As the saying goes, information is power.

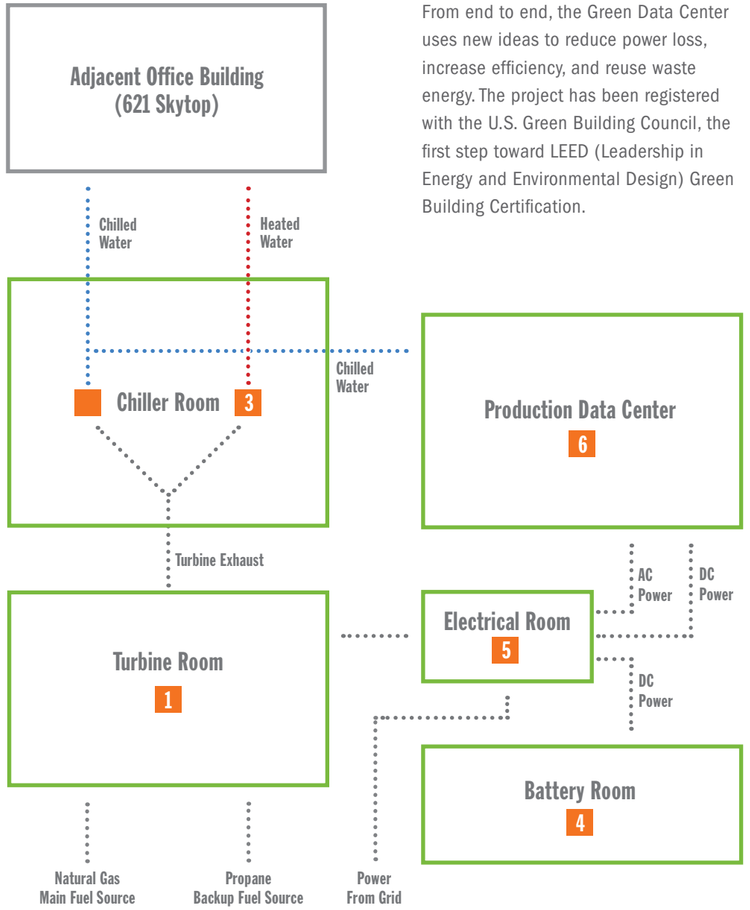
The Green Data Center at SU

That has never been a truer statement than today, when the world depends on the data flowing through our electronic lines of communication. But power comes at an increasingly high cost, both in dollars and environmental impact on our planet.

That is why **Syracuse University, IBM,** and **New York State** joined together to create the **Green Data Center.** Through a combination of new innovations and smarter technologies, this partnership has created one of the most energy-efficient data centers in the world.

As part of its "Smarter Planet" initiative, IBM has worked with SU to look beyond computer hardware and software to the actual infrastructure of the data center. The Green Data Center—with its own electrical tri-generation system and IBM's latest computers and computer-cooling technology—is expected to use 50 percent less energy than a typical computer center, making it one of the "greenest" in operation today.

The Green Data Center is a showcase that will demonstrate how energy-efficient technologies can reduce energy costs and environmental impact. And it is a perfect example of how cross-sector partnerships—the foundation of Scholarship in Action—can truly change the world.



From end to end, the Green Data Center uses new ideas to reduce power loss, increase efficiency, and reuse waste energy. The project has been registered with the U.S. Green Building Council, the first step toward LEED (Leadership in Energy and Environmental Design) Green Building Certification.

1 Capstone Hybrid UPS Turbines

The data center's electrical tri-generation system uses 12 patented, natural-gas-fueled microturbines to provide electricity for the Green Data Center. Ten of the microturbines can generate all of the power needed, enabling the data center to operate completely off-grid.

Where a typical data center converts alternating current (AC) power from the utility's electrical grid to direct current (DC) to power the servers, these microturbines can generate any combination of AC and DC power on site, avoiding the loss of power that typically occurs during transmission and conversion.

In addition, the heat generated by the turbines is not wasted. The hot exhaust is piped to the chiller room, where it is used to generate cooling for the servers and heating and cooling for the adjacent office building.

2 Thermax Absorption Chillers

Waste heat from the microturbines is sent to these two absorption chillers, which operate on the principal that water in a vacuum evaporates at very low temperature.

The vacuum is maintained by circulating a lithium bromide solution that absorbs the vapor from the evaporating water. The heat from the 585°F (307°C) turbine exhaust re-concentrates the solution and releases the water vapor, which is then re-condensed in a cooling tower. This unique double-effect process increases the amount of cooling generated. The 45°F (7°C) water is then piped to the Production Data Center to cool the servers.

With no moving parts apart from the water pumps, these chillers are extremely reliable and quiet. Their capacity—equivalent to 300 tons of ice—produces approximately three times the cooling needed by the data center. The excess chilled water is piped to the adjacent office building at 621 Skytop for air conditioning.

3 Cain Heat Exchangers

During the winter, the 585°F (307°C) exhaust from the microturbines flows through these heat exchangers to produce hot water, capturing valuable energy that would otherwise be wasted. The water is then piped to 621 Skytop to provide free heating for the much larger office building.

4 Uninterruptible Power Supply (UPS)

Forty-four tons of sealed batteries provide emergency backup power in the unlikely event that all 12 turbines and the utility grid fail to provide enough electricity to maintain operations. The battery banks generate at least 17 minutes of full data center power, permitting an orderly shutdown of computers in the event of a calamity.

5 Switchgear

Switchgear and other equipment direct electric power supplied to the data center. The equipment routes power:

- From the turbines to the computers.
- From the turbines to the backup batteries, to keep them fully charged.
- From the batteries to the turbines, to restart idle turbines.

6 IBM Rear Door Heat eXchanger

Cooled water from the absorption chillers is pumped through pipes beneath the floor to special heat exchanger-equipped "cooling doors" on the server racks.

The doors remove heat from each rack far more efficiently than conventional air conditioning methods. Sensors monitor server temperatures and usage to tailor the amount of cooling delivered, further reducing energy waste and expense.