Smart Energy Systems

Winter 2020-2021

Optimization Project Group

Milestone 1

Attachment 1: ms1.pdf

The objective of this milestone is to help the students get familiar with the unit commitment problem and get started with simple coding practices using Pyomo.

Task Descriptions:

1. Develop a code using Pyomo that models
   (a) the objective function expressed in (7) in Attachment 1.
   (b) the constraints (8) and (17) in Attachment 1.
2. Solve the coded optimization problem using Pyomo with Gurobi as the solver and simulate the objective function value and the optimal solutions over the study period using the parameters in Tables 1 and 2 and the retail electricity rate $\lambda[h] = 21.97¢/kWh \quad \forall h \in \mathscr{H}$.
3. Study the sensitivity of the optimal solutions to the retail electricity rate by varying the electricity rate $\lambda[h]$ from $5¢/kWh$ to $75¢/kWh$ in $10¢/kWh$ increments.

Expected Outcome:
You are asked to

1. send me the source code of your presentation by no later than 10 a.m. on December 1, 2020 at yurdakul@tu-berlin.de.
2. prepare a slide set depicting the work you carried out as well as the results you obtained. The prepared slide set is to be presented in class on December 1, 2020; the duration of the presentation is 15 minutes.

Table 1: *TGR* Parameters

γ_g	$[p^{\mathrm{i}}_{\gamma_g}]^m$	$[p^{\mathrm{i}}_{\gamma_1}]^M$	$\bar{\bar{c}}_{\gamma_g}$	$\bar{c}_{\gamma_g}$	c_{γ_g}
γ_1	0 kW	20 kW	$\$1.20(10^{-3})/kW^2h$	$\$0.128/kWh$	$\$2.12(10^{-5})/h$
γ_2	0 kW	40 kW	$\$1.12(10^{-3})/kW^2h$	$\$0.532/kWh$	$\$1.28(10^{-5})/h$

Table 2: Load Values

h	$p^{\mathrm{w}}_{\delta}[h](kW)$
1	8
2	8
3	10
4	10
5	10
6	16
7	22
8	24
9	26
10	32
11	30
12	28
13	22
14	18
15	16
16	16
17	20
18	24
19	28
20	34
21	38
22	30
23	22
24	12