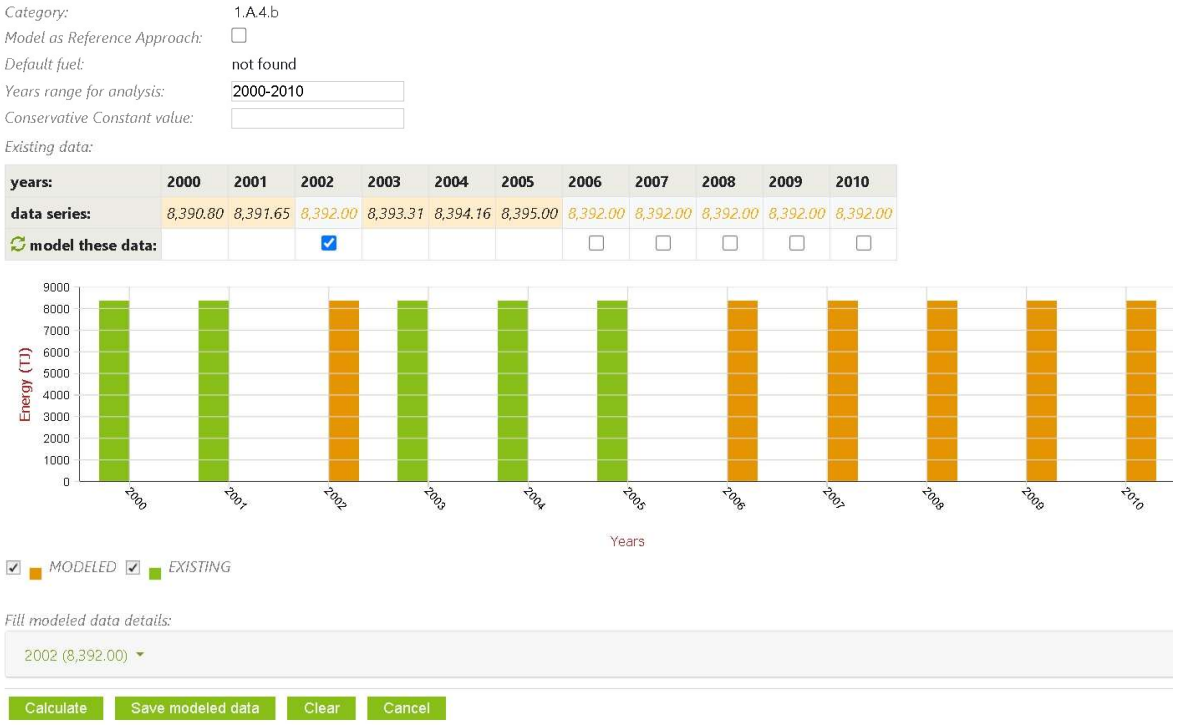


☑ MODELED ☑ EXISTING ☑ Trend line (Standard deviation = 1.56)

Calculate Clear Cancel

Gap filing option 5: First value

Choose the years of data to use values from, view the modeled value, if it looks sensible, click 'Calculate' and if you're happy with that, click 'Save modeled data'.



11. Activity data analysis

Use the **Analytics** component for data analysis in SAGE.

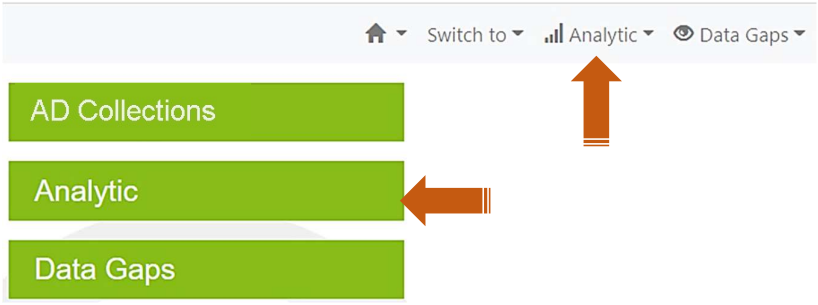
This component enables users to perform basic data analyses over the AD collections that achieved the state **Published**. SAGE includes the following analysis modules:

	Shows:
• **Total values**	total energy consumed as a result of combusting one, or more, or all, fuels from selected categories in a selected year.
• **Historical trend**	time series for fuel consumption for selected categories, fuels, and years.
• **Rank by Category**	energy in TJ used ranked by IPCC category for your chosen parameters. This is not applicable to the IPPU sector because its activity data are not recorded in the energy units and describe different types of products and processes.
• **Rank by Fuel**	energy in TJ used ranked by fuel for your chosen parameters. As above, this option is applicable to the energy sector only because the data in the IPPU sector are not so uniform.
• **AD Change**	IPCC categories as rows, and energy in TJ or the industrial product amount in the relevant units as values. If you select more than one year then this allows you to compare differences.

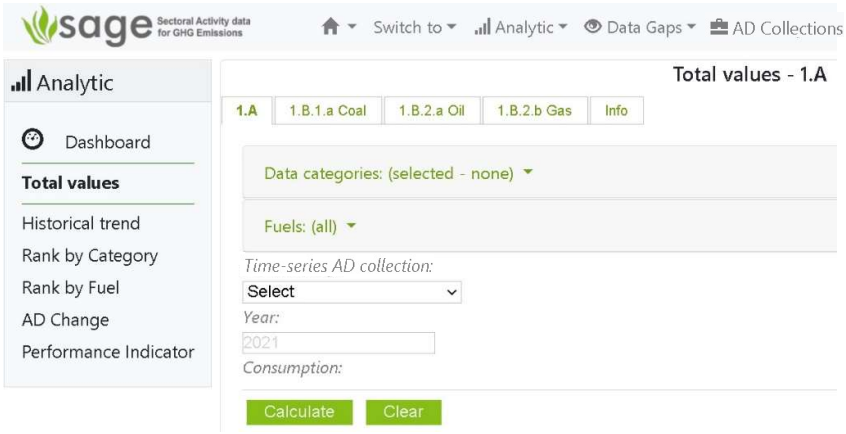
- **Performance Indicator** time series table of consumption (summed if required), by category, category-specific application (or fuel), AD collection, and by year(s).

11.1 How to calculate total fuel consumption

Step 1 click the Analytic link.



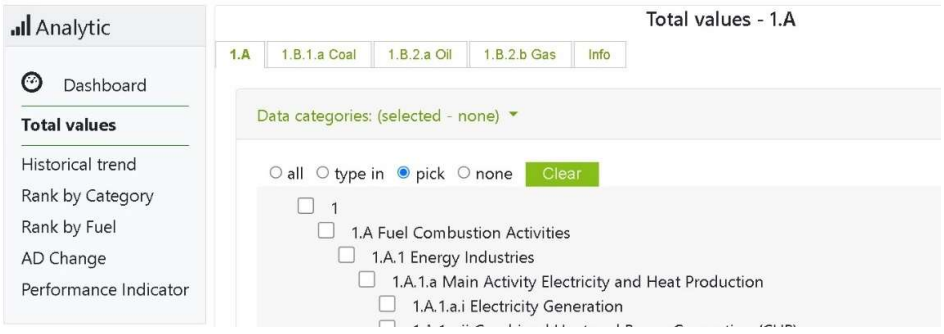
Step 2 click the list of available analyses links on the left to select **Total values**.



Step 3 click the list of categories to select one or more categories for the analysis.
You can pick any combination of categories.
If all categories are selected, each of them will be included in the summation table and the amount of energy consumption by each category will also be displayed.

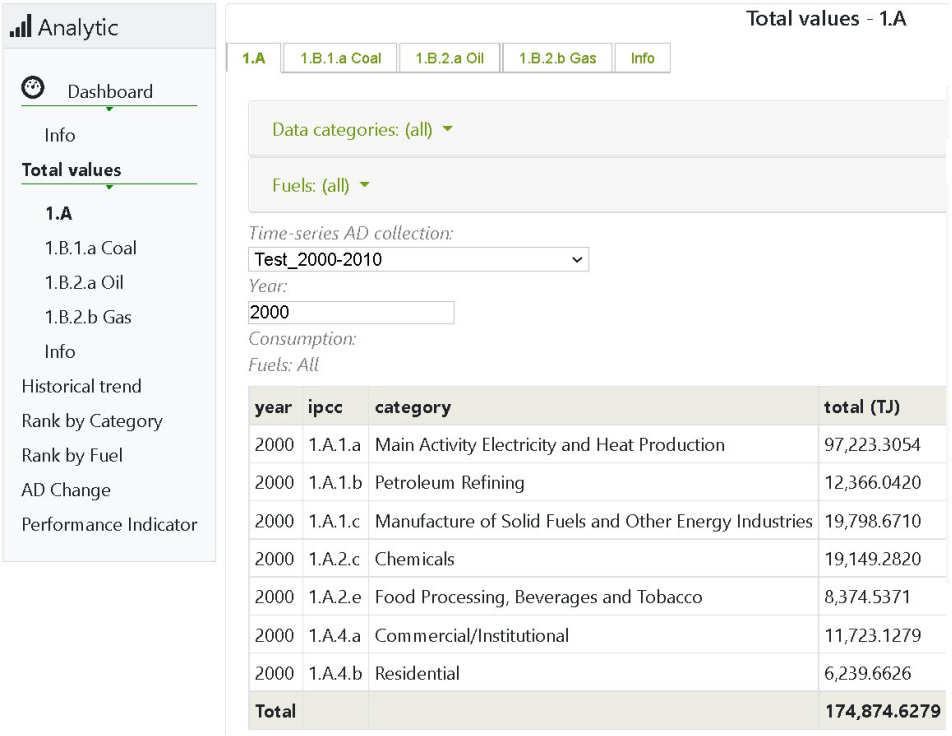
Below is a sample screenshot showing the 'category selection' screen.

Appendix E shows the complete list of categories that you can pick from.



Step 4 select a category-specific application (in this example - list of fuels to select one or more fuels, or all fuels; in ***Figure 123*** – all fuels are selected selected), then select the year

Figure 123. Selecting fuels for total energy consumption analysis



year	ipcc	category	total (TJ)
2000	1.A.1.a	Main Activity Electricity and Heat Production	97,223.3054
2000	1.A.1.b	Petroleum Refining	12,366.0420
2000	1.A.1.c	Manufacture of Solid Fuels and Other Energy Industries	19,798.6710
2000	1.A.2.c	Chemicals	19,149.2820
2000	1.A.2.e	Food Processing, Beverages and Tobacco	8,374.5371
2000	1.A.4.a	Commercial/Institutional	11,723.1279
2000	1.A.4.b	Residential	6,239.6626
Total			**174,874.6279**

Step 5 Select AD collection, e.g., "Test_2000-2010"

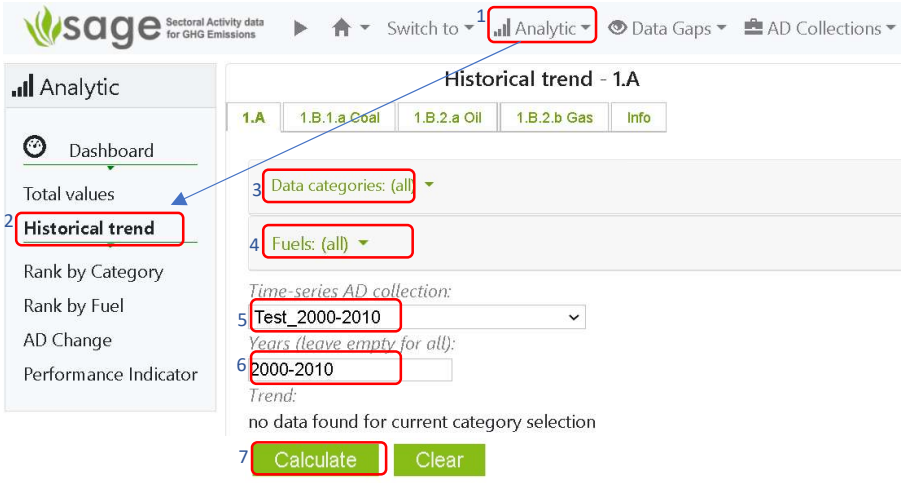
Step 6 Select a year that is included within the AD collection name e.g., 2010

Step 7 Click **Calculate**

11.2 How to display historical trends

Step 1 click the **Analytic** link

Step 2 click **Historical trend** to select it as the chosen analysis type



Step 3 click the list of categories to select one or more categories for the analysis. You can pick one or more categories or select all categories. If all categories are selected, each

of them will be included in the summation table and the amount of energy consumption by each category will also be displayed.

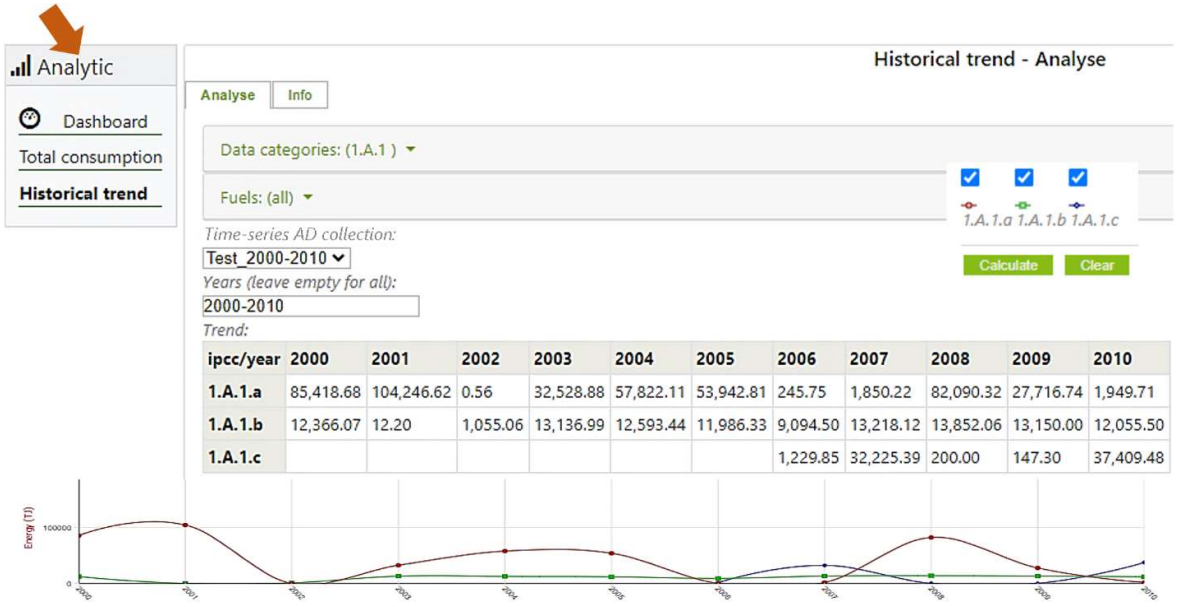
Step 4 click the list of select a category-specific application (in this example - list of fuels to select one or more fuels, or all fuels to select one or more fuels, or all fuels), then select the time period for the time series. SAGE will show the available activity data in their energy value (TJ) or as an industrial product amount for selected AD collection, category, and the time period

Step 5 Select the AD collection to review

Step 6 Enter the year(s) to review if you need to

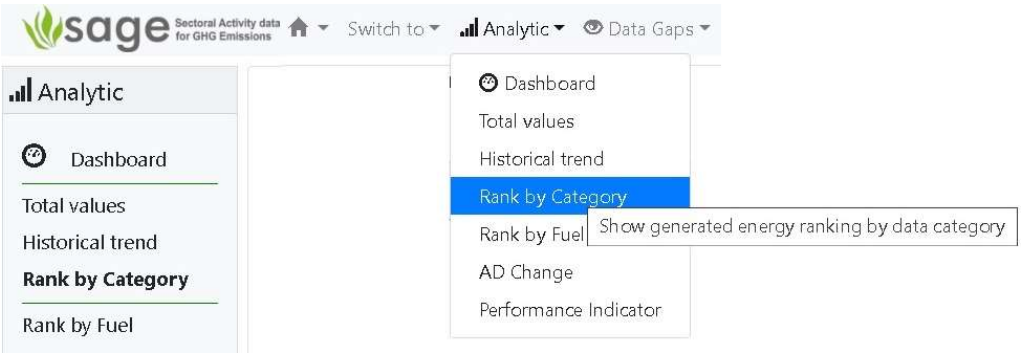
Step 7 Click Calculate, see ***Figure 124***

Figure 124. Select analysis type (Historical trend is selected for all fuels in category 1.A.1 – Energy Industries)

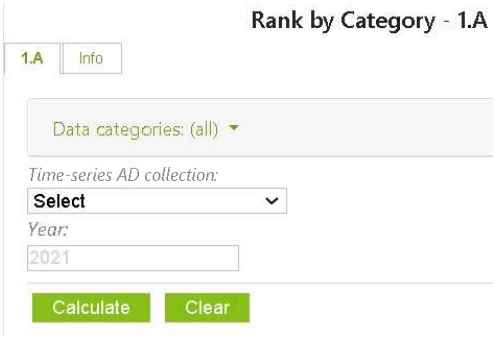


11.3 How to 'Rank by Category' (for the Energy sector only)

Step 1 Click 'Analytic' link at the top of the page and then 'Rank by Category' menu item



'Rank by Category' form will display as below.



Step 2 Select whichever data categories to include in analysis (see *Appendix E* for complete list)

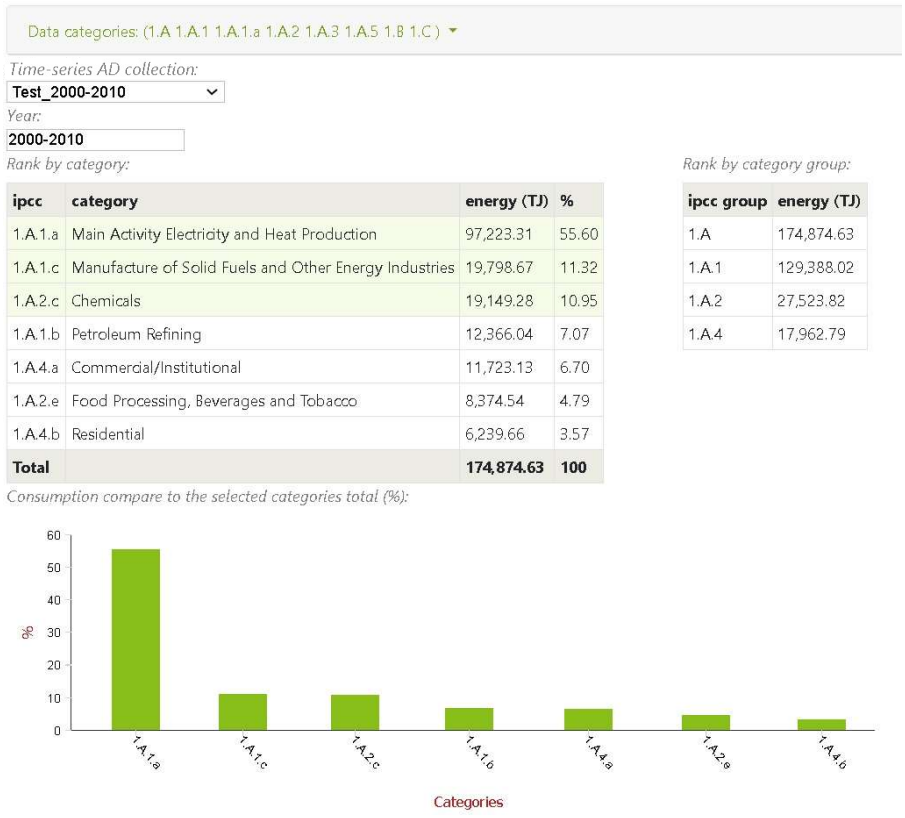
Step 3 Select the 'Activity data collection' to analyze

Step 4 Enter the year

Step 5 Click 'Calculate'

If it shows "no data found for current category selection" then try a different selection.

An example output follows:

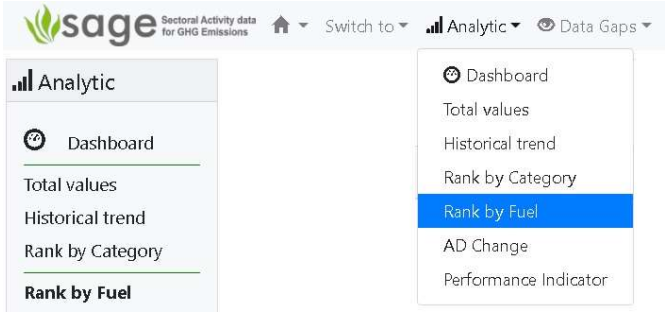


ipcc	category	energy (TJ)	%
1.A.1.a	Main Activity Electricity and Heat Production	97,223.31	55.60
1.A.1.c	Manufacture of Solid Fuels and Other Energy Industries	19,798.67	11.32
1.A.2.c	Chemicals	19,149.28	10.95
1.A.1.b	Petroleum Refining	12,366.04	7.07
1.A.4.a	Commercial/Institutional	11,723.13	6.70
1.A.2.e	Food Processing, Beverages and Tobacco	8,374.54	4.79
1.A.4.b	Residential	6,239.66	3.57
Total		**174,874.63**	**100**

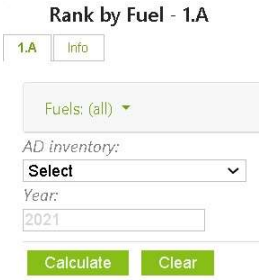
ipcc group	energy (TJ)
1.A	174,874.63
1.A.1	129,388.02
1.A.2	27,523.82
1.A.4	17,962.79

11.4 How to 'Rank by Fuel' (for the Energy sector only)

Step 1 Click 'Analytic' link at the top of the page and then 'Rank by Fuel' menu item



'Rank by Fuel' form will display as below.



Step 2 Select whichever data categories to include in analysis (see *Appendix E* for complete list)

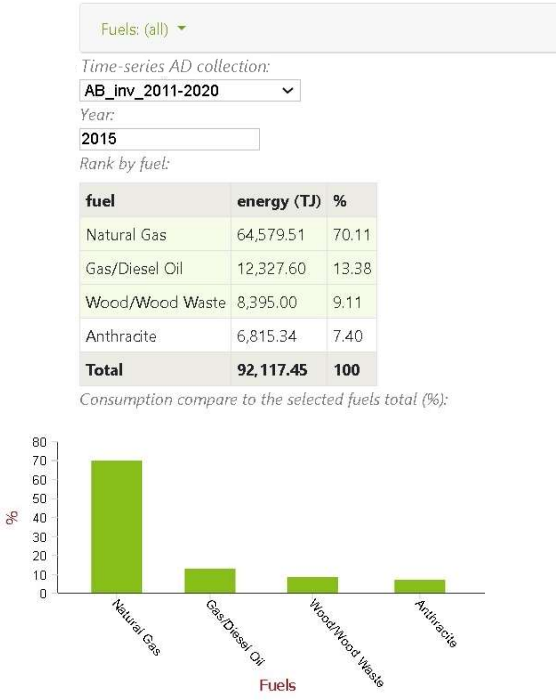
Step 3 Select the 'AD collection' to analyze

Step 4 Enter the year

Step 5 Click 'Calculate'

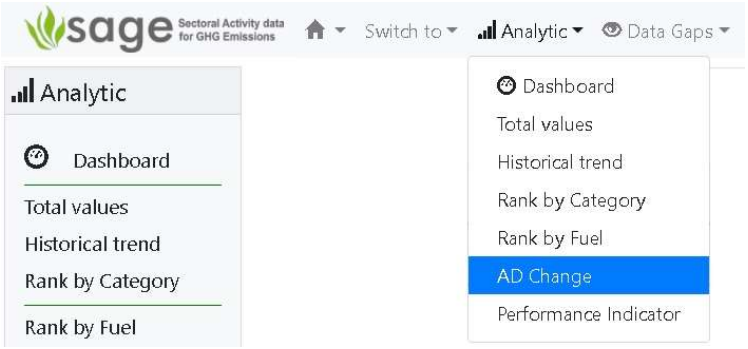
If it shows "no data found for current fuel selection" then try a different selection.

An example output follows:

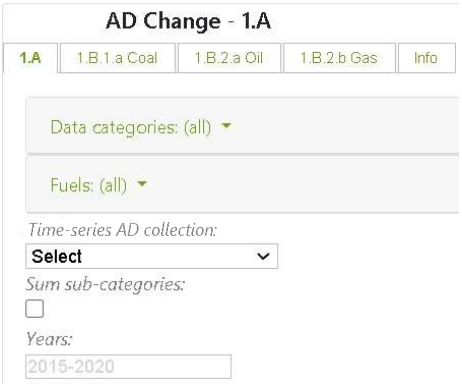


11.5 How to analyze Activity Data Changes

Step 1 Click 'Analytic' link at the top of the page and then 'AD Change' menu item



'AD Change' form will display as below.



Step 2 Select whichever data categories to include in analysis (see *Appendix E* for complete list)

Step 3 Select the Activity data collection to analyze

Step 4 Choose whether to sum sub-categories

Step 5 Enter the year

Step 6 Click 'Calculate'

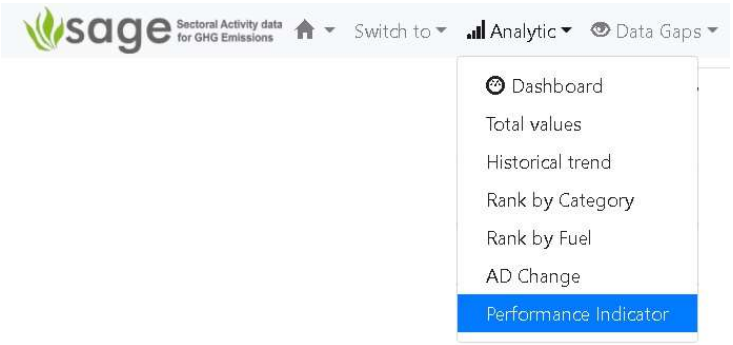
If it shows "no data found for current selection" then try a different selection.

An example output follows:

years:	units	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
calculate difference for these:		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
1.A.1.a Main Activity Electricity and Heat Production	TJ	97,223.31	106,198.35	25,804.53	64,182.51	126,943.57	133,052.73	132,109.59	119,899.27	53,453.62	98,208.24	96,399.31
Δ current-prev year	TJ											
Δ (current-prev)/prev year	%											
1.A.1.b Petroleum Refining	TJ	12,366.04	*	*	13,136.99	*	*	*	13,218.12	13,852.09	13,149.95	12,055.50
Δ current-prev year	TJ		*	*		*	*	*				
Δ (current-prev)/prev year	%		*	*		*	*	*				
1.A.1.c Manufacture of Solid Fuels and Other Energy Industries	TJ	19,798.67	21,500.27	23,201.88	24,903.47	26,584.29	28,270.23	30,739.45	32,445.75	33,320.61	33,485.00	37,649.53
Δ current-prev year	TJ											
Δ (current-prev)/prev year	%											
1.A.2.c Chemicals	TJ	19,149.28	16,032.18	12,590.70	14,333.07	19,434.64	206.64	18,552.83	19,495.55	30,253.42	*	*
Δ current-prev year	TJ										*	*
Δ (current-prev)/prev year	%										*	*
1.A.2.e Food Processing, Beverages and Tobacco	TJ	8,374.54	8,617.11	8,691.13	9,059.85	9,573.13	10,163.92	10,415.23	11,021.66	11,019.06	10,850.69	11,521.33
Δ current-prev year	TJ											
Δ (current-prev)/prev year	%											
1.A.2.i Mining (excluding fuels) and Quarrying	TJ	*	*	48,000.00	*	*	*	*	*	*	*	*
Δ current-prev year	TJ	*	*		*	*	*	*	*	*	*	*
Δ (current-prev)/prev year	%	*	*		*	*	*	*	*	*	*	*
1.A.4.a Commercial/Institutional	TJ	11,723.13	11,737.67	13,969.97	9,335.18	8,213.77	12,080.91	10,529.55	10,315.64	10,828.26	11,044.55	11,607.04
Δ current-prev year	TJ											
Δ (current-prev)/prev year	%											
1.A.4.b Residential	TJ	6,239.66	6,814.18	7,261.05	2,947.19	7,557.15	7,096.45	28,806.39	6,928.60	7,174.83	7,893.24	43,060,071.26
Δ current-prev year	TJ											
Δ (current-prev)/prev year	%											

11.6 How to 'Performance Indicator'

Step 1 Click 'Analytic' link at the top of the page and then 'Performance Indicator' menu item



'Performance Indicator' form will display as below.

Step 2 Select whichever data categories to include in analysis (see *Appendix E* for complete list)

Step 3 For the Energy sector, also select whichever fuels or fuel categories to include in analysis

(see *Appendix H: Fuels* and/or *Appendix I: Fuel categories*)

Step 4 Select the 'Activity data AD collection' (AD collection) to analyze

Step 5 Choose whether to sum sub-categories

Step 6 Enter the year

Step 7 Enter a comparative data value if you want

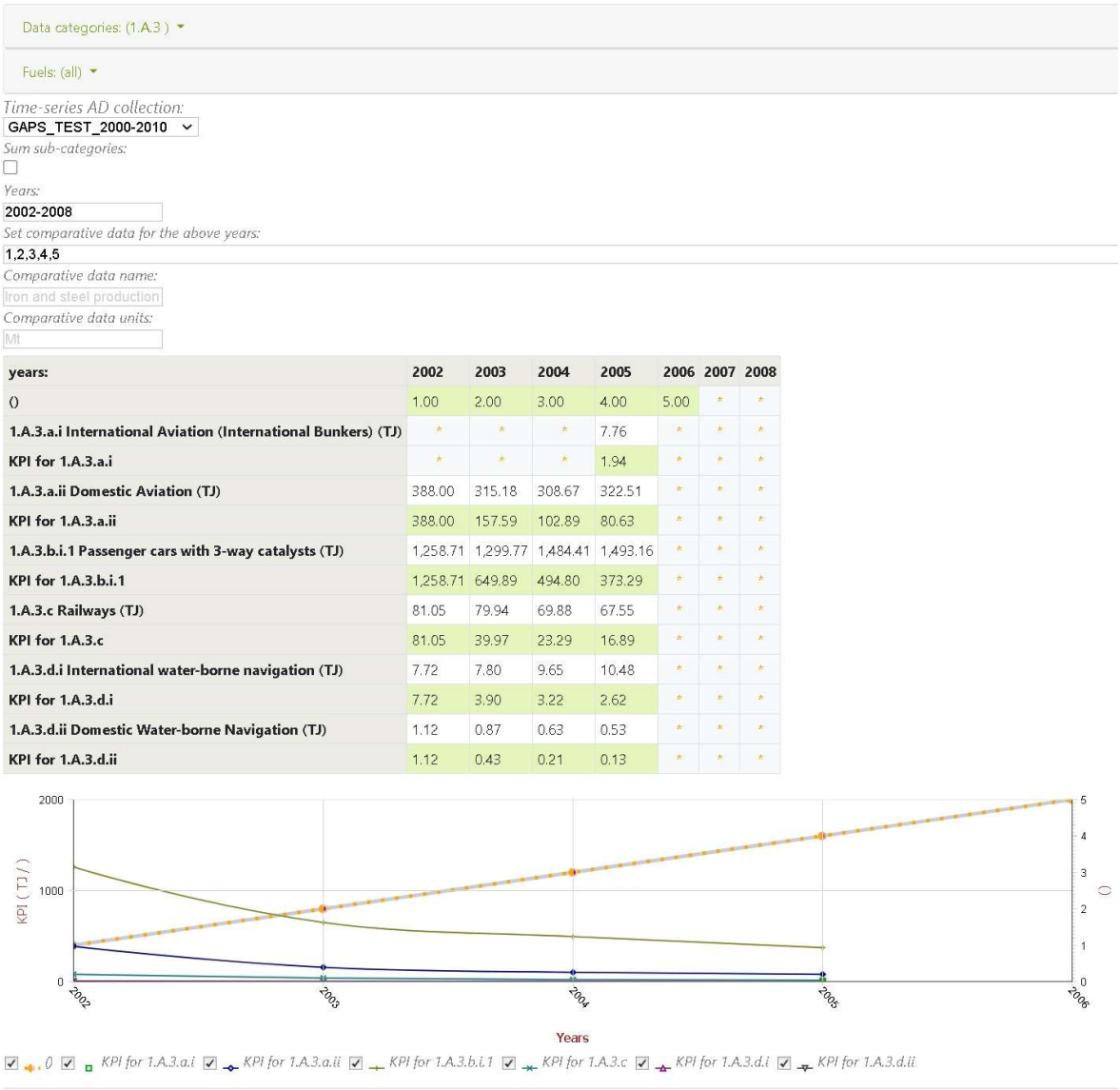
Step 8 Enter a comparative data name if you want

Step 9 Enter comparative data units if you want

Step 10 Click 'Calculate'

If it shows "no data found for current fuel selection" then try a different selection.

An example output follows:



years:	2002	2003	2004	2005	2006	2007	2008
()	1.00	2.00	3.00	4.00	5.00	*	*
1.A.3.a.i International Aviation (International Bunkers) (TJ)	*	*	*	7.76	*	*	*
KPI for 1.A.3.a.i	*	*	*	1.94	*	*	*
1.A.3.a.ii Domestic Aviation (TJ)	388.00	315.18	308.67	322.51	*	*	*
KPI for 1.A.3.a.ii	388.00	157.59	102.89	80.63	*	*	*
1.A.3.b.i.1 Passenger cars with 3-way catalysts (TJ)	1,258.71	1,299.77	1,484.41	1,493.16	*	*	*
KPI for 1.A.3.b.i.1	1,258.71	649.89	494.80	373.29	*	*	*
1.A.3.c Railways (TJ)	81.05	79.94	69.88	67.55	*	*	*
KPI for 1.A.3.c	81.05	39.97	23.29	16.89	*	*	*
1.A.3.d.i International water-borne navigation (TJ)	7.72	7.80	9.65	10.48	*	*	*
KPI for 1.A.3.d.i	7.72	3.90	3.22	2.62	*	*	*
1.A.3.d.ii Domestic Water-borne Navigation (TJ)	1.12	0.87	0.63	0.53	*	*	*
KPI for 1.A.3.d.ii	1.12	0.43	0.21	0.13	*	*	*

12. Country-specific menu options and background data tables

12.1 Background

To configure background tables in SAGE, use **Configuration** component.

Only system administrator and technical users can access this component.

The **Configuration** component maintains and manages the core data sets for user selections. It has sections to configure basic and sectoral information. (It currently has three sections being 'basic', 'Energy' and 'IPPU'). The component is flexible and enables authorized users to customize the default selection options to reflect their country's national circumstances. Initially, SAGE provides a list of default options that are in-line with the 2006 IPCC Guidelines. However, each country is different and

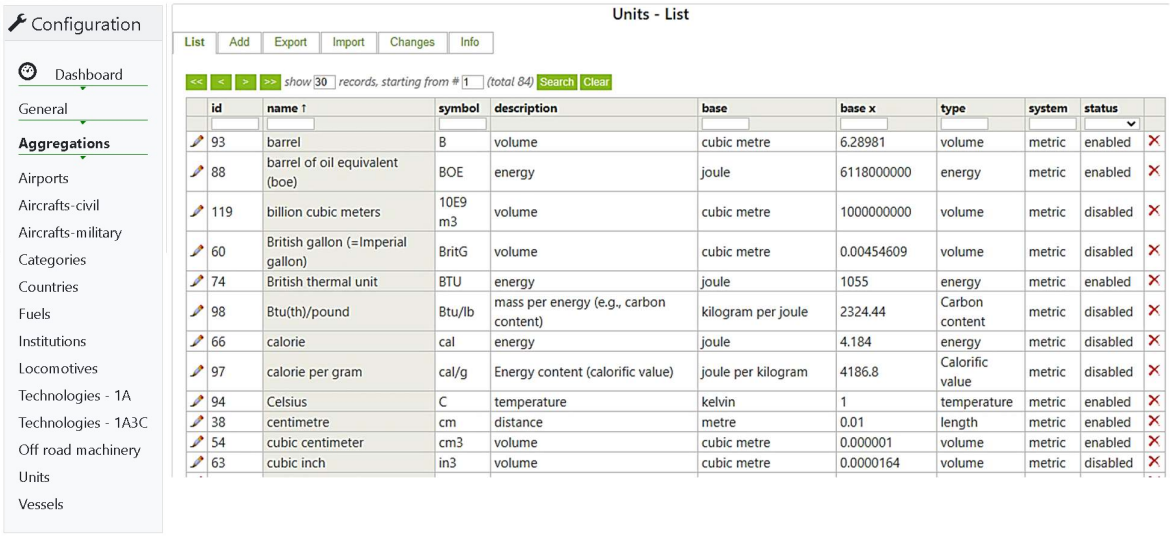
some options might not be applicable to all and, thus, require adjustments. The following options are currently available for customization:

- Data aggregation levels
- Emission/removal source categories (2006 IPCC categories)
- Fuels (including such fuel characteristics as density, calorific values, Carbon content, and water content) Institutions - a very high-level indication of the source where the data are coming from
- Technologies - a list and description of technologies applied in the category or a sub-sector
- Units - a comprehensive list of units used for mass, volume, distance, energy, density, calorific values, carbon-content values. Each unit record includes calibrating coefficient to enable unit conversions to the metric units used in the IPCC equations.

In addition, authorized users can include and customize the instructional notes included in the component's information section to tailor them to the other users' needs. The records in the configuration tables could be added, modified, and deleted. They can be enabled or disabled on demand by the authorized users, which provides further flexibility in working with SAGE.

Another feature of this component is mapping between 2006 IPCC and UNFCCC category codes to enable an easy shift to the reporting under the ETF under the Paris Agreement. Figure 125 shows an example of the configuration table.

Figure 125. Configuration component – Units

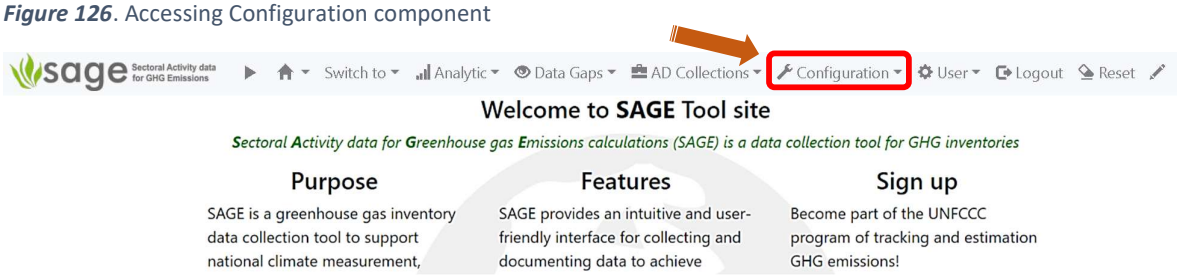


id	name ↑	symbol	description	base	base x	type	system	status
93	barrel	B	volume	cubic metre	6.28981	volume	metric	enabled
88	barrel of oil equivalent (boe)	BOE	energy	joule	6118000000	energy	metric	enabled
119	billion cubic meters	10E9 m3	volume	cubic metre	1000000000	volume	metric	disabled
60	British gallon (=Imperial gallon)	BritG	volume	cubic metre	0.00454609	volume	metric	disabled
74	British thermal unit	BTU	energy	joule	1055	energy	metric	enabled
98	Btu(th)/pound	Btu/lb	mass per energy (e.g., carbon content)	kilogram per joule	2324.44	Carbon content	metric	disabled
66	calorie	cal	energy	joule	4.184	energy	metric	disabled
97	calorie per gram	cal/g	Energy content (calorific value)	joule per kilogram	4186.8	Calorific value	metric	disabled
94	Celsius	C	temperature	kelvin	1	temperature	metric	enabled
38	centimetre	cm	distance	metre	0.01	length	metric	enabled
54	cubic centimeter	cm3	volume	cubic metre	0.000001	volume	metric	enabled
63	cubic inch	in3	volume	cubic metre	0.0000164	volume	metric	disabled

12.2 How to manage Configuration tables

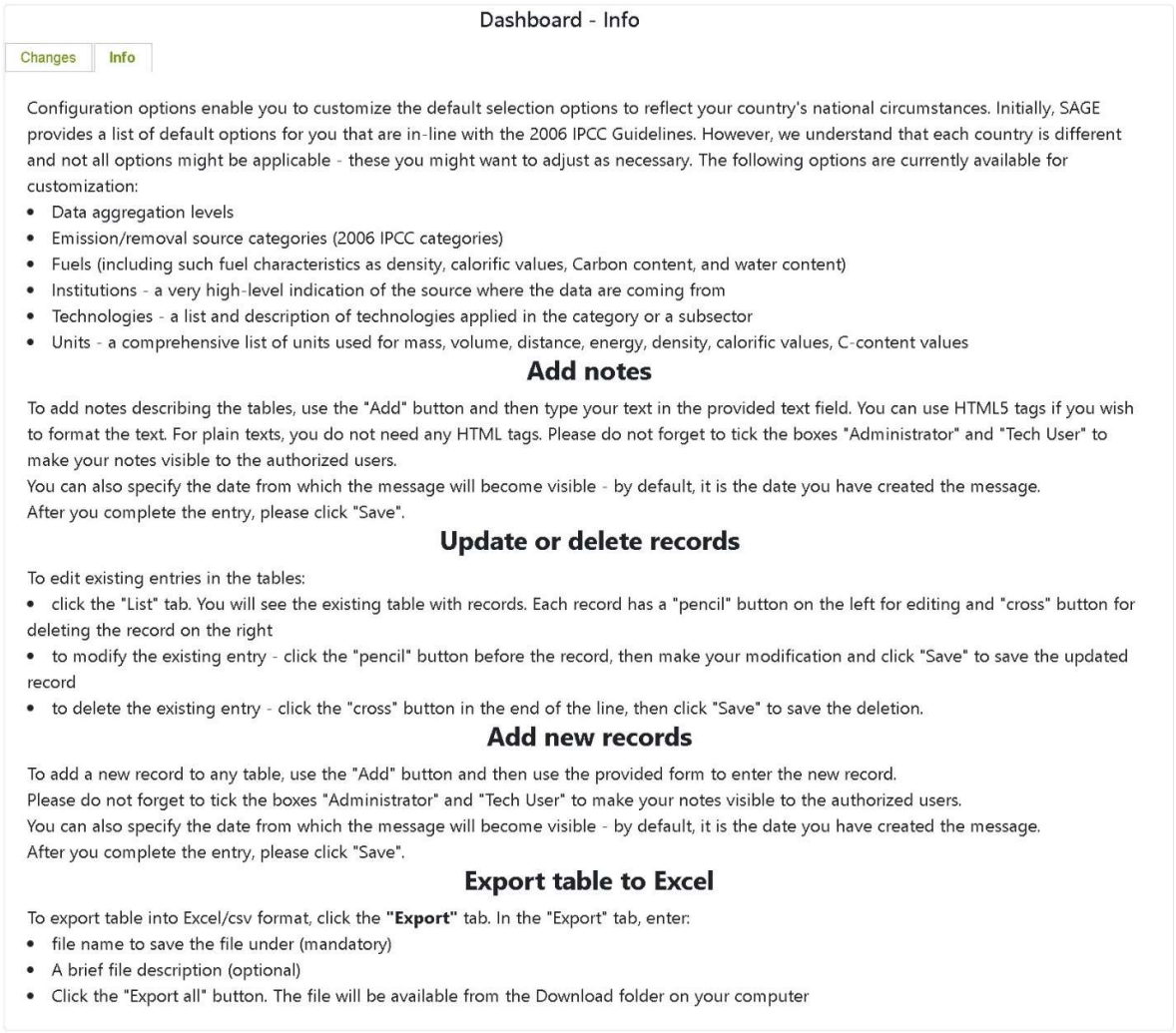
Step 1 click **Configuration** link using the global access menu across the top of the application screen (**Figure 126**).

Figure 126. Accessing Configuration component



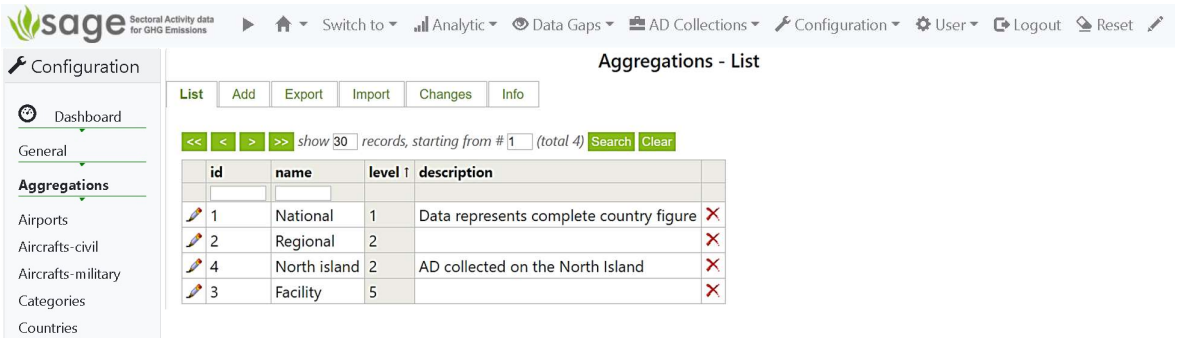
Step 2 Click **Dashboard** link and select tab Info to familiarize yourself with available options (Figure 127)

Figure 127. Accessing information notes on configuration options and instructions through the dashboard/Info links.



Step 3 Use local navigation panel on the left to click the link to the table you wish to edit (Figure 128).

Figure 128. Accessing the list of records in a configuration table (Aggregations table is displayed)



The table management modules are similar to the AD collection tables (section 5 page 15).

Each module in the **Configuration** component includes the following control tabs:

List	displays a table with the list of records; each record has a **pencil** icon at the beginning (this is the edit option) and a **cross** icon at the end (to delete a record),
Add	allows new item creation (an AD collection, an AD collection record, or a record in a configuration table),
Export	allows exporting existing items to an Excel (CSV) file,
Import	allows importing data from an Excel (CSV) templates,
Changes	contains a log of changes performed over the records within the module,
Info	provides user guidance for each option in the module.

12.2.1 Edit or delete activity a data record

Click the **List** tab. You will see the existing table with records.

To edit existing configuration tables:

- Find the record you want to modify
- Click the **pencil** button at the left of the record you want to modify,
- make your modification using the form provided, and
- click **Save** to save the updated record.

To delete existing configuration tables:

- Click the **cross** icon at the right end of the record.

12.2.2 Add a new activity data record

The process of adding a new data record in the configuration table is similar to adding a new activity data record to the AD collection. To add a new data record, click **Add** and then use the provided form to create a new record. This will include entering both activity data and supporting information.

SAGE allows importing the entire data table for each configuration table from the Excel (CSV) file as well as using the entry form for ad-hoc entries.

Importing the data table from Excel

To import the entire table, you need to access the Import screen, get the import template, populate the data cells in the import table as required, save it on your computer, and then select and load the prepared table into SAGE (Figure **129** – Figure 131):

Step 1 Click Import tab to get to the table **Import** screen (Figure **129**).

Step 2 Click **Get template** button to get the CSV template (Figure 130). The CSV template will be downloaded to your computer (most likely, you can find it in your folder **Downloads** or similar.

Step 3 Enter the data in the template (lines starting with # will be ignored by SAGE – you can safely delete them). Make sure that there are no gaps in the table. When you have entered the data on the table, save it as **CSV** file.

Step 4 In **SAGE**, click the **Choose File** button, navigate to the saved CSV file with the saved configuration table in the displayed file explorer window, then click Open. The file name will be displayed in the field near the Choose File button.

Figure 129. File import screen. Use the **Choose file** button to select the file for the upload (section Units is being uploaded in this example)

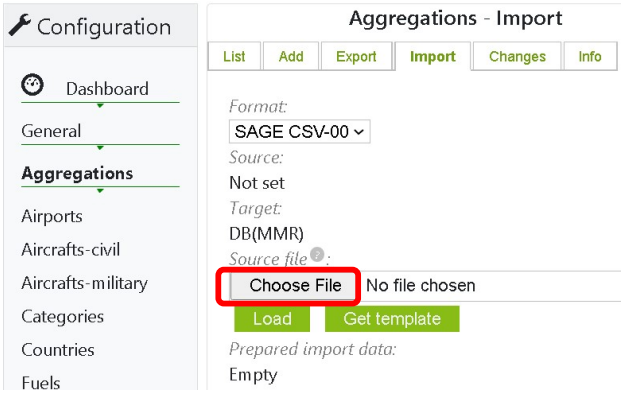
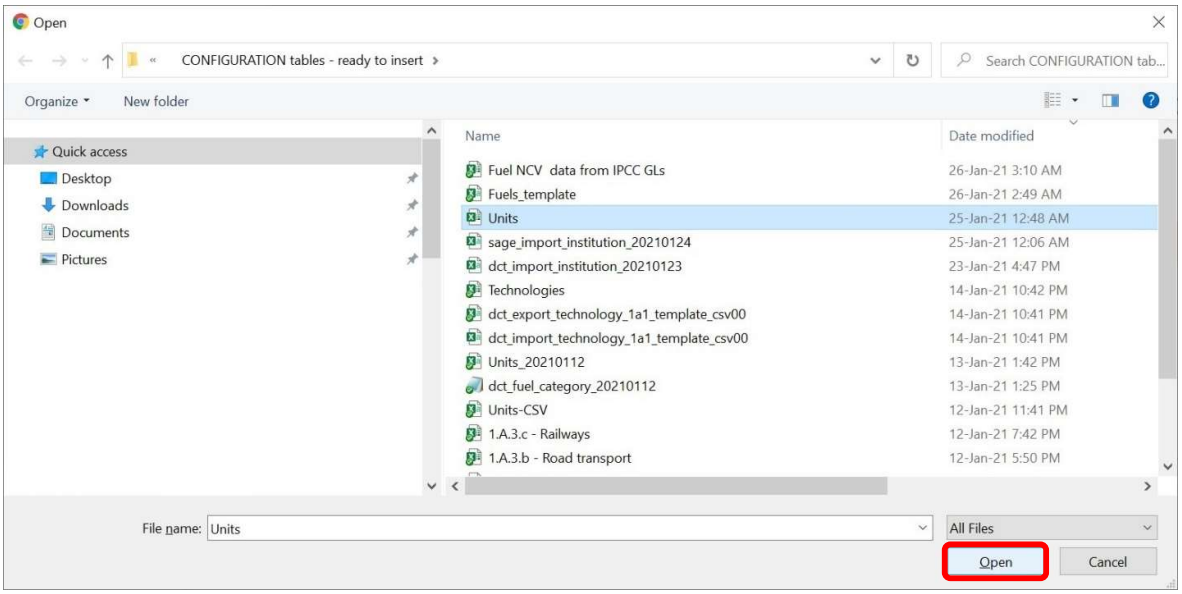
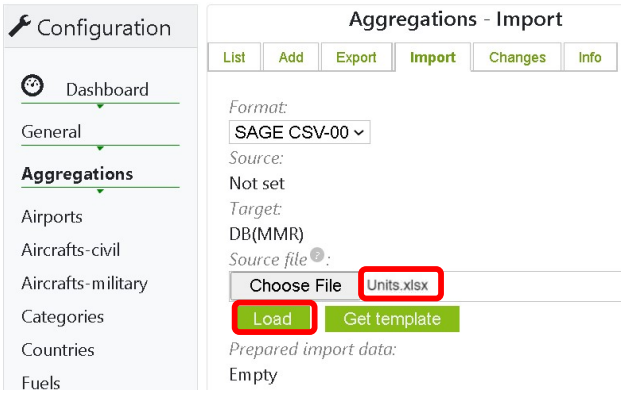


***Figure 130**. File import screen*



Step 5 In **SAGE**, click the **Load** button. SAGE will upload the selected file to the configuration layer and will save it in the database.

Figure 131. Upload the selected file



12.2.3 Hide configuration table selections that are irrelevant to your country

You can hide a selection of a particular item from the configuration tables for your data entry personnel (for example, if your country only uses metric units then all imperial units are irrelevant to you). This is possible for all configuration tables except **Aggregations**.

Step 1 Go to the configuration component (see section 7.1 of this manual).

Step 2 Use local navigation panel on the left to click the link to the table you wish to edit. SAGE will display the list of records in the selected table (for example, table Units).

Step 3 In the displayed table, examine the column called Status. It allows you to enable or disable the record for viewing. Enabled records are visible as options in the unit selection menu and disabled records will not be visible. If you disable a record, it will still remain in the database and you will be able to enable it in the future, if necessary. SAGE advises to minimize the number of enabled. To disable a record (for example, a Barrel [B] **Figure 132**):

Step 3a type **barrel** in the search field in the column **name**, press **enter**. The record will be displayed

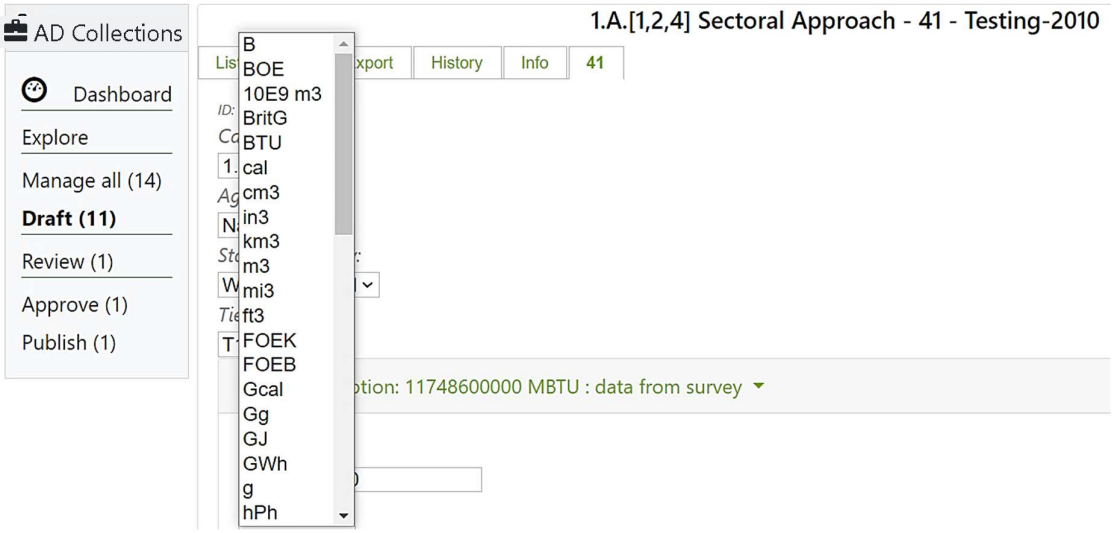
Step 3b click the editing icon (pencil) at the beginning of the record, SAGE will open the entry form,

Step 3c in the form, scroll down to the status **entry**, Figure 133

Step 3d select **disabled**, Figure 134

Step 3e **save** record. Now if you open the **Draft** component, open a record for editing and in the section **Fuel consumption** click menu **Units**, Barrel (B) option will not show. Figure 135

Figure 132. In the Draft component, fuel consumption section of the record, B (Barrel) is included in the



selection.

Figure 133. *In the Configuration component, find the record B (Barrel) and use the pencil button for editing.*

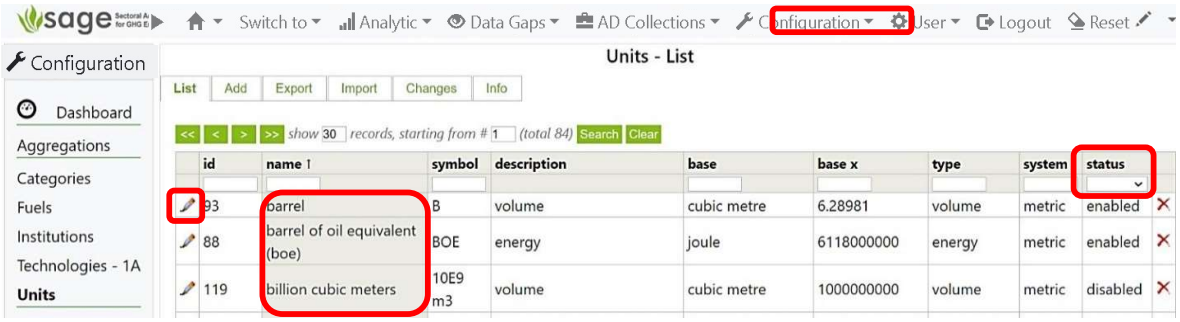


Figure 134. *In the editing form, disable the unit Barrel and save the record*

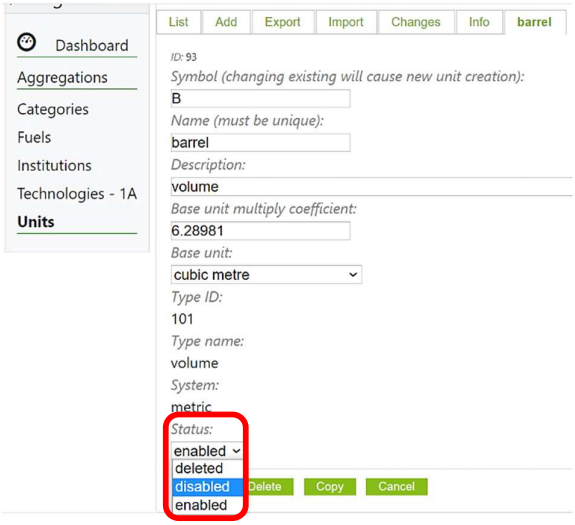
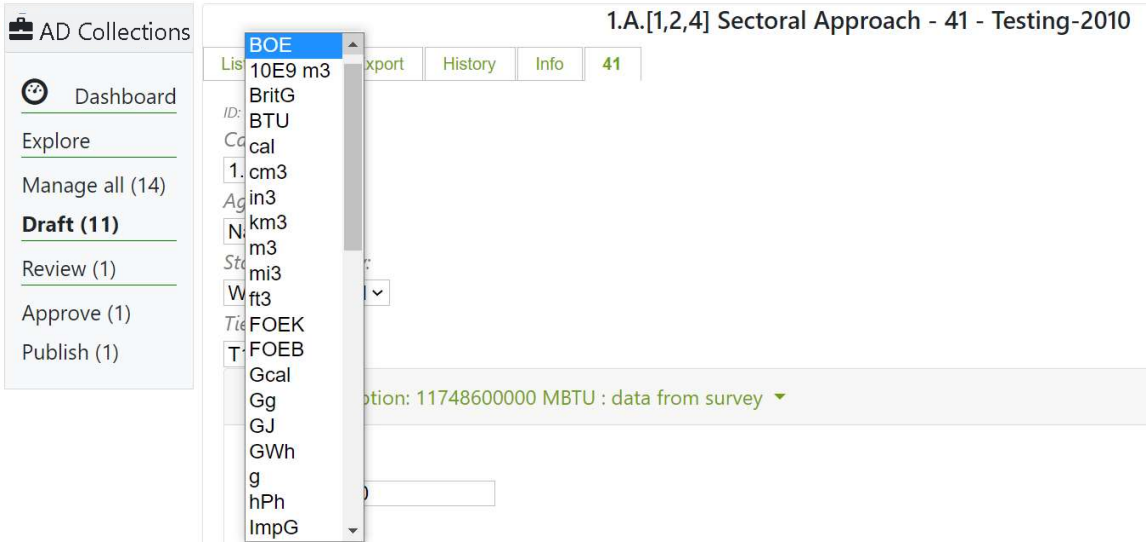


***Figure 135**. In the Draft component, fuel consumption section of the record, B (Barrel) is excluded from the selection*



12.2.4 Configuration layer organization for the agriculture sector

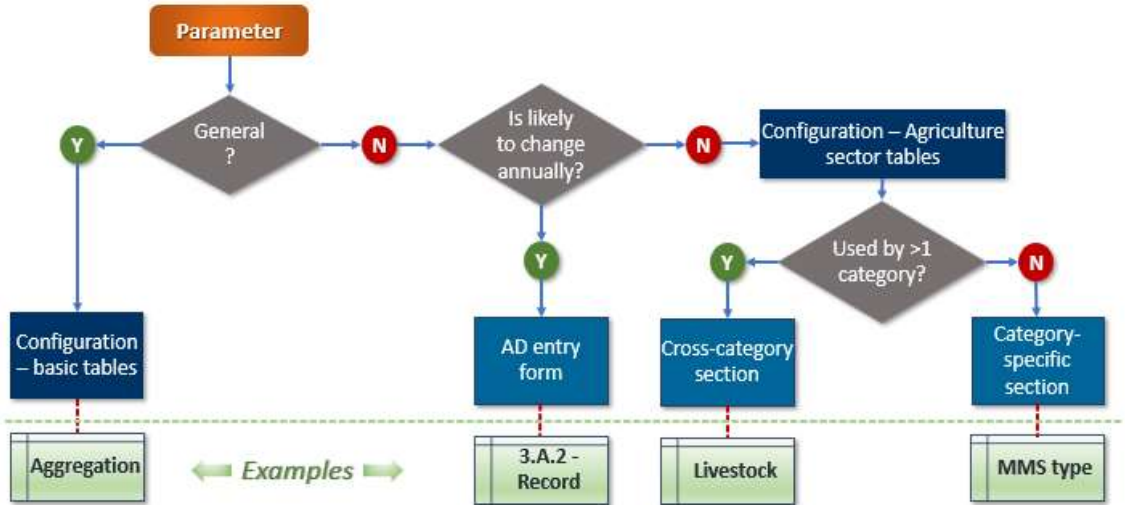
The agriculture sector has a high level of data complexity and inter-category dependencies. That is why there are some differences in the logic and organization of the configuration layer for the agriculture sector in SAGE from other sectors.

12.2.4.1 Addressing different frequencies of updates for the agriculture sector parameters

For each category in the agriculture sector, some parameters are not likely to change on an annual basis and others are expected to be changed from year to year. The parameters that are not likely to undergo an annual change are entered and stored in the **configuration tables**.

The entries in these tables should be made only by authorized technical experts or the inventory compiler. These entries will define the available selection options in the data entry forms, and the default parameters (from the 2006 IPCC Guidelines or country-specific) (***Figure 136***).

Figure 136. Distribution of parameters between the AD entry layer and the configuration in SAGE reflecting different frequencies of update



Configuration tables that are serving to multiple categories are grouped on the top of the configuration tables list. The tables mostly associated with one category (category-specific tables) are displayed below the cross-category tables. All category-specific configuration tables for the Ag sector are grouped by category or category family (e.g., configuration tables for 3.A.1 and 3.A.2 categories are grouped as 3.A).

For example, for 3.A category group in the cross-category portion of the Configuration – Agriculture sector of the Configuration layer, users need to adjust the following tables before entering the annual activity data in the cross-category section:

- Table **Livestock** leave only the relevant animal types to your country as "enabled" records; add new livestock types
- Table **Climate zones** – to ensure that only climate zones relevant to your country are entered or/and enabled and the parameters for the relevant climate zones are correct.

These tables are needed for ALL methodological tiers for 3.A category (T1, T2 simplified, T2 detailed)

In the category-specific configuration tables in the Configuration – Agriculture sector, the parameter entries depend on:

- The methodological tier (the higher the tier, the more parameters are required)
- The type of animal (e.g., some parameters required for dairy cows might differ from the parameters required for sheep, buffalo, and other animal types)

12.2.4.2 Separating entries for quantitative and qualitative parameters

The category-specific configuration parameter tables in SAGE are split into quantitative (i.e., with a numerical value) and qualitative (i.e., descriptive) (***Figure 138***):

- A typical structure of a descriptive table in SAGE includes a parameter name identifier, its code, name, and a description.
- For quantitative parameters, SAGE has two groups of tables:
  - "Parameter types" where the list and descriptions for each quantitative parameter entering the IPCC equations are included (***Figure 137***). These tables are fixed at the database level.

- The values of the quantitative parameters in SAGE are included in separate tables called "Calculated parameters" (***Figure 138***). These tables can be populated by technical users and superusers.

Figure 137. Separating entries for quantitative and qualitative parameters in SAGE

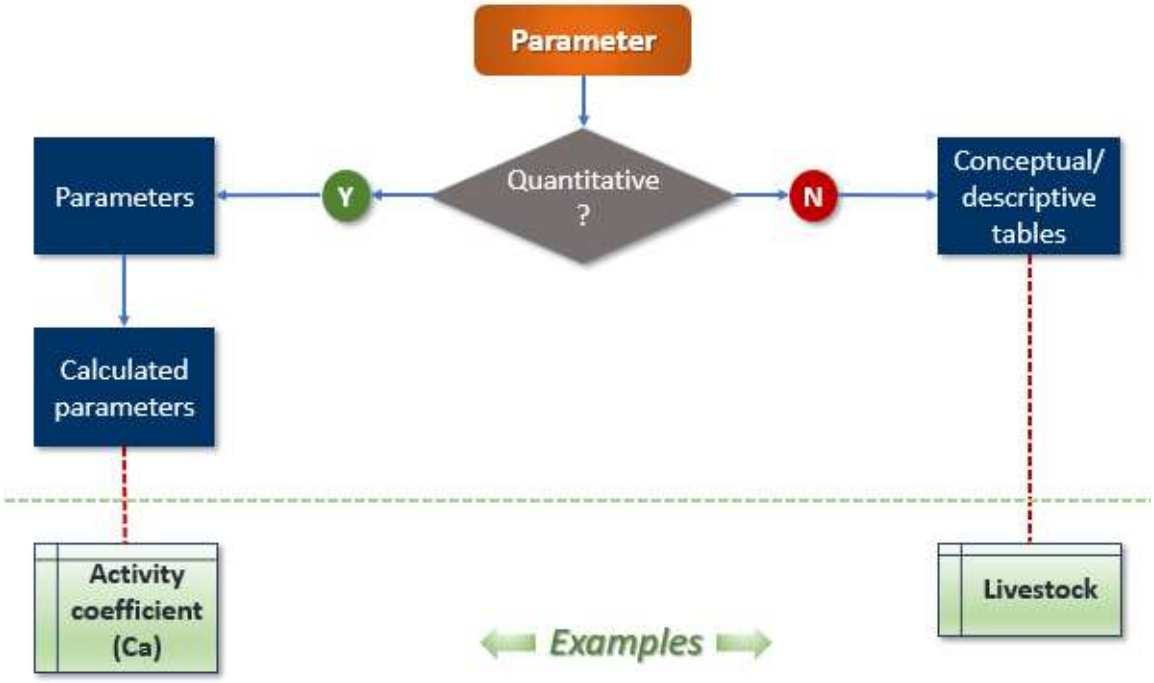


Figure 138. Example of Parameter types list in SAGE (3.A category)

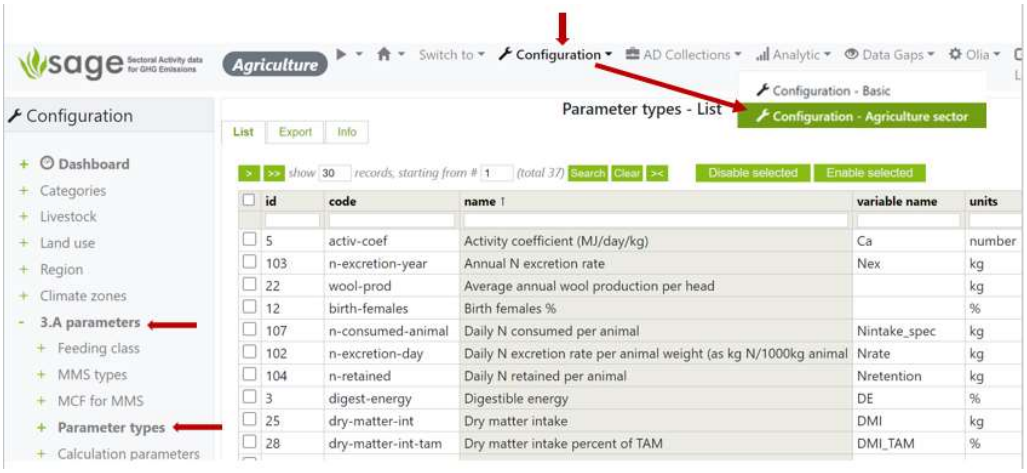
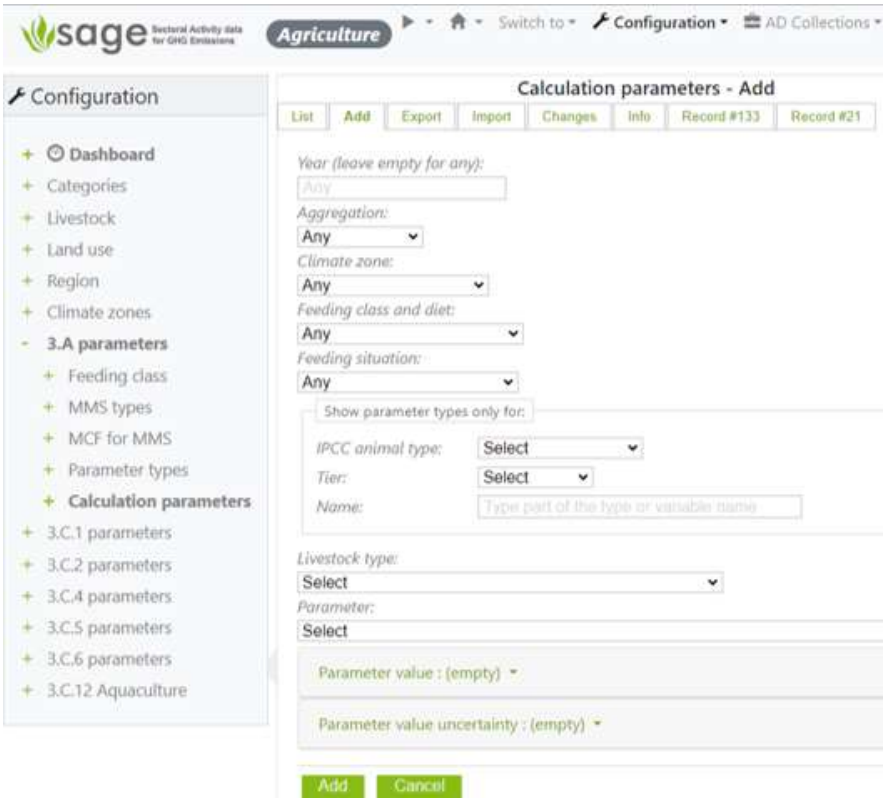


Figure 139. An example of calculation parameter entry form in SAGE (3.A category)



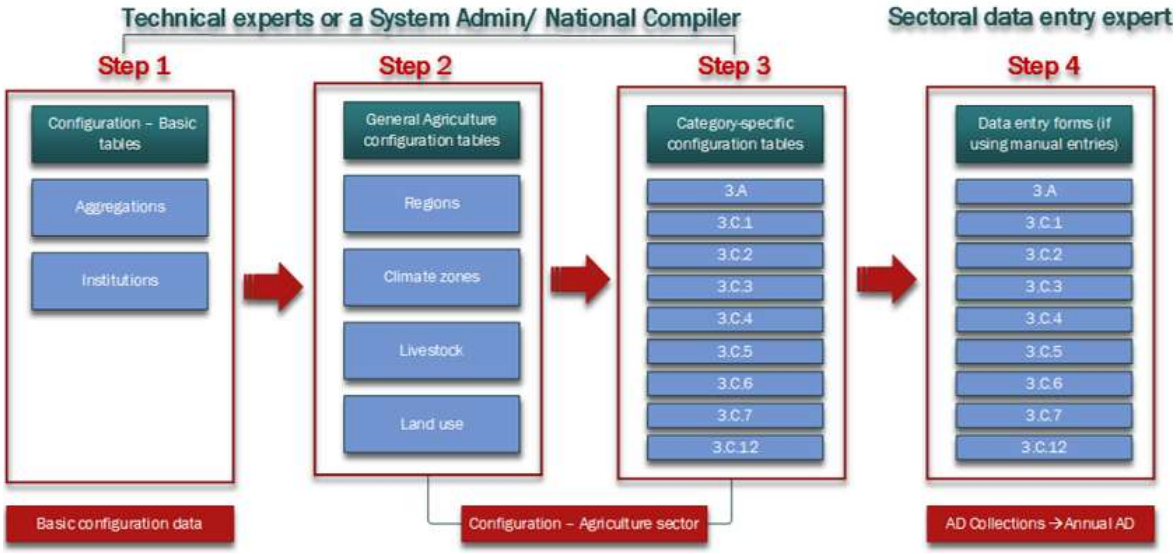
The example of the entry form (***Figure 143***) illustrates the flexibility of data entry allowing the selection of descriptive parameters to identify the situation, select the parameter type (e.g., annual excretion rate Nex), the value, the source, and the uncertainty of the parameter value.

To enable time-bounded entries and high-level values or disaggregated values, for some of the descriptive values the entry "Any" is allowed. For example, if a parameter does not depend on a climate zone or a feeding situation, then "Any" is an acceptable entry value for those descriptors. If for a particular setting of descriptors, users wish to have a very specific parameter's value, this is also allowed. If in the second record for the parameter the descriptors will be set to a particular (not Any) value, when those conditions are true, the specified value of the parameter will be used. For example, typical animal mass could be different from year to year for the same animal type depending on the climatic changes (like draught), accessibility to feed, etc.

If a parameter is specific to only one IPCC livestock category or a methodological tier, these can be selected in the section *"Show parameter only for"*.

Figure 140 below shows a general order of filling the data tables and forms and the configuration tables and forms available at each step. The general configuration tables and the category-specific category tables need to be filled in and checked BEFORE the category entries are made in the relevant entry forms.

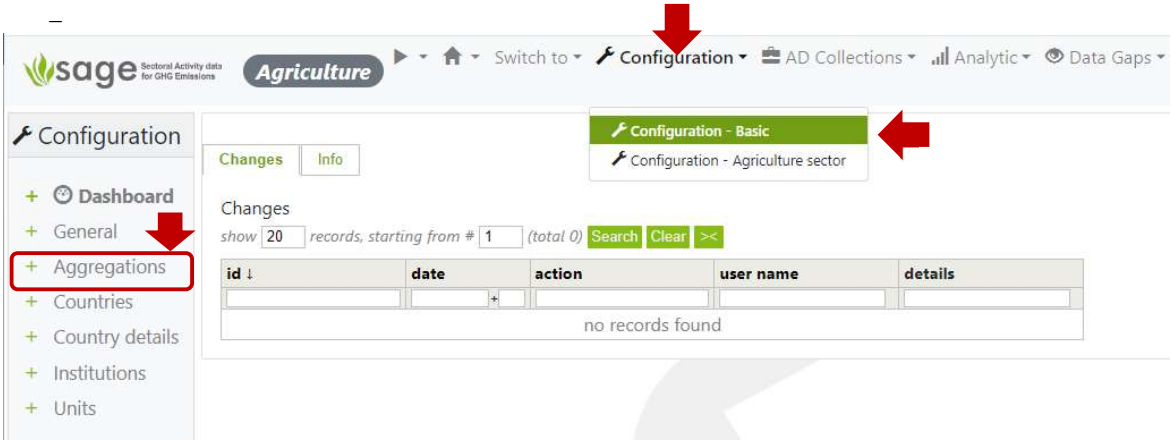
Figure 140. Recommended order of entries



12.2.4.3 Configuration table and parameter entries

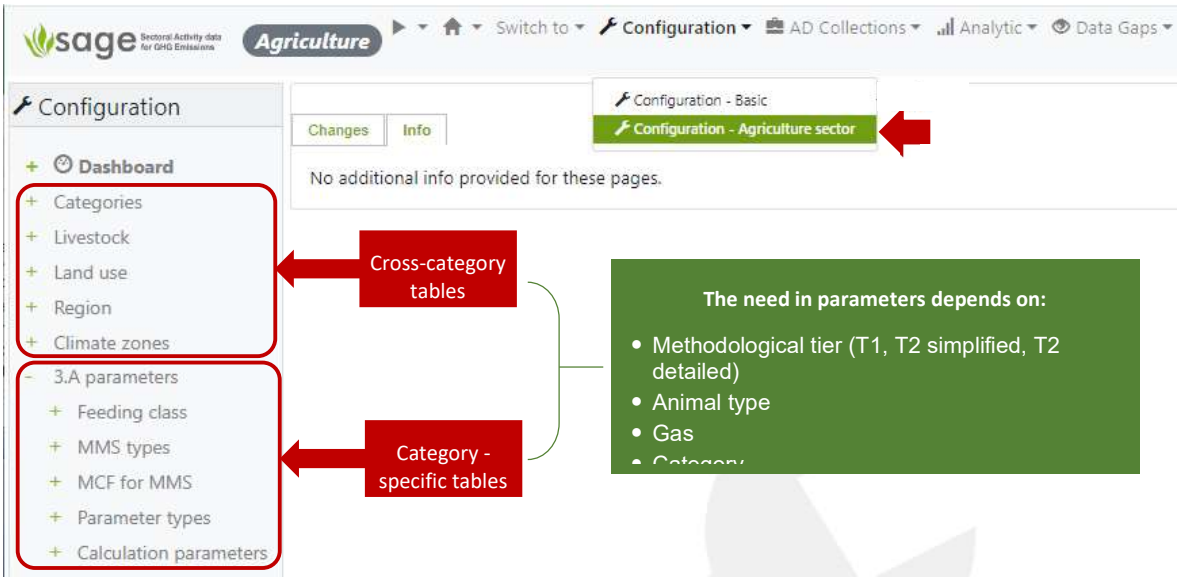
- Step 1: In the section **Configuration – Basic**, adjust the table Aggregations to ensure that only administrative/geographical subdivisions relevant to your country are entered and enabled (***Figure 141***). This is needed if the agriculture data are collected on a regional basis and the climate zones and animal types vary between the regions or if region-specific emission factors and parameters are available and planned for use in the inventory.

Figure 141. Getting to the Aggregations table



When finished – move to Steps 2 and 3- the Configuration – Agriculture sector (Figure 142)

***Figure 142**. Navigating to the Configuration – Agriculture sector tables*



- Step 2: In the **cross-category** portion of the **Configuration – Agriculture sector** of the Configuration layer, adjust the following tables before entering the annual activity data in the cross-category section:
  - Table **Livestock** leave only the relevant animal types to your country as "enabled" records; add new livestock types (see section ***12.2 How to manage Configuration tables*** for details)
  - Table **Climate zones** – to ensure that only climate zones relevant to your country are entered or/and enabled and the parameters for the relevant climate zones are correct.

  These tables are needed for ALL methodological tiers for 3.A category (T1, T2 simplified, T2 detailed)
- Step 3: In the **category-specific** configuration tables in the **Configuration – Agriculture** sector, the parameter entries depend on:
  - The **methodological tier** (the higher the tier, the more parameters are required)
  - The **type of animal** (e.g., some parameters required for dairy cows might differ from the parameters required for sheep, buffalo, and other animal types

12.2.4.4 Configuration parameters that are required for category group 3.A

Category 3.A has the biggest variety of parameters required for methodological tiers by animal types. IPCC offers tier 1 (T1), tier 2 simplified (T2s), and tier 2 detailed (T2d) for these categories. In the IPCC software, Tiers 1 and 2s are available for all animal types. In the IPCC inventory software and in SAGE, T2d is available only for estimating emissions from dairy and non-dairy cattle, buffalo, and sheep. For all other animal types, the highest methodological tier provided by the 2006 IPCC GLs and the IPCC software is T2s.

This section presents the lists of required parameters for different methodological tiers and different animal types.

Note: because SAGE is the software for Activity data, **emission factors are out of scope for this tool and they are not listed in the tables below.** Also not listed the parameters that are obtained as a result of calculations from the listed parameters (e.g., NEa, NEm, NEp, NEl, etc.)

Tier 1: the following parameters are needed before entering data in the activity data entry form (**Table 1**):

Table 1. Parameters in the configuration layer are needed for categories 3.A.1 and 3.A.2 for 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

Note: all these parameters are already entered in SAGE, your task is to **check if they apply to your country, and adjust the values as needed, and/or delete/disable irrelevant records.**

For Tier 2, the IPCC offers 2 options – **simplified** (**T2s**) and **detailed** (**T2d**).

Note:

- T2d for enteric fermentation is substantially different from T2s.
- Parameters required for T2d for enteric fermentation for dairy cattle, other cattle, buffalo, and sheep are quite different. This is because these types of animals have different age and economic use categorizations.
- T2d for manure management uses the same basic livestock parameters as T2d for enteric fermentation for each animal type. The general list of parameters specific to 3.A.2 only is very similar for simplified and detailed tiers. However, for T2d, IPCC offers equations that allow us to work out those parameters from scratch rather than using available defaults.

***T2s**: the following parameters are needed before entering data in the activity data entry form (**Table 2**,*

Table 3):

Tier 2 simplified for 3.A.2 category (Manure management, all animal types)		
Configuration table type	***Parameter needed***	***Are there options calculated/specified?***
Configuration - basic	Aggregation	No
Agriculture sector – cross-sectoral	Climate zone	No
Agriculture sector – cross-sectoral	Livestock (type, subdivision, if available)	No
Agriculture category-specific	Typical animal mass (TAM)	No
	Number of days alive (DA)	No
	Digestible energy (DE)	Yes
	Manure Management system (MMS)	No
	Methane correction factor (MCF)	No
	Feeding class and diet	No
	Feeding situation	No
	Daily N excretion rate per animal weight	No
	Average daily milk production	No
	Fat content of milk	No
	Feed intake (dry matter, DMI)	Yes
	Energy density of feed	No
	Percent of protein in milk (PR%)	Yes
	Daily N consumed per animal	Yes
	Fraction of annual N retained by animal	Yes
	Crude protein in diet (CP%)	No
	Urinary energy fraction (UE)	No
	Feed ash content (ASH)	No

Table 2. Parameters in the configuration layer are needed for categories 3.A.1 for tier 2 simplified.

Tier 2 simplified for 3.A.1 category (Enteric fermentation, all animal types)	
Configuration table type	***Parameter needed***
Configuration - basic	Aggregation
Agriculture sector – cross-sectoral	Climate zone
Agriculture sector – cross-sectoral	Livestock (type, subdivision, if available)
Agriculture category-specific	Typical animal mass (TAM)
Agriculture category-specific	Number of days alive (DA) (default value, could be entered through the AD entry form)
	Digestible energy (DE)
	Dry matter feed intake (DMI)
	Energy density of feed
	Gross energy (if a country-specific value is available)

Table 3. Parameters in the configuration layer are needed for categories 3.A.2 for tier 2 simplified in addition to those in table 3.A.1 for T2s provided in table 2.

Configuration table type	***Parameters to enter in the configuration tables***
MMS types	Manure management system (S)
MCF to MMS	Methane conversion factor for MMS in geographical zone MCF(T,S)
Agriculture sector – cross-sectoral	Fraction of livestock category's manure handled using MMS in geographical zone (MS(T,S) – this is not entered in SAGE, but calculated after entries are done
Agriculture category-specific	Feeding class and diet
Agriculture category-specific	Feeding situation
Calculation parameters	Feed intake (DMI)
Calculation parameters	Energy density of feed (FED)
Calculation parameters	Urinary energy (UE)
Calculation parameters	Ash content of feed (ASH)
Calculation parameters	Volatile solid excretion per day (VS)
Calculation parameters	Maximum methane production capacity (Bo)

Calculation parameters	Milk protein content (PR%)
Calculation parameters	Crude protein in diet (CP%)
Calculation parameters	Daily N consumed per animal (Nintake)
Calculation parameters	Fat content of milk (%Fat) (for females)
Calculation parameters	Daily N retained per animal (Nretention)
Calculation parameters	Fraction of annual N retained by animal (Nretention(frac))
Calculation parameters	Annual N excretion rate (if specified as a country-specific number)
Calculation parameter	Estimated dietary net energy concentration of diet (NEma) (specified), other cattle only

T2d: the following parameters are needed before entering data in the activity data entry form (tables 4 – 10):

Enteric Fermentation – tier 2 detailed

Table 4. Parameters in the configuration layer are needed for categories 3.A.1 for tier 2 detailed – dairy cattle (= dairy cows).

Configuration table type	*Parameters to enter in the configuration tables*
Configuration - basic	Aggregation
Agriculture sector – cross-sectoral	Climate zone
Agriculture sector – cross-sectoral	Livestock (type, subdivision)
Agriculture category-specific	Typical animal mass (TAM)
	Number of days alive (DA)
	Activity coefficient (Ca)
	Average daily milk production
	Fat content of milk
	% of females that give birth in a year
	Coefficient for calculation NEp Energy for pregnancy (Cpregnancy)
	Digestible energy (DE%)
	Feeding class and diet
	Feeding situation
	Feed energy density
	Maintenance energy coefficient (Cfi)
	Switch to Cfi-cold temperature (Cfi_in cold)

Table 5. Parameters in the configuration layer are needed for categories 3.A.1 for tier 2 detailed – Other cattle (=Non-dairy cattle), Buffalo.

Tier 2 detailed for 3.A.1 category (Enteric fermentation, other cattle, buffalo)		
Configuration table type	*Parameters to enter in the configuration tables*	*Applicability to specific animal subdivision*
Configuration - basic	Aggregation	All
Agriculture sector – cross-sectoral	Climate zone	All
Agriculture sector – cross-sectoral	Livestock (type, subdivision)	All
Agriculture category-specific	Typical animal mass (TAM)	All
	Number of days alive (DA)	All
	Activity coefficient (Ca)	All
	Digestible energy (DE%)	All
	Feeding class and diet	All
	Feeding situation	All
	Feed energy density	All
	Maintenance energy coefficient (Cfi)	All
	Switch to Cfi-cold temperature (Cfi_in cold)	All (only for cold countries)
	Fat content of milk	Mature females only
	% of females that give birth in a year	Mature females only

	Coefficient for calculation Net Energy for pregnancy (Cpregnancy)	Mature females only
	Average daily milk production	Mature females only
	Average weight gain per day	Growing animals only
	Mature weight	For mature animals = TAM
	Average number of hours worked per day	Mature animals only
	Growth energy coefficient	Growing animals only

Table 6. ***Parameters in the configuration layer are needed for categories 3.A.1 for tier 2 detailed – Sheep.***

Tier 2 detailed for 3.A.1 category (Enteric fermentation, sheep)			
Configuration table type	***Parameters to enter in the configuration tables***	***IPCC variable name***	***Applicability to specific animal subdivision***
Configuration - basic	Aggregation		All
Agriculture sector – cross-sectoral	Climate zone	Z	All
Agriculture sector – cross-sectoral	Livestock (type, subdivision)	T, Ts	All
Agriculture category-specific	Typical animal mass	TAM	All
	Number of days alive	DA	All (default value, could be entered through the AD entry form)
	Activity coefficient	Ca	All
	Digestible energy	DE%	All
	Feeding class and diet		All
	Feeding situation		All
	Feed energy density	FED	All
	Maintenance energy coefficient	Cfi	All
	Switch to Cfi-cold temperature	Cfi_in cold	All
	% of females that give birth in a year		Mature females only
	Coefficient for calculation Net Energy for pregnancy	Cpregnancy	Mature females only
	Average daily milk production		Mature females only
	En required to produce 1 kg of milk	EVmilk	Mature females only
	Fat content of milk	%Fat	Mature females only
	Average Annual wool per head		Mature sheep
	Energy value of each kg of wool produced	EVwool	All
	Weight gain of the lamb between birth and weaning	WGwean	Growing animals only
	Live body weight weaning	BWi	Growing animals only
	Live body weight at 1 year old or at slaughter if less than 1 year old	BWf	Growing animals only
	Const. 1 for calc. Net Energy for growth	a	Growing animals only
	Const. 2 for calc. Net Energy for growth	b	Growing animals only

Manure management – tier 2 detailed

For category 3.A.2 (Manure management) requires the above parameters to be set ap in the configuration layer. For each livestock type, the parameters required for tier 2 detailed for 3.A.1 category should be entered first. The additional configuration parameters needed for 3.A.2 category at tier 2 detailed are presented in table 6 below. All these parameters should be entered in the category-specific section for 3.A.

Table 7. ***Parameters in the configuration layer are needed for categories 3.A.2 for tier 2 detailed (in addition to livestock parameters in T2d for 3.A.1)***

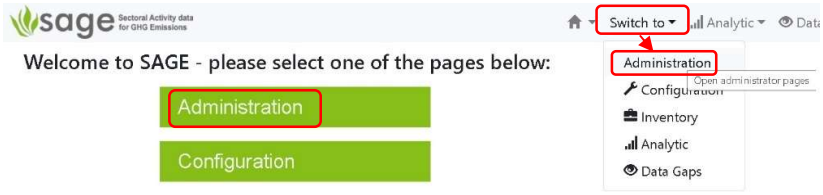
Configuration table	*Parameters to enter in the configuration tables*	*IPCC variable name*	*Animal type*
MMS types	Manure Management System	S	All
MCF to MMS	Methane conversion factor for MMS in geographic zone	MCF(T,S)	All
Calculation parameters	Urinary Energy Fraction	UE	All
Calculation parameters	Ash content of feed calculated as a fraction	ASH	All
Calculation parameters	Volatile solid excretion per day on a dry-organic matter basis	VS	All
Calculation parameters	Crude protein in diet	%CP	Except sheep and buffalo
Calculation parameters	Daily N consumed per animal	Nintake	All
Calculation parameters	Milk protein content (= percent of protein in milk)	PR%	Cattle
Calculation parameters	Fat content of milk	%Fat	All (female)
Calculation parameters	Daily N retained per animal	Nretention	Cattle
Calculation parameters	Fraction of annual N retained by animal	Nretention(frac)	All
Calculation parameters	Annual N excretion rate (if specified as a country-specific number)	Nex	All
	Mx methane production capacity	Bo	All

13. System administration

SAGE administration can be performed using the **Administration** component.
Only users with administrative rights have access to this component.

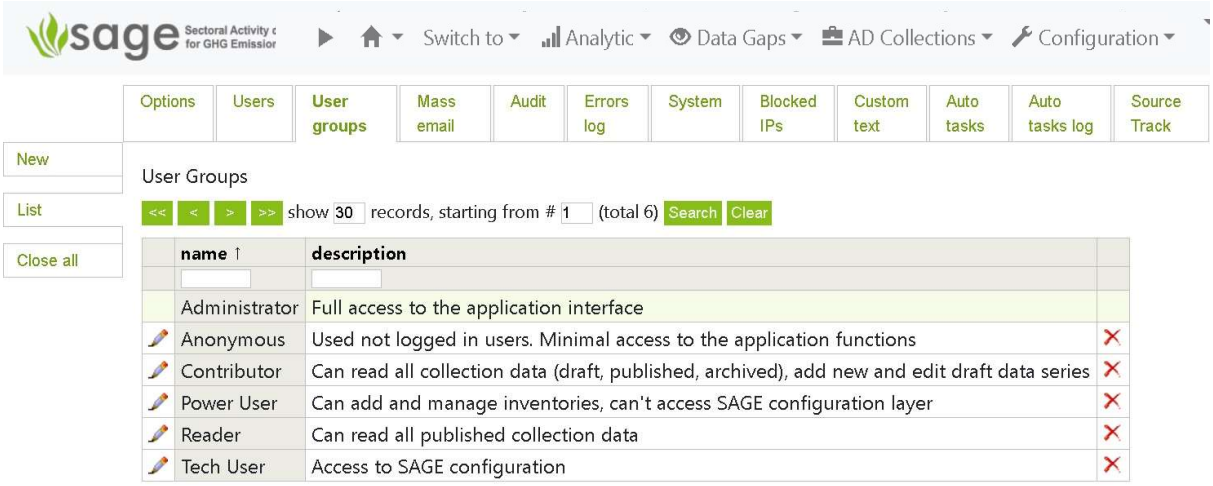
To access the administration component after logging in, click 'Administration'

Otherwise click 'Switch to' at the top and then 'Administration' or else on the front page, click:



The administrative component of SAGE includes a set of module controls for user management messaging, system logs and audits, system messaging and automatically performed system checks (Figure 143).

***Figure 143**. Administrative component modules (the User groups module is selected in this figure).*

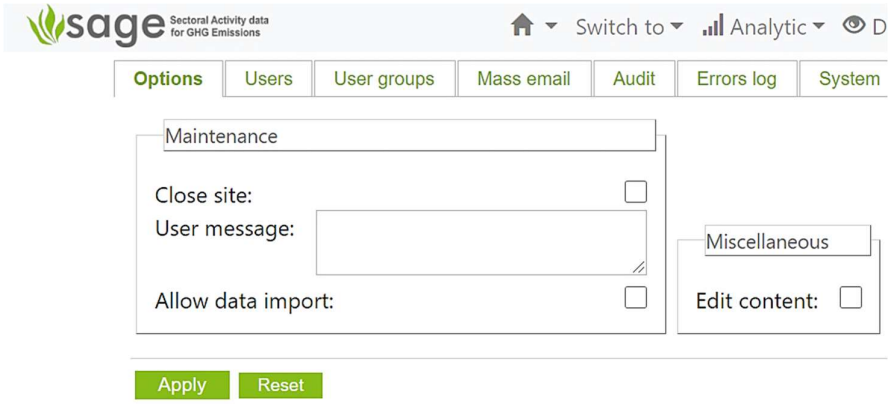


13.1 How to close/open the site for maintenance

A SAGE administrator can close the site for maintenance using the **Options** module (Figure 144) by checking the **Close site** box. SAGE advises to leave a message for users that will be displayed on the home page of the site. Use the **Apply** button to implement your choice. The site will be closed for all users except administrators.

To open the site again, log as administrator, go to the **Administration** component, select the **Options** module and **uncheck the Close site box**.

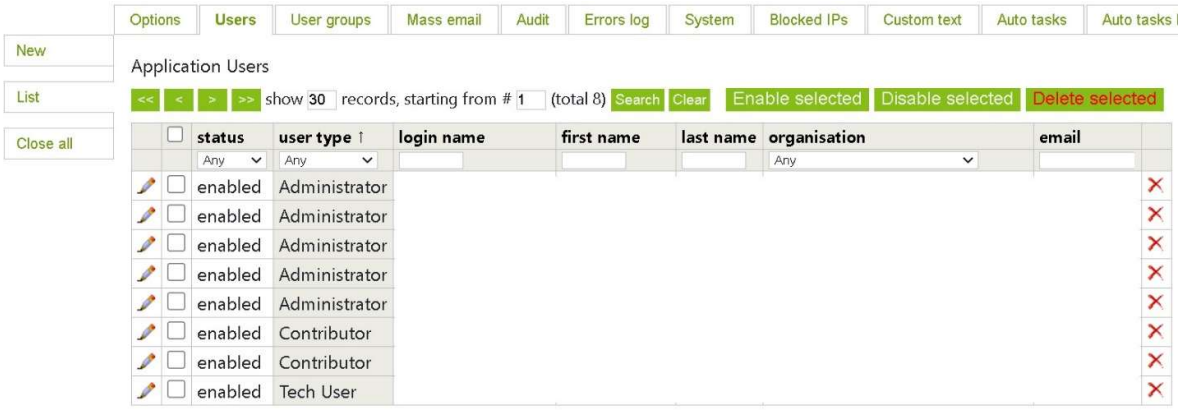
***Figure 144**. Options module – closing/opening SAGE site*



13.2 How to manage users

To add new users, assign a user to a user group, edit user records, or delete a user, go to **Users** module of the **Administration** component (Figure 145).

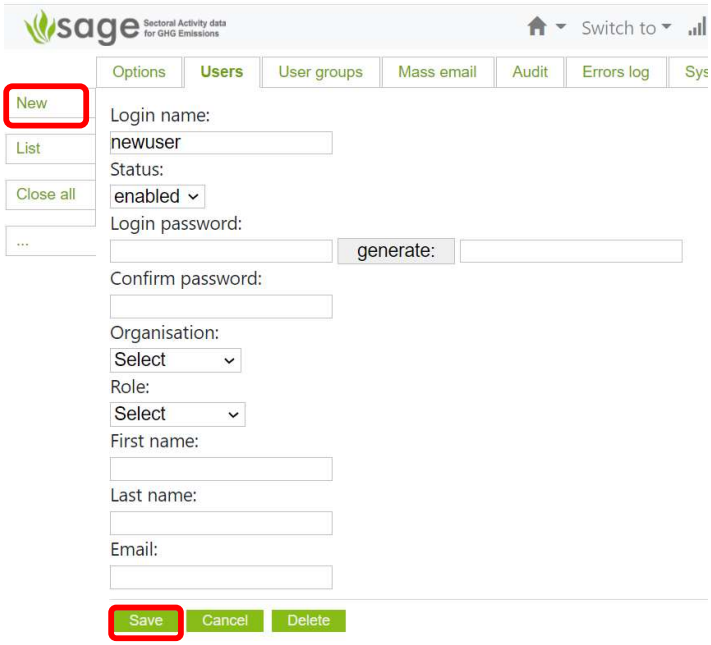
Figure 145. Users module in SAGE



13.2.1 Add new user

In the **Users** tab, click the New button on the left of the screen. SAGE will display a user group entry form (***Figure 146***). Fill in the details and save the record. A new user record will be entered in the SAGE database and the e-mail will be sent to the user

Figure 146. Adding new user in SAGE



13.2.2 Edit new details

Editing user records is similar to the record editing procedure for the AD collection records or the table records in the configuration tables.

Step 1 In the **Users** tab, click the List button on the left of the screen. SAGE will display a list of users (Figure 145).

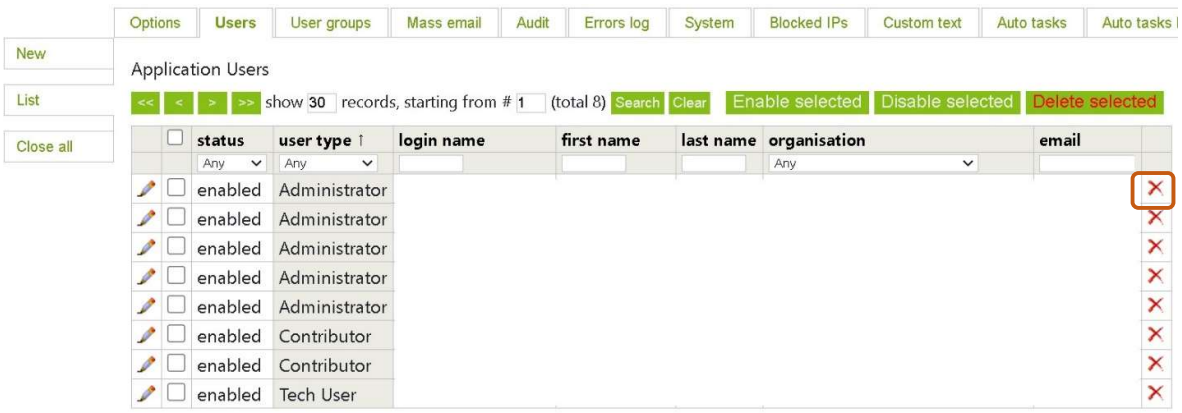
Step 2 Click the **pencil** at the beginning of the record you'd like to edit. SAGE will display the editing form. Adjust the group title, description and permissions as required (see the steps for editing contents in section 8.2.1 above).

Step 3 Save your selections by clicking on the **Save** button on the bottom of the screen.

13.2.3 Delete a user record

To delete a user record, click the **red cross** icon at the end of the record (***Figure 147***).

Figure 147. Deleting a user record



13.2.4 Temporarily disable user access

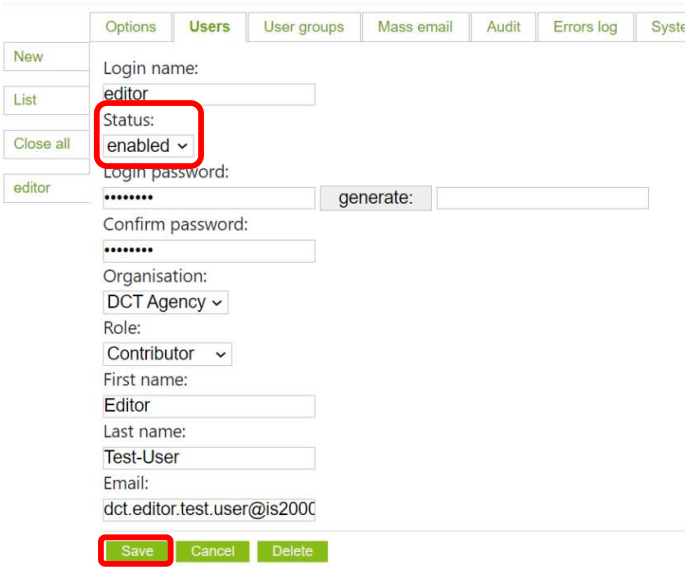
SAGE lets you **disable the user access temporarily** without removing the user's record (Figure 148).

Step 1 In the **Users** tab, click the List button on the left of the screen. SAGE will display a list of users (Figure 145).

Step 2 Click the **pencil** at the beginning of the record you'd like to edit. SAGE will display the editing form. Adjust the group title, description and permissions as required (see the steps for editing contents in section 8.2.2 above).

Step 3 In the user form, in the Status selection menu, select **disabled** and save the form. You can enable the user later following the same logical path.

Figure 148. How to disable or enable a user in SAGE without deleting the user record



13.3 How to manage user groups

To manage user groups, go to the **Administration** component, select the **User Groups** module. The list of available user groups will be displayed (Figure 149).

In line with the stakeholder analysis results, it is essential for the data and operational security to set up several groups of users with different access level. The following groups of roles and skills for different users have been identified:

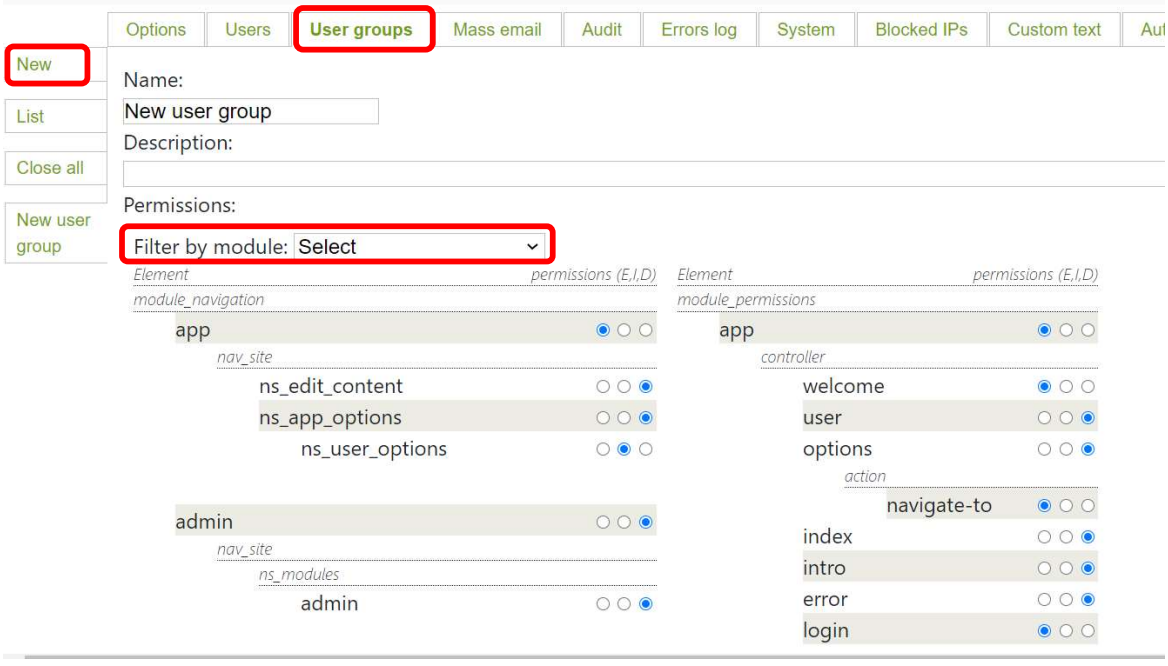
- **Administrative users** that combine some information system knowledge combined with business knowledge and sufficient authority (for example, a national AD collection compiler or a national AD collection QC manager). These users should be able to perform the administrative system control, manage user accounts, and liaise with the SAGE support group regarding updates and upgrades. SAGE administrator will also be involved in the SAGE installation process and can assist the technical user in setting up the configuration tables. This group of users should be able to access all functional blocks and the administrative control block of SAGE.

- **Technical users** will have technical knowledge of the AD collection and AD collection processes (for example, national AD collection compilers, sectoral compilers, sectoral experts, and QC experts). They should be able to enter AD collection data, add and manage AD collections, perform data gap filling, do data analysis, and create reports. This group of users should be able to access all system functional components excluding the administrative control block.
- **Power users** are the people with more administrative than technical inclinations. For example, they can make a decision on the AD collection approval and sign-off, make some corrections at the data entry level, fill the gaps, and perform data analyses, but cannot configure the background data for the configuration component. For example, team managers or team leaders that manage the AD collection group could play this role.
- **Contributors** are the people performing data entry, gap filling and data analysis. These could be AD collection experts as well as people assisting in data entry process and performing basic data quality control. They should be able to access the **AD collection drafting**, **Data Gaps**, and **Analysis** components of SAGE as well as generate reports, but cannot access **AD collection management**, **Configuration** or **Administration** components.
- **Readers** are the people who can view the data in the published AD collections and perform data analysis over the approved AD collection data, for example policy analysts or AD collection negotiators. They should be able to access only AD collection published, and analysis components as well as generate reports.
- **Anonymous** are any other people without access account who are interested to view SAGE welcome page and the SAGE introduction video, e.g., general public. They will not have an access to any other SAGE facilities.

13.3.1 Add new user group

Step 1 In the User Groups tab, click the **New** button on the left of the screen. SAGE will display a user group entry form (Figure 149).

Figure 149. Adding new user group in SAGE



Step 2 Enter the name for the new group in the Name field and type the user group description to explain what the users of this group can and can't do.

Step 3 Set up the specific permissions for the users of this group for each module of SAGE. To switch between the modules, use **Filter by module** selection menu.

Step 4 For each element and module and each, select **one of the following**:

- **E** Enabled
- **I** Inherited
- **D** Disabled

Step 5 Save your selections by clicking on the **Save** button on the bottom of the screen. You can also copy the entire set of permissions using the button **Copy** to save time if in some other group only few permissions will need to be modified.

13.3.2 Edit a user group

Editing user group records is similar to the record editing procedure for the AD collection records or the table records in the configuration tables.

Step 1 Click the **pencil** at the beginning of the record you'd like to edit. SAGE will display the editing form.

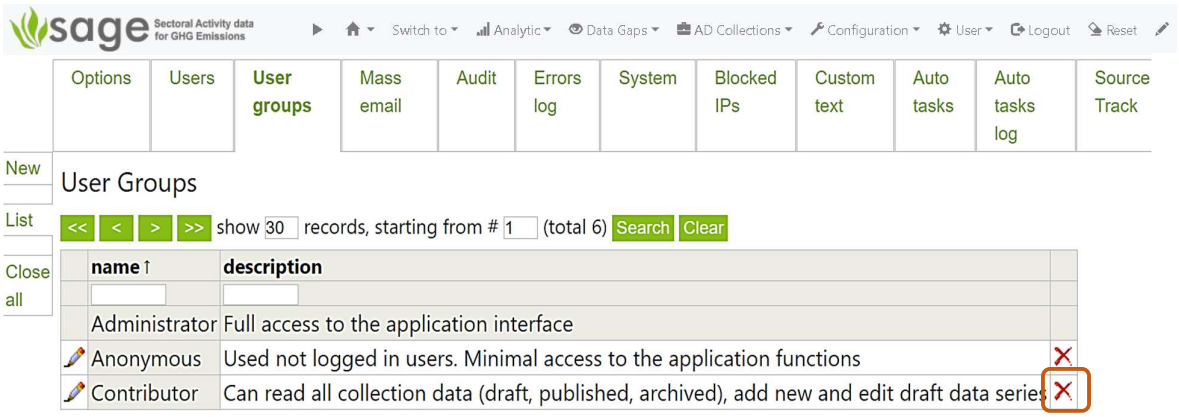
Step 2 Click the **pencil** at the beginning of the record you'd like to edit. SAGE will display the editing form. Adjust the group title, description and permissions as required (see the steps for editing contents in section 8.2.1 above).

Step 3 Save your selections by clicking on the **Save** button on the bottom of the screen. You can also copy the entire set of permissions using the button **Copy** to save time if in some other group only few permissions will need to be modified.

13.3.3 Delete a user group

To delete a user group, click the **red cross icon** at the end of the record (***Figure 150***).

Figure 150. Deleting a user group



13.4 Other administration menus

The remaining administration menus are hopefully quite obvious.

Mass email	Use this if you need to send a message to a number of SAGE users Use filters to trim the list, then click 'Message' to draft a message, then 'Send'
Audit	This shows an audit trail of actions and this list can be filtered Where there is a magnifying glass  , you can click that for more information
Errors log	This lists errors and details
System	This allows setting of directory write permissions, showing log data, system data and a list of currently active users
Blocked IPs	This shows a list of currently blocked Internet Protocol (IP) addresses
Custom text	This shows an editable list of custom text (in HTML text format)
Auto tasks	This shows a list of automated tasks
Auto tasks log	This shows the log of completed automated tasks
Source Track	This may show the source (depending on your permissions)

Appendix A: Acronyms

Acronym	Full text	Meaning
AD	Activity Data	This describes the information you are collecting and recording that measures the emission-causing activity
Bo	Maximum methane producing potential (or capacity)	The Bo is the maximum amount of methane that can be produced from a given quantity of organics (as expressed in BOD or COD) in the wastewater.
BOD	Biochemical oxygen demand	The BOD concentration indicates the amount of carbon that is aerobically biodegradable. The standard measurement for BOD is a 5-day test, denoted as BOD_5. This term is used in the 2006 IPCC Guidelines in relation to domestic wastewater.
CH_4	Carbon tetrahydride	Chemical formula for methane
CO_2	Carbon dioxide	Chemical formula for carbon dioxide
COD	Chemical oxygen demand	The COD measures the total material available for chemical oxidation (both biodegradable and non-biodegradable). This term is used in the 2006 IPCC Guidelines in relation to industrial wastewater.
CSV	Comma-separated values file	a delimited text file that uses a comma to separate values https://en.wikipedia.org/wiki/Comma-separated_values
EF	Emission Factor	Ultimately, the emission factor shows the amount of GHG produced per unit of activity data. This can be a simple parameter or a function of other parameters.
ETF	Enhanced transparency framework	The ETF specifies how Parties to the Paris Agreement must report on progress in climate change mitigation, adaptation measures and support provided or received. It also provides for international procedures for the review of the submitted reports. https://unfccc.int/news/understanding-the-enhanced-transparency-framework-new-handbook-published-0
Gg	Gigagrams	Mass measure 10^6 kg (= 1 kt)

Acronym	Full text	Meaning
GHG	Greenhouse Gas	Any gas that causes increased heat reflection of heat that would otherwise have been radiated from Earth out to space
HFCs	Hydrofluorocarbons	A group of chemicals containing only carbon, fluorine, and hydrogen atoms in their molecules. They are used individually or within ozone depleting substitutes in refrigeration, air conditioning blends. They are also used as foam blowing agents, fire extinguishing, etc. HFCs are direct GHGs.
IPCC	Intergovernmental Panel for Climate Change	A team of people working between country governments to measure and address methods to reduce harmful changes to the environment of Earth
IPPU	Industrial Processes and Product Use	A GHG inventory sector concerned with GHG emissions from chemical processes and using solvents and other chemical products in industries and equipment use.
MCF	Methane correction factor	This term is used for both solid waste disposal category and the wastewater treatment and discharge category. In terms of solid waste disposal, methane correction factor (MCF) is interpreted as the part of the waste that will decompose under aerobic conditions (prior to the conditions becoming anaerobic) in the solid waste disposal sites (SWDS) In terms of wastewater treatment and discharge, the MCF indicates the extent to which the CH4 producing capacity (Bo) is realized in each type of treatment and discharge pathway and system. Thus, it is an indication of the degree to which the system is anaerobic. MCF is a component for calculation the emission factor for domestic wastewater treatment and discharge for a particular pathway or system.
MSW	Municipal solid waste	Municipal Solid Waste (MSW)—more commonly known as trash or garbage—consists of everyday items we use and then throw away, such as product packaging, grass clippings, furniture, clothing, bottles, food scraps, newspapers, appliances, paint, and batteries. This

Acronym	Full text	Meaning
		comes from our homes, schools, hospitals, and businesses.
N_2O	Dinitrogen oxide	A chemical formula for nitrous oxide, a direct GHG.
PFCs	Perfluorocarbons	A group of chemicals containing only carbon and fluorine atoms in their molecules. They are used individually or within blends of ozone depleting substitutes. Also, PFCs can be released as a result of anode effect during aluminum production and magnesium production. PFCs are direct GHGs.
SAGE	Sectoral Activity data for GHG Emissions	This is the program you are using
St. Combustion	Stationary Combustion	Devices generally stay in one place and combust fuel
SWDS	Solid waste disposal site	Sites for disposal and treatment of municipal, industrial, and other solid wastes.
T1	Tier 1	See '6.1.3 How to add a new data record – manual entry' page 28 which discusses methodological tiers
T2	Tier 2	
T3	Tier 3	
TJ	Tera Joule	A measure of energy
TOW	Total organics in wastewater	Measures content of organic compounds in wastewater
UNFCCC	United Nations Framework Convention for Climate Change	The structure defined by a united group of world nations to measure, understand and manage changes to the environment

Appendix B: Examples of common data entry field values

Category *for Stationary Combustion 1.A.[1,2,4,5]*

1.A.1 - Energy Industries
1.A.1.a - Main Activity Electricity and Heat Production
1.A.1.a.i - Electricity Generation
1.A.1.a.ii - Combined Heat and Power Generation (CHP)
1.A.1.a.iii - Heat Plants
1.A.1.b - Petroleum Refining
1.A.1.c - Manufacture of Solid Fuels and Other Energy Industries
1.A.1.c.i - Manufacture of Solid Fuels
1.A.1.c.ii - Other Energy Industries
1.A.2 - Manufacturing Industries and Construction
1.A.2.a - Iron and Steel
1.A.2.b - Non-Ferrous Metals
1.A.2.c - Chemicals
1.A.2.d - Pulp, Paper and Print
1.A.2.e - Food Processing, Beverages and Tobacco
1.A.2.f - Non-Metallic Minerals
1.A.2.g - Transport Equipment
1.A.2.h - Machinery
1.A.2.i - Mining (excluding fuels) and Quarrying
1.A.2.j - Wood and wood products
1.A.2.k - Construction
1.A.2.l - Textile and Leather
1.A.2.m - Non-specified Industry
1.A.4 - Other Sectors
1.A.4.a - Commercial/Institutional
1.A.4.b - Residential
1.A.4.c - Agriculture/Forestry/Fishing/Fish Farms
1.A.5 - Non-Specified

Category *for Transport 1.A.[3,5]*

1.A.3.a.i - International Aviation (International Bunkers)
1.A.3.a.ii - Domestic Aviation

Aggregation

Airport	Oil field
Coal Basin	Province
Facility	Region A
Gas field	Region B
National	Regional
Oil and Gas Basin	State

Statistics quality

Unknown
Well developed

Tier

T1
T2
T3

Airport Code (only a small subset is shown below to indicate format)

AAE - Algeria	ACV - USA	AHE - French Polynesia
AAL - Denmark	ACY - USA	AHN - USA
AAM - South Africa	ADA - Turkey	AHO - Italy
AAR - Denmark	ADB - Turkey	AIA - USA
ABE - USA	ADD - Ethiopia	AJA - France
ABI - USA	ADE - Yemen	AJR - Sweden
ABJ - Ivory Coast	ADF - Turkey	AKL - New Zealand
ABQ - USA	ADL - Australia	AKN - USA
ABR - USA	ADQ - USA	ALA - Kazakhstan
ABV - Nigeria	ADU - Iran	ALB - USA
ABX - Australia	ADZ - Colombia	ALC - Spain
ABY - USA	AES - Norway	ALF - Norway
ABZ - Scotland	AEX - USA	ALG - Algeria
ACA - Mexico	AGA - Morocco	ALL - Italy
ACC - Ghana	AGH - Sweden	All airports - Current country
ACE - Canary Islands	AGP - Spain	ALO - USA
ACH - Switzerland	AGS - USA	ALS - USA
ACK - USA	AGT - Paraguay	ALW - USA
ACT - USA	AGU - Mexico	ALY - Egypt

Note: if you are importing Airport codes then you must match exact text. For example, for Algeria, it must have “AAE - Algeria”, that is, “AAE” space hyphen space “Algeria”.

Fuel consumption – Value (simply enter a value for ‘Value’)

Fuel consumption - Units

Previously used

B		Mt
BOE	cal	MWh
m3	cm3	t
kt	in3	10E6 m3
Mt	km3	PJ
t	m3	Lb
10E6 m3	Gg	1015 BTU
TJ	GWh	st
MBTU	g	TJ
KTOE	ImpG	105 BTU
	kg	1000US bbl oil
All units	KOE	MBTU
B	kt	10E3 m3
BOE	kWh	KTOE
10E9 m3	l	TOE
bbl	Lt	USG
BritG	MTOE	Wh

Fuel consumption - Type

NA	mod-expert
survey	mod-average
modeled	mod-first-val
mod-L-regr	

Fuel consumption – Source

2006 IPCC default
Academic source
Country-specific
Customs
Direct measurements
Energy balance
Engineering website
Expert judgement
Facility specific
ICAO
Industry report
Industry specific
International organisation
Invoice
Laboratory report
Modeled data
National fuel statistics
Organisational report
Sub-national statistics
Technical report
Technology report
Technology specific
UNFCCC
unknown

Fuel (type) (only a sample is shown)

Anthracite
Aviation Gasoline
B20
B5
Biodiesels
Biogasoline
Biogasoline (=biopetrol)
Bitumen API gravity <10
Bitumen
Blast Furnace Gas
Brown Coal Briquettes
Charcoal
CNG (compressed natural gas)
Coal Bed Methane
Coal Tar
Coke Oven Coke
Coke Oven Coke and Lignite Coke
Coke Oven Gas
Coking Coal
Condensate API gravity from 50 to 80
Crude Oil
Deep-cut extraction
Dry gas
E10
E3
E5
E85
Enhanced gas recovery
ETBE11
ETBE22
Ethane
ethanol
Gas Coke
Gas Works Gas
Gas/Diesel Oil
Gasoline
Heavy crude oil API gravity between 10 and 22
Heavy Diesel

Fuel density units

g/cm3	lb/UKG
g/l	lb/USG
kg/m3	ton/yd3

Value type

survey	mod-expert
modeled	mod-average
mod-L-regr	mod-first-val
mod-surrogate	

Appendix C: Data Dictionary

Following is a small subset of the data dictionary.

Attribute name	Required data format	Optional (O) or Mandatory	Attribute description	Entry type	Example of data entry
inv_code	string (text)	M	AD collection for a particular year	Fully user-defined	My_AD_2020
ipcc_category	string (text)	M	The IPCC category code as per the configuration table (must be the same syntax)	As per the *Category* menu in the entry form or from the *Category* table among the configuration tables	1.A.3.a.1
ipcc_suffix	string (text)	O	Extension of the category name that is not specified in the main IPCC category	Fully user-defined	mil *(for international military aviation in category 1.A.3.a.i)*
tier	integer	M	IPCC methodological tier (T1, T2, T3)	As per the *Tier* menu in the entry form (it's sufficient to enter the tier number)	1
aggregation	string (text)	M	Level of data aggregation (national, regional, etc.)	As per the *Aggregation* menu in the entry form or from the *Aggregations* table among the configuration tables	National
stat_quality	string (text)	M	Statistics quality (t is either well developed or not. If not well-developed, enter "unknown")	As per the *Statistics* quality menu	Unknown
fuel_name	string (text)	M	Name of fuel	As per the *Fuel* menu in the entry form or from the *Fuels* table among the configuration tables, column *Name*	Anthracite
fuel_name_local	string (text)	O	Additional, more name for the fuel, like "Texas oil" to provide fuel name specific for a region, oil field, etc.	Fully user-defined, max 30 characters	Texas oil
cal_type_name	string (text)	O	Calorific value type - GCV or NCV	Enter either GCV or NCV	NCV
airport_code	string (text)	M	3-letter airport code followed by the country name as: "*XXX - country name*" (do not forget to enter the spaces and the dash)	As per the *Airport code* menu in the entry form or from the *Airports* table among the configuration tables, columns *code* and *country*	AAE - Algeria
fuel_total_value	float	M	Total amount of fuel consumed	Fully user-defined	2500
fuel_total_units	string (text)	M	The units of measurement for fuel consumption (do not forget the space between the order of magnitude like 10E3 or 10E6 and the following unit symbol)	As per the *Units* menu options in the entry form or from the *Units* table among the configuration tables, column *symbol*	10E3 m3
fuel_total_issued_date	date	M	When the data has been published (or the website last viewed)	Please use format YYYY-MM-DD	2020-01-25
fuel_total_source	string (text)	M	The source type for the fuel value (e.g., energy balance, national fuel statistics, etc.)	As as listed in *Source* menu options in the entry form or from the *Institutions* table, column *name*	Direct measurements
fuel_total_reference	string (text)	M	A complete reference to the data source (e.g., website or the publication reference, or the report name) and any comments	Fully user-defined	https://www.stats.govt.nz/information-releases/new-zealand-energy-use-2018 These are provisional data, we will make corrections when the actual figures are available
fuel_total_type	string (text)	O	The type of data collection, e.g., survey, or modeled	Use one of the options listed in the *Type* menu in the entry form (with the exact syntax). If unknown, use NA	modeled
density_value	float	O	Fuel density value	If not known, SAGE will use the default value from the *Fuels* table among the configuration tables (column *density*).	870
density_units	string (text)	O	Measurement units for density	As per the *Units* menu options in the entry form or from the *Units* table among the configuration tables, column *symbol*	kg/m3
density_issued_date	date	O	When the data has been published (or the website last viewed)	Please use format YYYY-MM-DD	2020-01-25
density_source	string (text)	O	The source type for the density value (e.g., energy balance, national fuel statistics, etc.)	As as listed in *Source* menu options in the entry form or from the *Institutions* table among the configuration tables, column *name*	Direct measurements
density_reference	string (text)	O	The detailed reference source of density value and any relevant comments	Fully user-defined	www.engineeringtoolbox.com/liquids-densities-d_743.html
density_type	string (text)	O	The type of data collection, e.g., survey, or modeled	Use one of the options listed in the *Type* menu in the entry form (with the exact syntax). If unknown, use NA	survey
calorific_value	float	O	Calorific value	If not known, SAGE will use the default value from the *Fuels* table among the configuration tables (column *cal.value*).	44.3
calorific_units	string (text)	O	Measurement units for calorific value (also known as "heating value" in North America)	As per the *Units* menu options in the entry form or from the *Units* table, column *symbol*	TJ/Gg
calorific_issued_date	date	O	When the data has been published (or the website last viewed)	Please use format YYYY-MM-DD	2020-01-25

carbon_source	string (text)	O	The source type for the carbon content value (e.g., energy balance, national fuel statistics, etc.)	As listed in *Source* menu options in the entry form or from the *Institutions* table among the configuration tables, column *name*	Direct measurements
carbon_reference	string (text)	O	The detailed reference source of carbon value and any relevant comments	Fully user-defined	www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf
carbon_type	string (text)	O	The type of data collection, e.g., survey, or modeled	Use one of the options listed in the *Type* menu in the entry form (with the exact syntax). If unknown, use NA	survey
water_value	float	O	Fuel density value	If not known, SAGE will use the default value from the *Fuels* table (if configured for the fuel).	15
water_units	string (text)	O	The units of measurement for water content (usually given as % of water in the fuel)	Enter %	%
water_issued_date	date	O	When the data has been published (or the website last viewed)	Please use format YYYY-MM-DD	2020-01-25
water_source	string (text)	O	The source type for the water content value (e.g., energy balance, national fuel statistics, etc.)	As as listed in *Source* menu options in the entry form or from the *Institutions* table, column *Name*	Direct measurements
water_reference	string (text)	O	The detailed reference source of water value and any relevant comments	Fully user-defined	www.engineeringtoolbox.com/water-density-specific-weight-d_595.html
water_type	string (text)	O	The type of data collection, e.g., survey, or modeled	Use one of the options listed in the *Type* menu in the entry form (with the exact syntax). If unknown, use NA	survey
uncert_1_value	float	O	Uncertainty value	If not known for the amount of fuel combusted, SAGE will calculate the uncertainty using the relevant algorithm from the 2006 IPCC Guidelines. For all other values, we strongly recommend to enter uncertainty data.	5
uncert_1_units	string (text)	O	The units of measurement for uncertainty (usually %, but could be absolute units - the same as the actual measurement)	If not %, enter the unit as per the *Units* menu options in the entry form or from the *Units* table among the configuration tables, column *symbol*	%
uncert_1_issued_date	date	O	When the data has been published (or the website last viewed)	Please use format YYYY-MM-DD	2020-01-25
uncert_1_source	string (text)	O	The source type for the uncertainty value given as a single number (e.g., energy balance, national fuel statistics, etc.)	As as listed in *Source* menu options in the entry form or from the *Institutions* table among the configuration tables, column *name*	Direct measurements
uncert_1_reference	string (text)	O	The detailed reference source of uncertainty value and any relevant comments	Fully user-defined.	Industry Report XYZ
uncert_1_type	string (text)	O	The type of data collection, e.g., survey, or modeled	Use one of the options listed in the *Type* menu in the entry form (with the exact syntax). If unknown, use NA	survey
uncert_2_value	float	O	Fuel density value	Fully user-defined. There is no need to enter unbcertainty 2 value if uncertainty 1 is entered.	10
uncert_2_units	string (text)	O	The units of measurement for uncertainty (usually %, but could be absolute units - the same as the actual measurement)	If not %, enter the unit as per the *Units* menu options in the entry form or from the *Units* table among the configuration tables , column *symbol*	%
uncert_2_issued_date	date	O	When the data has been published (or the website last viewed)	Please use format YYYY-MM-DD	2020-01-25
uncert_2_source	string (text)	O	The source type for the uncertainty value given as a range or an asimmetric uncertainty (e.g., energy balance, national fuel statistics, etc.)	As as listed in *Source* menu options in the entry form or from the *Institutions* table among the configuration tables, column *name*	Direct measurements
uncert_2_reference	string (text)	O	The detailed reference source of uncertainty value and any relevant comments	Fully user-defined.	Industry Report XYZ
uncert_2_type	string (text)	O	The type of data collection, e.g., survey, or modeled	Use one of the options listed in the *Type* menu in the entry form (with the exact syntax). If unknown, use NA	modeled
fuel_mass	float	N/A	amount of fuel recalculated to kt in SAGE	N/A	N/A
energy	float	N/A	amount of fuel in energy units, calculated in SAGE	N/A	N/A
state	string (text)	N/A	State of the inventory (draft, reviewed, approved, published)	N/A	N/A
inv_issue_code	string (text)	M	Annual AD collection name and year	User entry	RA_National_2000
inv_year	integer	M	Year of the annual AD collection	User entry	2000
gcv_to_ncv	float	M	Conversion coefficient between gross and net calorific values (.95 or .9)	User entry	0.95

Appendix D: Mapping import information and data structure – Energy Sector

When in SAGE, Aircraft Types shows a list in the following format:

Airbus A300, A306, AB4
Airbus A300, A306, AB6
Airbus A300, A306, ABF
Airbus A300, A306, ABX
Airbus A300, A306, ABY
Airbus A300, A30B, AB3
Airbus A310, A310, 310
Airbus A310, A310, 312
Airbus A310, A310, 313
Airbus A310, A310, 31F
Airbus A310, A310, 31X
Airbus A310, A310, 31Y
Airbus A319, A318, 318
Airbus A319, A319, 319
Airbus A320, A320, 320
Airbus A320, A320, 32S
Airbus A321, A321, 321
Airbus A330-200, A330, 330
Airbus A330-200, A332, 332

(To get there, in SAGE, click ▶ at the top, 'Energy' on the left, 'AD Collections' in the body, Edit annual AD (on the left), at the top ensure it says '1.A Reference appr. data', to the right of that, click and select '1.A.3.a T3', click Add at the top, and look for '*Aircraft code:*' in the body of the page.)

Also, when setting up an import file, text in the format above is required.

The underlying data structure is presented in the table below (by going to SAGE, 'Configuration – Energy Sector', and selecting 'Aircrafts-civil').

id	plane class	generic type	ICAO	IATA	default fuel	fuel consumption (kg per LTO)	status	
							Any	
162	Large Commercial Aircraft	Airbus A300	A30B	AB3	Jet Kerosene	1720	enabled	✕
163	Large Commercial Aircraft	Airbus A300	A306	AB4	Jet Kerosene	1720	enabled	✕
164	Large Commercial Aircraft	Airbus A300	A306	AB6	Jet Kerosene	1720	enabled	✕
165	Large Commercial Aircraft	Airbus A300	A306	ABF	Jet Kerosene	1720	enabled	✕
166	Large Commercial Aircraft	Airbus A300	A306	ABX	Jet Kerosene	1720	enabled	✕
167	Large Commercial Aircraft	Airbus A300	A306	ABY	Jet Kerosene	1720	enabled	✕
168	Large Commercial Aircraft	Airbus A310	A310	310	Jet Kerosene	1510	enabled	✕
169	Large Commercial Aircraft	Airbus A310	A310	312	Jet Kerosene	1510	enabled	✕
170	Large Commercial Aircraft	Airbus A310	A310	313	Jet Kerosene	1510	enabled	✕
171	Large Commercial Aircraft	Airbus A310	A310	31F	Jet Kerosene	1510	enabled	✕
172	Large Commercial Aircraft	Airbus A310	A310	31X	Jet Kerosene	1510	enabled	✕
173	Large Commercial Aircraft	Airbus A310	A310	31Y	Jet Kerosene	1510	enabled	✕
174	Large Commercial Aircraft	Airbus A319	A319	319	Jet Kerosene	730	enabled	✕
175	Large Commercial Aircraft	Airbus A319	A318	318	Jet Kerosene	730	enabled	✕
176	Large Commercial Aircraft	Airbus A320	A320	320	Jet Kerosene	770	enabled	✕
177	Large Commercial Aircraft	Airbus A320	A320	32S	Jet Kerosene	770	enabled	✕
178	Large Commercial Aircraft	Airbus A321	A321	321	Jet Kerosene	960	enabled	✕
179	Large Commercial Aircraft	Airbus A330-200	A330	330	Jet Kerosene	2230	enabled	✕
180	Large Commercial Aircraft	Airbus A330-200	A332	332	Jet Kerosene	2230	enabled	✕
181	Large Commercial Aircraft	Airbus A330-300	A330	330	Jet Kerosene	2230	enabled	✕
182	Large Commercial Aircraft	Airbus A330-300	A333	333	Jet Kerosene	2230	enabled	✕
183	Large Commercial Aircraft	Airbus A340-200	A342	342	Jet Kerosene	1860	enabled	✕
184	Large Commercial Aircraft	Airbus A340-300	A340	340	Jet Kerosene	2020	enabled	✕
185	Large Commercial Aircraft	Airbus A340-300	A343	343	Jet Kerosene	2020	enabled	✕
186	Large Commercial Aircraft	Airbus A340-500	A345	345	Jet Kerosene	3370	enabled	✕
187	Large Commercial Aircraft	Airbus A340-600	A346	346	Jet Kerosene	3370	enabled	✕
188	Large Commercial Aircraft	Boeing 707	B703	703	Jet Kerosene	1860	enabled	✕
189	Large Commercial Aircraft	Boeing 707	B703	707	Jet Kerosene	1860	enabled	✕
190	Large Commercial Aircraft	Boeing 707	B703	70F	Jet Kerosene	1860	enabled	✕
191	Large Commercial Aircraft	Boeing 707	B703	70M	Jet Kerosene	1860	enabled	✕

Appendix E: Mapping import information and data structure – IPPU Sector

When in SAGE, Lime type shows a list in the following format:

Dolomitic lime large-scale production
Dolomitic lime small-scale production
High-calcium lime
Hydraulic lime

To get there, in SAGE, click ▶ at the top, 'IPPU' on the left, 'AD Collections' in the body, Edit annual AD (on the left), at the top click tab '2.A', choose '2.A.2 T1' from the popup list, click Add at the top, and look for '*Lime type:*' in the body of the page.

Also, when setting up an import file, text in the format above is required.

		id	name ↑	stoichiometric ratio	CaO range	CaO fract.	MgO range	MgO fract.	CaO-MgO fract.	status	
										Any	
☐	✎	3	Dolomitic lime L-Prod	0.913	55-57	56	38-41	39.5	0.95	enabled	✕
☐	✎	4	Dolomitic lime S-Prod	0.913	55-57	56	38-41	39.5	0.85	enabled	✕
☐	✎	2	High-calcium lime	0.785	93-98	96	0.3-2.5	1.4	0.95	enabled	✕
☐	✎	5	Hydraulic lime	0.785	65-92	79		0	0.75	enabled	✕

Appendix F: Mapping import information and data structure – Waste Sector

When in SAGE, the discharge pathways show a list in the following format:

Constructed wetlands
Horizontal subsurface flow
Hybrid type
Semi-natural treatment wetlands
Surface flow
Vertical subsurface flow

Other
None
Other

Treated
Aerobic treatment plant
Aerobic treatment plant, overloaded
Anaerobic deep lagoon
Anaerobic digester for sludge
Centralized, aerobic treatment plant, overloaded
Latrine, dry climate, low water
Latrine, dry climate, low water, large commune
Latrine, regular removal
Latrine, wet climate
Septic system

Untreated
Flowing sewer (open or closed)
Sea, river and lake discharge
Stagnant sewer

To get there, in SAGE, click ▶ at the top, 'Waste' on the left, 'AD Collections' in the body, Edit annual AD (on the left), at the top click tab '4.D', choose '4.D.1 T1,2' from the popup list, click Add at the top, and look for '*Discharge pathway:*' in the body of the page.

Also, when setting up an import file, text in the format above is required.

The underlying data structure is presented in the table below (by going to SAGE, 'Configuration – Waste Sector', and selecting '4.D', '+', and then 'CH4'on the left).

		id	year	ipcc ↑	aggregation	discharge system	pathway type	MFC	source	max CH4 prod. capacity	
					Any						
☐	✎	2		4.D.1	National	Constructed wetlands	Vertical subsurface flow	0.0100	2006 IPCC default	0.6000	✕
☐	✎	3		4.D.1	National	Treated	Centralized, aerobic treatment plant	0.0000	2006 IPCC default	0.6000	✕
☐	✎	4		4.D.1	National	Treated	Anaerobic deep lagoon	0.8000	2006 IPCC default	0.6000	✕
☐	✎	5		4.D.1	National	Treated	Anaerobic reactor	0.8000	2006 IPCC default	0.6000	✕
☐	✎	6		4.D.1	National	Treated	Anaerobic digester for sludge	0.8000	2006 IPCC default	0.6000	✕
☐	✎	7		4.D.1	National	Treated	Septic system	0.5000	2006 IPCC default	0.6000	✕
☐	✎	8		4.D.1	National	Treated	Latrine, dry climate, low water	0.1000	2006 IPCC default	0.6000	✕
☐	✎	9		4.D.1	National	Treated	Latrine, dry climate, low water, large commune	0.5000	2006 IPCC default	0.6000	✕
☐	✎	10		4.D.1	National	Treated	Latrine, wet climate	0.7000	2006 IPCC default	0.6000	✕
☐	✎	11		4.D.1	National	Treated	Latrine, regular removal	0.1000	2006 IPCC default	0.6000	✕
☐	✎	12		4.D.1	National	Constructed wetlands	Horizontal subsurface flow	0.1000	2006 IPCC default	0.6000	✕
☐	✎	13		4.D.1	National	Constructed wetlands	Semi-natural treatment wetlands	0.4000	2006 IPCC default	0.6000	✕
☐	✎	14		4.D.1	National	Constructed wetlands	Hybrid type	0.2000	2006 IPCC default	0.6000	✕
☐	✎	15		4.D.1	National	Constructed wetlands	Surface flow	0.4000	2006 IPCC default	0.6000	✕
☐	✎	16		4.D.1	National	Untreated	Sea, river and lake discharge	0.1000	2006 IPCC default	0.6000	✕
☐	✎	17		4.D.1	National	Treated	Anaerobic shallow lagoon	0.2000	2006 IPCC default	0.6000	✕
☐	✎	27		4.D.1		Untreated	Flowing sewer (open or closed)	0.0000	2006 IPCC default	0.6000	✕
☐	✎	28		4.D.1		Untreated	Stagnant sewer	0.5000	2006 IPCC default	0.6000	✕
☐	✎	1		4.D.2	National	Treated	Anaerobic shallow lagoon	0.2000	2006 IPCC default	0.2500	✕
☐	✎	18		4.D.2	National	Constructed wetlands	Vertical subsurface flow	0.0100	2006 IPCC default	0.2500	✕
☐	✎	19		4.D.2	National	Treated	Centralized, aerobic treatment plant	0.0000	2006 IPCC default	0.2500	✕
☐	✎	20		4.D.2	National	Treated	Anaerobic deep lagoon	0.8000	2006 IPCC default	0.2500	✕
☐	✎	21		4.D.2	National	Treated	Anaerobic reactor	0.8000	2006 IPCC default	0.2500	✕
☐	✎	22		4.D.2	National	Treated	Anaerobic digester for sludge	0.8000	2006 IPCC default	0.2500	✕
☐	✎	23		4.D.2	National	Constructed wetlands	Horizontal subsurface flow	0.1000	2006 IPCC default	0.2500	✕
☐	✎	24		4.D.2	National	Constructed wetlands	Semi-natural treatment wetlands	0.4000	2006 IPCC default	0.2500	✕
☐	✎	25		4.D.2	National	Constructed wetlands	Hybrid type	0.2000	2006 IPCC default	0.2500	✕
☐	✎	26		4.D.2	National	Constructed wetlands	Surface flow	0.4000	2006 IPCC default	0.2500	✕

Appendix G: Example of Data Categories presentation in SAGE (the energy sector)

- 1
  - 1.A Fuel Combustion Activities
    - 1.A.1 Energy Industries
      - 1.A.1.a Main Activity Electricity and Heat Production
        - 1.A.1.a.i Electricity Generation
        - 1.A.1.a.ii Combined Heat and Power Generation (CHP)
        - 1.A.1.a.iii Heat Plants
      - 1.A.1.b Petroleum Refining
      - 1.A.1.c Manufacture of Solid Fuels and Other Energy Industries
        - 1.A.1.c.i Manufacture of Solid Fuels
        - 1.A.1.c.ii Other Energy Industries
    - 1.A.2 Manufacturing Industries and Construction
      - 1.A.2.a Iron and Steel
      - 1.A.2.b Non-Ferrous Metals
      - 1.A.2.c Chemicals
      - 1.A.2.d Pulp, Paper and Print
      - 1.A.2.e Food Processing, Beverages and Tobacco
      - 1.A.2.f Non-Metallic Minerals
      - 1.A.2.g Transport Equipment
      - 1.A.2.h Machinery
      - 1.A.2.i Mining (exduding fuels) and Quarrying
      - 1.A.2.j Wood and wood products
      - 1.A.2.k Construction
      - 1.A.2.l Textile and Leather
      - 1.A.2.m Non-specified Industry
    - 1.A.3 Transport
      - 1.A.3.a Civil Aviation
        - 1.A.3.a.i International Aviation (International Bunkers)
        - 1.A.3.a.i/mil International Aviation (International Bunkers) Mil
        - 1.A.3.a.ii Domestic Aviation
      - 1.A.3.b Road Transportation
        - 1.A.3.b.i Cars
          - 1.A.3.b.i.1 Passenger cars with 3-way catalysts
          - 1.A.3.b.i.2 Passenger cars without 3-way catalysts
        - 1.A.3.b.ii Light-duty trucks
        - 1.A.3.b.iii Heavy-duty trucks and buses
        - 1.A.3.b.iv Motorcydes
        - 1.A.3.b.v Evaporative emissions from vehides
        - 1.A.3.b.vi Urea-based catalysts
      - 1.A.3.c Railways
      - 1.A.3.d Water-borne Navigation
        - 1.A.3.d.i International water-borne navigation
        - 1.A.3.d.ii Domestic Water-borne Navigation
      - 1.A.3.e Other Transportation
        - 1.A.3.e.i Pipeline Transport
        - 1.A.3.e.ii Off-road
    - 1.A.4 Other Sectors
      - 1.A.4.a Commercial/Institutional
      - 1.A.4.b Residential
      - 1.A.4.c Agriculture/Forestry/Fishing/Fish Farms
    - 1.A.5 Non-Specified
      - 1.A.5.a Stationary
      - 1.A.5.b Mobile
        - 1.A.5.b.i Mobile (aviation component)
        - 1.A.5.b.ii Mobile (water-borne component)
        - 1.A.5.b.iii Mobile (Other)
      - 1.A.5.c Multilateral Operations
  - 1.B Fugitive emissions from fuels
    - 1.B.1 Solid Fuels
      - 1.B.1.a Coal mining and handling
        - 1.B.1.a.i Underground mines
          - 1.B.1.a.i.1 Mining
          - 1.B.1.a.i.2 Post-mining seam gas emissions
          - 1.B.1.a.i.3 Abandoned underground mines
          - 1.B.1.a.i.4 Flaring of drained methane or conversion of methane to CO2
        - 1.B.1.a.ii Surface mines
          - 1.B.1.a.ii.1 Mining
          - 1.B.1.a.ii.2 Post-mining seam gas emissions
      - 1.B.1.b Uncontrolled combustion and burning coal dumps
    - 1.B.2 Oil and Natural Gas
      - 1.B.2.a Oil
        - 1.B.2.a.i Venting
        - 1.B.2.a.ii Flaring
        - 1.B.2.a.iii All Other
          - 1.B.2.a.iii.1 Exploration
          - 1.B.2.a.iii.2 Production and Upgrading
          - 1.B.2.a.iii.3 Transport
          - 1.B.2.a.iii.4 Refining
          - 1.B.2.a.iii.5 Distribution of oil products
          - 1.B.2.a.iii.6 Other
      - 1.B.2.b Natural Gas
        - 1.B.2.b.i Venting
        - 1.B.2.b.ii Flaring
        - 1.B.2.b.iii All Other
          - 1.B.2.b.iii.1 Exploration
          - 1.B.2.b.iii.2 Production
          - 1.B.2.b.iii.3 Processing
          - 1.B.2.b.iii.4 Transmission and Storage
          - 1.B.2.b.iii.5 Distribution
          - 1.B.2.b.iii.6 Other
    - 1.B.3 Other emissions from Energy Production
  - 1.C Carbon dioxide Transport and Storage
    - 1.C.1 Transport of CO2
      - 1.C.1.a Pipelines
      - 1.C.1.b Ships
      - 1.C.1.c Other (please specify)
    - 1.C.2 Injection and Storage
      - 1.C.2.a Injection
      - 1.C.2.b Storage
    - 1.C.3 Other

Appendix H: Fuels

Anthracite	LNG (liquified natural gas)
Aviation Gasoline	LNG/CNG/API gravity 77 - 92
B20	Lubricants
B5	Medium crude oil/API gravity between 22 and 31
Biodiesels	methanol
Biogasoline	Middle distillate/gasoil (for transportation)
Biogasoline (=biopetrol)	Motor gasoline/(petrol) - oil product
Bitumen	Motor Gasoline
Bitumen/API gravity <10	Municipal Wastes (biomass fraction)
Blast Furnace Gas	Municipal Wastes (non-biomass fraction)
Brown Coal Briquettes	Naphtha
Charcoal	Natural Gas
CNG (compressed natural gas)	Natural Gas Liquids (NGLs)
Coal Bed Methane	Oil Shale and Tar Sands
Coal Tar	Orimulsion
Coke Oven Coke	Other Biogas
Coke Oven Coke and Lignite Coke	Other Bituminous Coal
Coke Oven Gas	Other Kerosene
Coking Coal	Other Liquid Biofuels
Condensate/API gravity from 50 to 80	Other Petroleum Products
Crude Oil	Other Primary Solid Biomass
Deep-cut extraction	Oxygen Steel Furnace Gas
Dry gas	Patent Fuel
E10	Peat
E3	Petroleum Coke
E5	Racing fuels
E85	Refinery Feedstocks
Enhanced gas recovery	Refinery Gas
ETBE11	Residual Fuel Oil
ETBE22	Shale Oil
Ethane	Sludge Gas
ethanol	Sour Crude Oil/API gravity approx. 30
Gas Coke	Sour gas plants
Gas Works Gas	Sub-Bituminous Coal
Gas/Diesel Oil	Sulphite Lyes (Black Liquor)
Gasoline	Sweet Crude Oil/API gravity approx. 30
Heavy crude oil/API gravity between 10 and 22	Sweet gas plants
Heavy Diesel	Sweet light crude oil/API gravity >35
Industrial Wastes	Synthetic crude oil/API gravity approx. 30
Jet fuel	Thermal oil/API gravity 31.5
Jet Gasoline	Total Crude Oil/API gravity approx. 30
Jet Kerosene	Total natural gas
Landfill Gas	Very Light Oil/API gravity >35
Light crude oil/API gravity between 31 and 35	Waste Oils
Light Diesel	Waxes
Lignite	White Spirit & SBP
Liquefied Petroleum Gases	Wood/Wood Waste

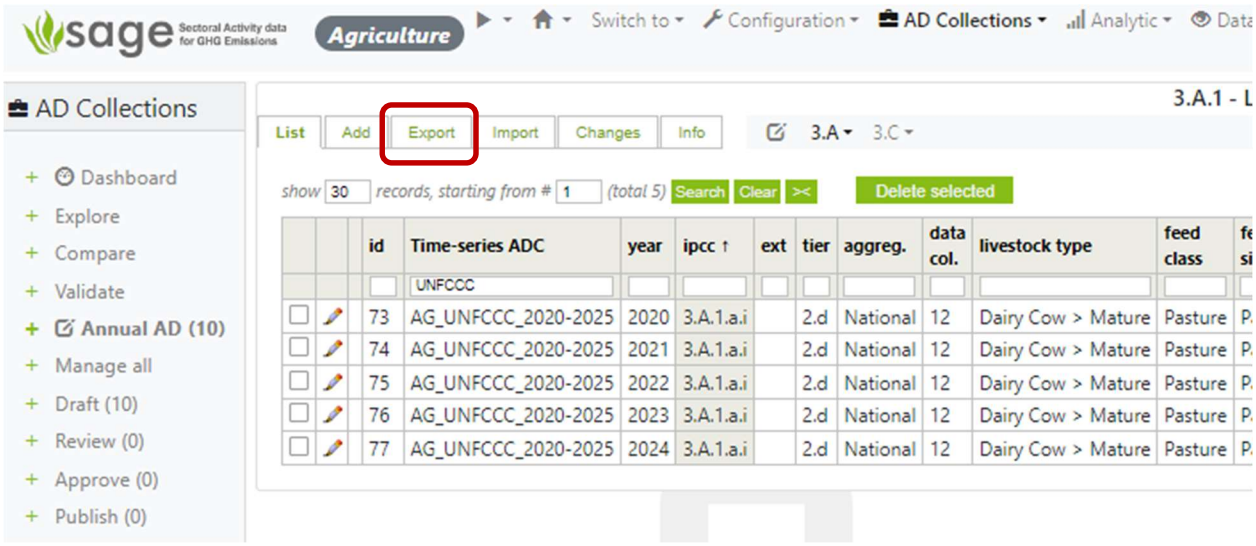
Appendix I: Fuel Categories

All
Biofuels
Biomass
Gas
Gas biomass
Gaseous Fossil
Gaseous fossil.type and origin
Liquid
Liquid biomass
Liquid Fossil.Primary Fuels
Liquid Fossil.Secondary Fuels
Liquid fossil.type and origin
Natural gas
Other
Other biomass
Other fossil fuels
Other gas
Other liquid
Other non-fossil fuels
Other solid
Peat
Solid
Solid biomass
Solid Fossil.Primary Fuels
Solid Fossil.Secondary Fuels

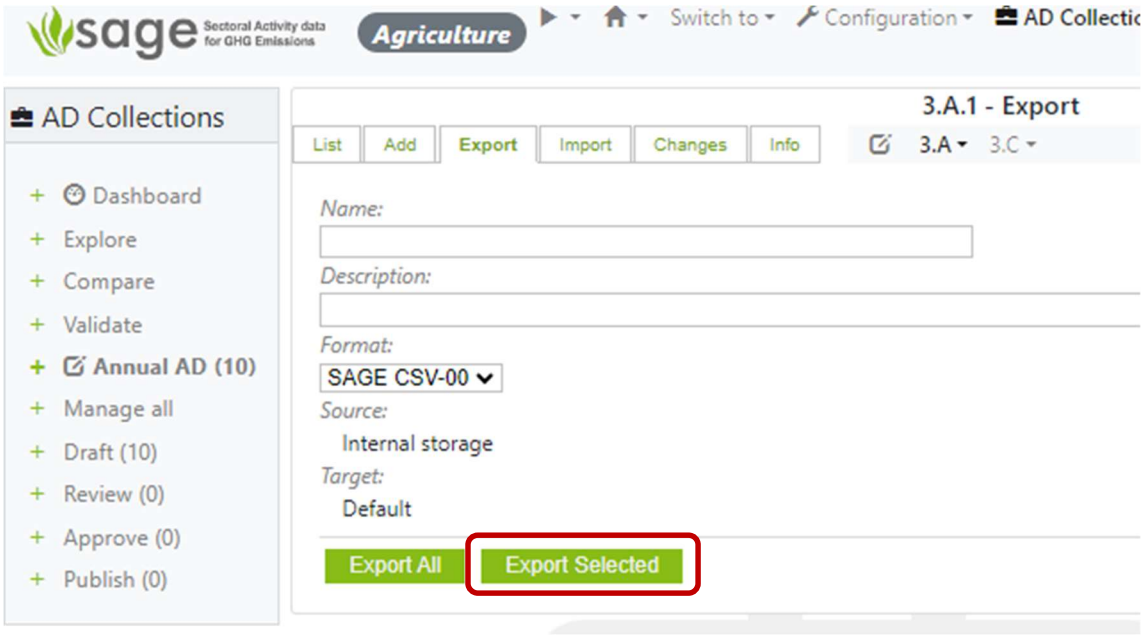
Appendix J: Export from SAGE

1. Using the EXPORT options SAGE:
    a. Exporting an individual record(s) (It's the same procedure for AD Collections, records within collections, and the records from the Configuration layer)

- Go to "List" page
- Filter a record (or a group of records) using the list page facilities
- Click EXPORT button above the list table
  (all records from the Ag_UNFCCC_2020-2025 collection are now filtered out)

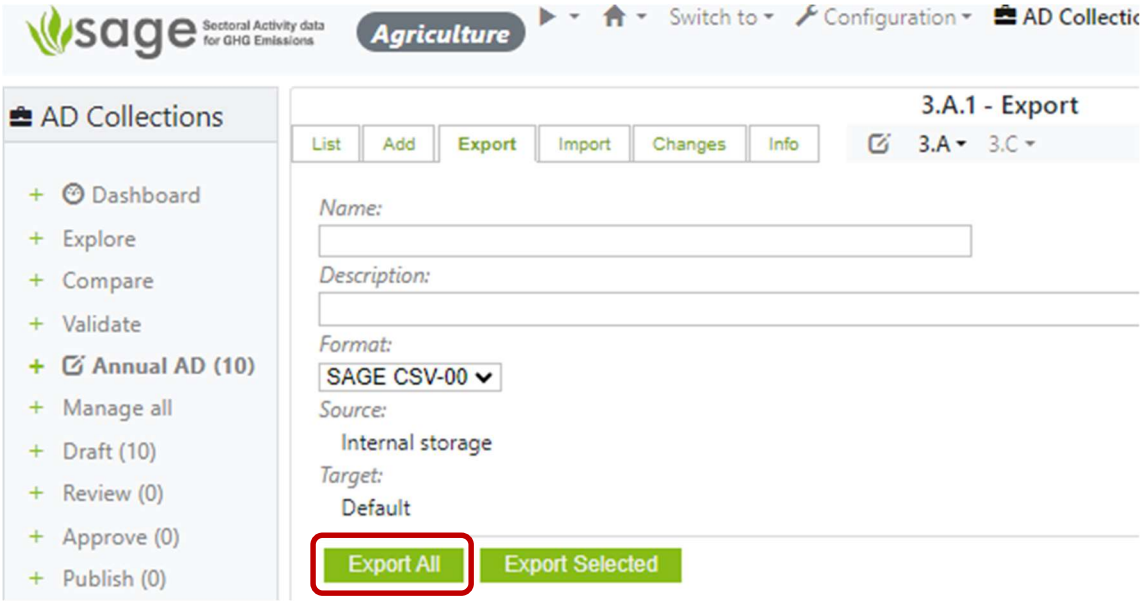


Click "Export Selected"



b. Exporting the entire set of records

Export → Export ALL



2. Alternatively:
    - select a block of data or a table on the screen,
    - Use Copy + Paste from nearly every screen – this works not only for the data sets but also the entire tables from the screen