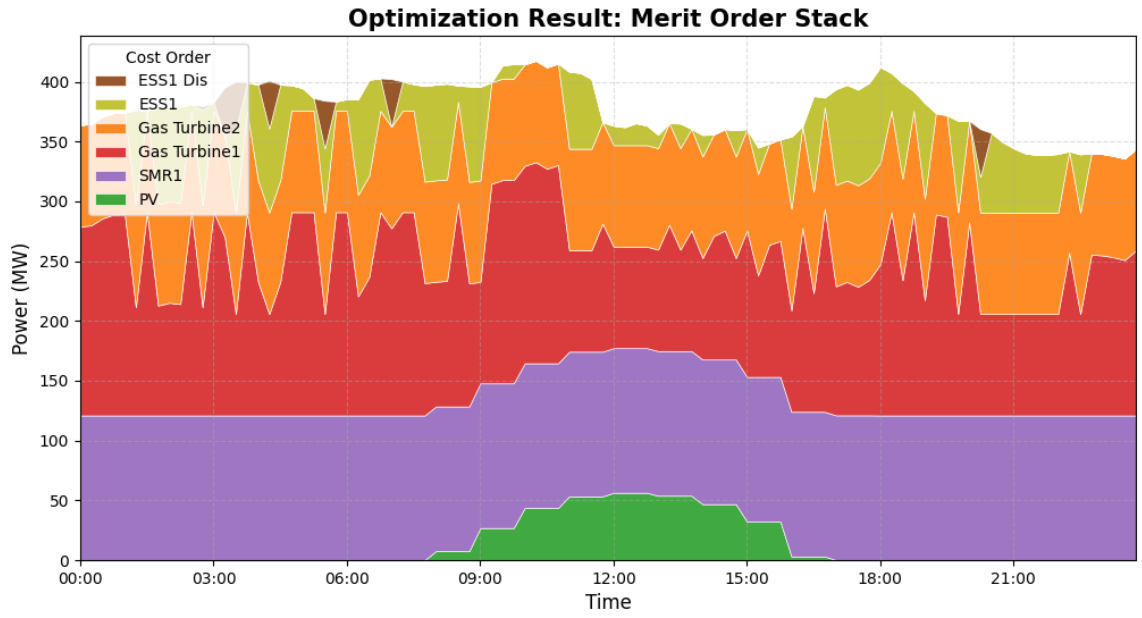
AI Data Center Energy Optimization Report



Executive Report

1. **Executive Summary:**
   이번 시뮬레이션에서는 총 비용이 1,217,205 KRW로 최적화되었습니다. 주요 성과로는 그리드 전력 사용을 완전히 배제하고, 자체 발전 및 에너지 저장 시스템을 효과적으로 활용하여 에너지 비용을 절감한 점이 있습니다.

2. **Energy Mix Analysis:**
   에너지 공급은 총 36,286.5 MW로 구성되었으며, 이 중 태양광 발전(PV)이 1,295.1 MW로 전체의 3.6%를 차지했습니다. 발전기의 경우, 가스터빈1, 가스터빈2, SMR1, ESS1이 총 34,748.2 MW를 공급하여 대부분의 에너지를 책임졌습니다. 특히, 그리드 전력 사용이 0.0 MW로 기록되어 외부 전력 의존도를 완전히 제거한 점이 주목할 만합니다.

3. **ESS Strategy:**
   에너지 저장 시스템(ESS)은 243.2 MW를 방전하여 피크 시간대의 에너지 수요를 효과적으로 지원했습니다. ESS의 활용은 피크 부하 시간인 10:15에 417.7 MW의 부하를 안정적으로 관리하는 데 중요한 역할을 했습니다. ESS의 전략적 운영은 에너지 비용 절감 및 시스템 안정성에 기여했습니다.

4. **Conclusion:**
   이번 시뮬레이션은 에너지 자급률을 높이고, 비용 효율성을 극대화하는 데 성공했습니다. 특히, 그리드 전력 사용을 완전히 배제하고 자체 발전 및 ESS의 최적화를 통해 에너지 비용을 절감한 점은 큰 성과로 평가됩니다. 향후에도 이러한 에너지 믹스와 ESS 전략을 지속적으로 발전시켜 나간다면, 더욱 효율적이고 경제적인 데이터 센터 운영이 가능할 것으로 기대됩니다.

Detailed Simulation Data (24h)

Time	Grid	PV	Gas Turbine	Gas Turbine2	SMR1	ESS1	ESS1	Total	Diff
00:00	0.0	0.0	157.9	84.8	121.0	0.0	0.0	363.7	0.0
00:15	0.0	0.0	159.1	84.8	121.0	0.0	0.0	364.9	0.0
00:30	0.0	0.0	164.9	84.8	121.0	0.0	0.0	370.7	0.0
00:45	0.0	0.0	168.0	84.8	121.0	0.0	0.0	373.9	0.0
01:00	0.0	0.0	168.3	84.8	121.0	0.0	0.0	374.2	0.0
01:15	0.0	0.0	90.5	84.8	121.0	80.0	0.0	376.4	0.0
01:30	0.0	0.0	170.0	84.8	121.0	0.3	0.0	376.2	0.0
01:45	0.0	0.0	91.8	84.8	121.0	80.0	0.0	377.7	0.0
02:00	0.0	0.0	94.3	84.8	121.0	80.0	0.0	380.1	0.0
02:15	0.0	0.0	93.2	84.8	121.0	80.0	0.0	379.0	0.0
02:30	0.0	0.0	170.0	84.8	121.0	5.4	0.0	381.3	0.0
02:45	0.0	0.0	90.6	84.8	121.0	80.0	3.2	379.7	0.0
03:00	0.0	0.0	170.0	84.8	121.0	6.8	0.0	382.7	0.0
03:15	0.0	0.0	149.3	84.8	121.0	0.0	40.0	395.2	0.0
03:30	0.0	0.0	84.8	84.8	121.0	69.6	40.0	400.3	0.0
03:45	0.0	0.0	170.0	84.8	121.0	23.5	0.0	399.3	0.0
04:00	0.0	0.0	111.9	84.8	121.0	80.0	0.0	397.7	0.0
04:15	0.0	0.0	84.8	84.8	121.0	70.2	40.0	400.9	0.0
04:30	0.0	0.0	111.8	84.8	121.0	80.0	0.0	397.6	0.0
04:45	0.0	0.0	170.0	84.8	121.0	21.3	0.0	397.2	0.0
05:00	0.0	0.0	170.0	84.8	121.0	18.9	0.0	394.8	0.0
05:15	0.0	0.0	170.0	84.8	121.0	10.5	0.0	386.4	0.0
05:30	0.0	0.0	84.8	84.8	121.0	53.5	40.0	384.2	0.0
05:45	0.0	0.0	170.0	84.8	121.0	7.7	0.0	383.5	0.0
06:00	0.0	0.0	170.0	84.8	121.0	9.8	0.0	385.6	0.0
06:15	0.0	0.0	99.6	84.8	121.0	80.0	0.0	385.4	0.0
06:30	0.0	0.0	115.9	84.8	121.0	80.0	0.0	401.7	0.0
06:45	0.0	0.0	170.0	84.8	121.0	27.1	0.0	402.9	0.0
07:00	0.0	0.0	156.5	84.8	121.0	0.0	40.0	402.4	0.0
07:15	0.0	0.0	170.0	84.8	121.0	24.4	0.0	400.2	0.0
07:30	0.0	0.0	170.0	84.8	121.0	22.2	0.0	398.1	0.0
07:45	0.0	0.0	110.7	84.8	121.0	80.0	0.0	396.5	0.0
08:00	0.0	7.5	104.3	84.8	121.0	80.0	0.0	390.1	0.0
08:15	0.0	7.5	105.1	84.8	121.0	80.0	0.0	390.9	0.0
08:30	0.0	7.5	170.0	84.8	121.0	13.5	0.0	389.4	0.0
08:45	0.0	7.5	102.9	84.8	121.0	80.0	0.0	388.7	0.0
09:00	0.0	26.9	84.8	84.8	121.0	78.3	0.0	369.0	0.0
09:15	0.0	26.9	166.9	84.8	121.0	0.0	0.0	372.8	0.0
09:30	0.0	26.9	170.0	84.8	121.0	11.1	0.0	387.0	0.0
09:45	0.0	26.9	170.0	84.8	121.0	12.1	0.0	388.0	0.0
10:00	0.0	43.6	165.1	84.8	121.0	0.0	0.0	371.0	0.0
10:15	0.0	43.6	168.2	84.8	121.0	0.0	0.0	374.0	0.0
10:30	0.0	43.6	162.7	84.8	121.0	0.0	0.0	368.6	0.0
10:45	0.0	43.6	165.8	84.8	121.0	0.0	0.0	371.6	0.0
11:00	0.0	53.3	84.8	84.8	121.0	64.5	0.0	355.2	0.0
11:15	0.0	53.3	84.8	84.8	121.0	63.4	0.0	354.1	0.0
11:30	0.0	53.3	84.8	84.8	121.0	58.4	0.0	349.1	0.0
11:45	0.0	53.3	107.1	84.8	121.0	0.0	0.0	312.9	0.0

Time	Grid	PV	Gas Turbine	Gas Turbine2	SMR1	ESS1	ESS1	Total	Diff
12:00	0.0	56.3	84.8	84.8	121.0	16.2	0.0	306.9	0.0
12:15	0.0	56.3	84.8	84.8	121.0	15.1	0.0	305.8	0.0
12:30	0.0	56.3	84.8	84.8	121.0	18.4	0.0	309.1	0.0
12:45	0.0	56.3	84.8	84.8	121.0	16.4	0.0	307.1	0.0
13:00	0.0	53.9	84.8	84.8	121.0	11.3	0.0	302.0	0.0
13:15	0.0	53.9	105.7	84.8	121.0	0.0	0.0	311.5	0.0
13:30	0.0	53.9	84.8	84.8	121.0	20.6	0.0	311.3	0.0
13:45	0.0	53.9	101.0	84.8	121.0	0.0	0.0	306.9	0.0
14:00	0.0	46.8	84.8	84.8	121.0	18.1	0.0	308.8	0.0
14:15	0.0	46.8	103.3	84.8	121.0	0.0	0.0	309.1	0.0
14:30	0.0	46.8	107.8	84.8	121.0	0.0	0.0	313.6	0.0
14:45	0.0	46.8	84.8	84.8	121.0	22.2	0.0	312.9	0.0
15:00	0.0	32.3	122.4	84.8	121.0	0.0	0.0	328.3	0.0
15:15	0.0	32.3	84.8	84.8	121.0	22.1	0.0	312.8	0.0
15:30	0.0	32.3	110.4	84.8	121.0	0.0	0.0	316.3	0.0
15:45	0.0	32.3	113.8	84.8	121.0	0.0	0.0	319.7	0.0
16:00	0.0	3.1	84.8	84.8	121.0	60.5	0.0	351.2	0.0
16:15	0.0	3.1	154.0	84.8	121.0	0.0	0.0	359.8	0.0
16:30	0.0	3.1	99.3	84.8	121.0	80.0	0.0	385.2	0.0
16:45	0.0	3.1	170.0	84.8	121.0	8.0	0.0	383.9	0.0
17:00	0.0	0.1	107.9	84.8	121.0	80.0	0.0	393.7	0.0
17:15	0.0	0.1	111.6	84.8	121.0	80.0	0.0	397.4	0.0
17:30	0.0	0.1	107.5	84.8	121.0	80.0	0.0	393.4	0.0
17:45	0.0	0.1	113.2	84.8	121.0	80.0	0.0	399.1	0.0
18:00	0.0	0.0	126.5	84.8	121.0	80.0	0.0	412.3	0.0
18:15	0.0	0.0	170.0	84.8	121.0	31.5	0.0	407.4	0.0
18:30	0.0	0.0	113.1	84.8	121.0	80.0	0.0	398.9	0.0
18:45	0.0	0.0	170.0	84.8	121.0	16.5	0.0	392.4	0.0
19:00	0.0	0.0	96.5	84.8	121.0	80.0	0.0	382.3	0.0
19:15	0.0	0.0	168.1	84.8	121.0	0.0	0.0	373.9	0.0
19:30	0.0	0.0	166.2	84.8	121.0	0.0	0.0	372.1	0.0
19:45	0.0	0.0	84.8	84.8	121.0	76.8	0.0	367.5	0.0
20:00	0.0	0.0	161.5	84.8	121.0	0.0	0.0	367.3	0.0
20:15	0.0	0.0	84.8	84.8	121.0	29.8	40.0	360.5	0.0
20:30	0.0	0.0	84.8	84.8	121.0	66.5	0.0	357.2	0.0
20:45	0.0	0.0	84.8	84.8	121.0	59.0	0.0	349.7	0.0
21:00	0.0	0.0	84.8	84.8	121.0	53.8	0.0	344.5	0.0
21:15	0.0	0.0	84.8	84.8	121.0	49.6	0.0	340.3	0.0
21:30	0.0	0.0	84.8	84.8	121.0	48.1	0.0	338.8	0.0
21:45	0.0	0.0	84.8	84.8	121.0	48.1	0.0	338.8	0.0
22:00	0.0	0.0	84.8	84.8	121.0	49.0	0.0	339.7	0.0
22:15	0.0	0.0	136.2	84.8	121.0	0.0	0.0	342.0	0.0
22:30	0.0	0.0	84.8	84.8	121.0	48.7	0.0	339.4	0.0
22:45	0.0	0.0	134.5	84.8	121.0	0.0	0.0	340.3	0.0
23:00	0.0	0.0	133.8	84.8	121.0	0.0	0.0	339.7	0.0
23:15	0.0	0.0	132.3	84.8	121.0	0.0	0.0	338.1	0.0
23:30	0.0	0.0	130.0	84.8	121.0	0.0	0.0	335.9	0.0
23:45	0.0	0.0	138.0	84.8	121.0	0.0	0.0	343.8	0.0