

# PROJECT SNAPSHOT

**Facility:** Verizon Central Office, Pittsburgh, PA

**Situation:** Very poor operating efficiency due to an aging chilled water plant and inadequate control. There was also insufficient back-up in case of equipment failure.

**Solution:** New dual compressor chiller, variable primary conversion, and TekWorx adaptive control and kW/ton monitoring.

## Comments:

“They[Tekworks] were a critical component in this project. There’s no way we would have been able to get this efficient without them.”

*Ted Bold, Consulting Engineer,  
LLI Technologies*

“We can see what’s going on in the system now, how many tons of refrigeration we are actually using. We *know* much more than we ever did with the previous system.”

*Jack Bostrum, Master Craft Lead  
Person, BTE*

## Adaptive Control Helps Restore Efficiency to Critical Verizon Telecommunications Facility

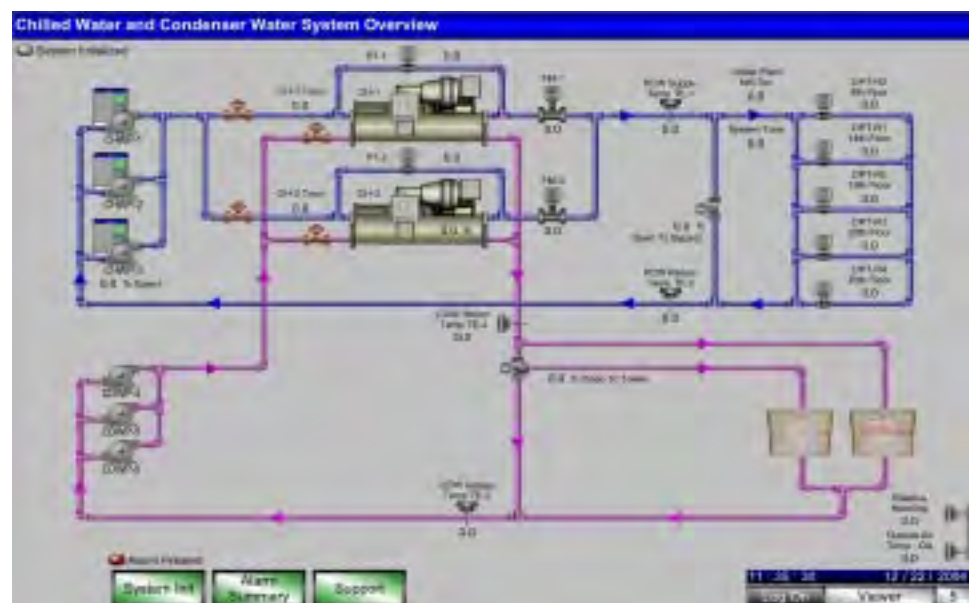
**On a scale from 1 to 10, Verizon’s telecommunications central office in downtown Pittsburgh, PA got an efficiency grade of about 2. Now it’s a 9 or 10.**

That’s according to Ted Bold, of LLI Technologies, the engineering firm charged with upgrading the chiller plant at the facility, which operates 24/7, and is responsible for generating approximately \$1 million in revenue per hour. Bold attributes this leap in efficiency to a variable primary conversion, a new, higher efficiency chiller, and a TekWorx thermal energy control system.

## The Challenge

An aging chiller plant was taking a bite out of the profits at this 4-million square feet facility with 20 floors of occupied space. 75% of the office building space is taken up by computer equipment. Approximately 800 people take up what’s left, saddling the chilled water plant with a design day cooling load of more than 750 tons.

Part of the problem was the plant’s constant speed/3-way valve design. Since the spaces, which are cooled by 85 air handling units, are never fully loaded, a tremendous amount of chilled water was bypassing the load and going right back to the chillers, resulting in low delta T. The two existing 650 ton chillers were also old and inefficient and the plant lacked sufficient back-up required for this mission critical facility.



**TekWorx’ easy-to-read panel makes it simple for users to monitor chiller plant operation for maximum efficiency.**

## The Solution

LLI Technologies knew Verizon needed to replace one of the existing chillers and therefore selected a new, higher efficiency dual compressor machine, keeping one of the older chillers on stand-by. They also knew that without addressing other important control and hydronic design issues, Verizon's problems with inefficiency and unnecessarily high operating costs would persist.

The solution was a variable primary conversion and a new adaptive control system with kW/ton monitoring capability that would keep the chillers and other chilled water components operating at peak efficiency under any and all circumstances. The first step was to swap 2-way valves for the 3-way valves that were keeping the system flow fixed at an unnecessarily high level. The 2-way valves allow flow to be directed precisely where it is needed and little (if any) flow is bypassed.

Next, the existing chilled water pumps were updated with variable speed drives so that as loads are satisfied, the pumps slow down. As a result, the plant is able to meet their load requirements much more easily and efficiently. Finally, a single system by-pass valve was installed to ensure adequate chiller flow during low load conditions. Thus, water is bypassed only when the flow required to serve the load is below the chiller's minimum flow.

## Controls Make It Work

You don't become a 9 or 10 on the efficiency scale without

The Tekworx control, which ties into the existing Johnson Controls Building Automation System (BAS), was essential to making this new system work. The control monitors chiller plant kW consumption and adjusts the simultaneous operation of individual components to effectively minimize energy consumption.

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comprehensive control, certainly in a system of this size and complexity.

The Tekworx control, which ties into the existing Johnson Controls Building Automation System (BAS), was essential to making this new system work. The control monitors chiller plant kW consumption and adjusts the simultaneous operation of individual components to effectively minimize energy consumption. It accomplishes this by:

- Sequencing CHW pumps based on kW input to minimize pumping energy.
- Adjusting CHW pump speed to maintain the correct differential pressure in all 4 cooling zones.
- Controlling two, 2-speed cooling towers for optimum condenser water temperature, and thus, maximum chiller efficiency.
- Sequencing the two operating chillers

It was obviously critical that the control integrate well with the existing Johnson Control Metasys system, as Verizon

didn't want to go through a total replacement. Fortunately, TekWorx's high speed N2 communication driver made this integration with the system very easy.

## Redundancy is CRITICAL

The Tekworx control also provides enhanced reliability at a facility that can't afford downtime. The massive amount of telecommunication equipment drives the cooling load up, and loss of cooling – even for a short time — could have dire results. A past incident revealed just *how* critical cooling was to facility when a single chiller failure resulted in an 8 degree temperature rise within just 11 minutes!

Now with one chiller as back-up and Tekworks controlling automatic switchover of pumps and chillers in case of failure, operating conditions will always be maintained. This was put to the test one day when a condenser pump was accidentally bumped off-line. The TekWorx control automatically switched on the back-up pump in a matter of seconds so that the resultant drop in flow was so brief and so slight that it wasn't even detected by the chiller.