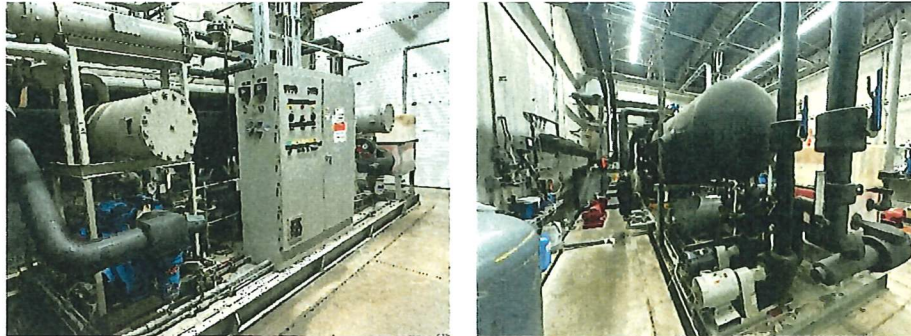




Red Wing Public School District-Prairie Island Ice Arena

PRELIMINARY ASSESSMENT
SEPTEMBER 2023

REFRIGERATION SYSTEM REPLACEMENT



Definition

As a refrigeration system ages the cost of operation increases until it reaches the end of its useful life. At that time, significant thought should be given to the replacement refrigeration system as these systems are expensive and the type of system will have a significant impact on the operating costs of the facility. In addition, different refrigerants will have differing environmental impacts with some being phased out in the future.

How This Measure Applies

The existing system is an R-22 refrigeration system which has been converted to R-45. The system is old and is near the end of its useful life. We have provided budgets for a traditional ammonia refrigeration system and an ammonia geothermal system. Ammonia is the most efficient refrigerant operating in the ice rink temperature ranges and comes with a GWP and ODP of zero for both making it the most environmentally friendly option. There are other refrigerants that could be considered such as CO₂ or a blend, however these come with various drawbacks compared to the ammonia refrigerant.

Location(s)

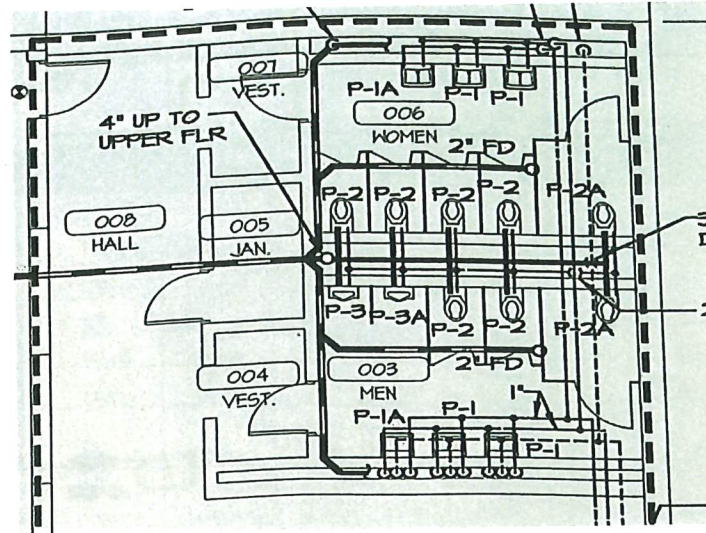
Ice Arena

Expected Simple Payback

Capital Project

Ammonia is a 100% natural refrigerant is the only one used for ice arenas that is considered zero risk for both Ozone Depletion and Greenhouse Gas risk.

ARENA BATHROOM BUILDOUT



Definition

Large additions and improvements to facilities require large capital outlays. These additions can often times be “bought down” by coupling the improvements with projects that also save energy or other operational costs. When these large projects are in the conceptual stage looking at life cycle costs, as opposed to looking at first costs, of the project can often lead to significantly lower operating costs, which in turn lead to substantial savings over the life of the improvement.

How This Measure Applies

The existing facility is in need of a new set of bathrooms located on the mezzanine level of the facility.

Location

Arena Mezz

Expected Simple Payback

Capital

Large capital projects such as additions can frequently be “bought down” by combining these projects with energy and operational saving projects.

Summary of Findings

The following tables summarize the findings resulting from the facility walk through. These are rough estimates of the possible opportunities that may be developed by the District. This list does not include all opportunities in the facility, as a detailed study would be required to generate a more comprehensive, investment-grade list of opportunities. This table identifies all of the opportunities presented in this report.

| Work Description | Location | Budget | | Annual Utility Savings | | Annual O&M Savings | Potential Incentives | Budget Net Cost | | Budget Simple Payback | |
|---|----------|--------------------|--------------------|------------------------|-----------------|--------------------|----------------------|--------------------|--------------------|-----------------------|------------------|
| | | Min | Max | Min | Max | | | Min | Max | Min | Max |
| Building Envelope - Seal roof/wall connections and replace door weather-stripping | Arena | \$18,900 | \$23,100 | \$972 | \$1,188 | \$0 | \$0 | \$18,900 | \$23,100 | 15.9 | 23.8 |
| Solar PV Roof Mount - Install a 210 kW DC solar PV system on the facility roof. | Arena | \$433,099 | \$529,343 | \$18,634 | \$22,774 | \$0 | \$192,488 | \$240,611 | \$336,855 | 10.6 | 18.1 |
| Dehumidification Demand Ventilation Controls - No DCV and unit trips out frequently | Arena | \$25,200 | \$30,800 | \$2,187 | \$2,673 | \$0 | \$0 | \$25,200 | \$30,800 | 9.4 | 14.1 |
| Power Factor Correction - Fix the power factor in the building (avg .77). | Arena | \$40,320 | \$49,280 | \$0 | \$0 | \$3,075 | \$0 | \$40,320 | \$49,280 | 13.1 | 16.0 |
| Low E-Ceilings - Add low E ceilings to existing rinks to reduce radiation load on the refrigeration system. | Arena | \$109,620 | \$133,980 | \$4,860 | \$5,940 | \$0 | \$0 | \$109,620 | \$133,980 | 18.5 | 27.6 |
| Refrigeration System - Install high efficient refrigeration system and floor. Reuse existing dasher boards. | Arena | \$3,159,000 | \$3,861,000 | \$3,240 | \$3,960 | \$8,000 | \$0 | \$3,159,000 | \$3,861,000 | Capital Projects | Capital Projects |
| Install high efficient refrigeration system and floor. Use Geothermal sources and reuse existing dasher boards. | Arena | \$4,095,000 | \$5,005,000 | \$4,212 | \$5,148 | \$0 | \$1,700,000 | \$2,395,000 | \$3,305,000 | Capital Projects | Capital Projects |
| Bathrooms - Add two new gender neutral bathrooms to upper floor located at existing conference room. | Arena | \$252,000 | \$308,000 | \$0 | \$0 | \$0 | \$0 | \$252,000 | \$308,000 | Capital Projects | Capital Projects |
| Totals | | \$8,133,139 | \$9,940,503 | \$34,105 | \$41,683 | \$11,075 | \$1,892,488 | \$6,240,651 | \$8,048,015 | 118.3 | 178.1 |