Case study

Energy Control Systems engineer hiring

Index

Rule of the game **3**
Case Study 1 4
Case Study 2 5

Rule of the game

In the following, two Case Studies are reported. The Candidate is required to develop pieces of code, in Python 3, meeting the requirements described in each of them.

The Candidate has 7 days to report its results by mail to the address andrea.bergamin@elum-energy.com. The detailed deadline is reported in the mail.

The provided result should represent the best effort the Candidate can do so that the Examiner will be able to fully grasp the skills of the Candidate. Partial resolution of the case studies are welcome.

The requirements reported in the Case Studies are the minimum requirements to be met, the Candidate can implement additional features to its algorithm. As long as the minimum requirements are respected, the additional feature will be evaluated.

Case Study 1

Given a plant described by the simplified SLD reported in Figure 1 installing a photovoltaic (PV) inverter, develop an algorithm to control the active power traded by the plant at the point of common coupling (PCC) by tuning the maximum active power production of the PV inverter.

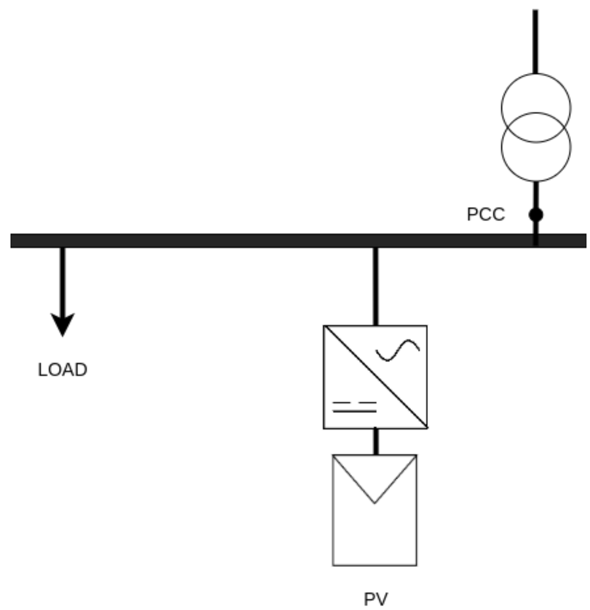

Figure 1

The algorithm inputs are:

Plant observations available:

- Active power at the point of common coupling, expressed in W
- Active power production of the PV inverter, expressed in W

Control parameter:

- Maximum active power injection allowed into the grid, expressed in W
- Nominal power of the PV inverter, expressed in W

The output of the algorithm must be:

- The maximum active power command for the PV inverter, expressed in W

The output of the algorithm must be calculated so to optimize the PV production while respecting the following constraint:

- The active power injected into the grid should not exceed the control parameter *Maximum active power injection into the grid.*

Case Study 2

Given a plant described by the simplified SLD reported in Figure 2 installing a photovoltaic (PV) inverter and a battery energy storage system (BESS), develop an algorithm to control the active power traded by the plant at the point of common coupling (PCC) by tuning the maximum active power production of the PV inverter and the BESS active power set point.

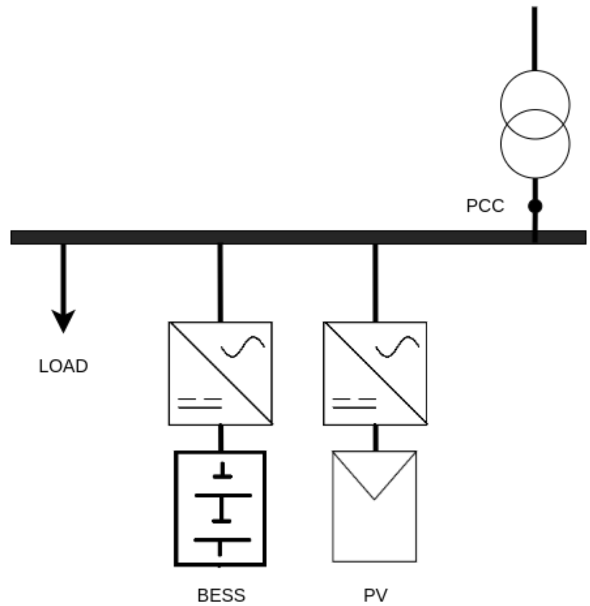

Figure 2

The algorithm inputs are:

Plant observations:

- Active power at the point of common coupling, expressed in W
- Active power production of the PV inverter, expressed in W
- Active power production of the BESS, expressed in W
- State of charge, expressed in %, of the BESS nominal energy

Control parameter:

- Maximum active power injection into the grid, expressed in W
- Nominal power of the PV inverter, expressed in W
- Nominal power of the BESS, expressed in W

The output of the algorithm must be:

- The maximum active power command for the PV inverter, expressed in W
- The active power set point for the BESS, expressed in W

The output of the algorithm must be calculated so to optimize the PV production while respecting the following constraint:

- The active power injected into the grid should not exceed the control parameter *Maximum active power injection into the grid.*