Pursuing the Efficient Use of Resources at Harvard Business School

As climate change progresses, we have three choices: to more efficiently use our resources, to search out other planets that can support life, or to allow the planet and humanity to slowly die. Harvard Business School has chosen to play its part in using its resources more efficiently. In supporting the University-wide renewable energy study, **HBS Student Sustainability Associates**, George Khoury and I, have taken the opportunity to search out new, emerging technologies that would help inform the University's future greenhouse gas reduction plans.

The focus of our research was on solar, wind, thermal, and fuel cell technologies. We sought out novel technologies with potential applications on the HBS campus (and beyond) that could offset electricity consumption. We were specifically interested in the potential payback period and considered a payback period of 20 years feasible for any investment in renewable energy.

Solar

Due to the fact that aesthetics plays such a large role on the HBS campus and that the historic roofs are to be kept in their original form, we had to look to a more novel solution. Sistine Solar offers a compromise. Their innovative technology allows for roofs to remain aesthetically historical, while still harnessing the sun's energy for electricity production. The technology is currently unavailable in the US, but that should be changing soon so we recommend that this technology be bookmarked by HBS for future application.

Wind

For wind energy solutions a utilization of 25% was assumed for payback periods.

There exists a plethora of wind energy options in today's market and we were able to identify a few applications that could be used on the HBS campus.

Quiet Revolution QR5 is a vertical axis wind turbine (VAWT) that consists of a system of swept carbon blades reducing the noise traditionally associated with wind turbines. This technology is manufactured in the UK and has a payback period of under 20 years.

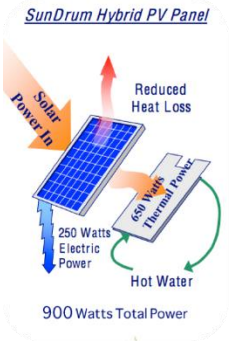
The Arbre à Vent is another solution from Europe. This consists of Aeroleafs that collects wind from all directions and packages it in an aesthetically pleasing tree form. This technology will be available in the US in 2017, but has a currently non-viable payback period. This may change once the product enters the US market.

Another VAWT is WePower. This company offers a wide range of vertical axis wind turbines covering outputs across the board. This technology can also be coupled with their Windvertiser technology to help spread the word about HBS's renewable energy goals and/or progress. This technology offers both viable and non-viable payback periods, depending on which application is chosen.

Finally, we researched the WindSpire VAWT. This is the least aesthetically pleasing solution for the HBS campus, but offers a viable payback period and is currently available for purchase.

Thermal

SunDrum is a technology that attaches to many existing photovoltaic (PV) systems (HBS currently has five PV systems on campus) and is able to extract the currently wasted thermal energy. This wasted energy constitutes 71% of the sun's energy and this technology is able to capture that and convert that into energy savings. SunDrum also serves to cool the panels, increasing their efficiency. A quote has been sent to HBS and is currently under consideration.



Fuel Cell

The final technology researched was the Bloom ES5. The evolving Bloom fuel cell technology is something that HBS has been looking into in the past conversations are continuing with the manufacturer.

Conclusion

We hope that some of the technologies that we have identified as viable or as possibly viable in the future will be considered and implemented on the HBS campus. We also hope that these products can help exceed the University-wide Greenhouse Gas Emissions Reduction Goal and will help inform future planning.