



National Electrical Manufacturers Association

Representing Electrical and Medical
Imaging Equipment Manufacturers
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Comments of the
National Electrical Manufacturers Association (NEMA)
to US Department of Energy, Office of Energy Efficiency & Renewable Energy
Bipartisan Infrastructure Law (BIL) - Request for Information on Energy
Improvements at Public School Facilities

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The National Electrical Manufacturers Association (NEMA) is the leading U.S. trade association representing electrical equipment and medical imaging manufacturers, which are at the forefront of sustainability, resiliency, and energy efficiency. Our nearly 325 Member companies provide a range of products for high-performance buildings, electric vehicles, and the utility sectors. Collectively our membership provides some 370,000 American manufacturing jobs in more than 6,100 facilities, with worldwide industry sales exceeding \$130 billion.¹ The electroindustry has a robust domestic manufacturing base and supports the fundamental goal of creating good-paying American jobs and shoring up our domestic supply chains.

The Biden-Harris Administration has taken quick action to implement the historic Infrastructure Investment and Jobs Act (IIJA). The IIJA represents an important milestone in the transformation of U.S. infrastructure systems toward accessible, electrified transportation systems, modernized buildings and lighting, a more resilient grid, and increased efficiency of expanded U.S. manufacturing. The legislation also includes important Build America, Buy America (BABA) provisions that in the long term will allow for more resilient and equitable domestic supply chains and support the creation of high-paying American jobs. The ambitious timelines outlined in the law combined with the difficulties faced by U.S. manufacturers in obtaining raw materials and supplies used to support infrastructure projects in our current global geopolitical environment, underscores the need for a nimble and strategic approach to implementation.

¹ For more information, please visit: <https://www.nema.org/>.

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NEMA Comments

The U.S. Department of Energy (DOE) has requested information "on Energy Improvements at Public School Facilities." Please find our comments herein:

Category 1 – Capacity Development:

NEMA is approaching its 100th anniversary; the organization has a longstanding history as an advocate for safe electrical systems and installations. NEMA and its member companies serve as an educational resource for the electrotechnical industry, developing codes and standards and installation guidelines for the myriad of NEMA products installed in buildings. From construction and housing to commercial enterprises and industrial centers, NEMA's products shape building integrity, safety, and performance. Electrical efficiency, safety and protective electrical components are the backbone of the electroindustry, supporting electrical infrastructure in new construction and the retrofitting of existing building stock. **NEMA recommends that school districts receive assistance with three key aspects of major school improvement projects including project management, reporting, and financing.**

Project Management is a concern for large projects from a grant management perspective. School administration staff already serve many roles, adding both the implementation and the reporting requirements for a grant can be cumbersome, dissuading Local Education Agencies (LEAs) from pursuing them. Funding should support provisions for additional capacity or streamlined reporting requirements which would significantly benefit school districts and the goals of DOE and the IIJA. NEMA and its members have decades of experience assisting contractors, engineers, building owners, and facility managers with technical information and installation guidance to make buildings more safe, efficient, and resilient.

Increased energy efficiency can be achieved through electrification of all aspects of a school facility, including electric appliances for the kitchens, roof-mounted solar panels, battery storage

systems, and electric vehicle chargers for school bus fleets. The examples abound of institutional buildings, and schools in particular, that have reduced greenhouse gas emissions (GHGs), increased energy efficiency and reduced costs for these systems.^{2,3} NEMA is prepared to assist school districts with technical guidance on product selection, operation, maintenance, and safe installation of electrical products.

Additionally, NEMA recommends the creation of direct assistance resources. For example, the U.S. Department of Agriculture created a contact center for their ReConnect⁴ broadband program, put in place to respond to inquiries, assisting applicants with technical issues, and providing valuable information for project content. The capabilities of underserved school districts can be enhanced with the similar direct contact and support.

Easing the reporting burden is important, especially for disadvantaged LEAs. Due to smaller staff numbers and larger improvement requirements, there is a need for a simplified process by which staff members can access funding and report progress without needing to dedicate a significant portion time to the task.

LEAs can also utilize the Department of Justice Community Oriented Policing Services Grant Programs (COPS)⁵, which serve to streamline efficient grant application and post-award reporting including the drawdown of funds. These programs provide a reporting system and a portal for funding drawdown or reimbursement, proving to be extremely helpful for quarterly reporting with automated deadline reminders, for example.

Category 2 - Needs Assessments:

Education for LEAs regarding what building systems are available for electrification and energy efficiency upgrades is an important starting point. According to the U.S. Environmental Protection Agency⁶, 30 percent of the energy used in commercial buildings is wasted even though practical energy-saving solutions from the electroindustry are commercially available. In 2017, 40 percent of the overall energy consumption by a commercial building was attributed to plug and process loads, general lighting, heating, ventilation, cooling, and water heating.

Connected Building Systems (CBS) are integrated systems of hardware, software, and two-way communications to automatically monitor and instantaneously control building subsystems (such as HVAC, lighting, power, plug loads, fire, access control, and security) to maximize energy

² [Washington DC Schools - Going Net Zero](#)

³ [Arlington County's Energy Efficient Schools](#)

⁴ <https://www.usda.gov/reconnect>

⁵ <https://cops.usdoj.gov/grants>

⁶ [EPA - Promoting Energy Efficiency with Energy Star.pdf](#)

efficiency, reduce costs, improve comfort, and otherwise optimize the building's performance.⁷ Through automation and advanced monitoring (e.g., smart plugs or advanced power strips that sense loads and facilitate power control systems), building operators can monitor and schedule plug loads remotely and integrate them into building management systems.

Targeted equipment and energy/building management tools are available to help schools balance indoor air quality, safety, and energy efficiency, using variable speed motors and germicidal lighting^{8,9,10} to make effective use of the specific type of energy improvements noted in the IIJA legislation.

Using specific efficient equipment, along with energy and building management tools, schools can optimize performance of healthy indoor air quality, occupant safety and energy efficiency simultaneously. Examples include the utilization efficient variable speed motors for ventilation along with germicidal lighting, all being monitored and controlled by these management tools and thereby making effective use of healthy, safe and efficient improvements.

An information and knowledge gap exists not just regarding building hardware, but also the software programs created to manage equipment. Software platforms are available which assist with efficiency, automation, and provide far more access through web-based automation. These connected technologies lead to far better predictive maintenance requiring only a fraction of the work hours and smart software enables the management of electric buildings systems leading to a reduction in service calls and costs.

Regarding DOE's question of needs assessment completion, software platforms exist in some industries to empower effective evaluation. Some examples for lighting are Snapcount by Streamlinx¹¹ and Retrolux¹². Use of software enables schools to identify energy saving opportunities without an individual on site in a low cost manner.

A general lack of engineers and energy managers can hinder efforts to save energy. Creating a standardized form with a templated excel sheet, for example, will simplify efforts for school staff and program administrators. Two examples for energy efficiency projects are listed below:

- Comparing operations savings cost model with a certain percentage of savings per year compared to total capital cost; or

⁷ [NEMA Connected Building Systems \(CBS\)](#)

⁸ <https://www.sciencedirect.com/science/article/pii/S2666469021000920?via%3Dihub>

⁹ [Global Lighting Association - Position Statement on UV Germicidal Irradiation](#)

¹⁰ <https://www.whitehouse.gov/ostp/news-updates/2022/03/23/lets-clear-the-air-on-covid/>

¹¹ <https://www.streamlinx.com/>

¹² <https://www.retrolux.com/>

- A percentage of the total budget threshold for energy costs. Any group spending more than X percent of their school budget on energy should be eligible and competitive for funding.

Both of these examples would be moderately easy to validate upon review and very easy to validate with post-award reporting metrics. If pre-application expenses can be made an eligible part of the reimbursement upon notification of an award, NEMA believes more schools would be interested in performing this task via consulting professionals. It is important, however, to provide an in-house option. Therefore, a standardized template should be used for this activity as well.

NEMA recognizes that a robust needs assessment is essential to prioritizing the education facilities with the greatest needs and opportunities to improve energy efficiency for the benefit of students and teachers. While DOE has several resources that can be expanded to specifically address K-12 facilities, NEMA encourages DOE to incorporate attributes into the needs assessment that will not only prioritize short-term energy cost savings, but also the ability to invest in improvements that will enhance the school infrastructure and learning environment for long-term benefits. Technologies such as a controllable infrastructure and attributes that create a safe, secure environment for a healthy and productive learning environment are essential for the Administration to achieve its' infrastructure goals.

Category 3 - Criteria and Metrics:

NEMA and its members recommend schools consider the age of buildings and systems, as older equipment is in most need of upgrades or replacement and will lead to the greatest energy savings. Given the knowledge gap of many local decision makers, DOE should consider developing a landing page that provides links to resources for school solutions, technologies or associations to help the school officials evaluate energy conservation measures (ECMs). Additionally, a school district should be able to demonstrate a project's ability to save money long term, potentially as a percentage of savings annually compared to the project cost. School districts should be able to demonstrate internal capacity to operate and maintain the equipment, technology, and infrastructure included in the budget request. If they are unable to perform these activities internally, and with existing resources, they should demonstrate affordability on an ongoing basis for the outsourced services required to keep the improvements in operating condition.

A 2021 Department of Motor Systems Market Assessment Report¹³ highlighted that outdated mechanical systems for controlling water and ventilation loads is currently installed in almost 90

¹³ [2021 Department of Motor Systems Assessment Report](#)

percent of buildings. Research conducted by the Cadeo Group¹⁴ shows how updating these legacy systems with advanced electronically monitored and controlled motor systems can reduce energy use by more than 40 percent.

The DOE Better Buildings Program indicates¹⁵ that K-12 schools can save up to 50 percent on energy use if they optimize their lighting equipment and operations with retrofits to light-emitting diode (LED) technology, and notes that additional savings are achieved with the use of controls. The use of Networked Lighting Controls has been shown to further increase savings by an average of 28 percent¹⁶ and in conjunction with power monitoring technology can be used to meet DesignLights Consortium (DLC) Technical Requirements, a program supported by many utility rebate programs.¹⁷ In addition, student performance can be enhanced with lighting designs that incorporate spectral characteristics¹⁸ and daylighting.¹⁹

In recent years, the capabilities of remote monitoring equipment have increased rapidly, enabling buildings managers to perform web-based, relatively inexpensive predictive maintenance, with far fewer staff members. Unnecessary maintenance deployments and operating costs can be minimized, school assets can be protected, facility energy usage can easily be monitored and reported, and a return on investment can be realized. Remote monitoring equipment can also improve the safety of building occupants for emergency systems, such as emergency lighting systems. DC microgrids in conjunction with DC based lighting systems have the opportunity to enhance resilience, further improve LED lighting efficiency and improve reliability of equipment.^{20,21,22}

For the prioritization requirement of leveraging energy-related performance contracting, NEMA understands that schools struggle to undertake major improvements in their buildings due to budgeting constraints. Since they are limited to smaller amounts spent for phases or sub-projects, there are no economies of scale that can be afforded for larger, more comprehensive, projects. School districts lacking in funding can engage an Energy Service Company (ESCO) around an Energy Savings Performance Contract (ESPC) to upgrade multiple energy conservation measures (ECMs) in its facility. Other examples of financing include design-build and Energy as

¹⁴ [Northwest Energy Alliance \(NEEA\) - Cadeo Group Energy Savings](#)

¹⁵ [DOE Better Buildings Program Toolkit](#)

¹⁶ [Networked Lighting Control Energy Savings](#)

¹⁷ [DesignLights Consortium \(DLC\) Networked Lighting Controls](#)

¹⁸ [US DOE: Evaluating Trial LED Lighting Systems](#)

¹⁹ [Daylighting in Schools](#)

²⁰ [DC Lighting and Microgrids Whitepaper](#)

²¹ [DC Microgrid Building Energy Management Platform for Improved Energy Efficiency](#)

²² [Microgrid Knowledge White-papers](#)

a Service (EaaS). Various models opportunities for optimizing solutions have been explored in the DOE energy savings performance contract ENABLE²³ program.

Category 4 - Workforce:

Education and training programs are very effective, especially for under-resourced districts or districts in more rural areas where public resources are harder to access. Many programs exist to better educate the workforce on the latest equipment, systems, and software available for advanced building operations. One such program is run by the Lighting Controls Association²⁴. Called Education Express²⁵, it provides free, comprehensive online education on lighting controls technology and application for electricians and installers to better understand and apply the many advanced lighting controls systems components that improve building energy efficiency. Funding should encourage continuing education for the workforce as turnover and upgrades to unfamiliar equipment will require knowledgeable operation and maintenance staff.

More than ever, today's building mechanical, electrical, monitoring, security and safety systems require software and electrical expertise to assess, design, install and maintain. NEMA and its members stand ready to help educate school systems and its employees, who work to maintain safe buildings, providing more energy savings with fewer staff members by implementing electrification and smarter Internet of Things (IoT) applications. Training of the workforce needs to go hand-in-hand with upgrade projects that onboard new building technology so that improvements will perform long-term to support improved energy efficiency and enhanced resilience. NEMA offers a free curriculum for high-school students to learn the basics of safety, electrical knowledge, and mechanical repair that could be used to enhance local skills.²⁶

Awareness and education for the professional design community should accompany education of school staff, contractors, and installers. Often training school staff and contracting installation crews comes first to mind for building efficiency upgrade projects. However, successful projects start with the design professionals and their teams. Creating energy-efficient design guidelines, developed in partnership with trade associations, can provide ready-made project solutions and options best suited for schools.

To evaluate a school's current facility operations and maintenance capacity, the program should set up minimum standards and/or a bypass process by which schools can attach appropriate documentation indicating they have an outsourced or contracted firm for maintenance and operation of facilities.

²³ [DOE ENABLE Program](#)

²⁴ [Lighting Controls Association](#)

²⁵ [Lighting Controls Association Education Express](#)

²⁶ [NEMA Industrial Maintenance Technician Youth Apprenticeship](#)

Category 5 - Leveraging Funds:

Energy as a service (EaaS) is an effective option offered by various energy contractors or ESCOs. However, rural areas have fewer options for contractors, workers, and maintenance professionals. Schools, especially rural LEAs, should look for local partners and utility energy efficiency funding programs. This type of information could also be included as a resource on a DOE landing page.

Schools should be encouraged to use money from this IJJA program and leverage it with funding from the State Energy Programs (SEP). Schools should also confer with state energy offices and officials about their projects to find additional opportunities for leveraged funding or other areas of support

Category 6 - Partnership:

NEMA recommends partnering with contractors and distributors at local, smaller locations, especially in areas that may address the needs for underserved communities or assist in promoting small or minority businesses. Partnerships specifically with ESCOs, manufacturers and others performance based contractors in the energy services and building energy upgrade marketplace, can provide much of the administrative support and guidance needed for school facilities and school boards to approve and carryout school efficiency projects.

Summary

NEMA and its members are active proponents of several focus points: health, safety, energy efficiency, electrification, and resiliency. NEMA is prepared to assist schools and LEAs towards their energy, health, and resiliency improvement goals with electrical products and systems that provide safe and healthy learning environments. Through increased electrification, school systems can lower the carbon footprints and energy bills for their buildings, increase student and staff productivity, and automate all aspects of operations and maintenance. NEMA supports electrification in schools and looks forward to assisting with efforts to reach energy efficiency goals in as many schools as possible.