



Contents list available at IJRED website

Int. Journal of Renewable Energy Development (IJRED)

Journal homepage: <http://ejournal.undip.ac.id/index.php/ijred>



Supplementary Information

This supplementary information is attached to article:

Kaur, S., Brar, Y.S., and Dhillon, J.S. (2021) Real-Time Short-term Hydro-Thermal-Wind-Solar Power Scheduling Using Meta-Heuristic Optimization Technique. *Int. Journal of Renewable Energy Development*, 10(3), 635-651
DOI: 10.14710/ijred.2021.35558

Table S1

Values of fuel cost, NO_x emission, SO_2 emission, and CO_2 emission of four thermal generators of test system-1 achieved with ACSM

Time interval (t)	Thermal generator	F_1 (\$/h)	F_2 (kg/h)	F_3 (kg/h)	F_4 (kg/h)
1	gt1	17.08	422.31	754.85	1777.07
	gt2	31.94	544.36	1410.79	3346.43
	gt3	46.72	632.97	2063.30	5992.02
	gt4	61.69	675.61	2724.48	8227.80
2	gt1	16.19	429.12	715.17	1691.03
	gt2	30.09	542.97	1329.00	3271.95
	gt3	43.98	623.68	1942.36	6165.24
	gt4	58.18	643.12	2569.53	8388.97
3	gt1	15.87	431.68	701.40	1664.10
	gt2	29.48	543.14	1302.19	3255.32
	gt3	43.07	621.34	1902.36	6244.16
	gt4	57.01	639.19	2517.98	8467.65
4	gt1	15.62	433.84	690.13	1643.14
	gt2	28.96	543.23	1279.31	3246.27
	gt3	42.33	619.63	1869.70	6310.02
	gt4	56.07	636.31	2476.43	8534.70
5	gt1	15.41	435.63	681.06	1627.01
	gt2	28.54	543.35	1260.57	3241.98
	gt3	41.69	618.05	1841.55	6381.02
	gt4	55.24	633.65	2439.67	8607.96
6	gt1	16.01	430.56	707.36	1675.57
	gt2	29.77	543.21	1314.72	3261.21
	gt3	43.50	622.64	1921.40	6202.18
	gt4	57.56	641.17	2542.02	8425.53
7	gt1	18.06	415.85	797.78	1884.04
	gt2	33.94	547.53	1498.80	3477.54
	gt3	49.64	645.10	2192.19	5920.24
	gt4	65.43	676.11	2889.77	8187.38
8	gt1	21.67	400.03	957.41	2406.58
	gt2	41.29	574.20	1823.53	4404.15
	gt3	60.58	712.86	2675.04	6564.37
	gt4	79.50	775.34	3510.69	9115.72
9	gt1	23.60	396.79	1042.39	2763.61
	gt2	45.22	598.28	1996.92	5176.46
	gt3	66.46	763.42	2934.94	7495.01
	gt4	87.06	847.25	3844.61	10300.46
10	gt1	23.92	396.59	1056.59	2828.54
	gt2	45.87	602.76	2025.34	5320.88
	gt3	67.43	772.54	2977.64	7685.42
	gt4	88.33	860.47	3900.44	10543.02
11	gt1	24.56	396.49	1084.94	2962.63
	gt2	47.18	612.60	2083.08	5630.20
	gt3	69.39	791.82	3063.90	8102.97
	gt4	90.82	887.46	4010.64	11060.98
12	gt1	24.89	396.58	1098.45	3028.59
	gt2	47.88	618.01	2111.94	5793.60
	gt3	70.44	802.25	3107.56	8331.05
	gt4	92.19	902.12	4067.07	11345.37
13	gt1	20.96	402.20	925.07	2284.95
	gt2	39.82	566.57	1756.68	4157.70
	gt3	58.38	695.95	2575.60	6313.77

14	gt4	76.66	750.86	3382.07	8783.98
	gt1	21.75	399.88	959.90	2416.27
	gt2	41.45	574.74	1828.35	4423.04
	gt3	60.79	713.92	2681.70	6584.41
15	gt4	79.76	776.79	3518.76	9139.94
	gt1	22.09	399.06	975.06	2476.29
	gt2	42.15	578.55	1859.21	4547.45
	gt3	61.85	722.46	2728.60	6723.0
16	gt4	81.12	788.93	3578.90	9319.26
	gt1	23.25	397.14	1025.78	2689.58
	gt2	44.50	593.00	1962.89	5009.83
	gt3	65.37	752.65	2883.66	7280.16
17	gt4	85.66	832.06	3778.79	10030.35
	gt1	25.40	396.93	1120.95	3141.49
	gt2	48.90	626.41	2157.18	6058.18
	gt3	72.00	818.68	3176.06	8708.67
18	gt4	94.22	925.59	4156.28	11818.42
	gt1	26.02	397.66	1147.91	3281.66
	gt2	50.16	637.56	2212.73	6401.43
	gt3	73.89	839.62	3259.33	9204.74
19	gt4	96.63	954.75	4262.91	12428.15
	gt1	24.75	396.53	1092.22	2998.02
	gt2	47.55	615.15	2097.65	5711.34
	gt3	69.96	797.03	3086.31	8217.69
20	gt4	91.57	894.84	4039.64	11204.50
	gt1	24.04	396.55	1060.65	2847.37
	gt2	46.11	604.32	2034.20	5367.31
	gt3	67.79	775.38	2990.41	7745.40
21	gt4	88.78	864.31	3916.38	10615.89
	gt1	22.52	398.200	993.96	2553.51
	gt2	43.03	583.74	1898.12	4712.97
	gt3	63.17	733.42	2786.71	6915.32
22	gt4	82.84	804.79	3654.47	9568.50
	gt1	21.13	401.67	932.28	2311.41
	gt2	40.15	568.05	1771.10	4208.47
	gt3	58.87	699.40	2597.07	6362.78
23	gt4	77.29	755.88	3409.75	8849.34
	gt1	19.73	407.05	870.55	2098.02
	gt2	37.30	556.35	1645.45	3811.62
	gt3	54.62	671.07	2409.56	6032.36
24	gt4	71.82	714.69	3168.55	8394.35
	gt1	18.57	412.92	819.66	1944.06
	gt2	34.97	549.68	1542.97	3563.32
	gt3	51.17	652.18	2257.60	5922.50
	gt4	67.41	686.83	2974.06	8213.27

Table S2Values of fuel cost, NO_x emission, SO_2 emission, and CO_2 emission of test system-2 obtained by ACSM

Time interval	Thermal generator	F_1 (\$/h)	F_2 (kg/h)	F_3 (kg/h)	F_4 (kg/h)
1	gt1	18.99	410.62	838.30	1998.14
	gt2	35.82	551.79	1580.28	3645.97
2	gt1	17.91	416.86	790.64	1865.25
	gt2	33.63	546.75	1483.59	3451.68
3	gt1	17.55	419.19	774.82	1825.04
	gt2	32.89	545.50	1451.19	3400.69
4	gt1	17.27	421.15	762.11	1794.13
	gt2	32.31	544.73	1425.48	3364.89
5	gt1	16.95	423.42	748.08	1761.52
	gt2	31.66	544.02	1396.88	3330.51
6	gt1	17.66	418.47	779.64	1837.07
	gt2	33.11	545.85	1461.05	3415.46
7	gt1	20.16	405.19	889.51	2160.47
	gt2	38.19	559.77	1684.84	3924.76
8	gt1	24.40	396.48	1076.66	2922.83
	gt2	46.84	609.68	2066.29	5538.15
9	gt1	26.62	398.73	1174.50	3425.07
	gt2	51.39	648.90	2266.72	6752.37
10	gt1	26.92	399.39	1187.85	3499.01
	gt2	52.01	654.86	2293.90	6935.86
11	gt1	27.65	401.33	1219.91	3681.86
	gt2	53.49	669.89	2359.37	7396.41
12	gt1	28.07	402.67	1238.46	3791.06
	gt2	54.35	678.99	2397.20	7674.27
13	gt1	23.05	397.37	1017.35	2652.81
	gt2	44.10	590.38	1945.48	4927.39
14	gt1	23.60	396.80	1041.37	2758.99
	gt2	45.22	597.92	1994.75	5165.62
15	gt1	23.75	396.69	1048.21	2790.02
	gt2	45.53	600.09	2008.56	5235.02
16	gt1	24.96	396.62	1101.78	3045.10
	gt2	48.01	618.94	2117.82	5826.65
17	gt1	27.56	401.07	1215.97	3659.00
	gt2	53.30	667.93	2351.15	7336.93
18	gt1	28.57	404.49	1260.62	3924.78
	gt2	55.38	690.39	2442.75	8020.70
19	gt1	27.54	400.99	1214.98	3653.25
	gt2	53.26	667.44	2349.08	7322.04
20	gt1	27.13	399.91	1197.24	3551.80
	gt2	52.44	659.24	2313.27	7069.66
21	gt1	25.32	396.85	1117.04	3121.60
	gt2	48.72	624.80	2148.99	6009.05
22	gt1	23.68	396.75	1044.76	2774.32
	gt2	45.36	598.84	2001.13	5197.31
23	gt1	22.00	399.28	970.89	2459.57
	gt2	41.96	577.53	1850.87	4513.23
24	gt1	20.74	402.97	915.20	2249.44
	gt2	39.38	564.71	1737.29	4091.43