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T1 _____	88277	F1 _____
T2 _____		F2 _____
T3 _____	Problem Chosen	F3 _____
T4 _____	B	F4 _____

2018
MCM/ICM
Summary Sheet

Summary

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The Title

Team 88277

February 11, 2018

Summary

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Keywords: keyword1; keyword2

Contents

1 Introduction

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2 Establishing Energy profile

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 intro-

duction, we divide energy into five categories which are Coal, Natural Gas, Petroleum, Renewable Energy and Nuclear electric power. This energy profile includes the annual consumption of five energy sources and describes their changes from 1960 to 2009. In addition, we use the annual energy consumption of the five major energy sources in different industries to reflect changes in the use of different types of energy in different industries

2.1 Data analysis and preparation

2.1.1 Energy classification

Energy sources have been classified into five main kinds. Each class has some variables which listed in the memo page.

- Coal
  Includes coal(CL) and coal coke(CC). Recorded as *coal* . Then $coal = \{CL, CC\}$
- Natural Gas
  Includes natural gas (NN). Recorded as ng . Then $ng = \{NN\}$
- Petroleum
  Includes aviation gasoline(AB), crude oil(CO), fossile fuels (ff), jet fuel(JF) etc. Recorded as *petro*. Then $petro = \{AB, AR, AV, CO, DF, FF, FN, ...\}$. More variables are listed in the memo page.
- Renewable Energy
  Includes fuel ethanol(EN), geothermal energy(GE), solar energy(GO), wind(WY) and wood(WD) etc. Recorded as re . Then $re = \{BM, EN, EM, ES, GE, GO, ...\}$
- Nuclear electric power
  Includes nuclear electric power(NU). Recorded as nu . Then $nu = \{NU\}$

2.1.2 Four kinds of industries

- 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.

2.1.3 Construct the formula and explain the calculation process

Calculation of the total consumption of five kinds of energy sources Filter the given variables. What we need is the total annual consumption of each kind energy sources. For example, the total consumption of coal($coalTCB$) is $CLTCB + CCTCB$. The more general way to represent the total consumption of each kind energy sources is

$$coalTCB = \sum_{i=0}^{n} var_i TCB \quad var_i \in coal, n = |coal|$$

$$ngTCB = \sum_{i=0}^{n} var_i TCB \quad var_i \in ng, n = |ng|$$

$$petroTCB = \sum_{i=0}^{n} var_i TCB \quad var_i \in petro, n = |petro|$$

$$reTCB = \sum_{i=0}^{n} var_i TCB \quad var_i \in re, n = |re|$$

$$nuTCB = \sum_{i=0}^{n} var_i TCB \quad var_i \in nu, n = |nu|$$

Calculate the consumption of five kinds of energy sources 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, $coalRCB$ (consumption of coal in the residential sector) is: $CLRCB + CCRCB$. As well, use symbols to represent this is

$$coalACB = \sum_{i=0}^{n} var_i ACB \quad var_i \in coal, n = |coal|$$

$$coalCCB = \sum_{i=0}^{n} var_i CCB \quad var_i \in coal, n = |coal|$$

$$coalICB = \sum_{i=0}^{n} var_i ICB \quad var_i \in coal, n = |coal|$$

$$coalRCB = \sum_{i=0}^{n} var_i RCB \quad var_i \in coal, n = |coal|$$

$$ngACB = \sum_{i=0}^{n} var_i ACB \quad var_i \in ng, n = |ng|$$

$$ngCCB = \sum_{i=0}^{n} var_i CCB \quad var_i \in ng, n = |ng|$$

$$ngICB = \sum_{i=0}^{n} var_i ICB \quad var_i \in ng, n = |ng|$$

$$ngRCB = \sum_{i=0}^{n} var_i RCB \quad var_i \in ng, n = |ng|$$

And the rest three kinds of energy sources ($petro, re\ and\ nu$) have similar formula.

2.1.4 Formula for energy profile

To get the final formula, we have one step to do. Use every kinds of annual consumption to divide it own fields of total annual consumption. Such as, record the total energy annual consumption is $TETCB$, and the result of using $coalTCB$ to devide $TETCB$ is noted as $coalVT$.

$$coalVT = \frac{coalTCB}{TETCB}$$

And use $coalVA$ to record $coalACB$ to devide $TEACB$.

$$coalVA = \frac{coalACB}{TEACB}$$

More variables have been listed in the memo page.
The final representation of the formula is

$$EP = \begin{pmatrix} coalVT & coalVA & coalVC & coalVI & coalVR \\ ngVT & ngVA & ngVC & ngVI & ngVR \\ petroVT & petroVA & petroVC & petroVI & petroVR \\ reVT & reVA & reVC & reVI & reVR \\ nuVT & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$EP \in \mathbb{R}^5$$

* Note that Nuclear electric power doesn't have variables to represent the annual consumption in different sectors. But it is still an important energy sources, so we keep it.

2.2 California's energy profile

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.
- **Imporve 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 TEXbook the American Mathematical Society and Addison-Wesley Publishing Company , 1984-1986.

[2] Lamport, Leslie, LATEX: " 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

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