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# **Electrical and Electronic Equipment Placed on Market Calculation Tool Manual**

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## Abbreviations

POM	:	Placed on market
EEE	:	Electrical and Electronic Equipment
CPC	:	Central Product Classification
UNU	:	United Nations University
HS	:	Harmonized Commodity Description and Coding System
EU	:	European Union

## 1. Introduction

The "EEE POM Calculation Tool" is a tool for estimation of placed on market (POM) electrical and electronic equipment (EEE) in a country under investigation. It is based on the apparent consumption methodology developed by the task group of United Nations University (UNU).

The user can utilize the tool as follows:

- In the user interface page (Frontpage), enter the year under investigation to determine the placed on market of EEE of the country.
- Enter the import, export, and domestic production data
- Find the calculated POM in sheet "POM\_to\_Tool" which can be used as an input to e-waste generated tool

The purpose of the manual is to assist the user in smooth operation of the tool and to get the output POM data of EEE for the country under investigation.

## 2. Overview of the POM Calculation Tool

The "POM calculation tool" is developed in excel consisting of 15 different sheets. **All sheets are useful for proper functioning of the tool and their sequence should not be changed.** The user can give the input only in "FrontPage" to get the output in "POM\_to\_Tool". The explanation of sheets is given in table 1.

**Table 1 Overview of the sheets of the EEE POM tool**

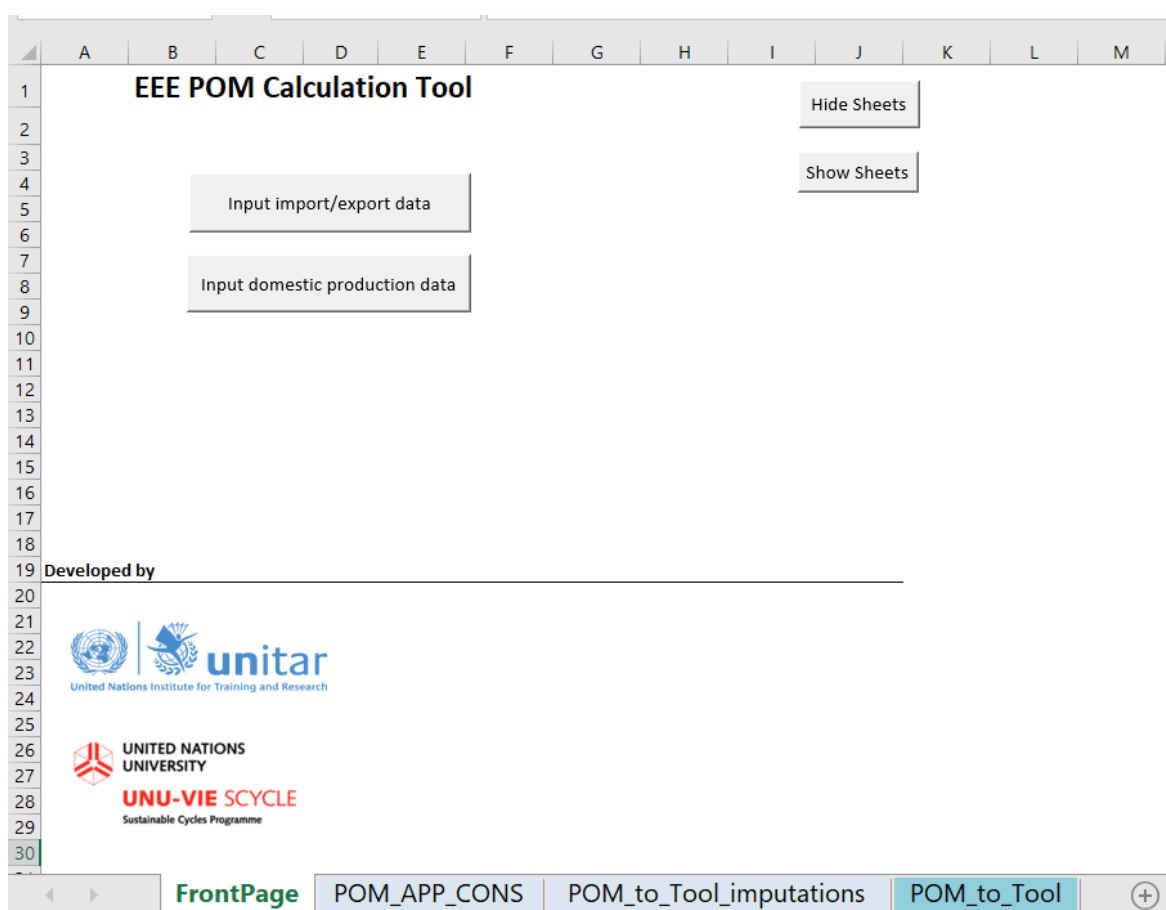
Sheet Name	Description/Purpose
FrontPage	User Interface
POM_APP_CONS	Time series (1980-2030) Placed on market data per UNU key with EU6 and EU10 classification
POM_to_Tool_imputations	The substitution of estimated values for missing or inconsistent data items
POM_to_Tool	A table displaying the final result of placed on market per UNU key. This result will be entered as an input in e-waste generated tool
<i>The following sheets are hidden, it can be made visible by clicking on the "show sheets" button</i>	
HS_UNU_pair	Linkage of HS code and UNU Key
Input_HScode	Sheet used for entering EEE import, and export data based on the HS codes of a country under investigation
Weight_Year	Average weight of EEE per UNU Key for chosen Year of Import/Export and domestic production data. A sheet for converting EEE import, export and domestic production data in piece/unit or "kg" in tonnes
Input_CPCcode	A table to enter the domestic production data per CPC code in either "piece/unit" or "kg"
CPC_UNU_SplitMatrix	Matrix to transform CPC code into UNU-KEY
Import_timeseries	Time series import data per UNU key and HS code
Export_timeseries	Time series export data per UNU Key and HS code

CPC_timeseries	Time series production data per UNU Key
CPC_UNU	Time series production data per UNU key with EU6 and EU10 classification
Import_UNU	Time series import data per UNU key with EU6 and EU10 classification
Export_UNU	Time series export data per UNU key with EU6 and EU10 classification

The user can use "POM\_to\_Tool\_imputations" to enter missing and incorrect data points. The EEE POM calculation tool is developed in Excel 2019 as a ".xlsm" spreadsheet.

### 3. Using the EEE POM Calculation Tool

The "Frontpage" of the EEE POM calculation tool contain four buttons. A user can perform all necessary actions using these four buttons.



**Figure 1 showing buttons in the "frontpage" of EEE POM Calculation Tool**

#### 3.1 Hide/Show Sheets Button

There are total 15 sheets in the tool among which 11 are hidden. These 11 sheets can be made visible by the user using "show sheets" button. Clicking on the "Hide Sheets" button will hide the sheets again and only 4 of the 15 sheets will be unhidden.

### 3.2 EEE POM Calculation Tool Functionalities

The EEE POM can be calculated by entering the import, export, and domestic production data. The import and export data must be entered with reference to HS code (6-digit HS code 2017) and the country under investigation whereas the domestic production data must be entered with reference to CPC code (CPC version 2.1, 5 digit) and the country under question.

#### 3.2.1 Enter Import and Export Data

The first step is to click on **input import/export data** button on the "frontpage" sheet, it will bring the user to a pop-up window which will request the user to enter the year for which POM is to be calculated. Please note that the year should be entered in four digits (e.g. 2020) and the valid years are from 1980 to 2030.

Once the year has been specified, the user will be re-directed to the Input sheet (Input\_HScode) where they should enter import (column "C") and export (column "D") data per HS code (Column "A") as shown in Figure 2.

HS	Full name	IMPORT	EXPORT	UNIT	Possible Units	UNLU-KEY	CONVERTED UNITS IN	
							IMPORT	EXPORT
950300	Tricycles, scooters, pedal cars & similar wheeled toys, dolls' carriages, dolls; other toys, reduced-size ("scale") models & similar recreational models, working/rocs, puzzles of all kinds.			p/unit	p/unit or kg	5101	0	0
950450	Games, video game consoles and machines, other than those of subheading 9504 30			p/unit	p/unit or kg	5102	0	0
950990	Articles for funfairs, table and parlor games, nes			p/unit	p/unit or kg	5103	0	0
842390	Personal weighing machines, baby & household scales			kg	p/unit or kg	5201	0	0
842220	Dish washing machines, of other than household type			kg	p/unit or kg	5202	0	0
630110	Electric blankets of textile material			kg	p/unit or kg	5301	0	0
843100	Household type sewing machines			p/unit	p/unit or kg	5302	0	0
840100	Central heating boilers, nes			p/unit	p/unit or kg	5401	0	0
842112	Clothes-dryers, centrifugal			kg	p/unit or kg	5405	0	0
844310	Printing machinery, letterpress, other than rectified, excluding flexographic printing			p/unit	p/unit or kg	5504	0	0
844320	Sheet-fed, office offset presses, sheet's 230x36 cm			kg	p/unit or kg	5507	0	0
847130	Portable digital data pr			p/unit	p/unit or kg	5903	0	0
847240	Dig auto data proc w/ou			p/unit	p/unit or kg	5902	0	0
847490	Dig auto data proc units			p/unit	p/unit or kg	5902	0	0
847150	Digital process units wh			p/unit	p/unit or kg	5902	0	0
847600	10 units w/lt storage su			p/unit	p/unit or kg	5903	0	0
844331	Machines which perform two or more of the functions of printing, copying/facsimile transmission, capable of connecting to an automatic data processing machine to a network			kg	p/unit or kg	5904	0	0
847190	Automatic data processin			p/unit	p/unit or kg	5901	0	0
847170	Storage units			p/unit	p/unit or kg	5901	0	0
940200	Lighting sets of a kind used for Christmas trees			p/unit	p/unit or kg	5906	0	0
940540	Electric lamps, lighting fittings, nes			p/unit	p/unit or kg	5907	0	0
851230	Lighting/signaling equipment as used on bicycles			p/unit	p/unit or kg	5908	0	0
851110	Rubber or fire alarms and similar apparatus			kg	p/unit or kg	5909	0	0
854370	Other machines & apparatus for electrical machines & apparatus, other than machines & apparatus for electroplating/electrolysis/electrotherapeutic signal generators/particle accelerators.			kg	p/unit or kg	5901	0	0
854140	Photosensitive/photovoltaic/LED semiconductor devices			kg	p/unit or kg	5901	0	0
852900	Transmission apparatus for radio-broadcasting/television incorporating reception apparatus			p/unit	p/unit or kg	5904	0	0
852680	Television cameras, digital cameras & video camera recorders			p/unit	p/unit or kg	5906	0	0
851711	Line telephones sets, cord			p/unit	p/unit or kg	5905	0	0
851712	Telephones for cellular networks/for other wireless networks, other than line telephone sets with cordless			p/unit	p/unit or kg	5904	0	0
901840	Dental drill engines			kg	p/unit or kg	5902	0	0

**Figure 2 Input Import (column "C") and Export ("D") Data per HS Code**

The user should specify the unit (kg or piece (p)/unit) of entering import and export data in column "E". The possible units are already specified in column "G" (p/unit) and "I" (Kg) respectively. After entering the unit (kg or p/unit) and import and export data, click on the **continue** button. It will automatically store the data in column "L" and column "M" by converting p/unit or kg to tonnes. Please note that for column "C" (import data) and column "D" (export data) a value will be considered "invalid value" if is not a numeric character (e.g. ".", "@", "/" etc). For column "E" (unit) a value will be considered incorrect when the unit or format differs from the options provided in columns "G" and "I". After making the correction, the user can proceed to click on the **continue** button again. The **cancel** button is available in case the user wants to cancel the input.

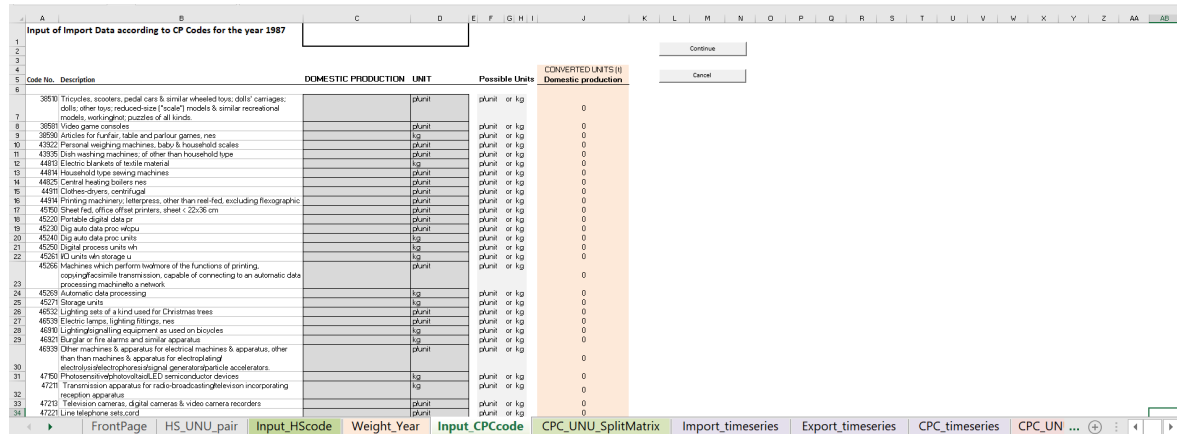
After successfully entering the unit, import and export data in a correct format as discussed above. Clicking on **continue** button will store the data and will get back the user to "frontpage" sheet. The next step is to enter domestic production data which is explained below in section 3.2.2.

#### 3.2.2 Enter Domestic Production Data

After redirecting to the "frontpage", the user should enter domestic production data of a country under investigation by clicking on **input domestic production data** button.

Clicking on **input domestic production data** button will bring you a pop-up window where the user has to enter the year for which POM is to be calculated. Please note that the year should be entered in four digits (e.g. 2020) and the valid years are from 1980 to 2030. Also, the year should be same as that of import and export data to calculate EEE POM data.

After specifying the year in the pop-up window, the user will be redirected to the "Input\_CPCcode" where the user should enter domestic production data (column "C") per CPC code as shown in figure 3 below.



**Figure 3 Input domestic production data in column "C"**

The user should also specify the unit of entering the domestic production data in column "D". The possible units are given in column "F" (p/unit) and "H" (kg) respectively. When the user will enter the data in column "C", it will be automatically convert the data into tonnes in column "J". After entering the domestic production data and their unit, click on **continue** button. clicking on **continue** button will store the data per UNU\_key in "CPC\_timeseries" sheet of respective year. An example of assigning the proportion of the CPC code to UNU-Key in "CPC\_disaggregate" is given below in Table 2. In case where the CPC codes are same for a number of HS codes (refer column HS code and CPC code of table 2) with varying UNU-Keys (Refer UNU-Key column of table 2) the ratio assigned to each UNU-Key is divided by the number of CPC codes. In table 2, 5 CPC codes (47321) are linked to 5 different HS codes and 4 similar UNU-Keys (0403) and with 1 unique UNU-key (0306). Therefore, the ratio assigned to each UNU-Key is  $1/5 = 0.2$ .

After clicking on **continue** button, the user will be redirected to the "frontpage" sheet to calculate POM as discussed in below in section 3.2.3.

**Table 2 An example to convert CPC code into UNU-Key**

HS Code	Full name	CPC code	UNU-Key	Ratio Assigned
851920	Apparatus operated by coins, banknotes, bank cards, tokens/by other means of payment	47321	0403	0.20
851930	Turntables (record-decks)	47321	0403	0.20
851950	Telephoning answering machines	47321	0306	0.20

851981	Other sound recording/reproducing apparatus, using magnetic, optical/semiconductor media, other than 8519.20, 8519.30, 8519.50	47321	0403	0.20
851989	Other sound recording/reproducing apparatus, other n.e.s. in Ch. 85.19	47321	0403	0.20

### 3.2.3 Calculate POM

Once the user has entered the import, export and domestic production data for the reference year, the tool can calculate the quantity of EEE POM using the apparent consumption methodology given in equation 1.

$$POM = Domestic\ Production + Import - Export \quad (1)$$

In case the country does not have the domestic production data of EEE, then the user can disregard inserting information on domestic production, or it can put "0" in the empty cells. Once the user entered the import, export, and their unit, the tool will automatically calculate the EEE POM using equation 2.

$$POM = Import - Export \quad (2)$$

After entering the data, when the calculations were completed, the user will get the notification and the result will be stored in "POM\_to\_Tool" sheet. This "POM\_to\_Tool" sheet will be used as an input to E-waste generated tool.

### 3.2.4 Performing a statistical analysis prior to inserting the EEE POM data in E-waste Generated Tool

Prior to inserting the EEE POM data into the E-waste Generated Tool, it is of paramount importance to perform a statistical analysis of the obtained data to check its reliability and accuracy. The statistical analysis should as a minimum criterion include the following:

- detection of possible outliers;
- imputation steps for missing data points; and
- an analysis of the trends of the time series.

The user may edit the data in the "POM\_to\_Tool\_imputations" sheet in the case an outlier may be found. However, keep in mind that entering an invalid or incorrect data point will result in a modified, sometimes incorrect, or unexpected result for the amount of EEE POM.

### 3.2.5 Calculating the E-Waste Generation Using the E-Waste Generated Tool

Once the data from the "POM\_to\_Tool" sheet of the EEE POM calculation Tool has been analysed, polished, refined and further estimated, the user can copy it into the "POM" sheet of the E-waste Generated Calculation Tool.

Finally, the user can go on the "FrontPage" sheet of the E-waste Generated Calculation Tool and press the Calculate E-waste Generated button to calculate the E-waste arising from the country's POM data.

## **Annex**

### **Annex 1 – linkage between HS code and UNU-Keys**

The linkage between the HS code and UNU-Keys with their description is given in the following link.

<https://exp.unu.edu/media/project/174/UNU-KEYS-to-HS-Codes.xls>

### **Annex 2 - linkage between the HS code and CPC code**

The linkage between the HS code and CPC code is given in the following link.

[https://unstats.un.org/unsd/classifications/Econ/tables/CPC/CPCv21\\_HS2017/CPC21-HS2017.csv](https://unstats.un.org/unsd/classifications/Econ/tables/CPC/CPCv21_HS2017/CPC21-HS2017.csv)