

# Managing the Energy Pandemic

Xinmiao Wang

Department of Mathematics, Northwest University, Xi'an City, Shanxi, China

wangxinmiao@126.com

**Keywords:** Descriptive statistical model; Time Series Analysis

**Abstract:** Energy is the material basis of human activities. The development of human society is inseparable from the emergence of high-quality energy and the use of advanced energy technologies. The energy is equivalent to the city's blood, and the more modern cities rely more on energy. With the development of the society, people are more and more in demand for energy and it is imperative to solve the energy problem.

## 1. Introduction

In the first part, the regression relationship between clean energy and its influencing factors is obtained through multivariate linear regression. Through the sensitivity analysis by controlling variables, we get similarities and differences of influencing factors in the four states. Found that states cleaner, renewable energy consumption is positively correlated with the population, negatively correlated with the industry.

In the second part, for the state energy profiles for 2025 and 2050, We have established energy supply and demand forecast model that predict the 2025 and 2050 energy profiles for each of the four states through time series analysis, and provide an overview of expected energy profiles for each state.

## 2. Development model of energy in four states

### 2.1 Index selection

The following indicators measures the factors affecting clean energy and renewable energy:

Table 1. Measure the indicators of each influencing factor

Geography	Diesel gallon	Vocation	Industrial greenhouse gases emissions
Population	The permanent population, including the armed forces	Climate	Greenhouse gases emissions

### 2.2 Establishment of Multiple Linear Regression Models

In real economic problems, a variable is often influenced by multiple variables,Ontology such as the states of the development of clean and renewable energy by the states of the residenpopulation, including the armed forces, greenhouse gases emissions of the number of gallons, diesel and the influence of industrial emissions of greenhouse gases.

### 2.3 Solution of Multiple Linear Regression Model.

The development of clean and renewable energy is often influenced by multiple factors. In order to better deal with the development of clean and renewable energy, we regard these four factors as independent variables (including the armed forces by the resident population, greenhouse gas emissions, diesel on the number of gallons, industrial emissions of greenhouse gases). By establishing a multivariate linear regression equation to measure its impact.The relationship is

shown as follows:

California:  $y = 20.201x_1 - 504.595x_2 + 70157.273x_3 - 5098.267x_4 - 515977.674$

Arizona:  $y = 17.166x_1 - 434.625x_2 + 10201.963x_3 - 4207.343x_4 - 35193.863$

New Mexico:  $y = 19.155x_1 + 12.929x_2 - 2978.902x_3 - 5385.396x_4 - 25988.622$

Texas:  $y = 10.913x_1 - 166.883x_2 + 11145.84x_3 + 2881.737x_4 - 69277.570$

Among them, the ‘y’ on behalf of the fuel ethanol removal of deforming agent overall consumption (EMTCB), the ‘ $x_1$ ’ on behalf of the resident population, including the armed forces, ‘ $x_2$ ’ represents the emissions of greenhouse gases, ‘ $x_3$ ’ on behalf of the diesel on the number of gallons, ‘ $x_4$ ’ representative industrial emissions of greenhouse gases.

## 2.4 Analysis of Results

Through the analysis of the above equation, we can get these four states in its clean and renewable energy development and their similarities and differences in the relationship between the influencing factors, shown in the Table below:

Table 2. The similarities and differences of each influencing factor

Differences	New Mexico greenhouse gas emissions and fuel ethanol removal of deforming agent overall consumption is positively related to relationship, with the gallon of diesel fuel ethanol negatively related to remove the total consumption of deforming agent.
Similarities	The four states of the resident population, including the armed forces and the overall consumption of fuel ethanol to remove deforming agent were positively correlated, industrial emissions of greenhouse gases and fuel ethanol removal of deforming agent negatively related overall consumption; In addition to New Mexico, the other three states in greenhouse gas emissions and fuel ethanol deforming agent to remove the negative correlation between total consumption, number of gallons of diesel and ethanol removal of deforming agent overall consumption was positively related to relationship.

In combination with the economic, social and geographical analysis of these four states, we can find the reasons for these similarities and differences.

Reasons for the similarities are as follows:

Permanent population increases, will cause the increase of energy consumption, so clean and renewable energy consumption will increase.

The more industrial emissions of greenhouse gases that to a clean energy consumption, the more so clean and renewable energy consumption will be reduced accordingly; Diesel gales how much reflects the state of the demand for non-renewable energy, the more left, on behalf of the state demand less, so the states of clean and renewable energy demand will increase.

Reasons for the differences are as follows:

New Mexico has the most energy and mineral sources. Oil and gas account for 65 percent of the state's mineral wealth, and wind and solar power are also sources of energy.

Therefore, the impact of clean energy or renewable energy development in New Mexico is different from that of other states.

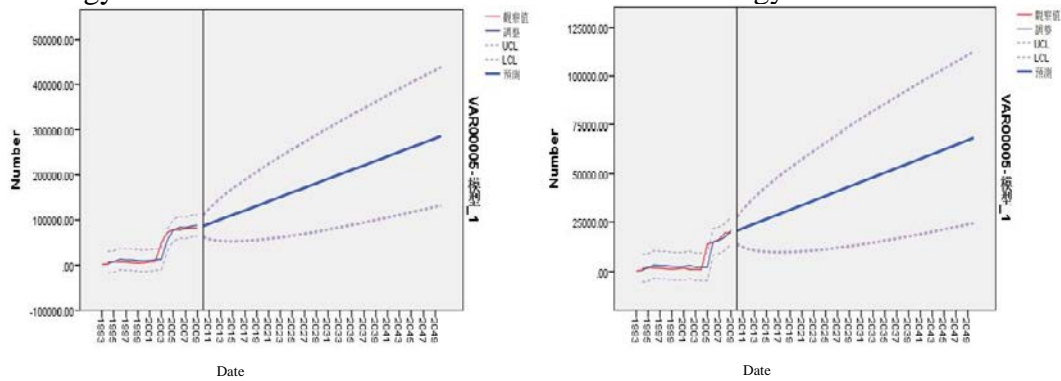
## 3. Prediction of Energy Profiles in the 4 States 2025 and 2050

### 3.1 Establishment of Energy Supply and Demand Forecasting Model

We use time series analysis to predict the energy profile of 2025 and 2050.

We used SPSS for time series analysis to get a general overview of the future clean energy and

renewable energy in four states. The future conditions of clean energy in four states are as follows:



California Arizona  
New Mexico Texas

Figure 1 A clean energy profile for the future of four states

In the figure above, the blue line represents the predicted value.

Above analysis shows that fuel ethanol in four states will be completely consumed by 2025 and 2050. In the years when clean and renewable sources of energy were not fully consumed, the specific data of these countries are as follows:

Table 3 Renewable energy growth between 2025 and 2050 in 4 States

	California	Arizona	New Mexico	Texas
2025	161442.37	38625.73	10609.63	147130.42
2050	286011.23	68586.21	19155.51	265364.89

Using the data in the above Table, we can obtain the growth rate of clean energy and renewable energy between the states from 2025 to 2050, as shown in the following Table:

Table 4 Forecast of non-renewable energy in 4 states in 2025 and 2050

	California	Arizona	New Mexico	Texas
Amplification	0.7716	0.7757	0.8055	0.8036

Through the above two Tables, we can see that the total consumption of clean and renewable energy in the four states is increasing, and clean and renewable energy sources of 4 states are developing. The increase in clean energy and renewable energy in New Mexico is greater.

Similarly, by means of time series analysis, we have made a prediction of the non-renewable energy sources in the states in 2025 and 2050. The non-renewable energy sources of the states in 2025 and 2050 are as following Table:

Table 5 State projections for non-renewable energy sources in 2025 and 2050

	California	Arizona	New Mexico	Texas
2025	18139.12	18200	37201.26	12551.87
2050	12356.52	18000	11056.42	8964.54

Table 6 The decline of non-renewable energy from 2025 to 2050 in 4 States

	California	Arizona	New Mexico	Texas
Descend range	0.3188	0.0110	0.7028	0.2858

Through the above two Tables, we get the proportion of clean and renewable sources of energy in the states in 2025 and 2050 as shown in the following Table:

Table 7 The proportion of clean and renewable energy accounts for total energy

	California	Arizona	New Mexico	Texas
2025	0.8989	0.6797	0.2219	0.9214
2050	0.9586	0.7921	0.6341	0.9673

### 3.2 Energy Profile Prediction in Each State For California:

For clean energy and renewable energy, the prediction results show that total consumption will increase significantly from 2025 to 2050, with an expected growth rate of 77.16%.

For non-renewable energy, the forecast results show that from 2025 to 2050, the total consumption will decrease, and the decrease is 31.88%.

Therefore, it can be predicted that the total consumption of clean energy and renewable energy will greatly increase the proportion of total energy consumption. For Arizona:

For clean energy and renewable energy, the prediction results show that total consumption will increase significantly from 2025 to 2050, with an expected growth rate of 77.57%.

For non-renewable energy, the forecast results show that from 2025 to 2050, the total consumption will remain the same, which is the lowest in the four states.

Therefore, it can be predicted that the total consumption of clean energy and renewable energy will increase the proportion of total energy consumption.

For New Mexico:

For clean energy and renewable energy, the prediction results show that total consumption will increase significantly from 2025 to 2050, with an expected growth rate of 80.55%, the largest growth rate.

For non-renewable energy, the forecast results show that from 2025 to 2050, the total consumption will decrease significantly, and the expected decrease is 80.55%.

Therefore, it can be predicted that the total consumption of clean energy and renewable energy will increase the proportion of total energy consumption.

For Texas:

For clean energy and renewable energy, the prediction results show that total consumption will increase significantly from 2025 to 2050, with an expected growth rate of 80.36%.

For non-renewable energy, the forecast results show that from 2025 to 2050, the total consumption will decline gradually, and the decrease is 0.2859.

Therefore, it can be predicted that the total consumption of clean energy and renewable energy will increase the proportion of total energy consumption.

In conclusion, according to the forecast of energy situation of the four states in 2025 and 2050, we can see that clean energy and renewable energy of the four states accounts for the proportion of total energy are increasing, including California and New Mexico. What's more obvious is that the state of California has the largest share, shows that California in the use of clean or renewable energy, showing the "best" image.

### References

- [1] Google public data:<https://www.google.com/publicdata/directory?hl=en&dl=en>
- [2] The Obama administration's energy policy evolution Yufeng Yang,Wenke Han,Ren Han, Qi An.(ERI)
- [3] MacEwan university.Institute of Quantitative & Technical Economics, Chinese Academy of Social Sciences)
- [4] Qiongfang Luo,Chunmei Wu. The theory and application of time series analysis.[J]. Journal of Liuzhou Teachers College, 2009,24(03):113-117
- [5] Jing Zhao.Mathematical Modeling and Mathematical Experiment.BeiJing: High Education Press, 2000