



# INDUSTRIAL CASE STUDY

## Petitt National Ice Center

## ENERGY UPGRADE



### Existing Condition

The facility had 700 tons of cooling for the ice that was using a once through city water cooling system for the heads and traditional cooling tower system for the ammonia.

At the same time they were rejecting all the heat from refrigeration they were heating the arena to maintain 55F for events. The challenge was to re-direct the heat into the arena and close the loop for the once through water.

**Close to 1.9 Million gals of water saved per year**

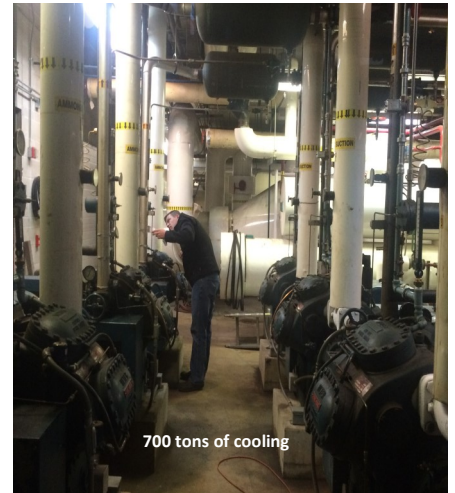
The once through water used to cool the heads of the compressors was re-directed into the existing air handlers that were designed for cooling. The cooling was never used however so a system was designed to pipe the water into the same coils and close the loop. This saved both water and sewer charges while also getting the benefit of the heat during the heating season. It was still possible to close the loop all year since the added heat to the arena did not overheat the area in summer.

### De-superheater added to ammonia system

Hot gas ammonia was diverted through a de-superheater to capture the heat heading to the cooling tower. This was done through a series of gas to water exchangers and again diverted to the second air handler that was also not being used for cooling. The new system also reduced the cooling requirement or fan energy in the cooling tower.

### Cooling Tower Upgraded to VFD

The cooling tower system had fixed speed staged fans that were converted to VFD ( variable frequency drives ) that could balance the load based on pressure or temperature of the cooling system. The Rockwell Automation System was already capable of utilizing the VFD to control the system. Rockwell donated their expertise and upgraded the control system. The net saving on maintenance, evaporative water and electrical energy added to the savings and reliability of the system.



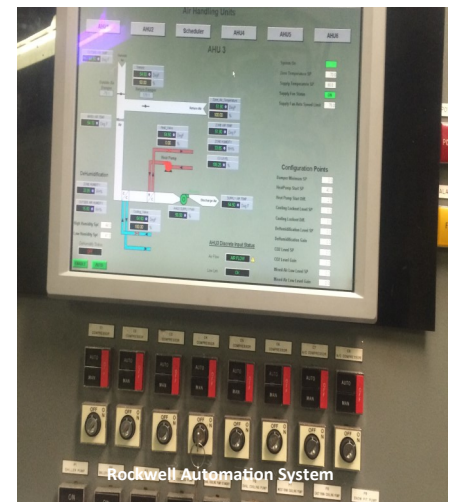
700 tons of cooling

### Actual Therm Saving– 8 months

Unit	8 months	Cost Saving
Therms	44,813	\$ 28,680.00

**Grants Procured \$ 110,481.37**

Note: Savings based on historical cost of energy



Rockwell Automation System

## Filtration and water treatment added

The water loop was isolated from the ammonia with sensors and safety system to recognize any potential failure of the exchanged. Monitor and testing stations were also added. A water conditioning system and filtration was also added later to protect the new system from any potential corrosion or sediment accumulation.

### Savings from Closed Water Loop

Unit	Yearly Energy saving	Yearly Cost Saving
Therms	13,187	\$ 6,593.00
Water	1,896,928	\$ 5,924.00
Sewer	1,896,928	\$ 5,924.00

**Projected Yearly on Water and Sewer \$ 18,441.00**

Note: Project was starting and savings were accelerated during progress

**Combined Yearly Saving \$ 47,121.00**

**Combined Project Yearly ROI**

**16.6%**

**10 Year Projected Saving**

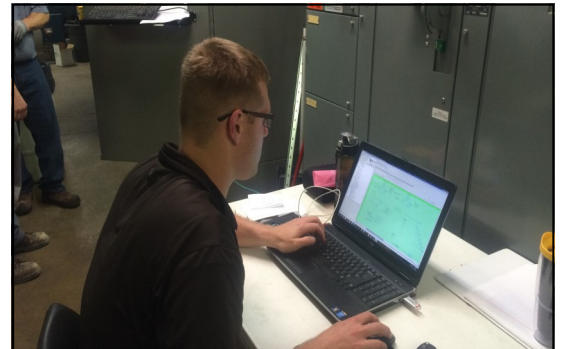
**\$ 551,315.00**



Controls integration

### Complete System Integration

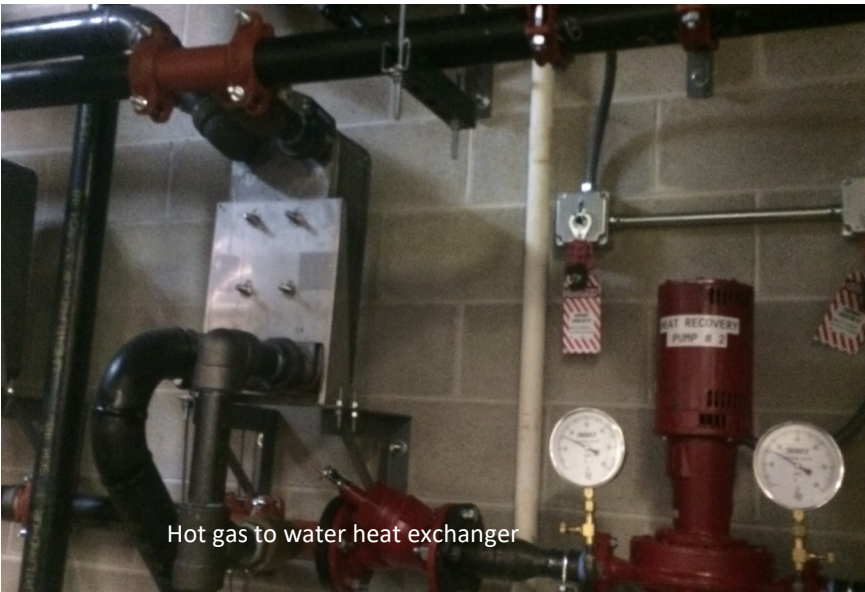
The new system was completely integrated into the existing system to maintain required temperatures and operation of the refrigeration without disruption.



The hot gas to water high performance heat exchangers pictured left had new variable volume pumps added to balance the flow and manage condensation before going to the tower. The new VFD was also added to the automation system based on the entering and leaving hot gas temperature and the known condensation temperature of the gas.

### Grant Procurement

Tower Energy engineered and procured a 6 figure grant to subsidize the project based on energy savings.



Hot gas to water heat exchanger