

Chapter 7

Results and Conclusions

7.1 Introduction

To achieve the main objective of the study, to fit an appropriate model for the daily day and night peak load forecast, two methods are used. Those methods are Double Exponential Smoothing and Box-Jenkins Approach for ARIMA Modeling. By using these methods (Chapter 5 and 6) for all the data sets, best fit model was decided. To verify the model, forecasted the values for last three periods using the fitted model. It is also calculated the MAPE for those forecasted values.

7.2 Results

The results obtained using Double Exponential Smoothing is as follows:

Table 7.1 Fitted models and MAPE values using Double Exponential Smoothing:

Day	Before power Day			Night			After power Day			Cut Night		
	α	γ	MAPE	α	γ	MAPE	α	γ	MAPE	α	γ	MAPE
Sunday	0.20	0.10	1.883	0.10	0.10	0.840	0.10	0.10	0.510	0.10	0.10	5.480
Monday	0.10	0.10	3.630	0.10	0.10	2.260	0.10	0.10	2.380	0.10	0.10	1.620
Tuesday	0.10	0.10	5.480	0.10	0.10	4.850	0.10	0.10	3.070	0.30	0.10	1.570
Wednesday	0.10	0.10	1.560	0.20	0.10	1.970	0.10	0.10	1.600	0.10	0.10	1.080
Thursday	0.45	0.10	2.943	0.10	0.10	1.650	0.10	0.10	1.043	0.10	0.10	5.770
Friday	0.20	0.10	1.290	0.30	0.10	1.470	0.10	0.10	1.730	0.10	0.10	0.510
Saturday	0.20	0.10	0.823	0.10	0.10	1.190	0.10	0.10	1.840	0.10	0.10	1.000

The results obtained using ARIMA Modeling is as follows:

Table 7.2 Fitted models and MAPE values Using ARIMA Modeling (Before power-cut):

Day	Day		Night	
	Fitted Model	MAPE	Fitted Model	MAPE
Saturday	ARIMA(2,0,2)	1.00	ARIMA(1,1,2)	0.90
Sunday	ARIMA(1,1,2)	4.20	ARIMA(2,0,1)	2.04
Monday	ARIMA(2,0,2)	3.20	ARIMA(1,0,0)	2.32
Tuesday	ARIMA(2,0,2)	2.75	ARIMA(2,0,2)	3.98
Wednesday	ARIMA(1,0,1)	1.47	ARIMA(2,0,1)	2.46
Thursday	ARIMA(2,0,1)	3.50	ARIMA(0,1,2)	1.20
Friday	ARIMA(1,1,1)	2.53	ARIMA(1,1,2)	1.41

Table 7.3 Fitted models and MAPE values Using ARIMA Modeling (After power-cut):

Day	Day		Night	
	Fitted Model	MAPE	Fitted Model	MAPE
Saturday	ARIMA(1,0,2)	3.20	ARIMA(1,0,1)	2.03
Sunday	ARIMA(1,1,2)	7.68	ARIMA(2,0,2)	2.01
Monday	ARIMA(1,1,1)	6.30	ARIMA(0,1,2)	1.29
Tuesday	ARIMA(1,0,0)	7.00	ARIMA(0,0,1)	1.51
Wednesday	ARIMA(2,0,2)	1.47	ARIMA(2,1,2)	0.88
Thursday	ARIMA(1,1,1)	9.20	ARIMA(1,0,2)	4.79
Friday	ARIMA(1,0,1)	2.18	ARIMA(2,0,1)	1.93

7.3 Conclusions

In this section we summarize the findings from chapter 5 and 6. The two forecasting techniques, called ARIMA time series modeling and Double Exponential smoothing are used to analyze the daily day and night peak load in Sri Lankan power system. In order to check how well implementations of these two forecasting techniques work, these methods were applied to forecast the last three points of each data set, as seen in tables 7.1, 7.2, and 7.3 respectively. The error analyses are provided for comparative purpose.

Table 7.4 Comparison of two techniques: (Before power-cut)

Day	Day		Night	
	Technique	MAPE	Technique	MAPE
Saturday	Double Exp. Smoothing	0.823	Double Exp. Smoothing	1.190
	ARIMA modeling	1.000	ARIMA modeling	0.900
Sunday	Double Exp. Smoothing	1.883	Double Exp. Smoothing	0.840
	ARIMA modeling	4.320	ARIMA modeling	2.040
Monday	Double Exp. Smoothing	3.630	Double Exp. Smoothing	2.260
	ARIMA modeling	3.200	ARIMA modeling	2.320
Tuesday	Double Exp. Smoothing	5.480	Double Exp. Smoothing	4.850
	ARIMA modeling	2.750	ARIMA modeling	3.980
Wednesday	Double Exp. Smoothing	1.560	Double Exp. Smoothing	1.970
	ARIMA modeling	1.470	ARIMA modeling	2.460
Thursday	Double Exp. Smoothing	2.943	Double Exp. Smoothing	1.650
	ARIMA modeling	3.500	ARIMA modeling	1.200
Friday	Double Exp. Smoothing	1.290	Double Exp. Smoothing	1.470
	ARIMA modeling	2.530	ARIMA modeling	1.410

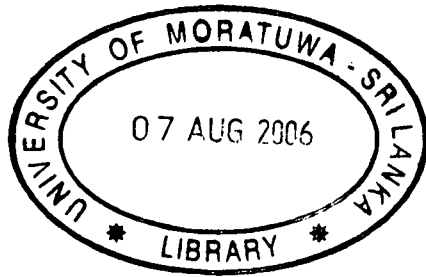
Table 7.5 Comparison of two techniques: (After power-cut)

Day	Day		Night	
	Technique	MAPE	Technique	MAPE
Saturday	Double Exp. Smoothing	1.840	Double Exp. Smoothing	1.000
	ARIMA modeling	3.300	ARIMA modeling	2.030
Sunday	Double Exp. Smoothing	0.570	Double Exp. Smoothing	5.480
	ARIMA modeling	7.680	ARIMA modeling	2.010
Monday	Double Exp. Smoothing	2.380	Double Exp. Smoothing	1.620
	ARIMA modeling	6.300	ARIMA modeling	1.290
Tuesday	Double Exp. Smoothing	3.070	Double Exp. Smoothing	1.570
	ARIMA modeling	7.000	ARIMA modeling	1.570
Wednesday	Double Exp. Smoothing	1.600	Double Exp. Smoothing	1.080
	ARIMA modeling	1.470	ARIMA modeling	0.880
Thursday	Double Exp. Smoothing	1.043	Double Exp. Smoothing	5.770
	ARIMA modeling	9.200	ARIMA modeling	4.790
Friday	Double Exp. Smoothing	1.730	Double Exp. Smoothing	0.510
	ARIMA modeling	2.180	ARIMA modeling	1.930

When comparing the two techniques, double exponential smoothing and ARIMA modeling, before and after power-cut data, it is clear that ARIMA modeling is more appropriate than double exponential smoothing method. But for some days MAPE value is lesser in double exponential smoothing method. For this, there can be many other reasons. So, what we can suggest is, in general, for Sunday and Friday double exponential smoothing method can be used. For other days, ARIMA modeling method can be used to forecast the future demand.

7.4 Recommendation

We have only very few data after power-cut. If we have more data after power-cut, we could have fit better models. There can be many irregular factors that affected data. Due to those factors models can be changed. But practically we can not consider those factors. So it can be recommended that using some other technique, one can find the best models and compare with the above models.



Appendix 1

Saturday Data:

Before power-cut			
Day		Night	
Time	MW	Time	MW
6.30	807.60	19.30	1138.90
7.00	786.40	19.30	1145.80
7.00	712.90	20.00	1131.40
6.30	813.10	20.00	1216.20
7.00	762.30	20.00	1205.60
7.00	712.40	20.00	1162.10
7.00	776.20	20.00	1217.00
7.00	727.80	20.00	1117.80
6.30	771.80	20.00	1218.30
7.00	760.60	20.00	1220.40
6.30	818.05	20.00	1224.10
6.30	772.50	20.00	1246.40
6.30	788.20	19.30	1134.70
6.30	821.20	19.30	1154.70
6.30	811.90	20.00	1269.40
6.30	635.80	20.00	1125.50
11.00	774.90	19.30	1263.10
11.00	814.53	20.00	1296.40
11.30	775.30	20.00	1247.20
11.00	831.30	20.00	1300.70
11.30	785.70	20.00	1326.80
11.30	743.90	20.00	1249.20
11.30	729.30	20.00	1209.80
11.30	723.60	20.00	1177.80
11.00	633.60	20.00	1201.90
11.30	745.00	20.00	1222.90
6.30	665.50	20.00	1159.36

11.00	735.80	20.00	1188.20
11.30	760.00	20.00	1237.70
11.30	764.70	20.00	1202.30
11.30	774.60	20.00	1215.20
6.30	711.80	20.00	1213.00
11.00	772.30	20.00	1201.50
11.30	806.10	20.00	1271.40
11.30	759.10	20.00	1208.90
11.30	800.70	20.00	1260.70
11.30	765.70	20.00	1256.20
12.00	790.80	19.30	1224.40
11.00	806.90	19.30	1253.60
11.30	798.90	19.30	1197.50
12.00	787.90	19.30	1272.80
11.30	797.30	19.30	1233.70
12.00	785.90	19.30	1289.00
6.30	815.60	19.30	1306.50
6.30	741.50	19.30	1174.80
11.30	837.90	19.00	1264.30
6.30	779.30	19.30	1315.90
6.30	816.00	19.30	1323.60
11.30	822.30	19.30	1302.30
6.30	822.40	19.30	1314.20
9.00	790.30	19.30	1311.00
11.00	770.40	19.30	1214.50
11.30	813.50	19.30	1292.40
7.00	830.90	20.00	1317.60
7.00	817.70	19.30	1284.30
7.00	818.30	20.00	1262.80
7.00	818.94	20.00	1272.40
7.00	786.40	20.00	1263.20
7.00	784.80	19.30	1219.20
6.30	797.30	20.00	1273.50
6.30	786.10	20.00	1269.80
6.30	749.50	20.00	1246.40

6.30	808.10	20.00	1280.10
6.30	824.90	20.00	1309.80
6.30	821.30	20.00	1311.30
6.30	776.70	20.00	1188.40
6.00	989.90	20.00	1075.10
6.30	768.60	20.00	1256.70
11.30	757.50	20.00	1259.40
11.30	783.30	20.00	1303.80
11.30	813.00	20.00	1349.40
12.00	774.30	20.00	1288.30
11.00	727.70	20.00	1252.90
6.30	785.50	20.00	1215.50
1.30	788.00	20.00	1296.20
11.30	777.50	20.00	1296.00
11.00	773.30	20.00	1265.10
11.30	786.00	20.00	1273.70

After power-cut			
Day		Night	
Time	MW	Time	MW
11.30	830.70	20.00	1258.70
11.30	843.60	19.30	1233.30
6.00	838.55	20.00	1185.30
11.30	833.50	20.00	1249.00
11.00	812.00	20.00	1268.80
11.30	813.70	20.00	1234.20
11.00	832.90	20.00	1260.90
11.30	858.60	20.00	1291.50
12.00	854.70	20.00	1271.80
11.30	854.90	20.00	1253.10
11.30	870.20	20.00	1234.40
12.00	840.30	20.00	1268.40
11.30	825.40	20.00	1228.50
11.00	828.80	20.00	1287.10
11.30	852.60	20.00	1258.30
11.00	826.60	20.00	1258.50
11.30	873.60	20.00	1290.90
11.30	860.60	20.00	1283.10

Sunday Data:

Before power-cut			
Day		Night	
Time	MW	Time	MW
6.30	807.60	19.30	1138.90
7.00	786.40	19.30	1145.80
7.00	712.90	20.00	1131.40
6.30	813.10	20.00	1216.20
7.00	762.30	20.00	1205.60
7.00	712.40	20.00	1162.10
7.00	776.20	20.00	1217.00
7.00	727.80	20.00	1117.80
6.30	771.80	20.00	1218.30
7.00	760.60	20.00	1220.40
6.30	818.05	20.00	1224.10
6.30	772.50	20.00	1246.40
6.30	788.20	19.30	1134.70
6.30	821.20	19.30	1154.70
6.30	811.90	20.00	1269.40
6.30	635.80	20.00	1125.50
11.00	774.90	19.30	1263.10
11.00	814.53	20.00	1296.40
11.30	775.30	20.00	1247.20
11.00	831.30	20.00	1300.70
11.30	785.70	20.00	1326.80
11.30	743.90	20.00	1249.20
11.30	729.30	20.00	1209.80
11.30	723.60	20.00	1177.80
11.00	633.60	20.00	1201.90
11.30	745.00	20.00	1222.90
6.30	665.50	20.00	1159.36
11.00	735.80	20.00	1188.20
11.30	760.00	20.00	1237.70
11.30	764.70	20.00	1202.30

11.30	774.60	20.00	1215.20
6.30	711.80	20.00	1213.00
11.00	772.30	20.00	1201.50
11.30	806.10	20.00	1271.40
11.30	759.10	20.00	1208.90
11.30	800.70	20.00	1260.70
11.30	765.70	20.00	1256.20
12.00	790.80	19.30	1224.40
11.00	806.90	19.30	1253.60
11.30	798.90	19.30	1197.50
12.00	787.90	19.30	1272.80
11.30	797.30	19.30	1233.70
12.00	785.90	19.30	1289.00
6.30	815.60	19.30	1306.50
6.30	741.50	19.30	1174.80
11.30	837.90	19.00	1264.30
6.30	779.30	19.30	1315.90
6.30	816.00	19.30	1323.60
11.30	822.30	19.30	1302.30
6.30	822.40	19.30	1314.20
9.00	790.30	19.30	1311.00
11.00	770.40	19.30	1214.50
11.30	813.50	19.30	1292.40
7.00	830.90	20.00	1317.60
7.00	817.70	19.30	1284.30
7.00	818.30	20.00	1262.80
7.00	818.94	20.00	1272.40
7.00	786.40	20.00	1263.20
7.00	784.80	19.30	1219.20
6.30	797.30	20.00	1273.50
6.30	786.10	20.00	1269.80
6.30	749.50	20.00	1246.40
6.30	808.10	20.00	1280.10
6.30	824.90	20.00	1309.80
6.30	821.30	20.00	1311.30

6.30	776.70	20.00	1188.40
6.00	989.90	20.00	1075.10
6.30	768.60	20.00	1256.70
11.30	757.50	20.00	1259.40
11.30	783.30	20.00	1303.80
11.30	813.00	20.00	1349.40
12.00	774.30	20.00	1288.30
11.00	727.70	20.00	1252.90
6.30	785.50	20.00	1215.50
1.30	788.00	20.00	1296.20
11.30	777.50	20.00	1296.00
11.00	773.30	20.00	1265.10
11.30	786.00	20.00	1273.70

After power-cut			
Day		Night	
Time	MW	Time	MW
6.30	741.40	20.00	1193.40
6.30	703.40	20.00	1220.90
6.30	664.90	20.00	1227.30
6.30	693.30	19.30	1199.10
6.30	697.20	20.00	1205.30
6.30	721.00	20.00	1185.40
6.30	723.40	20.30	1256.70
6.30	713.40	20.00	1209.10
6.30	730.00	20.00	1197.40
6.30	738.60	20.30	1229.70
6.30	698.60	20.30	1214.20
7.00	743.20	20.30	1253.80
6.30	711.40	21.30	1001.70
6.30	727.80	20.00	1258.60
6.30	732.50	20.00	1272.70
6.30	705.40	20.00	1250.70

Monday Data:

Before power-cut			
Day		Night	
Time	MW	Time	MW
6.30	826.50	19.30	1264.00
6.30	841.80	19.00	1113.20
6.30	836.10	19.30	1229.30
6.30	871.30	20.00	1270.80
6.30	810.50	20.00	1256.60
6.30	866.10	20.30	1186.20
6.30	872.40	20.00	1264.40
6.30	870.40	19.30	1243.10
6.30	895.70	20.00	1246.30
6.30	871.60	20.00	1253.60
6.30	906.00	19.30	1274.50
6.30	874.70	20.00	1277.20
6.30	890.80	20.00	1216.80
6.30	890.20	19.30	1312.90
6.30	797.10	20.00	1290.10
6.30	797.10	20.00	1290.10
6.30	679.10	20.00	1197.70
6.30	668.70	19.30	1305.40
6.30	850.10	20.00	1193.80
6.30	849.70	19.30	1293.50
6.30	814.90	20.00	1327.10
6.30	803.50	20.00	1363.40
6.30	801.10	20.00	1328.10
6.30	835.80	20.00	1210.60
6.30	798.90	20.00	1239.90
6.30	825.60	20.00	1246.50
6.30	832.90	20.00	1272.70
6.30	819.10	20.00	1238.70
6.30	639.00	20.00	1250.70
6.30	836.00	20.00	1287.30

6.30	854.20	20.00	1301.50
6.30	865.80	20.00	1276.40
6.30	838.20	20.00	1245.30
6.30	838.20	20.00	1125.30
6.30	877.90	20.00	1309.90
6.30	887.80	19.30	1292.30
6.30	889.70	20.30	1225.40
6.30	869.80	19.30	1293.90
6.30	883.30	19.30	1288.40
6.30	894.80	19.30	1314.10
6.30	864.90	19.30	1289.40
6.30	846.20	19.30	1262.90
6.30	882.80	19.30	1289.40
6.30	868.80	19.30	1262.90
6.30	927.70	19.30	1370.50
6.30	934.70	19.30	1375.30
6.30	876.00	19.30	1345.40
6.30	873.70	19.00	1379.80
6.30	893.00	20.00	1375.20
6.30	900.10	19.30	1317.80
6.30	908.90	19.30	1360.70
6.30	900.10	20.00	1344.90
6.30	933.00	19.30	1353.70
6.30	940.40	19.30	1356.80
6.30	920.90	19.30	1224.80
6.30	893.80	19.30	1187.70
6.30	602.40	19.30	1343.80
6.30	872.70	19.30	1311.60
6.30	866.10	19.30	1361.30
6.30	723.50	19.30	1310.20
6.30	894.00	20.00	1290.60
6.30	875.00	20.00	1299.80
6.30	862.00	20.00	1278.70
6.30	798.80	20.00	1324.70
6.30	861.70	20.00	1310.30

6.30	866.20	20.00	1300.80
6.30	879.30	20.00	1329.20
7.00	695.60	20.00	1361.40
11.00	870.80	20.00	1284.30
11.00	825.70	20.00	1268.80
11.00	870.50	19.30	1140.50
11.00	885.00	20.00	1282.60
11.30	842.70	19.30	1281.70
11.30	864.80	20.00	1216.10
11.30	820.10	20.00	1356.50
11.30	861.30	20.00	1353.70
11.30	848.30	20.00	1346.00
11.30	848.20	20.00	1263.60
11.30	803.70	20.00	1281.20
11.30	803.70	20.00	1328.40
11.30	860.80	20.00	1326.80

After power-cut			
Day		Night	
Time	MW	Time	MW
11.30	876.50	20.00	1251.10
12.00	874.70	19.30	1305.00
6.00	623.90	20.00	1249.20
11.30	861.20	20.00	1338.70
6.30	887.20	20.00	1314.40
11.00	869.70	20.00	1308.30
6.30	634.60	20.00	1120.20
11.00	918.70	20.00	1318.10
11.30	927.90	20.00	1316.30
12.00	914.20	20.00	1306.20
11.00	866.10	20.00	1262.40
11.30	926.60	20.00	1316.60
12.00	932.90	20.00	1302.20
11.30	950.30	20.00	1343.30
11.30	930.80	20.00	1329.40
11.30	936.00	19.30	1303.40
11.00	905.00	19.30	1370.30
11.30	946.60	19.30	1328.60



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Tuesday Data:

Before power-cut			
Day		Night	
Time	MW	Time	MW
6.30	846.00	19.30	1275.00
6.30	874.50	19.30	1274.90
6.30	868.10	20.00	1250.10
6.30	877.30	20.00	1224.50
6.30	884.80	20.00	1245.00
6.30	899.60	20.30	1240.30
6.30	883.90	20.00	1262.40
6.30	915.00	19.30	1244.34
6.30	902.60	19.30	1277.50
6.30	901.40	19.30	1267.00
6.30	912.12	20.00	1286.30
6.30	897.60	20.00	1309.80
6.30	908.40	20.00	1287.00
6.30	890.20	19.30	1312.90
6.30	762.90	20.00	1216.60
6.30	672.60	20.00	1079.30
6.30	810.10	19.30	1336.10
11.30	853.60	20.00	1336.90
6.00	877.60	19.30	1315.70
6.30	886.00	20.00	1327.10
6.30	839.10	20.00	1357.80
6.30	867.40	19.30	1308.40
11.30	705.30	20.00	1205.30
6.30	843.71	20.00	1257.60
6.30	838.80	20.00	1284.70
6.30	851.90	20.00	1243.00
6.30	840.60	20.00	1241.60
6.30	828.30	20.00	1265.90
6.30	869.20	20.00	1296.50
6.30	880.50	20.00	1303.30

11.00	868.60	20.00	1300.20
11.30	769.80	20.00	1202.80
12.00	808.90	20.00	1262.80
11.00	870.10	20.00	1303.50
6.30	873.00	19.30	1309.40
6.30	888.70	19.30	1302.50
6.30	876.90	19.30	1301.90
6.30	833.30	19.30	1296.40
6.30	883.80	19.30	1357.20
6.30	886.10	19.30	1330.20
6.30	718.00	19.30	1160.80
6.30	893.40	19.30	1359.00
11.30	882.40	19.30	1348.40
6.30	871.30	19.30	1370.90
6.30	918.10	19.30	1206.90
6.30	897.40	19.30	1373.00
6.30	886.80	19.30	1334.50
6.30	900.90	19.00	1335.80
6.30	916.50	19.30	1370.00
11.30	904.00	19.30	1274.40
11.00	918.00	19.30	1356.90
10.30	793.30	19.30	1132.40
6.30	868.70	19.30	1315.20
7.00	712.00	19.30	1229.30
6.30	923.10	19.30	1346.10
7.00	933.60	19.30	1330.20
7.00	856.60	20.00	1330.30
6.30	922.70	20.00	1286.70
6.30	910.00	20.00	1320.00
6.30	939.30	20.00	1286.60
6.30	938.50	20.00	1338.80
6.30	829.50	19.30	1298.70
6.30	931.40	20.30	1313.30
6.30	993.50	20.00	1328.30
6.30	960.80	20.00	1350.50

6.30	941.30	19.30	1292.20
6.30	833.30	20.00	1254.50
6.30	867.60	20.00	1126.60
6.30	907.00	20.00	1318.50
6.30	658.60	20.00	1194.70
6.30	586.60	20.00	1314.50
6.30	914.60	20.00	1391.80
6.30	896.80	20.00	1364.70
6.30	869.00	20.00	1269.10
6.30	676.10	20.00	1164.30
6.30	876.10	20.00	1332.00
6.30	891.30	20.00	1349.30
6.30	880.80	20.30	1345.40

After power-cut			
Day		Night	
Time	MW	Time	MW
11.30	880.10	20.00	1311.00
11.30	916.40	20.00	1318.80
12.00	842.60	20.00	1362.10
11.30	882.70	20.00	1340.00
6.30	886.50	20.00	1298.40
6.30	884.50	20.00	1325.60
11.00	850.70	20.00	1321.70
11.30	916.60	20.00	1346.20
6.30	917.90	20.00	1332.60
11.30	939.10	20.00	1331.00
6.30	708.80	20.00	1178.20
6.30	908.90	20.00	1321.50
11.00	940.70	20.00	1331.80
11.30	950.80	20.00	1370.20
11.00	961.40	20.00	1336.00
11.30	939.30	20.00	1355.00
11.30	948.50	19.30	1349.00

Wednesday Data:

Before power-cut			
Day		Night	
Time	MW	Time	MW
6.30	874.20	19.30	1274.70
6.30	909.60	19.30	1206.40
6.30	888.80	19.30	1264.00
6.30	886.80	20.00	1257.20
6.30	913.50	19.30	1226.30
6.30	915.00	20.00	1273.50
6.30	921.10	19.30	1247.90
6.30	907.10	20.00	1366.20
6.30	926.70	20.00	1281.70
6.30	934.40	20.00	1282.70
6.30	933.50	20.00	1288.40
6.30	886.70	19.30	1311.20
6.30	922.30	20.00	1286.20
6.30	920.40	19.30	1247.20
6.30	626.90	20.00	1175.90
12.00	801.20	19.30	1206.40
6.30	861.20	20.00	1308.40
6.30	888.90	20.00	1277.30
6.30	896.50	20.00	1310.60
6.00	747.30	20.00	1250.00
6.30	881.60	20.00	1342.70
6.30	850.90	20.00	1267.90
6.30	773.60	20.00	1199.00
6.30	842.80	20.00	1245.70
6.30	848.30	20.00	1272.00
6.30	861.50	20.00	1247.70
6.30	846.80	20.00	1254.10
6.30	848.90	20.00	1259.30
6.30	884.30	20.00	1312.90
6.30	876.00	20.00	1313.80

11.30	866.50	20.00	1275.30
11.30	830.10	20.00	1235.00
11.30	854.50	20.00	1290.00
11.30	871.00	20.00	1278.60
6.30	894.20	20.00	1309.10
6.30	898.90	20.00	1320.10
6.30	715.80	20.00	1208.80
6.30	866.50	19.30	1303.70
6.30	895.80	19.30	1314.10
6.30	899.70	19.30	1321.20
6.30	714.40	19.30	1166.40
6.30	904.50	19.30	1354.70
6.30	897.00	19.30	1342.30
6.30	905.70	19.00	1366.30
6.30	915.80	19.30	1324.10
6.30	936.20	19.30	1370.40
6.30	904.80	19.30	1368.70
6.30	912.20	19.30	1375.80
11.00	893.60	19.30	1365.00
11.30	891.50	19.30	1372.30
10.00	896.90	19.30	1375.90
12.00	716.30	20.00	1145.10
6.30	917.80	19.30	1339.10
6.30	900.10	19.30	1364.80
6.30	949.50	19.30	1307.20
6.30	972.90	19.30	1306.80
6.30	962.10	20.00	1352.10
7.00	726.10	20.00	1198.50
6.30	938.70	20.00	1308.80
11.30	810.00	20.00	1279.00
6.30	954.30	20.00	1329.40
6.30	949.00	20.00	1325.80
6.30	936.20	20.00	1341.80
6.30	965.50	20.00	1318.20
6.30	946.00	20.00	1356.60

6.30	935.30	19.30	1270.90
6.30	795.60	20.00	1239.50
6.30	736.40	19.30	1141.80
6.30	915.30	19.30	1292.10
6.30	828.80	20.00	1304.20
11.00	764.30	20.00	1395.30
6.00	906.00	20.00	1349.40
6.30	904.70	19.30	1339.60
6.30	891.20	20.00	1303.50
6.30	803.90	20.00	1326.50
6.30	875.20	20.00	1337.60
6.30	890.00	20.00	1354.30
6.30	889.20	20.00	1334.50

After power-cut			
Day		Night	
Time	MW	Time	MW
11.00	900.60	20.00	1311.50
6.30	917.20	20.00	1310.90
6.30	845.00	20.00	1399.50
11.00	899.80	20.00	1336.90
6.30	855.20	20.00	1286.20
6.30	904.00	20.00	1300.40
11.30	902.80	20.00	1330.10
11.00	933.00	20.00	1357.30
6.30	915.40	20.00	1334.50
11.30	923.50	20.00	1332.10
11.30	894.10	20.00	1304.50
11.00	908.40	20.00	1277.20
11.00	918.50	20.00	1308.90
11.30	945.80	20.00	1351.10
11.30	966.50	19.30	1330.00
11.30	948.30	19.30	1328.30
11.00	958.10	19.30	1357.40

Thursday Data:

Before power-cut			
Day		Night	
Time	MW	Time	MW
6.30	853.80	20.00	1267.80
6.30	870.00	19.30	1226.90
7.00	962.90	20.00	1163.20
6.30	879.80	20.00	1275.70
6.30	872.70	19.30	1211.70
6.30	918.10	20.00	1268.20
6.30	902.50	20.00	1257.60
6.30	914.00	20.00	1268.40
6.30	931.10	20.00	1282.50
6.30	932.00	19.30	1234.80
6.30	913.40	20.00	1278.90
6.30	916.20	19.30	1216.90
6.30	946.10	20.00	1319.10
6.30	908.82	20.00	1293.80
6.30	669.40	20.00	1222.50
11.30	846.20	20.00	1276.10
6.30	880.50	19.30	1291.20
11.30	834.00	20.00	1289.20
6.30	888.90	20.00	1310.60
6.00	638.00	20.00	1286.50
6.30	897.70	20.00	1342.70
6.30	851.90	20.00	1232.60
6.30	782.11	20.00	1215.90
6.30	676.70	20.00	1163.40
6.30	852.00	20.00	1255.30
6.30	854.10	20.00	1226.70
6.30	854.40	20.00	1236.30
6.30	850.50	20.00	1282.40
6.30	887.70	20.00	1297.40
6.30	865.60	20.00	1273.50

11.00	839.70	20.00	1271.90
11.00	830.20	20.00	1263.00
11.30	844.40	20.00	1300.00
11.30	851.70	19.30	1305.95
6.30	874.60	20.00	1311.90
6.30	893.80	20.00	1312.10
6.30	853.60	19.30	1277.90
6.30	874.60	19.30	1293.40
6.30	886.60	19.30	1338.60
6.30	903.40	20.00	1314.30
6.30	829.40	19.30	1340.10
6.30	904.50	19.30	1365.90
10.30	820.60	19.30	1343.30
6.30	902.50	19.30	1362.10
6.30	916.90	19.30	1305.30
6.30	931.20	19.30	1393.70
6.30	917.20	19.30	1380.30
11.30	902.30	19.30	1375.80
6.30	915.20	19.30	1371.80
11.30	882.80	19.30	1372.30
11.00	890.60	19.30	1348.10
11.30	771.80	19.30	1230.00
6.30	930.60	20.00	1324.80
6.30	953.80	19.30	1360.70
6.30	940.10	19.30	1311.14
6.30	961.80	19.30	1315.40
6.30	959.20	19.30	1267.00
6.30	902.70	20.00	1314.70
6.30	936.80	19.30	1248.40
6.30	953.70	20.00	1300.50
6.30	952.70	20.00	1335.10
6.30	938.60	20.00	1312.90
6.30	966.20	20.00	1330.10
6.30	953.70	20.00	1362.50
6.30	928.10	20.00	1333.90

6.30	936.30	20.00	1256.00
6.30	746.60	20.00	1192.40
6.30	759.50	20.00	1192.80
6.30	902.90	19.30	1273.70
6.30	906.20	20.00	1341.50
6.30	896.30	20.00	1432.10
6.30	919.80	20.00	1350.00
6.30	894.00	20.00	1364.00
6.30	863.00	19.30	1332.30
6.30	861.60	20.00	1325.30
6.30	878.70	20.00	1345.90
6.30	911.90	20.00	1345.20
6.30	886.90	20.00	1313.50

After power-cut			
Day		Night	
Time	MW	Time	MW
11.00	913.10	20.00	1326.00
6.30	906.30	20.00	1319.80
6.30	908.30	20.00	1391.50
6.30	887.50	19.30	1219.20
6.30	858.30	20.00	1277.30
6.30	910.40	20.00	1303.00
11.00	920.60	20.00	1338.80
11.30	938.40	20.00	1336.10
6.30	934.00	20.00	1341.20
6.30	930.70	20.00	1314.50
11.30	927.70	20.00	1353.60
11.30	885.00	20.00	1290.00
11.30	902.50	20.00	1320.00
11.30	925.90	20.00	1338.20
6.30	751.30	20.00	1196.40
11.30	931.80	20.00	1365.40
11.30	955.60	20.00	1377.60

Friday Data:

Before power-cut			
Day		Night	
Time	MW	Time	MW
6.30	837.70	19.30	1205.40
6.30	875.40	19.30	1230.40
6.30	4.80	19.30	1267.20
6.30	881.30	20.00	1251.10
7.00	681.50	20.00	1073.30
7.00	839.66	20.00	1246.50
6.30	898.10	20.00	1194.60
6.30	895.40	20.00	1261.30
6.30	918.70	20.00	1209.80
6.30	927.70	20.00	1253.80
6.30	823.48	20.00	1267.30
6.30	896.00	20.00	1216.30
6.30	919.50	20.00	1319.10
6.30	906.30	19.30	1237.90
6.30	624.10	20.00	1135.80
11.30	790.00	20.00	1222.30
11.30	881.10	20.00	1317.60
6.30	861.70	19.30	1282.00
6.30	870.00	20.00	1321.00
11.30	775.36	20.00	1351.80
6.30	871.70	20.00	1292.00
6.30	766.20	20.00	1249.70
6.30	818.70	20.00	1227.60
6.30	644.10	20.00	1108.40
6.30	836.33	20.00	1264.30
6.30	824.30	20.00	1199.20
6.30	825.10	20.00	1242.00
6.30	854.90	20.00	1258.20
6.30	875.40	20.00	1285.40
6.30	875.20	20.00	1267.00
11.30	857.10	20.00	1278.50

11.30	849.10	20.00	1286.00
11.00	881.70	20.00	1284.50
11.30	849.40	20.00	1168.70
6.30	884.40	20.30	1265.70
6.30	892.60	19.30	1327.30
6.30	867.10	19.30	1295.10
6.30	866.80	20.00	1287.20
6.30	892.40	19.30	1317.50
19.00	895.20	19.30	1264.60
11.00	815.20	19.30	1228.10
6.30	901.50	19.30	1373.80
11.00	857.10	19.30	1315.30
6.30	901.90	19.30	1310.40
6.30	903.80	19.30	1296.70
6.30	930.20	19.30	1335.90
6.30	926.70	19.00	1370.80
6.30	905.50	19.30	1354.70
6.30	911.90	19.30	1359.70
11.30	881.70	19.30	1364.10
9.00	872.80	19.30	1387.20
11.00	815.60	19.30	1280.30
6.30	913.40	6.30	1333.10
6.30	940.10	19.30	1315.30
6.30	945.70	19.30	1339.60
7.00	932.60	19.30	1307.50
6.30	937.20	19.30	1271.30
6.30	911.70	20.00	1291.40
6.30	925.90	19.30	1237.10
6.30	927.60	20.00	1321.20
6.30	935.90	20.00	1311.70
6.30	745.80	20.00	1206.90
6.30	950.00	19.30	1325.60
6.30	964.40	20.00	1334.90
6.30	950.70	20.00	1311.30
6.30	919.60	19.30	1145.60

6.30	686.20	20.00	1141.60
6.30	790.40	20.00	1252.30
6.30	902.40	19.30	1268.10
6.30	882.10	20.00	1285.20
6.30	915.40	20.00	1388.20
6.30	906.70	20.00	1307.00
6.30	881.10	20.00	1344.30
6.30	891.00	20.00	1325.80
6.30	852.80	20.00	1302.10
6.30	874.90	20.30	1312.40
6.30	895.80	20.00	1321.50
6.30	901.70	20.00	1273.70

After power-cut			
Day		Night	
Time	MW	Time	MW
11.00	907.00	19.30	1197.30
11.30	888.50	20.00	1288.50
11.00	891.00	20.00	1265.30
6.30	890.10	20.00	1336.50
6.30	856.20	20.00	1265.80
11.00	875.50	20.00	1259.10
6.30	889.60	20.00	1303.50
11.30	914.70	20.00	1336.40
11.00	921.90	20.00	1301.10
11.00	925.20	20.00	1290.50
11.30	926.20	20.00	1300.00
11.30	921.30	20.00	1300.80
11.30	899.80	20.00	1287.40
11.30	947.20	20.00	1318.00
11.30	938.50	20.00	1283.80
12.00	939.10	20.00	1317.40
11.00	915.30	20.00	1334.90
11.00	965.80	20.00	1318.30

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