TMY3 is Not Normal, Nor is it Typical – The New Normal is a Trend!

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Summary

This poster emphasizes the proper and improper use of the Typical Meteorological Year 3 (TMY3) and published Cooling Degree Days (CDD).

This process analyzed 167 National Solar Radiation Data Base Class I stations' daily data for the 62 years from 1960 through 2012. It found a generally increasing trend in ambient temperatures that resulted in increasing CDD year over year. This finding is significant because it is not uncommon for evaluations to use published CDD or CDD's derived from TMY3 to "Normalize" the results of evaluations. These methods are also used to project usage and savings results into the future.

For most locations, any method that uses an average of cooling degree days over some time period will necessarily result in an erroneous conclusion. It is simply true that, for most locations, there is a rising number of CDD (and a falling number of Heating Degree Days). For these reasons evaluations should take into account this "new normal" in normalizing the results and for projections into the near future.

Utilizing simple linear regressions: $CDD_i = C_i + a_i \times year$, two thirds of the stations showed at least a .05 predictive value attributed to the year. One example of the trend in CDD is shown in Figure 1. This figure also shows the inaccuracy associated with a CDD that is based on an average over a number of years.



Figure 1. Actual and TMY3 Generated CDD (base 68°F) vs. year for Reno, Nevada

Both the R2 and the t values of the coefficient "a" show statistical significance of the trend. Figure 2 shows the t values for the coefficient of the year within the regressions.

The values of a (the change in CDD68 per year) range from -0.16 (t value -0.16) for Cedar City, Utah to +26.97 (t value 10.7). Figure 3 shows the values of the coefficient a.



Figure 2. t Statistics for the coefficient of year in the regressions



Figure 3. Values for the coefficient of year in the regressions