2018 MCM
Problem C: Energy Production

Background: Energy production and usage are a major portion of any economy. In the United States, many aspects of energy policy are decentralized to the state level. Additionally, the varying geographies and industries of different states affect energy usage and production. In 1970, 12 western states in the U.S. formed the Western Interstate Energy Compact (WIEC), whose mission focused on fostering cooperation between these states for the development and management of nuclear energy technologies. An interstate compact is a contractual arrangement made between two or more states in which these states agree on a specific policy issue and either adopt a set of standards or cooperate with one another on a particular regional or national matter.

Problem: Along the U.S. border with Mexico, there are four states – California (CA), Arizona (AZ), New Mexico (NM), and Texas (TX) – that wish to form a realistic new energy compact focused on increased usage of cleaner, renewable energy sources. Your team has been asked by the four governors of these states to perform data analysis and modeling to inform their development of a set of goals for their interstate energy compact.

The attached data file "ProblemCData.xlsx" provides in the first worksheet ("**seseds**") 50 years of data in 605 variables on each of these four states' energy production and consumption, along with some demographic and economic information. The 605 variable names used in this dataset are defined in the second worksheet ("**msncodes**").

Part I:
A. Using the data provided, create an energy profile for each of the four states.

B. Develop a model to characterize how the energy profile of each of the four states has evolved from 1960 – 2009. Analyze and interpret the results of your model to address the four states' usage of cleaner, renewable energy sources in a way that is easily understood by the governors and helps them to understand the similarities and difference between the four states. Include in your discussion possible influential factors of the similarities and differences (e.g. geography, industry, population, and climate).

C. Determine which of the four states appeared to have the "best" profile for use of cleaner, renewable energy in 2009. Explain your criteria and choice.

D. Based on the historical evolution of energy use in these states, and your understanding of the differences between the state profiles you established, predict the energy profile of each state, as you have defined it, for 2025 and 2050 in the absence of any policy changes by each governor's office.

Part II:
A. Based on your comparison between the four states, your criteria for "best" profile, and your predictions, determine renewable energy usage targets for 2025 and 2050 and state them as goals for this new four-state energy compact.

B. Identify and discuss at least three actions the four states might take to meet their energy compact goals.

Part III:
Prepare a one-page memo to the group of Governors summarizing the state profiles as of 2009, your predictions with regard to energy usage absent any policy changes, and your recommended goals for the energy compact to adopt.

Your submission should consist of:

- One-page Summary Sheet,
- One-page memo,
- Your solution of no more than 20 pages, for a maximum of 22 pages with your summary and memo.
- Note: Reference list and any appendices do not count toward the 22-page limit and should appear after your completed solution.

Attachments:
ProblemCData.xlsx
Includes two worksheets **seseds** and **msncodes**.

References:
State Energy Data System (SEDS) Complete Dataset through 2009 (All 50 states)
https://catalog.data.gov/dataset/state-energy-data-system-seds-complete-dataset-through-2009#sec-dates

2018 年 MCM

问题 C：能源生产

背景：能源生产和使用是任何经济的主要部分。在美国，能源政策的许多方面分散到国家层面。此外，不同国家的不同地区和行业也影响能源使用和生产。 1970 年，美国的 12 个西方国家组建了西部州际能源契约（WIEC），其使命的重点是促进这些州之间的合作，以开发和管理核能技术。州际契约是两个或两个以上的州之间的合同安排，在这两个州之间，就具体的政策问题达成一致，并采取一套标准或就某一地区或国家事务相互合作。

问题：在美国与墨西哥的边界上，有四个州 - 加利福尼亚州（CA），亚利桑那州（AZ），新墨西哥州（NM）和德克萨斯州（Texas） - 希望就清洁和可再生能源的广泛使用形成一个现实的新能源契约。您的团队已经被这些州的四位州长要求进行数据分析和建模，以便为他们的州际能源契约制定一套目标。

附加的数据文件“ProblemCData.xlsx”在第一个工作表（“seseds”）中提供了这四个州的能源生产和消费中的 605 个变量的 50 年数据以及一些人口和经济信息。在这个数据集中使用的 605 个变量名在第二个工作表（“msncodes”）中定义。

第一部分：

A.使用提供的数据，为四个州中的每一个创建一个能源概况。

B.开发一个模型来描述 1960 年至 2009 年四个州中每个州的能源状况。从分析和解释模型的结果可以看出，四个州使用清洁的可再生能源的方式是让州长们很容易理解，帮助他们了解这四个州之间的异同。在你的讨论中加入可能影响相似性和差异性的因素（如地理，行业，人口和气候）。

C.确定2009年四个州中哪一个看起来具有“最好”的使用清洁可再生能源的概况。解释你的标准和选择。

D.根据这些国家能源使用的历史演变，以及你对你所建立的国家概况之间的差异的理解，按照你的定义，预测 2025 年和 2050 年在各州长办公室没有政策调整的情况下，每个国家的能源概况。

第二部分：

根据你们四国之间的比较，你们对“最佳”概况和你们预测的标准决定了 2025 年和 2050 年的可再生能源使用目标，并将它们作为这个新的四国能源契约的目标。

B.确定并讨论四个州为达到其能源紧凑目标可能采取的至少三项行动。

第三部分：

准备一份长达一页的总结备忘录，概述截至 2009 年的状态概况，您没有任何政

策变化的能源使用预测，以及能源契约采纳的建议目标。

您的提交应包括：

- 单页汇总表，
- 单页备忘录，
- 您的解决方案不超过 20 页，最多 22 页的摘要和备忘录。
- 注意：参考列表和任何附录不计入 22 页的限制，应在完成的解决方案后出现。

附件：ProblemCData.xlsx 包括 seseds 和 msncodes 两个工作表。

参考文献：州能源数据系统（SEDS）2009 年全部数据集（所有 50 个州）

https://catalog.data.gov/dataset/state-energy-data-system-seds-complete-dataset-through-2009#sec-dates

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推荐

2018年美赛赛题分析及思路精讲

美赛老司机

2018-02-09 星期五 11:00

荔枝微课

邀请卡有效期至2018. 02. 22