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innovation

An electric workout through pedal power

Gyms hook up exercise bikes to TVs, laptops, and batteries to let their patrons power the place.

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CAMBRIDGE, MASS.

After classes, Sally Peach, a student at the Massachusetts Institute of Technology, has a long list of to-dos.

She wants to hit the gym, tackle school work, and, as captain of an intramural soccer team and member of a campus health advocacy program, she has plenty of e-mail to respond to every evening.

“Though I know I am being productive, it feels like a complete waste of time to sit there and do just [e-mail replies],” says Ms. Peach.

So, once she arrives at the gym, Peach makes a beeline for a special stationary bike that has a laptop built into the front. The computer is not plugged in. There is an empty space where the battery once fit. But when Peach starts pedaling, the computer fires up. Her spinning workout powers the laptop – and lets her cross off two tasks at once.

Pedal power has been a small-time alternative-energy source for ages. Many innovators have tried to tap the simple motion to power devices – especially those engineered for developing countries, where power grids are unreliable. But few designs have stuck. People aren’t willing to exert much energy just to run simple devices.

But in gyms across the country, ecoconscious patrons are asking why cardio equipment needs to drain power, when the exercisers are already eager to burn calories. Now, fitness centers are beginning to experiment with ways to put muscle strength to good use.

“The idea pretty much sold itself,” says Adam Boesel, a personal trainer in Portland, Ore.

He saw a television report about a Hong Kong gym with human-powered equipment and set out to create an eco-friendly fitness center in his hometown. Mr. Boesel’s Green Microgym opened in late August and has already registered more than 100 members.

The gym chose Team Dynamo stationary bikes, which harness the power of four connected bicycles to generate an average of up to 200 watts per hour. That’s enough to power a LCD television and stereo system for the duration of the ride, according to Team Dynamo inventor Mike Taggett. “And you don’t have to be cycling champ Lance Armstrong to do this because it is a team effort,” he says, referring to how four bikers help charge the batteries.

At Green Microgym, electricity generated by the bikes flows into a bank of batteries, which, in turn, powers devices. Boesel plans to install a “grid-tie” inverter, which allows the generated energy to stream directly into the power grid. This device allows creators of alternative energy, such as solar and wind, to “spin the meter backward” and sell power to their local utility company.

The idea is to meet the gym’s power requirements – kept low by a prudent use of plugged-in devices – with solar panels and an array of energy-producing equipment, says Boesel.

Power bike setups of all sizes

David Butcher, a California Web manager, gets his daily workout on a generator-bike he built three years ago. Pedaling at a steady pace, he charges many appliances at once: the robotic vacuum cleaner, a set of lights, and his laptop. Mr. Butcher webcasts live from his Los Gatos, Calif. basement during these 40-minute sessions. Thanks to the energizing workout, “I feel like a rocket now,” he says, a little breathless from his morning exercise.

Elsewhere, others are testing retrofitted equipment in well-trafficked commercial gyms. A group spinning class can produce a monthly output of 300 kilowatt-hours – enough energy to light six homes for a month and cut 420 pounds of carbon emission, according to Jay Whelan, founder of Green Revolution.

“There is no use it or lose it, or battery maintenance, because the power goes right back to the grid,” says Mr. Whelan, a clean-energy entrepreneur who recently retrofitted bikes for the spin class at the 1,200-member Ridgefield Fitness Club in Connecticut.

Elliptical trainers, another popular piece of cardio equipment, are a good source of human power.

“They are even better than bikes since they involve both arm and leg muscles,” says Hudson Harr, founder of ReRev.com in St. Petersburg, Fla. In April, his start-up company installed an array of retrofitted ellipticals at the 28,000-member Gainesville (Fla.) Health & Fitness Center. A student gym at the University of Florida in Gainesville was next on his list. “Not doing this would be such a waste of energy,” says David Bowles, the school’s director of recreational sports.

How to balance the workout

The idea of using human energy to power appliances – instead of using batteries – is catching on for two reasons: fun and environment-consciousness, says Arjen Jansen, a researcher in human-powered energy systems at Delft University of Technology in the Netherlands.

“Laptops and televisions have evolved and the designs are very energy-efficient, says Jason Moore, a Fulbright scholar studying bicycle design at the Dutch university. Now that these rigs are better at capturing energy, gyms are can put them to use – powering little perks such as TVs, laptops, and lights.

Still, few people go to a fitness center in order to generate electricity.

“People go the gym primarily to get a good workout,” says Whelan from Green Revolution. The workout equipment should feel just like it did before the retrofitting, he emphasizes. Raising the resistance level on these machines will increase the output exponentially, but it might ruin the experience for his customers. He opts to let the rider have complete control over the settings, same as before.

What's next for ecogyms?

"What we are doing now is taking baby steps in the right direction," says Boesel of Green Microgym.

All aerobic equipment, including Stairmasters and rowing machines, can be retrofitted to generate power. Each device, however, comes with its own set of engineering challenges. And while the industry is most driven by retrofitting companies, "in the future, manufacturers may offer power-generation as an option on cardio equipment," says Joe Cirulli, owner of the Gainesville Health & Fitness Center.

Some energy savings could be incidental. "As the exerciser's output exceeds the display needs, the extra power is 'shunted' to resistors, which then heat up simply to shed the energy that is created," says Mr. Taggett of Team Dynamo. The cardio room warms up and requires extra air-conditioning in warmer climates. With these new machines, however, the excess energy is channeled into creating power.

As exercisers become aware of the metrics of human power-production, it could push them to work harder.

"What we have been finding is that people challenge themselves to work a little bit harder because now they can measure how much energy they create," says Whelan. "It seems like there is a personal goal to try and create just a little bit more than the last time they worked out."

When they gravitate to these innovative systems, gym-goers could also move away from power-hogging equipment. Once people figure out that the average treadmill takes 1,500-2,000 watts to run, they may switch to power-producing machines, says Taggett.

"Right now, it would take nine Lance Armstrongs or 15 nonathletes to keep one treadmill chugging along," he says.