A THREE PRONGED APPROACH TO BETTER ENERGY:

APPLYING THE RIGHT PRESSURE!

HARVESTING PIEZOELECTRICITY
(WALKING THE WALK)

SHAPING PUBLIC POLICY
(TALKING THE TALK)

BUILDING SUSTAINABLE COMMUNITY
(BLOCK BY BLOCK)

THE BLS PRESSURE PLATOON, BOSTON LATIN SCHOOL

Introduction/Our Challenge

There is one thing that all BLS students use daily: energy. Energy that powers our vehicles, generates our electricity, and is integral to all of our daily routines, from being awakened by an alarm clock in a warm house to flipping on the lights, taking a hot shower, making a piece of toast, and checking texts or email on our fully charged devices, energy is used endlessly, as if the flow of power from our outlets and the gas pumps will never cease. However, this system is very problematic because the *way* energy is typically created entails the depletion of limited fossil fuel resources such as coal, oil, and natural gas, and the *burning* of these fossil fuels poses hazards not only for the environment (greenhouse gasses, etc.), but also creates health risks for the humans who help harvest the natural resources as well as those who live near where the natural resources are burned.

Researching the Need for Change

Mining is the most common way that coal, the most commonly used fossil fuel, is harvested. However, with mining there are constant dangers of a cave in or coal dust explosions, with thousands of deaths per year since the 1900s in the US[2]. Although technology exists that lessens the chances of a cave in, coal miners and their neighbors still suffer from chronic lung diseases such as pneumonia and Black Lung caused by coal dust inhalation that reduce their life expectancies, causing nearly 670,000 deaths every year in China alone[3]. Coal also produces environmental issues, as the land gets ruined with mountaintop removal threatening the organisms and ecosystems living in the surrounding area through loss of habitats, such as the trees and ground that are removed, and loss of water and food sources as rivers get polluted with trace minerals, making them toxic to living organisms. The microorganisms responsible for adding nitrogen to the ground get killed off, preventing plants from growing due to lack of nutrients in the soil[4]. One of the most well-known environmental concerns is the release of carbon dioxide into the atmosphere due to burning fossil fuels. Coal, the most heavily used fossil fuel, is responsible for 37% of the world's electricity[5]. There are additional problems that come from the harvesting and burning of other fossil fuels.

In recent years, much of the world has begun to realize the need for safer, cleaner, less damaging, and more efficient ways to produce energy. But it is difficult for many to imagine change on the scale that would be required to transition away from the use of non-renewable energy sources entirely, especially since the industries and infrastructure currently in place provide most of the world's energy and electricity using non-renewable sources. Those industries have a stake in a world that continues to rely on fossil fuels for energy and electricity production. People argue that the cost of such a transition would be prohibitive.

Our 3-Pronged Solution:

We wanted to undertake a very focused project that would address the energy problem on three very specific levels:

A. Offering A Better Source of Energy: Offering a concrete alternative to traditional, unsustainable sources of energy. We thought, what if the transition could be made by contributions from all human beings as they simply go about their daily business? No interruptions, no extra effort. Just do what you do everyday and the change to cleaner energy will be brought about. We set about envisioning a practical, visible, low cost, easily implementable alternative to the form of energy our school currently uses, one that students could interact with and be aware of every day, something that they would see generating energy simply through the activity pf students doing what they already do—entering the building and walking from class to class.

B. Demanding a Shift inPublic Policy: We also wanted to push lawmakers to address the problem of the continuing generation of greenhouse gasses created by the burning of fossil fuels by advocating for carbon pricing through a lobbying campaign in partnership with Our Climate. https://www.ourclimate.us/the_campaign

C. Promoting Behavioral Change: We wanted to create a space that students would like (always give them something they will like) while at the same time giving them an opportunity to learn while in that space about the sort of shifts that will be required of all of us if we are to transition to clean energy and a more sustainable world. We worked with an architect, Stephanie MacNeil, to create plans for a Sustainable Community Room at BLS focused on giving students a relaxation space that would also promote the energy mindset and habits needed in future energy users.

Part I - The First Prong:– AN ENERGY ALTERNATIVE – The "STEP BY STEP" Pressure Plate

When walking, the point at which the foot comes into contact with the ground produces kinetic energy. Instead of wasting this kinetic energy, our team, the Pressure Platoon, wanted to see if we could create a way that the kinetic energy from student footsteps could be harnessed and converted into electricity that could be harvested. Our goal was to develop a tool for Boston Latin School that could help offset the school's daily energy consumption by generating some of our energy needs through the everyday activities that students engage in: entering the building and walking from class to class.

We concluded that the kinetic energy from student footsteps could be converted into electricity using a piezoelectric generator. Piezoelectricity, put concisely, is electricity made from pressure. When a mechanical stress (pressure) or strain (deformation) is applied to piezoelectric material, the response is the generation of an internal charge in the material. This charge can be described as electrical potential energy (voltage) that can be used like any other energy source. Using a device that we researched and invented that we're calling the "Step By Step piezoelectric pressure plate" we will harvest the potential energy generated by people stepping on the plate and store it in an ultrathin lithium ion battery, so that the energy in the battery can be readily used as electricity.

Our goal is that the Step By Step will not just produce clean energy, but it will serve as a way of helping future energy consumers begin to envision how an incremental shift towards producing clean electricity is very possible. Renewable energy sources such as solar, wind, and hydroelectricity that already exist, are of course are all effective ways to produce clean electricity, but they all rely on external effects such as the wind, sun, and water-all as well as large infrastructure. We wanted to harness the daily power of human beings engaged in their routine activities. Kinetic energy, created by sources such as cars driving on the streets and humans walking through their day are a constant that can continuously generate energy. So instead of relying on a sunny day or a gust of wind, electricity could be collected from the periodic and repetitive movement of human beings within schools, hospitals, and other busy buildings.

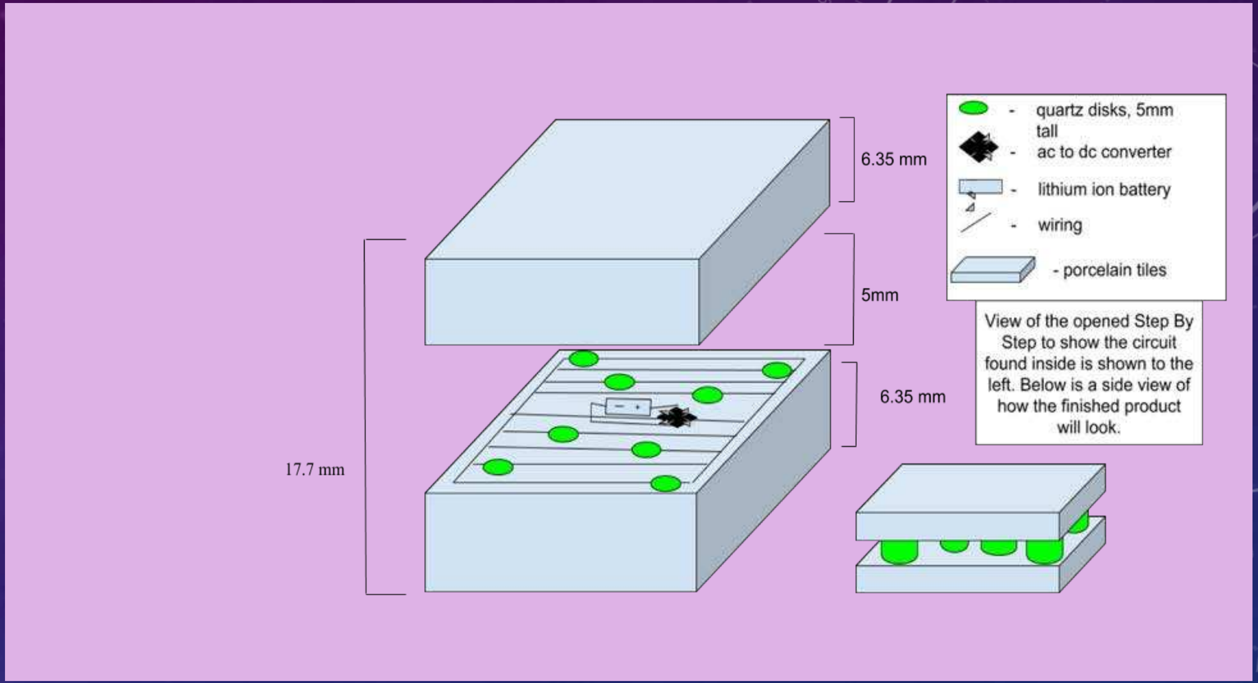
Boston Latin School already has undertaken many green initiatives such as solar panels on the roof, vegetation trays to reduce carbon dioxide, a lighting retrofit saving 200,000 kWh per year, and a hydroponic freight farm for sustainable growing of greens[6]. But the solar panels don't work at night, and the new lighting fixtures don't help when they aren't on. The electricity used by our school is recorded daily on a Lucid Dashboard at the front entrance of the building, highlighting a general trend of increased electrical use during the school day when students arrive and stopping once they leave. Every time electricity is used is it transformed into a new form of energy.   Similarly, our proposed "Step By Step" device will take kinetic energy and convert it into electrical energy. Boston Latin School's energy consumption peaks between 6:00 A.M. and 9 A.M. on Mondays through Fridays, as students and faculty arrive at school and walk through the front doors to their first classes of the school day, a trend documented on the Lucid Dashboard that calculates the amount of energy Boston Latin School consumes.

The students and faculty use electricity to heat up the school, operate the lights, run school computers, prepare school lunches, and more. The school would benefit from energy generated by the Step By Step which would help supply the building's electrical needs. However, implementing the piezoelectric forces found naturally in quartz crystals would be a new form of electricity that has never been used by our school. This is a form of energy that is generated when certain materials, in our case quartz crystals, creates electrical charges when mechanical pressure is applied. The power being generated would directly reduce the amount of unsustainable, unclean energy, the electricity generated from the burning of fossil fuels that contribute to global warming, and the energy that is currently in use by Boston Latin School.

The Step by Step will increase the amount of clean, renewable energy consumed. Not only will the school be using clean energy, but each student will be helping to power the school, demonstrating to them that clean electricity does not have to take a toll on their daily life, instead they are just walking into the school as they have been doing daily. It takes one step to begin to counteract global warming and that same step can start promoting cleaner energy. The Step by Step is both a metaphorical and practical demonstration of how such change can be brought about and will serve not only to generate energy, but also as a means of countering the powerful and discouraging narrative that the kind of change needed is overwhelming and beyond reach. The Step by Step demonstrates that change can be as simple as walking through your daily life as you always do, but with a vastly different and more sustainable outcome.

Methods

In order to investigate our project further, it was necessary to estimate the amount of electricity that would be produced by the Step By Step, since the use of piezoelectric plates to generate electricity is still a new and developing topic. Many studies we encountered were either not completed or not publicly available. Thus our electrical output estimates were determined based on results of studies completed for devices that that are not comparable in size to the Step By Step. Therefore, we will have a much firmer sense of the amount of electricity the Step By Step will generate after actual testing of the Step By Step Plate is finished. However, given that watts is equal to volts multiplied by the amperage, Boston Latin School should be able to reduce daily electricity consumption by 150 kilowatts per hour with just ten of the Step By Step plates. The school's average daily consumption is 3800 kilowatts of electricity per hour, according to our Lucid Dashboard, and that number is expected to be reduced to 3650 kilowatts per hour, because those 150 kilowatts per hour will be saved using Step By Step. It is expected that one Step By Step should produce 15 kilowatts after being stepped on 2500 times (a conservative estimate given that we have 2,400+ students in our school, not including faculty and staff.)



Above is a diagram of the Step By Step

The 2 outside tiles of the Step By Step will be made out of light porcelain and it will have a thin layer of rubber glued to it, to protect against someone slipping on the outer surface by making friction. The porcelain is water-resistant since it is not porous, so it will be effectual in keeping water out. Cuben fiber will be attached to the sides of the plate, to prevent water from entering the Step By Step plate through the sides. Both the upper and bottom porcelain tiles will be parallel square prisms, 304.8 mm long and wide, as well as 6.35 mm thick. In the 5 mm space between the porcelain tiles there will be 8 piezoelectric disks. Each of the disks will be 5 mm thick, extending the entire height of the 5 mm space. Four of the piezoelectric disks will be fixed onto the corners of the inside top and bottom tiles. The other 4 disks will be attached to the middle of the upper and lower tile. Each of the eight disks will be 20 mm in diameter. The quartz crystals will hold together the upper and bottom plates, since it will be fastened to both tiles. Since the space between the tiles is 5 mm, the compression of the plate will be slightly perceptible to the person who steps on it, ranging from 2-3 mm of compression. In the 5 mm space, there will also be copper wires connecting each of the quartz disks to the capacitor, a lithium ion battery. The ultra-thin lithium ion battery will be located in a hole carved into the bottom porcelain tile. As electric energy is created due to the mechanical pressure on the quartz crystal by the piezoelectric effect, the electricity will be stored in the ultrathin lithium-ion battery.

Creative Design

Piezoelectric materials are commonly found in everyday items from speakers to lighters, and only one company, Pavegen, currently makes piezoelectric tiles for electrical use, along with a second company that uses them for design and looks. Currently, Pavegen uses a triangular design, which allows their electromagnetic motors to be shared between multiple tiles but forces the tiles to be installed into the ground instead of resting on top of the ground, which our rectangular design is able to do while protecting the quartz disks. The problem with their tile is that it has to be placed into the ground instead of being able to rest on the floor, as our tile is able to do, and their costs around a couple thousand dollars per square meter, a price that we intend to significantly reduce to around $307.2-$645 per square meter[7]. Each tile will cost around $50-$60, with the quartz, electronics, and porcelain all costing around $10-$20 depending on their quality, strength, and which supplier we decide to use. Furthermore, since our porcelain tiles are rectangular prisms instead of circular disks, if there are multiple Step By Steps placed side by side, the tiles will take up less space lying adjacent to one another. Because porcelain tiles are stain-proof, the tiles will not absorb any dirt or mud that the person's foot may deposit on the tiles. Also, the Step By Steps plates' porcelain tiles on the outside consist of a heat-resistant and scratch resistant substance. Another difference with our Step By Step is that instead of using the electromagnetic motors that the Pavegen tile uses[7], the piezoelectricity of the quartz crystals that we will use will result in smaller compression, between 10mm and 5mm, meaning that our cost is further reduced. By using quartz instead of electromagnetic motors, in order for the deformation of the quartz and the piezoelectric effect to take place, there will be a slight height change as the plate is stepped on, less than 3 mm. Another improvement is the longevity of the product, by using quartz crystals instead of motors, moving parts are eliminated and the chance of the product breaking over time is reduced.

Potential Applications of the Step By Step

The entire plate will be small and light in weight, while maintaining its strength and structural integrity, therefore making it easily transportable. The plate can be used in areas reeling from the devasting effects of a natural disaster where power lines may have been destroyed, or where limited access or no access to gas generators exists. By using our device, these places in need of a stable energy supply will be able to find some relief due to the electricity made from the Step By Step.

Testing and Redesign

For data collection, we will run tests using the quartz disks to see how much electricity each one produces by using a voltmeter with a constant pressure for each quartz disk. Since we will be making our own quartz disk to generate the electricity as they aren't commercially available, we will first test the thickness and size at which the quartz disks are most efficient, ranging from 1mm to 10mm, and adjusting the distance between the upper and bottom porcelain plates depending on the height of the quartz disks. The same test will be done a second time but with materials that create better vibrations around the quartz disks, to test if the vibrations would continue applying and removing mechanical stress and generating more electricity even after the initial mechanical stress was removed. After a small scale test to see if there is any difference in efficiency between a vibrating material, the porcelain plate which was our original design, and a non-vibrating material around the quartz disks, there will be a test to determine the frequency that optimizes the vibrations for producing electricity, and if it is less than the normal vibration of porcelain we will had dampeners to lessen the vibrations formed.

After the optimal size of quartz is ascertained, there will be a test to determine the best setup for the circuit, first comparing how many watts, volts, and amps is produced by: (1) the single quartz disk; (2) two quartz disks in a series; and (3) two quartz disks in a parallel setup. The series should increase the voltage, while the parallel setup improves the amperage[8]. We will also test a mix of series in a parallel setup to test if six series in six parallels is the most efficient as explained in our hypothesis. Whether or not the series in parallel structure is better will be examined, if there is a result of diminishing returns (where the cost outweighs the energy yielded, we will reconfigure). Furthermore, a mix of different thickness for the quartz disks will be tested for efficiency in the circuit, since different thicknesses respond differently to different frequencies of vibrations. All of these tests will be done using wires with alligator clips instead of soldering them on and off. To test the volts, watts, and amps we will use a capacitor to maintain the charge for easier readings, using a voltmeter to measure the voltage, and an ampere to measure the current, and by multiplying volts by amps we get the amount of watts.

Multiple tests for each circuit will be set up, using different weights and dropping the weights on different places to determine the most productive combination of circuit setup and thickness of the quartz disc to test if the circuits perform differently under different mechanical stress. Taking the average mechanical stress closest to that produced by a human walking on the tile, it helps to find which circuit setup will be the most efficient, and also what part of the tile produces the most electricity when stepped on. Tests are necessary to determine which circuit setup produces the most electricity from all places it is stepped on by moving the position of the quartz disks.

After determining what material to use, the construction of the prototype will be built, in order to test out if the rubber on the top keeps out the water and stains from dirty shoes. It is also important to test for the maximum weight the quartz is able to hold, and if it is discovered that the quartz is unable to hold an adequate weight considering the average weight of a person, then more support will be added to the structure. By adding more quartz disks, and then by putting in metal stoppers to hold up the plate at a certain compression, adding support to the structure can be done. Thus, with more support, the mechanical strain on the quartz disks is reduced as well as the chance of them breaking. Then the prototype will be placed at the front entrance of our school, where an estimated 4 thousand feet walk through in the morning alone[9]. If the quartz disks break again, adjustments will be made in the height of the metal spotters to increase protect the quartz disks from breaking.

When the structure is completed, the crystals will be installed and the ability of the crystals to withstand the weight of a human will be assessed. Tests will be conducted to see which locations for the piezoelectric disks generate the most electricity, moving them around if needed. Once the optimal locations for the crystals are identified, more tests will be conducted in the front lobby of Boston Latin School. In this test, a multimeter will measure the voltage and current of the circuit in the Step by Step plates. The amount of footsteps placed onto the plate will be counted and then the average amount of electricity produced by each footstep will be ascertained.

When the Step By Step has been fully tested for functionality, the Boston Latin School student body will be asked to answer how they felt when stepping on the device. Their feedback on whether it was too obtrusive, the aesthetics of the device, and also if they even noticed it when they stepped on the plate will be an important part in improving the design of the plate. Initially the Step By Step will have an ultrathin lithium ion battery in the bottom layer of porcelain, but later it could be connected to the electrical system of buildings and places who use the tiles. We think it represents an important step forward in the long process towards perfecting sustainable energy sources.

As a replacement for quartz, if there is enough financial support, improvements will be made on the efficiency of the Step By Step by using a more effectual piezoelectric material such as lead zirconate titanate, also referred to as PZT. Moreover, the Step By Step's efficacy can be improved by adding a way to quickly take off the top layer of porcelain for quick and easy access to the interior of the plate. Once the design is out of the prototype phase, a way to easily access the electricity will be added that will be stored in the lithium ion battery, through a USB plug. Electrical cables can be utilized to attach the Step By Step plate to each other, so that access to the electricity of multiple tiles is possible since the plates are attached to one another through a single plug.

Results & Analysis

When Boston Latin School employs the Step By Step, the school will be able to reduce daily energy consumption, thus making Boston Latin School more sustainable in terms of energy. Since Boston Latin School uses 3800 kilowatts of electricity at peak consumption. If 6^7 watts are saved by the average force of a footstep hitting each Step By Step plate, and given that there are nearly 2,500 students and teachers walking through the school's front doors every morning, by the piezoelectric effect on the quartz, 15 kilowatts of energy will be preserved every morning from just one of our plates.

Conclusion Part 1

The Earth has a finite amount of energy sources, and so non-renewable energy sources which damage our environment will become less common as Earth's natural stores of fossil fuels, oil, and natural gas continue to be depleted. Therefore, society must work hard to use in lieu of those energy sources more renewable, sustainable energy sources and develop sustainable energy practices. This means in general preserving more energy, whether by homeowners using solar energy, or using the Step By Step to limit energy consumption. With the application of Step By Step, one

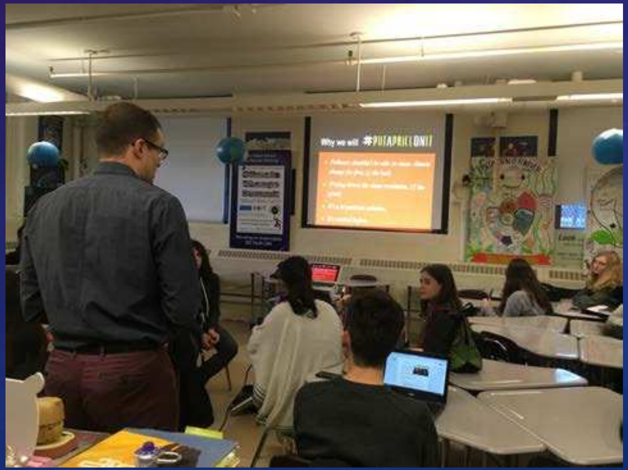
PART 2 - SHAPING PUBLIC POLICY BY TALKING THE TALK PUTTING PRESSURE ON LAWMAKERS

Boston Latin School Lobbying Project - In Partnership with Our Climate - https://www.ourclimate.us

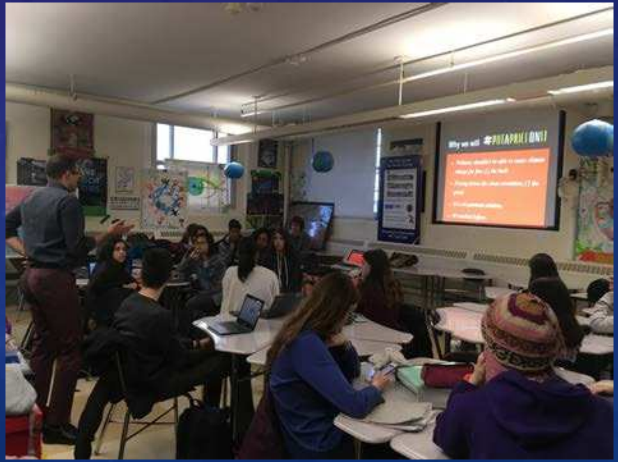
Accomplishments:

- Hosted a training meeting at BLS with Eben Bein, Our Climate
- Attended Our Climate meetings to prep for lobby days on: Thursday, Jan 17 @ 8pm - Planning Meeting; Sunday, Jan 20 @ 7:30pm
- Training for newcomers; Tuesday, Jan 22 @ 8pm - Planning Meeting; Our Climate All Call @ Mon Feb 11, 2019 9pm - 10pm; 4/9 YLD Planning Meeting @ Thu Mar 21, 2019; Planning meeting @ Thu Mar 28, Our Climate All Call @ Mon Apr 1, 2019; Nationwide Pump-Up call @ Mon Apr 8, 2019;
- Held meetings with legislators to gain support for H.2810 (formerly H.D.2370) on Jan 23 and Apr 9, 2019

Planning Meeting



Eben Bein @ BLS Training



Eben @ Training

On the way to Mtg.

Description of The Bill H.2810:

Chairwoman Jennifer Benson's Bill H.2810
"An Act to Promote Green Infrastructure and Reduce Carbon Emissions"

- Grows the clean energy economy, green tech innovation, and thousands of new green jobs
- Reduces pollution that drives climate change and its $ billions of health and infrastructure costs
- Protects low and moderate-income citizens
- Provides local governments with funds to invest in green infrastructure, and

Already has 95 cosponsors in the House of Representatives and 11 cosponsors in the Senate

Post Lobbying In front of State House

Meeting with Benson (Bill Author)

The "Why" As Massachusetts and the world experience worsening storms and climate-related disasters, and federal environmental action falters, it is imperative that states lead on policies that will measurably reduce greenhouse gas pollution and catalyze a movement for comprehensive climate solutions. Students and millennials—the generations who will be saddled most heavily with the impacts of climate change—are eager to advance such policies and to hold the fossil fuel industry financially accountable for the consequences of their business model. Youth, scientists, legislators, economists, and advocates agree on one policy that can get the job done: putting a price on carbon.

The "How" Our Climate supports carbon pricing policies that meet the following principles:

- Are strong and grow over time, guaranteeing science-based emissions reductions;
- Apply to all types of greenhouse gas emissions (carbon dioxide, methane, etc.);
- Are equitable and just, protecting vulnerable communities;
- have a durable price and revenue plan that doesn't benefit climate change-causing industries.

Chairwoman Jennifer Benson's H.2810 meets our principles. This bill will discourage the use of polluting fossil fuels by levying fees on their import and **rebating 70% of the revenue raised from the fee back to citizens and businesses**, shielding them from price hikes. The remaining 30% will be invested in a **Green Infrastructure Fund (GIF)** to finance projects that make it easier for citizens and businesses to make affordable, climate-friendly choices. H.2810 addresses all 4 of Our Climate's policy principles:
Fees start at $20/ton of pollution and increases by $5/ton/year. If in 5 years, MA meets its pollution reductions targets, the price caps at $40/ton. If not, the price will increase by an additional $5/ton/year until targets are met. Fees are not just levied for carbon-dioxide emissions but also for natural gas leaks.

Rebates are weighted by income, the GIF funds community-led infrastructure projects in local cities and towns, and **40% of those projects must benefit low-income residents and communities.** Rural communities and vulnerable industries also receive additional rebates**;** The emissions fee mechanism ensures that only polluters pay, while the rebates ensure that the price is politically and financially durable.

Other organizations we've worked with:
Climate XChange
Climate Action Business Association
Sunrise Boston
Clean Water Action
Mothers Out Front
Citizens' Climate Lobby
Clean Energy Future Massachusetts


At the State House – Zoe & Susan


At the State House – Azalea & Gwen


At the State House - Mateo

Lobbying on Jan 23
YouthCAN met with at least 7 legislators (Angelo Scaccia, Speaker Robert DeLeo, Ed Coppinger, Ronald Mariano, Michael Moran, Minority Leader Brad Jones & more) We asked them to cosponsor the bill and many did, leading to us having 95 cosponsors in the House, which is 16 more than a majority and was a considerable improvement as the previous session the bill had died in the House, having passed unanimously in the Senate.
Additional Pictures from that lobby day:
https://drive.google.com/drive/folders/1Mi9bEXW5CJgsB4P0E_dF3uFzA96nmb_v?usp=sharing

Lobbying on Apr 9
We met with at least 4 legislators (Angelo Scaccia, Aaron Michlewitz, Sonia Chang-Diaz and Frank Moran)
We had different requests for each legislator; Chang-Diaz was for advice and to understand the relative positions of the H.2810 as opposed to a competing bill, Moran was to ask for public support, Michlewitz was approached to see if he even supported the policy – answer was no!

Next steps:

- Climate Mosaic Project – see right

  1. We started making our own mosaic panels (right and below) on April 6th at Boston Latin School to contribute to the whale.
  2. We will also be making additional mosaic panels at our Annual Youth Summit at MIT o May 4th 2019 with more than 250 youth in attendance.

Sam with his mosaic

- Building constituency support for the bill by:

  1. Writing letters to the editor (currently working on one to the Boston Herald)
  2. Talking at events (we reached out to BCAN to see if they'll let students speak about the bill at one of their meetings)
  3. Convincing people to come to the hearing to show their support for the bill (we want at least 10 Michlewitz constituents to come, so we've been sharing link to help students find out who their reps are in the hopes of finding some fellow students who are Michlewitz constituents.)
  4. Preparing for the hearings on the bill in late May-early June is currently the focus of our work and trying to ensure that the bill doesn't die in committee.

Arianna's mosaic

Mosaic panels we created on 4/6 at a mosaic session at Boston Latin School

OUR CLIMATE

Right Whale Climate Mosaic

10AM-1PM ● June 22, 2019 ● Boston Commons

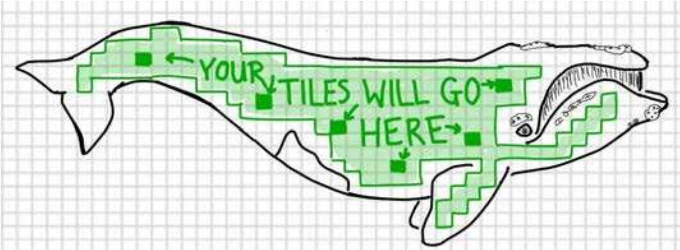
OC Climate Mosaics

Our Climate's youth leaders spread the word about climate solutions through epic community-designed mosaics. Join us as we design and assemble the biggest mosaic yet—a Right Whale—on the Boston Commons on June 22 to inspire science-based, equitable climate policy.

In 2015, OC made its first mosaic of a salmon in Portland Oregon--a regionally significant symbol of the climate we're protecting.

Make a Tile

To build a colorful, inspiring Right Whale we need your help designing a tile for one of the 175 spots shown below:



The Right Whale—MA's state cetacean—was hunted to near extinction for its plentiful blubber, and was even named because it was the "right" whale for whalers to hunt. Now climate change is driving this endangered species to migrate into the paths of oncoming ships.

1. Cut out a 12"x12" piece of cardboard from an recycled box
2. Paint, collage, or draw on one side in response to the prompt: "*What do we stand to lose to climate change?*"
3. On the back of your tile write your name, age, address, and your representatives.

*MA residents find state reps here.
Out-of-state-ers find national reps here.

PART 3: Better Energy Through Behavior Change: Designing A Sustainable Community Room

Statement of Need

It's well known from the results of our school's Challenge Success survey that Boston Latin School students are sleeping less than ever and stress levels are at their highest. The academic rigor is taking a toll on the BLS student body and we lack open spaces where we can relax and escape from dimly lit classrooms. We also need to be reminded of the connection between people's health and the planet's health. Today's energy users need to have a deep understanding of and commitment to environmental sustainability. We wanted to connect the stress issue with the need for sustainability education. Climate change is a real and pressing problem, and so is learning to think in terms of long-term sustainability across multiple interconnected considerations, such as access to clean energy, social justice, and economic issues to name just a few, all of it is crucial. In order to be prepared for the future we face, BLS students need to become the agents of the behavioral changes we need to see. They need to be educated for sustainability. We set out to design a community space that could bring about that change….a space that emphasizes our commitment to environmental sustainability and human sustainability. We set out to design a Sustainable Community room for our school!

It is proven that being in nature reduces stress. As a result of the creation of these two spaces, BLS students will be able to relax more, while learning about the importance of sustainability. In order to bring about changes in these two spaces, we applied for an internal grant through our school, requesting $9,830, so that we can buy all the furniture and modifications necessary. Our design entails a space where students feel invited to relax in a setting that features elements like natural lighting, scenes in nature, and messaging about the sorts of habits of mind and behavioral change that will ensure long term sustainability. We plan to incorporate artistic information about creating better energy overall. The calming atmosphere (natural artwork, sustainable furniture, a mural etc.) will make students more open to taking in the sustainability messaging in the room. Allowing students more time to see the sunlight and connect with nature will benefit their mental health, their grades, and their environmental consciousness. They will become better equipped to be functional and engaged members of the community. We also sought permission to upgrade the adjacent outdoor patio space adjacent to the dining hall to complement this effort.

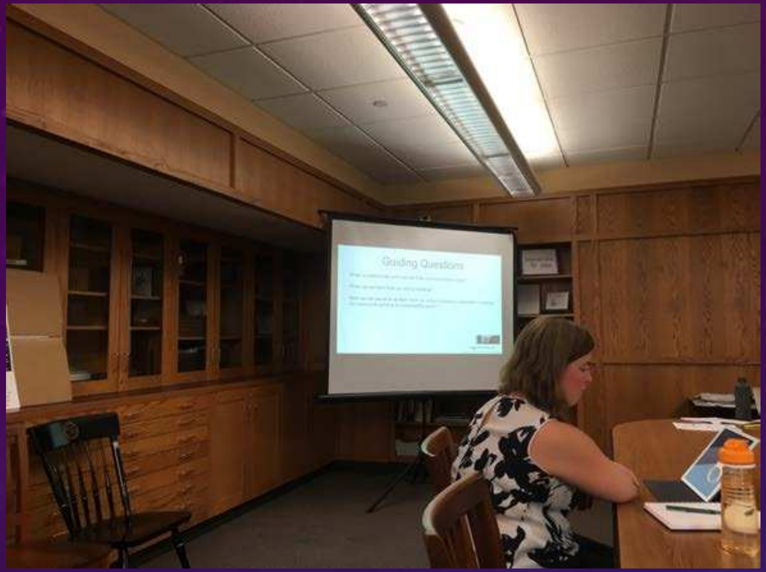
Action Plan

To do this, we partnered with our school's Challenge Success Committee and Assistant Headmaster, Mr. Giacobozzi, as well as a local architect, Stephanie MacNeil, AIA LEED AP, HMFH ARCHITECTS (pro bono). We are proposing to convert the current faculty dining hall into a shared space where both teachers and students are able to relax and learn about how to be more energy efficient and support a more a sustainable environment. Students will be able to sign up to go to this room during studies or W-block, so that they can benefit from the calming effect of the environment-themed room. The room will contain artwork and messaging about sustainability in general and energy specifically. Teachers will continue to be able to use this space during lunch periods. We will also enhance the patio adjacent to the dining hall. We will set up foldable tables and stackable chairs to ensure that seating is more readily available outside and plant an ivy fence along the edge of the patio to provide some shade and create the effect of a Newbury Street outdoor cafe space.

YouthCAN has met multiple times with architect Stephanie MacNeil, of HMFH Architects, Inc. for brainstorming sessions, as well as a site visit and discussion of the plan. We propose to soften lighting in the room with light shelves, soften the overhead lighting with fabric diffusers made for that purpose, add decorative environmental-themed ceiling panels, a wall mural, and lounge furniture for seating. We will also add some carpet tiles in a portion of the room. Artistic messaging about the importance of a holistic approach to energy use will be incorporated throughout the room. Outside we intend to enhance patio dining. We will purchase 32 additional chairs, 15 folding side tables, two lengths of bench with attached planters, and a space defining green trellis for creating some shade in hot weather, and the effect of a cafe style patio space.

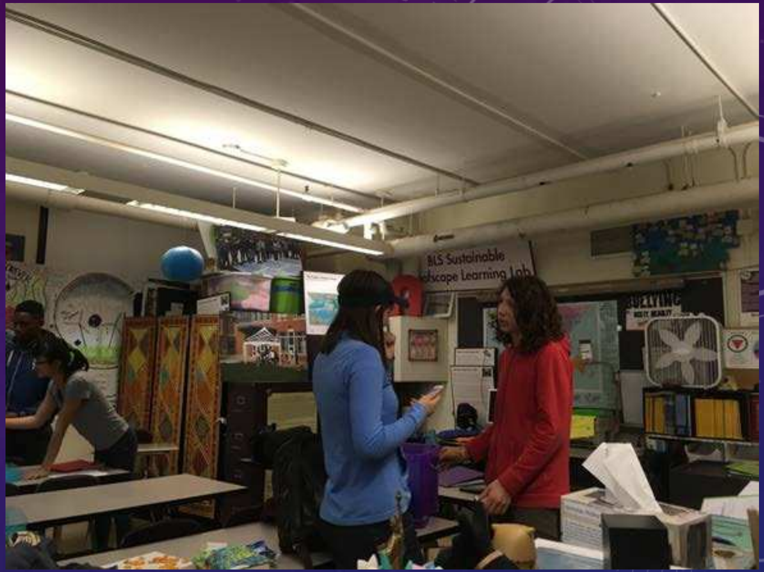
We worked with Ms. MacNeil to identify the best providers of the features we want. She provided several connections to vendors she uses who she believes may provide some of these items as a donation. By the end of May 2019, the room should be set up, complete with a mural on one wall, and all of the furniture. School faculty should be available to oversee the use of this room. Over the summer break of 2019, we will have the green fencing installed in the ground outdoors, so that both spaces are open for use at the start of the 2019-2020 school year. We have gotten a greenlight to proceed with this project from the headmaster, as well as Mr. Mulhern, and Mr. Giacobozzi. We've also reached out to BPS Facilities (Katherine Walsh). Katherine has offered her assistance in navigating the coordination with BPS Facilities.

http://xwlcapstonebls.weebly.com/uploads/1/0/9/9/109912973/boston_latin_7th_8th_survey_report_2017___1_.pdf2



Early Meeting With Architect

Brainstorming Session With Stephanie

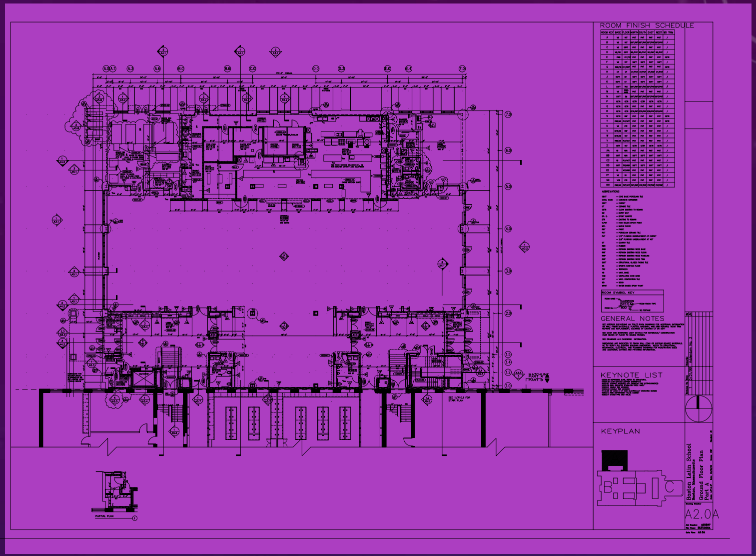


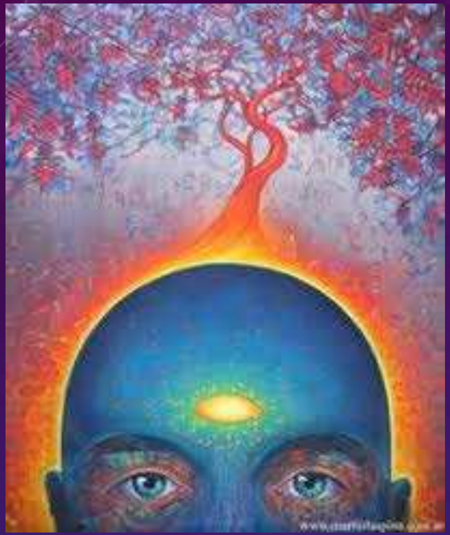
Anna and Addy Discussing Design

Site Visit With Stephanie

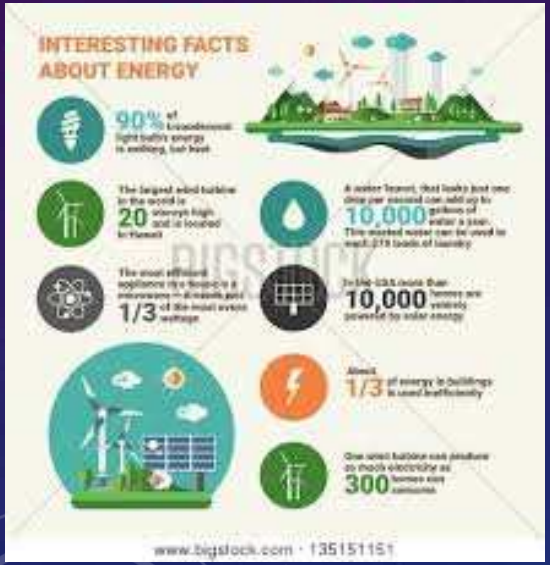
Demonstrating How Light Shelves Work

Discussing the Adjacent Patio

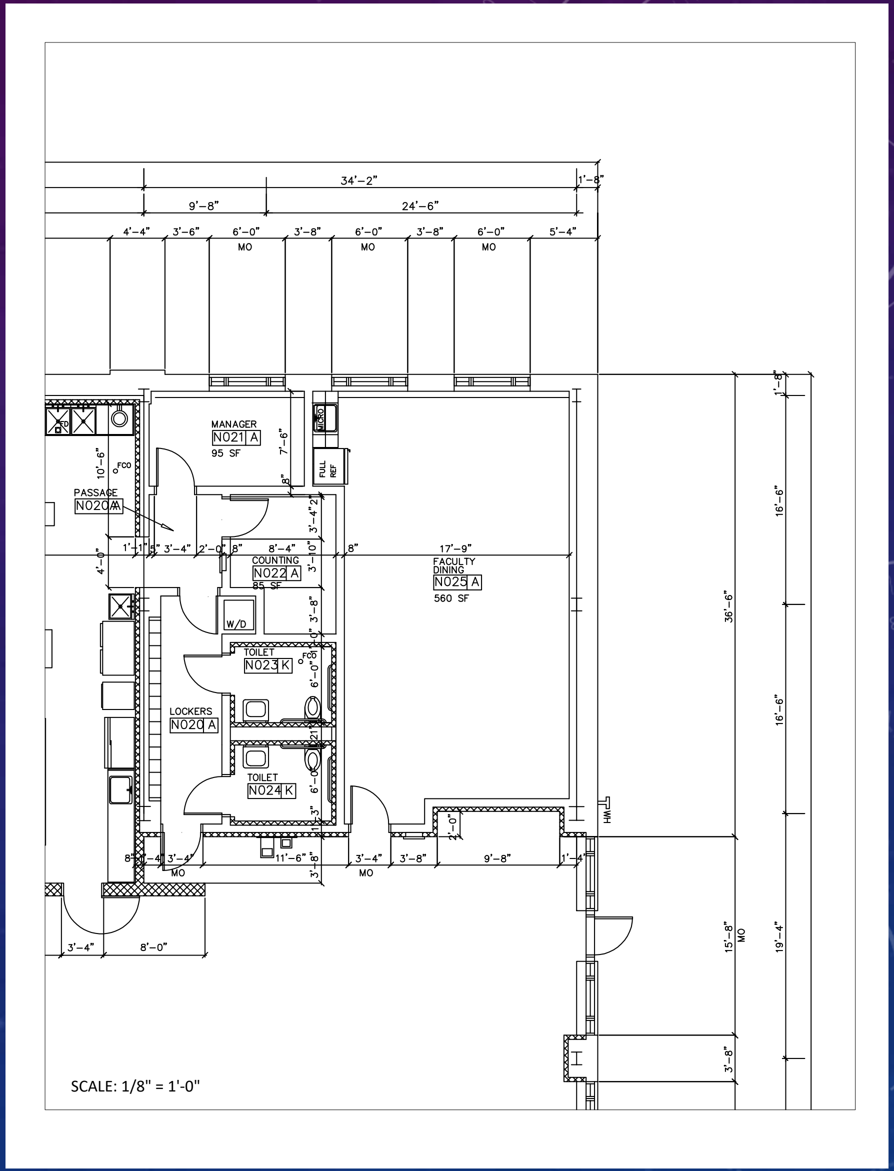




Detailed Schematic & Some of Our Energy Art & Energy Messaging



CO2LED
Created by artists Butch Anthony, Robert Gay and Jack Sanders, CO2LED was a temporary public artwork installed in Arlington, Virginia, USA in 2007. The piece was constructed of more than five hundred solar-powered LEDs on rods, each topped with a recycled plastic bottle. CO2LED, which was installed in the middle of a traffic island, exemplifies the way in which solar artworks can sustainably beautify otherwise mundane urban spaces.



Layout of Sustainable Community Room