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**Presentation Title:** Finding the Perfect Baseline: Advanced Time Series Control Group Matching Strategies on Energy Consumption

**Abstract:** The evaluation of savings due to the installation of energy efficient equipment using an experimental approach is heavily dependent on how closely a control group reflects the specific characteristics of the treatment group in the pre-period. In cases where the treatment population size is not large enough to wash away confounding and external effects, it is necessary to select a control group sample that can remove those effects to the greatest possible extent. The decision on how to select that control group can have a large enough impact such that the difference between one selection and another can be the difference between accurately identifying the savings and producing results which suggest that the energy efficient equipment is increasing a home's energy consumption.

This paper discusses the different methods developed for selecting control group matches and the statistical procedures developed to explore the validity of those methods. The results of this exploration highlight the importance of understanding behavioral differences in energy consumption rather than absolute statistics. The methods which are compared in this paper include several summary statistic matching techniques, along with some behavioral matching, and an exploration into predictive forecasting models which can be used to match on a home's predicted behavior.