Appendix

Parameters of EH

Table I Internal parameters of EHs

Internal parameters of EHs					
$c_{ m ES,CH}$	0.01 \$/kWh	$c_{ m ES,DC}$	0.01 \$/kWh	$c_{ m CS,CH}$	0.01 \$/kWh
$c_{ m CS,DC}$	0.01 \$/kWh	$c_{ m HS,CH}$	0.01 \$/kWh	$c_{ m HS,DC}$	0.01 \$/kWh
$\xi_{ m G}(t)$	0.1892 \$/kWh	$c_{ m PV}$	0.001 \$/kWh	$c_{ m air}$	0.185 \$/kWh
R_T	0.13°C/kW	$ heta_{ m in,min}$	21℃	$ heta_{ m in,max}$	26℃
$P_{ m UG,min}$	-2000kW	$P_{ m UG,max}$	2000kW	$P_{ m BIC,max}$	2000kW
$\eta_{ ext{BIC}}$	0.95	$\eta_{ m CHPe}$	0.3	$\eta_{ ext{CHPh}}$	0.4
$\eta_{ m GAS}$	0.9	$\eta_{ ext{IAC}}$	4	$\eta_{ m AC}$	1.2
$\eta_{ m ES,DC}$	0.9	$\eta_{ m ES,CH}$	0.9	$\eta_{ m CS,DC}$	0.9
$\eta_{ m CS,CH}$	0.9	$\eta_{ m HS,DC}$	0.9	$\eta_{ m HS,CH}$	0.9
$\eta_{ m ES}$	1	$\eta_{ ext{CS}}$	0.98	$\eta_{ m HS}$	0.98
$P_{ m ES,DC,max}$	500kW	$P_{ m ES,CH,max}$	500 kW	$y_{ m ESL,min}$	50 kWh
$y_{ m ESL, max}$	500 kWh	$E_{ m CS,DC,max}$	500 kW	$E_{ m CS,CH,max}$	500 kW
$y_{ m CSL,min}$	50 kWh	$y_{ m CSL, max}$	500 kWh	$E_{ m HS,DC,max}$	500kW
$E_{ m HS,CH,max}$	500kW	$y_{\scriptscriptstyle ext{HSL,min}}$	50 kWh	$y_{ m HSL, max}$	500kW
$v_{ m max}$	10000kW	$v_{ m inj,max}$	5000kW	$v_{ m ex,max}$	5000kW

Table II Load data for EH 1

Time (h)	DC load(kW)	AC load (kW)	Heating load (kW)	Cooling load (kW)
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	I	I		
1	140.330	210.495	0	0
2	113.373	170.059	0	0
3	103.349	155.023	0	0
4	126.768	190.153	93.936	0
5	160.213	240.320	200.054	0
6	221.344	332.016	292.856	0
7	303.132	454.698	300	0
8	305.870	458.805	81.878	0
9	267.426	401.140	0	0
10	235.240	352.860	0	0
11	222.631	333.947	0	0
12	214.385	321.577	0	0
13	202.887	304.331	0	0
14	193.850	290.776	0	0
15	188.943	283.415	0	0
16	198.411	297.617	0	0
17	238.311	357.466	0	0
18	316.214	474.322	0	0
19	378.396	567.594	0	0
20	400	600	0	300
21	378.354	567.531	0	212.787
22	338.067	507.101	0	36.761
23	271.419	407.128	0	0
24	206.972	310.458	0	0

Table III Load data for EH 2

Time (h)	DC load(kW)	AC load (kW)	Heating load (kW)	Cooling load (kW)
1	136.533	204.800	0	0

2	110.334	165.501	0	0
3	100.621	150.932	0	0
4	99.043	148.564	0	0
5	123.086	184.629	0	0
6	179.217	268.826	0	0
7	400	600	0	0
8	313.779	470.669	0	0
9	259.466	389.199	0	0
10	228.207	342.311	0	0
11	216.126	324.189	0	0
12	208.246	312.370	0	0
13	197.128	295.693	0	0
14	188.385	282.578	0	0
15	183.593	275.389	0	0
16	192.724	289.086	0	0
17	232.060	348.090	0	31.186
18	307.194	460.791	0	0
19	373.222	559.833	0	265.440
20	388.576	582.864	300	300
21	364.665	546.998	212.787	66.994
22	327.943	491.915	36.761	0
23	264.016	396.024	0	0
24	201.431	302.147	0	0
·		I	1	

Table IV Load data for EH 3

Time (h)	DC load(kW)	AC load (kW)	Heating load (kW)	Cooling load (kW)
1	100.548	150.822	0	0

2 95.679 143.519 18.001 0 3 122.071 183.106 60.030 0 4 142.292 213.438 86.787 0 5 181.609 272.414 131.246 0 6 223.973 335.960 151.543 0 7 400 600 300 0 8 324.394 486.592 151.200 0 9 246.169 369.254 68.254 0 10 168.614 252.921 0 0 11 159.602 239.403 0 0 12 153.673 230.510 0 0 13 145.421 218.132 0 0 14 138.936 208.404 0 0 15 135.322 202.983 0 0 16 142.061 213.092 0 0 17 171.259 256.889 0 22.402					
4 142.292 213.438 86.787 0 5 181.609 272.414 131.246 0 6 223.973 335.960 151.543 0 7 400 600 300 0 8 324.394 486.592 151.200 0 9 246.169 369.254 68.254 0 10 168.614 252.921 0 0 11 159.602 239.403 0 0 12 153.673 230.510 0 0 13 145.421 218.132 0 0 14 138.936 208.404 0 0 15 135.322 202.983 0 0 16 142.061 213.092 0 0 17 171.259 256.889 0 22.402 18 226.319 339.478 0 0 19 279.792 419.688 0 276.119 20 291.354 437.031 0 300 <	2	95.679	143.519	18.001	0
5 181.609 272.414 131.246 0 6 223.973 335.960 151.543 0 7 400 600 300 0 8 324.394 486.592 151.200 0 9 246.169 369.254 68.254 0 10 168.614 252.921 0 0 11 159.602 239.403 0 0 12 153.673 230.510 0 0 13 145.421 218.132 0 0 14 138.936 208.404 0 0 15 135.322 202.983 0 0 16 142.061 213.092 0 0 17 171.259 256.889 0 22.402 18 226.319 339.478 0 0 19 279.792 419.688 0 276.119 20 291.354 437.031 0 300 <td>3</td> <td>122.071</td> <td>183.106</td> <td>60.030</td> <td>0</td>	3	122.071	183.106	60.030	0
6 223.973 335.960 151.543 0 7 400 600 300 0 8 324.394 486.592 151.200 0 9 246.169 369.254 68.254 0 10 168.614 252.921 0 0 11 159.602 239.403 0 0 12 153.673 230.510 0 0 13 145.421 218.132 0 0 14 138.936 208.404 0 0 15 135.322 202.983 0 0 16 142.061 213.092 0 0 17 171.259 256.889 0 22.402 18 226.319 339.478 0 0 19 279.792 419.688 0 276.119 20 291.354 437.031 0 300 21 275.249 412.873 0 238.333	4	142.292	213.438	86.787	0
7 400 600 300 0 8 324.394 486.592 151.200 0 9 246.169 369.254 68.254 0 10 168.614 252.921 0 0 11 159.602 239.403 0 0 12 153.673 230.510 0 0 13 145.421 218.132 0 0 14 138.936 208.404 0 0 15 135.322 202.983 0 0 16 142.061 213.092 0 0 17 171.259 256.889 0 22.402 18 226.319 339.478 0 0 19 279.792 419.688 0 276.119 20 291.354 437.031 0 300 21 275.249 412.873 0 238.333	5	181.609	272.414	131.246	0
8 324.394 486.592 151.200 0 9 246.169 369.254 68.254 0 10 168.614 252.921 0 0 11 159.602 239.403 0 0 12 153.673 230.510 0 0 13 145.421 218.132 0 0 14 138.936 208.404 0 0 15 135.322 202.983 0 0 16 142.061 213.092 0 0 17 171.259 256.889 0 22.402 18 226.319 339.478 0 0 19 279.792 419.688 0 276.119 20 291.354 437.031 0 300 21 275.249 412.873 0 238.333	6	223.973	335.960	151.543	0
9 246.169 369.254 68.254 0 10 168.614 252.921 0 0 11 159.602 239.403 0 0 12 153.673 230.510 0 0 13 145.421 218.132 0 0 14 138.936 208.404 0 0 15 135.322 202.983 0 0 16 142.061 213.092 0 0 17 171.259 256.889 0 22.402 18 226.319 339.478 0 0 19 279.792 419.688 0 276.119 20 291.354 437.031 0 300 21 275.249 412.873 0 238.333	7	400	600	300	0
10 168.614 252.921 0 0 11 159.602 239.403 0 0 12 153.673 230.510 0 0 13 145.421 218.132 0 0 14 138.936 208.404 0 0 15 135.322 202.983 0 0 16 142.061 213.092 0 0 17 171.259 256.889 0 22.402 18 226.319 339.478 0 0 19 279.792 419.688 0 276.119 20 291.354 437.031 0 300 21 275.249 412.873 0 238.333	8	324.394	486.592	151.200	0
11 159.602 239.403 0 0 12 153.673 230.510 0 0 13 145.421 218.132 0 0 14 138.936 208.404 0 0 15 135.322 202.983 0 0 16 142.061 213.092 0 0 17 171.259 256.889 0 22.402 18 226.319 339.478 0 0 19 279.792 419.688 0 276.119 20 291.354 437.031 0 300 21 275.249 412.873 0 238.333	9	246.169	369.254	68.254	0
12 153.673 230.510 0 0 13 145.421 218.132 0 0 14 138.936 208.404 0 0 15 135.322 202.983 0 0 16 142.061 213.092 0 0 17 171.259 256.889 0 22.402 18 226.319 339.478 0 0 19 279.792 419.688 0 276.119 20 291.354 437.031 0 300 21 275.249 412.873 0 238.333	10	168.614	252.921	0	0
13 145.421 218.132 0 0 14 138.936 208.404 0 0 15 135.322 202.983 0 0 16 142.061 213.092 0 0 17 171.259 256.889 0 22.402 18 226.319 339.478 0 0 19 279.792 419.688 0 276.119 20 291.354 437.031 0 300 21 275.249 412.873 0 238.333	11	159.602	239.403	0	0
14 138.936 208.404 0 0 15 135.322 202.983 0 0 16 142.061 213.092 0 0 17 171.259 256.889 0 22.402 18 226.319 339.478 0 0 19 279.792 419.688 0 276.119 20 291.354 437.031 0 300 21 275.249 412.873 0 238.333	12	153.673	230.510	0	0
15 135.322 202.983 0 0 16 142.061 213.092 0 0 17 171.259 256.889 0 22.402 18 226.319 339.478 0 0 19 279.792 419.688 0 276.119 20 291.354 437.031 0 300 21 275.249 412.873 0 238.333	13	145.421	218.132	0	0
16 142.061 213.092 0 0 17 171.259 256.889 0 22.402 18 226.319 339.478 0 0 19 279.792 419.688 0 276.119 20 291.354 437.031 0 300 21 275.249 412.873 0 238.333	14	138.936	208.404	0	0
17 171.259 256.889 0 22.402 18 226.319 339.478 0 0 19 279.792 419.688 0 276.119 20 291.354 437.031 0 300 21 275.249 412.873 0 238.333	15	135.322	202.983	0	0
18 226.319 339.478 0 0 19 279.792 419.688 0 276.119 20 291.354 437.031 0 300 21 275.249 412.873 0 238.333	16	142.061	213.092	0	0
19 279.792 419.688 0 276.119 20 291.354 437.031 0 300 21 275.249 412.873 0 238.333	17	171.259	256.889	0	22.402
20 291.354 437.031 0 300 21 275.249 412.873 0 238.333	18	226.319	339.478	0	0
21 275.249 412.873 0 238.333	19	279.792	419.688	0	276.119
	20	291.354	437.031	0	300
22 241.560 362.340 0 0	21	275.249	412.873	0	238.333
	22	241.560	362.340	0	0
23 194.450 291.675 0 0	23	194.450	291.675	0	0
24 148.277 222.415 0 0	24	148.277	222.415	0	0