Public Schools Leading the Way

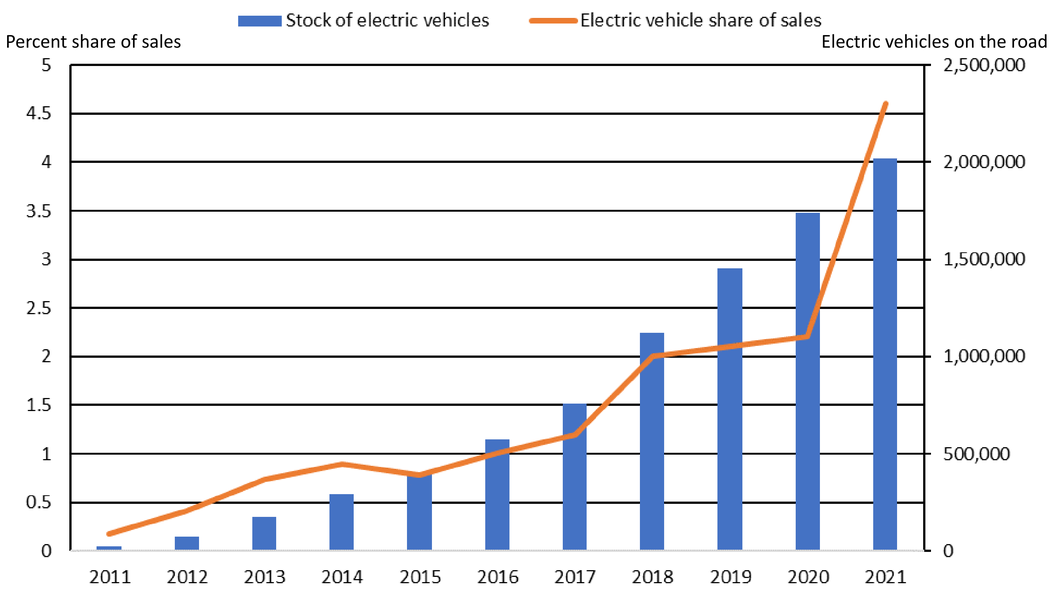
The Generational Opportunity and Management Challenges of Deploying Electric Vehicle Charging and Energy Storage at K-12 School Sites

Abstract

There are approximately 98,000 kindergarten through grade 12 (K-12) public school sites in the United States covering roughly 2 million acres of land. Given the growth of electric vehicle (EV) adoption and federal goals of 500,000 installed EV chargers by 2030, K-12 public school sites present a once-in-a-generation opportunity to supplement the estimated 115,000 fossil fuel stations currently serving internal combustion engine vehicles in a century old market.

K-12 public schools account for 50.8 million students and 3.7 million full-time employees. 16.4% of the nation's population is present at a K-12 campus on any given school day. Moreover, in urban / suburban settings, most homes are within 3 miles of a K-12 public school site. Thus, providing widespread access to EV chargers across all communities is one of the many appealing benefits of these sites.

Meshing EV charging with established solar photovoltaic (PV) technology and emerging battery energy storage system (BESS) technology compounds potential to reduce carbon emissions while optimizing grid utilization. However, despite the abundant benefits distinct to K-12 school sites, there are a multitude of challenges to be considered and addressed for nationwide investment to be successful.



Source: International Energy Agency

Opportunities

STATE AND FEDERAL LEGISLATION / GRANT PROGRAMS

- The Energy Act (2020) ~ $35.2B - renewable energy, energy efficiency, research and development, electric vehicles, and grid modernization
- Bipartisan Infrastructure Law part of Build Back Better (2021) ~ $7.5B – EV charge network, $7B – battery manufacturing, $10B – clean transit and school buses
- Inflation Reduction Act (2022) extends investment tax credits (ITCs) for EVs, charging infrastructure, and energy storage for 10 years

REVENUE STREAMS TO SUPPLEMENT K-12 EDUCATION AND PROGRAMS

- Low Carbon Fuel Standard (LCFS) credits in certain markets
- Charging convenience premium to customer on fixed percentage above blended $/kWh cost of electricity
- Digital or traditional advertisement revenue displayed on charger pedestals or through charging app to customer

LAND USE AVAILABILITY / EQUITY

- K-12 public school sites typically have parking lots which can feasibly convert some parking spaces to become EV charging stalls
- EV chargers at K-12 public school sites have the capability to serve surrounding neighborhoods, including disadvantaged communities

Technological and Financial Synergies

Renewable Energy Integration: By pairing EV charging infrastructure with solar PV installations, PV electricity can be used to charge EVs directly thereby lowering GHG emissions associated with traditional energy generation. Schools can offset energy expenses associated with fleet EVs and potentially generate surplus electricity to sell back using net-metering and/or vehicle-to-grid (V2G) opportunities. This financial benefit can help schools redirect funds towards educational initiatives.

Optimized Grid Utilization: Integrating solar PV installations with BESSs allows schools to store excess solar energy generated during the day for later use, such as during peak demand periods or when sunlight is limited. This flexibility helps optimize grid utilization by reducing strain on the grid during high-demand periods and supplying power during periods of low generation while enhancing grid stability and resilience.

Load Management: The integration of EV charging stations with BESSs enables load management and demand response capabilities. By intelligently managing the charging cycles of EVs and using stored energy, schools can avoid peak demand charges and balance their energy consumption to align with available renewable energy generation.

GHG Emission Reduction and Educational Opportunities : The combined benefits of solar PV installations, BESSs, and EV charging can lead to a substantial reduction in greenhouse gas (GHG) emissions while creating valuable educational opportunities. Students can learn about renewable energy technologies, energy conservation, and the importance of sustainable transportation which will foster the next generation of environmentally conscious citizens.

Challenges

LOCAL UTILITY AND SITE INFRASTRUCTURE LIMITS AND RULES

- Competition with other local utility customers for grid capacity
- V2G rules and regulations may be cumbersome if pursued
- Are there existing site constraints such that PV and BESS technologies cannot be engineered into solutions?

CODES VERSUS FUNDING

- Competing technological requirements may be misaligned with necessary funding levels to execute successful projects

PROGRAM MANAGEMENT

- Interdepartmental complexity – Contracts, O&M, IT, Finance, Etc.
- Hire / train in-house resources or contracted services for set terms?

SECURITY OF STUDENTS AND STAFF

- Safety and well being of students and staff is the number one priority, thus appropriate operational measures must be applied
- Data hacks compromising personal information remains a threat anytime payment info and monetary transactions are involved

Conclusion

K-12 school sites hold tremendous potential to drive sustainable transportation and reduce greenhouse gas emissions. However, realizing this potential will require addressing various challenges including but not limited to: utility and site limitations, codes, funding, management, and security. Ongoing implementation efforts and sustained government support will be crucial in harnessing the full benefits of EV charging and BESSs at K-12 school sites, promoting clean energy solutions, and fostering a greener future for generations to come.

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