



Behind-The-Meter (BTM) Storage

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Demand Forecasting Pup

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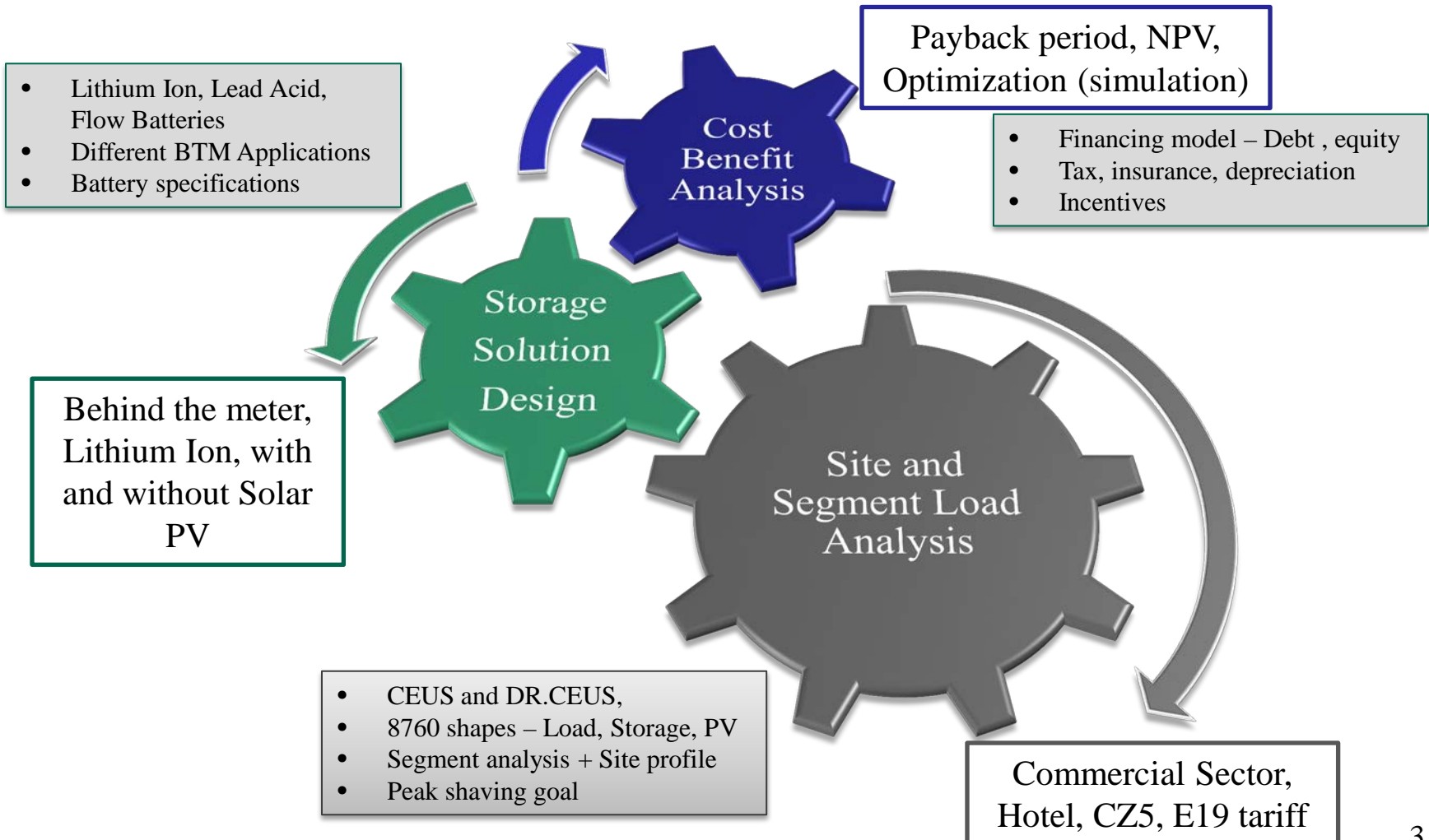


Overview

- Background
- Goals
 - Understand interplay between climate, building type, business operations, fuel mix and end uses in site selection for a specific battery technology
 - Identify application suitable for a specific business, utility tariff
 - Model stand alone and paired storage dispatch scenarios
 - Evaluate economic case using System Advisor Model (SAM), Energy Storage Valuation Tool (ESVT)
 - Extend analysis → Analytic Framework
- Current Status
- Next steps



Approach and Methodology



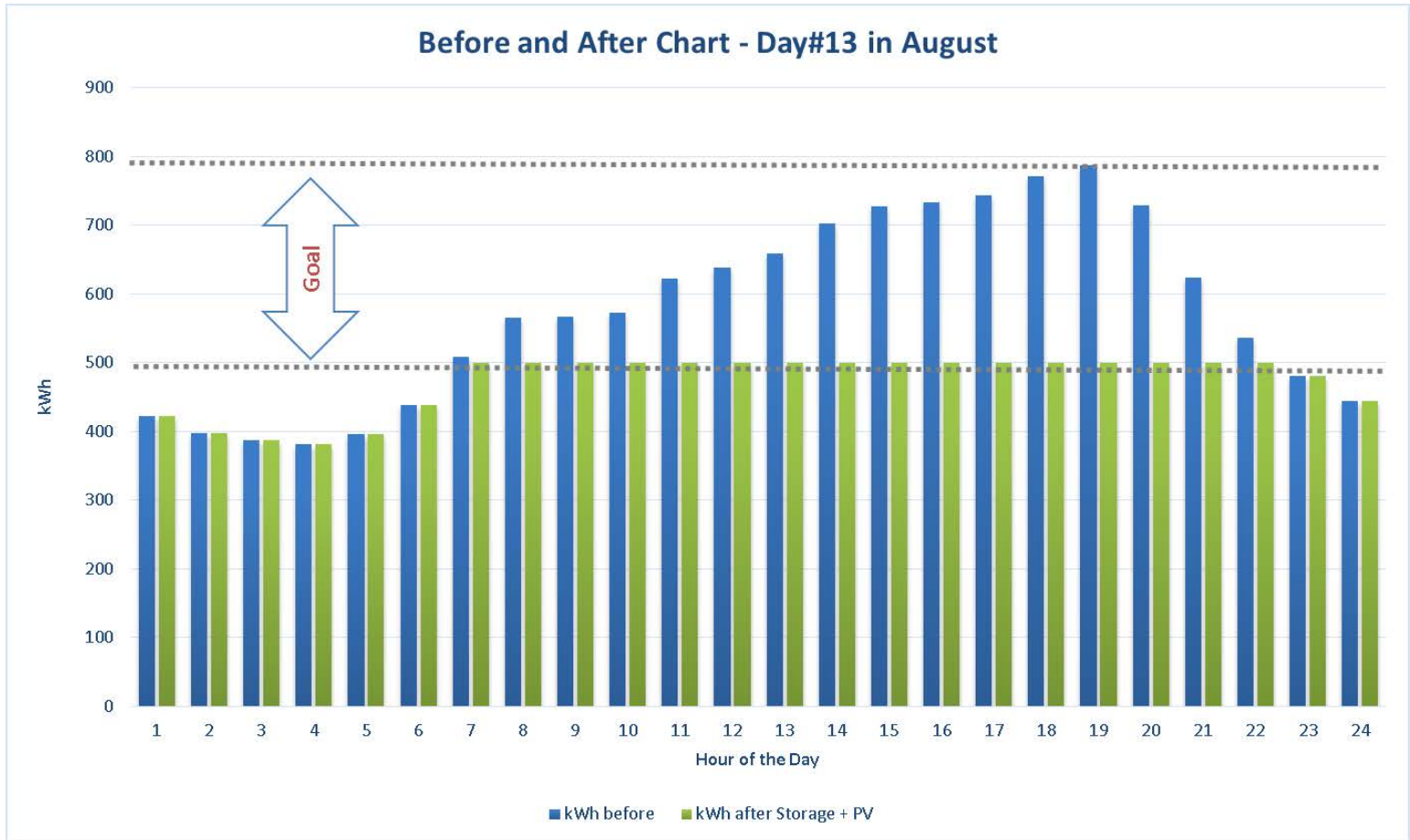


Test Case – LODGING

- CEUS Climate Zone 5 – San Francisco
- Building Type 14 – Lodging (Hotels)
- Size (ft²) 4540, 44500, 252996
 - Compared to CZ1(Ukiah) - 231487, 135556
 - Compared to CZ3 (Fresno) – 294847
- Segment vs. site analysis
- Determine peak fraction
- Design goal – optimal ratio of PV and Storage
- Peak load management with Grid + Storage + PV



Peak Shaving with Storage + PV





Forecast Climate Zone 3, Lodging, Fresno

Day#24 across the year

Hour/ Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
								96.26679	5.18627	-31.3348	-30.4556	13.43521	-9.38679
								81.56243	5.44911	35.0476	41.1427	1.32093	40.4785
								65.94817	-15.5363	-51.4941	-53.1618	-26.6326	-58.9526
1	312.2123	307.3976	308.9607	315.5038	317.2811	331.5719	343.03702	-38.19	-65.9521	-76.7713	-33.4479	-78.4195	
2	308.1507	302.7853	304.9798	305.5355	312.7412	324.5391	334.60721	-43.1012	-95.7721	-112.204	-46.6635	-98.8561	
3	306.3465	301.3864	302.0874	302.8474	309.075	320.6377	329.48955	-56.5917	-130.593	-127.372	-67.1179	-106.631	
4	306.0495	298.3098	299.9961	308.7081	312.982	323.5608	326.04202	-77.3712	-156.952	-153.933	-108.905	-133.145	
5	313.2694	305.1237	306.3442	325.6955	331.316	334.4414		-0.03969	-115.29	-205.949	-198.889	-135.016	-137.53
6	330.8255	323.0578	324.5014	378.8297	379.3253	381.9222		-15.9813	-105.401	-205.633	-191.089	-135.983	-155.814
7	382.73	349.5471	346.0329	416.5909	428.7535	466.6357	478.7535	25.18058	-42.6134	-139.475	-140.173	-82.9822	-99.0692
8	419.0639	400.7666	404.1169	429.5317	468.5125	499.2172	499.984	98.88583	44.89046	-33.9491	-31.0171	-3.20101	-12.8425
9	426.5642	419.7123	414.9343	407.0615	473.2369	499.984	486.2638	477.7597	443.7112	464.8026	376.6212	395.3491	400.7814
10	407.0319	396.4498	388.7985	380.9217	455.9341	486.2638	477.7597	443.7112	464.8026	376.6212	395.3491	400.7814	
11	376.1677	366.3264	357.4524	402.7332	493.8137	530.3348	529.4556	485.5648	508.3868	397.2469	361.78	369.139	
12	395.7759	387.1178	380.9731	417.4376	504.4491	534.0476	540.1427	500.3209	539.4785	402.9422	385.477	383.5341	
13	398.6627	390.5288	385.8625	433.0518	514.5363	550.4941	552.1618	525.6326	557.9526	402.3145	388.519	386.343	
14	401.2959	392.9711	386.8175	455.963	537.19	564.9521	575.7713	532.4479	577.4195	397.3918	388.7549	389.6004	
15	391.3303	386.0818	379.1285	464.3928	542.1012	594.7721	611.2042	545.6635	597.8561	403.1116	380.5699	381.9492	
16	391.5989	386.509	377.3946	459.5104	555.5917	629.5932	626.3716	566.1179	605.6309	395.867	385.5223	380.459	
17	391.1214	390.6535	384.0153	472.958	576.3712	655.9516	652.9334	607.9053	632.1454	413.251	379.9922	378.9965	
18	403.0568	404.7131	400.0242	499.0397	614.2397	704.9489	697.8891	634.0158	636.5302	446.1957	393.1856	399.0149	
19	433.2201	441.7295	436.5605	514.9813	604.4014	704.6334	690.0888	634.9827	655.8144	483.1051	433.948	431.5313	
20	468.1222	474.2855	471.5894	473.8194	541.6134	638.475	639.173	581.9822	598.0692	455.7418	462.4387	467.9488	
21	440.9139	443.7039	442.4333	400.1141	454.1095	532.9491	530.0171	502.201	511.8425	391.0992	441.2852	443.2448	
22	380.6365	390.5421	391.8622	344.2508	378.2401	444.7473	449.6163	415.7946	428.1336	335.3073	390.1009	385.996	
23	327.1797	329.2328	330.0018	328.2737	350.7339	407.5286	411.166	371.3508	396.3325	323.4654	328.3736	332.5576	
24	316.5313	307.2863	307.0061	314.0517	328.0588	379.5768	380.8322	353.9715	373.2734	312.0544	306.6867	322.2903	
24 Total	9027.857	8896.218	8832.574	9553.803	10784.76	11841.78	11892.22	11007.85	11572.47	9132.883	8841.989	8739.204	



Next steps

- Other climate zones and building types
- Other sectors – Residential, Industrial
- Other Storage technologies
- Other applications – Energy TOU arbitrage, dual service
- Fine tune for incentives and policy drivers
- Use AMI data for 8760 & 35040 profiling
- Optimize PV & Storage specifications, multiuse scenarios, other technologies
- DER impacts