WILLINGNESS TO PAY FOR GREEN ELECTRICITY IN TIANJIN, CHINA: BASED ON CONTINGENT VALUATION METHOD

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Overview

Along with the fast development of economy and urbanization, environmental issues characterized with haze and water pollution, have emerged and seriously affected the daily lives of residents. Thermal power industry, which consumes a large amount of fossil fuels, has always been blamed for the contributing nearly half of the greenhouse-gas emissions and air pollution in China. Comparatively, green electricity is an effective approach to fulfill the power demand with less emissions. To lower the dependency on fossil energy and achieve a diversified portfolio of energy sources has become a worldwide issue in recent years. Consequently, China has set a series of green electricity goals in recent development plans. The study on WTP for green electricity is important to investigate the influences of new plans and to forward related policies to achieve the development goals.

Although the preferential policies and subsidies from the government may compensate for the economic losses of corporations in developing the green electricity to some extent, cost is still one of the critical factors to restrict the promotion of clean energy, such as wind power and solar power. One effective approach to boost their development is to increase the awareness of residents on sustainable development and to increase their willingness to pay (WTP) for renewable energy. Previous studies indicate that there are significant gaps exist on WTP among people. This study chooses Tianjin, a typical industrial city in North China which is heavily suffered from air pollution, to conduct the pilot study. It employs the Contingent valuation method (CVM)to explore the WTP of residents for green electricity and identify the factors affecting their WTP. The results are of great significance to schedule renewable energy development and to make scientific subsidy policies.

Methods

CVM has been proved to be the most widely used tool to estimate the economic value of non-market goods and services by eliciting individual's WTP or willingness to accept (WTA). The application of the CVM allows for the development of scenarios in which renewed goods are presented to the situation out of the experience of investigators. We employ this approach to design the sampling questionnaire and construct hypothetical scenarios to estimate the value of green electricity.

This study employs open-ended format (OE) questionnaire to state the WTP questions to respondents, which does not require a professional interviewer and may not result in any starting-point bias compared with the dichotomous choice approach. The survey includes three parts: (i) questions about the respondents' knowledge and awareness of environmental issues, renewable energy and the belief on the authority for environmental governance; (ii) the description of assumed scenario and key questions adopted to estimate the maximum WTP of the respondents; and (iii) the demographic information including gender, age, education, household income, health and so on.

Following the random utility theory, the true indirect utility function can be denoted as $U(Q, M, S)$, where M represents the income of the respondent, S is a vector that contains other specific characteristics and Q stands for the level of provision on green electricity. The status of Q will improve from a given level of Q^0 to Q^1 when the ratio of renewable power increases. The WTP is expressed as: $V(Q^0, M, S) = V(Q^1, M - WTP, S)$, where Q^0 represents electricity generated by fossil fuels and Q^1 means the adjusted power mix. Thus the WTP, the maximum amount of money the household would like to pay for green electricity, is a function of income, demographic and the renewable power available.

Results

According to a sample of 407 respondents, most residents have positive WTP for green electricity and the average WTP is approximately 32.63 yuan/month (US$ 4.73). Although some respondents show a rather high WTP,

it can also be observed that 133 households are not willing to pay. About 57 percent of respondents of this group insist that the government and polluters should pay for it. A further cross check of selected survey demographics compared to the Tianjin population show the survey sample to be representative.

The main factors incentivized to have a positive WTP are knowledge of renewable energy, the belief towards the government, behavior, education background, history of respiratory disease and so on. The factors affecting the WTP mainly include income, belief, disease and age. The first three factors often have a positive influence on WTP while the influence of the last one is negative. The male tends to have a higher WTP than the female. A positive attitude towards government also resulted in a relatively high WTP. This study further adopts the Logit model to test whether the respondents have positive WTP. Similar to Logit model, multiple regression model is employed to identify the factors that affect the WTP significantly.

Conclusions

The WTP estimates vary across countries due to the differences in economic development and environmental awareness as well as social customs and cultural backgrounds. The estimate of WTP for renewable energy in Tianjin offer a good empirical evidence to justify the public' preference on environmental responsibility and on sharing the development cost.

The majority of respondents are willing to pay a monthly premium of $4.73 to support green electricity. Whether the respondents have the willingness to pay is mainly influenced by consciousness, such as behaviour of the households, the belief towards the government and the knowledge of renewable energy. In addition, WTP is related to income, age and belief.

In order to promote the development of green electricity, the government needs to broadcast the benefits of renewable energy. The main reason for negative responses is the lack of trustfulness on the government. Different groups may hold distinct opinions on roads of incentivizing the development of green electricity, all the attitudes of the public should be taken into account in policy implementations, and the individual-level actions can be improved by elevating the public awareness.

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