

COMPARISON INVESTIGATION AND ANALYSIS OF LOW-CARBON ENERGY AND ENVIRONMENT AWARENESS OF URBAN-RURAL RESIDENTS

Liu Ming¹, Zhang Baogang², Chen Bin², Fan Yue¹, Yuan Jie¹, Zhang Ruina¹

¹ School of Architecture and Fine Art, Dalian University of Technology, Dalian (China);

² School of Civil & Hydraulic Engineering, Dalian University of Technology, Dalian (China);

1. Introduction

Energy and environment are the two major problems that the mankind together face (Gratia 2003; Lam 2006). The World Climate Conference was held in Copenhagen, the capital of Denmark, on December 7-18, 2009. Environment ministers from 192 countries and heads of states or governments from 85 countries attended the summit to discuss how to deal with climate warming. Building "low-carbon society" is a significant measure to retard the Earth's environmental degradation, climate warming in the world, and many countries are making unremitting endeavors in various ways (Brohus 2006; Liu 2009). As the world's one of largest consuming countries, China has got some electricity and natural gas supply problem in recent years, due to world energy shortages, power peak and valley difference increases, gas price hike, air conditioning and heating energy consumption increased (Liu 2009; Xu 2010), which the situation is not optimistic. So it is necessary to carry out a survey on the family life of residents with energy and environmental awareness.

There were 2 city schools and 1 rural school, a total of 1200 students families received a questionnaire survey on "the survey of household energy use and eco-awareness in Dalian". The first-hand data was obtained, which provided a frame of reference to further understand effects of urban and rural residents' living behaviors and the building design on energy use and to develop reasonable energy-saving measures and policies.

2. Investigation background

2.1 Investigation method and content

The survey analysed the family's lifestyle, consumer behavior, environmental awareness and environmental action by the actual investigations with regard to the ordinary family behaviors, energy-saving measures and low-carbon action based on city's climate, population, characteristics of economy and industry, social cultural etc (Chen, 2007). The questionnaire of family life with energy and environmental awareness of Dalian urban residents was carried out in Dalian, Liaoning Province, 2009. The questionnaires had been divided into city chapter and township chapter, and were designed for students and parents (grandparents) in several forms of the questionnaires (Fig.1). The effective respondents are 3182 from cities and 1650 from rural areas. The culture structure of respondents is shown in Fig 2.

The contents of questionnaire focus mainly on follow issues: 1. Considering different life style and living conduct in urban and rural area. 2. Study factors toward energy saving life style, including purchase of house appliances, automobile use, cooking, house heating, waste treatment, and other energy consumption activities. 3. Demonstrate incentives and practices to change lifestyle.

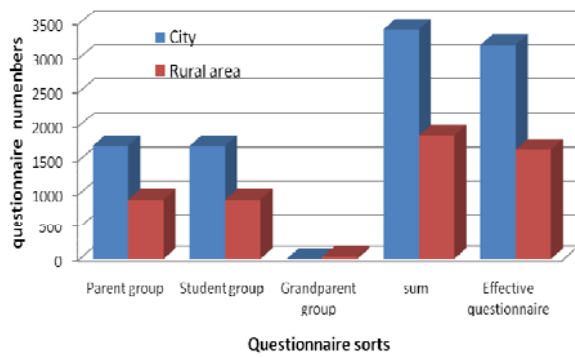


Fig. 1: Reprocessed questionnaire statistics

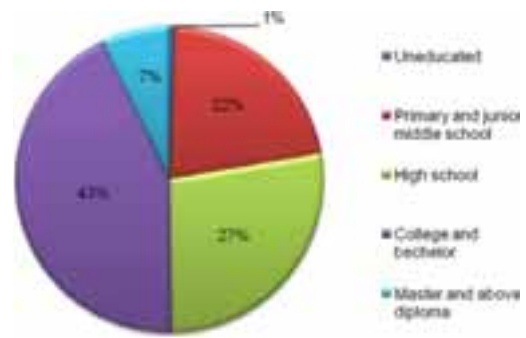


Fig. 2: Culture structure of respondents

3. Survey results and analysis

3.1 On changes of energy use in daily life.

From the survey on the energy use (in Fig.3), the coal still is the main type, especially in cities. From Fig 4 the Heating styles, 100% of city family and 6% of town family use coal for heating at present. 100% of rural family and 9% of town family use 50% of electricity and coal and 50% of bio-energy for heating. More or less quarter of families still use Kang, a traditional heating. However, the tradition heating styles such as fire wall, Kang and burning cave have a remarkably decrease and solar house and district heating have a evident increase in Da lian.

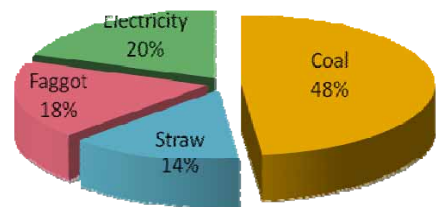


Fig 3: Energy use types

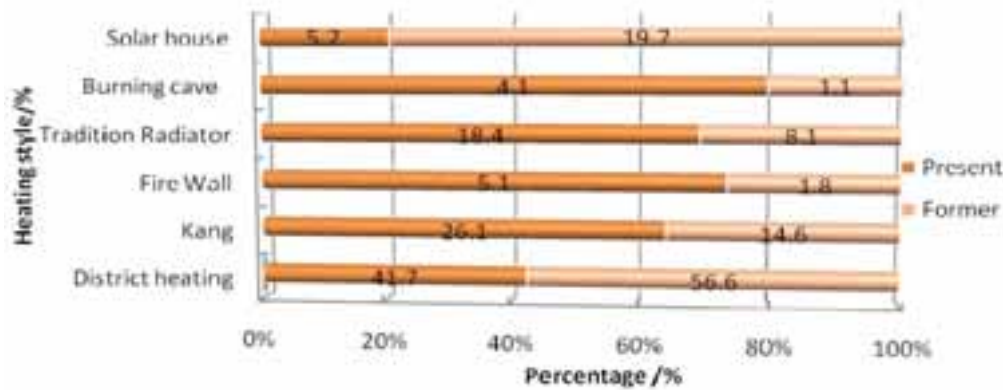


Fig 4: Heating styles

Through the contrast between the former and present types of home cooking energy use and the types of bath water heater to understand the energy use situation in daily life. According to the comparison, the change of China's energy use types as followed (Fig. 5).

From Fig.5, the proportion of electricity consumption in cooking is increasing significantly now than ever before, and the proportion of coal and firewood consumption is less, which can be connected with energy use structure. Fig. 6 shows that more and more people are using solar shower and the water heater now, with the improvement of living standard and people's comfort request. Solar energy use can reduce the increase in the use of other disposable energy (as coal, natural gas, etc.), which can make energy conservation improvement.

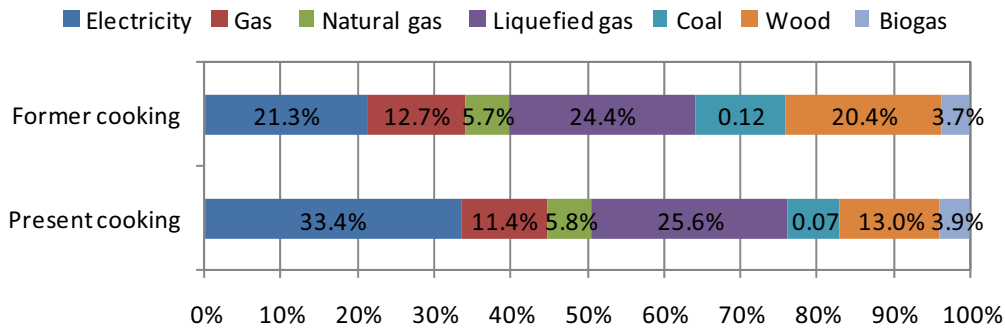


Fig 5 :Type of energy use of daily life

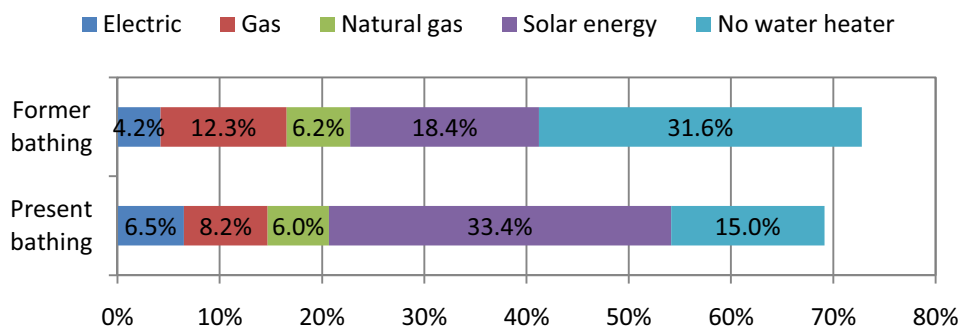


Fig 6 :Type of energy use of daily life

3.2 On reducing private car

Reducing private cars use can make environmental improvement. Residents selected the effects of reducing the frequency of private cars use by the understanding on some conditions, taking the urban parents for example (Fig.7).

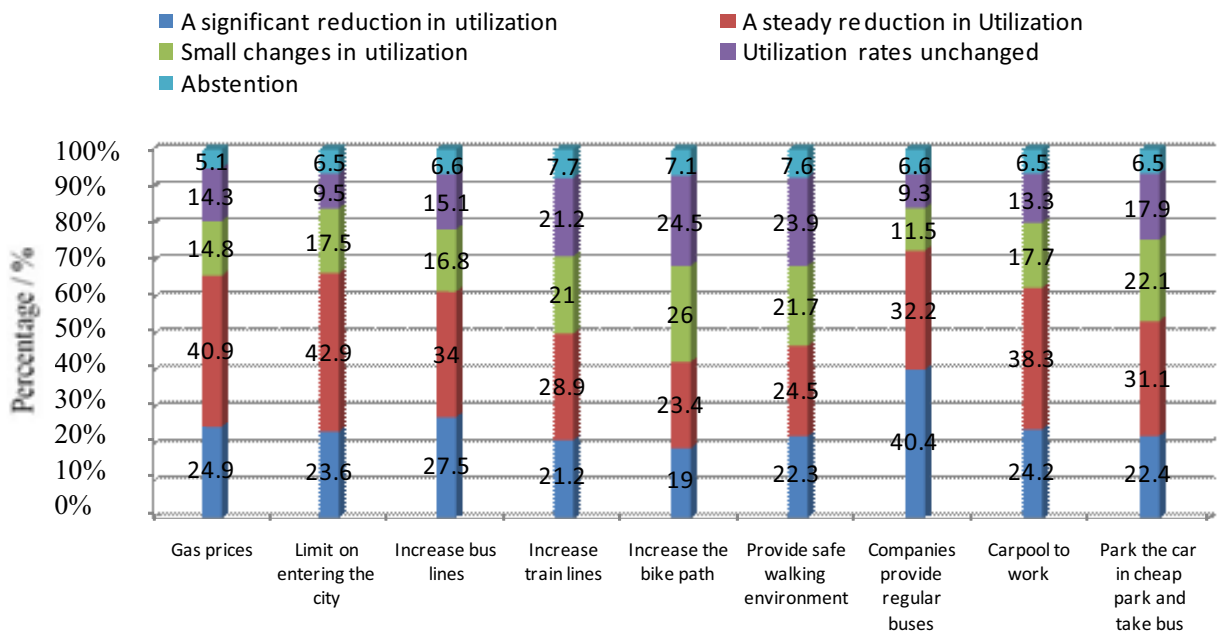


Fig.7: Effects of reducing private car

Fig.7 shows that more than 40% of the residents think that the "companies provide regular buses" condition can greatly reduce the use of private cars, and the conditions " increasing fuel cost," "limit on entering the city" "car pooling" respectively are 40.9%, 42.9% and 38.3%.More than 50% of the residents think that private car use frequency will "significant decreases" or "decreases" by various effective policies and methods, even some conditions are up to 60%, indicating that residents think reducing private car use has a relationship with improving the environment, we should promote and put the above conditions into effect to control the number of private cars to improve the environment. The government can reduce the prices and fuel costs of the good environmental performance cars to extend the use of environment-friendly cars.

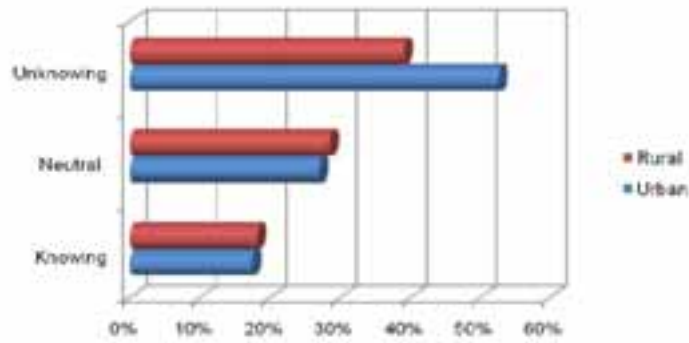


Fig.8 Survey on influence of government subsidies on purchase of energy-saving car

Fig 8 is on the problem of government subsidies for purchasing energy-saving and environmental protection cars. The farmer's consciousness is better than that of in the city residents.the farmer's consciousness is better than that of in the city residents. The city residents in 53% did not know the government encourage them to purchase environmental protection car, much higher than the rural villager of 39.10%. on this issue, the propaganda of villagers committee played a great role. In the future, to strengthen propaganda for government subsidies on purchase of energy-saving car to city residents, a strong purchasing power.

3.3 On air-conditioning

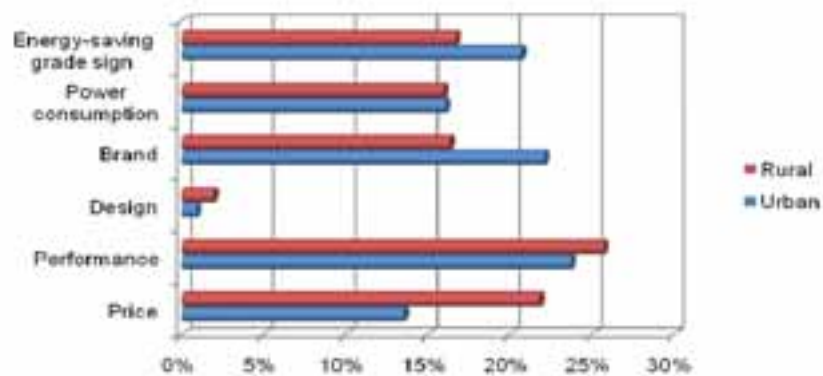


Fig.9 Differences of important factors on purchase of air-conditioning

From Fig 9, the most important factor for the public in the purchase of air-conditioning is the performance of the air conditioner. City survey indicated that the important factors in the top three were the performance(23.70%), brand (22.10%), energy saving grade (20.69%); while the rural survey, important factors in the top three were performance(25.70%), price (21.80%) and energy saving grade (16.69%). Whether citizens or farmers showed indifferent on the appearance of product design. City residents pay more attention to brand effect, while the relatively low income farmers on the price of the product.

3.4 Waste disposal

Waste disposal is closely related to energy conservation, "turning waste into wealth": how to make reuse of

waste has become a hot issue. Recycling of renewable resources should help to prevent environmental pollution, improve the urban environment, maintain public security and improve the comprehensive utilization of resources. The investigation can well reflect the awareness of energy conservation and waste handling of the residents. The following are some questionnaire examples about the urban and rural residents' behavior in waste disposal. About the question of garbage classification, the proportions of urban parents and students, rural parents and students selecting the "Very good" option were respectively 88.9%, 70.4%, 83.8% and 79.0%. It is obvious conclusion that the residents got fairly good understanding on the improvement due to garbage classification.

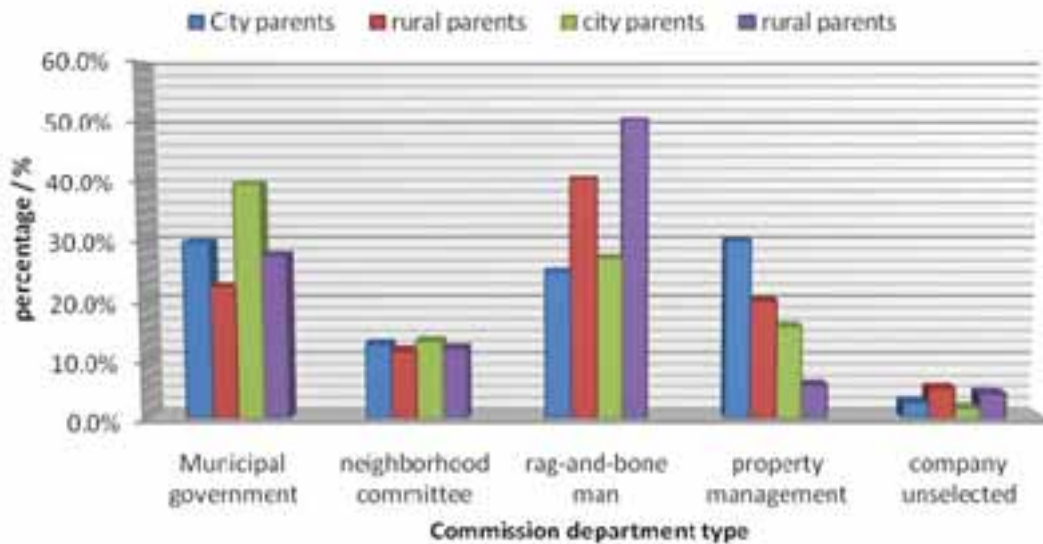


Figure 10 Choice of the public on commission department of garbage collection and reuse

However, "in order to recover and reuse waste, which department can be commissioned?" Different groups have different answers (Fig 10). It can be seen from the figure that the proportions of the parents, whether urban or rural, choosing the option 'Municipal government', 'neighborhood committee' or 'property management' are almost the same, which means that the parents had no clear answers about which department can be commissioned to make recycling possible. While nearly 40% of the urban students chose 'Municipal government', more than 50% of the rural students chose 'rag-and-bone man', there were relatively deep differences between the two groups.

Through the analysis and investigation of the two issues above, it indicates that the residents have some knowledge of garbage classification but not deep enough. The government departments should pay more attention to the recovery of garbage classification, strengthening the power of propaganda on the important role that garbage classification has played in improving the environment, eventually truly making recycling possible.

4. Conclusions

The following conclusions can be drawn through the investigation and analysis above, reflecting the environmental protection awareness of the urban and rural residents in Dalian.

1. The energy dependence of the developed regions and less developed regions is different. Developed regions' dependence on energy is higher than the less developed regions. Therefore, the Government should implement the corresponding energy-saving and environmental protection policies in different regions to achieve the objective of national energy saving.

2. The landscaping awareness of the residents is good, but the relevant departments developed few activities on landscaping. Many residents would like to participate in environmental activities, so it is necessary for the relevant departments to strengthen the propaganda about the landscaping and hold more environmental

activities.

3. With regard to selection of appliance, the performance and energy-saving grade sign of electrical appliances are main decisive factors on urban and rural residents. Only difference is that city dwellers pay attention to the brand effect, while the relatively low income farmers have a much greater attention on price of the product.

4. Many of the questions reflect that the urban residents have better energy-saving and environmental awareness than rural residents, relevant departments should pay more attention to the rural residents' understanding on environmental awareness and strengthen the implementation of relevant policies, so that people can consciously save energy, reducing unnecessary waste of energy.

5. Acknowledgment

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