



CLEWs

Hands-on: Working with technology parameters

Useful links:

- 1) [Discussion forum](#) for CLEWs
- 2) [Results from this Hands-on](#)

Learning outcomes

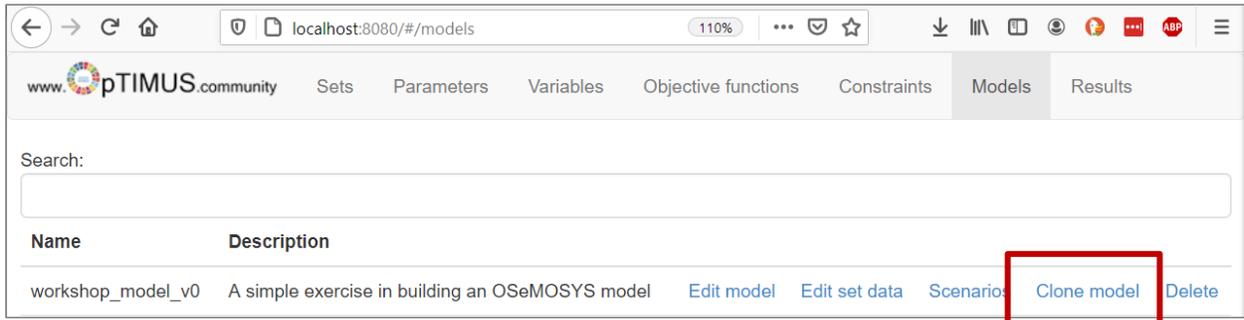
By the end of this exercise you will be able to:

- 1) Define several techno-economic parameters of technologies
- 2) Input the techno-economic parameters in an energy system model
- 3) Understand the impact of different technology parameters on the results of an optimisation

Activity 1 – Introduce techno-economic parameters

Before starting this activity, we strongly suggest that you 'clone' the model you worked on in the previous hands-on. In this way, if something goes wrong in this activity, you will be able to go back to the model you worked on before. We recommend you do this **before any activity where you introduce new elements in the model**. We will be reminding you to clone your model through all hands-on sessions. Here how you clone the model:

- On MoManI, next to the name of your model, click **Clone model** (see figure)



- In the window that opens, select the previous model and enter a name for the new model, different from the one of the previous model (enter a name that makes it easy for you to distinguish between the versions). Then click OK.

Select scenario to clone

exercise_1 (rev. 1)

New name

- Now you're set for the activity. **In the next steps of this activity, when asked to modify SETs or parameters do so only for this new model!**

Having learnt about the main techno-economic parameters linked to technologies in Lecture 4, you will now introduce them into the model you initiated in Hands-on 2. The structure of the model will not change this time: you will work with the technologies and commodities you defined in Hands-on 2 and will not add more. You will only introduce numerical values for the parameters related to them.

The parameters for which you will need to add values are shown in the table below. In the rows you see the list of parameters; in the columns you see for which technologies you need to define the parameters; in the cells you see the values you need to assign. Bear in mind that the values below need to be assigned **for all years**. Note that the VariableCost of the technologies MINCOA and MINGAS has been introduced to represent the fuel cost for coal and gas, respectively.



Parameter	Units	MINCOA	MINGAS	PWRCOA	PWRGAS	PWRTRN
AvailabilityFactor	Fraction	1	1	1	1	1
CapitalCost	\$/kW	0	0	2200	1250	8000
FixedCost	\$/kW/yr	0	0	75	30	0
VariableCost	\$/GJ	5	10	0	0	0
OperationalLife	Years	30	30	30	30	50
CapacityTo-ActivityUnit	PJ/(PJ/yr)	1	1	31.536	31.536	31.536

Here, we will guide you on how to modify a parameter. We will use the example of the VariableCost. You will have to repeat similar steps, although with few small differences, for the other parameters. We do not show the steps for the other parameters, since part of the learning process for this activity is for you to become independent in the process of modifying the parameters of a model.

Here the steps for the **VariableCost**:

1. In MoManI, on the models page, choose your model from the list and click **Scenarios** on its right
2. Click **Enter data**
3. Search for the parameter's name (in this case, VariableCost) and click **Enter data (slices)**
4. Fix the dimensions REGION (first) and MODE_OF_OPERATION (then). When you do that, a data table will appear.
5. Enter the data as per table below. **In MoManI, you can copy, paste and drag values like in MS Excel.**
6. **Save!**

Technology	2019	2020	2021	2022
MINCOA	5	5	5	5
MINGAS	10	10	10	10
PWRCOA	0	0	0	0
PWRGAS	0	0	0	0



PWRTRN	0	0	0	0
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NOTE: What does it mean when we 'fix a dimension' in MoMani?

This is linked to algebra more than MoMani. It depends on the fact that each parameter is actually a multi-dimensional matrix. For instance, the VariableCost has 4 dimensions, i.e. it is defined for every REGION, MODE_OF_OPERATION, TECHNOLOGY and YEAR in the model. If we want to display the values of the VariableCost on a table with only TECHNOLOGY and YEAR (that is, a matrix of only 2 dimensions), we will have to fix a value first for the other two dimensions, REGION and MODE_OF_OPERATION.

Which dimensions should we fix?

The short answer is: those that you **do not** need to see on the table. If we suggest to put values for all TECHNOLOGIES and YEARS, then you should fix the other dimensions (in this case REGION and MODE_OF_OPERATION).

For VariableCost, if you fix the REGION first and then the MODE_OF_OPERATION, the two remaining dimensions, TECHNOLOGY and YEAR, are displayed on the table and you can easily insert values for all technologies and all years in one go. This is the fastest way of providing all values, because anyway there is only one REGION and one MODE_OF_OPERATION. If you fix the values for REGION and MODE_OF_OPERATION, you do not have to change them. That is, once you have inserted the values, you will not have to insert them again for another REGION or another MODE_OF_OPERATION.

You can try and fix the YEAR first and then the MODE_OF_OPERATION. When you do so, you'll see that a table appears also in this case. However, the table shows this time the REGION on the rows and the TECHNOLOGIES on the column. Since you fixed the YEAR dimension, you are now giving values for the REGION, for all TECHNOLOGIES, **in one specific year** (next to the YEAR dimension, you'll see that the year selected, for which you are giving values, is by default the first one, 2019). In this case, after inserting the values for all the technologies, you will need to change the year and repeat the operation for all years.

The choice of which dimensions to fix is important and you will have to think it carefully always. You will notice that the other parameters in this exercise will be easier than VariableCost. For some, you will not have to fix any dimension: they are defined only for two dimensions and a table appears as soon as you open the page for giving inputs. For others, you will have to fix only one dimension (for the reasons stated above, we suggest to **always start with the REGION!**).



Activity 2 – Run the model

Now, download the executable of this new model and run it (if you do not recall how, kindly go back to Activity 3 of Hands-on 2).