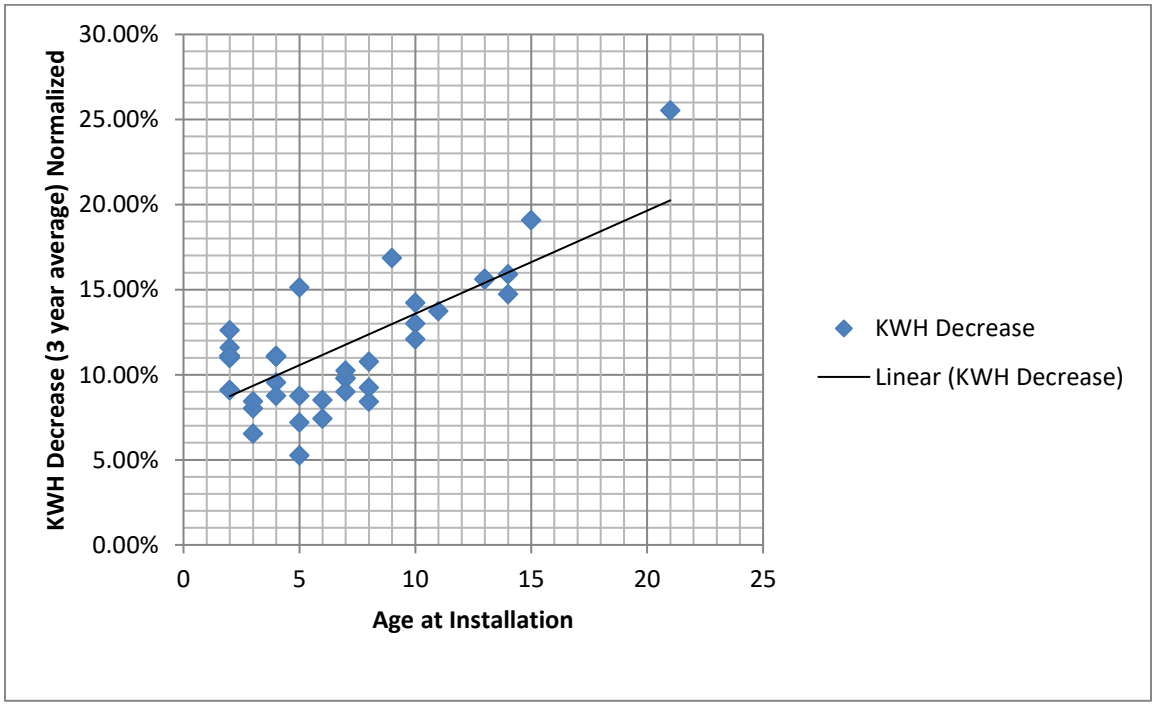
# Cold-Plus™ Proof of Longevity

The purpose of this study s to determine to long term (three year) effect on the treatment of Cold-Plus in HVAC units and prove that the treatment will last over time. We do this by comparing utility bills from Cold-Plus clients one year prior to treatment to utility bills in the three years following the treatment. To make the most accurate comparison, we used the months of May through October which are the primary air conditioning season. The data was compared as follows:

1. Each month of the base year was compared to the corresponding month in each of the following three years.
2. In order to compensate (normalize) for temperature changes the Cooling Degree Days (CDD), each of the post-treatment months was corrected to the base year numbers.
3. The KWH usage data for the three years after treatment was averaged to compare to the base year on a monthly basis.
4. Questions were asked to determine if the use patterns had changed over the study period and only constant patterns were used in the study. Any building that had significant change in physical properties or usage were illuminated from this study. If a significant change in occupancy occurred, or if additional energy efficiency improvements were made, those buildings were not studied here. This step adds confidence that the efficiency added is directly attributable to Cold-Plus.

The unit type and age at installation were recorded from installation data to determine if there was a correlation as to the age of the unit and the efficiency increase experienced.

The following graph shows the results of KWH decrease as it relates to unit age.




The trend line clearly shows the older the unit the better the results. This is because the “oil fouling” is more severe in older units, and the older units have lower SEER ratings and, therefore, have higher potential for improvement. The points also have a wide spread of efficiency increase in the same age group due to varying SEER ratings and whether the unit was properly sized for the application.

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The electrical consumption data used comes directly from the utility bill, which includes all electric used in the building, not only HVAC. We assume that the HVAC consumption is approximately 40% of the total utility bill and that the remaining 60% of the consumption did not change.

The following chart indicates critical information for each of the units in the study.

| Manufacturer | Model # | Tonnage | Age at Installation (years) | Decrease in KWH | Efficiency added to HVAC* |
|---|---|---|---|---|---|
| TRANE | XL 14 | 4.0 | 4 | 11.08% | 27.70% |
| TRANE | XL 14 | 4.0 | 4 | 11.08% | 27.70% |
| TRANE | XL 14 | 4.0 | 4 | 11.08% | 27.70% |
| TRANE | XL 19 | 5.0 | 4 | 11.08% | 27.70% |
| TRANE | XL 19 | 5.0 | 4 | 11.08% | 27.70% |
| RHEEM | RPPA049JAZ | 4.0 | 2 | 11.00% | 27.50% |
| RHEEM | RPPA049JAZ | 4.0 | 2 | 11.00% | 27.50% |
| JANITROL | CKJ048-LAB | 4.0 | 5 | 15.12% | 37.80% |
| LUX AIR | AC5036A2C1 | 3.0 | 9 | 16.86% | 42.15% |
| YORK | WLGP160400 | 4.0 | 5 | 8.76% | 21.90% |
| TRANE | 2TWR106011000AB | 5.0 | 2 | 11.60% | 29.00% |
| HEIL | NAC042AKA1 | 3.5 | 2 | 12.60% | 31.50% |
| TRANE | TCD060C300BC | 5.0 | 2 | 11.11% | 27.78% |
| TRANE | TCC060F300BA | 5.0 | 2 | 11.11% | 27.78% |
| TRANE | TCD210C300EA | 5.0 | 2 | 11.11% | 27.78% |
| TRANE | TSC060A3E0A2F | 5.0 | 2 | 11.11% | 27.78% |
| RUUD | UAMA036JAZ | 3.0 | 13 | 15.60% | 39.00% |
| RUUD | UAMA036JAZ | 3.0 | 13 | 15.60% | 39.00% |
| CARLYLE | AIR COND 5H40-A219 | 40.0 | 7 | 9.78% | 24.45% |
| CARLYLE | AIR COND #5H40A-219 | 40.0 | 7 | 9.78% | 24.45% |
| GOODMAN | CKJ30-1AB | 2.5 | 2 | 9.09% | 22.73% |
| GOODMAN | CKJ30-1AB | 2.5 | 2 | 9.09% | 22.73% |
| LENNOX | 12ACB60 | 5.0 | 6 | 8.50% | 21.25% |
| TRANE | TWR042C100B0 | 13.0 | 13 | 15.64% | 39.10% |
| HEIL | HAC448AKA1 | 4.0 | 5 | 7.20% | 18.00% |
| TRANE | TWR042C100A0 | 3.5 | 15 | 19.08% | 47.70% |
| TRANE | YCP060F1M0AA | 5.0 | 7 | 8.99% | 22.48% |
| TRANE | 2TTR2048A1000AA | 4.0 | 3 | 6.54% | 16.35% |
| TRANE | TTP036C100AT | 3.0 | 14 | 14.73% | 36.83% |
| LENNOX | H526-048-2P | 4.0 | 8 | 8.42% | 21.05% |

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|---|---|---|---|---|---|
| GOODMAN | A49-10 | 4.0 | 3 | 8.02% | 20.05% |
| TRANE | TTP060100AA | 5.0 | 10 | 14.22% | 35.55% |
| CARRIER | 38BRC060340 | 5.0 | 5 | 5.25% | 13.13% |
| LENNOX | 0525-411 | 5.0 | 11 | 13.74% | 34.35% |
| TRANE | TWE030P13FAO | 2.5 | 10 | 13.01% | 34.35% |
| LENNOX | H526-036-CA | 3.0 | 10 | 12.08% | 30.20% |
| CARRIER | 38CMC024310 | 2.0 | 14 | 15.90% | 39.75% |
| RUUD | UAKA037JAZ | 3.0 | 4 | 9.55% | 23.88% |
| CARRIER | 38CKC024340 | 2.0 | 3 | 8.44% | 21.10% |
| CARRIER | 38AKS024 | 10.0 | 4 | 8.76% | 21.90% |
| LENNOX | H526030-1P | 2.5 | 8 | 9.25% | 23.13% |
| TRANE | TTJ030B100AO | 2.5 | 7 | 10.24% | 25.60% |
| TRANE | 2TTBP048A1000AA | 4.0 | 8 | 10.77% | 26.93% |
| RHEEM | RAPA042JAZ | 3.5 | 6 | 7.42% | 18.55% |
| GOODMAN | TH036-1A | 3.0 | 21 | 25.53% | 63.83% |

* Savings due to HVAC Efficiency added are calculated based on the estimate that HVAC consumption comprises 40% of the overall electricity in the building, as follows:

**Efficiency added to HVAC = 1-((.4-decrease in KWH% ) /.4))**

This study concludes that the increase in efficiency due to Cold-Plus is still present after three years. This supports the manufactures claim that the Polytetrafluoroethylene component of Cold-Plus does not deteriorate over time and that initial savings will last for the life of the HVAC unit.