AMERICA ATMOsphere

Business Case for Natural Refrigerants

June 12-14, 2018 – Long Beach

Art Sutherland

Accent Refrigeration Systems

AMERICA

ATMO sphere

AMMONIA / CO2 ICE RINK

ATMO sphere AMERICA

#1

PROJECT CHALLENGES

- Refrigeration room had no exterior walls
- Direct R-22 system with 6000 pounds of R-22
- New steel piping grid too small for glycol
- Refrigeration system to be moved in 5 years
- Client did not want an Evaporative Condenser
- Very Large electrical consumption
- Very large fossil fuel consumption

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SMALL MECHANICAL ROOM WITH NO EXTERIOR WALLS

EXISTING DIRECT SYSTEM HAD 6000 POUNDS OF R-22

ATMO sphere AMERICA

Existing ½” Steel Pipe Grid

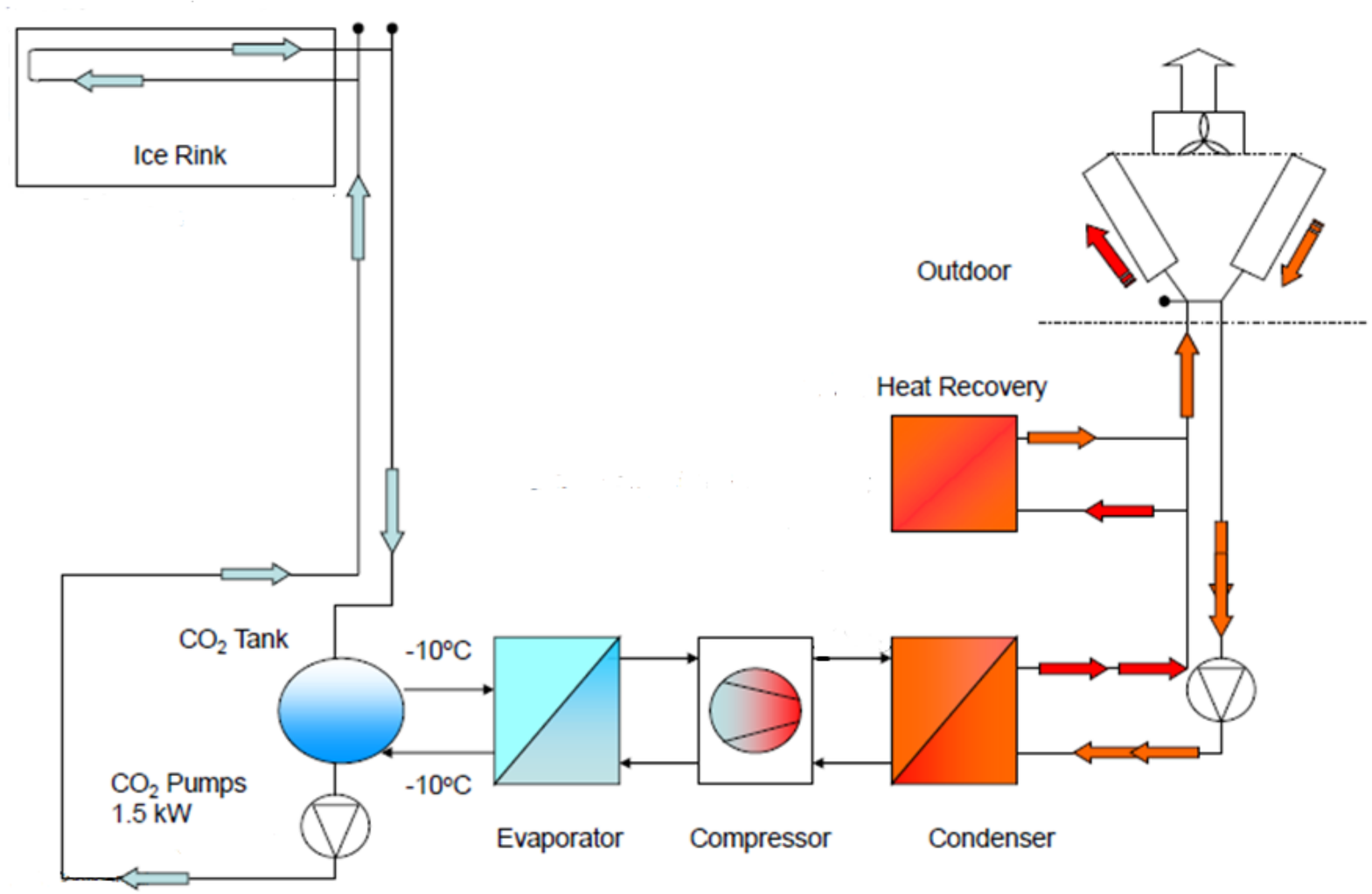
Too Small for Glycol or Brine

DIRECT SYSTEM DISADVANTAGES

- Prone to large refrigerant leaks
- High cost of refrigerant loss
- R-22 has high GWP and ODP
- Long term depositing of oil in the rink floor
- Potential for oil to plug ice rink circuits

Containerized NH3/CO2 System with 100% Energy Recovery

AMMONIA / CO2 SCHEMATIC DIAGRAM

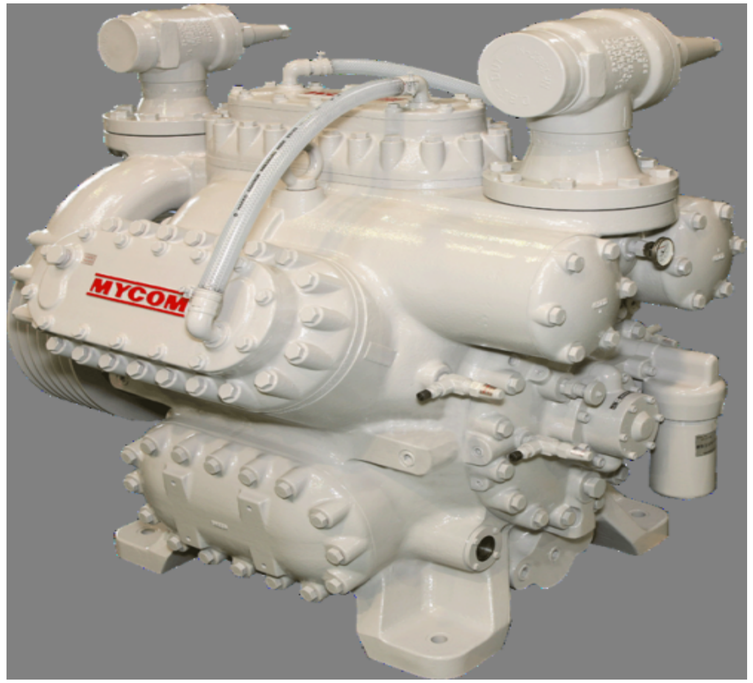


Ammonia / C02 System Advantages

- Ammonia system more efficient than CO2
- No oil circulating through the floor
- Ability to use all of the low grade heat
- Very low secondary pump horsepower
- Even temperatures across the entire floor
- Could use existing floor piping system

MYCOM M INDUSTRIAL COMPRESSORS

Very reliable and long lasting compressors
Very Low Oil Consumption
Extremely Efficient
Variable Speed to match system load



Vahterus Plate and Shell Heat Exchanger

Compact design

Very close approach temperatures

Vahterus Plate and Shell Heat Condenser

Very close approach temperatures

100% Energy recovery for facility

VFD Pumps for pressure control

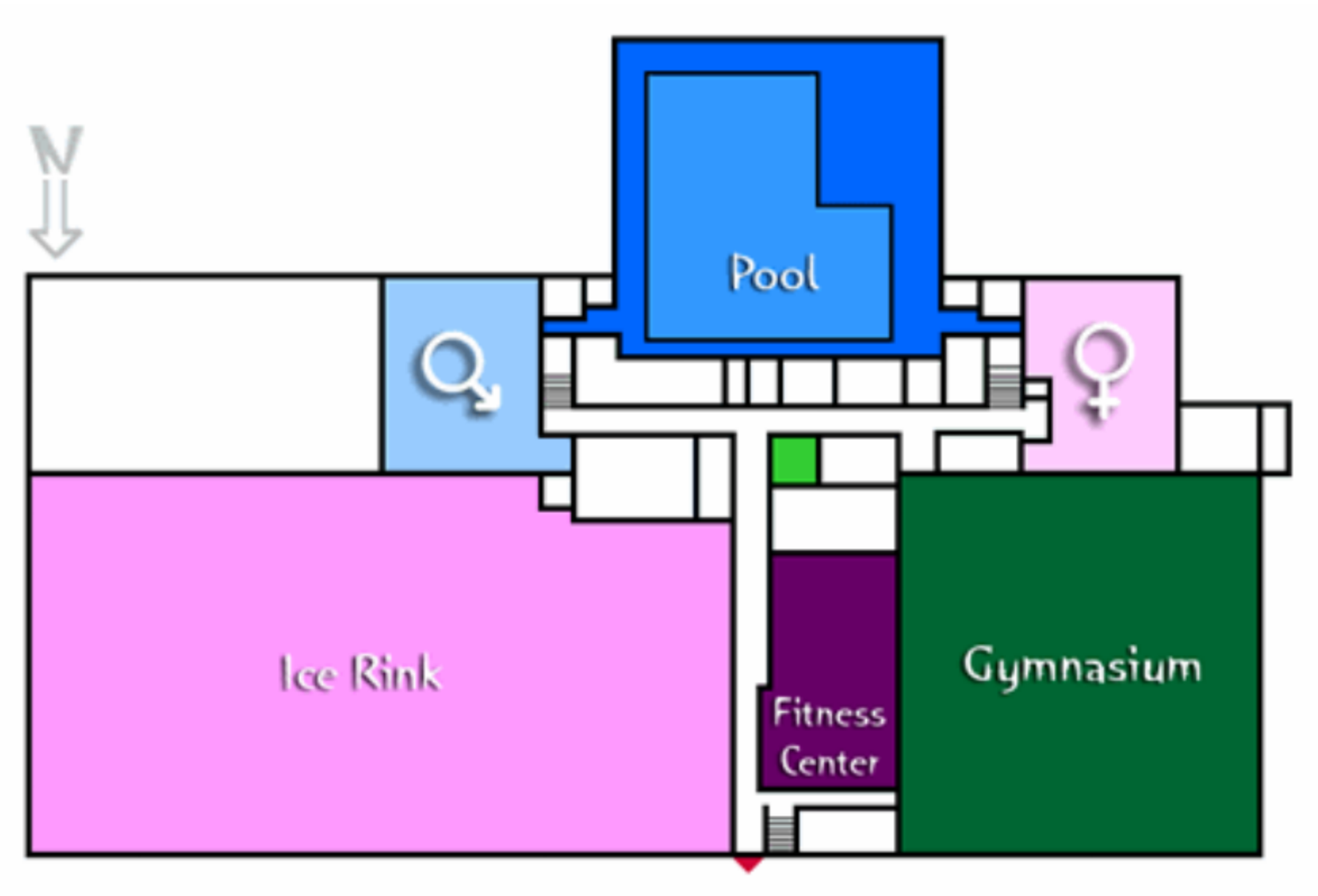
Adiabatic Fluid Cooler

Very efficient in summer

No water required in winter

ECM Fan motors for control and efficiency

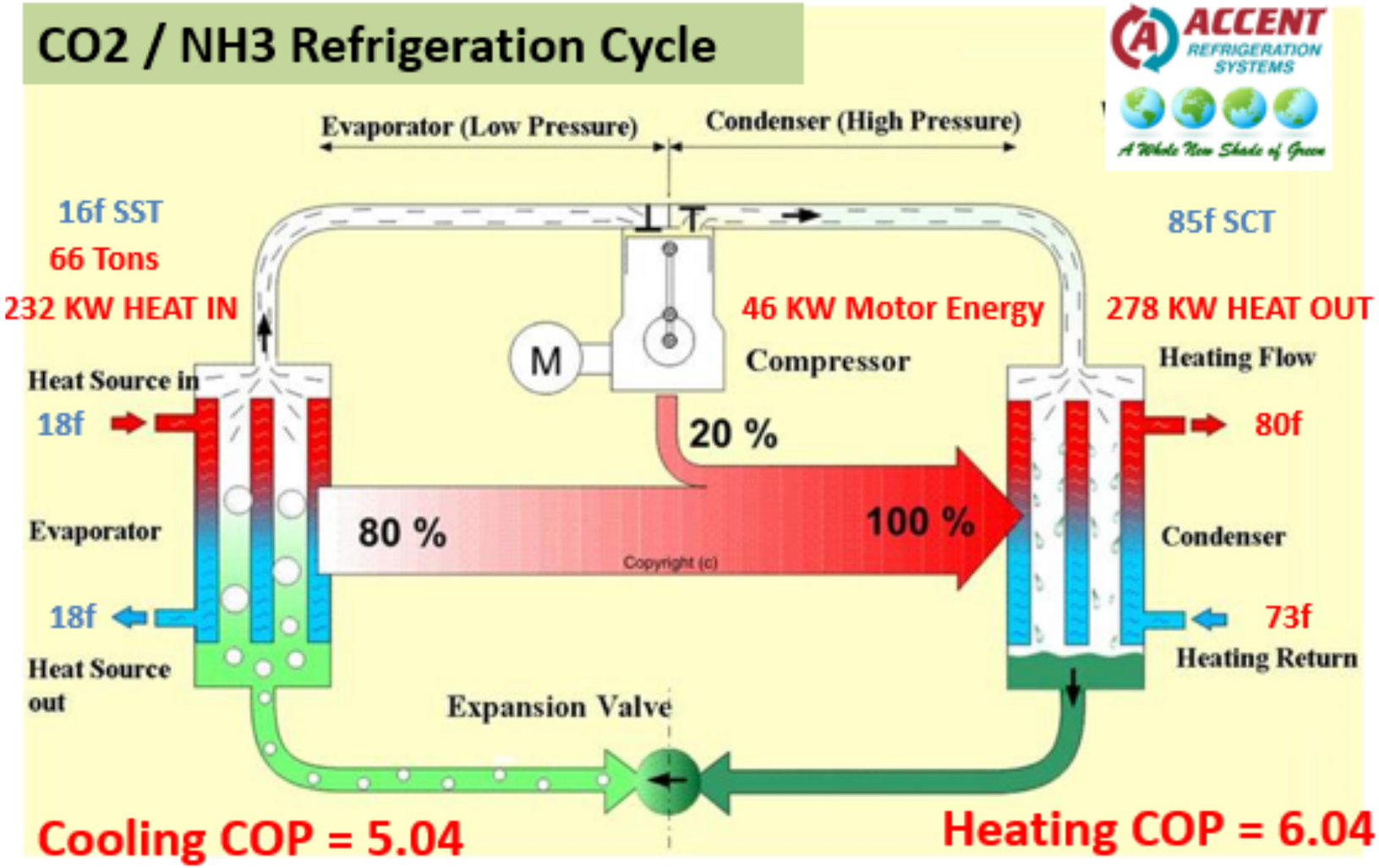
Diverse complex provided a lot of opportunity for energy recovery.



All public areas fresh air warmed by low grade heat.

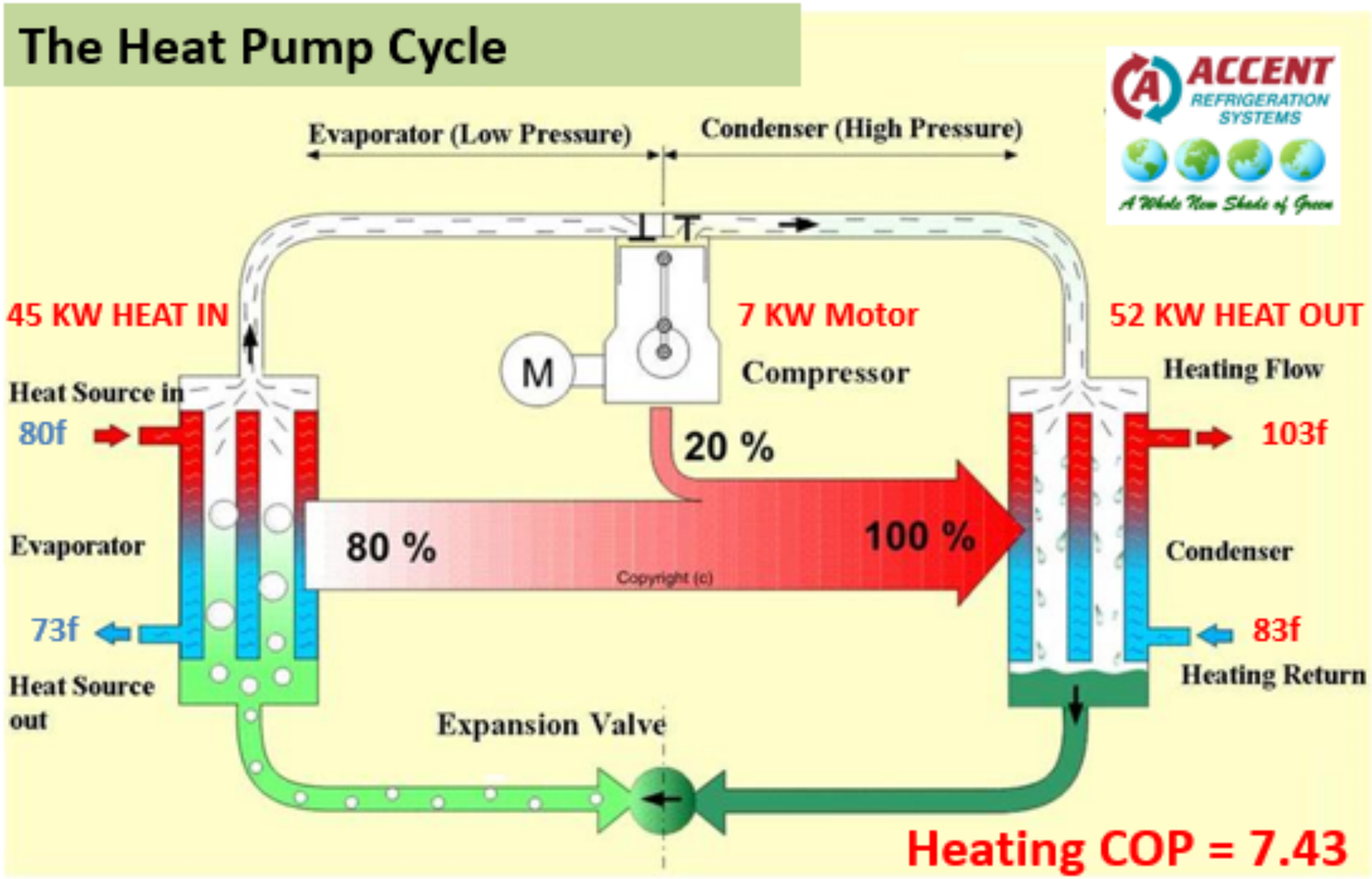
Up to 100% of the energy could be used in this manner

Refrigeration Cycle Performance



Custom high COP Heat Pump Provided Energy for the Pool

Heat Pump Performance



Facility Improvements

The cost of CO2 is $9000.00 versus $144,000.00 for R-22

The Ammonia has an ODP of 0 and a GWP of 0

Daily Electrical Energy Reduction of $175.00 per day

Daily Fossil Fuel Reduction of up to $160.00 per day

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Thank you very much!