Friends School Sustainability Survey

October 2015

Contents

Preface

The Friends School Sustainability Survey was undertaken by members of a Philadelphia Yearly Meeting Working Group, some of whom are also members of Friends Environmental Education Network (FEEN). As Friends, we share a concern about how to support our faith community in preventing the worst impacts of climate disruption. As professionals in a variety of fields, we are also aware of the many opportunities to reduce our emissions and build our resilience.

This survey was undertaken to better understand schools' sustainability and clean energy policies, actions, and experiences and to build on FEEN's 2013 Epistle sent to Heads of School (see Appendix A). The survey sought to ascertain knowledge and integration of conservation, efficiency, renewable energy practices and future energy options in our schools.

All members and affiliates of the Friends Council on Education were invited to participate in this online survey. Letters were sent directly by email to 79 Heads of School and 14 Presidents of post-secondary institutions. Responses (both complete and partial) were received from 48 institutions (52%) – 43 from childhood education to secondary schools and five from post-secondary schools. All surveys were completed between August 24th and October 19th 2015.

We were very pleased to have a better than average response rate to the survey. That said, many schools are not represented here. For this reason, we consider this report as more of a snapshot, rather than the final word on Friends schools' sustainability and energy efforts. Like many in-house type surveys, we are seeking a general sense of our standing and direction. Several key strategies emerged as we surveyed the field, and we have made a set of recommendations for schools. We would welcome input from others in designing a more precise instrument for future inquiries and the sharing of best practices.

We hope that this report will further the conversation already underway in our schools. We anticipate that it may inspire creative problem solving and lead to dynamic collaboration.

George Alexander

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Key Findings of the Survey

What roles are Friends schools taking in leading the transition to climate safety? Have Friends schools measured their carbon footprint and how do they compare to other educational institutions? Have they set targets to make fair share reductions? How many schools purchase renewable electricity? Which schools have on-site solar or wind generation? What have they learned from their experiences with conservation and energy efficiency strategies?

In our first sustainability survey, we find that of between the 48 schools that responded, Friends schools manage over 600 buildings. United Nation agencies estimate that buildings contribute as much as one third of total global greenhouse gas emissions largely through the use of fossil fuels in their operations. The UNEP Sustainable Buildings and Climate Initiative's *Buildings and Climate Change* reported that the building sector has the largest potential for significantly reducing greenhouse gas emissions compared to other major emitting sectors. This is an affirmation that school policies and practices will have a meaningful impact.

When asked to rank their reasons for taking energy related actions, three primary reasons emerged: 1) to save money and resources, 2) to teach and model to students, and 3) to reduce their carbon footprint. While the responses suggest that Friends school are concerned about their energy use and climate stability, there is ample opportunity for leadership in contributing to the global effort to meet the reduction targets required by 2020, 2030 and 2050* in order to stabilize the impacts of climate disruption.

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*General information of reduction targets to maintain global temperatures below 2 degrees Celsius are available here:

- Questions and Answers Emissions Reductions Needed to Stabilize Climate

https://www.climatecommunication.org/wp-content/uploads/2011/08/presidentialaction.pdf

- On the question of "fair share emissions" http://climateactiontracker.org/countries/usa.html
- History of the 2 Degree Limit http://www.carbonbrief.org/two-degrees-the-history-of-climate-changes-speed-limit/ and what it means

http://www.carbonbrief.org/what-happens-if-we-overshoot-the-two-degree-target-for-limiting-global-warming/

Administrative Support and Policy

> "Would you tell me, please, which way I ought to go from here?"
>
> "That depends a good deal on where you want to get to," said the Cat.
>
> "I don't much care where—" said Alice.
>
> "Then it doesn't matter which way you go," said the Cat.
>
> From *Alice In Wonderland*

School sustainability and energy policies are an articulation of where schools intend to go. Friends' schools, by and large, integrate equality, diversity and integrity into their mission statements and their operational policies. School leadership is critical for the integration new policies and practices. Of the 47 respondents to this question, 35% (12 schools) reported that they have energy conservation and sustainability policies in place, leaving 65% of schools with no specific policies, goals or targets. Ten schools are considering adopting an energy conservation and sustainability policy.

Among our respondents, almost a quarter had a sustainability coordinator. Four of the nine coordinators have paid positions. A higher number of schools (45%) have an energy or sustainability committee. Oversight for sustainability and energy efforts was still most commonly undertaken by volunteer faculty or by facilities staff. Twelve schools reported no current administrative support for this area.

Friends schools have yet to join with their peer institutions in large numbers in making a public commitment to addressing climate change. Six schools have signed the Green Schools Alliance Climate Leadership Commitment. Only two Friends post-secondary schools, Guilford College and Haverford, have signed the American College and University Presidents' Climate Commitment.

Benchmarking

> "Every line is the perfect length if you don't measure it."
>
> Marty Rubin

Benchmarking energy use allows each school to assess where they stand in relation to other schools and in meeting their own targets. A small percentage of schools had undertaken baseline inventories of their emissions or employed recommended benchmarking tools. Benchmarking is a readily available first step for Friends schools to measure, evaluate, monitor and report on their energy use. (See resources under Benchmarking).

Energy conservation and efficiency

A penny spar'd is twice got.

George Herbert's *Outlandish Proverbs*, circa 1633

Energy conservation and efficiency measures are best designed and undertaken when based on a benchmarking process. Numerous schools have begun to address energy conservation in a more intentional manner. Most Friends schools have initiated at least one conservation or energy efficiency strategy. Building-focused conservation measures, such as advanced lighting and use of controls, was mentioned by 83% of respondents. Energy conservation through behavior change is being done or considered by 79% of the respondents. Sixty-two percent are approaching or considering approaching energy conservation through student engagement in a conservation and sustainability curriculum.

A growing number of schools nationwide are engaged in green building practices, including LEED/ CHPS-certified construction and renovation projects. Among our respondents, nine schools reported having one or more LEED buildings on their campus. Of these, four were post-secondary institutions (Earlham College, Guilford College, Haverford College and George Fox University). No reporting schools reported certification with CHPS.

Friends Schools would be well served to incorporate sustainability and energy reduction policies in their operations. Likewise, the adoption of benchmarking, green building standards and renewable energy options has helped many schools achieve maximum efficiency, save money and other resources and exhibit leadership in their communities. More Friends schools will want to follow suit.

Clean Energy Sources

"The sunlight ... that strikes Earth's land surface in two hours is equivalent to total human energy use in a year. While much of that sunlight becomes heat, solar energy is also responsible for the energy embodied in wind, hydro, wave, and biomass, each with the potential to be harnessed for human use. Only a small portion of that enormous daily, renewable flux of energy will ever be needed by humanity."

Christopher Flavin, *State of the World 2008*

Once schools have reduced their energy consumption as far as possible, they turn to how to responsibly meet their energy needs. Many in Friends schools are motivated to do what they can to prevent harm. They wish to avoid the negative health repercussions and the current and future climate disruption impacts on their students that are linked to continued fossil fuel use.

One important step schools can and have taken to shift to renewable energy is to purchase electricity from renewable providers. While 56% of respondents are aware of the process involved in shifting to a renewable electricity supplier, only 9.1% currently purchase renewable electricity from a renewable electricity supplier.

Schools were also asked a series of questions regarding the transition to renewable energy. Sixty-three percent reported they have an informed understanding of the variables that have an impact on renewable energy projects. Twelve schools have implemented solar or wind generation projects (including solar hot water). Advanced Lighting has been installed in 21 schools. Geothermal has been adopted by 28%. Five schools have instituted the use of electric vehicles and it is under consideration by another three. One school elected to not purchase a school bus; their students walk or use public transportation.

An important 68% affirmed that they would consider the installation of solar or wind in cooperation with other schools, non-profits or third party partners (as in a purchasing coop, a PPA or a Community PPA). And there is the space on Friends school campuses to make it possible. Fifty-five percent reported having the open space that would be required for ground mounted solar and just under half have a parking area that could be used for that purpose.

A common legal and financial mechanism for the installation of local renewable energy generation is known as a Power Purchase Agreement (PPA). We asked schools that had employed a PPA about their experience. Twenty schools completed this portion of the survey. Of these, seven agreed that PPAs are the best way to install alternative energy, and one disagreed.

Broader Sustainability Actions

While the focus of the survey lay in the energy sector, many schools lifted up other efforts that reflect their commitment to sustainability. Recycling programs were virtually universal (90%). Four schools mentioned other forms of waste reduction and/or composting programs. A number of schools named sustainable landscaping and grounds maintenance, including chemical free grounds care. A smaller number of schools are working to produce organic food through sustainable garden and farm programs, thereby reducing known risks of chemically produced food for school aged children.

Recommendations Drawn from the Survey

"Do the best you can until you know better. Then when you know better, do better."

Maya Angelo

Many schools are making headway in sustainability, while others are still seeking the best way forward. Those that are thriving have taken many of the steps below, so other Friends Schools are encouraged to do so as well:

1. Create a sustainability mission statement and fold language into the school's overall mission that highlights the school's commitment to environmental protection and safety. The importance of a written plan, with goals and targets, can not be underestimated.
2. Establish a staff position, or designate a current staff member at the highest level, to lead sustainability initiatives and to clerk a sustainability committee.
3. Establish a baseline of current campus energy use and set benchmarks for improvement.

4. Consider joining the Green Schools Alliance (K-12) or signing the Presidents Climate Commitment.
5. Consider partnering with other schools to collaborate on renewable energy installations through a Power Purchase Agreement or a Community Power Purchase Agreement, or other cooperative buying mechanism to benefit from economies of scale.
6. Conserve energy where possible, and invest in energy efficient equipment. As units are replaced, plan for the highest efficiency models in advance, based on your own research. Don't rely exclusively on your contractor's product recommendations.
7. Generate renewable energy on campus and/or purchase renewable energy or REC certificates. Aggregated purchases are worth exploring.
8. Integrate sustainability efforts into the curriculum (see Friends Environmental Education Network – FEEN – notes in Appendix B).
9. In addition to a focus on energy, continue efforts in other areas as well: recycling, local food sourcing, composting, etc.
10. Consider a broad range of funding to support the above: energy performance contracting, annual and capital budgets, deferred maintenance budgets, grants and individual gifts, investment-grade opportunities for alumni, parents, etc.
11. Use your sustainability efforts to bolster every aspect of communications with alumni and prospective families.

Survey Details

Forty-eight schools completed the survey, although not all questions were answered by all respondents. Of these, 5 were post-secondary schools. A summary follows.

School level of respondents	Number of responses
Pre K and K	3
Through 3rd grade	1
Through 5th or 6th grade	5
Through 8th grade	19
6th to 12th	3
Through 12th grade	8
9th to 12th only	3
11th and 12th only	1
Post-secondary institutions	5

Table 1

Friends Academy
Olney Friends School
Friends Central School
Cambridge Friends School
Friends School of Baltimore
West Chester Friends School
William Penn Charter School
San Francisco Friends School
Friends School of Harford
Wichita Friends School
Sandy Spring Friends School
Lincoln School
Oakwood Friends School
Friends School of Minnesota
Westtown School
Oak Lane Day Care
Moorestown Friends
Stratford Friends School
Plymouth Meeting Friends School
George School
London Grove Friends Kindergarten
Delaware Valley Friends School
Frankford Friends School
George Fox University
Carolina Friends School
Barclay College
Earlham College
Guilford College
Greenwood Friends School
Friends School Haverford
Newtown Friends School
The Quaker School at Horsham
Friends School Mullica Hill
The Woolman Semester
Goshen Friends School
Buckingham Friends
United Friends School
Friends Community School
The Friends School of Atlanta
Oakwood Friends School
Friends School of Portland
Lansdowne Friends School
School for Friends
Richmond Friends School
New Garden Friends School
Stratford Friends School
Friends School of Wilmington
Haverford College

School footprint

Friends' schools range in size from small pre-schools in Friends Meeting houses to schools surrounded by hundreds of acres. Most of the respondents were on more than 2, but fewer than 10, acres of land. That so many Friends schools are blessed with large tracts of land translates into strong potential for hosting ground mounted solar systems.

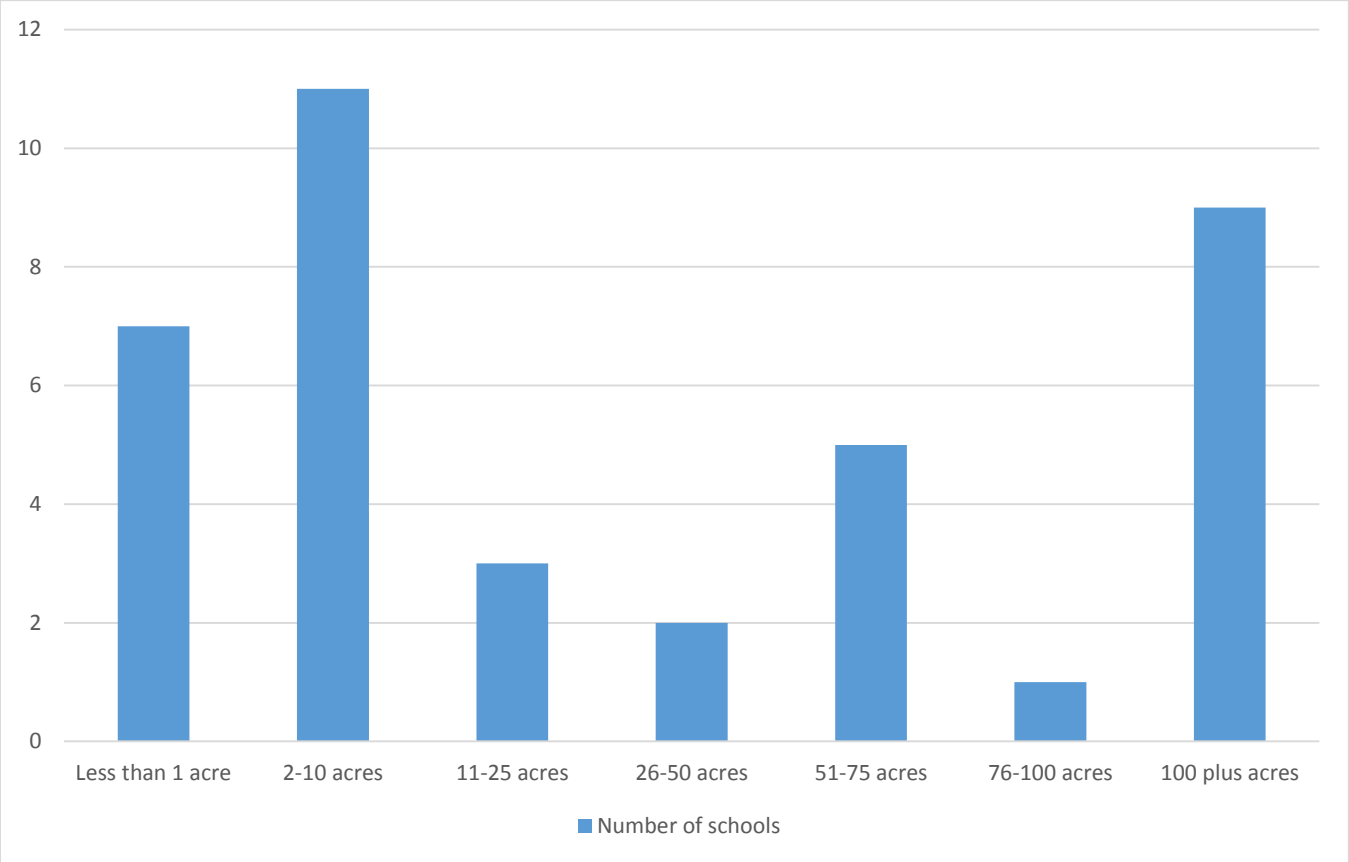
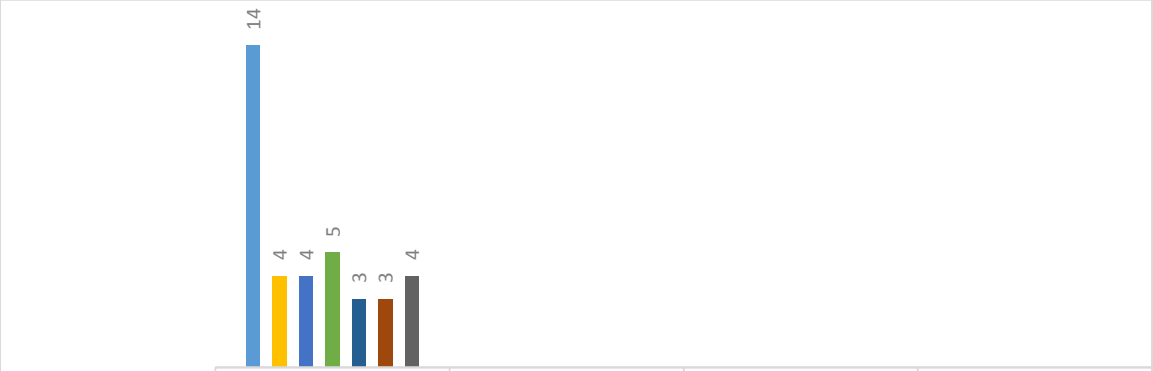


Table 2

Number of buildings under school administration

Among the 41 respondents to the question regarding the number of buildings schools manage, 14 were housed in one building. Responding Friends schools manage more than 600 buildings. Not surprisingly, the post-secondary institutions manage the largest number of buildings. Reducing emissions on our campuses and transitioning to renewable energy would have a meaningful impact, aside from serving as an example to others.



	Number of schools
One building	14
5-6 buildings	4
9-10 buildings	4
12-19 buildings	5
20-25 buildings	3
40-60 buildings	3
70-90 buildings	4

Table 3

Part 1: Policy & Administrative Support

"Action expresses priorities."

Gandhi

1.1 Reasons for Concern and Action

The survey asked schools to rank their reasons for taking energy related actions. The three most important reasons selected were: 1) to save money and resources, 2) to teach and model to students, and 3) to reduce their carbon footprint. Attracting prospective students and improving working conditions were each ranked second by four schools. Secondary reasons included improving public relations and encouraging contributions. Attracting new employees and competing nationally received the lowest rankings. (Table 4).

1.2 Policies at Friends Schools

Friends Schools are established and grounded within a long tradition of attention to social justice and the awakening of ethical reasoning and decision making. Our mission statements embrace our commitment to our students' development as individuals and as socially responsible members of society.

Increasingly, educational institutions understand and describe their mission to include the creation of a healthy and ecologically responsible learning environment. This mission translates often into school policies for sustainability that include reducing GHG emissions in the care of the schools' physical plant, healthy eating, safe grounds maintenance, and efficient transportation, among others. Regional and national associations and networks such as the Green Schools Alliance Climate Commitment and the American College and University Presidents' Climate Commitment support and guide school sustainability efforts and specify emission reduction targets.

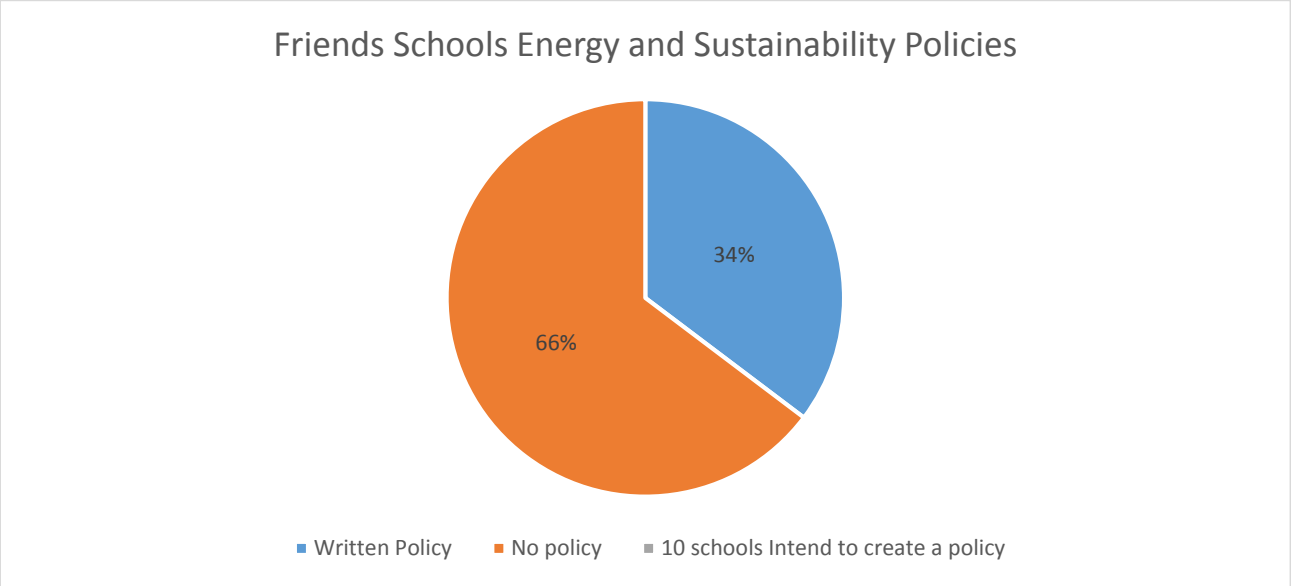
In our survey, we asked schools about the adoption of sustainability and related policies, the administrative structures they make available to support and implement these commitments, and the steps they have taken to establish baselines needed to set targets for emissions reductions and assess progress towards those targets.

Table 4: Ranking of Reasons for Concern (1 is highest concern, 10 is lowest concern)

Reason/ Ranking	1	2	3	4	5	6	7	8	9	10
To reduce our carbon footprint	**33.33%** 11	**24.24%** 8	**12.12%** 4	**6.06%** 2	**9.09%** 3	**6.06%** 2	**3.03%** 1	**0.00%** 0	**0.00%** 0	**0.00%** 0
To save money and resources	**35.19%** 14	**20.51%** 8	**28.21%** 11	**7.89%** 3	**2.63%** 1	**0.00%** 0	**0.00%** 0	**0.00%** 0	**2.63%** 1	**0.00%** 0
To improve public relations	**0.00%** 0	**3.03%** 1	**9.09%** 3	**9.09%** 3	**24.24 %** 8	**27.27%** 9	**15.15 %** 5	**3.03%** 1	**0.00%** 0	**3.03%** 1
To attract prospectiv e students and their parents	**0.00%** 0	**11.43%** 4	**8.57%** 3	**37.14%** 13	**25.71 %** 9	**8.57%** 3	**5.71%** 2	**0.00%** 0	**0.00%** 0	**0.00%** 0
To teach and model to students, staff and communit y	**35.90%** 14	**30.77%** 12	**23.08%** 9	**2.56%** 1	**5.13%** 2	**0.00%** 0	**2.56%** 1	**0.00%** 0	**0.00%** 0	**0.00%** 0
To encourage contributio ns from alumni, parents and others	**0.00%** 0	**0.00%** 0	**8.33%** 3	**5.56%** 2	**11.11 %** 4	**36.11%** 13	**19.44 %** 7	**11.11 %** 4	**0.00%** 0	**0.00%** 0
To improve working conditions	**0.00%** 0	**11.43%** 4	**5.71%** 2	**11.43%** 4	**8.57%** 3	**11.43%** 4	**14.29 %** 5	**5.71%** 2	**14.29 %** 5	**0.00%** 0
To attract new employees	**0.00%** 0	**5.41%** 2	**0.00%** 0	**10.81%** 4	**8.11%** 3	**8.11%** 3	**18.92 %** 7	**35.14 %** 13	**0.00%** 0	**0.00%** 0
To compete nationally	**2.63%** 1	**2.63%** 1	**5.26%** 2	**2.63%** 1	**0.00%** 0	**0.00%** 0	**2.63%** 1	**15.79 %** 6	**39.47 %** 15	**2.63%** 1

Of the 48 respondents, 34% (12 schools) reported that they have energy conservation and sustainability policies in place. At least one school specified that sustainability is integrated in their mission statement. Not surprisingly, the same schools reported having set specific goals for energy conservation and sustainability, leaving 66% of schools with no specific goals or targets. Ten schools are considering adopting an energy conservation and sustainability policy.

Table 5



1.2.1 Policy related Options:

Review your mission statement, master plan, school yard/athletic field plan, transportation, food/nutrition and energy and other procurement policies. Are sustainability concerns regarding both emissions reductions as well as environmental and health impacts included?

Review the regional or national associations' commitments available to you and consider signing on. Two to look at are:

- **Green Schools Alliance Climate Commitment.** A school signatory at the *Climate Steward level* pledges to calculate their school's carbon footprint by establishing an energy and carbon emissions baseline, and achieve carbon reductions over time. Some schools choose to sign at the *Climate Champion level*, pledging to reduce their school's carbon footprint by at least 30% within 5 years, and achieve Carbon Neutrality by 2020. http://www.greenschoolsalliance.org/program/join-gsa-commitment
- The **American College and University Presidents' Climate Commitment.** Higher Education presidents and chancellors can choose to sign either the Carbon or the Resilience Commitment, or the integrated Climate Commitment. An institution can transition to the Climate Commitment at any time. http://www.presidentsclimatecommitment.org/

- **Learn about the targets for emissions reduction for your state's fair share of global emission reductions.** Describe your efforts in this context and calculate what your school can contribute to help meet your state's goals. Link: http://www.governing.com/gov-data/other/carbon-emissions-reduction-state-map-of-proposed-targets.html

Resources related to Policy Development

- **The Center for Green Schools** at the US Green Building Council has prepared a report entitled the *Whole-School Sustainability Framework: Guiding Principles for Integrating Sustainability into All Aspects of a School Organization*. Available as a pdf here:

http://centerforgreenschools.org/sites/default/files/resource-files/Whole-School_Sustainability_Framework.pdf

- **The International Institute for Sustainable Development** offers a Sustainable School and Campus Policy Bank as an online resource of policies developed by school boards, universities and colleges to guide the sustainability of their communities. The policies cover many areas, including: curriculum, environmental management, procurement/purchasing; transportation, and others. These policies provide the context, commitment and guidelines for sustainable development actions at their institutions, and the framework for monitoring performance and results. They may serve as useful models for other institutions seeking to strengthen their own policy environment. (Largely Canadian examples) Link: **https://www.iisd.org/leaders/policybank/**
- Friends Environmental Education Network has developed relevant materials. They are available at: **http://www.friendscouncil.org/**

1.3 Administrative Support and Oversight

We asked schools what forms their support for sustainability and energy conservation takes. Nationwide, the schools that witness the greatest success generally appoint some form of recognized leadership and have an organized group responsible for developing and monitoring goals and tracking progress made. The commitment of school leadership at the highest level has been critical, along with board support, to guarantee continuity and perseverance in adopting and integrating new policies and practices.

While we did not specifically ask about the efficacy of the committees charged with sustainability tasks, several mentioned that these committees were inactive or struggled to maintain their momentum without dedicated leadership.

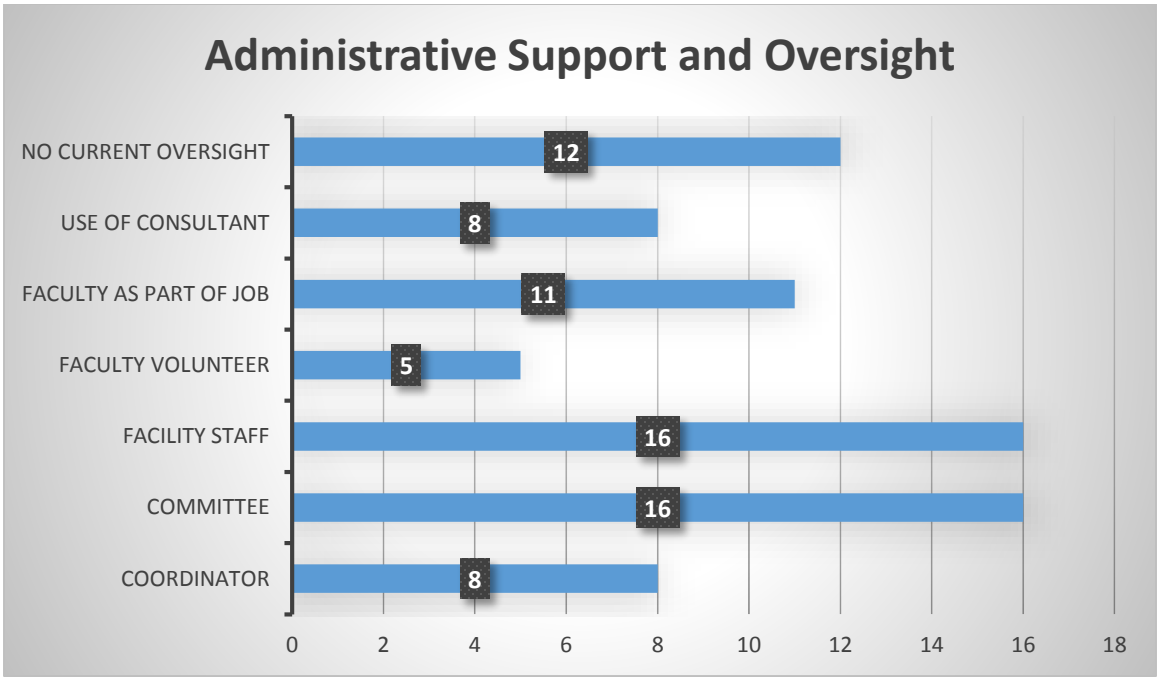


Table 6

1.3.1 Administrative Support related Options

Consider how you can support both a bottom up and top down approach to achieving your sustainability goals. Can you establish a sustainability coordinator position, a sustainability/energy committee at the faculty, board and parent level?

Practical Energy Solutions (of West Chester, PA) has 17 years of experience in energy education with schools. They have identified a number of key elements for successful integration of conservation, efficiency and installation of renewable energy, as follows:

- Include students directly in the assessments of energy use and in the presentation of the results. Aside from being educational and more efficient (as often staff do not have time to undertake the inventory), the hands-on experience is transformational.
- The efforts need to be motivational – in the sense of understanding that we are all motivated by what we believe works and what we see (and believe) other people are doing.
- The program needs to remain visible and individuals must receive positive feedback for their efforts. Habits take time to develop. Administrative leadership's visible commitment is very important.
- Conservation and efficiency efforts and targets need to be prioritized and included in relevant job descriptions.

1.4 Assessments Inventories and Benchmarking

Benchmarking is the process of collecting information on your energy performance and comparing it to the performance of other similar energy users. This is most effective when it is done consistently over time. "In a recent study, EPA found that buildings that were benchmarked consistently reduced energy use by an average of 2.4 percent per year, for a total savings of 7 percent. And, buildings that started out as poor performers saved even more." (Source: https://www.energystar.gov/buildings/about-us/how-can-we-help-you/benchmark-energy-use/benchmarking)

Because benchmarking is considered the foundation for effective efficiency and conservation, we asked our schools about their use of common benchmarking tools.

Only 4 schools had completed a Greenhouse Gas Inventory to catalog their current emissions. Four schools use the Energy Star benchmarking tool. Another five use other benchmarking tools including SchoolDude, Consultant/software EnerNoc and Energy Cap.

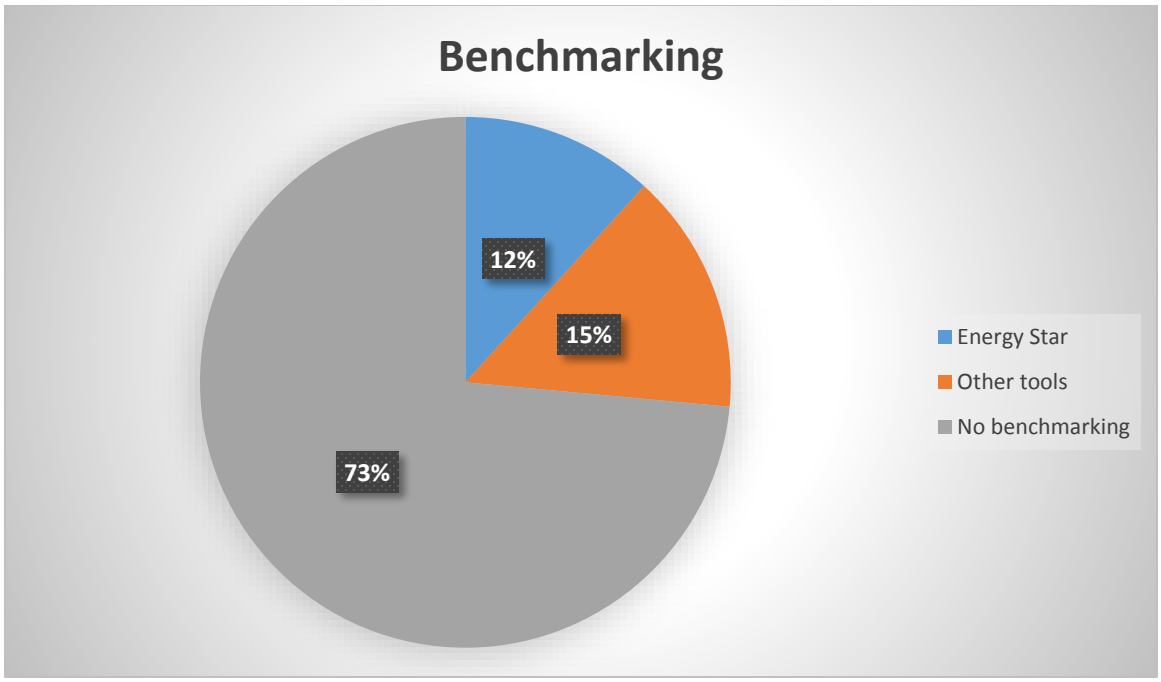
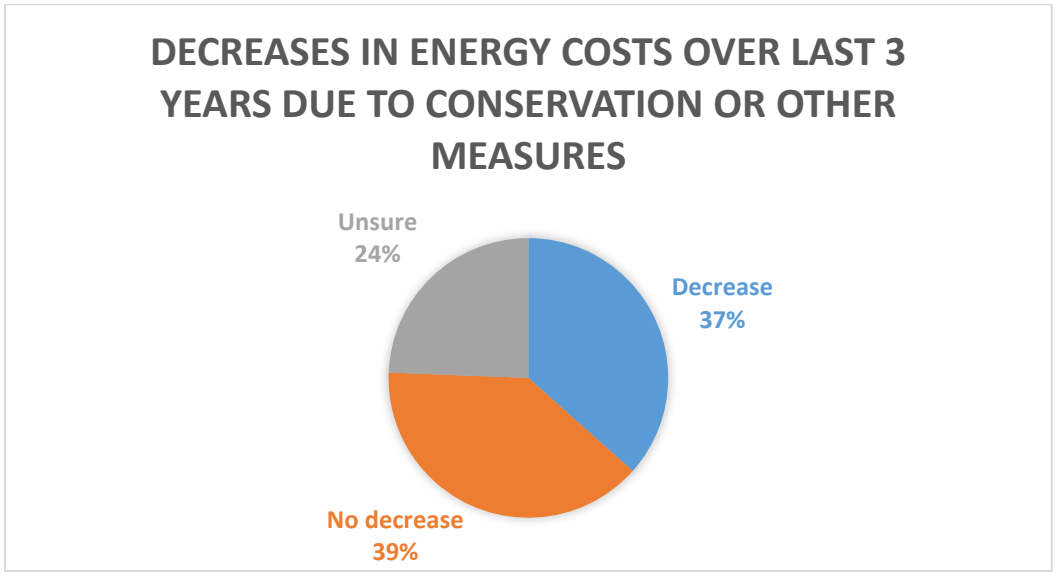


Table 7

We asked schools whether their school energy costs have increased in the past three years by more than 24%. 37% were unsure and 62.50% had not experienced increases greater than 24%.

We also asked if school energy costs decreased in the past three years due to conservation or other energy related actions they had taken. 35% reported a decrease, 40% no decrease and 10% were unsure.

Table 8



1.4.1 **Benchmarking Options**

A surprising percentage of a school's reductions can be done without spending any money. Benchmarking, as mentioned earlier, is the necessary first step. Look at your current energy performance. This is the most important part of energy management. Without benchmarking, you cannot identify your performance gaps or measure your progress. Many schools have reduced their emissions and as a result have avoided millions of dollars of energy expenses.

One recommendation is to use the Energy Star Portfolio Manager. This is a free online tool. Use it to inventory and assess all your buildings. The program allows you to compare yourself with comparable buildings in other parts of the country. You can also input data from previous years to track changes over time and assess the impact of particular upgrades or equipment purchases.

Resources

Energy Star Portfolio Manager

- http://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager
- http://www.energystar.gov/buildings/about-us/how-can-we-help-you/benchmark-energy-use?s=mega

1.5 Participation in Green Building Certifications

School buildings have multiple and continuing impacts on the environment. From construction or renovation to daily occupancy, our buildings use raw materials, generate waste, and produce harmful emissions which in turn create an impact on human health.

Building standards and rating systems which take environmental impacts and emissions into account are relatively recent. The U.S. Green Building Council (USGBC) created criteria in 2000, to improve building performance through a rating system initially for new construction called Leadership in Energy and Environmental Design (LEED). LEED certification is now also available for existing buildings.

Founded in 2002, the Collaborative for High Performance Schools (CHPS) created the nation's first green building rating program designed specifically for schools. The CHPS has priority areas: 1) improving health and student performance; 2) reducing operating costs; and 3) mitigating environmental impacts.

Among our respondents, 10 schools reported have one or more LEED building on their campus. Of these, 4 were post-secondary institutions (Earlham, Guilford, Haverford and George Fox University). No Friends schools reported certification with CHPS.

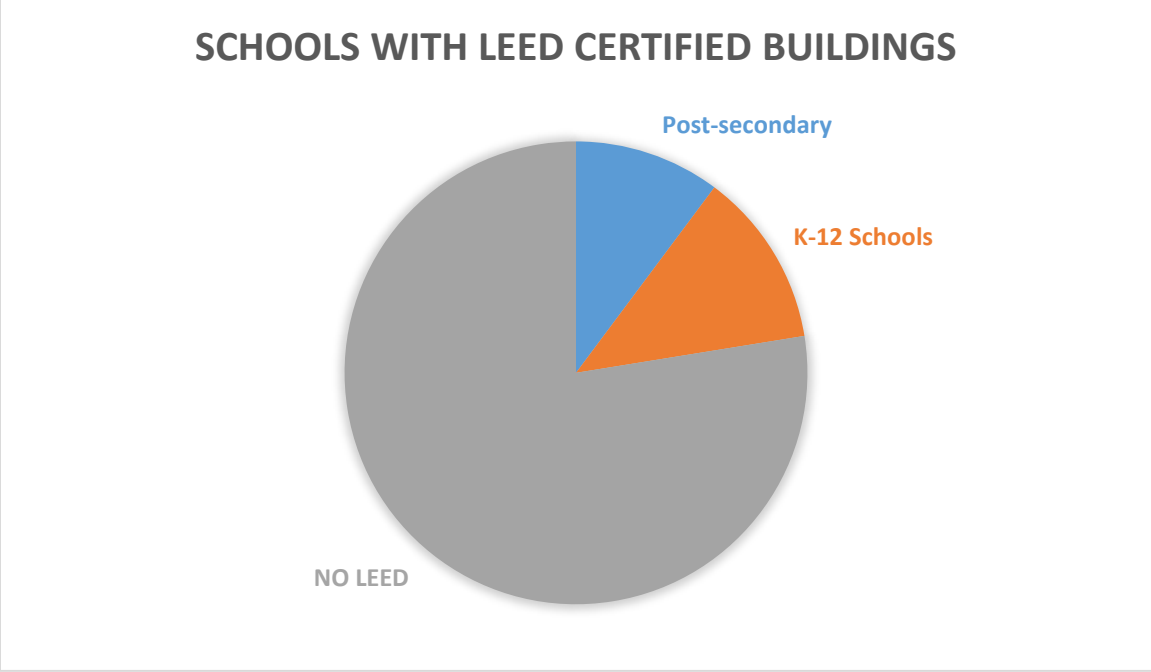


Table 9

1.5.1 **Green Building Options**

Consider both LEED and CHPS ratings for existing buildings and any new construction. Consult with other Friends schools who have been through the process for lessons learned.

Resources

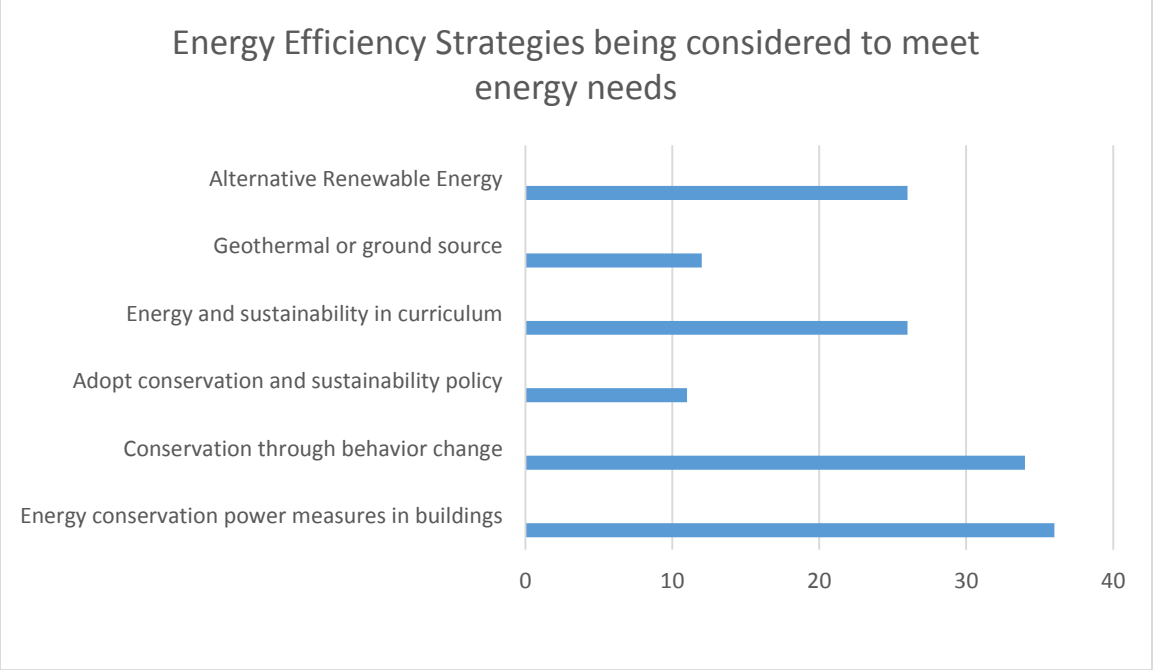
U.S. Green Building Council LEED: http://www.usgbc.org/leed

Summary of LEED and schools: http://www.usgbc.org/articles/green-school-facts

Collaborative for High Performance Schools (CHPS)
http://www.chps.net/dev/Drupal/national-core-criteria

Part 2 Energy Efficiency, Conservation and Renewable Energy

Schools were asked to identify the energy efficient strategies they were considering to meet their energy needs. Energy conservation power measures in buildings (such as advanced lighting and use of controls) was the strategy most commonly mentioned (83%). Energy conservation through behavior change was the next most common (79%). Sixty percent are considering approaching energy conservation through student engagement in a conservation and sustainability curriculum. Alternative energy such as solar and wind is under consideration at 25 schools (60%). Ten schools are considering adopting an energy conservation and sustainability policy. In addition, 90% of respondents are engaged in some aspect of recycling. Four schools reported active composting programs. One mentioned that they do not own a school vehicle – students walk or use public transportation.



Number of Schools Table 10

Aggressive conservation and efficiency measures are the second step for schools, after benchmarking. In the transition to renewable energy, it is essential to *only* install a solar or wind system for the actual energy you need. In terms of your spending, it is cheaper to create 100KW in efficiency than to generate 100KW. Whatever percent you reduce your actual use, you can apply to the size of the solar or wind system you install.

Significant savings and emissions reductions may be achieved through both energy efficiency and energy conservation. **Conservation** means using less or actually doing without a product or service. This is usually accomplished by behavior change and the use of mechanical controls and defaults. Energy **efficiency** means that you are getting the same output or service, but with less energy than was previously needed for the same service. Efficiency is often measured by the number of units of input in relation to the number of output units.

Energy Efficiency and Conservation Options

The 4 keys areas where schools have the greatest opportunity for both efficiency and conservation, thereby achieving significant reductions and savings include:

1. HVAC – for existing buildings purchasing highest possible efficiency models to replace equipment at or near the end of its life expectancy. For new buildings – consider the minimum, medium and high efficiency models and compare the cost difference and pay back periods.

2. Domestic hot water

3. Lighting – LEDs, dimmers, daylighting, sensors, etc.

4. Building Envelope

Regular assessments of facilities and equipment is recommended every 5 years to determine what the best replacement options are. This prevents emergency purchasing which locks your institution into sub-optimal equipment for 15 years or more.

Training your facilities and maintenance staff is critical. Likewise, orientations and training for students and teachers will improve your conservation outcomes.

Resources

Energy Efficiency Programs in K-12 Schools A Guide to Developing and Implementing Greenhouse Gas Reduction Programs http://www3.epa.gov/statelocalclimate/documents/pdf/k-12_guide.pdf

Guide to Operating and Maintaining Energy Smart Schools

http://apps1.eere.energy.gov/buildings/publications/pdfs/energysmartschools/ess_o-and-m-guide.pdf

REDUCING ENERGY CONSUMPTION IN SCHOOLS: 12 Tips for Tackling an Energy Management Program

https://www.schooldude.com/Portals/0/Public%20Content/White%20Papers/wp-energy-k12.pdf

2.1 Renewable Electricity Purchasing

Another step schools can and have taken to shift to renewable energy is to purchase electricity from renewable providers. 57% of respondents are aware of the process involved in shifting to a renewable electricity supplier. Less than 10% (7.50%) already purchase renewable electricity from a 100% renewable supplier.

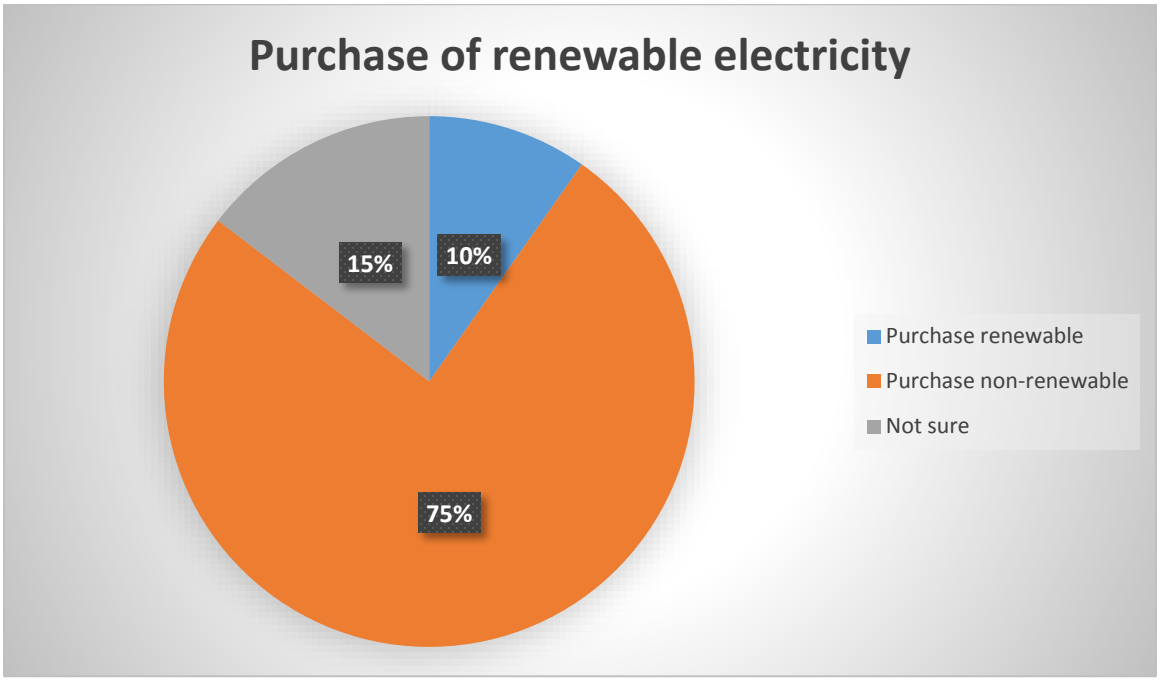


Table 11

2.1.1 Renewable Electricity Purchasing Options

As a bigger buyer, and one whose energy needs tend to decrease in the summer when electricity is more expensive, you have the potential to get a good price. This is especially true if you purchase through an aggregator. Typically you can buy wind credits, which are often the cheapest. You will get points for LEED applications, and will want to get green certified.

Get the price on conventional electricity and renewable and compare. We have all been conditioned just to ask what the lowest price is. But we don't ask, what will it cost us to not poison our air or poison are water?

Generally want to look for fixed rather than variable rate. Lock in, if possible, for 2 or 3 years. You may pay a bit more, but you will have a rate you can count on in your budgeting process.

2.2 Clean Energy Generation

The sun provides more energy in one hour than all humanity uses, in all forms, in a single year. Sunlight can provide us with its own resolution to our energy problems. The only transformation required is for humanity to reduce, or end, consumption of stored solar (as fossil fuels) and, in its place, use freely available "fresh" solar.

David S. Findley, *Solar Power for Your Home*

Schools were asked a series of questions regarding the transition to renewable energy. Most report an understanding of the variables that impact renewable energy projects. The majority affirmed that they would consider working with other institutions to install solar or wind in cooperation with other non-profits or third party partners (as in purchasing coop, a PPA or a Community PPA). Fifty-four percent reported having the open space that would be required for ground mounted solar. Forty-nine percent have a parking area that could be used for that purpose.

Lower carbon energy technologies are now more readily available at a commercial scale. We asked schools which of these technologies their schools have considered or implemented.

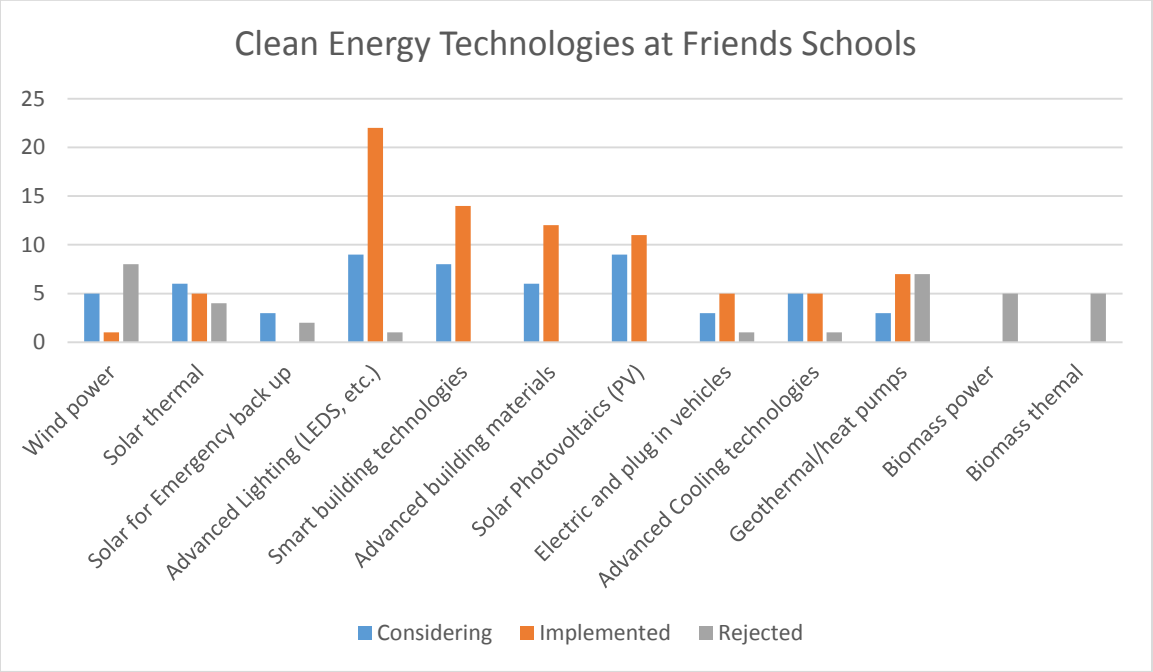


Table 12

2.3 Solar PV Installations

Because of the cost involved in solar and wind generation projects, there are a variety of financial and legal agreements that facilitate installations. Through the end of 2016, there is a **30% tax credit for solar and wind generation projects.** The tax credit is the base for the development of Power Purchase Agreements (PPA). When using a PPA, a third party, who can take advantage of the tax credit, provides the capital for a solar or wind installation. The school leases space on a building or buildings or on its grounds for the installation and the school agrees to purchase all its electricity through the PPA at a fixed rate, generally over the course of 20 to 25 years. **Many schools are taking a careful look at this option as the tax credit will be reduced to 10% beginning in January 2017.**

Examples include Elizabethtown College's 2 MW system gives them a fixed rate of approximately $.08 for 20 years. Dickinson College has a PPA for 3MW system with a fixed price of under $.08 per kwh for 25 years.

The best arrangement is to aggregate the energy needs to create economies of scale and drive construction costs down. The benefit of a fixed rate like this is that no other cost in your budget can be frozen and made so predictable.

We asked schools that had employed a PPA about their experience. Of the 8 schools who had experience with this funding and installation instrument, 7 agree that PPAs are the best way to get alternative energy, and one disagreed. Funding, contract terms and the contractual rate had not been barriers for those who responded.

Part 3 Funding options

"The cost of renewable energy is largely a function of initial investment cost.... Once a renewable energy facility is built, at least with fixed-rate financing, the cost of power from that facility is fixed throughout its lifetime. Not so for fossil fuels, where the cost of power will vary in the future with fuel prices."

Jose Amaya, *Development of Renewable Energy in Emerging Economies*

Funding is often the dominant challenge for many energy related projects at Friends schools. We asked respondents how their energy conservation and sustainability initiatives have been funded. Schools have successfully used capital campaigns (35.29%) and alumni or parent fundraising (35.29%). Solar Service Agreements or Power Purchase Agreements were used in eight cases (25.53%). Private grants accounted for the funding at ten schools. Utility company incentives were used by nine schools (26.47%). Few schools used federal funding (8.82%) or savings from conservation and efficiency measures to fund their efforts (20.59%). Schools also reported applying their own general revenues and small amounts from their operating budget. One college mentioned that sustainability items would be integrated into the annual budget in 2016-17. (For funding options see: *Sustainability Starts With Us Now*).

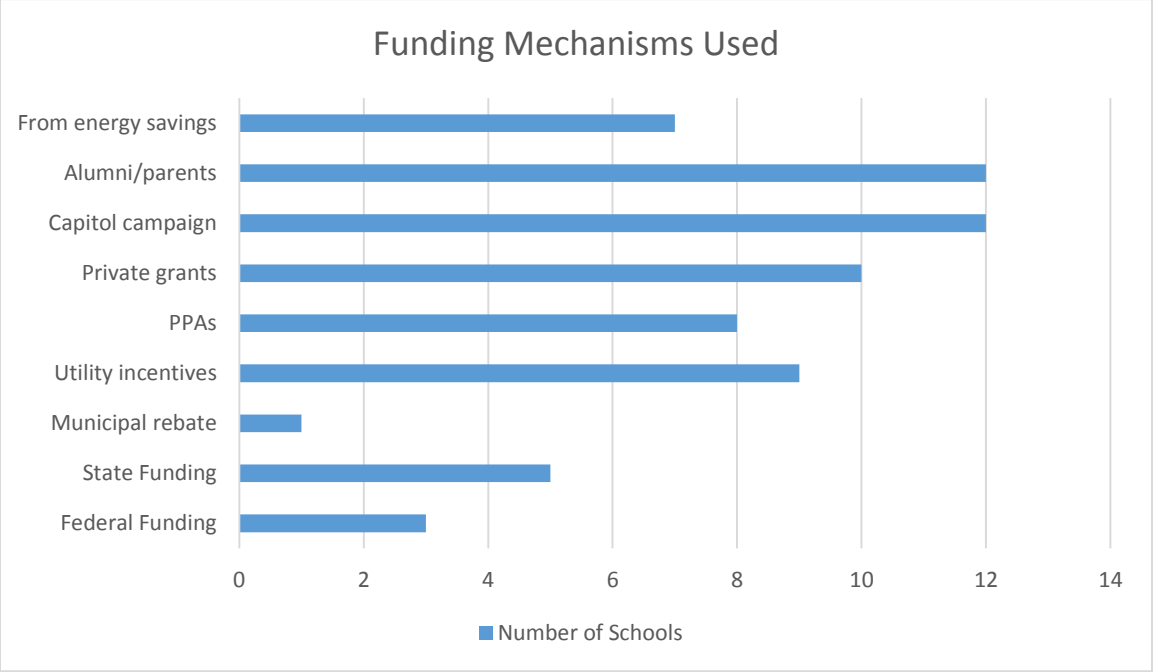


Table 13

Part 4 Challenges, Successes and Lessons Learned

We concluded the survey with three open ended questions regarding each school's experience of their greatest challenges, successes and lessons they would share with their peers.

4.1 **Greatest Challenges**

The challenges most frequently mentioned were limited financial resources, space for renewable installations, and time. Time referred to both the oversight of the current building and energy systems and finding time to research and follow through with renewable energy installation processes such as the PPA. Technical challenges were mentioned whether with equipment, the PPA process or with local utility companies. For schools which rent their facilities, obtaining cooperation from the owner was a challenge. Other schools cited the challenge of maintaining high levels of engagement and momentum, changing energy use behaviors, maintaining a focus on sustainability in procurement decisions. How to approach the carbon footprint of commuting parents and students was mentioned in one case. Inaction on securing a sustainability coordinator position even though a study showed that habit change alone could pay the coordinator's salary was mentioned in another.

4.2 **Greatest Successes**

We have opted to include all the successes shared by schools below.

- We have been very active in being an all-organic campus as far as grounds maintenance goes. Energy efficiency, not so much
- Geothermal installations in two buildings, LED, T8, and T5 fixtures, occupancy sensors
- Native gardens and swale gardens for conservation and mitigating runoff
- Purchase and installation of photovoltaic panels; installation of thermal towers for cooling
- The work we have completed on our buildings to increase their efficiency: Control systems, lighting retrofits, and insulation.
- Installation of two solar arrays (1MW)
- Solar Tubes, potential solar panels
- Creating a culture that is supportive of sustainability methods
- As a small institution on a large school campus, we do our best to conserve energy as best we can
- Expanding geothermal system in acquired building
- Installing native plant garden, native woodland garden, and rain garden
- Obtaining board commitment to install energy efficient windows
- Entered utility usage in Portfolio Manager to obtain baseline
- Started replacing lighting with LEDs
- We do not sell or distribute bottled water
- Centralized, automated Building Management Systems
- Plant Services has been highly successful in utilizing energy reducing technologies as we do HVAC and lighting remodels.

- We have undertaken a $3.5 million dollar energy-savings project on campus that will pay for itself in less than 9 years
- New windows and lighting
- Lighting
- Strong initial start at the curricular level with students
- Implementing behavioral changes
- Getting into a new building designed with natural lighting, metered faucets, waterless urinals, smart thermostats, etc.
- Implementation of solar panel field
- Some solar
- Original design of building
- Installed new windows, lights, composting, recycle
- Renovation of two existing buildings, recycling 85% of the demolition product, replacing old HVAC systems with modern, energy efficient systems
- PPA process, Central Hudson Lighting switch incentives, oil/gas conversions
- Our ability to design and build a Passive House certified school
- Putting in motion sensors for our lights
- Curricular initiatives
- LEEDS certified building
- Our working campus farm and food waste diversion system (compost) are both sources of great accomplishment for us.

4.3 Lessons Learned and Successful ideas to share with others

- Composting was easier to implement than anticipated
- Working with a 3rd party project manager when purchasing/installing photovoltaic modules
- All organic grounds maintenance works
- Never stop bringing it up. Be relentless
- An Environmental Stewardship Oversight Committee that has been developing some creative procedures to develop a sustainability culture.
- Control of usage
- We could never have done solar voltaic without the feed in tariff
- It is very important to involve Plant Services in choice and implementation of energy measures
- Projects that will pay for themselves through energy savings tend to have broad support.
- Photo voltaic installation makes sense
- Board engagement with “larger” projects such as the solar PPA process was key for our small-staffed school
- Incorporation of “smaller” initiatives into the curriculum and daily student schedule also proved critical to ensure time is built into our schedule for programmatic success
- Building in Passive House design features is not that much more expensive, if you can do it from the beginning
- We encourage students to walk and take public transportation and we thus do not own a school vehicle. The real education comes in getting students to see that they need to forego an auto-dependent lifestyle and live in cities and walkable neighborhoods, served by public transportation. It also means emphasizing in the curriculum not traveling all over the world: one cross-county plane trip puts out as much CO2 as the average human does in a year.
- Students are our best teachers and hope for our earth's future - it is worth the investment of time and 'energy' - !

Appendix A:

2013 Epistle to Heads of School from the Friends Environmental Education Network

Friends Environmental Education Network (FEEN)

MINUTE
May, 2013

TO FRIENDS SCHOOL BOARDS and HEADS of SCHOOL

On May 2-3, 2013, the Friends Environmental Education Network (FEEN), gathered for its annual meeting at Westtown School. Twenty-nine teachers from twelve Friends schools attended. As a Friends Council on Education Peer network, FEEN has worked for the past 12 years to promote innovative environmental education and sustainable practices at our schools. We represent schools that serve students of all ages from pre-school through 12th grade, in city settings as well as suburban and rural.

It is our shared conviction that all Quaker Schools need to advocate strongly for sustainability to ensure the health and safety not only of our own staff and students, but also of the diverse eco-systems that support the global community.

While there are many ways that each of our Friends Schools interprets and supports the Quaker testimony of Stewardship, we would like to propose that all Friends Schools make an effort to take the following action steps, which would put Quaker Schools on track to lead this crucial social transition.

I. Draft and adopt a Sustainability Mission Statement.

II. Join the Green Schools Alliance and make a commitment to carbon emissions reductions over time, either as "Climate Stewards" or "Climate Champions." Currently eleven Friends School are members. http://www.greenschoolsalliance.org/view-the-commitment.

III. Integrate themes surrounding Sustainable Food Systems into the curriculum, either through a gardening program, local/organic purchasing program in the dining room, connection with a community garden and/or other programs and activities suitable to your school.

IV. Embed Quaker testimonies of simplicity and stewardship into the curriculum wherever possible. The Cloud Institute has created excellent Education for Sustainability standards, which can be a helpful guide -- http://cloudinstitute.org/cloud-efs-standards/

Friends Schools have historically been at the forefront of progressive educational change, including co-education, desegregation, service learning, conflict resolution, and teaching the whole child. By becoming educational institutions that are also committed to stewarding our natural world through our campus operations and by educating for sustainability in our classrooms, we will graduate students who are ready to meet the world's ecological challenges.

Thank you for your attention and consideration,

FEEN Conference attendees, 2013

Judy Asselin, Westtown School
John Baird, Westtown School
Kevin Berkoff, William Penn Charter School
Elson Blunt, Westtown School
Michael Bonsignore, Carolina Friends School
Barbara Caccamo, Westbury Friends School
Grace Sharples Cooke, Trustee, Friends School Haverford and William Penn Charter School
Trish Cope, Sandy Spring Friends School
Mark Croxford, William Penn Charter School
Joel Eckel, William Penn Charter School
Toni Evans, Sandy Spring School
Christine Farley, Wilmington Friends School
Ann Fieldhouse, Sidwell Friends School
Laurel Flyer, Sandy Spring School,
Linda Garrettson, Westtown School
Jennifer Gilbert-Jenkins, Westtown School
Sue Geoghegan, Wilmington Friends School
Jonathan Howe, William Penn Charter School
Josie Johnson, Sandy Spring Friends School
Sharon Livingston, Friends School Haverford
Irene McHenry, Friends Council on Education
John McKinstry, Westtown School (Lansdowne Friends School fall 2013)
Lydia Parrish, Westbury Friends School
Victoria Pearson, Westtown School
Margaret Pennock, Sidwell Friends School
Doug Ross, Friends' Central School
Richard Schultz, Stratford Friends School
Geoffrey Selling, Germantown Friends School
Wade Tomlinson, Friends School Haverford

Appendix B: Statement from the Friends Environmental Education Network (FEEN)

Friends concern for the welfare of our students and the environment has taken many forms since awareness of climate disruption became evident more widespread in the 1990s. In 1999, a group of educators from Friends schools began the Friends Environmental Education Network (FEEN) to further environmental stewardship and green practices in our schools. Since then, FEEN has gathered each year in a different Friends school to share ideas, inspiration, and friendship. FEEN participants firmly believe that a commitment to sustainable living and environmental stewardship needs to be a fundamental component of a Quaker education. This conviction is expressed in FEEN's Statement of Purpose below.

Statement of Purpose

Friends' schools have a special obligation to include environmental education in their programs in order to promote a sustainable future for all life. Our students should learn how they can best understand, preserve, and restore the natural processes, resources, and beauty so vital to the earth and to humankind's physical and spiritual health. These goals grow directly from fundamental Quaker beliefs and testimonies:

Peace and Justice: Environmental degradation contributes to world disease, poverty, and despair. Without fertile soil, clean water and air, sufficient space, and adequate access to natural resources (renewable and non-renewable), people will not have the food, health, employment, and living conditions that will enable them to live in peace and dignity. A deteriorating natural environment thus becomes an important focus for Friends as they seek social justice and equity, and address root causes of violence in the world.

Simplicity: Quakers value simplicity. A simple lifestyle uses fewer of the earth's natural resources, reducing the human impact upon our planet's natural endowment and vital processes. "Live simply that others might simply live."

Stewardship and Service: Friends schools strive to develop good people as well as good students. Stewardship through valuing and actively caring for the natural world should be central to a Friends education. Friends have long had a reverence for living things and a belief in "that of God" in every person. This conviction impels Quakers to treat the natural world with love and respect, supporting the conditions needed for its health. Friends' schools need to take the lead in educating their students to be the earth's protectors and stewards.

Important Components of Environmental Education in Quaker Schools We must strive to build an active and environmentally knowledgeable community of children, teachers, and administrators. Each school will approach in different ways the task of helping all its students to develop a sense of their place in the natural world. The components of an environmental education program might include age-appropriate activities to help our communities to:

- Appreciate the beauty and fascination of the natural world, especially through outdoor experiences;
- Learn the ecological processes that sustain all living things, e.g. the needs of plants and animals, the importance of proper habitats, nutrient and water cycles, energy flow through ecosystems, population dynamics, and symbiosis;
- Learn the roles that all living things play in maintaining the health of the planet's ecosystems;
- Learn how human behavior can lead to environmental problems. Topics might include air, soil, and water pollution; acid rain, ozone depletion, global climate change, habitat destruction, loss of biodiversity, human population growth, overexploitation of non-renewable and commonly-owned natural resources, and the impact of high-consumption life styles;
- Learn how to live sustainably and in environmentally friendly ways as well as learn how to work constructively and effectively to encourage others to do so. Projects might include promoting recycling, developing energy, soil, and water conservation projects; reducing resource consumption, and providing input to local environmental decision-making;
- Develop a sense of personal responsibility for the stewardship of our planet;
- Work towards developing plans to make school grounds and facilities more environmentally friendly in the use of resources and overall impact;
- Develop personal and institutional codes of environmental ethics.