

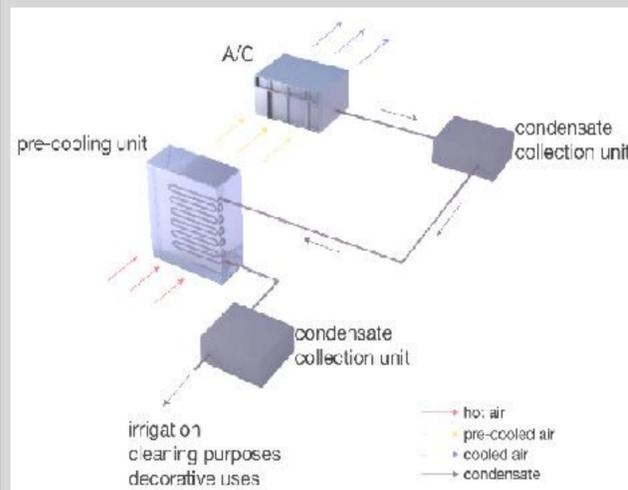
Pre-Cooling Solution

Air conditioners work by blowing air over coils filled with cold liquid. This result is cold air being pumped out. The warm air being blown in causes condensation to occur on the coils. We propose to collect this cold condensate and pump it through new coils placed before the existing coils. This will pre cool the air and make the air conditioner energy efficient.

Cooling Air at 80 degrees Fahrenheit:

Without Pre-cooling: 75.09 degrees Fahrenheit

With Pre-Cooling: 72.15 degrees Fahrenheit



Toilet Water Solution

Assuming a 1000 sq.-ft. building consisting 500 employees as a model, we approximate the following:

- 1.6 gallons per flush x 500 employees x 1.5 flushes a day x 260 days = 312,000 gallons of water a year
- 3 to 10 gallons of condensate/day per 1,000 square ft. hence an average of 6.5 gallons per day
- 6.5 gallons x 365 days a year x 120 = 284,700 gallons of condensate

This means Air conditioner condensate can make up around 90% of all water used in toilet flushing.

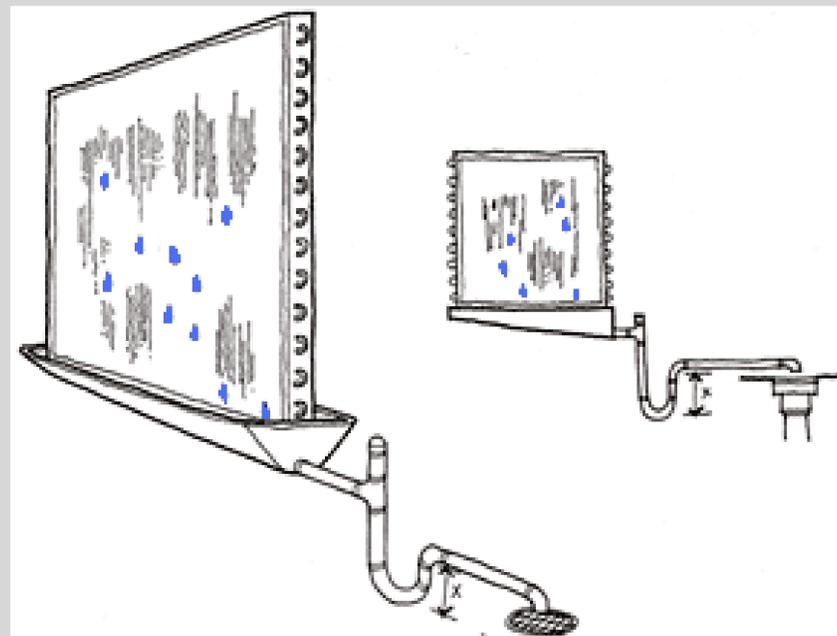
Water costs \$0.004 a gallon in Los Angeles, CA. This means over a \$1000 of savings a year!

Problem Statement

Our goal is to find viable uses for condensate produced by commercial HVAC systems. With the help of Pentair Water Co., quantification and insight will help lead to possible solutions to growing water needs.

What is Condensate?

Condensate is formed when ambient air is pulled through cooling coils of a HVAC (Heating, Ventilation, and Air Conditioning) system. Since the cooling coils are much colder than the ambient air, the water vapors within the air condense, creating water droplets. These droplets fall into a collection pan and normally discarded into sewer systems.



Objectives

- Calculation of the amount of condensate water generated by air conditioning units
- Suggesting a plan for a system to collect the condensate water
- Testing the condensate for bacteria and other chemicals
- Finding a purpose for the generated condensate water
- Marketing the system to the consumer (if the water generated is a great amount and profitable)

Methodology

Business and Market Analysis Team: Responsible for analyzing the feasibility of the project and its interest in the market

Testing Team: Responsible for performing a bacterial and chemical analysis of the water samples collected from various sites

Research Team: Responsible for finding out various applicable uses for the condensate water

Collection and Quantification Team: Responsible for analyzing the cost-effectiveness of the reuse of condensate water through mathematical calculations



Test Set Up

Future Action

- The next step for this project would be to use the data collected and formulated by this IPRO and market it to potential users that might be interested in using condensate water for making their businesses energy efficient
- Develop and market incentives through the government encouraging the use of condensate water.
- Market the idea to countries where the availability of water is very scarce.

TESTING

Bacterial Analysis

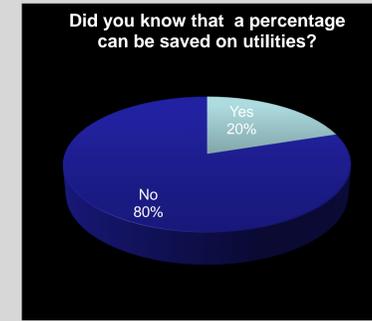
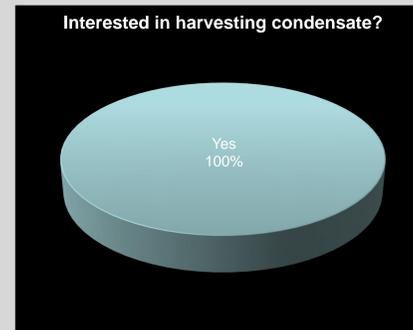
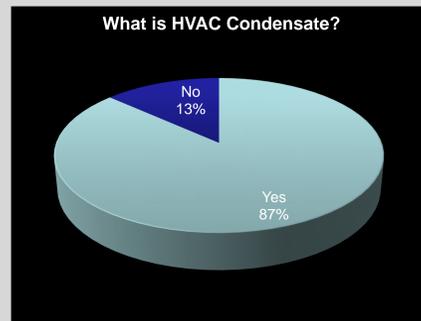
•Gram Stain analysis was performed of the water sample in Trypticase Soy Agar medium and Yeast Extract Agar medium to test for common bacteria found in AC Unit water (Eg. Legionella, Aspergillus etc).

Chemical Analysis

•Atomic Absorption Spectroscopy was performed on the water sample by passing light through the molecules of the sample to show the amount of a certain chemical in the sample.



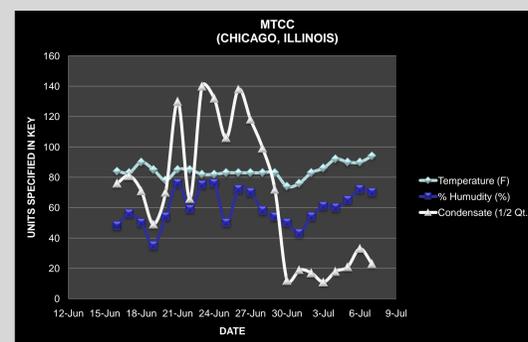
SURVEYS



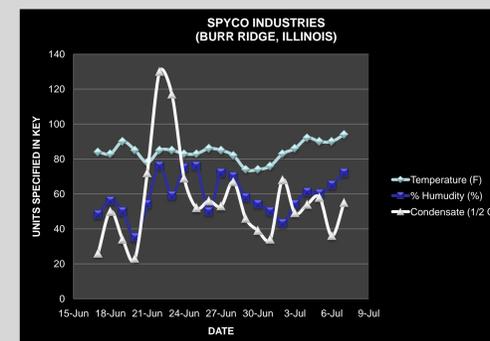
(30 Sites Surveyed)

"I actually never thought about it, in this way. Who ever came up with this idea, is genius. I must say we can probably save about \$1000 to \$1500 at this Home Depot." --*Home Depot Manager*

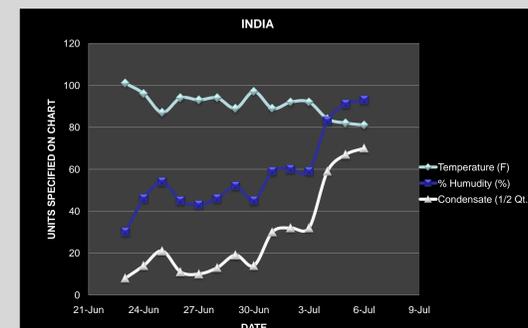
CONDENSATE COLLECTION DATA



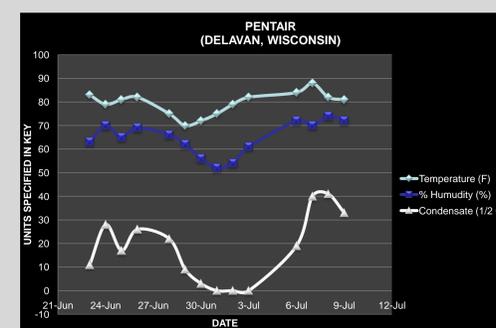
Total Condensate = 192 gallons



Total Condensate = 148 gallons



Total Condensate (Whole House) = 896 gallons



Total Condensate = 31 gallons

TESTING SITES

Set up multiple test sites which include MTCC, Spyco Industries Inc, and locations in India for measuring the amount of condensate.



SPYCO INDUSTRIES



MTCC