



# Model for Analysis of Energy Demand (MAED)

## Hands-on 5: Entering Input Data for the Reconstruction of the Base Year

### Learning outcomes

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

1. Enter General Information Data for the Reconstruction of the Base Year
2. Enter Socio Economic Data for the Reconstruction of the Base Year
3. Visualize Socio Economic Intermediate Results
4. Enter Sector Specific data (Agriculture) for the Reconstruction of the Base Year
5. View Results

### Activity 1: Adding Data for the Base Year Reconstruction (General Info)

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In the previous Hands-on, we configured the model structure of our case study. All the input and output data tables now correspond to the defined structure. The model is now ready to be loaded with input data.

Input data are usually entered in two phases. The first phase involves **reconstructing the base year**. The second phase involves entering **scenario data**, which are data with the assumptions about future years – we will learn how to input these future data in Hands-on 7.



When phase one is completed and the reconstructed data for the base year are entered, it should not be changed. To test multiple scenarios, we need only repeat phase two and enter new scenario data based on new assumptions about future years.

**N.B. The Base Year must be reconstructed for each Sector, to check that all the assumptions for that sector are correct.** We will now learn how to do it for the Agriculture and the Manufacturing Sector. In Hands-on 6, we will learn how to reconstruct the Household sector. Then, you must apply the same methodology to all the other sectors in your case.

We shall practise this procedure by entering some demonstration data in the two phases described above. We shall first create a copy of Demo MAED 1 and rename it Demo MAED 2. This will have the same structure as the case Demo MAED 1, because it is a copy of it. However, we shall change the planning period to practice adding new data. Change the planning years to "2030,2035,2040", as shown below. Because this is a new planning period, all input data should now be zero. This is done to avoid conflicts with the demo case data.

In this example, 2030 is our base year so we will assume we have fast-forward into the future and 2030 is a year in the past for which we have input data.

**N.B. When you will develop your real country model, you must select your Base Year (if you have the full data set available, we recommend using 2018 as a Base Year, otherwise please use the most recent year for which the full dataset is available).**

**N.B. You must not mix data from different years for the reconstruction of the Base Year. Let's imagine you have selected 2018 as the Base Year, and you have most of the data you need, but still some data are missing. Then you should not use the data from another year to fill in these gaps but rather select the most recent year for which you have ALL data.**



The screenshot displays the MAED (Model for Analysis of Energy Demand) software interface. The main window is titled 'General information' and shows the following details:

- Name of the case study:** Demo MAEDD 2
- Years:** 2030,2035,2040
- 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 [10<sup>9</sup>]  Billion [10<sup>9</sup>]  Trillion [10<sup>12</sup>] (Currency: US Dollar)
  - Transport Passenger (pkm):  Million [10<sup>9</sup>]  Billion [10<sup>9</sup>]  Trillion [10<sup>12</sup>]
  - Transport Freight (tkm):  Million [10<sup>9</sup>]  Billion [10<sup>9</sup>]  Trillion [10<sup>12</sup>]
  - Energy unit:  GWyr  PJ  Tcal  Mtoe  GBTU
- Sectors & Clients:**
  - Sectors: Agriculture, Construction, Mining, Manufacturing, Energy, Service, Household, Transport
  - Client: Farming
  - Options: Specific Electricity use (checked), Thermal use (checked), Motive Power (checked)

## Activity 2: Adding Data for the Base Year Reconstruction (Social Economic Data)

Let us start with entering the data for demography. As the base year is 2030, we must only enter data in the white cells for that year. Enter the data given in the screenshot below. Don't forget to click the **Save button**, every time you change data.

MAED Model for Analysis of Energy Demand

MAED D About

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### Social economic data

Name of the case study: Demo MAEDD 2

Demography GDP

#### Demography

Item	Unit	2030	2035	2040	Chart
Population *	Million	19.50000	19.50000	19.50000	<input type="checkbox"/>
Population growth rate *	% per annum	-	0.00000	0.00000	<input type="checkbox"/>
Urban Population	%	41.50000	0.00000	0.00000	<input type="checkbox"/>
Person/ urban Household	cap	6.00000	0.00000	0.00000	<input type="checkbox"/>
Number of urban Households	Million	1.34875	0.00000	0.00000	<input type="checkbox"/>
Rural Population	%	58.50000	100.00000	100.00000	<input type="checkbox"/>
Person/ rural Household	cap	7.00000	0.00000	0.00000	<input type="checkbox"/>
Number of rural Households	Million	1.82964	0.00000	0.00000	<input type="checkbox"/>
Potential Labour Force	%	49.00000	0.00000	0.00000	<input type="checkbox"/>
Participating Labour Force	%	40.00000	0.00000	0.00000	<input type="checkbox"/>
Active Labour Force	Million	3.82200	0.00000	0.00000	<input type="checkbox"/>
Population in cities with public transp...	%	22.00000	0.00000	0.00000	<input type="checkbox"/>
Population inside Large Cities	Million	4.29000	0.00000	0.00000	<input type="checkbox"/>

\* 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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The data in the shaded cells should automatically be calculated. For example, the percentage of the rural population is calculated as the difference between 100% and the declared value of the percentage of the urban population.

MAED Model for Analysis of Energy Demand

MAED D About

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### Social economic data

Name of the case study: Demo MAEDD 2

Demography GDP

#### Demography

Item	Unit	2030	2035	2040	Chart
Population *	Million	19.50000	19.50000	19.50000	<input type="checkbox"/>
Population growth rate *	% per annum	-	0.00000	0.00000	<input type="checkbox"/>
Urban Population	%	41.50000	0.00000	0.00000	<input type="checkbox"/>
Person/ urban Household	cap	6.00000	0.00000	0.00000	<input type="checkbox"/>
Number of urban Households	Million	1.34875	0.00000	0.00000	<input type="checkbox"/>
Rural Population	%	58.50000	100.00000	100.00000	<input type="checkbox"/>
Person/ rural Household	cap	7.00000	0.00000	0.00000	<input type="checkbox"/>
Number of rural Households	Million	1.82964	0.00000	0.00000	<input type="checkbox"/>
Potential Labour Force	%	49.00000	0.00000	0.00000	<input type="checkbox"/>
Participating Labour Force	%	40.00000	0.00000	0.00000	<input type="checkbox"/>
Active Labour Force	Million	3.82200	0.00000	0.00000	<input type="checkbox"/>
Population in cities with public transp...	%	22.00000	0.00000	0.00000	<input type="checkbox"/>
Population inside Large Cities	Million	4.29000	0.00000	0.00000	<input type="checkbox"/>

\* 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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We shall similarly introduce data for the economy for the base year. Enter the data given in the screenshot below in the GDP and Distribution of GDP by subsectors tables.

MAED Model for Analysis of Energy Demand

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Manage case studies

General information

Social economic data

Energy intensities

Industry

Transport

Household

Services

Calculate

Results

### Social economic data

Name of the case study **Demo MAEDD 2**

Demography **GDP**

#### GDP

Item	Unit	2030	2035	2040	Chart
GDP	US\$ Million	1230.00000	1725.13863	2308.62464	<input type="checkbox"/>
GDP Growth rate	% p.a.	-	7.00000	6.00000	<input type="checkbox"/>
GDP per capita	US\$/Cap	63.07692	85.39381	110.90876	<input type="checkbox"/>
Sectorial shares of GDP					
Agriculture	%	10.00000	10.00000	10.00000	<input type="checkbox"/>
Construction	%	10.00000	2.10000	2.00000	<input type="checkbox"/>
Mining	%	10.00000	5.30000	5.20000	<input type="checkbox"/>
Manufacturing	%	38.37398	15.00000	17.00000	<input type="checkbox"/>
Energy	%	11.62602	16.60000	12.80000	<input type="checkbox"/>
Service	%	20.00000	51.00000	53.00000	<input type="checkbox"/>
<b>Total</b>	<b>%</b>	<b>100.00000</b>	<b>100.00000</b>	<b>100.00000</b>	<input type="checkbox"/>

\* Enter GDP data for first Year & Average annual growth rate for each period/timestep

Data notes

#### Distribution of GDP by subsectors

Item	Unit	2030	2035	2040	Chart
<b>Agriculture</b>					
Agriculture	%	100.00000	100.00000	100.00000	<input type="checkbox"/>
<b>Total</b>	<b>%</b>	<b>100.00000</b>	<b>100.00000</b>	<b>100.00000</b>	<input type="checkbox"/>
<b>Construction</b>					
Construction	%	100.00000	100.00000	100.00000	<input type="checkbox"/>
<b>Total</b>	<b>%</b>	<b>100.00000</b>	<b>100.00000</b>	<b>100.00000</b>	<input type="checkbox"/>
<b>Mining</b>					
Mining	%	100.00000	100.00000	100.00000	<input type="checkbox"/>
<b>Total</b>	<b>%</b>	<b>100.00000</b>	<b>100.00000</b>	<b>100.00000</b>	<input type="checkbox"/>
<b>Manufacturing</b>					
Manufacturing	%	100.00000	100.00000	100.00000	<input type="checkbox"/>
<b>Total</b>	<b>%</b>	<b>100.00000</b>	<b>100.00000</b>	<b>100.00000</b>	<input type="checkbox"/>
<b>Energy</b>					
Energy	%	100.00000	100.00000	100.00000	<input type="checkbox"/>
<b>Total</b>	<b>%</b>	<b>100.00000</b>	<b>100.00000</b>	<b>100.00000</b>	<input type="checkbox"/>
<b>Service</b>					
Commercial and turism	%	30.00000	28.00000	25.00000	<input type="checkbox"/>
Public administration	%	10.00000	10.00000	10.00000	<input type="checkbox"/>
Finance and Buss	%	5.00000	10.00000	15.00000	<input type="checkbox"/>
Personal Services and others	%	55.00000	52.00000	50.00000	<input type="checkbox"/>
<b>Total</b>	<b>%</b>	<b>100.00000</b>	<b>100.00000</b>	<b>100.00000</b>	<input type="checkbox"/>

Save the data that you have entered and click the "calculate" button from the main menu.



MAED Model for Analysis of Energy Demand

Demography GDP

Item	Unit	2030	2035	2040	Chart
GDP	US\$ Million	1230.00000	1725.13863	2308.62464	<input type="checkbox"/>
GDP Growth rate	% p.a.	-	7.00000	6.00000	<input type="checkbox"/>
GDP per capita	US\$/Cap	63.07692	85.39381	110.90876	<input type="checkbox"/>
Sectorial shares of GDP					
Agriculture	%	10.00000	10.00000	10.00000	<input type="checkbox"/>
Construction	%	2.30000	2.10000	2.00000	<input type="checkbox"/>
Mining	%	5.50000	5.30000	5.20000	<input type="checkbox"/>
Manufacturing	%	13.00000	15.00000	17.00000	<input type="checkbox"/>
Energy	%	20.20000	16.60000	12.80000	<input type="checkbox"/>
Service	%	49.00000	51.00000	53.00000	<input type="checkbox"/>
<b>Total</b>	<b>%</b>	<b>100.00000</b>	<b>100.00000</b>	<b>100.00000</b>	<input type="checkbox"/>

\* Enter GDP data for first Year & Average annual growth rate for each period/timestep

Data notes

Distribution of GDP by subsectors

Item	Unit	2030	2035	2040	Chart
<b>Agriculture</b>					<input type="checkbox"/>
Agriculture	%	100.00000	100.00000	100.00000	<input type="checkbox"/>

## Activity 3: Visualize Socio Economic Intermediate Results

Even with the little data that we have introduced, we should be able to see some intermediate results. Clicking the calculate button should already bring you to the Results page, if not, click the results button. Now click the GDP title on the Results page. This should show sub results for the GDP. Click GDP formation by sector/subsector (absolute values).



MAED Model for Analysis of Energy Demand

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MAED D About

Results

Name of the case study: Demo MAEDD 2

Export all result tables to excel

1. GDP

1.1. GDP formation by sector/subsector (absolute values)

1.2. Per Capita GDP by sector

1.3. GDP formation by sector/subsectors (growth rates)

2.1. INDUSTRY - Useful Energy

2.2. INDUSTRY - Energy Demand ACM

2.3. INDUSTRY - Final Demand Manufacturing

2.4. INDUSTRY - Demand Industry

3.1. TRANSPORT - Freight

3.2. TRANSPORT - Intercity

3.3. TRANSPORT - Urban

3.4. TRANSPORT - Final Demand Transport

4. HOUSEHOLD

5. SERVICES

6. TOTAL FINAL ENERGY Demand

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This table shows the contribution to GDP of each subsector, in the base year.

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MAED D About

1. GDP

1.1. GDP formation by sector/subsector (absolute values)

CHART TABLE

1.1. GDP formation by sector/subsector (absolute values)

	US\$ 10 <sup>6</sup>	2030	2035	2040
Agriculture		123.00000	172.51386	230.86246
Agriculture		123.00000	172.51386	230.86246
Construction		123.00000	36.22791	46.17249
Construction		123.00000	36.22791	46.17249
Mining		123.00000	91.43235	120.04848
Mining		123.00000	91.43235	120.04848
Manufacturing		472.00000	258.77079	392.46619
Manufacturing		472.00000	258.77079	392.46619
Energy		143.00000	286.37301	295.50395
Energy		143.00000	286.37301	295.50395
Service		246.00000	879.82070	1,223.57106
Commercial and tourism		73.80000	246.34980	305.89276
Public administration		24.60000	87.98207	122.35711
Finance and Buss		12.30000	87.98207	183.53566
Personal Services and others		135.30000	457.50676	611.78553
Total GDP		1,230.00000	1,725.13863	2,308.62464

# Activity 3: Calculate MAED Input Data for the Base Year Reconstruction

Let us introduce more data. We shall now introduce the **Specified Energy Consumption (or Energy Intensity (EI))** for the specific electricity use, motive power and thermal uses in each subsector of the Industry. However, before being able to do so, we need to calculate the **Specified Energy Consumption (or Energy Intensity (EI))**. If you don't remember how to do this please revise Lecture 5, in particular Slide 8.

## Lecture 5.2 Base Year Reconstruction (2/3)

### 5.2.1. Calculate MAED Input Data for the Base Year

Data Previously Collected for the reconstruction of the Base Year

**Final Energy**  
(the quantity of a specific energy source of energy purchased by end users)

**Useful Energy**  
(energy that is being used for the respective END-USES)  
 1. THERMAL USE  
 2. MOTIVE POWER  
 3. SPECIFIED ELECTRICITY USE

$FED_u^e \times \eta_u^e = UED_u$

**End-use Services**  
(socio-economic needs) = Driving Parameter (DP)

**MARKET PENETRATION**  
 $MP_u^e$

**SPECIFIED ENERGY CONSUMPTION (SEC) OR ENERGY INTENSITY (EI)**  
[Energy/Value Added]

$$SEC_u = \frac{UED_u}{DP}$$

Gather/Adjust MAED parameters for the base year

Calculate MAED Input Data for the base year

Check accuracy of MAED results for the base year

Run the MAED model

- With the **Final Energy Consumption** data and the **Efficiency** we calculate the **Useful Energy** and then the Market Penetration.
- The ratio of the **Useful Energy** and the **Driving Parameter** will give us the **Specified Energy Consumption (or Energy Intensity)**.

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To support the calculation of the **Specified Energy Consumption (or Energy Intensity (EI))** we will use a support Excel template. Please download this template available on Zenodo at this link:

<https://doi.org/10.5281/zenodo.7750256>

Per each sector there are 4 Tabs, in this example we have just the Agriculture Sector so in the Excel there will be:

- **IND\_AGR\_RawData**: in this Sheet we will collect the Raw data needed for the Base Year reconstruction.

- **IND\_AGR\_Reco**: in this Sheet there are tables that help you to do the calculations needed to get to the **Specified Energy Consumption (or Energy Intensity (EI))**.
- **IND\_AGR\_Inp**: this Sheet will have the data ready to be added into MAED.
- **IND\_AGR\_Out**: here you can calculate the expected outputs and double check that the Base Year was successfully reconstructed.

**Step 1 – Raw Data Collection:** The Raw Data needed for the Base Year Reconstruction for the Agriculture Sector are the **Final Energy Consumption (per each energy form and per each end use)** data and the **Efficiency (per each energy form and per each end use)**. Additionally, we need the **Total GDP in US\$ million** and the **Agriculture GDP** (as added in the Activity 2 of this Hands-on). Make sure that the tables in the **IND\_AGR\_RawData** Sheet in the Excel Template are populated with the following data. Then move on to Step 2.

## Lecture 5.1 Base Year Reconstruction (1/3)

### 5.1.5. Gather MAED Parameters for the Base Year - Example

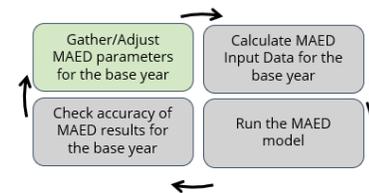
To reconstruct the Base Year we need to gather the following data:

- **Final Energy Demand/Consumption (FED)** by sectors, by end-use, and by fuels for the selected base year
- **Thermodynamic Energy Efficiency ( $\eta$ )** of the process/of the equipment used.
- **Driving Parameter (DP)** for each end-use (i.e. industry, transport, service, and household uses)

Final Energy Demand (FED) in GWh	Specific		
	Electricity Use	Thermal Use	Motive Power
Traditional Fuels	0	12	0
Modern Biomass	0	41	0
Fossil Fuels	0	12	0
Electricity	13	11	0
Solar Thermal	0	5	0
Motor Fuels	0	0	32

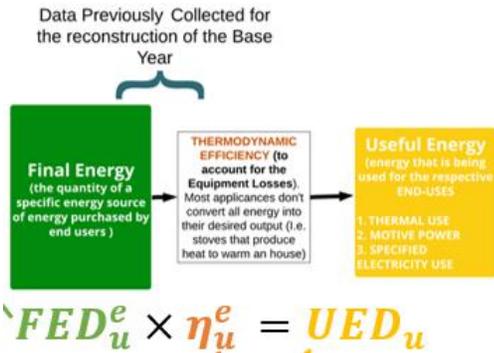
Efficiency	Electricity Use	Thermal Use	Motive Power
Traditional Fuels	0	0.6	0
Modern Biomass	0	0.8	0
Fossil Fuels	0	0.9	0
Electricity	1	1	0
Solar Thermal	0	1	0
Motor Fuels	0	0	1

GDP [Driving Parameter (DP)] in US\$ Million	
	2022
Agriculture	123
Total	1230



**Step 2 – Calculate MAED Input Data for the Base Year:** with the Raw Data collected we can now move on and calculate the **Useful Energy** and then the **Penetration of energy forms**.

Go to the **IND\_AGR\_Reco Sheet** and multiply the **Final Energy Demand** by the **Efficiency** to get the **Useful Energy Demand**.



And fill in the table for **Useful Energy Demand**.

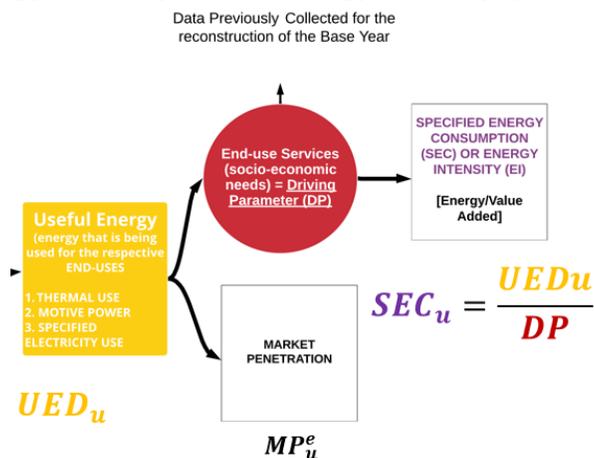
	A	B	C	D
1	Final Energy Demand (GWh)	Specific Electricity Use	Thermal Use	Motive Power
2	Traditional Fuels	0	12	0
3	Modern Biomass	0	41	0
4	Fossil Fuels	0	12	0
5	Electricity	13	11	0
6	Solar Thermal	0	5	0
7	Motor Fuels	0	0	32
8				
9	Efficiency	Specific Electricity Use	Thermal Use	Motive Power
10	Traditional Fuels	0	0.6	0
11	Modern Biomass	0	0.8	0
12	Fossil Fuels	0	0.9	0
13	Electricity	1	1	0
14	Solar Thermal	0	1	0
15	Motor Fuels	0	0	1
16				
17	Useful Energy Demand (GWh)	Specific Electricity Use	Thermal Use	Motive Power
18	Traditional Fuels			
19	Modern Biomass			
20	Fossil Fuels			
21	Electricity			
22	Solar Thermal			
23	Motor Fuels			
24	Total			

Congratulations, you have now calculated the **Useful Energy Demands** for each energy form (Traditional Fuels, Modern Biomass, Fossil Fuels, Electricity, Solar Thermal and Motor Fuels) for each end-use of the Agriculture Sector (Specific Electricity Use, Thermal Use, Motive Power).

Let's move on to calculate the Penetration of Energy Forms by dividing the **Useful Energy Demands of each fuel by the total Useful Energy Demand**. An example for the end use "Specific Electricity Use" is shown in the picture below. Apply the same formulas and calculate the Penetration of the Energy Forms for the Thermal Use and the Motive Power (based on the **Useful Energy Demand** you have calculated in the previous step).

	A	B	C	D
16				
	Useful Energy Demand (GWh)	Specific Electricity Use	Thermal Use	Motive Power
17				
18	Traditional Fuels	0		
19	Modern Biomass	0		
20	Fossil Fuels	0		
21	Electricity	13		
22	Solar Thermal	0		
23	Motor Fuels	0		
24	Total	13		
25				
	Penetration of energy forms	Specific Electricity Use	Thermal Use	Motive Power
26				
27	Traditional Fuels	=B18/B\$24		
28	Modern Biomass	0		
29	Fossil Fuels	0		
30	Electricity	1		
31	Solar Thermal	0		
32	Motor Fuels	0		

Finally, calculate the ratio of the **Useful Energy** and the **Driving Parameter (Agriculture GDP)** to obtain the **Specified Energy Consumption (or Energy Intensity) per each end-use**.



16				
17	Useful Energy Demand (GWh)	Specific Electricity Use	Thermal Use	Motive Power
18	Traditional Fuels			
19	Modern Biomass			
20	Fossil Fuels			
21	Electricity			
22	Solar Thermal			
23	Motor Fuels			
24	Total			
25				
26	Penetration of energy forms	Specific Electricity Use	Thermal Use	Motive Power
27	Traditional Fuels			
28	Modern Biomass			
29	Fossil Fuels			
30	Electricity			
31	Solar Thermal			
32	Motor Fuels			
33				
34	GDP (Mil US\$)	123		
35				
36	Specific Energy Consumption (kWh/USD)	Specific Electricity Use	Thermal Use	Motive Power
37				
38				
39				

Fill this in

Congratulations, you have now calculated the three **Specified Energy Consumption (Energy Intensities)** for each of end-use in the Agriculture Sector.

**Step 3 – Input Data for the Base Year:** We now need to input the calculated and collected data into MAED. Go to **IND\_AGR\_Inp Sheet**. This tables should be now filled in with the data from **IND\_AGR\_RawData** and **IND\_AGR\_Reco**.

	A	B	C	D	E	F	G	H
1	Specific Energy Consumption (kWh/USD)							
2	<b>Type</b>	<b>subtype</b>	<b>Unit</b>	<b>2030</b>				
3	EI-Motive Power	Agriculture	kWh/US\$					
4	EI-Specific Electricity Use	Agriculture	kWh/US\$					
5	EI-Thermal Use	Agriculture	kWh/US\$					
6								
7	<b>Penetration of Energy Forms in ACM - Agriculture</b>	Traditional Fuels	%					
8		Modern Biomass	%					
9		Fossil Fuels	%					
10		Electricity	%					
11		Solar Thermal	%					
12		Motor Fuels	%					
13								
14	<b>Efficiencies in ACM - Agriculture</b>	Traditional Fuels	%					
15		Modern Biomass	%					
16		Fossil Fuels	%					
17								
18	Social Economic Data							
19	GDP							
20	<b>Sectoral Shares of GDP</b>	<b>Units</b>	<b>2030</b>					
21	Agriculture	%	10					
22								
23								

Then, go into MAED Software to the **Energy Intensities** for Industry page and add the data that you have calculated per each end-use. Be carefully with the energy unit, highlighted by the red box (in this case, we have **kWh/US\$**) and with the order of the Energy Forms. Let's start with **EI** for Motive Power, add the data you have calculated for 2030. **N.B. Don't forget to Save when you add data.**



**Energy intensities**  
Name of the case study **Demo MAEDD 2**

**EI-Motive Power**    EI-Specific Electricity use    EI-Thermal use    Penetration of Energy Forms in ACM    Efficiencies in ACM    Temperature level in Manufacturing

**Energy intensities of Motive Power (final energy per unit of value added)**

Item	Unit	2030	2035	2040	Chart
<b>Agriculture</b>					<input type="checkbox"/>
Agriculture	kWh/US\$	0.00000	0.00000	0.00000	<input type="checkbox"/>
<b>Construction</b>					<input type="checkbox"/>
Construction	kWh/US\$	0.10000	0.10000	0.10000	<input type="checkbox"/>
<b>Mining</b>					<input type="checkbox"/>
Mining	kWh/US\$	0.30000	0.30000	0.30000	<input type="checkbox"/>
<b>Manufacturing</b>					<input type="checkbox"/>
Manufacturing	kWh/US\$	0.15000	0.15000	0.15000	<input type="checkbox"/>

Data notes

Then do the same with the EI-Specific Electricity Use. **N.B. Don't forget to Save when you add data.**



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### Energy intensities

Name of the case study **Demo MAEDD 2**

El-Motive Power **El-Specific Electricity use** El-Thermal use Penetration of Energy Forms in ACM Efficiencies in ACM Temperature level Manufacturing

#### Energy intensities of Specific Electricity use (final energy per unit of value added)

Item	Unit	2030	2035	2040	Chart
<b>Agriculture</b>					<input type="checkbox"/>
Agriculture	kWh/US\$				<input type="checkbox"/>
<b>Construction</b>					<input type="checkbox"/>
Construction	kWh/US\$	0.02000	0.02000	0.02000	<input type="checkbox"/>
<b>Mining</b>					<input type="checkbox"/>
Mining	kWh/US\$	0.10000	0.10000	0.10000	<input type="checkbox"/>
<b>Manufacturing</b>					<input type="checkbox"/>
Manufacturing	kWh/US\$	1.38400	1.38400	1.38400	<input type="checkbox"/>

Data notes

And finally for EI-Thermal Use. **N.B. Don't forget to Save when you add data.**



MAED

MAED Model for Analysis of Energy Demand

En Es Fr

- Manage case studies
- General information
- Social economic data
- Energy intensities
- Industry**
  - Transport
  - Household
  - Services
- Calculate
- Results

### Energy intensities

Name of the case study **Demo MAEDD 2**

El-Motive Power    El-Specific Electricity use    **El-Thermal use**    Penetration of Energy Forms in ACM    Efficiencies in ACM    Temperature level in Manufacturing

#### Energy intensities of Thermal uses (useful energy per unit of value added)

Item	Unit	2030	2035	2040	Chart
<b>Agriculture</b>					<input type="checkbox"/>
Agriculture	kWh/US\$				<input type="checkbox"/>
<b>Construction</b>					<input type="checkbox"/>
Construction	kWh/US\$	0.10000	0.10000	0.10000	<input type="checkbox"/>
<b>Mining</b>					<input type="checkbox"/>
Mining	kWh/US\$	0.08000	0.08000	0.08000	<input type="checkbox"/>
<b>Manufacturing</b>					<input type="checkbox"/>
Manufacturing	kWh/US\$	3.00000	3.00000	3.00000	<input type="checkbox"/>

Data notes

As soon as the values of the energy intensities for the motive power are introduced, some interesting results can be seen. For example, after clicking **Calculate**, we can see the values of the useful energy, used to produce the motive power in agriculture for the base year.

Now let's input the **Penetration of Energy Forms** into MAED for the Agriculture sector in 2030 and **SAVE**.

### Energy intensities

Name of the case study **Demo MAEDD 2**

EI-Motive Power      EI-Specific Electricity use      EI-Thermal use      **Penetration of Energy Forms in ACM**      Efficiency ACM

#### Penetrations of energy forms into useful thermal energy in Agriculture, Construction and Mining

Item	Unit	2030	2035	2040	Chart
<b>Agriculture</b>					<input type="checkbox"/>
<b>Agriculture</b>		<b>0.00000</b>			<input type="checkbox"/>
Traditional Fuels	%	0.00000			<input type="checkbox"/>
Modern Biomass	%	0.00000			<input type="checkbox"/>
Electricity	%	0.00000			<input type="checkbox"/>
Solar Thermal	%	0.00000			<input type="checkbox"/>
Fossil Fuels	%	0.00000			<input type="checkbox"/>
<b>Construction</b>					<input type="checkbox"/>

Then we move on to calculate and then add the **Efficiencies for the Thermal use in PERCENTAGE (%)** and then **SAVE**.

### Energy intensities

Name of the case study **Demo MAEDD 2**

EI-Motive Power      EI-Specific Electricity use      EI-Thermal use      Penetration of Energy Forms in ACM      **Efficiencies in ACM**

#### Average Efficiencies and Factors of energy forms in Thermal uses in Agriculture, Construction and Mining

Item	Unit	2030	2035	2040	Chart
<b>Agriculture</b>					<input type="checkbox"/>
<b>Agriculture</b>					<input type="checkbox"/>
Traditional Fuels	%				<input type="checkbox"/>
Modern Biomass	%				<input type="checkbox"/>
Fossil Fuels	%				<input type="checkbox"/>
<b>Construction</b>					<input type="checkbox"/>
<b>Construction</b>					<input type="checkbox"/>
Traditional Fuels	%	40.00000	40.00000	40.00000	<input type="checkbox"/>
Modern Biomass	%	40.00000	40.00000	40.00000	<input type="checkbox"/>
Fossil Fuels	%	50.00000	50.00000	50.00000	<input type="checkbox"/>
<b>Mining</b>					<input type="checkbox"/>
<b>Mining</b>					<input type="checkbox"/>
Traditional Fuels	%	40.00000	40.00000	40.00000	<input type="checkbox"/>
Modern Biomass	%	40.00000	40.00000	40.00000	<input type="checkbox"/>
Fossil Fuels	%	50.00000	50.00000	50.00000	<input type="checkbox"/>

Data notes



It is at this point in the process that the results from the MAED model should be compared to recorded data to confirm the accuracy of the reconstruction of the base year. Go to the Results page and then check the results in 2.2.2.

MAED Model for Analysis of Energy Demand

En Es Fr

Manage case studies

General information

Social economic data

Energy intensities

- Industry
- Transport
- Household
- Services

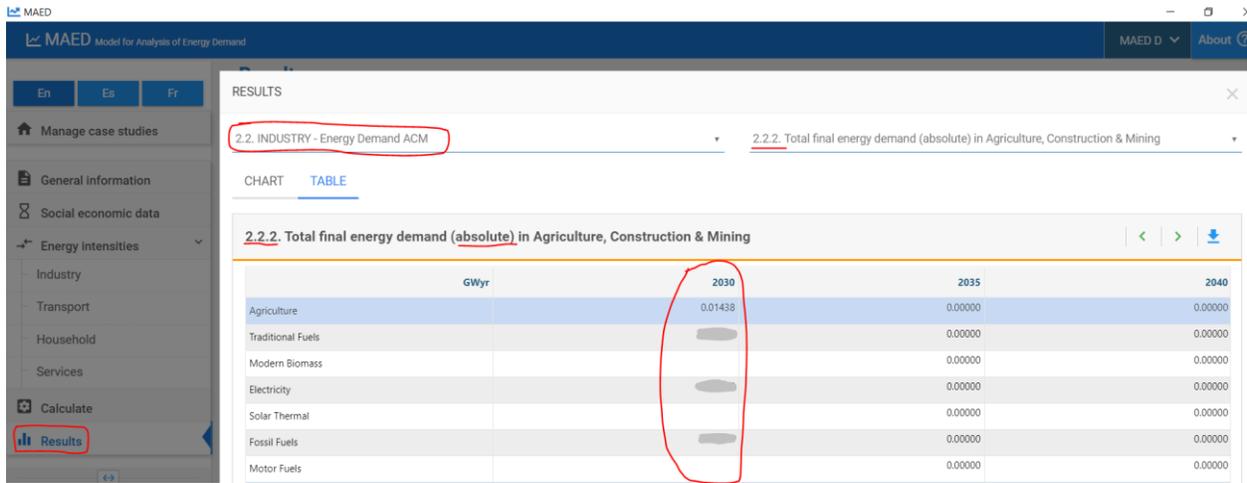
Calculate

**Results**

Name of the case study **Demo MAEDD 2**

- GDP
- INDUSTRY - Useful Energy
  - INDUSTRY - Energy Demand ACM
    - Total final energy demand for thermal uses in Agriculture, Construction & Mining
    - Total final energy demand (absolute) in Agriculture, Construction & Mining
    - Total final energy demand (shares) in Agriculture, Construction & Mining
    - Total Final Energy Demand per Value Added in Agriculture, Construction & Mining
  - INDUSTRY - Final Demand Manufacturing
  - INDUSTRY - Demand Industry
- TRANSPORT - Freight
  - TRANSPORT - Intercity
  - TRANSPORT - Urban
  - TRANSPORT - Final Demand Transport
- HOUSEHOLD
- SERVICES
- TOTAL FINAL ENERGY Demand

Now check the results that you have obtained for “**2.2.2. Total final energy demand (absolute) in Agriculture, Construction & Mining**” for 2030 (which is our Base Year for Industry) with the data in your Excel template. To do so, go into the Excel Sheet called **IND\_AGR\_Out** and check that the Excel results are the same as the ones you obtained in MAED, as explained in Lecture 5.



The screenshot shows the MAED (Model for Analysis of Energy Demand) interface. The left sidebar contains navigation options like 'Manage case studies', 'General information', and 'Energy intensities'. The main area displays 'RESULTS' for '2.2. INDUSTRY - Energy Demand ACM'. A table titled '2.2.2. Total final energy demand (absolute) in Agriculture, Construction & Mining' shows data for three years: 2030, 2035, and 2040. The 2030 column is circled in red, highlighting the value 0.01438 for Agriculture. The 'Results' button in the sidebar is also circled in red.

	GWyr	2030	2035	2040
Agriculture		0.01438	0.00000	0.00000
Traditional Fuels		0.00000	0.00000	0.00000
Modern Biomass		0.00000	0.00000	0.00000
Electricity		0.00000	0.00000	0.00000
Solar Thermal		0.00000	0.00000	0.00000
Fossil Fuels		0.00000	0.00000	0.00000
Motor Fuels		0.00000	0.00000	0.00000

As an example, in the picture below it is shown the formula. Sum up the **Final Energy Demands per each energy form for the three end uses** and divide this number (which is in GWy) by the number of hours in one year which is 8760 to obtain the results into GWh as produced by MAED output.

	A	B	C	D	E	F	G
1	2.2.2 Total final energy demand (absolute) in Agriculture, Construction & Mining						
2	Agriculture	Unit	2030				
3	Traditional Fuels	GWyr	=SUM(IND_AGR_RawData!B2:D2)/8760				
4	Modern Biomass	GWyr					
5	Electricity	GWyr					
6	Solar Thermal	GWyr					
7	Fossil Fuels	GWyr					
8	Motor Fuels	GWyr					
9							
10							
11							
12							
13							
14							
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17							
18							
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20							
21							
22							
23							
24							

IND\_AGR\_RawData | IND\_AGR\_Recon | IND\_AGR\_Inp | IND\_AGR\_Out | IND\_CON\_RawData

If the numbers in this table are the same as the results shown in MAED then you have successfully reconstructed the Base Year 2030 for the Agriculture Sector. **If not, you need to go back and change your input data until they don't match.**

When you build your real country case study you will have to repeat the same exact steps explained for the Agriculture sector to reconstruct the Base Year for the Construction and Mining Sector. The Manufacturing sector is similar, but as seen in the previous Hands-on, the Thermal Use is split into High Temperature, Medium Temperature and Low Temperature.