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Team Control Number

88277

Problem Chosen

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2018
MCM/ICM
Summary Sheet

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The Title

Team 88277

February 11, 2018

Summary

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Keywords: keyword1; keyword2

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1 Introduction

instroduction content

2 Establishing Energy profile

Energy consumption is related to many factors, but the variability of the industrial structure is relatively large. The industrial structure and its changes are the main factors affecting the energy consumption. Therefore, it is of great practical significance to analyze the relationship between industrial structure and energy consumption. Taken together, we choose the total consumption and industrial structure to measure the energy consumption in a region. Our aim is to use the Energy profile to represent the total annual consumption of various energy sources and their structure. According to the official website of the data introduction and their own induction of energy. We divide energy into Coal, Natural Gas, Petroleum, Renewable Energy and Nuclear electric power.

2.1 Energy classification

The 605 variables has been classified into five main classes. Each class has some variables which listed in the memo page.

- Coal
Recorded as coal
- Natural Gas
Recorded as ng
- Petroleum
Recorded as petro
- Renewable Energy
Recorded as re
- Nuclear electric power
Recorded as nu

2.2 Introduce four kinds of departments

- Residential sector
An energy-consuming sector that consists of living quarters for private households. We choose to use RCB (residential energy consumption, data in British thermal units (Btu)) to measure its energy consumption.
- Commercial sector
An energy-consuming sector that consists of service-providing facilities and equipment of: businesses; federal, state, and local governments; and other private and public organizations. The commercial sector includes institutional living quarters. It also includes sewage treatment facilities.
We choose to use CCB (commercial energy consumption, data in British thermal units (Btu)) to measure its energy consumption.
- Industrial sector
An energy-consuming sector that consists of all facilities and equipment used for producing, processing, or assembling goods.

We chose to use ICB (Industrial energy consumption, data in British thermal units (Btu)) to measure its energy consumption.

- Transportation sector

An energy-consuming sector that consists of all vehicles whose primary purpose is transporting people and/or goods from one physical location to another.

We chose to use TCB (Transportation energy consumption, data in British thermal units (Btu)) to measure its energy consumption.

2.3 Construct the formula and explain the calculation process

2.3.1 Calculation of the total consumption of five types of energy

Filter out the annual consumption of all energy sources in each type of energy from the data and seek for accumulation. For example, Coal: CL, CC. The total consumption of coal in 2009 is CLTCB + CCTCB.

Note the total consumption of five types of energy, respectively. Coal: coalTCB. Natural Gas: ngTCB. Petroleum: petroTCB. Renewable Energy: reTCB. Nuclear energy: nuTCB.

2.3.2 Calculate the consumption of five kinds of energy in four sectors separately

From the data, we choose the energy consumption of all energy sources in each sector and then add up according to the sector. For example, Coal : CL, CC. Consumption of coal in the Residential sector in 2009 is: CLRCB + CCRCB; Consumption in the commercial sector is: CLCCB + CCCC; Consumption in the Industrial sector is: CLICB + CCICB; Consumption in the Transportation sector is: CLACB + CLACB .

Note the total consumption of five types of energy, respectively. Coal: coalRCB, coalCCB, coalICB, coalACB. Natural Gas: ngRCB, ngCCB, ngICB, ngACB. Petroleum: petroRCB, petroCCB, petroICB, petroACB. Renewable Energy: reRCB, reCCB, reICB, reACB. Nuclear energy has no industrial structure and no data.

2.4 Formula for energy profile

$$EP = \begin{pmatrix} \frac{coalTCB}{TETCB} & \frac{coalACB}{TEACB} & \frac{coalCCB}{TECCB} & \frac{coalICB}{TEICB} & \frac{coalRCB}{TERCB} \\ \frac{ngTCB}{TETCB} & \frac{ngACB}{TEACB} & \frac{ngCCB}{TECCB} & \frac{ngICB}{TEICB} & \frac{ngRCB}{TERCB} \\ \frac{petroTCB}{TETCB} & \frac{petroACB}{TEACB} & \frac{petroCCB}{TECCB} & \frac{petroICB}{TEICB} & \frac{petroRCB}{TERCB} \\ \frac{reTCB}{TETCB} & \frac{reACB}{TEACB} & \frac{reCCB}{TECCB} & \frac{reICB}{TEICB} & \frac{reRCB}{TERCB} \\ \frac{nuTCB}{TETCB} & 0 & 0 & 0 & 0 \end{pmatrix}$$

3 Calculating and Simplifying the Model

4 The Model Results

5 Validating the Model

6 Conclusions

7 Evaluate of the Model

8 Strengths and weaknesses

8.1 Strengths

- **Applies widely**

This system can be used for many types of airplanes, and it also solves the interference during the procedure of the boarding airplane, as described above we can get to the optimization boarding time. We also know that all the service is automate.

- **Improve the quality of the airport service**

Balancing the cost of the cost and the benefit, it will bring in more convenient for airport and passengers. It also saves many human resources for the airline.

References

- [1] D. E. KNUTH The T_EXbook the American Mathematical Society and Addison-Wesley Publishing Company , 1984-1986.
- [2] Lamport, Leslie, L^AT_EX: “ A Document Preparation System ”, Addison-Wesley Publishing Company, 1986.
- [3] <http://www.latexstudio.net/>
- [4] <http://www.chinatex.org/>

Appendices

Appendix A First appendix

Here are simulation programmes we used in our model as follow.

Appendix B Second appendix