**2020 May Day MCM**

**Problem A. Coal Price Prediction**

Coal belongs to bulk commodity, the price of coal is not only monitored by relevant government departments, but also affected by the domestic coal market. Apart from this, coal price could also be affected by climate change, travel mode, energy consumption mode, international coal market and other factors. Please finish the following tasks.

1. Please formulate a mathematical model to give the main factors (no more 10 factors) affecting the coal price through quantitative analysis. And taking Qinhuangdao Port steam coal price as an example, give the main factors in order (no more than 10) that affect the Qinhuangdao Port steam coal price during the period from May 1st, 2019 to April 30th, 2020.
2. Please use the historical data of Qinhuangdao Port steam coal price (Attachment 1) and the results of Task 1 to formulate a mathematical model for predicting the Qinhuangdao Port steam coal price of the coming 31 days, 35 weeks and 36 months, respectively. Pleas fill your results in Table 1.
3. For more accurately predict the Qinhuangdao Port steam coal price, please consider the changes in the structure and importance of the influencing factors on coal price caused by various situations in the future (such as emergencies) and then formulate a comprehensive prediction model for Qinhuangdao Port steam coal price. Detailed results are required to provide.
4. To ensure the stable development of China's coal market in the future, please provide relevant policy suggestions to the government departments with the use of the results in Task 3.

Remarks：

1. The data in Attachment 1 is provided by China Coal Transport & Distribution Association (CCTD) (<https://www.cctd.com.cn/>). The weekly data is given in Attachment 1, where the date is included by the corresponding week.
2. The parameters in this problem are explained as follows：

Qinhuangdao Port steam coal：sulfur content 0.8%, calorific value 5500kacl/kg；

The type of coal price：free on board (FOB) price；

Coal price unit：yuan/ton (RMB)。

Table 1 The results of Task 2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **May 2020** | | **May - Dec 2020** | | **May 2020 - April 2023** | |
| Day | Predicted price（yuan/ton） | Week  (the week including the corresponding date) | Predicted price（yuan/ton） | Month | Predicted price（yuan/ton） |
| May 1st |  | May 6th |  | May 2020 |  |
| May 2nd |  | May 13th |  | June 2020 |  |
| May 3rd |  | May 20th |  | July 2020 |  |
| May 4th |  | May 27th |  | August 2020 |  |
| May 5th |  | June 3rd |  | September 2020 |  |
| May 6th |  | June 10th |  | October 2020 |  |
| May 7th |  | June 17th |  | November 2020 |  |
| May 8th |  | June 24th |  | December 2020 |  |
| May 9th |  | July 1st |  | January 2021 |  |
| May 10th |  | July 8th |  | February 2021 |  |
| May 11th |  | July 15th |  | March 2021 |  |
| May 12th |  | July 22nd |  | April 2021 |  |
| May 13th |  | July 29th |  | May 2021 |  |
| May 14th |  | August 5th |  | June 2021 |  |
| May 15th |  | August 12th |  | July 2021 |  |
| May 16th |  | August 19th |  | August 2021 |  |
| May 17th |  | August 26th |  | September 2021 |  |
| May 18th |  | September 2nd |  | October 2021 |  |
| May 19th |  | September 9th |  | November 2021 |  |
| May 20th |  | September 16th |  | December 2021 |  |
| May 21st |  | September 23rd |  | January 2022 |  |
| May 22nd |  | September 30th |  | February 2022 |  |
| May 23rd |  | October 7th |  | March 2022 |  |
| May 24th |  | October 14th |  | April 2022 |  |
| May 25th |  | October 21st |  | May 2022 |  |
| May 26th |  | October 28th |  | June 2022 |  |
| May 27th |  | November 4th |  | July 2022 |  |
| May 28th |  | November 11th |  | August 2022 |  |
| May 29th |  | November 18th |  | September 2022 |  |
| May 30th |  | November 25th |  | October 2022 |  |
| May 31st |  | December 2nd |  | November 2022 |  |
|  |  | December 9th |  | December 2022 |  |
|  |  | December 16th |  | January 2023 |  |
|  |  | December 23rd |  | February 2023 |  |
|  |  | December 30th |  | March 2023 |  |
|  |  |  |  | April 2023 |  |