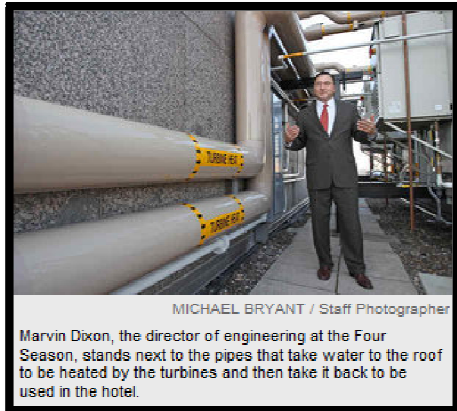


## Four Seasons employs the latest recyclable: Heat

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MICHAEL BRYANT / Staff Photographer

Marvin Dixon, the director of engineering at the Four Season, stands next to the pipes that take water to the roof to be heated by the turbines and then take it back to be used in the hotel.

Up on the roof at the Four Seasons Hotel, behind latticework meant to keep things pretty, three turbines are humming away, transforming the way the luxury hotel produces - and saves - energy.

They're taking a waste product - heat - and reharnessing it as a resource.

Part of an overall greening effort at the hotel, the new "microturbines" will help reduce the Four Seasons' energy bill 30 percent and halve its carbon footprint.

While this is the first installation of the technology in the city - Mayor Nutter will formally introduce it at a rooftop ceremony today - other hotels and universities are looking at it as well.

The "microturbines" use natural gas to generate 25 percent of the hotel's electricity. The process also creates heat - in this case, an amount that would keep 275 average homes comfy all winter long.

But instead of venting the heat into the atmosphere, as usually happens, the hotel is putting the heat to work warming the water for all the showers, for the kitchen and laundry, for the hot tub and the indoor pool, kept at a tropical 85 degrees.

And there's enough hot water left over to provide 15 percent of the hotel's heat.

"We're capturing and recycling wasted heat," said Marvin Dixon, director of engineering for the hotel.

The effort turns the notion of waste heat on its head. In essence, the equipment is "a boiler that makes electricity simultaneously," said Jeff Beiter, managing partner at E-Finity Distributed Generation L.L.C., of Wayne, the local sales rep for the equipment.

The Four Seasons microturbines cost \$1.049 million. But the equipment is expected to pay for itself in three or four years, Dixon said.

Still, "it wasn't all about savings," Dixon said. "We were just as interested in doing it because of the impact on the environment."

The microturbines are simply one of the latest incarnations of thinking that goes back to the origins of electric power generation. Manhattan's Pearl Street Station, built in 1882 by Edison Electric Light Co., sold electricity and the accompanying thermal energy.

But gradually, electric power plants moved to rural areas, where there was no need for the excess heat. "So we built cooling towers, which dumped heat into the air," said R. Neal Elliott, associate director for research at the American Council for an Energy-Efficient Economy, an advocacy group.

The efficiency of power generation actually declined, he said. Improved technologies brought small increases, but changes needed to meet subsequent environmental regulations wiped out the gains.

Today, about 60 percent of the energy in fuel used to generate power in the United States is lost as heat. An additional 7 percent is lost in transmission.

In contrast, the microturbine is 85 percent or more efficient, said Thomas E. Knudsen, president of Philadelphia Gas Works. "This is a powerful, powerful technology that we see with broad applications."

Last December, a study by the Oak Ridge National Laboratory concluded that combined heat and power - a.k.a. CHP - "is one of the most compelling sources of energy efficiency that could, with even modest investments, move the nation strongly toward greater energy security and a cleaner environment."

The Department of Energy recently lobbied recovery act funds at CHP, and the Environmental Protection Agency has formed a "partnership" to encourage its use.

About the time the Four Seasons system was revving up, a similar set of turbines from the same company - Capstone Turbine Corp., based in California - was being installed at the Bridge Business Center on the former Rohm & Haas site in Bristol Township.

There, the excess heat is used for heating and cooling air, partly to meet the large needs of a chemical research and testing laboratory, said Pete Krauss, senior vice president of the Keystone Redevelopment Group, which owns the property.

Capstone, founded in 1988, has sold more than 5,000 microturbines. The company incurred losses of \$5.3 million last year - partly attributed to an increase in manufacturing costs for new, more powerful units - yet reported its revenue from microturbine shipments increased 40 percent, from \$31.3 million to \$43.9 million.

The Four Seasons project is the latest in a green initiative begun in 2005, reducing overall energy consumption by more than 20 percent since then.

The microturbines, which generate about 65 decibels from 10 feet away - roughly comparable to that of a vacuum cleaner - are hidden by latticework and raised beds of blueberries, winterberries, kiwis, and other edibles.

Nearby are rooftop gardens where the chef raises salad greens and herbs in compost made from food scraps.

Dixon commutes from his home in northern Chester County to the city in a truck that runs on the hotel's used vegetable oil.

As he walks through the hotel, he cannot help but note the heat produced by the kitchen stoves. Or the laundry dryers and pressers.

To him, it's all fuel, awaiting his attempts to capture it and feed it back into the loop.