

論文内容の要旨

China has long suffered from severe haze pollution due to coal consumption, especially household low-quality coal use for winter space heating in rural areas. To combat this problem, a switch in household energy sources from low-quality coal to high-quality coal and electricity is advocated in rural areas recent years. Regarding household electricity use for winter space heating, one possible solution is the promotion of a new electric heating system, low temperature air source heat pump (LTHP) technology. Subsidy policies on high-quality coal consumption and the adoption of new-type coal stoves have also been implemented. While these policies are still in an early stage of implementation, little is known about the possibility that the public will accept LTHPs for electric heating, as well as the determinants of household coal consumption and switching behavior between low-quality and high-quality coals.

There is also an increasing concern of nonpecuniary interventions on changing people's energy consumption behaviors in policy making and research recent years. Social value orientation (SVO) refers to people's social preferences on the allocation of resources (e.g., money) between oneself and another and can categorize people's social values into cooperative, competitive or individualistic type. This research considers SVO an important factor of people's energy transition behavior, since selfishness is assumed to be an obstacle in public acceptance of environmentally friendly energy sources. At the same time, prosocial value orientation is claimed to be essential to address various social problems (e.g., environmental degradation) via individual voluntary efforts in modern societies. Hence, understanding the determinants of SVOs becomes a basic step to obtain insights from human societies for future sustainability.

Using household survey data in Beijing, we first assess people's willingness to adopt (WTA) and willingness to pay (WTP) for LTHP technology. The analysis reveals that income, science literacy and local environmental concern positively affect WTA and WTP, whereas global environmental concern does not. Contrary to our initial expectation, people in mountainous areas express the highest WTA and WTP, followed by those in hilly and plains areas. These findings suggest that efforts to promote this technology could begin in mountainous areas and move to hilly and then to plains areas, thereby advancing public education on local environmental concerns and science literacy.

We also analyze the determinants of coal consumption and switching behavior between low-quality and high-quality coals, considering the evaluation of subsidy policies in the analysis. Results reveal that prosociality and local environmental concern play crucial roles in household choices and consumption behaviors. The promotion of new-type coal stoves significantly facilitates the transition from low-quality to high-quality coal, while price subsidies on high-quality coal do not influence market acceptance of high-quality coal. These results demonstrate the importance of cognitive and psychological factors and promotion policies on coal consumption behavior.

Finally, we mainly examine a topographical difference in people's SVOs. Topography is hypothesized to directly and indirectly influence individual SVOs via physical environment and urbanization. we observe that social preferences tend to transition from prosocial to proself as the living environment

changes from mountainous to hilly and plains areas, while urbanization does not show a significant effect. The results imply that a new social mechanism is necessary to direct individual social preferences toward prosociality when more people live in plains and hilly areas.

In conclusion, this dissertation focuses on the factors influencing household energy transition from low-quality coal to high-quality coal and electricity. We empirically analyze possibility and public acceptance of an electric heating system (LTHP) and high-quality coal, respectively, taking perception variables, cognitive and psychological factors as a part of main concerns. We also observe topographical differences in people's living environment such as mountainous, hilly and plains areas in energy technological acceptance and people's social preference. These studies not only provide crucial insights on how to effectively facilitate household energy transition in China to address haze pollution problems, but also observe a necessity of social mechanism in human societies to induce more prosocial values and behaviors for future sustainability.