

Methodology for calculating harmonised risk indicators for pesticides under Directive 2009/128/EC

2021 edition



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calculating harmonised
risk indicators for
pesticides under
Directive 2009/128/EC** | **2021 edition**

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1

Introduction

1.1. Background

The Harmonised Risk Indicators for pesticides (HRIs) are used by the European Commission for monitoring trends in risk reduction from pesticide use at European Union level. They can also be used by Member States for monitoring trends in risk reduction from pesticide use at country level.

1.2. Legal basis of the Indicators

Article 15(4) of Directive 2009/128/EC requires the European Commission to calculate risk indicators at Union level using statistical data collected in accordance with Union legislation concerning statistics on plant protection products and other relevant data, in order to estimate trends in risks from pesticide use. Member States are also obliged to calculate the Harmonised Risk Indicators (Article 15(2) of the Directive). The first Harmonised Risk Indicators were introduced through amendment C(2019)3580⁽¹⁾.

The Harmonised Risk Indicator 1 (HRI1)

The Harmonised Risk Indicator 1 is calculated by combining the statistics on the quantities of pesticide active substances placed on the market in accordance with Regulation (EC) No 1185/2009⁽²⁾ and the information on active substances in accordance with Regulation (EC) No 1107/2009⁽³⁾, including if they are low risk active substances, candidates for substitution, or other active substances.

⁽¹⁾ Commission Directive (EU) 2019/782 of 15 May 2019 amending Directive 2009/128/EC of the European Parliament and of the Council as regards the establishment of harmonised risk indicators <http://data.europa.eu/eli/dir/2019/782/oj>

⁽²⁾ Regulation (EC) No 1185/2009 of the European Parliament and of the Council of 25 November 2009 concerning statistics on pesticides <http://data.europa.eu/eli/reg/2009/1185/oj>

⁽³⁾ Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC <http://data.europa.eu/eli/reg/2009/1107/oj>

The Harmonised Risk Indicator 2 (HRI2)

The Harmonised Risk Indicator 2 is calculated based on the number of authorisations granted under Article 8(4) of Council Directive 91/414/EEC⁽⁴⁾ and Article 53 of Regulation (EC) No 1107/2009, and the categorisation of active substances in accordance with Regulation (EC) No 1107/2009, including if they are low risk active substances, candidates for substitution, or other active substances.

1.3. Purpose of this document and disclaimer

This document has been developed by the Commission services in consultation with Member States. It is intended to provide information to Member States to assist them in meeting their obligations under Article 15(2) of Directive 2009/128/EC⁽⁵⁾. It has not been adopted or endorsed by the European Commission. Any views expressed are the views of the authors and may not in any circumstances be regarded as stating either a preliminary or an official position of the Commission or its services.

The results of calculations of the Harmonised Risk Indicators that are presented in this document are examples that are intended for explanatory purposes only.

⁽⁴⁾ Council Directive 91/414/EEC of 15 July 1991 concerning the placing of plant protection products on the market <http://data.europa.eu/eli/dir/1991/414/oj>

⁽⁵⁾ Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides <http://data.europa.eu/eli/dir/2009/128/oj>

2 | Overview

2.1. General information

Harmonised Risk Indicators are built from information regarding pesticide active substances in the EU as of reference year 2011. 'Pesticides' and 'Active substances' in this document are as defined in Article 2(2) of Regulation (EC) No 1107/2009.

2.1.1. Reference area

The Indicators shall be calculated by the countries for their national territory (NUTS0) and by the European Commission for the whole EU.

2.1.2. Reference period

The reference period shall be calendar year.

2.2. Categorisation of active substances: Groups and Categories

All active substances are categorised into a Group and a Category (Table 1). There are three Groups for approved active substances, Groups 1–3, and six Categories, Categories A–F. All non-approved active substances are placed in Group 4, Category G. Weightings are defined for the Groups, under Directive 2009/128/EC (Annex I).

Table 1. Categorisation of active substances and weightings for the purpose of calculating Harmonised Risk Indicators 1 and 2

Row	Groups						
	1	2	3	4			
(i)	Low-risk active substances which are approved or deemed to be approved under Article 22 of Regulation (EC) No 1107/2009, and which are listed in Part D of the Annex to Regulation (EU) No 540/2011	Active substances approved or deemed to be approved under Regulation (EC) No 1107/2009, and not falling in other categories, and which are listed in Parts A and B of the Annex to Regulation (EU) No 540/2011	Active substances approved or deemed to be approved under Article 24 of Regulation (EC) No 1107/2009, which are candidates for substitution, and which are listed in Part E of the Annex to Regulation (EU) No 540/2011	Active substances which are not approved under Regulation (EC) No 1107/2009, and therefore which are not listed in the Annex to Regulation (EU) No 540/2011			
(ii)	Categories						
(iii)	A	B	C	D	E	F	G
(iv)	Micro-organisms	Chemical active substances	Micro-organisms	Chemical active substances	Which are not classified as: Carcinogenic Category 1A or 1B and/or Toxic for Reproduction Category 1A or 1B and/or Endocrine disruptors	Which are classified as: Carcinogenic Category 1A or 1B and/or Toxic for Reproduction Category 1A or 1B and/or Endocrine disruptors, where exposure of humans is negligible	
(v)	Weightings applicable to quantities of active substances placed on the market in products authorised under Regulation (EC) No 1107/2009						
(vi)	1		8		16		64

eurostat 

The categorisation of active substances will be updated by the European Commission annually to take into account *inter alia* new approvals, re-approvals resulting in a change in Group/Category, non-approvals and withdrawals. The European Commission will communicate updates of the categorisation to the Member States. If an active substance changes Group/Category, it shall be placed in its new Group/Category for the entire period of calculating the Harmonised Risk Indicators. This means that the time series of the HRI1 and HRI2, including the development of the Groups and Categories, may need to be recalculated each year. (See further in the section 7).

Box 1. Examples of changes of Group/Category

- (1) In reference year 2016, active substance AA01_01_0X is categorised as Group 2, Category D. The active substance is re-approved on 1 September 2017, as a low-risk active substance. Therefore, in reference year 2018, it is re-categorised as Group 1, Category B. Indicators 1 and 2 for the reference years 2011–2018 will be re-calculated, placing the quantity of active substance placed on the market/the number of emergency authorisations of AA01_01_0X into Group 1, Category B.
- (2) In reference year 2016, active substance AA01_01_0X is classified as Group 3, Category F. The active substance is non-approved, or the approval for the active substance expires, i.e. there is no formal vote/decision on non-approval on 1 September 2017. There is a grace period of 18 months, up to 1 March 2019, for the disposal, storage, placing on the market and use of existing stocks in line with Article 46 of Regulation (EC) No 1107/2009. Therefore, from 2020 onwards, the active substance will be classified as Group 4, Category G. Indicators 1 and 2 for the reference years 2011–2020 will then be recalculated, placing

the quantity of active substance placed on the market/the number of emergency authorisations of AA01_01_0X into Group 4, Category G. If, as part of the non-approval decision, the grace period for the disposal, storage, placing on the market and use of existing stocks was reduced, e.g. to 12 months from 1 September 2017, then, the active substance would be classified as Group 4, Category G from 2019 onwards.

2.3. Categorisation of emergency authorisations

The plant protection products authorised under Article 8(4) of Council Directive 91/414/EEC and Article 53 of Regulation (EC) No 1107/2009 may contain multiple active substances. For the purpose of calculating HRI2, each authorisation shall be categorised in the Group/Category of its highest ranking active substance (Table 2).

Table 2. Examples of categorisation of emergency authorisations

Authorisation year	Active substances	(Group;Category)	Active substance to be considered
2017	F99_16_01	(2;D)	F04_01_04
	F04_01_04	(3;E)	
2015	I01_01_03	(2;D)	I01_01_03 OR I99_08_01
	I99_08_01	(2;D)	
2014	I99_15_01	(4;G)	I99_15_01
	I99_99_10	(2;D)	
	M01_01_01	(1;B)	

3

Harmonised Risk Indicator 1

3.1. Introduction

The first Indicator, Harmonised Risk Indicator 1 (HRI1), is based on the total quantities (kg) of active substances placed on the market in the EU or in a Member State during a reference period as reported under Regulation (EC) No 1185/2009. The HRI1 is presented as an index. The reference years concerned are from 2011 until the last available reference year. HRI1 shall be calculated by multiplying the annual quantities of active substances placed on the market for each Group in Table 1 by the relevant weighting set out in Row (vi), followed by the aggregation of the results of these calculations.

The European Commission (Eurostat) will provide the calculations for the EU based on the annual sales of active substances collected from countries. The quantities of active substances placed on the market for each Group and Category in Table 1 may be calculated, and presented as an index. Countries shall calculate their own HRI1, or accept the country HRI1 as calculated by Eurostat as described in Chapter 5.1.

Eurostat has produced a tool for calculating the HRI1 (Annex II). The tool is an Excel workbook with macros. **The tool can only be used in Excel.** The description of how to use this tool is in section 3.2. Countries can import their data on active substances into the tool, and produce and validate their HRI1 calculation.

Countries can also use other tools developed by themselves for these calculations. Section 3.3 provides a detailed description of the calculations to perform.

3.2. Use of Eurostat tool for calculating HRI1 based on sales of active substances

Step 1. Structure of the data to be imported

The data to be imported in the tool must be structured in a specific way, for the tool to work. The columns of data must be separated by 'tab'. Columns cannot be separated by comma, semi-colon, colon, etc. Eurostat recommends to prepare the data in Excel, and save the final file as '.txt'.

Please note that during each import of data, the previous data already imported will be overwritten. This is done to avoid any mistakes or duplications when loading data. Therefore, please import each time **a single file with all data from 2011 until the reference year in question.**

The file must contain the following columns, which are obligatory for the tool (Table 3):

Table 3. Structure to follow for uploading data in HRI1 Excel tool

time	geo	pesticides	obs_value



- The column 'time' shall contain the reference years of the data. Only numbers are allowed (e.g. 2015, 2016, 2017, etc.).
- The column 'geo' shall contain the country codes, using the format set by Eurostat⁽⁶⁾. The country codes must be in capital letters.
- The column 'pesticides' shall contain the Eurostat codes of the active substances as defined in Annex III of Regulation (EC) No 1185/2009. No names of active substances or other codes can be used.
- The column 'obs_value' shall contain the kg of active substances (**not in tonnes, not in colony-forming units (cfu)**) placed on the market in the reference year. Only numbers are allowed, if necessary with a decimal point '.' (not comma ','). If there are other characters or letters in this column, the value will be considered as 0.

The order of the columns is not important, and the titles can be in capital letters or in lower case, or mixed.

Box 2. Example of correctly structured data set for HRI1 tool, separated by 'tab'

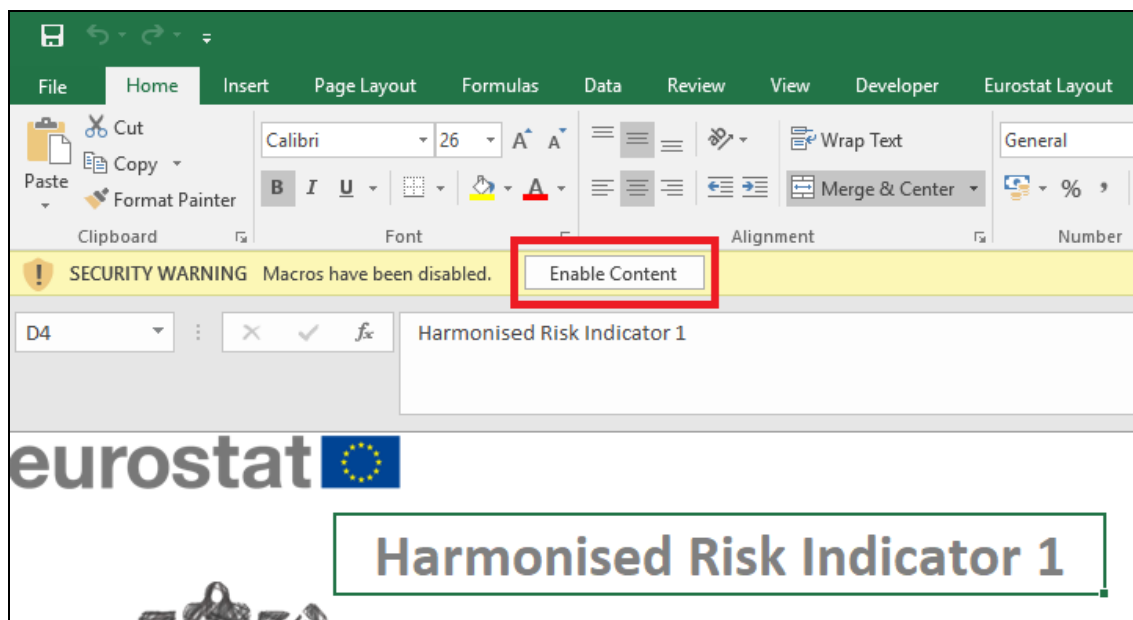
time	geo	pesticides	obs_value
2013	FR	F01_01_01	200
2014	DE	I99_99_99	76
2015	IE	M01_01_01	248

⁽⁶⁾ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Country_codes

Step 2. Import the data in the HRI1 Excel tool

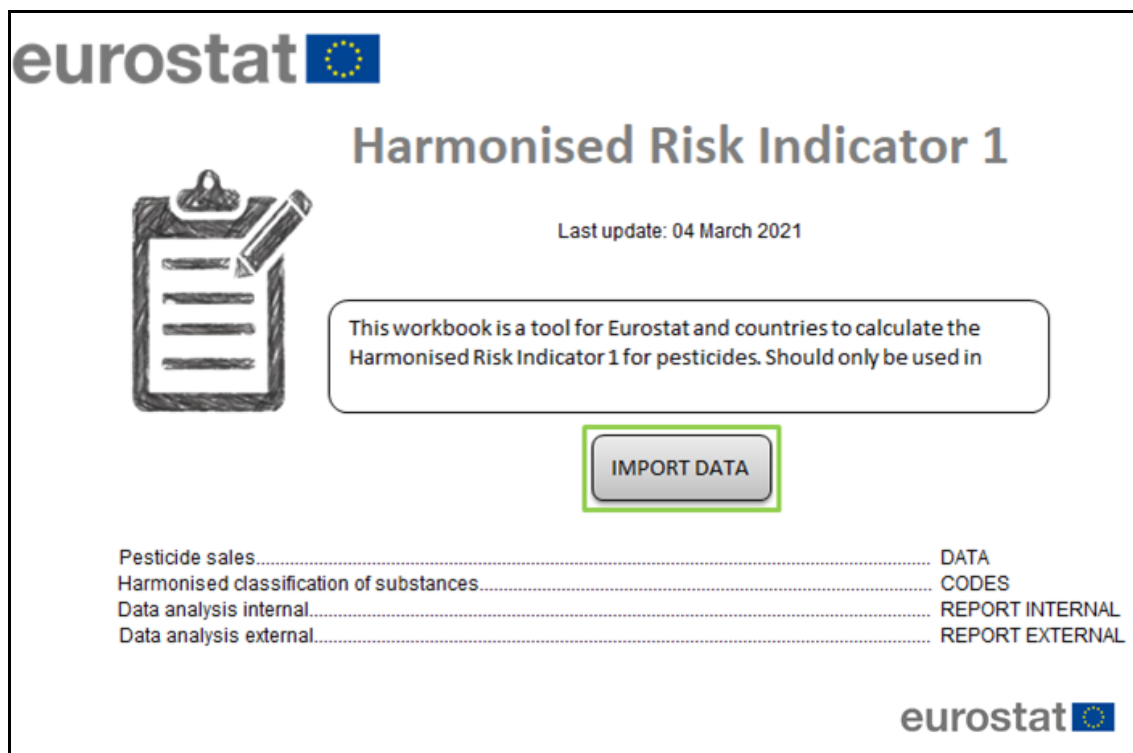
Open the HRI1 Excel tool and start by pressing 'Enable Content' button (Figure 1) to allow the use of the macros.

Figure 1. Screenshot highlighting the 'Enable Content' button



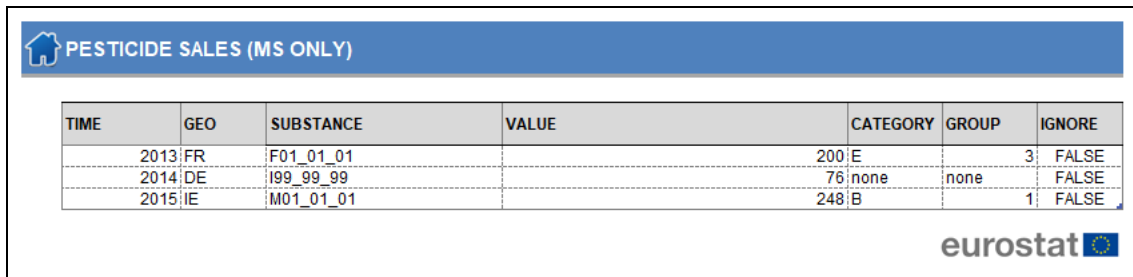
Press the 'IMPORT DATA' button (Figure 2) and choose the tab-separated file you have saved.

Figure 2. Screenshot highlighting the 'Import data' button



If the file has been correctly imported, you can see the data on the second sheet in the HRI1 Excel tool, called 'DATA'. The example in Figure 3 shows the result of importing the example file shown in Box 2 above under Step 1.

Figure 3. Screenshot showing the result of importing the data shown in Box 2



TIME	GEO	SUBSTANCE	VALUE	CATEGORY	GROUP	IGNORE	
2013	FR	F01_01_01		200	E	3	FALSE
2014	DE	I99_99_99		76	none	none	FALSE
2015	IE	M01_01_01		248	B	1	FALSE

Here the data are shown together with the Category and Group to which they belong, for calculating the HRI1.

All Eurostat active substance codes which are mixtures, such as the I99_99_99 'OTHER INSECTICIDES-ACARICIDES' shown in the example, do not belong to a Category or Group and will not be taken into account in the calculation. In this case, the Category/Group will show as 'none'.

If your dataset contains Eurostat aggregates such as F01, F01_01, etc., they will also not be taken into account for the calculation of the Indicator. In this case, the Category/Group will be empty. HRI1 is calculated based on active substances without aggregating to chemical classes or similar.

To avoid that data reported in cfu, and not in kg, distort the calculations, Eurostat has put in place a function to ignore values related to micro-biological substances (active substances from the chemical classes **F06_01**, **I05_01**, **ZR03_02**) above 100 000 000 kg. Experience shows that this excludes all suspicious values from the first years of the data collection, when some countries still reported certain micro-biological active substances in cfu. If a value is ignored for the purpose of the calculation, it will show on the second sheet, 'DATA', in the column 'IGNORE' as 'TRUE'. If the value will not be ignored, the column 'IGNORE' displays 'FALSE'.

The third sheet in the HRI1 Excel tool ('CODES') shows all Eurostat codes of active substances together with their names, CAS and CIPAC numbers and classification into Categories and Groups for the calculation.

Step 3. Analyse your data in the HRI1 Excel tool

After importing data into the Eurostat tool, the results of the index calculations are visualised in the 4th and 5th sheets, called 'REPORT INTERNAL' and 'REPORT EXTERNAL'.

The 4th sheet in the HRI1 Excel tool called 'REPORT INTERNAL' shows the detailed indicator calculation. It is necessary to choose your country in the drop-down list to get the right titles on the graphs in this sheet (Figure 4).

Figure 4. Screenshot highlighting the drop-down list where to choose country



DATA ANALYSIS INTERNAL (Figures are in tonnes)

Country ► **CY**

CY HRI1, 2011-2019

1. Weight of active substances placed on the market in tonnes by Group

The 'REPORT INTERNAL' shows the calculations step-by-step and **might display confidential aggregates**, depending on what is confidential in your country. This sheet can serve the purpose of inspecting more closely the aggregated data.

REPORT INTERNAL


This worksheet contains the following sections:

1. Weight of active substances placed on the market in tonnes by Group

The first section shows the tonnes of active substances for Groups 1–4 reported as placed on the market for each reference year (Figure 5).

Figure 5. Screenshot of section 1 of 'Report Internal'

Group	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	1	3	2	2	3	4	9	7	5
2	155	140	165	180	119	120	230	143	23
3	20	27	16	23	45	50	36	69	34
4	53	49	58	68	37	39	45	28	50

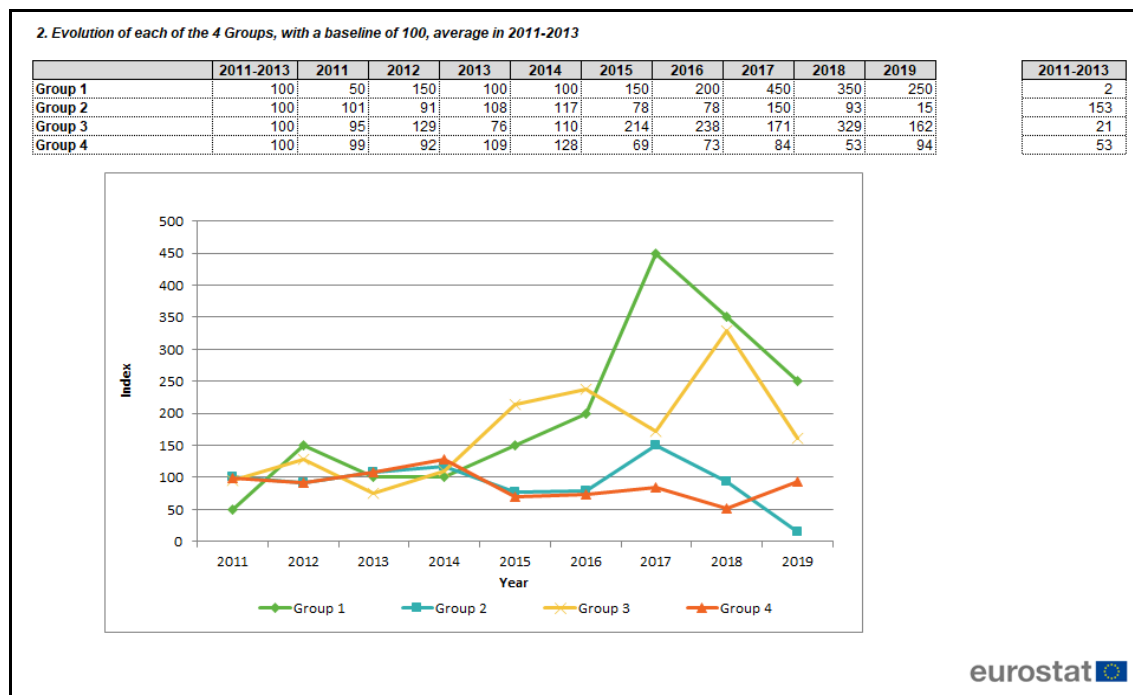
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2. Evolution of each of the 4 Groups, with a baseline of 100, average in 2011–2013

The second section shows the index of Groups 1–4, for the reference years (Figure 6). The baseline is set to 100 for the average of the period 2011–2013. The table to the right in Figure 6 shows the average of tonnes of active substances reported during these years, linked to the table above 'Weight of active substances placed on the market in tonnes by Group' (Figure 5).

The Groups' indexed evolutions are illustrated by a line graph.

Figure 6. Screenshot of section 2 of 'Report Internal'




3. The weighted volume of active substances placed on the market

The third section (Figure 7) displays the volume of each Group weighted using the weightings defined in Table 1. The baseline is shown in the last row in the table, labelled 'Average 2011–2012–2013'.

Figure 7. Screenshot of section 3 of 'Report Internal'

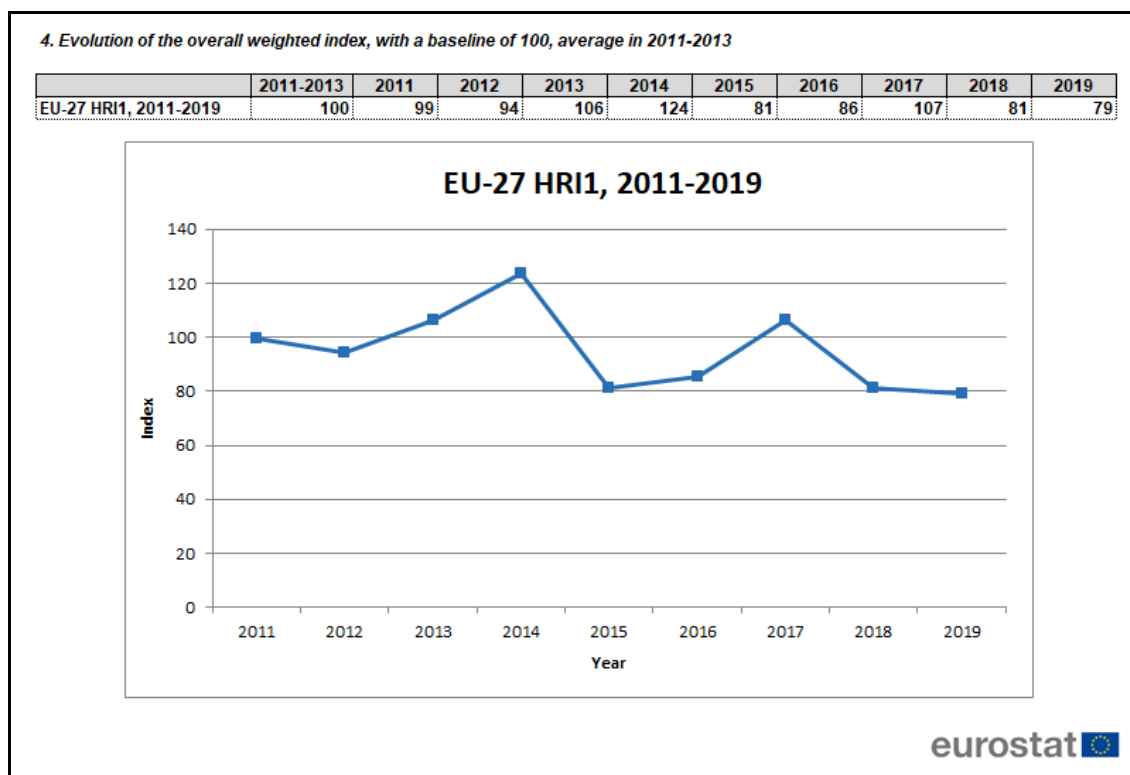
3. Weighted volume										
Group	Weighting	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	1	1	3	2	2	3	4	9	7	5
2	8	1 240	1 120	1 320	1 440	952	960	1 840	1 144	184
3	16	320	432	256	368	720	800	576	1 104	544
4	64	3 392	3 136	3 712	4 352	2 368	2 496	2 880	1 792	3 200
TOTAL		4 953	4 691	5 290	6 162	4 043	4 260	5 305	4 047	3 933
Average 2011-2012-2013		4 978								

eurostat 

4. Evolution of the overall weighted index, with a baseline of 100, average in 2011–2013

Section 4 (Figure 8) shows the evolution of the weighted index, i.e. the basis for the HR11 trendline which is displayed in the line graph below the table.

Figure 8. Screenshot of section 4 of 'Report Internal'



5. Weight of active substances placed on the market in tonnes by Category

This section of the 'REPORT INTERNAL' (Figure 9) shows the tonnes of active substances for Categories A–G reported as placed on the market for each reference year.

Figure 9. Screenshot of section 5 of 'Report Internal'

5. Weight of active substances placed on the market in tonnes by Category

Category	2011	2012	2013	2014	2015	2016	2017	2018	2019
A	1	1	1	0	1	1	3	5	4
B	0	2	1	2	2	3	6	2	1
C	75	70	110	99	78	85	180	97	19
D	80	70	55	81	41	35	50	46	4
E	15	17	9	10	17	12	6	24	13
F	5	10	7	13	28	38	30	45	21
G	53	49	58	68	37	39	45	28	50

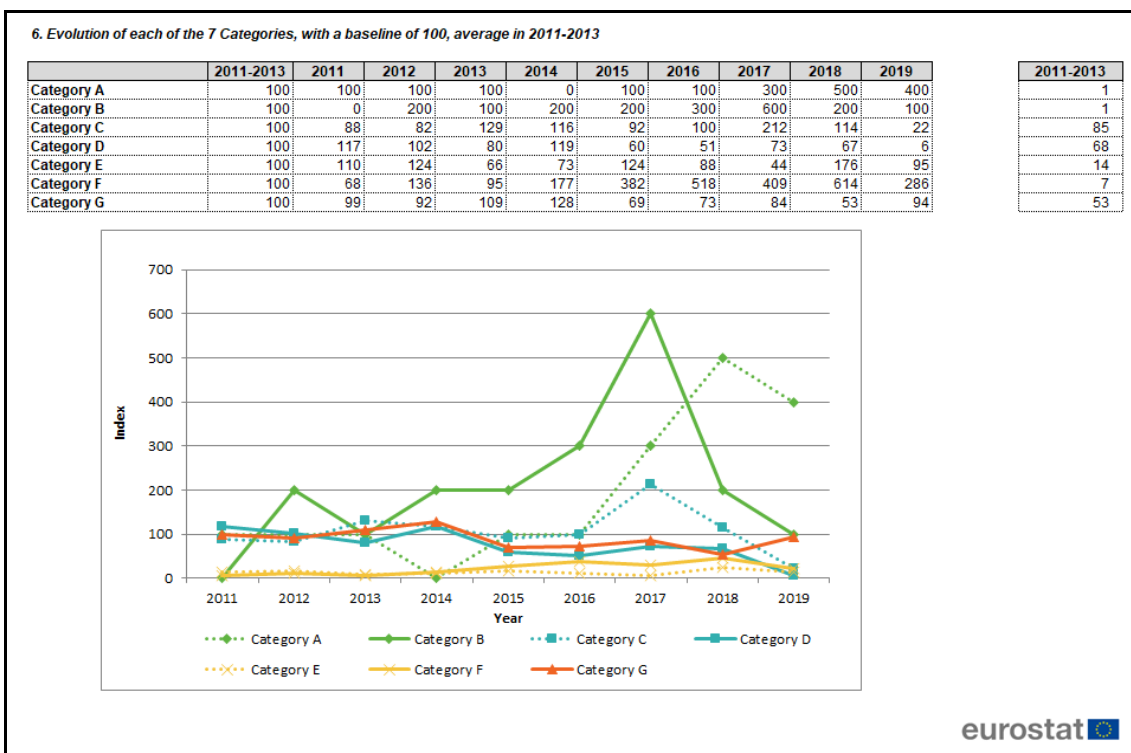
eurostat

6. Evolution of each of the 7 Categories, with a baseline of 100, average in 2011–2013

This section shows the index of Categories A–G, for the reference years (Figure 10). The baseline is set to 100 for the average of the period 2011–2013. The table to the right in Figure 10 shows the average of tonnes of active substances reported during these years, linked to table above 'Weight of active substances placed on the market in tonnes by Category' (Figure 9).

The Categories' indexed evolutions are also illustrated by a line graph.

Figure 10. Screenshot of section 6 of 'Report Internal'




7. Data excluded from this analysis (Weight of active substances placed on the market in tonnes)

The last section (Figure 11) shows the data excluded from the analysis. These are the Eurostat codes which contain mixtures of active substances so that no meaningful classification have been made into the HRI1 Groups/Categories. The purpose of this section is to show the volume of pesticides not included in the HRI1 calculation (for the whole EU, this excluded volume did not exceed 10 000 tonnes for any reference year, during the period 2011–2019).

Figure 11. Screenshot of section 7 of 'Report Internal'

7. Data excluded from this analysis (Weight of active substances placed on the market in tonnes)										
"OTHER" Substances	Code	2011	2012	2013	2014	2015	2016	2017	2018	2019
OTHER COPPER SALTS	F01_01_06	0	0	0	0	0	0	0	0	0
OTHER INORGANIC FUNG	F01_99_99	0	0	0	0	0	0	0	0	0
OTHER FUNGICIDES BASE	F02_99_99	0	0	0	0	0	0	0	0	0
OTHER FUNGICIDES BASE	F03_99_99	0	0	0	0	0	0	0	0	0
OTHER FUNGICIDES BASE	F04_99_99	0	0	0	0	0	0	0	0	0

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Step 4. Dissemination of results

REPORT EXTERNAL

To protect confidential data, it is recommended to use the fifth Excel sheet in the Eurostat HRI1 tool called 'REPORT EXTERNAL' for dissemination purposes. This data sheet contains only the results of the calculations in the version of the index with corresponding graphs. For sharing the results of the calculations without displaying confidential data, it is recommended to export the 'REPORT EXTERNAL' sheet either as a pdf or as a separate Excel worksheet (you can make a copy of the worksheet in a new Excel workbook, but remember to break the link to the original worksheet in the tab 'Data → break link').

This worksheet corresponds to the foreseen annual publication of the HRI1 trendline, the development of the active substance Groups and Categories. It contains the following sections:

1. Evolution of the overall weighted index, with a baseline of 100, average in 2011–2013

Section 1 shows the evolution of the weighted index, i.e. the basis for the HRI1 trendline which is displayed in the line graph below the table (same type of view as in Figure 8).

2. Evolution of each of the 4 Groups, with a baseline of 100, average in 2011–2013

The section shows the index of Groups 1–4, for the reference years. The baseline is set to 100 for the average of the period 2011–2013.

The Groups' indexed evolutions are also illustrated by a line graph (same type of view as in Figure 6).

3. Evolution of each of the 7 Categories, with a baseline of 100, average in 2011–2013

The section shows the index of Categories A–G, for the reference years. The baseline is set to 100 for the average of the period 2011–2013.

The Categories' indexed evolutions are also illustrated by a line graph (same type of view as in Figure 10).

3.3. Calculating HRI1 based on sales of active substances without the Eurostat tool

Baseline

Since sales of active substances are strongly linked to climatic conditions, and possibly also price developments, the baseline is fixed as the average of the first three years of data, in order to smooth out fluctuations. The baseline for HRI1 is set at 100, and is equal to the average of the calculation for the period 2011–2013. For each Category/Group and the HRI1, the total volume placed on the market will be expressed as an index in relation to 100.

GROUPS' BASELINES (BASELINE FOR GROUPS 1–4)

A Group_{*i*} baseline can be calculated as follows:

$$\sum_{t=2011}^{2013} \frac{\text{Group}_i \text{ sales (t)}}{3} = 100$$

Where:

- *i* is the Groups 1–4
- *t* refers to 2011, 2012 and 2013

Box 3. Example of baseline calculation for a Group

The volume of pesticides of Group 1 in 2011, 2012 and 2013 were 1 000 kg, 2 000 kg and 3 000 kg, respectively. The baseline for Group 1 (Group₁ baseline) is calculated as follows:

$$\frac{1\ 000 + 2\ 000 + 3\ 000}{3}$$

Conclusion: The baseline for Group 1 (Group₁ baseline) is equal to 2 000 kg = 100.

Please note!

The same system can be used for calculating the Categories' baselines (Baseline for Categories A–G):

$$\sum_{t=2011}^{2013} \frac{\text{Category}_j \text{ sales (t)}}{3} = 100$$

Where:

- *j* is the Categories A–G
- *t* refers to 2011, 2012 and 2013

BASELINE FOR HRI1

$$\frac{\sum_{t=2011}^{2013} \sum_{i=1}^4 (f_i * \text{Group}_i \text{ sales (t)})}{3} = 100$$

Where:

- f_i is the weighting for Group_{*i*} (the Groups 1–4):
 - $f_1 = 1$ (f_1 is defined as the weighting for Group₁)
 - $f_2 = 8$ (f_2 is defined as the weighting for Group₂)
 - $f_3 = 16$ (f_3 is defined as the weighting for Group₃)
 - $f_4 = 64$ (f_4 is defined as the weighting for Group₄)
- t refers to 2011, 2012 and 2013

Box 4. Example of baseline calculation for HRI1

The weightings 1, 8, 16 and 64 from Table 1 are multiplied with the respective sales volume for each Group, for the years 2011, 2012 and 2013, and the sums are then added. The sum is divided by 3 to give the baseline = the average of the weighted volumes.

		Volume of pesticide sales (kg)		
Group	f_i	2011	2012	2013
1	1	10	50	20
2	8	20	5	10
3	16	2	3	2
4	64	1	2	1
Total (1)		266	266	196
Baseline for HRI1 (2)		242.7		

- (1) is obtained as:
 - Reference year 2011 is calculated as follows: $1 * 10 + 8 * 20 + 16 * 2 + 64 * 1 = 266$
 - Reference year 2012 is calculated as follows: $1 * 50 + 8 * 5 + 16 * 3 + 64 * 2 = 266$
 - Reference year 2013 is calculated as follows: $1 * 20 + 8 * 10 + 16 * 2 + 64 * 1 = 196$
- (2) is calculated as follows: $\frac{266 + 266 + 196}{3} = 242.7$

Conclusion: Baseline for HRI1 is equal to 242.7 kg = 100

HRI1 calculation

The HRI1 is calculated according to the following formula for reference year n :

$$\text{HRI1}(n) = 100 * \left(\frac{\sum_{i=1}^4 (f_i * \text{Group}_i \text{ sales}(n))}{\left(\frac{\sum_{t=2011}^{2013} \sum_{i=1}^4 (f_i * \text{Group}_i \text{ sales}(t))}{3} \right)} \right)$$

Where:

- f_i is the weighting for Group $_{i-iv}$ (the Groups 1–4):
 - $f_1 = 1$ (f_1 is defined as the weighting for Group $_1$)
 - $f_2 = 8$ (f_2 is defined as the weighting for Group $_2$)
 - $f_3 = 16$ (f_3 is defined as the weighting for Group $_3$)
 - $f_4 = 64$ (f_4 is defined as the weighting for Group $_4$)
- t refers to 2011, 2012 and 2013

Box 5. Example of HRI1 calculation

For reference year 2014 ($n = 2014$):

		Volume of pesticide sales (kg)			
Group	f_i	2011	2012	2013	2014
1	1	10	50	20	30
2	8	20	5	10	2
3	16	2	3	2	3
4	64	1	2	1	4
Total (1)		266	266	196	350
Baseline for HRI1 (2)		242.7			

(1) and (2) are calculated as in the Box 4.

Conclusion: HRI1 for reference year 2014 is equal to:

$$\text{HRI1}(2014) = 100 * \left(\frac{350}{242.7} \right) = 144$$

4

Harmonised Risk Indicator 2

4.1. Introduction

The second Indicator, Harmonised Risk Indicator 2 (HRI2), is based on the number of authorisations granted for plant protection products under Article 8(4) of Council Directive 91/414/EEC and Article 53 of Regulation (EC) No 1107/2009 as communicated to the European Commission in accordance with Article 53(1) of that Regulation during a reference period. The HRI2 is presented as an index. The reference years concerned are from 2011 until the last available reference year. Since June 2016, the Plant Protection Products Application Management System⁽⁷⁾ (PPPAMS) database is used to collect all notified emergency authorisations. The HRI2 shall be calculated by multiplying the number of authorisations granted for plant protection products under Article 53 of Regulation (EC) No 1107/2009 for each Group in Table 1 by the relevant weighting set out in Row (vi), followed by the aggregation of the results of these calculations.

The European Commission (Eurostat) will provide the calculations for the EU based on the annual data on emergency authorisations notified to the European Commission. The countries shall calculate their own HRI2, or accept the country HRI2 as calculated by Eurostat.

Eurostat has produced a tool for calculating the HRI2 (Annex III). The tool is an Excel workbook with macros. **The tool can only be used in Excel.** The description of how to use this tool is in section 4.2. Countries can import their data on number of authorisations, expressed as active substances, into the tool, and produce and validate their HRI2 calculation.

Countries can also use other tools developed by themselves for the calculations and below (section 4.3) is therefore a detailed description of the calculations to perform.

4.2. Use of Eurostat tool for calculating HRI2 based on emergency authorisations

Step 1. Structure of the data to be imported

The data to be imported in the tool must be structured in a specific way, for the tool to work. The columns of data must be separated by 'tab'. Columns cannot be separated by comma, semi-colon, colon, etc. Eurostat recommends to prepare the data in Excel, and save the final file as '.txt'.

Please note that during each import of data, the previous data already imported will be overwritten. This is done to avoid any mistakes or duplications when loading data. Therefore, please import each

⁽⁷⁾ <https://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/ppp/pppeas/screen/home>

time a **single file with all data from 2011 until the reference year in question.**

The file must contain the following columns, which are obligatory for the tool (Table 4):

Table 4. Structure to follow for uploading data in HRI2 Excel tool

time	geo	pesticides

eurostat 

- The column 'time' shall contain the reference years of the data. Only numbers are allowed (e.g. 2015, 2016, 2017, etc.).
- The column 'geo' shall contain the country codes, using the format set by Eurostat⁽⁶⁾. The country codes must be in capital letters.
- The column 'pesticides'
 - shall contain the Eurostat codes of the active substances as defined in Annex III of Regulation (EC) No 1185/2009. No common or chemical names of active substances or products can be used. Eurostat codes must be used, but for non-authorized substances, it is possible that no Eurostat code has been allocated. In this case, countries should use the following code: **NA_XX_00**
 - The use of this code classifies a non-authorized substance into Group 4, Category G.
 - Each emergency authorisation according to Article 53 counts as 1 even if there is a mixture of substances in the product authorised. In this case, the active substance belonging to the Group/Category with the highest weighting shall be considered (see also section 2.3 and Table 2).

The order of the columns is not important, and the titles can be in capital letters or in lower case, or mixed.

Box 6. Example of correctly structured data set for HRI2 tool, separated by 'tab'

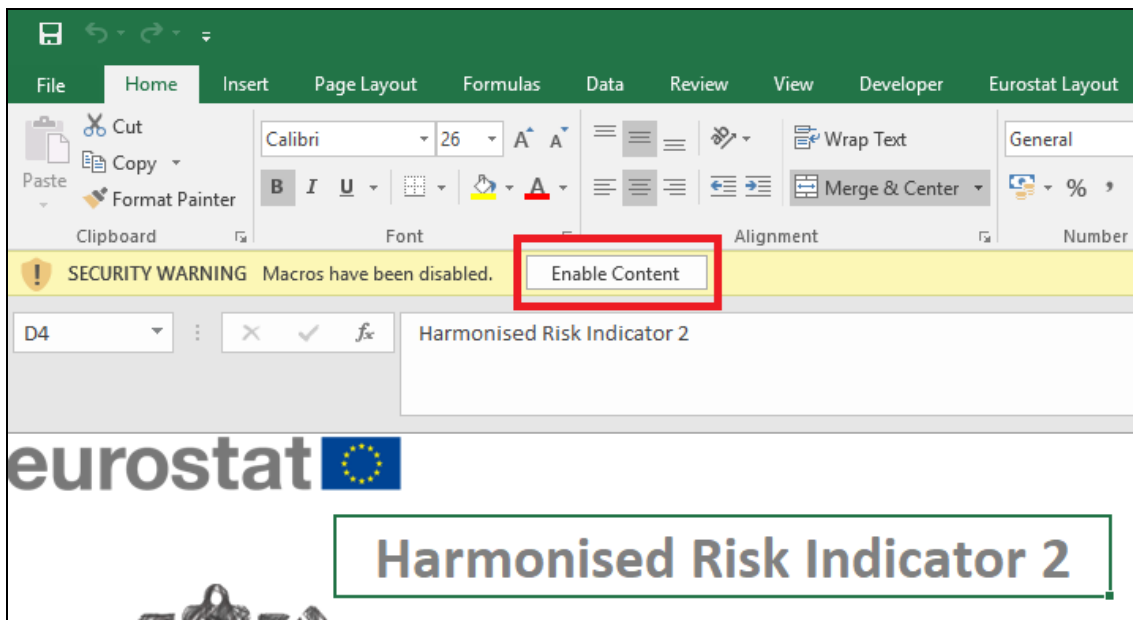
```
time    geo    pesticides
2013   FR     F01_01_01
2014   DE     H03_03_02
2015   IE     M01_01_01
2016   IE     NA_XX_00
```

⁽⁶⁾ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Country_codes

Step 2. Import the data in the HRI2 Excel tool

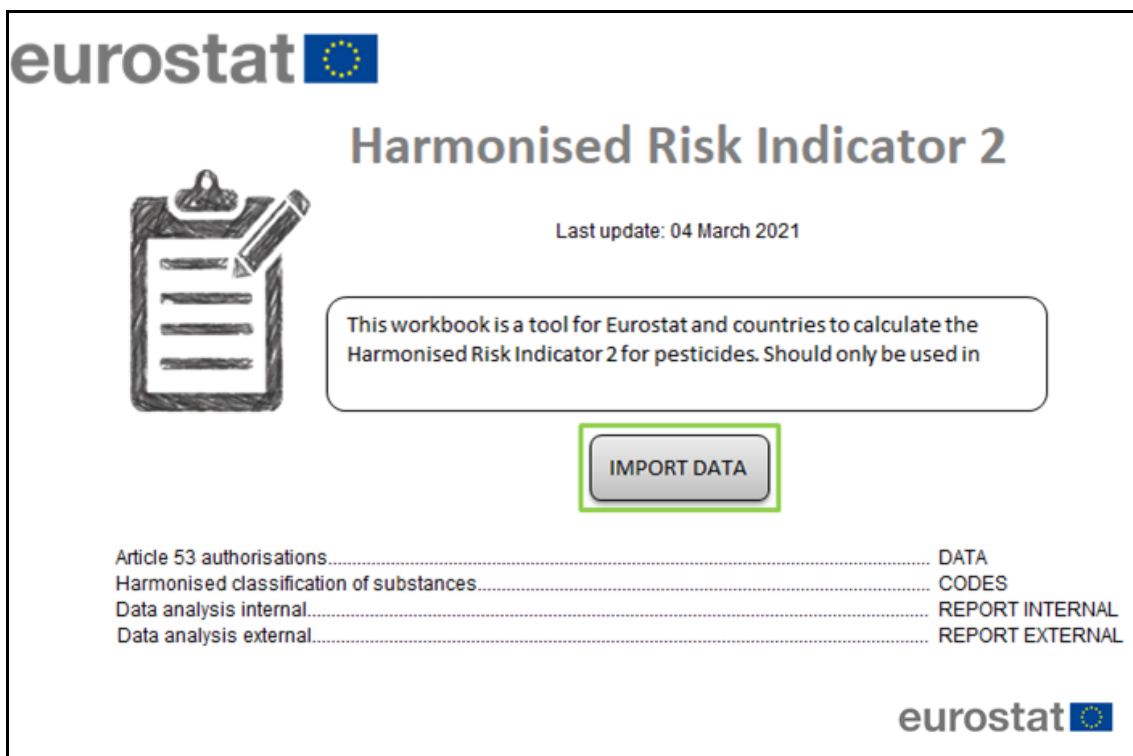
Open the HRI2 Excel tool and start by pressing 'Enable Content' (Figure 12) to allow the use of the macros.

Figure 12. Screenshot highlighting the 'Enable Content' button



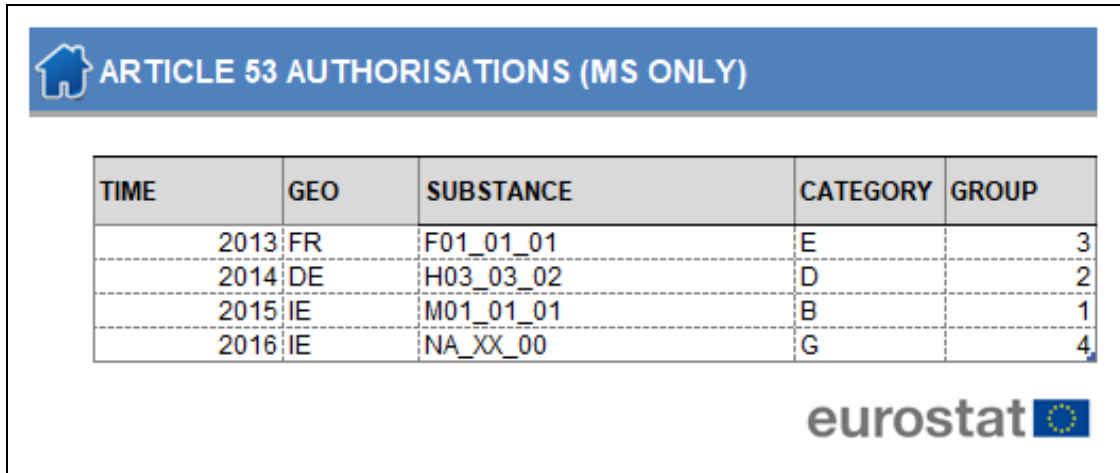
Press the 'IMPORT DATA' button (Figure 13) and choose the tab-separated file you have saved.

Figure 13. Screenshot highlighting the 'Import data' button




If the file has been correctly imported, you can see the data on the second sheet in the HRI2 Excel tool, called 'DATA'. The example below (Figure 14) shows the result of importing the example file shown in Box 6 above under Step 1.

Figure 14. Screenshot showing the result of importing data shown in Box 6



TIME	GEO	SUBSTANCE	CATEGORY	GROUP
2013	FR	F01_01_01	E	3
2014	DE	H03_03_02	D	2
2015	IE	M01_01_01	B	1
2016	IE	NA_XX_00	G	4

eurostat 

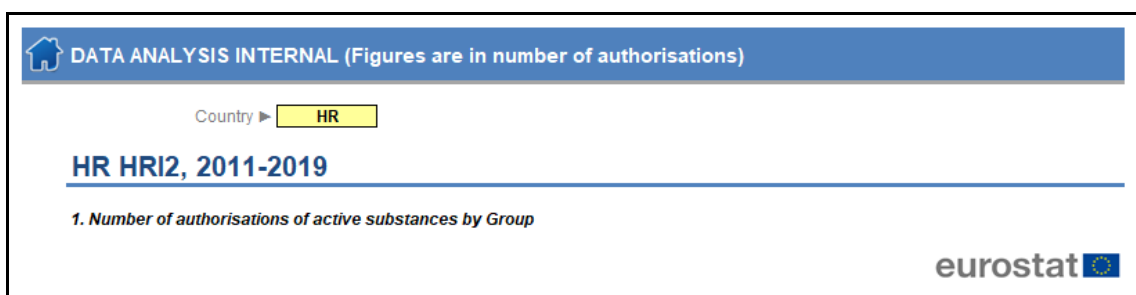
Here the data are shown together with the Category and Group to which they belong, for calculating the HRI2.

Step 3. Analyse your data in the HRI2 Excel tool

The third sheet in the HRI2 Excel tool ('CODES') shows all Eurostat codes of active substances together with their names, CAS and CIPAC numbers and classification into Categories and Groups for the calculation. After importing data into the Eurostat tool, the results of the index calculations are visualised in the sheets 'REPORT INTERNAL' and 'REPORT EXTERNAL'.

The sheet in the HRI2 Excel tool called 'REPORT INTERNAL' shows the detailed indicator calculation. It is necessary to choose your country in the drop-down list to get the right titles on the graphs in this sheet (Figure 15).

Figure 15. Screenshot highlighting the drop-down list where to choose country




DATA ANALYSIS INTERNAL (Figures are in number of authorisations)

Country ► **HR**

HR HRI2, 2011-2019

1. Number of authorisations of active substances by Group

eurostat 

The 'REPORT INTERNAL' shows the calculations step-by-step. This sheet can serve the purpose of inspecting more closely the aggregated data.

REPORT INTERNAL


This worksheet contains the following sections:

1. Number of authorisations of active substances by Group

This section shows the number of emergency authorisations of active substances for Groups 1–4 reported for each reference year (Figure 16).

Figure 16. Screenshot of section 1 of 'Report Internal'

Group	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	3	1	2	2	5	3	4	1	6
2	18	28	45	32	17	26	32	41	29
3	32	33	47	59	62	51	55	46	52
4	8	12	26	34	27	23	33	38	29

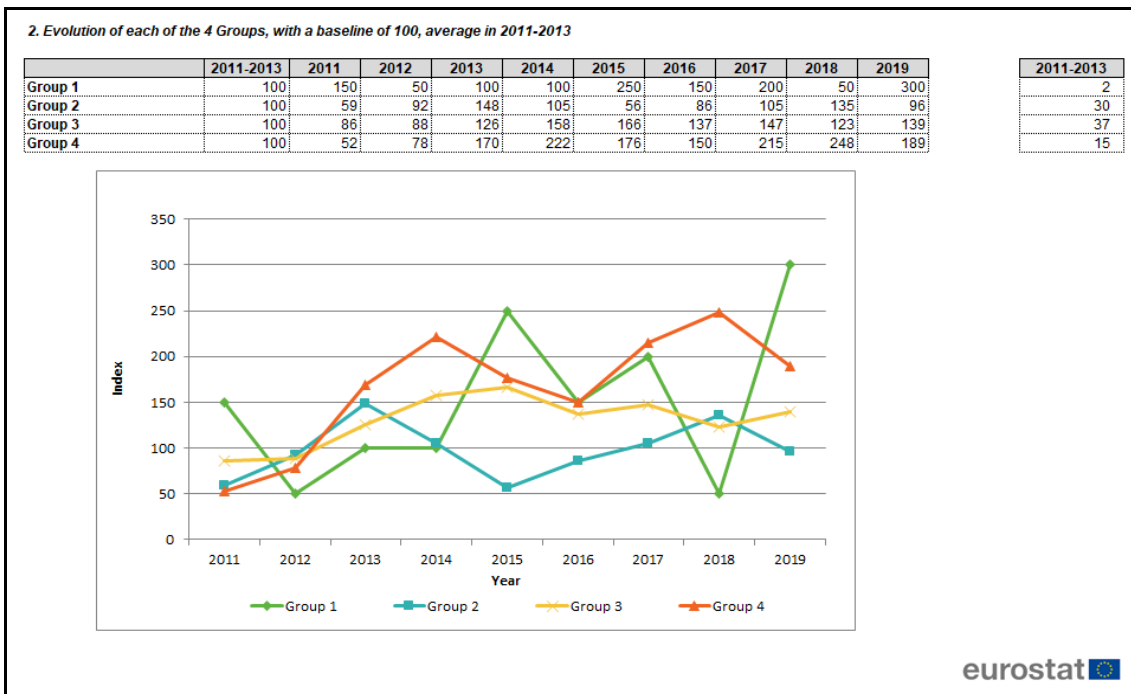
eurostat 

2. Evolution of each of the 4 Groups, with a baseline of 100, average in 2011–2013

This section shows the index of Groups 1–4, for the reference years (Figure 17). The baseline is set to 100 for the average of the period 2011–2013. The table to the right in Figure 17 shows the average of number of emergency authorisations of active substances reported during these years, linked to the table above 'Number of authorisations of active substances by Group' (Figure 16).

The Groups' indexed evolutions are illustrated by a line graph.

Figure 17. Screenshot of section 2 of 'Report Internal'




3. The weighted number of emergency authorisations

The third section (Figure 18) displays the number of authorisation of each Group weighted using the weightings defined in Table 1. The baseline is shown in the last row in the table, labelled 'Average 2011–2012–2013'.

Figure 18. Screenshot of section 3 of 'Report Internal'

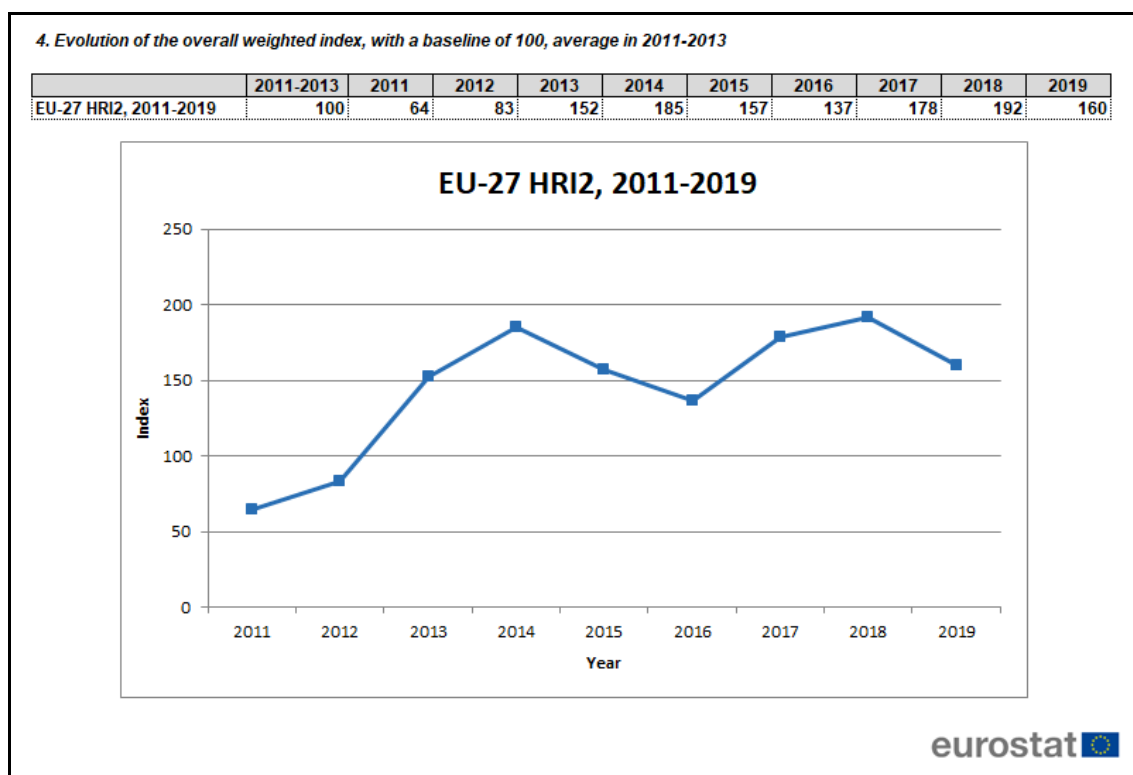
3. Weighted number										
Group	Weighting	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	1	3	1	2	2	5	3	4	1	6
2	8	144	224	360	256	136	208	256	328	232
3	16	512	528	752	944	992	816	880	736	832
4	64	512	768	1 664	2 176	1 728	1 472	2 112	2 432	1 856
TOTAL		1 171	1 521	2 778	3 378	2 861	2 499	3 252	3 497	2 926
Average 2011-2012-2013		1 823								

eurostat 

4. Evolution of the overall weighted index, with a baseline of 100, average in 2011–2013

Section 4 (Figure 19) shows the evolution of the weighted index, i.e. the basis for the HRI2 trendline which is displayed in the line graph below the table.

Figure 19. Screenshot of section 4 of 'Report Internal'



5. Number of authorisations of active substances by Category

This section of the 'REPORT INTERNAL' (Figure 20) shows the number of emergency authorisations of active substances for Categories A–G reported for each reference year.

Figure 20. Screenshot of section 5 of 'Report Internal'

Category	2011	2012	2013	2014	2015	2016	2017	2018	2019
A	2	1	2	1	4	2	3	1	3
B	1	0	0	1	1	1	1	0	3
C	7	12	19	9	7	12	15	11	8
D	11	16	26	23	10	14	17	30	21
E	16	9	21	30	43	39	38	20	25
F	16	24	26	29	19	12	17	26	27
G	8	12	26	34	27	23	33	38	29

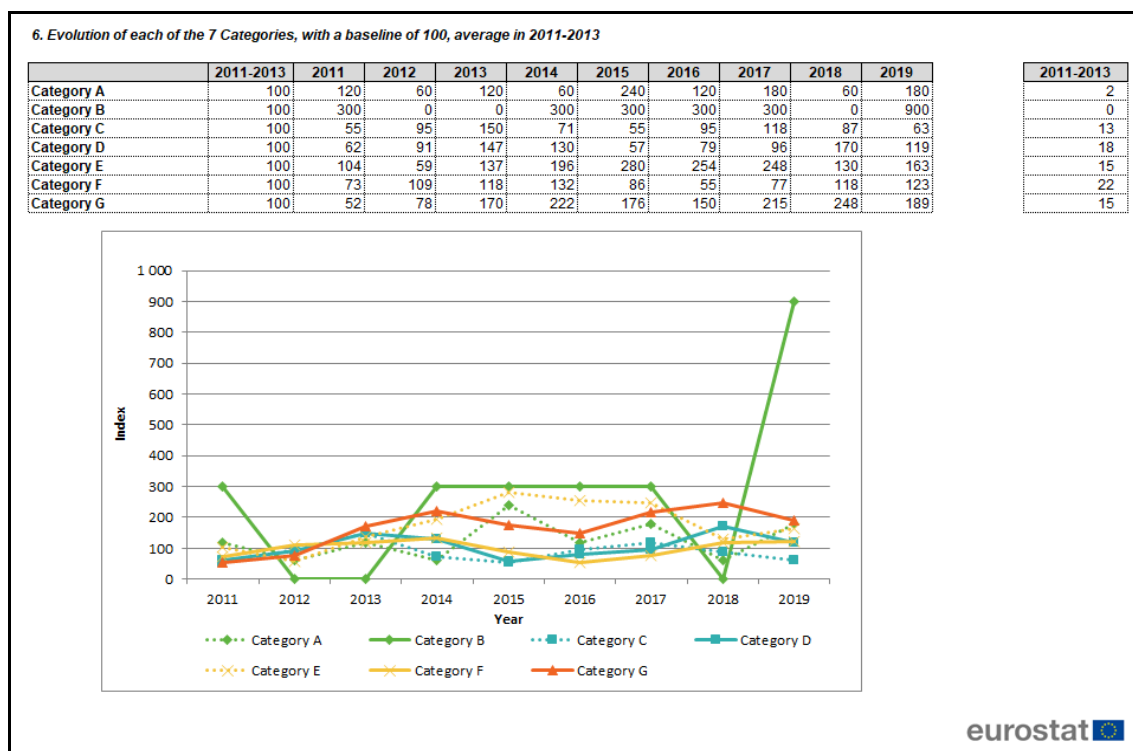
eurostat

6. Evolution of each of the 7 Categories, with a baseline of 100, average in 2011–2013

This section shows the index of Categories A–G, for the reference years (Figure 21). The baseline is set to 100 for the average of the period 2011–2013. The table to the right in Figure 21 shows the average of number of emergency authorisations of active substances reported during these years, linked to table above 'Number of authorisations of active substances by Category' (Figure 20).

The Categories' indexed evolutions are also illustrated by a line graph.

Figure 21. Screenshot of section 6 of 'Report Internal'




7. Data excluded from this analysis (Number of authorisations of active substances)

The last section (Figure 22) shows the data excluded from the analysis. These are the Eurostat codes which contain mixtures of active substances so that no meaningful classification have been made into the HRI2 Groups/Categories. The purpose of this section is to show the number of emergency authorisations not included in the HRI2 calculation.

Figure 22. Screenshot of section 7 of 'Report Internal'

7. Data excluded from this analysis (Number of authorisations of active substances)										
"OTHER" Substances	Code	2011	2012	2013	2014	2015	2016	2017	2018	2019
OTHER COPPER SALTS	F01_01_06	0	0	0	0	0	0	0	0	0
OTHER INORGANIC FUNG	F01_99_99	0	0	0	0	0	0	0	0	0
OTHER FUNGICIDES BASE	F02_99_99	0	0	0	0	0	0	0	0	0
OTHER FUNGICIDES BASE	F03_99_99	0	0	0	0	0	0	0	0	0
OTHER FUNGICIDES BASE	F04_99_99	0	0	0	0	0	0	0	0	0

eurostat 

Step 4. Dissemination of results

REPORT EXTERNAL

The fifth Excel sheet in the Eurostat HRI2 Excel tool called 'REPORT EXTERNAL' is made for dissemination purposes. This data sheet contains only the results of the calculation in the version of the index with corresponding graph. For sharing the results of the calculations, export the 'REPORT EXTERNAL' sheet either as a pdf or as a separate Excel worksheet (you can make a copy of the worksheet but remember to break the link to the original worksheet in tab 'Data → break link').

This worksheet corresponds to the foreseen annual publication of the HRI2 trendline. It contains only the following section:

1. Evolution of the overall weighted index, with a baseline of 100, average in 2011–2013

Section 1 shows the evolution of the weighted index, i.e. the basis for the HRI2 trendline which is displayed in the line graph below the table (same type of view as in Figure 19).

4.3. Calculating HRI2 based on emergency authorisations without the Eurostat tool

Baseline

Since emergency authorisations of plant protection products can also depend on climatic conditions, and possibly other developments, the baseline is fixed as the average of the first three years of data. This smooths the fluctuations. The baseline years are index 100, and for the HRI2, the total number of authorisations annually will be expressed as an index in relation to 100. The baseline for HRI2 is set at 100, and is equal to the average of the calculation for the period 2011–2013.

GROUPS' BASELINES (BASELINE FOR GROUPS 1–4)

A Group_{*i*} baseline can be calculated as follows:

$$\sum_{t=2011}^{2013} \frac{\text{Group}_i \text{ emergency authorisations (t)}}{3} = 100$$

Where:

- *i* is the Groups 1–4
- *t* refers to 2011, 2012 and 2013

Box 7. Example of baseline calculation for a Group

The number of emergency authorisations of pesticides of Group 1 in 2011, 2012 and 2013 were 30, 15 and 15 respectively. The baseline for Group 1 (Group₁ baseline) is calculated as follows:

$$\frac{30 + 15 + 15}{3}$$

Conclusion: The baseline for Group 1 (Group₁ baseline) is equal to 20 emergency authorisations = 100.

Please note!

The same system can be used for calculating the Categories' baselines (Baseline for Categories A–G):

$$\sum_{t=2011}^{2013} \frac{\text{Category}_j \text{ emergency authorisations (t)}}{3} = 100$$

Where:

- *j* is the Categories A–G
- *t* refers to 2011, 2012 and 2013

BASELINE FOR HRI2

$$\sum_{t=2011}^{2013} \frac{\sum_{i=1}^4 (f_i * \text{Group}_i \text{ emergency authorisations (t)})}{3} = 100$$

Where:

- *f_i* is the weighting for Group_{*i*} (the Groups 1–4):
 - *f₁* = 1 (*f₁* is defined as the weighting for Group₁)
 - *f₂* = 8 (*f₂* is defined as the weighting for Group₂)
 - *f₃* = 16 (*f₃* is defined as the weighting for Group₃)
 - *f₄* = 64 (*f₄* is defined as the weighting for Group₄)
- *t* refers to 2011, 2012 and 2013

Box 8. Example of baseline calculation for HRI2

The weightings 1, 8, 16 and 64 from Table 1 are multiplied with the respective number of emergency authorisations for each Group, for the years 2011, 2012 and 2013, and the sums are then added. The sum is divided by 3 to give the baseline = the average of the weighted numbers.

Group	f_i	Number of emergency authorisations		
		2011	2012	2013
1	1	10	8	4
2	8	5	5	10
3	16	2	3	2
4	64	1	0	1
Total (1)		146	96	180
Baseline for HRI2 (2)		140.7		

- (1) is obtained as:
 - Reference year 2011 is calculated as follows: $1 * 10 + 8 * 5 + 16 * 2 + 64 * 1 = 146$
 - Reference year 2012 is calculated as follows: $1 * 8 + 8 * 5 + 16 * 3 + 64 * 0 = 96$
 - Reference year 2013 is calculated as follows: $1 * 4 + 8 * 10 + 16 * 2 + 64 * 1 = 180$
- (2) is calculated as follows: $\frac{146 + 96 + 180}{3} = 140.7$

Conclusion: Baseline for HRI2 is equal to 140.7 emergency authorisations = 100

HRI2 calculation

The HRI2 is calculated according to the following formula for reference year n :

$$\text{HRI2}(n) = 100 * \left(\frac{\sum_{i=1}^4 (f_i * \text{Group}_i \text{ emergency authorisations}(n))}{\left(\frac{\sum_{t=2011}^{2013} \sum_{i=1}^4 (f_i * \text{Group}_i \text{ emergency authorisations}(t))}{3} \right)} \right)$$

Where:

- f_i is the weighting for Group_{*i*} (the Groups 1–4):
 - $f_1 = 1$ (f_1 is defined as the weighting for Group₁)
 - $f_2 = 8$ (f_2 is defined as the weighting for Group₂)
 - $f_3 = 16$ (f_3 is defined as the weighting for Group₃)
 - $f_4 = 64$ (f_4 is defined as the weighting for Group₄)
- t refers to 2011, 2012 and 2013

Box 9. Example of HRI2 calculation

For reference year 2014 ($n = 2014$):

		Number of emergency authorisations			
Group	f_i	2011	2012	2013	2014
1	1	10	8	4	2
2	8	5	5	10	8
3	16	2	3	2	3
4	64	1	0	1	1
Total (1)		146	96	180	178
Baseline for HRI2 (2)		140.7			

(1) and (2) are calculated as in the Box 8.

Conclusion: HRI2 for reference year 2014 is equal to:

$$\text{HRI2 (2014)} = 100 * \left(\frac{178}{140.7} \right) = 127$$

5

Dissemination

5.1. Harmonised Risk Indicators 1 and 2 for the EU

The European Commission shall calculate and publish the Harmonised Risk Indicators 1 and 2 for the EU in accordance with Article 15(2) and 15(4) of Directive 2009/128/EC for each calendar year and at the latest 20 months after the end of the year for which Harmonised Risk Indicators are being calculated (year N).

5.2. Harmonised Risk Indicators 1 and 2 for each Member State

The Member States shall calculate and publish Harmonised Risk Indicators 1 and 2 for their country. However, as a service to Member States, the Commission will calculate Harmonised Risk Indicator 1 for each Member State, based on the information reported by Member States under Regulation (EC) No 1185/2009, for the years 2011 until year N. Similarly, the Commission will calculate Harmonised Risk Indicator 2 for each Member State, based on data extracted from PPPAMS, for the years 2011 until year N.

The result of these calculations will be sent to each Member State by 30 April each year N+2. It is then optional for countries to accept these calculations of the HRIs or to provide their own calculations.

Therefore, before 31 July N+2, Member States shall;

1. **Accept the results of the Commission's calculations for year 2011 to year N or perform their own calculations in line with Commission Directive (EU) 2019/782,**
- and
2. **Conduct an evaluation pursuant to Article 15(2) of Directive 2009/128/EC,**
- and
3. **Publish the outcomes of Points 1 and 2,**
- and
4. **Provide a link to the Commission, via the contact information under point 6.1, of the website referred to in Point 3.**

The Commission shall publish the link provided by each Member State under Point 4 by 30 August year N+2. Where no such link is provided, the Commission will make this known on the same website.

6

Contacts

6.1. DG HEALTH AND FOOD SAFETY (DG SANTE)

For what concerns Harmonised Risk Indicators, DG SANTE can be contacted on the email address SANTE-PPPS@ec.europa.eu.

6.2. EUROSTAT

For what concerns Harmonised Risk Indicators, Eurostat can be contacted on the email address ESTAT-AGRI-ENVIRONMENT@ec.europa.eu.

7

Frequently asked questions (FAQ)

7.1. Why is my calculation different from that of Eurostat?

It is possible that the results calculated by Eurostat, and the results calculated by individual countries, differ. Reasons that can cause such differences can be:

- Eurostat uses the data transmitted by countries in the frame of the annual collection of statistics under Regulation (EC) No 1185/2009 on active substances placed on the market. A country may have revised its data without sending an update to Eurostat.
- Eurostat uses the active substances' classification as defined in the Annex III of Regulation (EC) No 1185/2009 as amended in 2017 (Commission Regulation (EU) 2017/269⁽⁹⁾). If a country has not reclassified data according to these codes, difference may occur since a few codes changed.

7.2. Does a country always have to send revised data to Eurostat?

If a country revises its national sales data for its own calculations, the calculation by Eurostat might differ from the one of the country. Therefore, revised data should always be sent to Eurostat via the single transfer point (eDAMIS) in good time.

⁽⁹⁾ Commission Regulation (EU) 2017/269 of 16 February 2017 amending Regulation (EC) No 1185/2009 of the European Parliament and of the Council concerning statistics on pesticides, as regards the list of active substances <http://data.europa.eu/eli/reg/2017/269/oj>

7.3. What is the process if statistics on active substances placed on the market from previous reference periods are corrected?

Two specific cases may occur:

- Some statistics on active substances placed on the market are corrected after several years based on products withdrawn from the market. The country can send a revised data file to Eurostat covering the previous year(s). The revised data will be taken into account in next publication of the HRI1.
- Some countries do not revise backwards in this situation but report negative values for the next reference year reported. This data will then be included in the publication of the next reference year.

7.4. Why to recalculate the time series if a substance changes Group?

The HRIs should always reflect the current status of active substances. If an active substance changes Group or Category, due to a change in its approval status, or due to a change in its classification, the active substance shall be considered to be placed in its new Group/Category for the whole period of calculation of HRIs. The change to the new Group/Category will occur in the year following the change in classification/approval status, and taking account of the period of grace for the disposal, storage, placing on the market and use of existing stocks, in line with Article 46 of Regulation (EC) No 1107/2009. It means that the time series of the HRI1 and HRI2, including the development of the Groups and Categories, may need to be re-calculated each year. The reason for this is that once the categorisation of an active substance changes, it is logical to re-calculate HRIs for the previous years using the new categorisation, as the properties of the active substance are the same over the time period.

8

Annexes

8.1. Annex I – Classification of active substances into Groups and Categories

8.2. Annex II – HRI1 Excel tool

8.3. Annex III – HRI2 Excel tool

All annexes are available on this webpage:

<https://ec.europa.eu/eurostat/web/agriculture/agri-environmental-indicators/information>

GETTING IN TOUCH WITH THE EU

In person

All over the European Union there are hundreds of Europe Direct information centres. You can find the address of the centre nearest you at: https://europa.eu/european-union/contact_en

On the phone or by email

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- at the following standard number: +32 22999696 or
- by email via: https://europa.eu/european-union/contact_en

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Information about the European Union in all the official languages of the EU is available on the Europa website at: https://europa.eu/european-union/index_en

EU publications

You can download or order free and priced EU publications at: <https://op.europa.eu/en/publications>. Multiple copies of free publications may be obtained by contacting Europe Direct or your local information centre (see https://europa.eu/european-union/contact_en).

EU law and related documents

For access to legal information from the EU, including all EU law since 1952 in all the official language versions, go to EUR-Lex at: <http://eur-lex.europa.eu>

Open data from the EU

The EU Open Data Portal (<http://data.europa.eu/euodp/en>) provides access to datasets from the EU. Data can be downloaded and reused for free, for both commercial and non-commercial purposes.

Methodology for calculating harmonised risk indicators for pesticides under Directive 2009/128/EC

Harmonised risk indicators are needed to estimate the trends in risk from pesticide use. Harmonised Risk Indicators are defined in the Directive 2009/128/EC establishing a framework for Community action to achieve the sustainable use of pesticides (the Sustainable Use Directive). These indicators are necessary to measure progress in meeting the main objective of the Directive - the reduction of risks from pesticide use for human health and the environment. The European Commission shall calculate them for the EU, and Member States should calculate the Harmonised risk indicators at a national level. The data to be used for the calculations shall be statistical data collected in accordance with Union legislation concerning statistics on plant protection products, i.e. Regulation (EC) No 1185/2009 on pesticide statistics, and other relevant data. This document is intended to provide information to Member States to assist them in meeting their obligations under Article 15(2) of Directive 2009/128/EC.

For more information

<https://ec.europa.eu/eurostat/>