

Hands On Exercise 6: Adding an agent

Now we will learn how to add a new agent to our example.

Learning objectives

- How to add a new agent

Introduction

In this hands-on, we will add a new agent called A2. This agent will be slightly different to the other agents in the `default` example, in that it will make investments based upon a mixture of levelised cost of electricity (LCOE) and equivalent annual cost (EAC). Where EAC is the is the annual cost of owning, operating, and maintaining an asset over its entire life. These two objectives will be combined by calculating a weighted sum of the two when comparing potential investment options. We will give the LCOE a relative weight value of 0.5 and the EAC a relative weight value of 0.5.

We will edit the default example to add a new agent, which can be found from the following zenodo link: <https://zenodo.org/record/6323453#.Yh-QWi-l1pQ>

To achieve this, first, we must modify the `Agents.csv` file in the directory:

```
{muse_install_location}/src/muse/data/example/default/technodata/Agents.csv
```

To do this, we will add two new rows to the file. To simplify the process, we copy the data from the first two rows of agent A1, changing only the rows: `AgentShare`, `Name`, `Objective1`, `Objective2`, `ObjData1`, `ObjData2`, `DecisionMethod` and `Quantity`. The values we changed can be seen below. Notice how we edit the `AgentShare` column. This variable allows us to split the existing capacity between the two different agents. There is a set list of objectives that can be chosen from, with more information provided at the documentation: <https://muse-docs.readthedocs.io/en/latest/> We will also need to edit the `Agents.csv` file to define these new `AgentShares`.

AgentShare	Name	RegionName	Objective1	Objective2	Objective3	ObjData1	ObjData2	ObjData3	ObjSort1	ObjSort2	ObjSort3	SearchRule	DecisionMet	Quantity	MaturityThre	Budget	Type
Agent1	A1	R1	LCOE			1			FALSE			all	singleObj	0.5	-1	inf	New
Agent2	A1	R1	LCOE			1			FALSE			all	singleObj	0.5	-1	inf	Retrofit
Agent3	A2	R1	LCOE	EAC		0.5	0.5		FALSE			all	weighted_su	0.5	-1	inf	New
Agent4	A2	R1	LCOE	EAC		0.5	0.5		FALSE			all	weighted_su	0.5	-1	inf	Retrofit

Figure 6.1: Updated `Agents.csv`.

Also notice that we amend the `Quantity` column. The reason for this is that we want to specify that Agent A1 makes up 50% of the population, and A2 makes up the remaining 50% of the population.

We then edit all of the `technodata` files to split the existing capacity between the two agents by the proportions we like. As we now have two agents which take up 50% of the population each, we will split the existing capacity by 50% for each of the agents. Notice that we only require the columns `Agent2` and `Agent4` to define the retrofit agents.

The new `technodata` file for the power sector will look like the following (we have hidden the middle columns as they remain the same):

ProcessName	RegionName	Time	Level	cap_par	cap_exp	fix_par	fix_exp	InterestRate	Type	Fuel	EndUse	Agent2	Agent4
Unit		Year				MUS\$2010/P						Retrofit	Retrofit
gasCCGT	R1	2020	fixed	23.782344	1	0	1	0.1	energy	gas	electricity	0.5	0.5
windturbine	R1	2020	fixed	36.3077118	1	0	1	0.1	energy	wind	electricity	0.5	0.5

Figure 6.2: Edited power `technodata` file.

However, remember you will have to make the same changes for the residential and gas sectors!

We will now save these files and run the new simulation model using the following command in Anaconda prompt:

```
python -m muse settings.toml
```

Figure 6.3 shows us the results of these two agents. We can see a divergence between technologies invested in by the agents dependent on their objectives

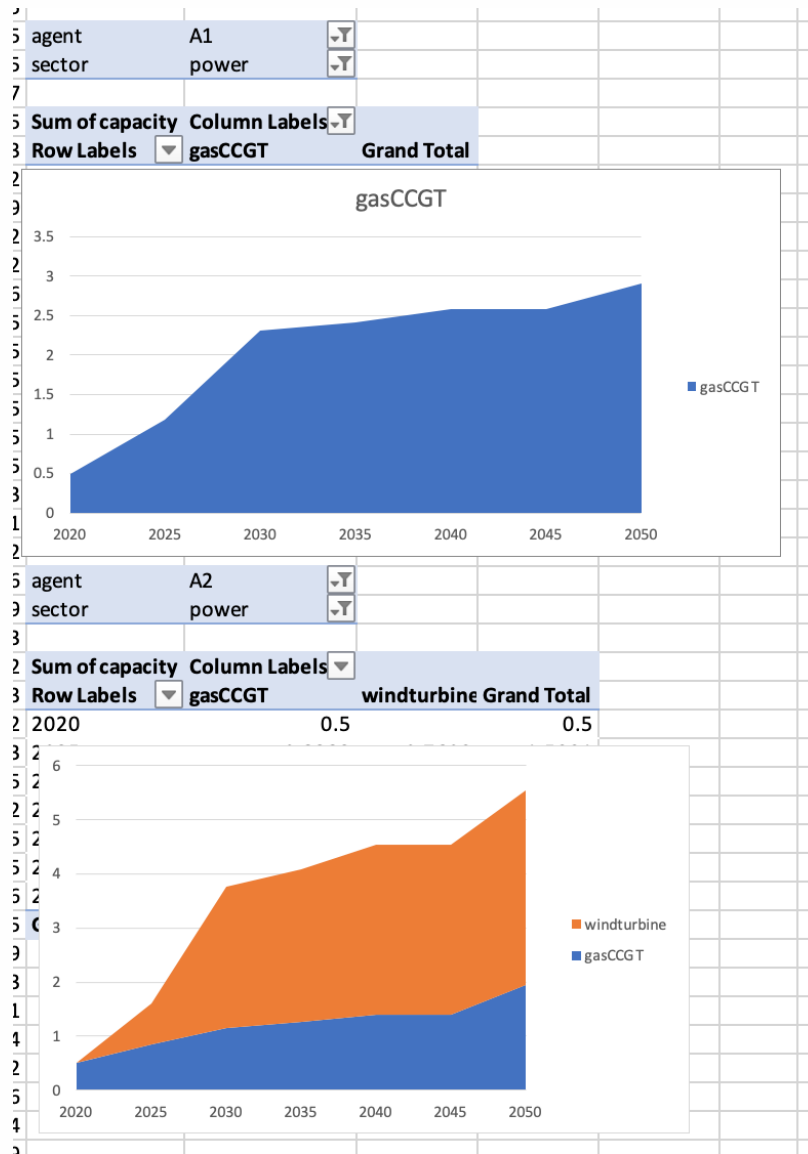


Figure 6.3: Visualisation of the two different agents - a) agent = A1, b) agent = A2.

For all the files explored in this hands-on, please refer to the following link:

<https://zenodo.org/record/6323453#.Yh-QWi-l1pQ>

Summary

In this hands-on we added a new agent which had different characteristics to the original agent and saw that this led to a dramatic change in the technologies invested in.