Energy Scenario Exploration with Modeling to Generate Alternatives (MGA)

Abstract
Energy system models should be used in an interactive way to uncover knife-edge solutions, characterize the flexibility inherent in the modeled system, and suggest alternative means to achieve policy objectives under conditions of deep uncertainty. In this analysis, we do so by employing an existing optimization technique called modeling to generate alternatives (MGA), which systematically explores the near-optimal decision space by changing the structure of the model. The MGA capability is incorporated into Tools for Energy Model Optimization and Analysis (Temoa), an open source framework that also includes a technology rich, bottom up energy system model. Temoa is used to explore alternative energy futures in a simplified single region energy system that represents the U.S. electric sector and a portion of the light duty transport sector. Given the dataset limitations, we place greater emphasis on the methodological approach rather than specific results.