4 Storage Deployment Barriers

4.1 Supply Chain and Material Costs

The rapid growth of the energy storage and EV industries has been fueled by the technological improvements and price reductions in lithium-ion batteries. Lithium-ion batteries represent an overwhelming majority of all stationary and mobile storage deployments, resulting in both competition between automotive and grid-connected segments and sensitivities across segments to supply chain issues and material price increases.

Since July 2021, prices for lithium carbonate, a key ingredient of lithium-ion batteries, have increased 500%.[34] Among projects awarded NYSERDA incentives, average total installed costs for non-residential, retail projects averaged $567/kWh for installations occurring in 2022 and 2023, up from $464/kWh for installations in 2020 and 2021, an over 20% increase in total costs.[35] This is consistent with recent industry reports that indicate near-term increases in storage costs.[36] Also in 2021, the electric vehicle market more than doubled while global energy storage deployments tripled.[37] Manufacturing and distribution of battery components and battery packs have struggled to keep up with the pace of demand growth. This has led to delays in deliveries, higher costs for storage assets, and in some cases, unmet demand. These factors are likely to impact the ability of storage to be deployed by the market until supplies increase.[38] Furthermore, this combination of factors has kept energy storage from being able to be deployed in the absence of market support mechanisms.

Efforts by the Federal Government, as well as the European Union, seek to expand and diversify supply in the coming decade to address overall supply, supply chain, and material cost issues.[39] However, the impacts of these interventions will take time to manifest and are unlikely to begin easing the cost issues until 2024-2025 at the earliest, with major improvements only expected by the end of the decade and into the 2030s. Given the time required to plan, study, construct, and commission energy storage projects, simply waiting for cost reductions, driven by factors outside New York's control, before beginning new deployments is not an option as the state pursues its decarbonization and renewable integration goals. For example, large-scale bulk storage projects often require five years or more between interconnection request and commissioning. Waiting to procure these resources until price reductions have been achieved near the end of the decade will result in projects coming online in the mid-2030s, beyond the timeline

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[34] McKinsey & Company: Lithium mining: How new production technologies could fuel the global EV revolution. https://www.mckinsey.com/industries/metals-and-mining/our-insights/lithium-mining-how-new-production-technologies-could-fuel-the-global-ev-revolution

[35] Case 18-E-0130, supra, Department of Public Service Third Annual State of Storage Report (issued April 1, 2022), p. 8 H

[36] E&E News: Climatewire. Calif. Sprints to install batteries but can't find parts. https://www.eenews.net/articles/calif-sprints-to-install-batteries-but-cant-find-parts/

[37] Wood Mackenzie: Global lithium-ion battery supply and demand update: H1 2022. https://www.woodmac.com/reports/power-markets-global-lithium-ion-battery-supply-and-demand-update-h1-2022-150048235/

[38] Wood Mackenzie: Global energy storage: staggering growth continues – despite bumps in the road. https://www.woodmac.com/news/opinion/global-energy-storage-staggering-growth-continues--despite-bumps-in-the-road/

[39] Energy Storage News: Overcoming the great disconnect in the battery storage supply chain. https://www.energy-storage.news/overcoming-the-great-disconnect-in-the-battery-storage-supply-chain/

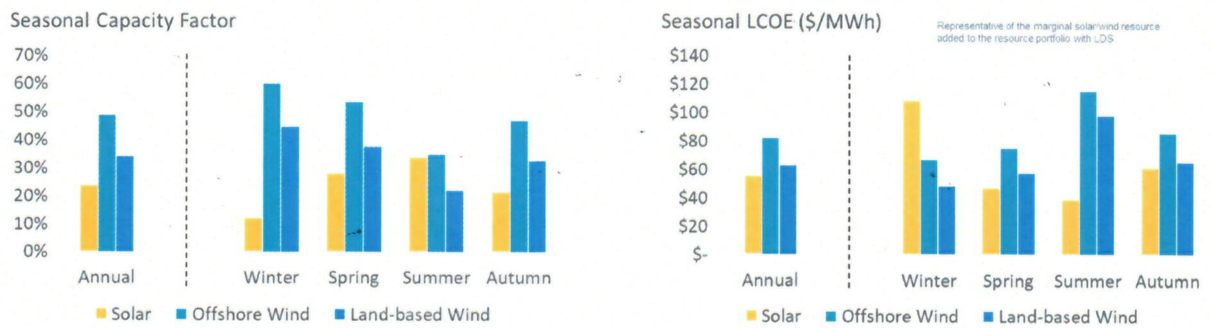
Page 92 of the document. Page 94 of the pdf. New York's 6 GW Energy Storage Roadmap:

Math at bottom of page.

Solar output is highest in the summer and lowest in the winter, and wind output is complementary to solar, as shown in Figure 40. With seasonal storage (1000+ hours), the availability of a specific resource during critical weeks – or in between multiple critical weeks in a season matters less; instead, the cheapest form of energy, such as solar in the spring and summer, can be stored and discharged over multiple winter weeks.

In the challenging weeks highlighted in Figure 41, output is lower than average while wind output is at or above average. As a result, although solar is cheaper on average over the course of the year, 100-hr storage needs to be paired with more expensive land-based or offshore wind, which can both directly meet load and be used to recharge storage between multiple critical weeks in this period. Figure 42 illustrates how the 100-hr storage with added renewables can fill the firm-resource need in the week highlighted in Figure 41.

Figure 40. Variation in Solar and Wind Generation over a Year



Notes: "Seasonal LCOE" is defined as the LCOE of the resource if its annual capacity factor was instead equal to the capacity factor in that season. For example, the Winter LCOE of solar is (Total costs) / (~10% * 8760), if the capacity factor of solar over the winter is 10%. These figures are intended to illustrate the underlying economic dynamics at a high level, but they do not capture the full complexity of loss-of-load probability analysis and portfolio optimization to ensure system reliability is maintained over many years of weather conditions.

GW = Gigawatt=1 billion watts Watts are a measure of Power
KW = Kilowatt = 1000 watts

KWh = Kilowatt-Hours Kilowatt-Hours are a measure of Energy

6 GW = 6,000,000 KW x 1000 hours = 6,000,000,000 KWh * $567/KWh = $3.4 Trillion