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The Philadelphia Inquirer

OPINION



While America dithers over climate change, Swarthmore College shows how we can live without fossil fuels

The small liberal arts college in the Philadelphia suburbs has become a proving ground for the latest green technology.



Swarthmore College dug up its rolling green lawns last year to install a geo-exchange system that will enable it to heat and cool eight buildings without fossil fuels. The new system, which will replace a century ... **Read more** Courtesy Swarthmore College

by Inga Saffron | Columnist Published Aug. 2, 2024, 5:00 a.m. ET For the full-on Hogwartian experience, few American campuses can match the moment when you step off the SEPTA train at Swarthmore College and gaze up at the immense Victorian pile presiding at the top of the hill. A path lined with towering white oaks and flanked by rolling lawns immediately summons you to the front door.

That vista is Swarthmore's signature, regularly pictured in the college's promotions. But last year, Swarthmore did something that, on first glance, would have horrified its Quaker founders and generations of alumni (not to mention, Harry Potter fans). It tore up a big swathe of that great lawn and proceeded to carve a checkerboard of 800-foot-deep tunnels into the hillside.

The grass will eventually be restored, but only after eight college buildings are connected into a geo-exchange loop that can provide heat and air-conditioning without energy from fossil fuels. The heart of the system is a remarkable, swoop-roofed dining hall constructed with a mass timber frame — a low-carbon alternative to the usual steel skeleton — and equipped with all electric appliances. With these two projects, Swarthmore has taken a giant step toward its goal of becoming carbon neutral by 2035. That means no more oil, gas or coal-generated power. Just renewables.

Swarthmore's progress is especially impressive, but it's not the only school working toward carbon neutrality. Locally, West Chester and Princeton Universities have installed similar geo-exchange systems. In fact, over 400 American colleges have **pledged** to become carbon neutral over the next decade, which puts them far ahead of most cities and states.

It's easy to be depressed right now about government efforts to address climate change. In the last month alone, the Canadian resort of Jasper has been incinerated; Houston has become the new Atlantis; California's Park fire has gobbled up over 600 square miles of woodlands, and the planet has experienced the four hottest days on record.

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Yet our elected leaders often seem unable to take the most basic steps to reduce emissions. Even while the world was burning this summer, the Republican-controlled Pennsylvania legislature refused to provide crucial operating funds to SEPTA and the state's other mass transit systems, and New York's Democratic governor abruptly canceled a long-studied congestion pricing plan that would have supported New York City's subways. Donald Trump has been campaigning on a promise to increase fossil fuel production and roll back environmental regulation if he wins the presidency, which would worsen the climate crisis.

All this twiddling of thumbs got me wondering how college campuses manage to plug along and steadily reduce their carbon footprint. Obviously, places like Swarthmore are more like self-contained idylls than the real world, where officials must satisfy multiple constituencies. But colleges have their internal politics, too. What tips can they offer our elected leaders?

Cutting-edge heating and cooling

One thing that distinguishes colleges is that they are mission-driven nonprofits, committed to turning out citizens who will, theoretically, work to improve the world. It helps that Swarthmore attracts environmentally minded students who would raise a ruckus if the school *didn't* adopt climate-friendly policies. The school also has the luxury of taking the long view and plenty of resources to devote to big-picture planning. Swarthmore has been around since the Civil War and expects to be operating a century from now. That mindset informs all its decisions.

Swarthmore began examining its carbon footprint in 2010 but really began to ramp up its sustainability in 2016, after the Trump administration pulled the U.S. out of the Paris climate accords. Swarthmore felt it had no choice but to act on its own, Swarthmore's director of sustainability, Elizabeth Drake, told me. That led to an extensive study that resulted in a planning road map called To Zero by Thirty-Five.

At the time, the college knew that its century-old central steam plant was coming to the end of its useful life. The question was whether to replace it with a conventional, gas-powered plant or invest in an expensive, but more sustainable, geo-exchange system. Geo-exchange systems have become an increasingly popular way to heat and cool buildings without using carbon fuels. The system, which is essentially a big grid of underground pipes attached to heat pumps, has often been compared to a bank. In the summer, the exchange works like a conventional air conditioner, by sucking heat out of buildings. But instead of spewing that hot air into the atmosphere — and contributing to global warming — it channels it into the earth, where it is stored in the pipe network. In the winter, the warm air is pumped back into the buildings.

Because geo-exchange pipes need to be placed 800 feet below the surface, where the temperature is a constant 55 degrees, installation is expensive. But once Swarthmore realized it was eligible for tax credits under the Biden administration's Inflation Reduction Act, which included incentives to encourage Americans to switch to renewable energy, the project became a nobrainer. The college expects to recoup 40% of the geo-exchange's \$60 million cost in the initial phase. Plus, Swarthmore will eliminate its energy bill for the eight buildings in the network when the system begins operating in November. (Other buildings will be added later.)

Swarthmore's decision to go ahead with the project (designed by Introba, an engineering firm) coincided with another big campus initiative, an addition to its '60s-era dining hall. That building, designed by Philadelphia architect Vincent Kling, used heavy timber in the structure, but more for looks than sustainability. The mass timber frame, which is made by gluing together

smaller pieces of wood, allowed the college to preserve the dining hall's aesthetic, while getting the college closer to its carbon neutrality goal.

Mass timber buildings, like the geo-exchange network, are more expensive than the conventional approach. But after crunching the numbers, Swarthmore concluded that it, too, would save energy and money in the long run. Mass timber buildings go up faster because they use prefabricated columns and beams that are assembled in factories. Since wood is lighter than steel, the building foundations can be significantly smaller. That elimates a huge amount carbon-intensive concrete.

Swarthmore's architects, DLR Group, along with Mid-Atlantic Timber Frames, came up with a design that blends the campus' traditional collegiate aesthetics with cutting-edge sustainability techniques. There's plenty of gray stone to match Swarthmore's Victorian Parrish Hall. But all the cooking equipment, including a powerful pizza oven, is electric. The building was designed with an extra-large basement that serves as the nerve center for the campus geoexchange network.

While the architecture was largely informed by the college's do-good agenda, DLR did manage to sneak in a little pizzazz: The dining hall is capped with a crashing wave of a roof, albeit one designed to accommodate the maximum number of solar panels. Swarthmore felt it wasn't enough to just build a low-carbon dining hall. It also wanted to rethink its whole approach to food. Like many schools, it's been adding more plant-based options. It also set up a composting system, in an effort to get to zero waste.

But perhaps the biggest change in the cafeteria-style dining hall is that there are no trays. Swarthmore knew that the trays made it easy for students to fill their plates with more food than they could possibly eat. Now that they have to balance a plate and a drink in their hands, they're less likely to load up, which means less wasted food and less water to wash everything. The school's food service has also drastically cut back on packaged food and eliminated disposable take-out containers and utensils. But it's not a purely eat-yourvegetables approach: In a concession to students' time-honored devotion to hamburgers, Swarthmore installed a single gas stove to provide the char.

What city schools can do

It's a bit ironic that Swarthmore's sprawling suburban campus should become a model for sustainability. As an urban university, Penn can offer much greater density and more transit options, which help reduce greenhouse gas emissions. But its campus also has less space for energy-saving measures like geo-exchange, says William Braham, an architecture professor who heads the Center for Environmental Building + Design at Penn Design. As an alternative, Penn and other urban schools have been investing in solar farms and planting trees to offset their carbon footprint. These offsets are sometimes criticized because they allow institutions to continue drawing on an electric grid that is still predominantly powered by fossil fuels. But by upgrading its buildings with things like heat pumps and insulation, Braham says Penn has nevertheless cut its greenhouse gas emissions by 50% since 2009.

As a city with many conflicting needs, Philadelphia doesn't have the resources of these wealthy schools. Yet it, too, has managed to find ways to make government buildings and vehicles more sustainable. As part of its plan to reach carbon neutrality by 2050, Philadelphia recently purchased in a solar farm in Adams County. Officials say the site will produce enough electricity to offset 25% of its municipal energy usage.

Still, politics often works at cross-purposes with the effort to make the city as a whole a greener place. City Council has repeatedly thwarted climate-friendly measures aimed at encouraging electric cars, green roofs, building density and bike lanes. Ensuring there is easy parking, not adopting measures that would stop catastrophes like the Park fire, still shape decision-making in Philadelphia. Now the state seems determined to undertake a massive expansion of I-95 in Philadelphia, which will use vast amounts of carbon-intensive concrete and encourage more driving.

Of course, a small liberal arts college in the suburbs can never be a realistic model for a big, fractious city like Philadelphia. What Swarthmore offers is a

proving ground for new approaches to sustainability. The more that America's colleges normalize these ways of living, the more likely we'll all get used to them — and, ideally, want them in our cities.

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