THE TRUE COST OF GLYCOL

BY: DAVID BROMAN

WATER VS GLYCOL

Historically, ALL methods of providing freeze protection for closed loop utilities increased user energy costs, with some such as ethylene glycol providing damaging impacts to the environment.

Complexity of large scale HVAC systems can hide the true cost of adding glycol to system strictly for freeze protection.

How much Glycol costs to maintain versus Water

How to best measure the delta cost?

What are some potential methods to keep the system safe with Water…?

Does it make financial sense to make the switch?

Glycol Energy Analysis Tool

The Glycol Energy Analysis Tool easily identifies the additional cost associated using Glycol in your system versus Water and Freeze Block Technology

The Tool focuses on three primary areas of Energy Analysis:

- Annual Pump Energy Cost
- Annual Fan Energy Cost
- Annual Chiller Energy Cost

The Tool is designed to ultimately provide a Payback Analysis considering the use of Freeze Block technology and Water versus Glycol

Date:	12/19/2017
REV:	9

Glycol Energy Analysis Tool

COONEY ENGINEERED SOLUTIONS

Project Inputs

Project Location	Philadelphia
Electric Cost	$0.10/kWh

System Inputs / Outputs

Fan CFM	20,000 CFM	System Size	133.8 Tons
Fan Static Pressure	3 inWC	Chilled Water Flow	268 GPM
OA %	100%	Glycol Water Flow	286 GPM
CHW System ΔT	12 degF	Annual Ton Hours	279,224 Ton Hrs.
Total System Head	75 ft	Annual Cooling Hours	4,673 Hrs.
Propylene Glycol %	30%		

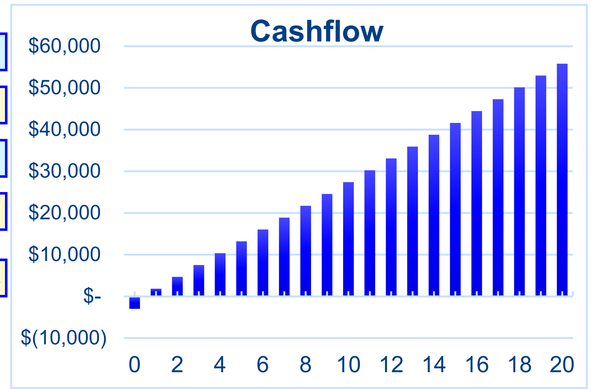
Energy Analysis

	Chilled Water	Glycol Mixture	Delta Cost
Annual Pump Cost	$ 885	$ 1,050	$ 165
Annual Fan Energy Cost	$ 8,655	$ 8,830	$ 175
Annual Chiller Energy Cost	$ 21,780	$ 23,280	$ 1,500
Total	**$ 31,320**	**$ 33,160**	**$ 1,840**

Delta Annual Energy Cost **$ 1,840** **Savings = 6%**

Payback Analysis

AHU Glycol vs Freezeblock Coil Delta	$ 3,000
Energy Savings	$ 1,840
Glycol + Maintenance Cost (/AHU/yr)	$ 1,000
Total Annual Savings	$2,840
Simple Payback	1.1 Years



PROJECT INPUTS

Project Location – Input
Current Options – Detroit / Philadelphia / Atlanta

Locations are Linked to:
Peak Cooling Temperature / Relative Humidity
*ASHRAE Design Day (0.4%)

Typical Hourly Metrological Weather Data (TMY3)
*National Renewable Energy Laboratory (NREL)

Electric Cost:
The total electricity cost per kilowatt hour paid by user

SYSTEM INPUTS/OUTPUTS

Fan CFM – User Input
Design Airflow rate of the AHU / System

Fan Static Pressure – User Input
Total Static Pressure of the Supply Fan

Outside Air Percentage – User Input
Percent of outside air for the system

Chilled Water Delta Temp – User Input
The Temperature Increase across the coil

Total System Head – User Input
The System pressure at the pumps

Propylene Glycol Percentage – User Input
Percentage of Glycol within the system

Outputs based on the user input:
System Size
Chilled Water Flow
Glycol Water Flow

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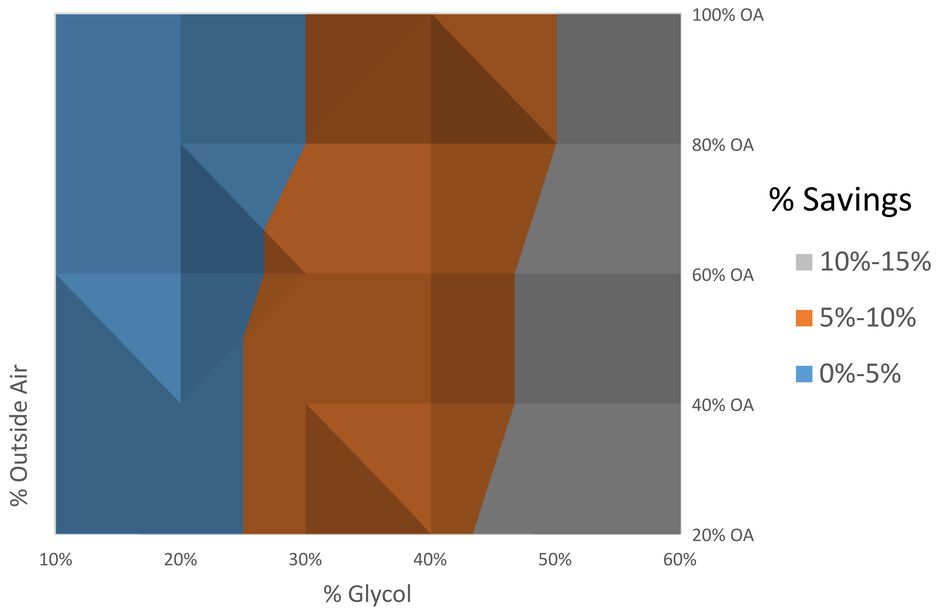
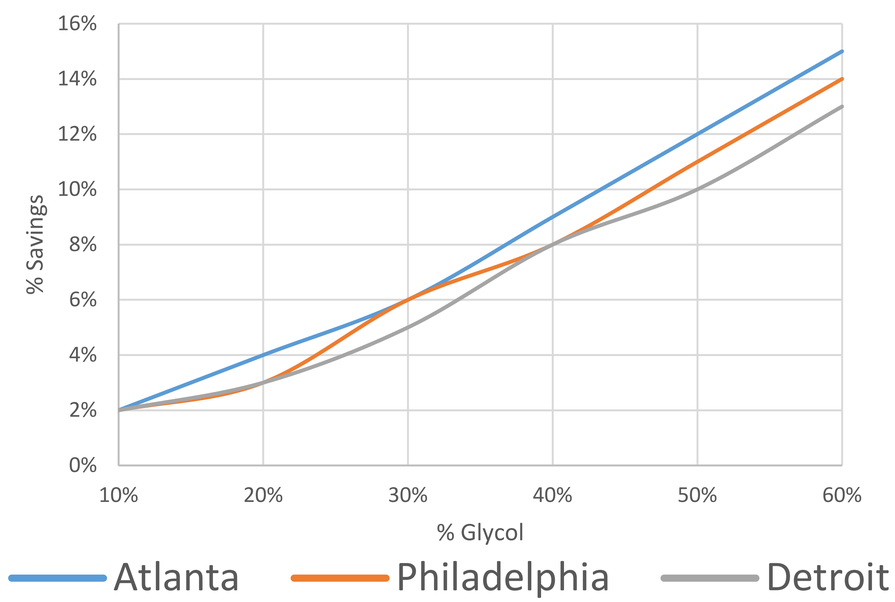
% SAVINGS: CHILLED WATER VS GLYCOL



Inputs held constant:

- 20,000 CFM @ 3" SP Fan
- Analysis in Detroit Michigan
- Electric cost @ $0.10/kWH
- Chilled Water System DT = 12F
- Total System Head = 75ft

% SAVINGS BY LOCATION



Inputs held constant:

- 20,000 CFM @ 3" SP Fan
- 100% OA
- Electric cost @ $0.10/kWH
- Chilled Water System DT = 12F
- Total System Head = 75ft

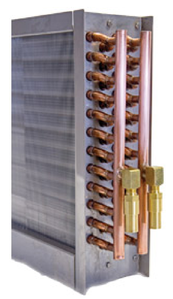
FREEZE BLOCK TECHNOLOGY

Freeze damage is one of the leading causes of coil failure in the HVAC industry

This patented technology helps protect coils in freezing conditions

The system is compromised of Expansion Relief Headers affixed to each return bend along with a Pressure / Temperature Relief Valve

The Freeze Block system is designed to allow expansion without restriction by displacing a controlled volume of water allowing ice expansion



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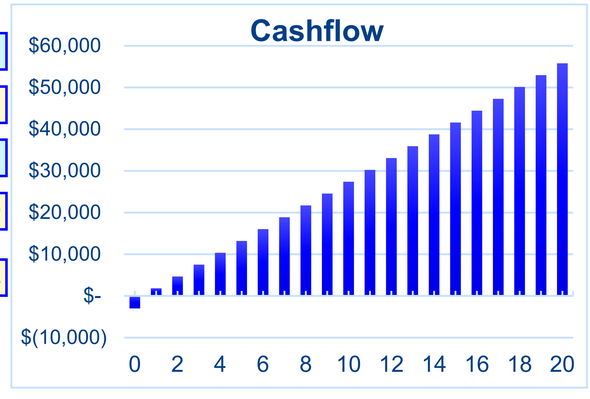

PAYBACK ANALYSIS

AHU / Delta Coil Cost – User Input
Delta of a standard coil cost versus a Freeze Block enabled coil cost

Energy Savings – Output
Annual Savings from the Analysis

Glycol + Maintenance Cost – User Input
Total annual cost of the Glycol product plus all the maintenance costs for the system

Total Annual Savings – Output
Total Savings expected for annual / one time items

Simple Payback – Output
The amount of time necessary to recoup the cost delta