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2018
MCM/ICM
Summary Sheet
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Energy consumption in the United States has vastly changed in the past fifty years. Growing demand has increased the amount of energy that is required to power the nation while changes in technology have created a massive overhaul in types of available energy sources. One of the most important sources of energy is renewable energy. Four states along the Mexican border (Arizona, California, New Mexico, and Texas) plan to form an interstate energy compact focused on increasing their usage of renewable energy sources.

We use existing data from 1960 to 2009 on the energy consumption of these four states to generate models to describe and predict their energy profiles over time. These models and other information concerning the similarities and differences between the states are used to develop goals for the energy compact. We begin by generating an energy profile based on total energy consumption from six sources (coal, petroleum, natural gas, nuclear, renewable, imports).

Based on the energy profile, we then develop two models to deal with the description and prediction of changes over time. The derivatives of thin plate smoothing splines are used to describe changes in total energy consumption for each energy source and state combination over the fifty years from 1960 to 2009. Then, autoregressive integrated moving average (ARIMA) models are used to predict the energy profiles for the four states in 2025 and 2050, which are applied to determining energy usage goals.

Based on the energy usage goals we create for the four states, we suggest three possible actions to achieve these goals: (1) California educates the other states about incentives and programs, (2) diversify sources of renewable energy, and (3) implement energy interconnection standards.