Energy storage and renewable energy integration in downstate New York

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Abstract

In the presentation we discuss the current trends in energy storage and renewable integration in downstate New York, specifically in the Eastern Long Island area.

South Fork of Long Island (SFLI) is a high-density residential area facing power shortage in coming years. The area is divided in three load pockets: South Hampton, East Hampton and Montauk see Figure 1a. Due to large summer population, the electricity demand has a distinct seasonal pattern. Figure 1b shows hourly demand of the South Hampton load pocket in 2014. The annual average power demand is 55 MW, however the summer month demand is 95 MW on average, reaching values as high as 140 MW for 10-20 hrs. The imbalance between the average and summer demand will increase as the global warming effect becomes more pronounced: even more electrical power will be required for summer air-conditioning and less power will be needed in the cold season.

The LI utility, PSEG, believes it is impractical to upgrade the current distribution grid in order to meet the growing demand. Deployment of renewable energy sources, such as wind and solar is considered as a viable solution for SFLI. Intermittent nature of renewables necessitates installation of energy storage. Currently, AES Corp. proposed installation of three 30 MW Li-ion battery farms on SFLI, each capable of providing 4 hr. of power supply, which amounts to 120 MWh. We further discuss implementation of Liquid salt batteries as peak-shaving energy storage. Liquid salt Na-NiCl2 (ZEBRA) batteries offer a low-cost energy storage that is better suited for an area with distinct seasonal demand. The battery normally operates at 300°C, when cooled to the ambient temperature it can be stored indefinitely. A battery farm would be activated for summer month only, thus requiring no off-season maintenance. Unlike Li-ion battery that needs to be replaced after 6-7 years, a ZEBRA battery pack operating in seasonal mode has practically unlimited lifetime. We show, that implementation of ZEBRA technology for the stationary storage SFLI will not increase the residential electricity rate.

Image

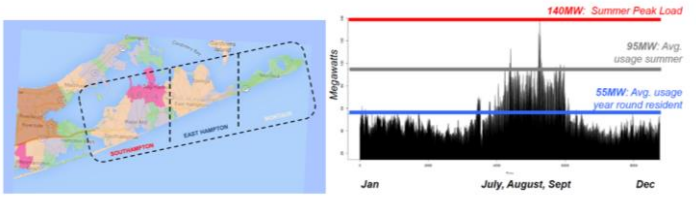


Figure 1. a) Map of the South Fork region showing the three load pockets. b) Hourly load for the South Hampton load pocket, 2014.



Biography

Dr. Vyacheslav Solovyov worked for 30 years in the field of materials for electric grid. He authored over 50 publications, holds 5 U.S. Patents, he is also a winner of 2015 R&D 100 award. He is currently working on integration of advanced energy storage technologies into the electric grid.

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