

Отчет по результатам расчета

1. Исходные данные

Название проекта: ТП-082

Дата и время формирования: 21.10.2024, 23:32:14

Расчеты выполнил: Иванов Н.А.

Параметры:

1. Напряжение на трансформаторной подстанции в голове фидера: 400.0 В
2. Допустимое минимальное напряжение в сети: 375.0 В
3. Расчетная температура линий передач и кабелей: 0.0 °С.

Структура сети представлена на Рисунке 1.



Рисунок 1. Схема сети

Исходное состояние сети с уровнем напряжения в узлах до установки СНЭ представлена на Рисунке 2.

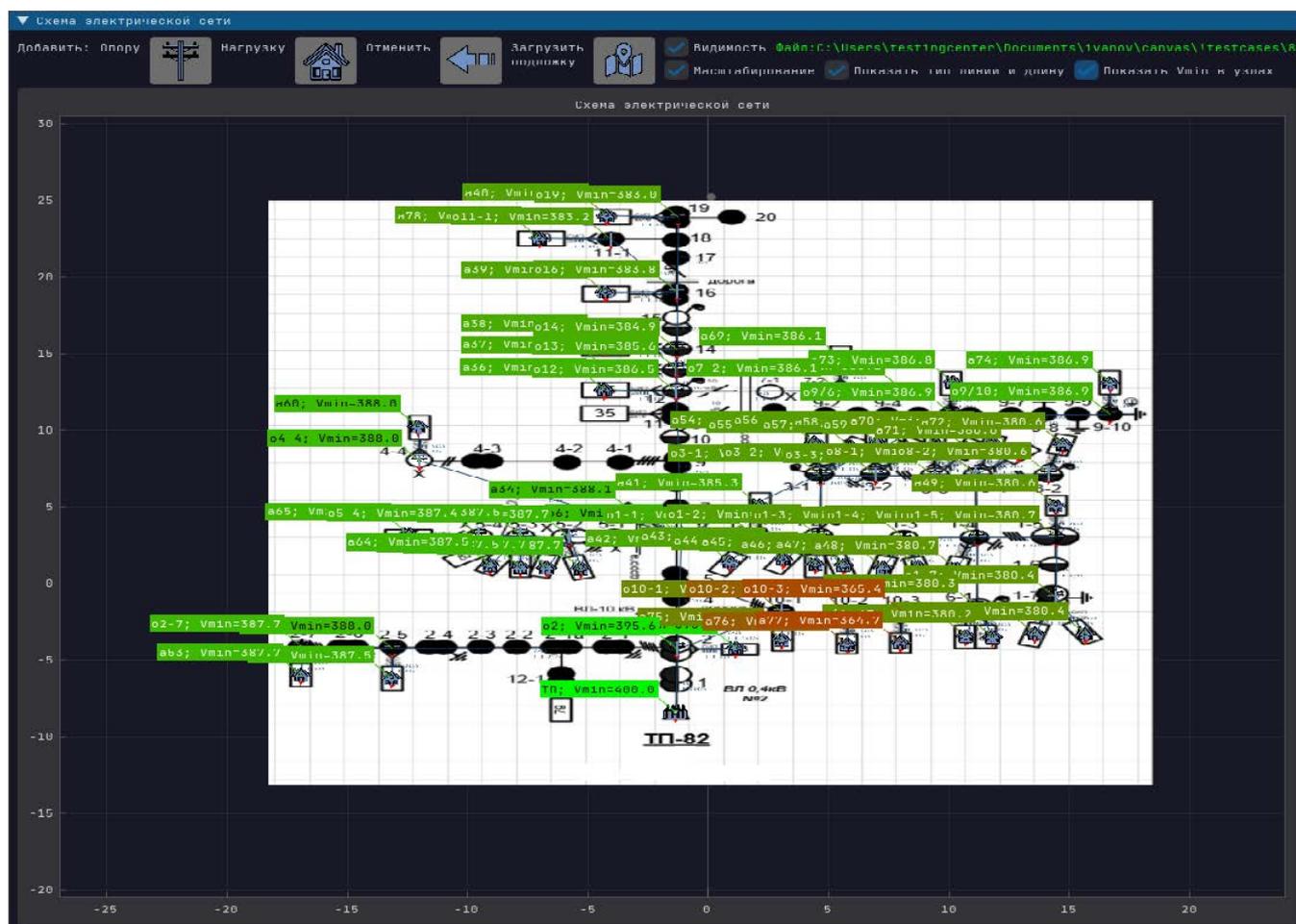


Рисунок 2. Исходное состояние сети без СНЭ

2. Результаты расчета

В Таблице 1 представлены параметры СНЭ для каждого узла и значение минимального напряжения в сети.

Таблица 1

Расположение СНЭ	Максимальная активная мощность (кВт)	Максимальная реактивная мощность (квар)	Максимальная полная мощность (кВА)	Емкость (кВт*ч)	Емкость (А*ч)	Минимальное напряжение в сети (В)
o2	507.5	0.0	507.5	1792.1	4480.25	375.0
a33	521.1	0.0	521.1	1813.5	4533.75	375.0
o6	502.3	211.1	544.856	1268.1	3170.25	375.0

a34	511.8	340.7	614.83	1252.7	3131.75	374.951
o12	492.9	283.3	568.515	997.5	2493.75	373.89
a36	500.2	245.8	557.331	993.8	2484.5	373.792
o13	486.8	246.2	545.517	877.2	2193.0	373.35
a37	493.0	212.0	536.65	871.6	2179.0	373.271
o14	477.4	229.4	529.656	760.4	1901.0	372.85
a38	482.9	216.1	529.048	755.9	1889.75	372.801
o16	470.7	196.5	510.069	619.5	1548.75	372.2
a39	473.1	167.6	501.91	609.0	1522.5	372.141
o19	440.1	143.8	462.997	408.0	1020.0	371.234
a40	428.0	128.9	446.989	369.3	923.25	371.053
o1-1	485.8	337.8	591.701	1038.5	2596.25	374.202
a41	494.4	330.0	594.417	1039.6	2599.0	374.091
a42	493.5	331.2	594.336	1037.0	2592.5	374.085
o1-2	475.8	265.4	544.814	904.6	2261.5	373.569
a43	482.1	267.7	551.438	898.7	2246.75	373.479
a44	482.1	267.7	551.438	898.6	2246.5	373.476
a45	482.1	267.8	551.486	898.5	2246.25	373.475
o1-3	463.5	220.7	513.362	772.0	1930.0	373.003
a46	467.6	193.4	506.017	761.1	1902.75	372.926
a47	467.6	193.3	505.979	761.4	1903.5	372.927
o1-4	456.7	218.1	506.105	681.9	1704.75	372.582
a48	457.6	203.2	500.688	661.7	1654.25	372.481
o1-5	455.1	184.9	491.227	622.1	1555.25	372.3
a49	454.9	173.8	486.971	602.4	1506.0	372.17
o1-7	449.9	147.7	473.524	517.4	1293.5	371.766
a50	449.0	115.1	463.518	498.8	1247.0	371.682
a51	448.9	113.2	462.953	498.5	1246.25	371.682
o2-5	501.9	194.5	538.269	782.0	1955.0	372.816
a52	499.4	209.7	541.641	747.9	1869.75	372.67
o2-7	499.5	176.6	529.8	659.8	1649.5	372.253
a53	498.9	189.0	533.5	639.2	1598.0	372.162
o3-1	476.0	229.2	528.307	832.2	2080.5	373.199
a54	473.8	230.1	526.719	791.3	1978.25	373.035
a55	473.4	198.0	513.139	789.8	1974.5	373.03
o3-2	469.1	208.0	513.146	740.1	1850.25	372.79
a56	467.5	194.4	506.308	708.0	1770.0	372.66
a57	467.5	194.4	506.308	707.9	1769.75	372.659

o3-3	466.0	185.3	501.49	673.2	1683.0	372.488
a58	465.0	176.5	497.37	647.0	1617.5	372.365
a59	465.0	176.5	497.37	647.1	1617.75	372.366
o4-4	499.4	179.0	530.51	653.6	1634.0	372.224
a60	498.9	144.0	519.266	633.5	1583.75	372.125
o5-2	508.2	290.5	585.37	1082.3	2705.75	374.166
a61	507.8	284.3	581.968	1038.8	2597.0	373.945
a62	507.8	284.3	581.968	1038.7	2596.75	373.945
o5-3	506.5	261.8	570.159	1000.1	2500.25	373.774
a63	506.5	273.7	575.72	962.5	2406.25	373.588
a64	506.5	227.3	555.164	962.7	2406.75	373.589
o5-4	506.0	266.7	571.983	930.1	2325.25	373.44
a65	503.9	236.7	556.724	886.3	2215.75	373.264
o6-1	450.7	188.9	488.686	562.4	1406.0	371.997
a66	449.8	158.4	476.876	542.0	1355.0	371.91
a67	449.1	145.1	471.958	540.0	1350.0	371.891
o7-2	497.6	231.6	548.857	876.3	2190.75	373.266
a68	494.1	205.1	534.977	828.4	2071.0	373.081
a69	494.4	217.2	540.007	829.4	2073.5	373.082
o8-1	456.4	179.5	490.43	636.2	1590.5	372.359
a70	455.4	186.3	492.033	613.1	1532.75	372.224
a71	455.2	186.4	491.886	612.3	1530.75	372.221
o8-2	454.4	163.5	482.92	591.1	1477.75	372.145
a72	453.0	159.5	480.26	568.2	1420.5	372.033
o9/6	492.1	191.2	527.939	643.2	1608.0	372.207
a73	491.3	179.0	522.893	622.5	1556.25	372.104
o9/10	490.4	164.6	517.286	552.1	1380.25	371.767
a74	475.7	154.1	500.037	491.5	1228.75	371.537
o10-1	39.6	0.0	39.6	140.5	351.25	375.0
a75	39.5	0.0	39.5	140.2	350.5	375.0
o10-2	23.4	0.0	23.4	83.4	208.5	375.0
a76	23.4	0.0	23.4	83.2	208.0	375.0
o10-3	16.7	0.0	16.7	59.6	149.0	375.0
a77	16.0	0.0	16.0	57.0	142.5	375.0
o11-1	441.7	153.1	467.481	411.6	1029.0	371.249
a78	430.0	128.2	448.704	372.5	931.25	371.069

В Таблице 2 представлены параметры СНЭ в порядке увеличения емкости накопителя, позволяющие поднять напряжение до уровня допустимого минимального напряжения сети. Оптимальные варианты установки СНЭ минимальной емкости соответствуют узлам:

1. Узел - а77
2. Узел - о10-3
3. Узел - а76

Таблица 2

Расположение СНЭ	Максимальная активная мощность (кВт)	Максимальная реактивная мощность (квар)	Максимальная полная мощность (кВА)	Емкость (кВт*ч)	Емкость (А*ч)	Минимальное напряжение в сети (В)
а77	16.0	0.0	16.0	57.0	142.5	375.0
о10-3	16.7	0.0	16.7	59.6	149.0	375.0
а76	23.4	0.0	23.4	83.2	208.0	375.0
о10-2	23.4	0.0	23.4	83.4	208.5	375.0
а75	39.5	0.0	39.5	140.2	350.5	375.0
о10-1	39.6	0.0	39.6	140.5	351.25	375.0
о6	502.3	211.1	544.856	1268.1	3170.25	375.0
о2	507.5	0.0	507.5	1792.1	4480.25	375.0
а33	521.1	0.0	521.1	1813.5	4533.75	375.0

Состояние сети с уровнем напряжения после установки СНЭ в выбранных узлах представлены на рисунках ниже.

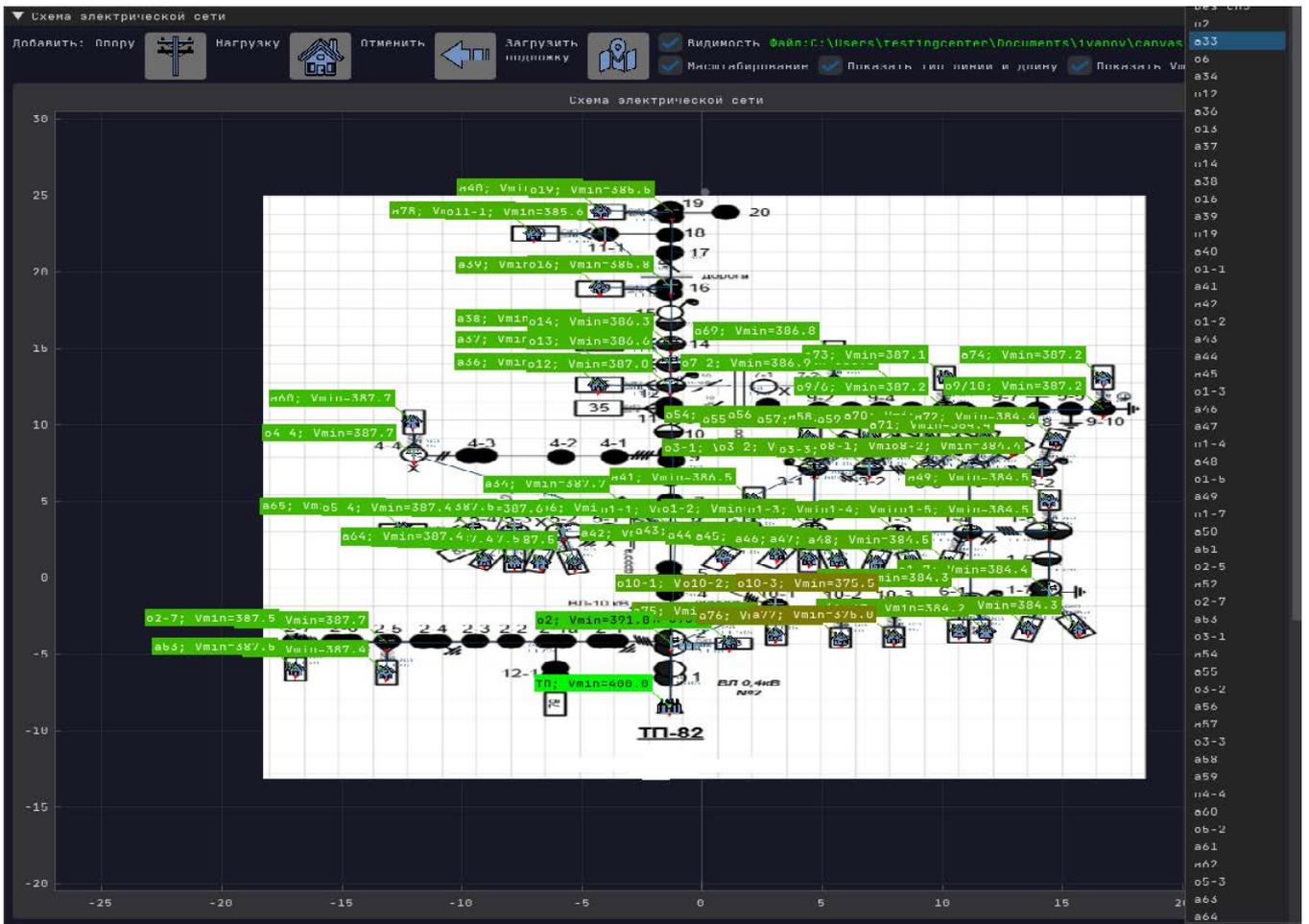


Рисунок 3. Расчетное состояние сети с установкой СНЭ в узел - o2

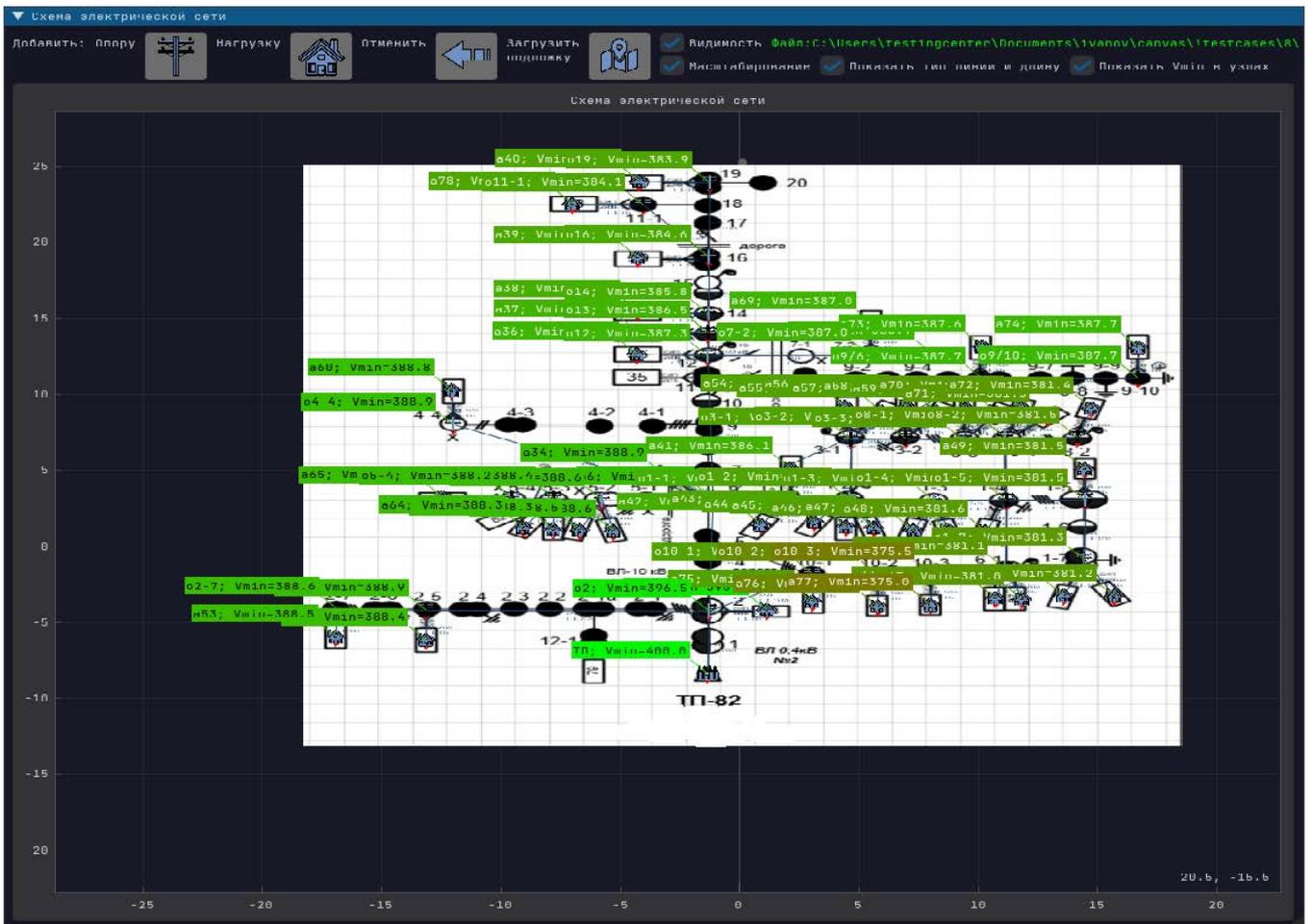


Рисунок 4. Расчетное состояние сети с установкой СНЭ в узел - o10-1

Графики напряжение, уровень заряда СНЭ, активная/реактивная мощность и минимальный угол после установки СНЭ для каждого узла сети представлены ниже.

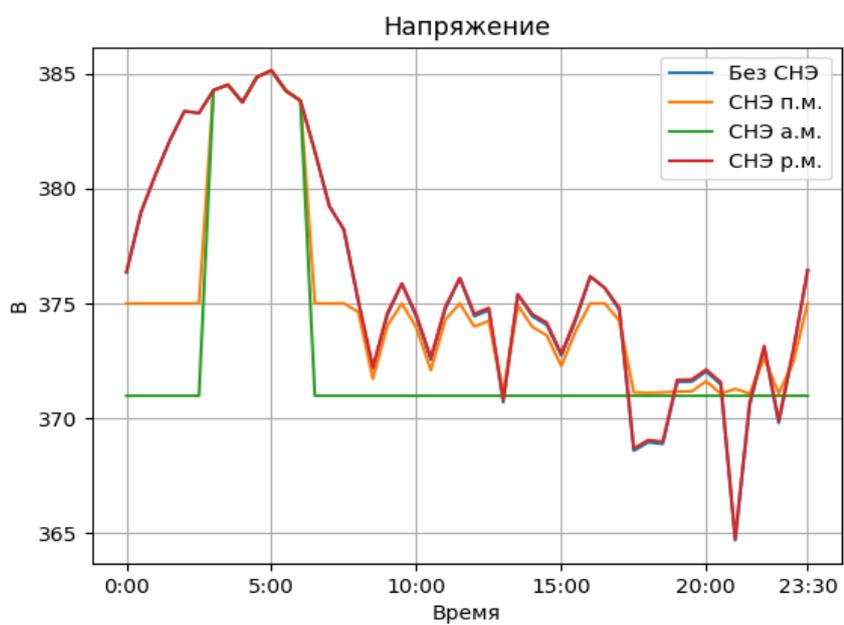


Рисунок 5.1 Узел - о2



Рисунок 5.2 Узел - о2

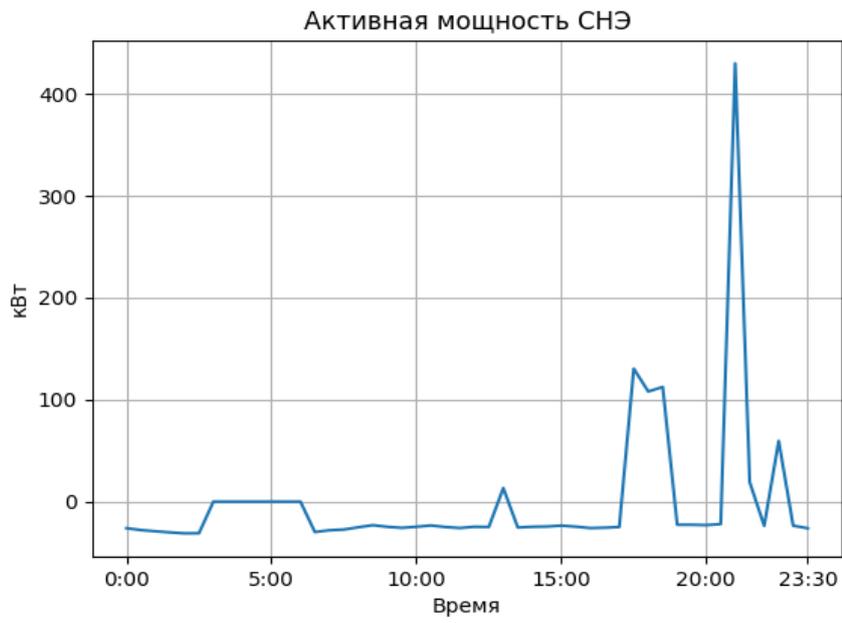


Рисунок 5.3 Узел - о2

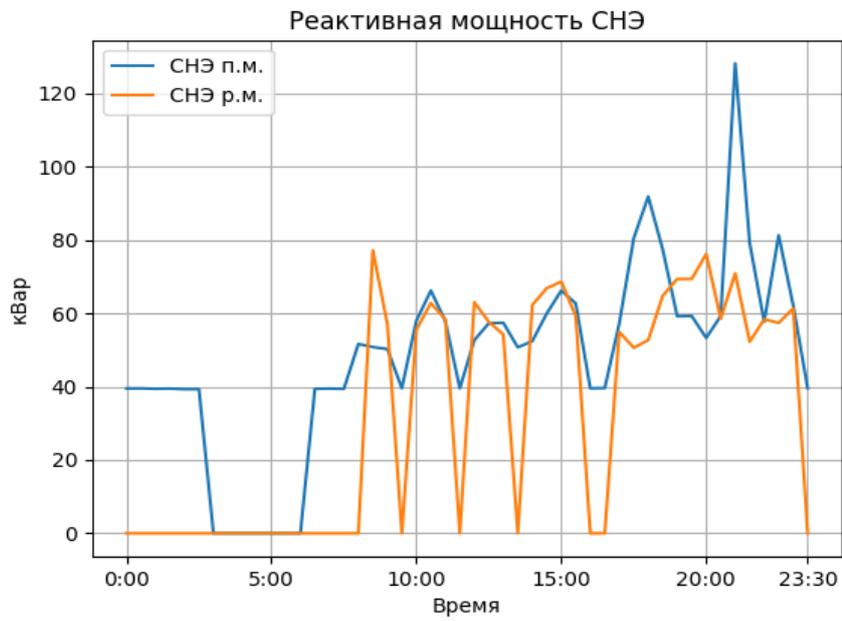


Рисунок 5.4 Узел - о2

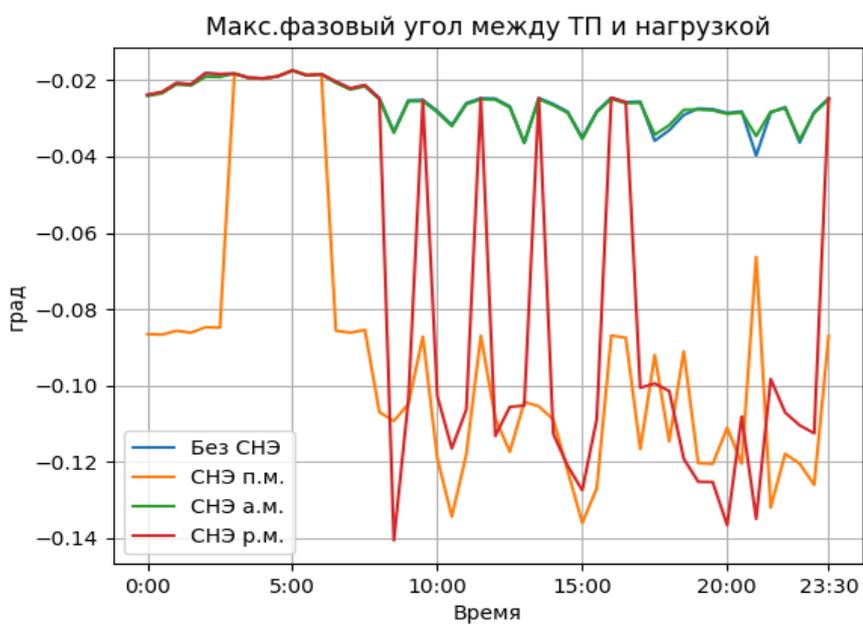


Рисунок 5.5 Узел - о2

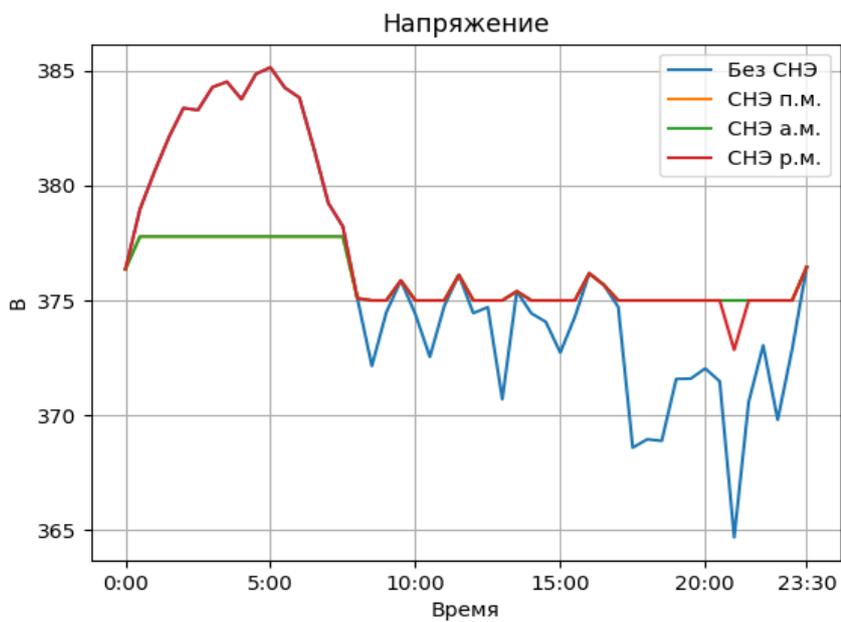


Рисунок 6.1 Узел - а33

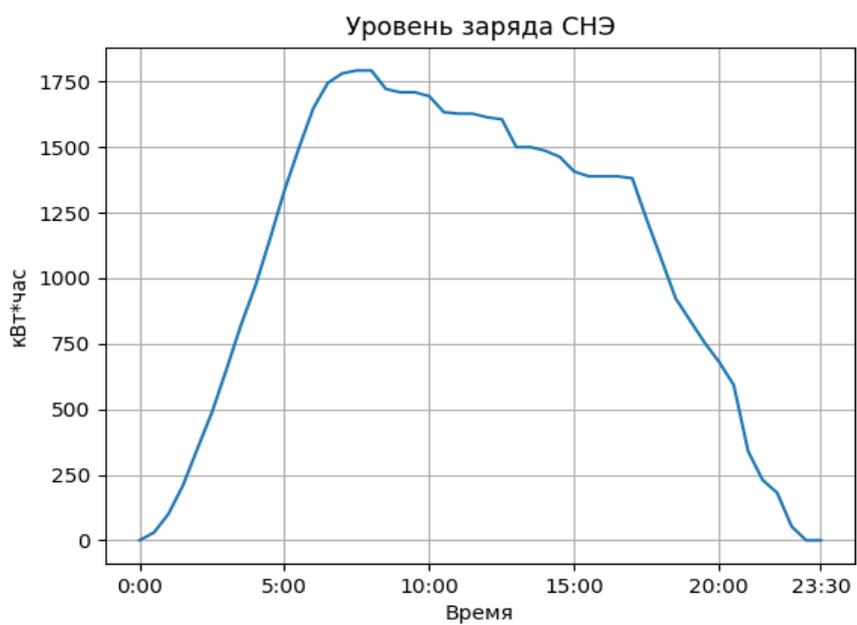


Рисунок 6.2 Узел - а33

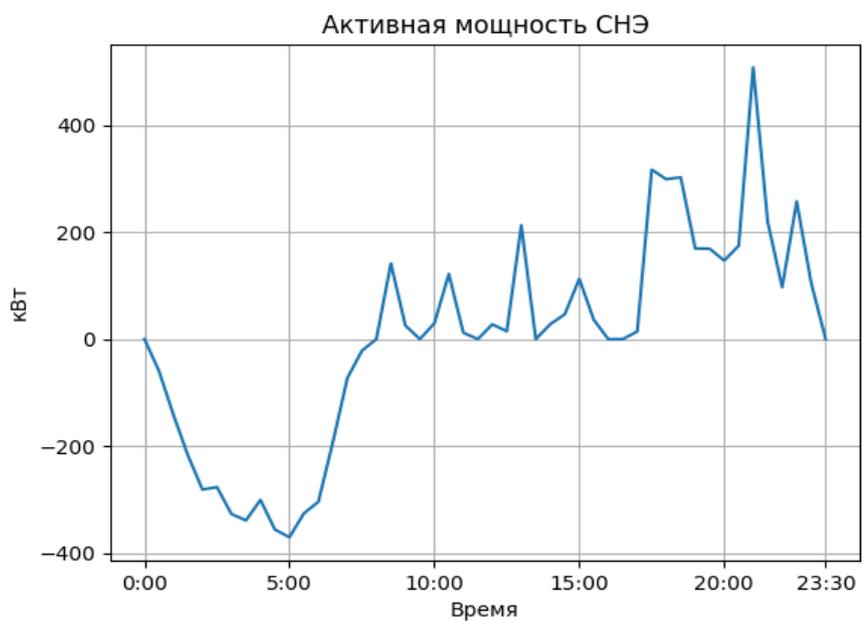


Рисунок 6.3 Узел - а33

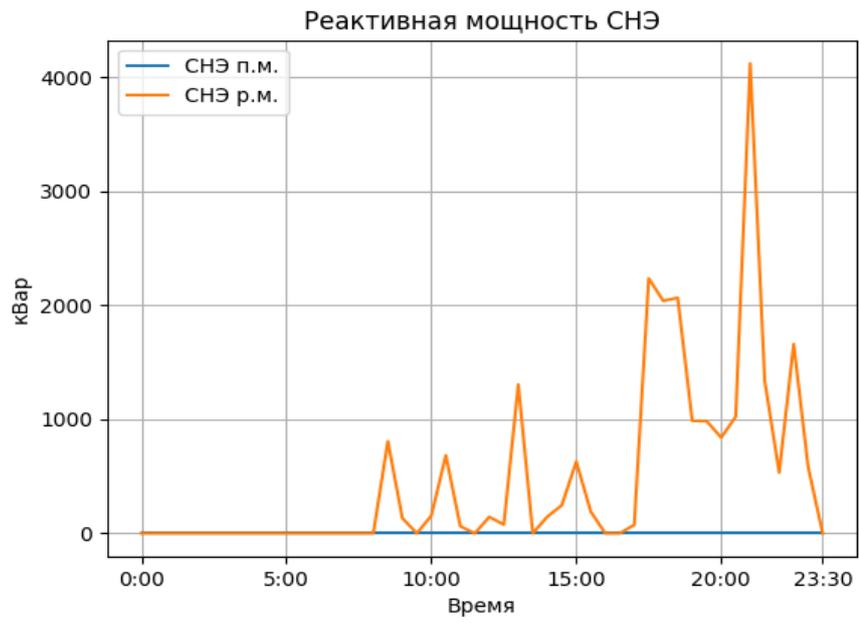


Рисунок 6.4 Узел - а33

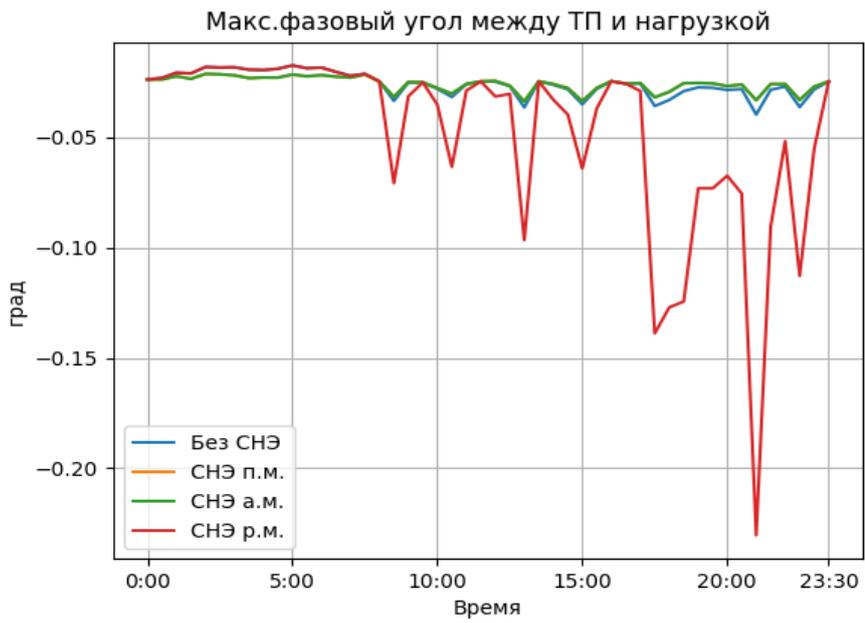


Рисунок 6.5 Узел - а33

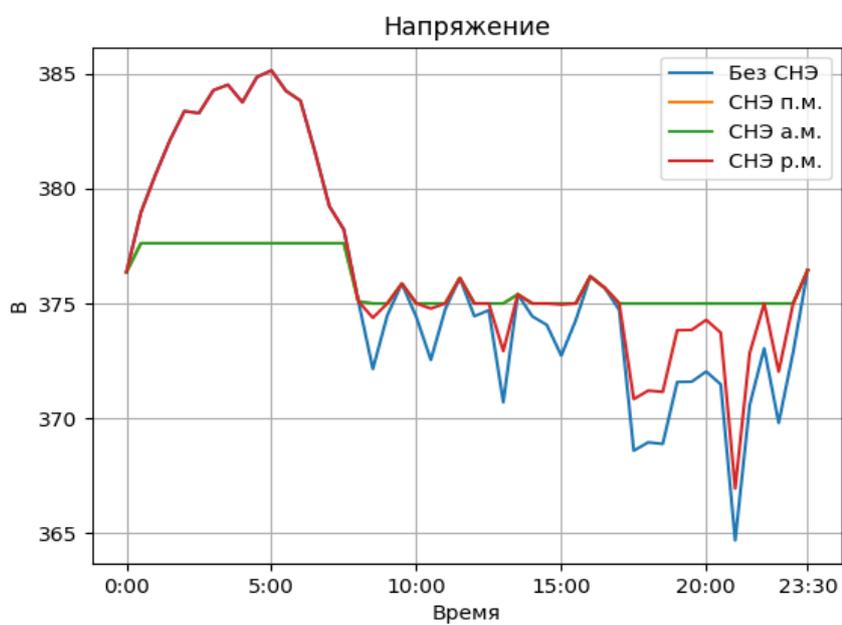


Рисунок 7.1 Узел - об

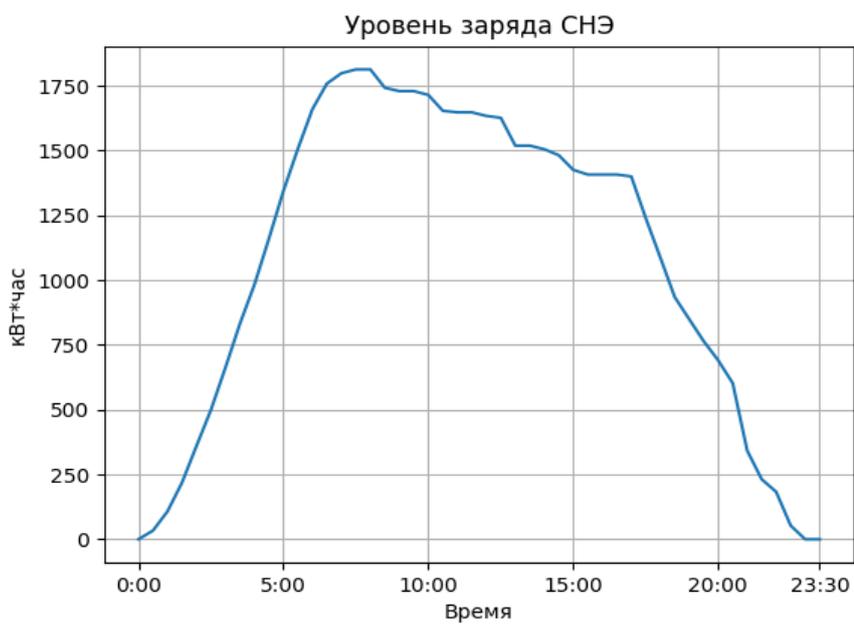


Рисунок 7.2 Узел - об

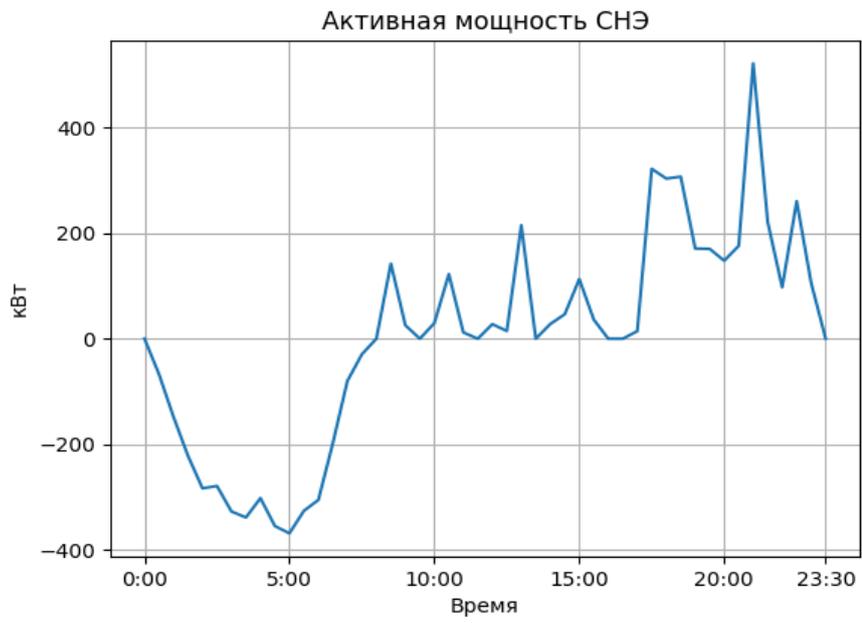


Рисунок 7.3 Узел - об

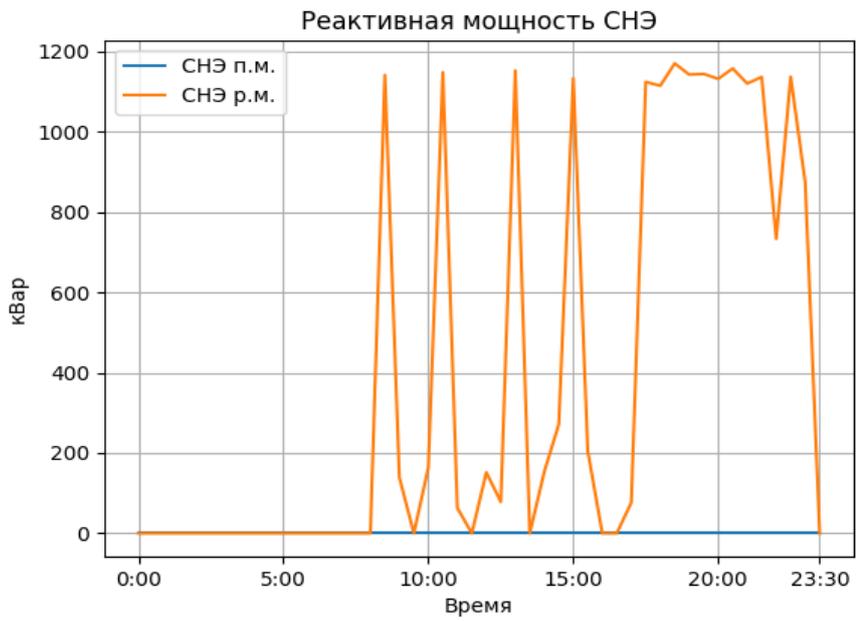


Рисунок 7.4 Узел - об

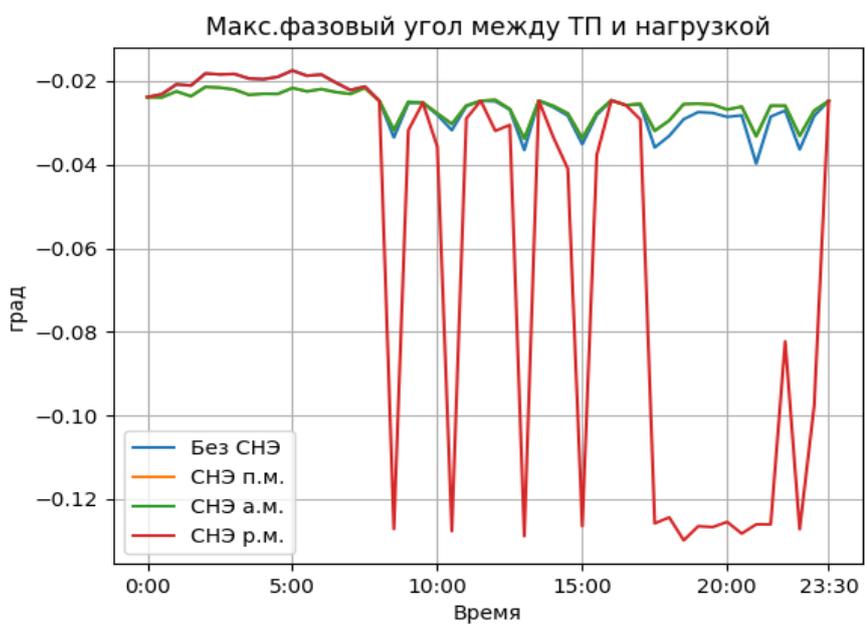


Рисунок 7.5 Узел - об

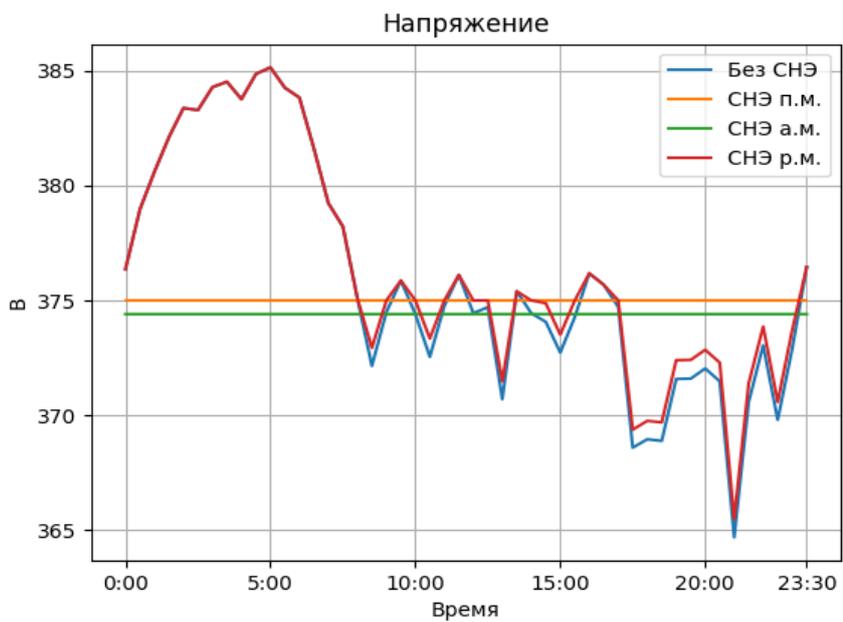


Рисунок 8.1 Узел - а34

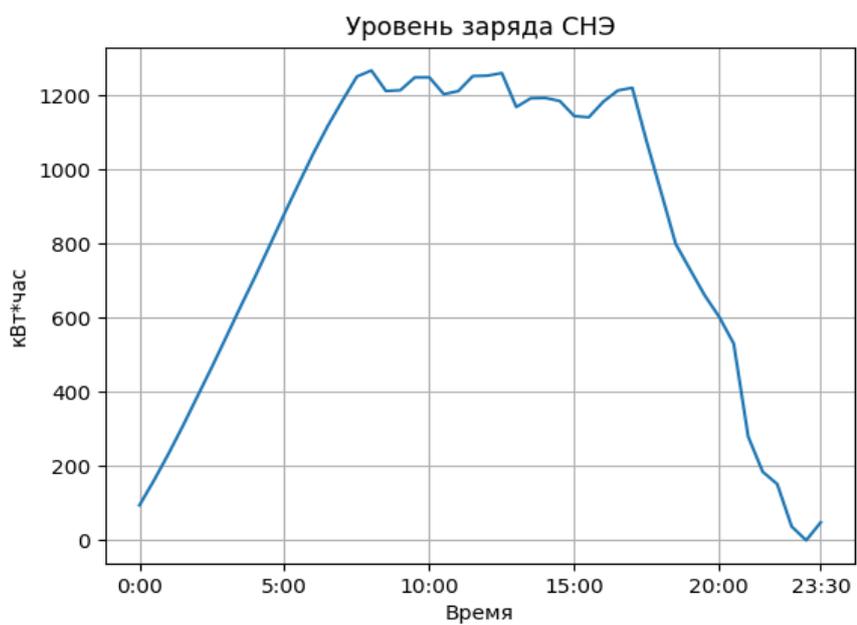


Рисунок 8.2 Узел - а34

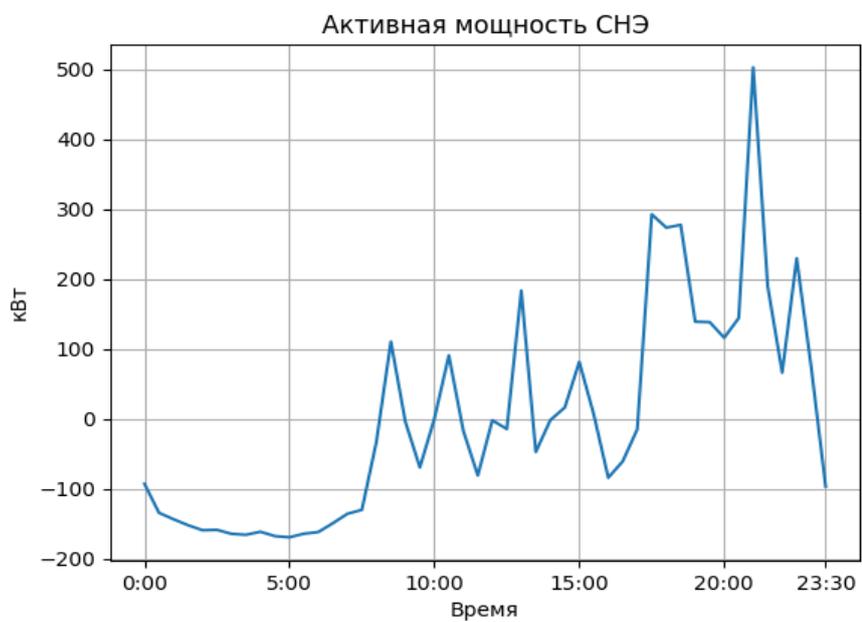


Рисунок 8.3 Узел - а34

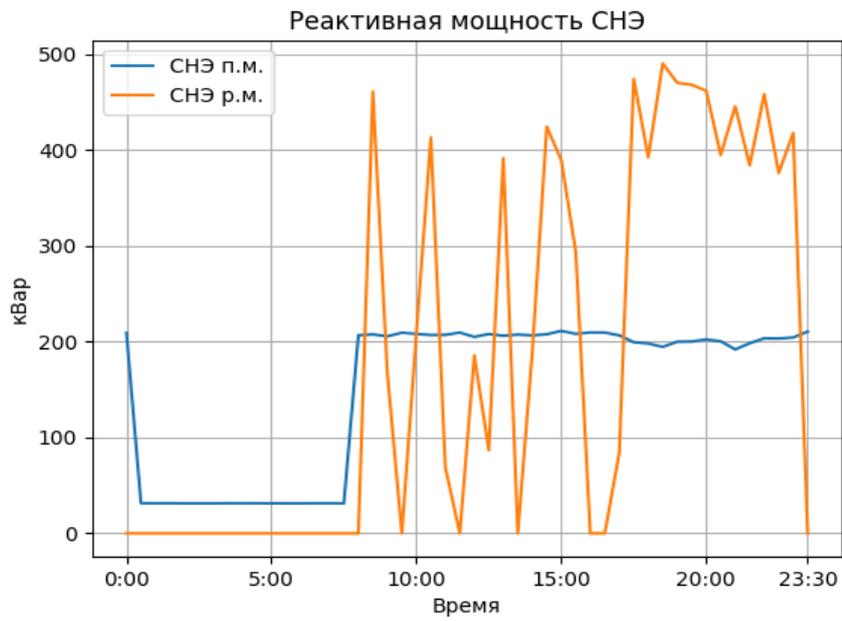


Рисунок 8.4 Узел - а34

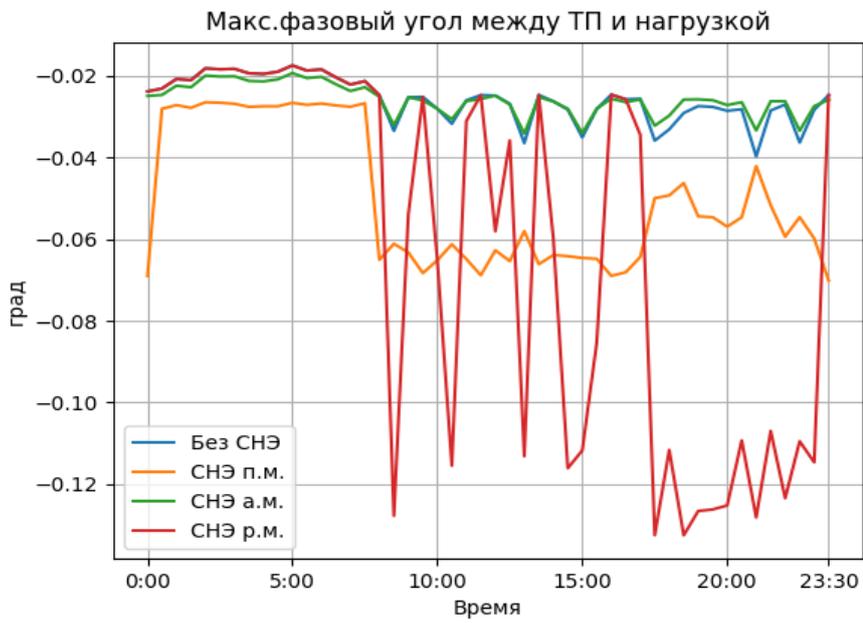


Рисунок 8.5 Узел - а34

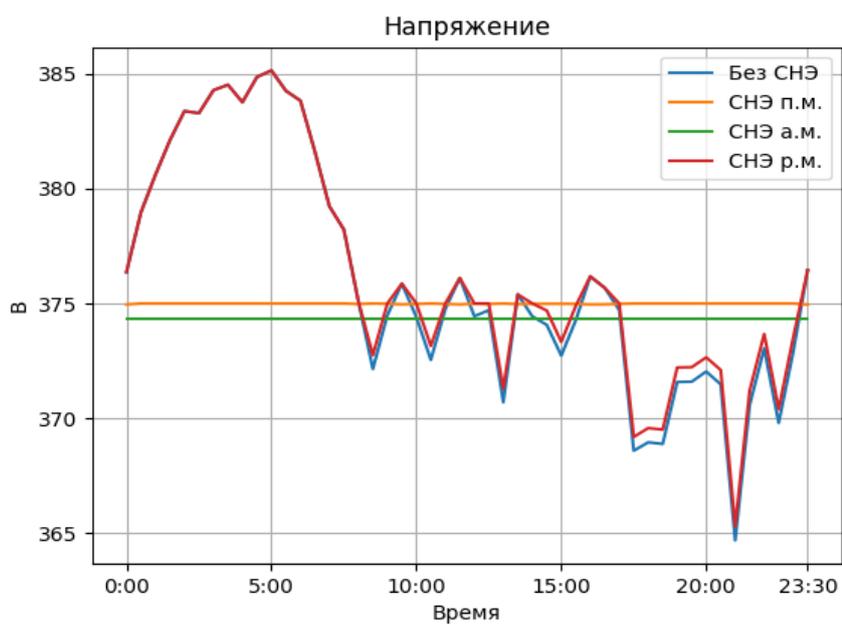


Рисунок 9.1 Узел - о12

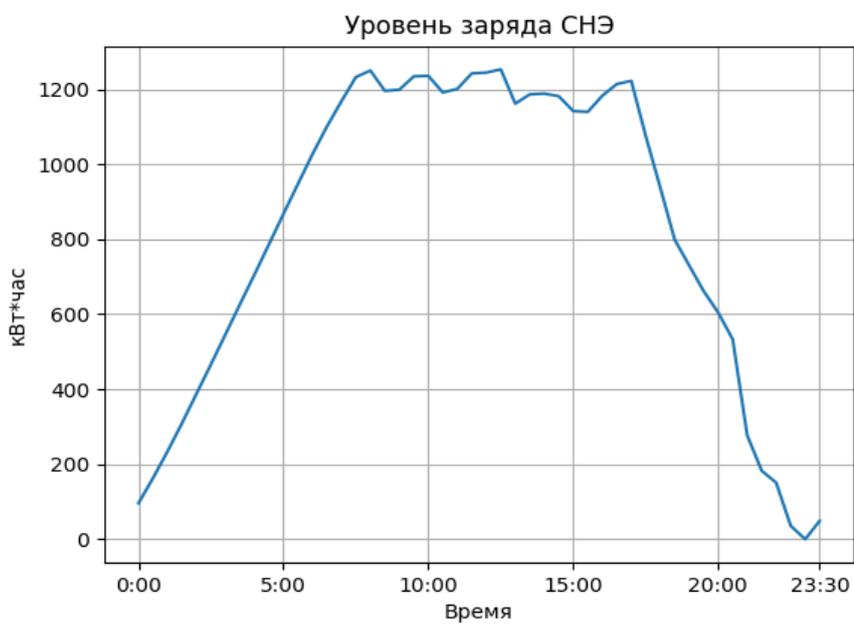


Рисунок 9.2 Узел - о12

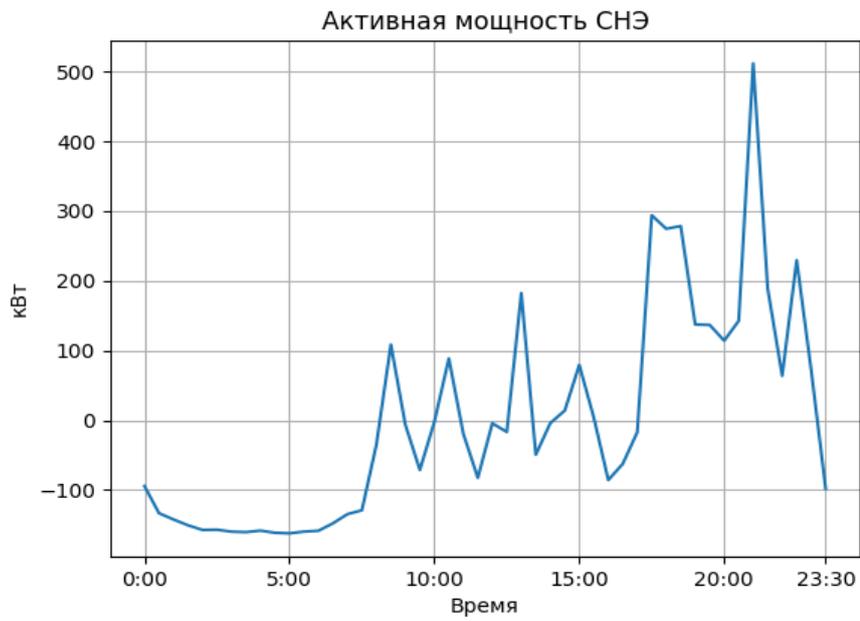


Рисунок 9.3 Узел - о12

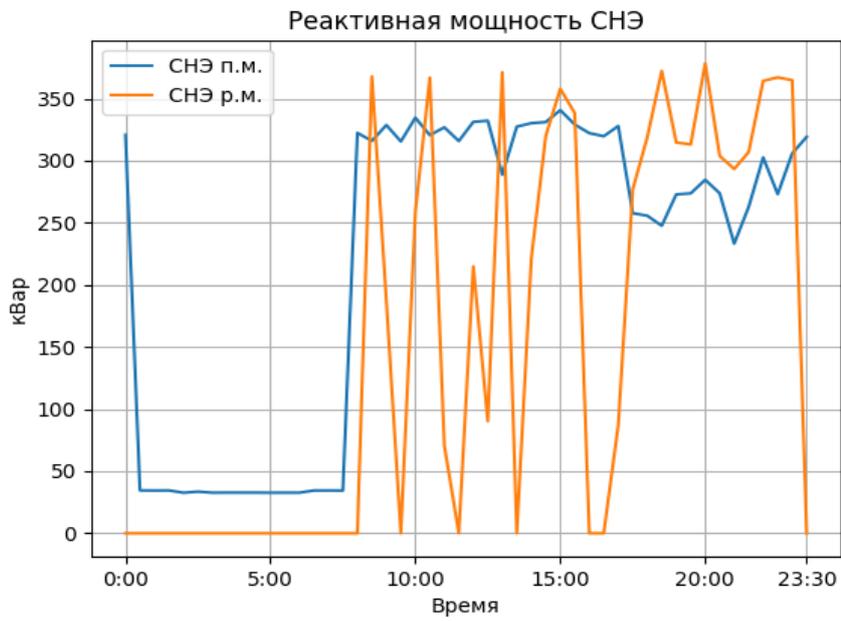


Рисунок 9.4 Узел - о12

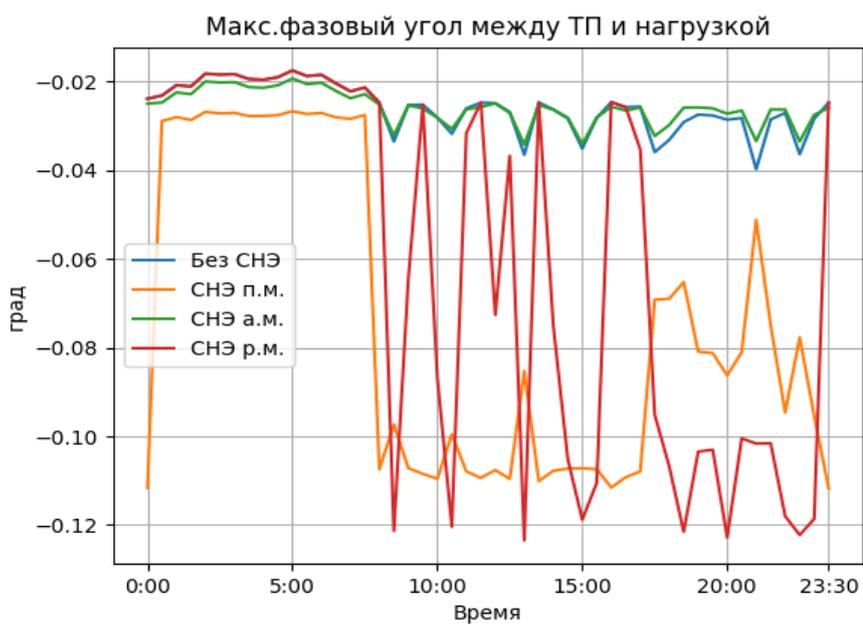


Рисунок 9.5 Узел - о12

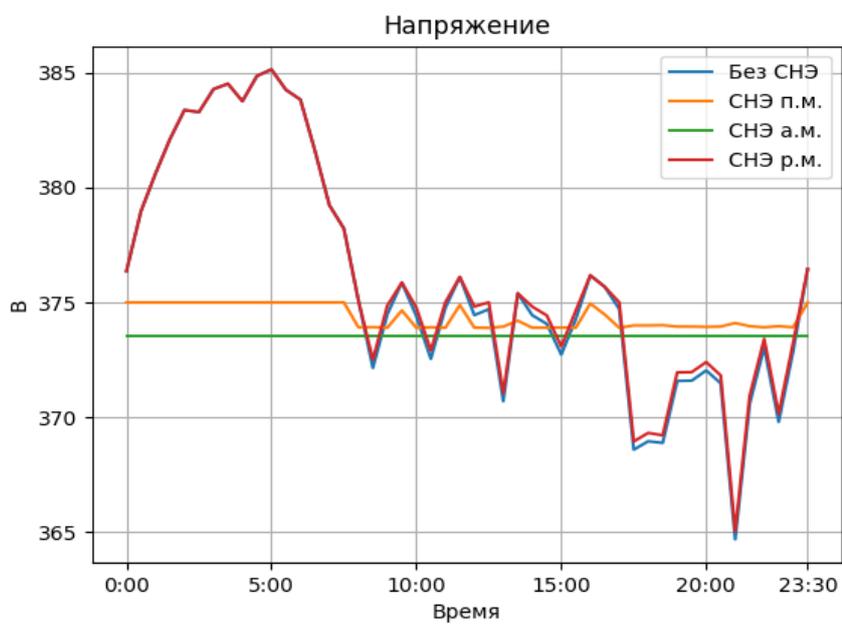


Рисунок 10.1 Узел - а36

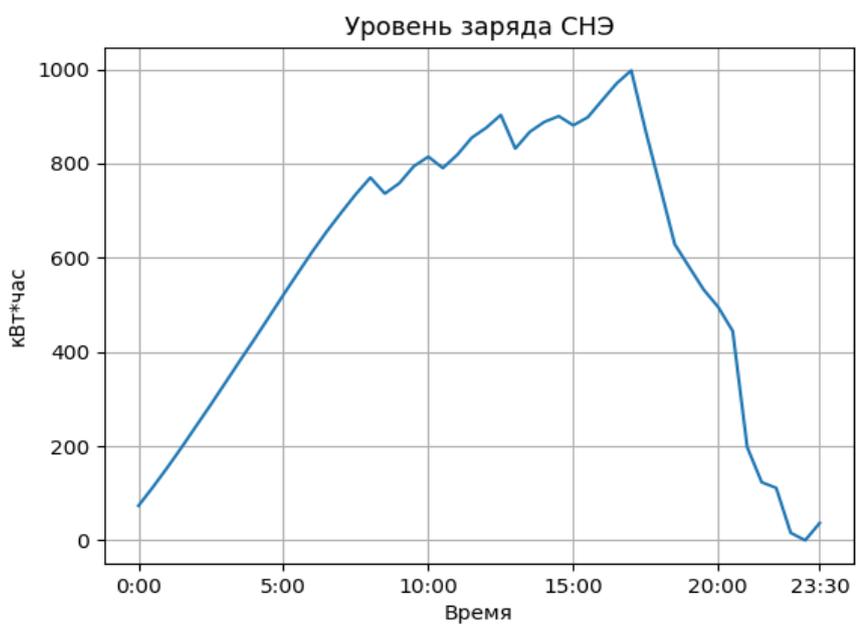


Рисунок 10.2 Узел - а36

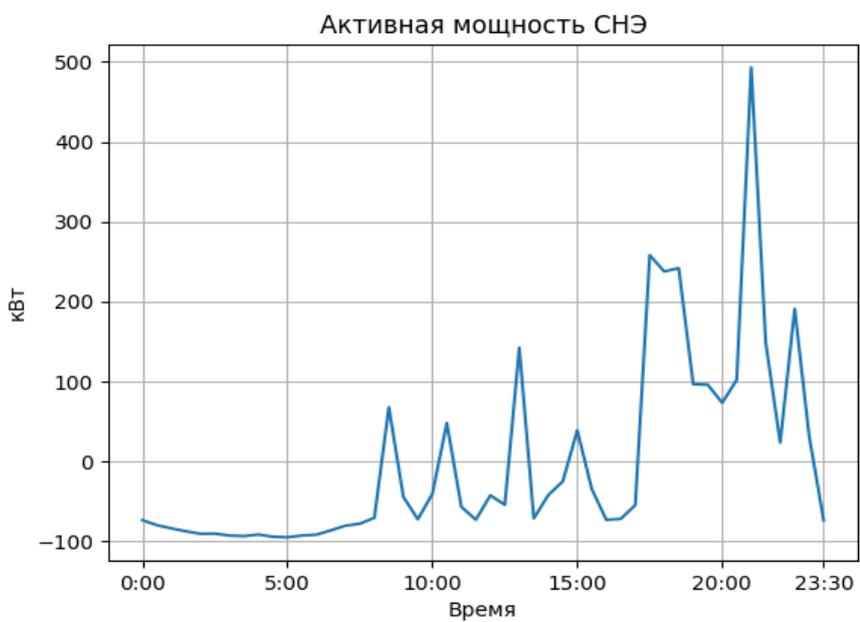


Рисунок 10.3 Узел - а36

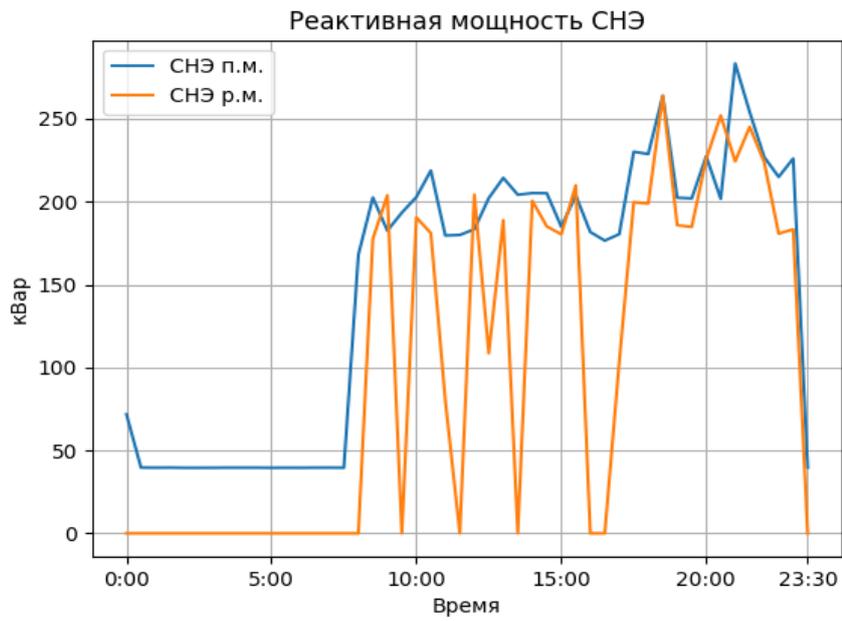


Рисунок 10.4 Узел - а36

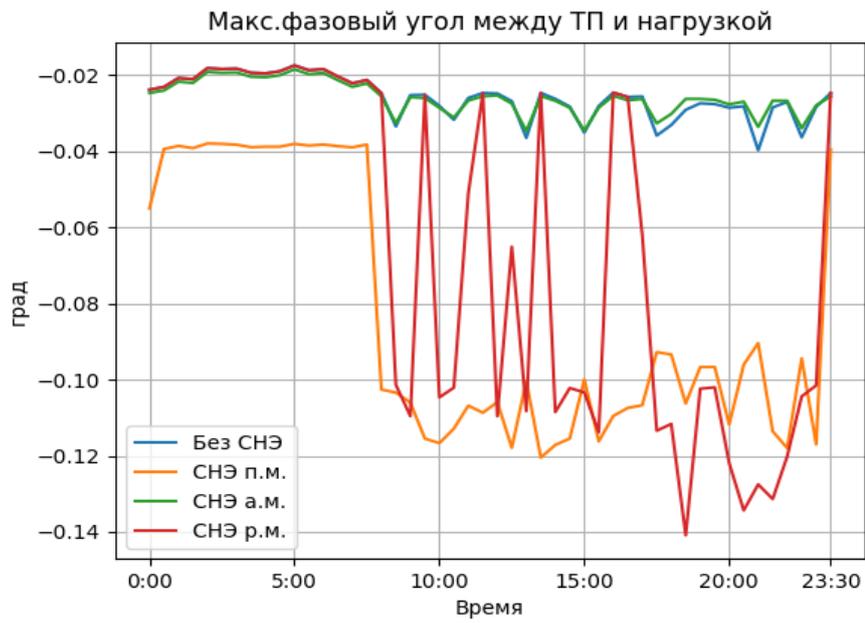


Рисунок 10.5 Узел - а36

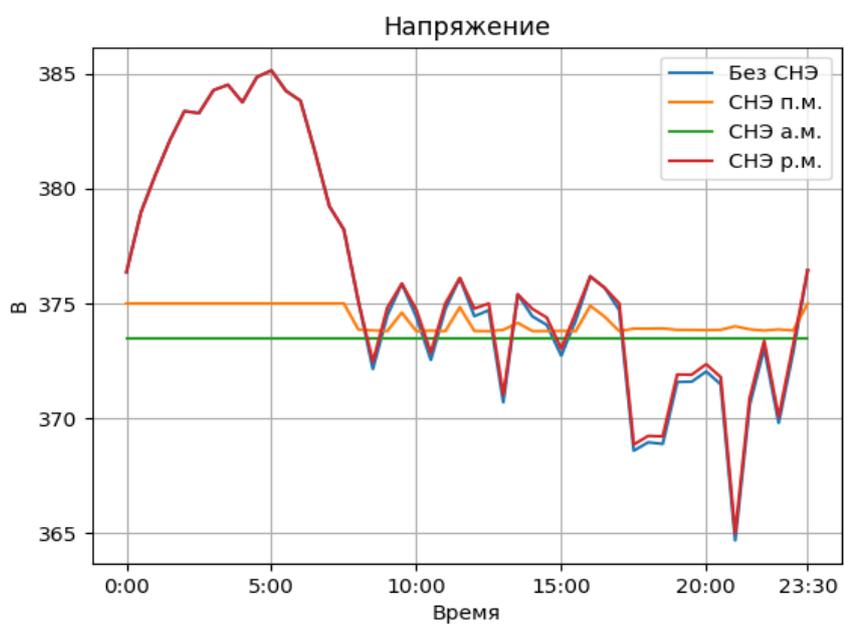


Рисунок 11.1 Узел - 013

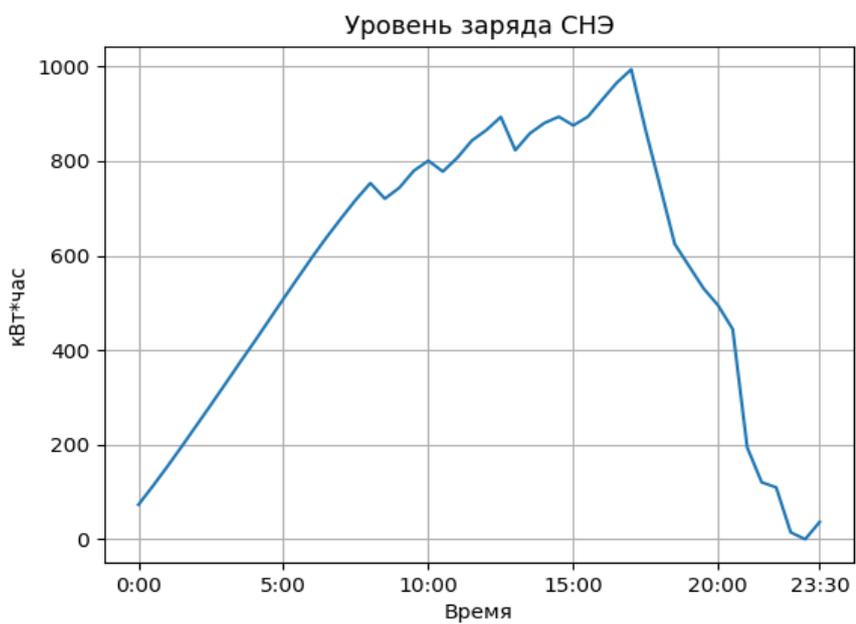


Рисунок 11.2 Узел - 013

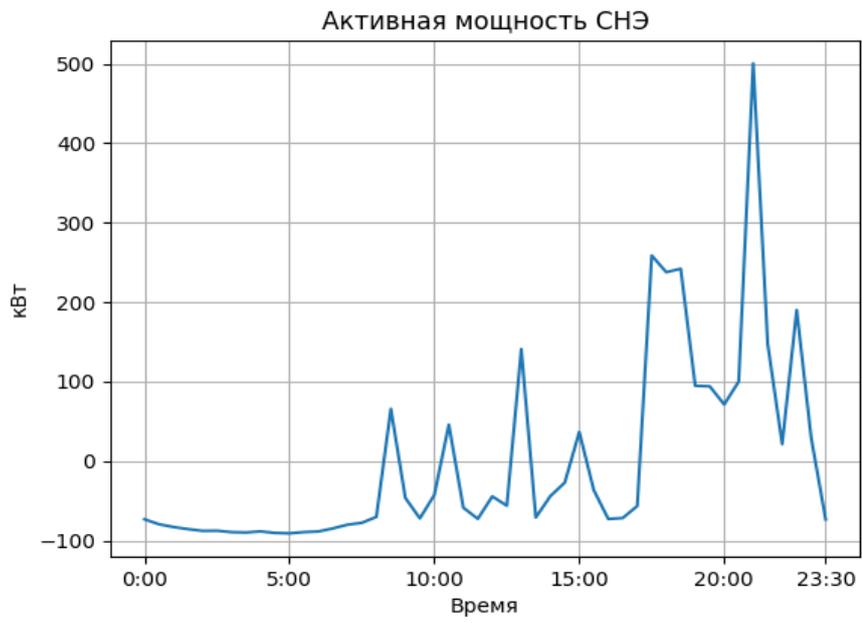


Рисунок 11.3 Узел - 013

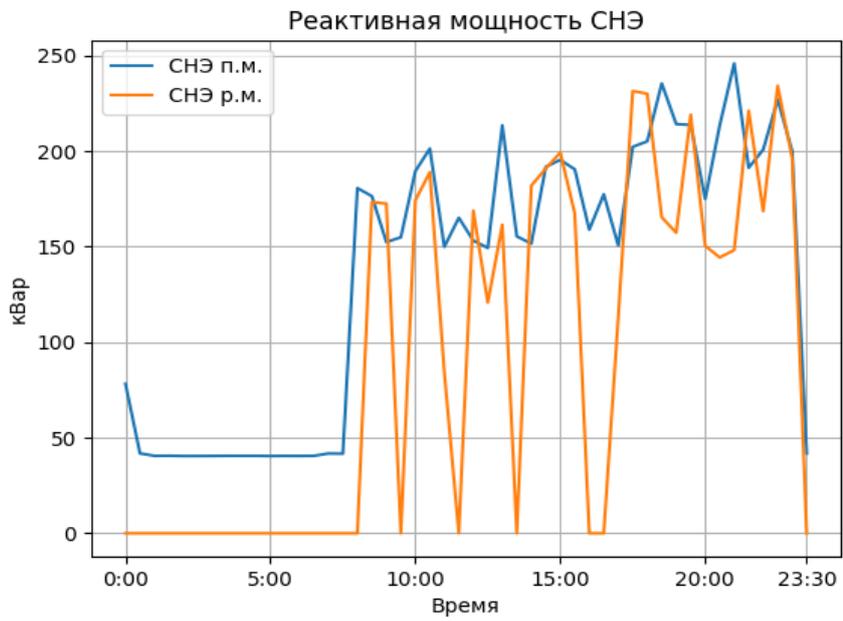


Рисунок 11.4 Узел - 013

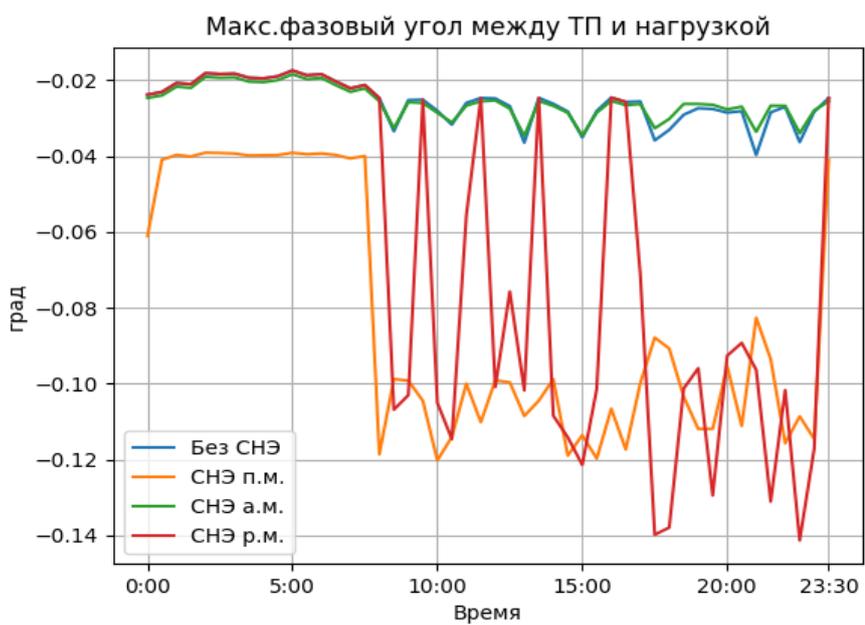


Рисунок 11.5 Узел - 013

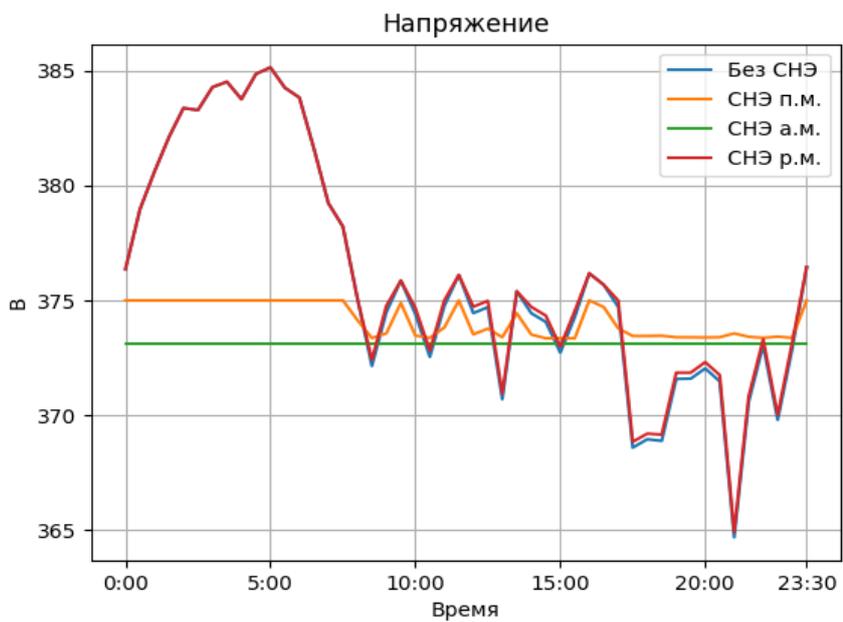


Рисунок 12.1 Узел - а37

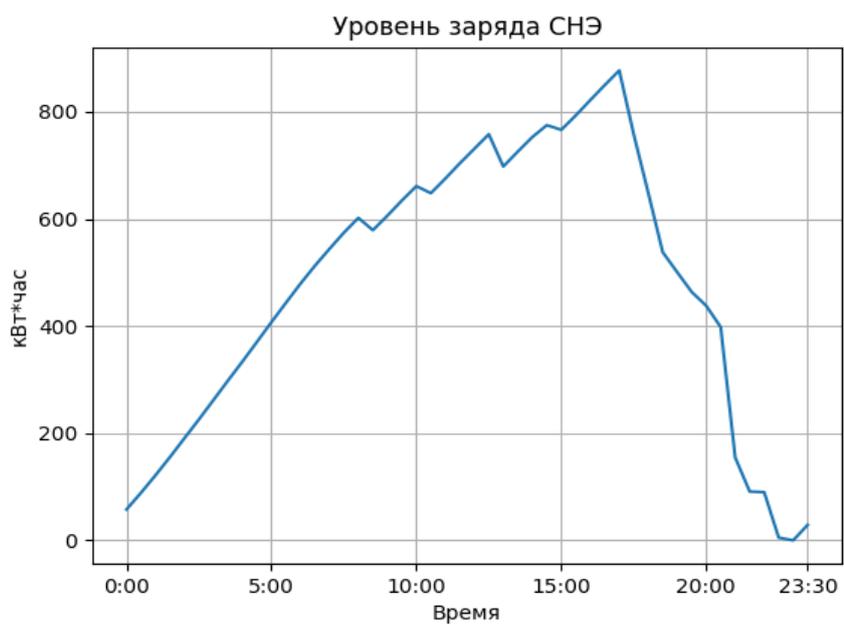


Рисунок 12.2 Узел - а37

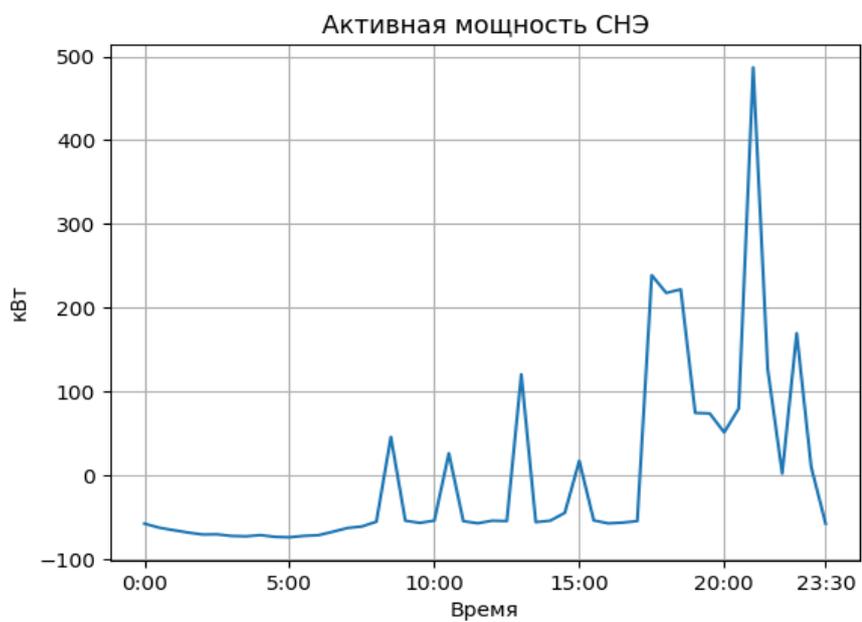


Рисунок 12.3 Узел - а37

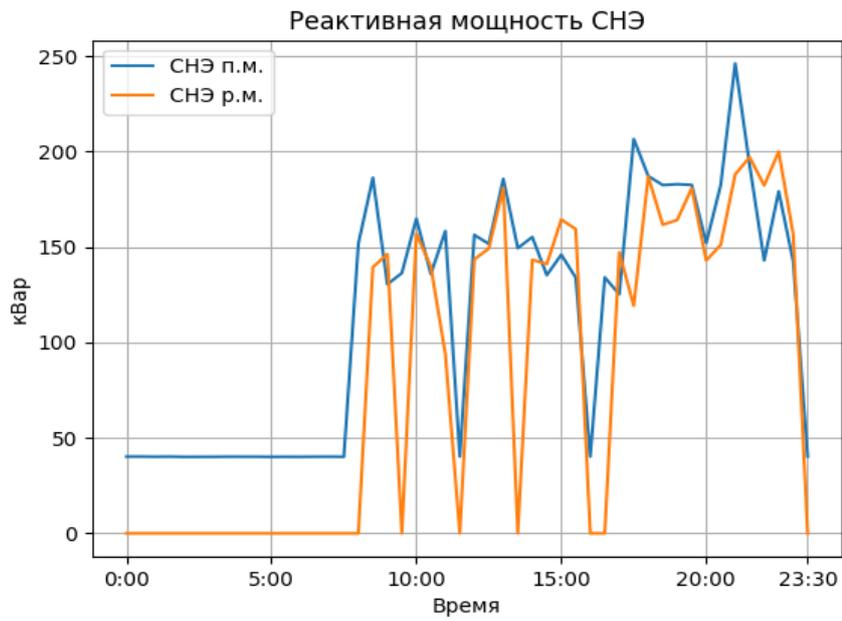


Рисунок 12.4 Узел - а37

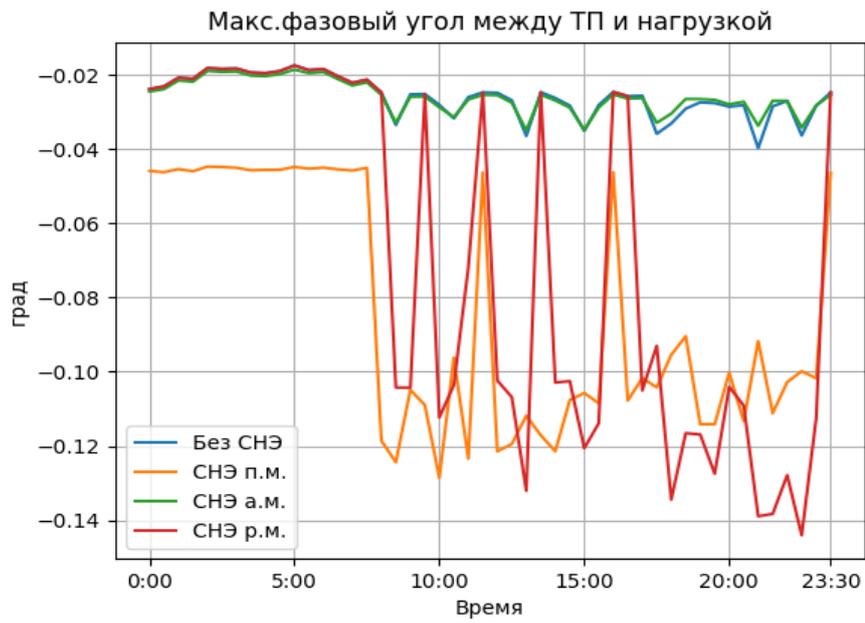


Рисунок 12.5 Узел - а37

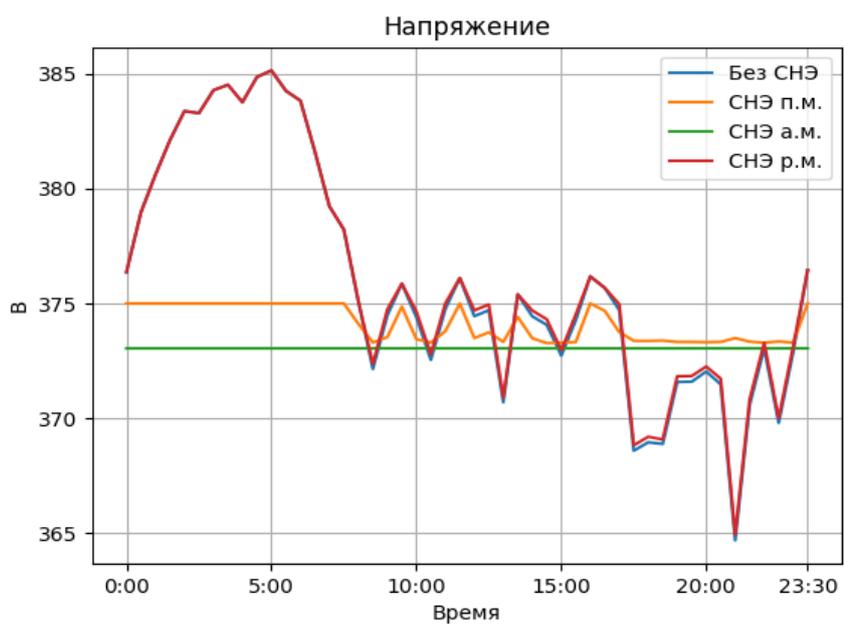


Рисунок 13.1 Узел - 014

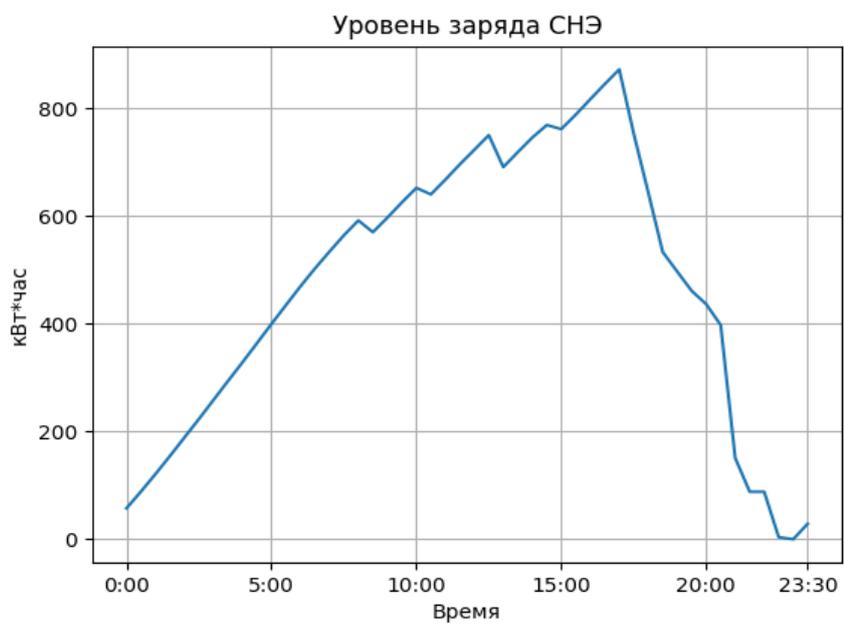


Рисунок 13.2 Узел - 014

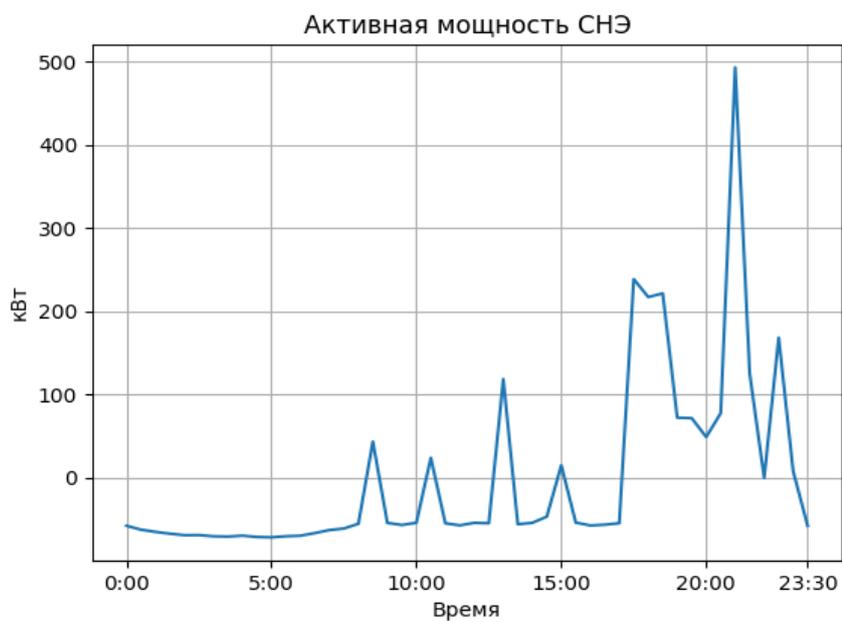


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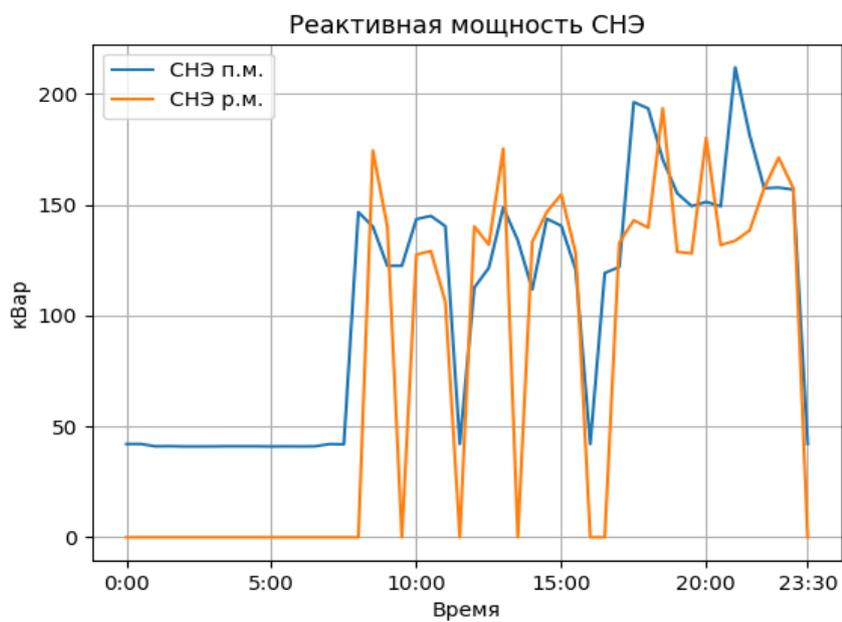


Рисунок 13.4 Узел - 014

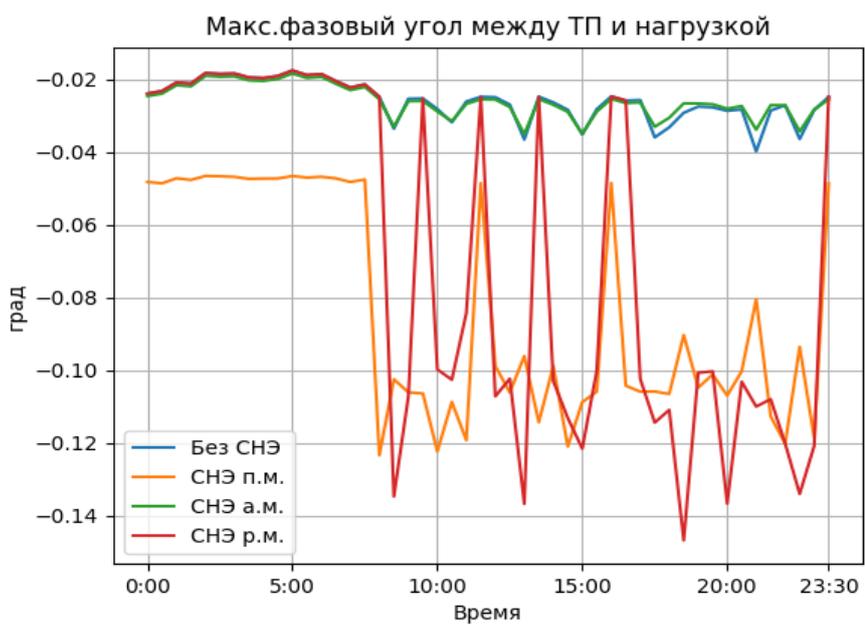


Рисунок 13.5 Узел - о14

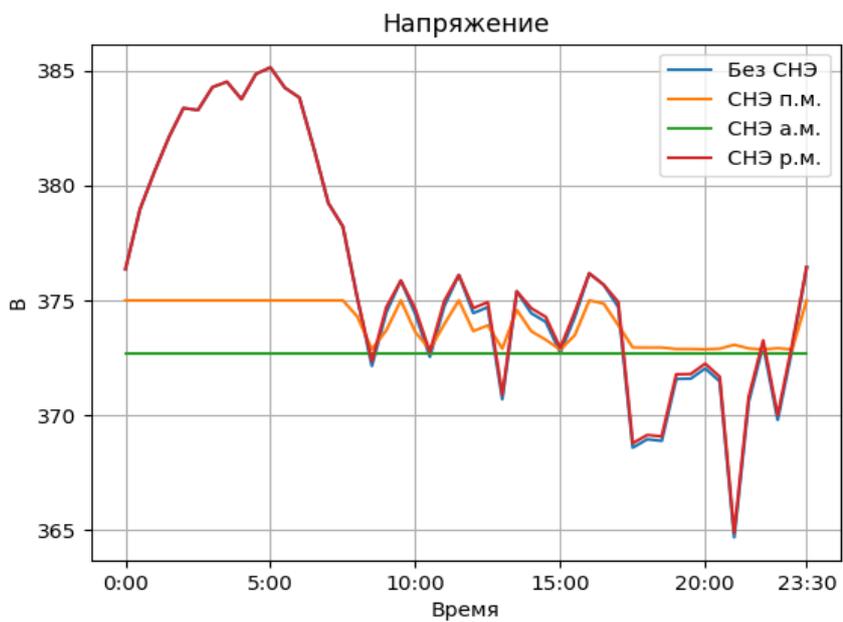


Рисунок 14.1 Узел - а38

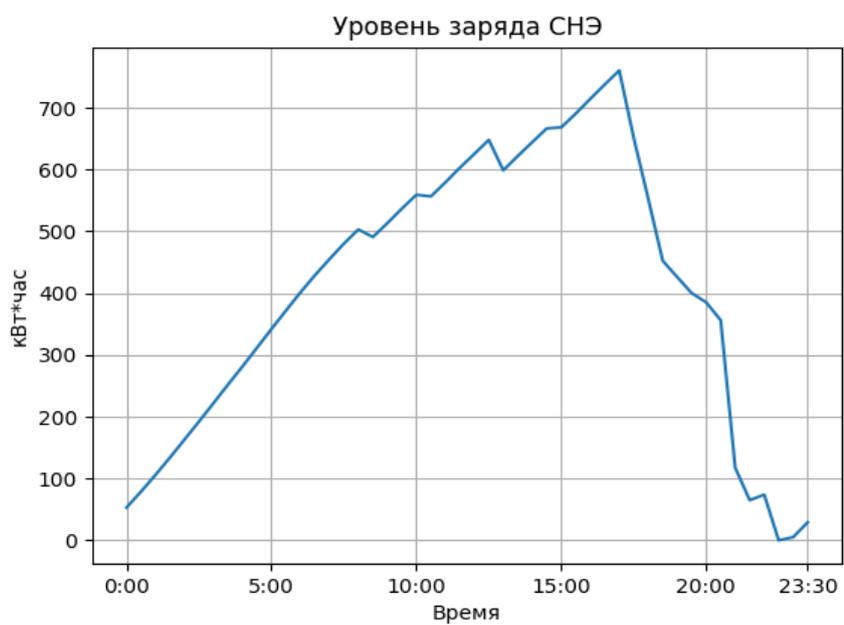


Рисунок 14.2 Узел - а38

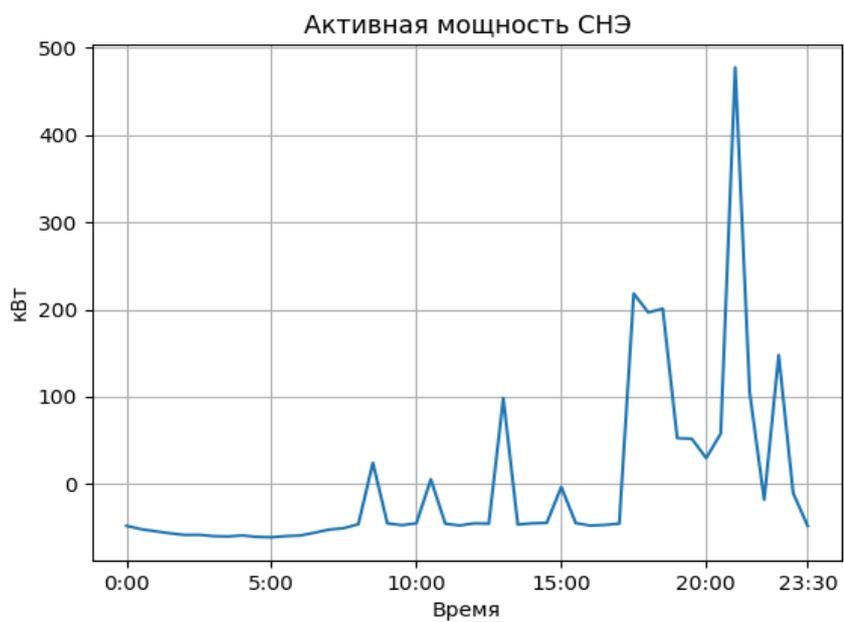


Рисунок 14.3 Узел - а38

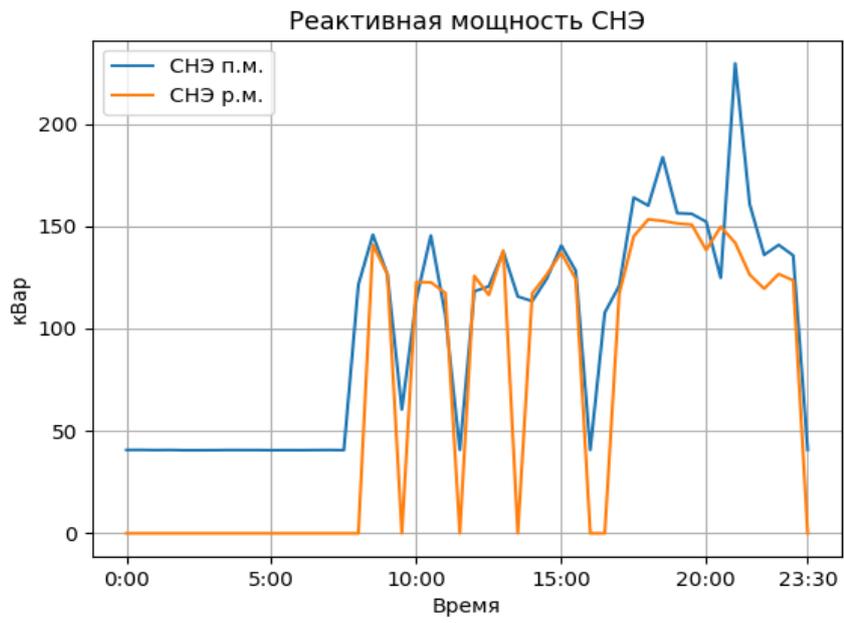


Рисунок 14.4 Узел - а38

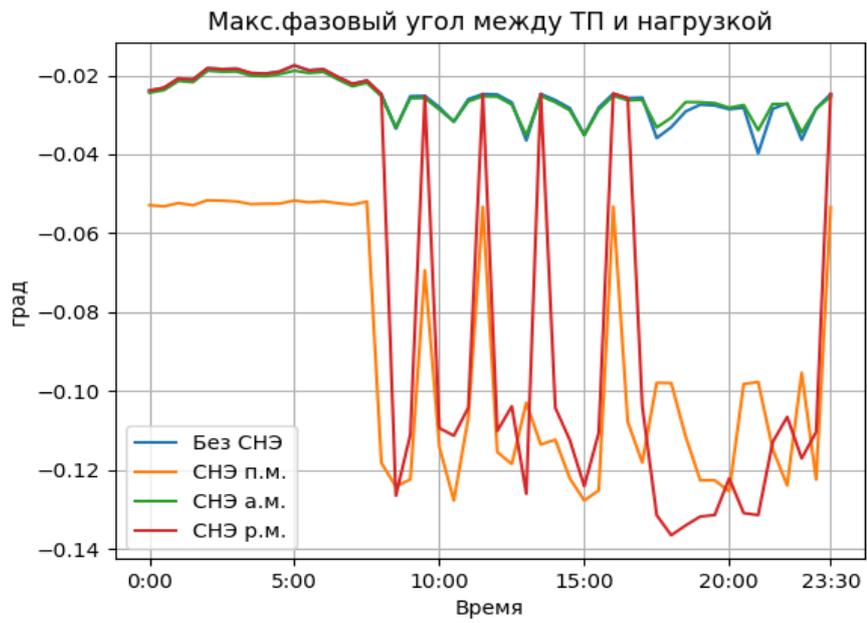


Рисунок 14.5 Узел - а38

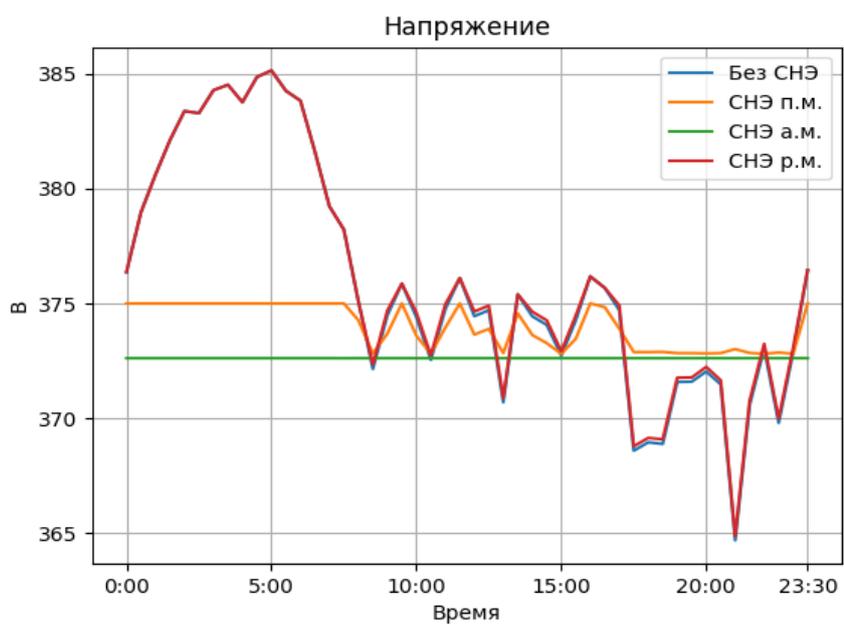


Рисунок 15.1 Узел - 016

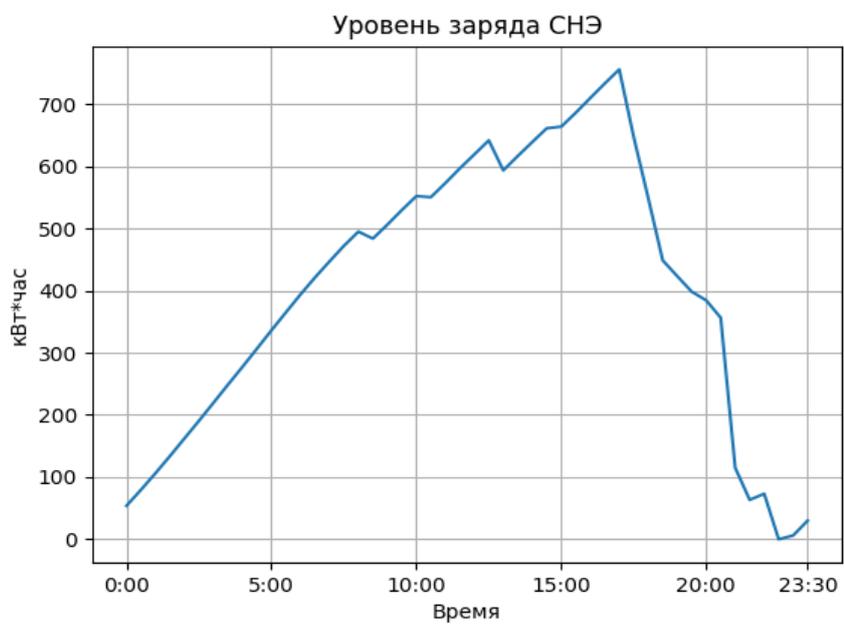


Рисунок 15.2 Узел - 016

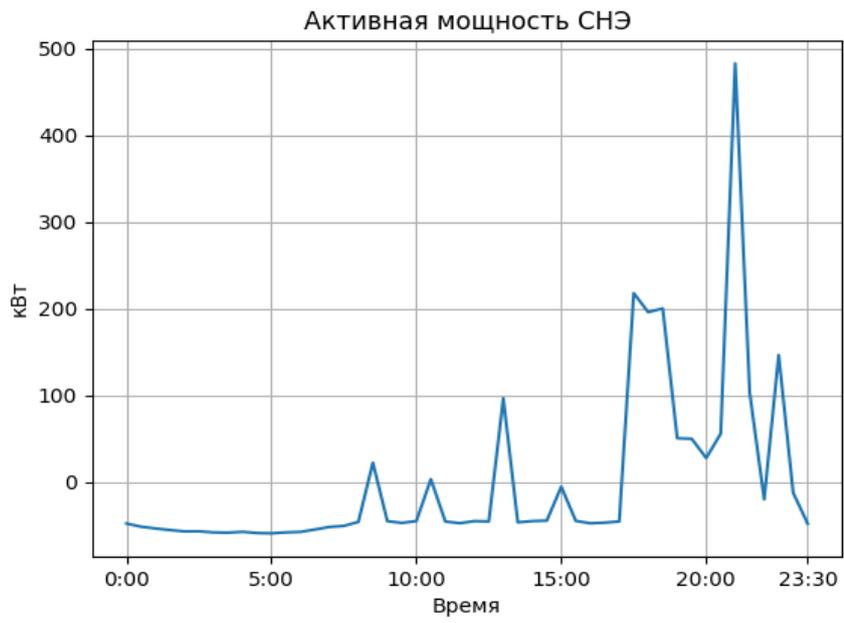


Рисунок 15.3 Узел - 016

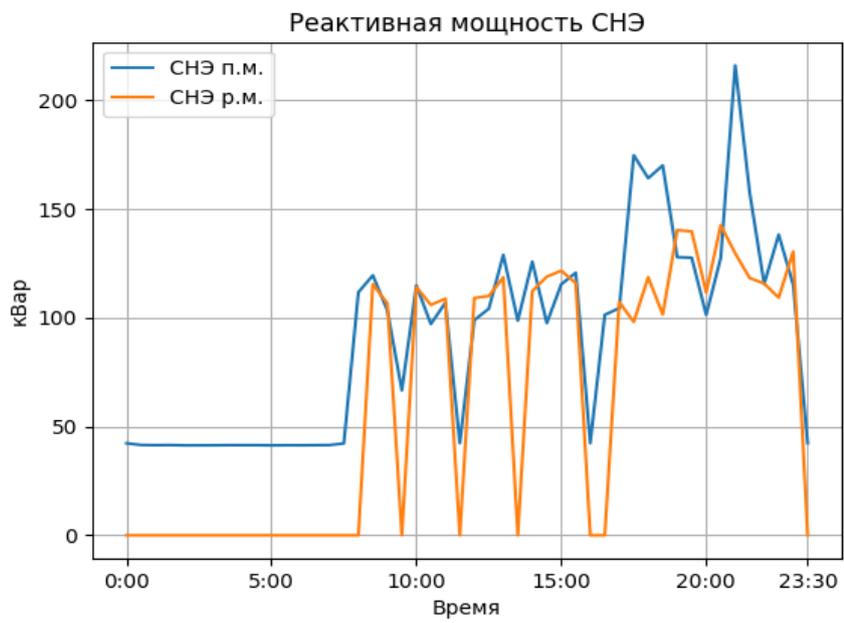


Рисунок 15.4 Узел - 016

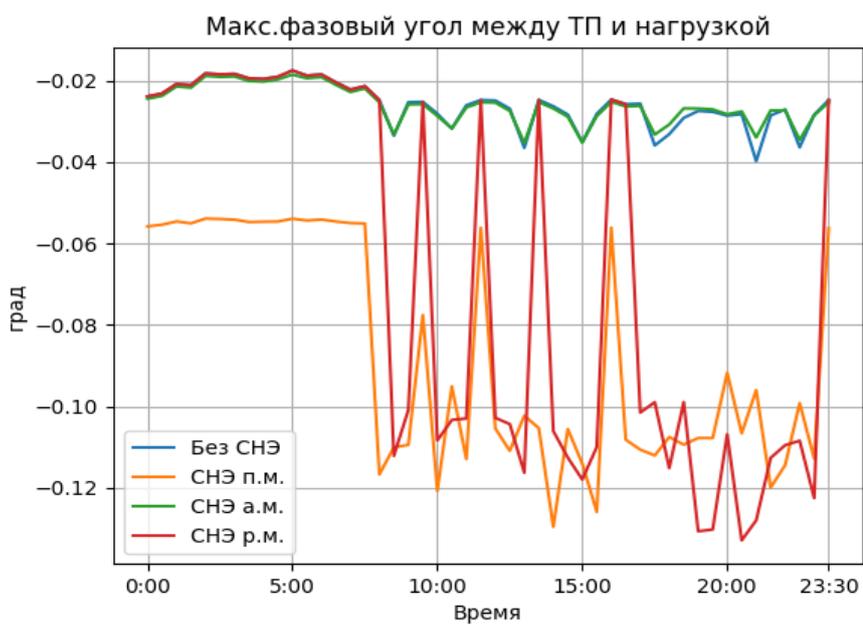


Рисунок 15.5 Узел - о16

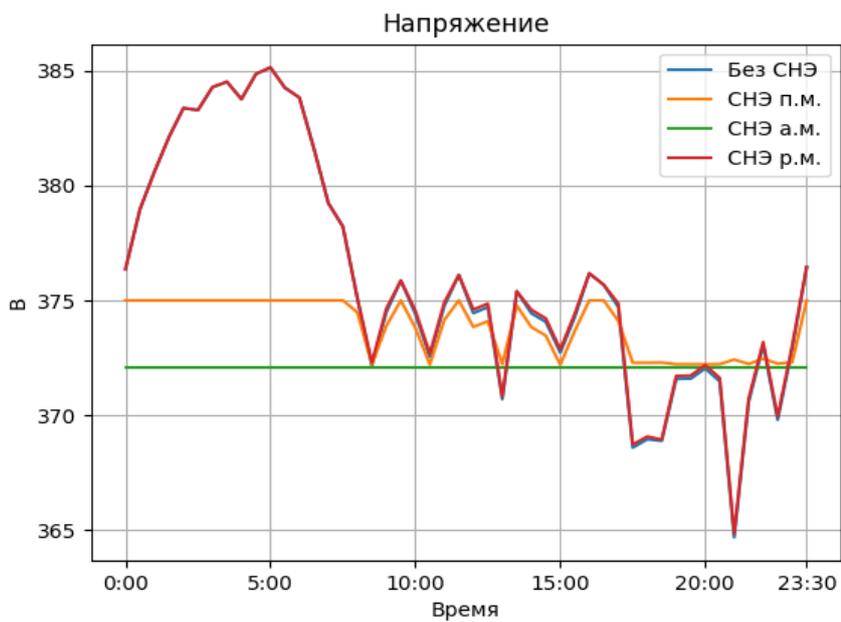


Рисунок 16.1 Узел - а39



Рисунок 16.2 Узел - а39

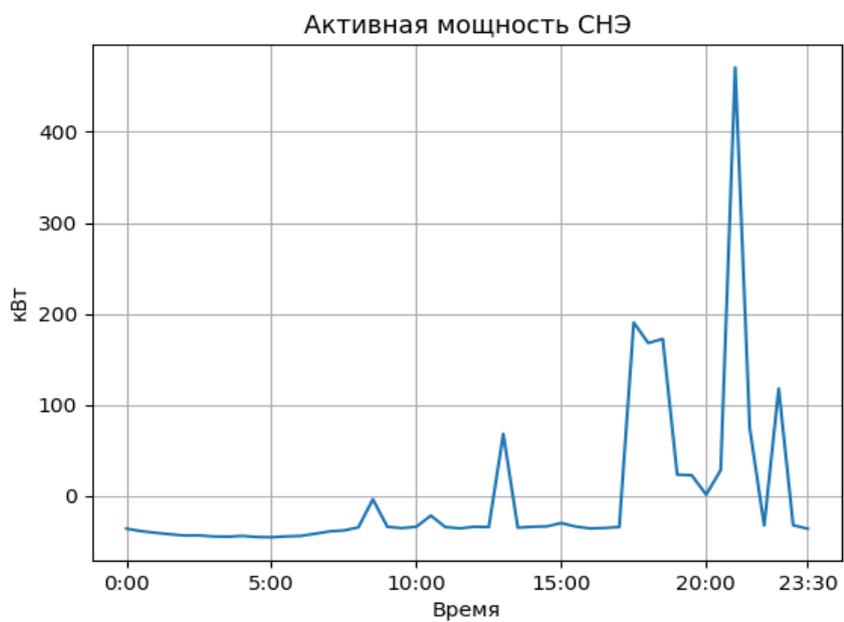


Рисунок 16.3 Узел - а39

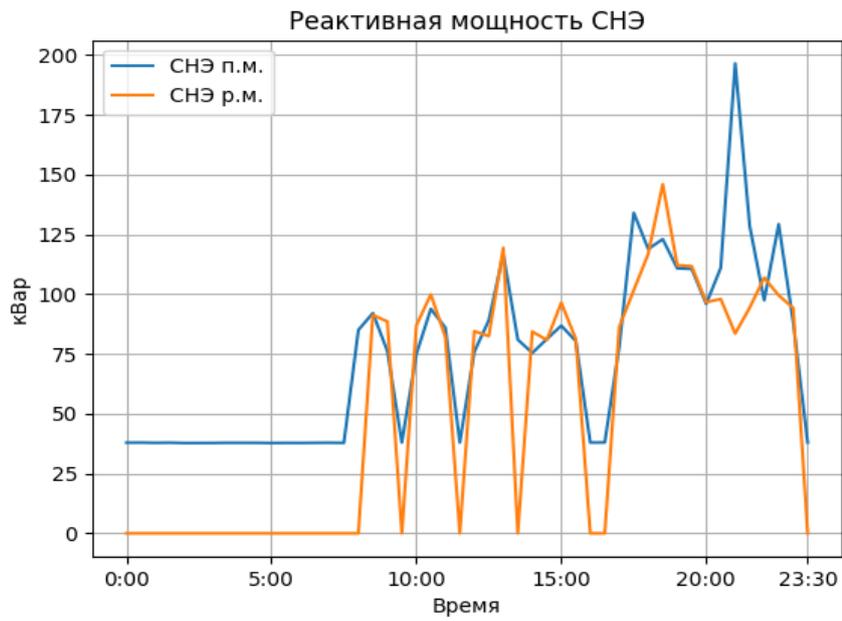


Рисунок 16.4 Узел - а39

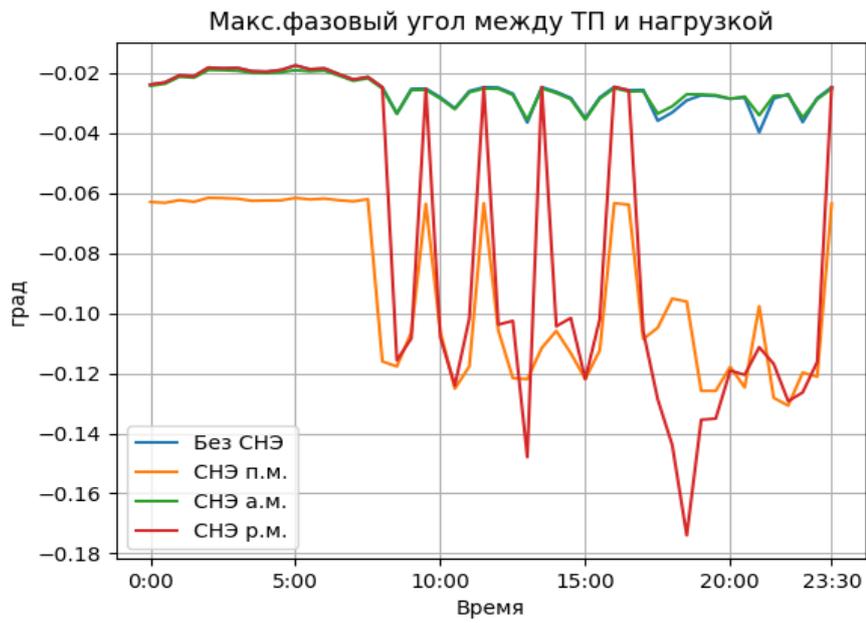


Рисунок 16.5 Узел - а39

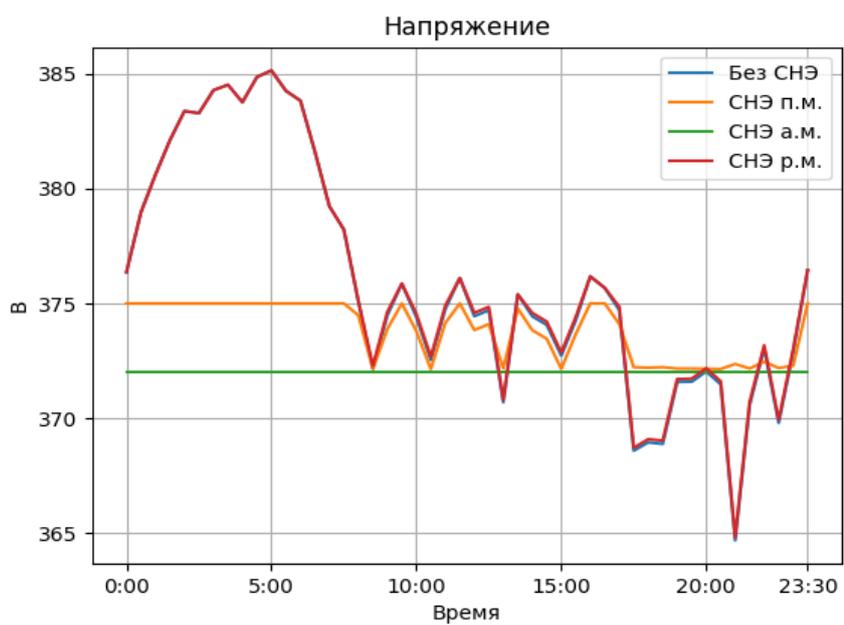


Рисунок 17.1 Узел - 019

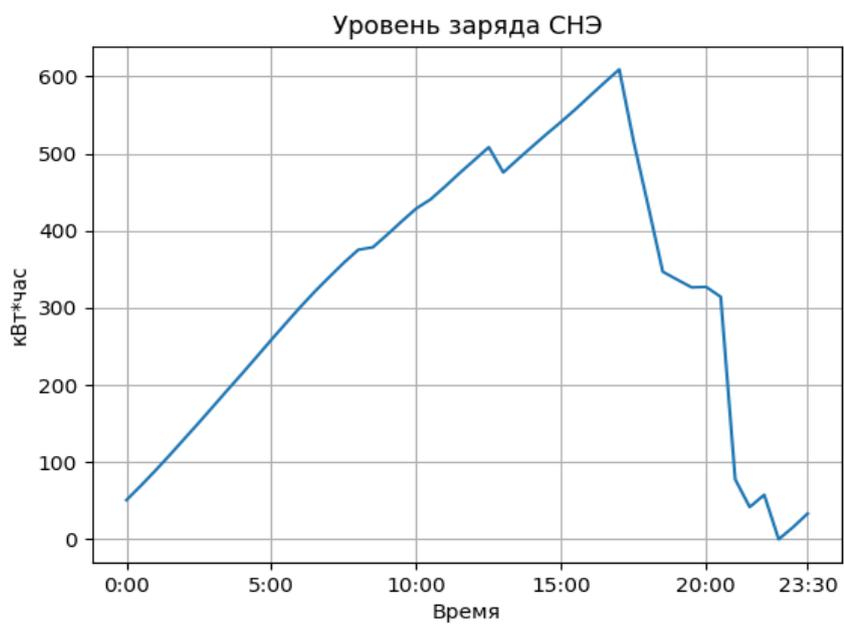


Рисунок 17.2 Узел - 019

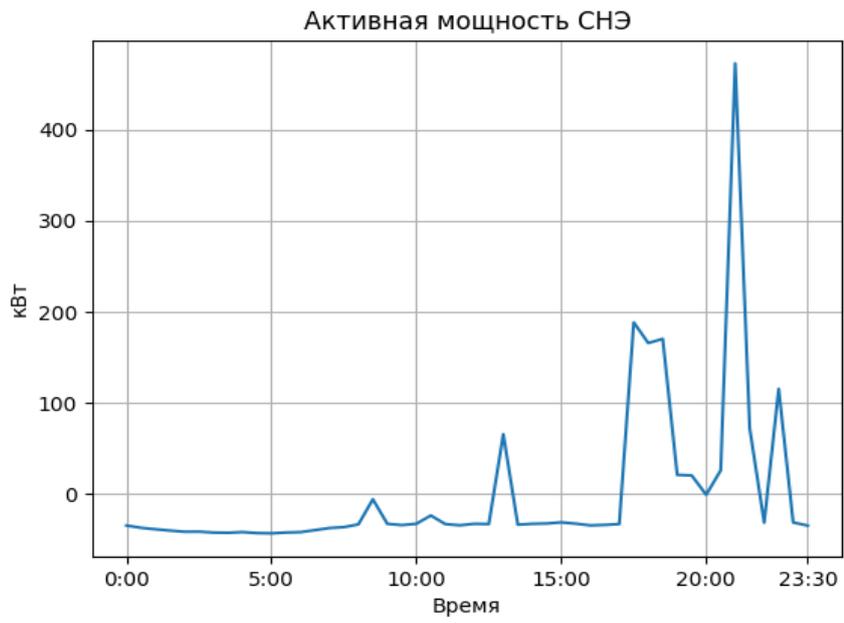


Рисунок 17.3 Узел - 019

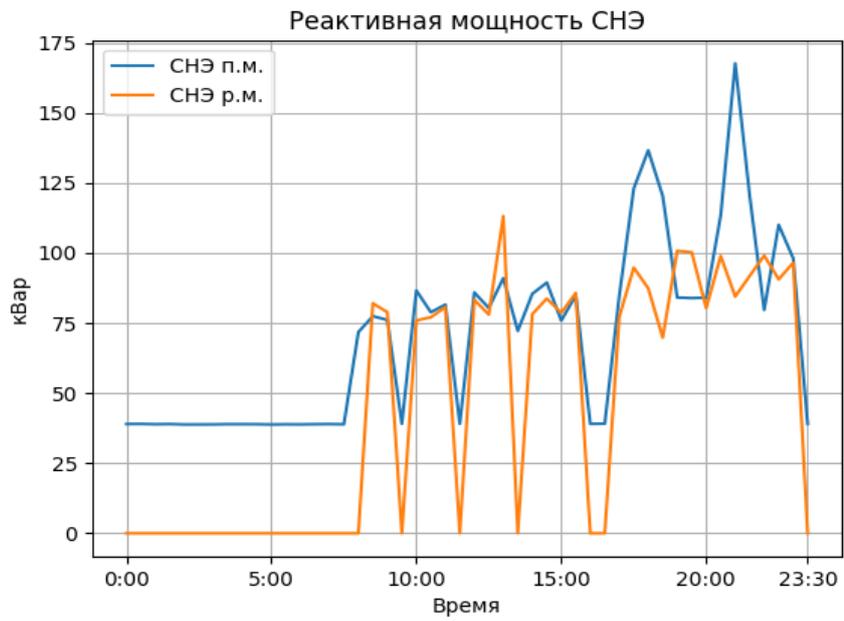


Рисунок 17.4 Узел - 019

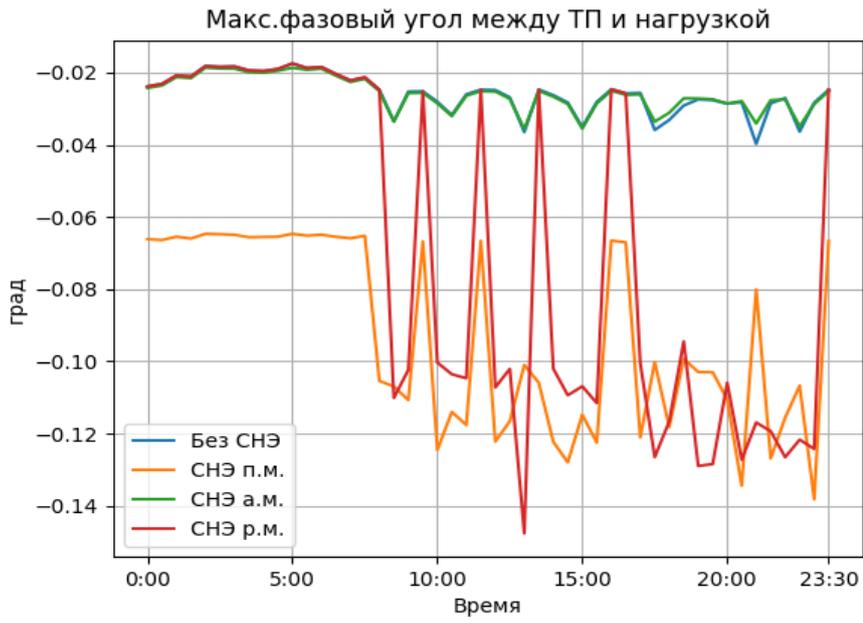


Рисунок 17.5 Узел - о19

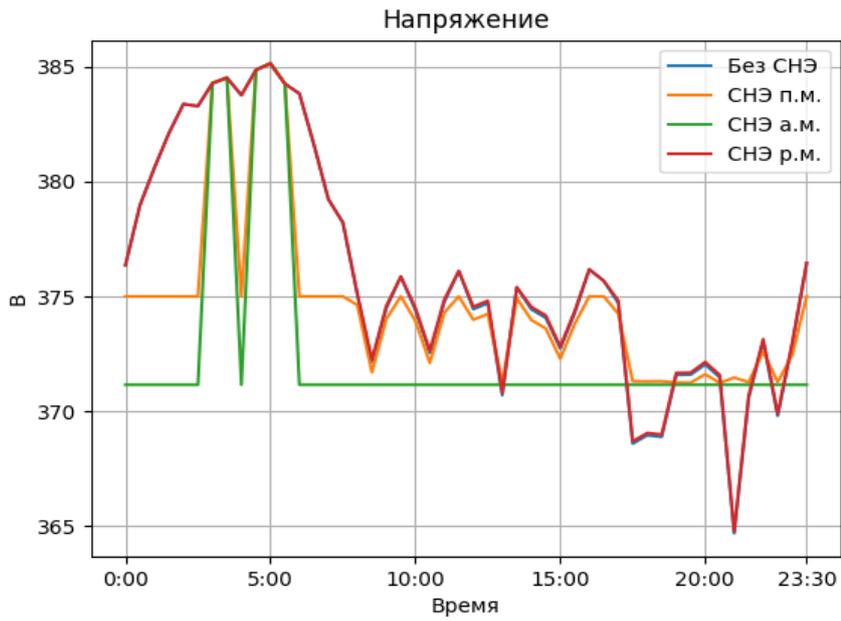


Рисунок 18.1 Узел - а40



Рисунок 18.2 Узел - а40

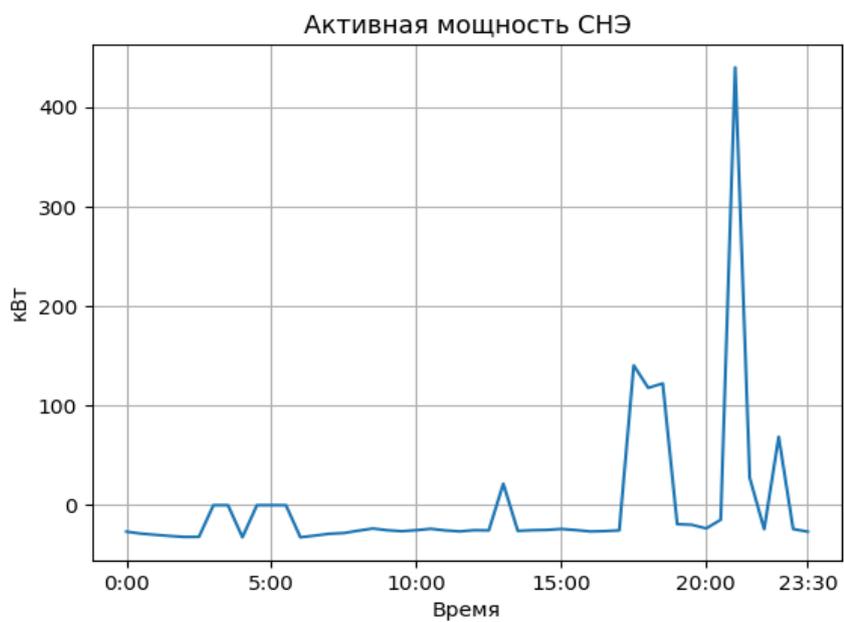


Рисунок 18.3 Узел - а40

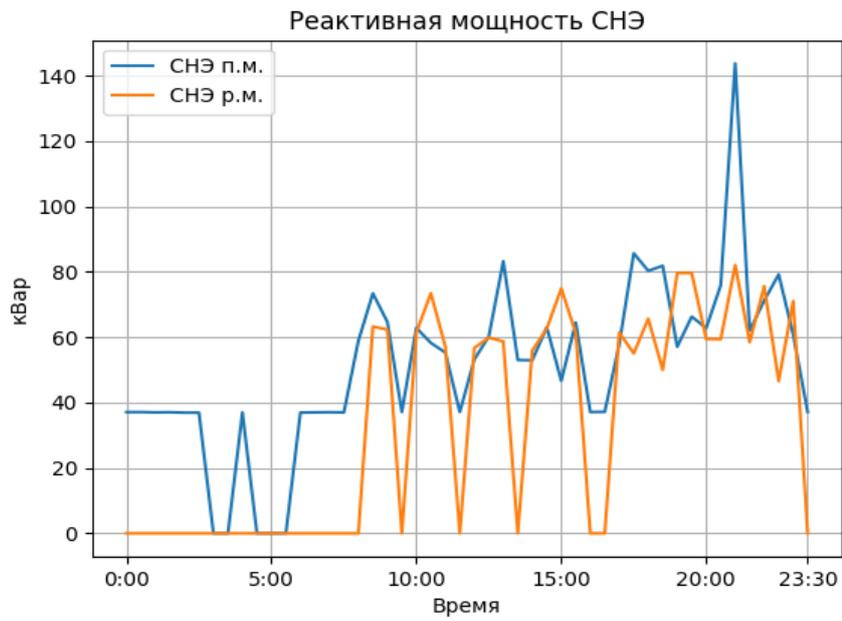


Рисунок 18.4 Узел - а40

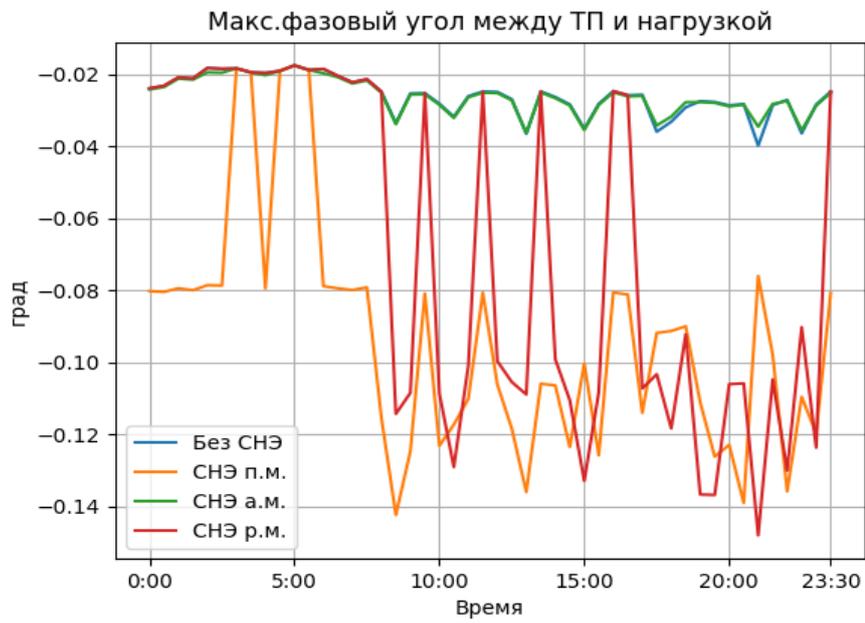


Рисунок 18.5 Узел - а40

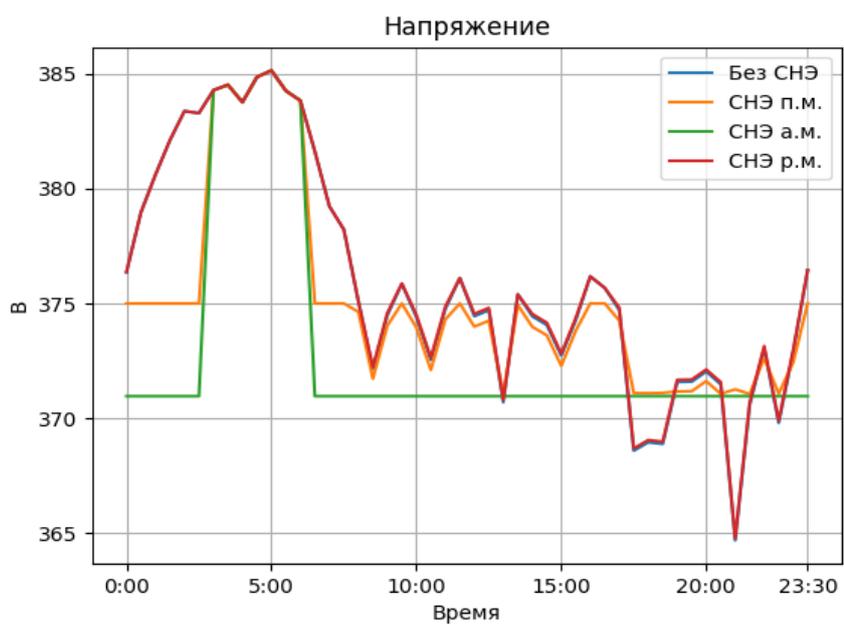


Рисунок 19.1 Узел - о1-1

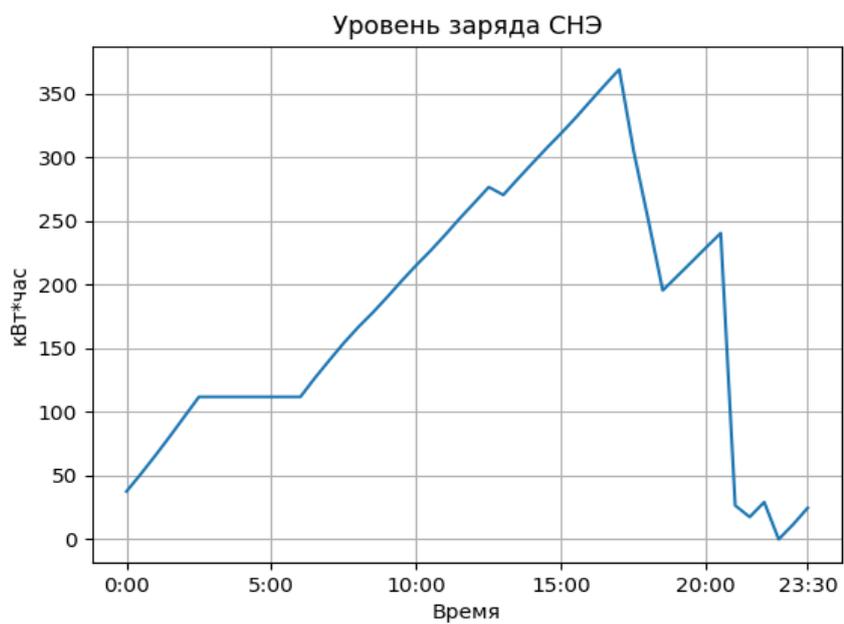


Рисунок 19.2 Узел - о1-1

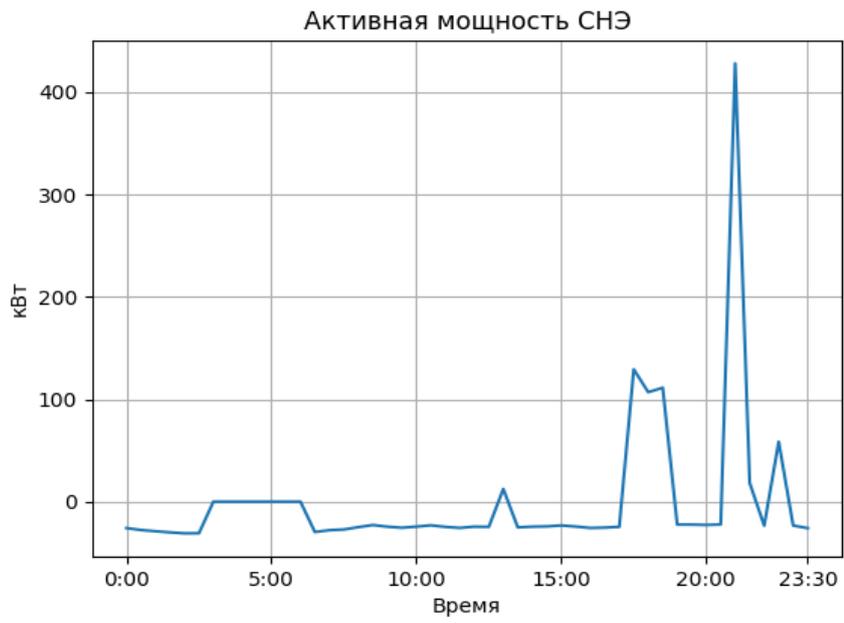


Рисунок 19.3 Узел - о1-1

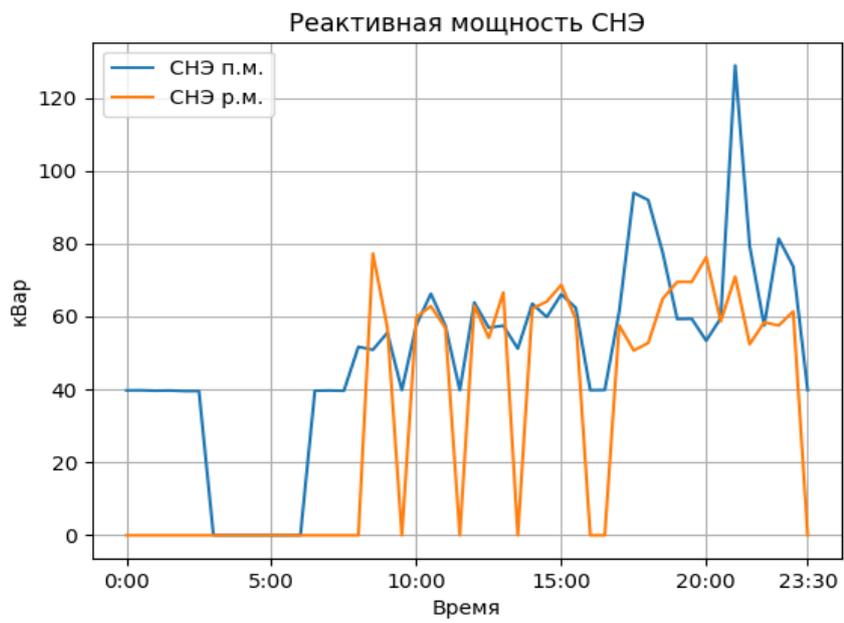


Рисунок 19.4 Узел - о1-1

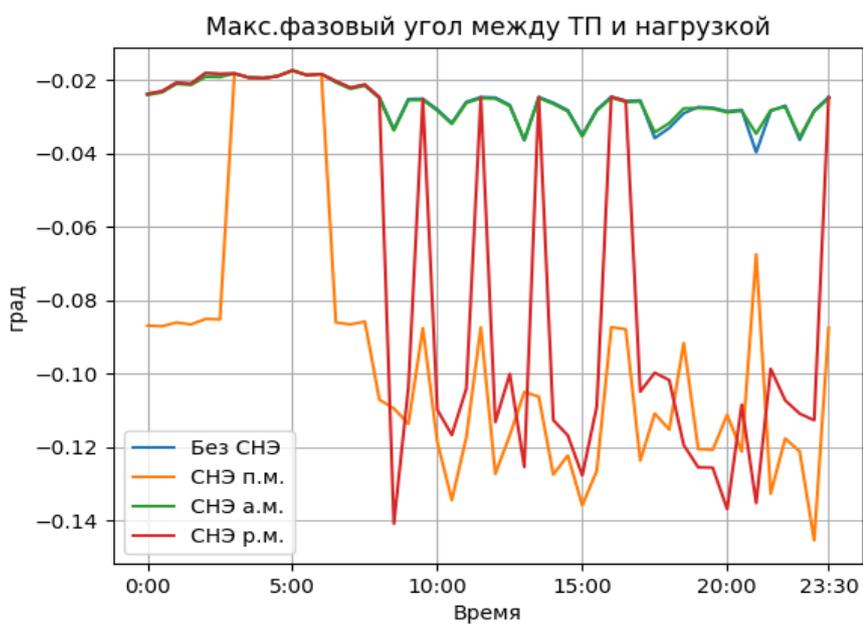


Рисунок 19.5 Узел - о1-1

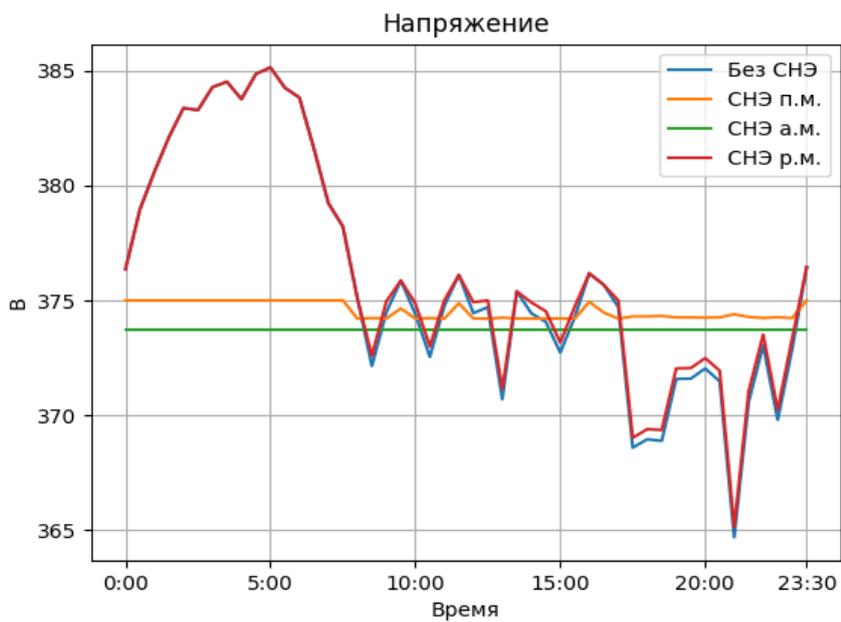


Рисунок 20.1 Узел - а41

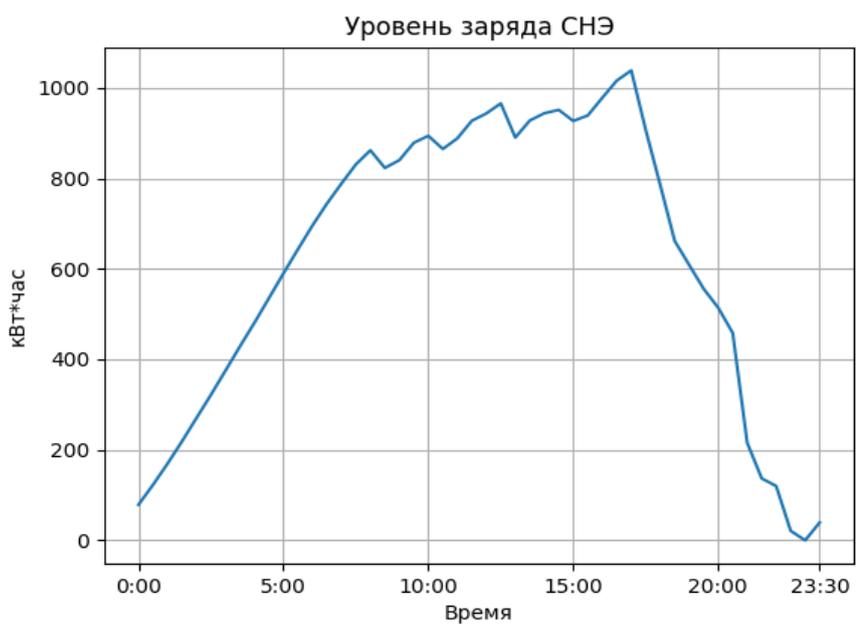


Рисунок 20.2 Узел - а41

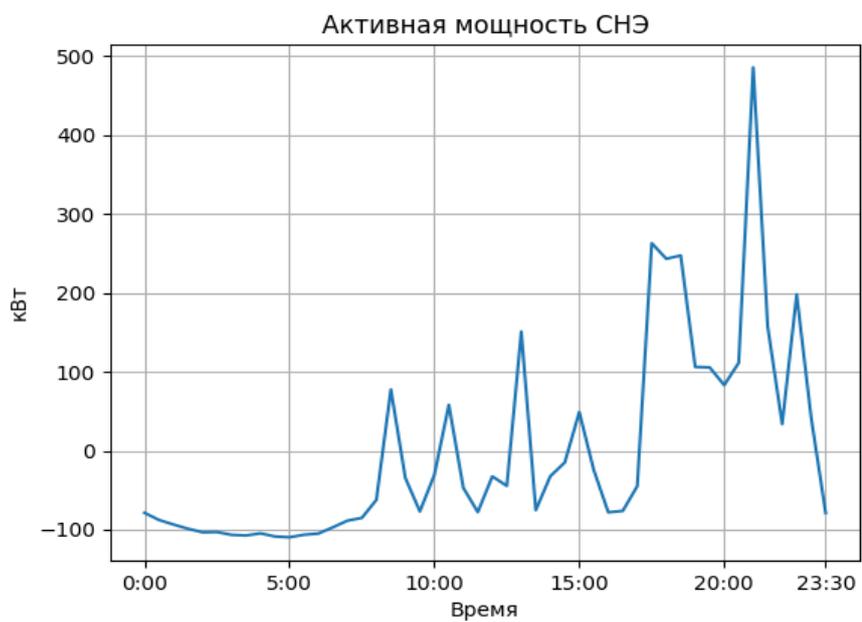


Рисунок 20.3 Узел - а41

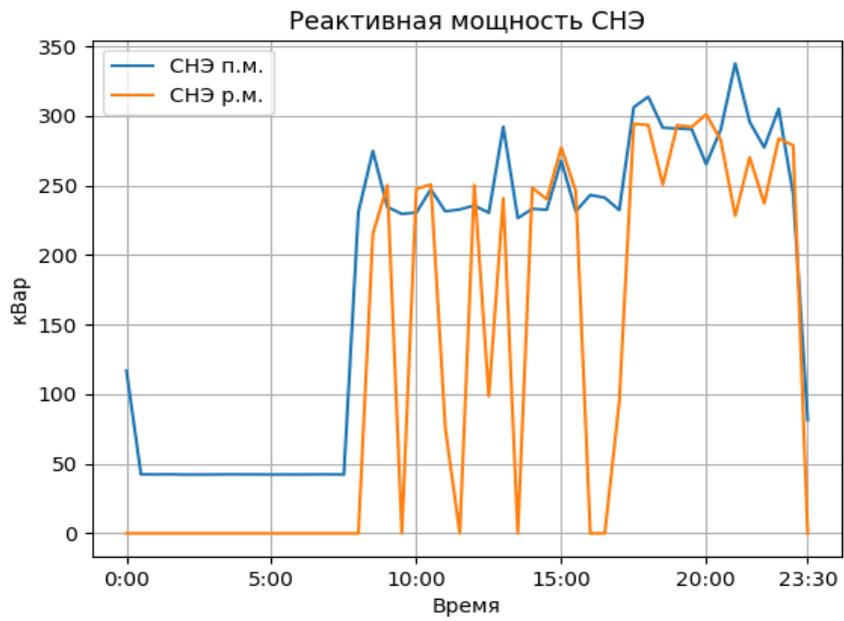


Рисунок 20.4 Узел - а41

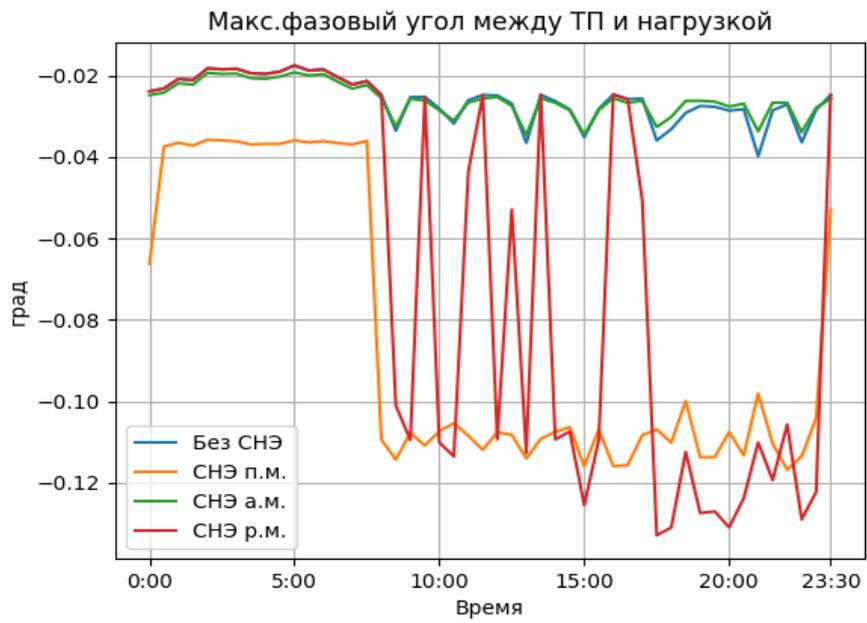


Рисунок 20.5 Узел - а41

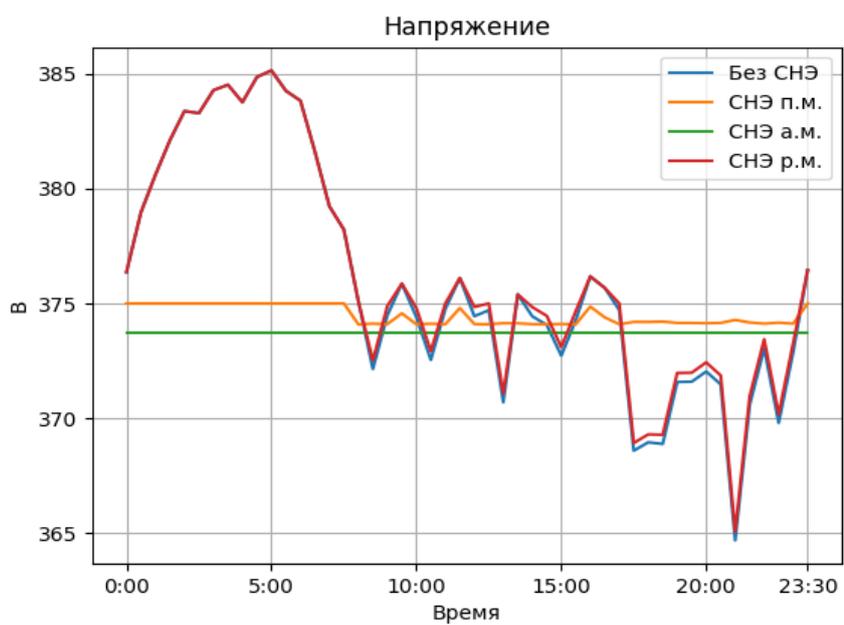


Рисунок 21.1 Узел - а42

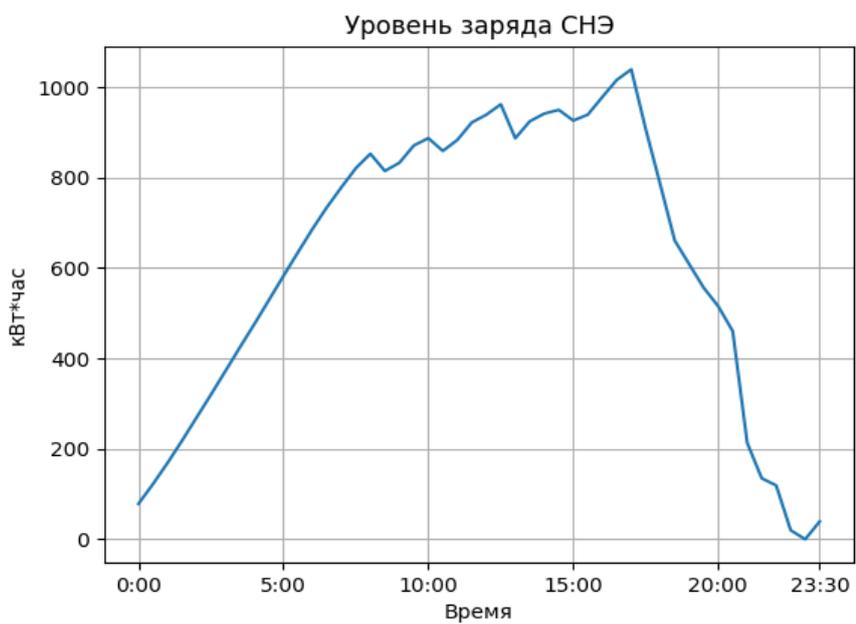


Рисунок 21.2 Узел - а42

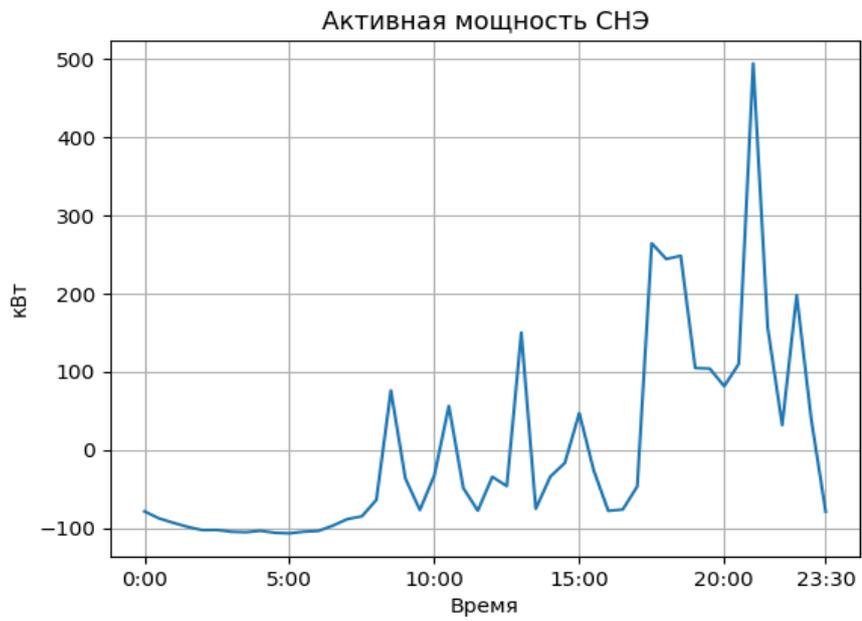


Рисунок 21.3 Узел - а42

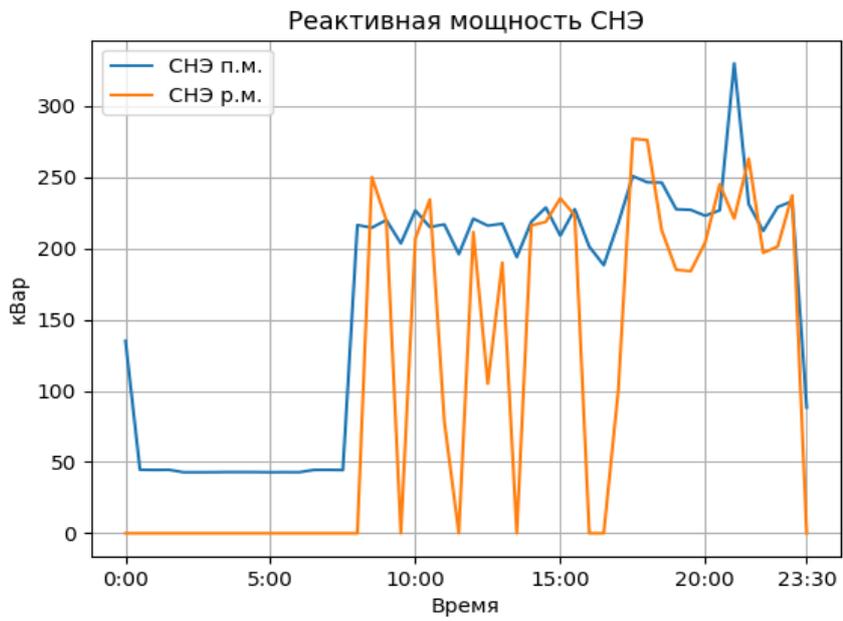


Рисунок 21.4 Узел - а42

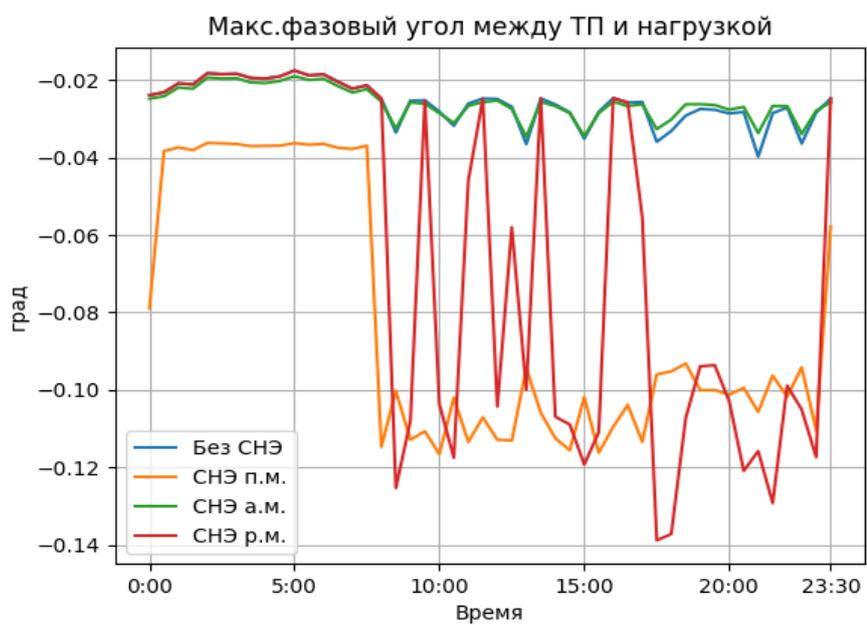


Рисунок 21.5 Узел - а42

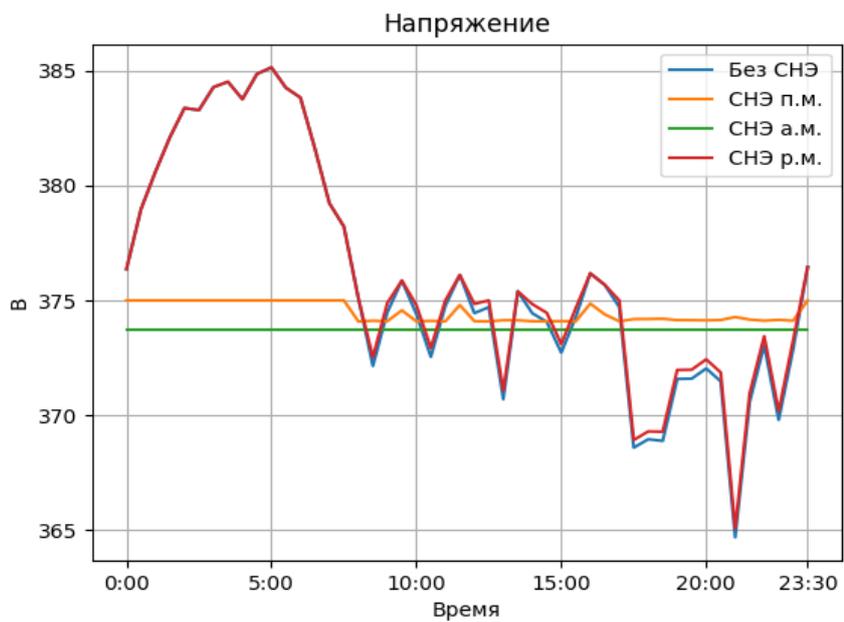


Рисунок 22.1 Узел - о1-2

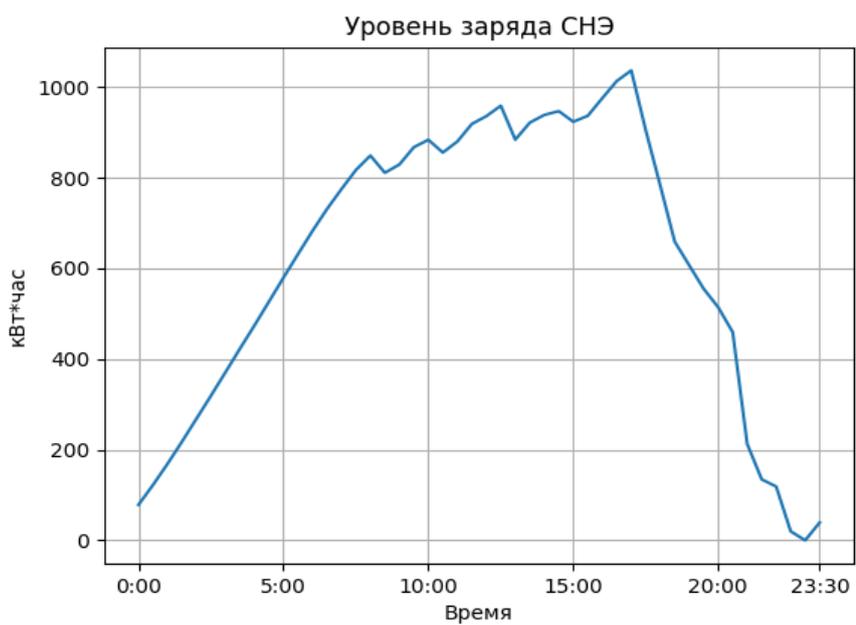


Рисунок 22.2 Узел - 01-2

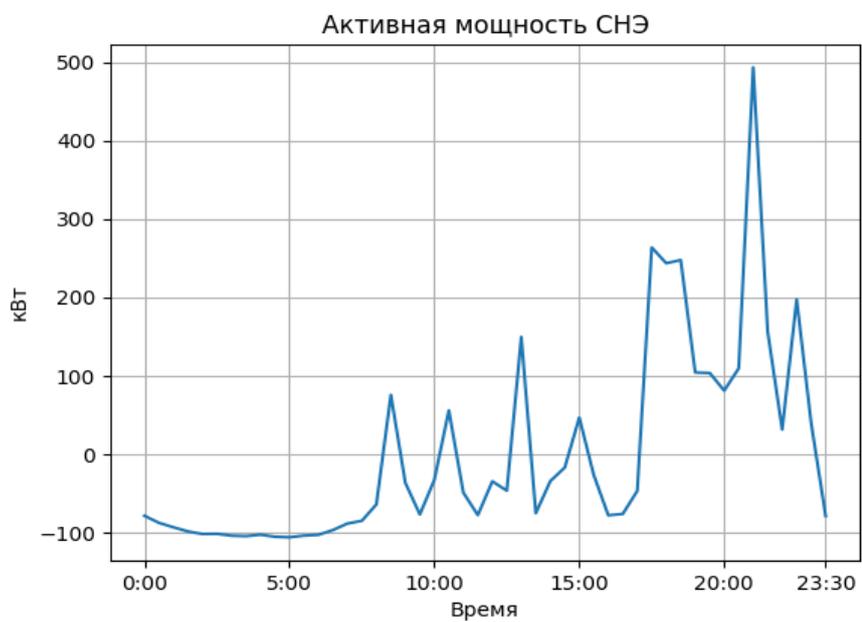


Рисунок 22.3 Узел - 01-2

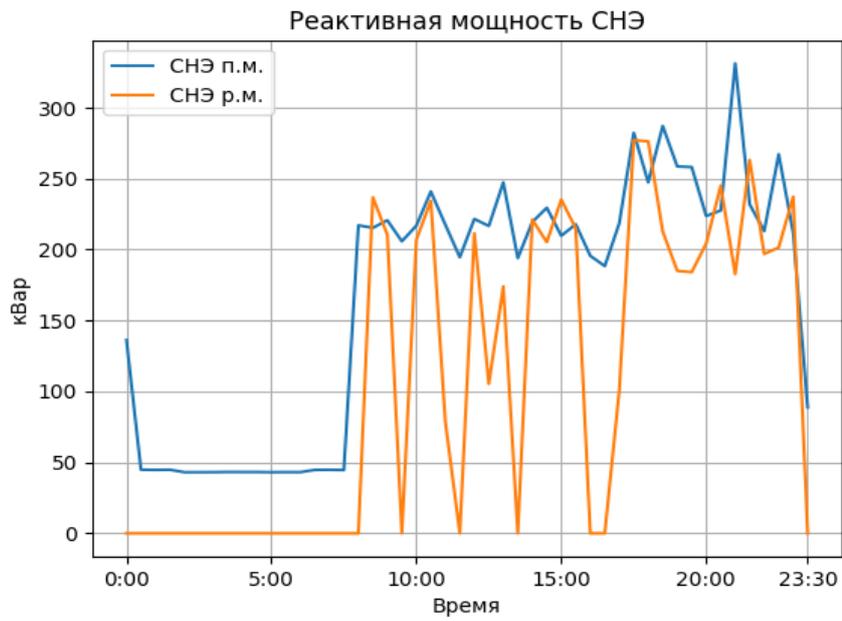


Рисунок 22.4 Узел - о1-2

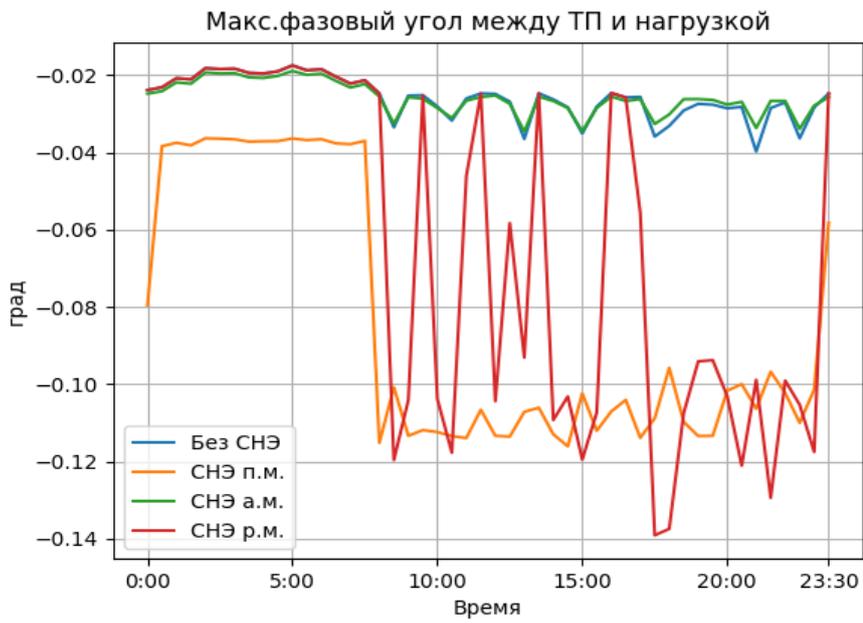


Рисунок 22.5 Узел - о1-2

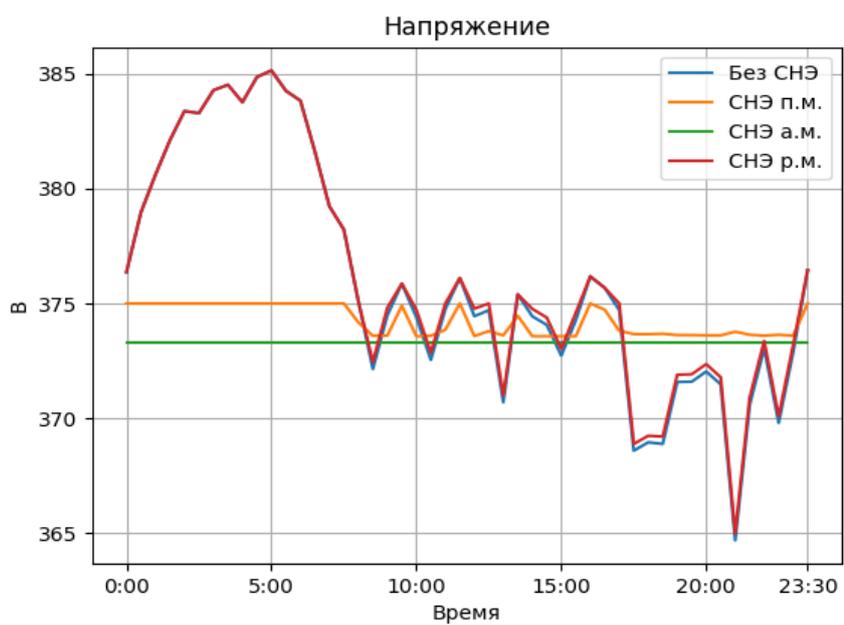


Рисунок 23.1 Узел - а43

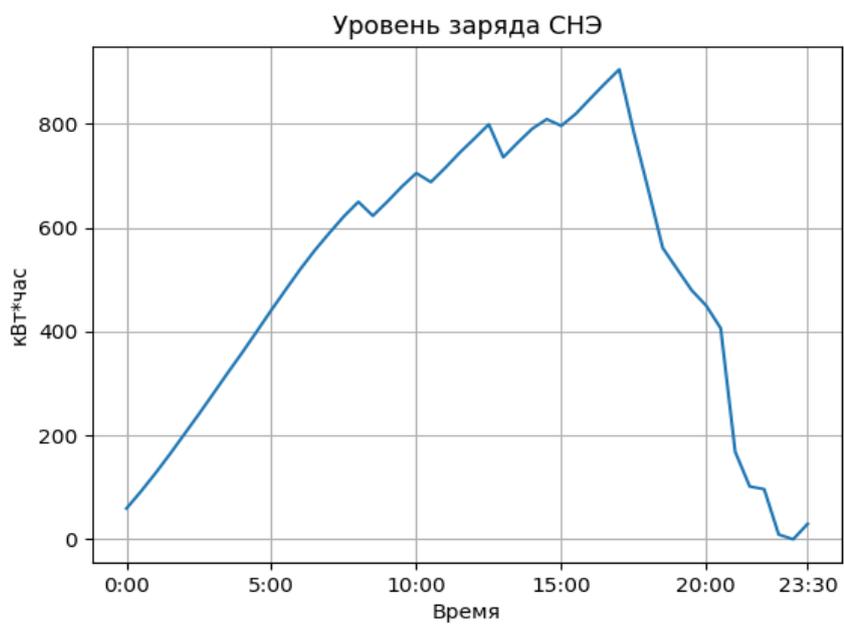


Рисунок 23.2 Узел - а43

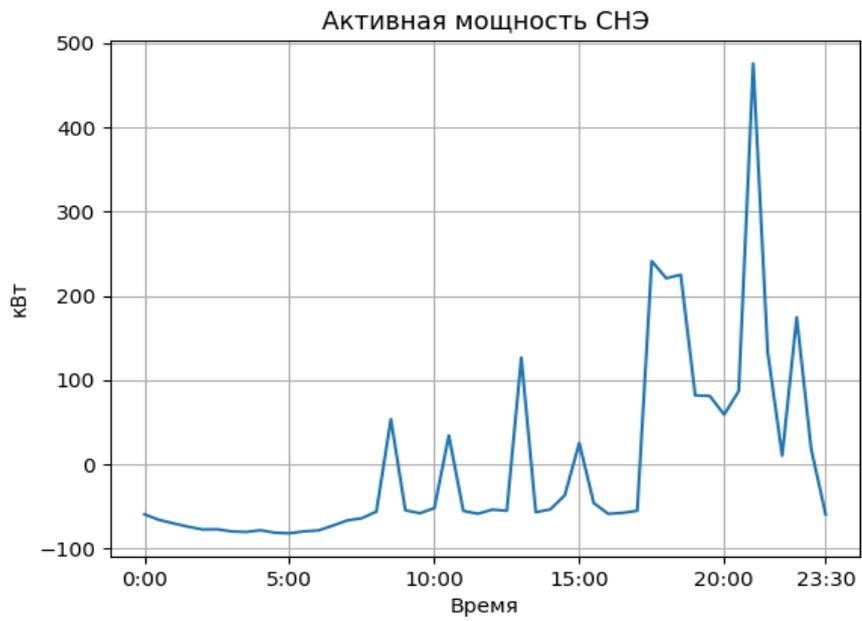


Рисунок 23.3 Узел - а43

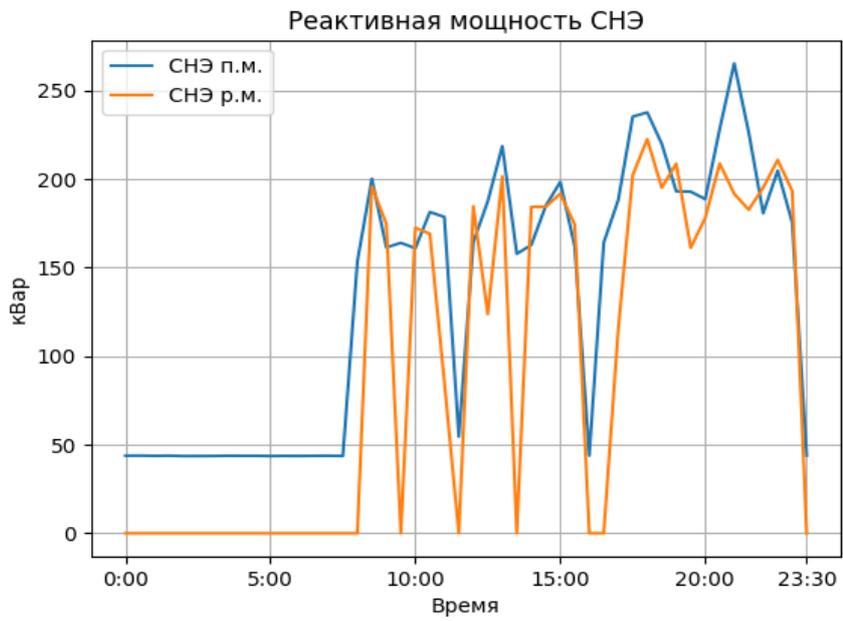


Рисунок 23.4 Узел - а43

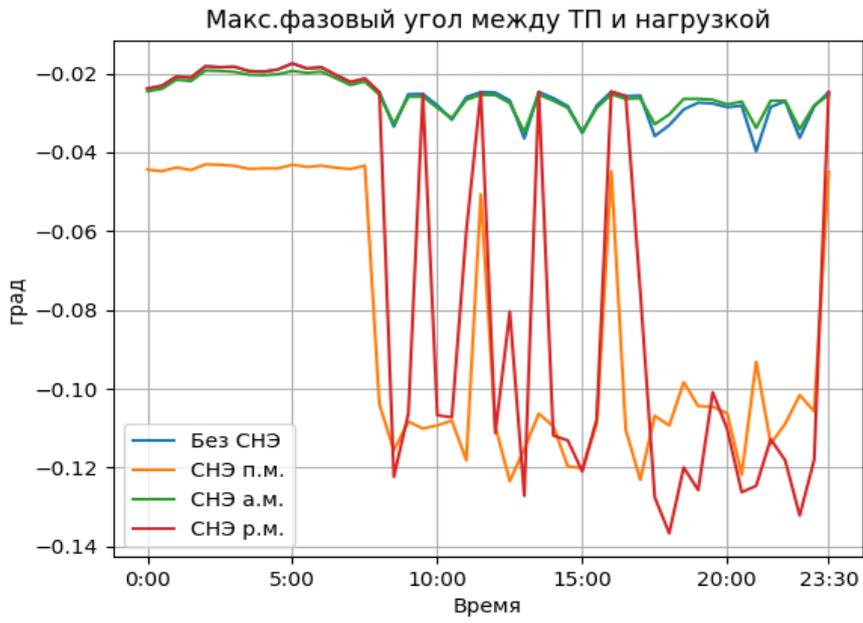


Рисунок 23.5 Узел - а43

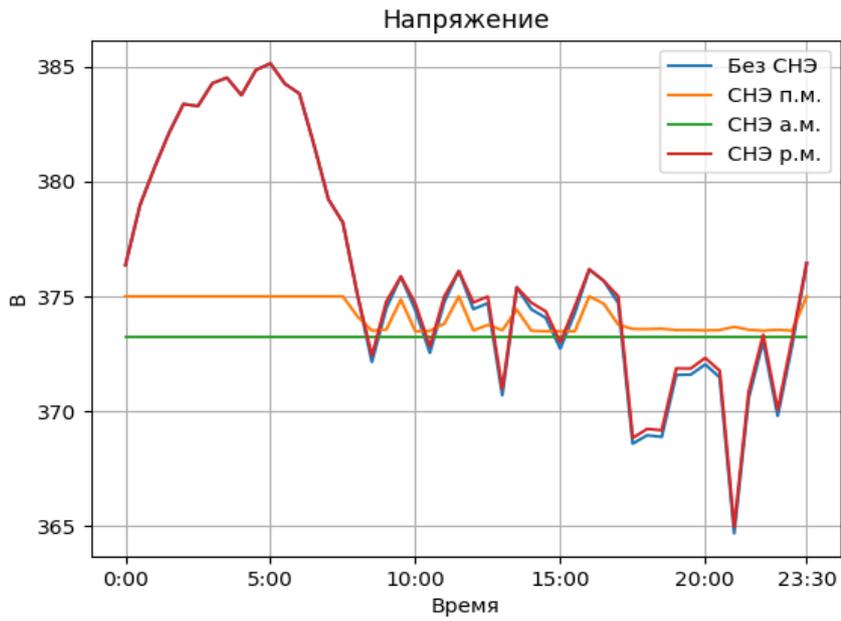


Рисунок 24.1 Узел - а44

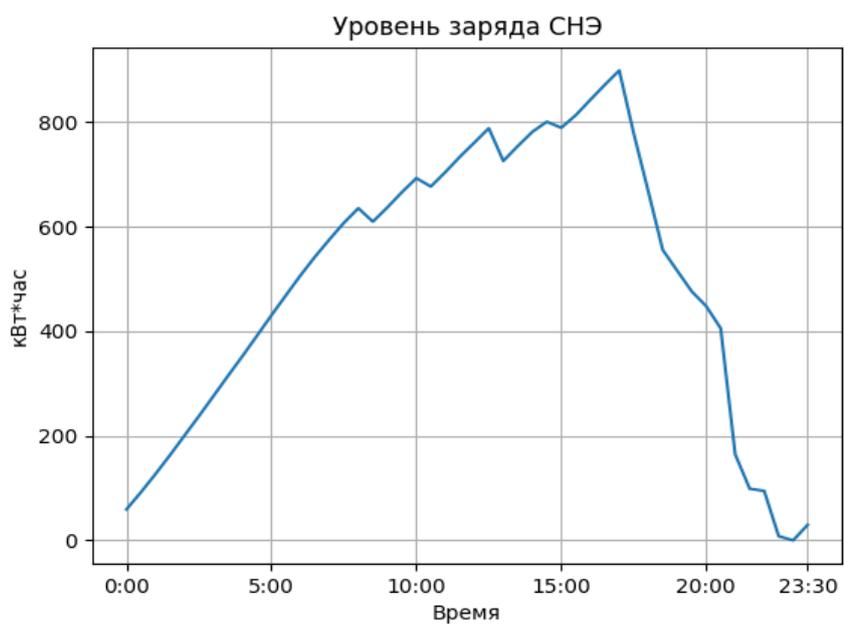


Рисунок 24.2 Узел - а44

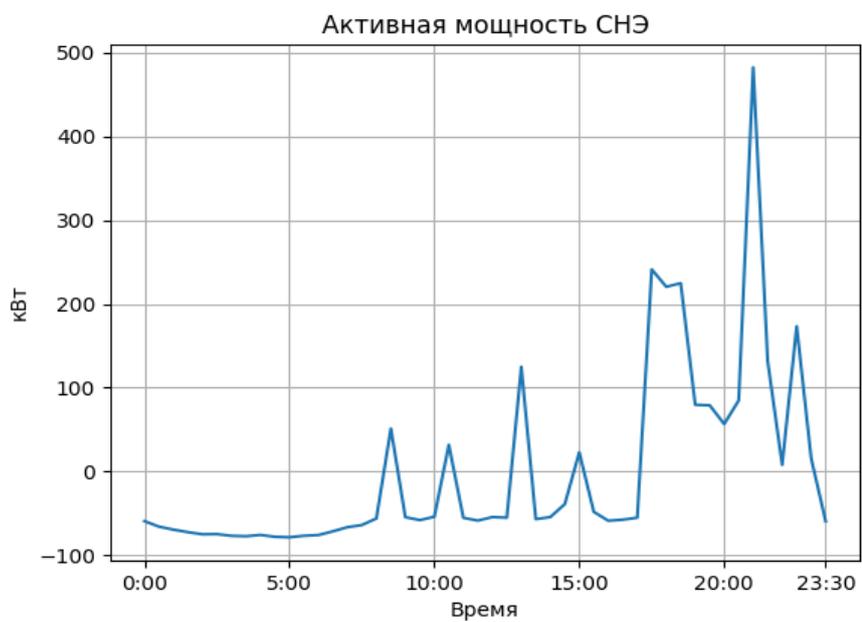


Рисунок 24.3 Узел - а44

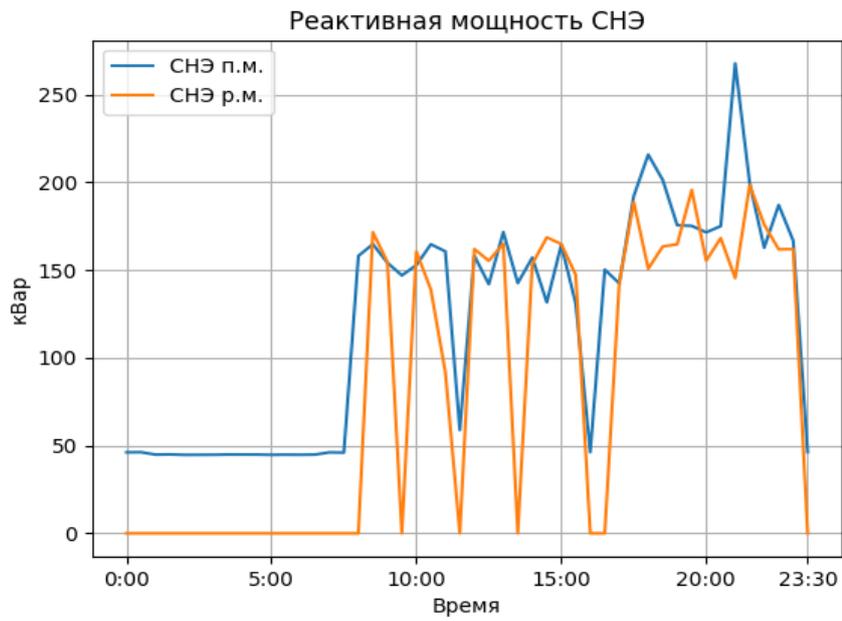


Рисунок 24.4 Узел - а44

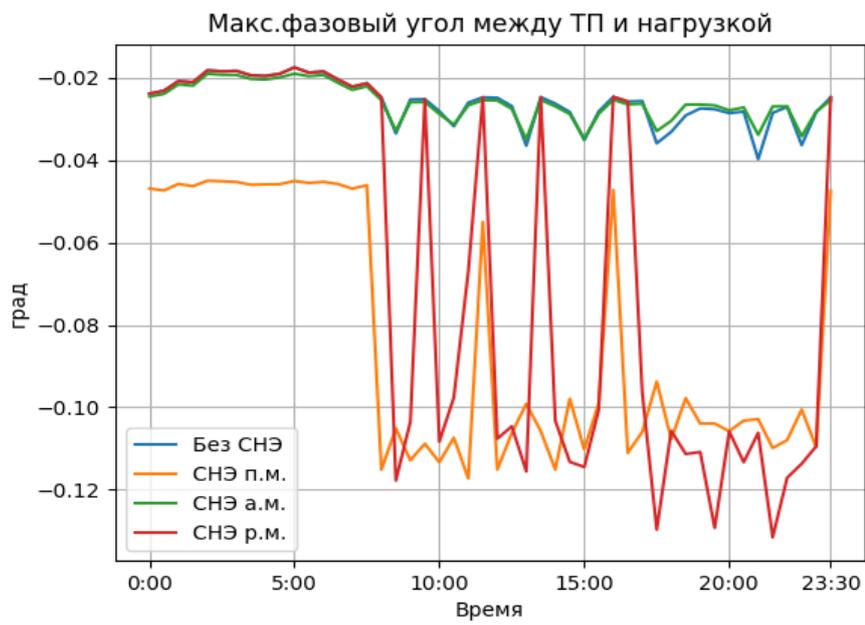


Рисунок 24.5 Узел - а44

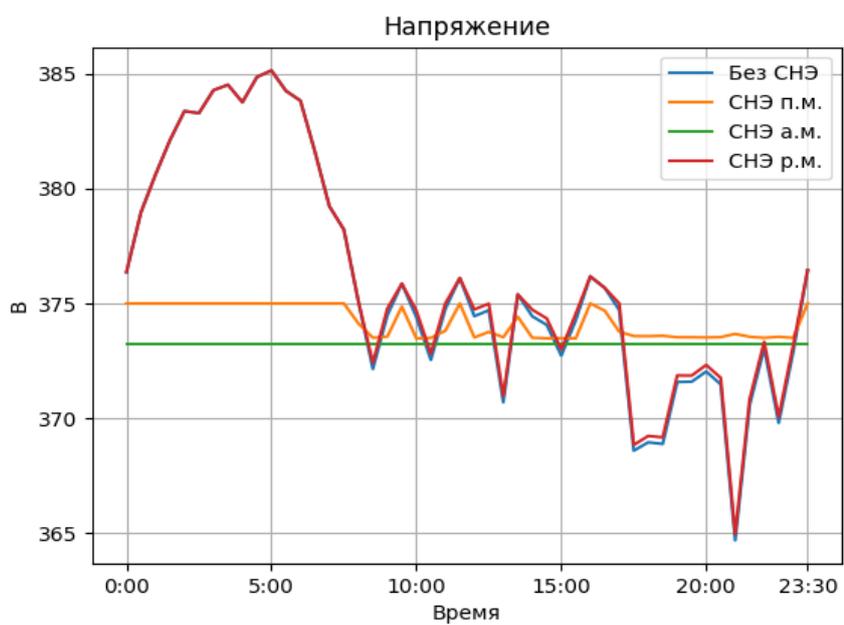


Рисунок 25.1 Узел - а45

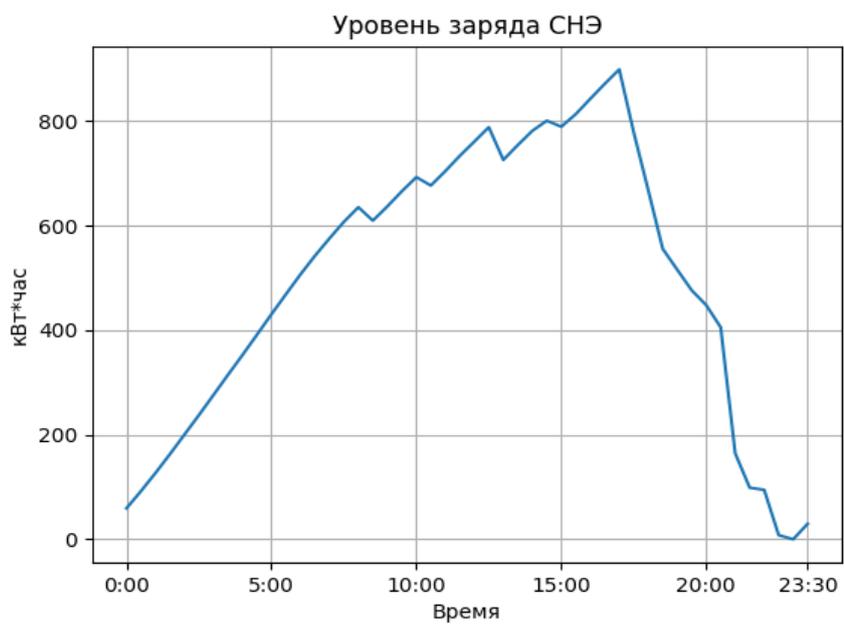


Рисунок 25.2 Узел - а45

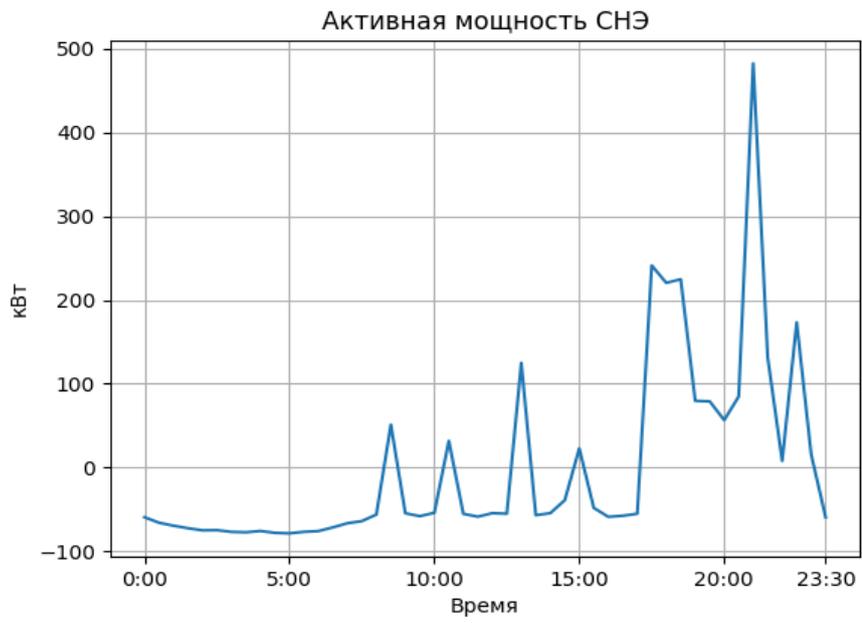


Рисунок 25.3 Узел - а45

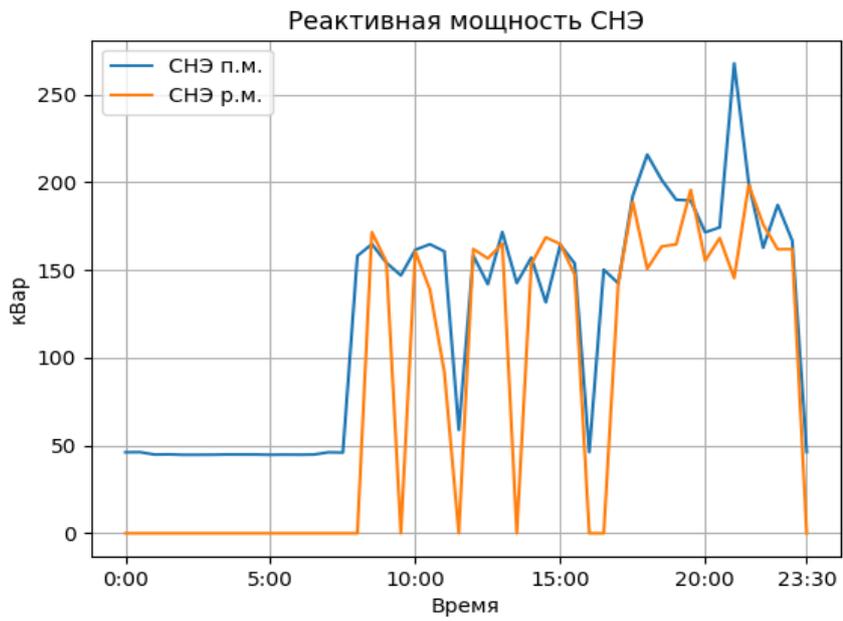


Рисунок 25.4 Узел - а45

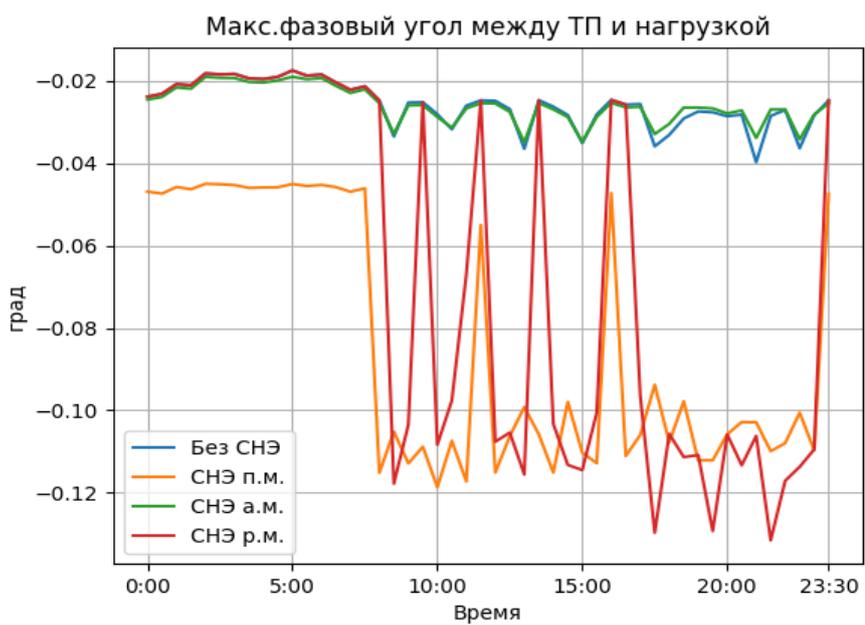


Рисунок 25.5 Узел - а45

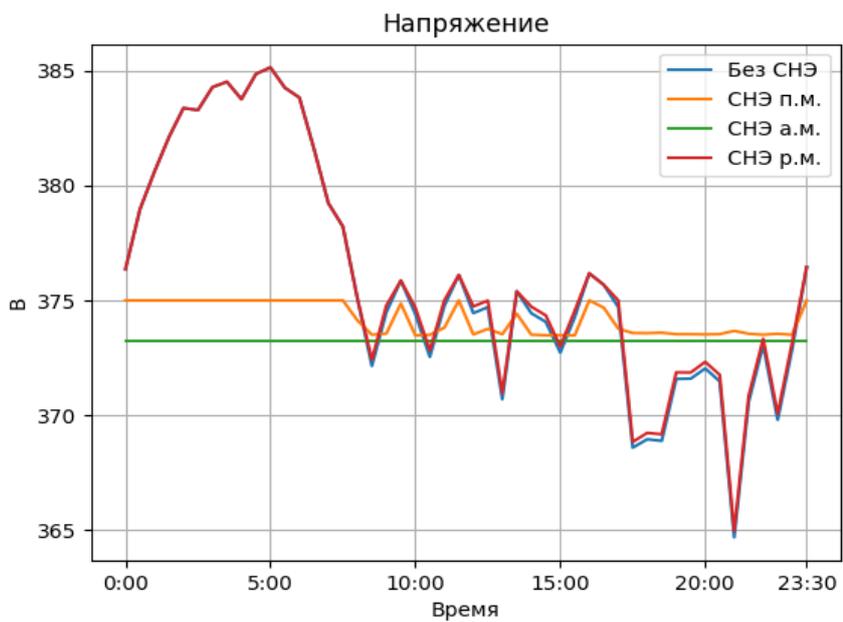


Рисунок 26.1 Узел - о1-3

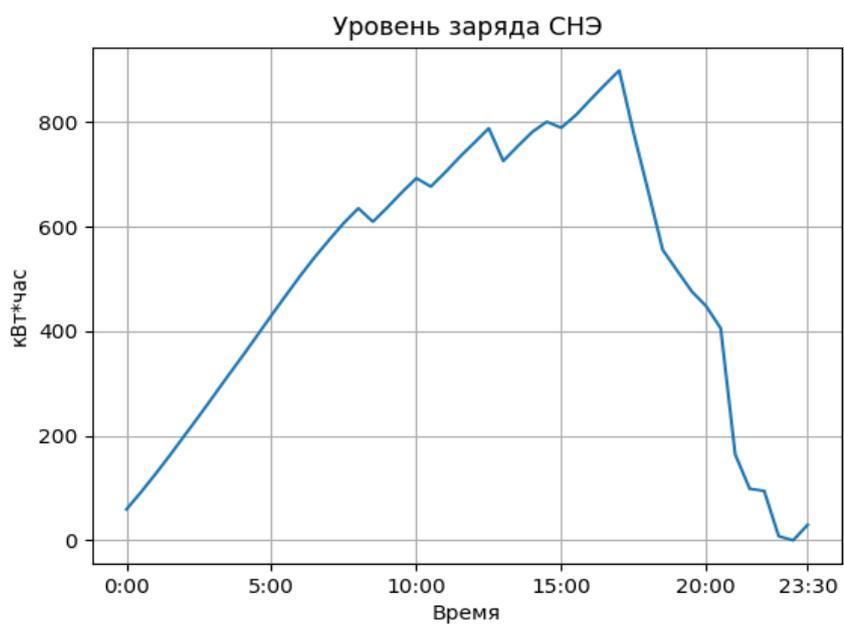


Рисунок 26.2 Узел - 01-3

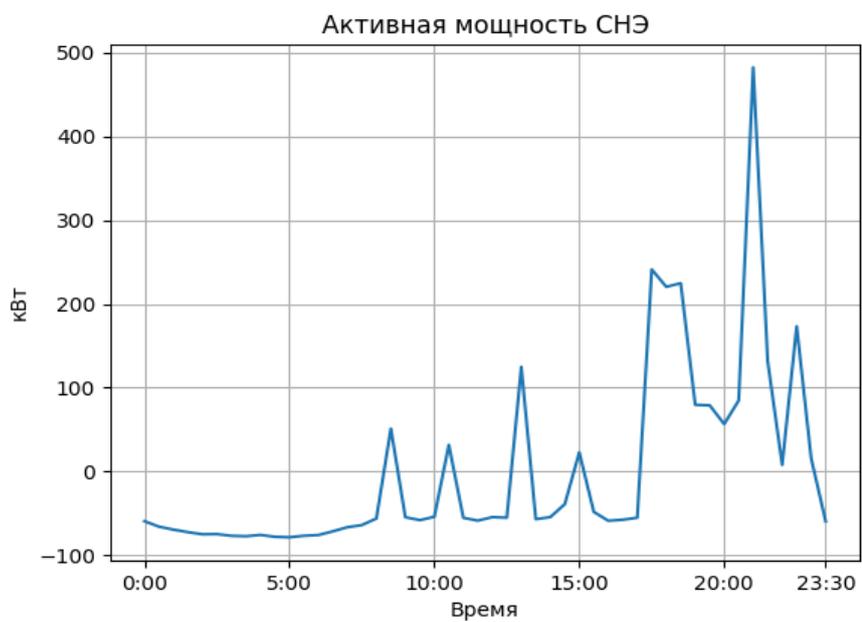


Рисунок 26.3 Узел - 01-3

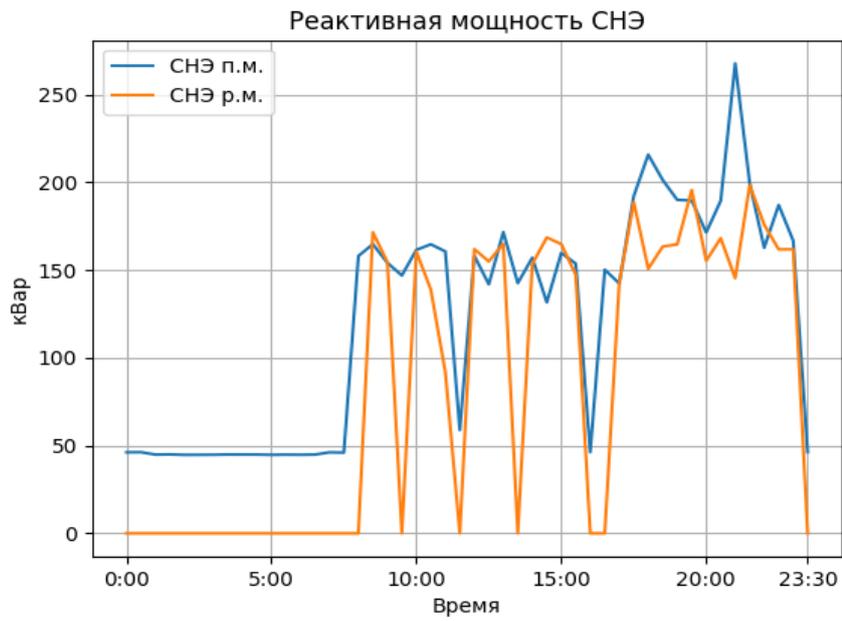


Рисунок 26.4 Узел - о1-3

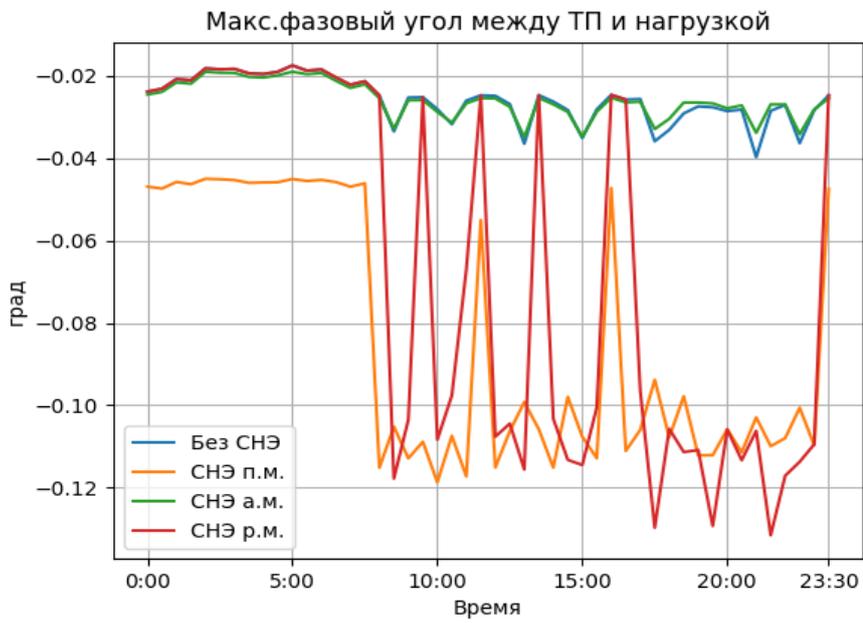


Рисунок 26.5 Узел - о1-3

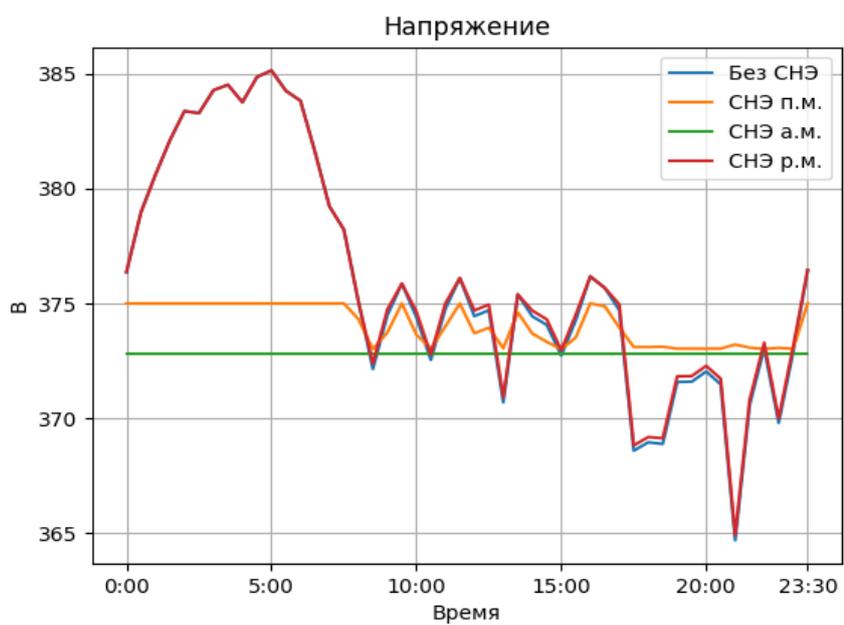


Рисунок 27.1 Узел - а46

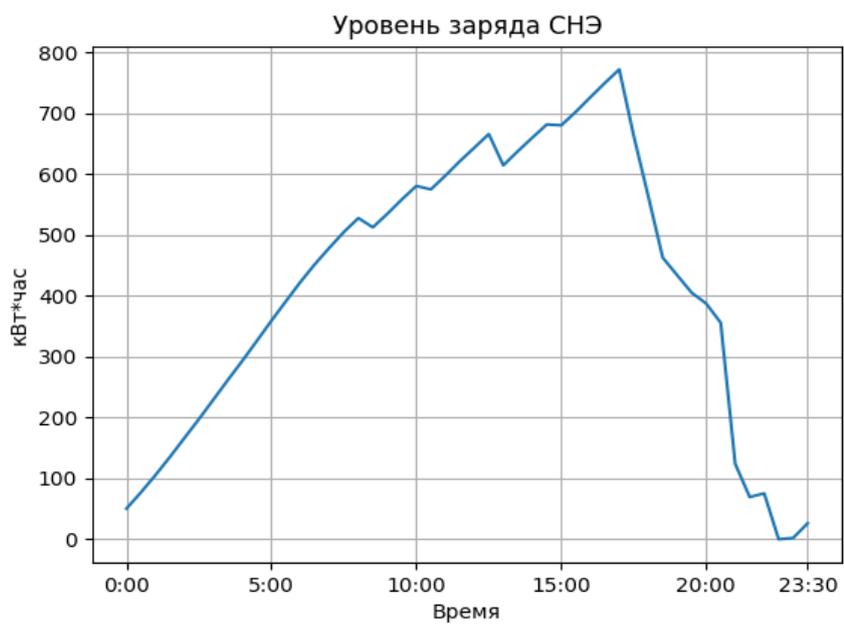


Рисунок 27.2 Узел - а46

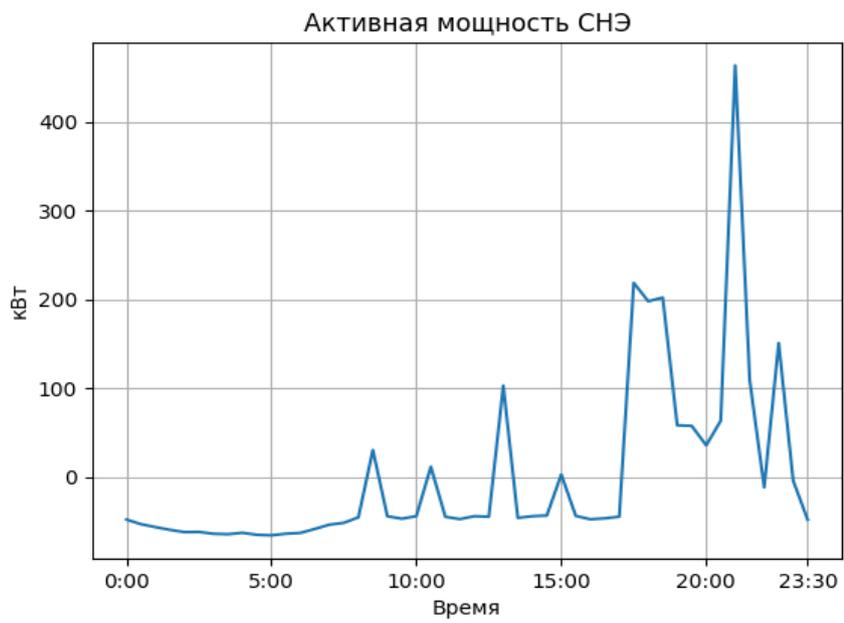


Рисунок 27.3 Узел - а46

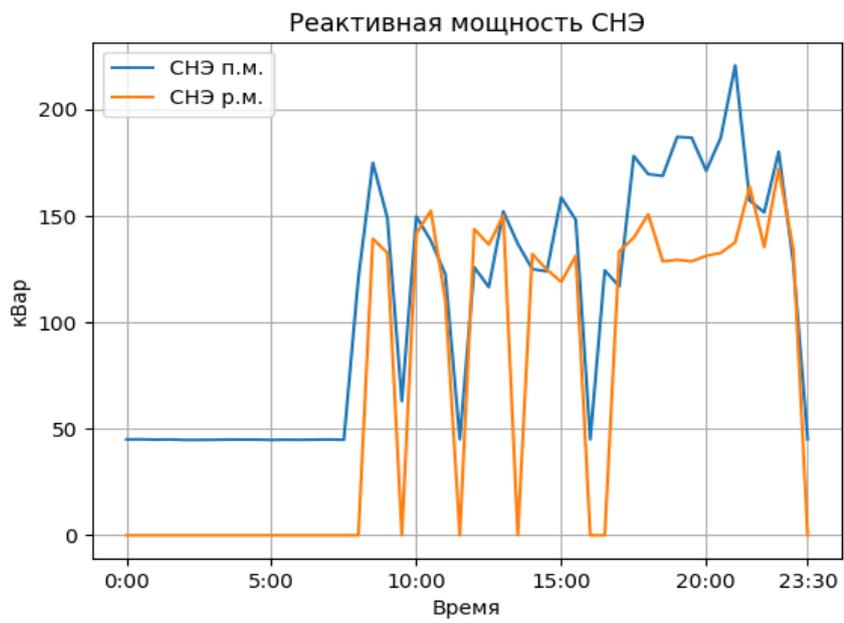


Рисунок 27.4 Узел - а46

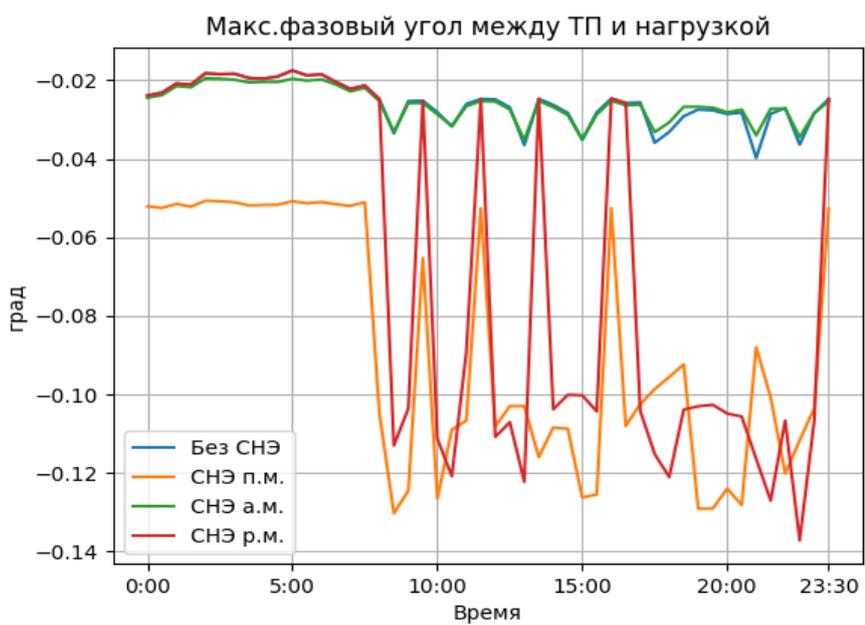


Рисунок 27.5 Узел - а46

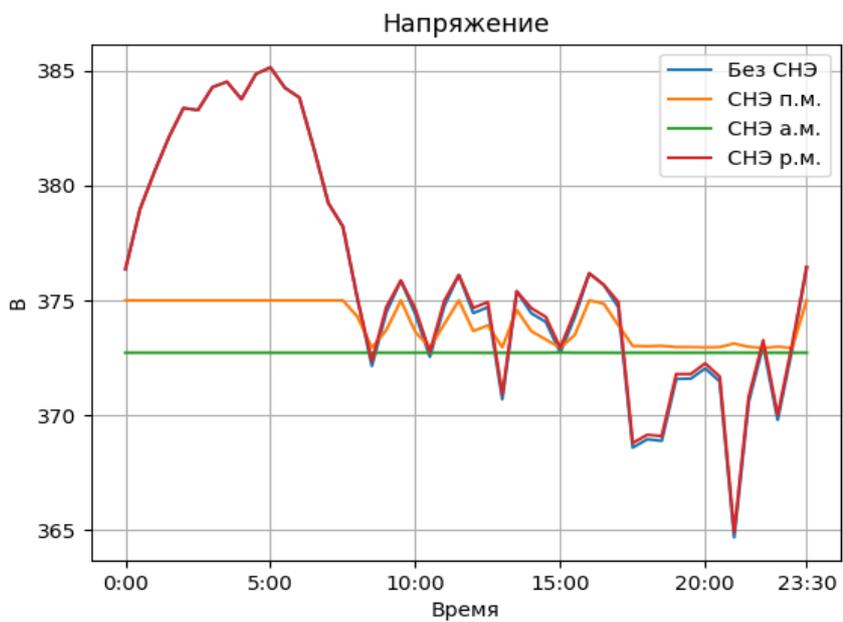


Рисунок 28.1 Узел - а47



Рисунок 28.2 Узел - а47

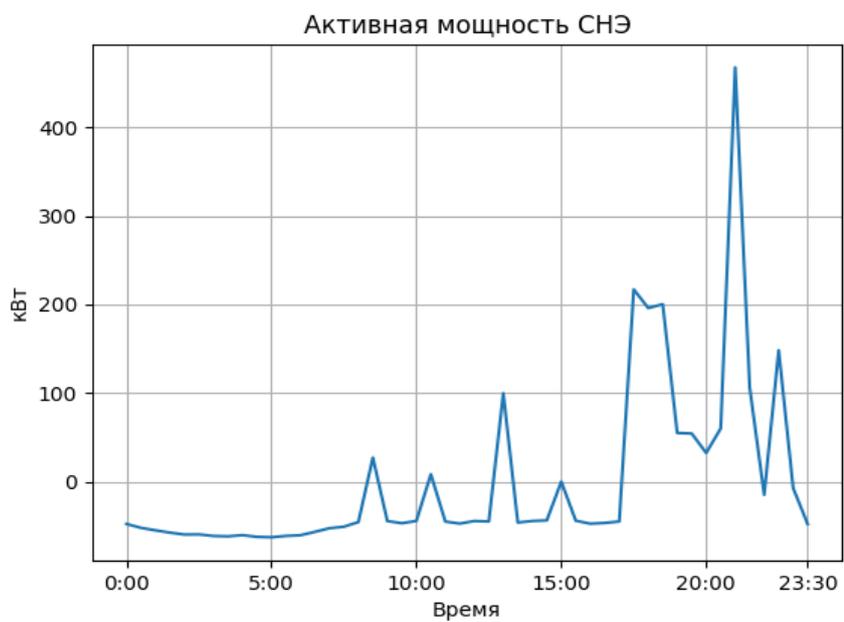


Рисунок 28.3 Узел - а47

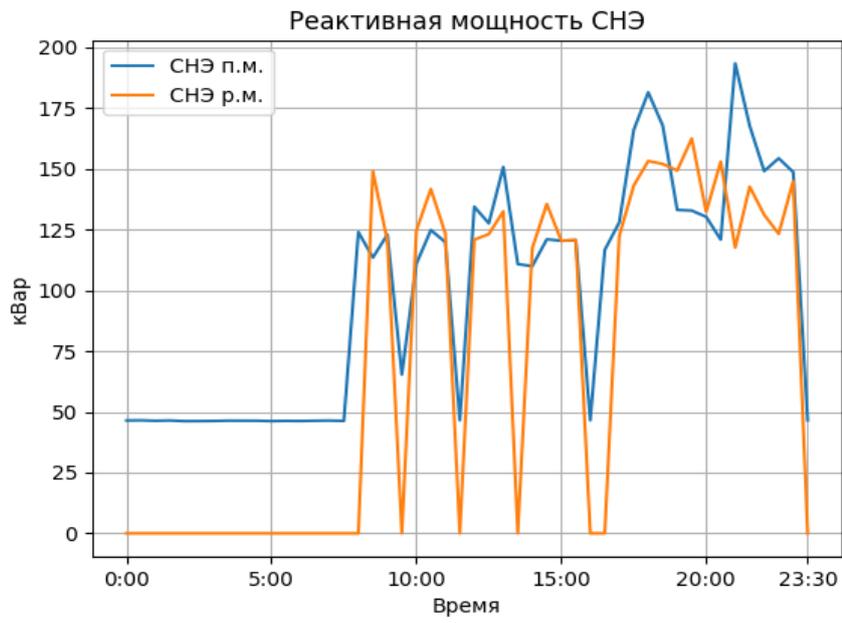


Рисунок 28.4 Узел - а47

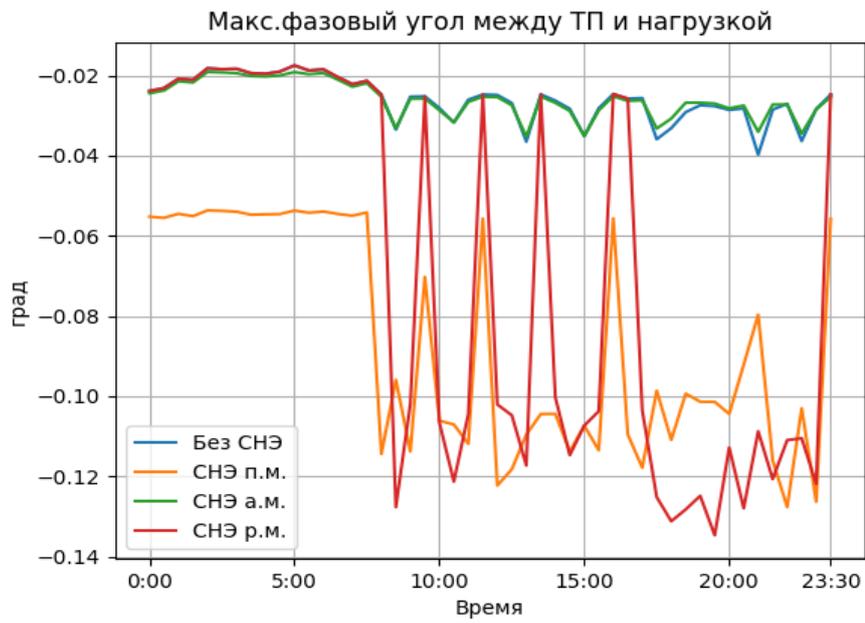


Рисунок 28.5 Узел - а47

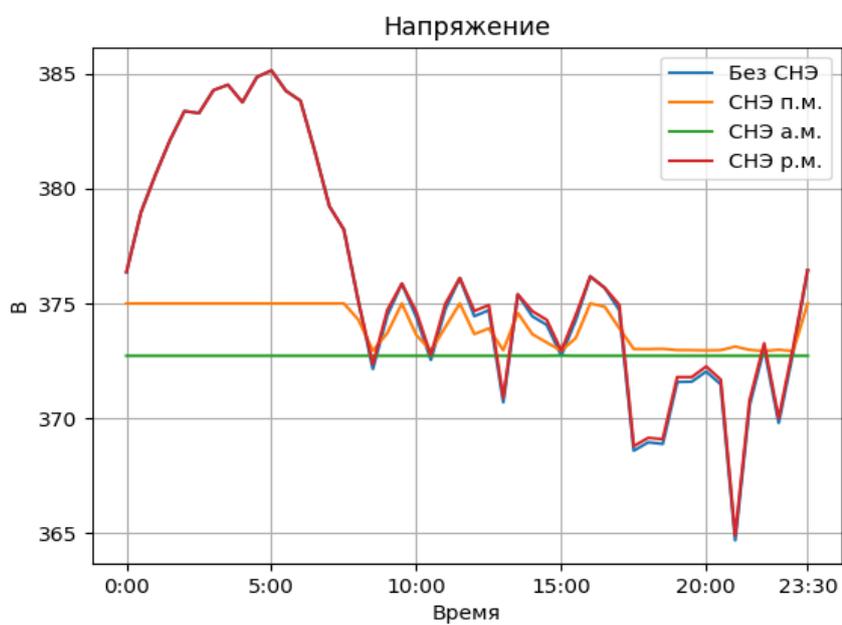


Рисунок 29.1 Узел - о1-4

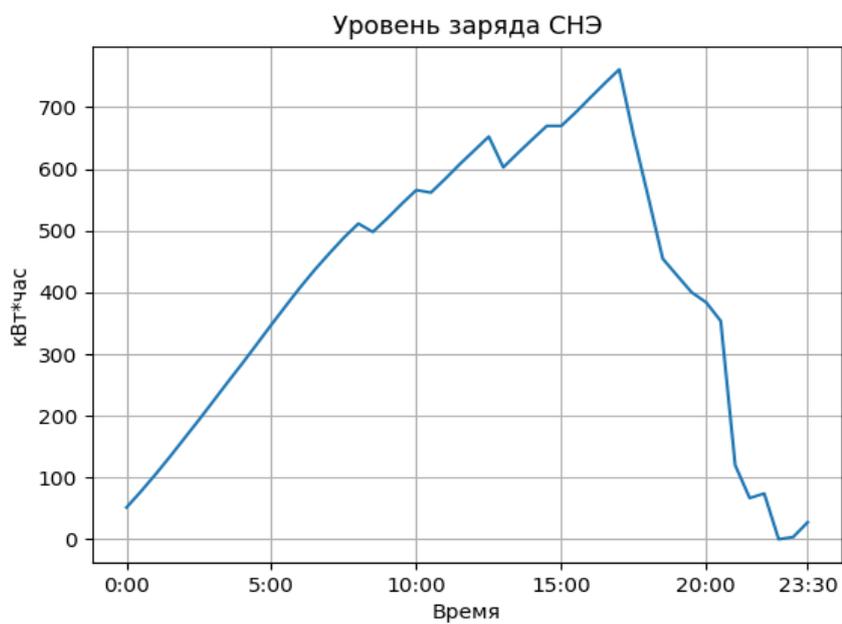


Рисунок 29.2 Узел - о1-4

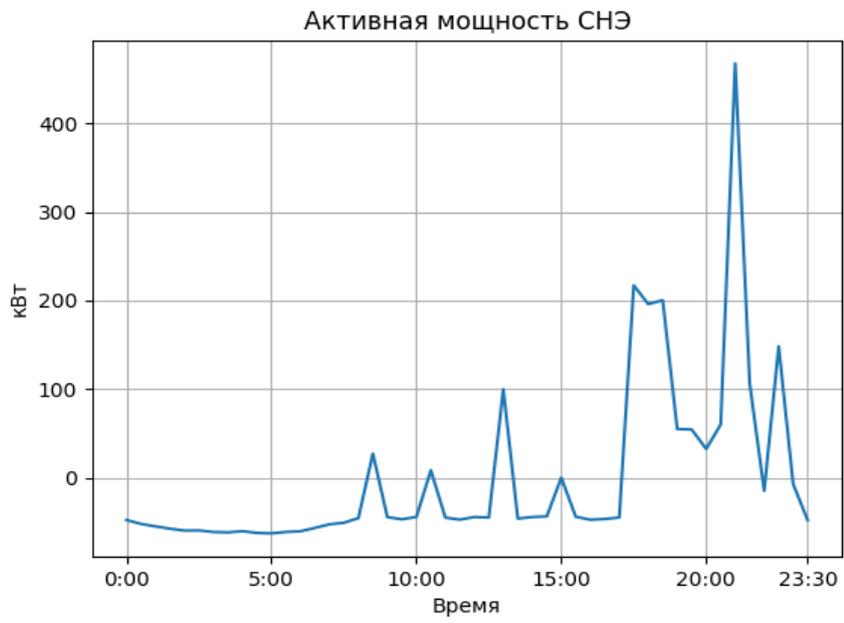


Рисунок 29.3 Узел - о1-4

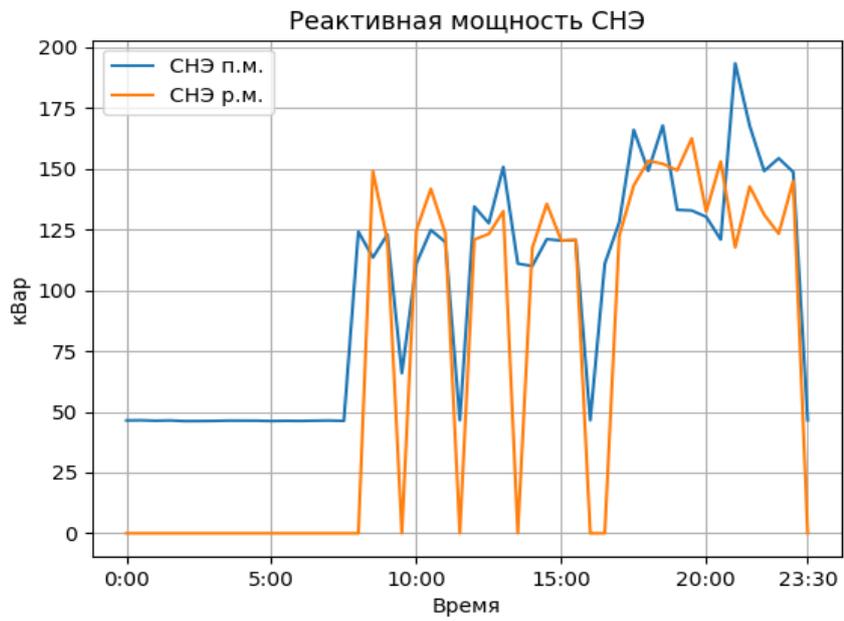


Рисунок 29.4 Узел - о1-4

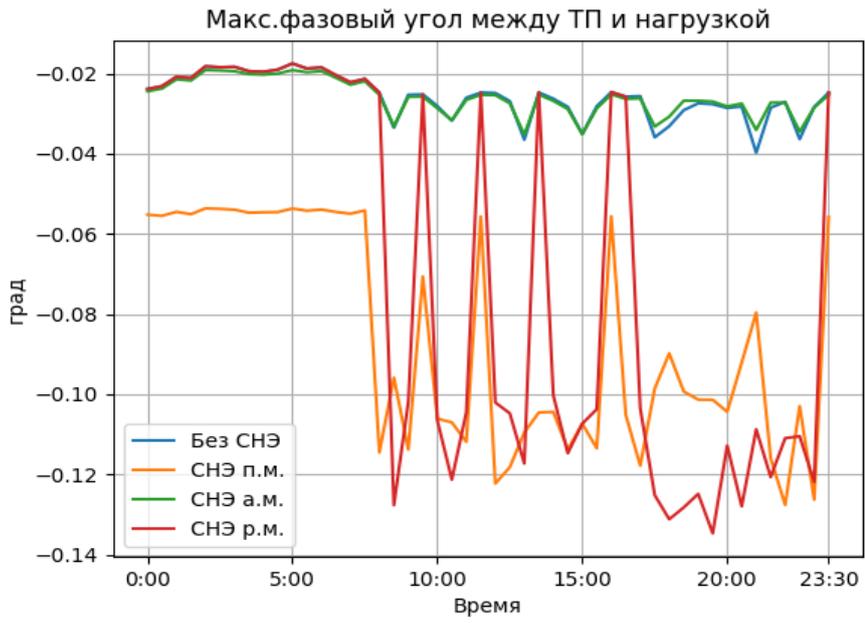


Рисунок 29.5 Узел - о1-4

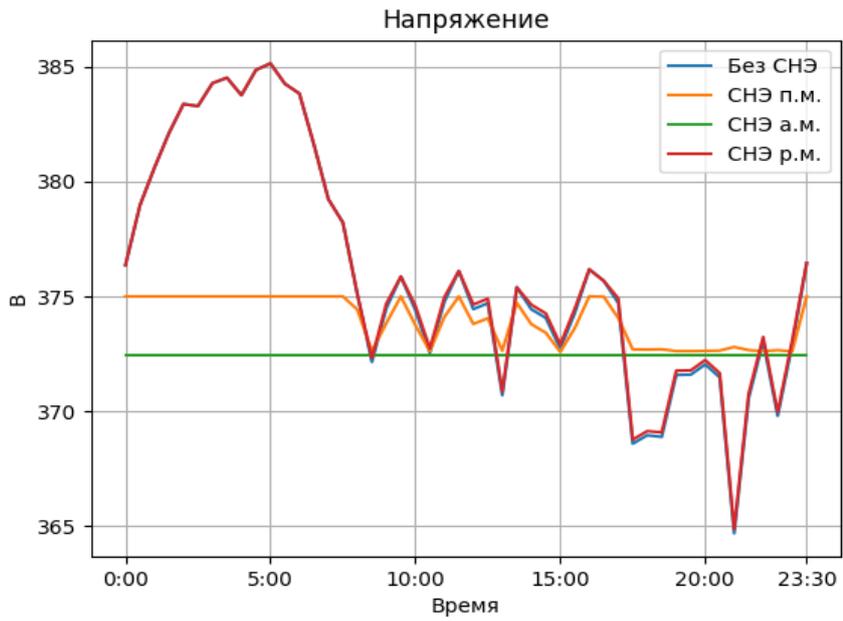


Рисунок 30.1 Узел - а48

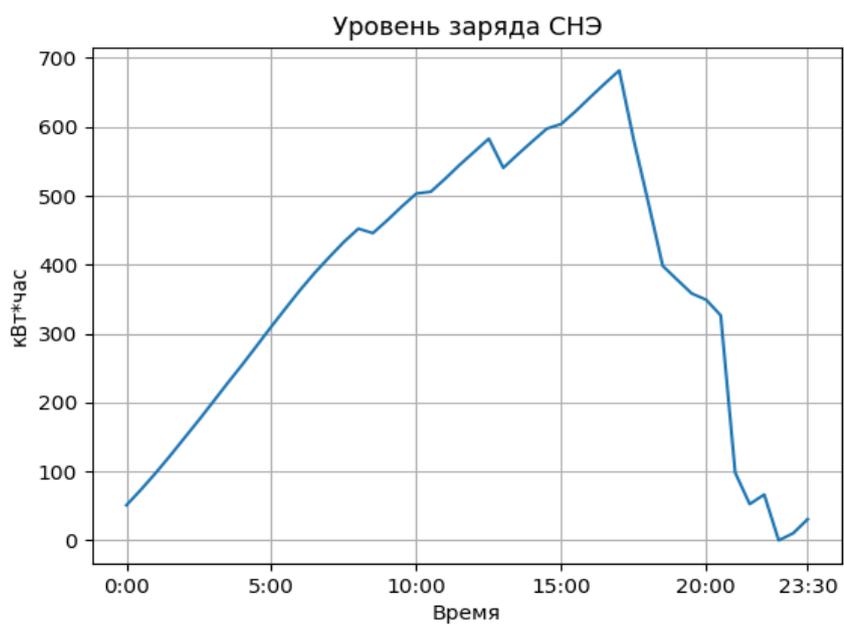


Рисунок 30.2 Узел - а48

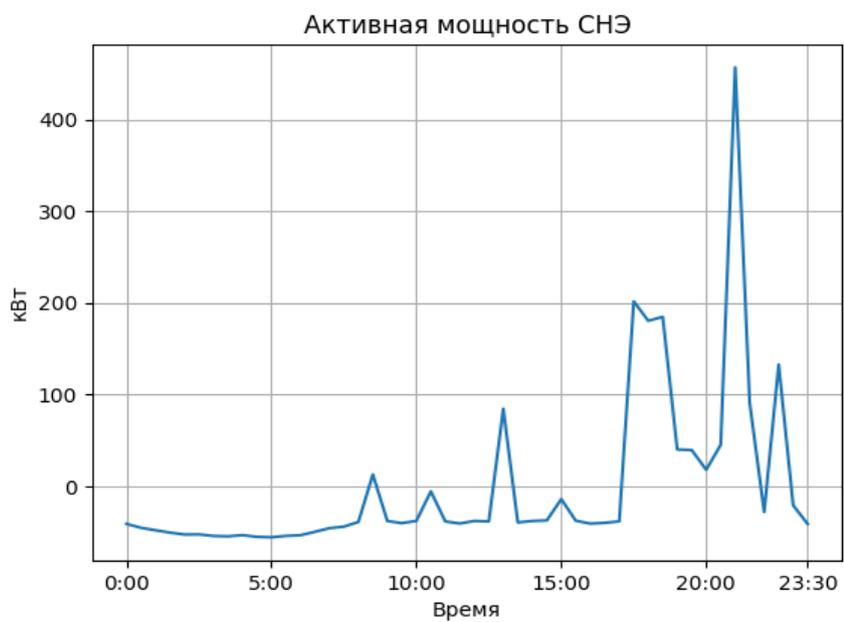


Рисунок 30.3 Узел - а48

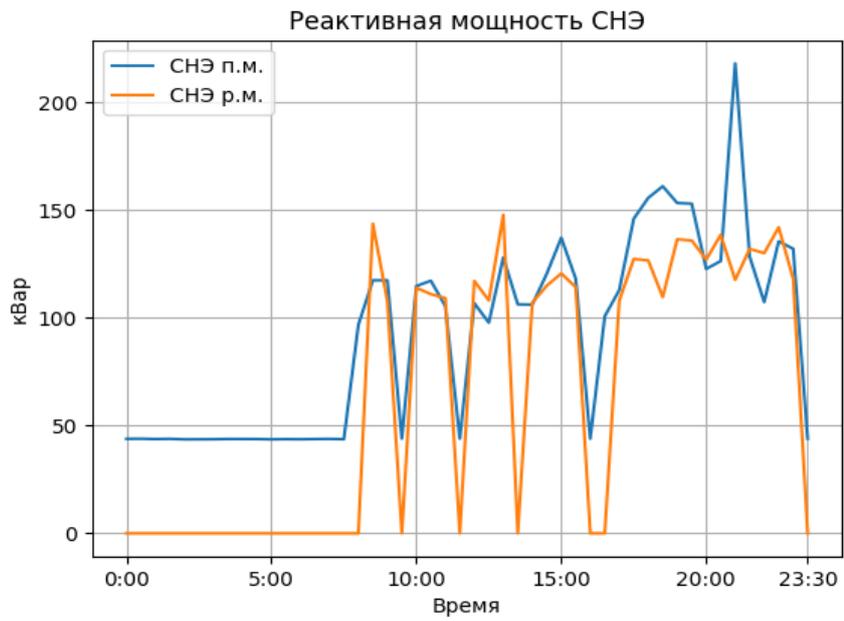


Рисунок 30.4 Узел - а48

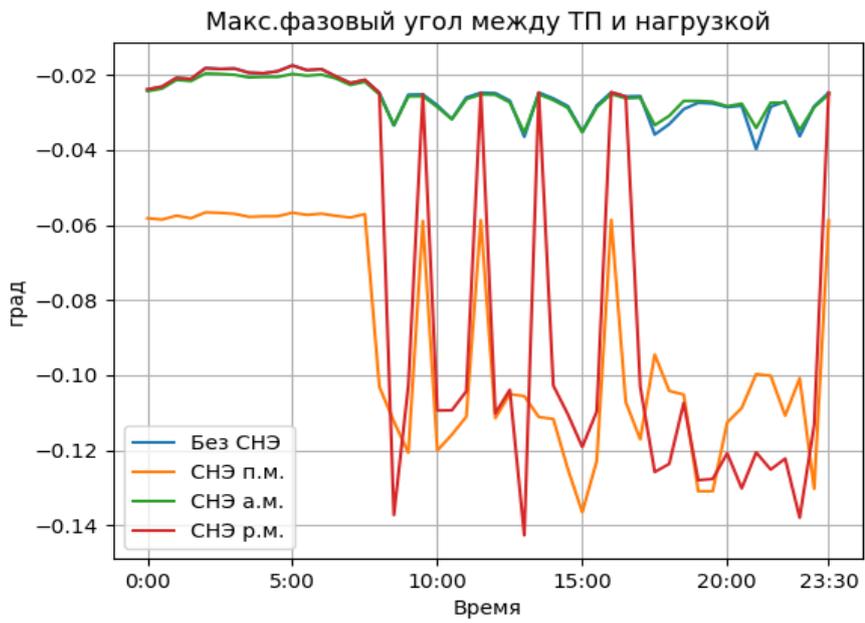


Рисунок 30.5 Узел - а48

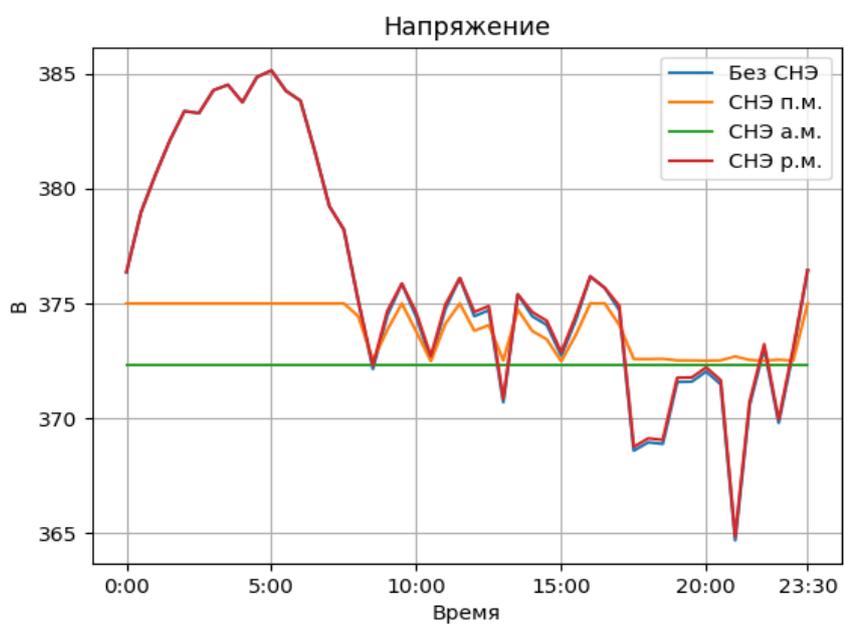


Рисунок 31.1 Узел - о1-5

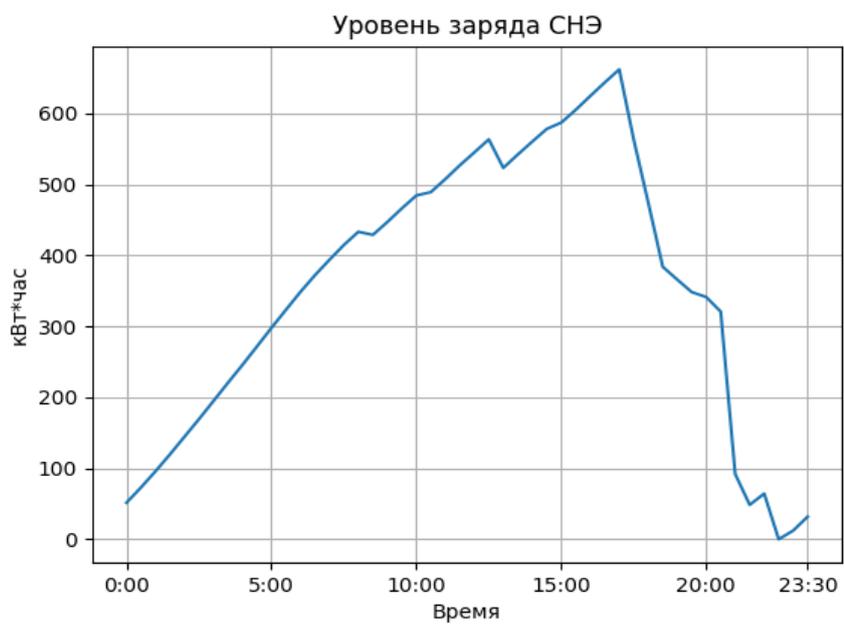


Рисунок 31.2 Узел - о1-5

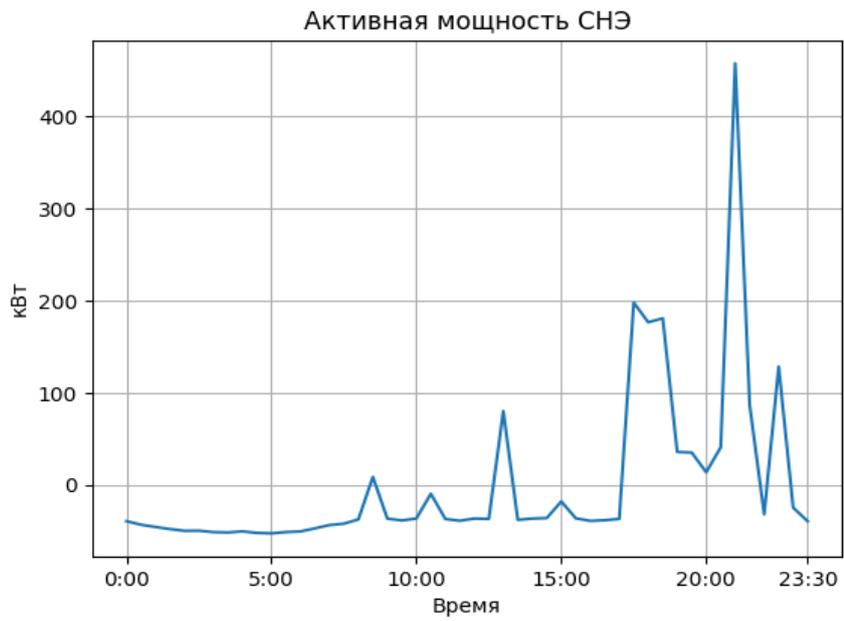


Рисунок 31.3 Узел - о1-5

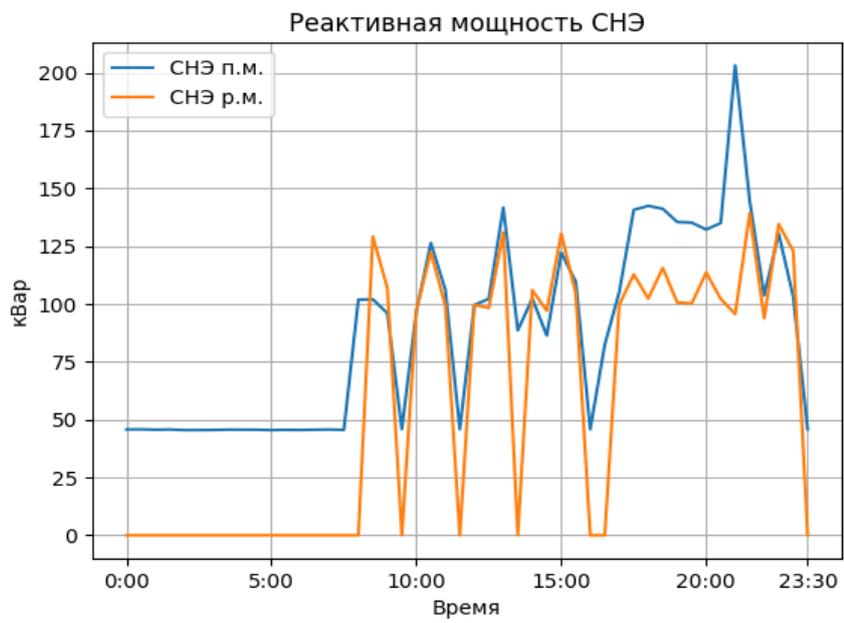


Рисунок 31.4 Узел - о1-5

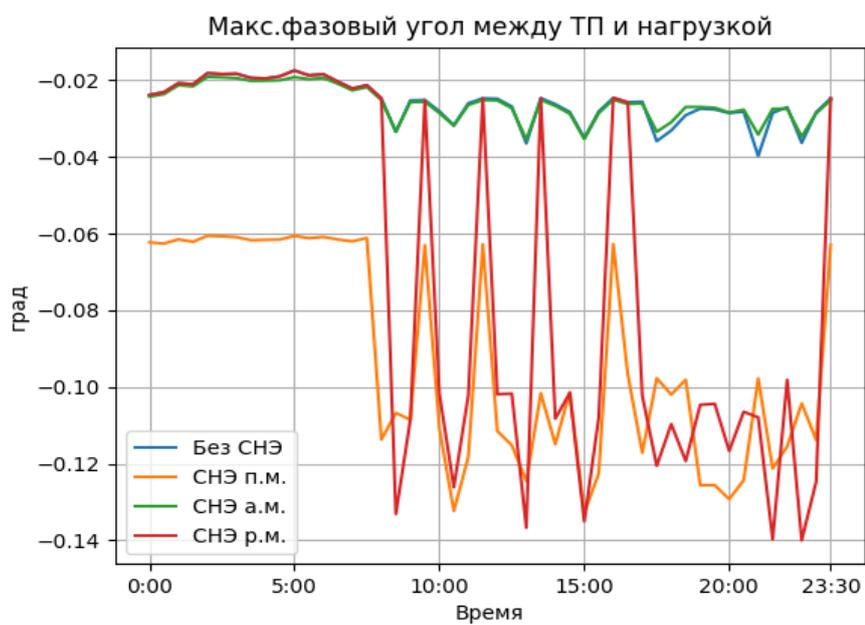


Рисунок 31.5 Узел - о1-5

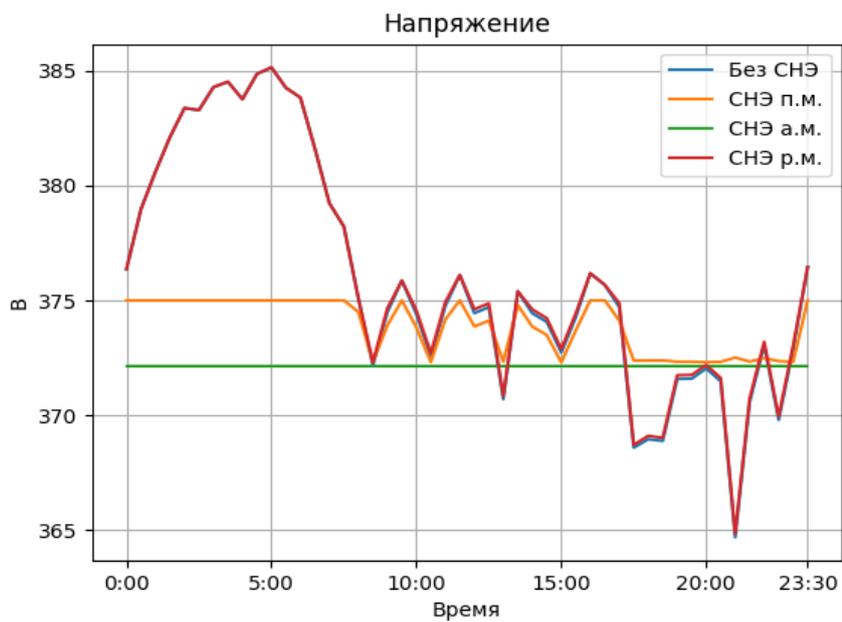


Рисунок 32.1 Узел - а49

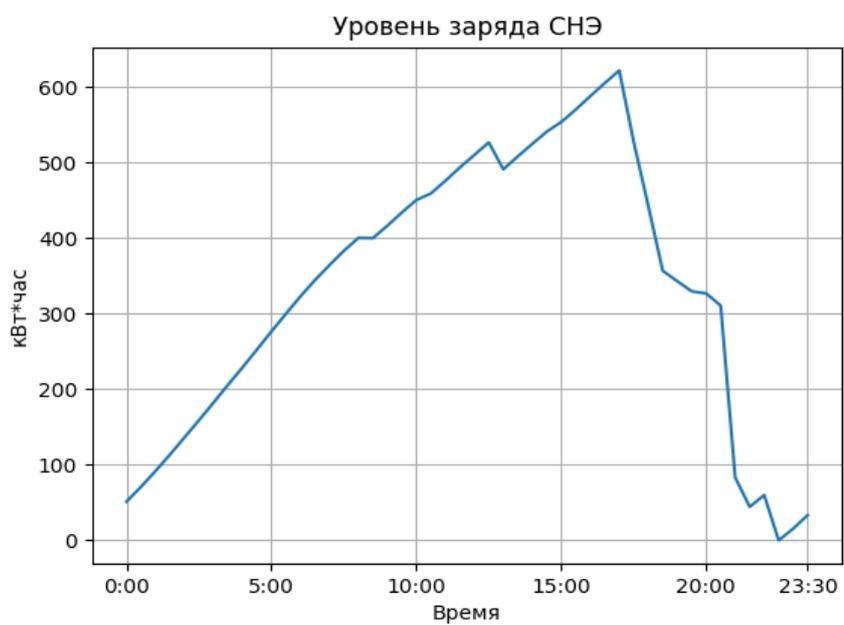


Рисунок 32.2 Узел - а49

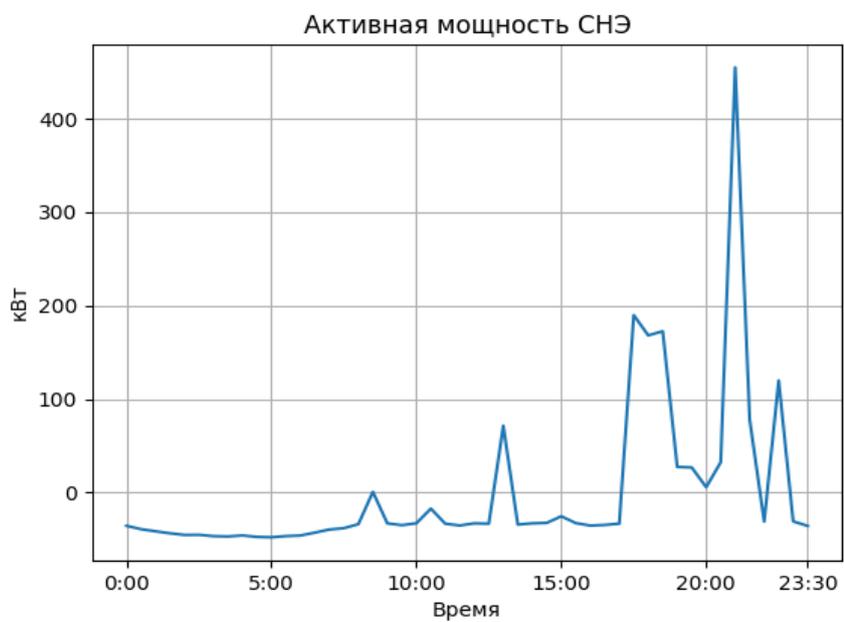


Рисунок 32.3 Узел - а49

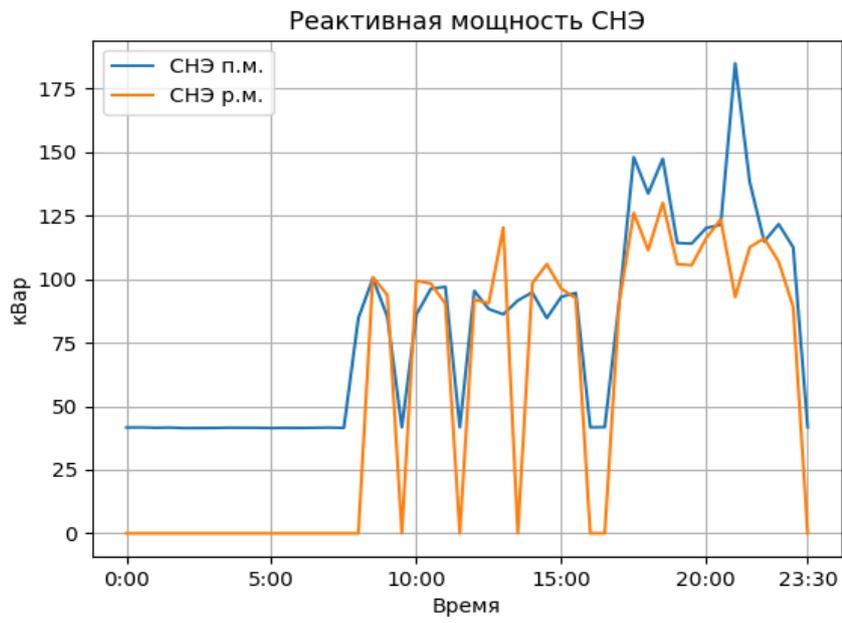


Рисунок 32.4 Узел - а49

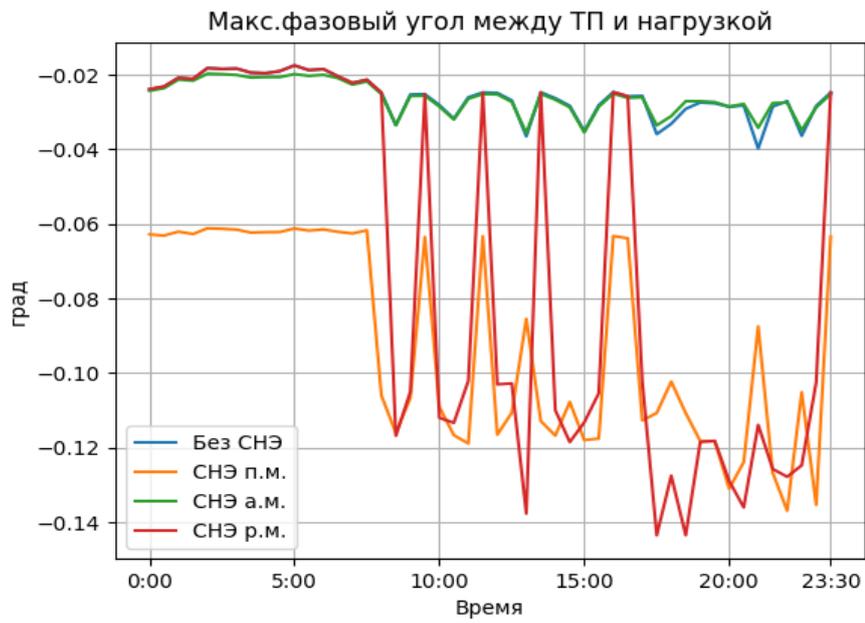


Рисунок 32.5 Узел - а49

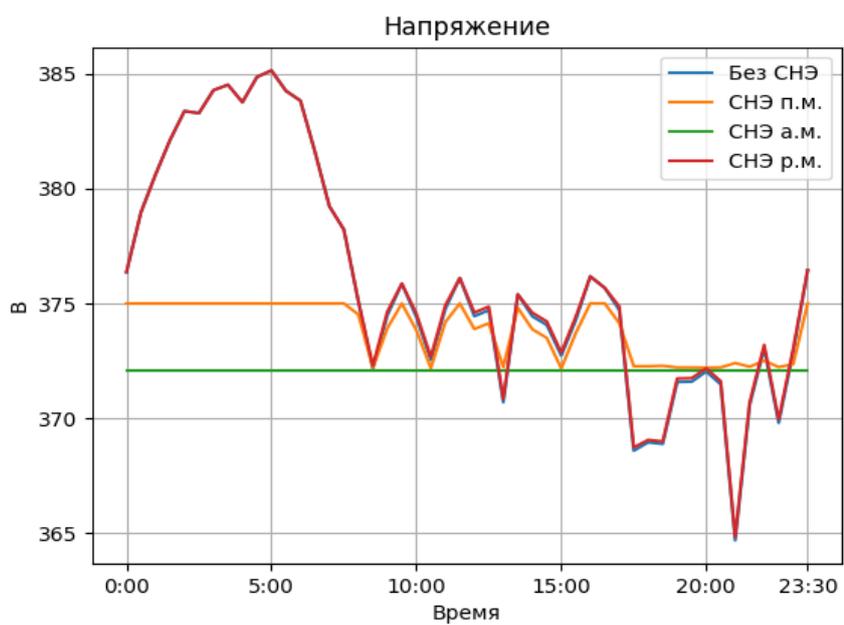


Рисунок 33.1 Узел - о1-7

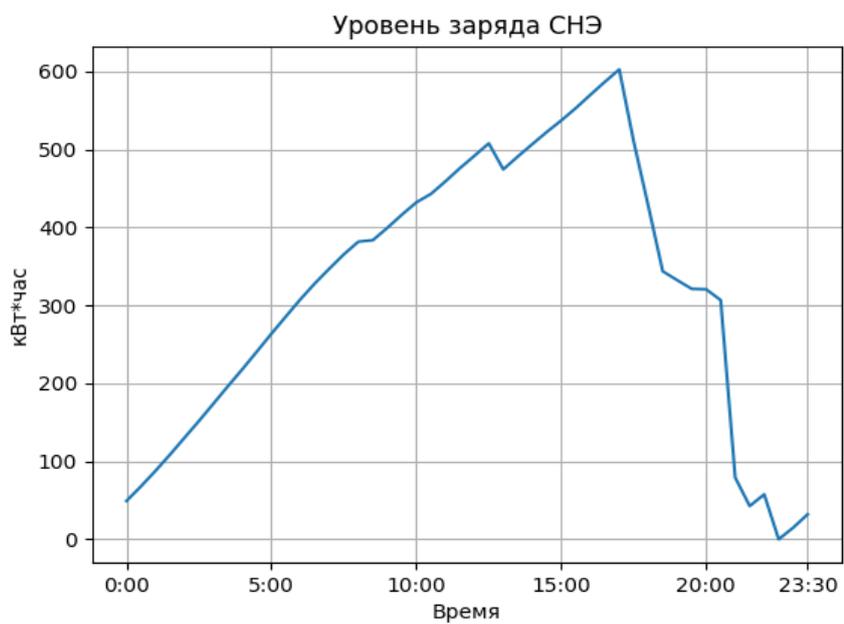


Рисунок 33.2 Узел - о1-7

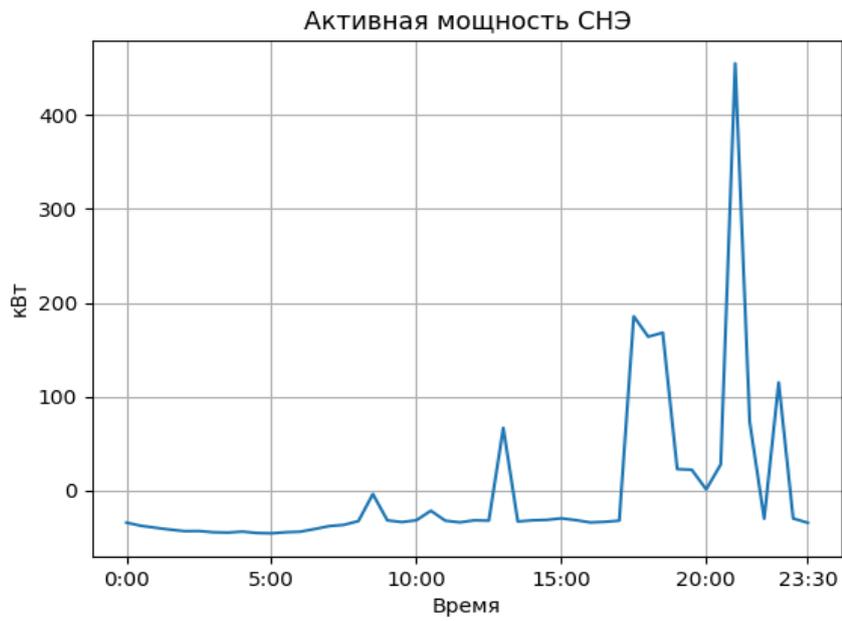


Рисунок 33.3 Узел - о1-7

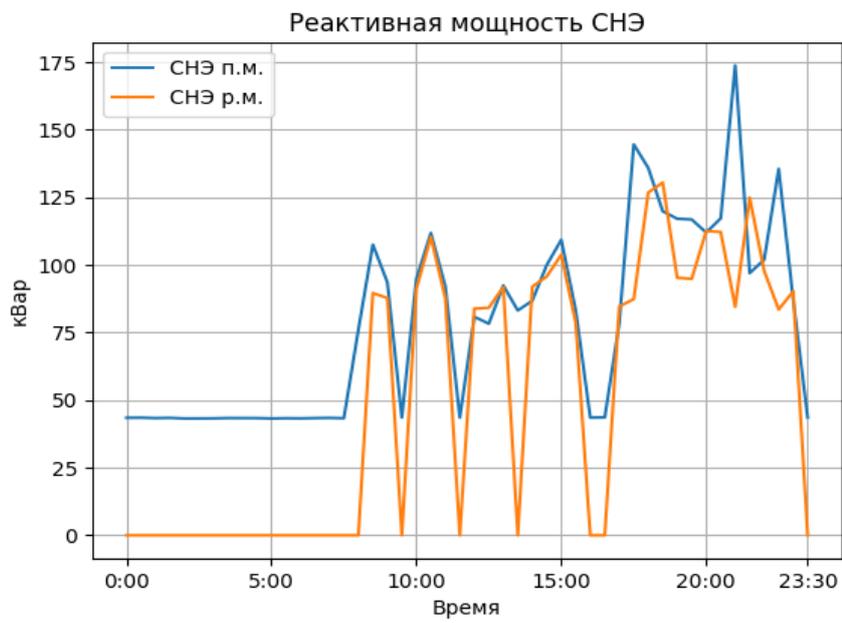


Рисунок 33.4 Узел - о1-7

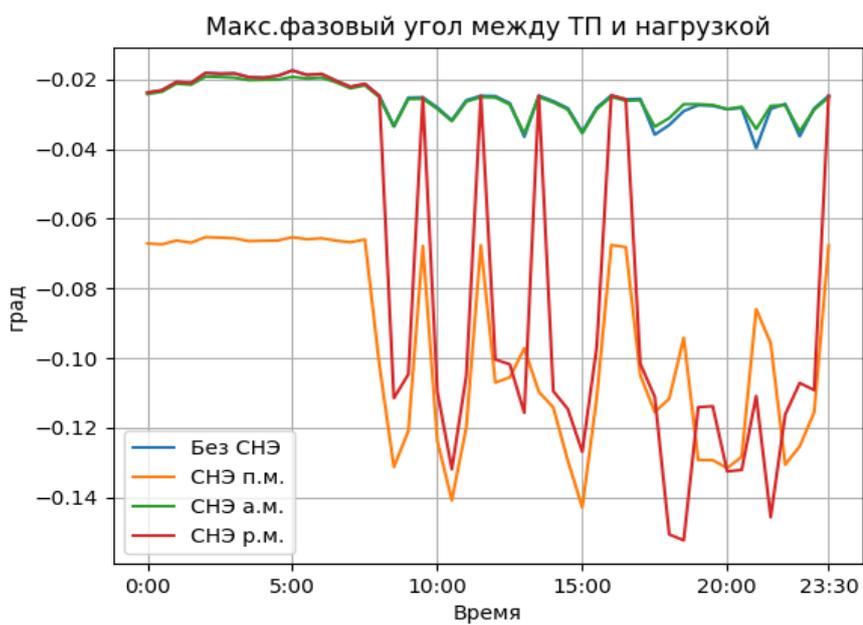


Рисунок 33.5 Узел - о1-7

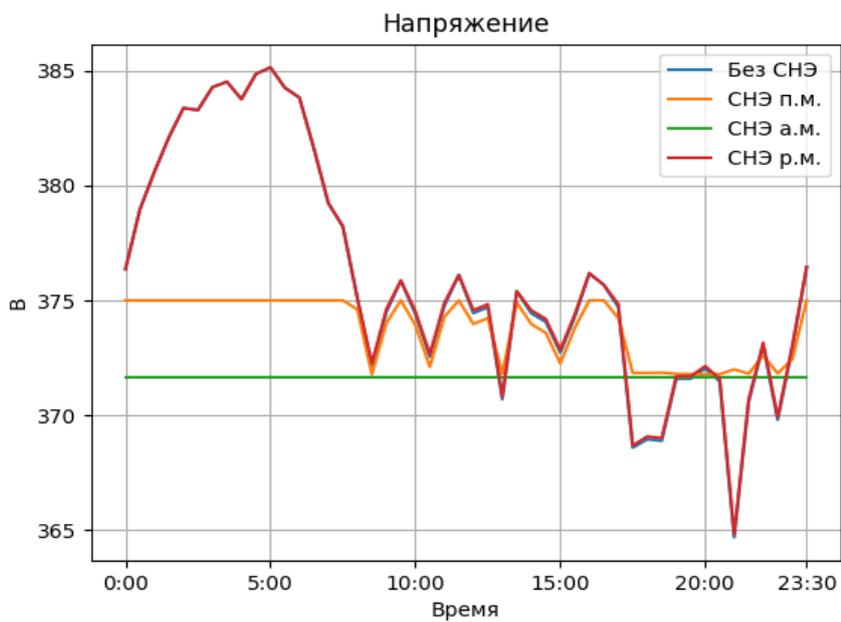


Рисунок 34.1 Узел - а50

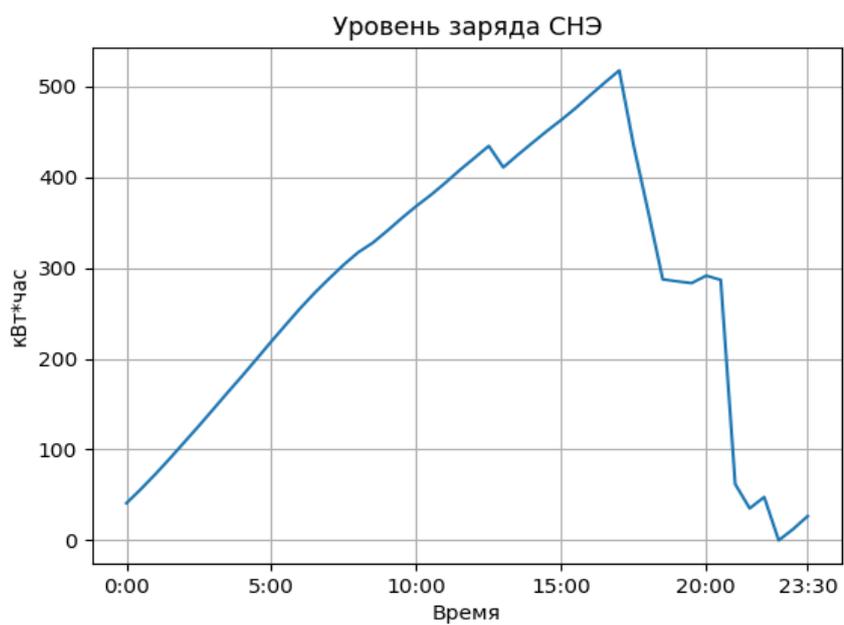


Рисунок 34.2 Узел - а50

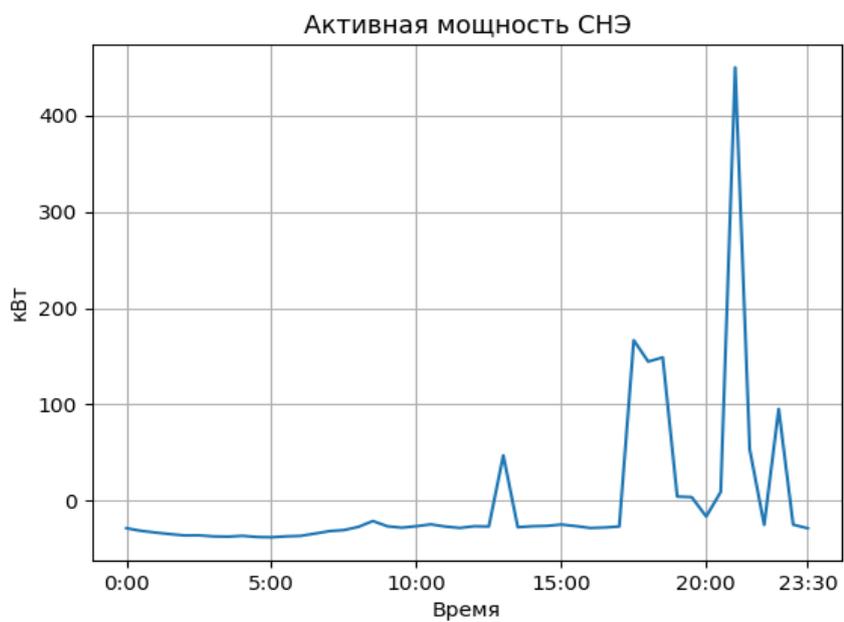


Рисунок 34.3 Узел - а50

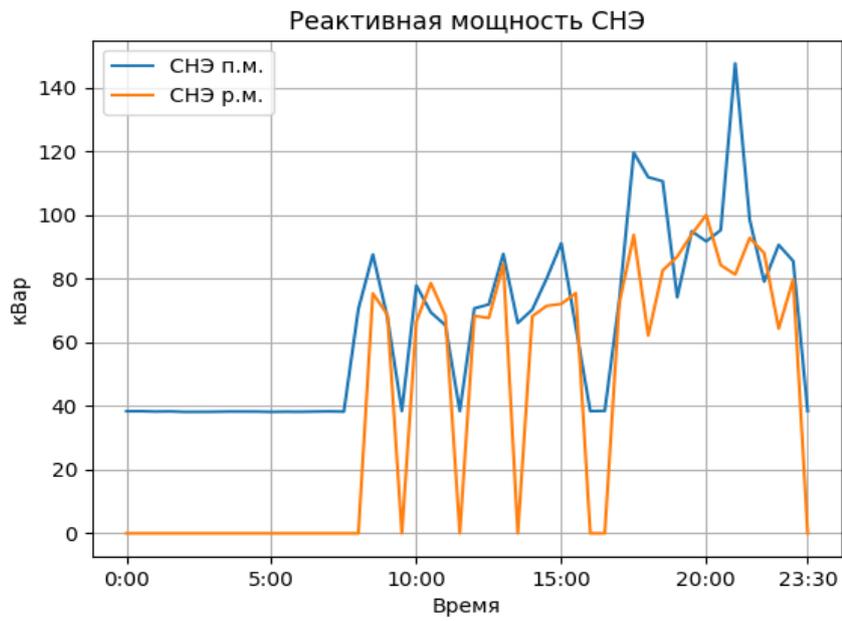


Рисунок 34.4 Узел - а50

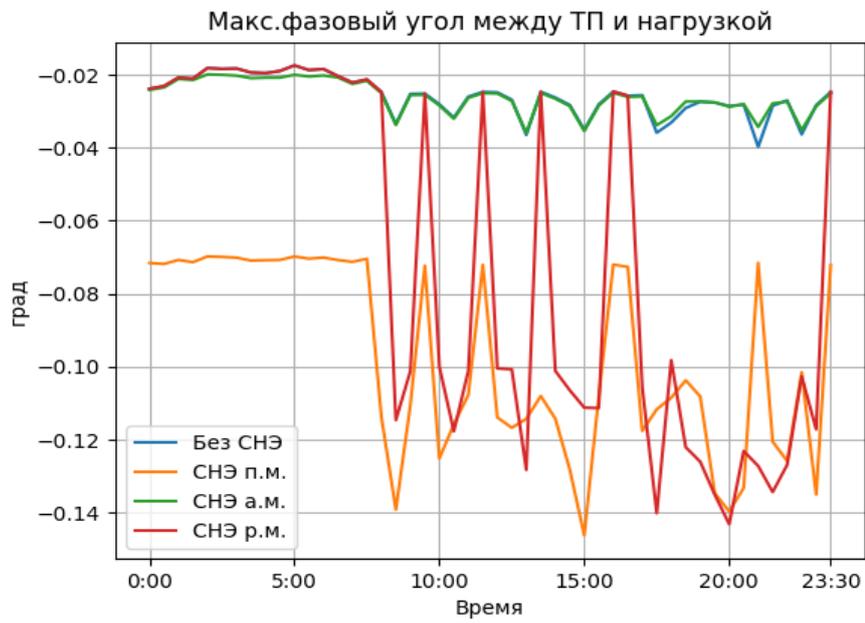


Рисунок 34.5 Узел - а50

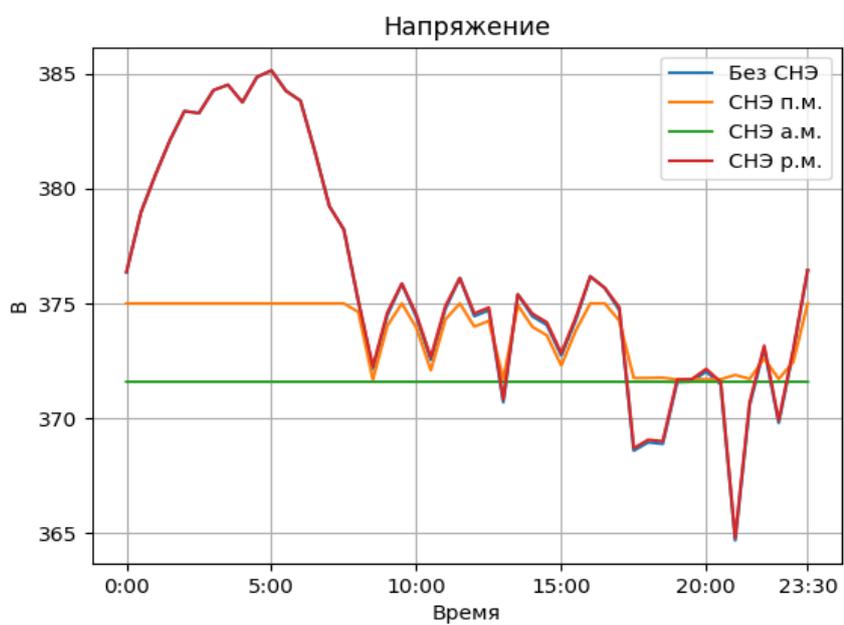


Рисунок 35.1 Узел - а51

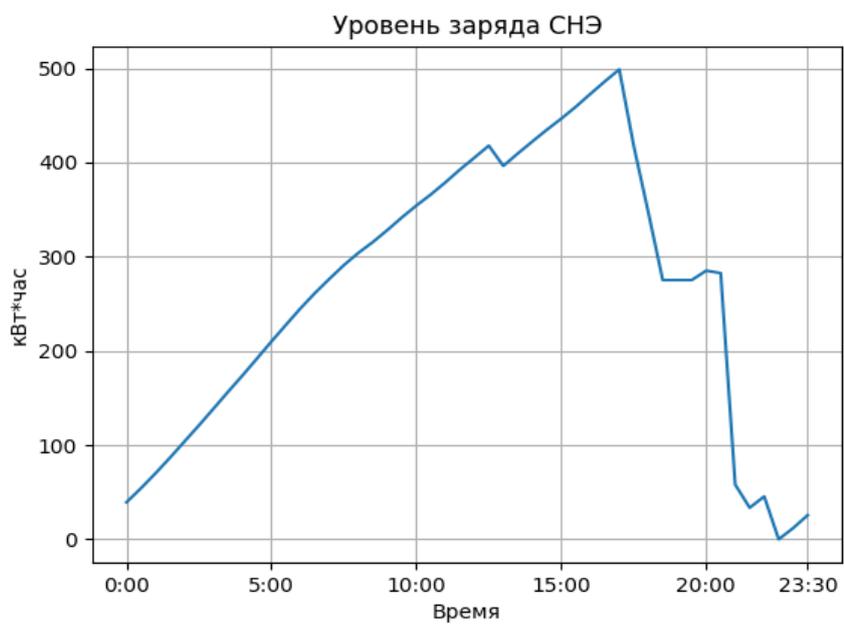


Рисунок 35.2 Узел - а51

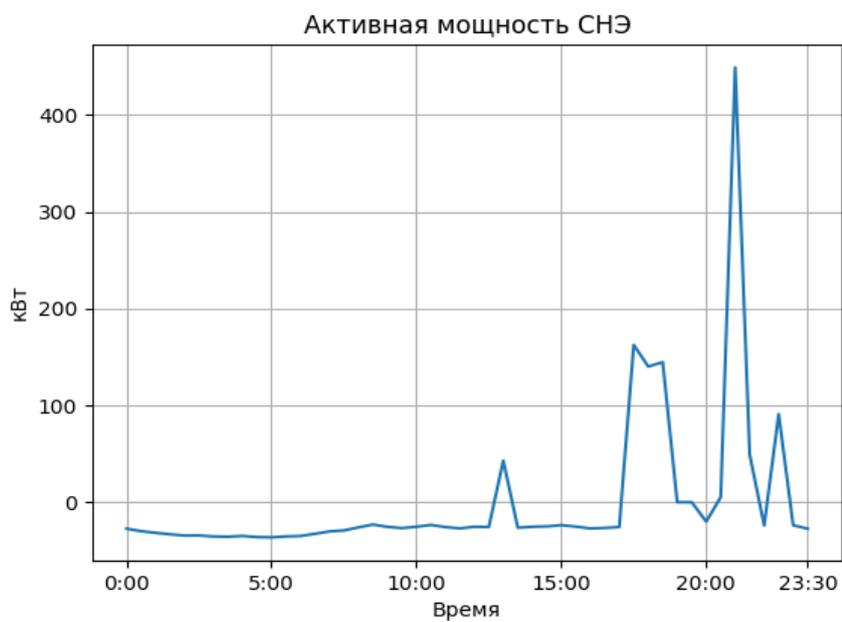


Рисунок 35.3 Узел - а51

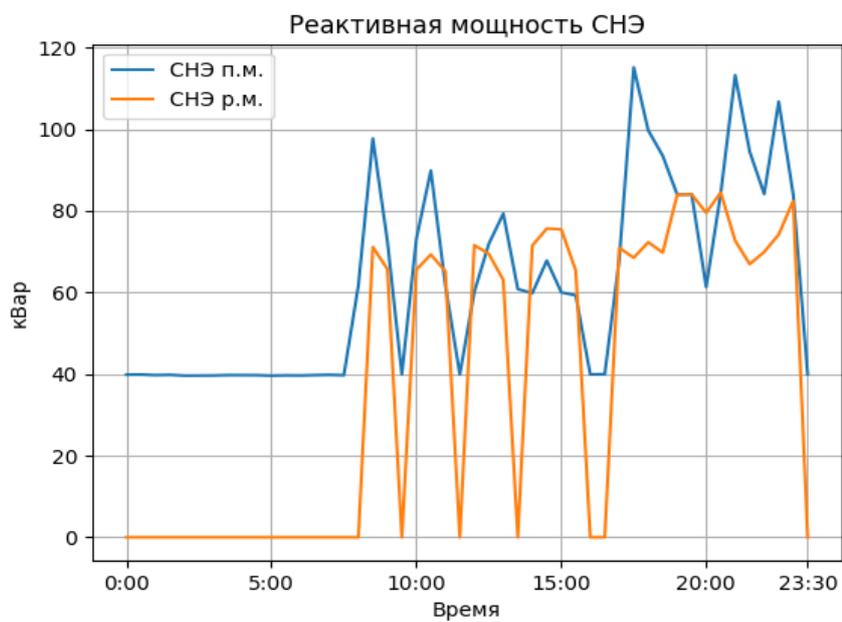


Рисунок 35.4 Узел - а51

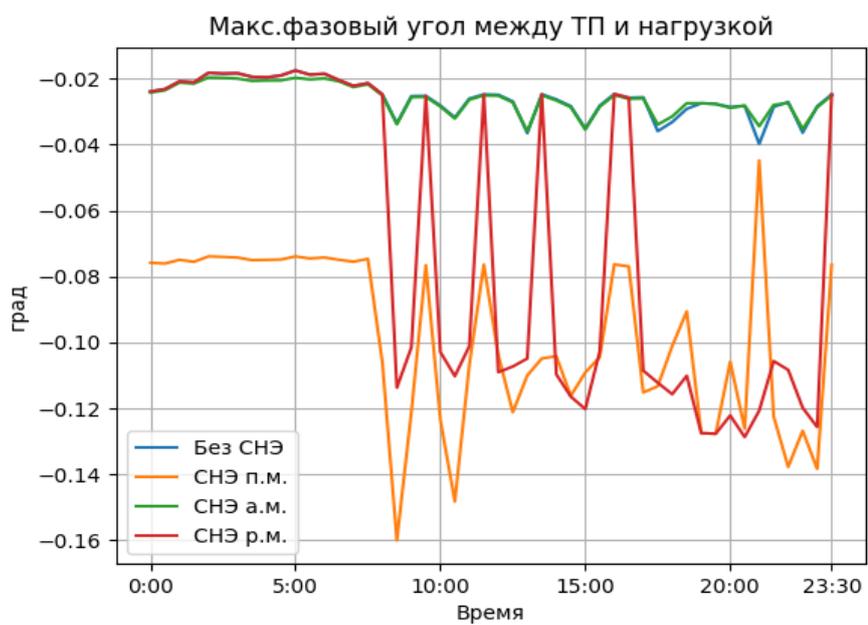


Рисунок 35.5 Узел - а51

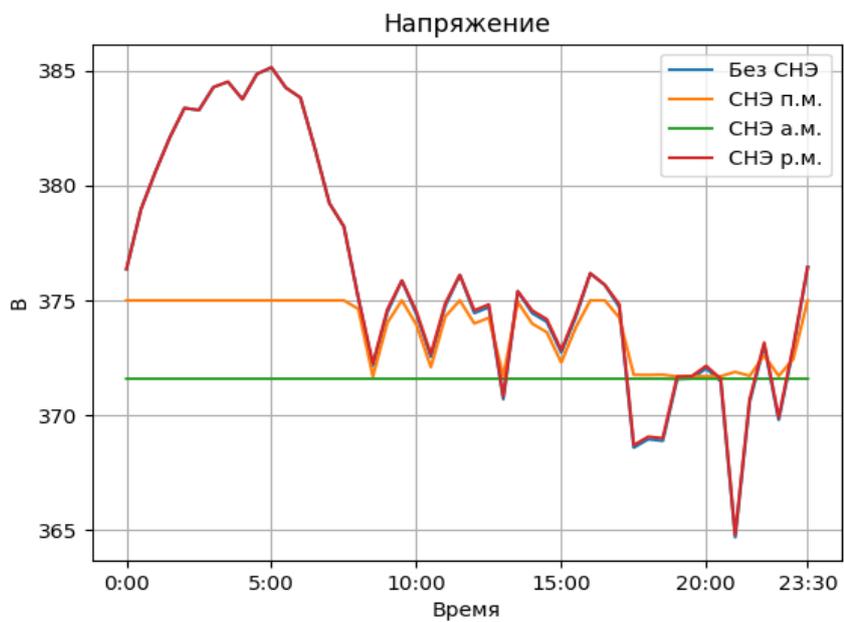


Рисунок 36.1 Узел - о2-5

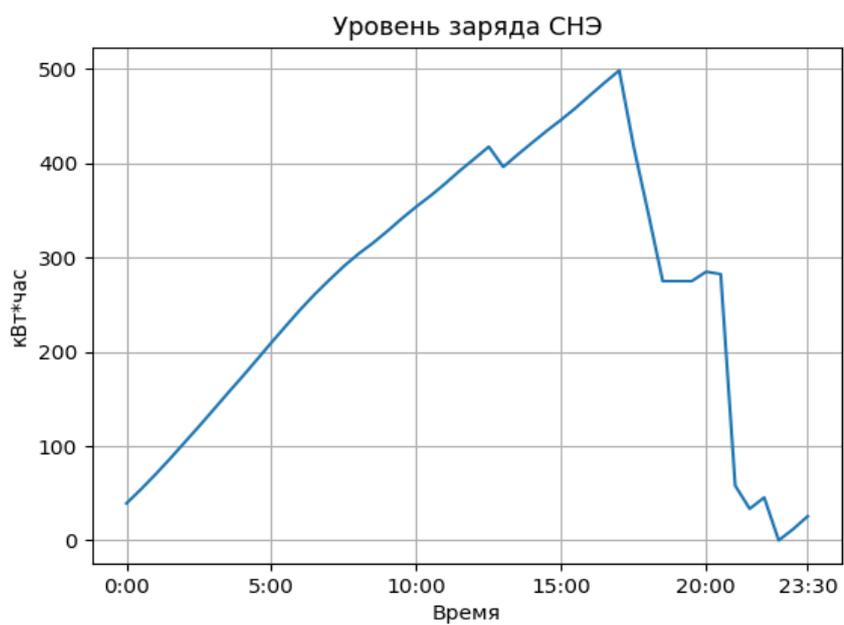


Рисунок 36.2 Узел - о2-5

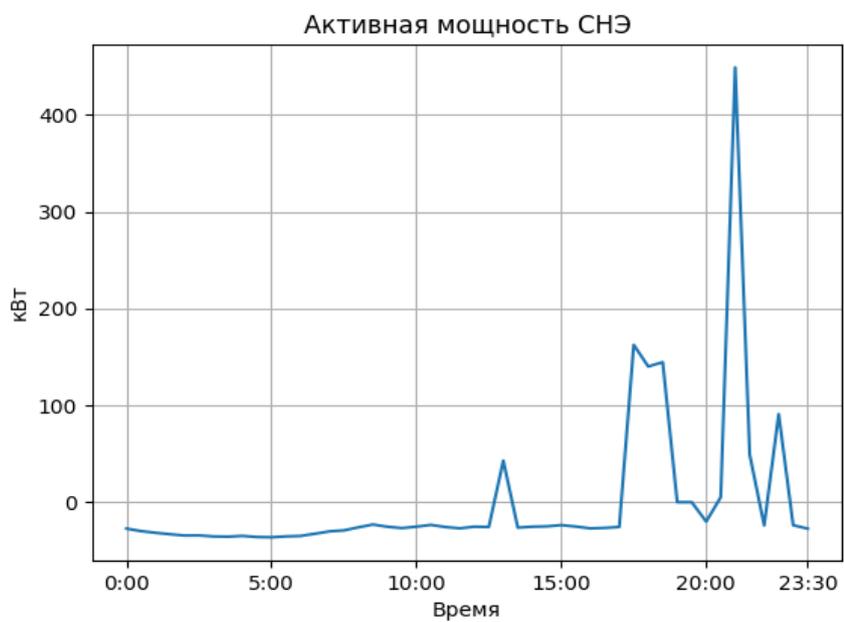


Рисунок 36.3 Узел - о2-5

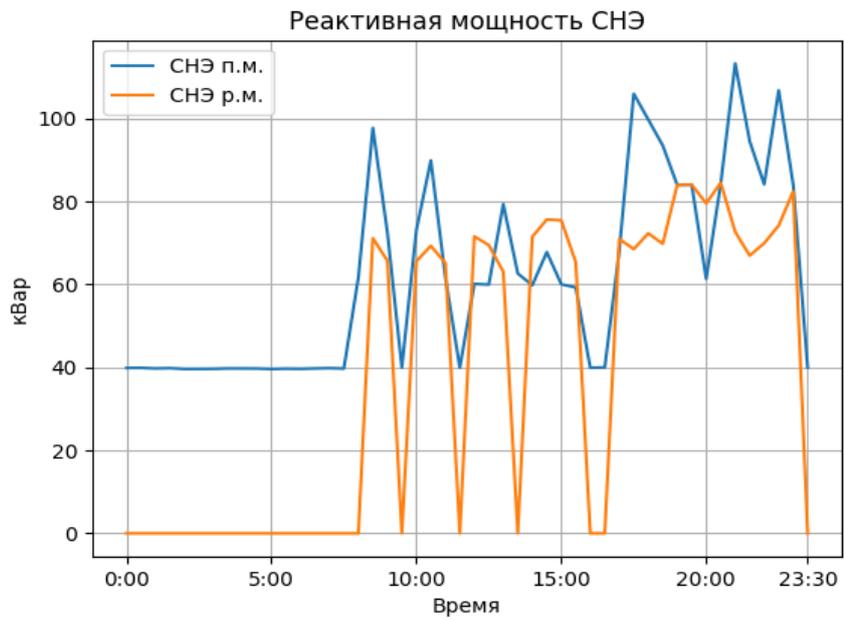


Рисунок 36.4 Узел - о2-5

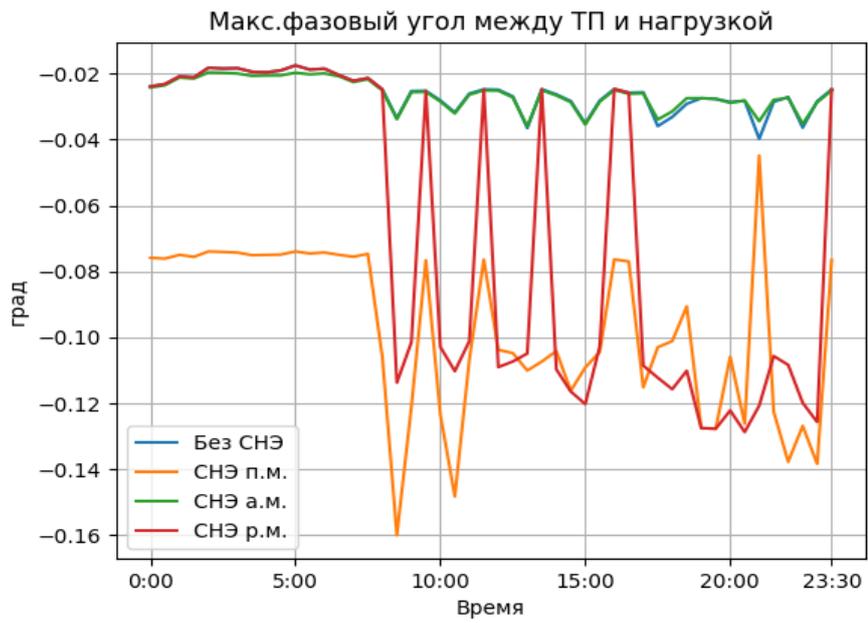


Рисунок 36.5 Узел - о2-5

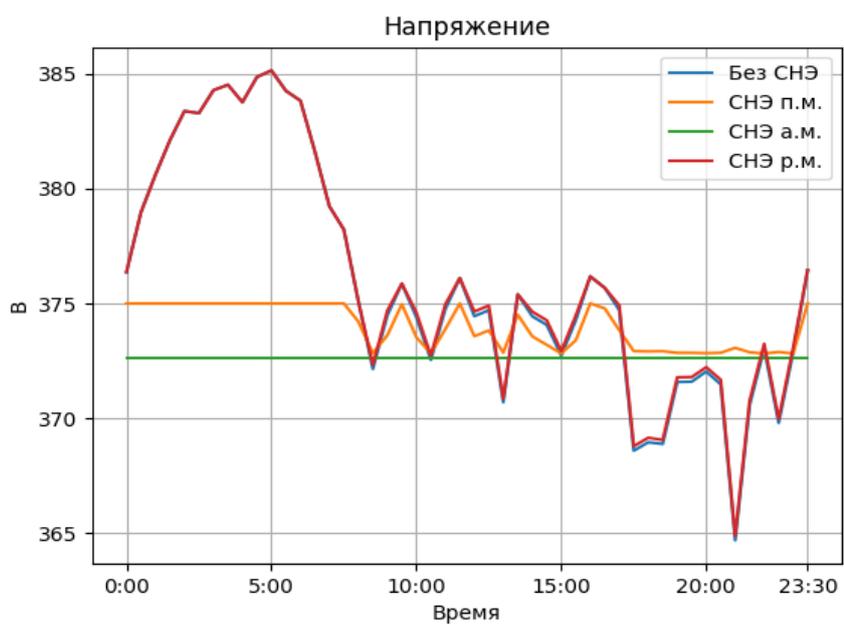


Рисунок 37.1 Узел - а52

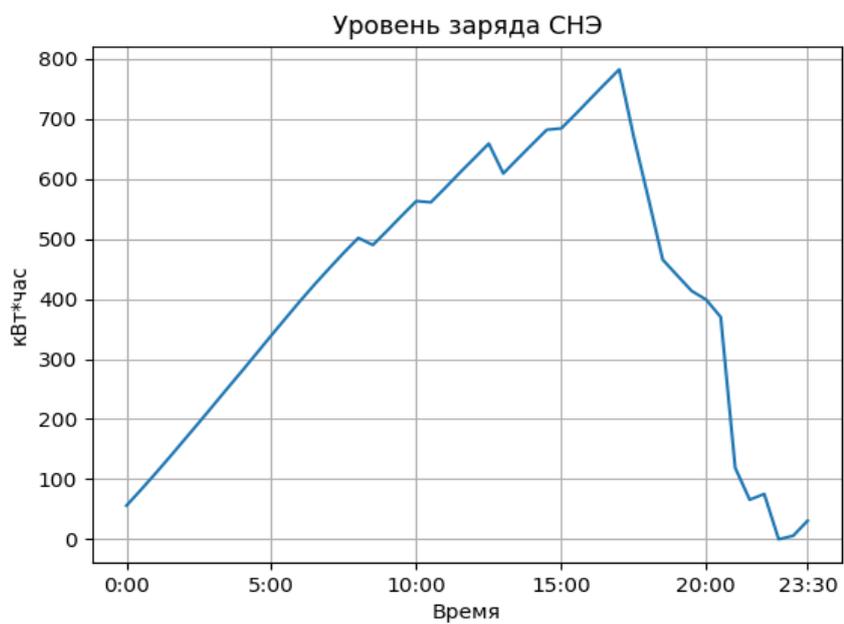


Рисунок 37.2 Узел - а52

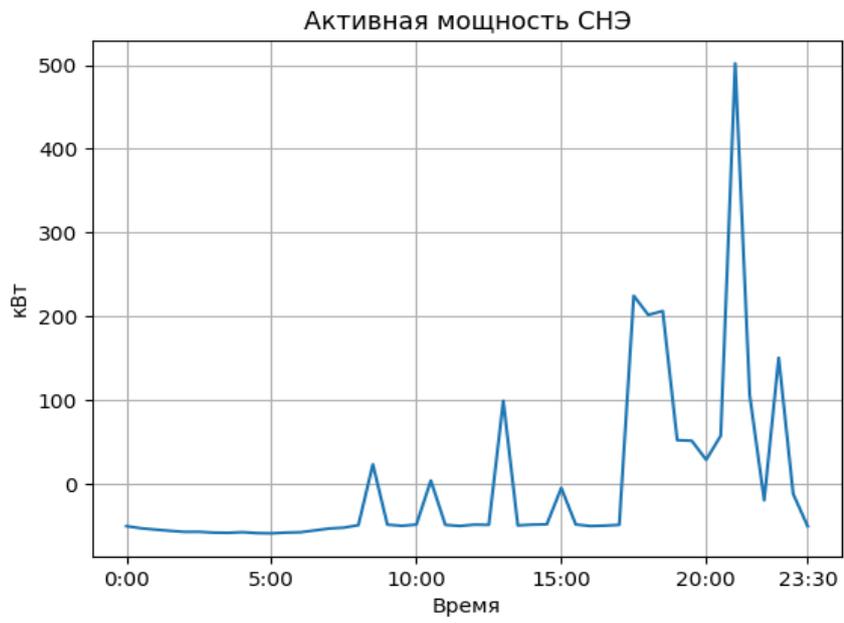


Рисунок 37.3 Узел - а52

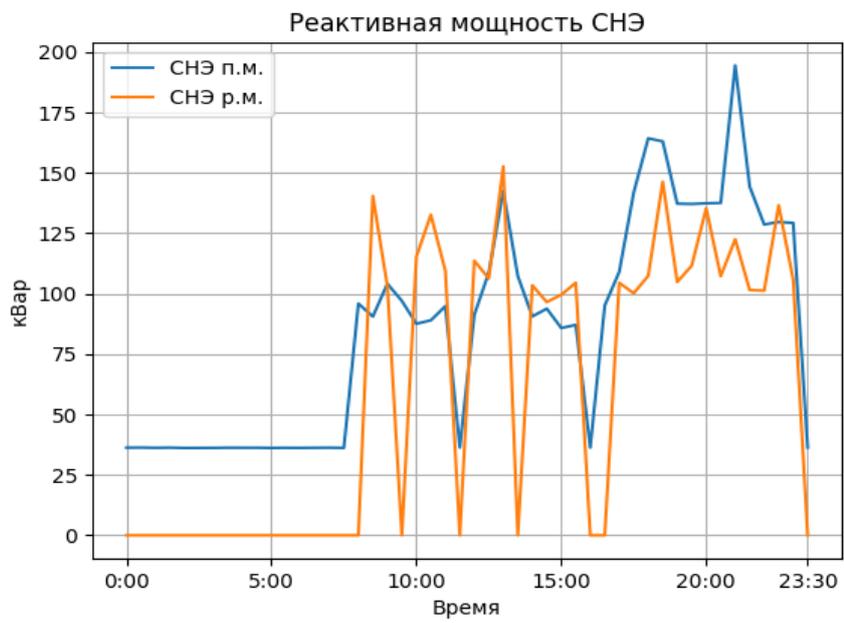


Рисунок 37.4 Узел - а52

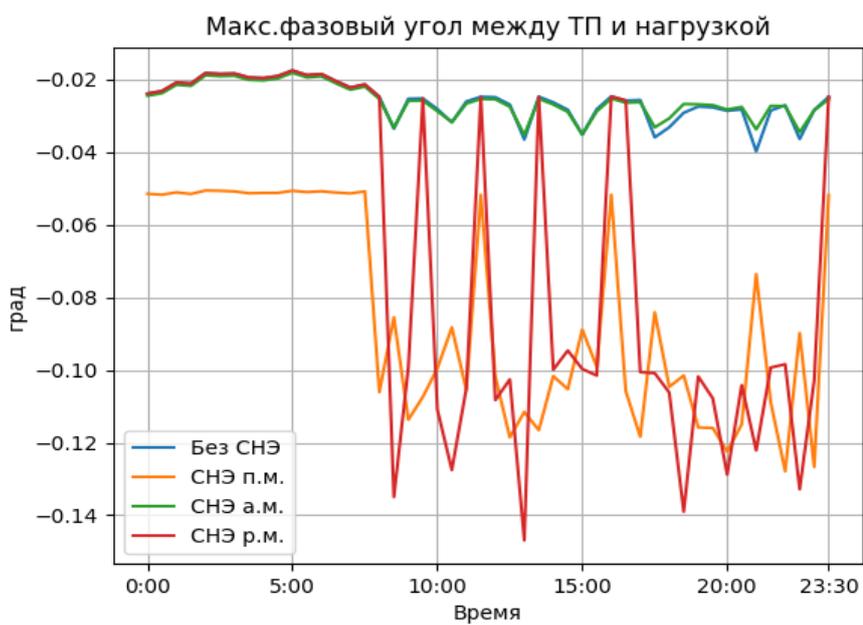


Рисунок 37.5 Узел - а52

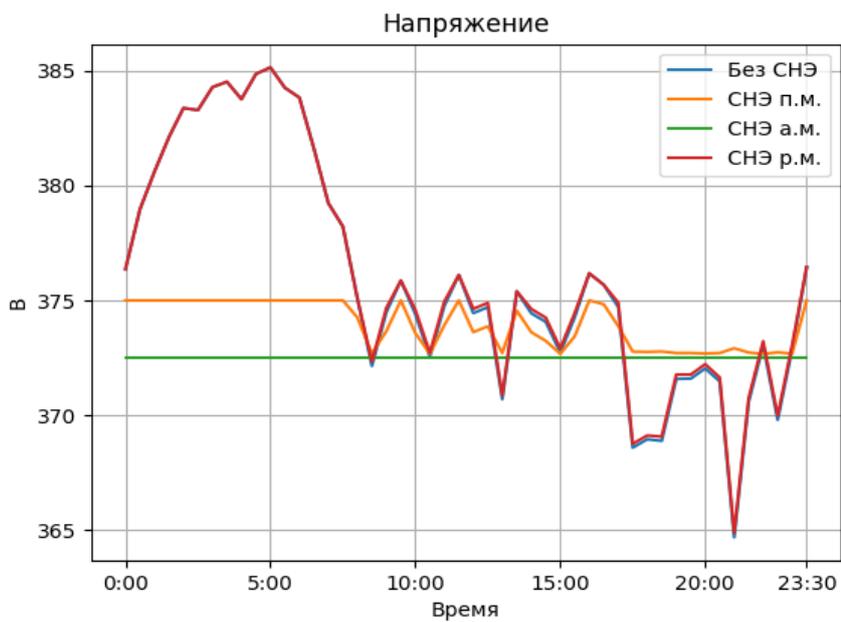


Рисунок 38.1 Узел - о2-7

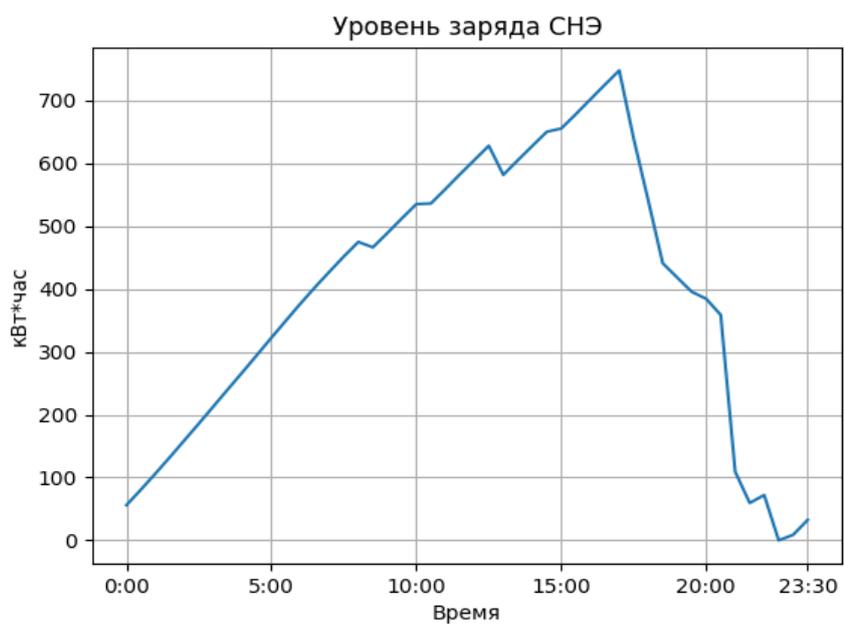


Рисунок 38.2 Узел - о2-7

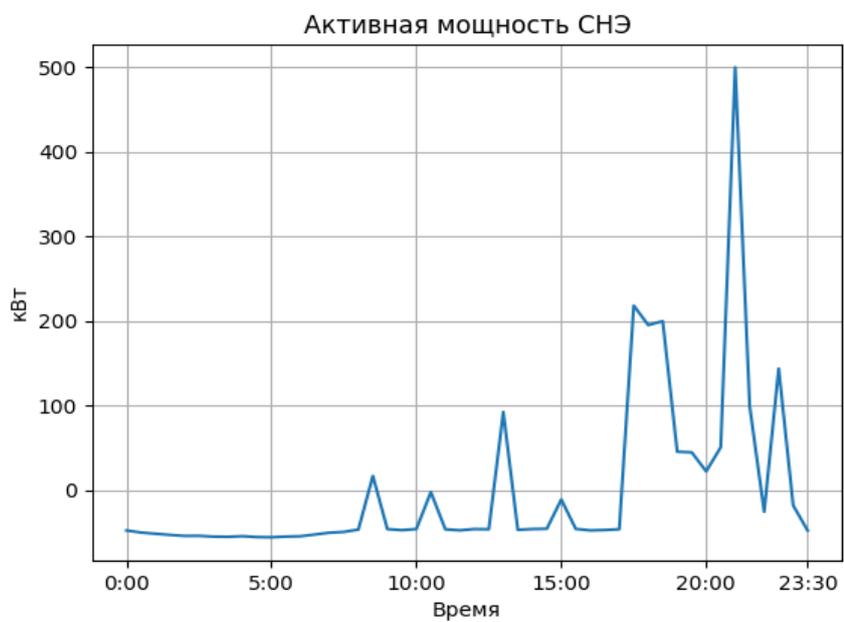


Рисунок 38.3 Узел - о2-7

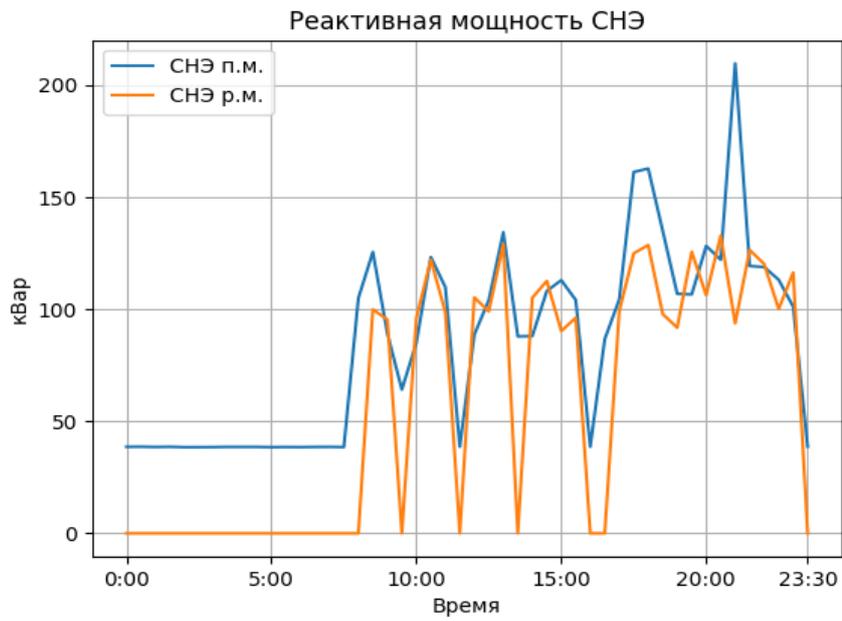


Рисунок 38.4 Узел - о2-7

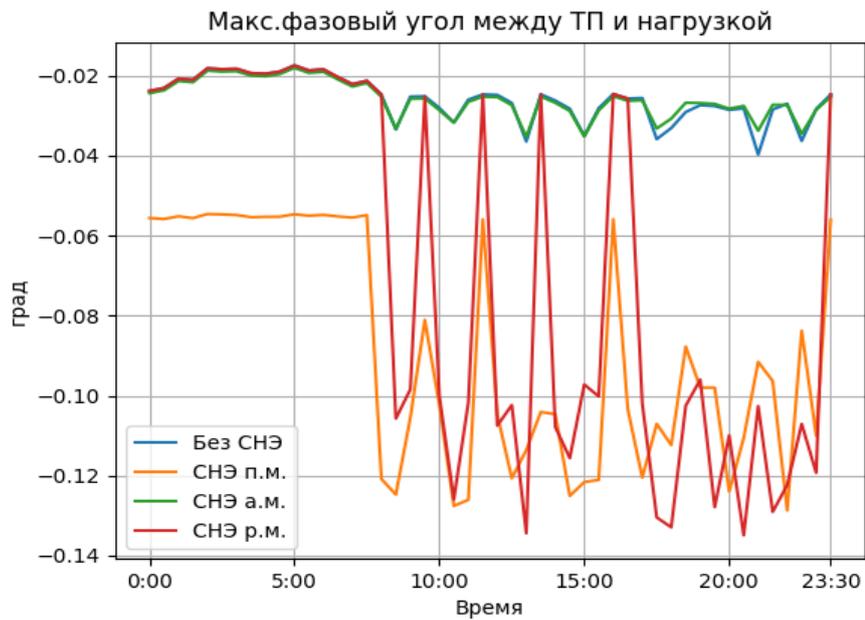


Рисунок 38.5 Узел - о2-7

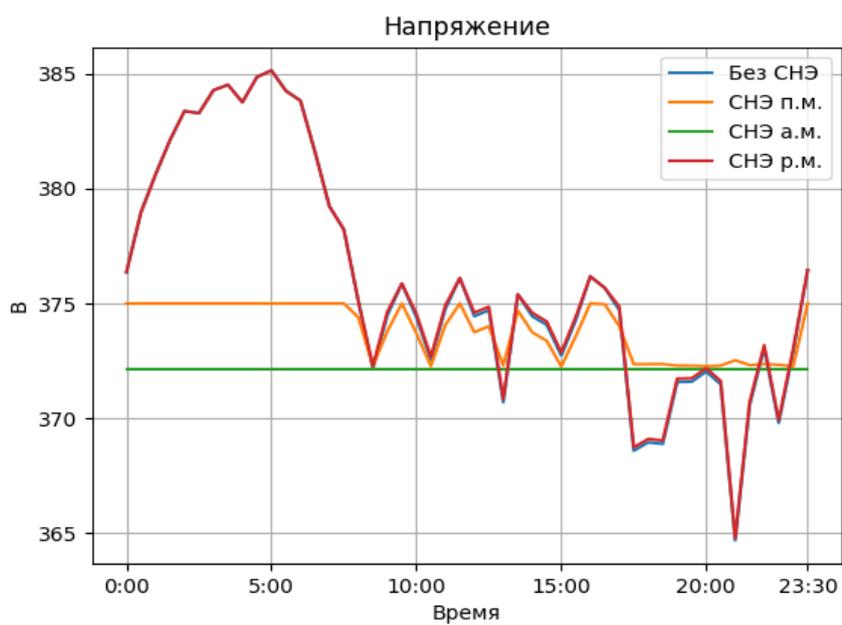


Рисунок 39.1 Узел - а53



Рисунок 39.2 Узел - а53

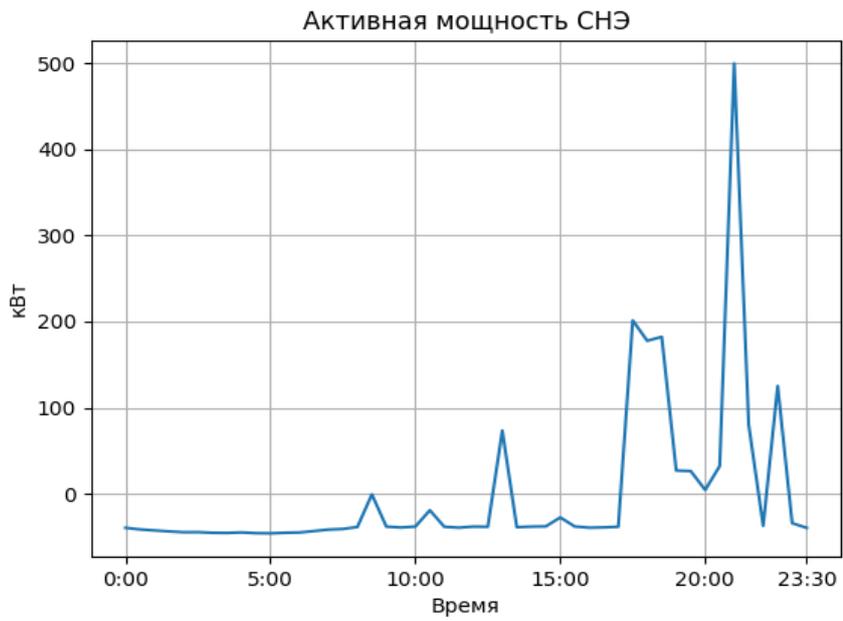


Рисунок 39.3 Узел - а53

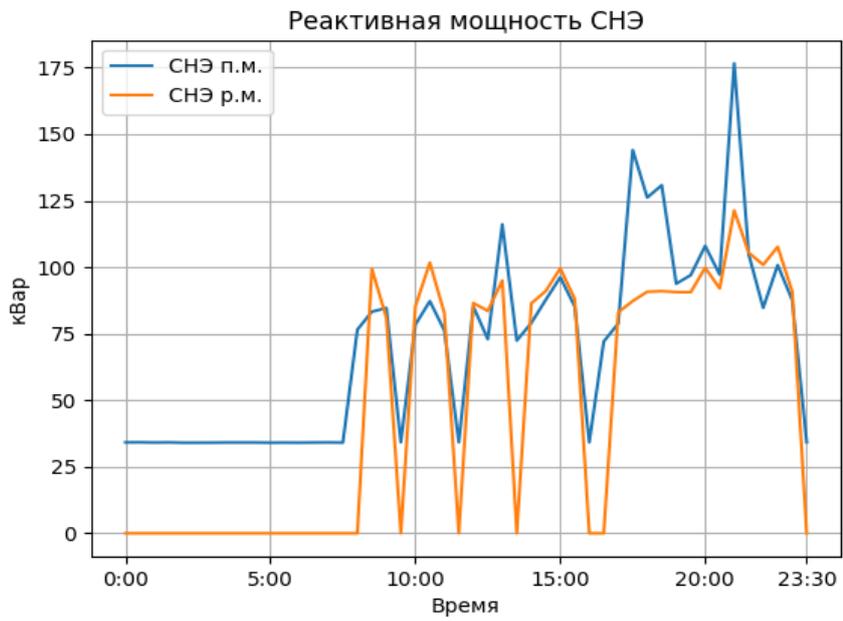


Рисунок 39.4 Узел - а53

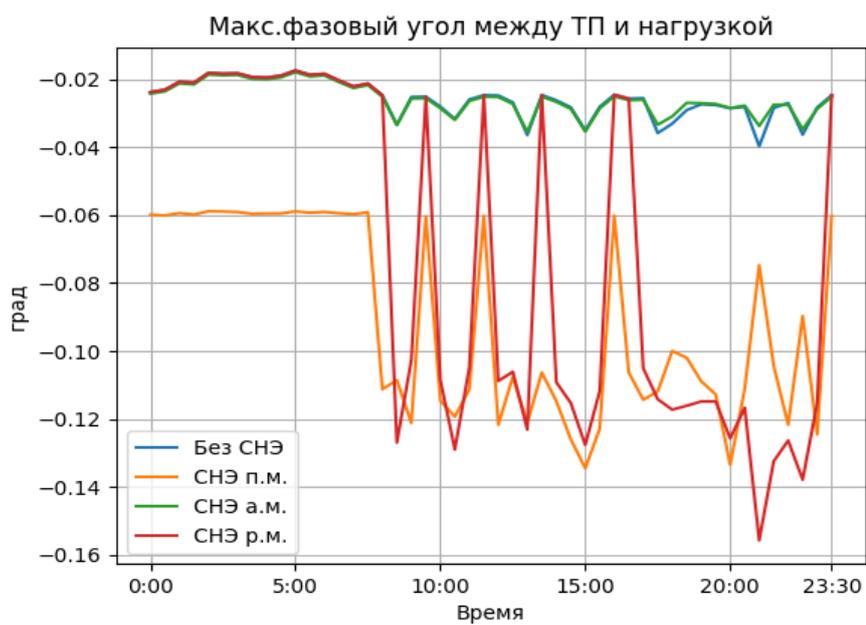


Рисунок 39.5 Узел - а53

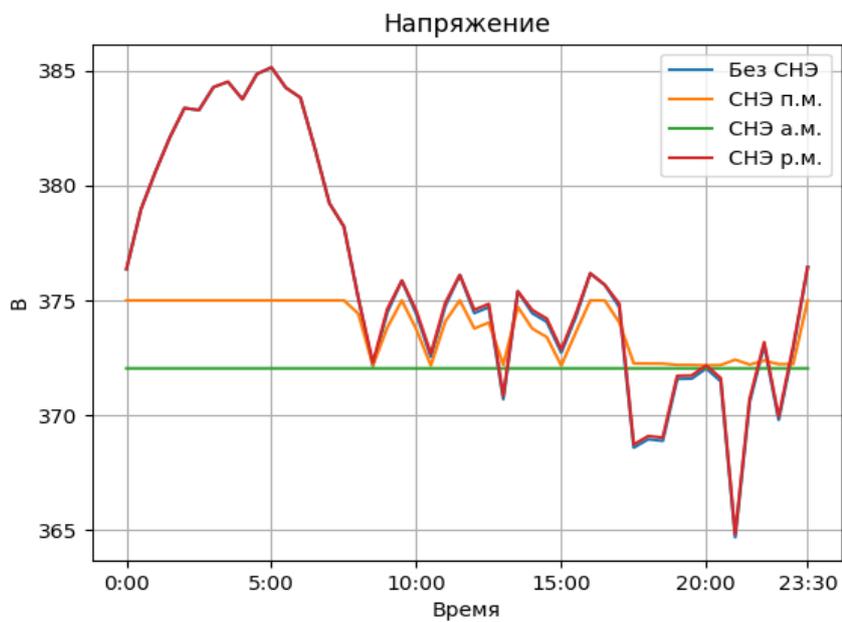


Рисунок 40.1 Узел - о3-1

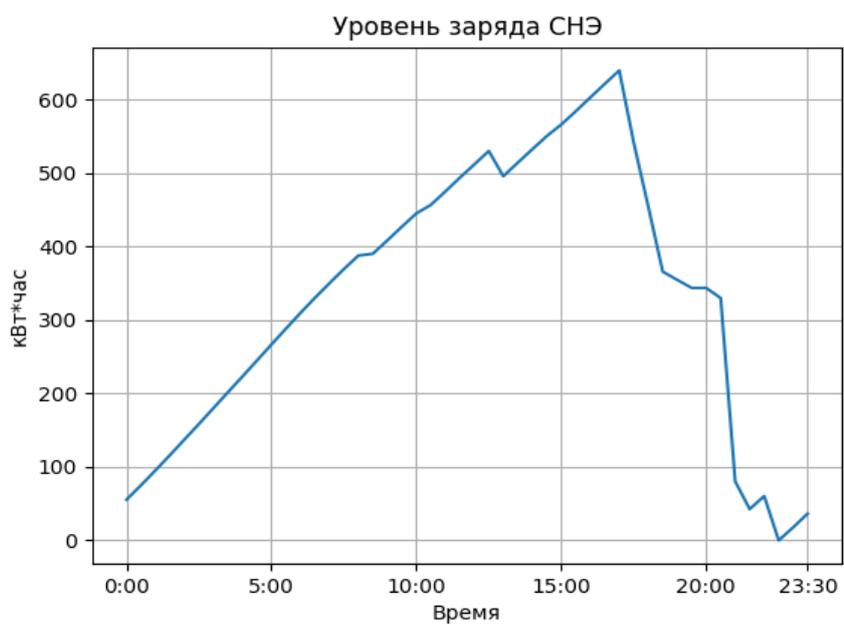


Рисунок 40.2 Узел - о3-1

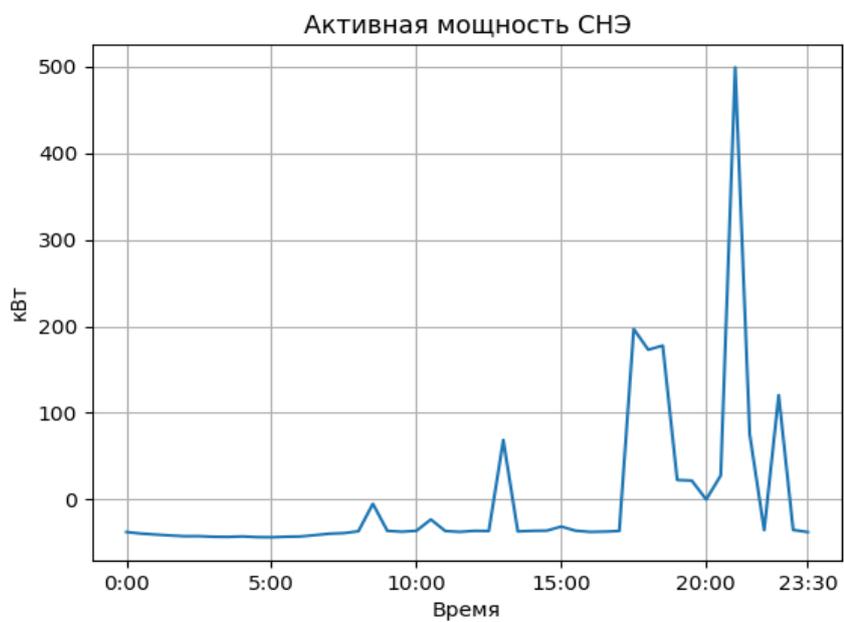


Рисунок 40.3 Узел - о3-1

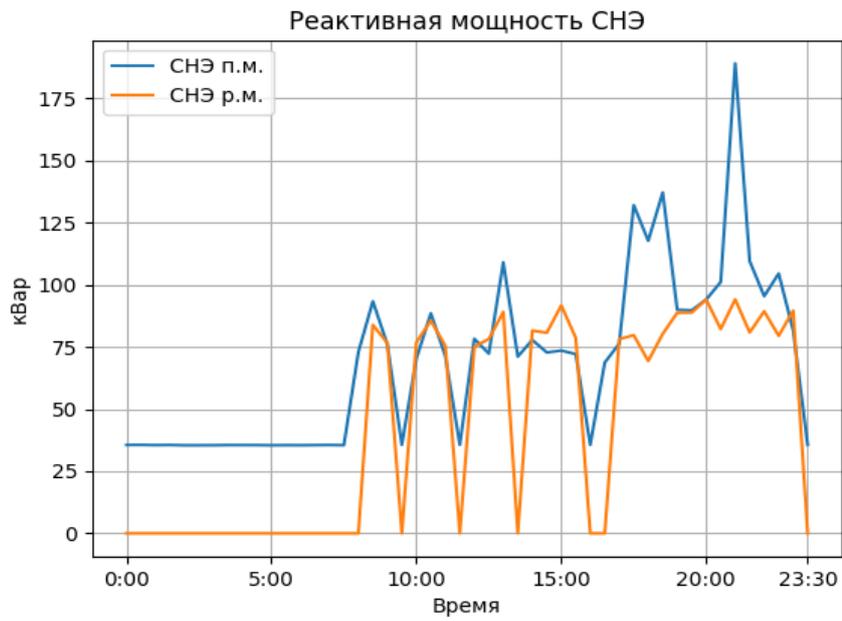


Рисунок 40.4 Узел - о3-1

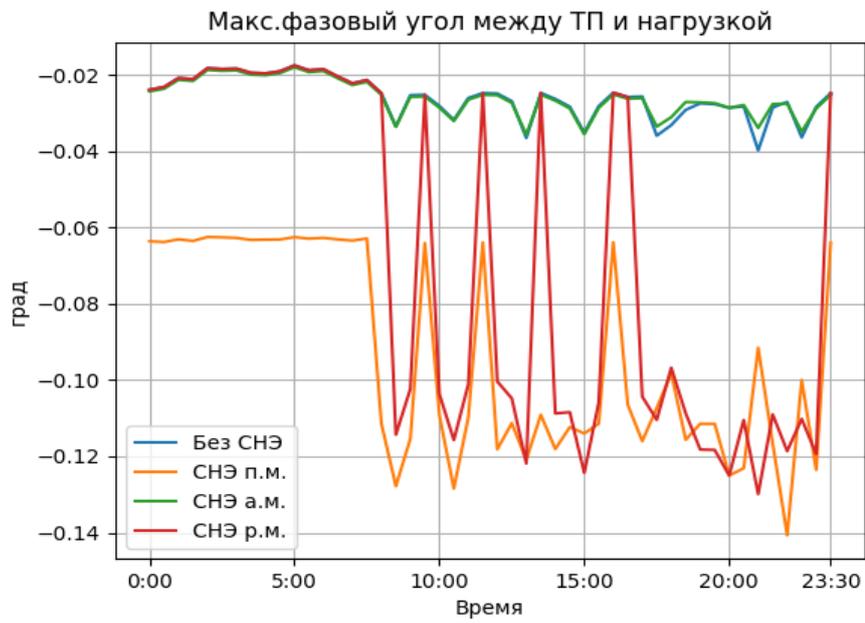


Рисунок 40.5 Узел - о3-1

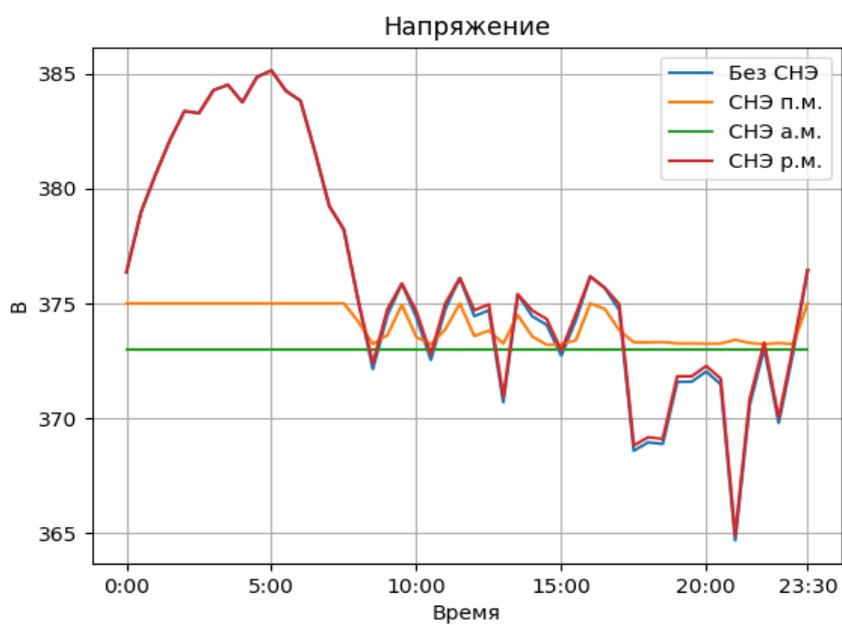


Рисунок 41.1 Узел - а54

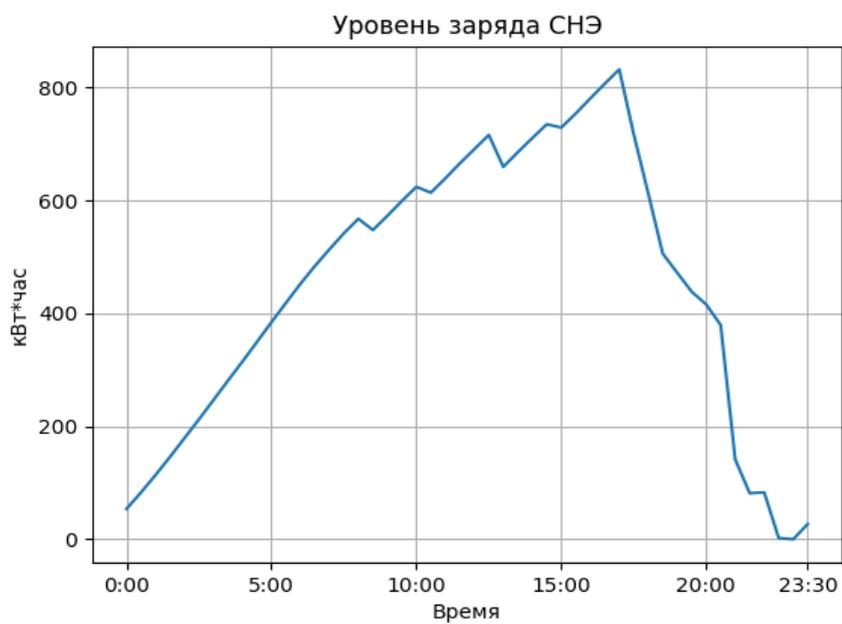


Рисунок 41.2 Узел - а54

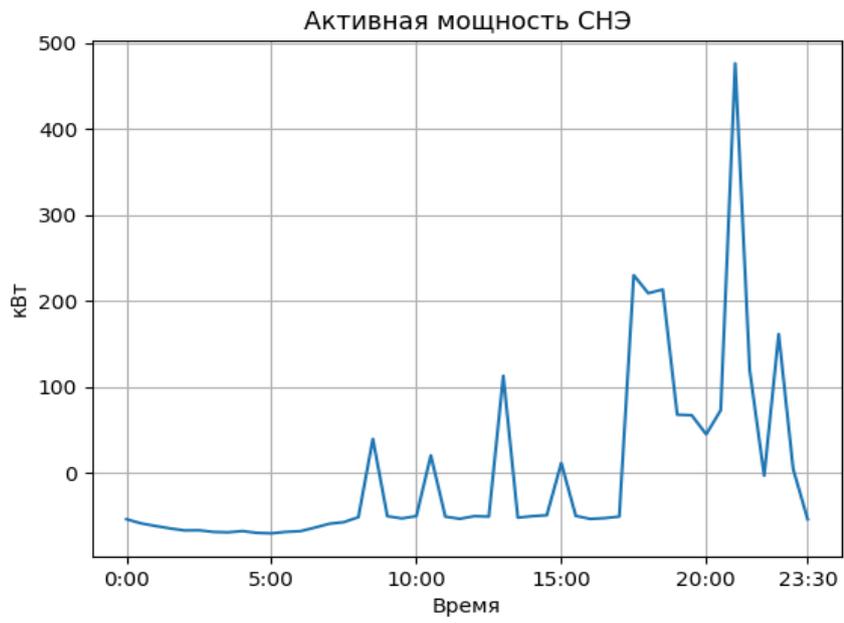


Рисунок 41.3 Узел - а54

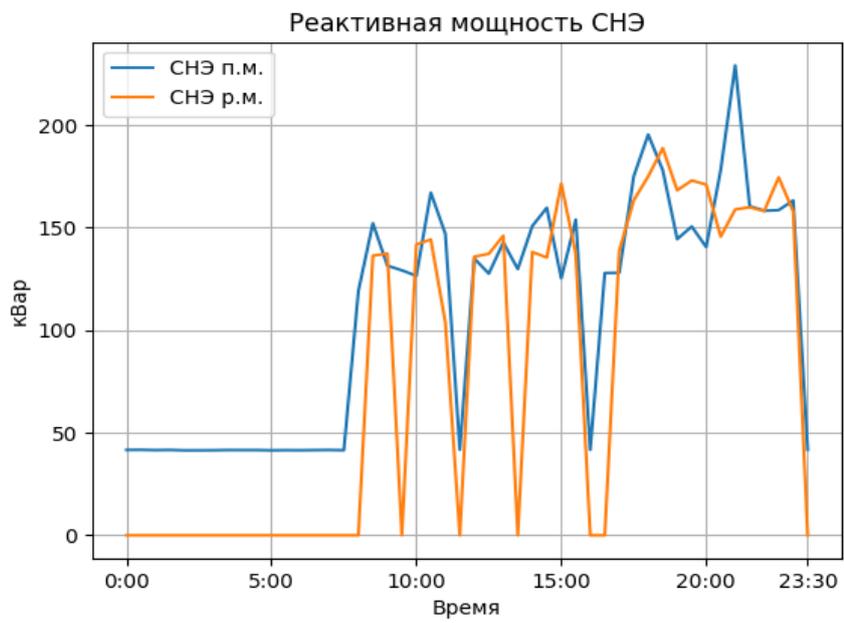


Рисунок 41.4 Узел - а54

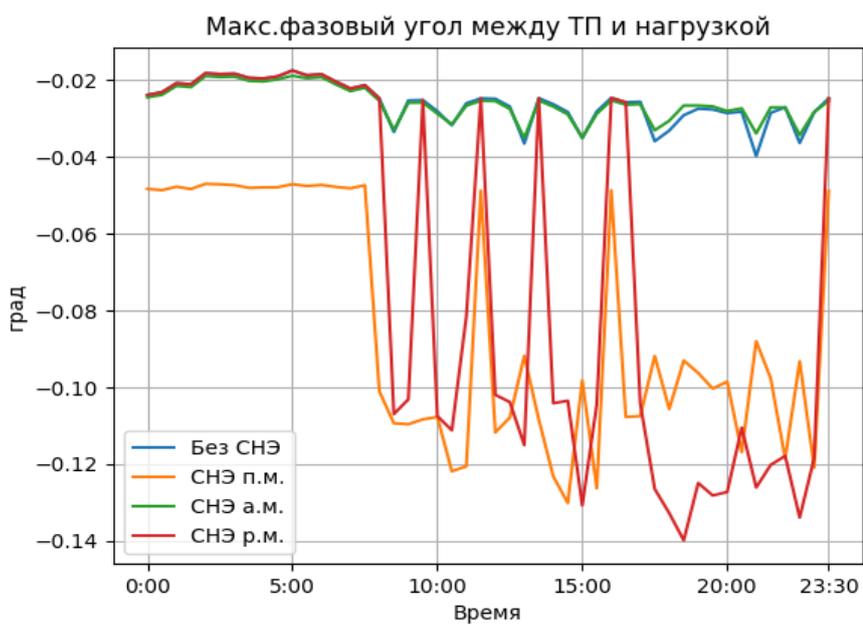


Рисунок 41.5 Узел - а54

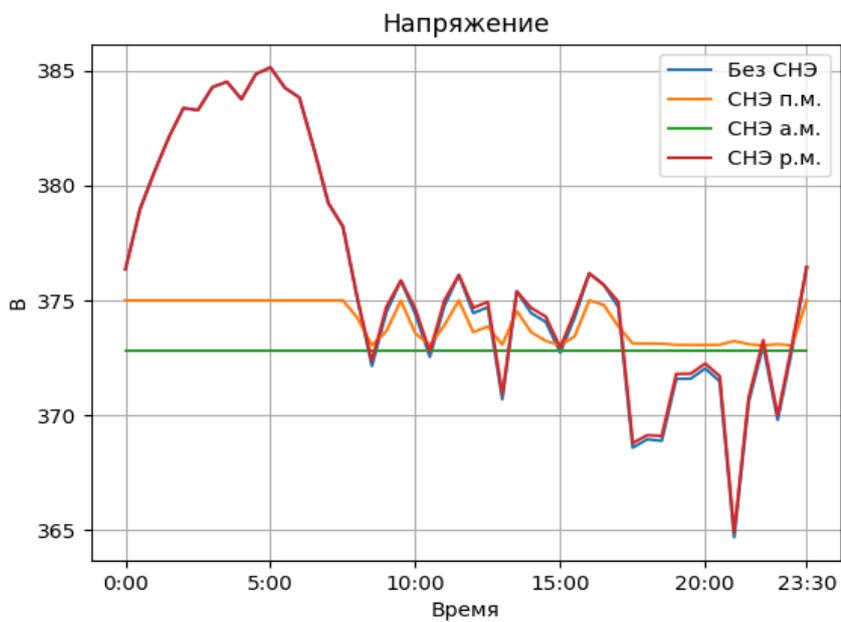


Рисунок 42.1 Узел - а55

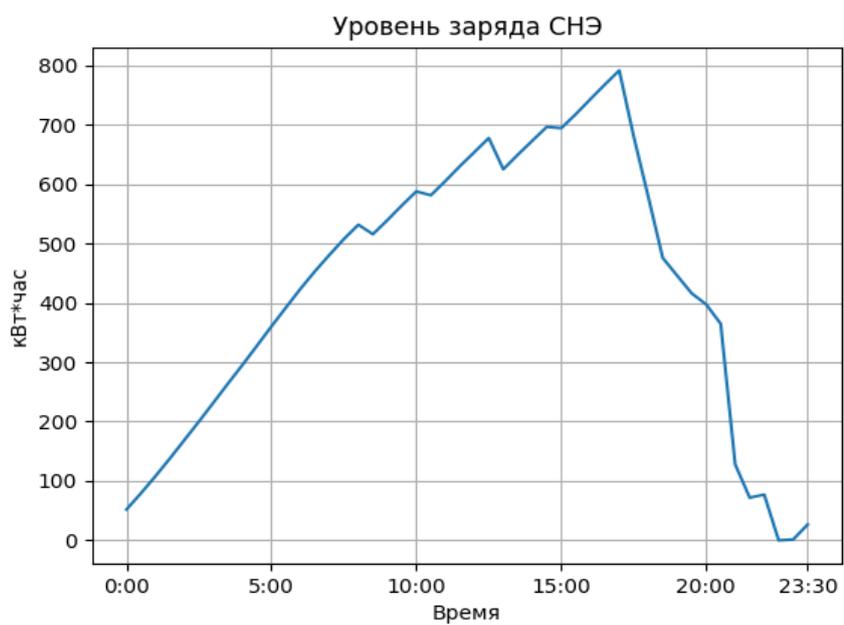


Рисунок 42.2 Узел - а55

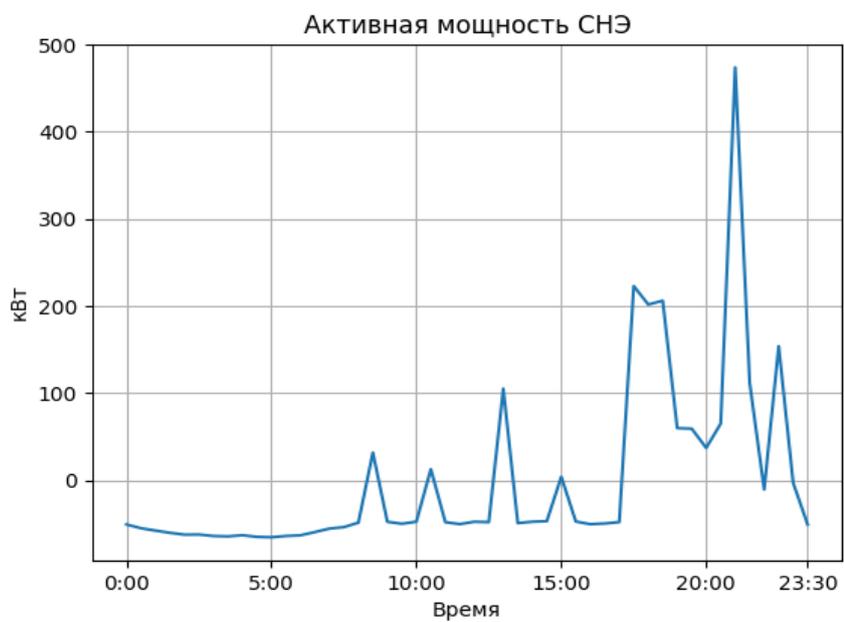


Рисунок 42.3 Узел - а55

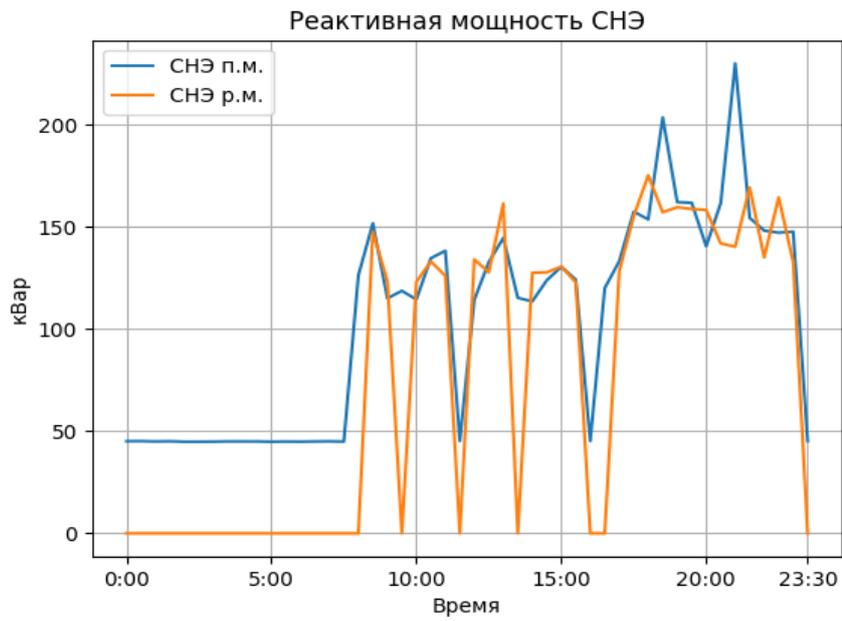


Рисунок 42.4 Узел - а55

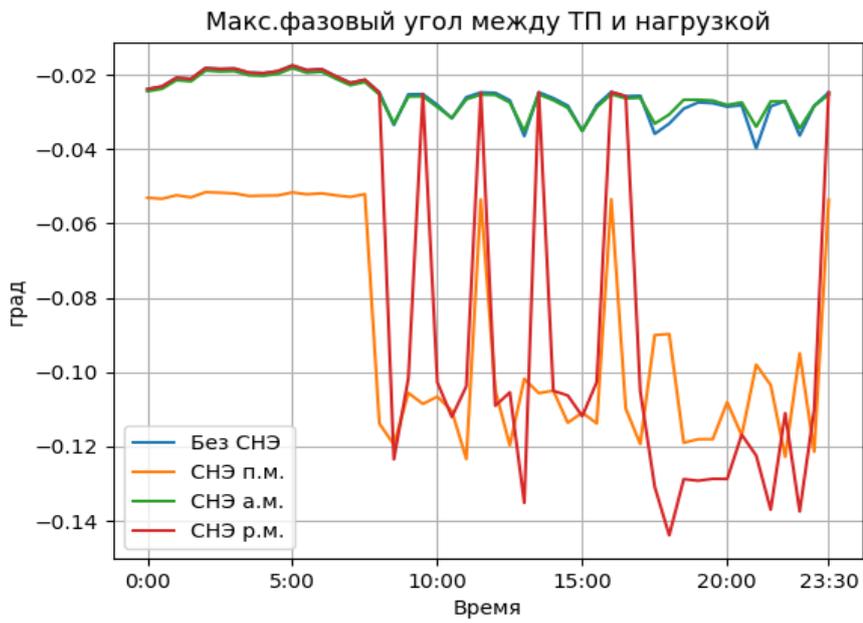


Рисунок 42.5 Узел - а55

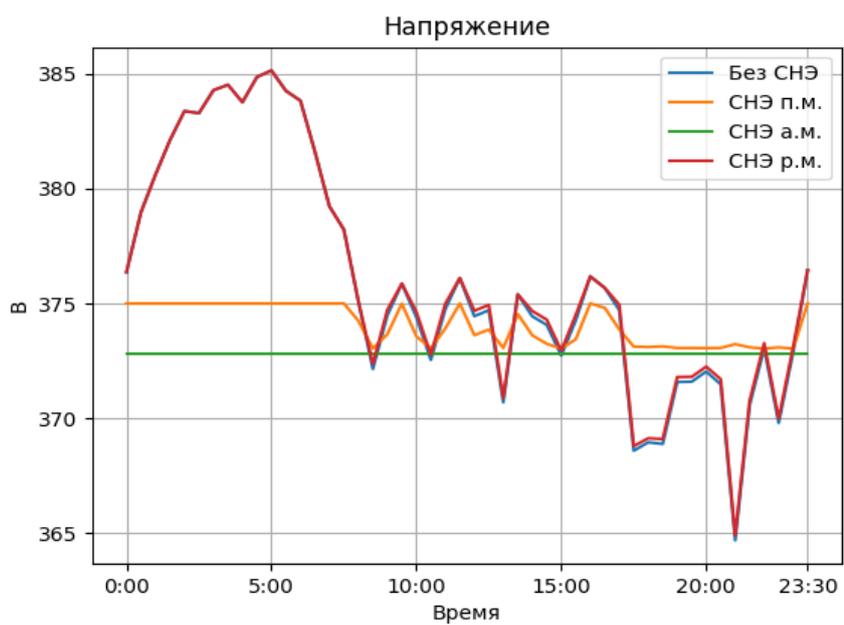


Рисунок 43.1 Узел - о3-2

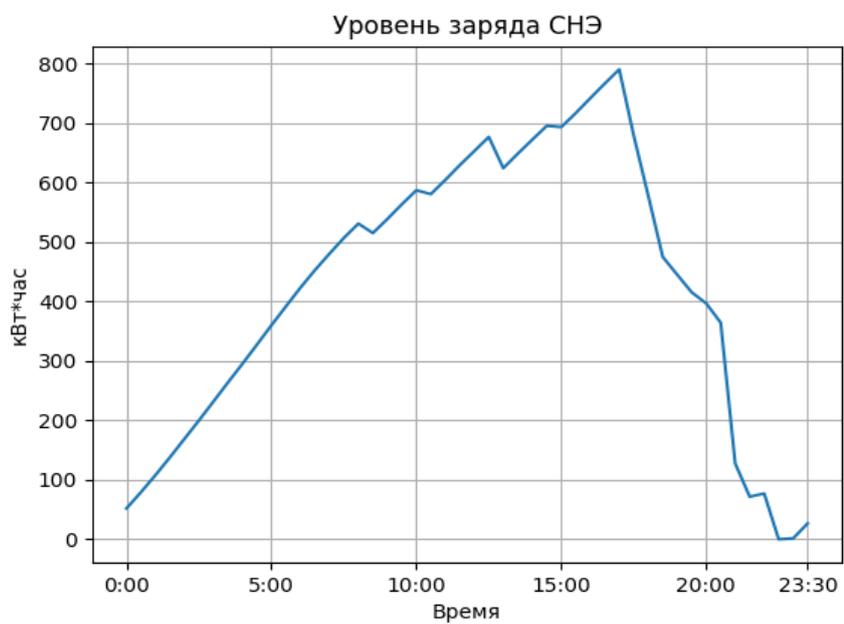


Рисунок 43.2 Узел - о3-2

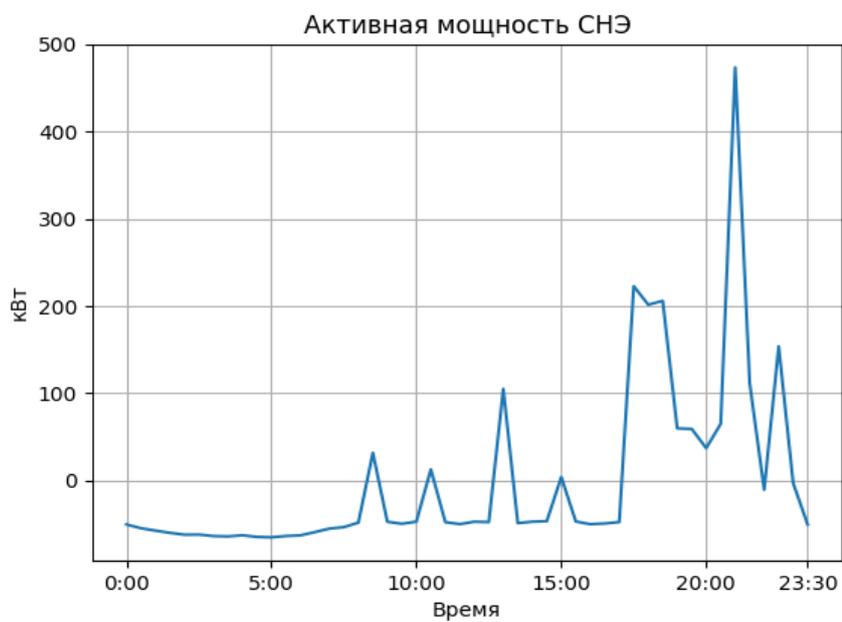


Рисунок 43.3 Узел - о3-2

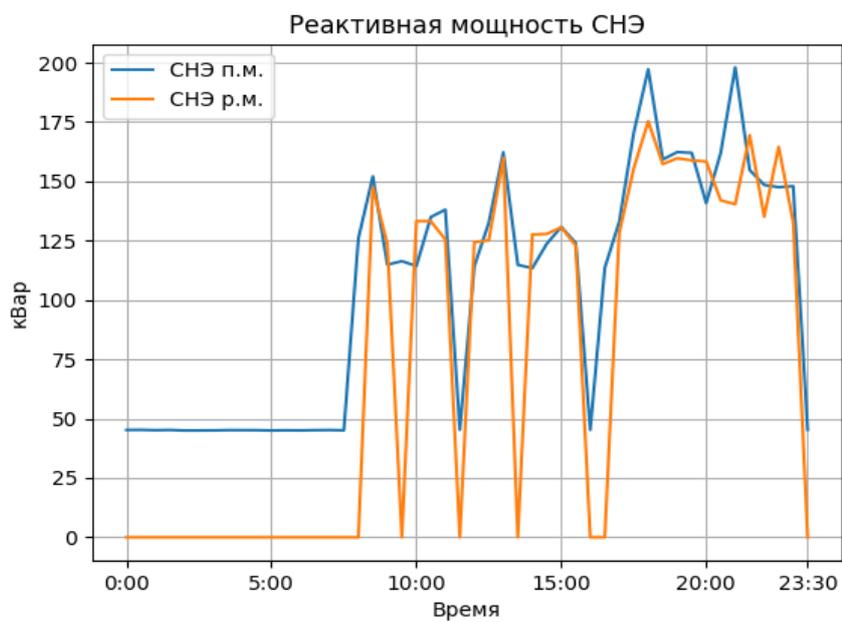


Рисунок 43.4 Узел - о3-2

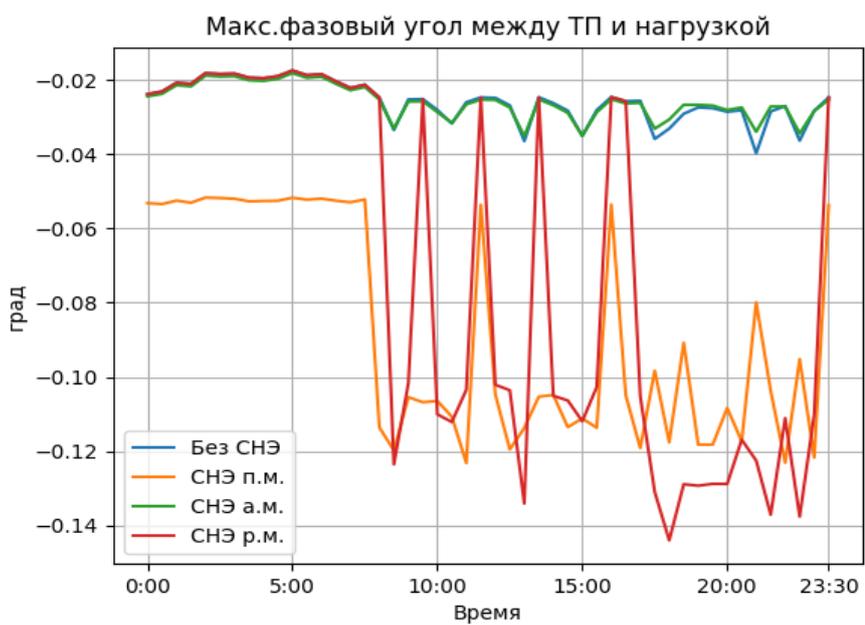


Рисунок 43.5 Узел - о3-2

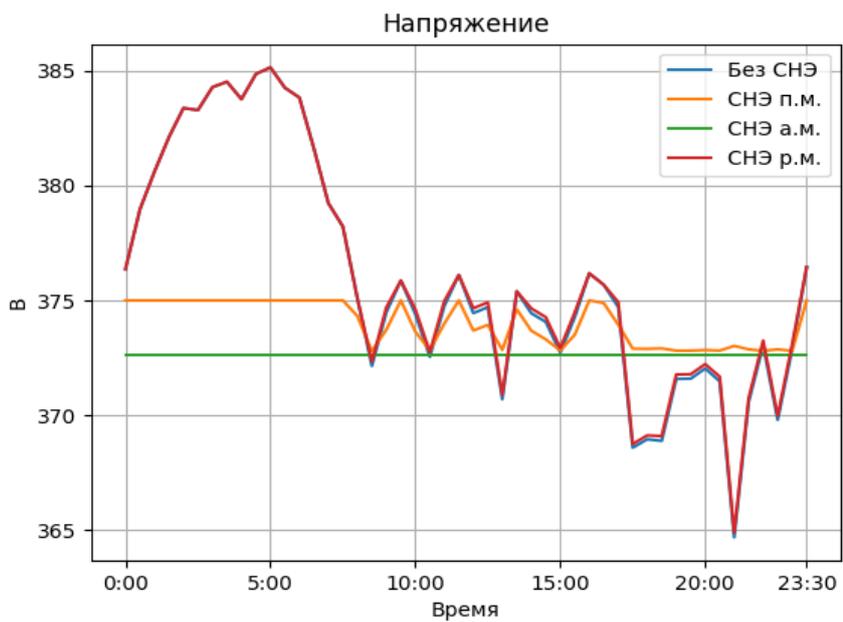


Рисунок 44.1 Узел - а56

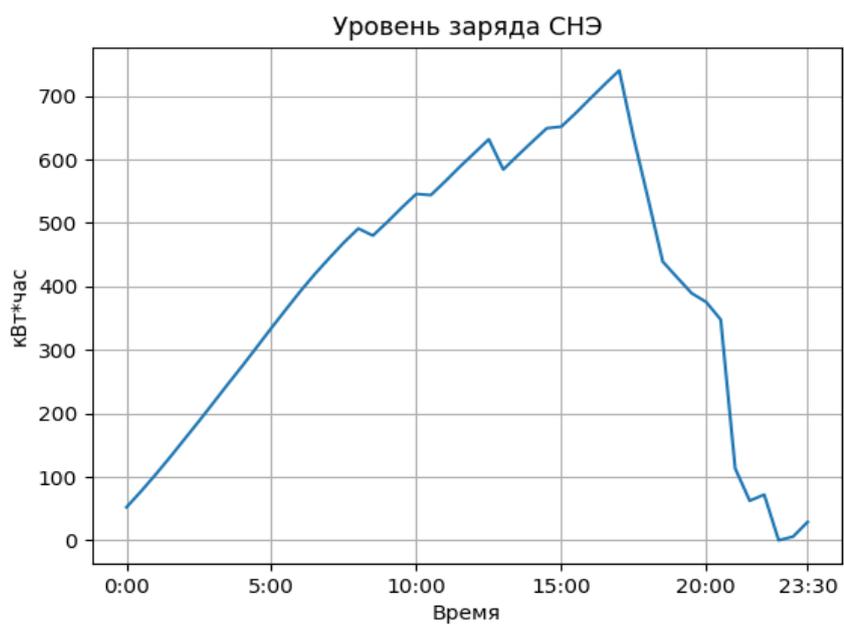


Рисунок 44.2 Узел - а56

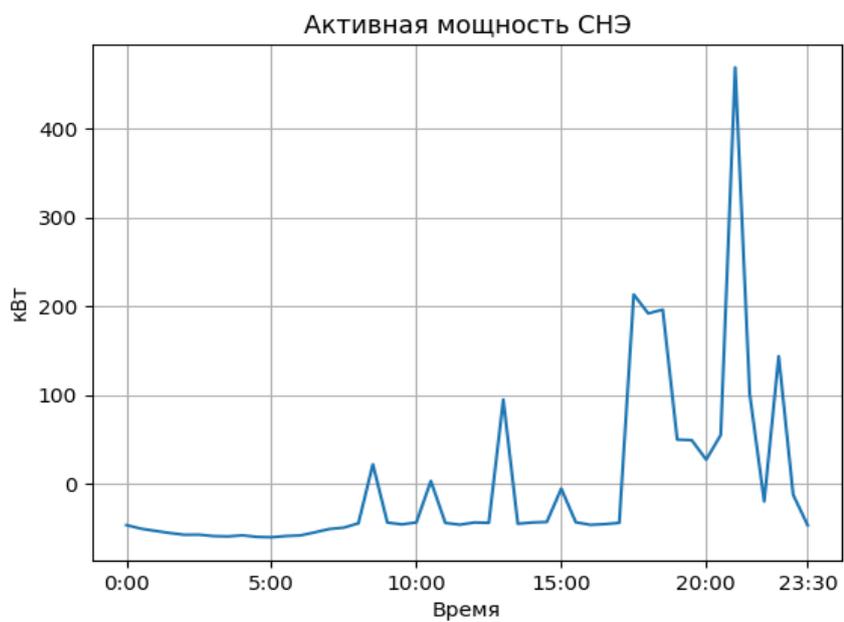


Рисунок 44.3 Узел - а56

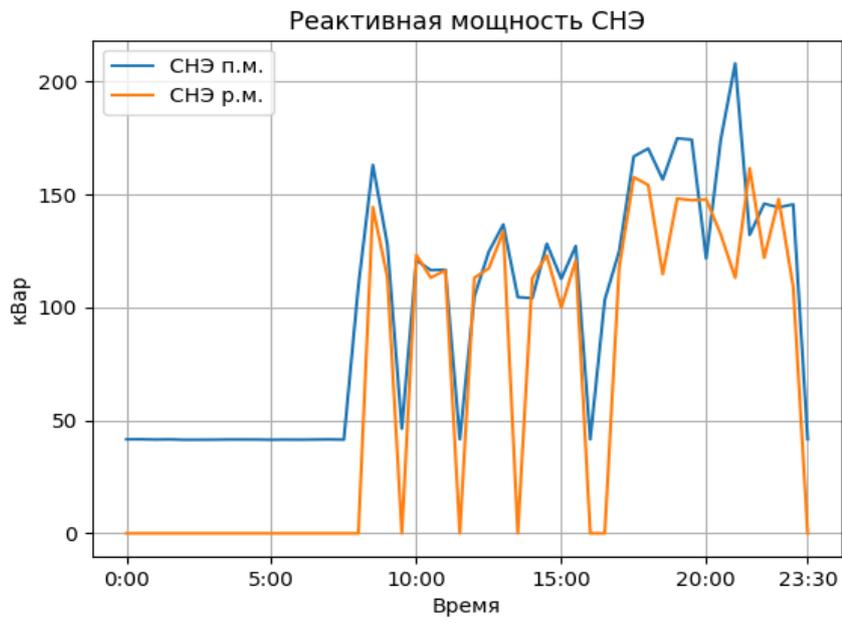


Рисунок 44.4 Узел - а56

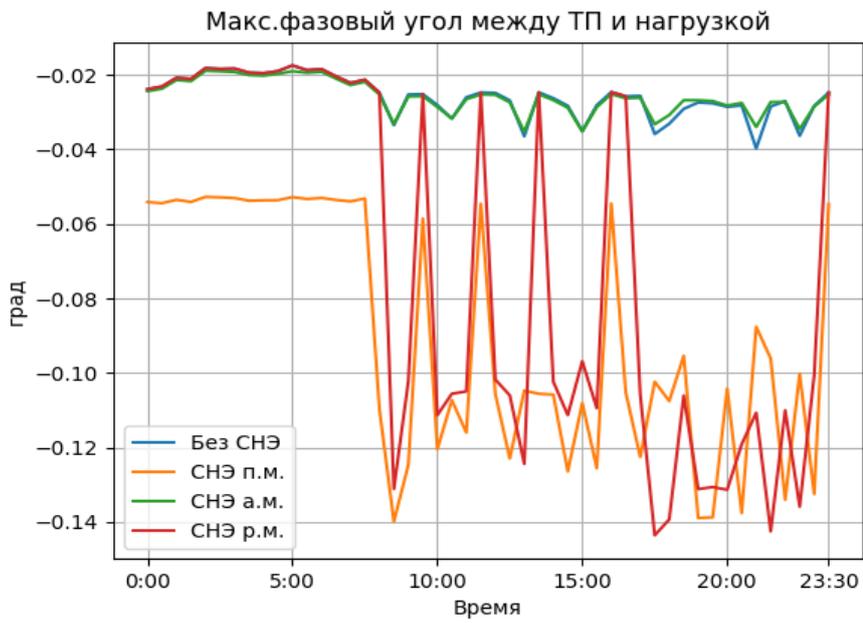


Рисунок 44.5 Узел - а56

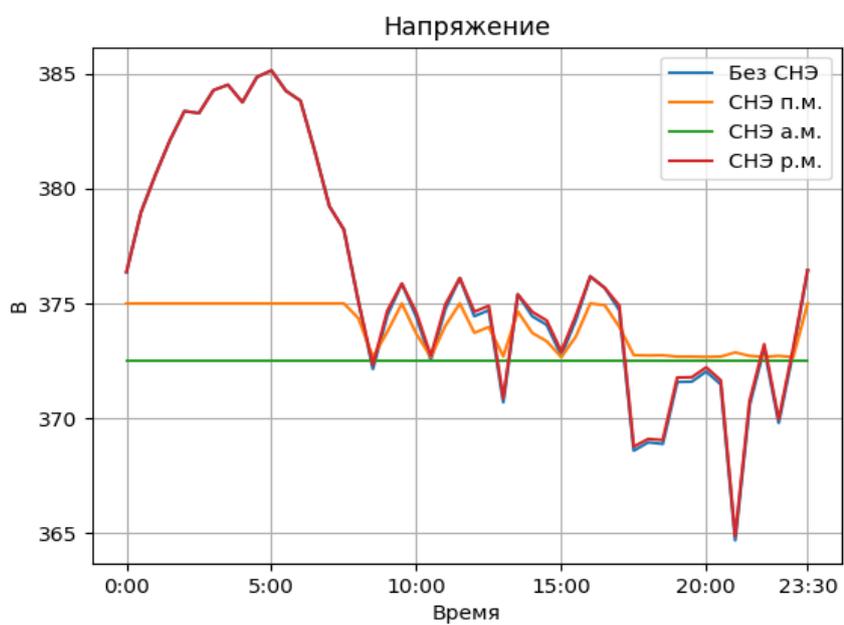


Рисунок 45.1 Узел - а57

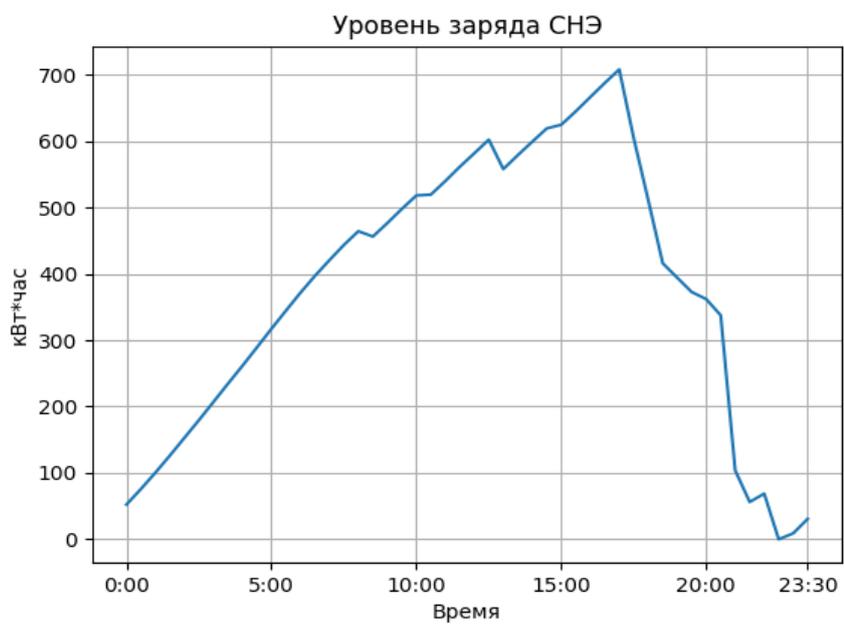


Рисунок 45.2 Узел - а57

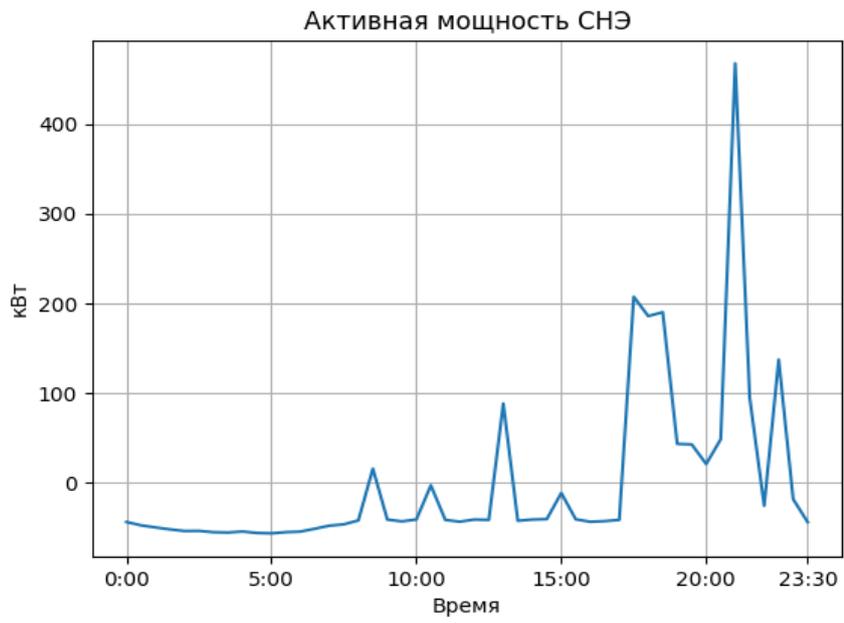


Рисунок 45.3 Узел - а57

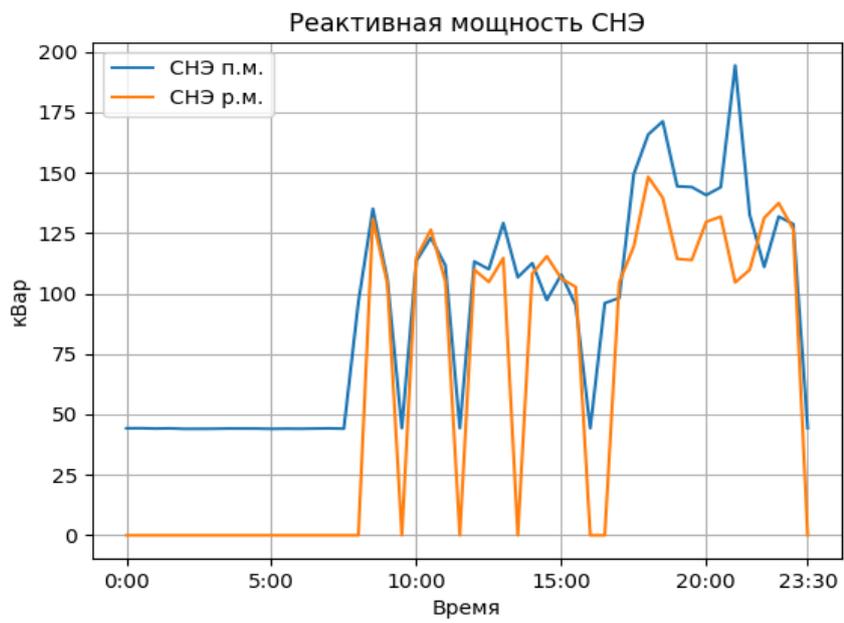


Рисунок 45.4 Узел - а57

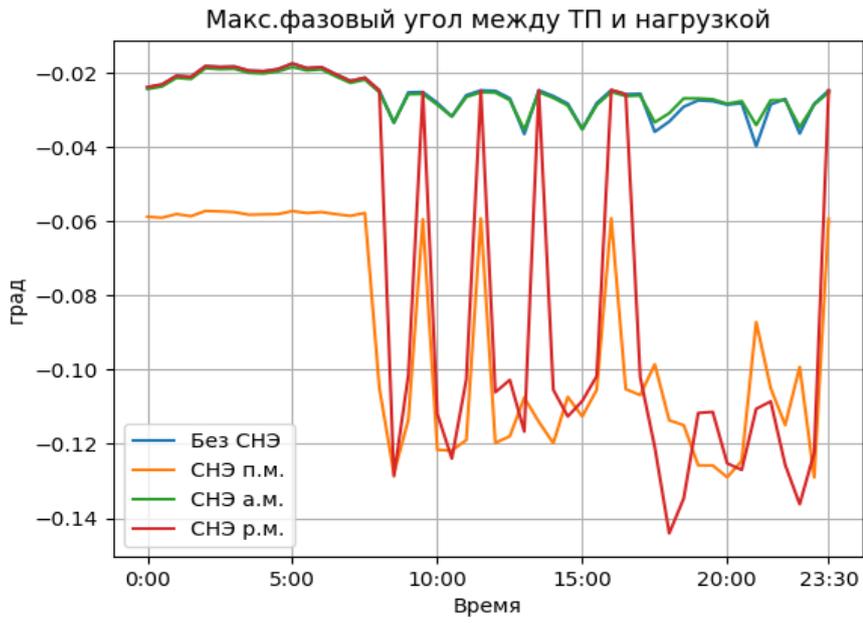


Рисунок 45.5 Узел - а57

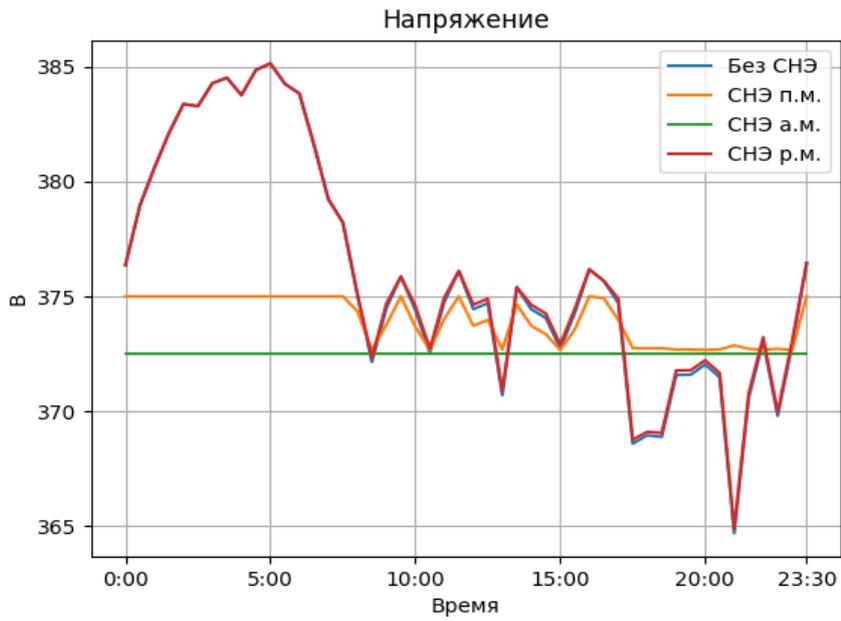


Рисунок 46.1 Узел - о3-3



Рисунок 46.2 Узел - о3-3

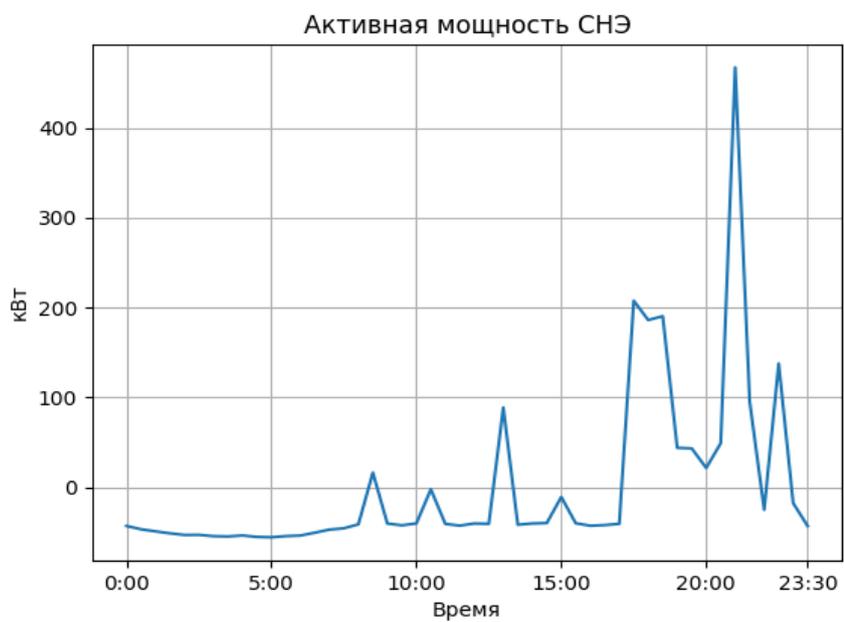


Рисунок 46.3 Узел - о3-3

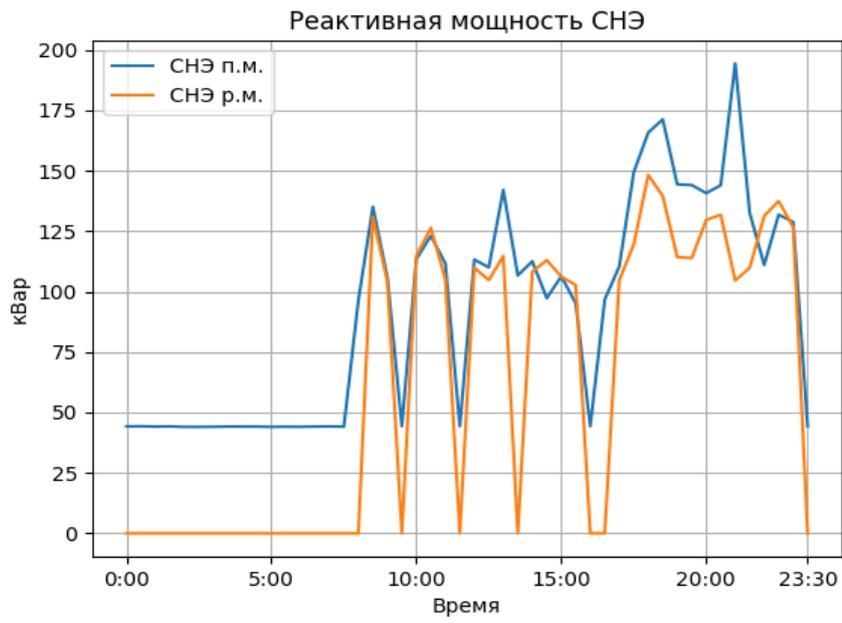


Рисунок 46.4 Узел - о3-3

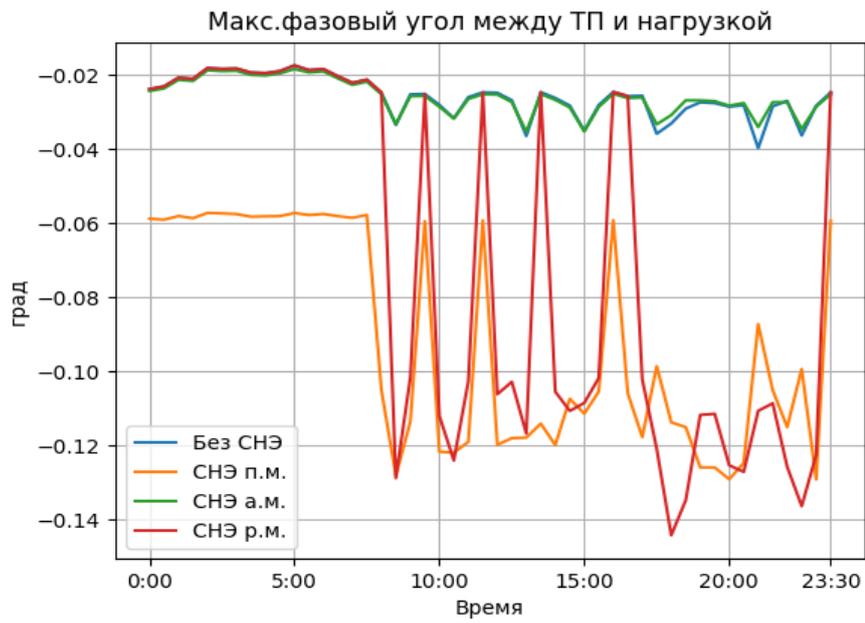


Рисунок 46.5 Узел - о3-3

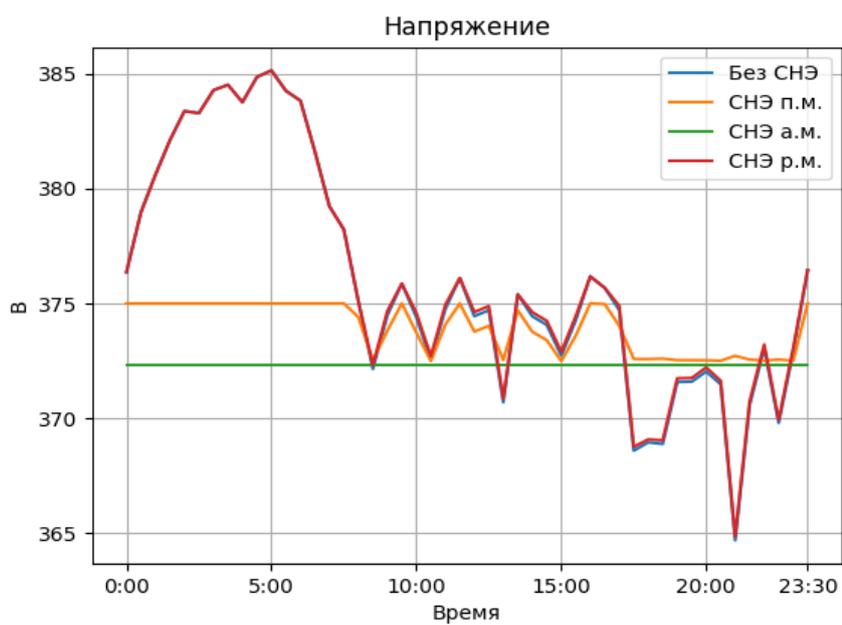


Рисунок 47.1 Узел - а58

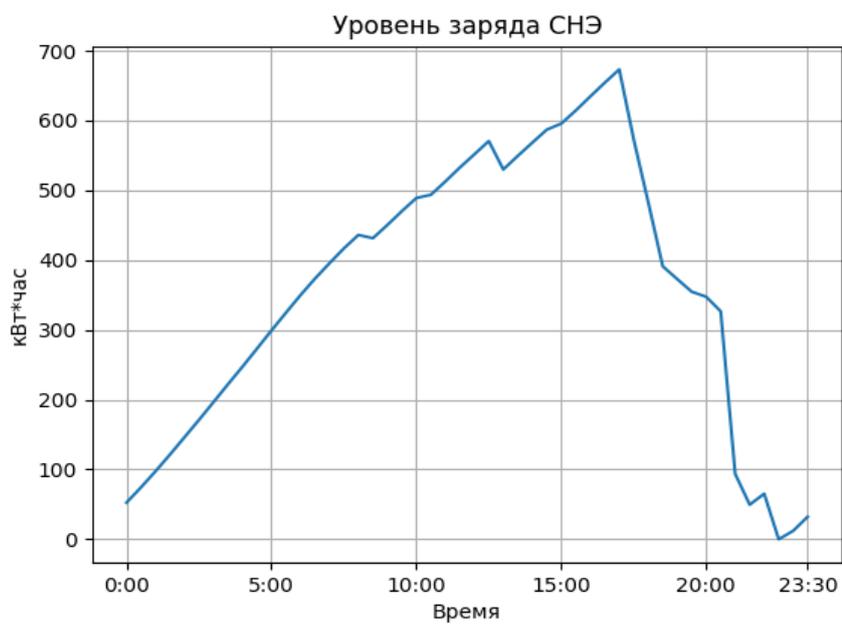


Рисунок 47.2 Узел - а58

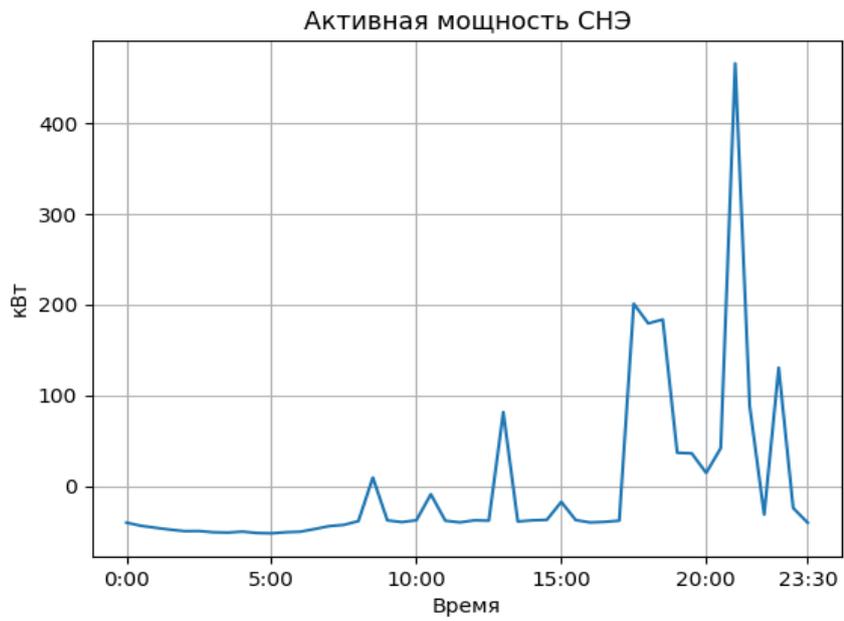


Рисунок 47.3 Узел - а58

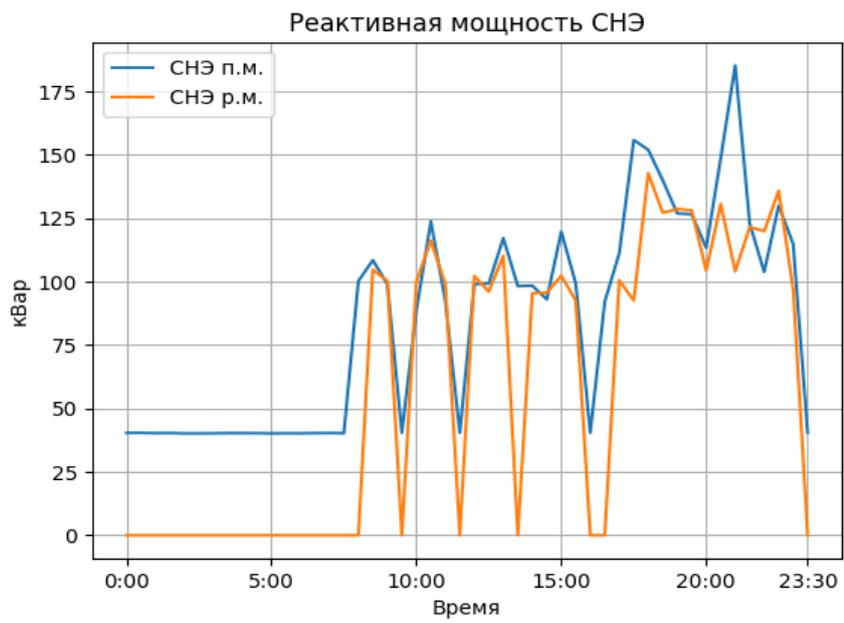


Рисунок 47.4 Узел - а58

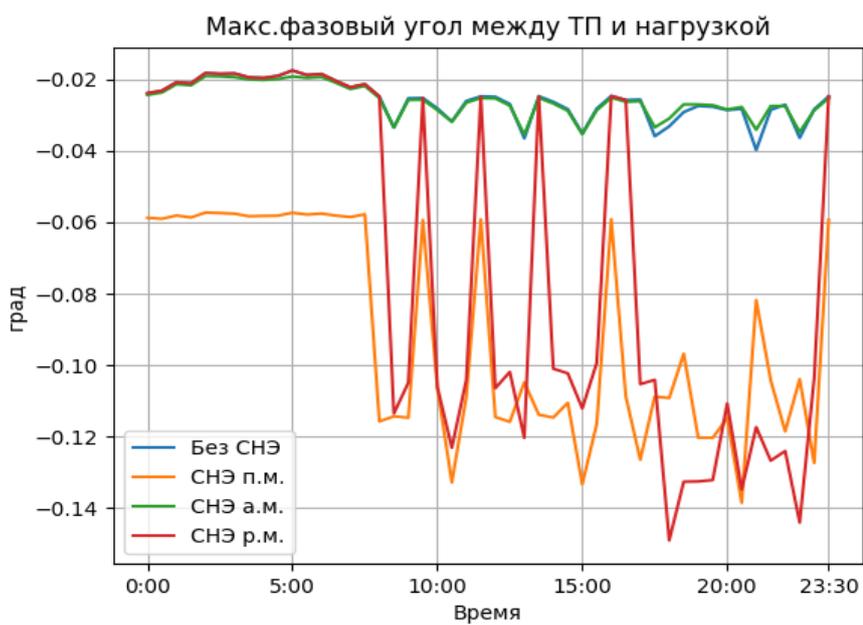


Рисунок 47.5 Узел - а58

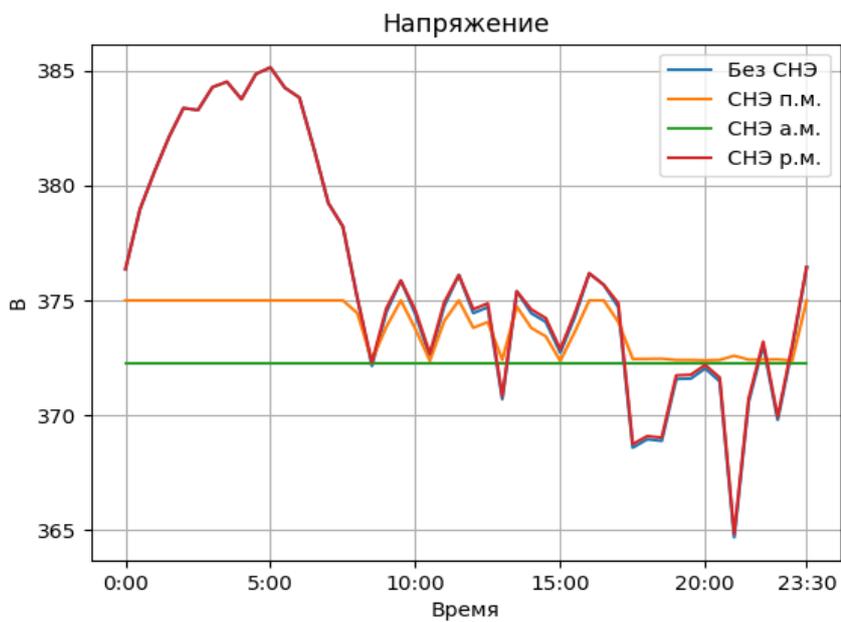


Рисунок 48.1 Узел - а59

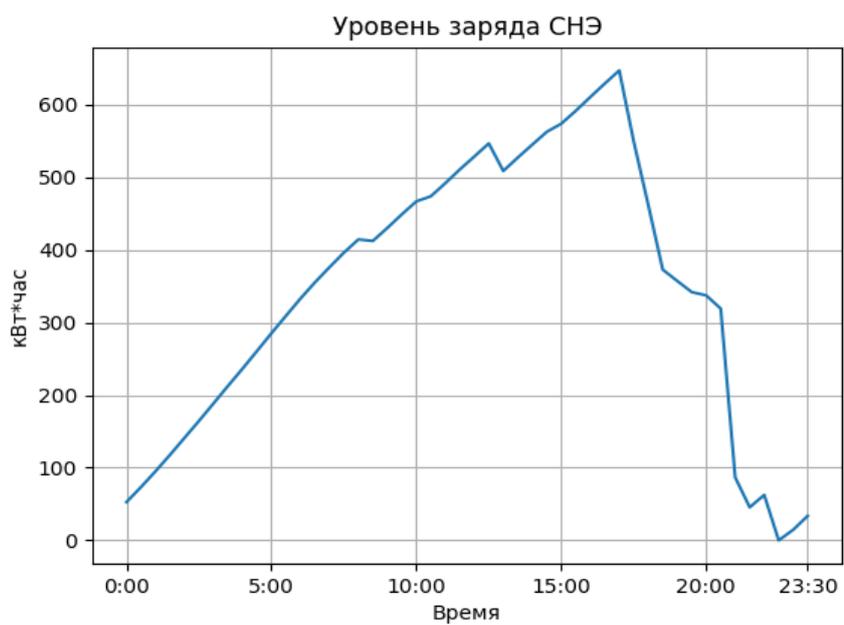


Рисунок 48.2 Узел - а59

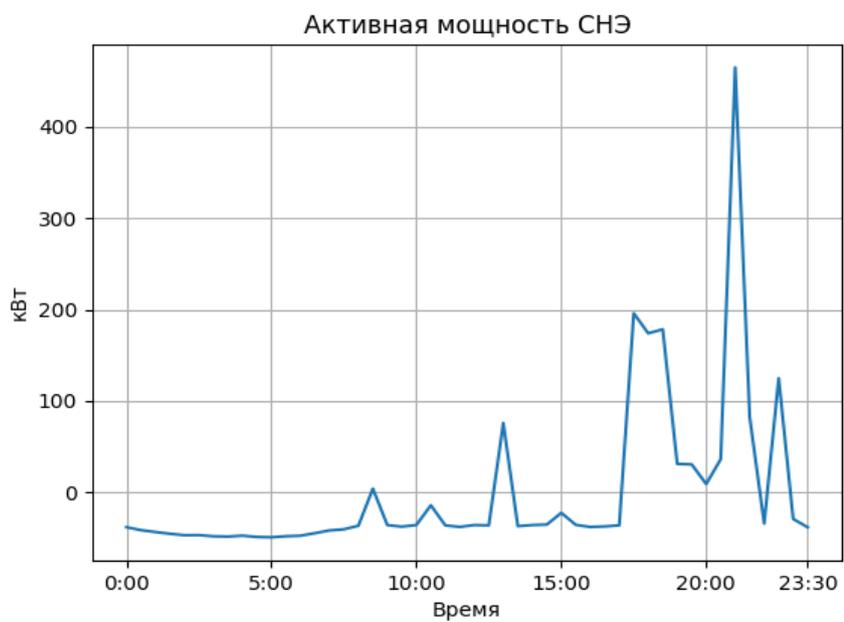


Рисунок 48.3 Узел - а59

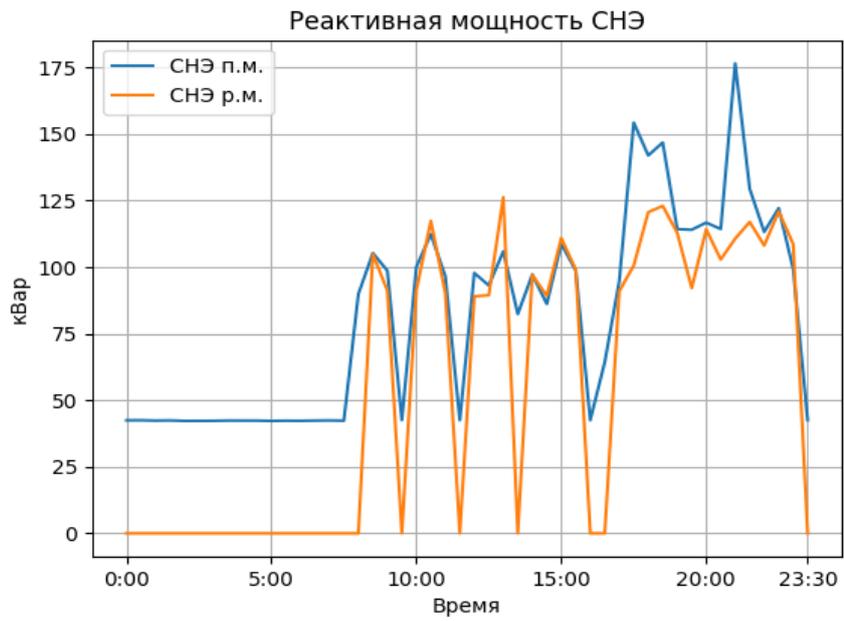


Рисунок 48.4 Узел - а59

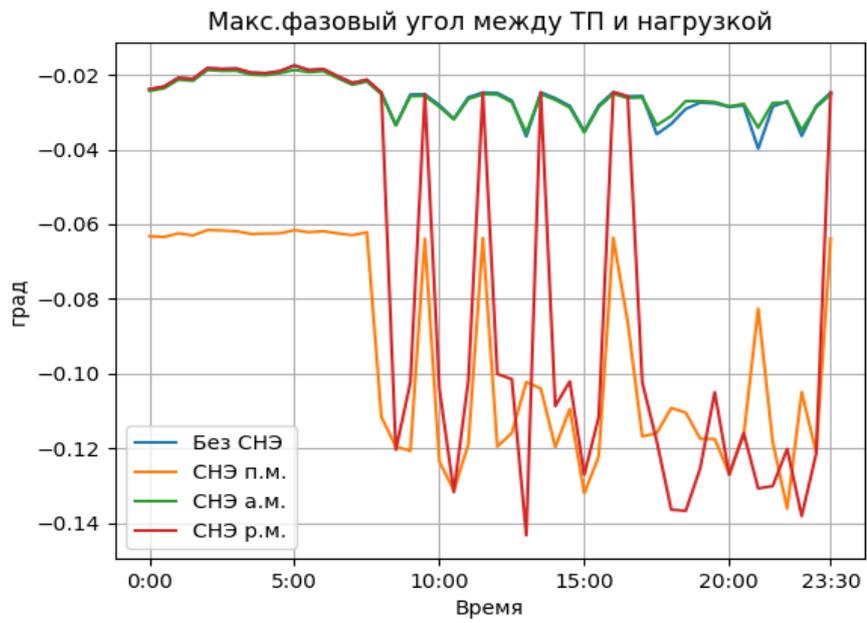


Рисунок 48.5 Узел - а59

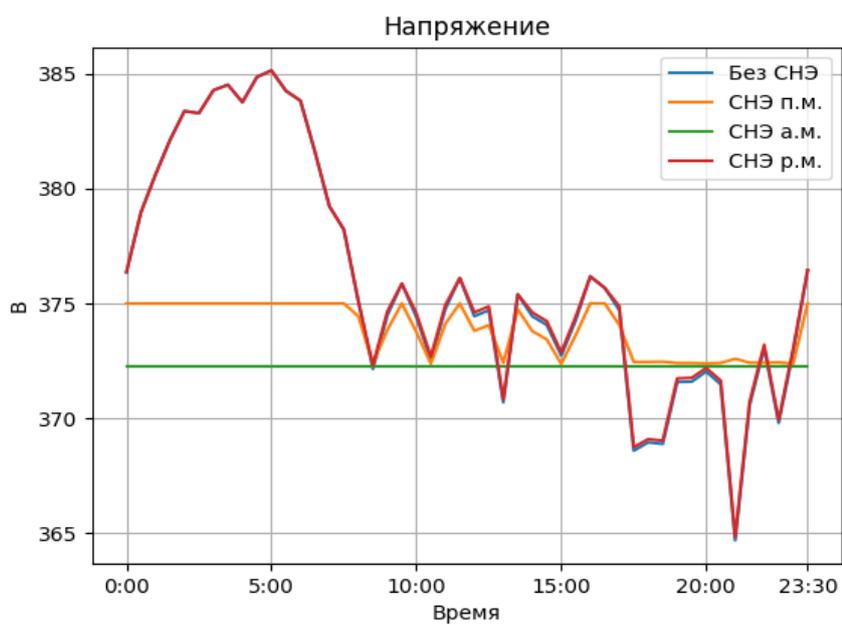


Рисунок 49.1 Узел - о4-4

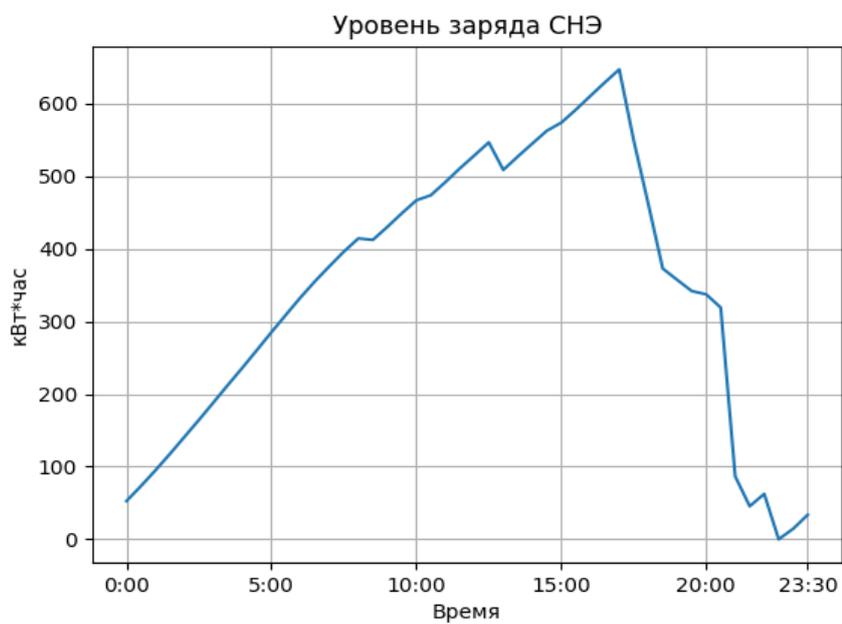


Рисунок 49.2 Узел - о4-4

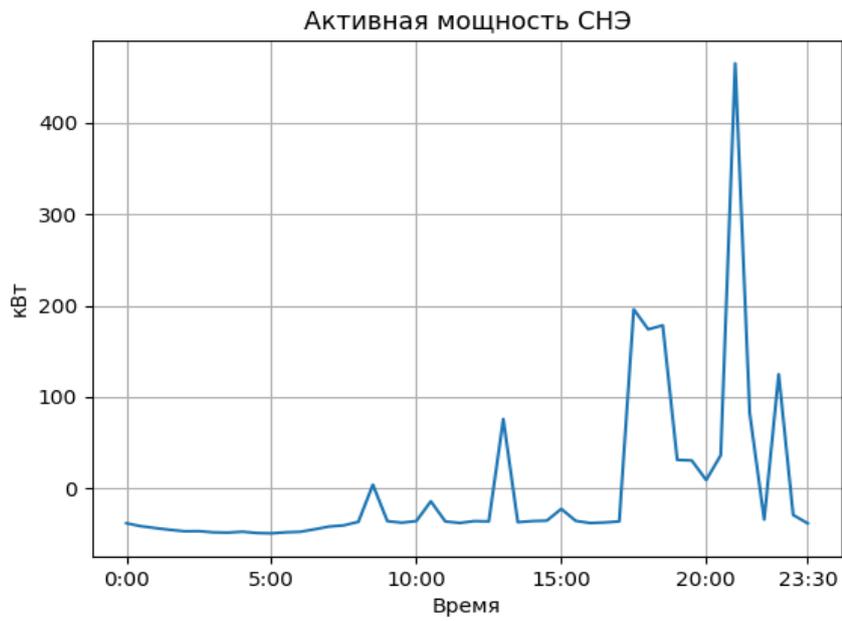


Рисунок 49.3 Узел - о4-4

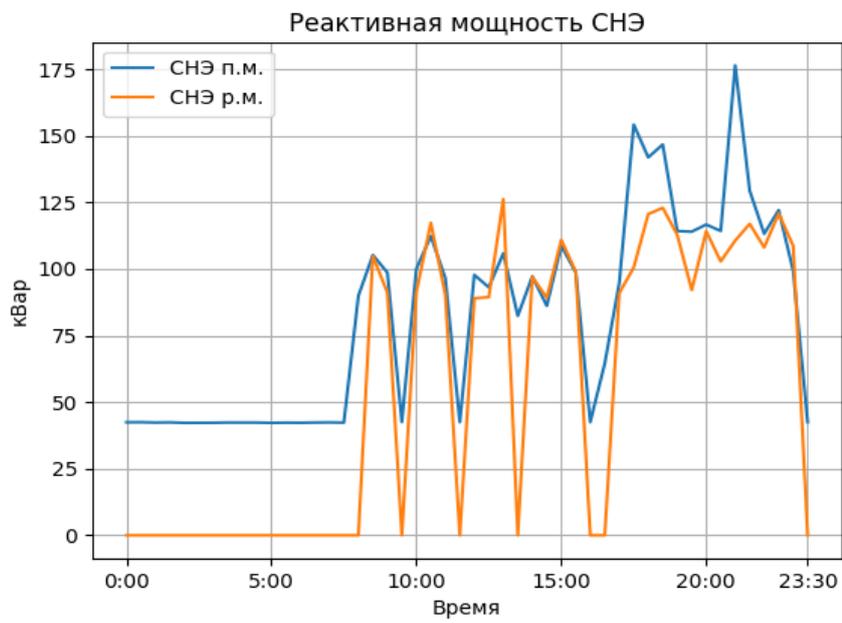


Рисунок 49.4 Узел - о4-4

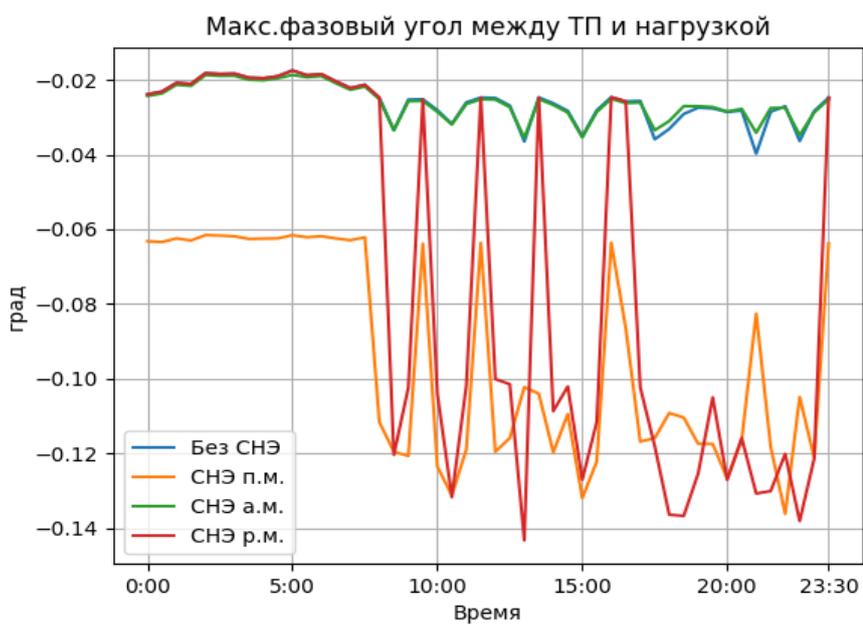


Рисунок 49.5 Узел - о4-4

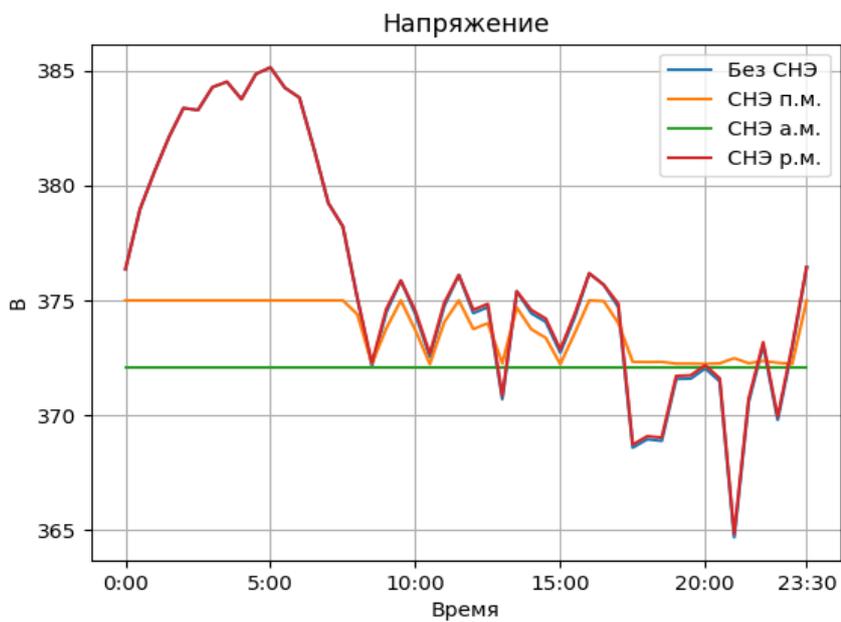


Рисунок 50.1 Узел - а60

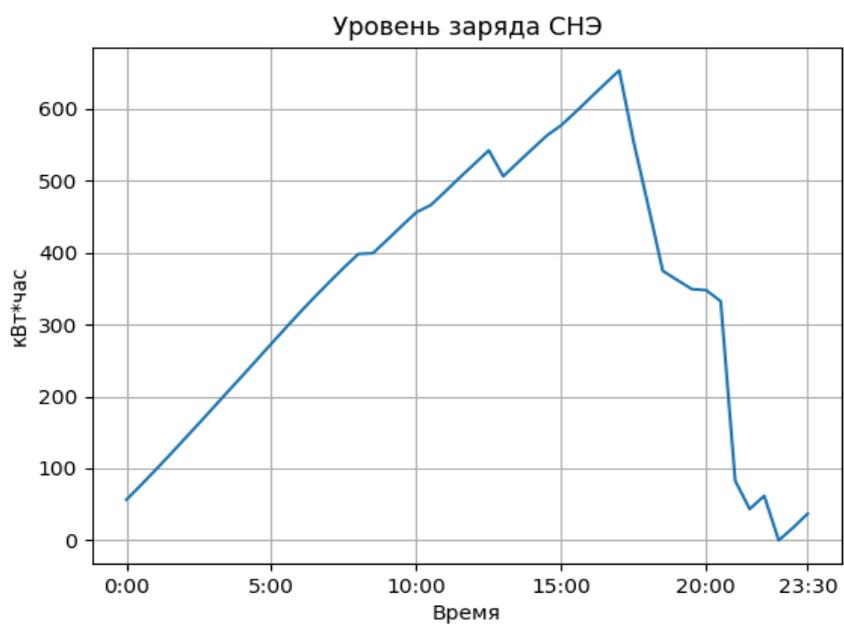


Рисунок 50.2 Узел - а60

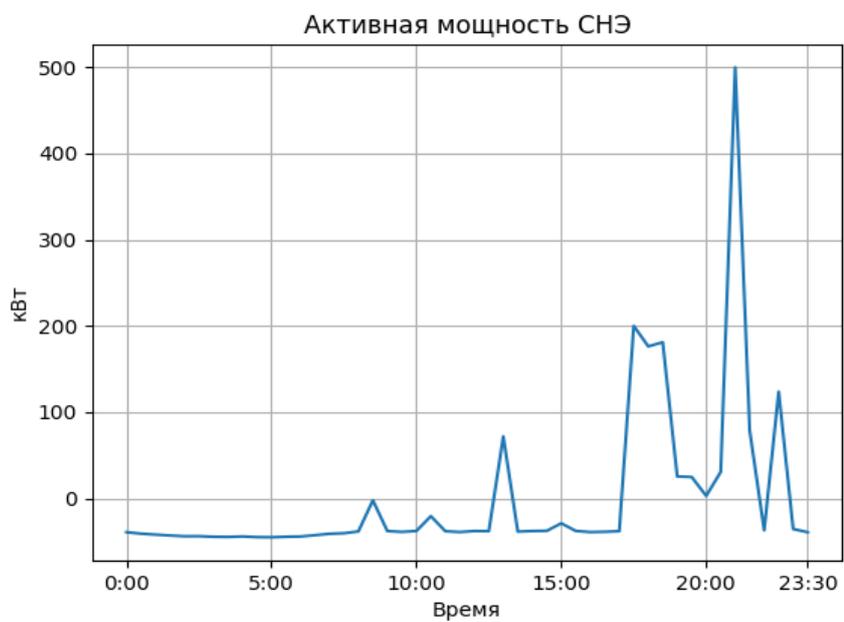


Рисунок 50.3 Узел - а60

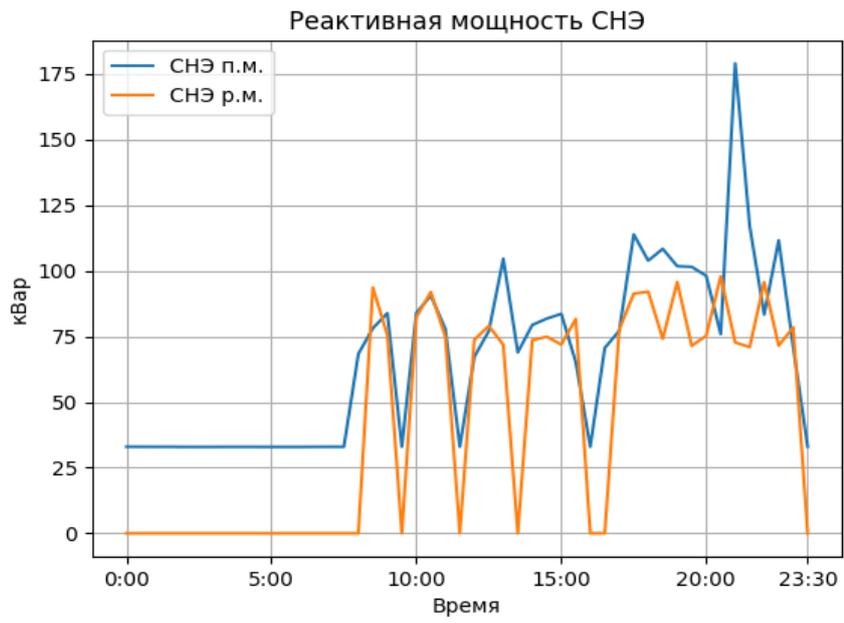


Рисунок 50.4 Узел - а60

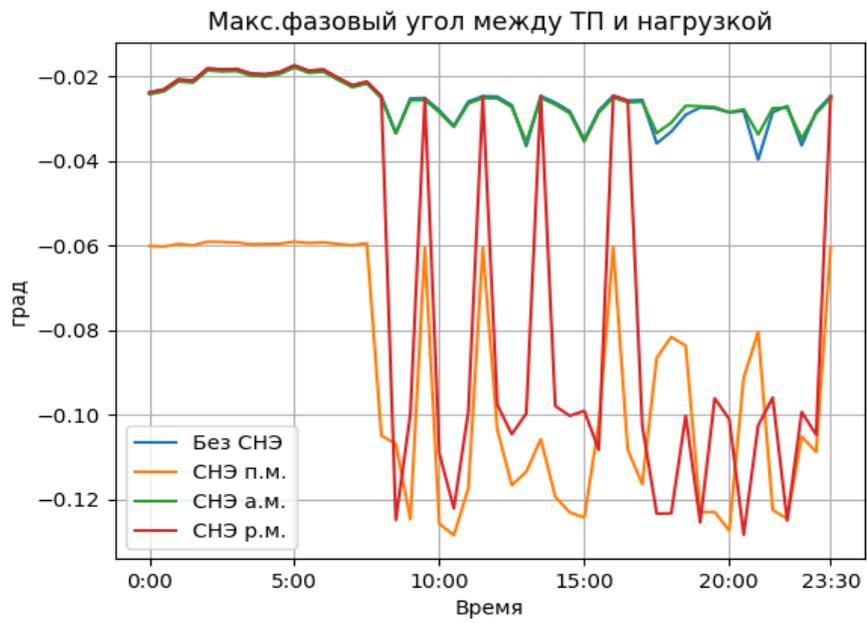


Рисунок 50.5 Узел - а60

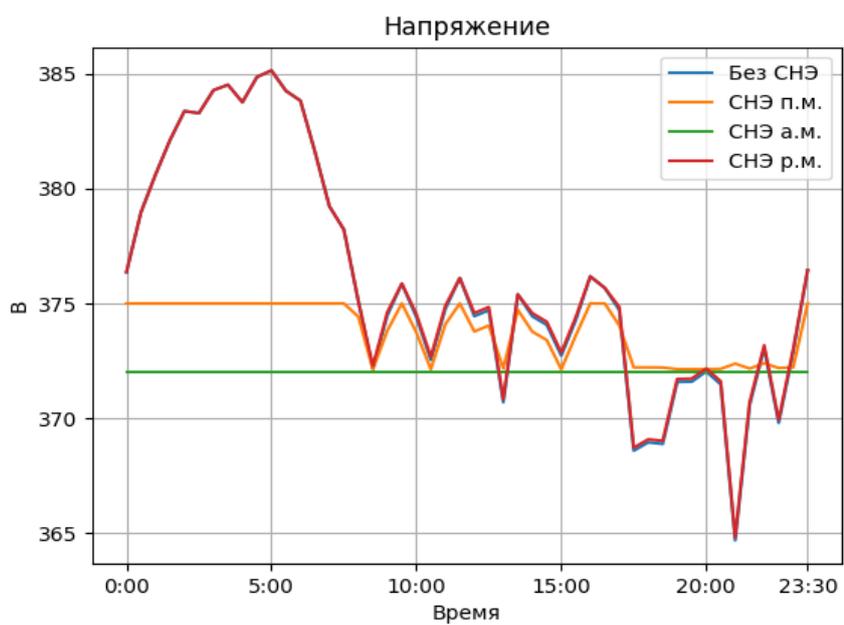


Рисунок 51.1 Узел - о5-2



Рисунок 51.2 Узел - о5-2

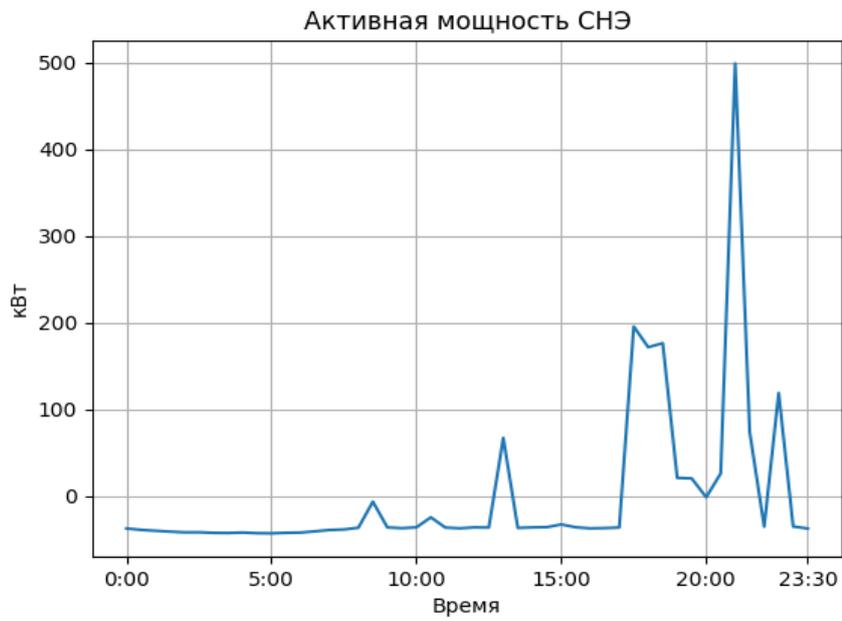


Рисунок 51.3 Узел - о5-2

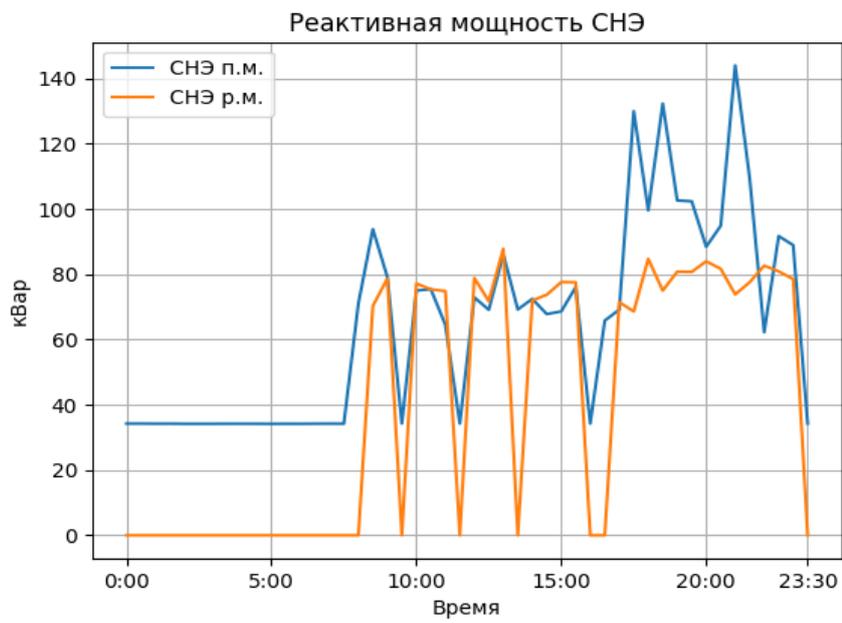


Рисунок 51.4 Узел - о5-2

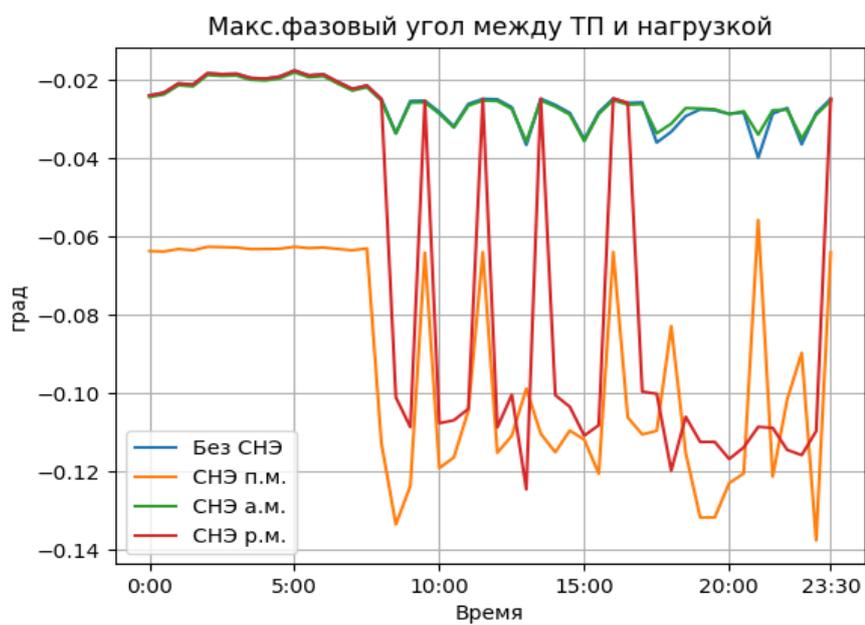


Рисунок 51.5 Узел - о5-2

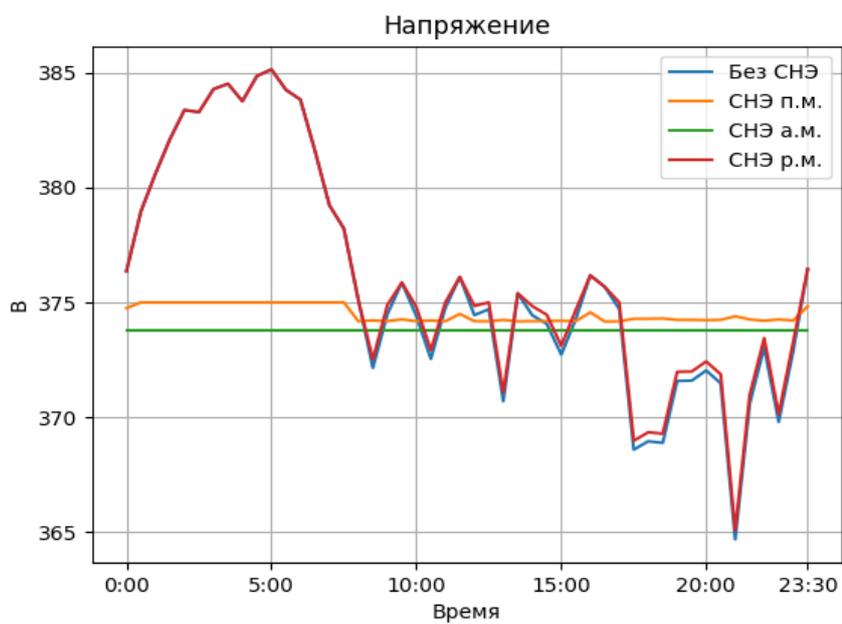


Рисунок 52.1 Узел - а61

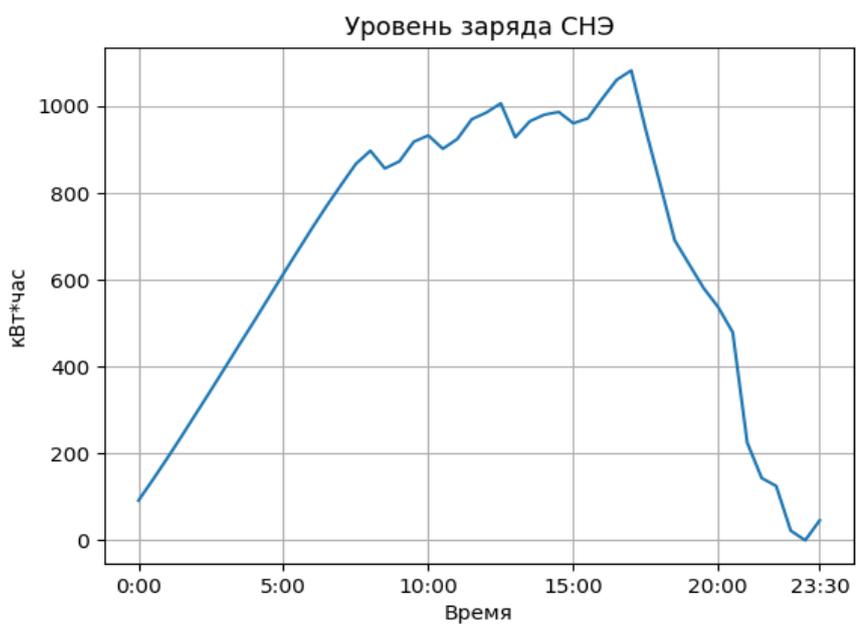


Рисунок 52.2 Узел - а61

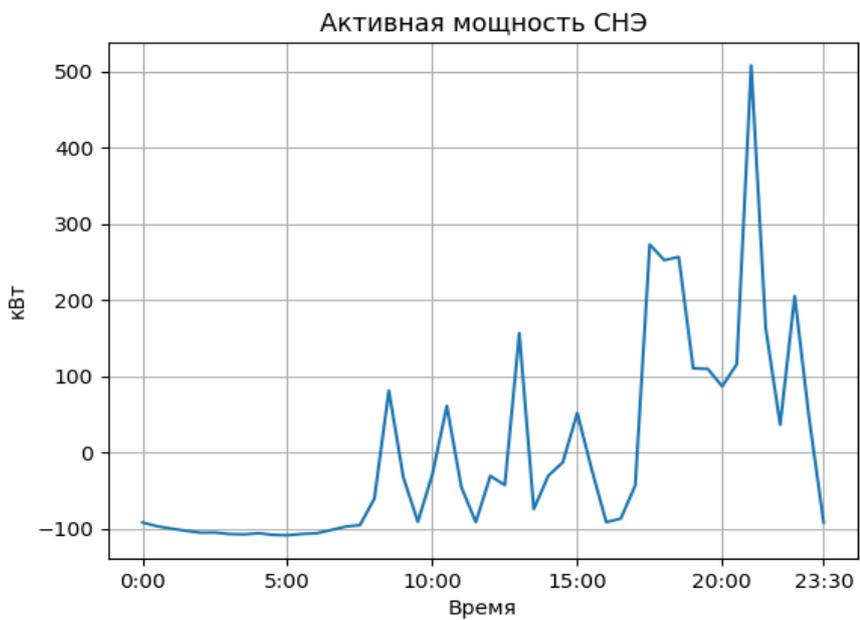


Рисунок 52.3 Узел - а61

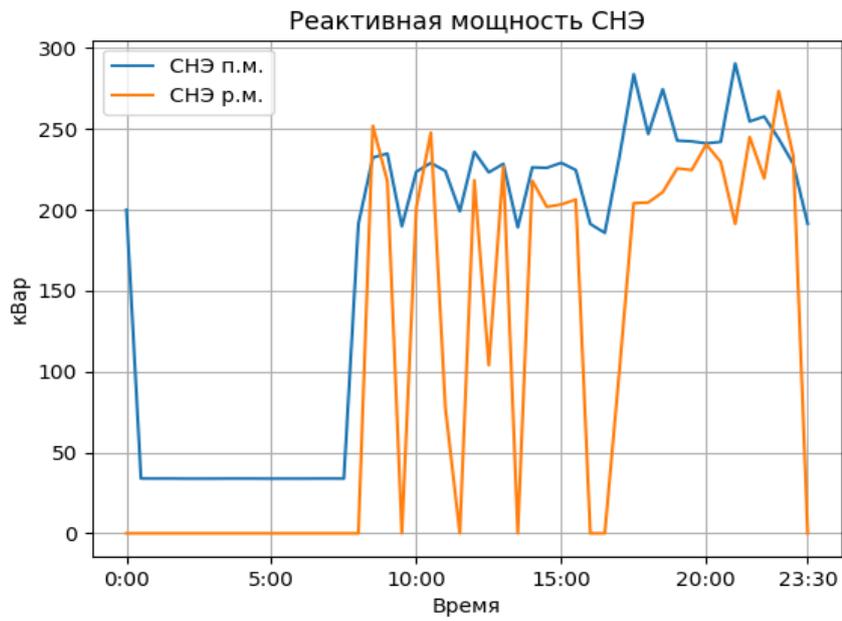


Рисунок 52.4 Узел - а61

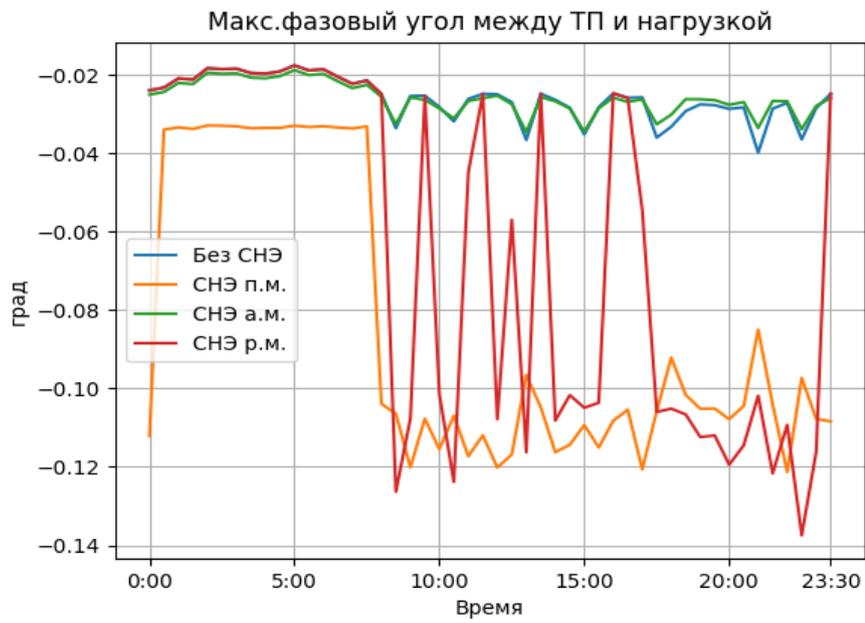


Рисунок 52.5 Узел - а61

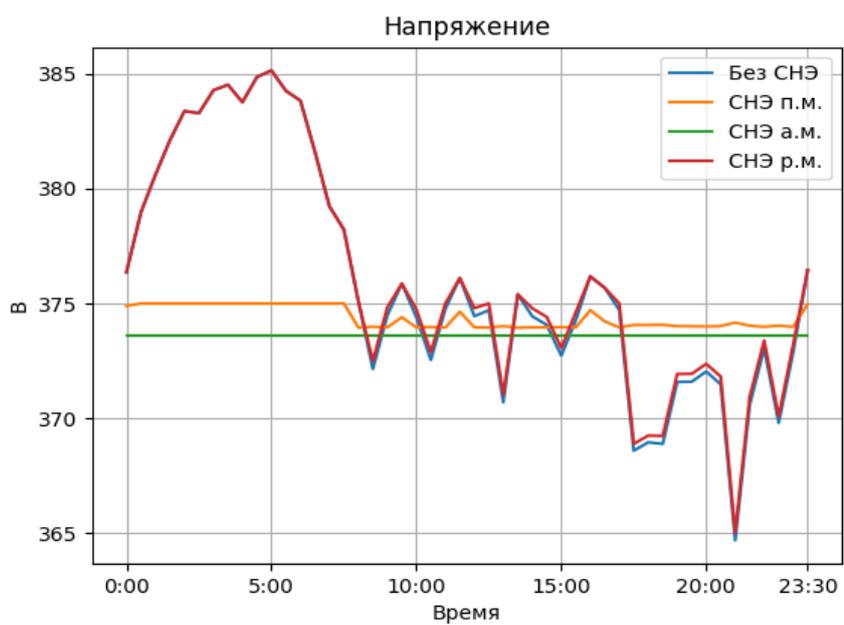


Рисунок 53.1 Узел - а62

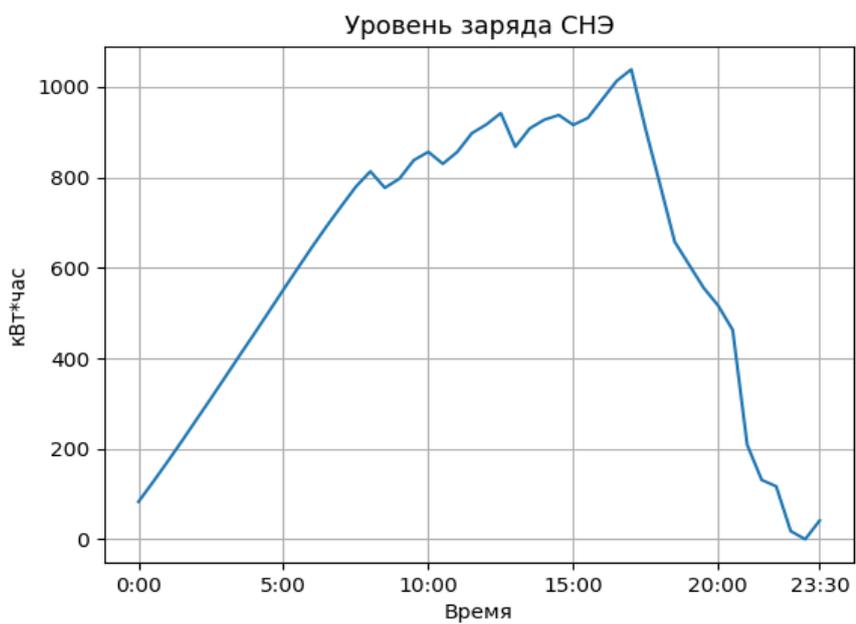


Рисунок 53.2 Узел - а62

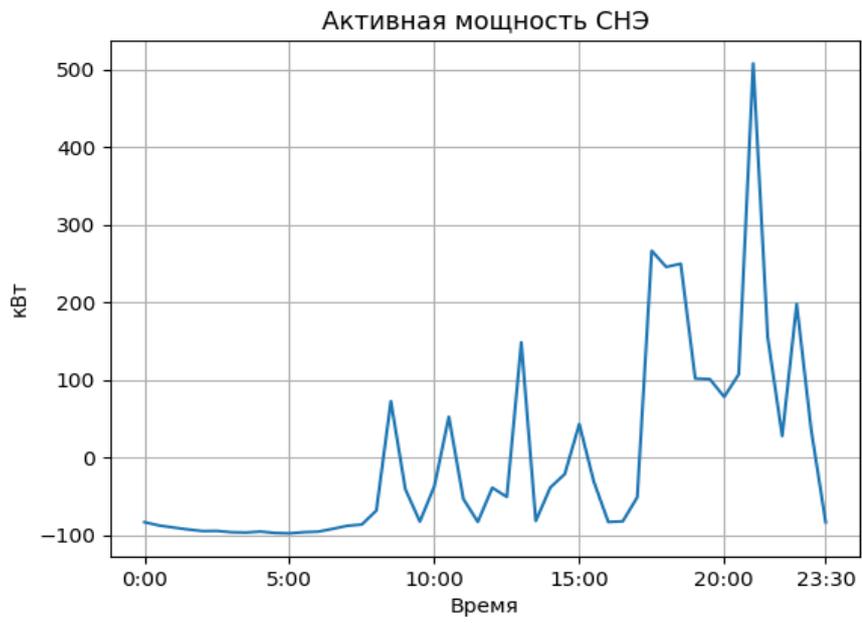


Рисунок 53.3 Узел - а62

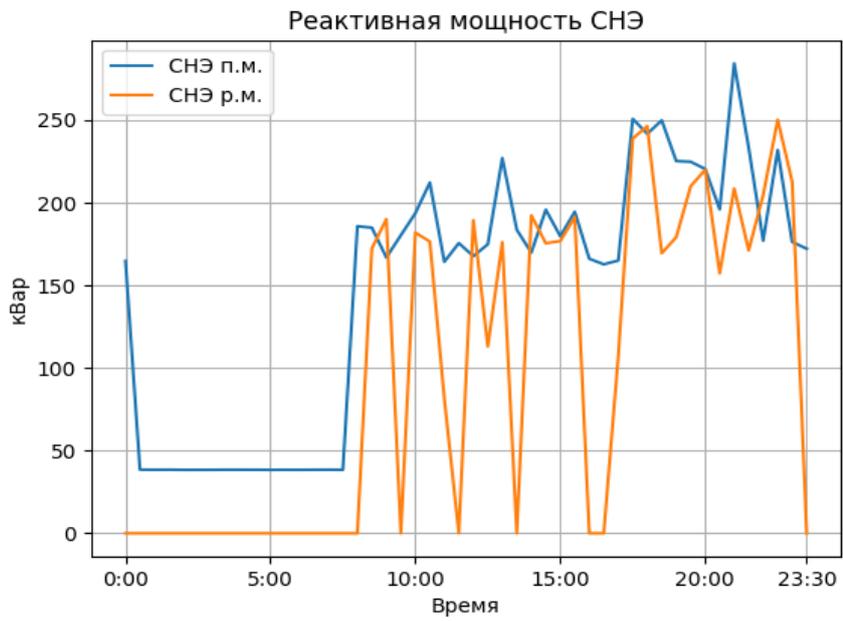


Рисунок 53.4 Узел - а62

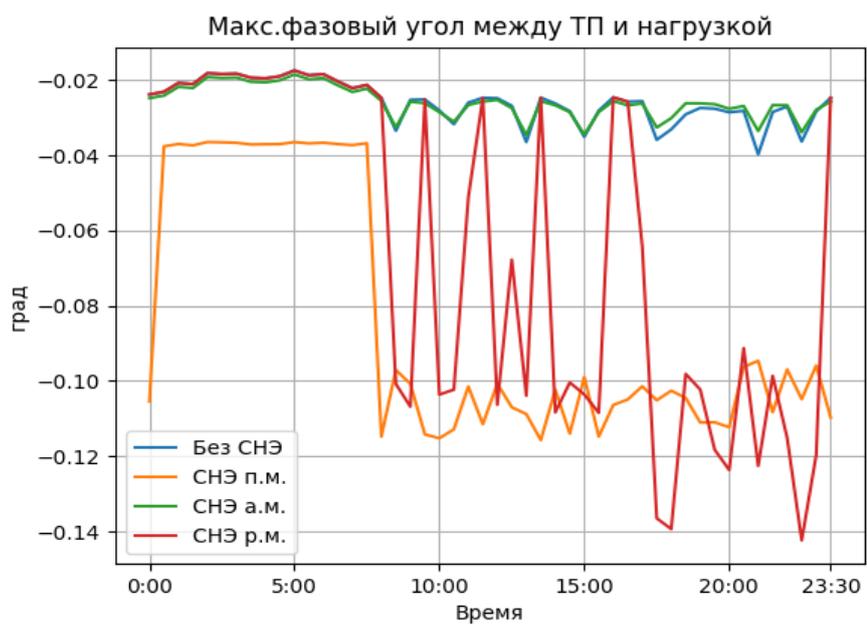


Рисунок 53.5 Узел - а62

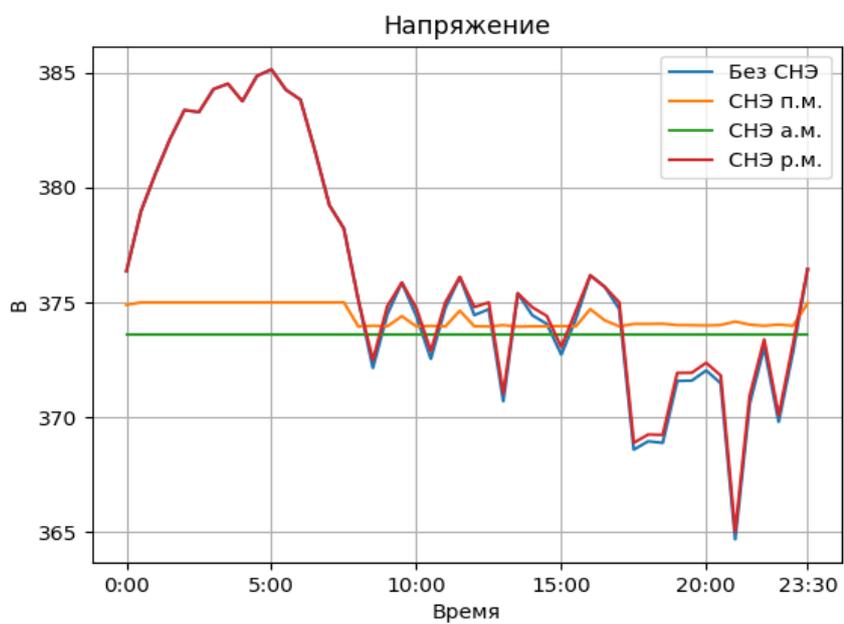


Рисунок 54.1 Узел - о5-3

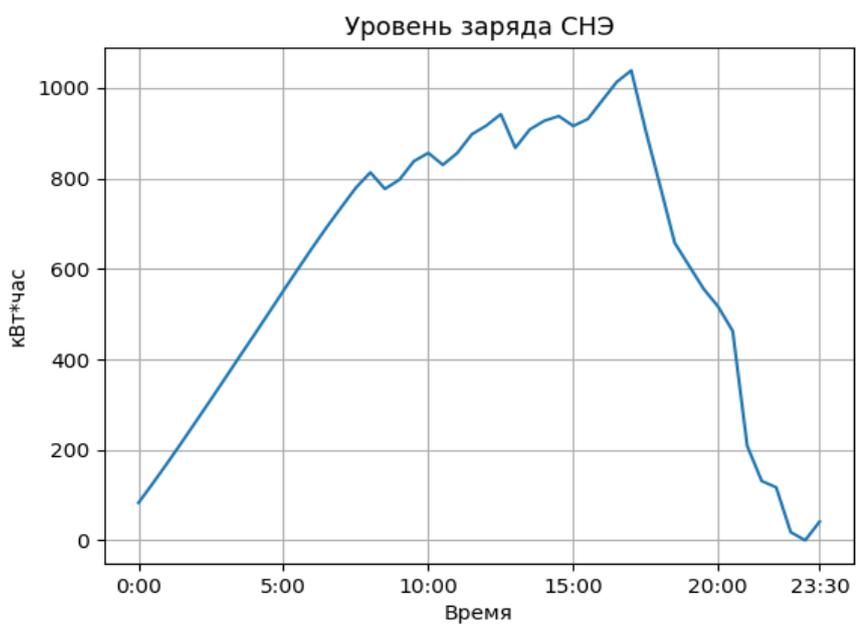


Рисунок 54.2 Узел - о5-3

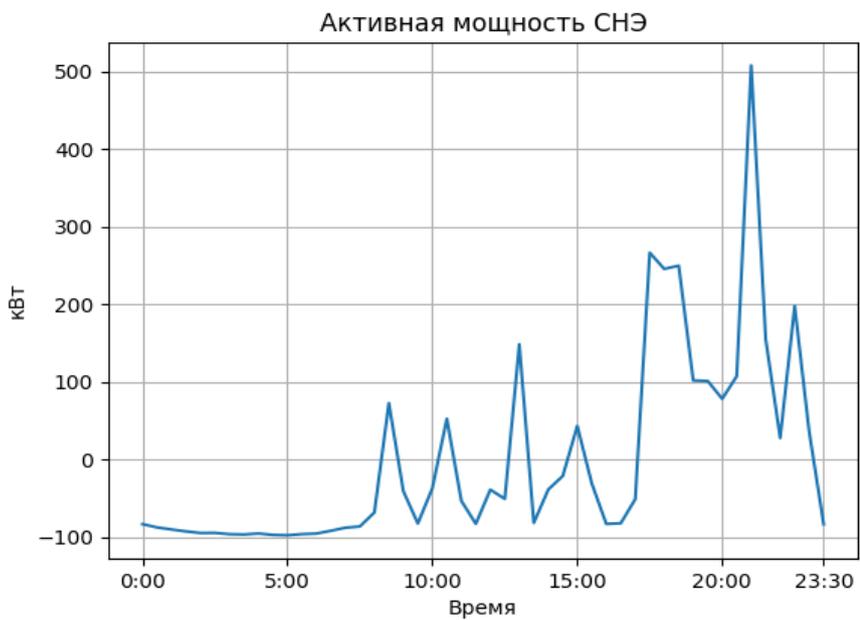


Рисунок 54.3 Узел - о5-3

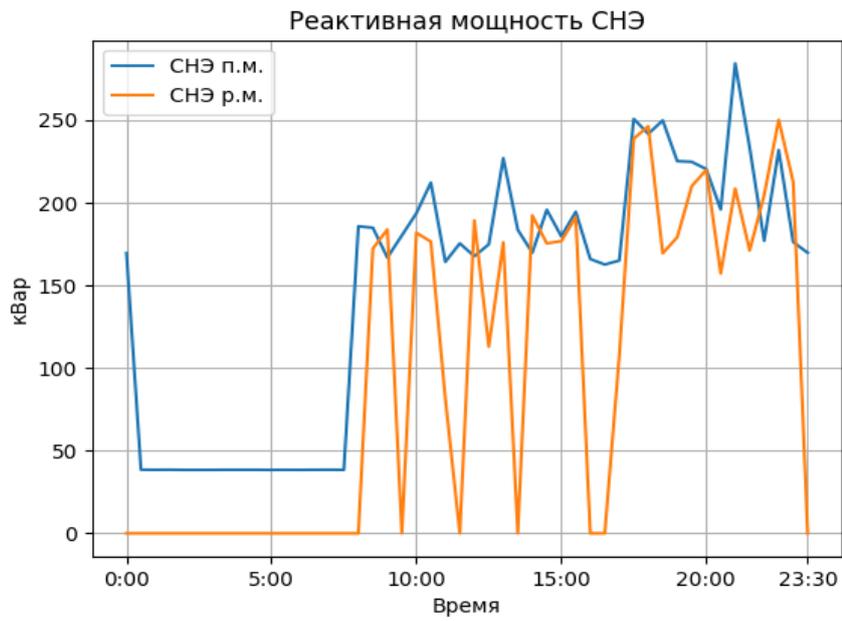


Рисунок 54.4 Узел - о5-3

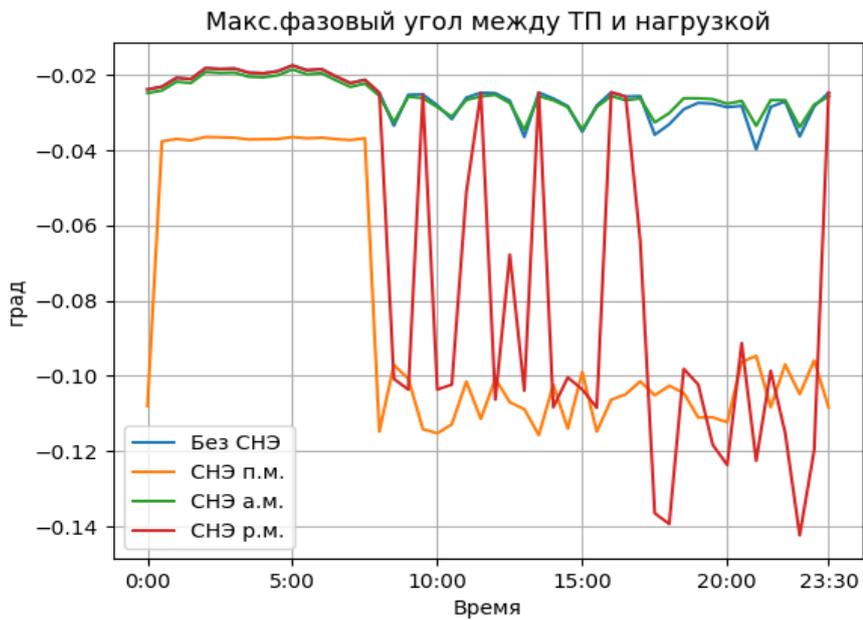


Рисунок 54.5 Узел - о5-3

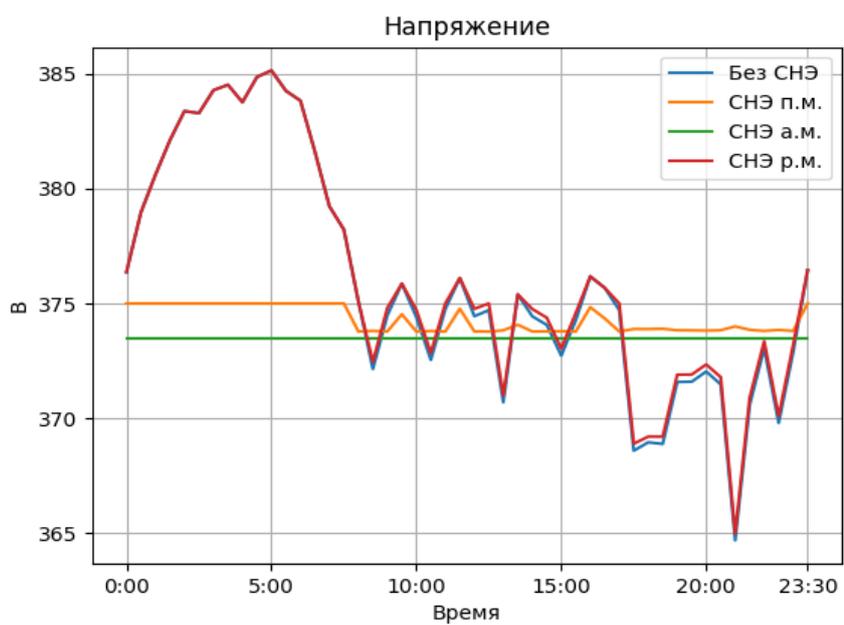


Рисунок 55.1 Узел - а63

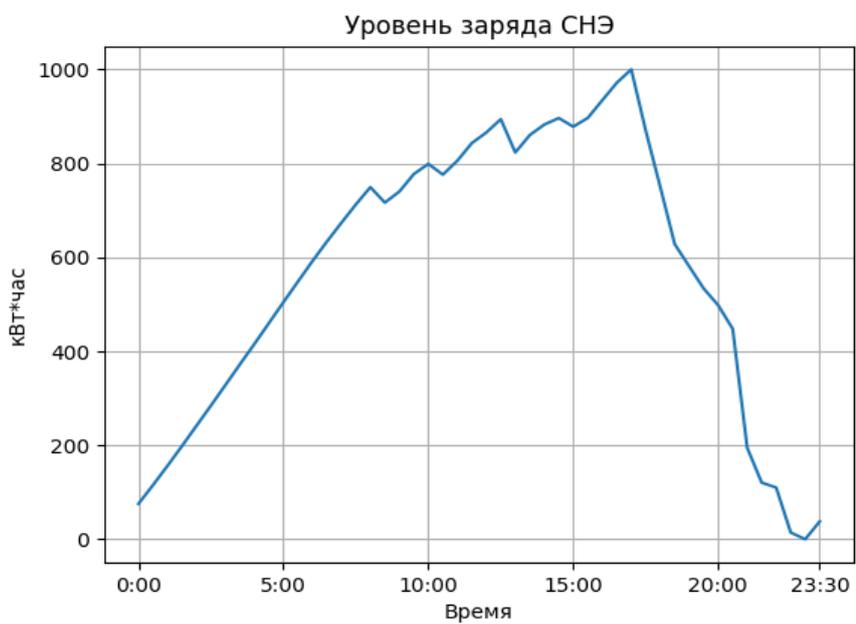


Рисунок 55.2 Узел - а63

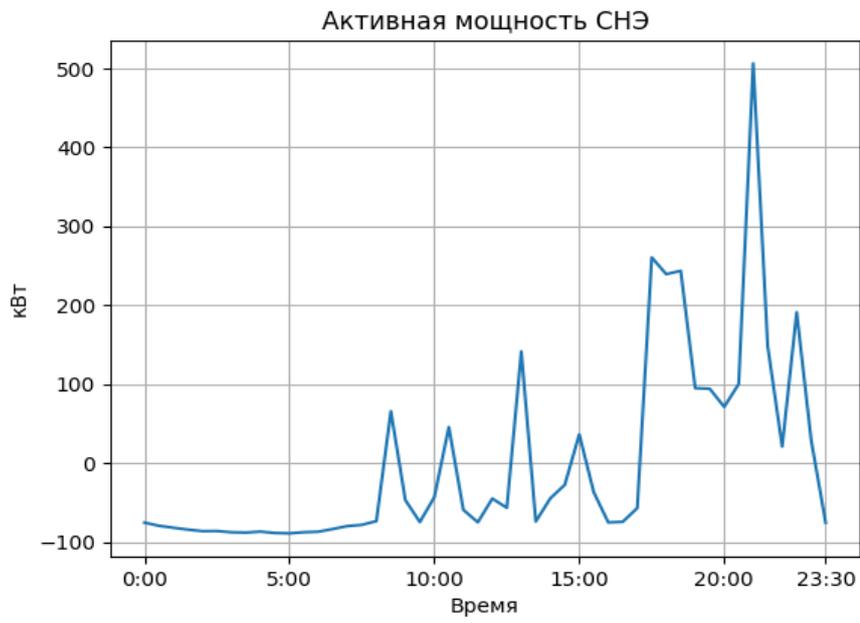


Рисунок 55.3 Узел - а63

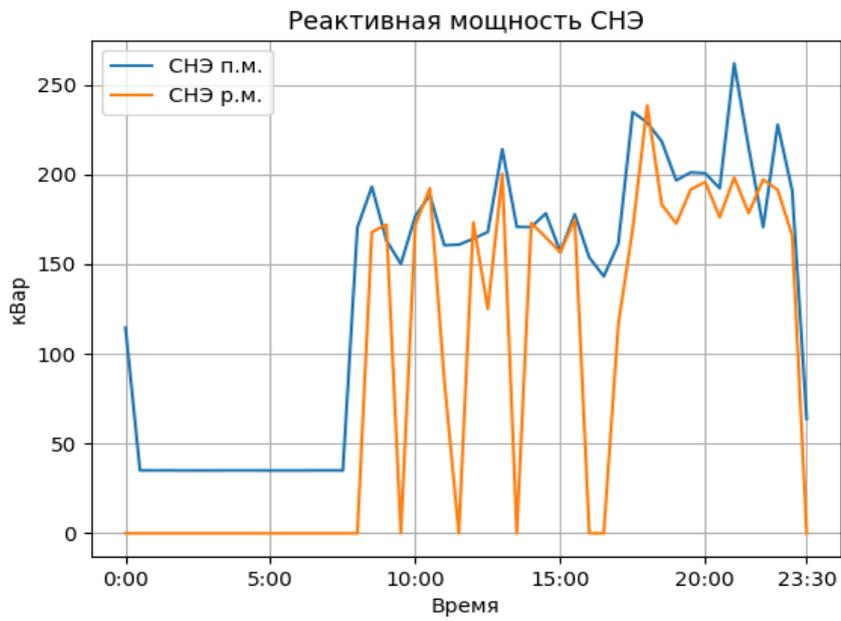


Рисунок 55.4 Узел - а63

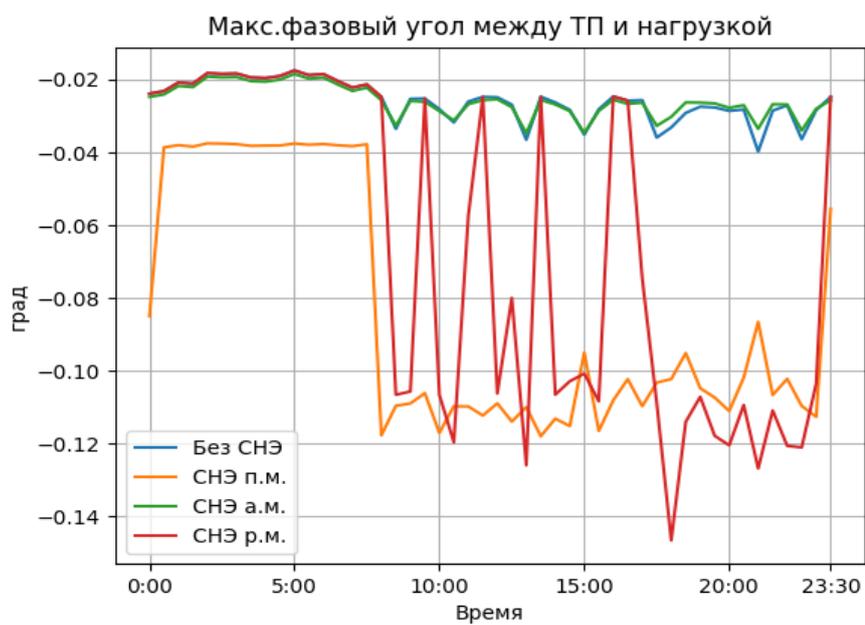


Рисунок 55.5 Узел - а63

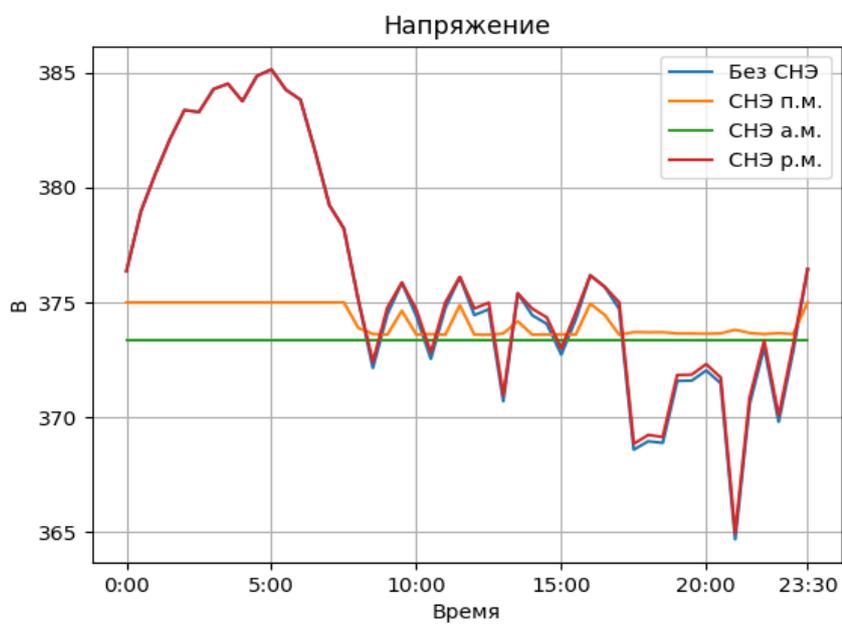


Рисунок 56.1 Узел - а64

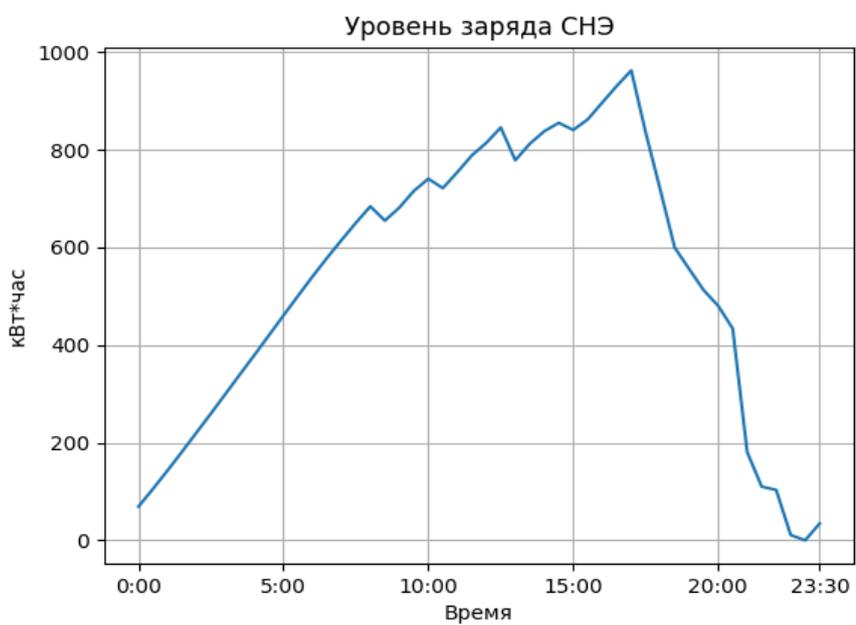


Рисунок 56.2 Узел - а64

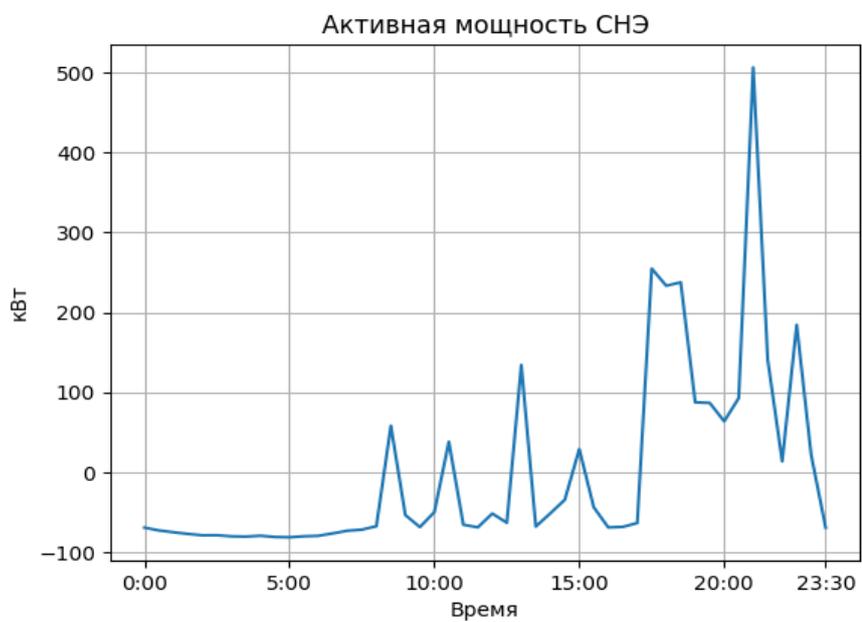


Рисунок 56.3 Узел - а64

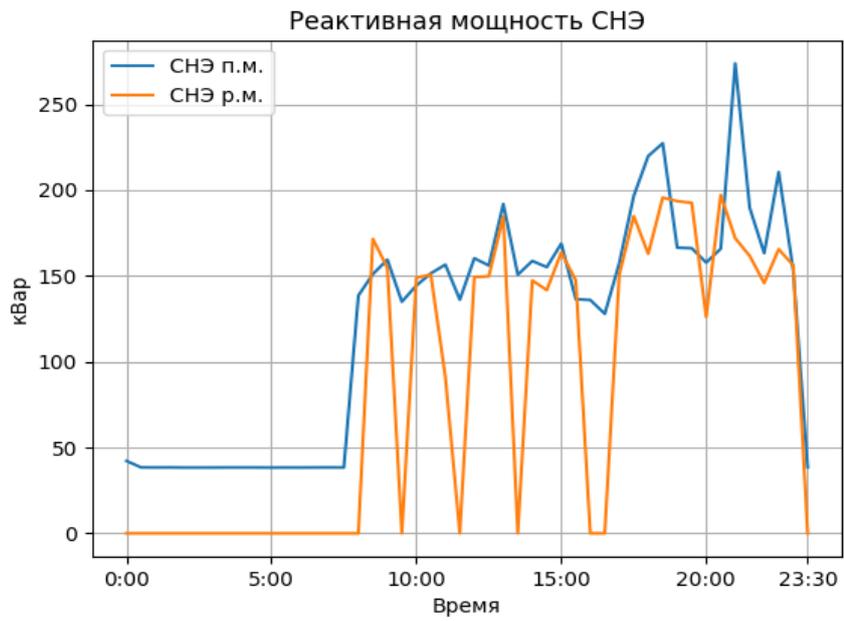


Рисунок 56.4 Узел - а64

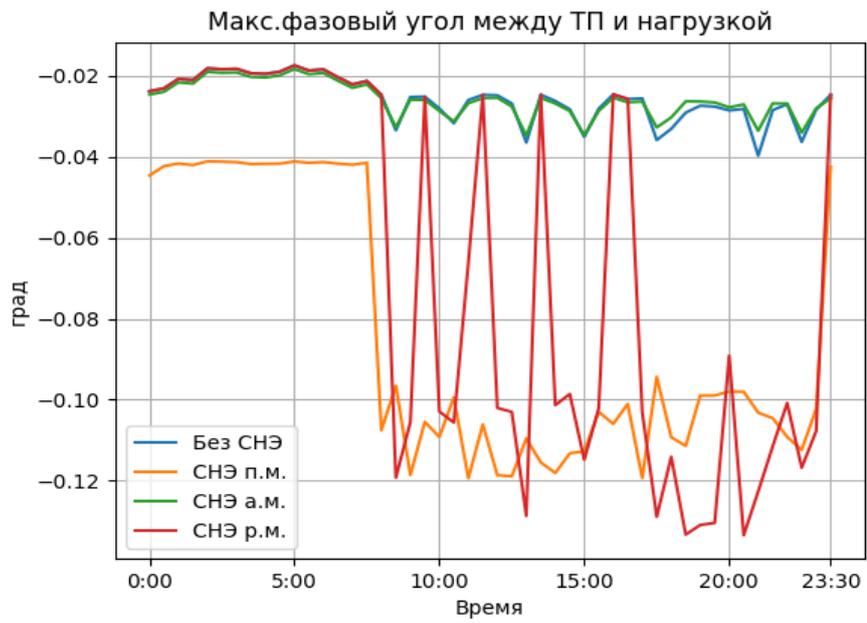


Рисунок 56.5 Узел - а64

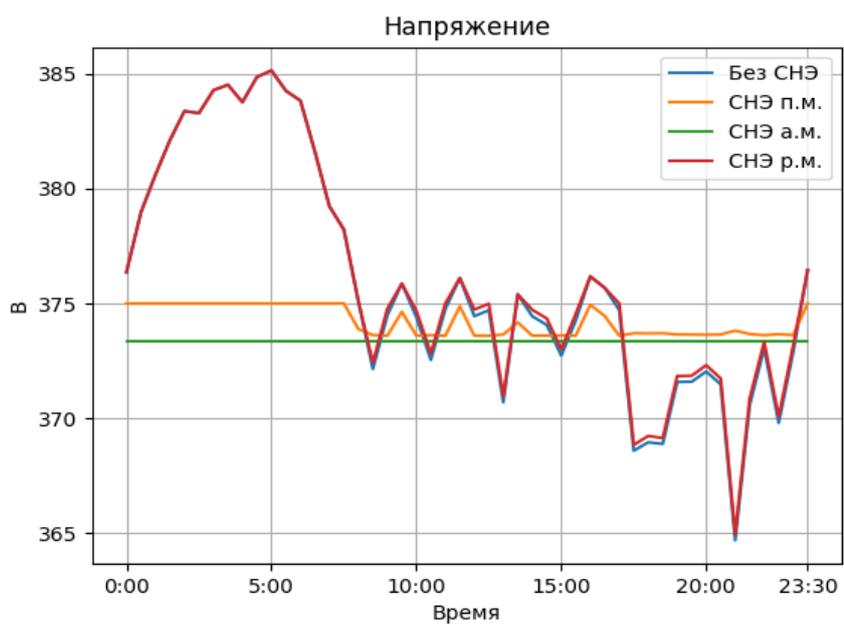


Рисунок 57.1 Узел - о5-4

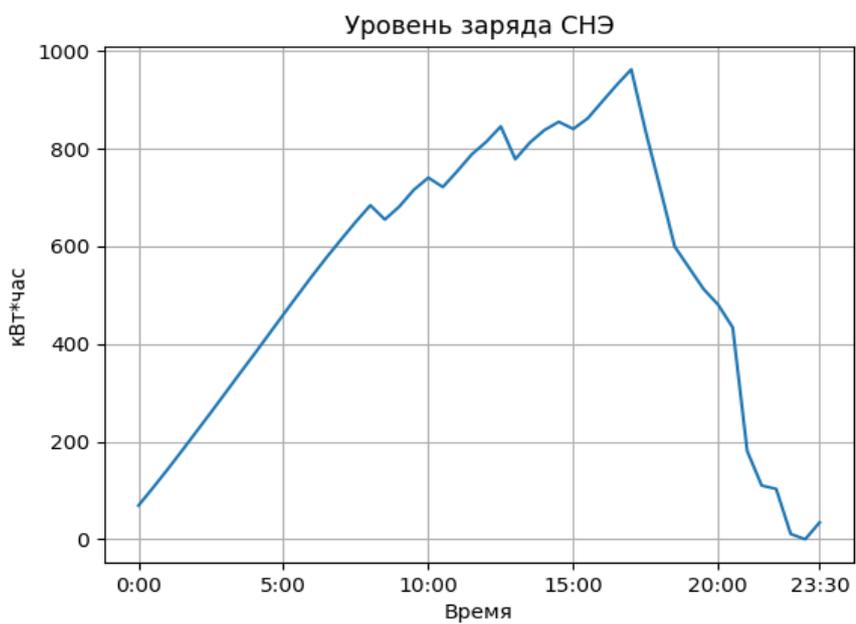


Рисунок 57.2 Узел - о5-4

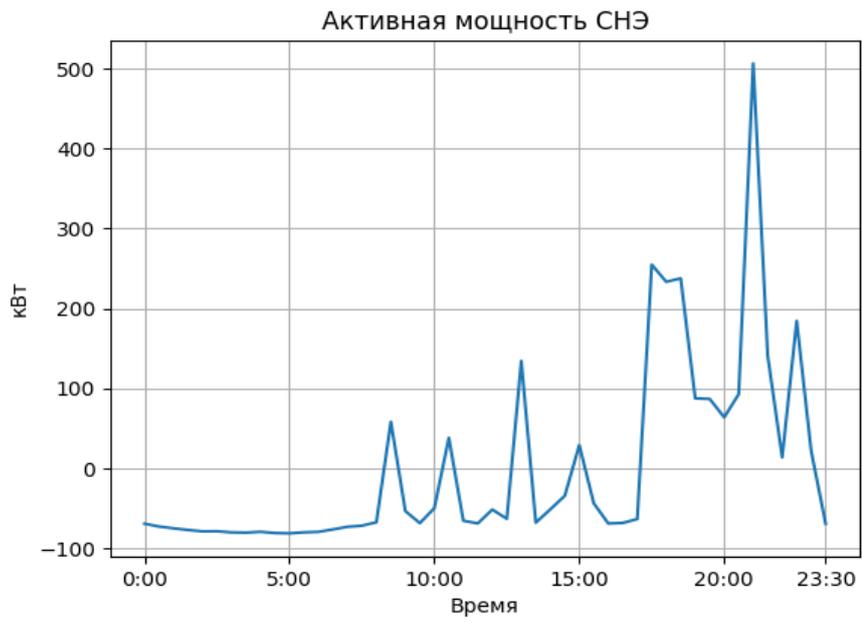


Рисунок 57.3 Узел - о5-4

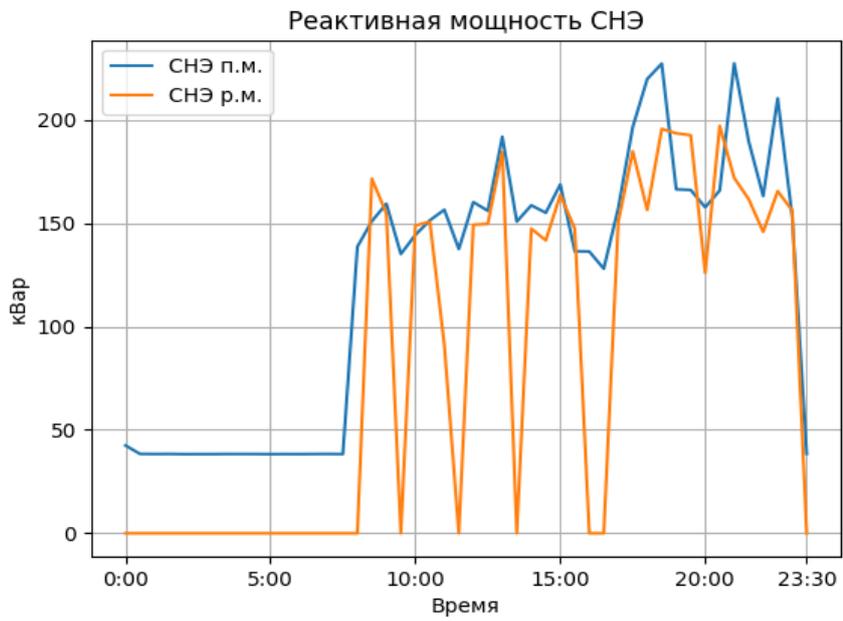


Рисунок 57.4 Узел - о5-4

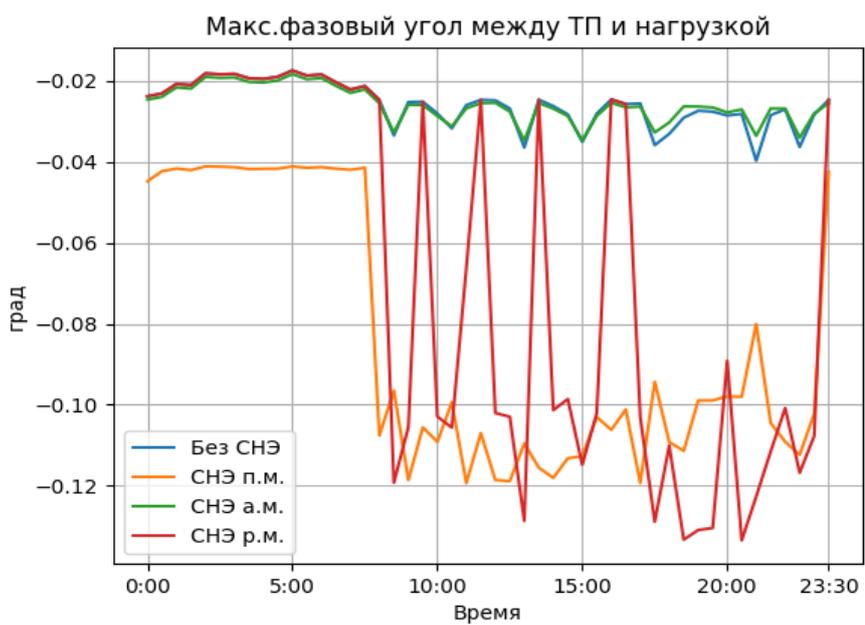


Рисунок 57.5 Узел - о5-4

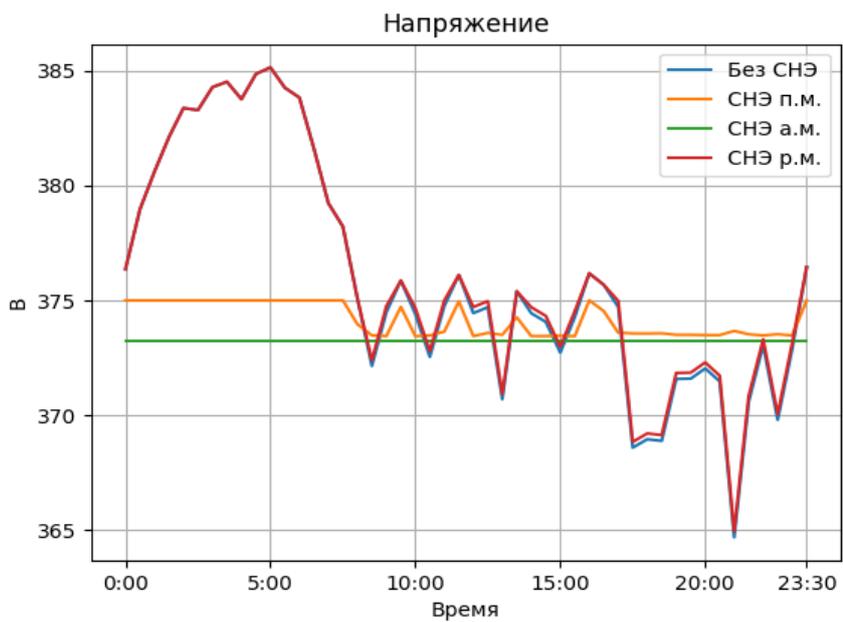


Рисунок 58.1 Узел - а65

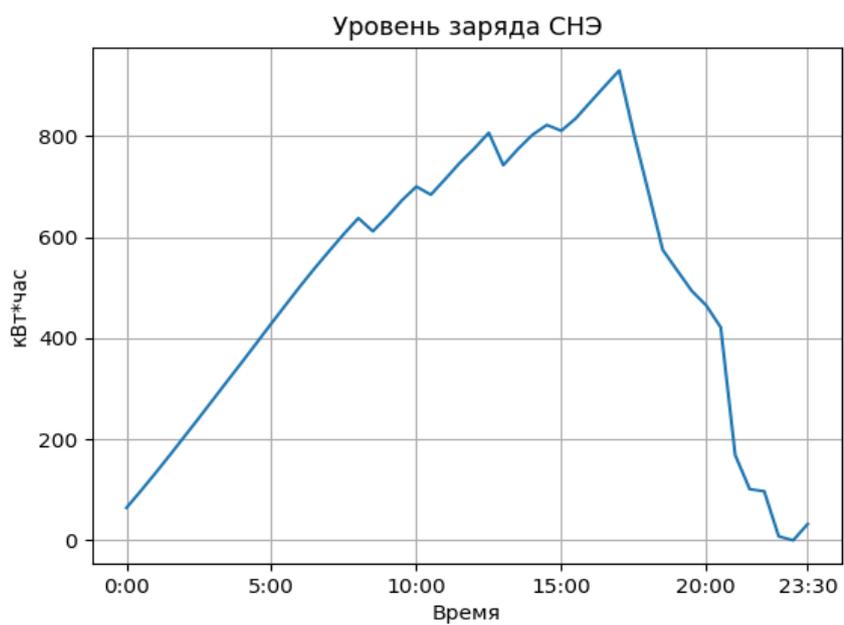


Рисунок 58.2 Узел - а65

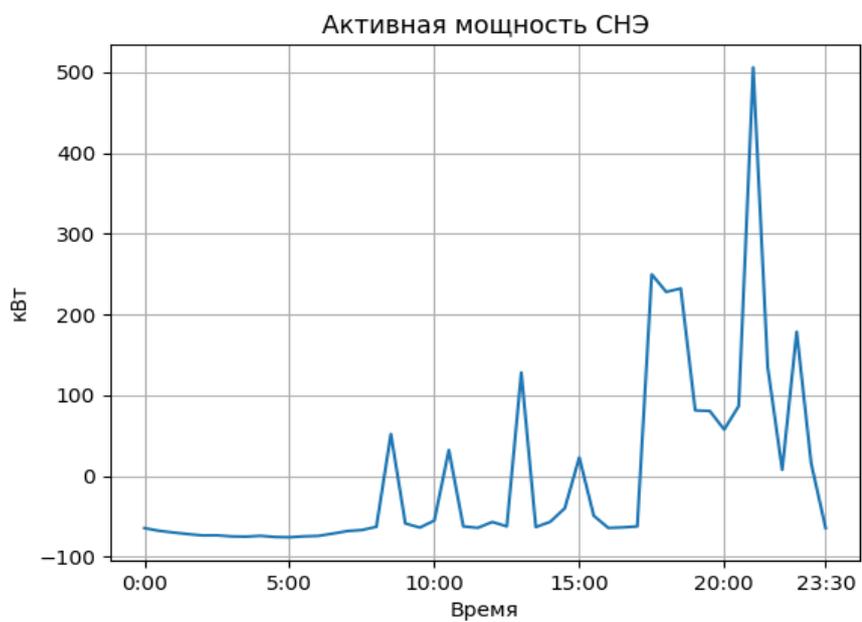


Рисунок 58.3 Узел - а65

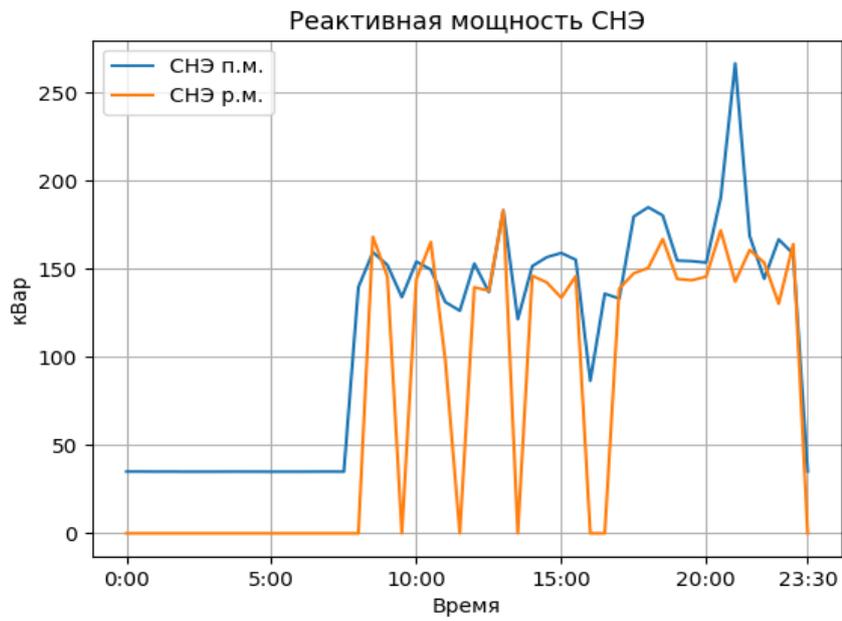


Рисунок 58.4 Узел - а65

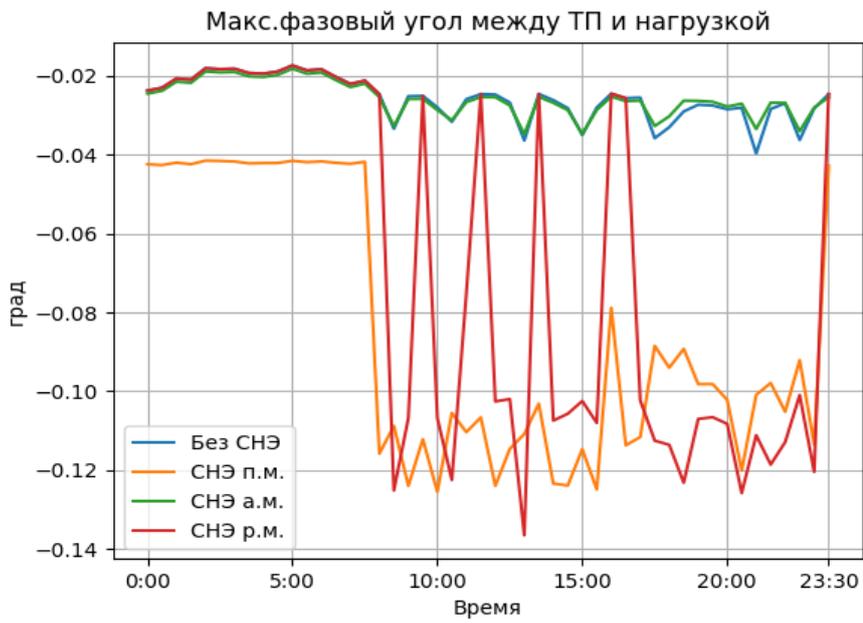


Рисунок 58.5 Узел - а65

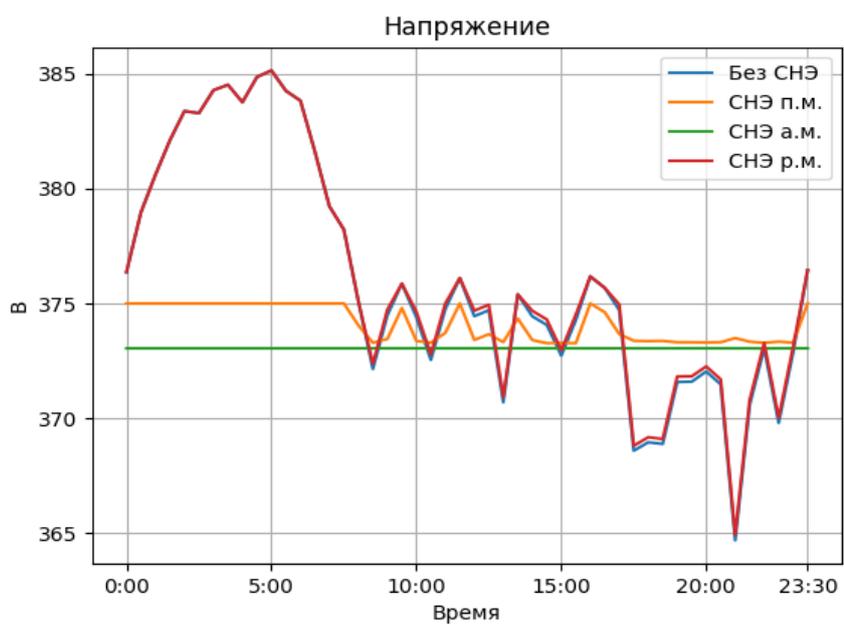


Рисунок 59.1 Узел - об-1

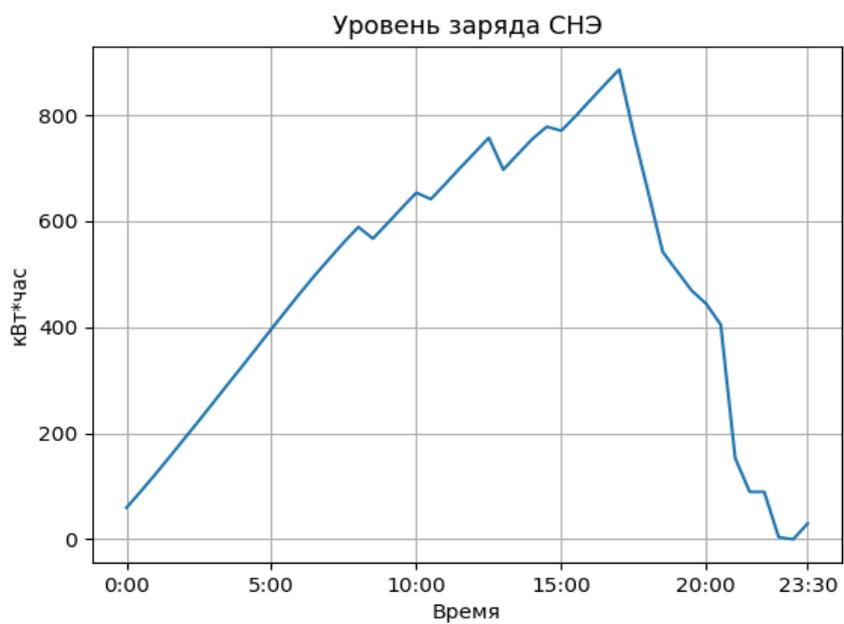


Рисунок 59.2 Узел - об-1

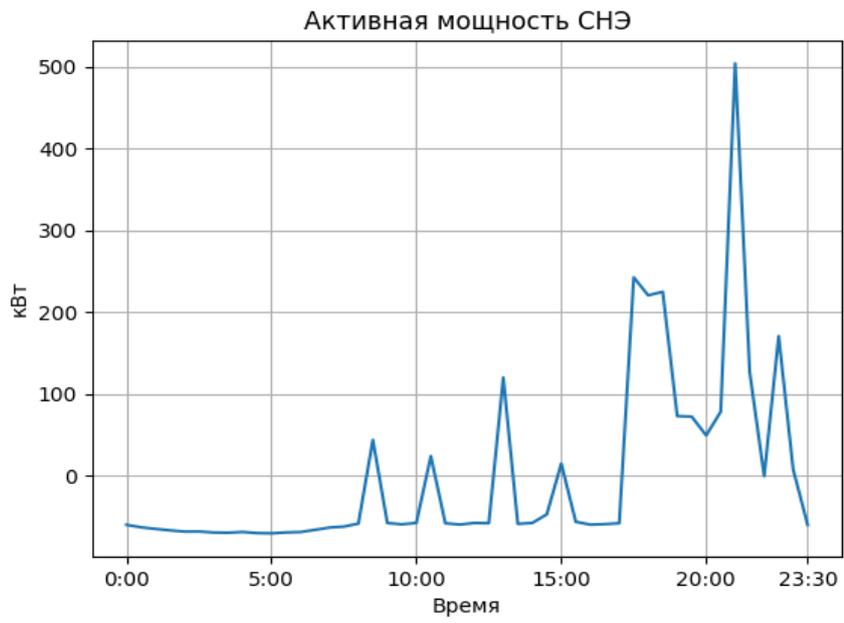


Рисунок 59.3 Узел - об-1

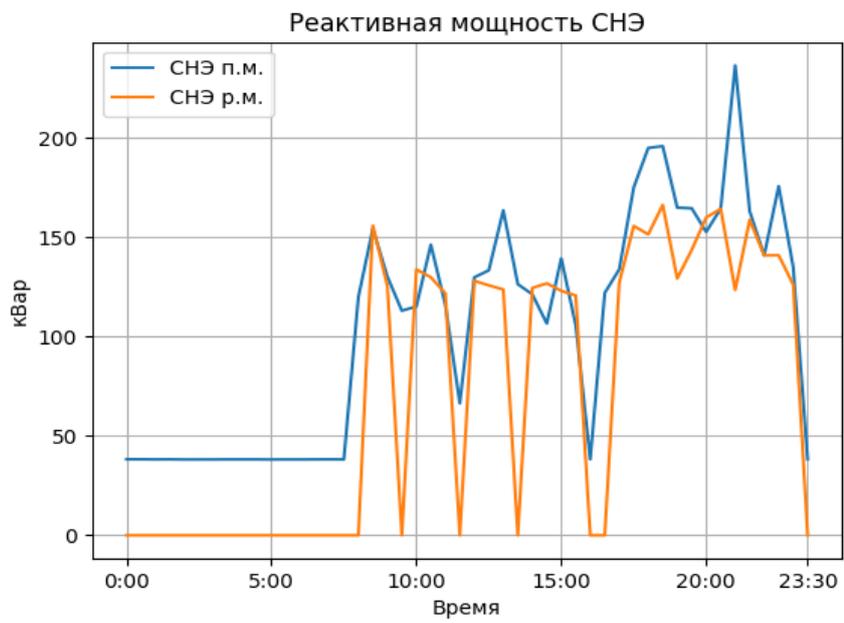


Рисунок 59.4 Узел - об-1

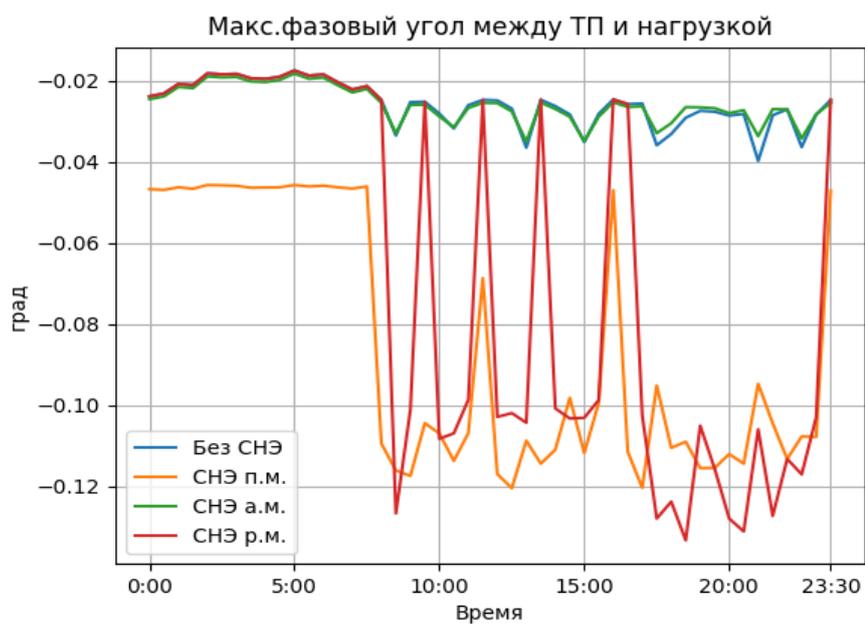


Рисунок 59.5 Узел - об-1

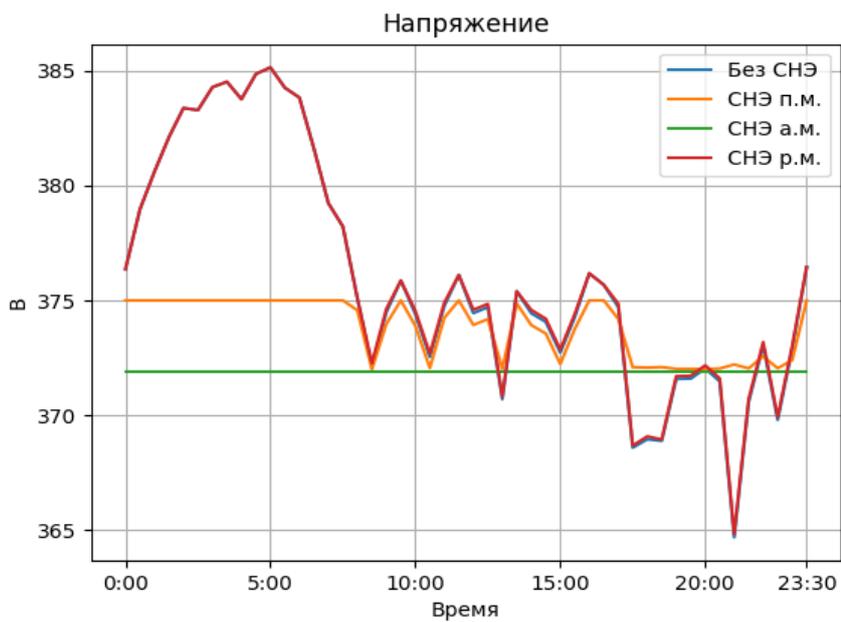


Рисунок 60.1 Узел - а66

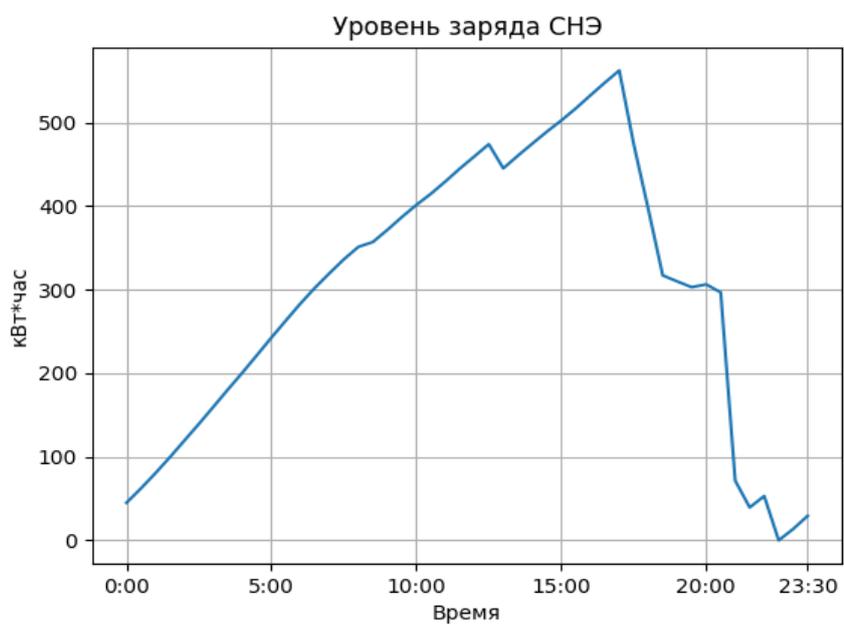


Рисунок 60.2 Узел - а66

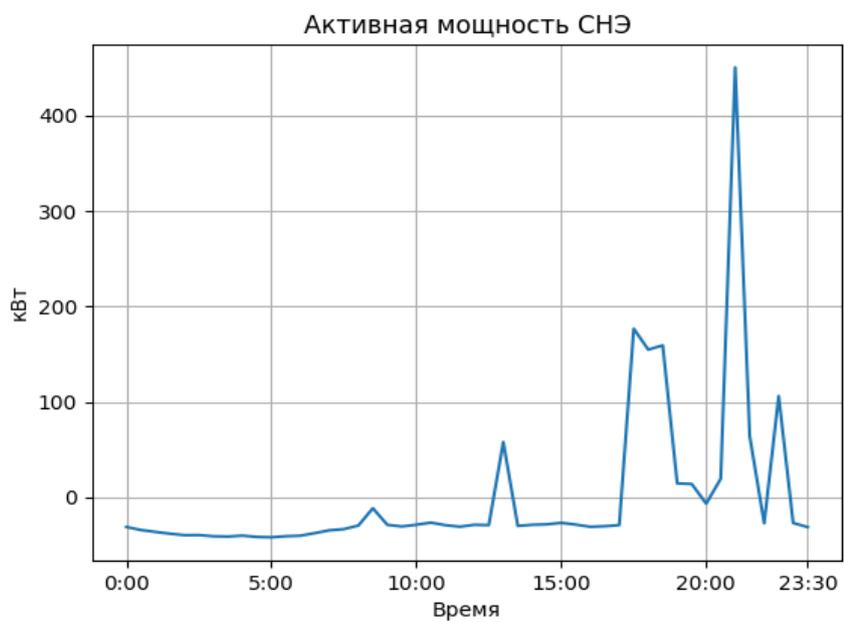


Рисунок 60.3 Узел - а66

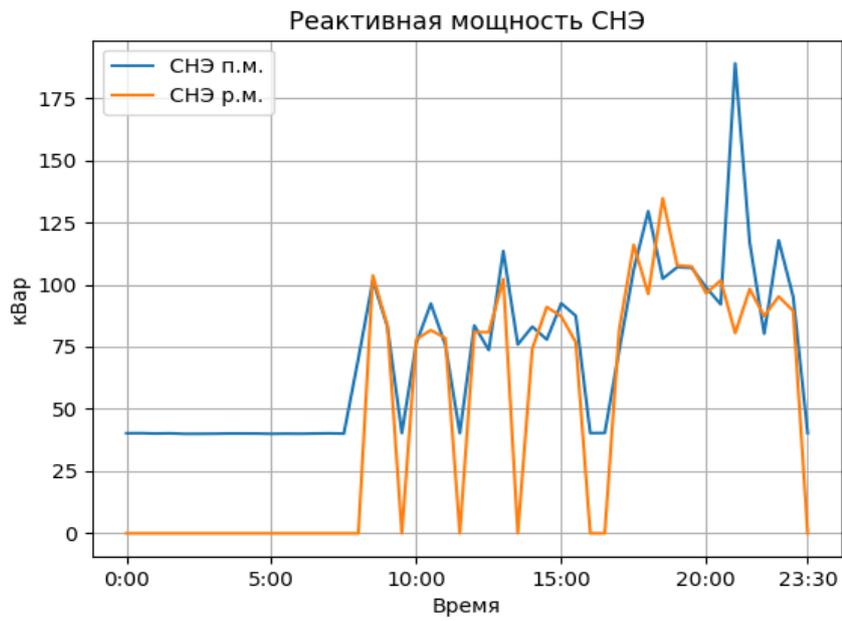


Рисунок 60.4 Узел - а66

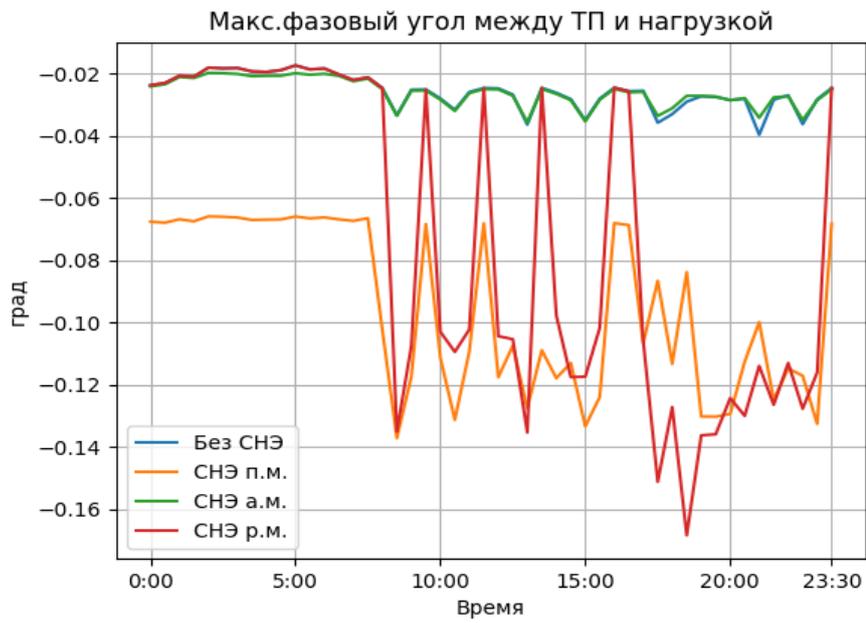


Рисунок 60.5 Узел - а66

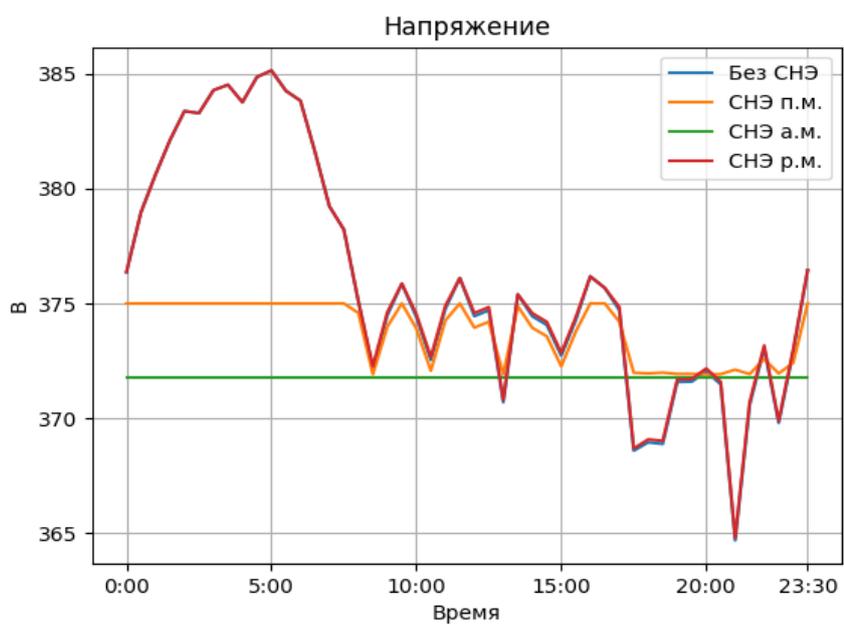


Рисунок 61.1 Узел - а67

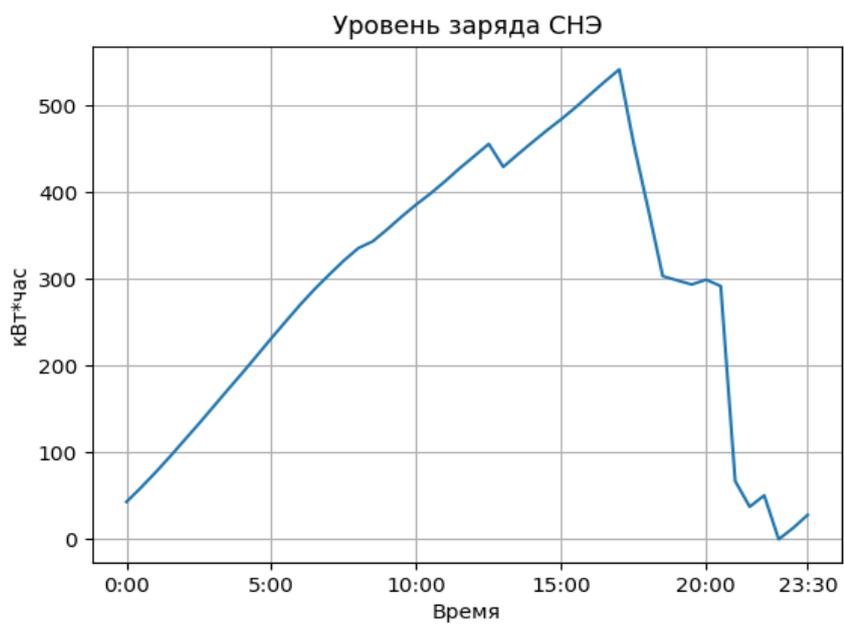


Рисунок 61.2 Узел - а67

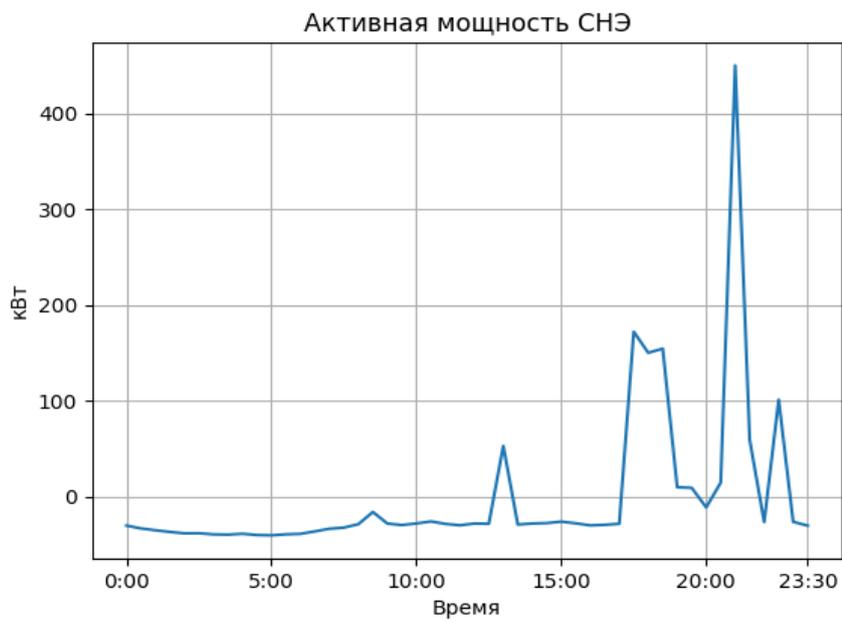


Рисунок 61.3 Узел - а67

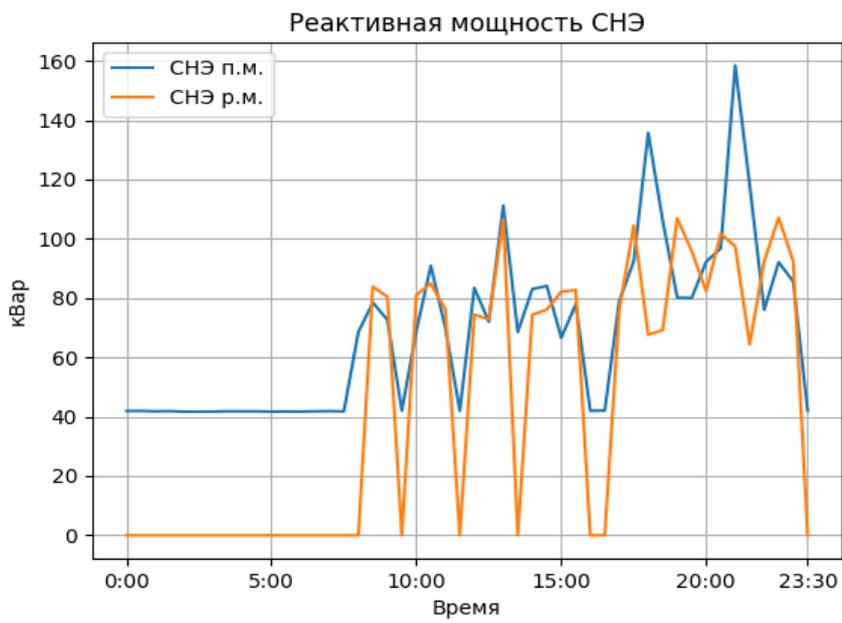


Рисунок 61.4 Узел - а67

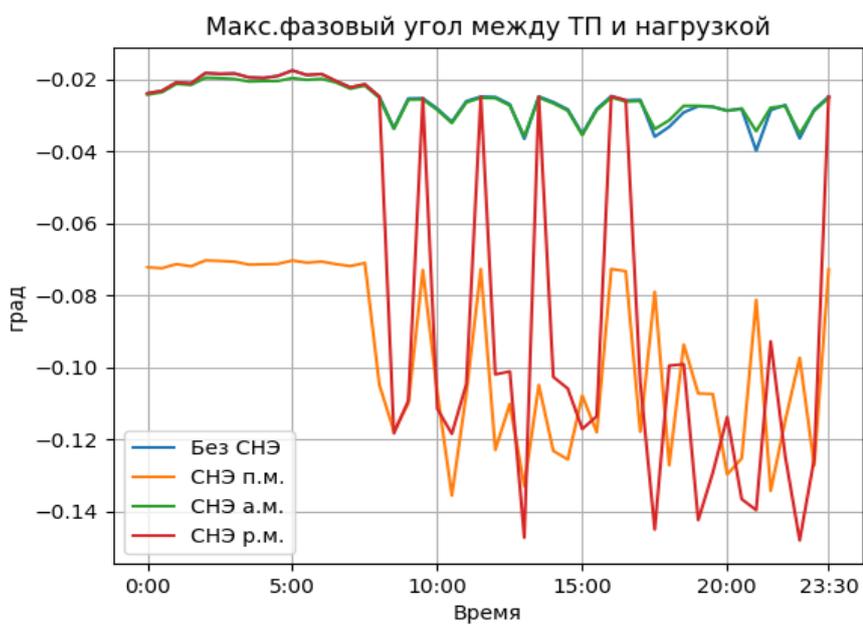


Рисунок 61.5 Узел - а67

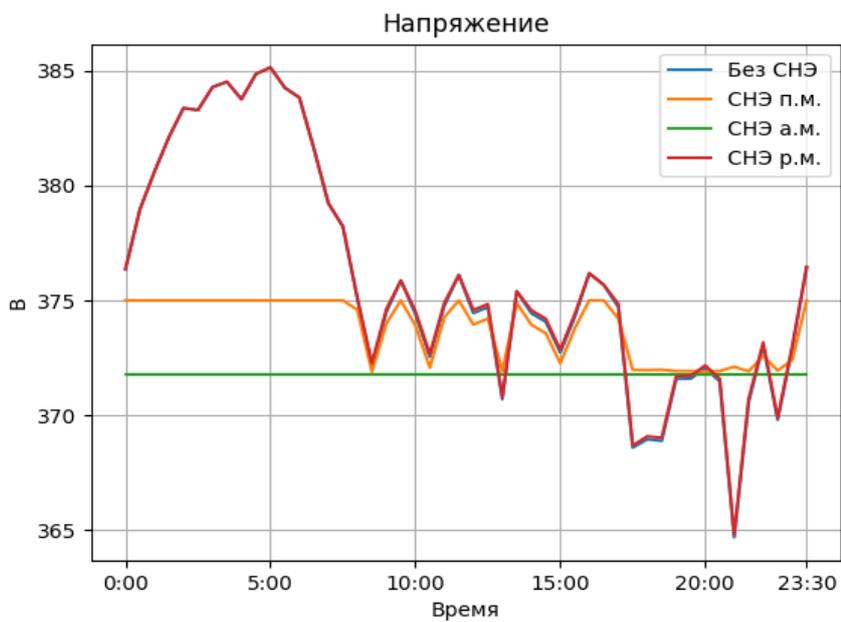


Рисунок 62.1 Узел - о7-2

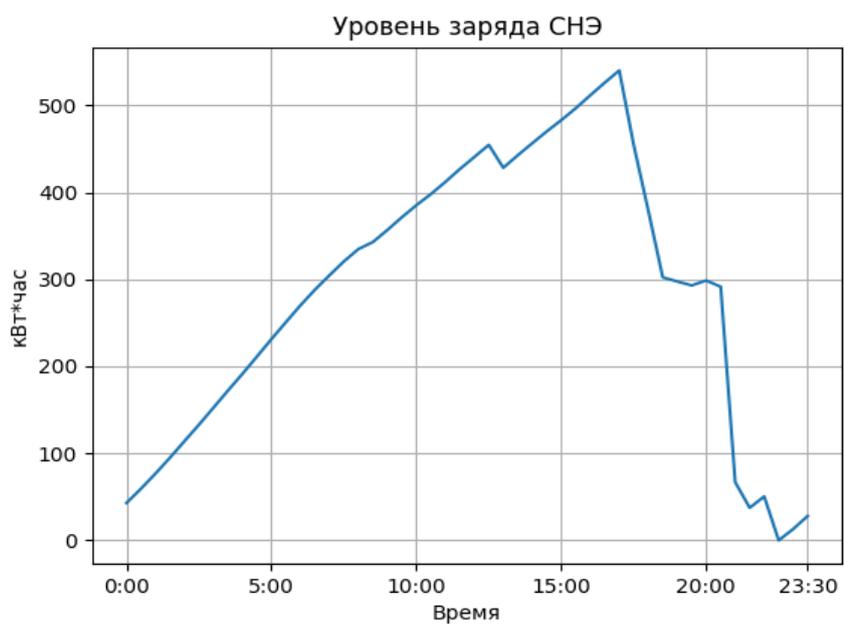


Рисунок 62.2 Узел - о7-2

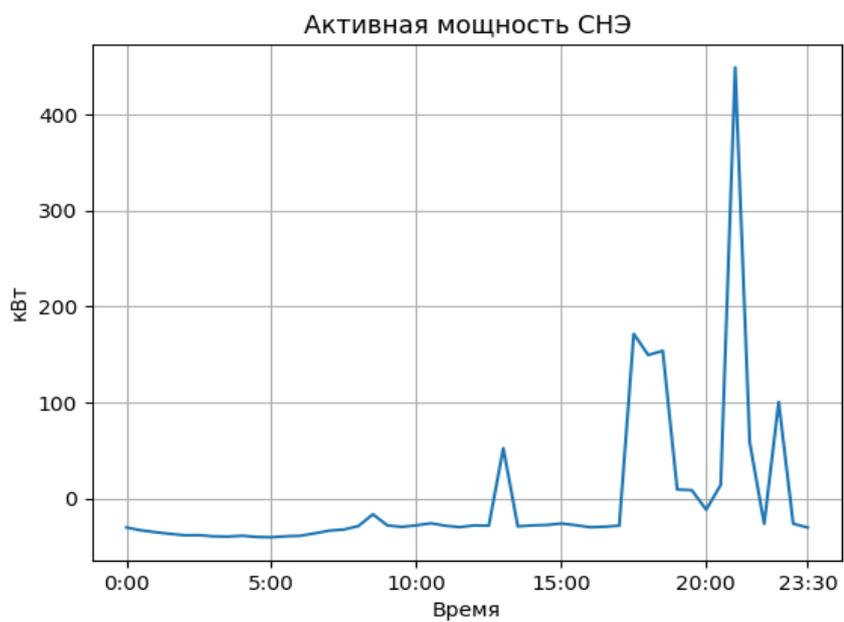


Рисунок 62.3 Узел - о7-2

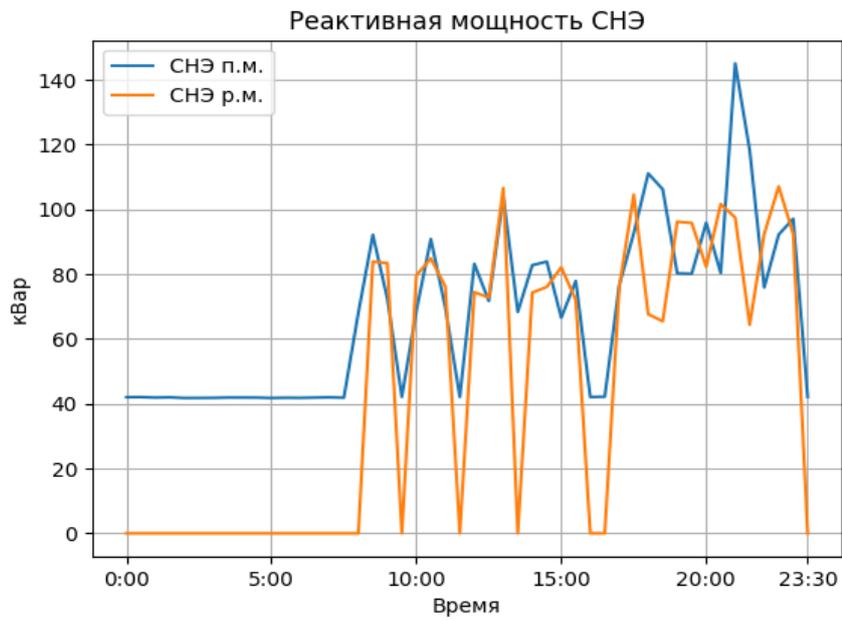


Рисунок 62.4 Узел - о7-2

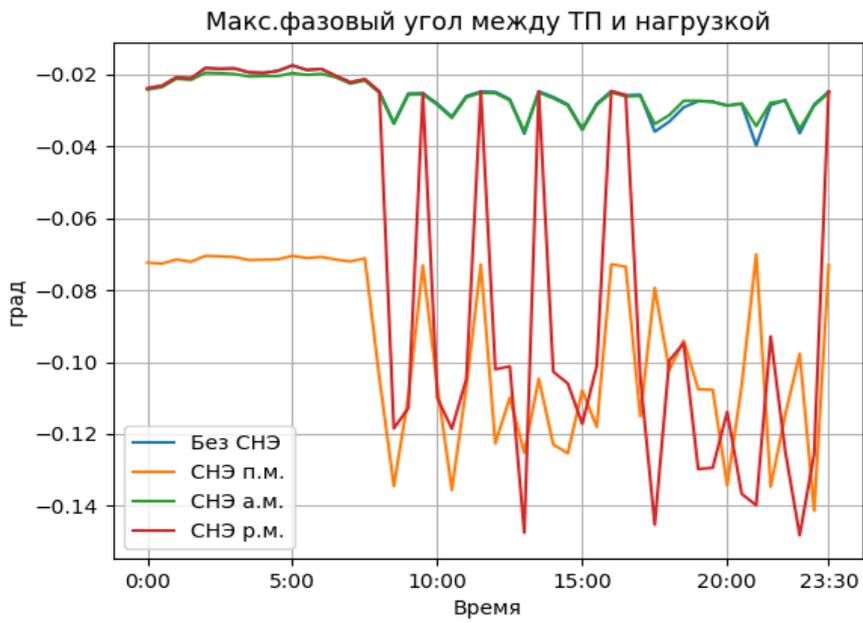


Рисунок 62.5 Узел - о7-2

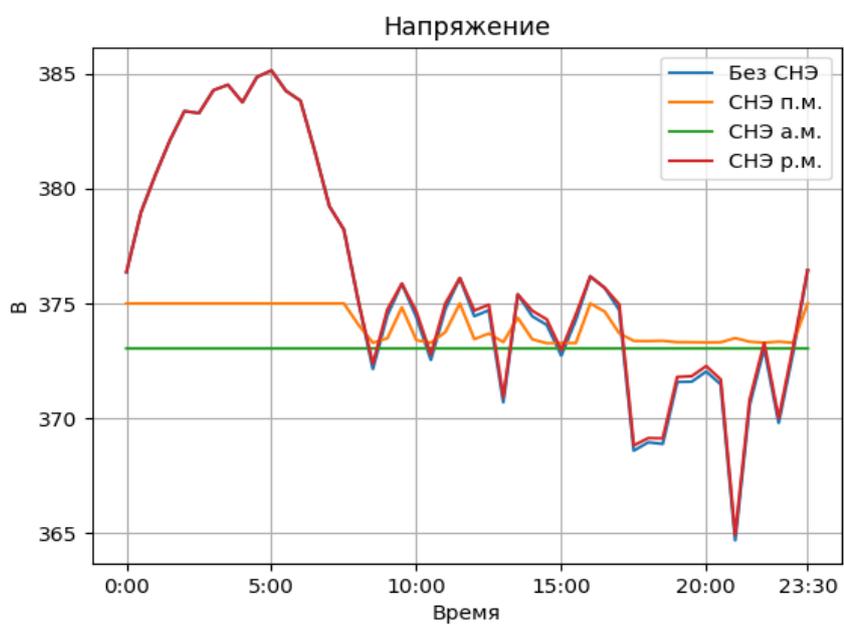


Рисунок 63.1 Узел - а68

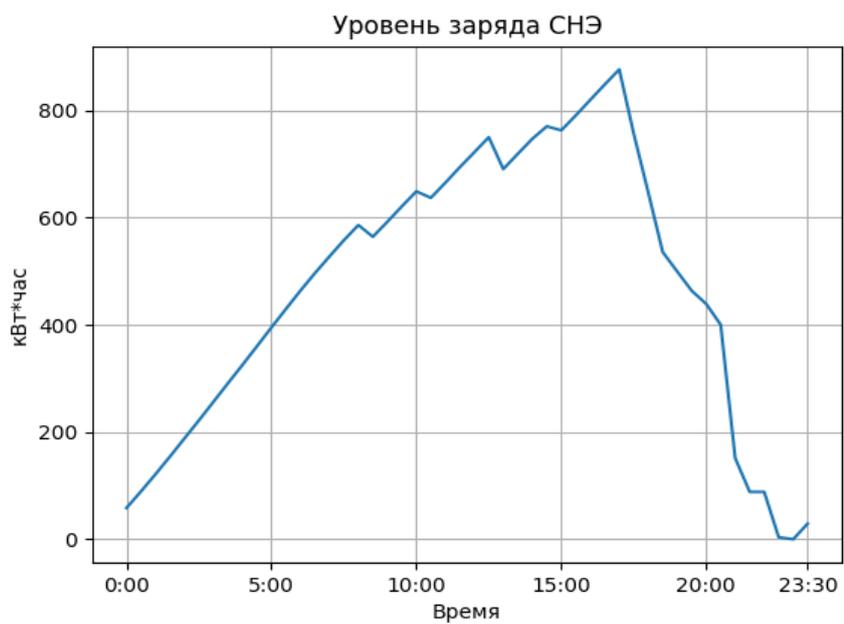


Рисунок 63.2 Узел - а68

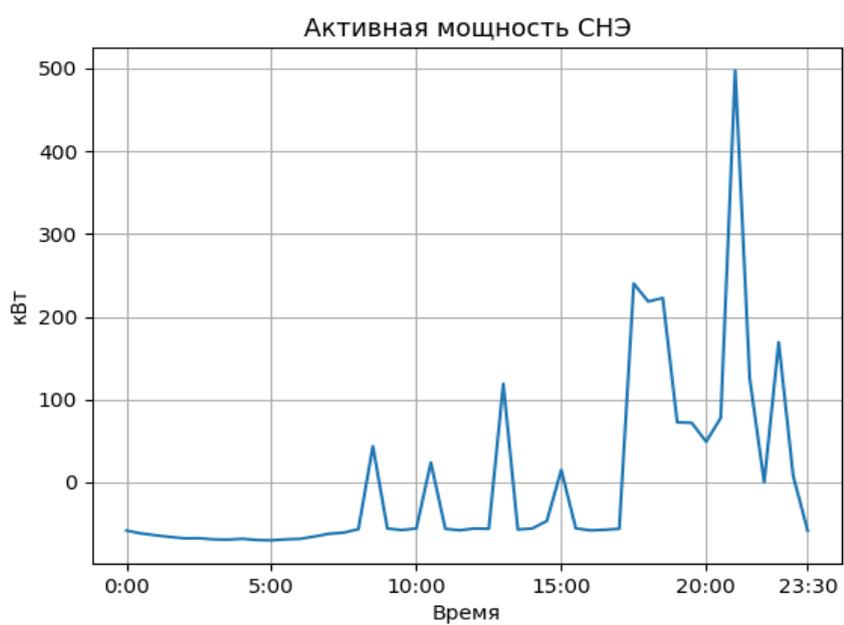


Рисунок 63.3 Узел - а68

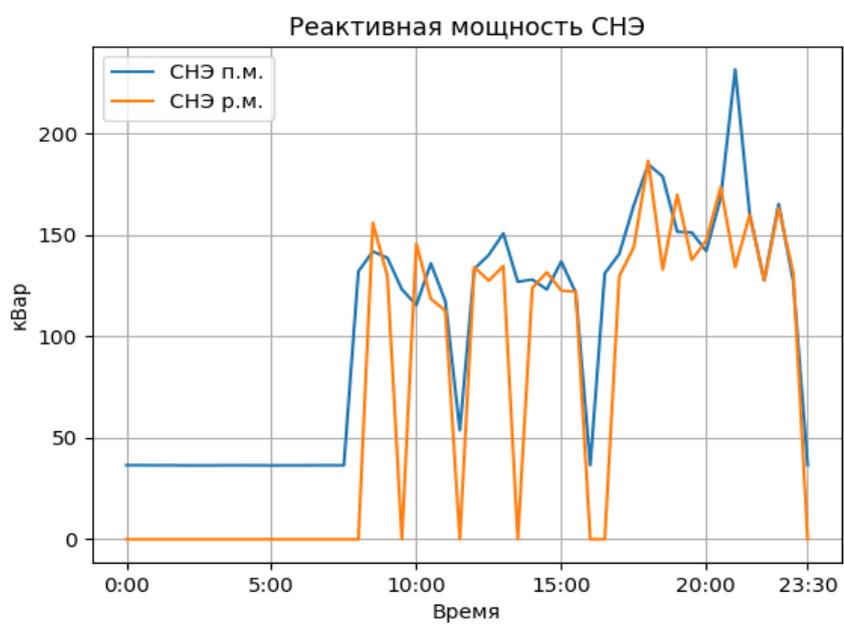


Рисунок 63.4 Узел - а68

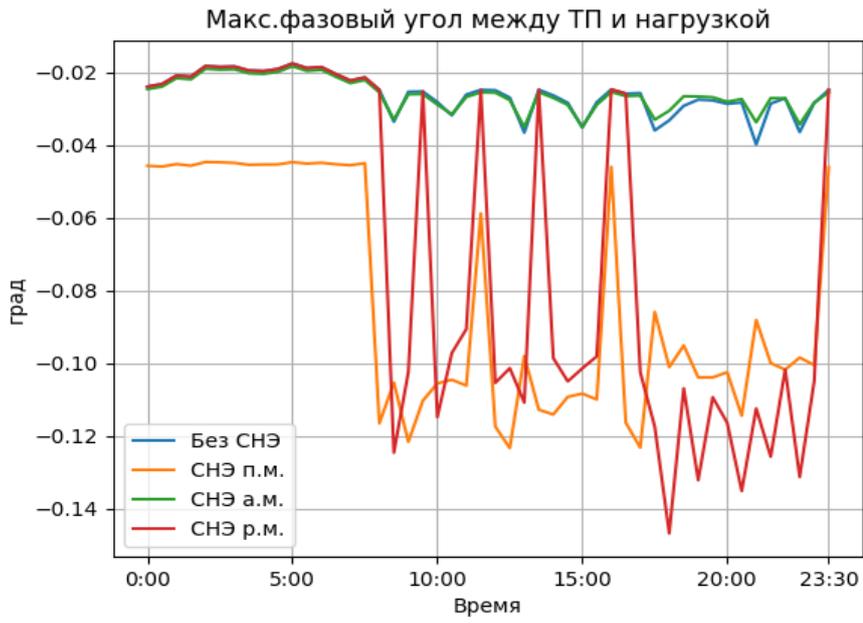


Рисунок 63.5 Узел - а68

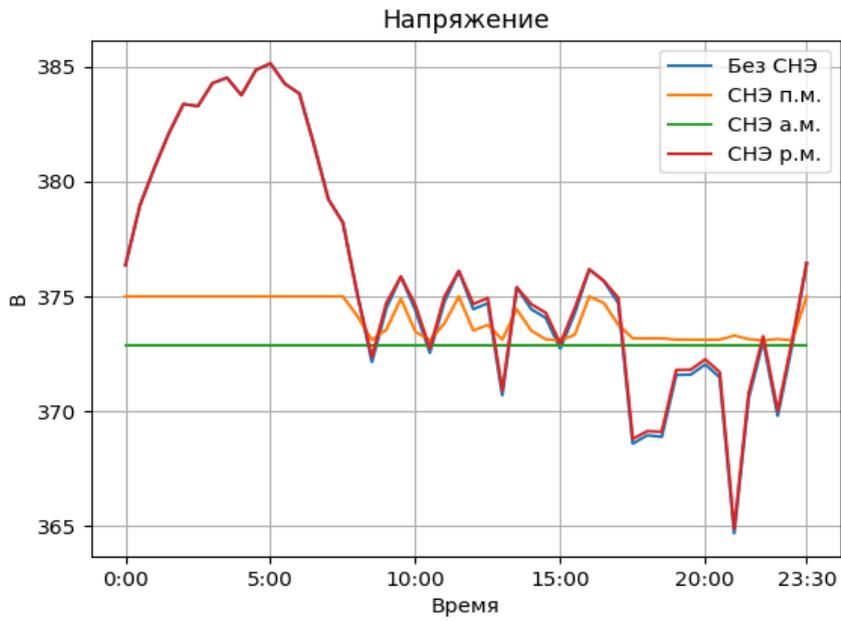


Рисунок 64.1 Узел - а69

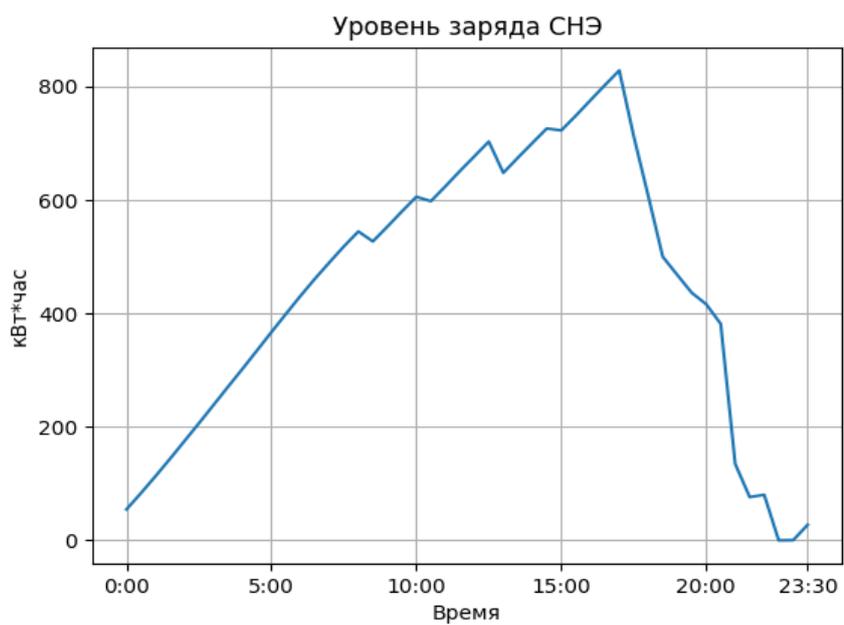


Рисунок 64.2 Узел - а69

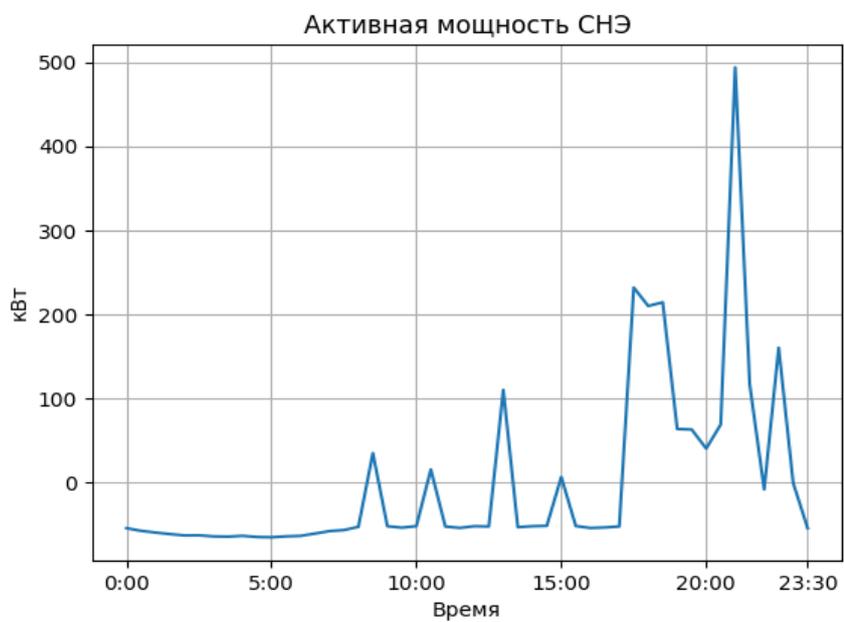


Рисунок 64.3 Узел - а69

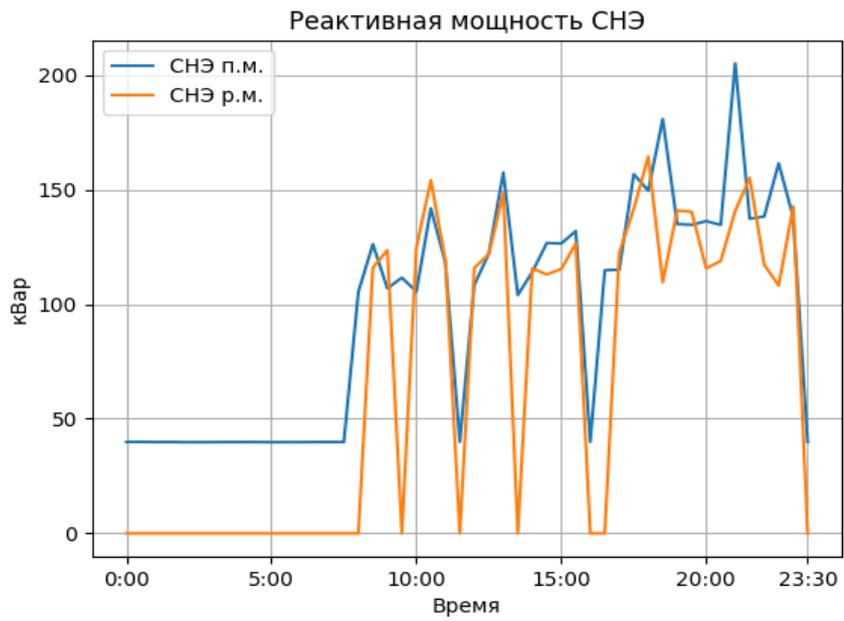


Рисунок 64.4 Узел - а69

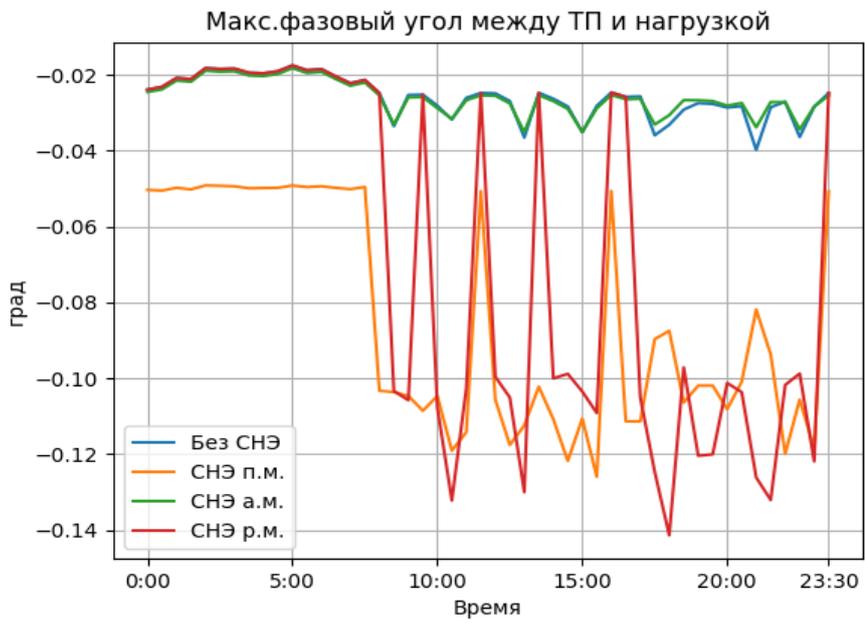


Рисунок 64.5 Узел - а69

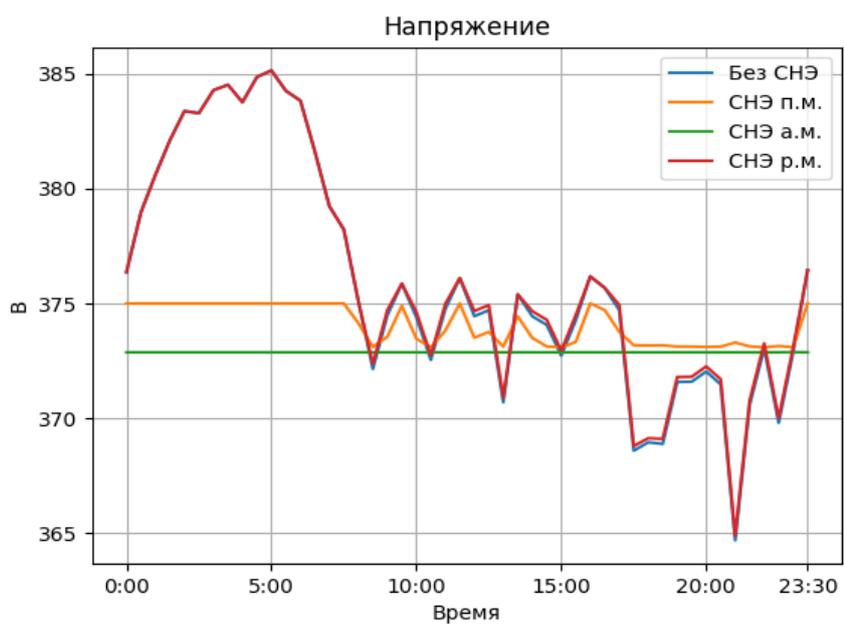


Рисунок 65.1 Узел - о8-1

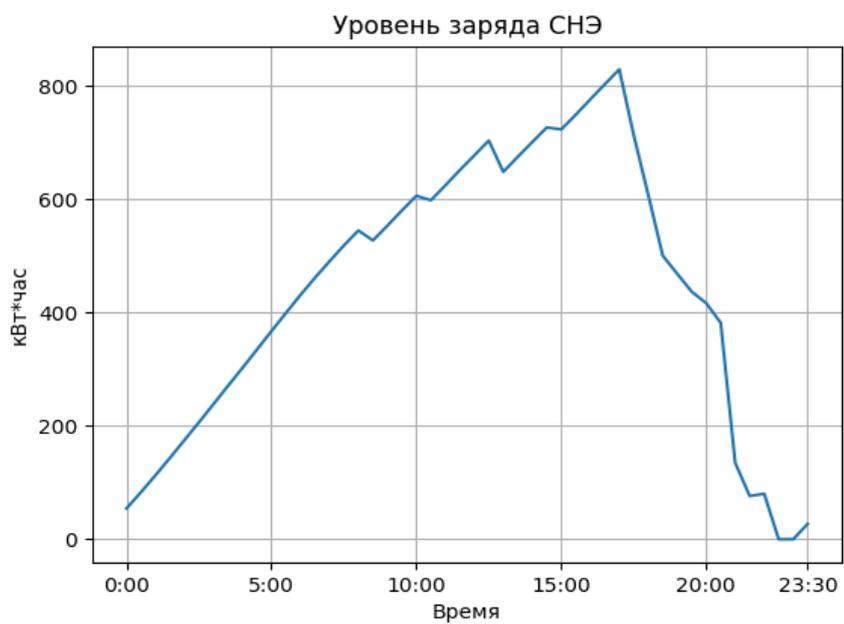


Рисунок 65.2 Узел - о8-1

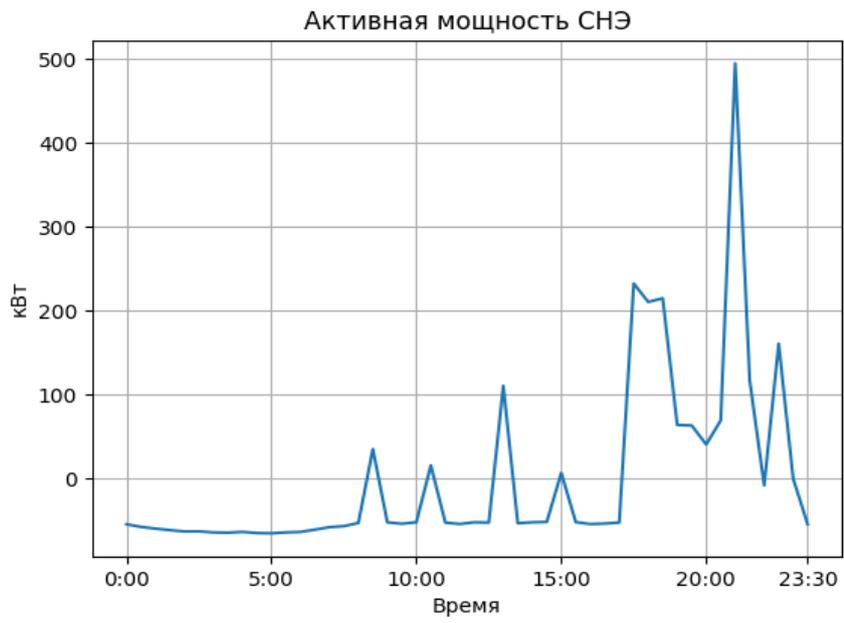


Рисунок 65.3 Узел - о8-1

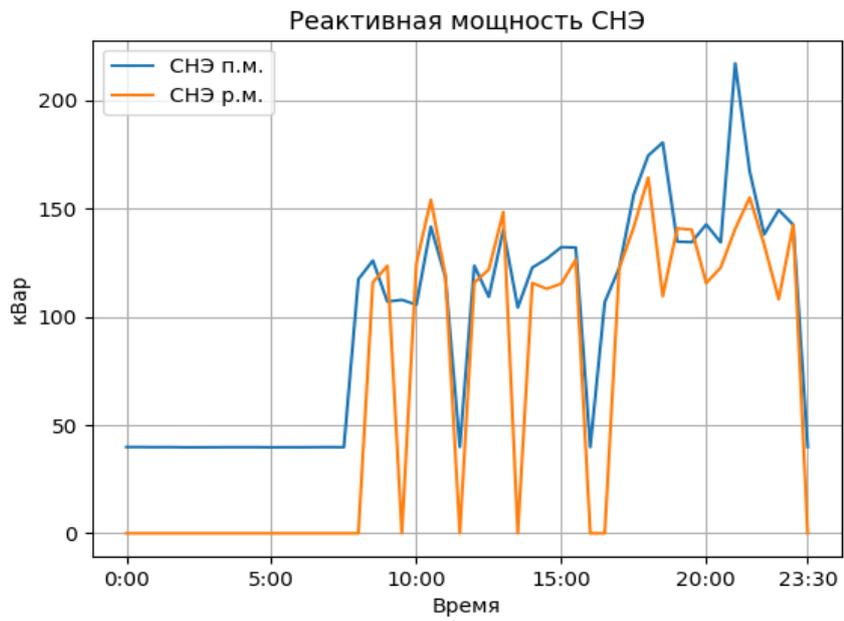


Рисунок 65.4 Узел - о8-1

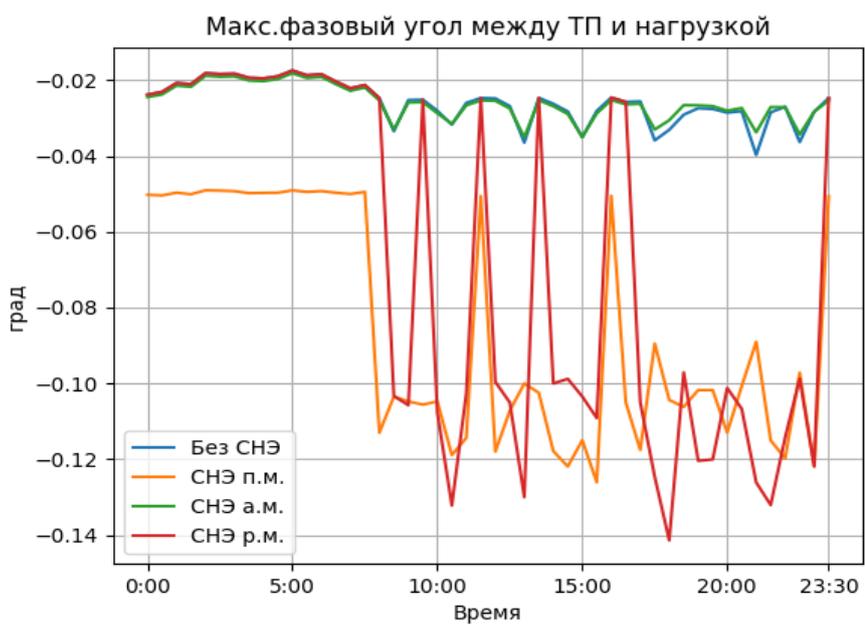


Рисунок 65.5 Узел - о8-1

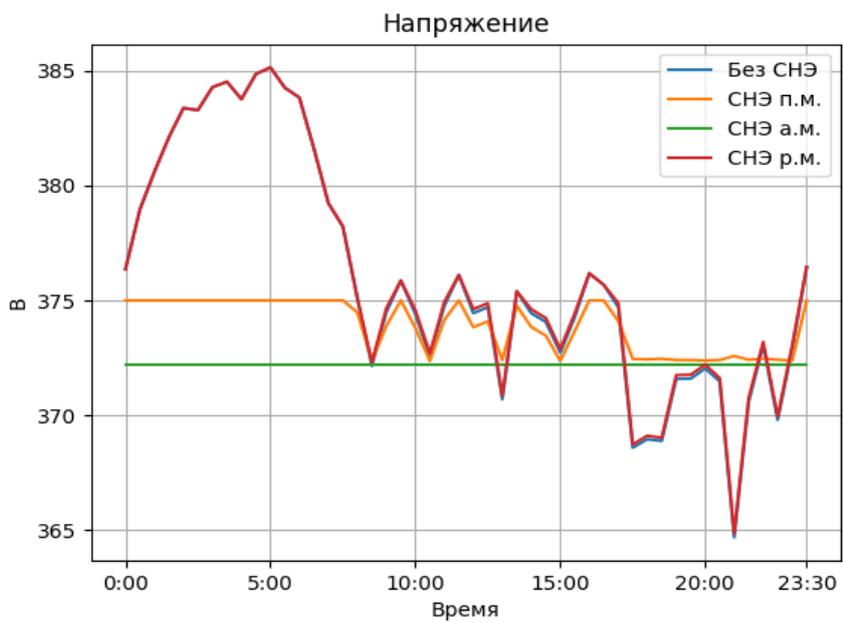


Рисунок 66.1 Узел - а70

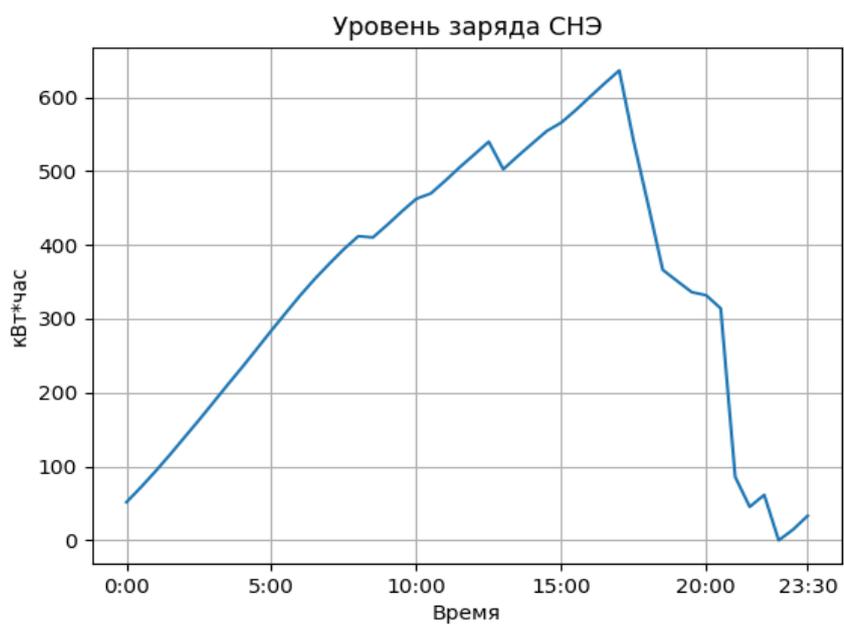


Рисунок 66.2 Узел - а70

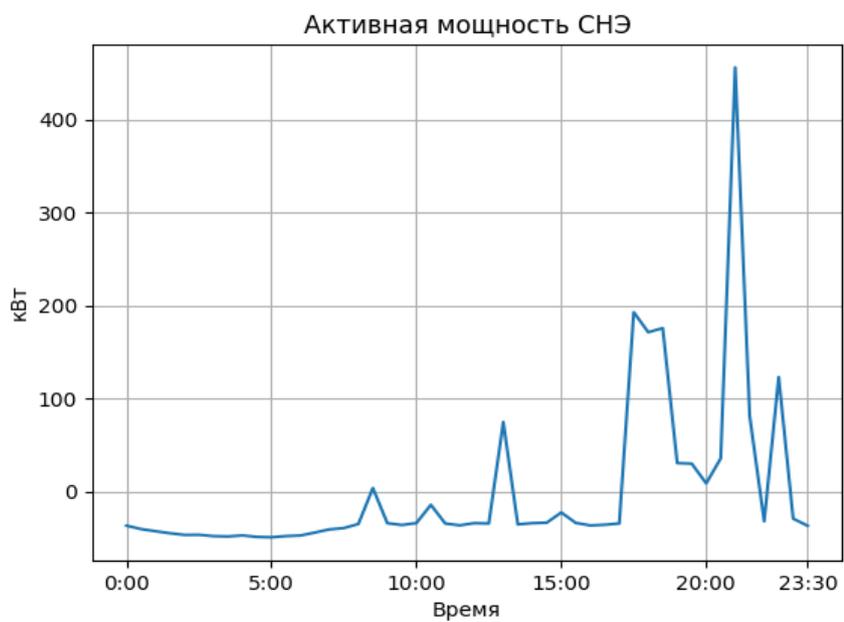


Рисунок 66.3 Узел - а70

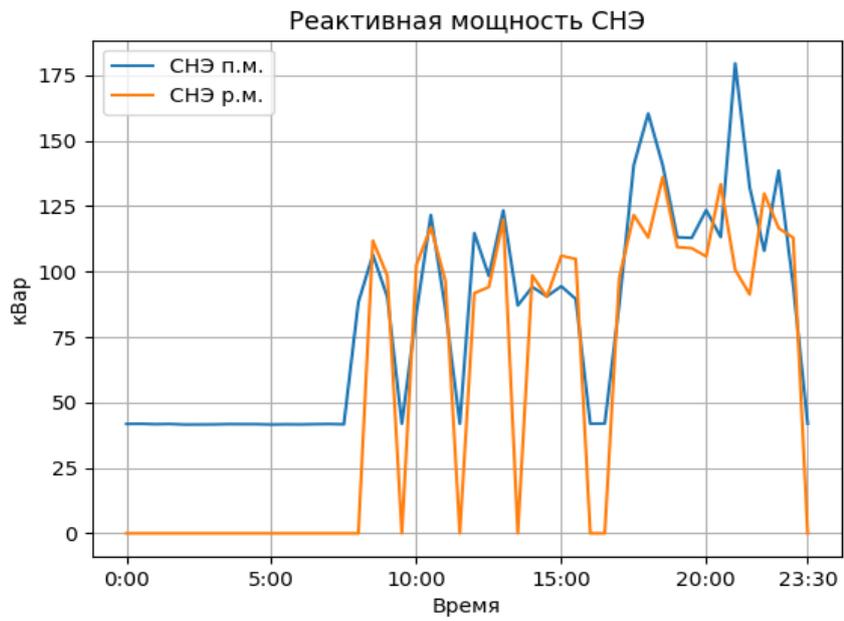


Рисунок 66.4 Узел - а70

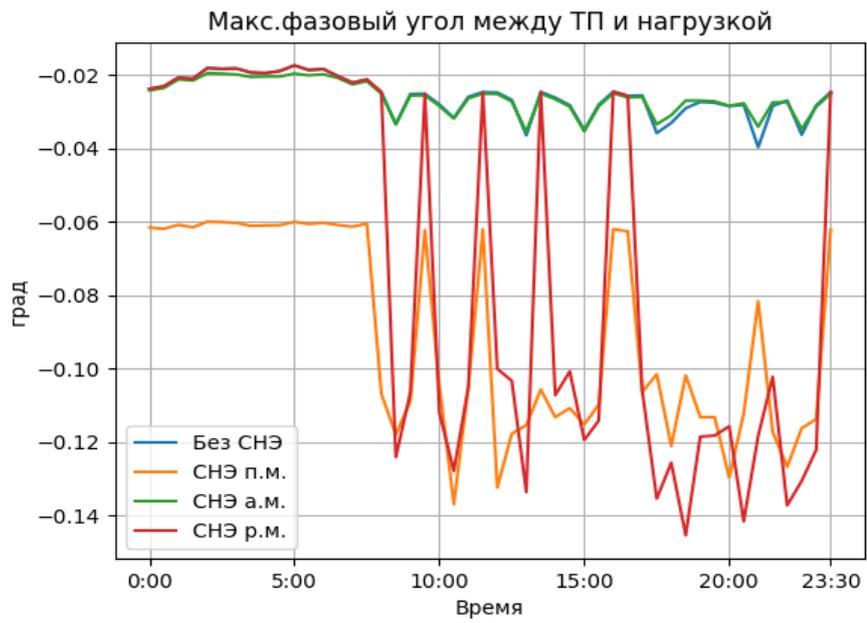


Рисунок 66.5 Узел - а70

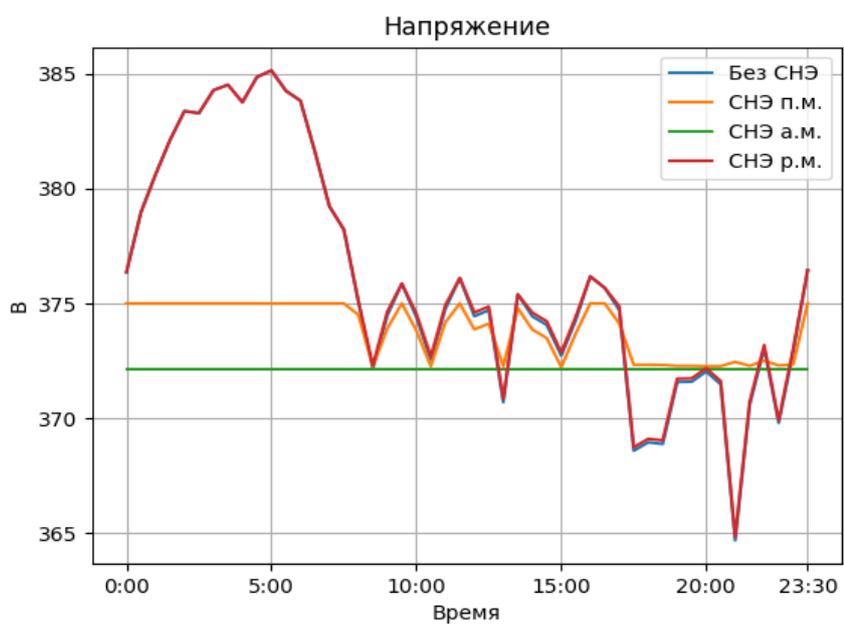


Рисунок 67.1 Узел - а71

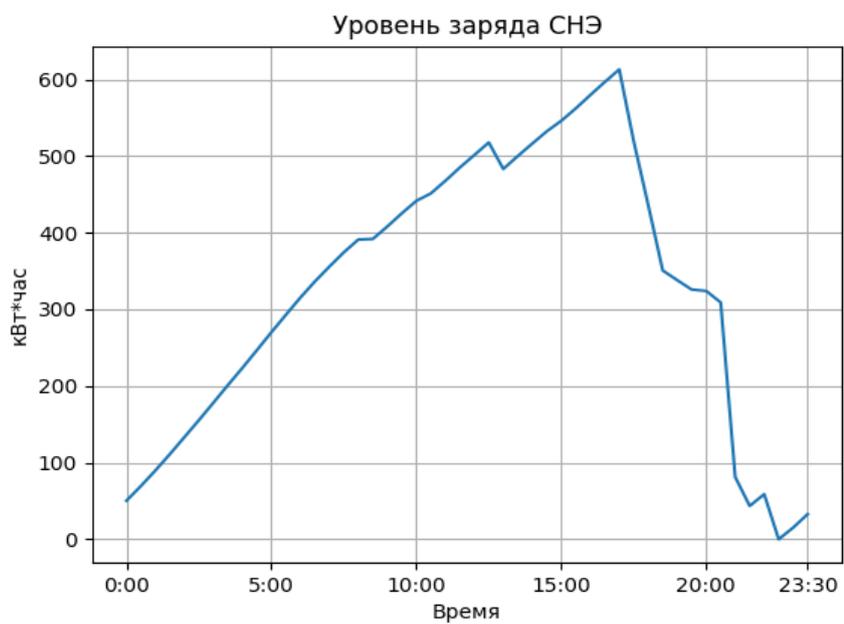


Рисунок 67.2 Узел - а71

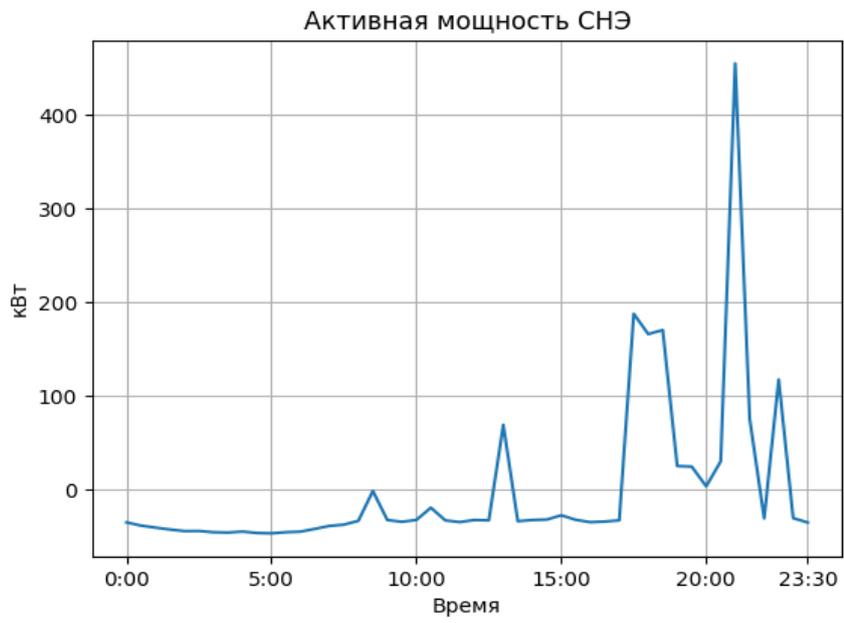


Рисунок 67.3 Узел - а71

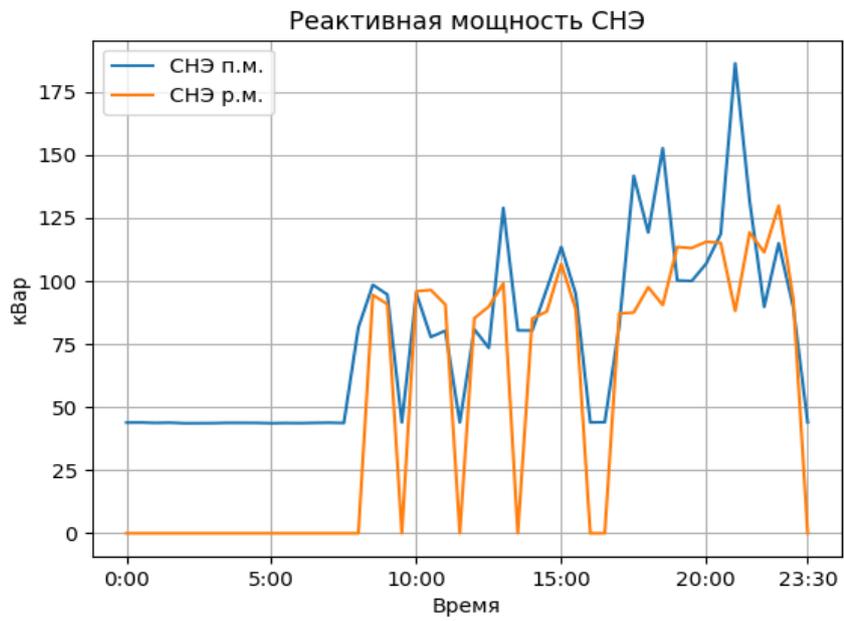


Рисунок 67.4 Узел - а71

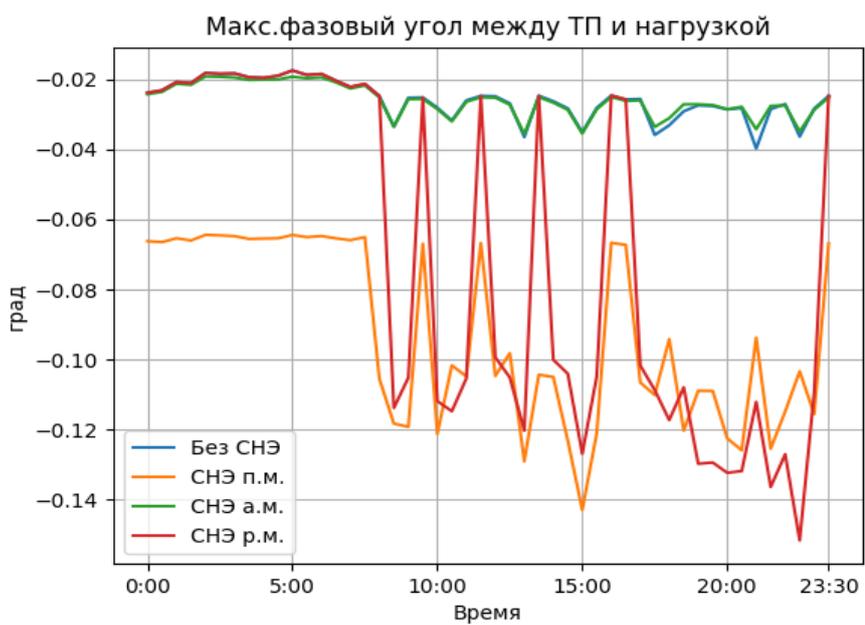


Рисунок 67.5 Узел - а71

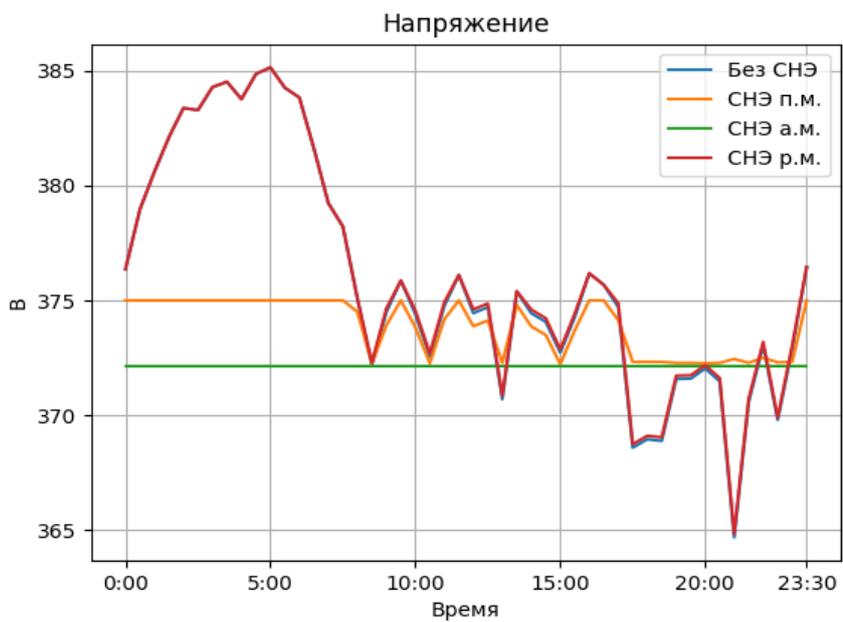


Рисунок 68.1 Узел - о8-2

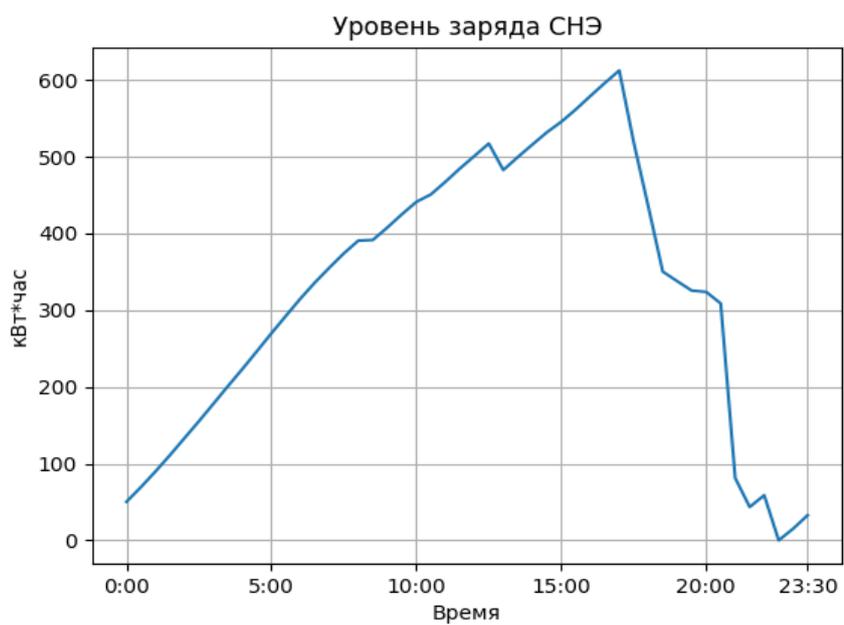


Рисунок 68.2 Узел - о8-2

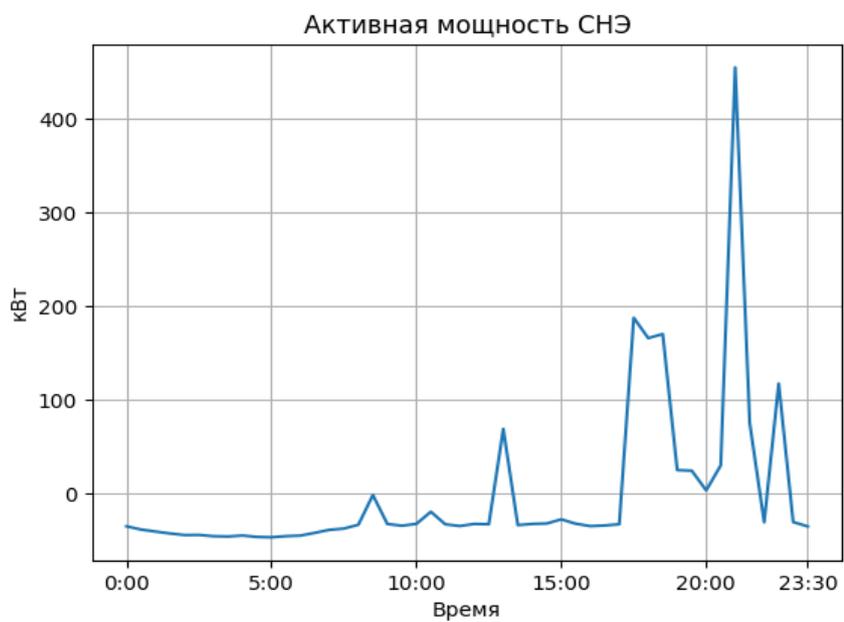


Рисунок 68.3 Узел - о8-2

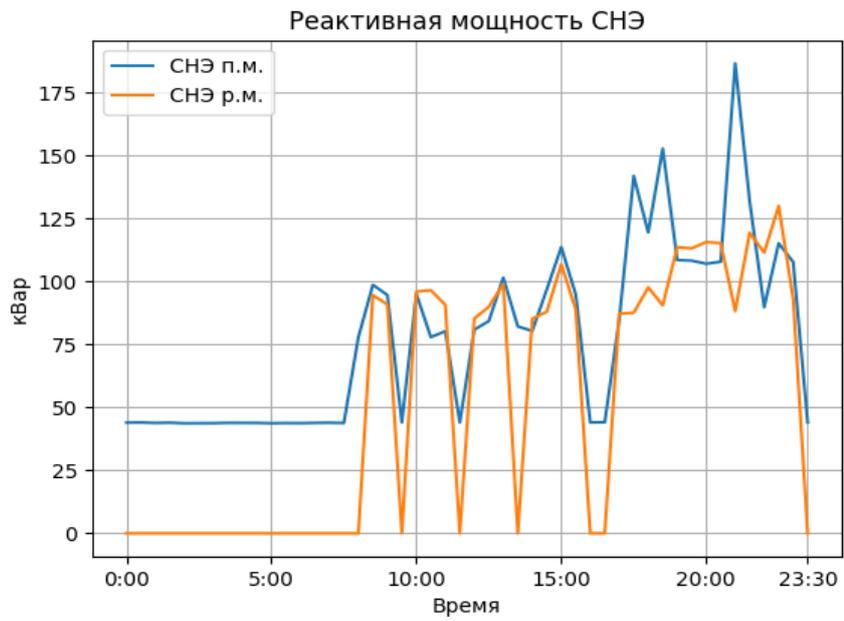


Рисунок 68.4 Узел - о8-2

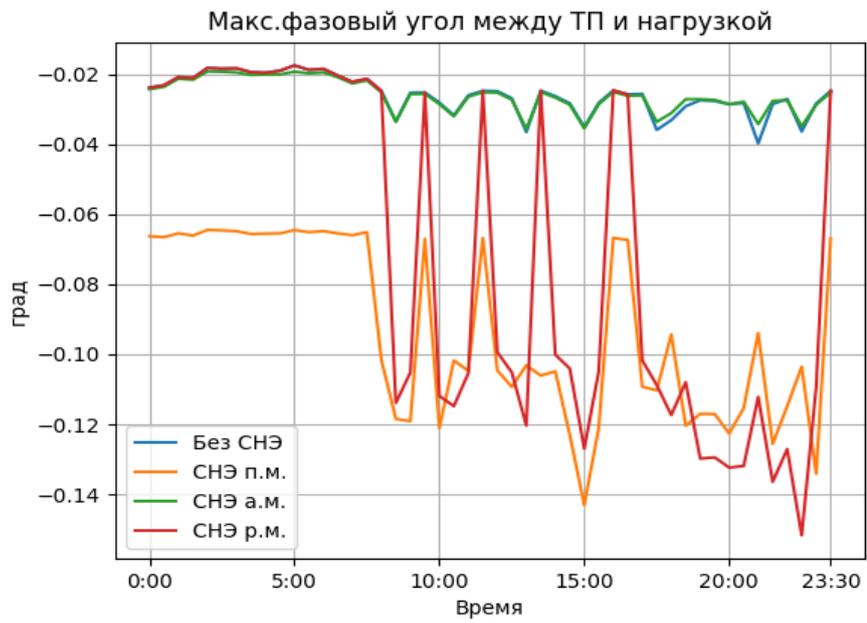


Рисунок 68.5 Узел - о8-2

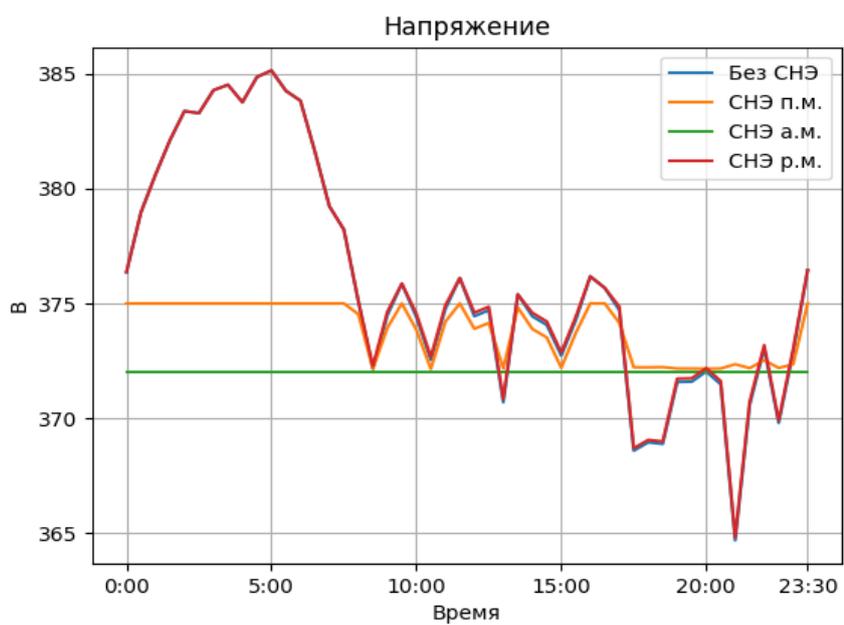


Рисунок 69.1 Узел - а72

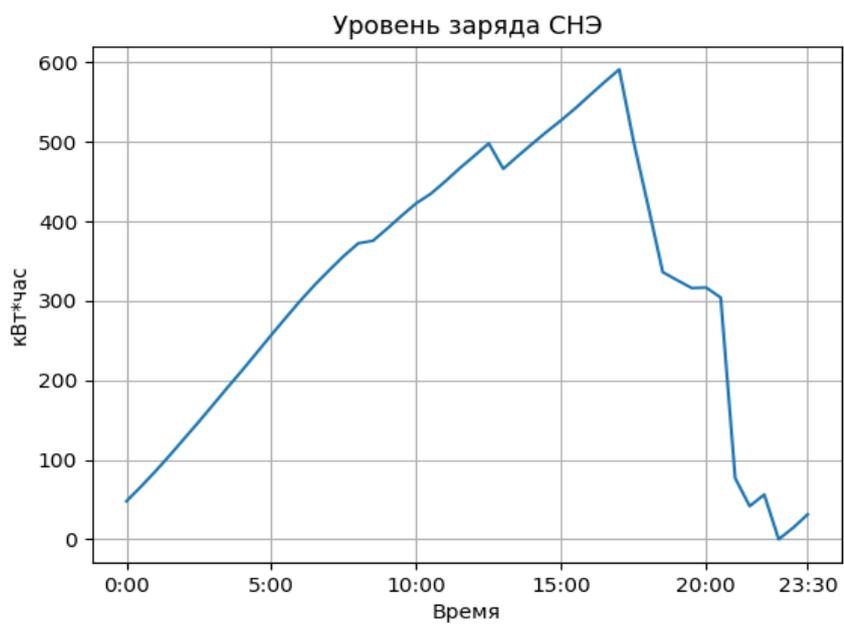


Рисунок 69.2 Узел - а72

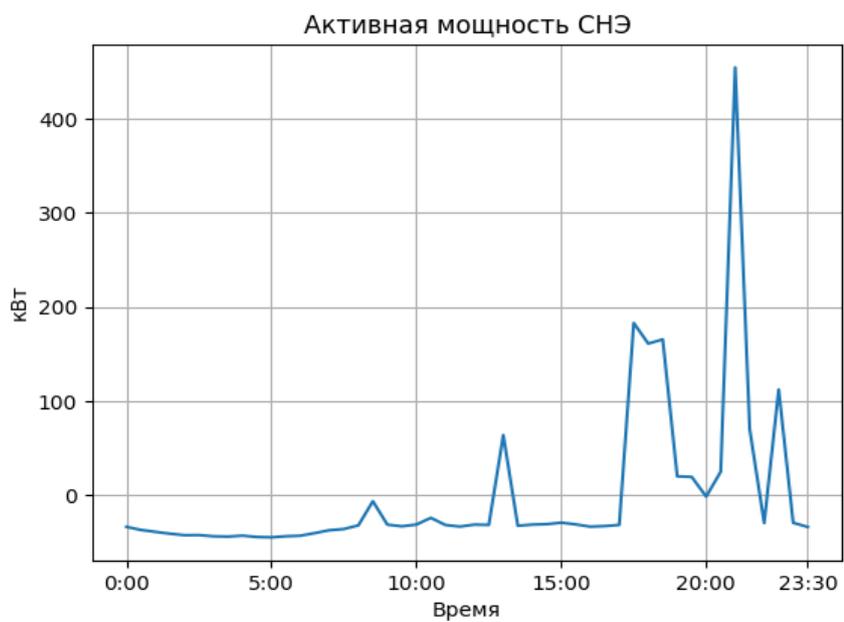


Рисунок 69.3 Узел - а72

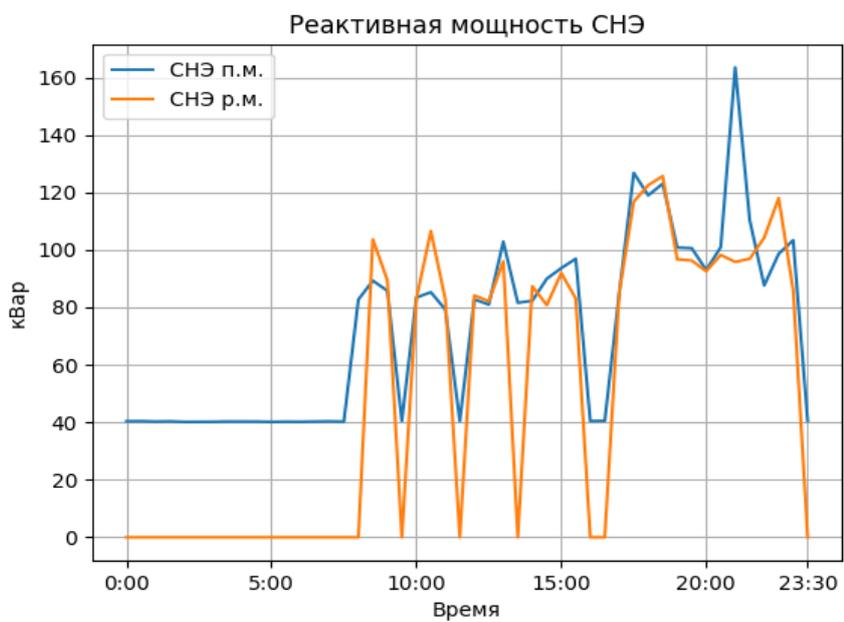


Рисунок 69.4 Узел - а72

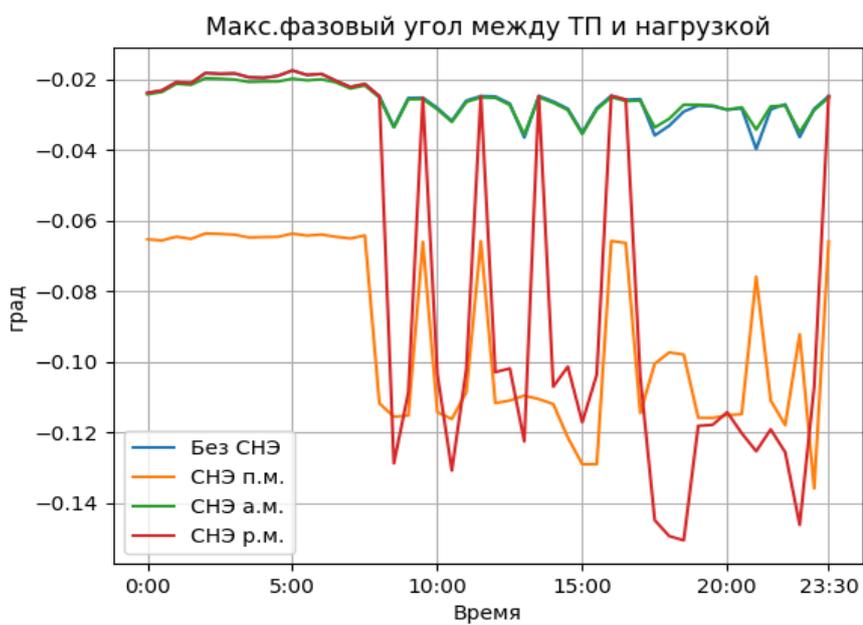


Рисунок 69.5 Узел - а72

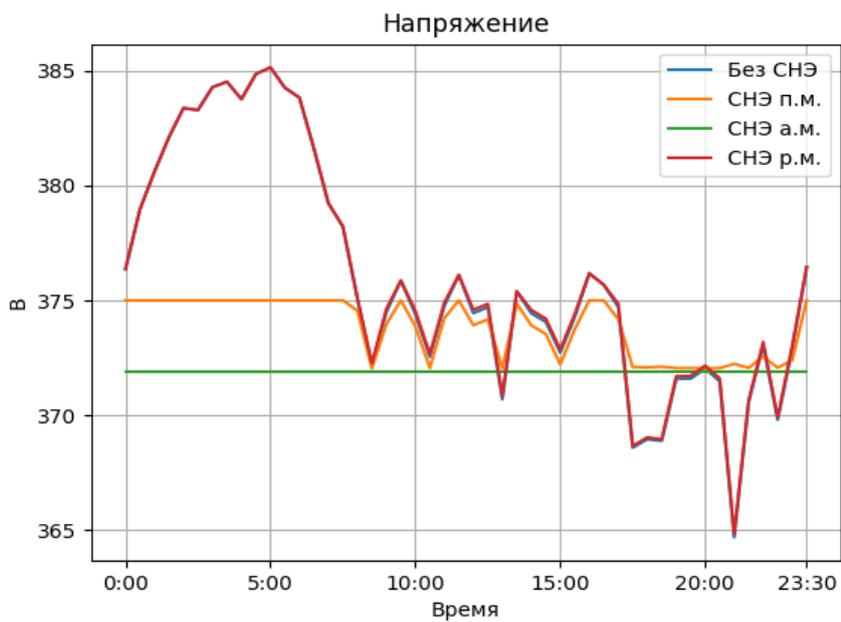


Рисунок 70.1 Узел - о9/6

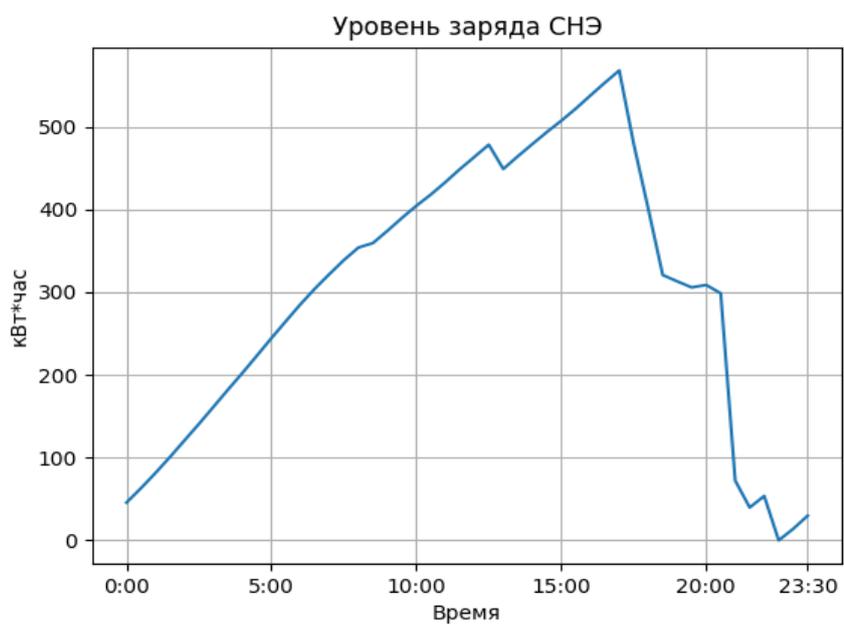


Рисунок 70.2 Узел - о9/6

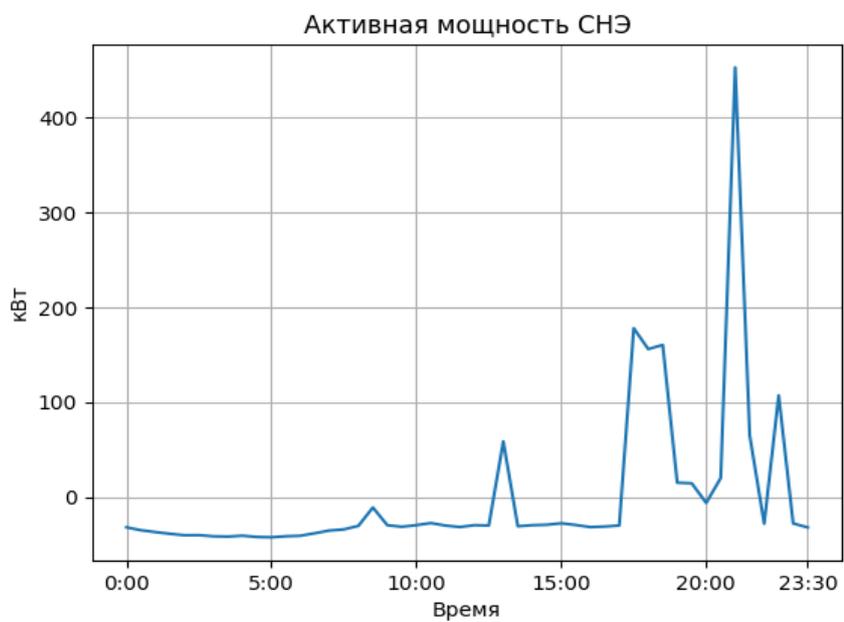


Рисунок 70.3 Узел - о9/6

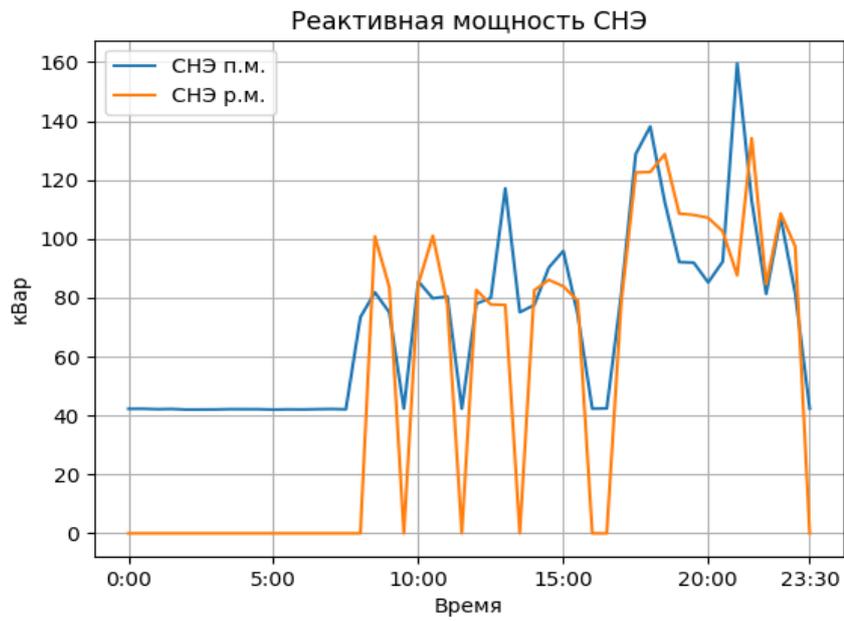


Рисунок 70.4 Узел - о9/6

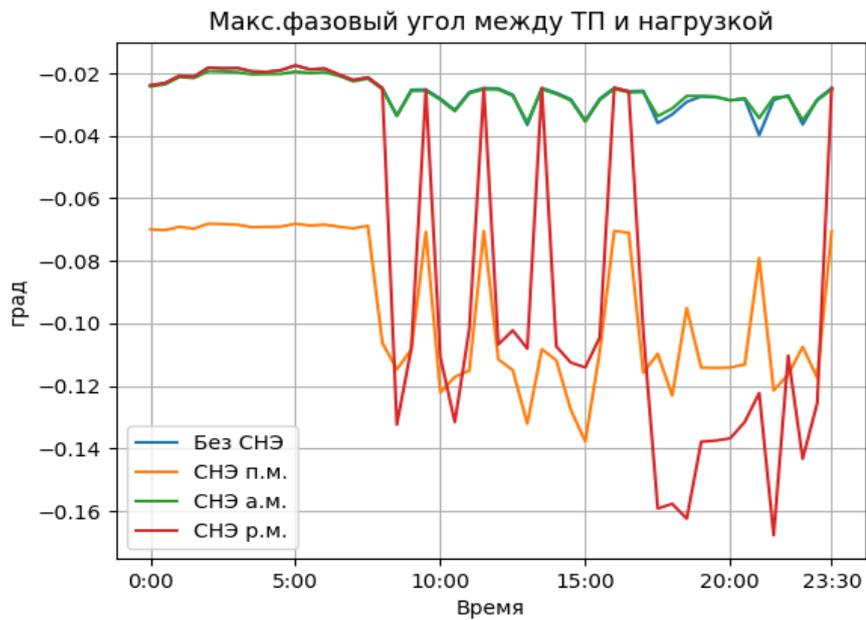


Рисунок 70.5 Узел - о9/6

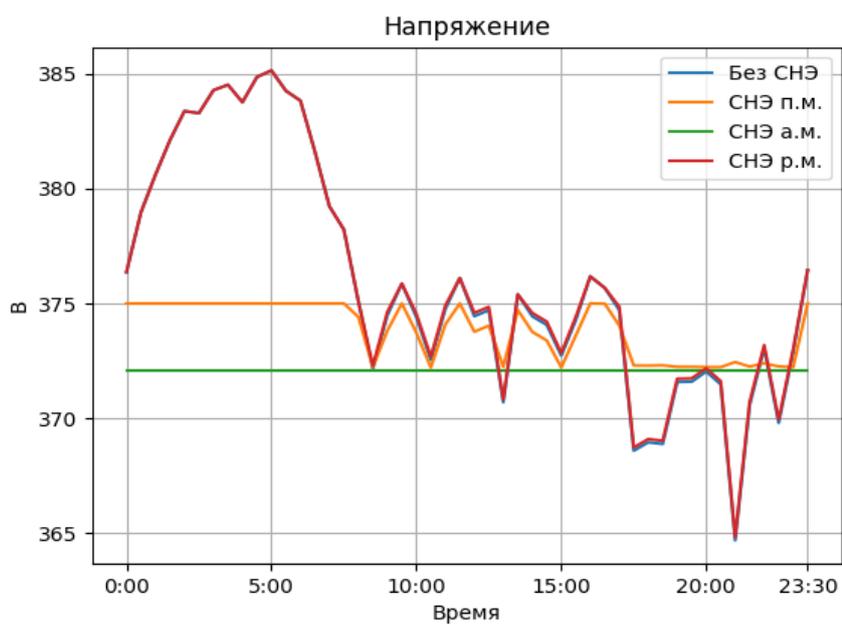


Рисунок 71.1 Узел - а73



Рисунок 71.2 Узел - а73

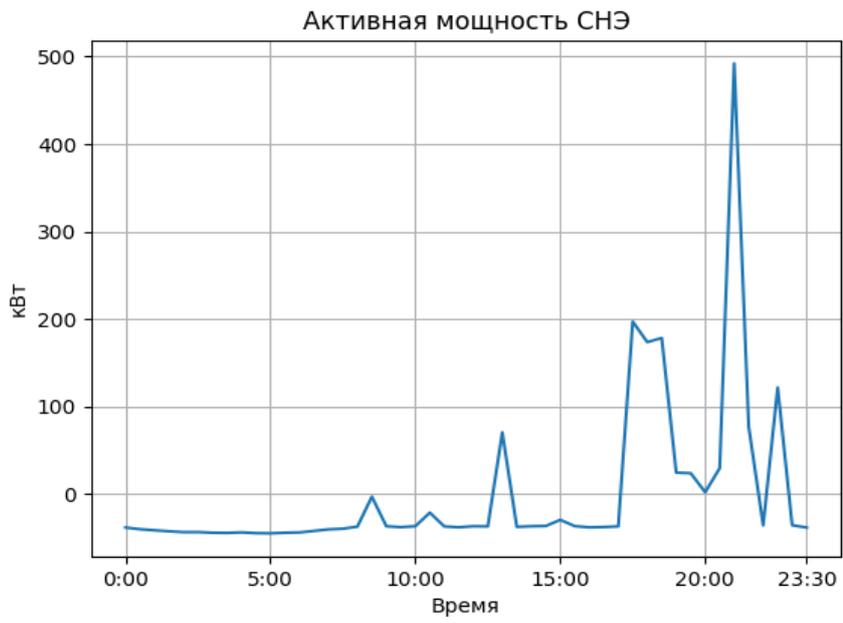


Рисунок 71.3 Узел - а73

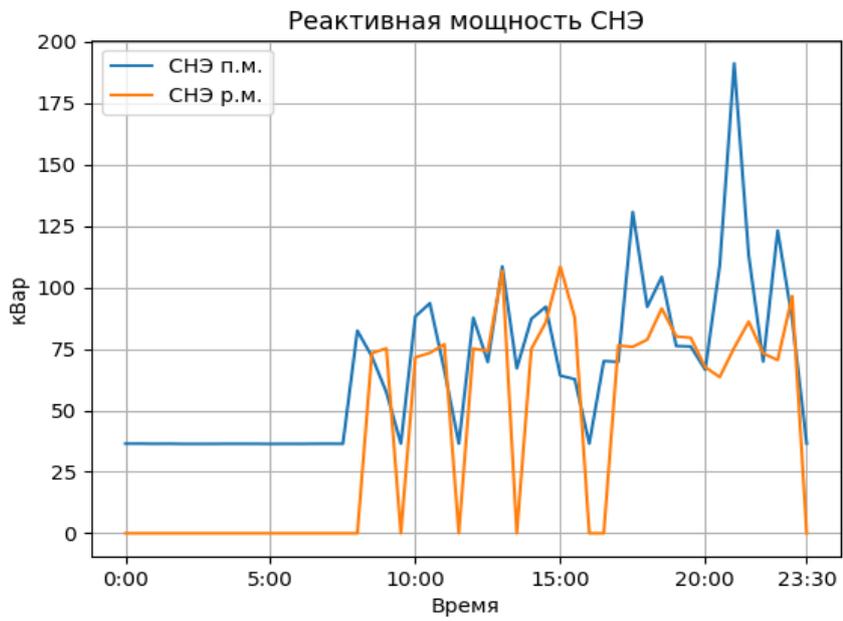


Рисунок 71.4 Узел - а73

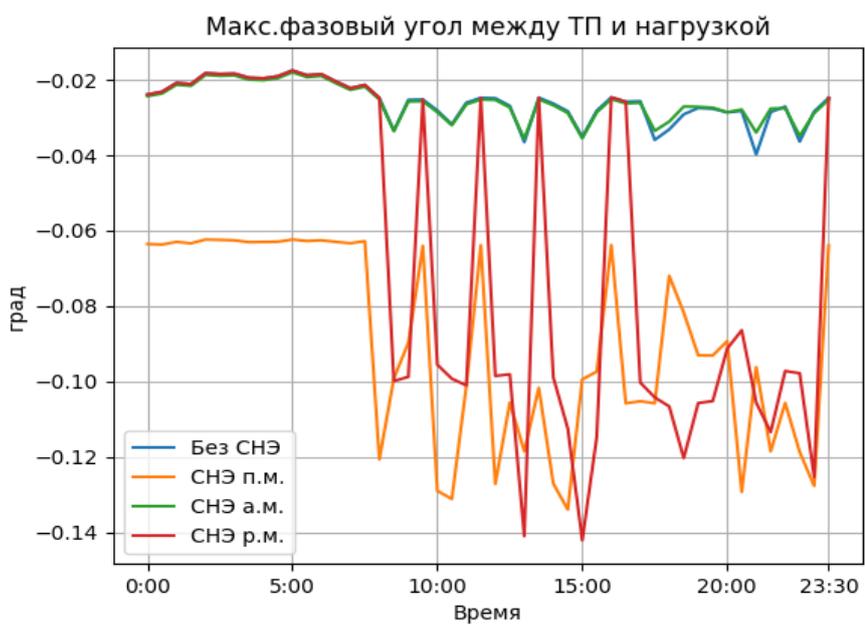


Рисунок 71.5 Узел - а73

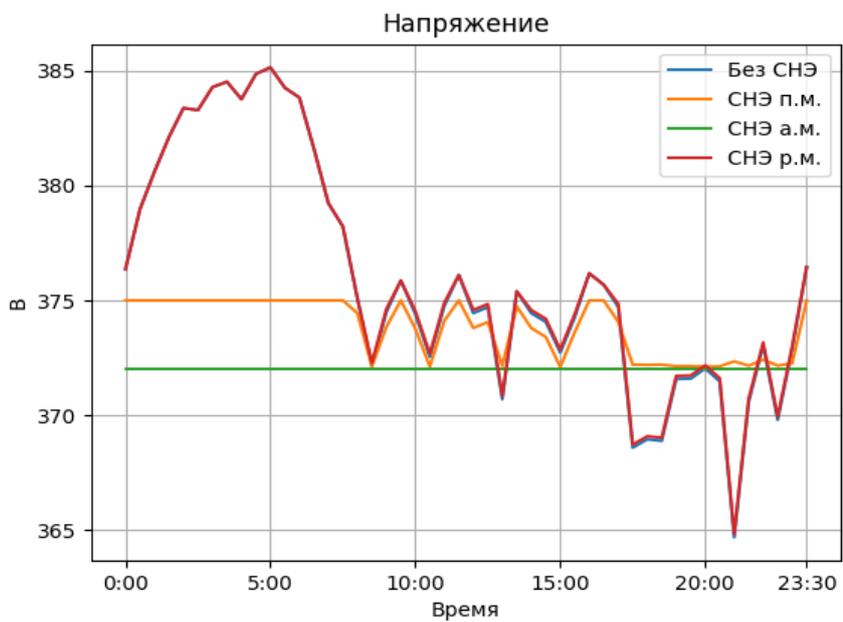


Рисунок 72.1 Узел - о9/10

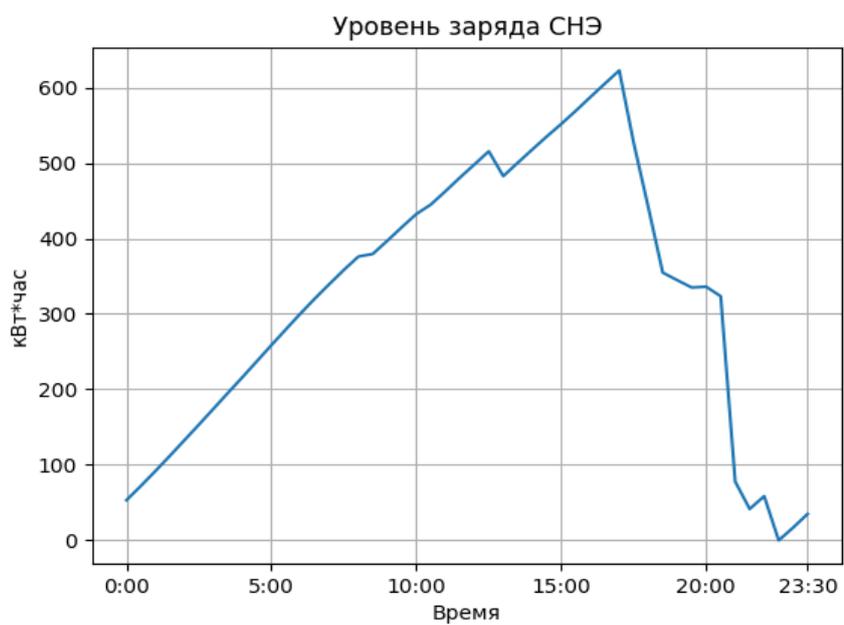


Рисунок 72.2 Узел - 09/10

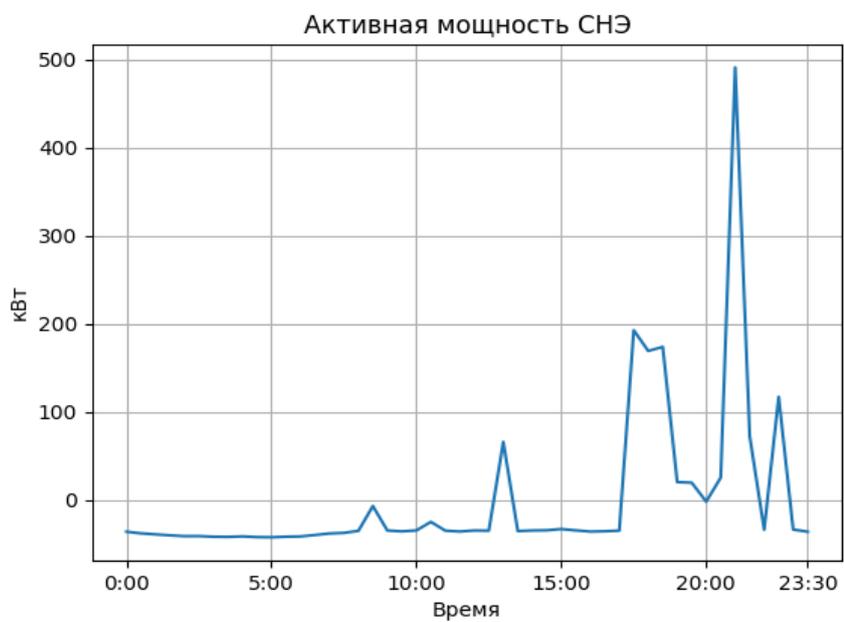


Рисунок 72.3 Узел - 09/10

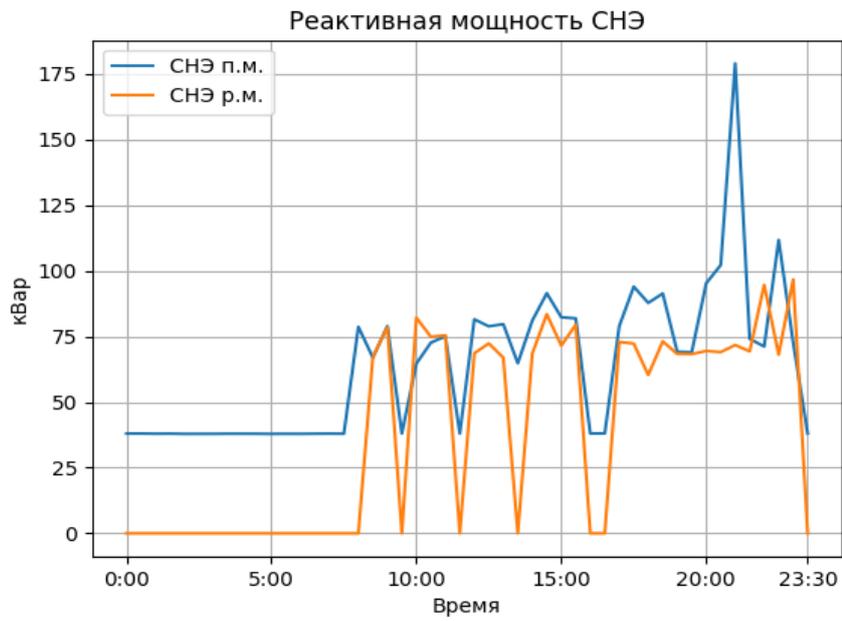


Рисунок 72.4 Узел - 09/10

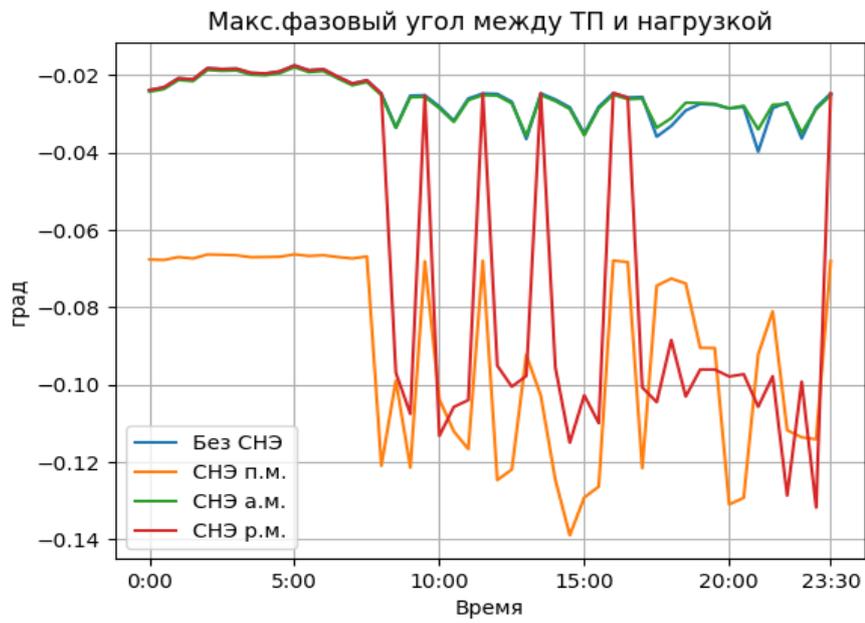


Рисунок 72.5 Узел - 09/10

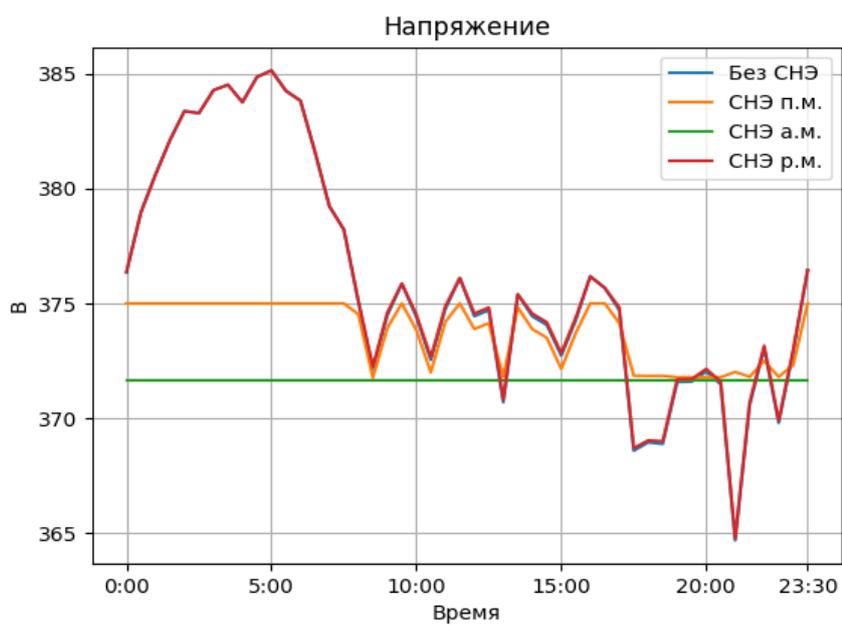


Рисунок 73.1 Узел - а74

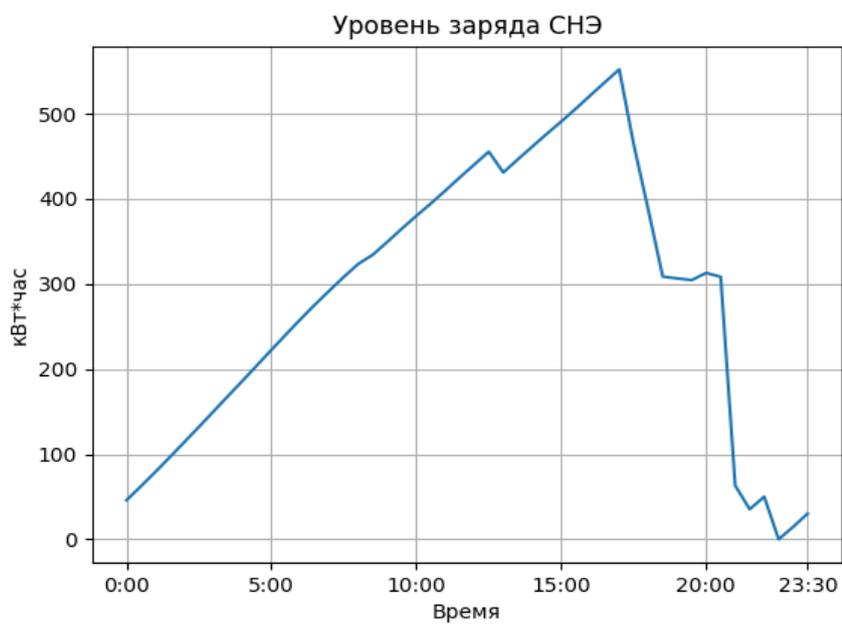


Рисунок 73.2 Узел - а74

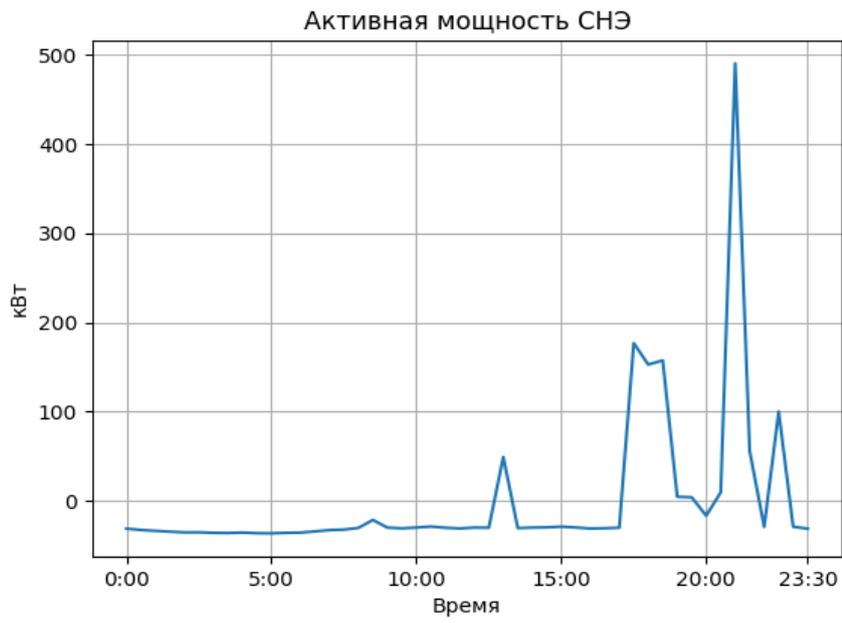


Рисунок 73.3 Узел - а74

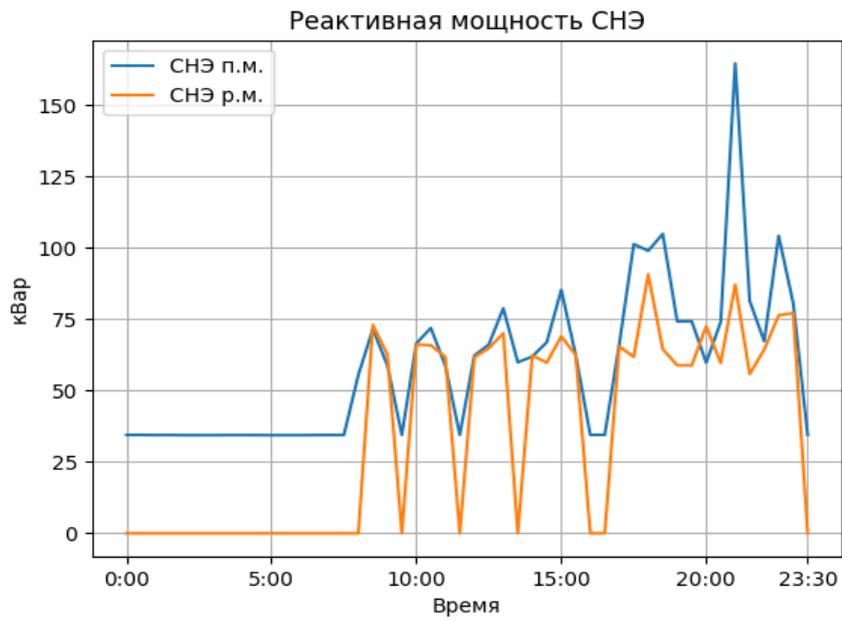


Рисунок 73.4 Узел - а74

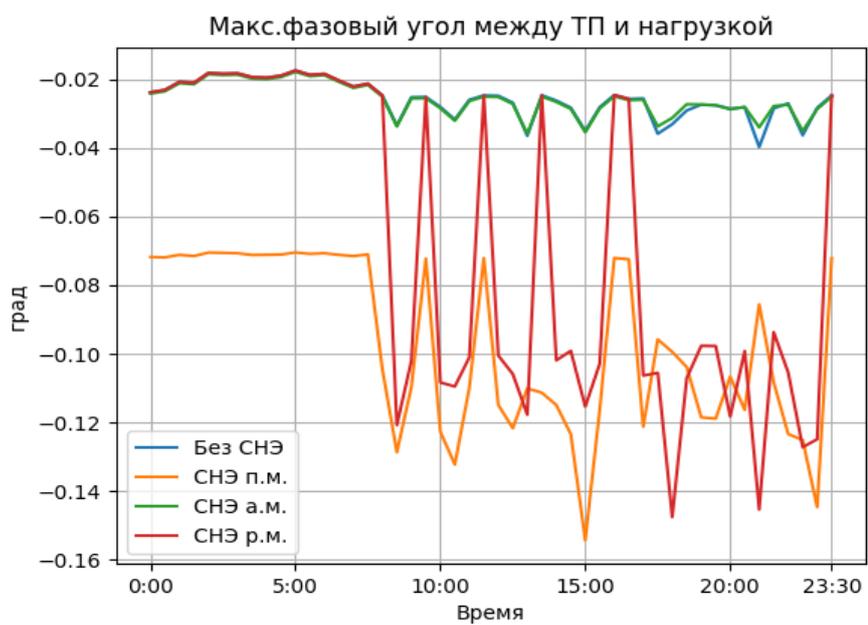


Рисунок 73.5 Узел - а74

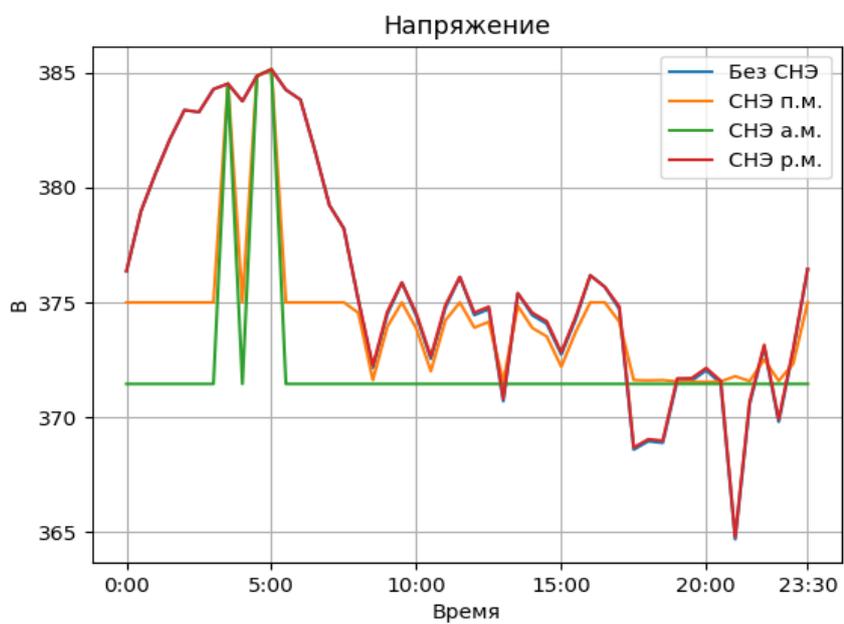


Рисунок 74.1 Узел - о10-1

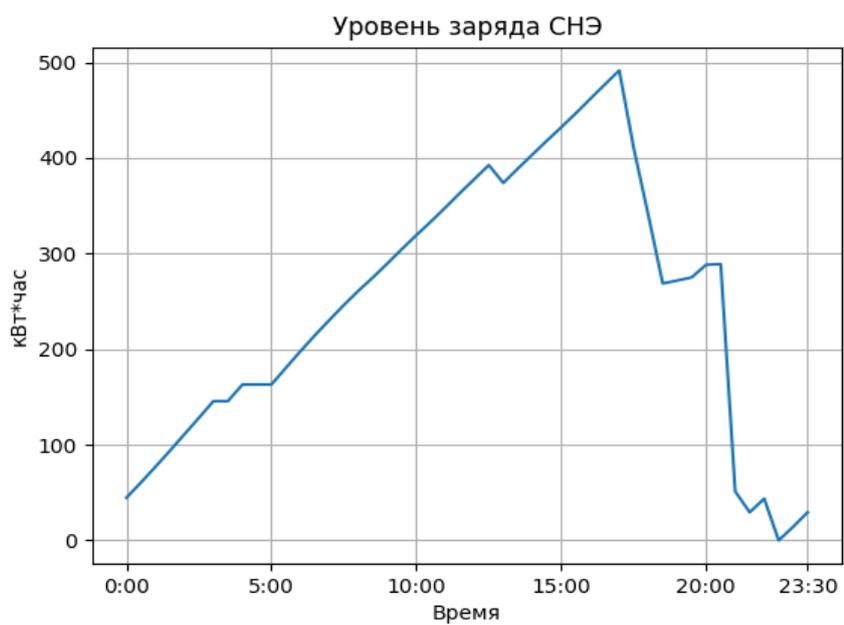


Рисунок 74.2 Узел - 010-1



Рисунок 74.3 Узел - 010-1

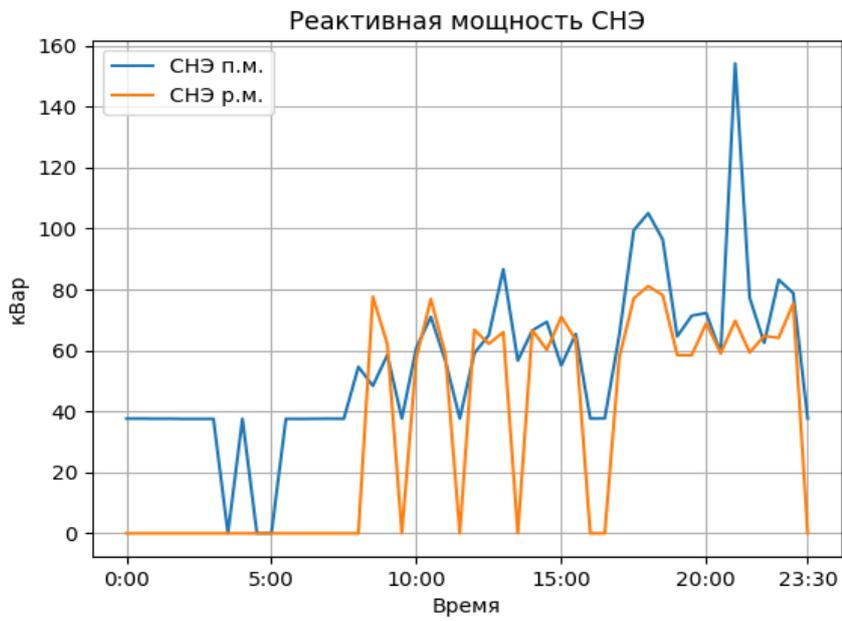


Рисунок 74.4 Узел - о10-1

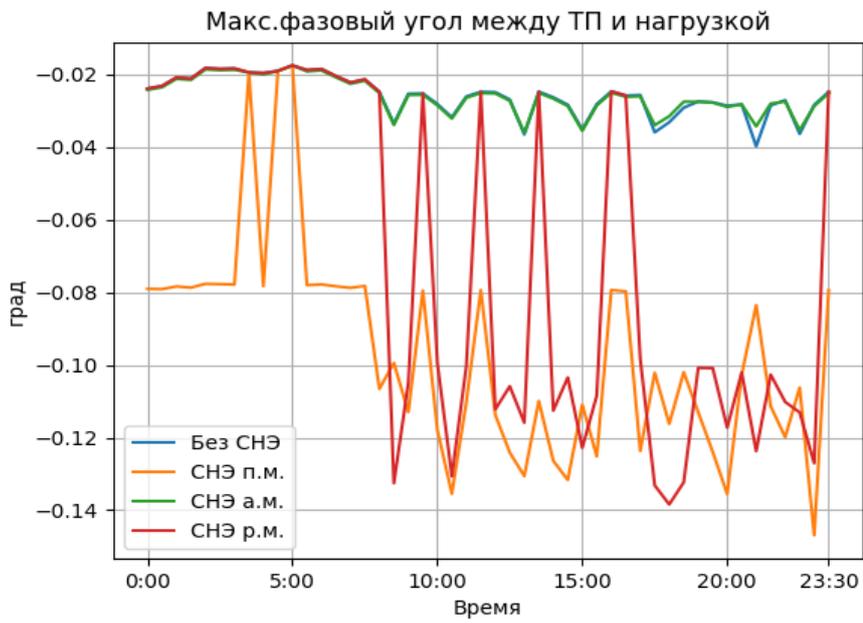


Рисунок 74.5 Узел - о10-1

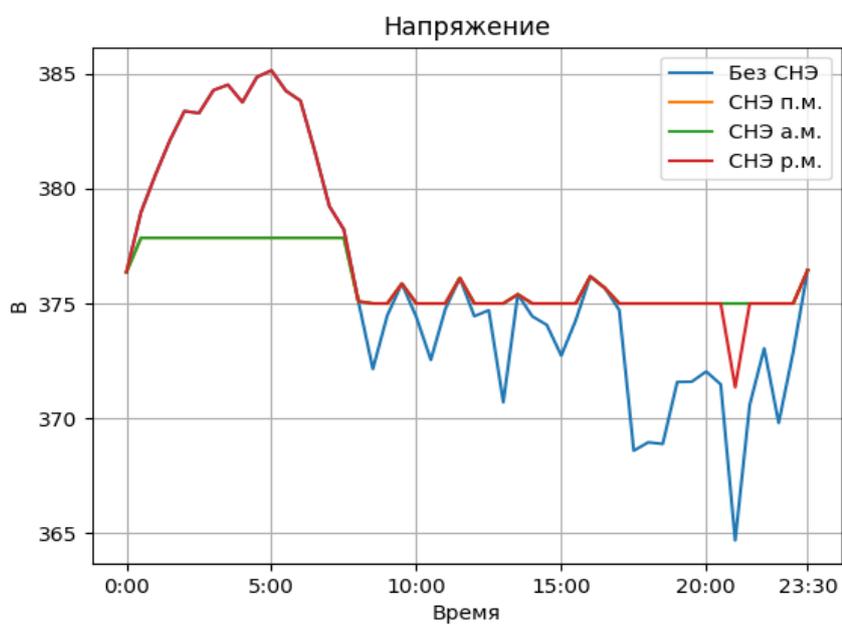


Рисунок 75.1 Узел - а75

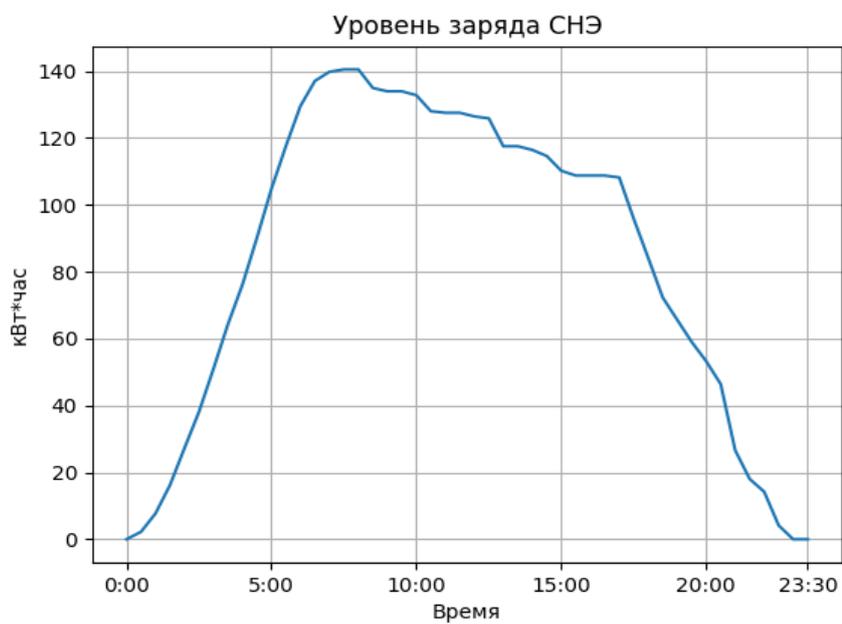


Рисунок 75.2 Узел - а75

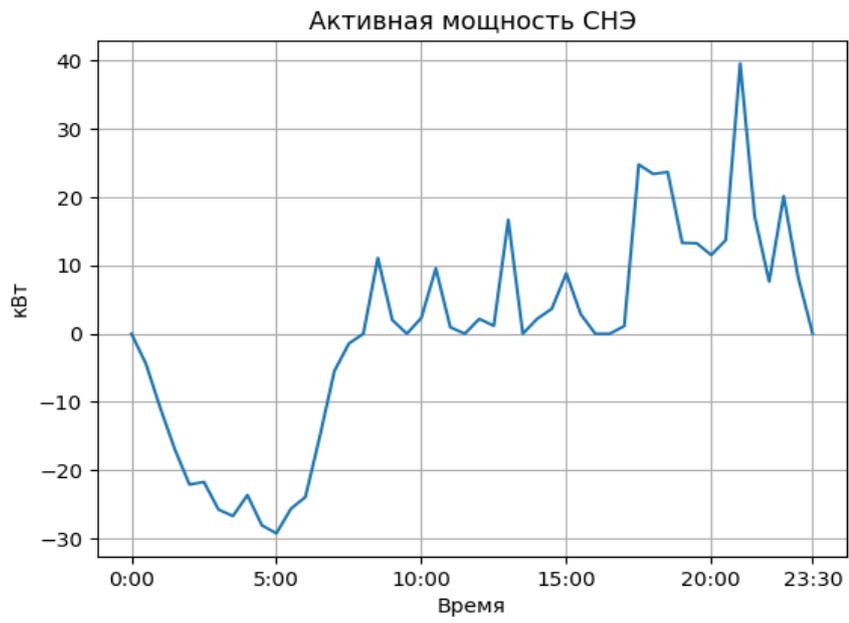


Рисунок 75.3 Узел - а75

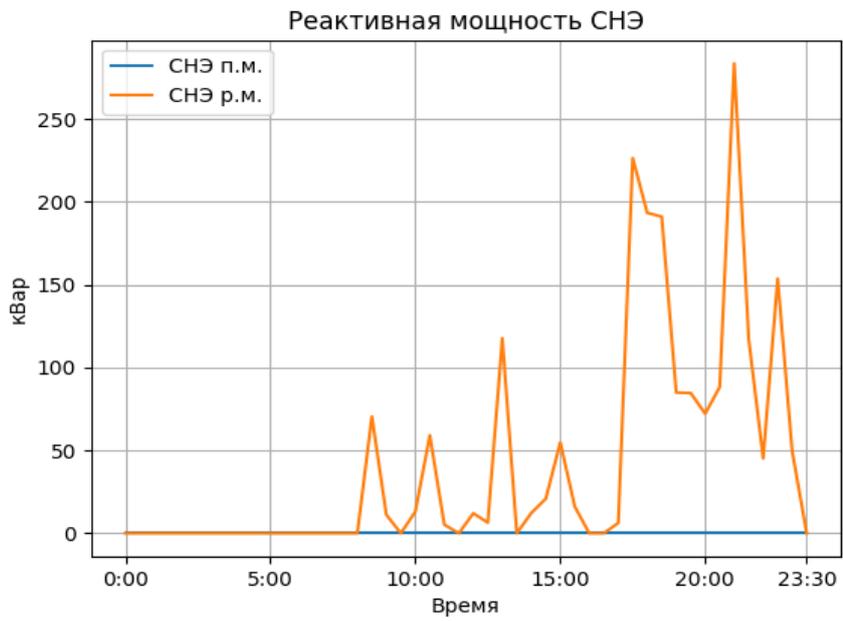


Рисунок 75.4 Узел - а75



Рисунок 75.5 Узел - а75

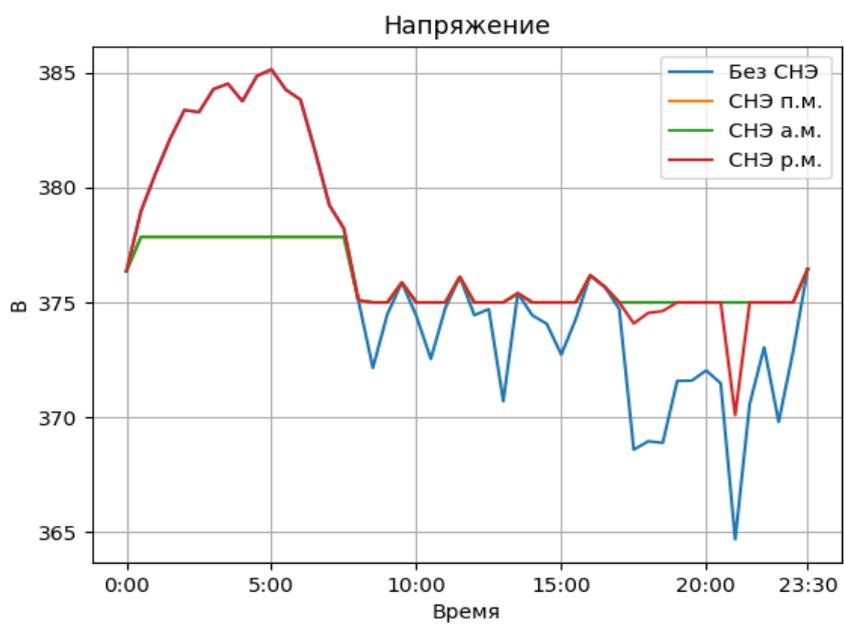


Рисунок 76.1 Узел - о10-2

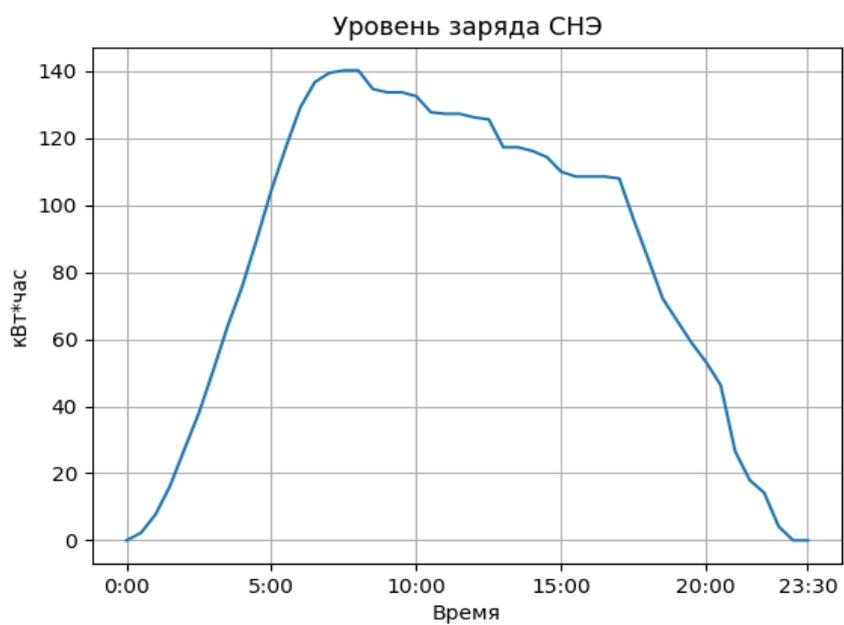


Рисунок 76.2 Узел - о10-2

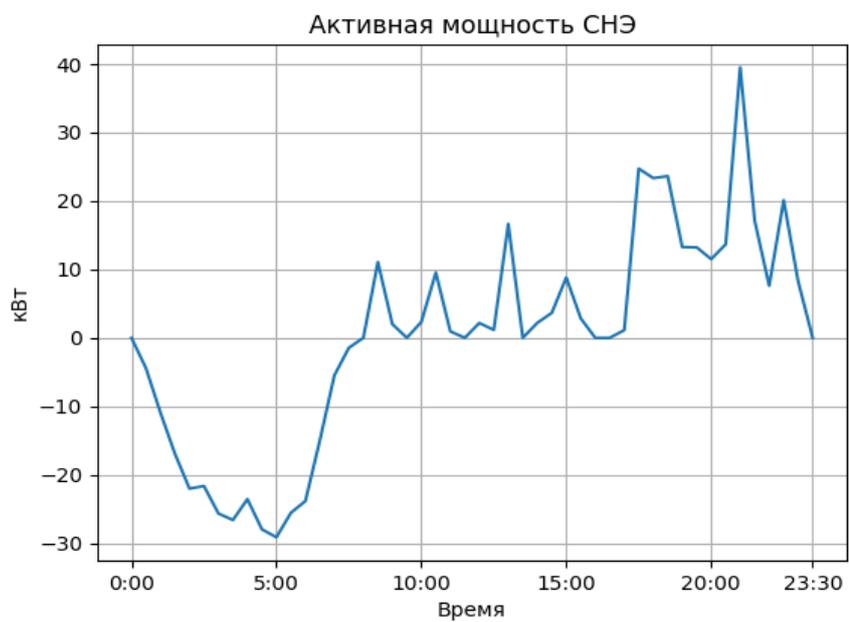


Рисунок 76.3 Узел - о10-2

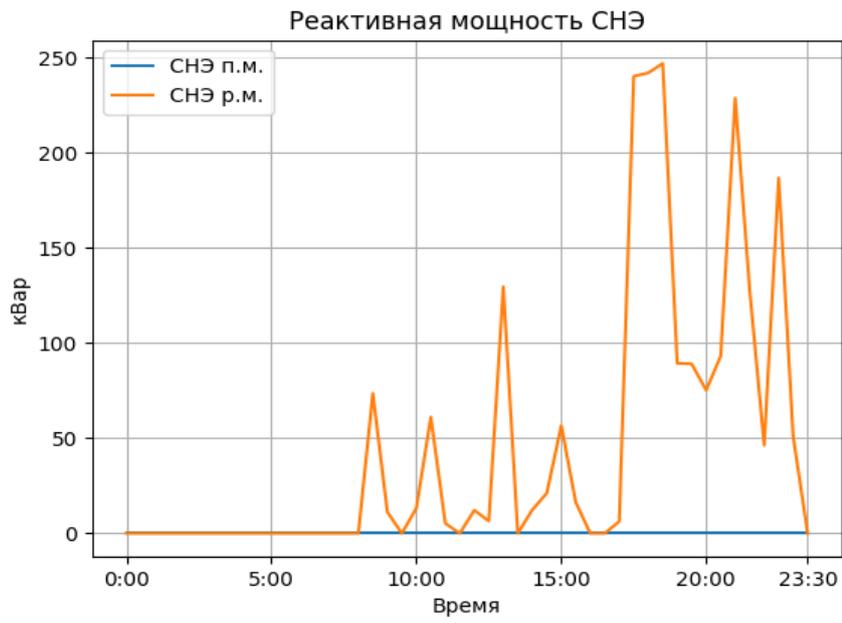


Рисунок 76.4 Узел - о10-2

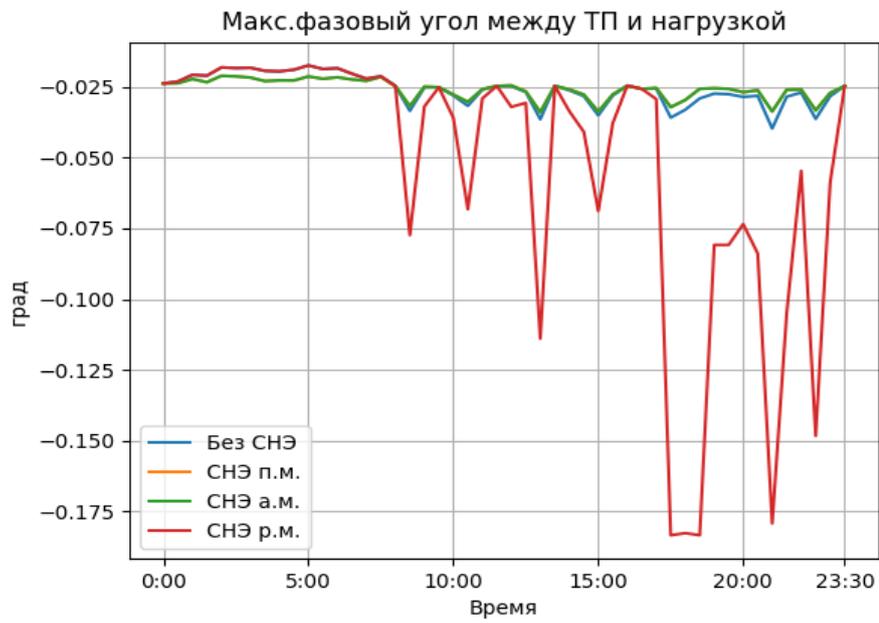


Рисунок 76.5 Узел - о10-2

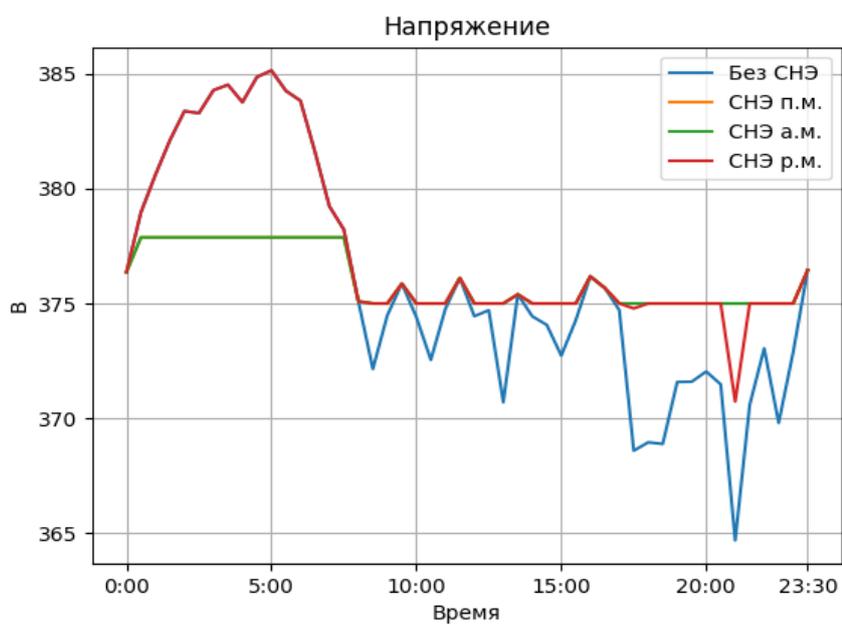


Рисунок 77.1 Узел - а76

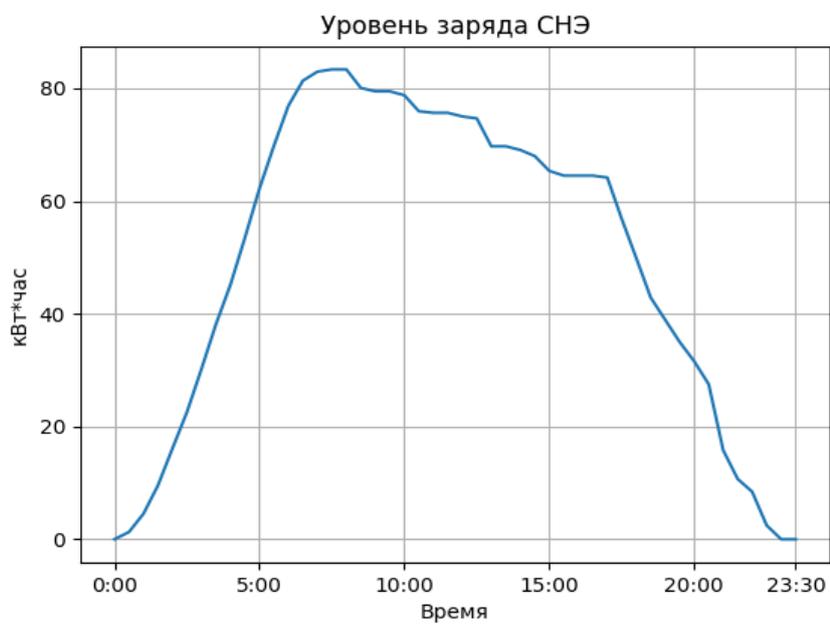


Рисунок 77.2 Узел - а76

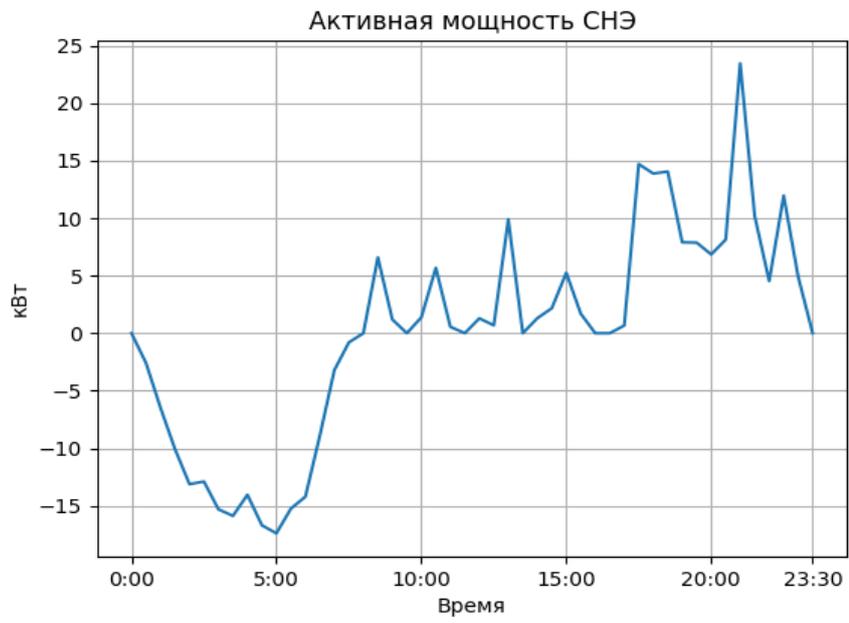


Рисунок 77.3 Узел - а76

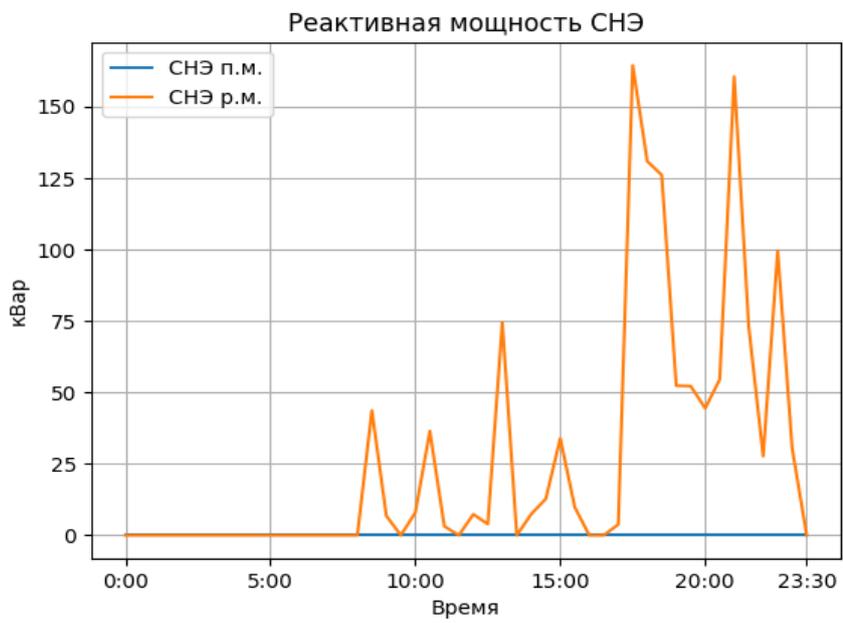


Рисунок 77.4 Узел - а76



Рисунок 77.5 Узел - а76

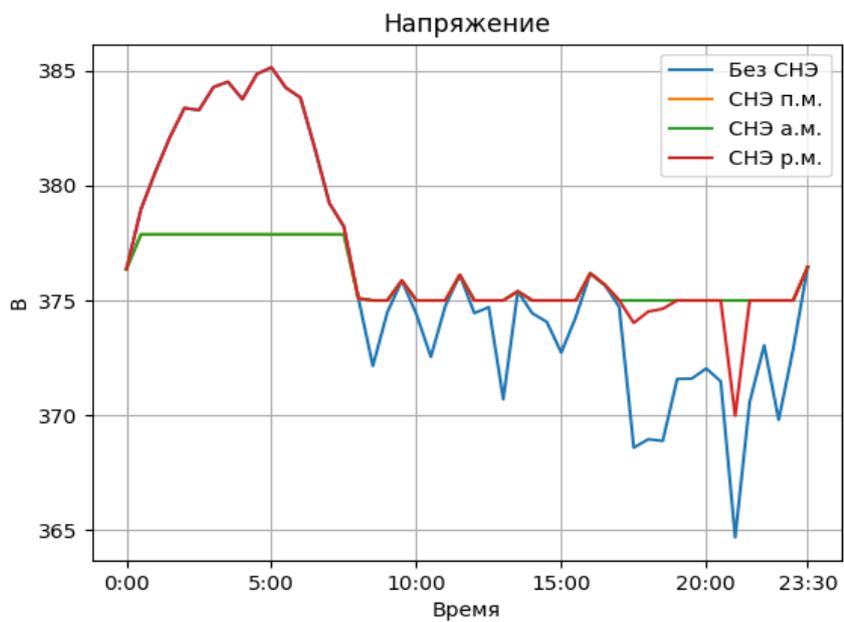


Рисунок 78.1 Узел - о10-3

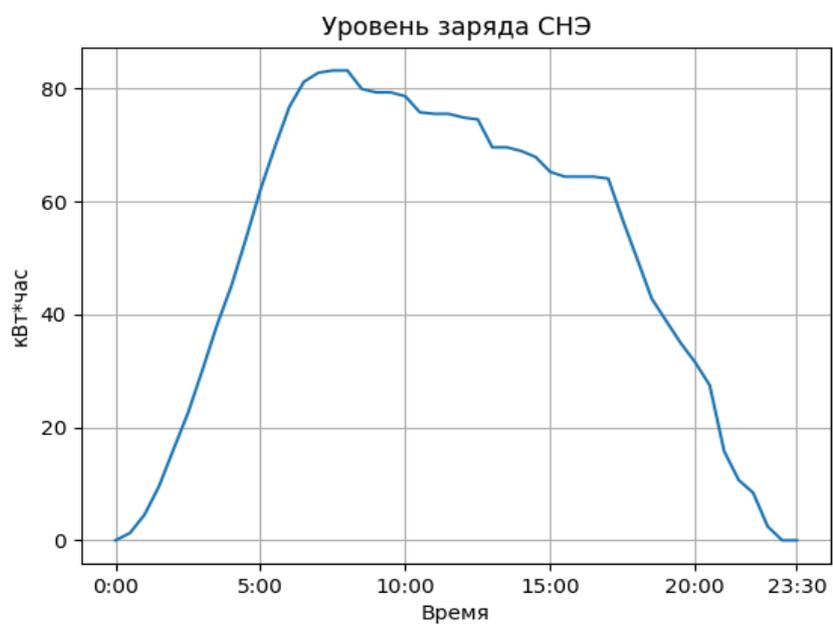


Рисунок 78.2 Узел - о10-3

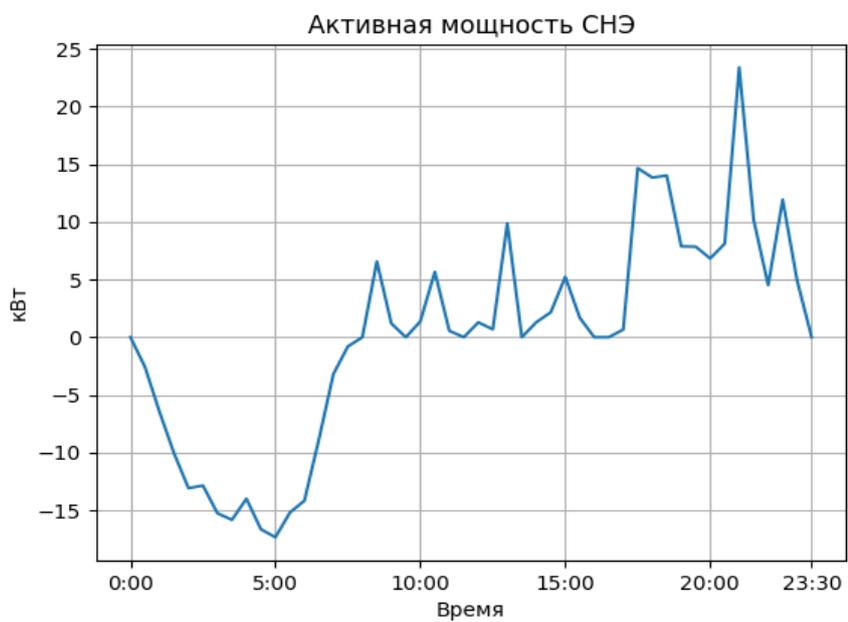


Рисунок 78.3 Узел - о10-3

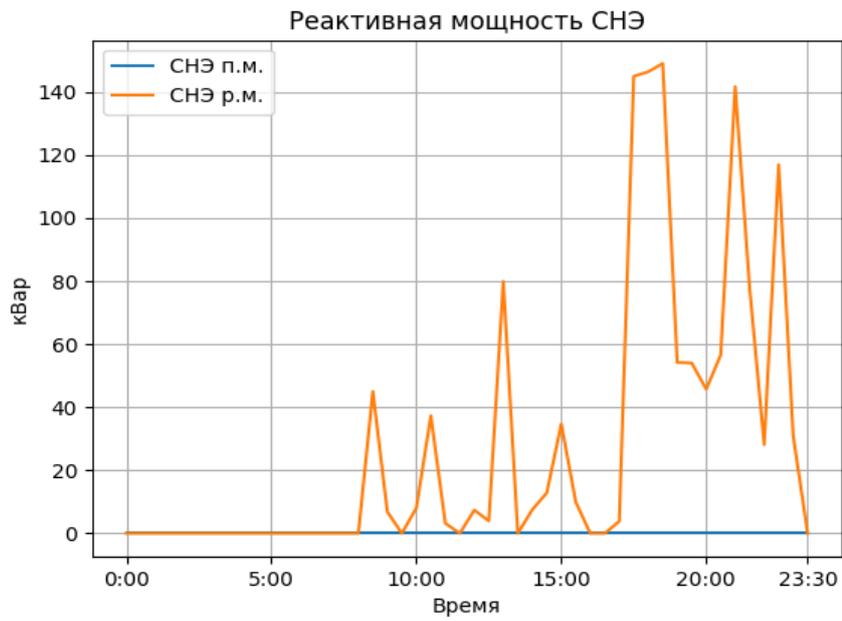


Рисунок 78.4 Узел - о10-3

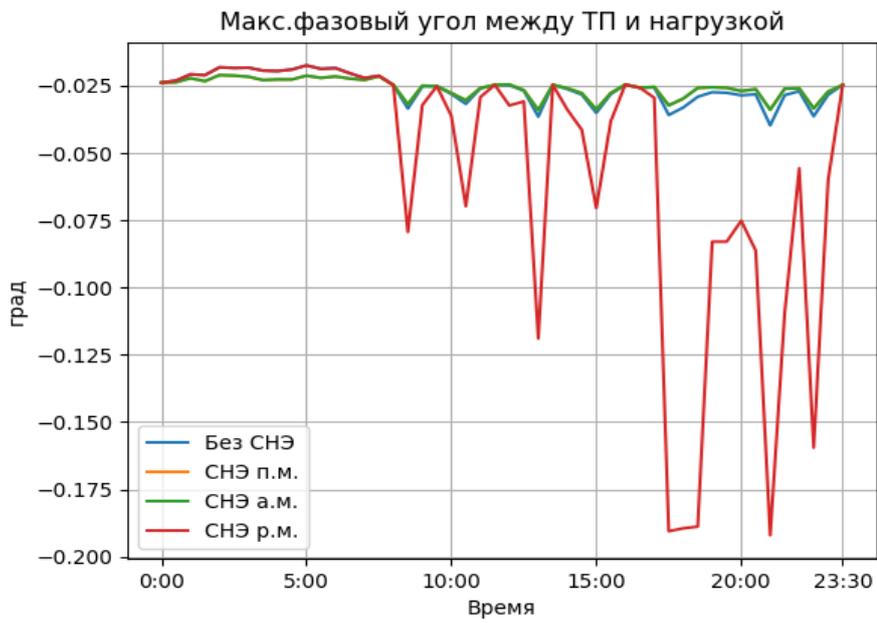


Рисунок 78.5 Узел - о10-3

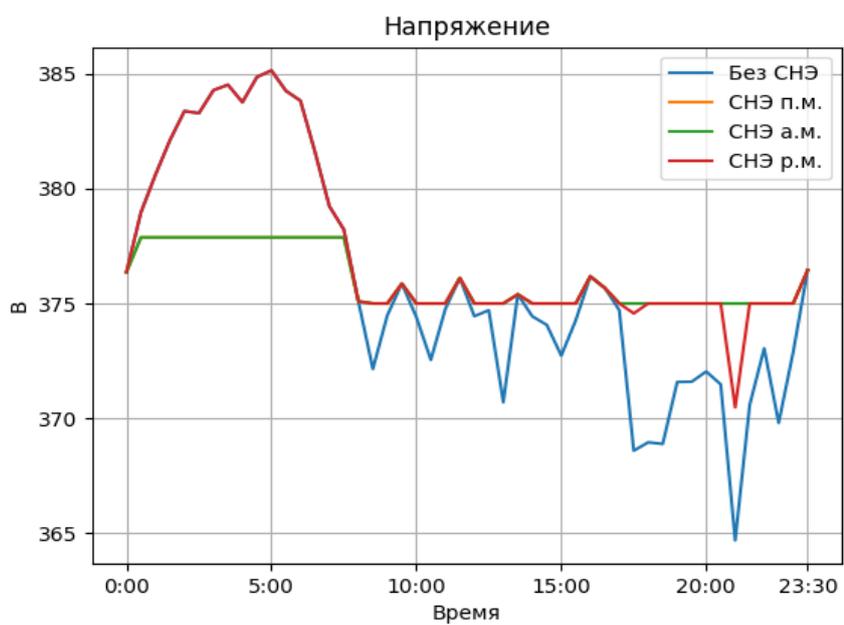


Рисунок 79.1 Узел - а77

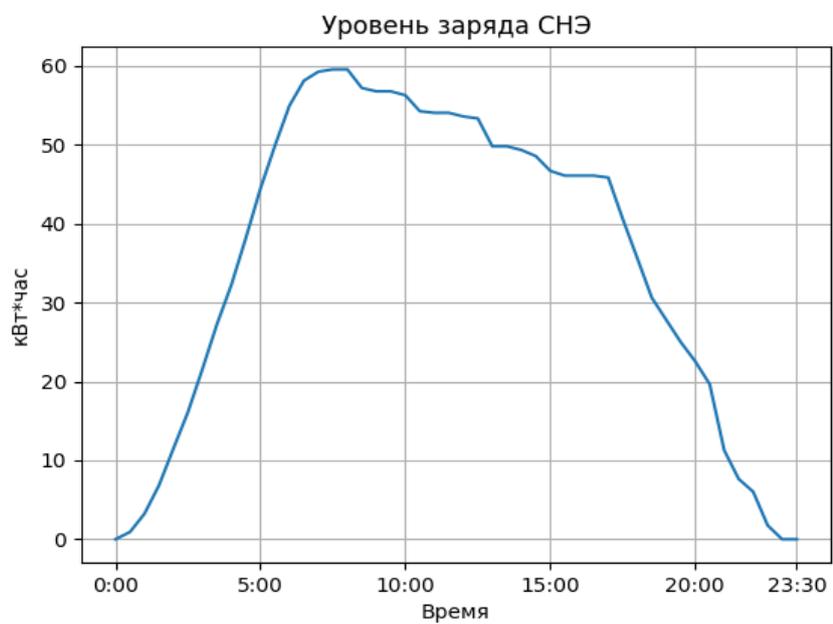


Рисунок 79.2 Узел - а77

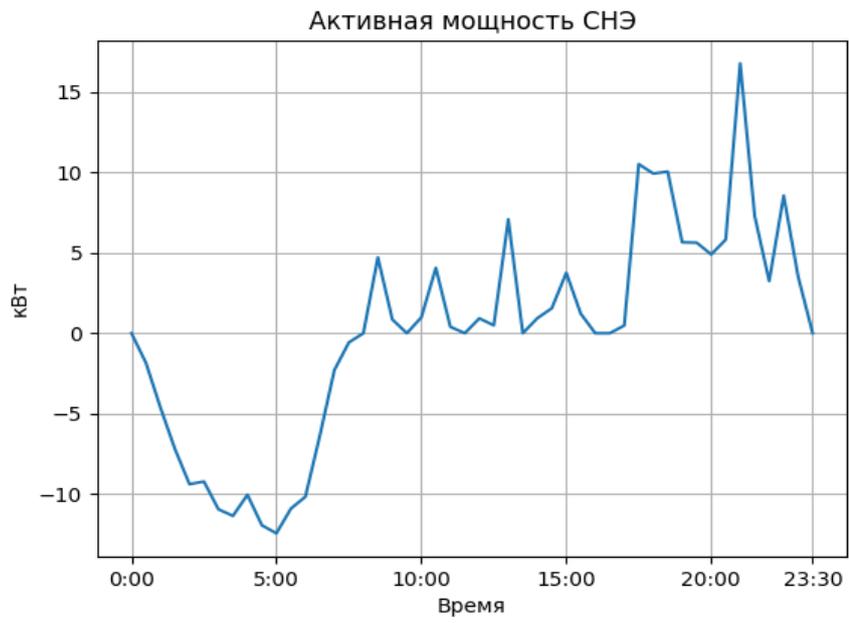


Рисунок 79.3 Узел - а77

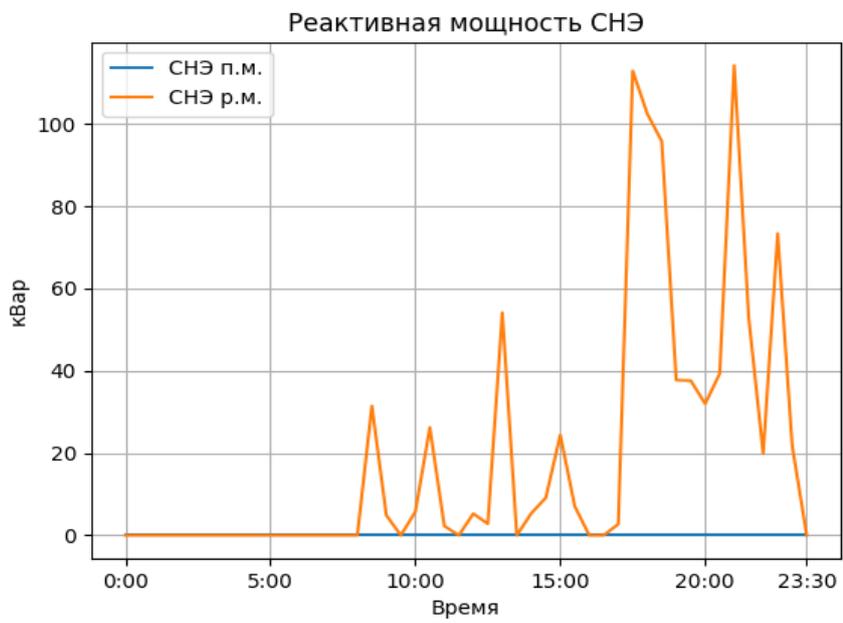


Рисунок 79.4 Узел - а77



Рисунок 79.5 Узел - а77

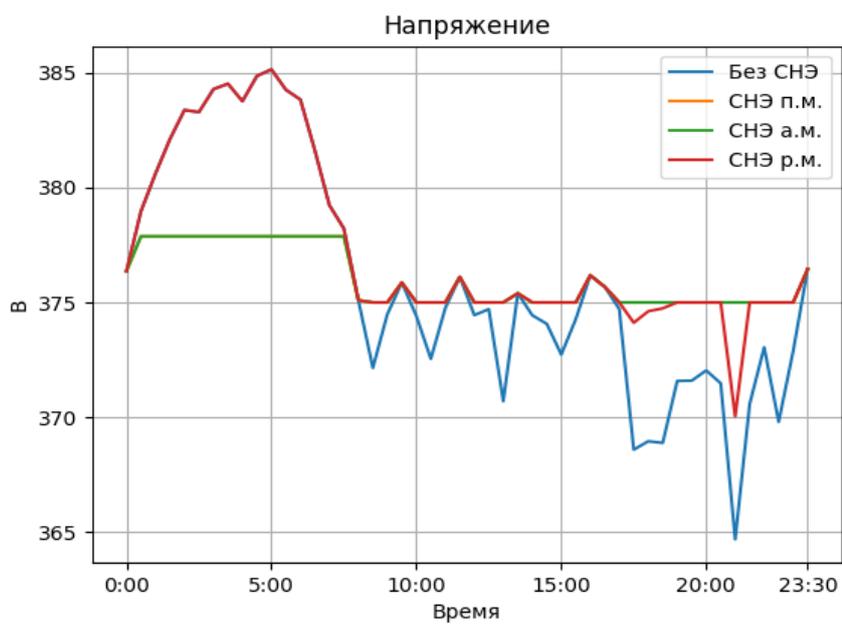


Рисунок 80.1 Узел - о11-1

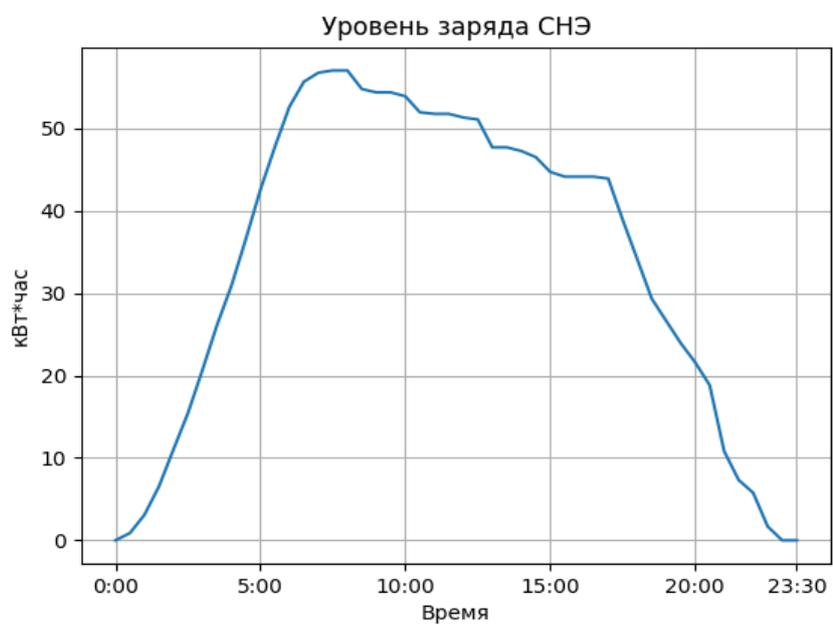


Рисунок 80.2 Узел - о11-1

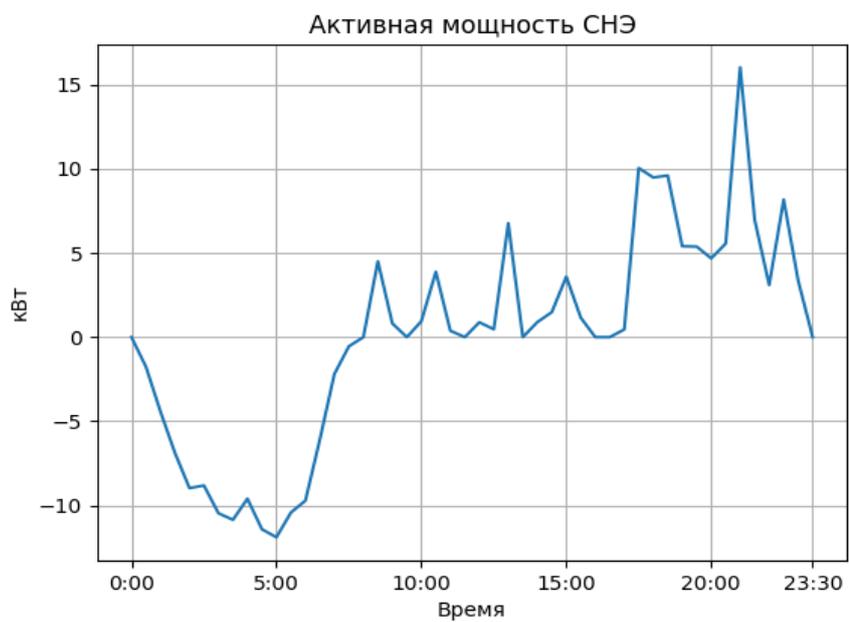


Рисунок 80.3 Узел - о11-1

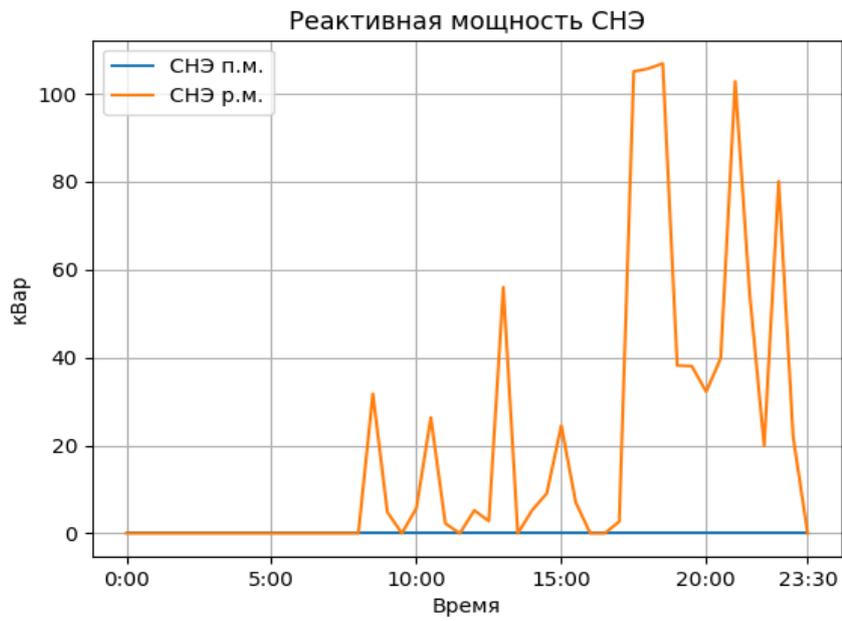


Рисунок 80.4 Узел - о11-1

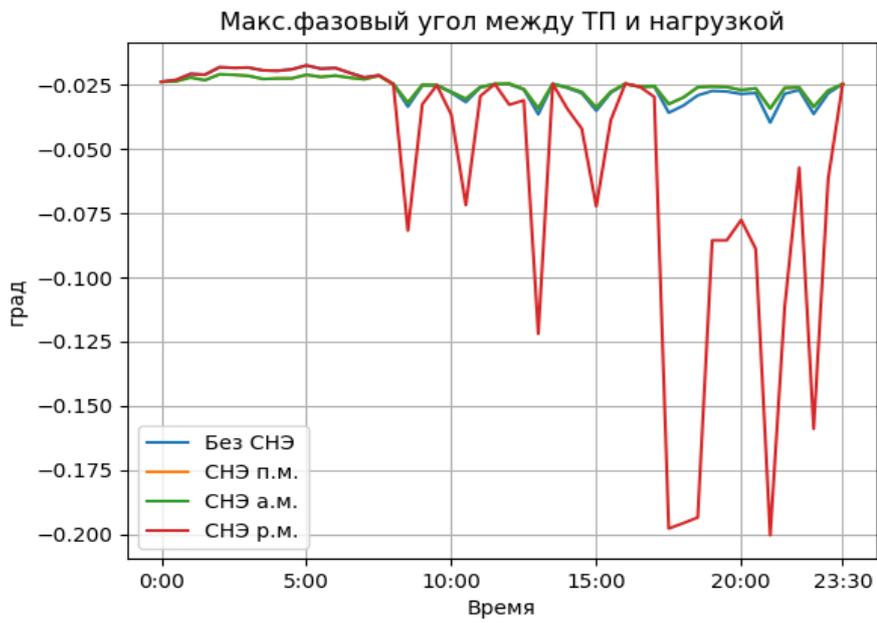


Рисунок 80.5 Узел - о11-1

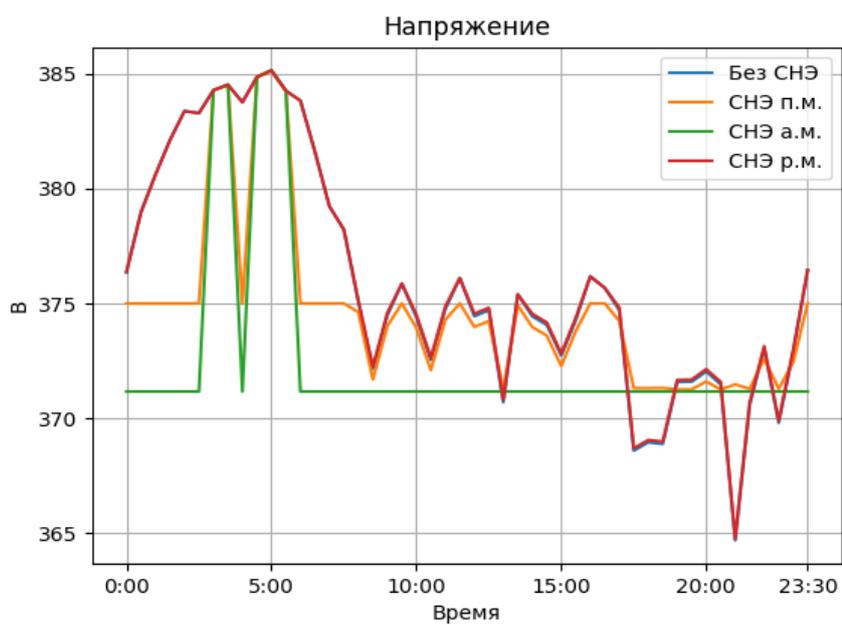


Рисунок 81.1 Узел - а78



Рисунок 81.2 Узел - а78

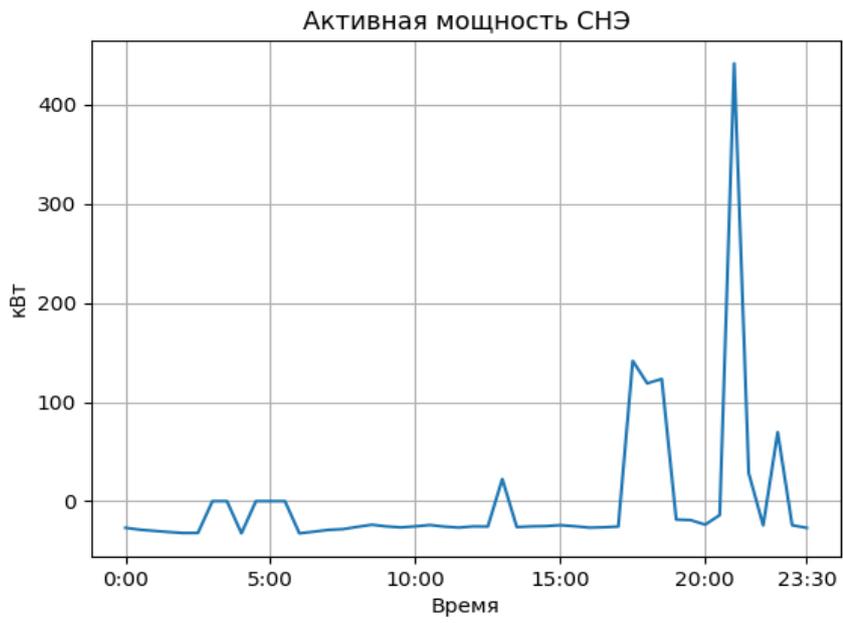


Рисунок 81.3 Узел - а78

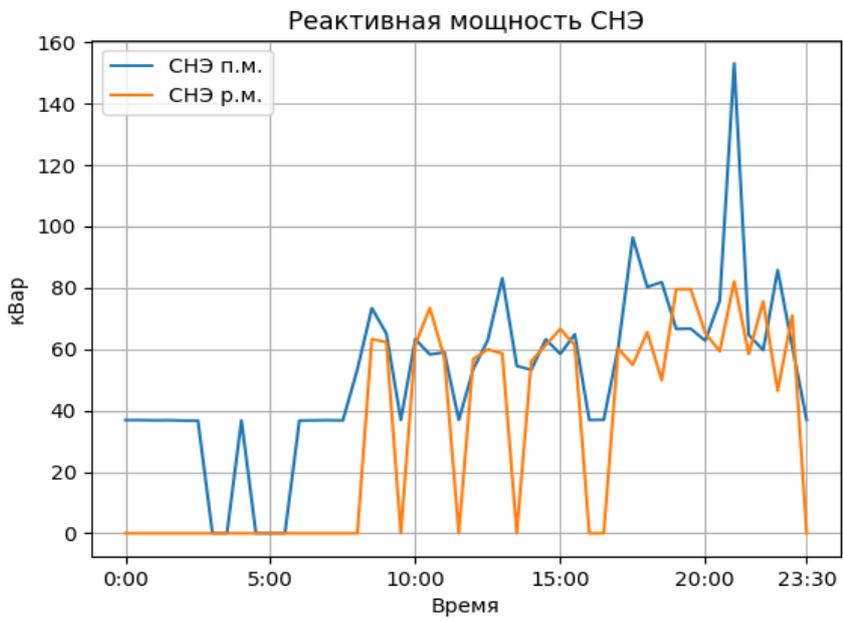


Рисунок 81.4 Узел - а78

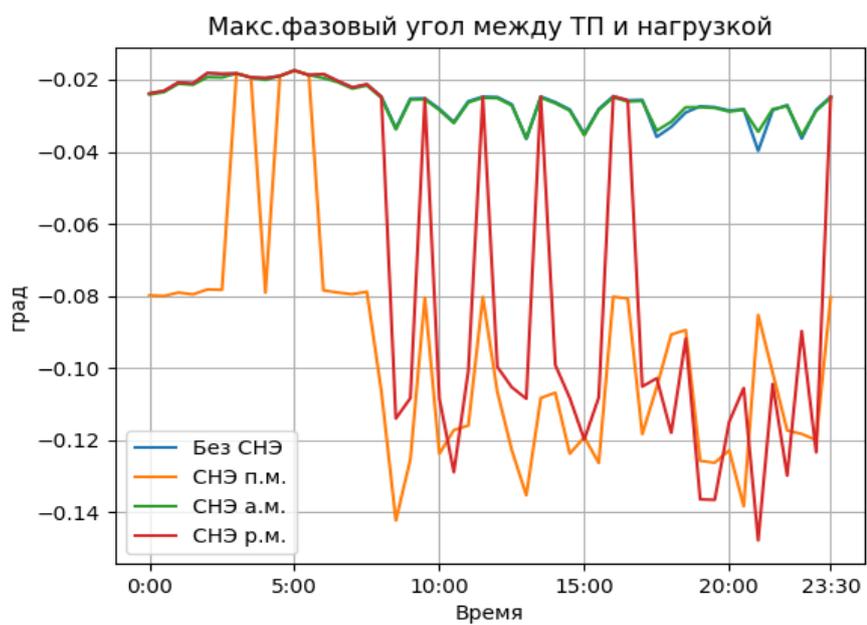


Рисунок 81.5 Узел - а78

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