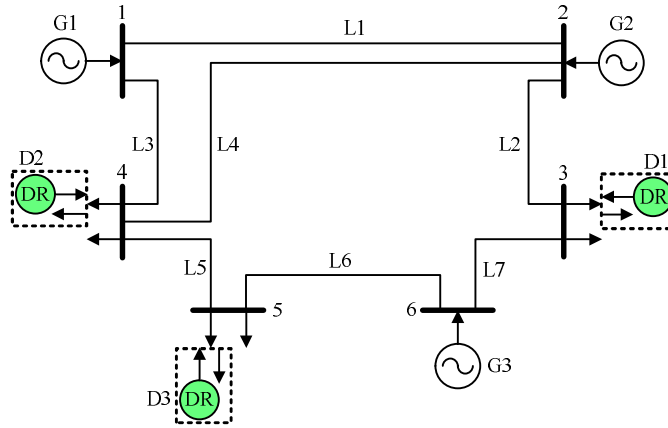


## 6-Bus System Data

### 1- One-line Diagram



### 2- Units data

Unit	Cost Coefficients			Startup Cost (\$)	Shutdown Cost (\$)	Pmin (MW)	Pmax (MW)	Min On (h)	Min Off (h)	Ramp (MW/h)
	a (\$)	b (\$/MW)	c (\$/MW <sup>2</sup> )							
G1	177	13.5	0.00045	100	50	100	220	4	4	55
G2	130	40	0.001	200	100	10	100	3	2	50
G3	137	17.7	0.005	0	0	10	40	1	1	20

### 3- Transmission lines data

Line No.	From Bus	To Bus	X (pu)	Flow Limit (MW)
1	1	2	0.170	200
2	2	3	0.037	100
3	1	4	0.258	100
4	2	4	0.197	100
5	4	5	0.037	100
6	5	6	0.140	100
7	3	6	0.018	100

### 4- Load data

HOURLY LOAD DATA												
Hour	1	2	3	4	5	6	7	8	9	10	11	12
Load (MW)	166.4	156	150.8	145.6	145.6	150.8	166.4	197.6	226.2	247	257.4	260
Hour	13	14	15	16	17	18	19	20	21	22	23	24
Load (MW)	257.4	260	260	252.2	249.6	249.6	241.8	239.2	239.2	241.8	226.2	187.2

#### BUS LOAD DISTRIBUTION PROFILE

Bus No	Load (%)
3	20
4	40
5	40

5- Aggregator's DR offers

a. Aggregator D1 at Bus 3:

DATA FOR THE LC OFFERS

Offer #	LC Quantity at offering hours (MW)							LC Price (\$/MW)	LC Initiation Cost (\$)	Min Load Reduction Duration (h)	Max Load Reduction Duration (h)	Max Number of Daily Load Curtailment
	10	11	12	13	14	15	16					
1	0.494	0.515	0.52	0.515	0.52	0.52	0.504	10	20	3	6	1
2	0.494	0.515	0.52	0.515	0.52	0.52	0.504	11	20	3	6	1
3	0.494	0.515	0.52	0.515	0.52	0.52	0.504	12	20	3	6	1
4	0.494	0.515	0.52	0.515	0.52	0.52	0.504	13	20	3	6	1
5	0.494	0.515	0.52	0.515	0.52	0.52	0.504	14	20	3	6	1

DATA FOR THE LS OFFERS

Offer #	LS Quantity at offering hours (MW)								LS Price (\$/MW)	LS Initiation Cost (\$)	Min Load Reduction Duration (h)	Max Load Reduction Duration (h)	$T_{kd}^{SH}$ (h)	$a_{kd}$	
	10	11	12	13	14	15	16	17							18
1	0.494	0.515	0.520	0.515	0.520	0.520	0.504	0.499	0.499	10	0	3	6	1-10	1
2	0.494	0.515	0.520	0.515	0.520	0.520	0.504	0.499	0.499	11	0	3	6	1-10	1
3	0.494	0.515	0.520	0.515	0.520	0.520	0.504	0.499	0.499	12	0	3	6	1-10	1
4	0.494	0.515	0.520	0.515	0.520	0.520	0.504	0.499	0.499	13	0	3	6	1-10	1
5	0.494	0.515	0.520	0.515	0.520	0.520	0.504	0.499	0.499	14	0	3	6	1-10	1

DATA FOR THE OG OFFERS

Offer #	Max OG Capacity at offering hours (MW)						Min OG Capacity (MW)	OG Price (\$/MW)	Startup Cost (\$)	Min on/off time (h)	Ramp Up/Down (MW/h)	Emission Coefficients (lbs/MW)		
	12	13	14	15	16	17						NOX	SO2	CO2
1	0.520	0.515	0.520	0.520	0.504	0.499	0	10	20	3	6	5.0	2.0	10
2	0.520	0.515	0.520	0.520	0.504	0.499	0	11	20	3	6	5.5	2.2	11
3	0.520	0.515	0.520	0.520	0.504	0.499	0	12	20	3	6	6.0	2.4	12
4	0.520	0.515	0.520	0.520	0.504	0.499	0	13	20	3	6	6.5	2.6	13
5	0.520	0.515	0.520	0.520	0.504	0.499	0	14	20	3	6	7.0	2.8	14

DATA FOR THE ES OFFERS

Offer #	ES Power Rating (MW)	Energy Capacity (MWh)	ES Price (\$/MW)	Initial Energy (MWh)	Charge/Discharge Efficiency	Charge/Discharge Ramp (MW/h)	Energy Retention Time (h)
1	0.520	3.12	10	0	0.9	20	18
2	0.520	3.12	11	0	0.9	20	18
3	0.520	3.12	12	0	0.9	20	18
4	0.520	3.12	13	0	0.9	20	18
5	0.520	3.12	14	0	0.9	20	18

b. Aggregator D2 at Bus 4:

DATA FOR THE LC OFFERS

Offer #	LC Quantity at offering hours (MW)							LC Price (\$/MW)	LC Initiation Cost (\$)	Min Load Reduction Duration (h)	Max Load Reduction Duration (h)	Max Number of Daily Load Curtailment
	10	11	12	13	14	15	16					
1	0.99	1.03	1.04	1.03	1.04	1.04	1.00	10	20	3	6	1
2	0.99	1.03	1.04	1.03	1.04	1.04	1.00	11	20	3	6	1
3	0.99	1.03	1.04	1.03	1.04	1.04	1.00	12	20	3	6	1
4	0.99	1.03	1.04	1.03	1.04	1.04	1.00	13	20	3	6	1
5	0.99	1.03	1.04	1.03	1.04	1.04	1.00	14	20	3	6	1

DATA FOR THE LS OFFERS

Offer #	LS Quantity at offering hours (MW)									LS Price (\$/MW)	LS Initiation Cost (\$)	Min Load Reduction Duration (h)	Max Load Reduction Duration (h)	$T_{kd}^{SH}$ (h)	$a_{kd}$
	10	11	12	13	14	15	16	17	18						
1	0.99	1.03	1.04	1.03	1.04	1.04	1.00	1.00	1.00	10	0	3	6	1-10	1
2	0.99	1.03	1.04	1.03	1.04	1.04	1.00	1.00	1.00	11	0	3	6	1-10	1
3	0.99	1.03	1.04	1.03	1.04	1.04	1.00	1.00	1.00	12	0	3	6	1-10	1
4	0.99	1.03	1.04	1.03	1.04	1.04	1.00	1.00	1.00	13	0	3	6	1-10	1
5	0.99	1.03	1.04	1.03	1.04	1.04	1.00	1.00	1.00	14	0	3	6	1-10	1

DATA FOR THE OG OFFERS

Offer #	Max OG Capacity at offering hours (MW)						Min OG Capacity (MW)	OG Price (\$/MW)	Startup Cost (\$)	Min on/off time (h)	Ramp Up/Down (MW/h)	Emission Coefficients (lbs/MW)		
	12	13	14	15	16	17						NOX	SO2	CO2
1	1.04	1.03	1.04	1.04	1.00	1.00	0	10	20	3	6	5.0	2.0	10
2	1.04	1.03	1.04	1.04	1.00	1.00	0	11	20	3	6	5.5	2.2	11
3	1.04	1.03	1.04	1.04	1.00	1.00	0	12	20	3	6	6.0	2.4	12
4	1.04	1.03	1.04	1.04	1.00	1.00	0	13	20	3	6	6.5	2.6	13
5	1.04	1.03	1.04	1.04	1.00	1.00	0	14	20	3	6	7.0	2.8	14

DATA FOR THE ES OFFERS

Offer #	ES Power Rating (MW)	Energy Capacity (MWh)	ES Price (\$/MW)	Initial Energy (MWh)	Charge/Discharge Efficiency	Charge/Discharge Ramp (MW/h)	Energy Retention Time (h)
1	1.04	6.24	10	0	0.9	20	18
2	1.04	6.24	11	0	0.9	20	18
3	1.04	6.24	12	0	0.9	20	18
4	1.04	6.24	13	0	0.9	20	18
5	1.04	6.24	14	0	0.9	20	18

c. Aggregator D3 at Bus 5:

DATA FOR THE LC OFFERS

Offer #	LC Quantity at offering hours (MW)							LC Price (\$/MW)	LC Initiation Cost (\$)	Min Load Reduction Duration (h)	Max Load Reduction Duration (h)	Max Number of Daily Load Curtailment
	10	11	12	13	14	15	16					
1	0.99	1.03	1.04	1.03	1.04	1.04	1.00	10	20	3	6	1
2	0.99	1.03	1.04	1.03	1.04	1.04	1.00	11	20	3	6	1
3	0.99	1.03	1.04	1.03	1.04	1.04	1.00	12	20	3	6	1
4	0.99	1.03	1.04	1.03	1.04	1.04	1.00	13	20	3	6	1
5	0.99	1.03	1.04	1.03	1.04	1.04	1.00	14	20	3	6	1

DATA FOR THE LS OFFERS

Offer #	LS Quantity at offering hours (MW)									LS Price (\$/MW)	LS Initiation Cost (\$)	Min Load Reduction Duration (h)	Max Load Reduction Duration (h)	$T_{kd}^{SH}$ (h)	$a_{kd}$
	10	11	12	13	14	15	16	17	18						
1	0.99	1.03	1.04	1.03	1.04	1.04	1.00	1.00	1.00	10	0	3	6	1-10	1
2	0.99	1.03	1.04	1.03	1.04	1.04	1.00	1.00	1.00	11	0	3	6	1-10	1
3	0.99	1.03	1.04	1.03	1.04	1.04	1.00	1.00	1.00	12	0	3	6	1-10	1
4	0.99	1.03	1.04	1.03	1.04	1.04	1.00	1.00	1.00	13	0	3	6	1-10	1
5	0.99	1.03	1.04	1.03	1.04	1.04	1.00	1.00	1.00	14	0	3	6	1-10	1

DATA FOR THE OG OFFERS

Offer #	Max OG Capacity at offering hours (MW)						Min OG Capacity (MW)	OG Price (\$/MW)	Startup Cost (\$)	Min on/off time (h)	Ramp Up/Down (MW/h)	Emission Coefficients (lbs/MW)		
	12	13	14	15	16	17						NOX	SO2	CO2
1	1.04	1.03	1.04	1.04	1.00	1.00	0	10	20	3	6	5.0	2.0	10
2	1.04	1.03	1.04	1.04	1.00	1.00	0	11	20	3	6	5.5	2.2	11
3	1.04	1.03	1.04	1.04	1.00	1.00	0	12	20	3	6	6.0	2.4	12
4	1.04	1.03	1.04	1.04	1.00	1.00	0	13	20	3	6	6.5	2.6	13
5	1.04	1.03	1.04	1.04	1.00	1.00	0	14	20	3	6	7.0	2.8	14

DATA FOR THE ES OFFERS

Offer #	ES Power Rating (MW)	Energy Capacity (MWh)	ES Price (\$/MW)	Initial Energy (MWh)	Charge/Discharge Efficiency	Charge/Discharge Ramp (MW/h)	Energy Retention Time (h)
1	1.04	6.24	10	0	0.9	20	18
2	1.04	6.24	11	0	0.9	20	18
3	1.04	6.24	12	0	0.9	20	18
4	1.04	6.24	13	0	0.9	20	18
5	1.04	6.24	14	0	0.9	20	18