Summary of Barriers and Opportunities for MAZE Schools

Overview

In May 2019, NEEP conducted interviews with stakeholders and building professionals involved in the design and operations of zero energy/high performance schools in Massachusetts. The interviews were conducted with a diverse group of professionals including architects, engineers, facility managers, and utility program administrators. The goal of the interviews was to identify the barriers to building zero energy (ZE) schools and figure out what opportunities there were for NEEP to help drive the development of more ZE schools in communities around the state. Based on the feedback we received the barriers that exist relate to cost, design feasibility, and general lack of verifiable data and information on existing ZE schools in the state. However, NEEP was able to identify what opportunities there are to help stakeholders become more informed about ZE schools as well as providing assistance in passing legislation and improving programs for ZE schools.

Technical Barriers And Opportunities to Achieve ZE Schools in MA

Key Topical Areas	**Description of Barriers and Opportunities**		**NEEP Priority Level** (low, medium, high)
Workforce	*Barrier*	There is a lack of qualified building operators, facility managers, and building professionals familiar with ZE school technologies and operations. Without a pool of local, qualified professionals, there may be resistance to building ZE schools.	Medium
	Opportunity	Expand workforce training of ZE schools proffesionals to increase pool of local, qualified professional through state legislation or utility program funding.	
Design Feasibility	*Barrier*	Design professionals may consider zero energy to be unattainable in this climate (higher upfront costs, technology, etc.). Space on site may be limited for achieving zero energy measures.	High
	Opportunity	Showcase those schools that are achieving ZE (or near ZE) performance. Catalogue the technologies used, costs, etc. Share via webinar and other dissemination strategies to design teams and communities. Facilitate peer-to-peer exchange for the design community. Hold listening session	

		with group of architects to understand barriers and best-practices.	
Project Costs	*Barrier*	High demand for school projects, limited number of design firms, high material and labor costs all contribute to a schools market in MA with very high total project costs.	High
	Opportunity	Emphasize the life-cycle costs of a ZE building. Compile data on upfront cost of ZE school compared to code-built school – is it significantly more costly? What technologies provide the best value?	
Design Variations	*Barrier*	Communities have varying needs/uses for schools making it difficult for design and construction firms to make a one-size fits all application. Also, high schools usually consume more energy than middle/elementary schools (extended operating hours, more technologies being used).	Low
	Opportunity	Communities (including all relevant stakeholders) and design teams should have regular meetings, starting early in the feasibility/schematic design process, to discuss goals, operational objectives, and building uses.	
Energy Modeling	*Barrier*	Models typically under estimate actual consumption by 10-15 percent (mainly due to plug loads and infiltration).	Low
	Opportunity	Facilitate conversation about addressing the issues associated with energy modelling. Is this problem occurring in other states? Potential targeted webinar or listening session.	
Geographical	*Barrier*	Achieving ZE in an urban setting is more difficult due to buildings with more stories and less roof space	Low
	Opportunity	Emphasize energy efficiency as the priority in urban settings. Drive down energy consumption in order to reduce renewable energy generation needs.	
Geothermal	*Barrier*	Inclusion of geothermal is usually necessary to achieve ZE but leads to higher costs and increases operating complexities.	Medium
	Opportunity	Incorporate best practices for geothermal operations and maintenance in NEEP's O&M Guide. Include data about geothermal in case studies and other materials.	

Climate Adaptability	*Barrier*	Designing systems that account for the wide variability of the Northeast climate can be difficult and expensive.	Medium
	Opportunity	Stress the important of passive systems that improve climate resiliency and passive survivability of the building in the event of extreme weather.	

Educational/Awareness Barriers and Opportunities to Achieve ZE Schools in MA

Key Topical Areas	**Barrier and Opportunity Discussion**		**NEEP Priority Level** *(low, medium, high)*
Advocacy	*Barrier*	Lack of grassroots efforts pushing for ZE schools in MA. Advocacy groups are more focused on curriculum, safety, etc.	Medium
	Opportunity	Partner with organizations such as MCAN, Mother's Out Front, and others to support grassroots efforts for ZE schools. Provide these groups with data, case studies, and talking points for why ZE schools should be the target.	
Incentive and Tax Credits	*Barrier*	Not all projects are taking full advantage of utility programs and tax breaks for high performance/ZE projects.	High
	Opportunity	Continue to promote and raise general awareness of MASS Save Program. Develop toolkit for schools including utility program information and case studies for those that have utilized these programs. Raise awareness of other federal tax credits (e.g. 179D Commercial Buildings Energy Efficiency Tax Deduction).	
Comprehensive Benefits	*Barrier*	Stakeholders and decision makers are primarily focused on lower operating costs and fail to recognize the other co-benefits (health, O&M, educational, resiliency, etc.) that could help move projects forward.	High
	Opportunity	Develop and disseminate fact sheets and presentations highlighting the comprehensive benefits of ZE schools. Equip energy champions with this information to share	

		with decision makers. Create a toolkit that helps stakeholders and decision makers understand what information they should be aware of when they are submitting a RFP to build a ZE school.	
Lifecycle Costs	*Barrier*	Decision makers are fixated on the upfront costs associated with high performance/ZE projects rather than overall cost of a project over the lifespan of the building.	High
	Opportunity	Change the mindsets of decision makers by collecting and providing exemplary data on the lifecycle costs of high performance/ZE projects. Educate stakeholders about the need to look at lifecycle costs rather than the upfront costs.	

Policy/Programmatic/Systemic Barriers and Opportunities to Achieve ZE Schools in MA

Key Topical Areas	**Barrier and Opportunity Discussion**		**NEEP Priority Level** *(low, medium, high)*
Priority Setting	*Barrier*	Energy efficiency and especially ZE are lower level priorities for MSBA and the greater schools community. The primary focus of these stakeholders is on issues related to safety, overcrowding, curriculum, etc.	Low
	Opportunity	Partner with Project Green Schools, NEED, and others to showcase how ZE features can be integrated into the curriculum. Highlight how NE-CHPS provides a pathway to ZE and provides comprehensive benefits such as safety, curriculum integration, etc.	
Achieving Goals	*Barrier*	Many communities are establishing energy and carbon reduction goals, but these are mostly aspirational and lack enforcement or actionable steps.	Medium
	Opportunity	Work with partners and communities to develop plans with actionable roadmaps to achieve goals. Share early success stories with communities.	

Utility Programs	*Barrier*	Communities are not required to work with their local utility and their program offerings may not always support school project needs.	Medium
	Opportunity	Require schools that are receiving state funding to work with their utility to receive incentives and technical assistance on projects. Work with the utilities to expand and align offerings with MSBA's programs including the accelerated repair program.	
Post-Occupancy	*Barrier*	Once a school is opened, there is no way to assess if the buildings are operating as they were designed.	High
	Opportunity	Work with MSBA to require post-occupancy benchmarking for schools to benchmark their energy usage after opening.	
Commissioning	*Barrier*	The level and quality of commissioning performed on schools varies widely amongst those on MSBA's Pre-Qualified List of Commissioning Agents. Also, there is a lack of building envelope commissioning taking place.	Medium
	Opportunity	MSBA needs to update the list of commissioning agents and perform quality assurance so these facilities are operating as designed. Building envelope commissioning should also be a priority for MSBA as many of the efficiency gains can be attributed to a tight thermal envelope. Expand utility programs to allow for retro-commissioning in schools.	

Human Barriers and Opportunities to Achieve ZE Schools in MA

Key Topical Areas	**Barrier and Opportunity Discussion**		**NEEP Priority Level** *(low, medium, high)*
Project Close-Out/Handoff	*Barrier*	Building owners/operators may lack the training required to operate modern buildings with sophisticated technologies. This issue, in large part, stems from the inadequate handoff of the building from the design/constriction team to the owner/operator.	High

	Opportunity	Work with the Massachusetts Facilities Administrators Association to disseminate training and credentialing opportunities to members. Provide a best practice guidance document or checklist to ensure a smooth transition. Work with MSBA to ensure this component is a core part of their programs.	
Goal Setting and Communication	*Barrier*	Decision makers and champions are uncertain regarding what goals they should be establishing. Target EUIs, ZE, High Performance are a few examples of common goals – but there is wide variation across the state. Also, there is an overall lack of communication about energy goals between design teams and communities.	High
	Opportunity	Provide specific and measureable goals for communities to use in RFPs or communications with design teams. Supply districts with questions to ask design teams to ensure the community's goals are being met.	