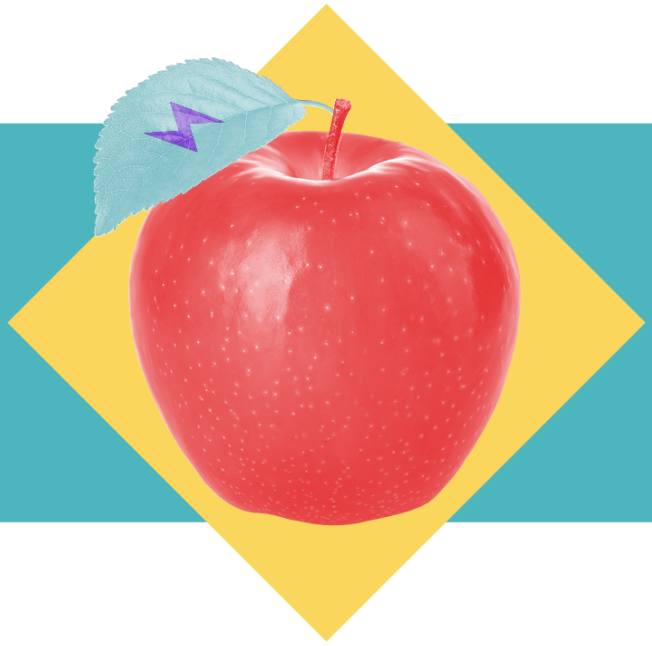


Electrify Everything in Your School Handbook:

From Campaign to Implementation

Version 1.1, November 2022

Table of Contents

Overview

Want to help #ElectrifyEverything in your school? That's great!
There are three main phases:

CAMPAIGN
Your push to change district policy!

PLAN & ASSESS
The district plans what to change based on what's there now.

IMPLEMENT
The work gets done!

To help your district move towards this goal, we've created a package of resources.

→**Campaign support:** To help you start or support a campaign, we've created a separate video and companion PDF. They're meant as an initial "how-to" run a campaign, which can also help you recruit others to join the campaign, or just lend their support. The main audience is students and supportive adults — including any adults interested in recruiting students!

→**Handbook:** The main focus of this handbook you're now reading is on the plan & assess and implement phases (though there's also more info in here about campaigns). We've tried to explain some big ideas, and link to other useful documents. It's written for people on the decision-making and implementation side (e.g. school board members, sustainability and energy management staff, school administration, members of a sustainability committee). But it is also useful to read through if you're on a campaign and

want to help overcome hurdles to why your district can't get this done. Be sure to share it with anyone who might find it useful — send them this link:

- https://content.rewiringamerica.org/reports/rewiringschools-handbook.pdf

→**Education:** We've created "#ElectrifyEverything: A Very Short Course," which is a series of videos that can be used to both teach and learn about some of the technical reasons for going all-electric. They're meant for teachers to show to students, but hopefully they're interesting to anyone curious about some of the STEM aspects of electrifying.

→**Updates:** We'll put news, updates, and other relevant info on our Rewiring Schools website, http://rewiringamerica.org/schools, and through Twitter, @rewiringamerica.

If you have any feedback or questions, or if you just want to let us know how it's going, feel free to reach out — schools@rewiringamerica.org.

Why electrify?

There are lots of great reasons to #ElectrifyEverything in your school. For example, this is a great opportunity to modernize schools to make them comfier, healthier places to learn by upgrading the heating, ventilation, and air conditioning (HVAC). And if you remove diesel fuel from school buses, and stop burning natural gas burning in the school's boilers and kitchens, you'll also be eliminating a lot of air pollution kids are exposed to.

But #ElectrifyEverything is also a key solution for fighting climate change! We can stop burning fossil fuels once everything is electric, powered with clean, renewable electricity like wind and solar. And even if your grid is still mostly fossil-powered, the emissions will still be lower today since modern electric machines are so much more efficient. Plus, those emissions will head towards zero emissions as the grid gets cleaner. For schools, we must:

- #ElectrifyEverything in buildings (heating, kitchen, etc.)
- Switch to electric buses
- Put solar on school sites (if there's room and infrastructure available).[1]

Modernize & Decarbonize

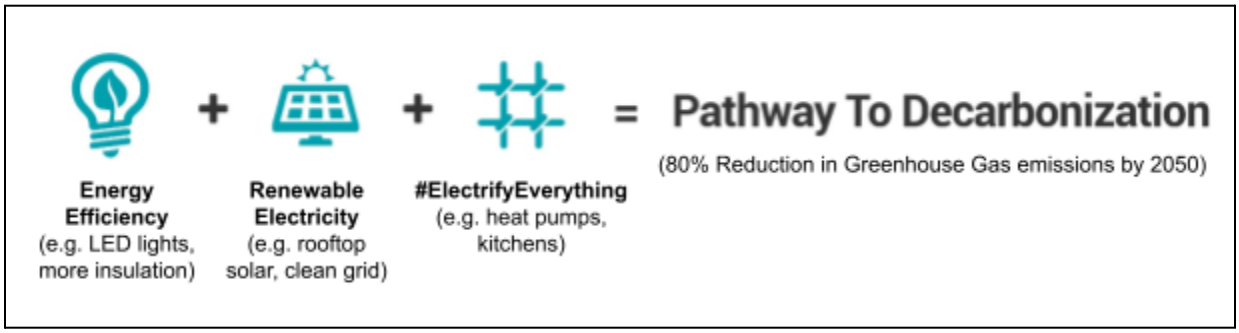
A 2020 Congressional report by the U.S. Government Accountability Office[2] found that out of 100,000 public schools, updates or replacements are needed for:

- *HVAC (Heating, Ventilation, and Air Conditioning)*: 36,000 schools
- *Interior lighting*: 30,000 schools
- *Roof*: 28,000 schools

Each of these improvements is an opportunity to invest in both modernization and energy efficiency. Replacing fossil fuel furnaces and boilers with electric heat pumps can improve thermal comfort and air quality, while using much less energy (even in very cold climates

[1] This framing comes from Will Vincent. "School Building Science Friday: Zero Energy, Zero Carbon & Electrification: Possible and Happening!"
[2] U.S. Government Accountability Office, *K-12 Education: School Districts Frequently Identified Multiple Building Systems Needing Updates or Replacement* (2020)

that drop below freezing). Efficient LED lighting can quickly pay for itself in cost savings (and using natural daylighting can save even more). And a roof replacement, paired with additional insulation and covered with solar panels, will help lower utility bills and make the roof last longer. To put it another way, *modernizing is the Pathway to Decarbonization.*[3]



Schools are a good target

Electricity is also a more stable energy supply — in terms of have a fairly stable and predictable cost[4] (unlike fossil fuels), and because it can be supplied locally by renewable sources like solar and wind. Here are some factors that make schools a good target:

- districts and towns often own their buildings and pay their own utility bills, so long-term paybacks from energy savings can make good financial sense;
- they have low energy demand since they're used less at night and in summers;
- they can be used as a living laboratory for teaching students about energy use;
- many school buildings are used as community resiliency centers during disasters.[5]

It's about more than money

COVID helped show us that something as simple as ventilation can have a major impact on whether a school can even stay open. But it's much deeper than that. A recent Harvard report looked at over 200 research studies and concluded that better school buildings improve student health, thinking and performance — which is the whole mission of school![6] If students are feeling well, they can be thinking well and performing well.[7]

---

[3] Graphic adapted from NEEP's "Strategic Electrification"
[4] Rewiring America Circuit Breaker, "Exporting oil and gas does not create energy independence, electrification does." (2022)
[5] Kendeda Regenerative Roadmap Net Zero Schools
[6] Harvard T.H. Chan School of Public Health, *Foundations for Student Success: How School Buildings Influence Student Health, Thinking and Performance* (2021)
[7] "Greening America's Schools | U.S. Climate Action Center at COP26" webinar (2021)

And while climate change might still be controversial among adults in your community, it is causing "eco-anxiety" (aka climate anxiety) in younger people. A 2021 survey of 10,000 young people (ages 16-25) from 10 countries found that:

- 75% believe "the future is frightening";
- 58% believe governments are "betraying me and/or future generations";
- 64% think their governments are not doing enough to avoid a climate catastrophe.[8]

But this anxiety can be helped by "having one's feelings and views heard, validated, respected, and acted upon, particularly by those in positions of power and upon whom we are dependent, accompanied by collective pro-environmental actions."[9] This is a generational justice issue that affects all students, and cuts across traditional school inequality issues between districts (which we also need to fix).

"What's our plan?"

You don't need to #ElectrifyEverything in your school immediately, but your community does need to ask itself: "What's our plan for modernizing our schools to make them healthier and comfier, while also decarbonizing them to protect the students' future?"

A great way to bring this up is through a school board campaign pushing for a resolution to *MAKE THAT PLAN*! And the campaign can be started by anyone in the community, from students to superintendents — it could even be *YOU*!

It might take up to a year for your resolution to pass, and another year for the district to create and adopt the plan, and then another bunch of years to actually implement the upgrades. This handbook is meant to help you understand more about what's involved, and help overcome hurdles to moving forward.

Thanks for taking action to #ElectrifyEverything!

[8] "Government inaction on climate change linked to psychological distress in young people - new study" (2022)
[9] "Climate anxiety in children and young people and their beliefs about government responses to climate change: a global survey" (2021)

What to electrify

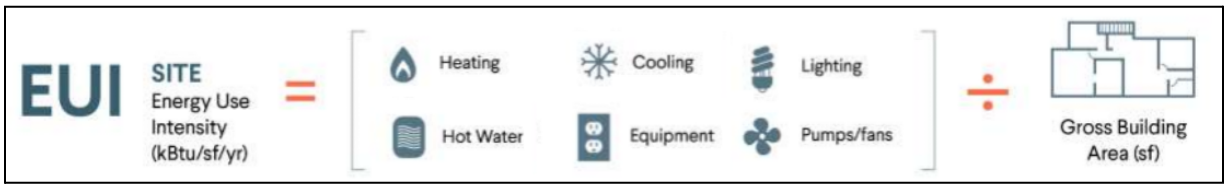
To #ElectrifyEverything in your school you have to: make the buildings all-electric (heating, kitchen, etc.), switch to electric buses, and put solar on school sites (if possible). A focus in this handbook is on the buildings, though there are sections on Electric School Buses and Solar Panels below under "How to pay for it."

Building EUI

To help understand how much energy your school building uses now, an important concept is EUI, which stands for Energy Use Intensity (and sometimes Energy Use Index). It's like a score for how well a building uses energy — similar to miles-per-gallon (MPG) for cars.[10]

The graphic below[11] visually shows how to calculate a building's "site" EUI: Add up all the energy used on-"site" in the building in a year (found on your utility bills), then divide it by the building's floor area. This gives you the average energy used in one square foot of the building in a year (with units kBtu/SF/yr). The lower the building's EUI, the less energy it uses.[12]

Within the list of energy uses, your school needs to electrify all space heating, hot water heating, and kitchen equipment that burns fossil fuels. The other things are already electric (cooling, lighting, equipment, pumps/fans), but when they stop working they can often be replaced with more efficient versions.



[10] For MPG, more efficient cars have higher MPG, while more efficient buildings have lower EUI.

[11] Graphic adapted from "Getting the $ and People On-board for a Zero Energy School"

[12] **NOTE**: There's also the "source" EUI, which is always higher by some fixed multiple that includes the wasted energy from generating electricity in fossil-fueled power plants. In general, if the EUI seems very high, double-check if it's the site or the source EUI. For more background, see video, "Essential Techniques and Calculations for Energy Managers and Cx Authorities"

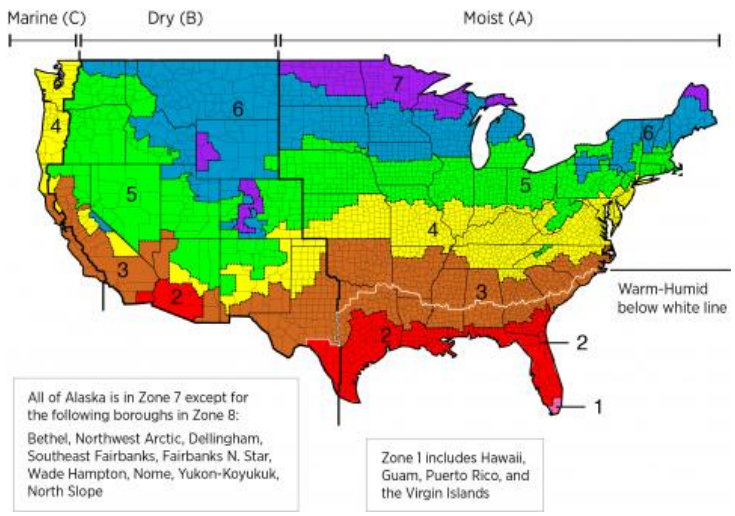
Target EUI

The nice thing about using EUI as a building score is that it provides a concrete, measurable target to aim for. In fact, including specific EUI targets in your project requirements and RFPs, and then hiring the architecture and engineering firms who can meet those targets, is one of the most effective things you can do!

One group, New Buildings Institute (NBI), says that an EUI of 25 is a good goal for new construction schools, and for major modernizations or deep energy retrofits of existing schools an EUI of 30 is a good goal.[13] Note that the median EUI for K-12 U.S. schools in 2021 was 48.5.[14]

These EUI targets can be used in all climate zones, even though hotter and colder places use more energy to stay comfy. Below is a map of US climate zones, along with the target EUIs for new construction primary school buildings in each zone (secondary school EUIs are similar). These are taken from ASHRAE's Advanced Energy Design Guide (aka AEDG, free download with registration, and well worth getting). These targets could also be specified for retrofits, though they might be harder to reach. In that case, consider using NBI's suggested upper limit of 30 for retrofits.[15]

[13] "Greening America's Schools | U.S. Climate Action Center at COP26" webinar (2021)
[14] "What is Energy Use Intensity (EUI)?" and "U.S. Energy Use Intensity by Property Type" (2021)
[15] Peter Turnbull, personal communication, https://www.turnbullenergy.com/

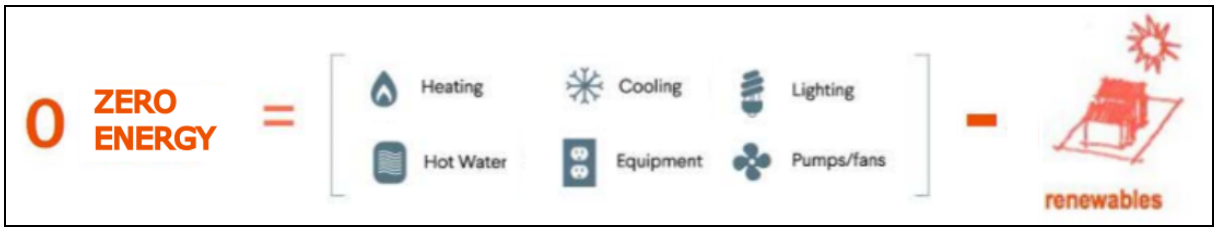


Climate Zone	Representative City	Primary School Site EUI
8	Fairbanks, AL	25.2
7	Duluth, MN	22.3
6B	Helena, MT	19.5
6A	Burlington, VT	21.1
5B	Boise, ID	18.7
5A	Chicago, IL	19.2
4C	Salem, OR	17.5
4B	Albuquerque, NM	18.4
4A	Baltimore, MD	18.8
3C	San Francisco, CA	17.5
3B	El Paso, TX	19.0
3A	Memphis, TN	18.8
2B	Phoenix, AZ	19.6
2A	Houston, TX	20.9
1A	Miami, FL	21.3

Zero Energy and other terms

A "Zero Energy" building is one that produces as much energy from clean, renewable on-site resources (such as solar) as it consumes in a year. They have been built in most climate zones, from hot to cold.[16] The graphic below illustrates the idea that Zero Energy = Energy Use – Renewables.[17]

[16] "A Technical Deep Dive into ZNE School Retrofits" (2017)
[17] Graphic adapted from "Zero Carbon Schools: Bringing Change to SFUSD" (2018)



Other closely related terms are:[18]

- *Zero Energy Ready*: Low EUI & waiting to add on-site solar
- *Zero Net Energy*: Buying off-site renewable energy to cover any not produced on-site
- *Ultra-low Energy*: Not aiming to add solar, but shooting for very low EUI.
- *High Performance*: Verified to meet an independent standard such as LEED or CHPS.[19]

It's important to note that Zero Energy doesn't mean "all-electric," but just that the amount of fossil fuel energy being burned in a building is offset by an equivalent amount of renewable energy. For that reason, Zero Energy doesn't automatically mean Zero Carbon.

We bring these terms up so you're aware of them, since they're often used to talk about efficient school buildings. And we recommend advocating for installing solar on school sites if possible, especially with new tax credits in the Inflation Reduction Act. But in the end, we think the primary goal needs to be to #ElectrifyEverything, since that's the only path that enables full decarbonization when powered by renewable electricity — whether on-site or from the grid. As your district sets renewable goals, work with the utility to figure out how to get to 100% renewable electricity if they don't already provide it.

#ElectrifyEverything over time

It also makes sense to make electric upgrades when fossil fueled equipment needs replacing, or other upgrades are being made. One of the lessons learned in California's Zero Net Energy school retrofit program (final report, webinar) is that retrofits have a "right order," where improvements make a better school, and also reduce energy use:

1. Consider comfort & health first (thermal, acoustic, comfort, daylight, views, etc.).
2. Align with other retrofits such as a new roof, gut renovation, or portable classroom plans, and push those known retrofits to be more energy efficient.

[18] *A Common Definition for Zero Energy Buildings* (2015)
[19] More on LEED and CHPS

3. After that, reduce the HVAC's energy needs by improving the building envelope (e.g. sealing/caulking, insulating, shading, windows), and reduce the electricity needs (e.g. better LEDs and daylighting).
4. Then optimize mechanical *design*, followed by optimized mechanical *equipment*.
5. Finally, consider solar and/or other renewables.

The important thing is for the district to *MAKE A PLAN* to #ElectrifyEverything in the coming years. Sooner is better, since students will get a better school sooner (and decarbonization will happen sooner). But it's fine to switch everything out over time, as other retrofits and replacements are planned.

Five Foundations of Building Decarbonization

So now let's discuss what actually needs to be done to the school. The table below catalogs potential improvements to modernize and decarbonize school buildings.[20] The three columns on the left make up the Pathway to Decarbonization described earlier: Energy Efficiency + Renewable Electricity + #ElectrifyEverything..

Don't get overwhelmed! Not every school needs every item, and again it can all be done over time. But it lays out the options nicely. See the Appendix to this guide for further links that can help with some of the items below.

Note that for Grid Harmonization, electric school buses might provide battery storage and help with load management — both on-site and back to the grid as needed. Also, talk to your design team about ways to reduce any Embodied Carbon, especially by using refrigerants with lower Global Warming Potential (GWP).

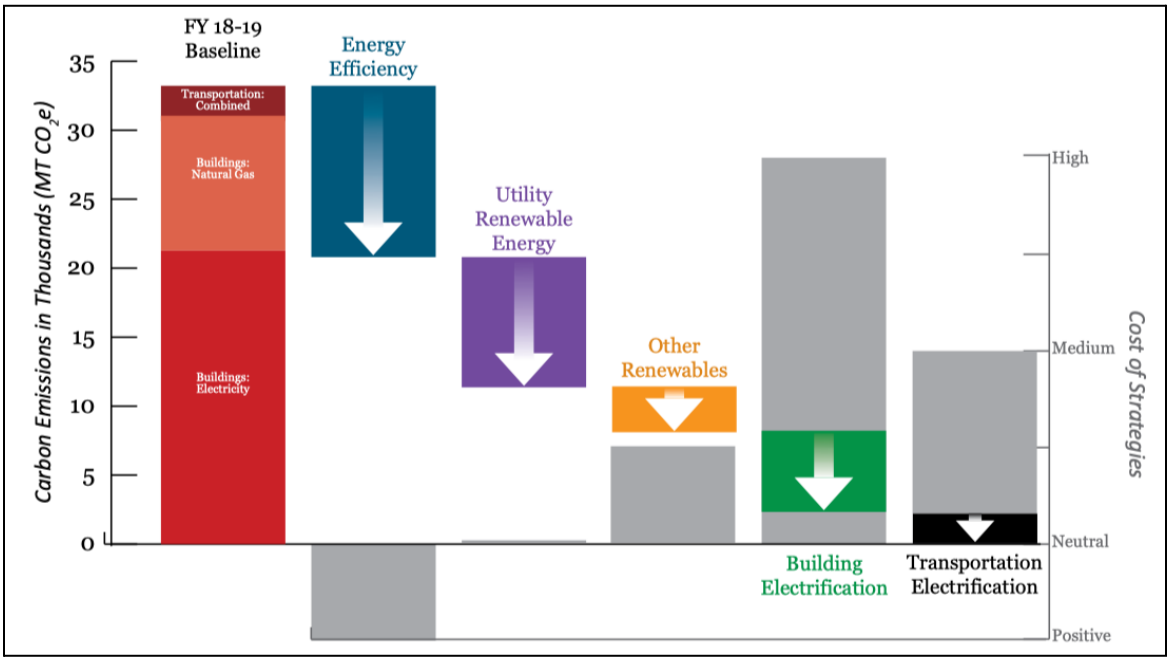
[20] "Greening America's Schools | U.S. Climate Action Center at COP26" webinar (2021)

Energy Efficiency	Renewable Electricity	#Electrify Everything	Grid Harmonization	Embodied Carbon
LED lighting	Rooftop solar	HVAC & boiler replacement with heat pumps	Battery storage	Concrete
Daylighting	On-campus solar (e.g. parking lots)	Kitchen loads	Grid integration	Steel
Controls	Purchased credits or tariff from utility	Fleet (e.g. bus) electric vehicles and charging	Load management	Refrigerants
Envelope				Other materials
Equipment and plug load management				

⇨ Case Study: Salt Lake City Public Schools:

Students from multiple SLC high schools got the school board to pass a sustainability resolution in 2020. In 2021 the district hired a company to produce their *2040 Sustainability Action Plan*. It's a great plan well worth reading and adapting. The chart below shows their Pathway to Decarbonization in terms of how much carbon they'll save (color bars), and how much each step costs (gray bars). From their Baseline Year, their targets by year are:

- **2025** Energy Efficiency (25% reduction in energy and water use), SAVES MONEY
- **2030** 100% renewable electricity from:
  - Utility Renewable Energy, NEUTRAL COST
  - Other Renewables (like on-site solar), LOW COST
- **2040** Building Electrification (starting with two pilot schools), HIGH COST
- **2040** Transporation Electrification, MEDIUM COST



You can watch the school board presentations about the Sustainability Plan, including:

- the initial update (9/1/2020, 10 min)
- presentation of the plan itself (9/21/2021, 32 min)
- unanimous adoption of the plan (10/5/2021, 13 min)
- start of implementation (2/1/2022, 18 min), where they fund Phase One with almost $30M (here's the approved proposal)

Check out their sustainability page for more resources.

→ **EQUIPMENT SUGGESTIONS**

The Department of Energy has created very useful "Low Carbon Technology Strategies" charts outlining simple, intermediate, and advanced options for many of these items. Here's a webinar about these charts, and the charts themselves for:

- Primary schools
- Secondary schools
- Commercial kitchens (including schools)

Technology		Simple	Intermediate	Advanced
Lighting	Interior Lighting	• Install Type B tubular TLEDs that meet DesignLights Consortium (DLC) technical requirements • Reduce overlit spaces • Install occupancy sensors or vacancy sensors	• Install dimmable LED retrofit kit or replace with LED fixture that meets DLC technical requirements • Install daylighting controls and occupancy / vacancy sensors • Integrate with building automation system (BAS) if possible	• Install retrofit kit or new luminaire with luminaire level lighting controls • Include integrated daylight and occupancy sensor networked lighting controls that meet DLC requirements, load shed via Auto-DR interface, and integrate with BAS
	Exterior and Parking Lot Lighting	• Install LED screw base replacement for HID lamps that meets DLC requirements • Install photocell to control lighting	• Replace with area luminaires that meet DLC requirements • Install time clock and reduce lighting at night	• Redesign using the Better Buildings Parking Lot specification and include video-based occupancy sensors

The Department of Energy has also produced a series of documents, Retrofit Packages for Schools (click the RETROFIT PACKAGES tab). These cover the upgrade of a school's boiler, chiller, rooftop unit (RTU), and building management system. Each document includes performance recommendations and some rough payback periods for that equipment in different climates. A webinar (1 hour) provides an overview of the documents, and some case studies — including Salt Lake City, starting at 49:20.

Here are two useful resources from UMass Amherst: Energy Efficiency Checklist for Municipal Buildings, and Selection of Clean Heating & Cooling Equipment.

This list of ASHRAE's Energy Efficiency Measures to Consider is pretty comprehensive, and many of these measures are explained further in the *AEDG* (free with registration), and the *Green Schools Investment guide* (2013).

→ **SOME TIPS**

1. The biggest roadblock isn't technology or cost — it's a lack of familiarity among school officials, and the fact that few architects and engineers have done this.
2. Benchmark the current energy use of a building to get a better sense of how much the energy use can be reduced.
3. Electrifying doesn't require renewable energy like solar panels to be installed at the same time, but some measures might be more cost-effective if they're included.
4. An integrated design team must be engaged from the start of the design process, including (if possible) a mechanical engineer or architect with experience with highly efficient buildings.
5. Engage operations and maintenance personnel in a meaningful way during your integrated planning, since how the building operates is just as important as the design and construction.
6. Incorporate sustainability into the school's curriculum and culture — the occupants are key participants in making the building a success.

Adapted from the Kendeda Regenerative Net Zero Schools Roadmap

Campaign

Rewiring America put together this video and companion document to support student-led school board campaigns. This section provides some more detail.

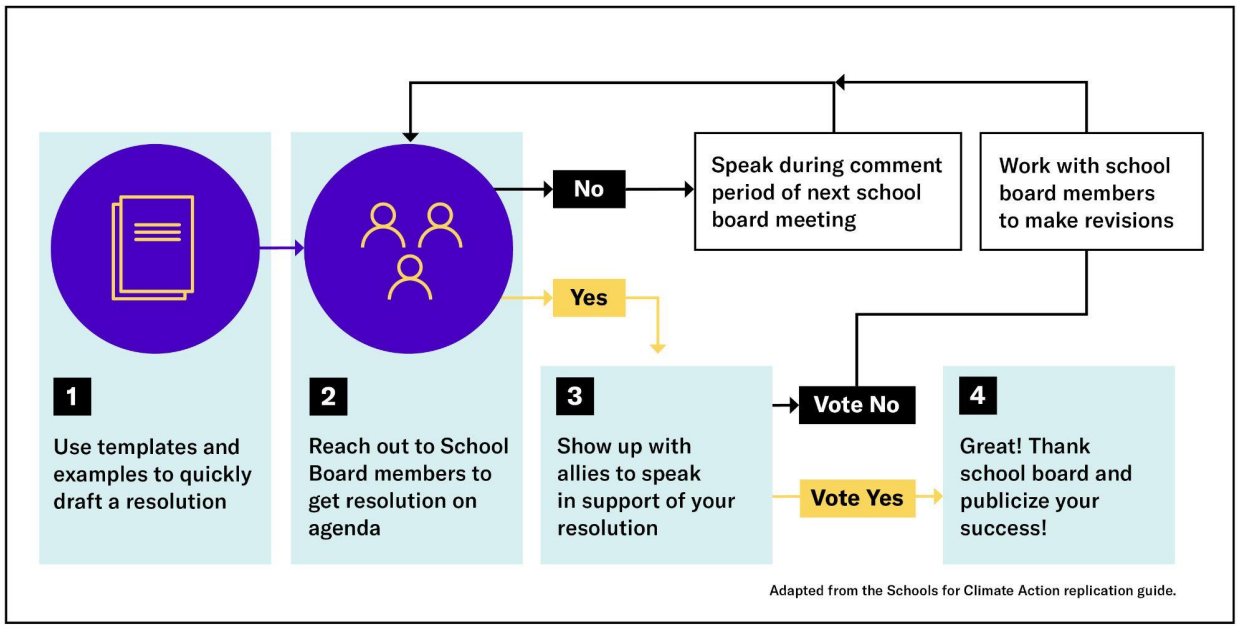
It's important that any campaign be customized for your community, since not every community cares about climate change (yet). But there are many good reasons to #ElectrifyEverything in your school (see "Why electrify?" section above). Use these two resources to find additional arguments:

- *Key Messages for Communicating About Carbon Neutral Schools* (2022)
- *Zero Energy Schools Stakeholder Engagement and Messaging* (2017)

Passing a resolution

Schools for Climate Action is a group that has been working with students to pass school board and student council resolutions for the past several years. They offer free support to all who ask — just email empower@schoolsforclimateaction.org. As part of their first place win in the 2022 American Climate Leadership Awards,[21] SCA wrote up their straightforward, well-tested playbook for passing a school board resolution. Here's their full "replication guide," and here's a visual summary:

[21] "Congratulations 2022 American Climate Leadership Awards Winners" and an interview with Nancy Metzger-Carter, one of SCA's founders



What to ask for in a resolution

Don't do months of background research before contacting school board members to request a meeting. Here are two templates you can use to put a draft together quickly. Listed for each template are its main requests, followed by example resolutions that have been passed by other districts.

→ New Buildings Institute's Carbon Neutral Schools Resolution Template

- Identify a champion of energy efficiency.
- Set specific energy use goals, and converting to all-electric buildings
- Develop and adopt guidance documents with deadlines (see SLC's 2040 Action Plan)
- Publicly report annual progress
- Examples

→ Schools for Climate Action's Model School Board Climate Action Resolution

- Declare climate change a generational justice and equity issue
- Establish a Climate Crisis Committee to develop recommendations for taking action.
- Call on Congress and State Legislature to protect the future
- Examples

Addressing stakeholders

A key part of your campaign is connecting with key stakeholders. Schools for Climate Action has an email template for reaching out to school board members. Make sure to edit it to reflect your messaging before sending!

You should also reach out to relevant stakeholders for support. The chart below is adapted from the Sierra Club.[22] Use this chart to identify the names of key people in each role, and identify key allies for your campaign — including the school board members themselves. DPS Students for Climate Action also has email templates for various groups. They took a few minutes during each of their weekly meetings to send emails (see the case study below for their toolkit with this and other great tips).

<table>
<tr><td colspan="2">PRIMARY TARGETS: DECISION MAKERS
• School board members
• Superintendent & Assistant Superintendent
• Principals (for independent school efforts)</td></tr>
<tr><td colspan="2">SECONDARY TARGETS: INFLUENCERS</td></tr>
<tr><td>TOP PRIORITY
• Facilities director
• Sustainability director & energy manager
• Finance staff / Capital Projects & Planning
• Principals (for school district efforts)</td><td>OTHERS
• Building occupants
• Student groups
• Teachers and other staff
• PTA, parents, parent organizations
• Local government</td></tr>
<tr><td colspan="2">TERTIARY TARGETS: ADDITIONAL STAKEHOLDERS</td></tr>
<tr><td>• Community energy, environmental and environmental justice organizations
• Community organizations
• Media</td><td>• Clean energy businesses and investors
• Utilities
• Other local constituents (e.g. labor unions, faith groups, service organizations)</td></tr>
</table>

[22] From the Sierra Club's *100% Clean Energy School District Organizing Toolkit*

⇨ Case Study: DPS Students for Climate Action

Students from multiple Denver public high schools formed this group in early 2020, and got a policy passed the next year. They've created a ***FANTASTIC*** toolkit with their advice, which includes links to all of their school board appearances. There's also an interesting presentation from DPS's Director of Sustainability and two students from the campaign team, which you can watch free with registration. And this presentation by other students has additional details about their campaign.

Reaching families too

If parents and other caregivers want to get involved in school board advocacy, this K12 Parent Climate Advocacy Toolkit from This Is Planet Ed, National PTA, and Mothers Out Front, has useful suggestions for strategies and messaging. We'd recommend recruiting students to lead the campaign instead of parents leading it — try reaching out to a student sustainability club, or talking to teachers you know about engaging their students in a campaign. But it would be useful for parents to organize the PTA in support of a student campaign, and this toolkit has suggestions for that.

Separately, families can start planning how to switch to electric appliances at home — even as renters! The Inflation Reduction Act includes a lot of money for home electrification, including **FREE**, **HALF-OFF**, and **30% OFF** discounts and rebates on many machines. Combining a campaign to #ElectrifyEverything in your school with a campaign to teach the community how to access their free money for personal electrification would be powerful, especially if the community started sharing ideas about contractors they like and equipment they're happy with. Two resources from Rewiring America that can help start the conversation:

- *Electrify Everything in Your Home*, for both homeowners and renters to learn how to make a plan
- *Go Electric! Guide to the IRA*, with case studies for different income levels

⇨ GOING DEEPER: Other campaign references

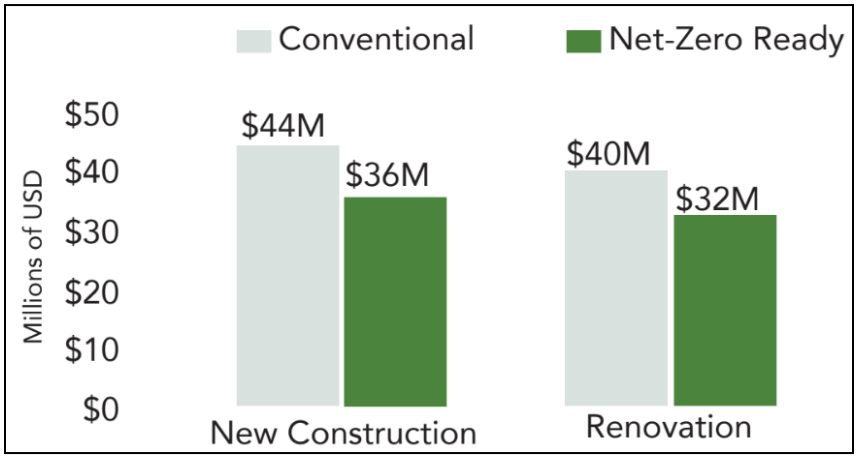
There are other groups besides Schools for Climate Action who have put together resources for student-led campaigns.

- Sierra Club, “100% Clean Energy School Districts”L
  - Campaign Organizing Toolkit includes planning docs, checklists, and templates.
  - Handbook includes useful background to assist in your campaign.
- Generation180, “Solar Schools Campaign Toolkit”: Similar to Sierra Club’s, but more school-focused than district-focused.
- Climate Generation, “Climate Commitments: School Board Resolution Toolkit” (free to “buy” by adding to cart and checking out): Focused more on getting a resolution to teach about climate change, but a good summary of the process.

How to pay for it

Paying for energy upgrades is perhaps the #1 concern of schools and the communities that fund the schools. It's important to note that there is a lot of money available from the Federal Government to help pay for upgrades to HVAC (from COVID relief funds), switch to electric buses (from the Bipartisan Infrastructure Law), and buy solar (from the Inflation Reduction Act). See the Federal Funds section below for more details.

The good news is that for both new and renovated buildings, the utility bills and maintenance costs can be significantly lower for all-electric school buildings than fossil-fueled ones over a 30-year life. This can add up to savings of hundreds of thousands of dollars a year, as shown in this chart.[23] And for new construction, there is basically no cost premium if low energy targets are specified as part of the project requirements.[24]



Costs of Delay

One way to look at energy upgrade projects is that by reducing the energy needs, it's like plugging an "operating cash leak," where you continually pay the utility bill for energy use you could have avoided. You're paying for these projects whether you do them or not!

[23] *The Financial Case for Net Zero Schools* (2021)
[24] *Affordable Zero Energy K-12 Schools: The Cost Barrier Illusion* (2021)

There is also the climate cost of continuing to burn fossil fuels — especially if old machines are replaced with new fossil-fuel burning ones, locking in decades more emissions.

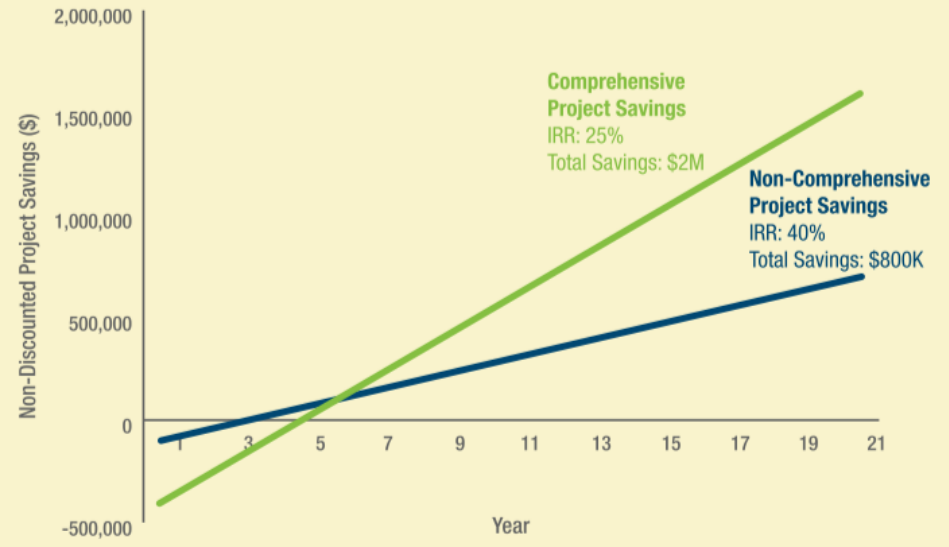
To help make the financial case for energy upgrades, these two documents can be useful:

- *Did Your Energy Efficiency Project Get Lost in Translation? Financial Speak for Facility Managers* (2020)
- *Getting to "Yes" for Energy Efficiency: A Guide to Developing a Persuasive Business Case for Energy Efficiency in Commercial and Corporate Properties* (2013)

Principles of Financing

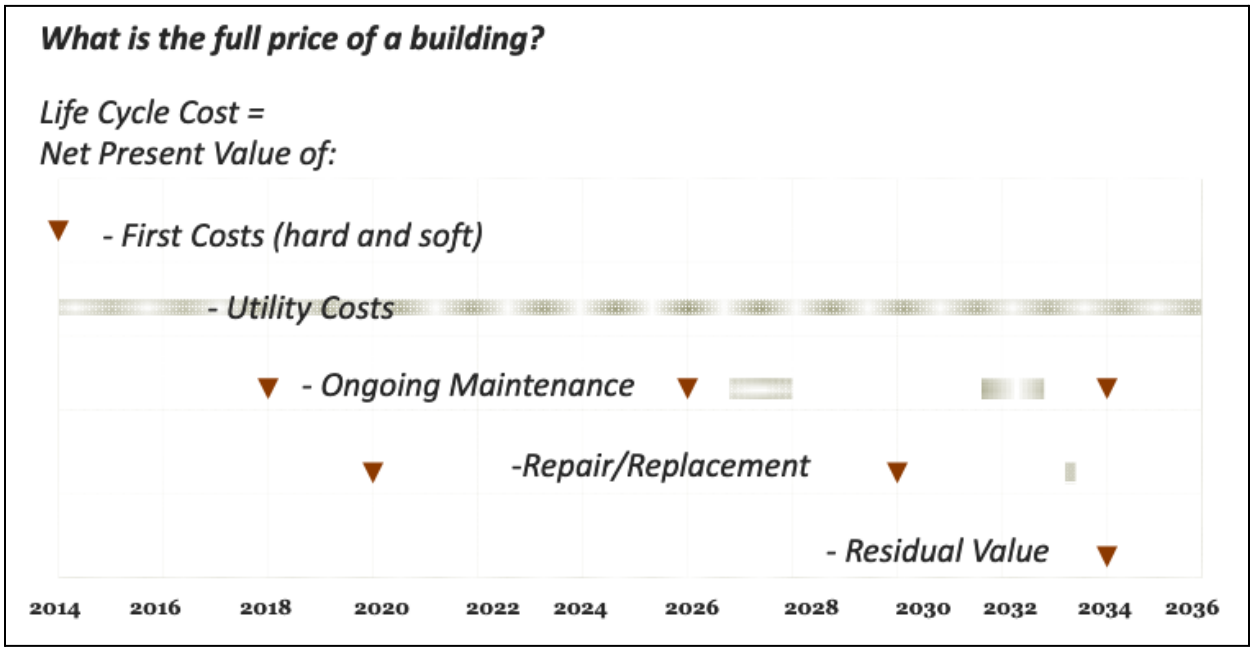
In the Department of Energy's *Guide to Financing EnergySmart Schools* (2008), they list six principles of financing for school energy upgrades. We'll visualize two of them here:

→ **"Avoid cream skimming":** Consider comprehensive upgrades that might cost more upfront but pay back more over time (green line), instead of just "cream skimming" non-comprehensive projects that pay back quicker but with less savings (blue line).



→ **"Focus on Life-Cycle Cost Analysis":** In the graphic below, beyond the upfront "first costs" (which includes the hard costs of equipment, and the soft costs of installation

labor), there's also the ongoing utility costs (dashed line), as well as maintenance & repair costs (triangles), and any final residual value of the equipment at end-of-life.[25]



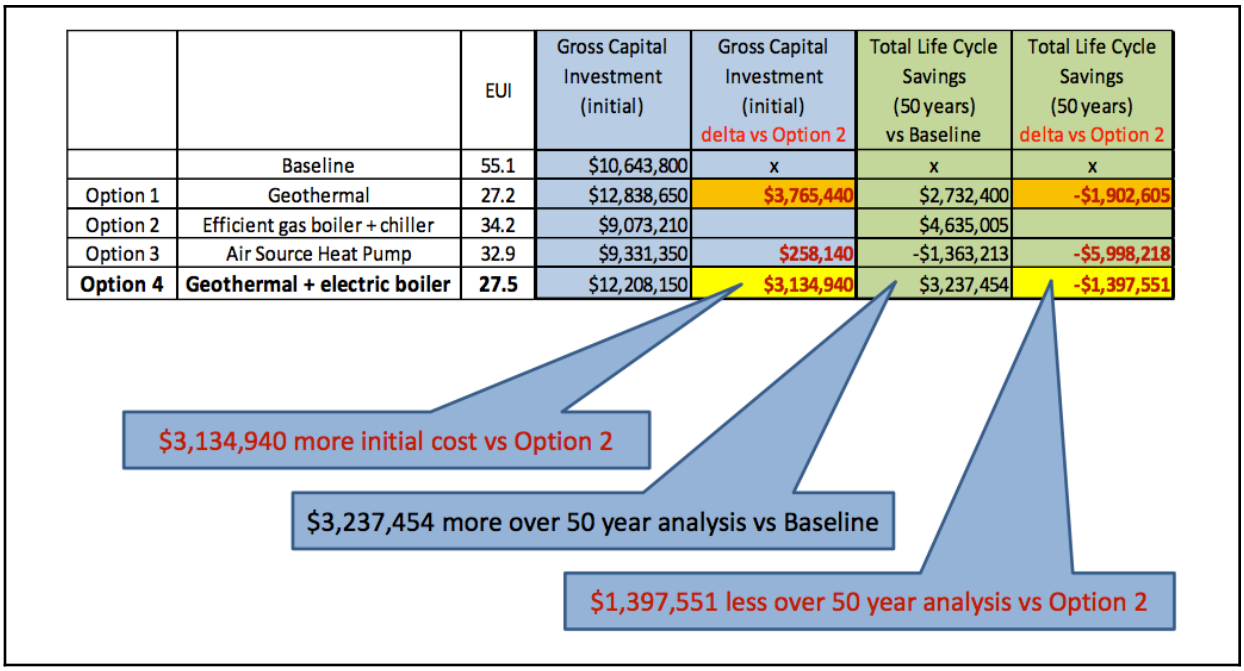
⇨ Case Study: Acton-Boxborough, MA

When one of Acton-Boxborough's elementary schools needed a new HVAC system, the engineers gave the district four options that would yield different EUIs, initial costs, and total life-cycle savings (see annotated table below).

Getting an "efficient" fossil gas boiler + chiller would have potentially saved the most money (assuming stable fossil gas prices). Instead, they went with a geothermal heat pump with electric boiler backup for extra-cold days (maybe 1 in 100). The benefit of a lower EUI (27.5 vs 34.2), and of switching to electric from gas, are wins for their students' future. You can watch the recording, and view the slides.

The town of Acton and the Acton-Boxborough school district have since commissioned an Electrification Roadmap to retrofit municipal and school buildings — you can watch a talk about it (1 hour).

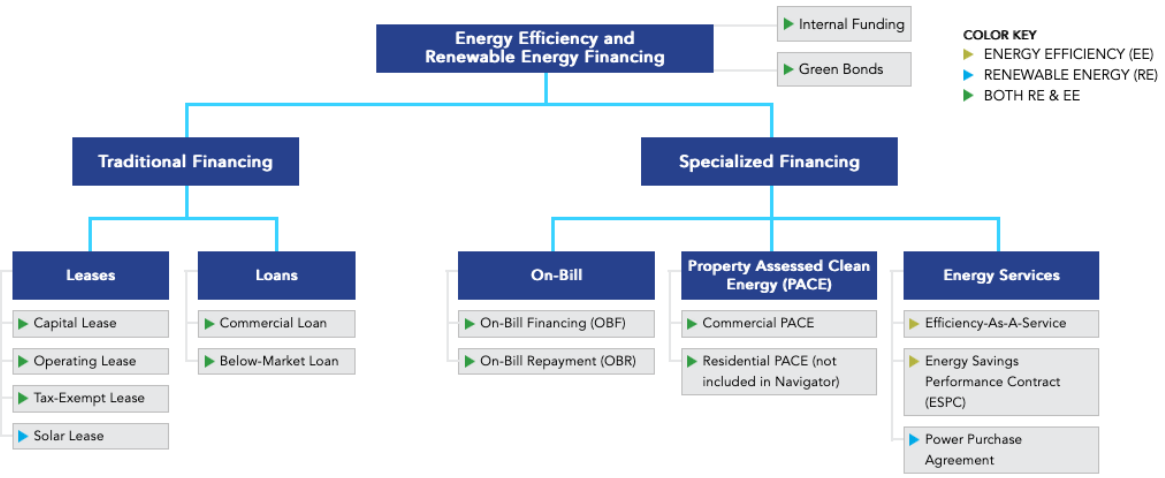
[25] Graphic from "Getting to Zero: Design, Operations and Occupancy" (2016)



Financing Options

Funding is different from district to district, county to county, and state to state. Below are a number of options to consider, though the particular mix will be heavily dependent on your local situation. To get an overview of these approaches, watch the webinar *Financing Energy Efficiency Projects: What to Know Before You Sign*, and check out this "Financing Landscape" (as shown in image below). After a summary of each option below, the pros (green) and cons (red) are listed.[26] You should also check with your State Energy Office about what financing programs are available, including Green Banks that can lend for energy projects.

[26] Adapted from "ESPC FINANCING OPTIONS"



Federal Funds

The federal government has made a large amount of funding for schools available in recent years, summarized in this toolkit from the White House, *Federal Resources for Addressing School Infrastructure Needs*. The funds come from:

- COVID relief bills, collectively known as ESSER (Elementary and Secondary School Emergency Relief): Can fund improvements associated with better indoor air quality and resiliency, including district-wide building assessments and improvements such as HVAC, daylighting, and building envelope upgrades. Money from the American Rescue Plan (March 2021) needs to be obligated by September 2024. Read more here in UndauntedK12's *American Rescue Plan: Five Guiding Principles* (2021) report.
- Infrastructure Investment and Jobs Act (aka the "bipartisan infrastructure bill"): Includes $500 million for energy improvements, $5 billion for electric school buses, and another $2.5 billion for charging infrastructure. Read more in This Is Planet Ed's *Education and Climate Provisions in the Infrastructure Investment and Jobs Act* (2022)m aDOE's Grants for Energy Improvement at Public School Facilities site.
- Inflation Reduction Act (previously part of Build Back Better): Can cover 30-50% of the cost of geothermal heat pumps and solar projects, and has additional funding for addressing indoor air pollution and buying electric school buses. Read more in This Is Planet Ed's *K12 Education and Climate Provisions in The Inflation Reduction Act* (2022).

• Reduces total project cost • No debt, so no interest or repayment	• Can be administratively burdensome • Might be hard to meet deadlines to obligate funds given ongoing supply

	chain issues, but worth trying

Grants

Grants are cash contributions from outside the schools, which don't need to be repaid by the school or taxpayers. They can come from many different sources (e.g. governments, utilities, philanthropies), and while the money is "free," applying for them might take a lot of time. Still, it's great if you can get a grant for energy efficiency or renewable energy.

Look for grants in your state by checking the DSIRE database. Apply the Schools filter by choosing your state or entering your zip code, then "Apply Filter → Eligible Sector → Non-Residential → Public Sector → Schools" and then click the Apply Filters button at the bottom. This will also reveal other incentives to reduce the costs of energy upgrades.

• Reduces total project cost • Not debt, so no interest or repayment	• Limited availability & restricted uses • Often covers only part of project costs • Require planning & detailed proposal

Internal Cash (aka Self-finance)

Internal cash funds the normal operating and capital budgets of a school. There's usually not much extra cash for doing energy-related projects, but if there is, it might be found in the facilities budget, energy budget, capital budget, or a special fund such as the rainy day/emergency fund, sustainability fund, or "Green Revolving" fund (see below). Since there's no debt, all the cost savings from any projects go directly back to the school (instead of interest payments). Internal cash could be a good source of money for smaller, short-term projects and "green team" activities.

• Extremely flexible capital • Not debt, so no interest or repayment	• Lots of competition for these flexible funds • Most school districts lack enough cash to fund energy upgrades

Municipal bonds

Municipal bonds are long-term debt obligations used to finance construction and improvement to public infrastructure, including schools.There are two main types — General Obligation ("GO") bonds, and Revenue Bonds.

General Obligation (GO) bonds are usually put to voters as a ballot initiative. If voters approve the selling of bonds to the public, then those who buy the bonds get paid back over time with interest payments, and the interest earned is often tax-free (making them more attractive to buy). They're usually for at least several million dollars, and require a clear value proposition for the community, since they're being asked to raise their own property taxes. They are considered low-risk since they're backed by the government's ability to raise taxes.

• Flexible capital for clean energy projects • Lowest cost debt due to robust security and tax exempt interest • Increased revenue for school district (taxpayers usually repay debt) • Long terms (20-30 yrs) • Often funds $2M+ projects	• Voter approval often required • Counts against statutory debt limit restrictions • High fixed issuance costs (legal opinion, trustee, accounting services) • Long development time (~9 months+) • Districts with poor credit or can't issue bonds face higher interest rates.

Revenue bonds are backed by a steady revenue stream, such as the cost savings from an energy upgrade (see Performance Contracting below). In many states, revenue bonds don't require voter approval since they have their own funding that doesn't directly affect the voters. For more details read this summary, *Leveraging Bond Financing to Support Energy Efficiency and Renewable Energy Goals* (2020).

• Secured only by specific project (e.g. performance contract cost savings) • Can have multiple maturity dates ("serial bonds") for multiple assets	• Not backed by taxes so slightly higher risk and higher interest rate • Harder to finance energy efficiency projects

Municipal Lease Agreements

Leases are like long-term rental agreements that don't need voter approval since they're not considered debt. In a lease, a school district (lessee) gets to use equipment for a certain period of time, and makes regular payments with interest to a third party (lessor). Schools often use a "tax exempt lease-purchase agreement" (aka municipal lease), where the lessor doesn't have to pay federal taxes on the interest payments ("tax exempt"), and the school owns the equipment at the end ("purchase").

The interest rate on a lease will be higher than on a bond, but they're easier to get done since they don't need voter input. There are two main types of leases: direct leases for small-to-medium scale improvements (often as part of a performance contract); and finance leases for large-scale projects such as major renovations (which also allows multiple investors). Here are some frequently asked questions about tax-exempt municipal leases.

• Often voter approval not required • Often not subject to debt limitations • Flexible capital for funding a range of energy efficiency projects • Tax exemption lowers costs • Flexible terms (5-15 years) • Short development time (3 months)	• School district (not taxpayers) must repay the debt • Higher interest rates than GO debt • Reserve fund and capitalized interest typically required

On-Bill finance

This is basically a low-interest loan from a utility company for an energy upgrade that is paid back over time through the monthly utility bill. It can require upfront staff time to get set up, and generally won't be for a lot of money, or take more than 5 years to pay back, so it tends to be for projects with quicker payback times. Check with your school's utility to see if they have an on-bill finance program, or check this map. You can also read more about the approach.

• Simple repayment process • Can use alternative underwriting (e.g. bill payment history) • Often lower-than-market interest rate • Combines with other utility incentives	• Can require complicated paperwork and/or project approval delays • Amount of financing often limited

Revolving loan fund (aka Green Revolving Fund)

This is a pot of money dedicated to energy efficiency and sustainability, which allows self-funding of "paid-from-savings" projects like performance contracting (see next section). Instead of paying a bank for financing, a district can "loan" money to internal projects and then pay back the fund from utility bill savings, enabling further projects (hence the name "revolving"). This approach is more common in higher education, but can be used in K-12 — especially if drawing on your State Energy Office fund.

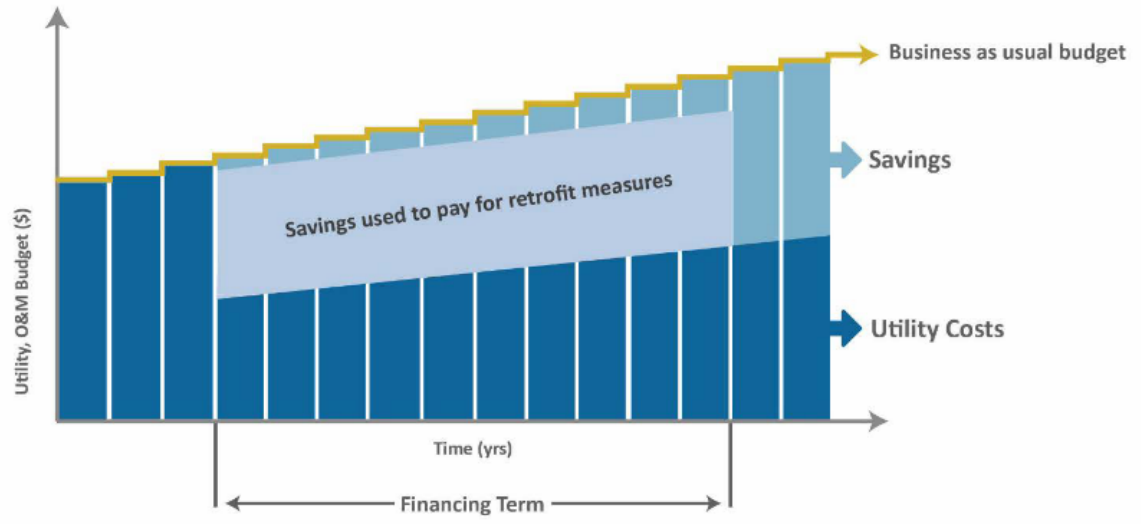
The initial funding ("seed capital") for an internal fund can come from many sources: the annual operating budget; utility rebates; capital budgets; cost savings or revenue from existing projects; donations and grants; and government funding. For more information:

- *Green Revolving Funds: A Guide to Implementation and Management* (2015)
- *Revolving Loan Funds: State and Local Solution Center*

• Cheap, potentially evergreen source of funds for clean energy projects • Can have low or no interest	• Need to have the capital to start the fund • Often slow to revolve, especially with longer loan terms (e.g. for comprehensive projects)

Performance Contracting

A popular approach for energy savings in schools is an Energy Savings Performance Contract (ESPC, also called "performance contracting"). Energy efficiency retrofits are paid for through financing, so there's no upfront cost. The financing is then repaid over time from utility bill savings that result from the upgrades. This is sometimes called a "paid-from-savings" project approach. The chart below comes from this ESPC Primer for K-12 Schools (2016).[27] In the chart the utility costs (in dark blue) are reduced from energy upgrades, and the "business as usual budget" (gold line) helps pay back the retrofit measures (light blue area) until the end of the financing term, when it all goes to savings.



[27] The Primer is explained more in the video "Expanding ESPC to New Markets," part of the ESPC Webinar Series.

The savings are guaranteed by the Energy Services Company (ESCO), which handles the design, construction, and post-installation monitoring — a potentially attractive option compared to a traditional DIY Design-Bid-Build (DBB) approach. If you're not very experienced working with ESCOs, consider hiring an Owner's Representative to help.

Here are more resources around ESPCs:

- Department of Energy's ESPC Fact Sheet
- A comparison of ESPC and DBB
- Financing Decision Tree (with useful info about many financing types)
- EPA's *ENERGY STAR Performance Contracting Best Practices* (2017) and *Easy Access to Energy Improvement Funds in the Public Sector* (2017)

• Some ESCOs can provide easy, fast funding with low interest rates • ESCOs are already comfortable funding performance contracts	• Might require a down payment • Shorter terms are often preferred, which limits comprehensive upgrades

→ **CONSIDERING HIRING AN ESCO?**

If you answer yes to six or more of these key questions, you should strongly consider it:

- Will ownership of the building remain the same for the foreseeable future?
- Do I have a project champion in-house that will drive the project to completion?
- Does my organization need a guarantee on the project's performance to move forward?
- Will my organization be willing to contract with an ESCO, including the time and effort required to develop and negotiate a project?
- Would the availability of capital financing be beneficial?
- Do I need external expertise to identify and scope the energy project?
- Would implementing the project unassisted, including contracting and construction management, be challenging for in-house staff?
- Do I still need to get high-level buy-in for the project internally?
- Will our in-house staff need help to properly operate and maintain the new equipment?

From *A Guide to Performance Contracting with ESCOs* (2011)

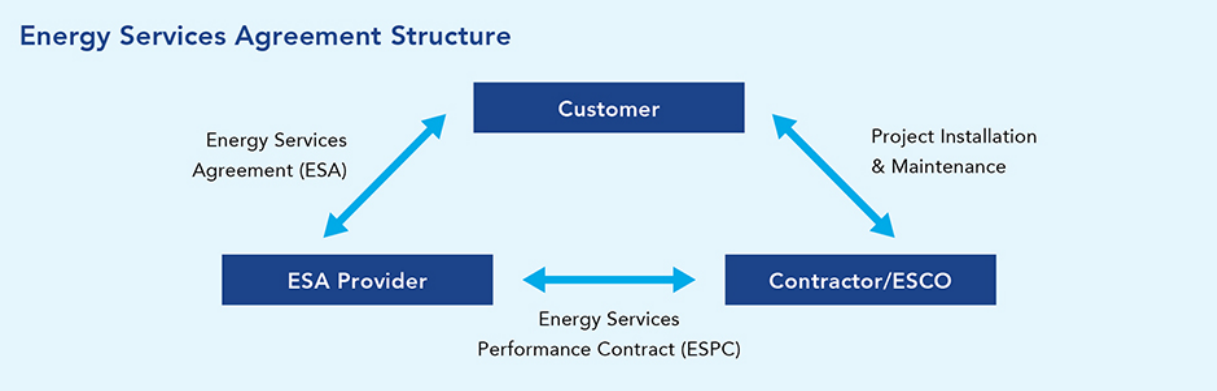
→ **STEPS FOR SELECTING AN ESCO**

1. Consider hiring an Owner's Representative, which might be required by law.
2. Investigate whether or not your State has an ESPC umbrella contract by contacting your State Energy Office. If so, use it, provided your procurement agent agrees that you can do so. If not, develop a Request for Proposal (RFP) — you can use model documents to get started.
3. Select several ESCOs that operate in your geographical area from DOE's list of qualified ESCOs.
4. Collect building and utility data (see "Baselining and Benchmarking" section below).
5. Issue RFP to selected ESCOs.
6. Hold a pre-bid meeting and walk-through of the facility with all ESCOs at the same time.
7. Explain the overall objective of the project to the ESCOs, including electrification, any EUI targets, and a requirement for a "comprehensive approach" (no cream skimming).
8. All audit costs get incorporated and financed with the final ESPC contract.
9. Limit the ESCOs to 30 days to develop proposals.
10. Receive proposals from ESCOs.
11. Review proposals and select the ESCO that appears to be best suited to your project and that you feel will be the best long term partner for your organization. Look for more than the low bid. Select an ESCO with a good track record that can provide other necessary services, such as project design, installation, and maintenance. Get references.
12. When the contract is signed, organize an in-house team to work with the ESCO to choose energy measures, prepare bid specs, qualify prospective bidders, and perform other tasks.
13. Document both the energy and non-energy benefits of the project and publicize its success widely.

Adapted from *Financing Energy Upgrades for K-12 School Districts* (2013) and *How to Select an ESCO*.

Efficiency-as-a-service (MESA, ESA)

This is a newer approach that's similar to a subscription, where a company like an ESCO pays for an energy upgrade project — from development, to construction, to maintenance. The difference is that the company keeps ownership of the equipment, and the customer makes monthly payments for the service. This is commonly done through an Energy Services Agreement (ESA) or a Managed Energy Services Agreement (MESA). Learn more from this Fact Sheet from the Department of Energy, and this "Energy as a Service" document from the ACEEE.



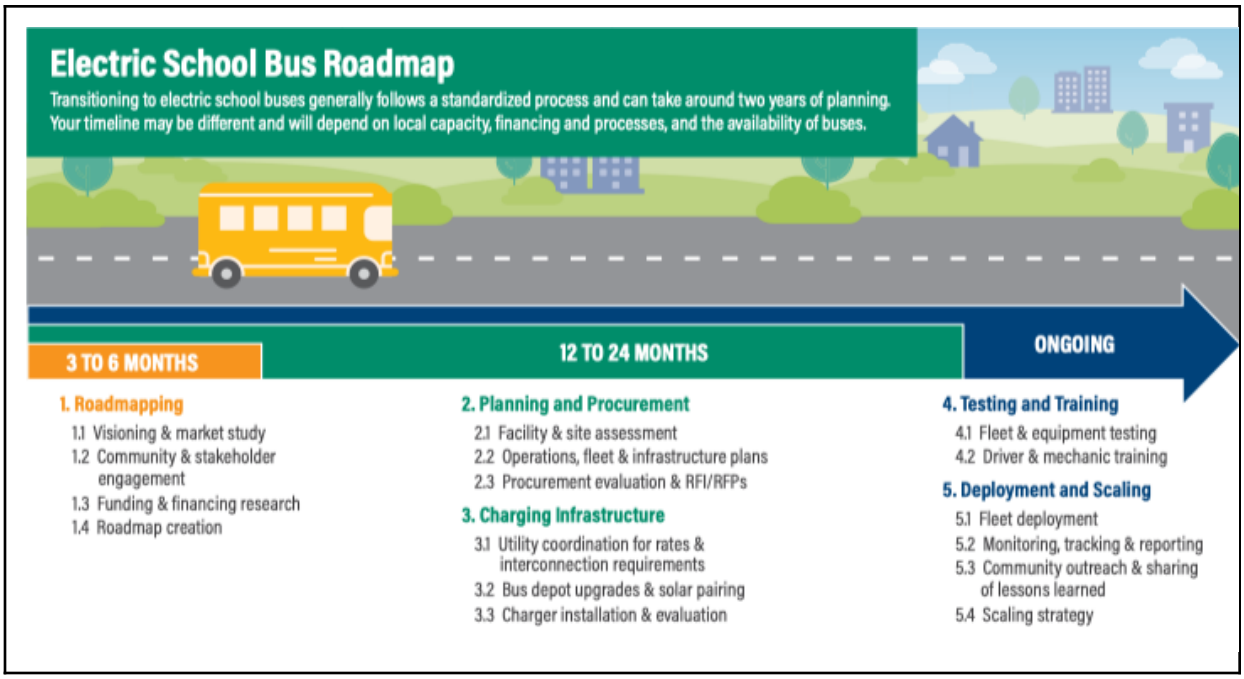
• Third party installs equipment and only earns fees when savings realized • Keeps investment off city/county/state balance sheet	• More expensive than city/state borrowing directly • Limited number of companies provide this service • Usually for $5M+ projects • Difficult to track real savings

Electric School Buses (ESB)

Electric school buses (ESB) are healthier for kids than polluting diesel buses, and they're also quieter and cheaper to run and maintain. The EPA is giving out almost $1B in Clean School Bus Rebates in 2022 to districts in all 50 states, and will give more in the next four years — so start planning now!

Free technical assistance

World Resources Institute (WRI) has an electric school bus Initiative that offers free technical assistance to districts, from early planning through deployment. They will help you throughout the steps of the process (see image below). Use their inquiry form to reach out, which is just one of many useful resources on their site — including a sample pitch deck for use in a campaign. Also see the many useful Resources for School Districts listed by the Alliance for Electric School Buses.



ESB funding ideas

In addition to the EPA's Clean School Bus program, you should check for state, local, utility, and other funding opportunities as described in this post, "How to Help Your Community Fund Electric School Buses in the US." Some additional ideas to consider:

- **Vehicle-to-Grid (V2G) potential**: When not in use, ESB batteries can provide energy to the electric grid using "vehicle-to-grid" technology. This can be a very cost effective way to supply energy when electricity demand is high (often in the evening), as well as when renewable resources like solar and wind are intermittent, and during a power outage. It could also be a way for a district to make money on the buses when not in use. At least 15 utilities in 14 states have committed to piloting an electric school bus V2G program, documented in WRI's "3 Design Considerations for Electric School Bus Vehicle-to-Grid Programs."
- **Transportation-as-a-service**: Some start-up companies are working with school bus manufacturers to sell districts "transportation-as-a-service," where the district doesn't own, fuel, or maintain their fleet, and instead just "subscribes" to transportation for their students. Highland Electric, one of several companies taking this approach, plans to offer subscriptions through 2025 at the same price as diesel busing.

→ **ESB RECOMMENDATIONS**

School districts should:

- Commit to transitioning to 100% all-electric buses by 2030, with a plan to phase out the purchase of new diesel buses immediately.
- Use any and all financing methods available (e.g. state & federal grant programs).
- Engage with local utilities to help accelerate the adoption of electric buses.

State Lawmakers should:

- Work with utilities and regulators to develop effective electric bus investment programs that protect ratepayers and consumers.
- Ensure electric utility programs adequately & equitably invest in charging infrastructure.
- Incorporate equity into all aspects of electric school bus program design and implementation.
- Develop grant programs to provide dedicated upfront funding for electric buses.
- Tighten fuel efficiency and greenhouse gas emissions standards.

- Incorporate technical assistance and workforce development strategies, to help districts manage their fleet transition.
- Subsidize research and development in electric bus technology, including vehicle-to-grid.

Utility companies should:

- Make a commitment to renewable energy.
- Reduce emissions, increase grid capacity, and earn money by assisting school districts in financing electric school buses and investing in the charging infrastructure necessary for large-scale adoption.
- Launch vehicle-to-grid and pay-as-you-save pilot programs, and scale up as soon as practical.
- Establish bulk purchase savings programs to further lower the cost barrier to procurement for school districts.

From *Accelerating the Transition to Electric Buses* (2021)

On-Site Solar

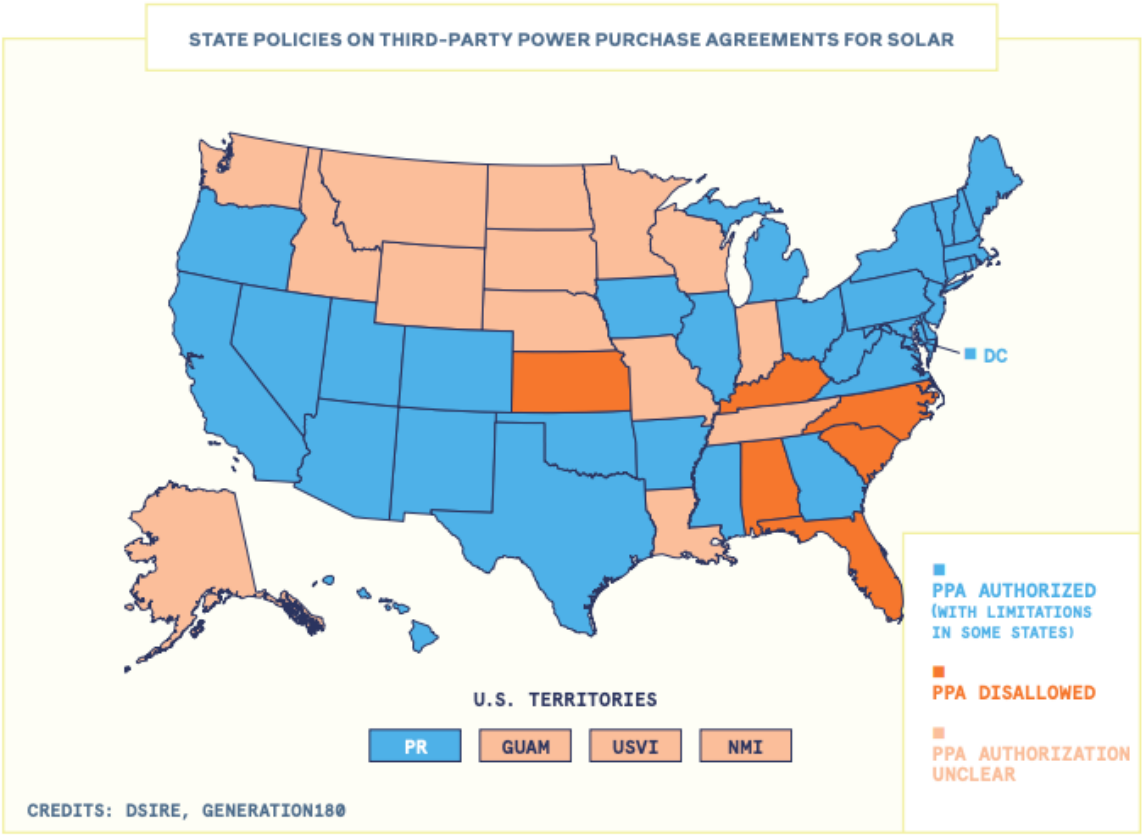
Putting solar on-site, whether on the roof or school grounds, can help make your electrification projects even more cost effective. It turns sunlight hitting your campus into electricity you can either use directly, or sell back to the grid. Read through Generation180's useful *How-To Guide for Schools Going Solar* (the same PDF includes "Intro to Solar Financing"). Use the recommended tools to figure out how much solar might work for your site (e.g. ReOPT, which also helps size batteries). Then follow their advice for finding a developer and financing it. Generation180's *Brighter Future* (2022) report explains a number of great reasons for getting solar — energy resilience, electrification, workforce development, and STEM education. This New York Times article describes how public schools are saving money with solar.

Solar funding ideas

Because schools are non-profits with no tax bill, many districts have had for-profit solar companies install and own the panels, giving them the federal tax credit. But the Inflation Reduction Act now allows the 30% tax credit to be a direct payment to schools, as well as for batteries. More districts may now opt to directly own their panels. Other options:

- **Power Purchase Agreements (PPAs):** This is a third-party contract popular with schools, but PPAs are not allowed in all states, as shown in the graphic below.[28] This *Power Purchase Agreement Checklist for State and Local Governments* (2009) could be useful for going this route. Check out this case study from Washington, DC, where they developed 35 solar projects using a PPA.

[28] From the 2022 *Brighter Future* report.



- **Community solar:** Members of the community can either own or subscribe to part of the solar installation at the school. This can bring solar to people who can't put it on their own roof. See case studies in the 2022 *Brighter Future* report.

The Steps

Passing a resolution and identifying funding help create lay the groundwork to #ElectrifyEverything. After that comes the actual work! The steps described below are:

PLAN & ASSESS

1. Engage stakeholders
2. Assess building stock
3. Set goals

IMPLEMENT

4. Align with building lifecycle events
5. Engage occupants
6. Track and report progress
7. Continually improve

These steps roughly follow NBI's *Decarbonization Roadmap Guide for School Building Decision Makers* (2022), which is a great, in-depth aid for planning energy upgrades. The Decarb Roadmap provides concrete instructions for using the accompanying spreadsheet and templates to really get things moving.

→ **GOING DEEPER**
There are numerous guides on this topic, with different numbers of steps in different orders, such that the summaries below won't completely line up with every guide. Also note that, as mentioned earlier, while we support the goal of "zero energy" where all of the school's energy is produced on-site, to us the most important goal is to #ElectrifyEverything in the schools — even if the electricity comes from the grid.

Additional guides worth downloading for reference:

- NREL's *A Guide to Zero Energy and Zero Energy Ready K-12 Schools* (2019)
- NEEP's *Zero Energy Schools Toolkit* (2020)
- NREL'S *Advanced Energy Retrofit Guide for K-12 Schools* (2013)
- MASS SAVE's *Deep Energy Retrofit Builder Guide* (2013)

Plan & Assess

Step 1. Engage Stakeholders

Create an Energy Team

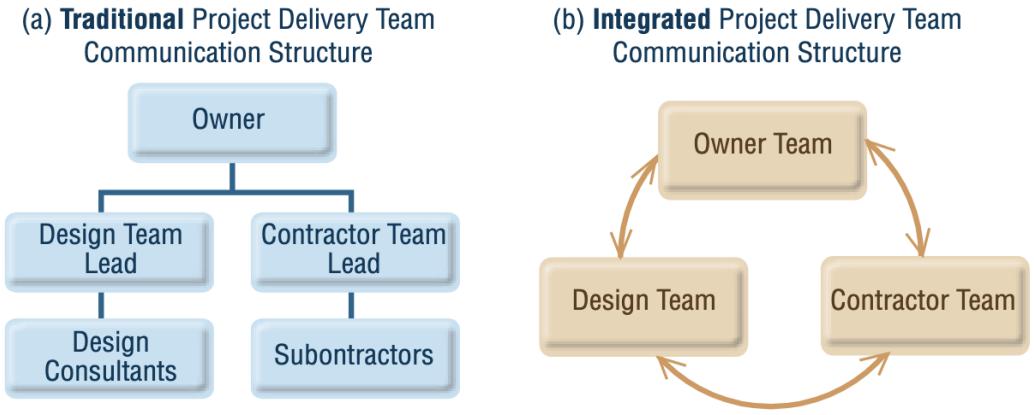
The Decarbonization Roadmap Guide suggests creating a team that is a subgroup of stakeholders that will be impacted by the #ElectrifyEverything plan, such as people from the business office, facilities, superintendent, maintenance & operations, sustainability, and others.

There should also be someone designated as the "energy champion" — someone on staff who will be involved during the entire project, who can remind everyone involved to focus on the goals of full electrification and hitting the target EUI. The champion can also help maintain stakeholder engagement throughout the entire project, and not just at the beginning and end.

Integrated Project Delivery Team

For the early design phases of an energy-focused project, it helps to form an "integrated project delivery team." When compared to a traditional approach (shown below-left), the integrated approach (shown below-right) emphasizes collaboration without hierarchy. Open communication and information-sharing between the teams, and not just through team leads, should be encouraged. The increased cost of involving all teams in the design phase can reduce the construction time by 5-10%, which can help save up to 18% of the

total cost. Basically you spend more earlier to have more people involved, but save more overall in the end. Learn more: *A Path to Successful Energy Retrofits: Early Collaboration through Integrated Project Delivery Teams* (2012).



It can also be helpful to make sure you hire advisors for your Owner Team, including:

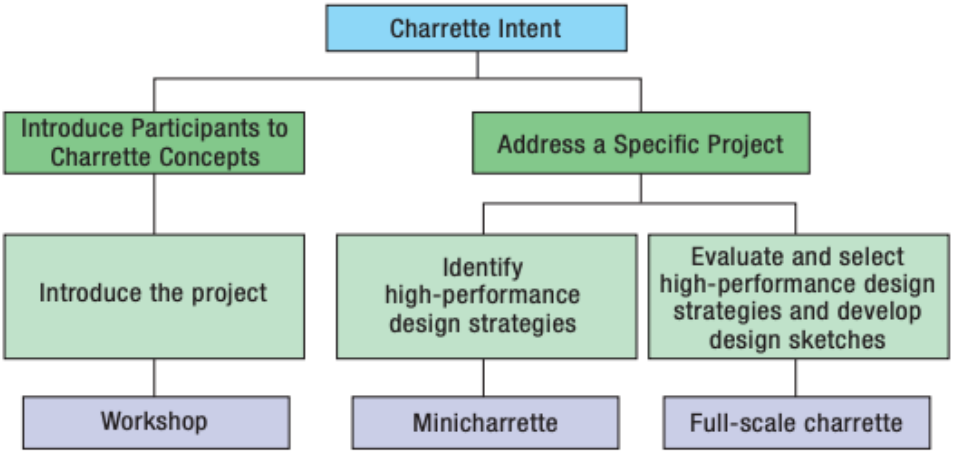
- Commissioning Agent/Authority (CxA, aka M&V consultant): This consultant can help ensure quality control through the design, installation, and operation of the building, and should be hired early. See *A Guide to Building Commissioning* (2011) for details about the involvement and deliverables you can expect from a CxA at the different stages of the process, with sample reports and RFQ/RFP/contract templates. Also useful is the Whole Building Design Guide's "Building Commissioning: The Process."
- Energy modeling experts: These consultants use computer models of the building and its equipment to estimate the building's expected energy use. By comparing those projections to the as-built measured performance, any differences can be investigated and corrected — perhaps under warranty. Watch this webinar about Energy Modeling Done Right (2022), and see Chapter 4 of the AEDG for more on "Building Performance Simulation."

→ **GOING DEEPER**

The American Institute of Architects's *Integrated Project Delivery: A Guide* (2007) has lots more details, including info about how an integrated project delivery team can operate under different types of procurement (e.g. design-bid-build) — see pages 44-50.

Design Charrettes

A charrette is a collaborative planning or design session. For an integrated project team, it can help everyone get behind the vision for the project, set specific goals, and streamline the design process. Below is a chart for determining the type and length of charrette, taken from *A Handbook for Planning and Conducting Charrettes for High-Performance Projects* (2009). And while charrettes are best led by experienced facilitators, the *Zero Energy Integrated Design Charrette Toolkit for Schools* (2017) can be useful for planning.

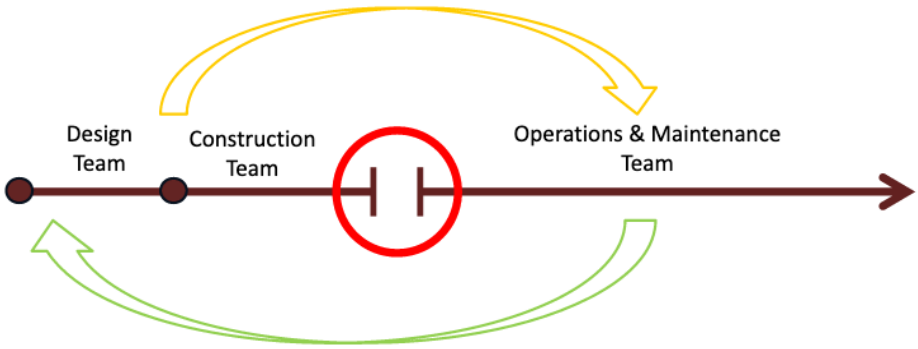


As an example, here are the slides from a 2019 "Kickoff Charrette" for an elementary school project in Connecticut.

Bring in Operations & Maintenance Team early

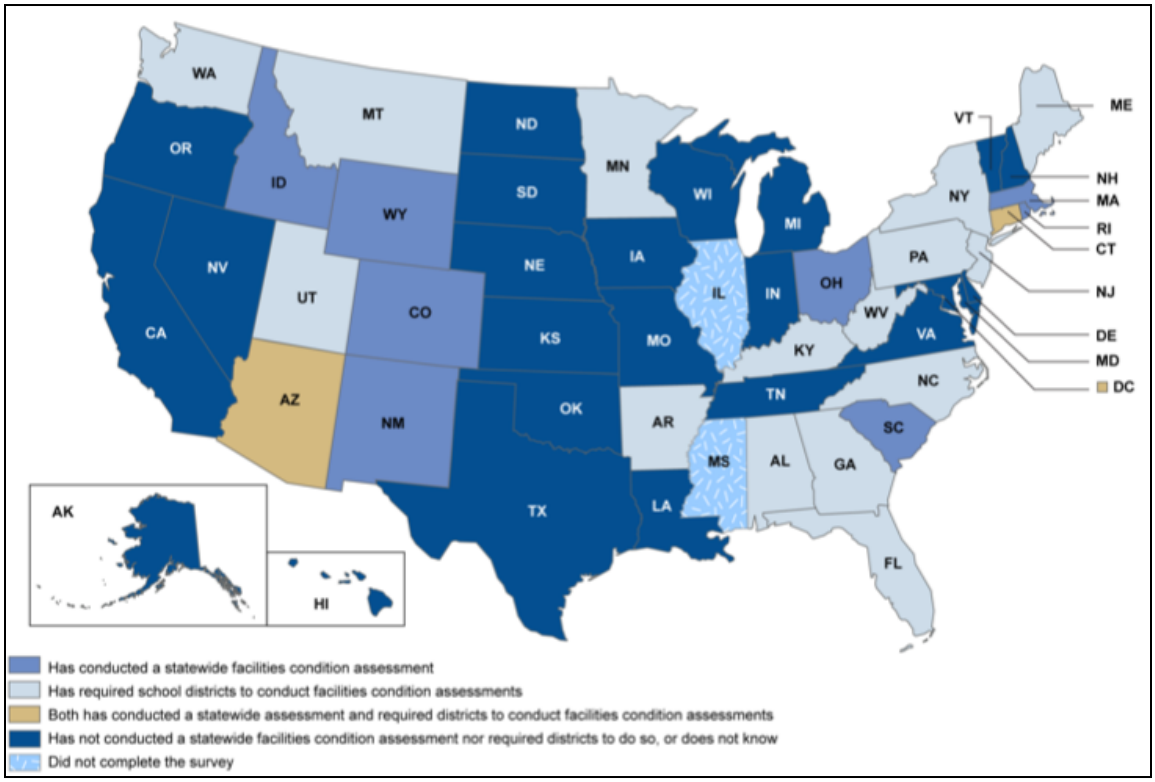
In the graphic below, there is a gap circled in red that represents the gap between the design & construction teams who do the planning and building, and the owner team's Operations & Maintenance (O&M) team. The O&M team are usually not involved in the design, but are later trained to run the systems (yellow arrow).[29] By including the O&M team early in the design phase (green arrow), you can avoid this gap. It gives the O&M team time to plan for what's being built, and also contribute their experience with the existing building to make the design even better.

[29] Slides from "Getting to Zero: Design, Operations and Occupancy" (2015)



Step 2. Assess Building Stock

Some states conduct statewide facilities condition assessments, or have the districts do it, as shown on the map below.[30] If your district has this data, it can be a good place to start. As an example, here is Rhode Island's Facilities Map with 2016 data.



[30] From GAO's *K-12 Education: School Districts Frequently Identified Multiple Building Systems Needing Updates or Replacement* (2020)

From there, it's important to know the performance of every existing building, before designing any retrofits. There are two main components to this: first baselining & benchmarking, and then auditing the building and its equipment. A good overview video that explains benchmarking and auditing is Essential Techniques and Calculations for Energy Managers & Commissioning Authorities (2019).

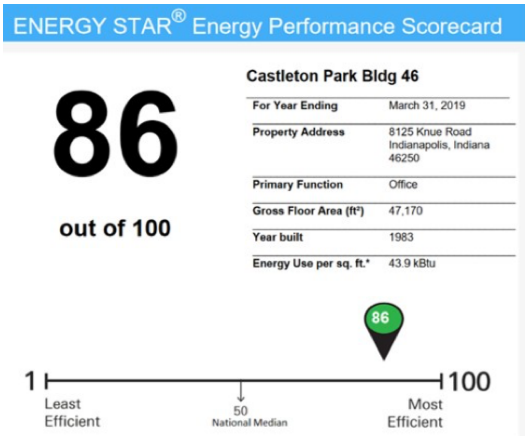
Baselining and Benchmarking

A school's energy use baseline is found by looking at utility bills from the past year or two (though you should also look at pre-pandemic 2019 data if possible). Benchmarking means comparing the baseline energy use against other schools to better understand how well it's performing (relative to building size, climate, age, etc.). In both cases, you need the bills.

It might be possible for students, parents, teachers, or others in the district to get access to the utility bill information. An Energy Manager or Sustainability Director might have the utility bill info, but it might also be available from the Business Manager, or even to the accounting department where bills are paid. These same people might be able to sign a utility data release form to make data import easier. This map shows which utilities will export data, and here is an example data release form — check with your utility to see if they have one.

Once you have access to the utility data, you can upload it to Portfolio Manager. This free platform from the federal government's Energy Star program collects the data, and lets you compare your school building's performance with others. This site a good place to get started with Portfolio Manager. You'll need additional data for benchmarking (summarized in the table below), and this downloadable blank Word document can be printed out to help you gather that info (choose "United States" and "K-12 School"). The *Green Existing Schools Implementation Workbook* (2009) has an introduction and worksheets for getting started with Portfolio Manager on pages 50-57. EPA also runs regular training on Portfolio Manager.

Once this data is in Portfolio Manager, you can produce a number of different performance documents, such as the Scorecard below. It shows a score of 86, which means it outperforms 86% of its peers (100 is the best).



What data is required to benchmark your property in Portfolio Manager?	
• Data Collected for All Properties: • Property Name • Property Address • Total Gross Floor Area of Property • Irrigated Area • Year Built/Planned for Construction Completion • Occupancy • Number of Buildings • 12 consecutive months of energy data	• Additional Data Collected for K-12 School, required to get an ENERGY STAR score (if eligible): • Gross Floor Area • High School • Number of Workers on Main Shift • Weekend Operation • Cooking Facilities • Percent That Can Be Heated • Percent That Can Be Cooled
Optional information not used to calculate a score; it may inform future analysis and score revisions by EPA and/or may help you manage and compare your properties: • Student Seating Capacity • Months in Use • Number of Computers • Gross Floor Area Used for Food Preparation • Number of Walk-in Refrigeration/Freezer Units • Gymnasium Floor Area • School District	

Energy Audits

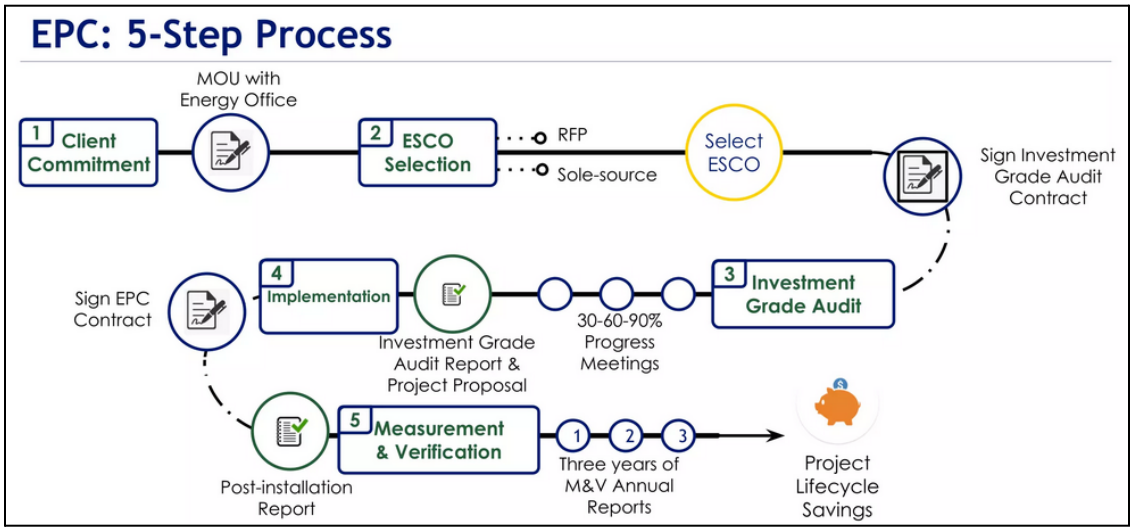
An energy audit (aka energy assessment or energy study) identifies immediate energy-saving opportunities, and helps with future planning. Below is a summary of the three ASHRAE energy levels, along with example reports where available.[31] You can find more details in *A Guide to Energy Audits* (2011), which includes RFQ/RFP/agreement templates in the appendix.

- **Level 1 — Site Assessment or Preliminary Walk-Through Analysis:** Assesses the total opportunity and provides confidence where the savings will come from in the following categories: (1) low/no cost Operations & Maintenance (O&M) or retro-commissioning, (2) standard retrofits like variable frequency drives and lighting replacements or (3) major upgrades that are needed for other reasons, like end of life.
  - Financial analysis: Simple payback.
  - Example: No example reports identified.
- **Level 2 — Energy Survey and Engineering Analysis:** This "standard" audit roughly quantifies cost and savings for each measure for just about everything. Accuracy of any single measure is crude, but when many measures are added together, the net result should be quite accurate. However, a Level 3 analysis of some items is often warranted for the big stuff. Should include a preliminary feasibility study (often provided by potential energy auditors free of charge) to scope the energy saving opportunities and ensure that the cost of the energy audit is worth the savings payoff. Costs can range from $0.12 to $0.503 per square foot, and should not exceed 10% of your annual utility bill.
  - Financial analysis: Net present value (aka net present worth).
  - Example: *Zero Net Energy ASHRAE Level II Audit, Lincoln Elementary*
- **Level 3 — Detailed Analysis of Capital Intensive Modifications**: Also known as a feasibility study, retro-commissioning study, or investment-grade audit, it's warranted when the project is expected to show significant changes at the utility meter level, and/or when a lot of money needs to be spent on a long-term (more than 20 years) investment.
  - Financial analysis: Life-cycle cost analysis (LCCA)
  - Example: *Egan Middle School Energy Modeling Results, Proposed Energy Efficiency Measures*

A Level 2 audit can be a key part of making a plan to #ElectrifyEverything, provided the audit doesn't just sit on a shelf. It's also worth knowing that an ESCO (see "Performance

[31] Adapted from "Energy Audits – Segmenting ASHRAE's Jello, Mashed Potatoes and Gravy" (2015)

Contracting" section above) will perform a Level 3 "investment grade audit" before starting a performance contract — see diagram below outlining the process.[32] Also note that an audit by an ESCO doesn't require moving forward with a performance contract if for some reason the relationship doesn't seem to be working well.



→ **DIY AUDIT**

This Audit Template from the Department of Energy includes the fields that would be used on a Level 2 audit, and can be helpful for making sure they're complete. Watch this training video, Introduction to the Audit Template for more info.

Even students could do an audit with some support. Los Angeles Unified School District had a Student Energy Auditor Training (SEAT) program as part of workforce development.

Retro-commissioning (RetroCx)

When something like a new HVAC system is installed, it's supposed to be "commissioned" for use through settings adjustments and things like that. But sometimes this doesn't happen, or it's done poorly, or it drifts over time. "Retro-commissioning" (or "recommissioning") is basically a tune-up for the building's equipment that can yield big energy savings for little to no cost, along with non-monetary benefits like better indoor air

[32] From Colorado's "Energy Performance Contracting A Proven Tool for Financing Public Facility Improvements"

quality, better thermal comfort, and extended equipment life with fewer repairs. And it can go well with an audit, allowing the school to quickly realize some of the energy savings identified by the audit. The table below compares energy audits and retro-commissioning.[33]

	Energy Audits	Retro-Commissioning
Objectives	Identify cost-effective upgrades/improvements to building systems that will result in energy savings and improve energy performance beyond the intent of the original building design.	Bring building systems and controls back to their intended level of performance.
Primary focus	Identification of capital projects addressing the energy performance in one or more of the building's major systems; measures are presented and recommended as part of audit report, but implementation is up to building owner.	Identification of necessary improvements to building controls and other operational measures (typically low-cost); measures implemented as they are identified.
Impact on building energy performance	Depends on specific measures identified during the audit, as well as building owner's willingness to implement.	Whole-building savings of 10% to 20% are reasonable[29]—more if the building was never commissioned before going into service or has not been retro-commissioned in a number of years.[30]

Priority Retro-commissioning Measures for K-12 Schools[34]

- Provide power strips in easy-to-access locations to facilitate equipment shutdown
- Repair broken and visibly damaged windows
- Repair any damaged or missing pipe and tank insulation
- Testing, adjusting, and balancing (TAB) of chilled water pumps and valves, refrigerant lines, air handlers, and flow modulation devices
- Verify or establish a comprehensive maintenance protocol for HVAC equipment
- Verify correct operation of outside air (OA) economizer
- Apply thermostat setback/setup when building is unoccupied
- Decrease ventilation flow rates to meet ASHRAE 62-1999 requirements

[33] From *Energy Audits and Retro-Commissioning: State and Local Policy Design Guide and Sample Policy Language* (2013)
[34] From *Retrofit Best Practices for K-12 Schools* (2013)

→ **GOING DEEPER**

Learn more from these resources:

- Webinar, "Basic Retro-commissioning: Using data to understand trends and make smart investments in PreK12 schools" (free with registration)
- *A Guide to Building Commissioning* (2011)
- Chapter 5: Retrocommissioning in EPA's *Energy Star Building Upgrade Manual* (2008)

Step 3. Set goals

It's important to set explicit energy goals, first in the plan made by the district, then during procurement. New Buildings Institute suggests that districts should target all schools being carbon neutral by 2045. Here are the procurement best practices, in order of importance, explained further in *A Guide to Zero Energy and Zero Energy Ready K-12 Schools* (2019):

- Establish a target EUI (usually measured in kBtu/ft^2/yr)
- Select contractors based on their ability to meet or exceed performance goals within the project's budgetary constraints.
- Identify the programmatic requirements for the building along with energy and other performance-based goals.
- Implement a procurement process that evaluates contractors based on a prioritized list of goals established by the school owner.
- Ensure the project team is committed to the energy goals.

You can find lots more details in the *How-To Guide for Energy-Performance-Based Procurement* (2012) — for setting clear goals from the project's start, advice for maintaining the goals throughout implementation, and then evaluating whether the goals were met.

Owner's Project Requirements (OPR)

The OPR is a document that sets priorities and goals for the project, including how the building will operate when finished. It can be developed alongside RFPs and used for hiring architects and contractors, or during the pre-design phase, and can be updated as changes arise. Here's an OPR template tailored around "Energy and Carbon Project Requirements." Additional topics for the OPR can include:

- Energy-efficiency, environmental, and sustainability goals
- Commissioning schedule and budget
- Natural ventilation
- Lighting — daylight and electric lights
- Metering requirements
- Indoor environmental quality
- Plug load management
- Equipment and system maintainability expectations

- Warranty requirements
- Personnel training requirement
- Operation and maintenance criteria

You might consider hiring a Commissioning Agent (described above in the Integrated Project Delivery Team section) to help draft the OPR, and to help with quality assurance of the installed systems to make sure they operate correctly.

Request for Proposal (RFP)

When it's time to go out and hire the Design Team (architects, engineers, and others), your Request for Proposal (RFP) will determine who bids and how serious they are about meeting your goals. This is a critical step, and there's a lot more info in DoE's *How-To Guide for Energy-Performance-Based Procurement* (2012). Again, you might want to enlist expert help in drafting the RFP, such as from a Commissioning Agent.

→ **WRITE A COMPELLING REQUEST FOR PROPOSAL (from the AEDG)**
"Along with the school district's standard RFP language and the detailed scope of services required, a successful zero energy RFP should include the following information:

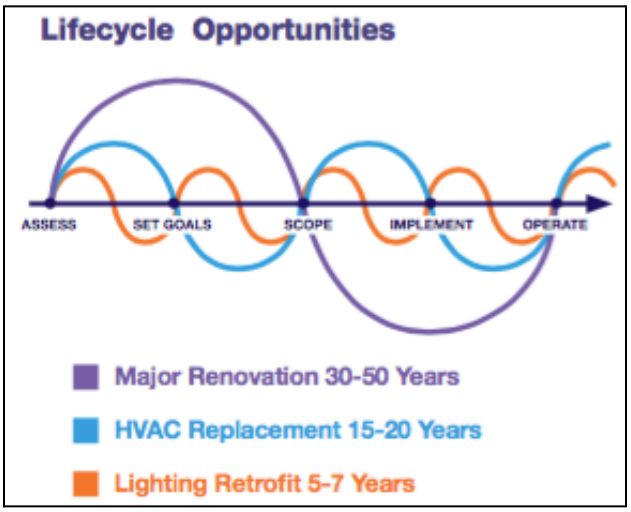
- The expectation that zero energy design and performance will contribute to student learning and success.
- The zero energy goal, including a description of the energy boundary. Note that any particular zero energy strategies can be included, but design teams may find more cost-efficient solutions while working through the design process.
- The energy performance considered essential to achieving zero energy performance. While energy use intensity (EUI) is most common, other energy metrics can also be used. A more aggressive, lower EUI should also be noted as an optional goal.
- The nature and extent of oversight, quality assurance, and commissioning expected during design, construction, and close-out, and who will provide it at each stage of the process.
- A process for ongoing monitoring and verification of performance after the official closeout of construction.

- Performance criteria for the building management system, including accommodation of future changes in utility rate structure and policy."
- The expectation that the school district, with the exception of the renewable energy sources needed to achieve zero energy, will achieve the low-EUI target without spending any more on the school than it would on a comparable school."

Implement

Step 4. Align With Building Lifecycle Events

The idea here is to develop your zero-energy, all-electric and renewable energy projects when you're planning to do something else — whether it's new construction, modernization, or a retrofit. In particular, it can make sense to time equipment replacements with their natural end-of-life. This requires planning, such as through an audit that will identify how old your current equipment is. This chart shows how major renovations come around every 30-50 years, while HVAC and lighting system upgrades are more frequent.



If several opportunities align, it can make sense to do a "Deep Energy Retrofit." Changing the lighting and improving the building envelope can allow significant downsizing of HVAC equipment, which in turn can lead to reclaiming space where equipment had been. This can also allow you to reclaim space on the electrical panel from the smaller lighting and HVAC loads. Along those same lines, it can make sense to get rooftop solar at the same time a roof is replaced, since the solar panels will help protect the new roof, and the panels won't need to be removed when the roof needs repair.

Example: Indoor Air Quality (IAQ)

One potential alignment that has become important from the COVID-19 pandemic is the relationship between indoor air quality (IAQ) and HVAC (Heating, Ventilation, Air

Conditioning) improvements. Since ventilation and air filtration are such key parts of fighting COVID, it makes sense for districts to consider upgrading the whole system, and getting electric heat pumps — air-source or geothermal ground-source — that also improve IAQ. This is an allowed use of ESSER funds, and many districts are spending on facilities improvements.[35]

Here are a couple of references that in part deal with the overlap of HVAC and IAQ, though there's nothing about heat pumps specifically:

- *Energy Savings Plus Health: Indoor Air Quality Guidelines for School Building Upgrades* (2014)
- *Addressing Indoor Air Quality in School Energy Efficiency Upgrades: Review of Selected State Policies*" (2016)

COVID's focus on IAQ was overdue, as evidenced by the fact that the IAQ program EPA is promoting post-COVID was developed years before the pandemic. The "IAQ Tools for Schools" program is pretty comprehensive, and includes checklists, best practices, and reference guides for identifying, correcting, and preventing IAQ problems. The toolkit also includes a couple of fun intro videos, with *This Old House* hosts Richard Thetheway and Steve Thomas on Taking Action (13 min) and Ventilation Basics (15 min).

If you're looking for a much more technical reference, ASHRAE's *Indoor Air Quality Guide: Best Practices for Design, Construction and Commissioning* (2010) is free with registration. Here's a primer about the guide.

→ GOING DEEPER ON VENTILATION

- Webinar (can watch recording by clicking the "Register now…" link) — *Ventilation and COVID-19 in Schools: Using a Framework to Assess, Prioritize, and Plan for HVAC Upgrades and IAQ Improvements* (2021)
- 5-step guide to checking ventilation rates in classrooms (2020)
- Clean Air in Buildings Challenge (2022)
- Proven Strategies to Improve Indoor Air Quality in Schools

[35] See ASSA American Rescue Plan Funding survey results: 9/2021, 1/2022, and 7/2022

- See recommended Owner's Project Requirements for ventilation on pages 15-16 of *School Ventilation for COVID-19* (2020)

Embracing (or avoiding) architect reviews

In some states, certain school upgrades require review by the state architect to check for code compliance. Because such reviews can trigger additional required improvements, it can be another reason to combine big upgrades together — things like HVAC upgrades with envelope improvements, or rooftop solar with a new roof.

At the same time, it might be possible to avoid an architect review if certain parameters remain the same. For example, one school in California wanted to replace their HVAC system with a more efficient unit, but because the new unit was heavier than the existing one it would have triggered a review and added delays. Instead, they worked with the manufacturer to build a custom unit using lighter-weight aluminum components to avoid the review.[36]

[36] Prop 39 Final Statewide Report (2019)

Step 5. Engage Occupants

Rewiring America advocates for "infrastructure" changes, such as upgrading to equipment like electric heat pumps, because they are infrequent decisions that lock-in energy use for a long time. But behavior changes are also important for saving energy. Raising the awareness of students, faculty, and staff (the building "occupants") is essential for helping to keep energy use down in a low-energy building.

Behavior Change Programs

A free toolkit for behavior-based energy conservation in K-12 schools is called *Powering Down* (2013). It outlines 5-steps to starting a student-led energy conservation program:

1. Figure out who's on the team, including support from the staff, principal, and district.
2. Gather information about where the best energy savings can be found.
3. Create momentum by distributing information and feedback about energy use.
4. Celebrate success and provide recognition, from the school to the nation.
5. Initiate special projects like equipment give-away of power strips.

Additional free behavior-change resources:

- *School Cents* (2013)
- *Power Down Friday Handbook* (2011, free with sign-up)
- Watt Watches of Texas

Your school and district could implement one of these programs for no-to-low cost, and could start saving immediately — even while the school board campaign for a resolution is underway! Even after the building is updated, these kinds of programs will still help reduce energy use. Any savings generated will help make the case for bigger infrastructure changes.

> → **GOING DEEPER**
> The *Community-Based Social Marketing Toolkit* (2017) is residential-focused, but could be helpful for designing a school program, as well as a community-focused #ElectrifyEverything campaign to help families access their Inflation Reduction Act benefits.

Example: Managing Plug Load

Plug load includes most equipment other than lighting that's plugged in, such as computers, vending machines, and refrigerators. Lighting and plug load are good targets for behavior change, and the *Plug Load Best Practices Guide* (2012) lists 5 Steps for Managing Plug Load Energy Use in Offices:

1. Review. Identify your needs, inventory your equipment and focus on the devices that use the most energy — usually, that's the equipment you use the most.
2. Remove. Eliminate or unplug unnecessary devices.
3. Replace. Purchase the most energy-efficient replacement devices for the job.
4. Reduce. Turn it off or power it down when not in use.
5. Retrain. Engage staff. Make sure they understand why, when and how to power down.

It's worth noting that changing occupant behavior is a smaller opportunity than infrastructure changes to the power management and settings of things plugged in. Changes to occupant behavior must be part of an overall energy saving program!

Curriculum

Beyond just trying to engage students in trying to be better stewards of energy, there's also a huge opportunity to use the building as a classroom to teach STEM (Science, Technology, Engineering, Math) concepts, as well as psychology and communication (working on behavior change), and social studies (working on school board campaigns).

Rewiring America has put together "#ElectrifyEverything: A Very Short Course," to aid teachers and students who want to learn a little more about the benefits of going all-electric from a somewhat deeper engineering and physics perspective.

The Center for Green Schools also has a Building Learners Program (free with registration) that helps teach what goes into a green building, and has different levels for elementary, middle, and high school students.

→ **GOING DEEPER**

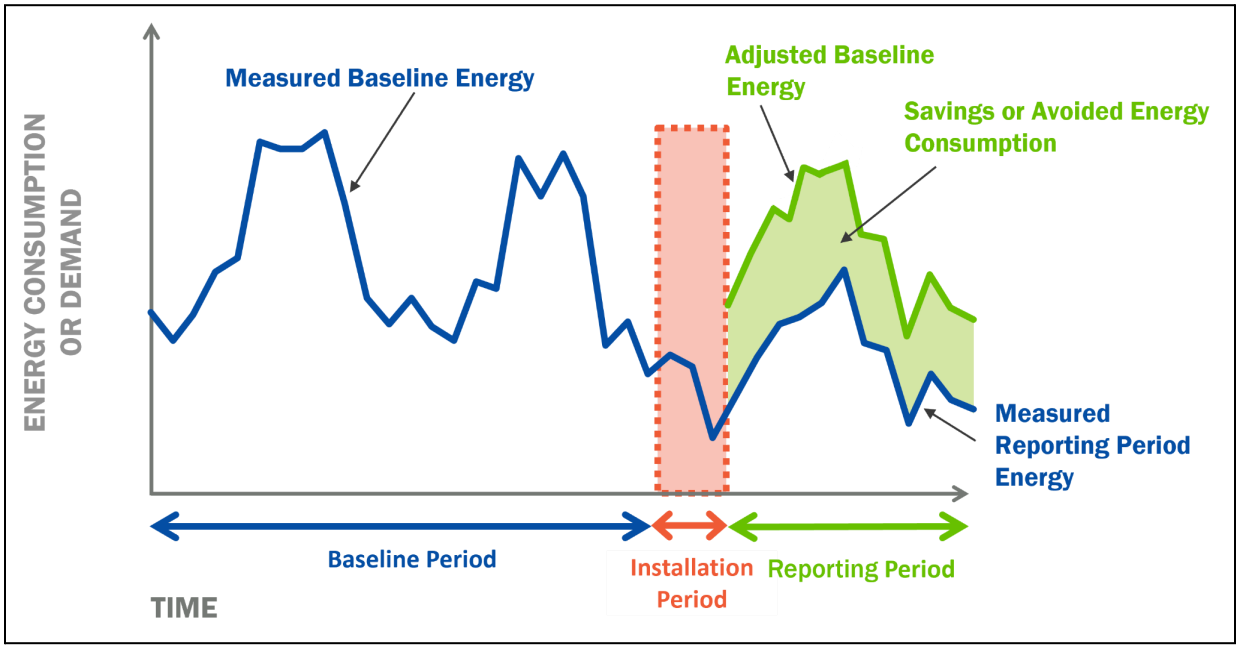
Paul Torcellini from NREL created the *Building Science Education Series* of videos. It's meant for college students competing in a solar house-building contest (called the Solar Decathlon), but it's a great way to learn and teach about energy-efficient buildings for non-college students and teachers as well.

Step 6. Track and report progress

Measurement & Verification (M&V)

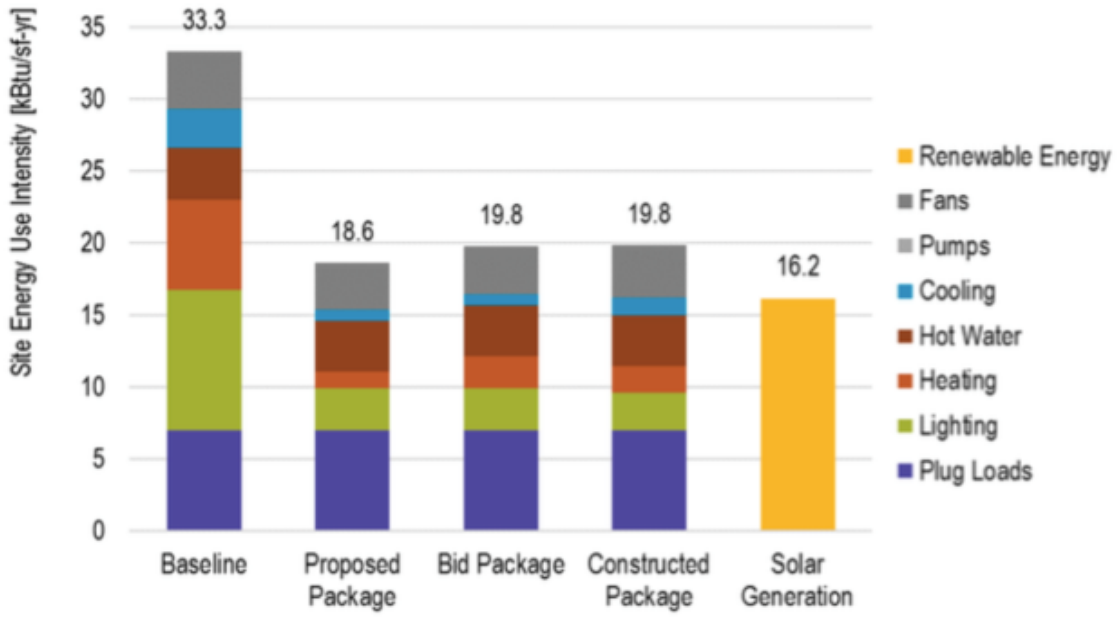
After the retrofit is done, you need to measure how much less energy you're using. This is called measurement & verification (M&V), and it typically runs from 12 to 24 months after the building is finished. The chart below shows in green the energy savings post-install of energy improvements, compared to an adjusted version of the pre-installation baseline. It's how ESCOs know if they have to pay for not hitting their targets. The chart comes from the IPMVP Core Concepts paper from EVO (Efficiency Valuation Organization), which is free with registration (after registering you'll be able to go to Library > IPMVP Documents > Current IPMVP Core Concepts > 2022 New IPMVP-Core Concepts in English).

During M&V, the commissioning agent, design team, contractor, and energy modeler should compare the actual energy use with what was modeled, and any differences should be resolved. It could trigger a performance guarantee claim if things are too far off.



⇨ Case Study: Egan Middle School, Los Altos CA

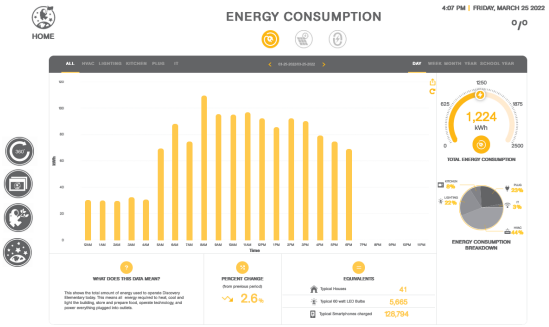
As part of a Zero Net Energy Pilot Study run in California between 2015 and 2020, Los Altos Egan Junior High School retrofitted their main 26,718 square foot administrative and classroom building. They replaced the existing combustion heating units with heat pump units, but not the recommended high efficiency heat pumps (they chose COP 2.4 instead of 4.0). They also did a lighting retrofit, daylighting controls, and skylight replacement. They didn't do the recommended air sealing or add ceiling fans. You can read the design proposal, which is similar to an ASHRAE Level 3 investment-grade audit, along with the post-installation M&V report. Because the building's baseline site EUI of 33.3 was reduced to 19.8, it became possible to mostly cover that energy need using on-site solar generation.



Monitoring

It's possible to monitor a building's performance in real-time through an online "dashboard," and many schools display their data on a display inside the school. This is a great way to publicize the energy improvements to the building occupants and wider

community, and also encourage behavior change (see Step 5. Enage Occupants above). The engineering company CMTA has a public collection of these dashboards from schools they've worked on. The images below are from Discovery Elementary's dashboard, showing the building's energy consumption (left), and an interactive 3D virtual tour of the building's energy improvements (right).



→ **MONITORING PLATFORMS**
One option for displaying school data is using ARC from the US Green Building Council.

- *Getting Started Guide* (2020)
- Webinar, ARC for schools: Practical Tips (2021, free with registration)
- Arc supports K-12 schools and STEM education

Other potential options are:

- Portfolio Manager (see Step 2. Assess Building Stock above) which can gather data, though not in real time
- Zero Tool, a website that helps owners compare their buildings to baselines of similar types of buildings, developed by Architecture 2030.

Publicizing

After your projects are done, tell the world about them! There are very few examples of retrofit schools that have chosen to #ElectrifyEverything, and we need more case studies! Get in touch with us if you're interested in sharing your experience (and documentation) with others — schools@rewiringamerica.org.

→ **SOME CASE STUDIES**

The town of Manchester, Connecticut, decided on deep energy retrofits for several of their schools, starting with Buckley Elementary. The funding was approved in a 2019 bond referendum, and two-thirds of that money will be reimbursed by the state. You can read about it in a 6-part narrative about the project, *Manchester Energy Efficiency Project: A Special Series* (start with chapter one). Other documents related to the retrofits include:

- CMTA (the engineering firm) case study
- Video describing the Manchester project (2021, also includes a school in Mansfield, CT)
- 2019 bond referendum presentation

An elementary school in Plainfield, New Hampshire, was retrofitted as something of a DIY project, led by engineer Marc Rosenbaum. They used donated local labor and smaller HVAC equipment. Here's Marc's writeup of the project, and here's a talk he gave about the project (free with registration).

Another case study from CMTA features seven schools in West Virginia that received ground-source (geothermal) heat pump renovations, resulting in HUGE energy and cost savings.

New Buildings Institute maintains a Getting to Zero Buildings Database (uncheck All, then check Education), as well as a collection of case studies.

And here's a document from Sierra Club listing other districts that have committed to 100% clean energy.

Step 7. Continually improve

Operations & Maintenance (O&M)

To keep a building's energy use low requires the Operations & Maintenance (O&M) staff to run the building well. That's one reason they should be included early in the design process (see Step 1: Engage Stakeholders above). It's also helpful to have detailed, facility-specific O&M manuals completed before commissioning. According to this *Comprehensive Facility Operation & Maintenance Manual* (2016), it should include:

- System-level O&M information
  - Physical Descriptions
  - Functional Descriptions
  - Troubleshooting
  - Preventive Maintenance (Procedures and Schedules)
  - Corrective Maintenance (Repair Requirements)
  - Parts Lists
  - Operation-/Maintenance-Significant Drawings
- Equipment-specific O&M information, organized into a vendor/manufacturer data library

Your district should also have a School Facilities Maintenance Plan. This video explains the activities, schedule, staff, materials, and budget the plan should include.

Additional references about O&M:

- NEEP's *Regional Operations & Maintenance Guide for High Performance Schools and Public Buildings in the Northeast and Mid-Atlantic* (2021)
- *Operations & Maintenance Best Practices: A Guide to Achieving Operational Efficiency* (2010)
- *Guide to Operating and Maintaining EnergySmart Schools* (2009)
- *CHPS Best Practices Manual Volume IV: Maintenance and Operations of High Performance Schools* (2004)
- *Best Practices for Controlling Energy Costs: A Guidebook for K-12 School System Business Officers and Facilities Managers* (2004)

Educating For the Future

The goal of education is to prepare students for the future. We have an opportunity to also update our school buildings and buses for the future. Once we #ElectrifyEverything, instead of running our world on savings (fossil fuels), we'll run it on income (renewable sun and wind). Clean, locally-produced electricity will also be cheap, and will have HUGE economic benefits, so the sooner we make the switch, the better off we'll all be.

And as you #ElectrifyEverything in Your School, the students, staff, and community will also be learning about why it makes sense to switch to much healthier equipment that uses a lot less energy. Everyone can also make the switch at home too!

This effort will help educate your community about the future we need.

Let us know how it's going, or if you have any questions — schools@rewiringamerica.org.

And thanks for helping to #ElectrifyEverything in your school!

Appendix

Here are some additional resources with more info on the Pathway to Decarbonization (see Why Electrify? section above).

Efficiency

- LED lighting
  - K-12 Lighting Toolkit
- Daylighting
  - Healthy Schools Network: Daylighting (2012)
  - Whole Building Design Guide: Daylighting
- Controls
  - *Zero Net Energy Building Controls* (2015)
- Envelope
  - Extreme Makeover: The Plainfield NH Elementary School (2021)
- Equipment and plug load management:
  - NBI's Plug Load Best Practices Guide (2012)
  - *Assessing and Reducing Plug and Process Loads in Office Buildings* (2013)
  - Webinar, *Better Together: Integrating Plug Load Management into Lighting and Building Management Systems*
  - Plug & process load management resources

Renewables

- Rooftop solar & On-campus solar (e.g. parking lots)
  - Generation180's *How-To Guide for Schools Going Solar* (includes "Intro to Solar Financing") and further assistance

#ElectrifyEverything

- HVAC & boiler replacement with heat pumps
  - *Decarbonizing HVAC and Water Heating in Commercial Buildings* (2021)
  - Webinar (free with registration) — Extreme Makeover: The Plainfield NH Elementary School (2021)

- Kitchen loads
  - Webinar (free with registration) — Induction Cooking and the All-Electric, California Schools, Kitchen of the Future
  - The California Foodservice Resource Centers Design Guides and Reports
  - Cooking Electric site from Building Decarbonization Coalition
- Electric buses and charging:
  - Alliance for Electric School Buses Resources for School Districts
  - Power Planner for Electric School Bus Deployment
  - Video tour of installed charging equipment — 23:00 to 27:00
  - Vehicle-to-Grid (V2G) webinar (2022, click the “.....” to unmute)

Thanks

Many thanks to everyone who has worked on helping to modernize and decarbonize schools for so many years. Additional thanks for help with the Rewiring Schools project:

- Jonathan Klein & Sara Ross, UndauntedK12
- LeeAnn Kittle, Heather Bird Jackson & DPS Students for Climate Action
- Reilly Loveland & Amy Cortese — New Buildings Institute
- Nancy Metzger-Carter — Schools for Climate Action
- Paul Torcellini & James Elsworth — NREL
- Kate Crosby — Acton-Boxborough Regional School District
- Ben Weil & Lauren Mattison — UMass Amherst
- Carrie Brown — Resource Refocus
- Peter Turnbull — Turnbull Energy
- Joe da Silva — Rhode Island School Building Authority
- Tish Tablan, Stuart Gardner & Nate McFarland — Generation180
- Anisa Heming — Center for Green Schools
- Dan Sherrell & Dave Hancock — Climate Jobs National Resource Center
- Tony Hans & Kiersten Washle — CMTA
- Sue Pierce — Fusebox
- Jock Gill & Ben Luce
- Mary Filardo — 21st Century School Fund
- Rengie Chan, Cynthia Regnier & Carolyn Szum — Lawrence Berkeley Laboratory
- Sue Gander, Jennifer Rennicks & Navva Sedigh — World Resources Institute
- John Balfe — NEEP
- Hanna Morgan & Joanna Moore — NYSERDA
- Jim Farrell & Chris Till — Manchester Public Schools
- Akira Rodriguez — University of Pennsylvania
- Tim Unruh — NAESCO
- Marc Rosenbaum — Energysmiths
- Alisa Petersen — RMI
- Andra Yeghoian — San Mateo County Office of Education
- Talia Fox — Arlington, MA
- Greg Libecci — Salt Lake City School District
- Shea Brams & Amy McGuire — Highland Electric Fleets
- Laura Schifter & Michelle Faggert — This is Planet Ed

Changelog

Version 1.1

- Changed WRI's Electric School Bus Initiative to new website
- Added DOE's Grants for Energy Improvement at Public School Facilities site
- Added This Is Planet Ed's *K12 Education and Climate Provisions in The Inflation Reduction Act* (2022).