

Data Center Heat Re-use – List of known implementations

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http://sustainable.pnnl.gov/report/env_stewardship.stm

Environmental Stewardship PNNL has a long history of demonstrated commitment to protecting and using resources wisely.

A number of efficiency measures were implemented to manage the intensive amounts of energy needed for PNNL's computing equipment. We were able to reduce fossil fuel use in our most energy-intensive facility through the reuse of the facility's "waste" heat.

ZURICH, July 2 -- IBM has delivered a first-of-a-kind hot water-cooled supercomputer to the **Swiss Federal Institute of Technology Zurich (ETH Zurich)**, marking a new era in energy-aware computing. The innovative system, dubbed Aquasar, consumes up to 40 percent less energy than a comparable air-cooled machine. Through the direct use of waste heat to provide warmth to university buildings, Aquasar's carbon footprint is reduced by up to 85 percent.

July 25, 2011 HPCWire “MEGWARE Announces World's First AMD Cluster System with Direct Hot Water Cooling”

“The system runs smoothly at flow temperatures between 25 °C and 45 °C. This results in high runback temperatures and the possibility of freely cooling or reusing the waste-heat produced, e. g. for the generation of heat and cold for the heating and cooling of rooms and buildings. Dr. Herbert Huber, Head of the Group Compute Server at the LRZ has studied the reuse of waste-heat with the use of new and established technologies for several years. His visionary ideas and the inventive genius of MEGWARE's engineers have now resulted in the creation of an operational installation.

"We will use the runback temperatures of 55 °C to 60 °C for the operation of an adsorption refrigerating machine. This machine produces 11 kW of cooling capacity which is used in turn to cool down conventional IT equipment. Thanks to the double use of the energy, the new cluster is twofold efficient" says Prof. Dr. Arndt Bode, Director of the LRZ.”

“**SuperMUC** will also use a new revolutionary form of high temperature cooling developed by IBM for the ETH Zürich with the prototype system [Aquasar](#). Active components like processors and memory are directly cooled with water that can have a temperature of up to 45 degrees Celsius. The "High Temperature Liquid Cooling" together with a very innovative system software promises to cut the costs for cooling by 40 percent according to IBM. It will therefore allow a very moderate increase in energy needed to operate this system compared to its predecessor HLRB II. In addition, all LRZ buildings will be heated re-using this energy. SuperMUC will be housed in the recently expanded Compute Cuboid of LRZ.”

EvoSwitch [*Inside EvoSwitch: Servers And Racks*](#)

June 7th, 2010 : Rich Miller

EvoSwitch offers cold aisle containment to isolate the cold air and hot air within its racks. The company then reuses the waste heat from the hot aisle, capturing it to warm office and storage areas, as well as generator housings.

Intel's "Greenest" Building Unveiled, posted by [Revital Bitan](#) on [June 28, 2010](#). Intel Israel Development Center, Heat thrown off by the data center's servers is captured and used to heat water used in the cafeteria and in showers and bathrooms.

CLUMEQ transforms rundown particle accelerator into high-efficiency cooling enclosure

HPC consortium discovers circular shape of concrete structure yields significant cooling efficiencies

The Université Laval in Quebec, Canada, had two problems. First, its campus was home to a run-down particle accelerator, constructed in the 1960s, that needed to be decommissioned. Second, the university and 11 of its fellow institutions, members of an HPC consortium, needed a place to construct a state-of-the-art supercomputer. With a little ingenuity -- and a devotion to embracing sustainable practices -- the group was able to transform the 36-foot-wide, 65-foot-high circular concrete silo into an effective cooling enclosure for its supercomputer.

Heat waste generated by the supercomputer is put to good reuse. During eight months of the year, it's transferred from the chilled water return to the campus hot-water loop to provide heating for the school, thus reducing energy bills.

Telecity (France)

The latest example comes from **Telecity**, which is using waste heat from its new [Condorcet data center](#) in Paris to heat an on-site Climate Change Arboretum, where scientists will recreate the climatic conditions expected to prevail in France in 2050. Société Forestière and the French National Institute for Agricultural Research (INRA) will use the arboretum to grow and research plants from around the world with the aim of selecting those species most adaptable to changes in the prevailing climatic conditions.

Telehouse West (United Kingdom)

[Telehouse to Heat Homes at Docklands](#)

Excess heat from servers at the new [Telehouse Westdata](#) center in the Docklands section of London will soon be used in nearby houses and businesses. The waste heat from the \$180 million Telehouse colocation facility will be used in a district heat network, which is expected to produce up to nine megawatts of power for the local Dockland community.

IBM (Switzerland)

[Data Center Used to Heat Swimming Pool](#)

An [IBM data center](#) in Switzerland is being used to heat a nearby swimming pool. Hot air generated by the Uitikon center will flow through heat exchangers to warm water that will be pumped into the nearby community pool. IBM says the volume of heat thrown off by GIB-Services' data center is enough to warm 80 homes. Or one swimming pool, it would appear.

Academica (Finland)

[Data Center Housed Under Cathedral Heats Homes in Finland](#)

Treehugger.com reports that waste heat from a data center in Finland underneath Uspenski Cathedral (a popular tourist spot) will warm up water pipes and channel it to nearby homes for heating. The planned data center for information technology services firm Academica would be capable of providing enough heat to warm up 500 large private houses.

IBM and Syracuse University (New York)

[Recycling Waste Heat in Nearby Buildings](#)

A data center built by IBM and Syracuse University uses gas-powered micro-turbines to generate on-site power. During the winter, the 585 degree F (307 C) exhaust from the micro-turbines flows through heat exchangers to produce hot water, which is then piped to a nearby office building to be reused in the building's heating system.

They created a liquid cooling system that uses double-effect absorption to convert the exhaust heat from the aforementioned power generator into chilled water to cool not only servers, but also an adjacent building. Server racks incorporate "cooling doors" that use chilled water to remove heat from each rack more efficiently than conventional room-cooling methods.

Notre Dame University (Indiana)

[Data Center Heats A Greenhouse](#)

The Notre Dame Center for Research Computing has placed a rack of high-performance computing (HPC) nodes at a local municipal greenhouse, the South Bend Greenhouse and Botanical Garden, to help heat the flowers and plants in the facility.

Quebecor (Canada)

[Companies Reuse Data Center Waste Heat to Improve Energy Efficiency](#)

Quebecor channels excess heat produced by servers at its data center in Winnipeg, Canada to the nearby offices of a local newspaper. The company ran a second duct out of the exhaust plenum to the intake duct of the editorial office upstairs. The process was controlled by pneumatic baffles that open and close depending on readings of thermometers within the ducts.

Plans for Heat Reuse:

Swiss National Supercomputing Center (swimming pool), NREL (offices), LBNL (offices)

Barcelona Supercomputing Center By [Manek Dubash, Techworld](#) | [Techworld](#) Published: 01:00 GMT, 09 June 05

“The computer vents its waste heat from a huge, floor-level grid next to the building. Stand on it in the hot summer sun and the blast is both hot and strong enough to be uncomfortable. Aware of the poor environmental image this paints, especially given the environmental work the supercomputer performs, Porta says it is hoped that the waste heat will be pumped underground for use a geothermal pump, although the engineering has yet to be designed.”