

Utility Scale Lithium Based Energy Storage Systems

Richard Ellenbogen

This post was put together by Roger Caiazza to describe a recently completed white paper by Richard Ellenbogen M.E.E. titled [The Intrinsic Danger of Siting Utility Scale Lithium Based Energy Storage Systems In Densely Populated Areas](#). Ellenbogen and I collaborated on an [article](#) about the potential impacts of a fire like the Moss Battery Plant fire if it were to occur in New York City. This report finds that the local conditions at the proposed large Battery Energy Storage System (BESS) facility at 220 Rabro Drive, Hauppauge, NY would magnify the impacts of a BESS fire in Nassau and Suffolk counties. The following two sections are lightly edited direct quotes from the report.

Executive Summary

This report was written at the request of the Hauppauge Fire Department because of their concerns about a proposed large Battery Energy Storage System (BESS) facility at 111 Rabro Drive. This would be located within 3500 feet of an elementary school, a much less than ideal siting for such a volatile and potentially dangerous facility.

Research on that issue revealed, in addition, that the proposed location is close to streams and has a high water table. In a location with these characteristics, a lithium-ion battery fire, of the type that frequently has occurred at BESS facilities, could produce long-term, catastrophic environmental damage. This is in addition to the more immediate, very serious threat to people and structures at the school and in nearby neighborhoods from heat and toxic gases in the event of a fire. The body of this report explains these threats in detail and also provides background that shows why the occurrence of fire at a BESS facility, like the one proposed, presents such a high level of risk. The readers should be aware in reading this report, that the author received no compensation or payment in kind for the research and writing, but willingly invested the hundreds of hours of work required for its preparation strictly as a result of his great concern for the Hauppauge community, Nassau and Suffolk Counties, the downstate region, and the State of New York in general, inspired by the high level of threat and risk arising from the proposed BESS facility. The report is designed to be read on a network connected device and is arranged with hyperlinks providing backup documentation for each issue should readers wish to learn more about the statements made within.

Introduction

Utility scale electrical energy storage has been a recognized need in the New York Metropolitan Area for over sixty years. For example, Con Ed first proposed the [Storm King Mountain Pumped Storage](#) facility in the early 1960's to address this. However, that facility

was never built because of potentially negative environmental impacts and community opposition. However, the need for energy storage has not gone away and has recently been exacerbated by a growing trend toward electrification to reduce carbon emissions, along with several years of state energy policies that have left the New York state critically short of electric generation.

The New York Independent System Operator (NYISO) recently released their [2025 – 2034 Reliability Study](#) that determined that electric generation capacity margins could go below zero as early as 2027 with the risk increasing even more each year through 2034. Figure 1 from page 10 of that document clearly shows the problem.

This crisis has resulted from state policies, many associated with New York’s Climate Leadership & Community Protection Act (CLCPA), that have blocked the construction or retooling of new gas generation plants for the past seven years, while simultaneously closing a 2 Gigawatt nuclear plant without having a viable operating alternative to replace the lost energy. As a result, NY State officials are moving hastily to find solutions to bridge the gaps. Among these hasty measures, the consequences of which do not seem to have been carefully thought out, is the proposed development and addition to its electrical grid of a number of lithium-ion-battery-based electrical energy storage facilities. To expedite this process, these officials have been attempting to override local zoning laws and their own Department of Environmental Conservation, via the six-year-old Office of Renewable Energy Siting (ORES).

One of these hastily conceived and poorly thought through BESS facilities is proposed for Long Island, within the town of Islip, in Suffolk County. This siting of an intrinsically dangerous BESS facility, in such a densely populated and environmentally sensitive area, having a high water table and close proximity to many streams and the ocean, would seem to defy logic. This is especially true given the very recent catastrophic history of a similar BESS siting at Moss Landing, near Monterey Bay in California.

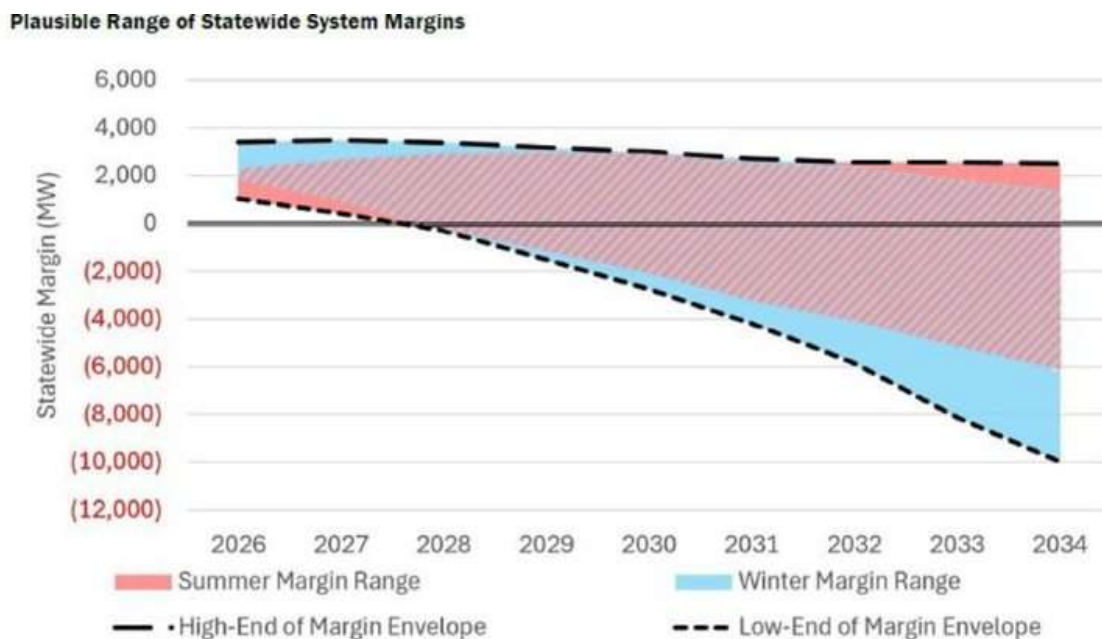


Figure 1

Whatever help a BESS facility in Islip might promise for the NY state electrical grid is certainly offset by the risks of such a move and the likelihood of accidents with long-term very negative consequences that would impact millions of people and large geographic areas of the state and its waters. These risks follow from three categories of intrinsic dangerous characteristics of lithium ion batteries and the large number of them housed within a BESS facility. These categories of risks are as follows:

- Lithium metal, [when brought into contact with any water](#), creates an exothermic reaction that generates a great deal of heat which can drive the batteries into a state of thermal runaway. So Li-ion batteries and BESS facilities that contain them are very subject to fires, especially if they are located near large bodies of water and exposed to significant humidity or moisture. Lithium Batteries can also burst into flame if they overheat and enter thermal runaway under heavy load.
- Li-ion battery fires are very hot and damaging. They burn at temperatures between 2600 – 5000 degrees-F making these fires, even small ones, very difficult and costly to put out, even if a fire department is well-prepared, which most are not. These fires spread rapidly within a BESS facility, quickly resulting in a conflagration. In addition to the great heat from them, there is release of toxic gases during the fires.
- In the aftermath of large-scale Li-ion battery fires, there is significant, nearly impossible to remediate environmental pollution of land and water with heavy metals and other toxins. This will be particularly damaging in areas with surface water or a high water table, and particularly on Long Island which has a history of water issues and highly permeable soil..

Sections of this report explain in detail, with reference to each of these risk categories, why siting utility-scale lithium battery facilities in densely populated areas, like Nassau and Suffolk Counties, is a problem, in general. Also, it will be detailed why this is made especially problematic in coastal areas because of the hydrology and soil composition in this part of Long Island, as well as its proximity to the ocean.

Report Sections

The report has four sections: The issues with lithium storage, the aftermath of Moss Landing, negative impacts of ingesting heavy metals, and groundwater leaching issues on Long Island. I summarized Ellenbogen's main points below and refer you to the report for more details.

There are substantive issues associated with lithium energy storage systems. It is necessary to keep water away from the batteries because lithium is volatile in the presence of water. Water causes lithium batteries to overheat and enter thermal runaway and catch fire. These fires are not unusual. Appendix 1 has a list of the fires, locations, and dates along with a link to the EPRI Battery Storage Fire Database. Once started the fires are so difficult to extinguish that they must left to burn out but during a fire there is release of toxic gases. To reduce the spread of the fire water is used to cool nearby batteries. As a result, in the aftermath of Li-ion battery fires, there is significant heavy metal and other toxin pollution of land and water from the smoke and water used to control the fire.

In another section Ellenbogen describes the aftermath of a BESS fire at Moss Landing California. On January 16, 2025, the Moss Landing 300 Megawatt – 1200 Megawatt-Hour Vistra BESS facility caught fire. A description of the fire and its aftermath is provided in Appendix 2. He explains that researchers from San Jose State had been working in the marshes around Moss Landing since 2018 and had measurements of the levels of certain chemicals in the ground and water around the BESS Site for at least two years prior to the battery fire. Their research on the effects of the fire on the ground and marshes around the BESS Site appear in the document [Coastal wetland deposition of cathode metals from the world's largest lithium-ion battery fire](#). It is also attached as Appendix 3. Ellenbogen includes the following quote from the paper:

The 2025 fire at the Moss Landing, California, battery energy storage system (BESS)—the world's largest—released approximately 55,000 pounds (25 metric tons) of toxic [cathode metals](#) (**nickel, manganese, cobalt**) into surrounding [Elkhorn Slough coastal wetlands](#). This airborne particulate matter formed a thin, widespread layer (<<5 mm) in surface soils, creating a “fingerprint” of the [NMC-type batteries](#).

- **Environmental Impact:** The metals, particularly cobalt and manganese, are toxic to aquatic and terrestrial organisms. They pose risks to the ecosystem by potentially bioaccumulating through the food chain, from small invertebrates to shellfish, crabs, and top predators like sea otters.
- **Fate of Contaminants:** While initially settling in the soil, heavy metals have been mobilized into the estuary through tidal action and rain, spreading the risk beyond the initial deposition zone.
- **Detection and Monitoring:** Researchers from San Jose State University's [Moss Landing Marine Laboratories](#) utilized field-portable X-ray fluorescence (FpXRF) to map the contamination.
- **Long-Term Concerns:** The long-term impacts on the restored tidal marsh ecosystem are under investigation, as the contaminants may cause lasting, subtle damage to the food web.

Ellenbogen also included a section describing the negative impacts of ingesting heavy metals contained in Lithium-Ion batteries. He used an AI search to ask which health effects are linked to nickel, manganese, and cobalt exposure in soil and water from BESS fire runoff over extremely porous soil with a shallow aquifer. The response explained: that exposure to nickel, manganese, and cobalt from battery fire runoff in porous soil and shallow aquifers heightens risks due to rapid leaching into groundwater, amplifying ingestion and dermal contact pathways. These metals, common in lithium-ion batteries, can contaminate drinking water and crops, leading to bioaccumulation in the food chain. Health agencies like Agency for Toxic Substances and Disease Registry note that such scenarios mirror industrial pollution patterns where soil pH and redox conditions accelerate mobility.

In his final section Ellenbogen describes the particular issues of local conditions at the proposed large Battery Energy Storage System (BESS) facility on Long Island, NY. [Long Island](#) is a terminal moraine formed during from the melting of the Laurentide ice sheet, specifically the Wisconsin Glacier, around 60,000 years ago. Ellenbogen explains that Long Island has a long history of water quality issues due to the resulting porous soils and its shallow aquifer which is used to provide its drinking water. A history of Long Island

environmental advocacy, initiated by water quality concerns, [appears here](#). There are numerous instances of specialized treatment being given to Long Island regarding chemicals that can leach into the aquifer. A history of chemical bans on Long Island can be found in Appendix 4. His report includes maps of aquifer depths that show that if a fire occurred at the proposed location that it would cause problems from the heavy metals.

Conclusion

Ellenbogen's conclusion notes that he has no monetary interest either way in Lithium Storage technologies. He views the issue entirely from a perspective of, "Would he want one of these facilities near him based upon what he knows, and if not, why not?" his analysis leads him to clearly believe that he would not want one located near him.

He believes that if you combine the hazardous emissions and the potential environmental damage, it becomes apparent that the suitable locations for these types of systems have to be restricted to areas where there are very few people and no surface water or ground water. Anything less than that will lead to a high probability of increased public health issues.

Ellenbogen is the President [\[BIO\]](#) of Allied Converters and frequently copies me on emails that address various issues associated with the New York [Climate Leadership and Community Protection Act](#) (Climate Act). I have published [other articles by Ellenbogen](#) including a description of his keynote address to the Business Council of New York 2023 Renewable Energy Conference Energy titled: "Energy on Demand as the Life Blood of Business and Entrepreneurship in the [State](#) -video here: [Why NY State Must Rethink Its Energy Plan and Ten Suggestions to Help Fix the Problems](#)". He comes to the table as an engineer who truly cares about the environment and as an early adopter of renewable technologies at both his home and business two decades ago.