

CLIMATE RESILIENCE

2016



Vermont Climate Resilient Schools 4 Case Studies

Vermont school and students are learning about climate change in ways that build a complex understanding of the issues and connect everyday actions to collectively make a big difference. The following case studies represent four schools that are engaging in climate change education, focusing on resilience and adaptation. Each case study features a story that illustrates what the students

and educators are doing, offers tips on getting started, and lists resources that they found helpful in their work.

This project is part of the New England Environmental Education Association's "Advancing Climate Change Education in New England" in which all six states compiled case studies of climate change education in action. The four Vermont schools

showcased here are: Burr & Burton Mountain Campus in Peru, Edge Academy/Essex Middle School, Thetford Elementary School, and Main Street Middle School in Montpelier. Each story is unique to the school, its people, and its place.. All of them are inspiring and offer hope for the future!



Students assist with menu planning and ordering as well as meal prep, using active participation to delve into the larger issues of food systems, food justice, and affordability.

Burr and Burton Mountain Campus Peru

It's hard for students to take action on climate change when they feel like they're part of a system that's impossible to change, says educator Jillian Joyce — or worse, when they feel personally responsible for climate devastation. At Burr and Burton's Mountain Campus semester program, students and faculty are fighting that paralysis with joy and a deep love of place.

"We're all in this because we love places, and we have a strong connection to our communities,"

says Joyce, one of four faculty at the Mountain Campus, which started in 2012. "It's really pulling students into that mindset. Things are changing — what's most essential about what we love?"

Love and joy may sound like fluffy concepts to base an educational method on, but the Mountain Campus is a down-to-earth place. Twenty-five students in grades 10–12 arrive by bus in the woods of Peru, Vermont, every morning for 15 weeks. They walk through the trees to a spacious timber-

frame building tucked into the forest that will be their home base for the day's adventures.

LEED certified and built with local timber and stone, the campus building uses net zero energy — it's powered by solar panels, heated by wood harvested from the campus's forest, and supplied with fresh well water.

The building is about "showing students what's possible," says Ben Freeman, director of the Mountain Campus. "Living that

while they're here is an essential part of developing an understanding of what's possible. It's a very intentional learning space."

As part of their daily routine, students split firewood, prepare a family-style lunch, and check all the building's systems, collecting data and reporting on the amount of water used, electricity generated and consumed, compost produced, and so on. "We are the kitchen staff and the maintenance staff!" says Joyce.

Local food is a particular focus. When students cook their own lunch, says Joyce, "they're seeing: what does a locally grown carrot look like? Sometimes they're gnarly and crazy looking, but they tend to be a really vibrant orange, as opposed to processed carrots."

Students assist with menu planning and ordering as well as meal prep, using active participation to delve into the larger issues of food systems, food justice, and affordability. Joyce says that the Mountain Campus's current per student, per day food cost, which includes a snack and a big lunch, is \$2.21 — and half of that is local food purchases. A major way that the campus is making local food affordable is by reducing their food waste and composting the waste they do generate, rather than paying twice for uneaten food — once when the food is bought and again when food scraps are hauled away as trash.

This philosophy of learning through doing extends to the day's interdisciplinary activities. As part



"It's really pulling students into the mindset. Things are changing -- what's most essential about what we love?"

Jillian Joyce, Educator Burr & Burton Mountain Campus

of a larger course of study on forest ecosystems, for example, students might take a snowshoe hike to practice tree identification and learn about the effects of invasive species on the campus's trees. They might read and reflect on woods-themed literature, study the legal distinctions of forest designations, or visit with a local expert on wilderness areas or woodlot management.

The four educators at the Mountain Campus typically use a "split and swap" approach for hands-on lessons, where two educators work with 12 students at a time, then switch groups partway through the day. On the early February day we interviewed Joyce, one small group was spending time in a small cabin learning about heat, energy, and how you stay warm in the Vermont winter. The other group was out on a hike, learning about which types of habitats and

substrates nurture which species of tree.

The teaching team at the Mountain Campus is small but extremely flexible, with a range of skills and backgrounds. Joyce brings a humanities focus, Freeman has a background in school administration and environmental science, and their colleagues Cindy Mowry and Paul Kelly have expertise in systems-based ecology and leadership through physical education, respectively.

Joyce is quick to point out that the specific, structured content areas of math, science, or humanities take a back seat to the central task of helping young people understand how everything is interconnected. "All of us might teach poetry," she says. "It's all integrated into one experience."

The four faculty have been with the program from the beginning.



The building is about “showing students what’s possible...It’s a very intentional learning space.”

Ben Freeman, director of Burr & Burton Mountain Campus



They planned the Mountain Campus together, starting with its larger purpose; in Freeman's words: "Education should be designed for the future. It should address the realities of our culture and our world and equip young adults with the behavior and skills they need to tackle challenges that lie ahead." The four teachers meet for an extended period at the beginning, middle, and end of the school year to plan the arc of the year, "everything from end goals and assessments to content blocks," says Freeman, who notes that they also use Google Docs and other online tools to continue that collaboration through the year.

"I feel incredibly fortunate to work with such a committed, passionate team," Freeman says. "We have particular passions and interests, but the synergy we bring is really robust. We're mirroring what we're trying to teach about resilience" — that its roots are diversity and interconnectedness.

Having just four faculty members, who are all working from a shared vision, creates a closeness and trust that supports flexibility. "There's this constant collaboration, back and forth," says Freeman. "We're changing our plans for tomorrow based on what the weather is. It's very nimble. But it's driven by this larger piece that's a very unifying thread. It makes it very comfortable to be nimble in that way."

While the outdoors and the immediate environment is the first place to start in developing a love of place, the Mountain Campus quickly expands students' experience into the larger world, taking field trips or inviting in professionals from the community. Joyce says that exposure to current, real-world issues keeps climate resilience work compelling for students.

"We'll start to think about town meeting in March. We'll visit Montpelier and talk about legislation. We can help inform leaders on what schools need. That's a really practical application for students," she says. "We hear all the time from our legislators about the importance of student voice, especially if we're coming in with a nuanced perspective. They will be those adults in just a few years."

Freeman echoes the importance of this youth-adult connection. "One of the critical elements of building resilience and change," he says, and one of

"the root causes of the challenges we're facing, is, it's cultural. It's very relationship-based." At the Mountain Campus, students begin to "understand their relationship to others, peers, and others in the community, and how to develop those social/emotional skills as part of being an agent of change," says Freeman. "To do that in really authentic ways with working professionals is a big shift for students."

The Mountain Campus experience, starting with self and place and moving out into community, doesn't just help students understand the messy, overlapping real world. It also gives them the skills to help change it.

"You might have a great idea, but you need to write about it, understand the science behind it, and have leadership skills to work with other people on it," says Joyce. "Building a community, students trust each other, know how to work with each other, and see the interconnectedness between all disciplines."

"It frees up time, too!" she adds. "When all their curricular material relates, they have more time to go deeper." This holistic way of approaching education, she says, leads to "greater motivation and ownership for the students."

In the last five weeks of the program, Mountain Campus students incorporate their experiences and learnings into an independent project, which often has a climate action focus. Students have designed a tiny house for a Mountain Campus intern, looked into the political and community process for getting plastics banned in Vermont, and worked on bringing composting back to the main campus.

They have even looked at climate resilience education itself, in the self-reflective way that the program encourages. "One student is doing an independent project on teaching around climate change — what people think is being taught versus what is actually being taught," says Joyce.

"It's fun to work with them when they get this drive," she adds, "That's one of the most rewarding parts of this job — that kids have this real sense of relevance and urgency."

Though students at Burr and Burton Academy only spend 15 weeks of their high school years at the Mountain Campus, the experience is a powerful one.

“We had students say, ‘I can't believe I've been through as much school as I've been through and I haven't learned this already! This is so fundamental,’” says Freeman. “It's not that we're teaching things that aren't being taught, but we're teaching it within the larger purpose, and within the framework of community, and something larger than ourselves.”

“They see positive change,” says Joyce, “and they feel like they can use their time in high school and college toward making a difference, as opposed to feeling like they're in a system that's entrenched and hard to change.”

“It's not like we're a magic wand that transforms students,” Freeman says, “but, in general, our students have new ideas, new passion, new excitement — and they're willing to engage with teachers in a different way because they've had this different relationship here.”

Mountain Campus students come away with a new relationship to their peers, as well, trusting and caring for each other more deeply — Joyce contrasts social media and high school social groups with the immediacy and responsibility of cooking a meal for 24 of your fellow students on a camp stove.

Students also develop a new relationship with themselves, their strengths and passions: “Our students tend to really value goal-setting and having the opportunity to be pressed for what are their goals, what are their roles in the world,” says Joyce.

They may even come away with a new relationship to climate change itself.

“Climate change [is] undeniably something our students are going to have to deal with,” says Joyce. Giving students “the deeper history — that earth has always been changing and people have always been impacting our places,” she says, helps free them from the sense of guilt that many people feel when faced with this crisis.

“We teach about climate resilience because it's something that we're all responsible for,” she says. “Everyone will have to change and adapt to it. What are the things about ourselves we value most, that we want to hold onto, and what can we let go?” Viewing change in this light “allows [students] to think about the future with hope and optimism.”

The Mountain Campus's approach to climate change is fundamentally one of joy — not just coping, but thriving in a changing world. Though we will all have to deal with the effects of climate change, “the dealing can also be joyful,” says Joyce. “If [students] are empowered to act, it alleviates guilt or frustration. You can start to fix the small parts that affect you, that affect the people in your communities.”

“We're looking for more than sustainability,” says Freeman. “We're looking for resilience, and vibrancy on top of that.”

Resources and further reading

For more on the Mountain Campus, their building, and their approach, check out these links:

- [The Mountain Campus website](#)
- [The Mountain Campus Tumblr](#), for photos and posts following student progress through the semester
- [The Mountain Campus Vimeo site](#), featuring both student videos and videos of the building's construction
- [Bensonwood, designers and builders, on the Mountain Campus timber-frame project](#)
- [Green Energy Times: “Mountain Campus Boasts Sustainability”](#)

Getting started: Tips from Burr and Burton Mountain Campus leaders

- **Embrace diversity, complexity, and interconnectedness.** “The problems we’re dealing with have to be looked at from a systems perspective, from this perspective of complexity,” says Freeman. “We can’t teach students to think in a hierarchical fashion, a siloed fashion, if we want them to think about reality.”
- **Ask “why?” before you ask “how?”** As Freeman puts it, “Figure out your larger mission, your passion. That will unify your students. And then build the program around that.” Create a mission grounded in today that also dreams for tomorrow: “Build it around reality as much as you can!”
- **Make that larger mission clear to your students.** “Providing the context, the greater goal, is very powerful,” says Freeman. “There’s a lot of talk in the educational world about how we build intrinsic motivation, grit, perseverance. So much of that so easily emerges when you’re working towards something greater than the individual learning.
- **Vision drives practicality.** “Bring people to the table who are motivated, who are willing to think creatively, and design big,” says Freeman. “Go for it! Do that first. Then we all have to face realities of finance, and what we can get people to understand and buy into. But if there’s a really compelling vision that’s on the scale of addressing these global issues, people will get behind it.”
- **Student voice is powerful.** “You get kids into the conversation,” says Freeman, “and that’s a huge driver. Often they’re very bluntly articulate about what works and doesn’t work. This is what they’ve been living.”
- **Start building interconnectedness among faculty.** “Find time to collaborate with other educators in other disciplines in your school,” says Joyce, and find out “what are the threads that overlap.”
- **Choose assessment that goes beyond grading.** “We have an intentional reflective process where students are thinking about the way they think — metacognition,” says Freeman. “We’ve removed grades. This is a pass-fail program; students are assessed on habits of mind and behaviors.”

- Involve professionals from the community. “Most people who love their work love to share it, and love to have people ask questions about it,” says Joyce. This kind of passion shows students that “you can choose something you love” for work.
- Be an enthusiastic driver, but let students take the wheel sometimes. “As educators, we are interested in the student experience,” says Joyce. “Part of that is bringing students along with you — and part of it is following their interest and issues.”

The Mountain Campus’s Five Habits of Mind and Behavior

The 15-week arc of education at the Mountain Campus is structured and guided by five paired “habits of mind and behavior,” which are also used as assessment metrics for the students.

1. **Empathy and stewardship.** “You first have to have empathy and understanding of people and the environment before you can take care of them,” says Freeman. “That’s the first piece we work on: developing a relationship with the human and natural community as the foundation for action.”
2. **Initiative and perseverance.** “You need to have the initiative to step forward and act,” says Freeman, “and you have to persevere through the challenges” that will inevitably arise.
3. **Confidence and humility.** “[We] see those two as very much linked,” says Freeman. “We need to have confidence in ourselves and what we believe in, and we need to have the humility to realize that we don’t have all the answers, and that we are unable to solve problems on our own.”
4. **Critical thinking and communication.** “We need to think about problems and systems,” Freeman says, “and we need to be able to communicate that.”
5. **Leadership and teamwork.** “Understanding that through initiatives, you’ll need to take on leadership roles,” which can look different from project to project and place to place, says Freeman. “Tied directly to that,” he adds, “is effectively working as a team.”



Students make frames for beehives as part of their study of climate change and pollinators.

Edge Academy, Essex Middle School Essex

In Essex, there's a dedicated group of people taking on climate resilience projects. They've built composting stations, researched alternative energy, written grants, interviewed solar installation companies, performed plays, designed, built, and staffed a working sugarhouse, constructed beehives and a hydroponics system that doubles as graywater treatment, and done hours of community education around all of these projects.

Who are these active, environmentally aware citizens? Middle schoolers.

At the Edge Academy, 41 students in grades 7 and 8 develop a year-long project, driven by their own questions and interests. "They are meeting with community partners and engaging with what the real world is like," says Lindsey Halman, who co-leads the Edge team with Phil Young.

These real-life, hands-on projects become a focus for all kinds of

learning, from arts to mathematics to science to humanities. This interdisciplinary approach includes climate resilience.

"All the projects really tie in education for sustainability," Halman says. "Climate is just integrated into our life and our practices. It's not just one focus."

The Edge Academy started as a school-within-a-school for grades 4–8 in 2009, in response to a district-wide call for innovative proposals to change the way

school was done and help reach all types of learners — "students who were struggling and disengaged, and also students who were gifted, who needed to be pushed beyond" what school typically offered, says Halman.

Halman was one of a team of five people who started Edge. They met all summer long, and before diving into the details of pedagogy, they talked about their larger dreams and goals for the new school.

"We always refer back to that mission and vision. We have the kids look at it," Halman says. "That was the first step."

The team envisioned a place where what to learn was a choice made by the learners themselves. Students pick a project at the beginning of the year, based on their interests, and follow that project all year, weaving in many different subject areas as they go.

Not everyone was on board with this new way of doing school. "The first year, it was so far out of people's comfort zones," Halman says. "There was a lot of pushback. Parents were not comfortable. It didn't look like 'school.'"

Since then, the Edge has shifted to become a team for seventh and eighth grade only, and has become more integrated into the larger middle school. Project-based learning is still a key part of the Edge, though, and a big part of every afternoon is devoted to project time.



"All the projects really tie in education for sustainability, and positive impact in the community," Halman reflects. "They are just practices that are incorporated into our daily lives."

Lindsey Halman, Educator Edge Academy

The first major project students took on was getting the school to go solar, in 2009. A group of Edge students were the first student-led team to take on the Vermont Energy Education Program's year-long Green School Energy Challenge. They researched alternative energy and decided that solar was the way to go. The students then wrote a grant to fund the solar panels, presented their proposal to the school board and the town energy committee, and even interviewed the contractors who were bidding for installation of the panels. Now, 81 panels on the roof provide 15% to 20% of the school's energy needs.

Project two was composting. Students built a small-scale composting system with the help of the Vermont Youth Conservation Corps in 2009. Two years later, students at Edge worked with the Chittenden Solid Waste District to do a waste stream analysis and plan and build

a compost system for the entire school district.

The project went beyond simple mechanics of bins and buckets. How do you change a whole culture's relationship to waste? Other students would need to be educated about how to compost properly.

Edge students drew on the arts as a way of communicating about science and environmental issues. They wrote a play about composting, which they then performed for the elementary school. An interactive game with the younger students on using their new waste station followed. The waste stations were adopted successfully by all the schools, and there continues to be district-wide composting.

Essex Middle School is situated on a large campus, including a wetland, and the Edge has taken



This diversity of community partners reflects how, at the Edge, climate resilience is a community effort — and a school subject that's part of every other subject.



advantage of the learning opportunities offered by the outdoors.

“We spend a lot of time exploring our campus, what exists here, and how that has changed over time,” says Halman. “We do a lot of data collection and tracking.”

Recently, students have used their campus to explore one of Vermont’s most beloved industries that’s also the most threatened by climate change: Maple sugaring.

“Our kids designed and built a sugarhouse and sugaring operation,” Halman says. “We look at what the impact of the climate is on this industry.” Edge students head out to the sugarhouse every spring and make maple syrup themselves, with Phil Young’s help.

“We sell some syrup to parents, we donate some to the cafeteria,” says Young. It’s not a large operation — “We make, like, five gallons,” he says — but the opportunities for learning exceed the syrup production. “We integrate with math. We do a lot of stuff with proportions and rate — proportional relationship and ratios are a major part of the seventh grade year.”

Peer-to-peer education also comes into play. The sugarhouse is a field trip destination for elementary grades. “[Edge] students run the field trips,” notes Young, leading sugaring-inspired math activities for their younger peers as well as giving a general tour of the sugarhouse.

Students have also built beehives, which live off-site (due to liability) and are managed by Young, though students often take field trips there and revisit the issue of pollinators and climate change.

“We did a lot of learning about bees this year and the bee population,” says Halman. “We talk about the three justices — environmental, social, and economic — and the impact that this issue has on those.”

This year’s projects also include an idling study, which “has to do with climate, but also people’s health and well-being,” notes Halman, and a model of an “eco-machine,” a graywater treatment/

hydroponic system that can feed plants and clean water at the same time.

“All the projects really tie in education for sustainability, and positive impact in the community,” Halman reflects. “They are just practices that are incorporated into our daily lives.”

“It’s very student-focused,” she says. “Phil and I have an interest, but their interests have given us more interest!”

This student interest has engaged other staff as well. “Neil McIntosh, who’s head of buildings and grounds for the district, has been a huge supporter,” says Halman. “He’s always engaged in a lot of conversations with us. He’s been awesome.”

McIntosh encourages students to take the lead on projects, according to Halman. “He didn’t help us build anything. He just says ‘yeah.’”

Part of that connection is personal. “His daughter was on our team from our first year together,” Halman says. “He saw her engagement in her learning. She wrote her college essay on her Edge Academy team experience.”

“She got a full ride!” adds Young with a laugh.

McIntosh’s daughter is not the only teenager who was shaped by her time at the Edge. “They learn a lot, but they don’t realize it ‘til later on,” says Young.

“We have our high-school students come back every year to talk to the middle schoolers,” Halman says. “They really speak to the skills and opportunity they had here that sets them on the path for high school.”

Community partners play a large role in the Edge experience. Besides the solid waste district, Halman mentions a tech partnership with the Tarrant Institute at UVM, an artist-in-residency partnership with the Flynn, a design partnership with an ecological design class at UVM, and many visitors and guest speakers, including Bill McKibben.

This diversity of community partners reflects how, at the Edge, climate resilience is a community effort — and a school subject that’s part of every other subject. “It’s woven into our life,” says Halman.

Getting started: Tips from Edge Academy leaders

- **Ask “why” — and keep asking it.** “Begin with the creation of a mission and vision statement,” says Halman. “It is extremely important to articulate what it is you believe about teaching and learning. We revisit our mission and vision every year to see how we can continue to improve as a team.”
- **Follow students’ enthusiasm to keep up your own energy and focus.** “There will always be new ideas,” says Halman. “The kids will always have interesting questions.”
- **Think of climate resilience as a guiding thread rather than a single subject.** Halman and Young don’t specifically teach “climate resilience.” Rather, climate and sustainability are bigger questions that become part of most lessons and projects at Edge. As Halman says, “It’s just integrated into our life.”

Resources and further reading

For more on the Edge, their projects, and their approach, check out these links:

- [Edge Negotiated Curriculum Model and Process](#)
- [Sustainable Schools: What Makes the Edge Unique?](#)
- [Sustainable Schools: Compost](#)
- [WPTZ news spot: Teaching Kids About Compost](#)
- [WPTZ news spot: School Solar Panels](#)
- [Tarrant Institute blog post: Sugaring, STEM, Community Connections](#)



Students in the Green Team carry out school-wide projects.

Main Street Middle School Montpelier

Small changes make a big difference. That's the motto at Main Street Middle School in Montpelier, where groups of seventh and eighth graders are tackling bite-size climate actions that add up.

"In order for kids to get exposed to citizenship, we have to provide opportunities at the school level," says Don Taylor, who co-leads Team Summit at MSMS with Amy Kimball. "If you did a survey of 50 kids, maybe five or

10 have had exposure to environmental responsibility."

Kimball, who teaches math and science, and Taylor, who teaches language arts and social studies, are working to change that. Their 49-student team is divided into nine or 10 "committees," groups of kids (collectively called the Green Team) who get together to plan and carry out school-wide projects. These projects have had an increasing focus on climate resilience in the 12 years Kimball

and Taylor have been team teaching at MSMS.

Some of the Green Team committee projects are suggested by adults, but Kimball and Taylor are especially interested in supporting student-driven committee ideas. Taylor recalls a moment from five years ago, when a staff person from Central Vermont Solid Waste Management District visited the school and suggested doing a trash audit, which inspired the

team to start focusing more on energy and waste issues.

The trash audit led to students creating slogans, logos, and PSAs for environmental issues as part of a unit on advertising and propaganda. "We started talking about paper and waste," he says, "and the lightbulb went on, at least for me: We saw how engaged they could be when they were making the choices and creating the materials."

Green Team committees are more than a way to take action. Students are learning "collaboration, working in a small group, cooperation, responsibility," says Taylor. "We help kids develop goals. These are really skills required in the modern-day workplace."

Committee time is part of Team Summit's core curriculum time. "At the moment, that means we are setting aside about 45 to 50 minutes a week for our sustainability initiatives," he says. "We also try to find as many connections as possible between the Green Team and the curriculum. Often this means reading comprehension activities, geography, or reading graphs and charts that deal with issues related to our Green Team."

One committee project that's become a yearly tradition is the Great Locker Clean-Out. Since 2012, instead of tossing leftover school supplies in the trash in June, a student committee reclaims notebooks with paper still left in them, useable pens and pencils, and so on. "We've collected over 150 binders each



"It's one of those science issues where if you're not teaching it, you have your head in the sand," she says. "It's prevalent in the news, prevalent in students' lives — we'd be doing them a disservice if we're not talking about it."

Amy Kimball, Educator Main Street Middle School

year, and reams of paper," says Kimball. "And kids can come here on the first day of school and get all their supplies for free."

Other committees collect bottle caps for special recycling, manage the compost buckets that now live in every classroom, and turn old greeting cards into bookmarks that are "a hot commodity in the library." Committees have held a green expo at MSMS, conducted a lighting audit, and installed stickers on light switches reminding people to turn off the lights and save energy. Other committees are working on battery recycling, reducing idling, and using less paper towels and printer paper.

One Green Team committee is responsible for doing outreach about all these activities, and regularly appears on Montpelier's community access TV station to talk about MSMS's climate resilience work. "We're starting to

create a culture, a tradition, around sustainability," says Taylor.

In 2013, a student committee worked on another big trash item: the ubiquitous single-use water bottle sold in school vending machines. That spring, "our kids convinced the central office to eliminate single-use water bottles," says Kimball.

But over the summer, the administration started to change their mind. "Pam [Arnold], our principal, went to bat for us," says Kimball. "'You can sell them in the other schools [in Montpelier],' she said, 'but you can't sell them here. These kids worked too hard for this.'"

Arnold's support and advocacy for student voice paid off. Now there are water-bottle filling stations in all Montpelier schools, and, thanks to funding from a grant written by Team Summit, every incoming student at MSMS is

given their own reusable water bottle when they arrive.

Other members of the school community have also been supportive of the committee projects. "Tom Woods, the facilities director, has helped with lighting issues" like a school-wide lighting use survey, says Kimball, as well as talking to the tech folks in the lab about using power strips. The committees have done outreach to other teams and classes about their projects that Kimball says has been well received.

Support has also come from outside the school walls. "Parents have been helpful," says Taylor, connecting Team Summit with local organizations and community partners, relationships that continue to support the team's work. "Most people, when we present them with ideas, are helpful," he adds.

If cultural and community change is one half of climate resilience work, numbers are the other half. "We are always collecting evidence about the difference we are making," says Taylor. They are happy to share that evidence — 25,000 bottle caps saved from the trash, 273 pounds of food composted, 106 binders refurbished, 1,300 batteries recycled. As Kimball puts it: "Opinions are great, but what's the data?"

Kimball is equally blunt about why teaching climate change and climate resilience is important. "It's one of those science issues where if you're not teaching it, you have your head in the sand," she says. "It's prevalent in the news, prevalent in students' lives —

we'd be doing them a disservice if we're not talking about it."

"This will be one of the biggest challenges they will face," says Taylor.

Taylor and Kimball are proud of the work their students have done, but they're looking for ways to integrate the Green Team activities more fully into the traditional classroom curriculum, which doesn't always support this type of connected, interdisciplinary learning. "You have to be willing to make adjustments," says Taylor, who notes that it helps that he and Kimball have a strong teaching partnership.

"The more we've done this, the more we connect it to our curriculum," says Taylor. "I'd like to see our team develop a curriculum that we could transfer to other teams in other schools."

The immensity of the climate crisis can feel overwhelming, but Team Summit's Green Team is starting with the changes they CAN make. "What feels small at the time, over time, can turn into powerful examples of what people can do," says Taylor.



Students doing a trash audit.

Getting started: Tips from Main Street Middle School leaders

- **Start small.** Pick one place to start, suggests Kimball — a trash audit or recycling, for example — and build from there.
- **Link activities to curriculum.** “Finding connections to current curriculum is a great way for teams to start,” says Taylor. “This is particularly true when considering the proficiency-based graduation requirements and transferable skills that the state of Vermont is implementing.”
- **Let students lead.** “Allow students to have a voice and choice in a project they work on in small groups,” says Kimball.
- **Use action to practice other skills.** You can “use the study of climate change and sustainability to build academic and technology skills,” suggests Taylor. “Green Team activities are an excellent example of multidisciplinary, integrated, and real-world activities that can help bring relevance to educational offerings.”
- **Keep it local.** “Don't be afraid to partner up with outside resources and organizations,” says Kimball, who suggests the Vermont Energy Education Program, Idle Free Vermont, and your local solid waste management district as good places to start. Taylor agrees: “There are great Vermont resources that students and teachers can use to explore climate change and sustainability right in our backyard.”
- **Use models from other schools to guide your developing programs,** suggests Taylor.

Resources and further reading

For more on Main Street Middle School's Team Summit/Green Team, their projects, and their approach, check out these links:

- [Team Summit's Green Team website](#)
- [Team Summit's YouTube channel](#), with “Green Team News” videos that are also aired on the local community access TV station
- [Montpelier Bridge: “Green Team Promotes Environmental Awareness at Main Street Middle School”](#)



Students harvesting in the school garden.

Thetford Elementary School Thetford

At Thetford Elementary, every student has a hand in growing the vegetables and fruit that they'll eat for lunch — a meal whose scraps will be composted back into the same gardens. These students go to school in a building powered 100% by solar energy, and they recycle so much of their waste that the garbage truck only comes once a month.

This holistic approach to food, waste, and energy has grown very organically, much like the school's bountiful raised-bed gardens.

"It's been some small, slow steps that are really building a culture of change," says Erin Sterner, who serves on the Thetford school board and the Orange East Supervisory Union board. "There hasn't been a real blueprint or map."

Working without a map means that school staff who have an idea and are willing to run with it can find themselves becoming climate resilience leaders. Joette Hayashigawa, who has been the

school nurse at Thetford for more than 10 years, is one of those people. As Kevin Petrone, Thetford's principal, says, "Joette has been the key person, or highly involved with everything."

Hayashigawa says that she was hired around the time when there were new educational guidelines coming out about health education, and school staff asked for her help in meeting the guidelines.

"They said, 'We want you to teach about health,'" she recalls. "And I was like, 'Oh my god, that sounds so boring.' I've read that you can talk to kids about healthy foods and it doesn't change their habits at all. I said, 'Well, what about a garden?'"

Hayashigawa's husband, who is a builder, volunteered to construct six raised beds; local farms donated seeds; and the project was off and rolling. "We proved we could grow food, right away," Hayashigawa says.

"We did need to interweave it with school studies — they didn't have time to just go out and garden," she adds. So Hayashigawa worked with the K–2 teachers to develop a curriculum focused around what was growing in the gardens. Each class had its own bed to tend, which they continue to do during each growing season, integrated with classroom studies.

"They love getting outside and getting their hands dirty," says Petrone. "There are very few kids who would prefer to sit in the classroom than be outside. It just makes learning more real, more fun."

Several years into a successful K–2 garden program, seven more beds were added, for a total of 13. Fruit was also added by student request: Blueberry, raspberry, and cranberry bushes and apple and pear trees are now part of the school's landscaping.

The school lunch manager started to take notice of the quantity of food being produced. Now cafeteria staff work with the staff

and students, making sure that's what's being grown is what people want for lunch.

"If you bring the food in from the gardens, kids are more likely to eat it," notes Hayashigawa. "This is a lot more exciting."

Not only are students eating food they grew, but they are also involved in preparing it. "This fall the first grade had a farm stand. They made popcorn from the garden, toasted pumpkin seeds, and made little muffins," she says. "The third grade makes cranberry bread out of the cranberries."

The addition of more beds and fruit bushes meant more room for student involvement in the growing process. Now each class in the K–6 school has their own specific job to do to make the gardens run smoothly. The third graders take care of the blueberries, for example, and the fifth and sixth graders handle the compost system.

Thetford turns all its food waste back into soil for its gardens — again, a project that grew slowly. "People started saying, 'Why don't we start composting our food?'" recalls Hayashigawa, "which I thought was completely crazy. We had tried doing this in a haphazard way, and we immediately had a rat colony."

Hayashigawa decided to give composting another go, though, and she helped the school get a grant from the local solid waste district that paid for training from Highfields Compost, as well as for construction of five large, sturdy bins with a roof.

"They love getting outside and getting their hands dirty."

Kevin Petrone, Principal Thetford Elementary School

The school also took time to get "all our systems running," Hayashigawa says — they collected food scraps and sent them out to a local chicken farm for a half a year, making sure that students knew how to sort everything before starting to compost the scraps themselves.

Now Hayashigawa is a convert. "The composting part itself is incredibly easy, if you follow a few protocols," she says.

Petrone says that the students are converts as well. "The way that [sustainability practices] are ingrained in our students is superb," he says. "When they have something to compost or recycle, they are looking all over for places to put it."

Recycling is another major part of Thetford's culture. The school has reduced trash pickups from once a week to once a month over the last

10 years. "We started doing some serious recycling," says Hayashigawa.

A dumpster dive activity with students revealed that brown paper towels and milk cartons were two of the major items getting thrown away. Brown paper towels from classrooms started heading to the compost pile. Milk cartons were discovered to be recyclable — though not for long.

In the past, the Thetford Recycling Center used haulers that went out of state, and "they were able to send out all kinds of stuff," says Hayashigawa, including the ever-present school milk carton. Ironically, when Vermont's universal recycling law went into effect this past summer, the recycling center had to switch to a large regional hauler that did not accept milk cartons.

"Our trash went up 60 percent," she says. "It was very upsetting."

Students turned that distress into action. "Kids wrote letters and said, 'Look more carefully into the law, there was an oversight, you're sending stuff to the landfill that shouldn't be,'" says Petrone.

"We wrote the legislature," says Hayashigawa. "The town and the selectboard got involved." Prompted by the outcry, the regional hauler looked into Thetford's local waste management center and discovered that they were capable of recycling these more unusual items after all. Thetford Elementary students are now back to dropping milk cartons in the recycle bin instead of the trash can. (Hayashigawa adds that, thanks to a UDSA grant, the school recently purchased a milk dispenser for the cafeteria; using cups instead of cartons will reduce the school's waste stream even more.)

Town leadership was also involved in Thetford Elementary's most recent climate resilience project: installing a net-metered solar array that covers 100 percent of the school's electricity costs, which came online at the beginning of 2015. The school has also "retired" all of the renewable energy credits associated with the array, rather than participate in the usual process of selling the credits (which allows companies to claim they are powered by renewable energy, much like carbon offsets).

"It's a great example of how the culture has evolved to be really open and encouraging of improvements and new ideas," says Sterner.

The school was approached by a developer interested in putting an array on the building, and so the school board reached out to the town energy committee and the local nonprofit Sustainable Energy Resources Group (SERG) to ask for their expertise on the proposal. This led to a larger analysis of whether it was feasible for the school to put in panels on their own, without a developer's help. Along the way, people started to get excited.

"The [school] board was like, 'This is the right thing to do; action is important,'" recalls Sterner. "That was a little sliver of an opportunity to act, to do something official."

Money came in to back up the moral conviction. "We were able to secure a grant from the state that covered a third of the cost of the array, which tipped the scales financially," says Sterner. "The town voted in favor of a bond to cover the rest."

Sterner says that the town of Thetford has often given strong support to environmental initiatives. "The culture encouraged us to do the best we could possibly do," she says. "That mindset led to us owning our array."

The solar array, she adds, "has been cash positive from day one. It generates more than the payments on the bond — a net savings of more than \$7,000 in the past year."

As a school board member, Sterner says that economics and climate resilience are natural partners.

"The financial climate in schools is really tough," she says. "We have to think outside the box — not just cutting staff or cutting programs. There are ways of adding value that can be beneficial. That's a big part of what climate resilience is: balancing all those aspects. Not only are we being fiscally conservative, but we're providing a great educational opportunity, and environmental benefits as well."

Working without a blueprint and pursuing projects as they naturally arise is a good way to nurture that



Students turn compost and take the temperature.



2016 kind of balance, Sterner suggests. "It speaks to that culture of openness and awareness that's really important for schools to have, so you're able to recognize an opportunity when it comes along," she says. "If we hadn't been open to a solar array, we would have missed that opportunity."

The local community has embraced the climate resilience opportunities at Thetford Elementary, as well. Community members, parents, and partners of school staff members donate compost ingredients like horse manure, sawdust, and leaves. A parent group helped raise donations for the gardens, and a group of adult volunteers tend the beds during the summer. Parents and town volunteers join the students for cider pressing in the fall. Cat Buxton, a community educator (originally employed by Cedar Circle Farm, but now working independently), has donated many hours of assistance to the garden project, and Bob Walker, the founder of SERG, was a "key player," says Sterner, in educating the town about the solar project.

"It really does take a village to tackle an issue such as climate resilience or sustainability," says Sterner.

The excitement of the students has been a major force in keeping the energy of the village going. "[Kids] really think they can do everything," says Sterner, who's also a parent of a kindergartener and a preschooler. "They have this tremendous amount of hope and can-do attitude that a lot of adults don't have."

Thetford Elementary students are bringing that engagement with them to Thetford Academy, the middle and high school, which previously had no recycling or composting program. "They'd get to middle school and ask, 'Where did everything go?'" says Petrone. The new seventh-graders' commitment to reducing waste has since inspired Thetford Academy to start their own recycling and composting initiatives.

Hayashigawa says that personal well-being and planetary well-being are inextricably linked.

"If you want to talk about food, then you end up talking about soil," she says. "Then respect for nature, and everything that it takes for a good

environment to grow things. It encompasses personal health, but once you're out there you can't help but talk about the things that affect environmental health. You start with food, but in the planting, you talk about good bugs; not just good bugs, but also animals... the whole thing gets bigger and bigger."

Sterner, Hayashigawa, and Petrone all have seeds of ideas for the future — making a stronger educational connection to the solar array, increasing the project-based learning aspect of the curriculum, including students on the decision-making committee about outdoor space, and proactively assessing the building to see what other improvements might be made.

They have some excellent soil to plant those ideas in, both literally and metaphorically.

"I think there's an agricultural gene in human beings," says Hayashigawa. "You can see in all the kids — the engagement — as soon as they get their hands in the dirt."



Getting started: Tips from Thetford Elementary leaders

- **Find out the interests and expertise** of your students and staff. Gather people together who have a shared interest in climate resilience. Thetford Elementary has a “green team” of adults in the school who are interested in sustainability projects, and that team helps oversee and organize the many projects going on.
- **Start small.** As Hayashigawa says: “Don't bite off more than you can weed!”
- Sometimes all it takes is **a few core committed people.** “If there's a group willing to do that groundwork, the teachers will accept it,” says Petrone.
- **Expect to work around the normal school schedule at first,** but then ask the administration to incorporate these “extra” tasks — like weeding or checking on compost or recycling bins — into the normal school schedule, “like pickup duty or lunch duty,” says Hayashigawa.
- **Plug into what’s happening already, and find ways to achieve multiple goals with one project.** “It's important to remember that everyone will be coming to the table with different focuses and different interests,” says Sterner. “The more you can broaden the appeal, the more energy there's going to be.”
- **Seek out community partners,** like local farms, composting companies, builders, nonprofits, or the town energy committee, to lend their expertise to your project, especially in the startup phase. “People and entities who donate or volunteer become emotionally invested in the success of a project and become part of what sustains projects for the long run,” says Hayashigawa.
- **Remember that natural beauty has power.** “[The gardens are] such an intuitively natural thing,” says Hayashigawa, “that people respond to it, especially if you can make them beautiful.”
- **Look to other schools as models.** Thetford Elementary staff are happy to share their knowledge and experience, and can even come lead a workshop for your school. “Our doors are always open,” says Petrone, “if anyone wants to come visit and see what we're doing here.”

Resources and further reading

For more on Thetford Elementary, their projects, and their approach, check out these links:

- [Thetford Elementary School website](#)
- [Educator Cat Buxton on Thetford's garden/compost food loop](#)
- [Valley News: “Thetford School Seeks Solar Panel Funding”](#)
- [Green Energy Times: “Thetford Elementary School Excels at Waste Reduction”](#)

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