For office use only	Team Control Number	For office use only
T1_____	**78826**	F1_____
T2_____		F2_____
T3_____	Problem Chosen	F3_____
T4 _____	**D**	F4 _____

2018
MCM/ICM
Summary Sheet
A Design of Elecomb
Summary

This article mainly analyzes the problem of charging station network construction.

In the first question, we first predict the development mode of Tesla's charging station with the help of the control system model and find that Tesla will push the United States to all-electrification. Considering the coverage of charging stations and other factors, the nonlinear programming model is established according to the idea of shortest path and minimum cost to get the network of charging stations in the United States. In total, 6.55 million charging stations need to be established, of which 1.28 million in rural, 3 million in suburban, 2.23 million in urban, 1.99 million fast charging stations, and 5.56 million destination charging stations.

In the second question, we chose Ireland. First, based on the model of the first question, a total of 87700 charging stations need to be established in the case of full coverage of electric vehicles. Then establish a degree of urgency index according to the distribution of population density and so on, which characterizes the establishment of the charging station of the degree of urgency mentioned above and it varies with the charging stations. With the index we find that the dynamic development mode of Irish charging station network is a mix of both rural and urban. Finally, based on the logistic growth model, we find that it takes Ireland about 18.1 years to realize all-electric.

In the third question, we first optimize the index of urgency in the light of the different cost of building charging stations in urban and rural areas and the level of science and technology. And then the indexes that affect the urgency level are described by the macroeconomic indicators of the country such as the Gini coefficient, the urban house price, using a similar way to establish an urgent degree of urban and rural areas within the country's priority AI. If AI< 0.2, built all rural chargers first, if AI >0.65, built all urban chargers first, while in other cases built both of them at the same time.

In the fourth question, we analyzed the impact of sharing cars, self-driving cars etc. on the popularization of electric vehicles and discovered that their influences are focus on different parts. Besides, we found that with the increase in the coverage rates of rapid battery-swap stations in the cities, it's effect on the reduction of the overall number of urban charging stations tends to decrease.

Finally, we wrote a handout for the leaders who are attending an international energy summit. And point out the key factors they should consider to realize all-electric cars and set a date to ban gas.

Key Words : Classification System   Logistic Growth   Urgency Index   Elecomb   Nonlinear Programming Model