Institut für Elektrizitätswirtschaft und Energieinnovation

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Developing a Framework for Multiple Participation in Energy Communities

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Abstract—Data from the Paper

1. Description

Nomenclature

Indices

k	Update counter
n	Consumer
g	Producer
$r(g)$	Renewable producer
$f(g)$	Fossil producer
d	Distribution System Operator (DSO)
$gd(g,d)$	Producer g in d
$nd(n,d)$	Consumer n in d
c	Energy community
$gc(g,c)$	Producer g in c
$nc(n,c)$	Consumer n in c
$dc(d,c)$	DSO d with clients participating in c

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Parameters

P Production in kWh

P^{al} Allocated production in kWh

D Demand in kWh

Sh^{kWh} Share of production in kWh

$Sh^{f\%}$ Static share of production in %

$Sh^{\%}$ Dynamic share of production in %

R Residual grid demand in kWh

$Exce$ Excess in kWh

Sc Self-consumption in kWh

$ResSh$ Share of renewable production in %

PC Preference coefficient in %

2. Data Input and Results

Time steps	P_{g1}	P_{g2}	P_{g3}
	kWh	kWh	kWh
1	98	77	56
2	74	63	55
3	73	52	50
4	72	57	54
5	95	85	60
6	66	81	67
7	70	100	57
8	55	82	64
9	75	65	56
10	62	76	52
11	63	80	51
12	62	60	52
13	83	82	60
14	82	83	51
15	89	74	52
16	69	75	64
17	85	94	53
18	57	75	67
19	59	85	54
20	96	66	65

TABLE 1: PRODUCTION PROFILES

Time steps	D_{n1}	D_{n2}	D_{n3}	D_{n4}	D_{n5}	D_{n6}	D_{n7}
	kWh	kWh	kWh	kWh	kWh	kWh	kWh
1	69	29	20	9	16	48	14
2	40	9	10	11	10	70	11
3	75	9	6	28	19	75	24
4	72	26	9	25	20	39	3
5	58	5	1	8	20	32	18
6	72	21	24	10	3	37	16
7	60	29	12	6	10	64	28
8	40	29	19	26	13	37	19
9	45	28	10	15	4	69	5
10	42	25	6	4	20	34	30
11	72	27	10	12	24	43	10
12	45	16	17	22	22	20	25
13	48	4	1	8	3	49	14
14	62	22	22	21	20	31	2
15	67	28	16	27	22	47	20
16	67	25	20	18	13	62	24
17	67	20	23	12	1	34	15
18	74	12	10	16	23	28	19
19	51	18	16	4	24	57	26
20	63	9	15	24	6	28	20

TABLE 2: DEMAND PROFILES

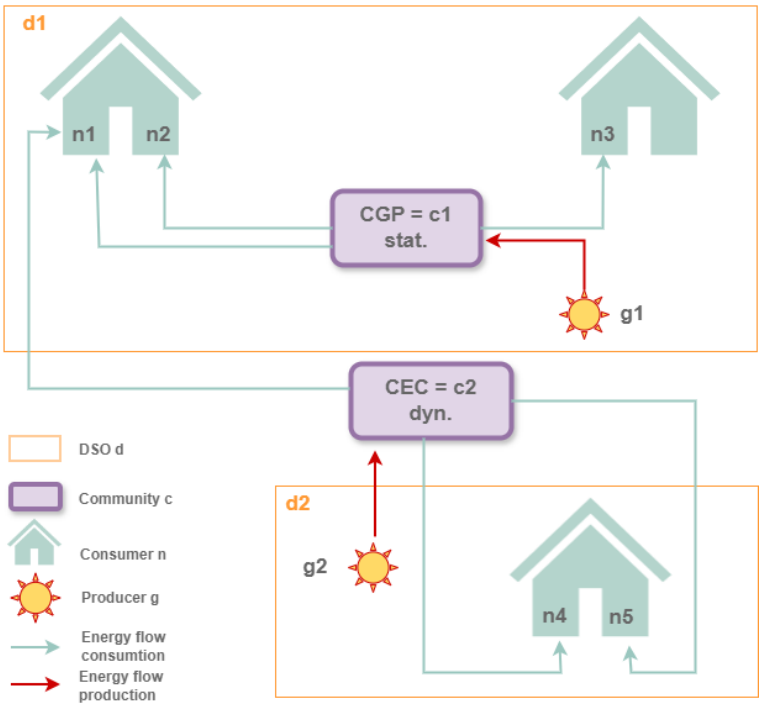


Fig. 1: Schematic illustration of case 1 scenario A

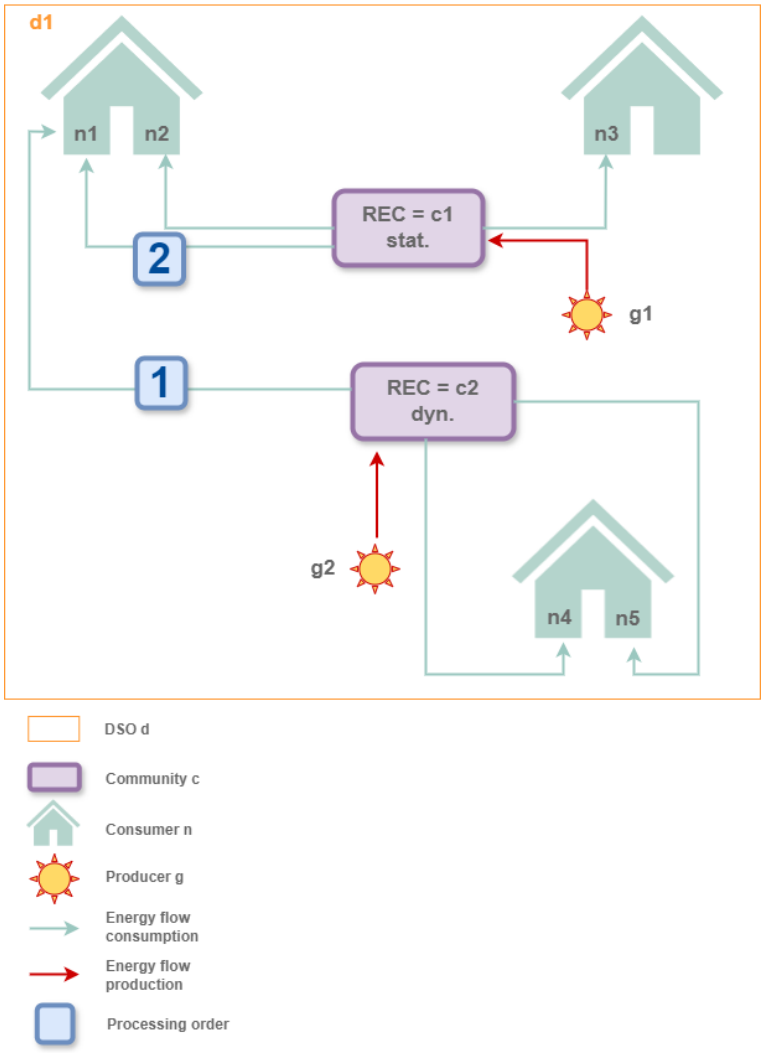
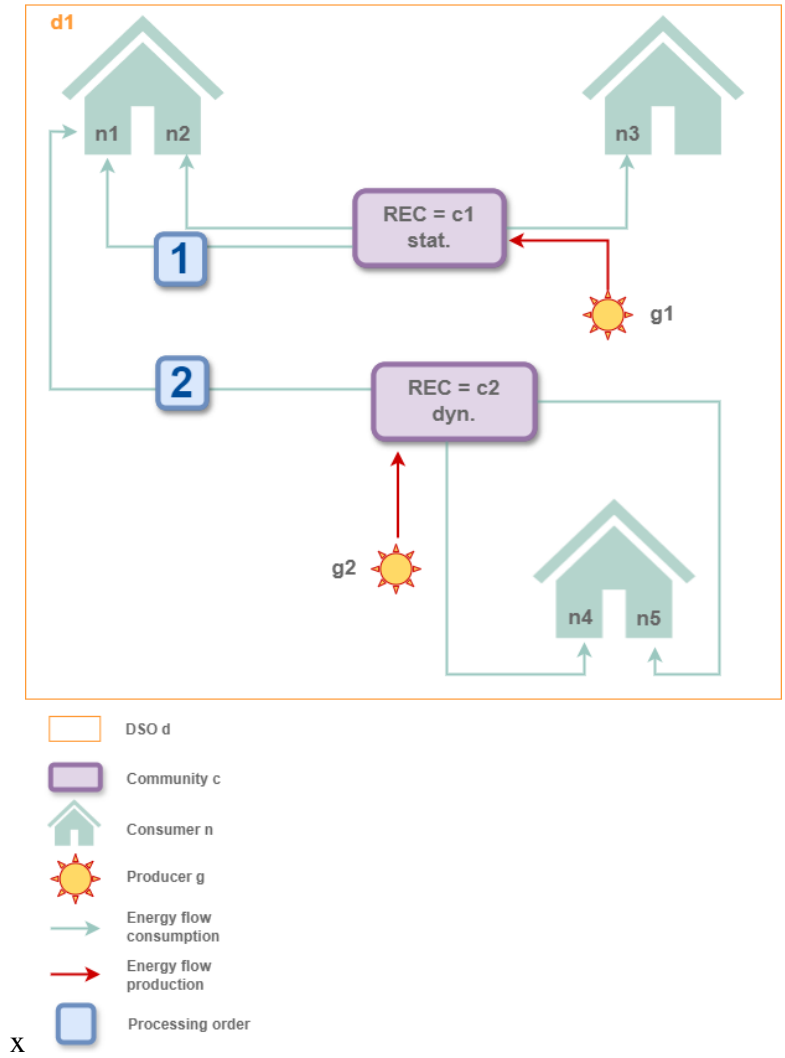


Fig. 2: Schematic illustration of case 1 scenario B

	Unit	n_1	n_2	n_3	n_4	n_5	g_1	g_2
D_n	kWh	69	29	20	9	16	-	-
P_g	kWh	-	-	-	-	-	98	77
$Share_{c1}^{st\%}$	%	40	30	20	-	-	-	-
$Share_{c1}^{kWh}$	kWh	39,2	29,4	19,6	-	-	-	-
Sc_{c1}	kWh	39,2	29	19,6	-	-	-	-
$Share_{c2}^{kWh}$	kWh	41,9	-	-	12,6	22,5	-	-
Sc_{c2}	kWh	29,8	-	-	9	16	-	-
R_s	kWh	0	0	0,4	0	0	-	-

TABLE 3: RESULTS FOR CASE 1 SCENARIO B WITH THE FIRST POSSIBLE PROCESSING ORDER WITHOUT FIXED PRIORITIZATION



x

Fig. 3: Schematic illustration of case 1 scenario B with the first possible processing order without fixed prioritization

	Unit	n_1	n_2	n_3	n_4	n_5	g_1	g_2
D_n	kWh	69	29	20	9	16	-	-
P_g	kWh	-	-	-	-	-	98	77
$Share_{c2}^{kWh}$	kWh	56,5	-	-	7,3	13.1	-	-
Sc_{c2}	kWh	56,5	-	-	7,3	13.1	-	-
$Share_{c1}^{st\%}$	%	40	30	20	-	-	-	-
$Share_{c1}^{kWh}$	kWh	39,2	29,4	19,6	-	-	-	-
Sc_{c1}	kWh	12,5	29	19,6	-	-	-	-
R_s	kWh	0	0	0,4	1,6	2,9	-	-

TABLE 4: RESULTS FOR CASE 1 SCENARIO B WITH THE SECOND POSSIBLE PROCESSING ORDER WITHOUT FIXED PRIORITIZATION

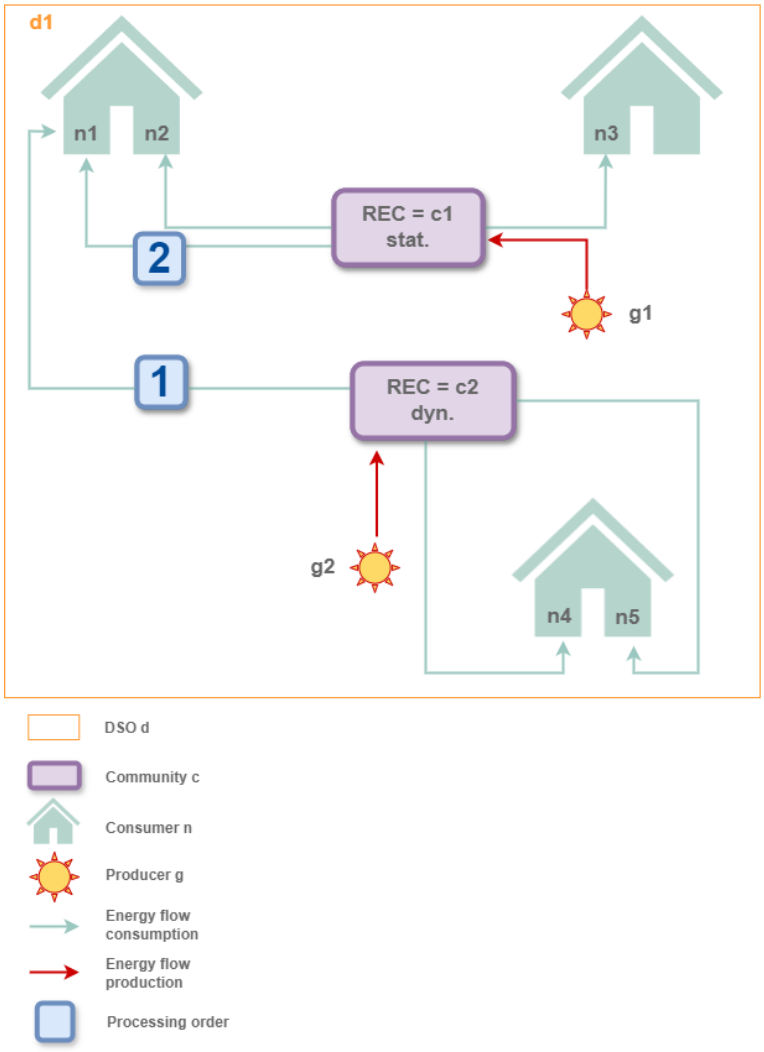


Fig. 4: Schematic illustration of case 1 scenario B with the second possible processing order without fixed prioritization

	Unit	n_1	n_2	n_3	n_4	n_5	n_6	n_7	g_1	g_2	g_3
$D_{n,c1}$	kWh	51	18	16	-	-	-	-	-	-	-
$D_{n,c2}$	kWh	15,6	-	-	4	24	-	-	-	-	-
$D_{n,c3}$	kWh	7,1	-	-	-	-	57	26	-	-	-
P_g	kWh	-	-	-	-	-	-	-	59	85	54
$Share_{c1}^{kWh}$	kWh	35,4	12,5	11,1	-	-	-	-	-	-	-
Sc_{c1}	kWh	35,4	12,5	11,1	-	-	-	-	-	-	-
$Share_{c2}^{st\%}$	%	10	-	-	20	40	-	-	-	-	-
$Share_{c2}^{kWh}$	kWh	8,5	-	-	17	34	-	-	-	-	-
Sc_{c2}	kWh	8,5	-	-	4	24	-	-	-	-	-
$Share_{c3}^{st\%}$	%	40	-	-	-	-	30	20	-	-	-
$Share_{c3}^{kWh}$	kWh	7,1	-	-	-	-	16,2	10,8	-	-	-
Sc_{c3}	kWh	7,1	-	-	-	-	16,2	10,8	-	-	-
R_s	kWh	0	5,5	4,9	0	0	40,8	15,2	-	-	-
$Ecxe_s$	kWh	-	-	-	-	-	-	-	0	48,5	14,5

TABLE 5: RESULTS FOR CASE 2 SCENARIO A WITH HIERARCHICAL SYSTEM

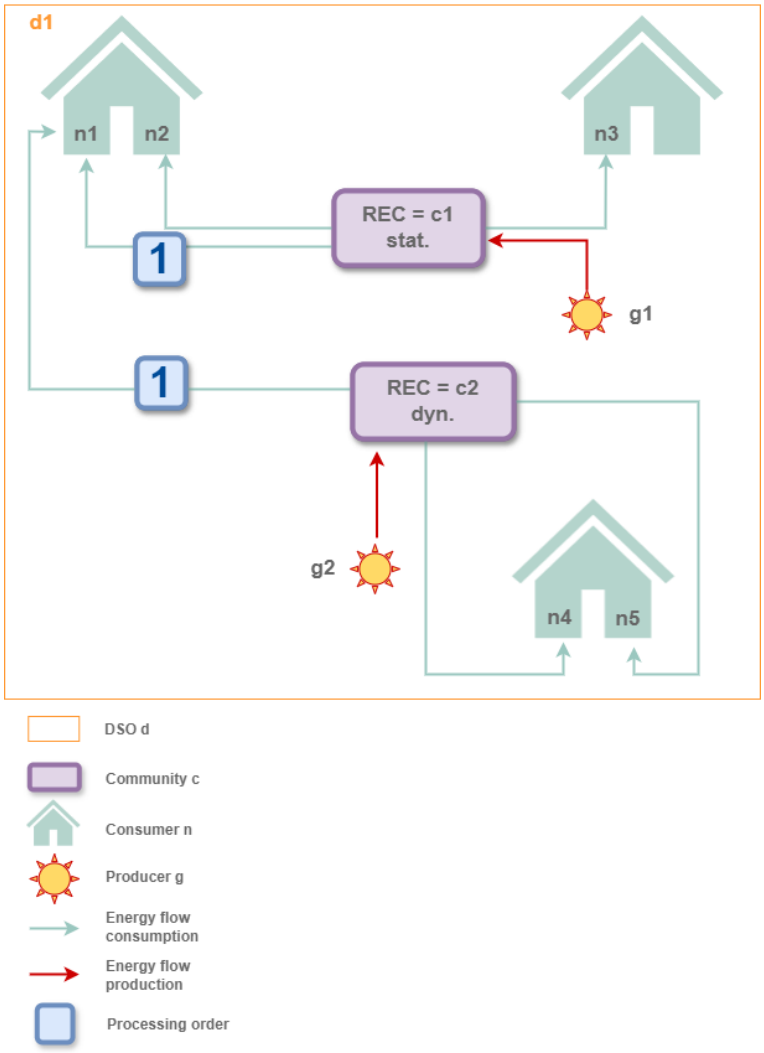


Fig. 5: Schematic illustration of case 1 scenario B with hierarchical system

	Unit	n_1	n_2	n_3	n_4	n_5	g_1	g_2
D_n	kWh	40	29	19	26	13	-	-
$P_{g,c1}$	kWh	-	-	-	-	-	55	-
$P_{g,c2}$	kWh	-	-	-	-	-	5,5	82
$Share_{c1}^{st\%}$	%	40	30	20	-	-	-	-
$Share_{c1}^{kWh}$	kWh	22	16,5	11	-	-	-	-
Sc_{c1}	kWh	22	16,5	11	-	-	-	-
$Share_{c2}^{kWh}$	kWh	-	-	-	58,3	29,2	-	-
Sc_{c2}	kWh	-	-	-	26	13	-	-
R_s	kWh	18	12,5	8	0	0	-	-
$Ecxe_s$	kWh	-	-	-	-	-	3	45,5

TABLE 6: RESULTS FOR CASE 3 SCENARIO A WITH THE FIRST POSSIBLE FIXED PRIORITIZATION

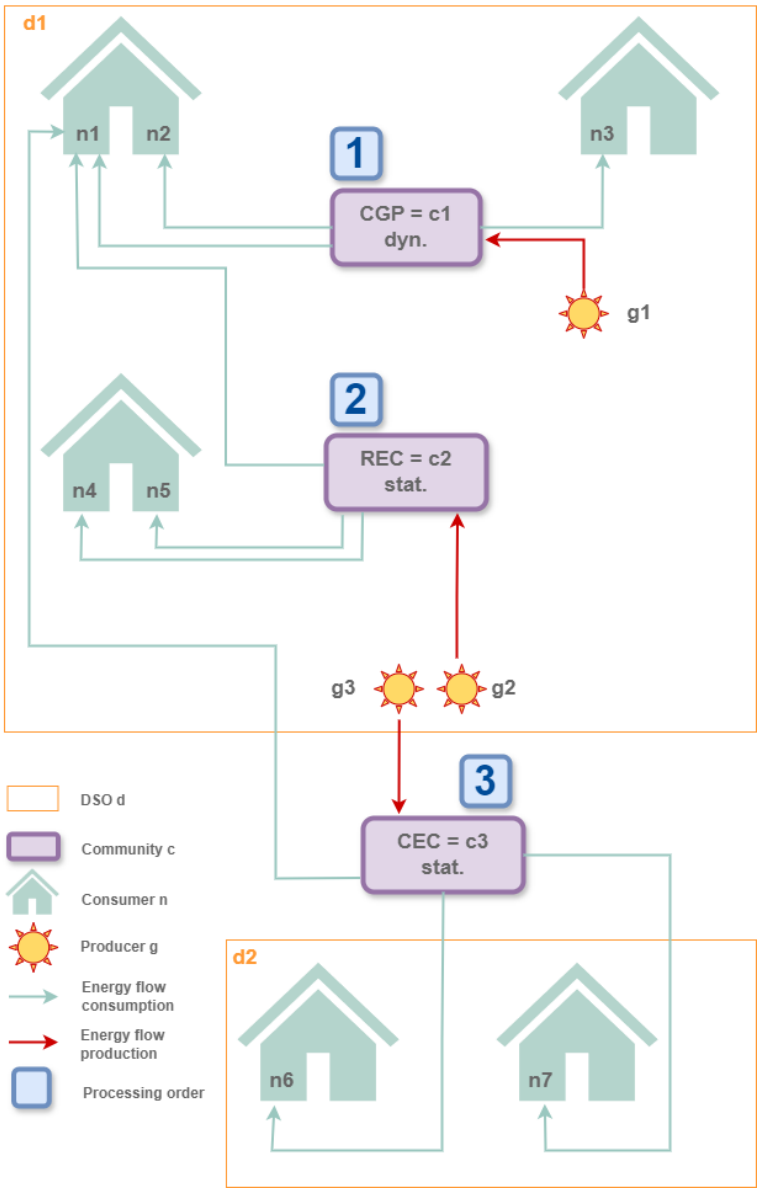


Fig. 6: Schematic illustration of case 2 scenario A with hierarchical system

	Unit	n_1	n_2	n_3	n_4	n_5	g_1	g_2
D_n	kWh	40	29	19	26	13	-	-
$P_{g,c2}$	kWh	-	-	-	-	-	55	82
$P_{g,c1}$	kWh	-	-	-	-	-	39,3	-
$Share_{c2}^{kWh}$	kWh	-	-	-	91,3	46,7	-	-
Sc_{c2}	kWh	-	-	-	26	13	-	-
$Share_{c1}^{st\%}$	%	40	30	20	-	-	-	-
$Share_{c1}^{kWh}$	kWh	15,7	11,8	7,9	-	-	-	-
Sc_{c1}	kWh	15,7	11,8	7,9	-	-	-	-
R_s	kWh	24,3	17,2	11,1	0	0	-	-
$Ecxe_s$	kWh	-	-	-	-	-	0	58,7

TABLE 7: RESULTS FOR CASE 3 SCENARIO A WITH SECOND POSSIBLE FIXED PRIORITIZATION

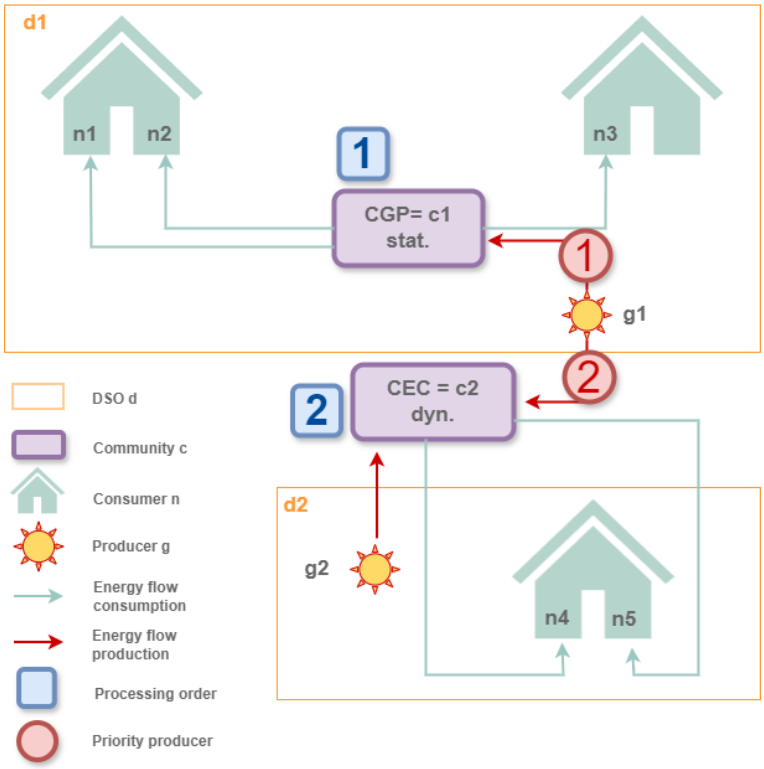


Fig. 7: Schematic illustration of case 3 scenario A with the first possible fixed prioritization

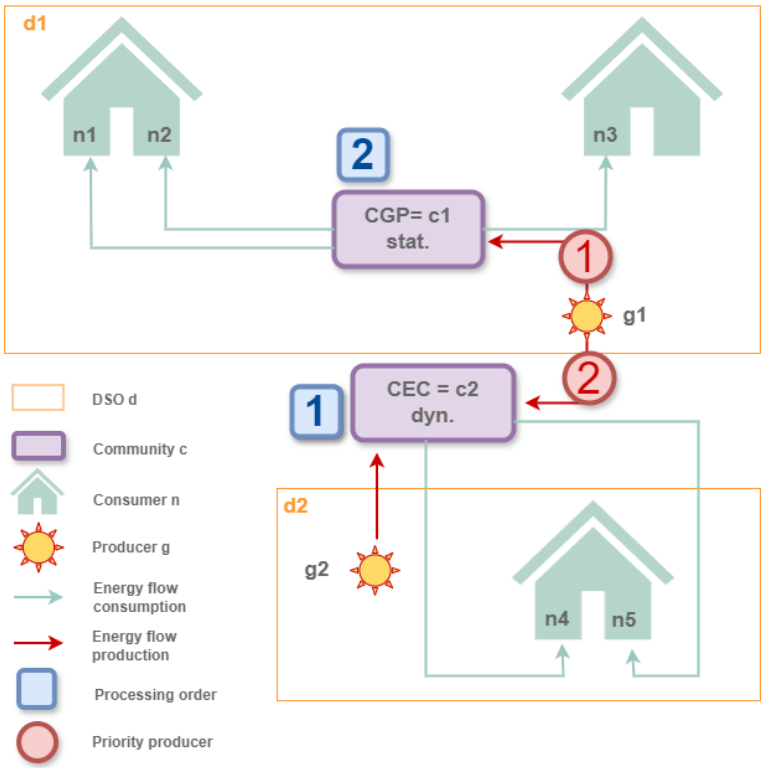


Fig. 8: Schematic illustration of case 3 scenario A with the second possible fixed prioritization

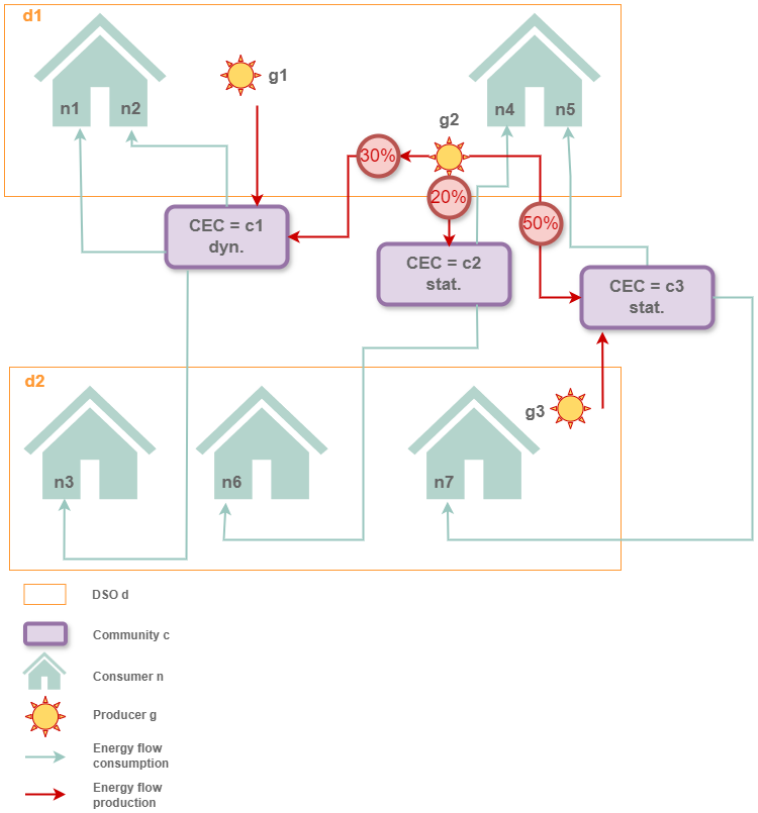


Fig. 9: Schematic illustration of case 4 scenario B with with distributed consumption

	Unit	n_1	n_2	n_3	n_4	n_5	n_6	n_7	g_1	g_2	g_3
$D_{n,c1}$	kWh	51	18	16	-	-	-	-	-	-	-
$D_{n,c2}$	kWh	-	-	-	4	-	57	-	-	-	-
$D_{n,c3}$	kWh	-	-	-	-	24	-	26	-	-	-
$P_{g,c1}$	kWh	-	-	-	-	-	-	-	59	25,5	-
$P_{g,c2}$	kWh	-	-	-	-	-	-	-	-	17	-
$P_{g,c3}$	kWh	-	-	-	-	-	-	-	-	42,5	54
$Share_{c1}^{kWh}$	kWh	50,7	17,9	15,9	-	-	-	-	-	-	-
Sc_{c1}	kWh	50,7	17,9	15,9	-	-	-	-	-	-	-
$Share_{c2}^{st\%}$	%	-	-	-	20	-	40	-	-	-	-
$Share_{c2}^{kWh}$	kWh	-	-	-	3,4	-	6,8	-	-	-	-
Sc_{c2}	kWh	-	-	-	3,4	-	6,8	-	-	-	-
$Share_{c3}^{st\%}$	%	-	-	-	-	30	-	20	-	-	-
$Share_{c3}^{kWh}$	kWh	-	-	-	-	24	-	19,3	-	-	-
Sc_{c3}	kWh	-	-	-	-	24	-	19,3	-	-	-
R_s	kWh	0,3	0,1	0,1	0,6	0	50,2	6,7	-	-	-
$Ecxe_s$	kWh	-	-	-	-	-	-	-	0	2,2	2,8

TABLE 8: RESULTS FOR CASE 4 SCENARIO B WITH DISTRIBUTED CONSUMPTION/DISTRIBUTED PRODUCTION

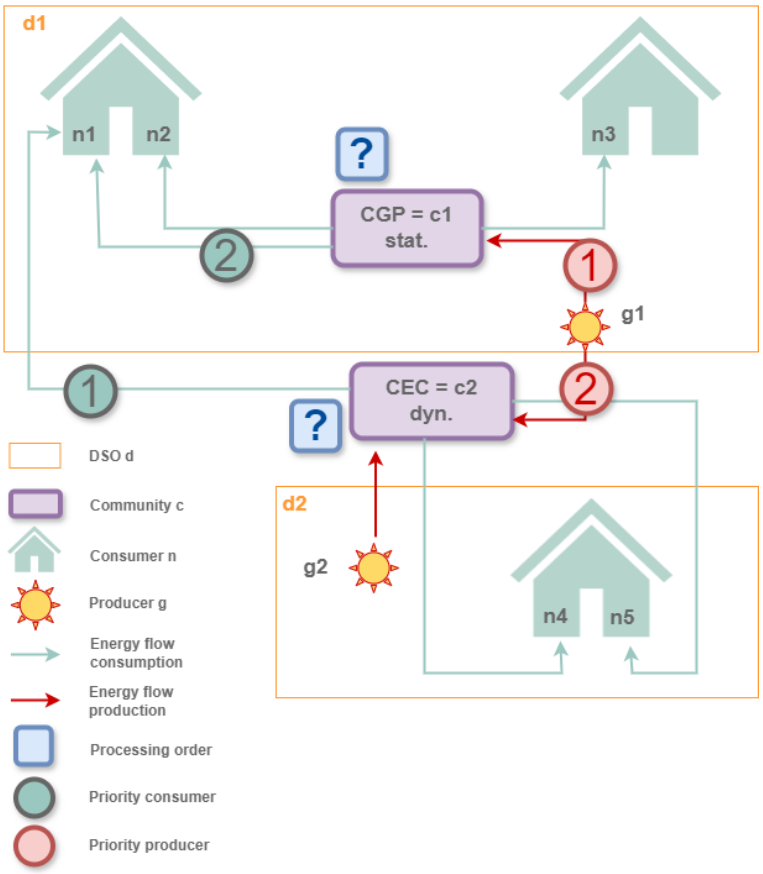


Fig. 10: Schematic illustration of case 5 scenario A with fixed prioritization

	Unit	n_1	n_2	n_3	n_4	n_5	n_6	n_7	g_1	g_2	g_3
$D_{n,c1}$	kWh	-	26	9	-	-	-	-	-	-	-
$D_{n,c2}$	kWh	72	-	-	25	20	-	-	-	-	-
$D_{n,c3}$	kWh	-	-	-	-	-	39	3	-	-	-
$P_{g,c1}$	kWh	-	-	-	-	-	-	-	36	-	-
$P_{g,c2}$	kWh	-	-	-	-	-	-	-	36	34,2	-
$P_{g,c3}$	kWh	-	-	-	-	-	-	-	-	22,8	54
$Share_{c1}^{st\%}$	%	-	60	40	-	-	-	-	-	-	-
$Share_{c1}^{kWh}$	kWh	-	21,6	14,4	-	-	-	-	-	-	-
Sc_{c1}	kWh	-	21,6	9	-	-	-	-	-	-	-
$Share_{c2}^{st\%}$	%	10	-	-	20	40	-	-	-	-	-
$Share_{c2}^{kWh}$	kWh	7	-	-	14	28	-	-	-	-	-
Sc_{c2}	kWh	7	-	-	14	20	-	-	-	-	-
$Share_{c3}^{kWh}$	kWh	-	-	-	-	-	71,3	5,5	-	-	-
Sc_{c3}	kWh	-	-	-	-	-	39	3	-	-	-
R_s	kWh	65	4.4	0	11	0	0	0	-	-	-
$Ecxe_s$	kWh	-	-	-	-	-	-	-	20,3	14,2	0

TABLE 9: RESULTS FOR CASE 7 SCENARIO A WITH DISTRIBUTED PRODUCTION

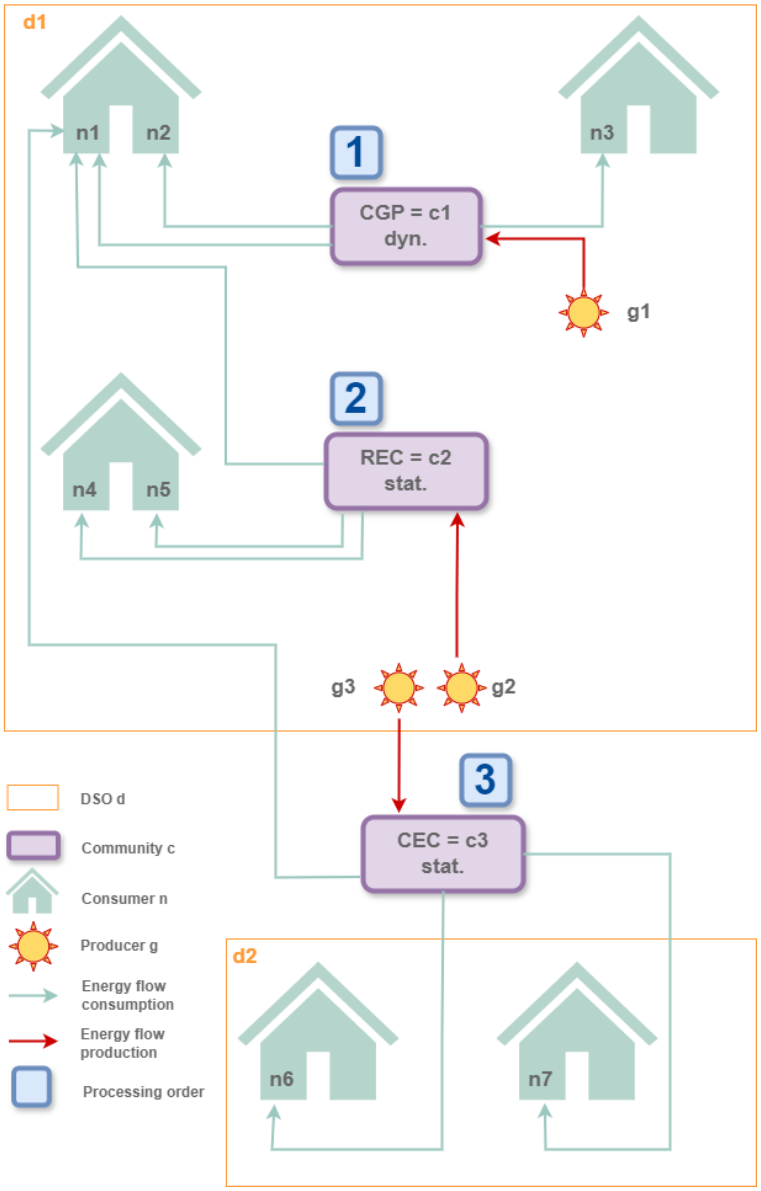


Fig. 11: Schematic illustration of case 2 scenario A

	Unit	n_1	n_2	n_3	n_4	n_5	n_6	g_1	g_2
$D_{n,c1}$	kWh	67	20	23	-	-	-	-	-
$D_{n,c2}$	kWh	-	-	-	12	1	34	-	-
$P_{g,c1}$	kWh	-	-	-	-	-	-	25,5	56,4
$P_{g,c2}$	kWh	-	-	-	-	-	-	51	37,6
$Share_{c1}^{kWh}$	kWh	49,9	14,8	17,1	-	- -	-	-	-
Sc_{c1}	kWh	49,9	14,8	17,1	-	-	-	-	-
$Share_{c2}^{st\%}$	%	-	-	-	10	20	40	-	-
$Share_{c2}^{kWh}$	kWh	-	-	-	8,9	17,7	35,5	-	
Sc_{c2}	kWh	-	-	-	8,9	1	34	-	-
R_s	kWh	17,1	5,1	5,9	3,1	0	0	-	-
$Ecxe_s$	kWh	-	-	-	-	-	-	25,8	19

TABLE 10: RESULTS FOR CASE 7 SCENARIO B WITH DISTRIBUTED PRODUCTION

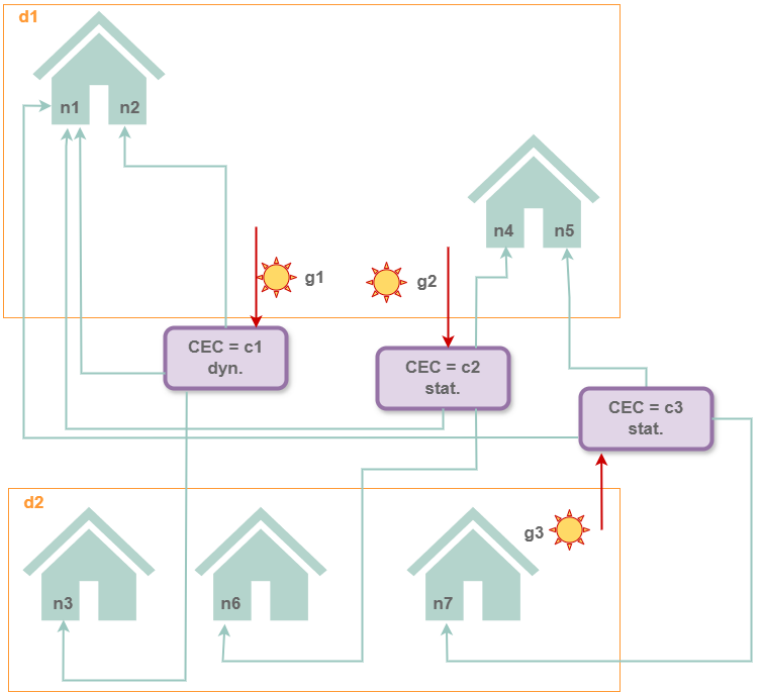


Fig. 12: Schematic illustration of case 2 scenario B

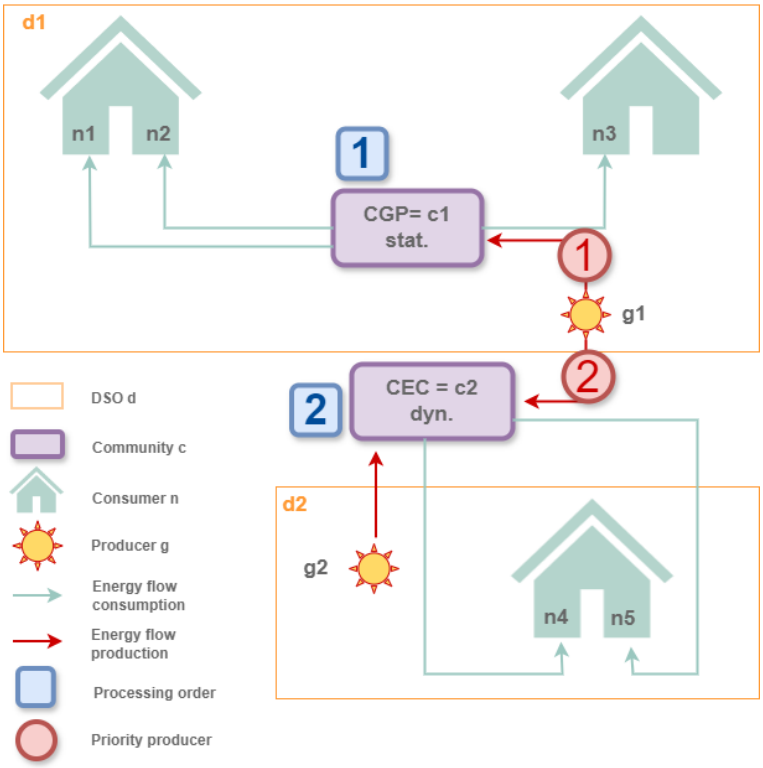


Fig. 13: Schematic illustration of case 3 scenario A

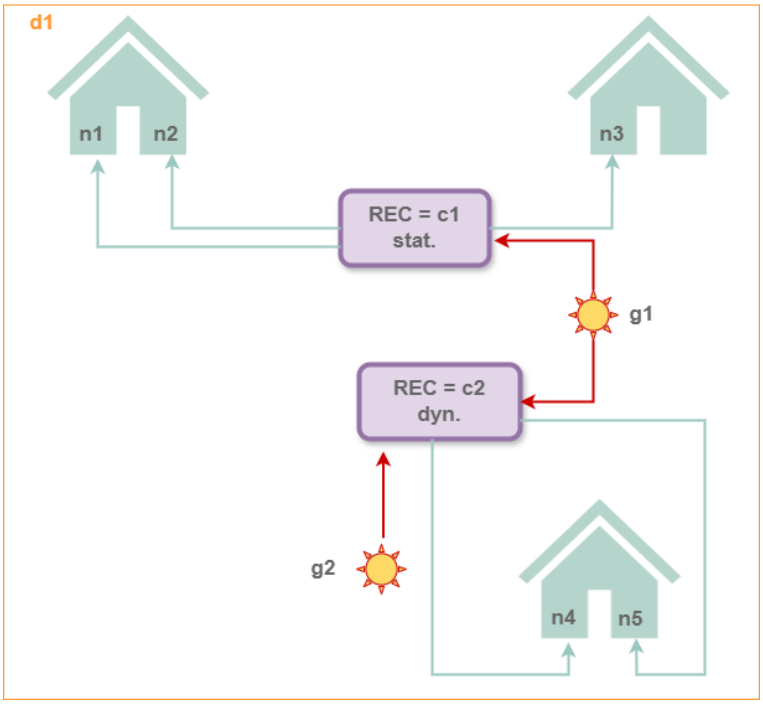


Fig. 14: Schematic illustration of case 3 scenario B

	Unit	n_1	n_2	n_3	n_4	n_5	n_6	n_7	g_1	g_2	g_3
$D_{n,c1}$	kWh	-	5	1	-	-	-	-	-	-	-
$D_{n,c2}$	kWh	58	-	-	8	20	-	-	-	-	-
$D_{n,c3}$	kWh	-	-	-	-	-	32	18	-	-	-
$P_{g,c1}$	kWh	-	-	-	-	-	-	-	28,5	17	-
$P_{g,c2}$	kWh	-	-	-	-	-	-	-	28,5	42,5	-
$P_{g,c3}$	kWh	-	-	-	-	-	-	-	38	25,5	60
$Share_{c1}^{st\%}$	%	-	60	40	-	-	-	-	-	-	-
$Share_{c1}^{kWh}$	kWh	-	27,3	18,2	-	-	-	-	-	-	-
Sc_{c1}	kWh	-	5	1	-	-	-	-	-	-	-
$Share_{c2}^{st\%}$	%	10	-	-	20	40	-	-	-	-	-
$Share_{c2}^{kWh}$	kWh	7,1	-	-	14,2	28,4	-	-	-	-	-
Sc_{c2}	kWh	7,1	-	-	8	20	-	-	-	-	-
$Share_{c3}^{kWh}$	kWh	-	-	-	-	-	74	44,5	-	-	-
Sc_{c3}	kWh	-	-	-	-	-	32	18	-	-	-
R_s	kWh	50.9	0	0	0	0	0	0	-	-	-
$Ecxe_s$	kWh	-	-	-	-	-	-	-	39,2	36,2	0

TABLE 11: RESULTS FOR CASE 8 SCENARIO A WITH DISTRIBUTED PRODUCTION

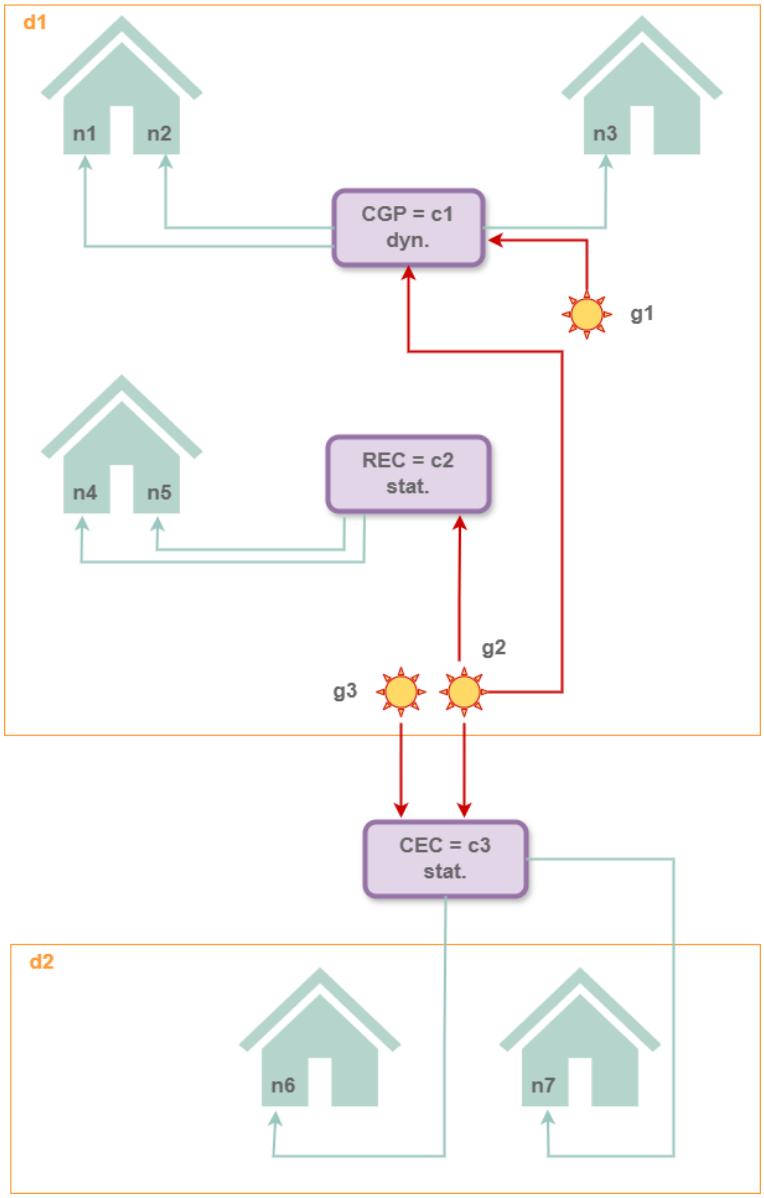


Fig. 15: Schematic illustration of case 4 scenario A

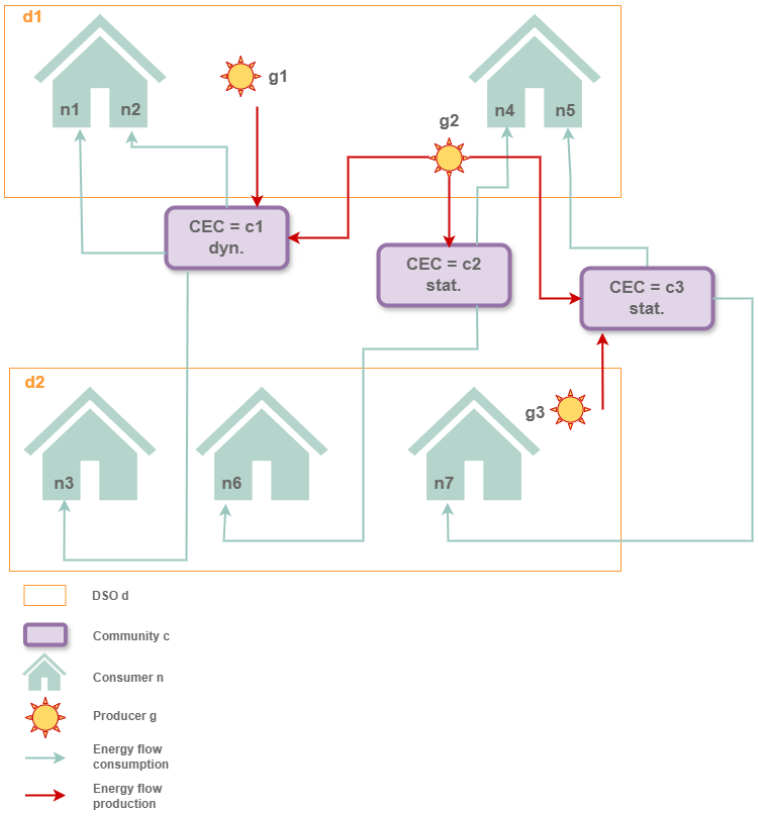


Fig. 16: Schematic illustration of case 4 scenario B

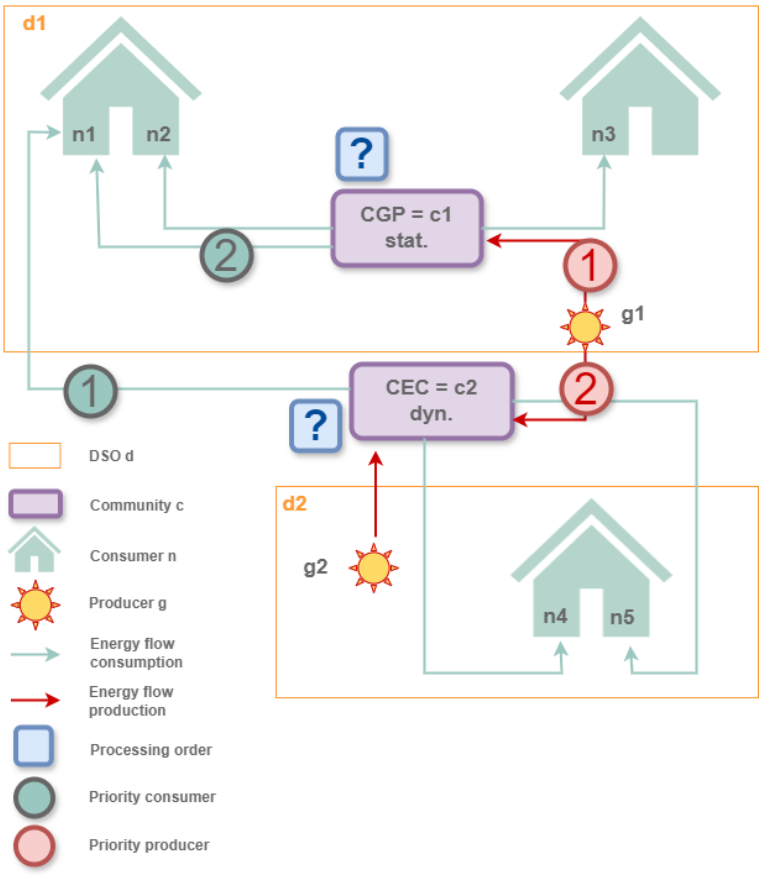


Fig. 17: Schematic illustration of case 5 scenario A

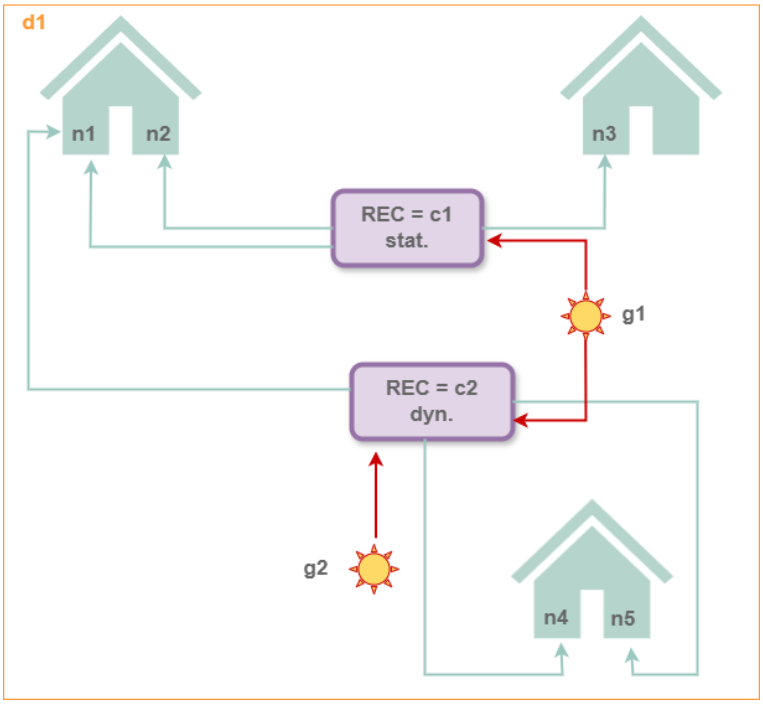


Fig. 18: Schematic illustration of case 5 scenario B

	Unit	n_1	n_2	n_3	n_4	n_5	n_6	n_7	g_1	g_2	g_3
$D_{n,c1}$	kWh	63	9	15	-	-	-	-	-	-	-
$D_{n,c2}$	kWh	-	-	-	24	-	28	-	-	-	-
$D_{n,c3}$	kWh	-	-	-	-	6	-	20	-	-	-
$P_{g,c1}$	kWh	-	-	-	-	-	-	-	38,4	33	-
$P_{g,c2}$	kWh	-	-	-	-	-	-	-	29	16,5	-
$P_{g,c3}$	kWh	-	-	-	-	-	-	-	29	16,5	65
$Share_{c1}^{kWh}$	kWh	51,7	7,4	12,3	-	-	-	-	-	-	-
Sc_{c1}	kWh	51,7	7,4	12,3	-	-	-	-	-	-	-
$Share_{c2}^{st\%}$	%	-	-	-	60	-	40	-	-	-	-
$Share_{c2}^{kWh}$	kWh	-	-	-	24	-	18,1	-	-	-	-
Sc_{c2}	kWh	-	-	-	24	-	18,1	-	-	-	-
$Share_{c3}^{st\%}$	%	-	-	-	-	30	-	70	-	-	-
$Share_{c3}^{kWh}$	kWh	-	-	-	-	6	-	20	-	-	-
Sc_{c3}	kWh	-	-	-	-	6	-	20	-	-	-
R_s	kWh	11,3	1,6	2,7	0	0	9,9	0	-	-	-
$Ecxe_s$	kWh	-	-	-	-	-	-	-	14,3	8,2	0

TABLE 12: RESULTS FOR CASE 8 SCENARIO B WITH DISTRIBUTED PRODUCTION

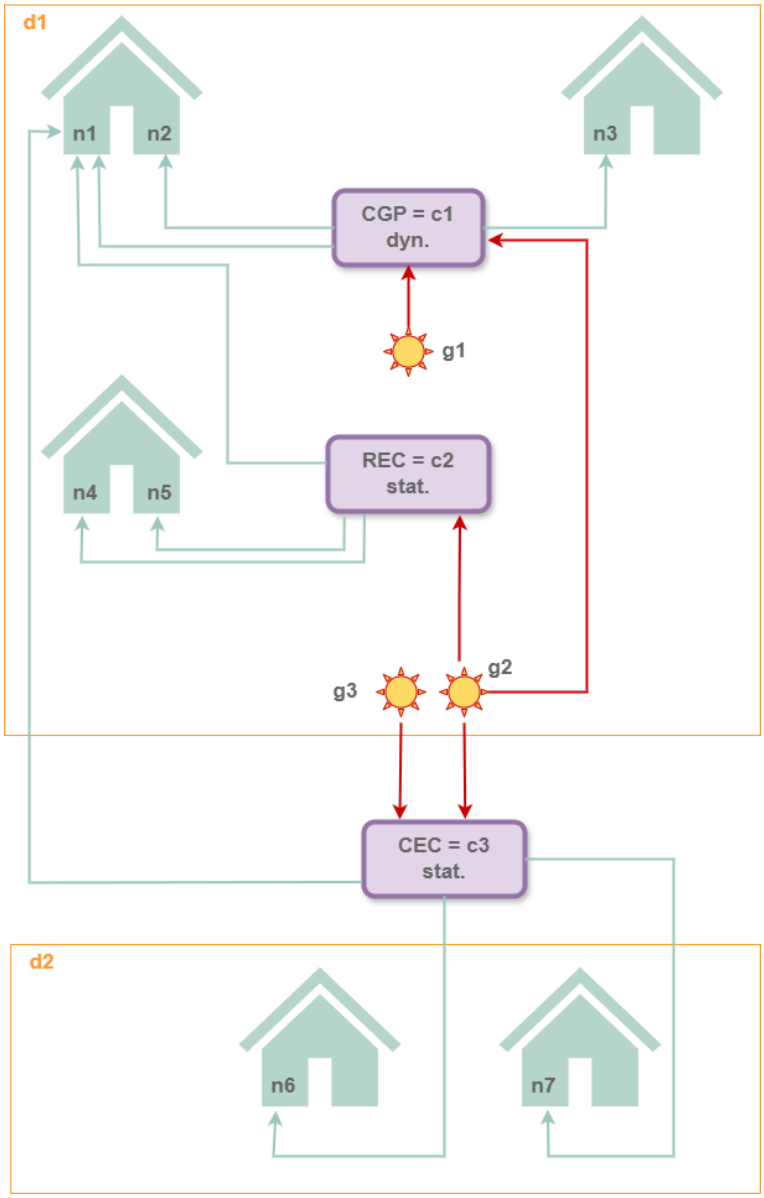


Fig. 19: Schematic illustration of case 6 scenario A

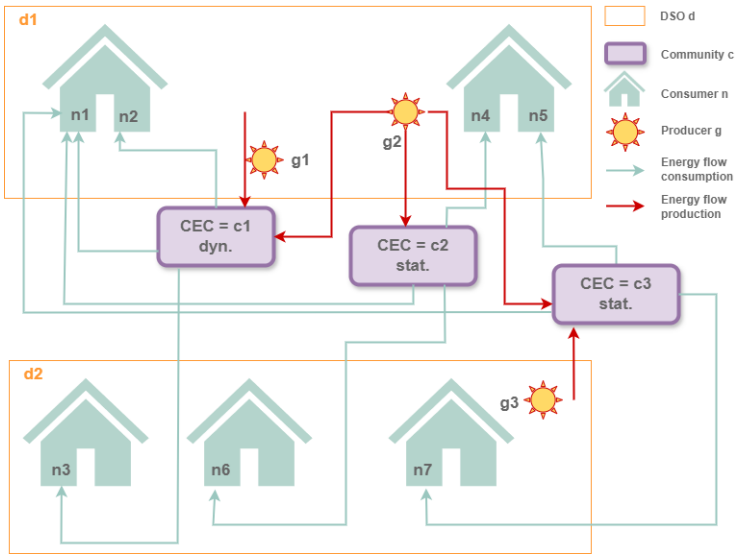


Fig. 20: Schematic illustration of case 6 scenario B

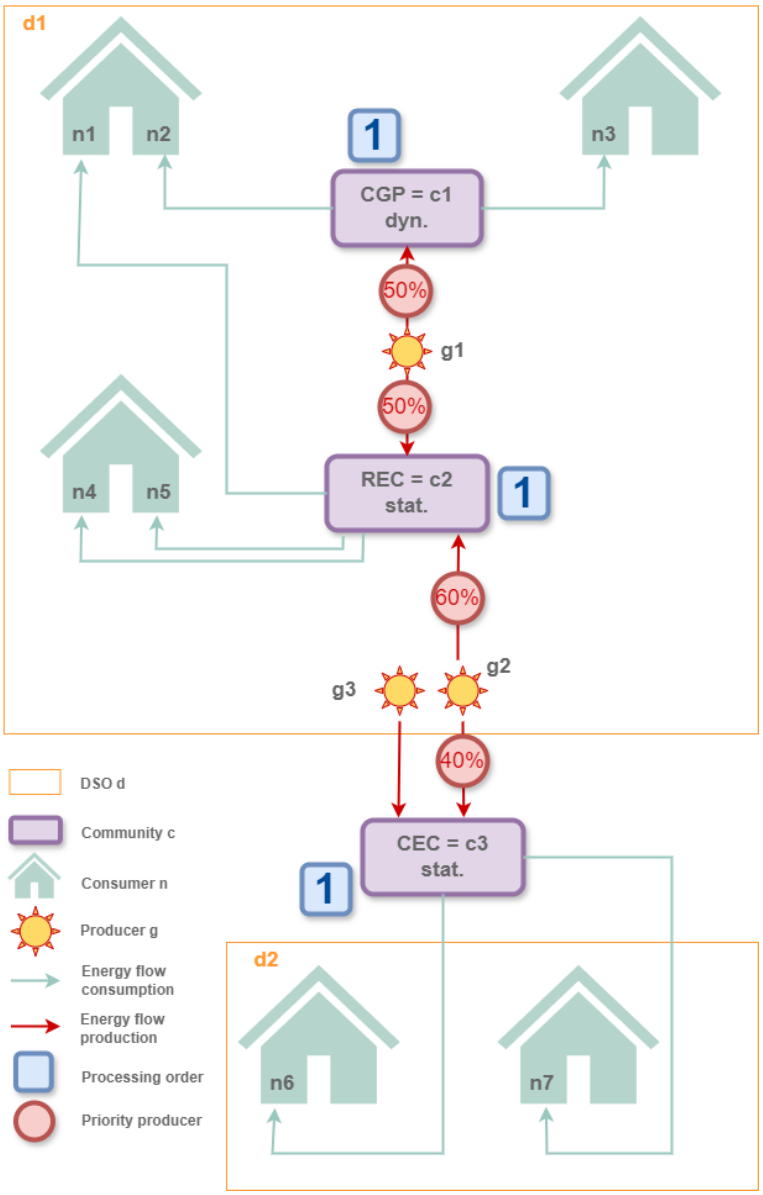


Fig. 21: Schematic illustration of case 7 scenario A

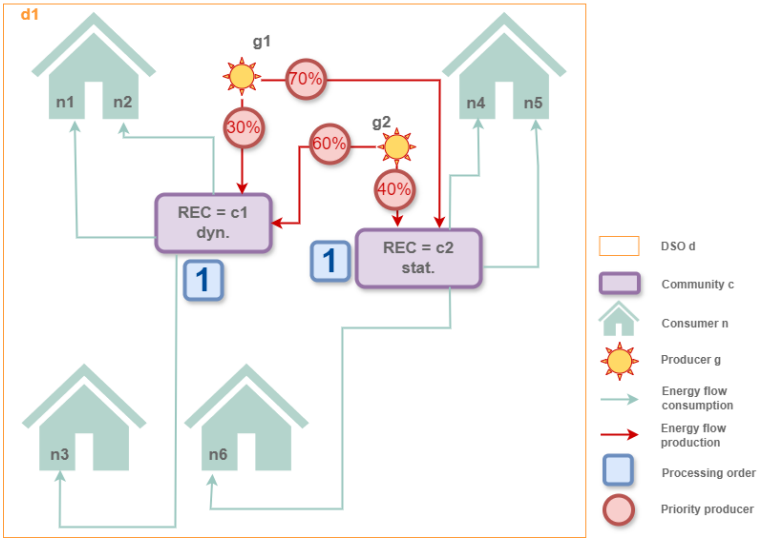


Fig. 22: Schematic illustration of case 7 scenario B

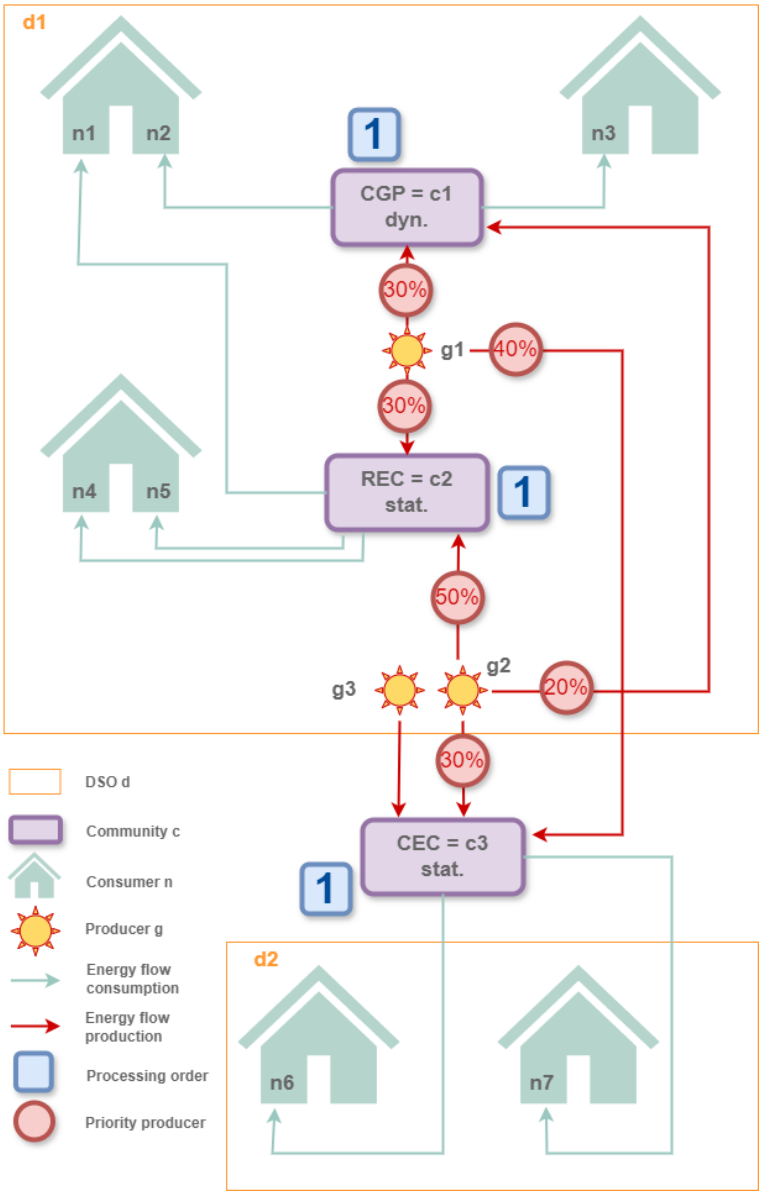


Fig. 23: Schematic illustration of case 8 scenario A

	Unit	n_1	n_2	n_3	n_4	n_5	g_1	g_2
$D_{n,c1}$	kWh	48	14,5	12	-	-	-	-
$D_{n,c2}$	kWh	12	14,5	-	6	10	-	-
$P_{g,c1}$	kWh	-	-	-	-	-	70	-
$P_{g,c2}$	kWh	-	-	-	-	-	-	100
$Share_{c1}^{st\%}$	%	30	40	30	-	-	-	-
$Share_{c1}^{kWh}$	kWh	21	28	21	-	-	-	-
Sc_{c1}	kWh	21	14,5	12	-	-	-	-
$Share_{c2}^{st\%}$	%	10	20	-	30	10	-	-
$Share_{c2}^{kWh}$	kWh	10	20	-	30	10	-	-
Sc_{c2}	kWh	10	14,5	-	6	10	-	-
R_s	kWh	29	0	0	0	0	-	-
$Ecxe_s$	kWh	-	-	-	-	-	22,5	59,5

TABLE 13: RESULTS FOR CASE 9 SCENARIO A WITH DISTRIBUTED PRODUCTION

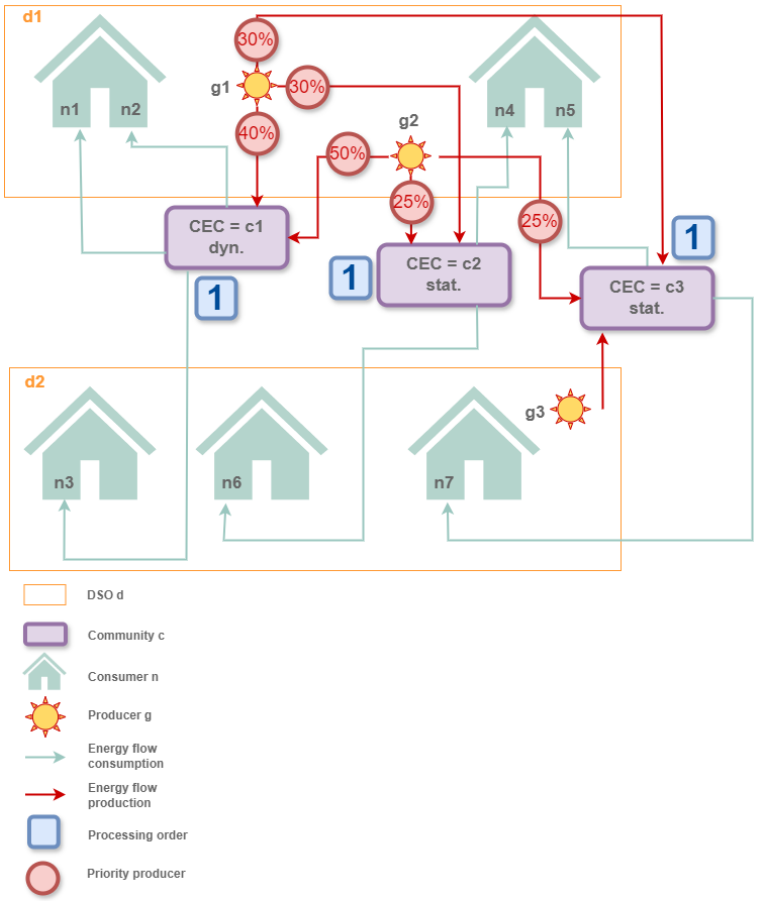


Fig. 24: Schematic illustration of case 8 scenario B

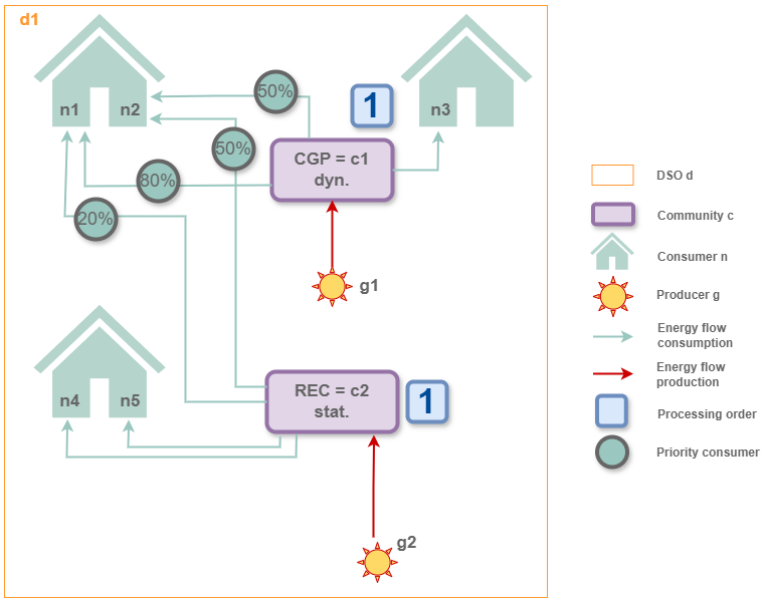


Fig. 25: Schematic illustration of case 9 scenario A

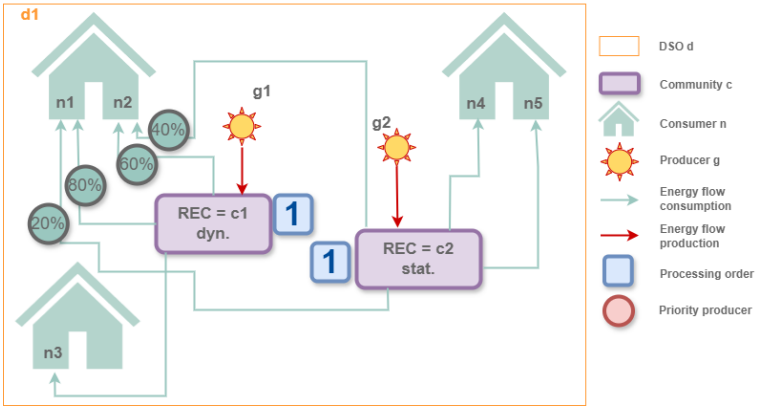


Fig. 26: Schematic illustration of case 9 scenario B

	Unit	n_1	n_2	n_3	n_4	n_5	g_1	g_2
$D_{n,c1}$	kWh	55,2	17,4	20	-	-	-	-
$D_{n,c2}$	kWh	14	12	-	9	16	-	-
$P_{g,c1}$	kWh	-	-	-	-	-	98	-
$P_{g,c2}$	kWh	-	-	-	-	-	-	77
$Share_{c1}^{kWh}$	kWh	58,4	18,4	21,2	-	-	-	-
Sc_{c1}	kWh	55,2	17,4	20	-	-	-	-
$Share_{c2}^{st\%}$	%	10	20	-	40	30	-	-
$Share_{c2}^{kWh}$	kWh	8	15	-	30,8	23,1	-	-
Sc_{c2}	kWh	8	12	-	9	16	-	-
R_s	kWh	6,1	0	0	0	0	-	-
$Ecxe_s$	kWh	-	-	-	-	-	5,4	32,7

TABLE 14: RESULTS FOR CASE 9 SCENARIO B WITH DISTRIBUTED PRODUCTION

	Unit	n_1	n_2	n_3	n_4	n_5	n_6	n_7	g_1	g_2	g_3
$D_{n,c1}$	kWh	6,8	5,6	10	-	-	-	-	-	-	-
$D_{n,c2}$	kWh	29,3	16,8	-	15	4	-	-	-	-	-
$D_{n,c3}$	kWh	9	5,6	-	-	-	69	5	-	-	-
$P_{g,c1}$	kWh	-	-	-	-	-	-	-	75	-	-
$P_{g,c2}$	kWh	-	-	-	-	-	-	-	-	65	-
$P_{g,c3}$	kWh	-	-	-	-	-	-	-	-	-	56
$Share_{c1}^{st\%}$	%	30	40	30	-	-	-	-	-	-	-
$Share_{c1}^{kWh}$	kWh	22,5	30	23	-	-	-	-	-	-	-
Sc_{c1}	kWh	6,8	5,6	10	-	-	-	-	-	-	-
$Share_{c2}^{st\%}$	%	10	20	-	30	10	-	-	-	-	-
$Share_{c2}^{kWh}$	kWh	6,5	13	-	19,5	6,5	-	-	-	-	-
Sc_{c2}	kWh	6,5	13	-	15	4	-	-	-	-	-
$Share_{c3}^{kWh}$	kWh	5,7	3,5	-	-	-	43,6	3,2	-	-	-
Sc_{c3}	kWh	5,7	3,5	-	-	-	43,6	3,2	-	-	-
R_s	kWh	26,1	5,9	0	0	0	25,4	1,8	-	-	-
$Ecxe_s$	kWh	-	-	-	-	-	-	-	52,7	26,5	0

TABLE 15: RESULTS FOR CASE 10 SCENARIO A WITH DISTRIBUTED PRODUCTION

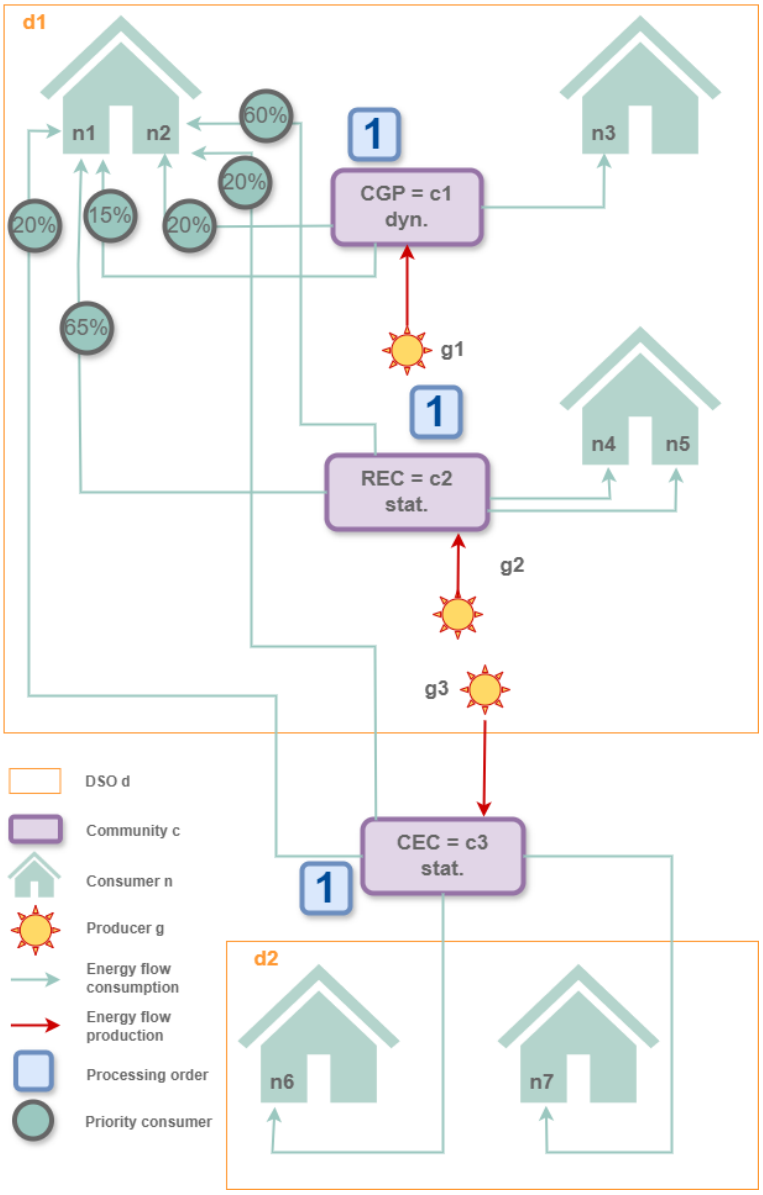


Fig. 27: Schematic illustration of case 10 scenario A

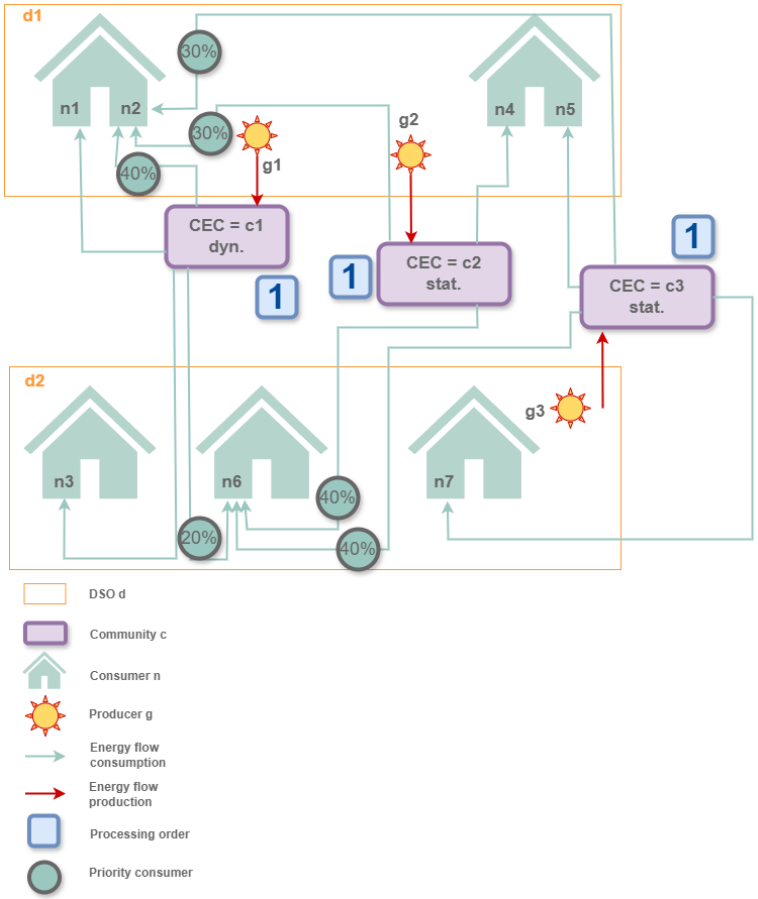


Fig. 28: Schematic illustration of case 10 scenario B

	Unit	n_1	n_2	n_3	n_4	n_5	n_6	n_7	g_1	g_2	g_3
$D_{n,c1}$	kWh	45	11,2	10	-	-	13,8	-	-	-	-
$D_{n,c2}$	kWh	-	8,4	-	15	4	27,6	-	-	-	-
$D_{n,c3}$	kWh	-	8,4	-	-	-	27,6	5	-	-	-
$P_{g,c1}$	kWh	-	-	-	-	-	-	-	75	-	-
$P_{g,c2}$	kWh	-	-	-	-	-	-	-	-	65	-
$P_{g,c3}$	kWh	-	-	-	-	-	-	-	-	-	56
$Share_{c1}^{kWh}$	kWh	42,2	10,5	9,3	-	-	12,9	-	-	-	-
Sc_{c1}	kWh	42,2	10,5	9,3	-	-	12,9	-	-	-	-
$Share_{c2}^{st\%}$	%	-	30	-	40	15	15	-	-	-	-
$Share_{c2}^{kWh}$	kWh	-	9,7	-	12,9	4,8	9,8	-	-	-	-
Sc_{c2}	kWh	-	8,4	-	12,9	4	9,8	-	-	-	-
$Share_{c3}^{st\%}$	%	-	30	-	-	-	40	30	-	-	-
$Share_{c3}^{kWh}$	kWh	-	8,4	-	-	-	18,6	14	-	-	-
Sc_{c3}	kWh	-	8,4	-	-	-	18,6	5	-	-	-
R_s	kWh	2,8	0,7	0,6	2,1	0	27,7	0	-	-	-
$Ecxe_s$	kWh	-	-	-	-	-	-	-	0	30	24

TABLE 16: RESULTS FOR CASE 10 SCENARIO B WITH DISTRIBUTED PRODUCTION

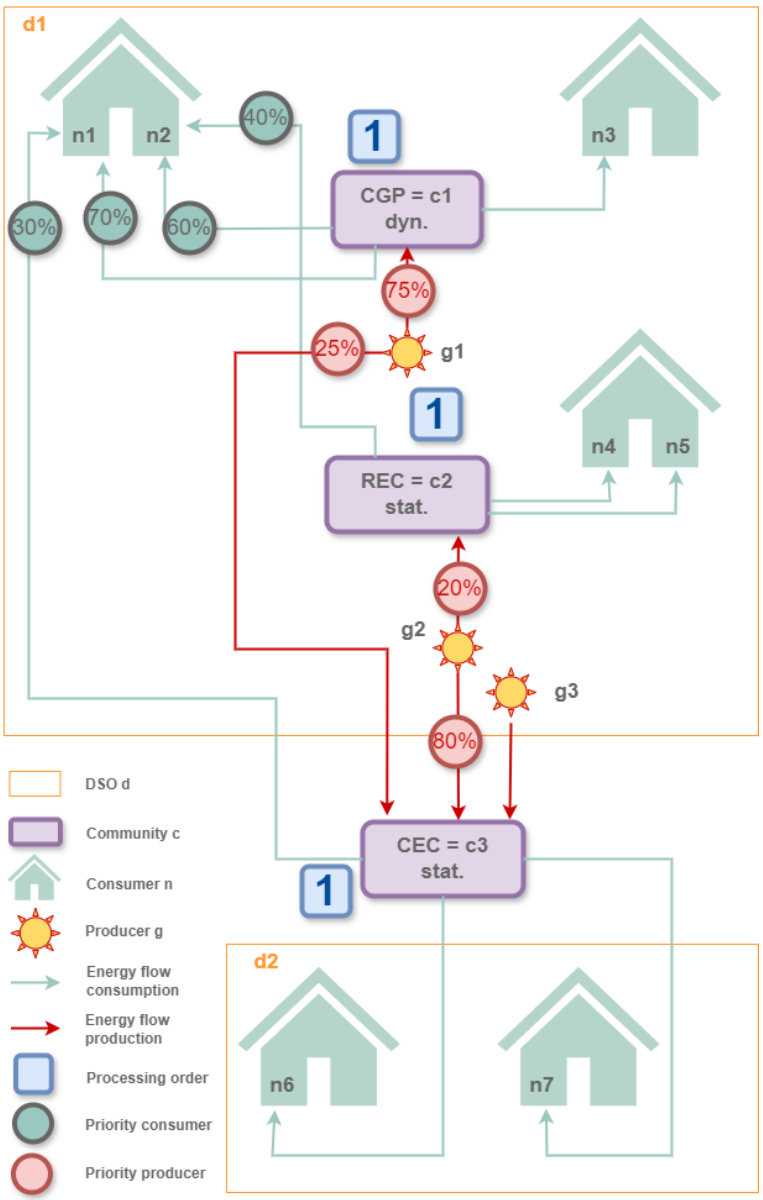


Fig. 29: Schematic illustration of case 11 scenario A

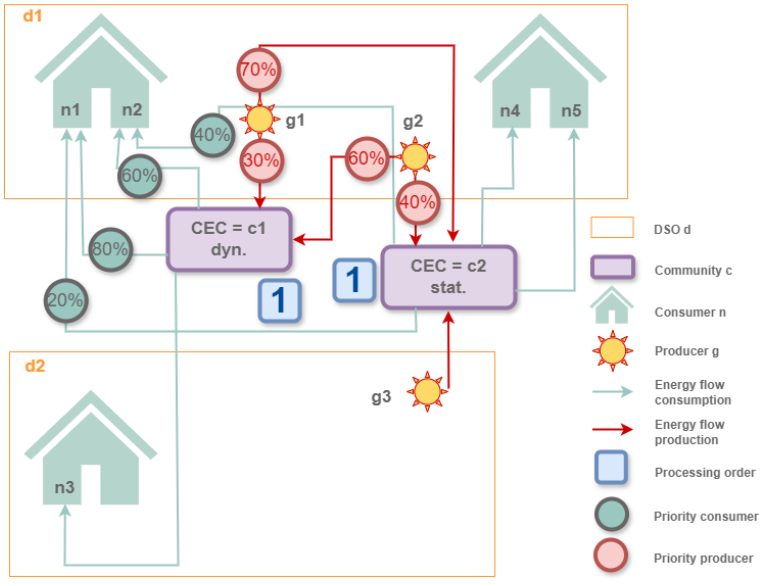


Fig. 30: Schematic illustration of case 11 scenario B

	Unit	n_1	n_2	n_3	n_4	n_5	n_6	n_7	g_1	g_2	g_3
$D_{n,c1}$	kWh	33,6	2,4	1	-	-	-	-	-	-	-
$D_{n,c2}$	kWh	-	1,6	-	8	3	-	-	-	-	-
$D_{n,c3}$	kWh	14,4	-	-	-	-	49	14	-	-	-
$P_{g,c1}$	kWh	-	-	-	-	-	-	-	62,3	-	-
$P_{g,c2}$	kWh	-	-	-	-	-	-	-	-	16,4	-
$P_{g,c3}$	kWh	-	-	-	-	-	-	-	20,8	65,6	60
$Share_{c1}^{st\%}$	%	30	40	30	-	-	-	-	-	-	-
$Share_{c1}^{kWh}$	kWh	18,7	24,9	18,7	-	-	-	-	-	-	-
Sc_{c1}	kWh	18,7	2,4	1	-	-	-	-	-	-	-
$Share_{c2}^{st\%}$	%	-	20	-	30	40	-	-	-	-	-
$Share_{c2}^{kWh}$	kWh	-	3,3	-	4,9	6,6	-	-	-	-	-
Sc_{c2}	kWh	-	1,6	-	4,9	3	-	-	-	-	-
$Share_{c3}^{kWh}$	kWh	27,2	-	-	-	-	92,7	26,5	-	-	-
Sc_{c3}	kWh	14,4	-	-	-	-	49	14	-	-	-
R_s	kWh	14,9	0	0	3,1	0	20	0	-	-	-
$Ecxe_s$	kWh	-	-	-	-	-	-	-	50	37,8	28,3

TABLE 17: RESULTS FOR CASE 11 SCENARIO A WITH DISTRIBUTED PRODUCTION

	Unit	n_1	n_2	n_3	n_4	n_5	g_1	g_2	g_3
$D_{n,c1}$	kWh	38,4	2,4	1	-	-	-	-	-
$D_{n,c2}$	kWh	9,6	1,6	-	8	3	-	-	-
$P_{g,c1}$	kWh	-	-	-	-	-	24,9	49,2	-
$P_{g,c2}$	kWh	-	-	-	-	-	58,1	32,8	60
$Share_{c1}^{kWh}$	kWh	68,1	4,6	1,8	-	-	-	-	-
Sc_{c1}	kWh	38,4	2,4	1	-	-	-	-	-
$Share_{c2}^{st\%}$	%	30	40	-	15	15	-	-	-
$Share_{c2}^{kWh}$	kWh	6,7	8,9	-	3,3	3,3	-	-	-
Sc_{c2}	kWh	6,7	1,6	-	3,3	3	-	-	-
R_s	kWh	2,9	0	0	4,7	0	-	-	-
$Ecxe_s$	kWh	-	-	-	-	-	63,3	51,1	54,2

TABLE 18: RESULTS FOR CASE 11 SCENARIO B WITH DISTRIBUTED PRODUCTION

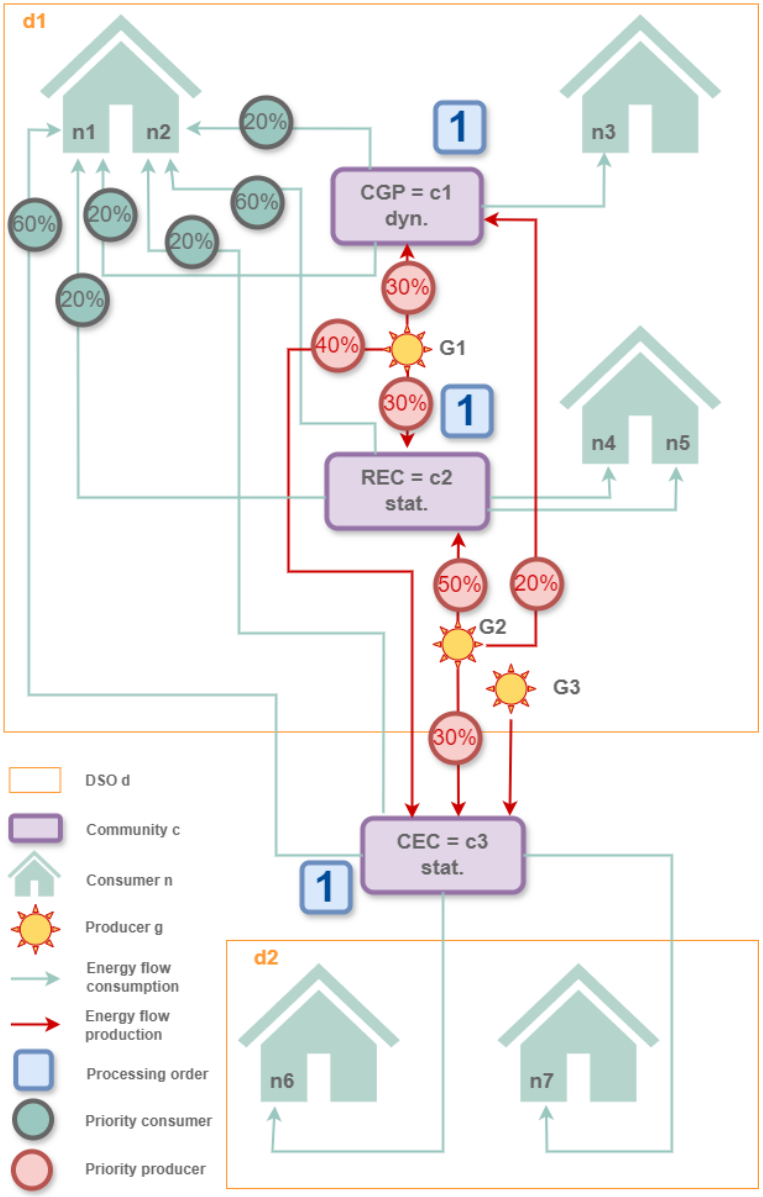


Fig. 31: Schematic illustration of case 12 scenario A

	Unit	n_1	n_2	n_3	n_4	n_5	n_6	n_7	g_1	g_2	g_3
$D_{n,c1}$	kWh	13,8	5,8	20	-	-	-	-	-	-	-
$D_{n,c2}$	kWh	13,8	17,4	-	9	16	-	-	-	-	-
$D_{n,c3}$	kWh	41,1	5,8	-	-	-	48	14	-	-	-
$P_{g,c1}$	kWh	-	-	-	-	-	-	-	29,4	15,4	-
$P_{g,c2}$	kWh	-	-	-	-	-	-	-	29,4	38,5	-
$P_{g,c3}$	kWh	-	-	-	-	-	-	-	39,2	23,1	56
$Share_{c1}^{st\%}$	%	30	40	30	-	-	-	-	-	-	-
$Share_{c1}^{kWh}$	kWh	15,6	6,6	22,6	-	-	-	-	-	-	-
Sc_{c1}	kWh	13,8	5,8	20	-	-	-	-	-	-	-
$Share_{c2}^{st\%}$	%	10	20	-	30	40	-	-	-	-	-
$Share_{c2}^{kWh}$	kWh	6,8	13,6	-	20,4	27,2	-	-	-	-	-
Sc_{c2}	kWh	6,8	13,6	-	9	16	-	-	-	-	-
$Share_{c3}^{kWh}$	kWh	28,3	18,9	-	-	-	35,5	23,7	-	-	-
Sc_{c3}	kWh	28,3	5,8	-	-	-	35,5	14	-	-	-
R_s	kWh	20,1	3,8	0	0	0	12,5	0	-	-	-
$Ecxe_s$	kWh	-	-	-	-	-	-	-	24,7	21,3	16,4

TABLE 19: RESULTS FOR CASE 12 SCENARIO A WITH DISTRIBUTED PRODUCTION

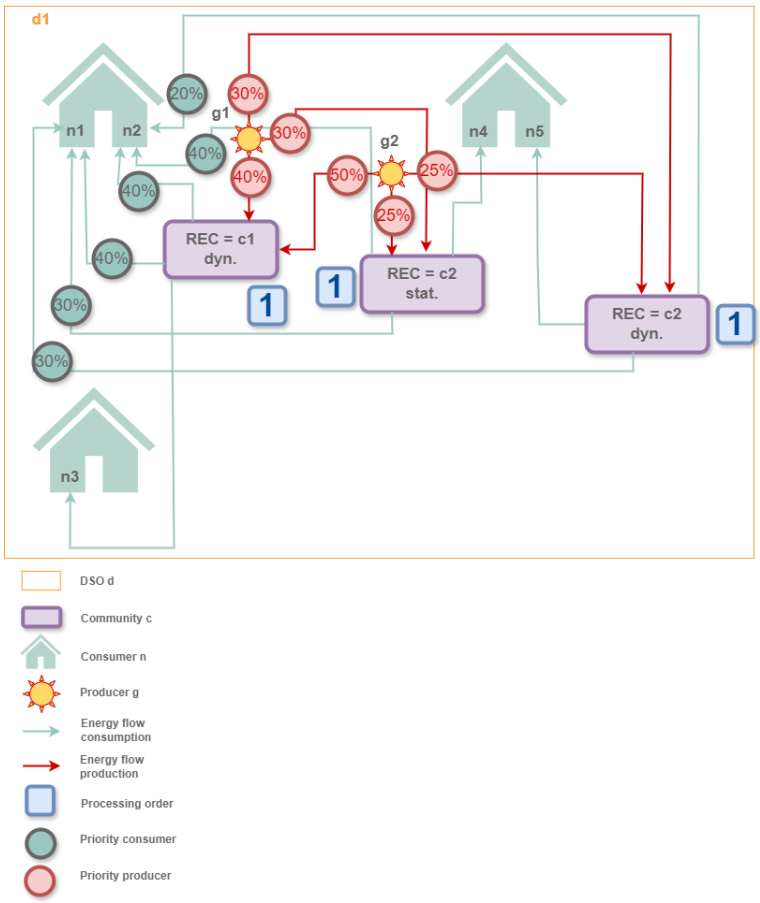


Fig. 32: Schematic illustration of case 12 scenario B

	Unit	n_1	n_2	n_3	n_4	n_5	g_1	g_2
$D_{n,c1}$	kWh	20,4	7,2	16	-	-	-	-
$D_{n,c2}$	kWh	15,3	7,2	-	4	-	-	-
$D_{n,c3}$	kWh	15,3	3,6	-	-	24	-	-
$P_{g,c1}$	kWh	-	-	-	-	-	23,6	42,5
$P_{g,c2}$	kWh	-	-	-	-	-	17,7	21,3
$P_{g,c3}$	kWh	-	-	-	-	-	17,7	21,3
$Share_{c1}^{kWh}$	kWh	30,9	10,9	24,3	-	-	-	-
Sc_{c1}	kWh	20,4	7,2	16	-	-	-	-
$Share_{c2}^{st\%}$	%	40	20	-	40	-	-	-
$Share_{c2}^{kWh}$	kWh	15,6	7,8	-	15,6	-	-	-
Sc_{c2}	kWh	15,3	7,2	-	4	-	-	-
$Share_{c3}^{kWh}$	kWh	13,9	3,3	-	-	21,8	-	-
Sc_{c3}	kWh	13,9	3,3	-	-	21,8	-	-
R_s	kWh	1,4	0.3	0	0	2,2	-	-
$Ecxe_s$	kWh	-	-	-	-	-	13,7	21,3

TABLE 20: RESULTS FOR CASE 12 SCENARIO B WITH DISTRIBUTED PRODUCTION