





## FUEL CONSUMPTION

Ron Taglieri, Chief Engineer at Liberty Science Center, recently shared the impressive results after 6 months of continuous operation following the equipment startup in October 2018:

- ✓ The project's initial fuel savings projections were estimated at 20%... but the first six months of operation have reduced fuel consumption by 30!
- ✓ The NURO® control system maintains a consistent hot water supply temperature to the AHU's within  $\pm 1^{\circ}\text{F}$ .

The boiler system at Liberty Science Center has several unique functional requirements, all of which are handled entirely by the boiler's built-in NURO® control system:

- ✓ **External backup for heat call via “Auxiliary Boiler in Cascade” relay output:** The system has retained one of the two existing Scotch Marine boilers. In the extremely rare situation where the Patterson-Kelley boiler equipment is unable to maintain the entire heating load, the P-K boiler equipment calls for backup from the Scotch Marine with the programmable “Auxiliary Boiler in Cascade” relay output.
- ✓ **Motorized control valve operation via programmable relay outputs:** The system features three motorized isolation valves installed at each boiler which must be opened prior to operation. Each boiler offers four programmable relay outputs (A, B, C & D) which can be configured to operate external devices such as air dampers, draft inducers, fixed-speed circulation pumps, variable-speed circulation pumps, motorized control valves, domestic water heat exchangers, etc. The control valve logic always ensures at least one valve is open at all times to prevent dead-heading the primary circulation pumps.

### **Variable speed control of primary circulation pumps via an adjustable 4-20mA analog output signal:**

- ✓ The system features three variable speed primary circulation pumps which track the firing rate of the boilers to maintain a consistent  $\Delta\text{T}$  throughout the entire firing range.

### **Automatic outdoor air temperature reset via outdoor temperature sensor:**

- ✓ The system automatically adjusts its operating setpoint throughout the year by monitoring the outdoor temperature conditions. In addition to changing the operating temperature, the NURO® cascade control the fewest number of boilers required to satisfy the heating load.

### **Building Management System integration via BACnet:**

- ✓ The system features a Siemens Building Management System which is able to monitor all the operating data from the P-K MACH® C2500 boilers and send remote commands via a BACnet ProtoNode gateway device. The operating data is then visually mapped to an interactive schematic of the boiler system which is displayed on a large screen TV inside the Engineering offices.