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2018
MCM/ICM
Summary Sheet

A Setting System of Interstate Energy Cooperation Goals Based on Data Insight

Summary

After performing data analysis and modeling, we finally determine a set of development goals for the new four-state energy compact.

First, we preprocess the data provided, which includes default value processing, abnormal value process and data classification. For the sake of analysis, we divide various energy into two broad categories. One is cleaner renewable energy (CRE), the other is traditional fossil energy (TFE). After that, we select 11 important variables from the given data to create the energy profile for each of the four states. We call the 11 variables the basic variables

Next, we apply the decoupling theory to characterize the dynamic relationship between economic development and energy utilization, which can reflect the evolution of energy profile. We find that the four states differ in production and usage of various energy significantly. To determine the underlying factors that lead to the differences, we construct the simultaneous equations model. Combining natural environment information further, we find out the factors and know the respective strengths of the four states in CRE.

Then, we establish a multi-dimensional evaluation system to identify the state that has the "best" energy profile on the whole. We introduce the index, comprehensive utilization performance (*CUP*) to measure the energy profile. The *CUP* is composed of three parts, energy performance, economic performance and environment performance. And each of the three parts includes three indexes respectively, all of which are synthesized by the basic variables. We use the PCA method to integrate the nine indexes into an overall index, namely the *CUP*. Ranking *CUP*, we find that California is the "best".

Finally, we construct BP neural network to predict the energy profile. Analogous to Cobb-Douglas Production Function in economics, we define the *CUP* in a new way for predicting. Through setting various development scenarios, we get the predictions successfully. After that, we regard the four states as a whole to determine renewable energy usage targets for 2025 and 2050. In this process, we use the BP neutral network and previous models again. We collect real data from 2010 to 2015 to calculate the values of *CUP*. Compare them to the predicted value, we test our predicting system. The result shows that our predicting system works well.