

Model for Analysis of Energy Demand (MAED)

Hands-on 2: Setting Up the Structure Part I

Learning outcomes

By the end of this exercise, you will be able to:

1. Manage Case Studies in MAED-D
2. Declare Definitions of a Case Study
3. Navigate the Main Menu in MAED-D
4. Add New Years in the Study Period

Activity 1: Manage Case Studies in MAED-D

In this hands-on session, you will familiarize yourself with the operation of the MAED-D model. You will practice managing case studies and declaring the definitions of a case study. To participate in this training session, you must have already installed the MAED software on your computer. During the session, you will be shown how to proceed through the successive steps of model building. You should replicate each step on your own computer.

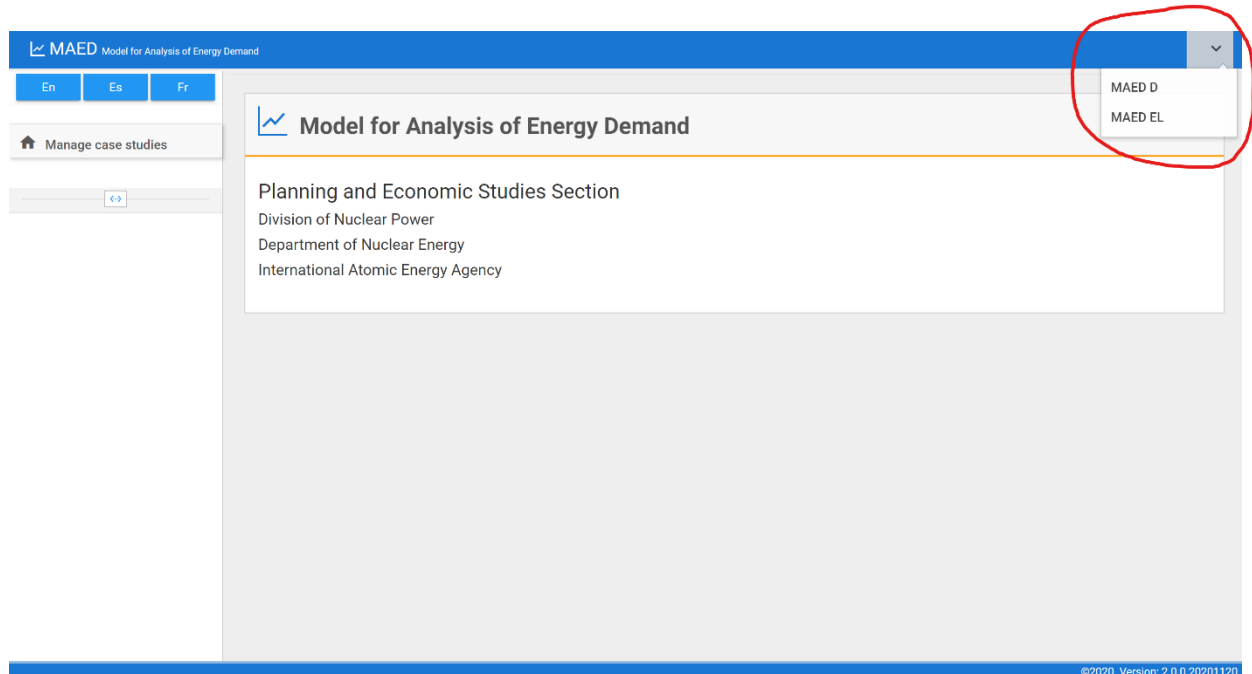
The previous version of MAED was two workbooks in EXCEL. All the information required for the simulation, as well as its results, were presented in different worksheets. Problems sometimes arose with security levels or certain computer configurations that did not allow the model to run. A new version of MAED has now been developed as a Web-based platform. This adapts the software to current computer trends.



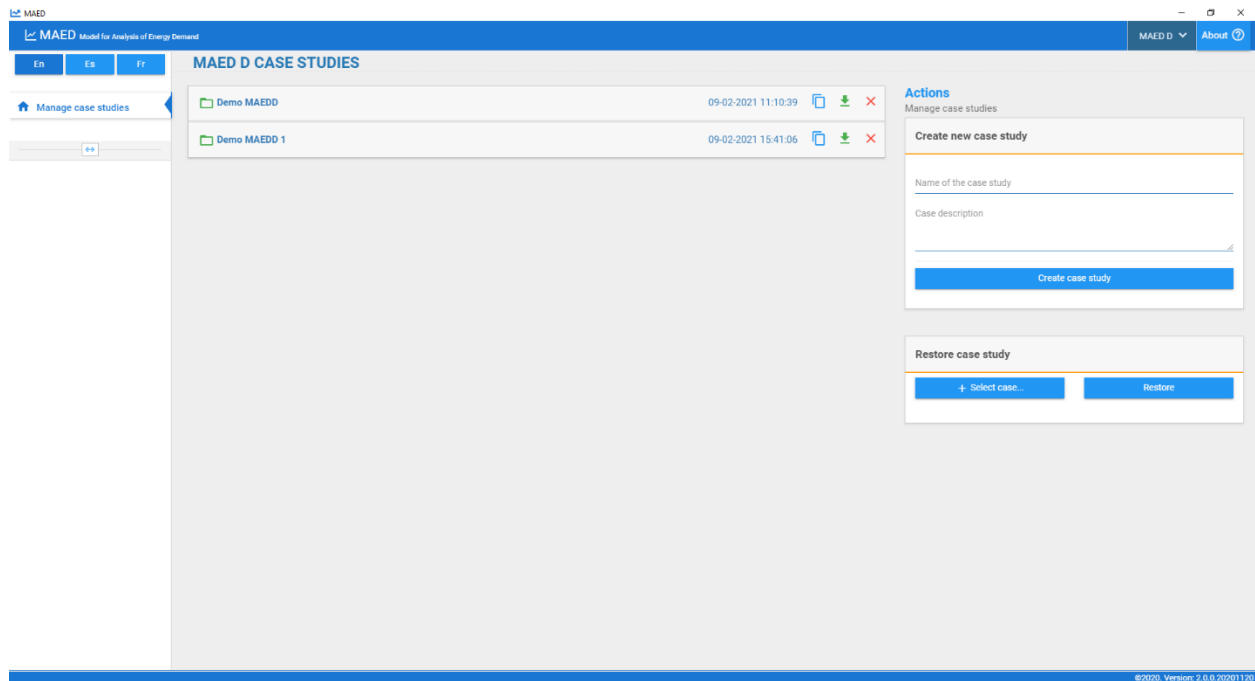
Each time MAED is started, the first screen allows you to choose the model in which you are going to work: MAED-D, for the analysis of the energy demand or MAED-EL, for the analysis of electricity demand curves.

In the following few hands-on exercises, we will learn how to use the first one, MAED-D. We will work with MAED-EL in the next part of the course.

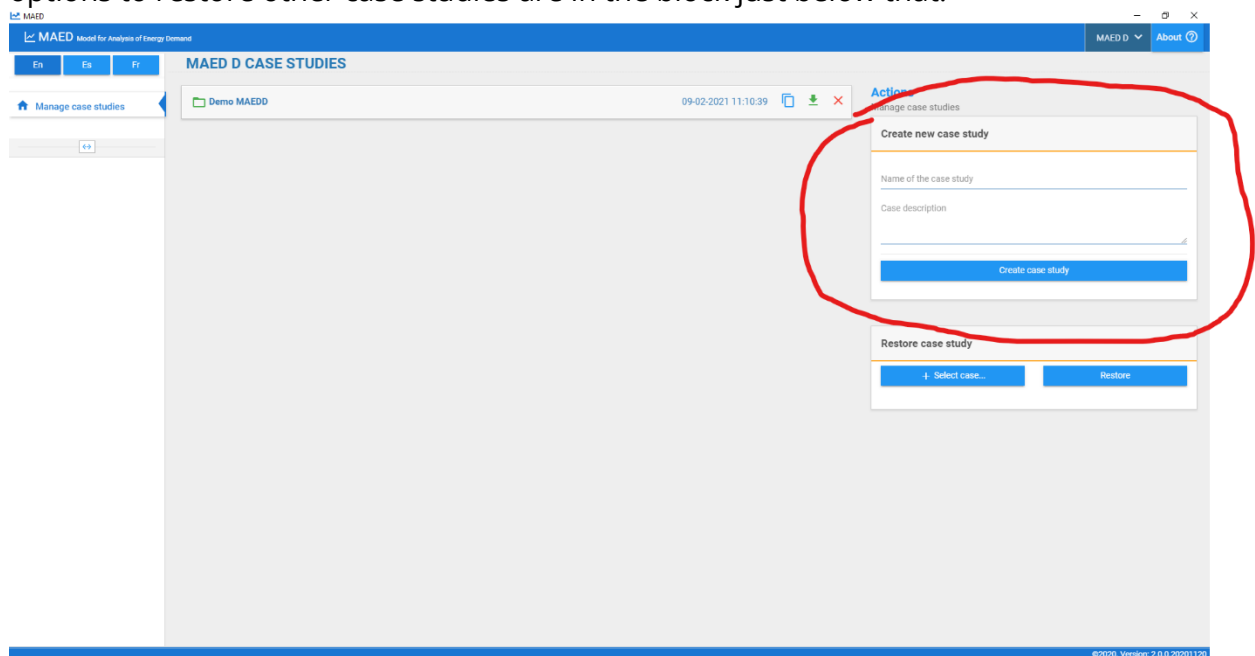
To start, we click on MAED-D from the main menu as shown below:



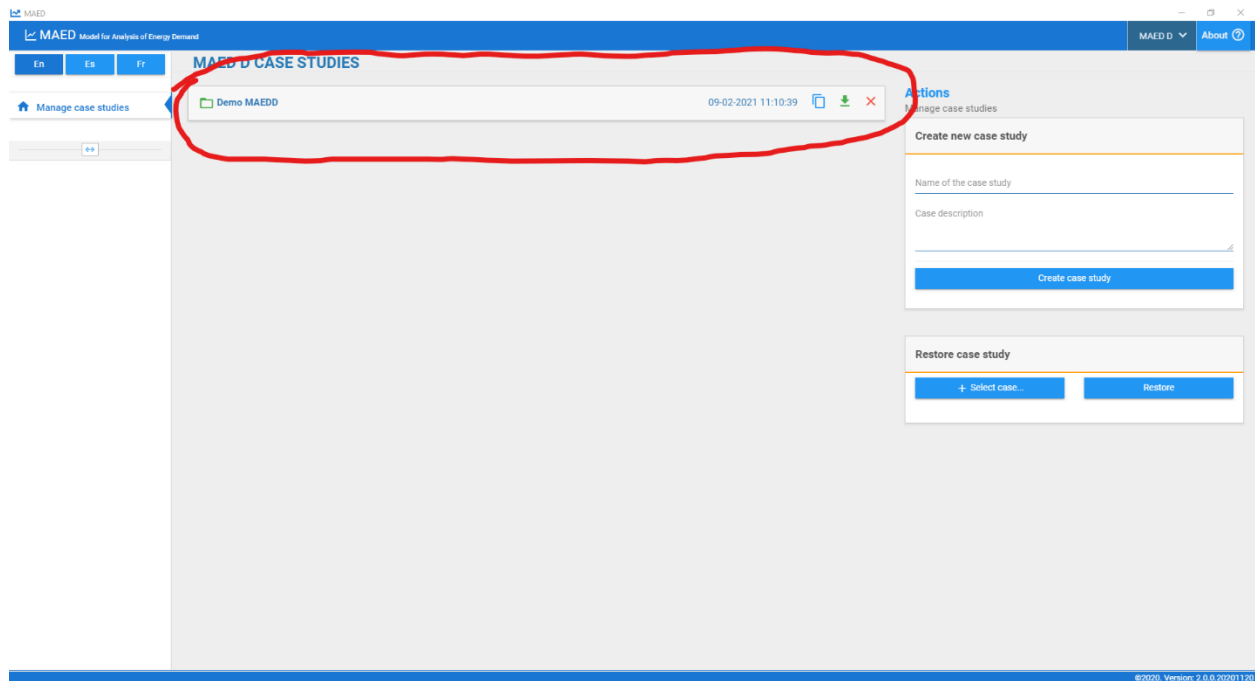
This will bring you to the menu to handle cases in MAED. This menu is shown below:



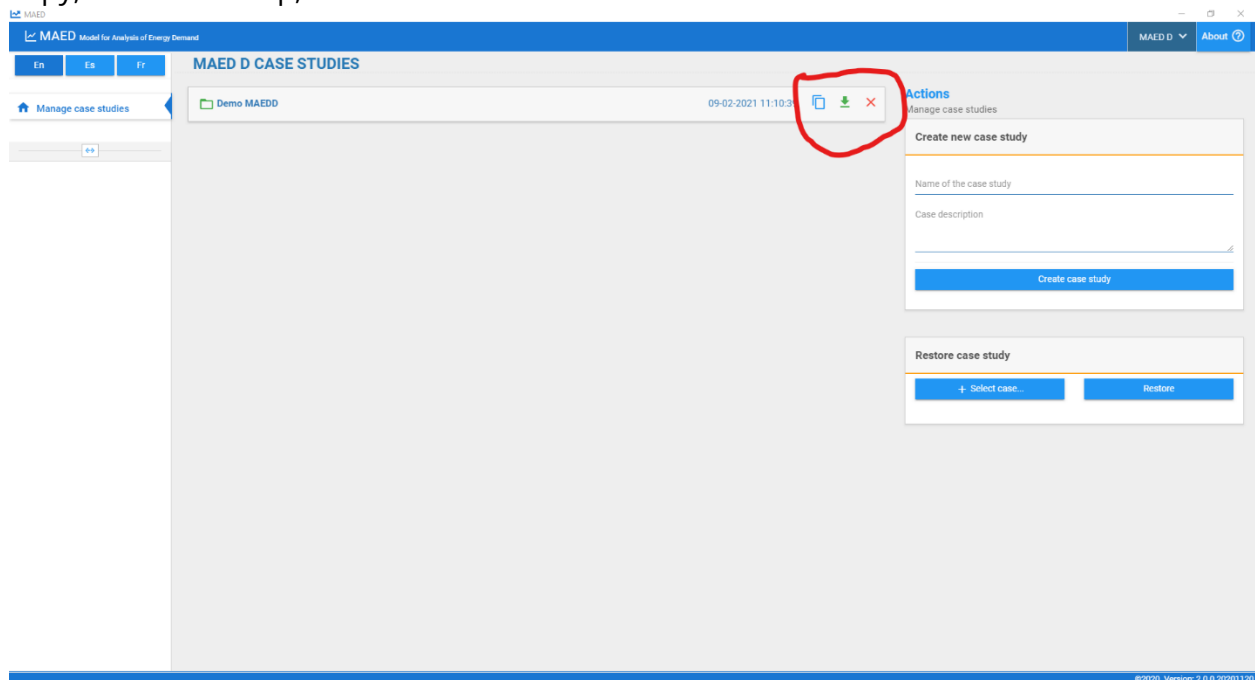
As highlighted below, the block on the right shows options for creating a new case study. The options to restore other case studies are in the block just below that:



The cases that currently exist in the data subdirectories of MAED are listed in the middle:

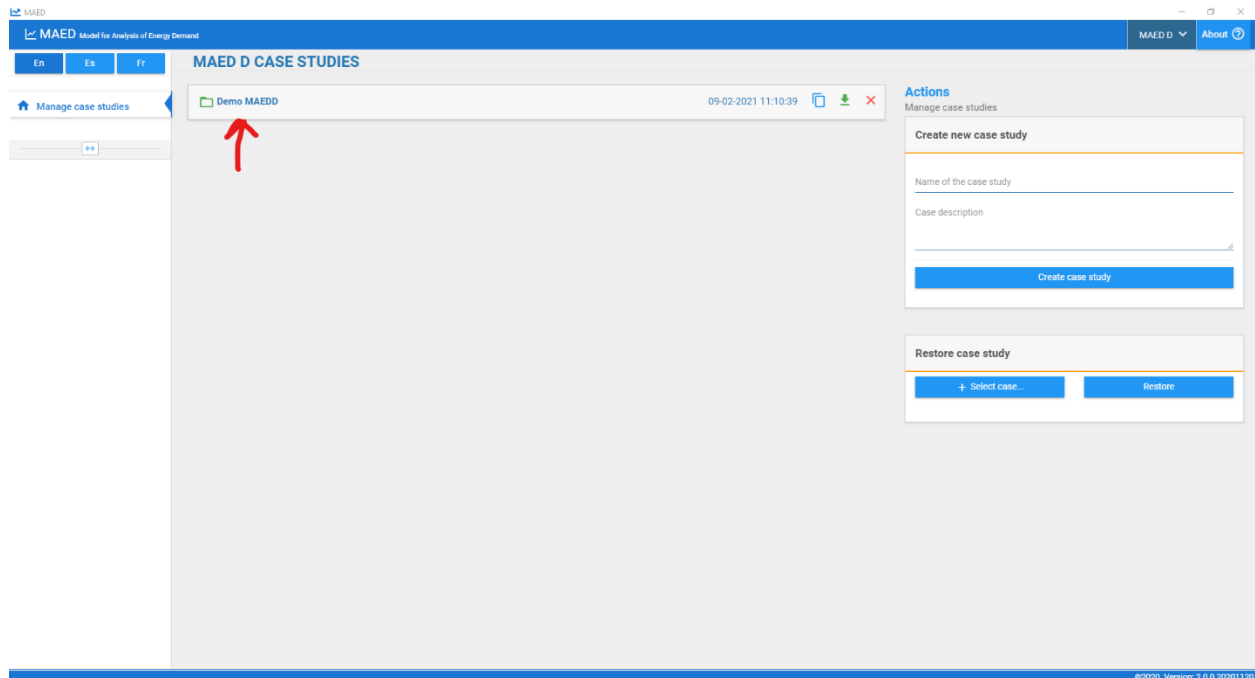


You can manage an existing case using the buttons on the right of the case name. You can copy, make a backup, or delete the case.

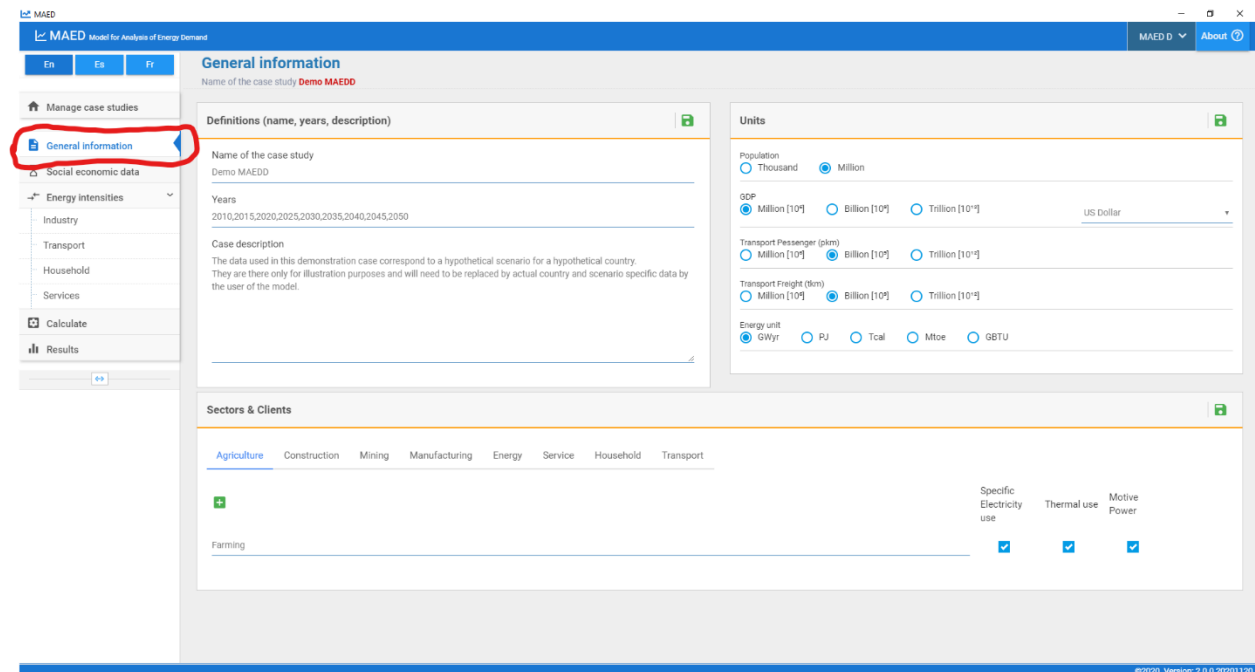




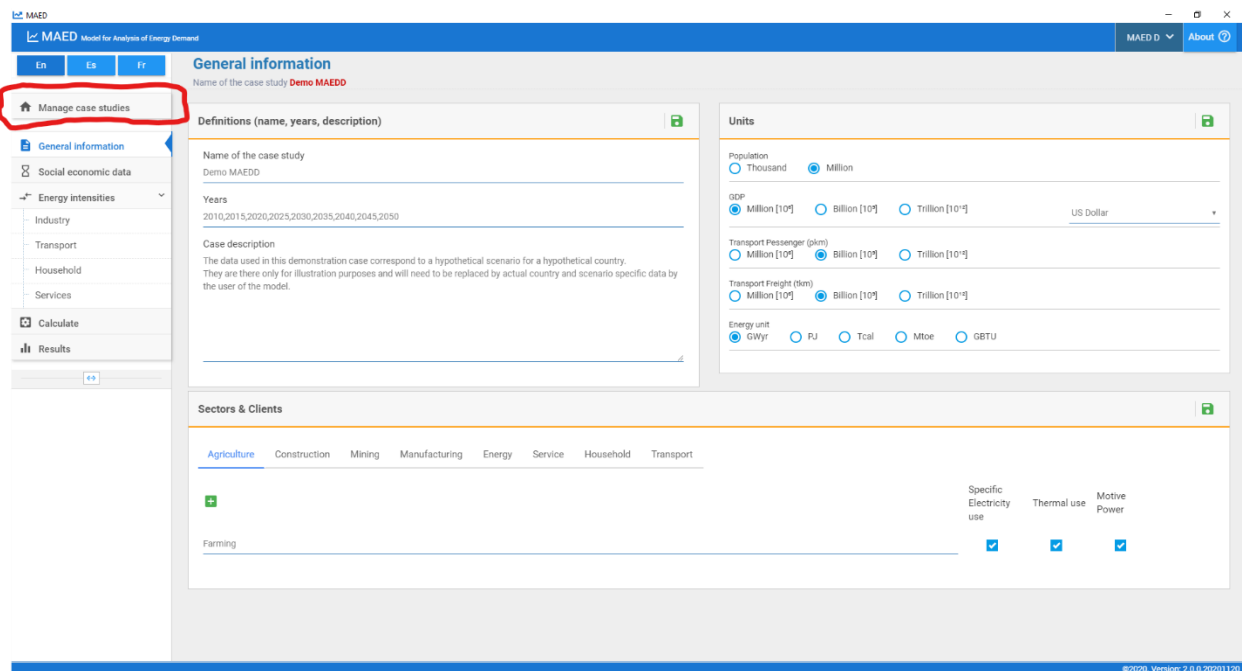
To take a quick tour of the model, and to have a look at some different internal menus, let us enter the case, Demo MAEDD. Just click on its name to enter the case.



The programme takes you to the General Information page. Note that the General Information tab is highlighted in the navigation menu. This indicates that you are currently on the General Information page.



We will be making some changes in the structure of the model to demonstrate the functionality of the software. Since we do not want to damage the case we have now, we will work on a copy of it. We must go to the Case Studies Management menu. To do so, we click on the button, Manage Case Studies, in the navigation menu.



MAED Model for Analysis of Energy Demand

General information

Name of the case study **Demo MAEDD**

Definitions (name, years, description)

Name of the case study
Demo MAEDD

Years
2010, 2015, 2020, 2025, 2030, 2040, 2045, 2050

Case description
The data used in this demonstration case correspond to a hypothetical scenario for a hypothetical country. They are there only for illustration purposes and will need to be replaced by actual country and scenario specific data by the user of the model.

Units

Population
☐ Thousand ☒ Million

GDP
☒ Million [10⁹] ☐ Billion [10⁹] ☐ Trillion [10¹²] US Dollar

Transport Passenger (pkm)
☐ Million [10⁹] ☒ Billion [10⁹] ☐ Trillion [10¹²]

Transport Freight (tkm)
☐ Million [10⁹] ☒ Billion [10⁹] ☐ Trillion [10¹²]

Energy unit
☒ GWyrs ☐ PJ ☐ Tcal ☐ Mtoe ☐ GBTU

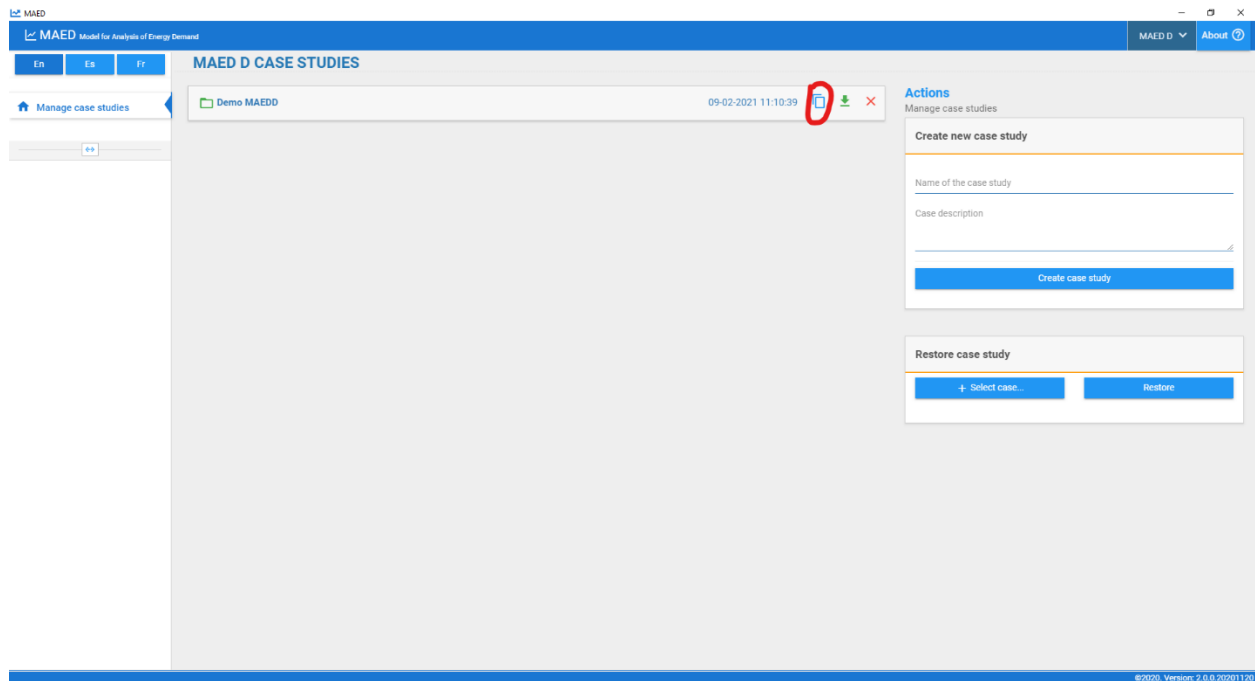
Sectors & Clients

Agriculture Construction Mining Manufacturing Energy Service Household Transport

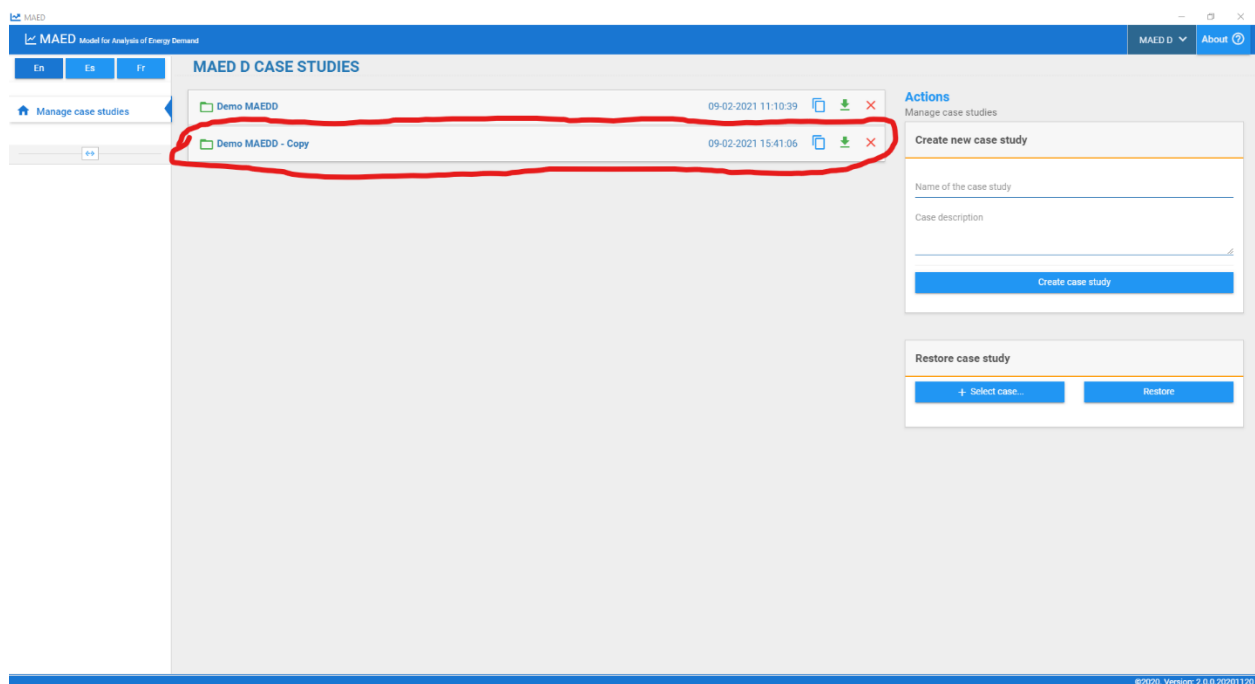
	Specific Electricity use	Thermal use	Motive Power
Farming	☒	☒	☒

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We need to copy the case: Demo MAEDD. To do so, we simply click on the copy button to the right of the case name.



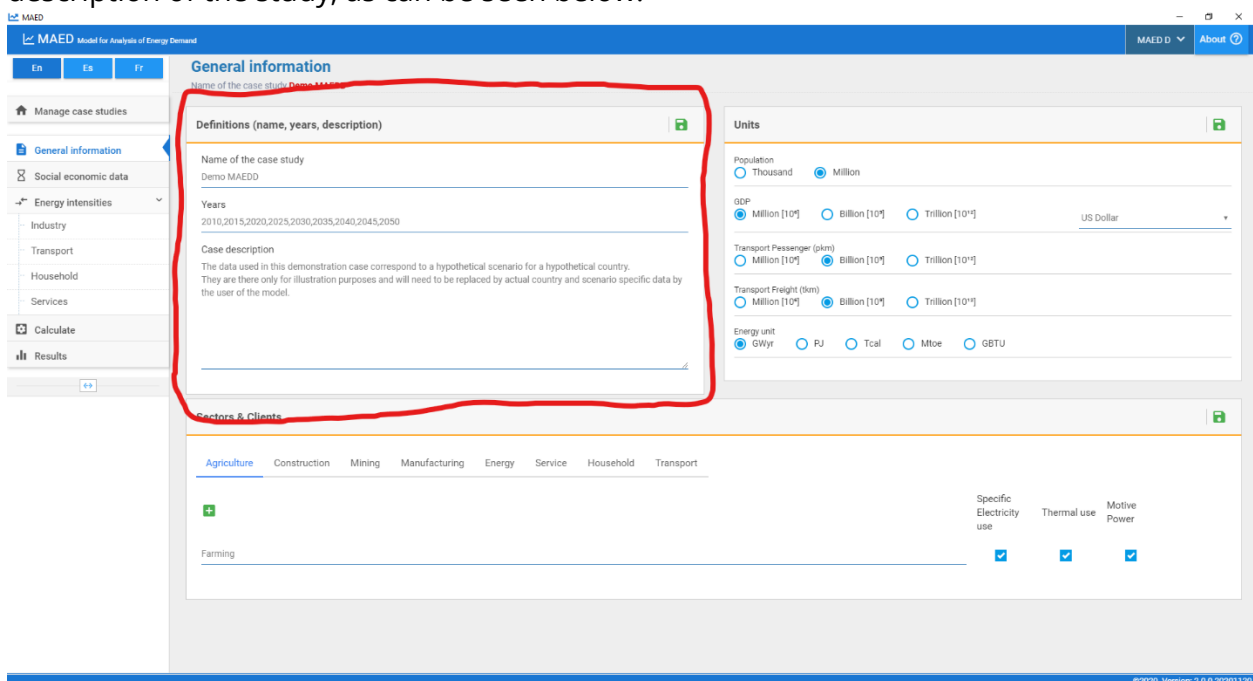
A new case should now appear underneath the original Demo MAEDD. Note that by default, this case has the same name as the original, but with an extra “-copy”. We will learn how to change that later.



Congratulations, you can now manage cases in MAED-D.

Activity 2: Declare Definitions of a Case Study

The start menu of MAED-D should now show the case that we copied in the previous activity. To enter the case, simply click on its name (it should be called Demo MAEDD - Copy). This should bring you to the General Information page. This page contains the Case Study Definitions. The case definitions include the name of the case, the years of the study, and a description of the study, as can be seen below:



MAED Model for Analysis of Energy Demand

MAED D About

EA ES ET

Manage case studies

General information

Social economic data

Energy intensities

Industry

Transport

Household

Services

Calculate

Results

General information

Name of the case study Demo MAEDD

Definitions (name, years, description)

Name of the case study

Demo MAEDD

Years

2010,2015,2020,2025,2030,2035,2040,2045,2050

Case description

The data used in this demonstration case correspond to a hypothetical scenario for a hypothetical country. They are there only for illustration purposes and will need to be replaced by actual country and scenario specific data by the user of the model.

Units

Population

☐ Thousand ☒ Million

GDP

☒ Million [10⁶] ☐ Billion [10⁹] ☐ Trillion [10¹²] US Dollar

Transport Passenger (pkm)

☐ Million [10⁶] ☒ Billion [10⁹] ☐ Trillion [10¹²]

Transport Freight (tkm)

☐ Million [10⁶] ☒ Billion [10⁹] ☐ Trillion [10¹²]

Energy unit

☒ GWyr ☐ PJ ☐ Tcal ☐ Mtoe ☐ GBTU

Sectors & Clients

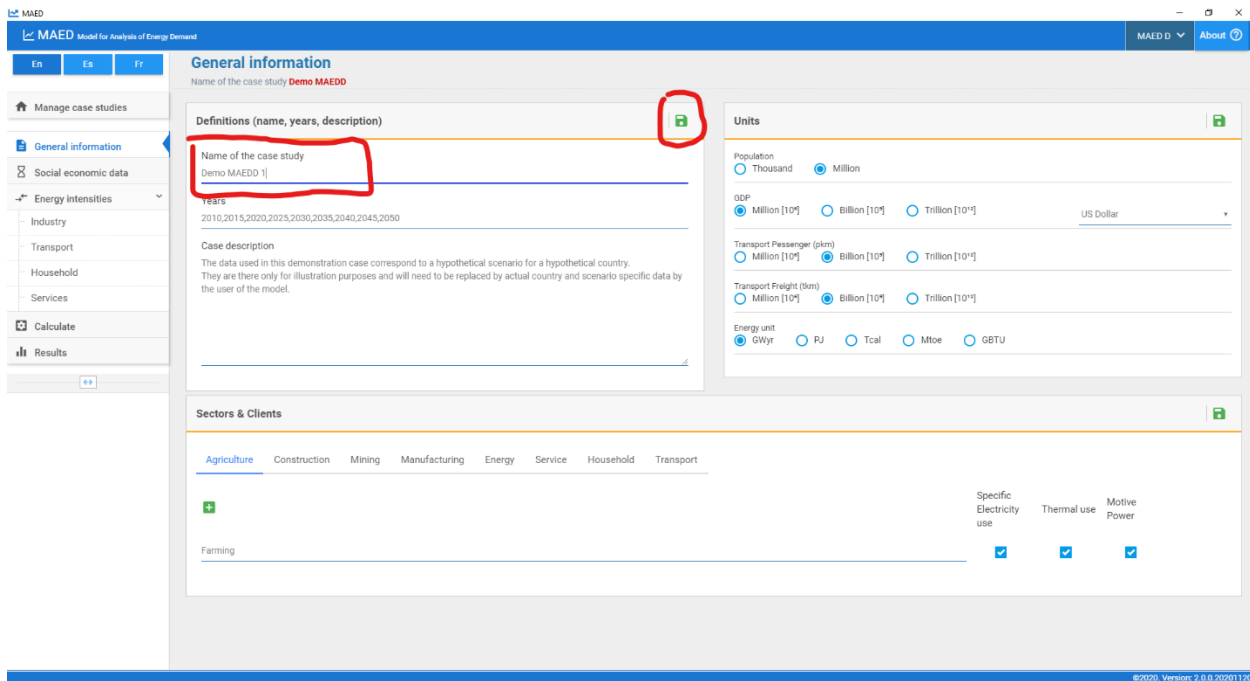
Agriculture Construction Mining Manufacturing Energy Service Household Transport

Farming

Specific Electricity use Thermal use Motive Power

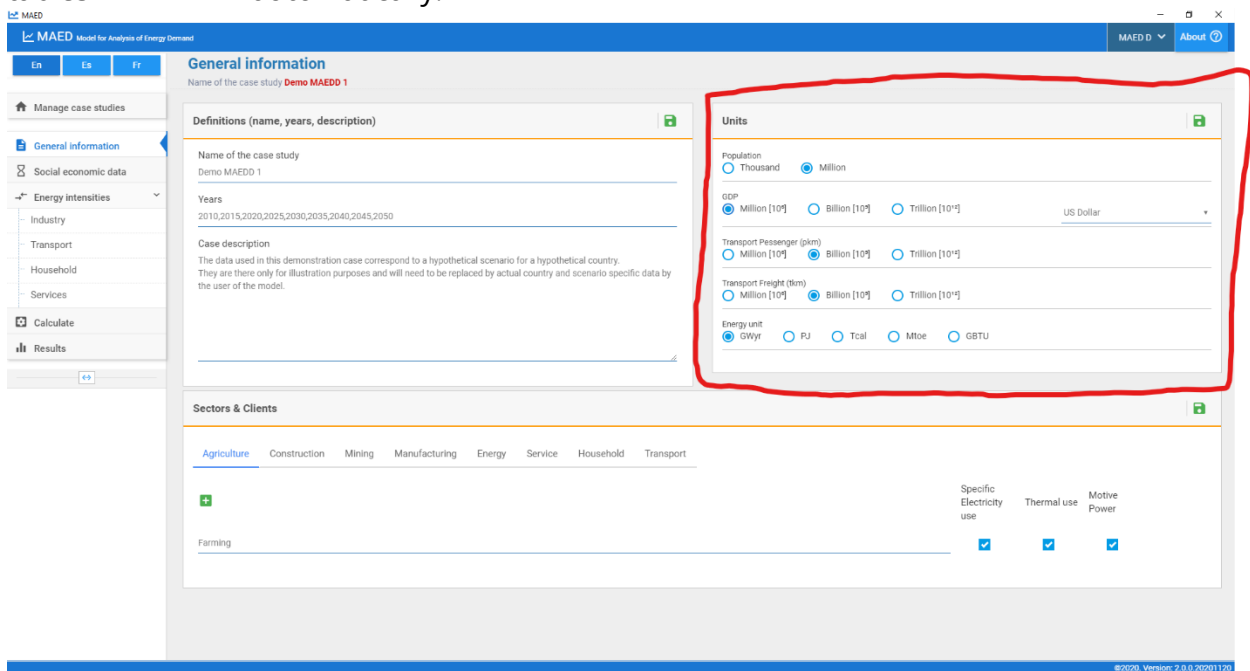
©2020, Version: 2.6.0.20201120

Note that the name of the copy of the study is the same as the original case study. Click on the Name of case study box and change “Demo MAEDD” to “Demo MAEDD 1”. After changing the name click the save button on the right to save the changes. Remember to click save whenever you make any changes to your cases.



The screenshot shows the MAED Model for Analysis of Energy Demand interface. The 'General information' tab is active. The 'Definitions (name, years, description)' section has a red box around the 'Name of the case study' field, which contains 'Demo MAEDD 1'. A green save icon is circled in red. The 'Units' section on the right allows selection of units for Population, GDP, Transport Passenger, Transport Freight, and Energy unit. The 'Sectors & Clients' section shows 'Agriculture' selected, with 'Farming' listed under it. The bottom right shows checkboxes for 'Specific Electricity use', 'Thermal use', and 'Motive Power', all of which are checked.

The units used for population, GDP, Transport Passenger, Transport Freight, and Energy can be selected in the block at the right of the definitions block. Remember to click the save button if you make changes to the units of the study. This will update all corresponding tables in MAED-D automatically.

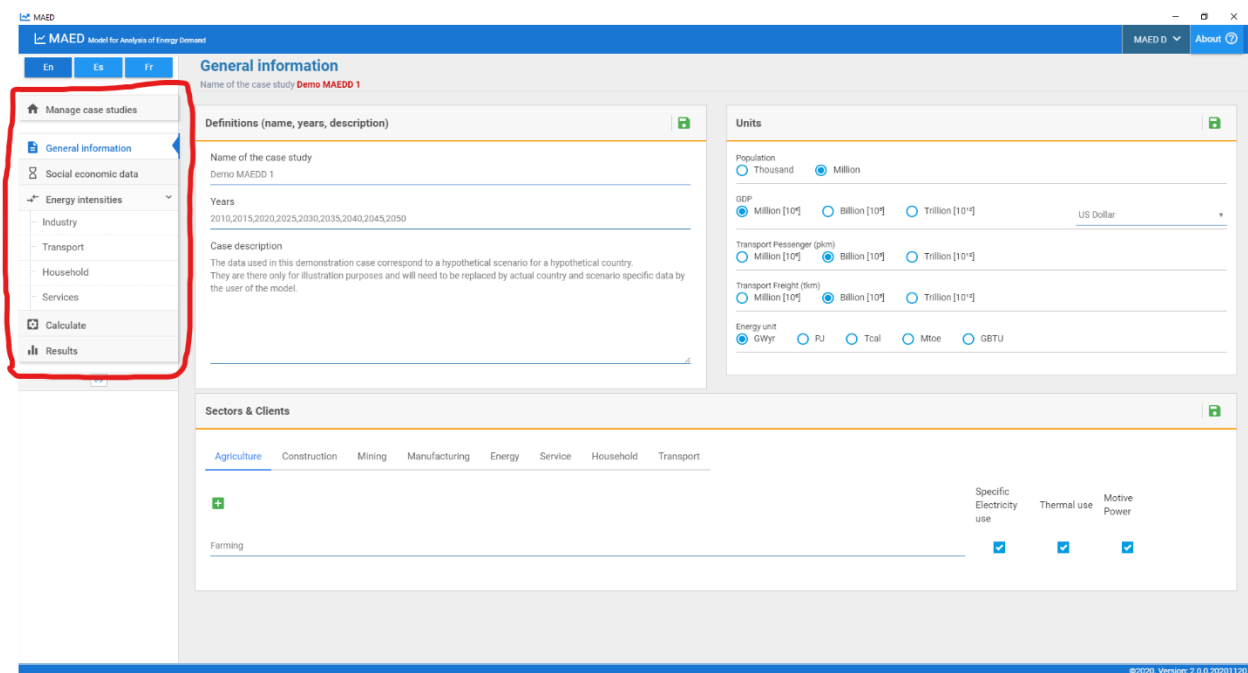


This screenshot is identical to the one above, but with a red box highlighting the 'Units' section. This section contains radio buttons for 'Population' (Thousand, Million), 'GDP' (Million [10⁹], Billion [10⁹], Trillion [10¹²]), 'Transport Passenger (pkm)' (Million [10⁹], Billion [10⁹], Trillion [10¹²]), 'Transport Freight (tkm)' (Million [10⁹], Billion [10⁹], Trillion [10¹²]), and 'Energy unit' (GWyr, PJ, Tcal, Mtoe, GBTU). The 'US Dollar' unit is selected for GDP.

Congratulations, you can now declare the definitions of a case study.

Activity 3: Navigate the Main Menu in MAED-D

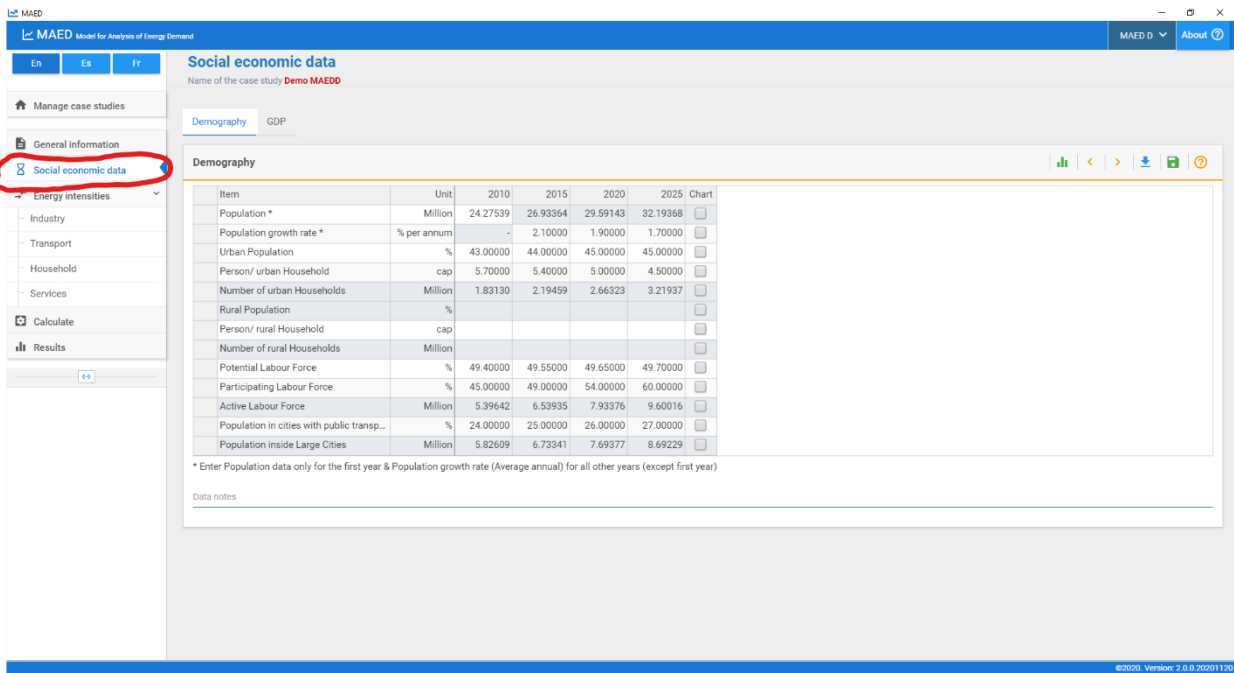
We shall now try navigating the main menu of MAED-D. The menu to navigate different pages of MAED-D is located on the block on the left.



At this point we recommend you go to the software to explore the various pages available by clicking on their names in the navigation menu. To return to the previous menu, simply click on the General information tab.

At this moment, Structure Definitions are active. These will generate the structure of the model to be used to analyse the demand for the country or the region being studied. The other tabs will enable tables for the input of the technical data of your model.

For example, when you click on social economic data a new page is enabled to introduce demographic and economic data. Let us see, for example, what the demographic data that the software asks for. To go to the demographic data tab, click on the Social economic data tab in the menu.



Social economic data

Name of the case study: **Demo MAED-D**

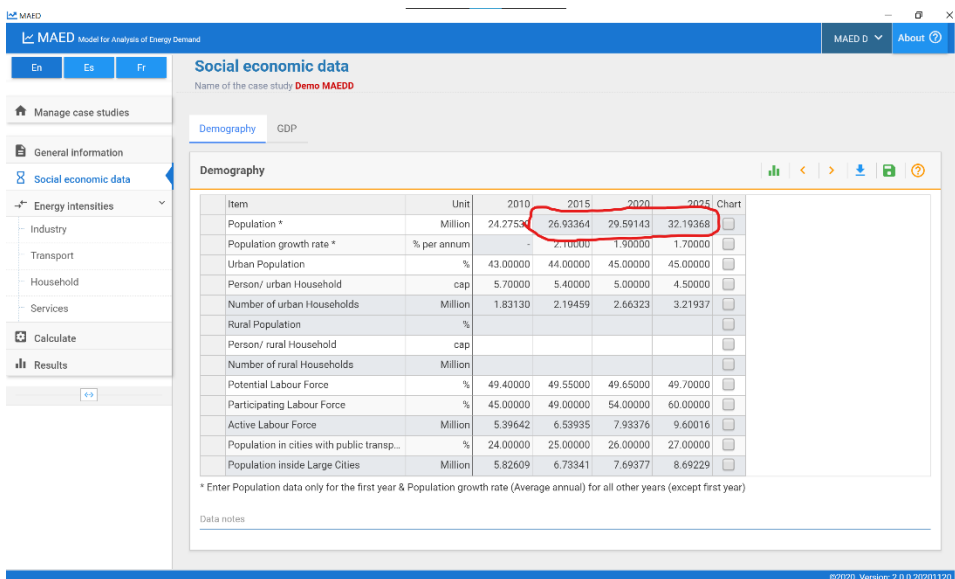
Demography

Item	Unit	2010	2015	2020	2025	Chart
Population *	Million	24.27539	26.93364	29.59143	32.19368	☐
Population growth rate *	% per annum	-	2.10000	1.90000	1.70000	☐
Urban Population	%	43.00000	44.00000	45.00000	45.00000	☐
Person/ urban Household	cap	5.70000	5.40000	5.00000	4.50000	☐
Number of urban Households	Million	1.83130	2.19459	2.66323	3.21937	☐
Rural Population	%					☐
Person/ rural Household	cap					☐
Number of rural Households	Million					☐
Potential Labour Force	%	49.40000	49.55000	49.65000	49.70000	☐
Participating Labour Force	%	45.00000	49.00000	54.00000	60.00000	☐
Active Labour Force	Million	5.39642	6.53935	7.93376	9.60016	☐
Population in cities with public transp...	%	24.00000	25.00000	26.00000	27.00000	☐
Population inside Large Cities	Million	5.82609	6.73341	7.69377	8.69229	☐

* Enter Population data only for the first year & Population growth rate (Average annual) for all other years (except first year)

Data notes

This is the table for entering demographic data. The shaded cells are results of calculations made by the tool. Shaded cells are blocked from editing. The other cells are available for entering numeric values.



Social economic data

Name of the case study: **Demo MAED-D**

Demography

Item	Unit	2010	2015	2020	2025	Chart
Population *	Million	24.27539	26.93364	29.59143	32.19368	☐
Population growth rate *	% per annum	-	2.10000	1.90000	1.70000	☐
Urban Population	%	43.00000	44.00000	45.00000	45.00000	☐
Person/ urban Household	cap	5.70000	5.40000	5.00000	4.50000	☐
Number of urban Households	Million	1.83130	2.19459	2.66323	3.21937	☐
Rural Population	%					☐
Person/ rural Household	cap					☐
Number of rural Households	Million					☐
Potential Labour Force	%	49.40000	49.55000	49.65000	49.70000	☐
Participating Labour Force	%	45.00000	49.00000	54.00000	60.00000	☐
Active Labour Force	Million	5.39642	6.53935	7.93376	9.60016	☐
Population in cities with public transp...	%	24.00000	25.00000	26.00000	27.00000	☐
Population inside Large Cities	Million	5.82609	6.73341	7.69377	8.69229	☐

* Enter Population data only for the first year & Population growth rate (Average annual) for all other years (except first year)

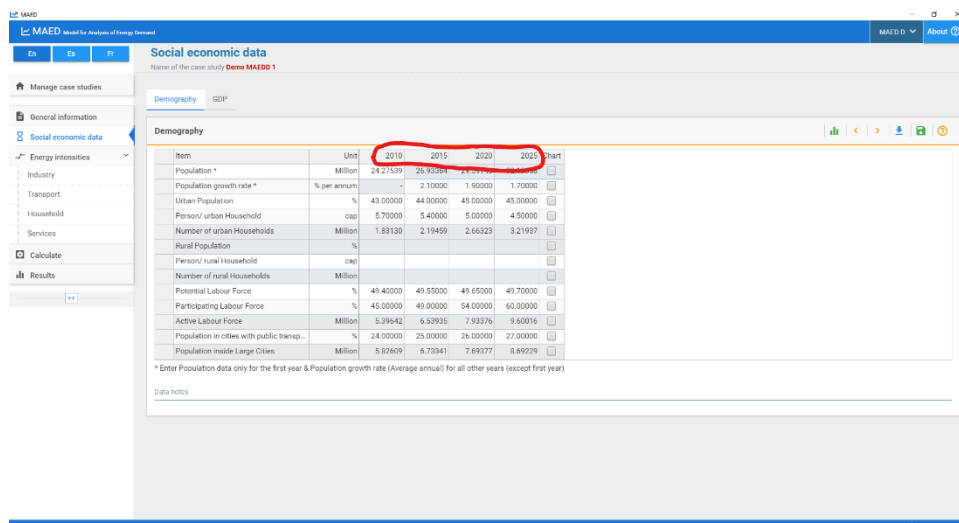
Data notes

Congratulations, you can now navigate the main menu in MAED-D.

Activity 4: Add New Years in the Study Period

In this activity we shall add more years to the study period of a case study.

The study period of the Demo MAEDD 1 case contains the years 2010, 2015, 2020, and 2025. All tables in MAED-D have these years. Let us confirm it by looking at a couple of them: the demographic data and the energy intensities of motive power. Click on the Social economic data tab in the main menu to access the demography page.

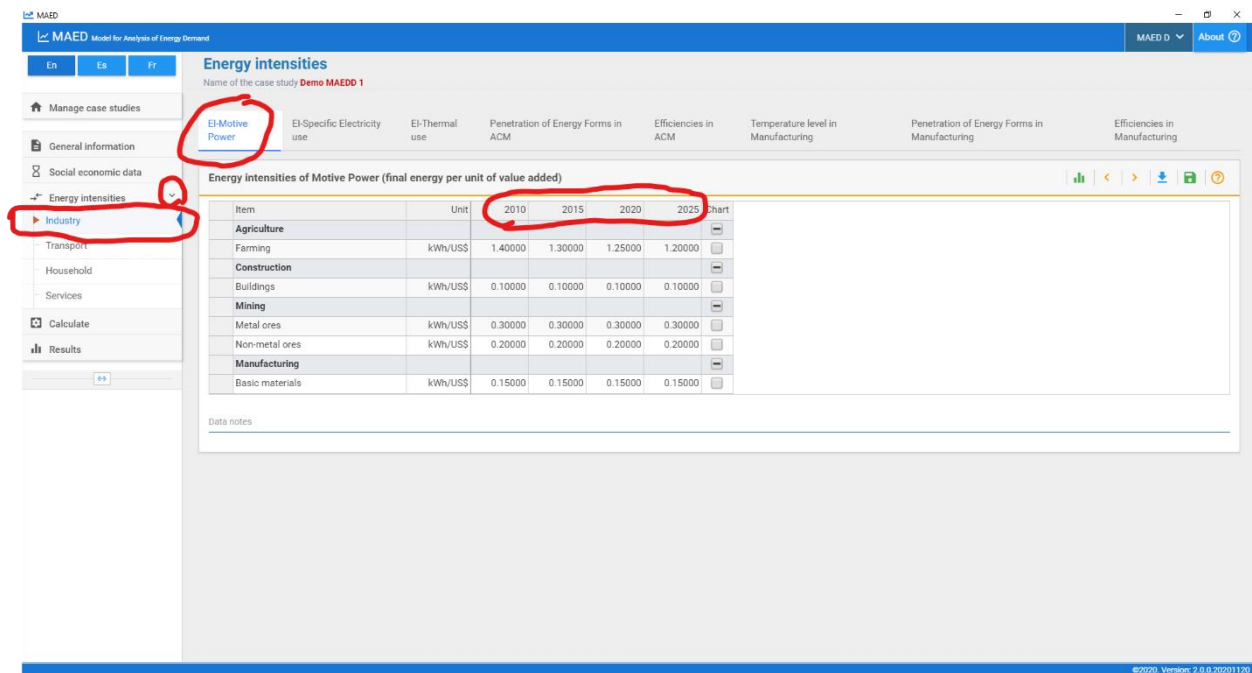


Item	Unit	2010	2015	2020	2025	Chart
Population *	Million	24.27339	25.93264	27.25100	28.25100	☐
Population growth rate *	% per annum	-	2.10000	1.80000	1.70000	☐
Urban Population	%	43.00000	44.00000	45.00000	45.00000	☐
Person/urban Household	cap	5.70000	5.40000	5.00000	4.50000	☐
Number of urban Households	Million	1.83130	2.19459	2.66323	3.21937	☐
Rural Population	%					☐
Person/ rural Household	cap					☐
Number of rural Households	Million					☐
Potential Labour Force	%	49.40000	49.55000	49.65000	49.70000	☐
Participating Labour Force	%	45.00000	49.90000	54.00000	60.00000	☐
Active Labour Force	Million	5.28642	6.53935	7.93376	9.62016	☐
Population in cities with public transp.	%	24.00000	25.00000	26.00000	27.00000	☐
Population inside Large Cities	Million	5.82609	6.73341	7.69377	8.69279	☐

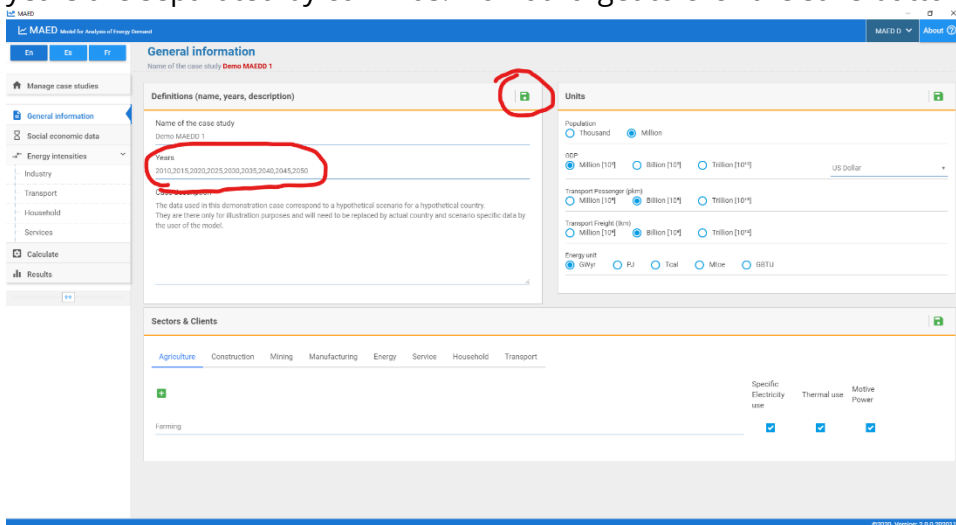
* Enter Population data only for the first year & Population growth rate (Average annual) for all other years (except first year)

Data notes

To access the energy intensity of motive power, click the following in the main menu: Energy Intensities -> Industry and then click EI-Motive Power. The energy intensity of motive power also contains the same years.



We will now extend the case study period to 2050. To do this, we will go to the general information page. We will now add the years 2030, 2035, 2040, 2045 and 2050. Note that the years are separated by commas. Do not forget to click the save button to save the changes.



General information
Name of the case study: Demo MAED 1

Definitions (name, years, description) | Units

Name of the case study: Demo MAED 1

Years: 2010,2015,2020,2025,2030,2035,2040,2045,2050

The data used in this demonstration case correspond to a hypothetical scenario for a hypothetical country. They are there only for illustration purposes and will need to be replaced by actual country and scenario specific data by the user of the model.

Units:

- Population: ☐ Thousand ☒ Million
- GDP: ☒ Million [10⁶] ☐ Billion [10⁹] ☐ Trillion [10¹²] US Dollar
- Transport Passenger (pkm): ☐ Million [10⁶] ☒ Billion [10⁹] ☐ Trillion [10¹²]
- Transport Freight (tkm): ☐ Million [10⁶] ☒ Billion [10⁹] ☐ Trillion [10¹²]
- Energy unit: ☒ GWh/yr ☐ PJ ☐ Tcal ☐ Mtoe ☐ GJ/tu

Sectors & Clients

Agriculture | Construction | Mining | Manufacturing | Energy | Service | Household | Transport

Farming

Specific Electricity use: ☒ Thermal use: ☒ Motive Power: ☒

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Let us review the tables of the demographic data.

MAED Model for Analysis of Energy Network

MAED ID: [] About []

En Es Rt

Manage case studies

General information

Social economic data

Energy intensities

Calculate

Results

Social economic data

Demography

Item Unit 2010 2015 2020 2025 2030 2035 2040 2045 2050 Part

Population *	Million	24.27529	26.93364	29.59143	32.19268					
Population growth rate *	% per annum	-	2.10000	1.90000	1.70000					
Urban Population	%	43.00000	44.00000	45.00000	45.00000					
Person/urban Household	cap	5.70000	5.40000	5.00000	4.50000					
Number of urban Households	Million	1.83130	2.19499	2.66323	3.21927					
Rural Population	%									
Person/rural Household	cap									
Number of rural Households	Million									
Potential Labour Force	%	49.40000	49.50000	49.60000	49.70000					
Participating Labour Force	%	45.00000	49.00000	54.00000	60.00000					
Active Labour Force	Million	5.39642	6.59935	7.93376	9.60976					
Population in cities with public transp...	%	24.00000	25.00000	26.00000	27.00000					
Population inside Large Cities	Million	5.82609	6.73341	7.69377	8.69229					

* Enter Population data only for the first year & Population growth rate (Average annual) for all other years (except first year)

Data notes

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Let us also review the tables of the energy intensities of motive power.

MAED Model for Analysis of Energy Network

MAED ID: [] About []

En Es Rt

Manage case studies

General information

Social economic data

Energy intensities

Calculate

Results

Energy intensities

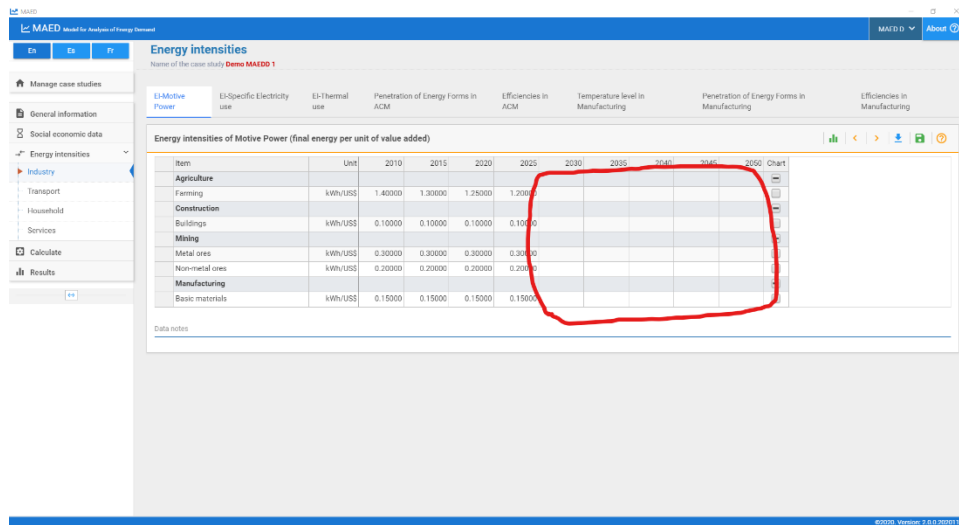
Item Unit 2010 2015 2020 2025 2030 2035 2040 2045 2050 Part

Agriculture									
Farming	kWh/US\$	1.40000	1.30000	1.25000	1.20000				
Construction									
Buildings	kWh/US\$	0.10000	0.10000	0.10000	0.10000				
Mining									
Metal ores	kWh/US\$	0.30000	0.30000	0.30000	0.30000				
Non-metal ores	kWh/US\$	0.20000	0.20000	0.20000	0.20000				
Manufacturing									
Basic materials	kWh/US\$	0.15000	0.15000	0.15000	0.15000				

Data notes

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We see that, in both tables, the study period has extended. Also notice that there are no data for these new years.



Congratulations, you have now successfully added new years to the definition of your case study.



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