For office use only	Team Control Number	For office use only
T1 _____	**80560**	F1 _____
T2 _____		F2 _____
T3 _____	Problem Chosen	F3 _____
T4 _____	**C**	F4 _____

2018
MCM/ICM
Summary Sheet

Summary

A New Keynesian Approach to Optimizing Energy Compact

In our paper, we construct an EROI evaluation system for the four states using data science and succeed in determining optimal goals for the interstate energy compact.

First, we operate on the data. Data are screened according to their integrity and usefulness of the infomation. Then we select and merge different variables using Cointegration and Multiple Dimensional Scaling(MDS) based on the independence and representativeness of the attributes. For the reserved variables and statistics by year, we use Mean Subtitution to conduct data imputation. Then, we classify the processed database by usage, sources and sectors. Classification on the energy sources is eventually made according to the corresponding environmental impact.

Second, we construct a EROI evaluation system, which is an improvement of Return on Investment (ROI). We classify various kinds of energies into 10 distinct groups. All variables of prices are adjusted in order to offset the influence by inflation and geographical differences. After that, we find that the external cost is related to the intensity of pollution, so it is used to measure the influence on environment. Also, we take sector influence and electric energy loss into consideration. Our data shows that California has the best profile for use of cleaner energy since 1974.

Third, our predicting models feature both Mathematical and Economic models. Since the data given are not stable in Time Series, we do not take ARMA or ARCH model into consideration. A linear model is initially adopted to regress the data, but it turns out to have limited accuracy and fails to fit short-term fluctuations or long-term trends. As a result, we adopt a dynamic New Keynesian IS-LM model and include forward-looking expectations in the model. We can therefore predict future energy consumption and structure with better accuracy. What's more, to simulate policy effects, demand shocks and supply shocks are added to the enhanced model, so that we are able to provide governors with quantitative prediction of policies.

Finally, sensitivity analysis is added to test and verify our models. The satisfying results allow us to put models into real situations and to solve real problems. We determine the renewable energy usage targets that in 2025, California may reach 42% of clean, renewable energy to the total consumption. Other states can reach 35%. And in 2050 All states may reach different from 38% to 51%. Four states' government should subsidize clean and renewable energy and impose pollution tax on others. Other kinds of direct investment and long-term policy can also be used to meet the energy goals.

Keywords: New Keynesian; IS-LM Model; Linear Regression; Time Series; MDS