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作品名称： Research on the Psychological Motivation of Low-carbon Energy-saving Behaviors of Household Consumers: An Empirical Analysis based on the Theory of Planned Behavior

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# Research on the Psychological Motivation of Low-carbon Energy-saving Behaviors of Household Consumers：An Empirical Analysis based on the Theory of Planned Behavior

**Abstract:**

The issue, how to promote the low-carbon and energy-saving lifestyle, has become a heated issue that receives universal public attention, and consumers are the most important part through the process. This study aims at household consumers, proposes the main model based on the Theory of Planned Behavior and collects data by questionnaire analysis and depth interviews in order to conduct empirical research. The final purpose of the study is to explore whether the psychological drivers of household consumers can influence their low-carbon energy-saving behaviors, and study the path of action among different variables and the size of the coefficient, scilicet the strength of the relationship among the variables. This study adapted the SEM method, and tested the reliability and validity by SPSS 24.0 and AMOS 22.0 according to different standards, so as to explore the influence of psychological factors on the low-carbon energy-saving behavior of household consumers.

**Key words:** Theory of Planned Behavior, Structural Equation Model, External Guiding Factors

# 1 Introduction

With the development of society and economy, citizens' living standards have improved significantly, bringing environmental protection into the focus, and strengthening the importance of carbon emissions from household consumption. As the world's largest energy consumer, China has embarked on the path of green transformation of energy consumption. “ Low-carbon energy-saving and environmental protection” has become a heated issue in the moment.

As the main part and the first factor in the consumption process, consumers directly determine the sustainable development level of low-carbon energy-saving consumption patterns. The study aims at household consumers (also known as individual consumers), which can be divided into personal consumption and household consumption, opposing to the concept of corporation consumers. Meanwhile, consumer's consumption behavior mainly includes two types, purchase-related[1] and habitat-related low-carbon consumption behaviors (Abrahamse et al., 2007; Lingyun Min, 2012)[2].The former behavior is defined as one-time purchase action; that is, acquisition on low-carbon domestic equipments. While the latter behavior refers to repetitive daily activities, attempting to adapt the low-carbon and energy-saving lifestyle(Guo Qi,Fan Liming,2007;Liu Yuwei,2009;Sun Yan,Jiang Ling,2013)[3,4,5]

Household energy consumption plays an irreplaceable role in the whole process (Abrahamse, Steg, Vlek,& Rothengatter, 2007). The amount of carbon emissions is closely related to urban household consumers' perceptions and intentions of committing low-carbon energy-saving behaviors (Lu Yihong, 2012; Ma Liqiang et al., 2012)[6,7]. And according to psychological research, people's information analyzing and decision-making process are affected by many factors such as their own cognitive resources, the characteristics of the information itself, the presentation methods, and specific environmental factors[8]. Strengthening the guidance and intervention of household energy-saving behaviors and promoting the transformation of household energy consumption behaviors are important issues required to be solved urgently. The innovation of this study is applying the traditional theory of planned behavior, while comprehensively considering the influence of external guiding factors on the low-carbon energy-saving behavior of household consumers, enriching and perfecting theoretical research. Through fully understanding the influences exerted by both inner

psychological and eternal guidance factors, the study helps provide scientific evidence for promoting low-carbon energy-saving consumption behaviors; thus smoothing the path for the Chinese government to make future policies. As the significant part of GDP, household consumption is likely to be one of the main drivers for a new round of carbon emissions. This study is able to present external interventions that can effectively influence the inner psychological factors, so as to establish and improve the model of individual carbon emission trading mechanism suitable for China's current situation, and better promote the green and low-carbon transformation of economic and social development mode.

## 2 Research Status and Development Trend

In terms of responsibility, Steg (2005)[9] believes that environmental values fostered through new environmental models and sense of responsibility can significantly influence residents' acceptance of energy policies; Darby (2005)[10] conducted a research and found that in a competitive social environment, the improvement of energy-saving awareness will effectively promote residents' energy conservation; Bottezagias's (2014)[11] survey results showed that perceived behavior control, gender and age for instance, is essential in predicting energy-saving behavior.

In terms of environmental attitudes, David Gade[12,13] and other scholars have found that they are closely related to energy-saving behaviors, and there is a significant strong correlation between the two. In recent years, Chinese scholars such as Yu Kangkang (2018)[14] also examined the relationship between environmental attitudes and four types of energy-saving behaviors, and concluded that there is a significant positive correlation between environmental attitudes and environmental behaviors, and among four types of energy-saving behaviors, the correlation between green purchase behavior and environmental attitude is the strongest.

As for the low-carbon energy-saving behaviors and personal carbon emissions trading, Fleming (1996)[15] first proposed the concept of personal carbon trading in the mid-1990s. In 2006, the UK officially proposed a personal carbon trading model to extend the carbon trading system from the national and corporate level to the individual level. Starkey (2011)[16] proposed a scheme of equating individual carbon credits with complementary currencies. When consumers need to pay for their household energy consumption by money, they're also required to deduct the same

amount of carbon quota from their carbon accounts. China hasn't developed very much in the specific field, yet Fan Jin (2012)[17,18] and other researchers, from the perspective of consumers, used the property rights theory and externality theory to establish a theoretical framework for the transaction of emissions trading rights. Zhang Qingyu (2013)[19] made a corresponding study on the British personal carbon emissions, and summarized the corresponding programs on how to introduce them in China. Li Jian (2014)[20] proposed a "carbon coin" development model for personal carbon trading based on the existing national conditions of China based on the model and operational mechanism of individual carbon trading. In recent years, Wang Shanyong, Li Jun, and Wang Ting (2017)[21,22,23] have studied the relationship between consumer energy consumption and welfare changes from the perspective of personal carbon trading, and further explored their quotation strategies and emission reduction effects for consumers, impacts on carbon emission reductions in the transportation sector etc. Feng Ling (2011)[24], Zhang Xin (2011)[25], Qu Jiansheng (2014)[26], and Wang Wei (2015) [27]studied the factors of urban residents on energy consumption and carbon emissions through economic analysis of macro-statistics and economics-related methods. Sun Yan (2013)[28] and Xie Shouhong (2013)[29], on the basis of social surveys, focused on the factors such as family characteristics, demographic characteristics, and residential characteristics on the low carbonization of residents' energy consumption behavior.

According to current researches, in terms of the reasons for the low-carbon and energy-saving consumer behaviors, although many studies on subjective psychological factors have been completed in foreign countries, lots of controversies still remain. Furthermore, due to the differences in economy, society, and consumers' lifestyles, whether Western scholars' research conclusions are still valid in China needs further testing. In China, although relevant research reveals the distribution characteristics of residents' energy consumption, there is less attention to the mechanism of internal psychological motivation, meaning that it is impossible to explain the internal mechanism of behavior formation. As for the low-carbon energy-saving consumption model and personal carbon emissions trading mechanism, current studies mainly focus on the fairness, efficiency and effectiveness of this trading mechanism, the implementation of possible technical problems and comparison between emission reduction policies because of the complexity and uncertainty of personal carbon trading mechanism, is mainly based on qualitative research,. But few researchers have

explored the common impacts of external guiding factors and individual consumers' psychological factors on consumers' low-carbon energy-saving behaviors.

## 3 Research Assumptions

Based on the multi-attribute attitude theory, Fishbein and Ajzen proposed the Theory of Reasoned Action(TRA), and in order to expand its application, Ajzen improved the TRA theory and proposed a well-known Theory of Planned Behavior (TPB) in the field of social psychology, explaining and predict individual behavior. This theory provides an effective analytical framework for interpreting different individual behaviors. It has strong applicability in the field of environmental behavior research, and is widely accepted by scholars and widely used in researching behavioral intentions in various fields. TPB believes that behavioral attitudes (BA), subjective norm (SN), and perceived behavioral control (PBC) are the three main variables affecting behavioral intentions, and behavioral intentions directly affect the implementation of behaviors.

According to the Theory of Planned Behavior, the intention of behavior is the individual's tendency or willingness to choose and implement the established behavior, which is an influential factor of decision making [30]. Subjective norms, behavioral attitudes, and perceived behavioral control can influence behavioral intentions. The more positive individual's behavioral attitudes and subjective norms are, the stronger perceptual behavioral control and willingness to perform the behavior is[31].

Based on the theory of planned behavior (TPB) and existing research, this study includes following aspects related with household consumers' willingness to choose low-carbon energy-saving behaviors and influencing factors, and explores the impact of psychological factors on low-carbon energy-saving behaviors.

### 3.1 Behavior Intention

Intention of behaviors refer to the psychological preference and behavioral motivation of the individual before making the action, the necessary process of the behavior, and the decisive factor before the behavior actually appears. According to the definition of IB, this paper defines the willingness of low-carbon energy-saving behaviors to pay for the low-carbon energy-saving behavior of residents, that is, the time, energy, and money they are willing to sacrifice.

Relevant research based on the theory of planned behavior shows that there is a significant positive relationship between behavioral will and actual behavior. Behavioral will is the most direct antecedent variable of actual behavior, and other subjective psychological factors indirectly affect actual behavior through behavioral will. Among the research results related to environmental behavior, most scholars' research conclusions verify this point. Scholars Hines et al. (1986) considered that personal factors including behavioral attitudes, behavioral control and sense of responsibility, as well as environmental knowledge and behavioral knowledge, act indirectly on actual environmental behavior through behavioral will, and behavioral willingness is a direct antecedent variable of environmental behavior. Ajzen (1991) shows that each person's inner tendency and motivation before acting create a willingness to act. The willingness to act will inevitably lead to the occurrence of behavior, because the willingness to act is the most important reason in the process of behavio[32]. Klockner (2013)[33] used meta-analytic structural equation modeling to analyze 56 data sets and found that behavioral control perceptions and values act indirectly through behavior. Bai and Liu (2013)[34] conducted a survey of 354 residents in Tianjin and found that behavioral motives can not only promote the implementation of public energy-saving behaviors of residents, but also promote the implementation of private energy-saving behaviors of the public. Scholars Kara (1998)[35], Kaisc et al. (1999)[36], and Michele et al. (2004)[37] have shown that behavioral willingness has a greater explanatory power for actual behavior through field research results in different regions. In 2016, Morren and Grinstein used meta-analytic methods to compare 66 empirical papers from 8 countries involving TPB theory in 2004-2014, and found that in the context of the prevalence of self-interest in developed countries, the willingness to act on green consumption It can often be transformed into actual action[38]. Sun Yan, Wu Chunyou (2007)[39] and other Chinese scholars believe that environmental behavior should be caused by environmental incentives. Everyone's environmental behavior is conscious and purposeful, and its intention is often very important for the generation of environmental protection motives. Impact[40]. Qu Ying (2007)[41] also obtained a direct positive impact of behavioral willingness on actual behavior through the investigation of specific environmental behaviors[42]. Chen Lishun[43] believes that positive environmental behaviors have a positive effect on environmental behavior. Therefore, it is possible to

promote the environmental protection behavior and improve environmental behaviors by improving the environmental awareness of the masses. ChenJun (2018) [44]concluded that the impact of energy-saving awareness on energy-saving behavior does not act like a specific influencing factor, but acts at a certain stage or time, but acts throughout the process, and according to a certain stage Dynamic adjustment of feedback information.

### 3.1.1 Attitude

Attitude refers to the feeling that an individual holds about the outcome of the behavior. When the subject believes that taking certain actions will produce good results and will be positive about the behavior, then the willingness to choose behavior will be stronger. For example, if household consumers believe that low-carbon energy-saving behavior can save household consumption expenditure, then he will be positive about low-carbon energy conservation and more willing to carry out low-carbon energy-saving behavior.

Expectations - Value Theory (Fishbein & Ajzen, 1975)[45] pointed out that the attitude refers to like or dislike a personal position in advance of a particular object has shown continuous state, or it can be said to be positive for a particular individual behavior Or negative subjective evaluation, they believe that the formation of attitude can be explained from two levels: the important beliefs (salient beliefs) and the outcome evaluation (outcome evaluations) of individuals in the implementation of a particular behavioral outcome.

Based on the basic psychological cognition of “attitude-influencing behavior”, many scholars have proposed and comprehensively applied many classical theories when studying the intrinsic relationship between attitude and behavior, which laid a solid theoretical foundation for follow-up research. In the study of the relationship between the two, the first classical theory is the theory of planned behavior proposed by Ajzen (1991). He believes that the more positive the attitude, the stronger the willingness to act, and the attitude affects environmental behavior through behavioral intentions[46]. On the basis of this theory, rational behavior theory, value-belief-normative theory have also been promoted and applied. However, no matter what theory is chosen as the research guide, most of the existing studies show a significant correlation between attitudes and behaviors. Bradley (1999) and other

scholars pointed out that among all the influencing factors of behavior, individual attitude is the most important one[47].

In recent years, Chinese scholars have begun to pay attention to the study of the relationship between attitude and behavior, and this field has gradually become an emerging and important topic. Most of the research results on the direct relationship between the two are guided by the theory of planned behavior, and scholars generally believe that there is a significant relationship between attitude and behavior. In discussing the relationship between environmental attitudes and behaviors, Yu Yong and Zhong Yongde (2010) took the Wulingyuan Scenic Spot as an example to study the influence of tourists' environmental attitudes on their environmental behavior. They believe that environmental behavior has a certain degree of dependence on environmental attitudes[48]. Similar related research is also discussed by Shao Lijuan (2014) on the relationship between environmental attitudes and environmental behaviors of tourist[49]; Liu Li et al (2016) on the relationship between environmental attitudes and environmental behaviors of tourists in Dandong Yalu River National Scenic Area[50] .

**3.1.2 Subjective Norm**

Subjective norm refers to the influence of others on the behavior of the subject. If the number of other people supported by an act is more and the support attitude is more obvious, the more positive the subjective normative enthusiasm will be, the more willing to take the initiative to choose this behavior. When household consumers are engaged in low-carbon energy-saving behaviors, they are more positively influenced by their family members and friends, and are more willing to carry out low-carbon energy-saving behaviors. The purpose of subjective norms is to analyze the impact of social pressure on individual behavioral decisions, including the specific perception of the subject when the “public opinion pressure” is imposed, and the willingness of the subject to “meet” the public opinion expectation at this time. Strength[51]. Many scholars have applied and demonstrated that subjective norms have a positive and positive impact on socially responsible consumer behaviors and intentions (Rivis & Sheeran, 2003; Torben et al., 2004; He Fengbo, 2010; Deng Xinming, 2012; Hu Bing et al., 2014)[52,53,54,55].

Rivis & Sheeran (2003) added the descriptive norm of this variable to the theory of planned behavior, which increased the interpretation of behavioral intentions by 5%, proving this[56]. At the same time, the theory of social interaction believes that the public is not an independent individual in society, but constantly communicates with other members of the society. The generation of individual actions is influenced by the behavior of others and the effect of others. The dual impact of their own behavioral expectations. The environmental benefits generated by consumers' green purchases are shared by the whole society and are not exclusive to individuals. This makes consumers have an important reference impact on external coercive and inducing factors. For example, Sheng Guanghua believes that green purchases are related to unwritten group norms related to social interaction. In analyzing consumers' green purchasing decisions, if they do not consider the social forces generated by social situations, the analysis will be incomplete.

### 3.1.3 Perceived Behavioral Control

Perceived behavioral control refers to the endowments of the subject. The more resources an individual has and the easier the behavioral execution process, the stronger the perceptual behavioral control and the more willing to choose a certain behavior. The more familiar household consumers are about low-carbon energy-saving knowledge, the more powerful the perceptual behavior control is, and the more willing to conduct low-carbon energy-saving behavior.

Perceptual behavioral control reflects the influence of past experience and expected barriers on a particular behavioral decision of an individual. It includes the individual's feasibility and convenience perception of specific behaviors and the control beliefs of constraints (Control Belief). Meneses et al. believe that perceived behavioral control refers to the process by which consumers judge the difficulty of implementation and the obstacles in the implementation process before implementing a certain behavior based on their own cognitive situation or personal experience. Perceived behavioral control is related to the consumer's past behavioral experience and can reflect the constraints of actual control. Perceived behavioral control is also associated with external resources such as economic incentives and supporting facilities for green consumer behavior. For green buying behavior, perceived behavior

control also includes whether consumers tend to search for related products and purchasing habits.

In summary, the research hypothesis H1-H4 is proposed:

H1: The willingness to act with low carbon energy has a positive driving effect on the actual behavior of low carbon energy conservation. That is, the higher the willingness of household consumers to act, the more their low-carbon and energy-saving consumption behaviors.

H2: Behavioral attitudes have a positive driving effect on consumers' willingness to act with low carbon energy. That is, the more positive the attitude of low-carbon energy conservation, the higher the willingness to act.

H3: Subjective norms have a positive driving effect on consumers' willingness to act with low carbon energy. That is, the stronger the subjective perception of the social reference group's expectations, the higher the degree of compliance, and the higher the willingness to act.

H4: Perceptual behavior control has a positive driving effect on tourists' environmental behavior intentions. Perceptual behavior control has a positive impact on the consumer's willingness to use low-carbon energy-saving behavior, that is, the stronger the residents' control beliefs on the main and objective constraints of the low-carbon energy-saving consumption pattern, and their willingness to choose low-carbon energy-saving consumption mode. The higher.

### 3.2 External Guiding Factor

The external guiding factor includes external coercive factors and external inducers. External coercive factors, including national laws and regulations and government policies. External inducers, including policy propaganda, government subsidies, and guiding language. Xie Shouhong et al. (2013) found that the perception of policy effects significantly affects the low-carbon consumption behavior of urban residents[57]. Other studies have shown that low-carbon policies are widely regarded as an effective institutional arrangement for urban residents to adopt energy-saving behaviors, such as strengthening low-carbon culture construction and popularizing it (Yu Xiaozhong et al., 2013)[58], and adopting tax differential policies to cities. Residents clearly indicate the government's energy consumption policy orientation (Fan Liming et al., 2007)[59], and the government can also promote urban residents' active

implementation of energy conservation behavior by adopting financial subsidies and adjusting energy prices (Tsinghua University Building Energy Research Group, 2011)[60].

In summary, we believe that the impact of the external social environment in which consumers are located on purchasing decisions cannot be ignored. Therefore, this paper proposes a hypothesis that H5: external guiding factors will have a positive impact on low-carbon energy-saving consumer behavior, that is, external coercive factors and external inducers are stronger, and the consumption behavior of low-carbon energy-saving is more.

### 3.3 Individual Characteristic Factor

In addition, certain studies have proved that the significant influences of individual characteristics, such as gender, age, marital status, education level, occupation, and income, on low-carbon consumption behavior[61]. Therefore above factors are also taken as control variables.

## 4 Theoretical Model

As a part of green consumption behavior, low-carbon energy-saving consumer behavior is a complex human behavior, which is not only the independent choice of individual actors, but also the passive choice under the constraints of the overall society environment[62]. In other words, external guiding factors at the macro level, along with internal psychological factors and individual characteristics at the micro level will affect individual consumers' willingness to choose low-carbon energy-saving consumption patterns. Based on the above analysis, the theoretical model proposed in this paper is shown in Figure 4-1:

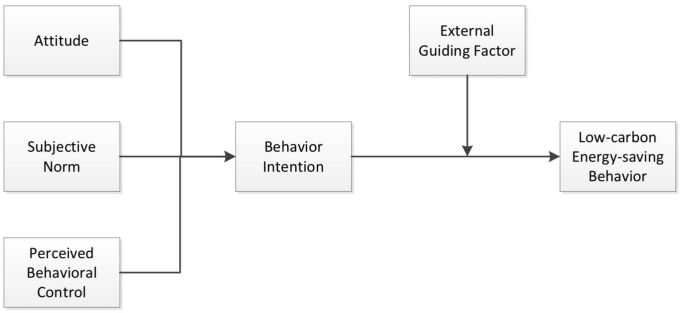


Fig. 4-1 Structural equation model of low-carbon energy-saving behavior of household consumers

# 5 Research Design

Combined with the maturity scale in related research, we proposed the research scales to measure related variables in our study, including attitude scale, subjective normative scale, perceptual behavior control scale, behavior intention scale, external guiding factor scale and actual low-carbon energy-saving behavior.

All variables in this study were assigned by the Likert-5 scoring method (eg "very disagree" = 1, "disagree" = 2, "not necessarily" = 3, "agree" = 4, "strongly agree" = 5) Our study contains a total of 33 scale items.

In this study, 50 pre-surveys were first conducted to test the scientificity and applicability of the questionnaire, and the final version was improved by modifying the order and presentation of the questions. The formal investigation began in October 2018 and lasted for about four months. In the form of electronic and paper questionnaires, we used a professional questionnaire survey website to share questionnaire links through social media such as WeChat and Weibo. Moreover, we invited friends to answer questions and expand the scope of participants by constant promotion. The online questionnaire is convenient and fast, and can directly input the questionnaire data. However, since it needs to be completed through the online platform, our participants appear to be relatively young. Therefore, some questionnaires were distributed among a targeted age group to expand the age diversity of the online questionnaire samples. In the end, a total of 380 valid questionnaires were collected. According to the filling time and completeness, 354 valid questionnaires were retained for analysis, with an effective rate of 93.16%.

# 6 Data Analysis

Statistics were analyzed by SPSS 24.0 and Amos 22.0 software, including the internal consistency test of the scale, the reliability and validity of the model, and the test of the hypothetical path.

### 6.1 Descriptive Statistics

**Table 6-1 Demographic characteristics of the samples**

| | | | |
|---|---|---|---|
| Gender | Female | 189 | 53.39% |
| | Male | 165 | 46.61% |
| Age | 18–20 years old | 52 | 14.69% |
| | 21–30 years old | 98 | 27.68% |
| | 31–40 years old | 54 | 15.25% |
| | 41–50 years old | 126 | 35.59% |
| | 51–60 years old | 18 | 5.08% |
| | 60 years old or older | 6 | 1.69% |
| Education level | Junior high school and below | 49 | 13.84% |
| | High school (secondary school, vocational high school, technical | 98 | 27.68% |
| | Bachelor (college, etc.) | 173 | 48.87% |
| | Graduate and above | 34 | 9.60% |
| Marital status | Single | 108 | 30.51% |
| | Married | 246 | 69.49% |
| Career | Party, government, institution, army | 119 | 33.62% |
| | Business | 94 | 26.55% |
| | Social group, residence (village) committee | 76 | 21.47% |
| | Self-employed | 14 | 3.95% |
| | Retire | 7 | 1.98% |
| | Other | 44 | 12.43% |
| Family monthly income level | Below 5,000 yuan | 67 | 18.93% |
| | 5000–10000 yuan | 149 | 42.09% |
| | 10000–15000 yuan | 75 | 21.19% |
| | 15000–20000 yuan | 22 | 6.21% |
| | 20000–25000 yuan | 16 | 4.52% |
| | More than 25,000 yuan | 25 | 7.06% |

As shown in Table 6-1: the scale of female sample is slightly larger than male, accounting for 53.39% of the total survey sample; the proportion of the 41-50 year old group is relatively high, accounting for 35.59%; the education level is mainly junior college and undergraduate, accounting for 48.87%; the majority participants of the questionnaire, accounting for 69.49%; family members' jobs mainly include civil servants and the military, accounting for 33.62%;most family earn 5000-10000 yuan a month, accounting for 42.09%.

## 6.2 Reliability Analysis

The method of measuring reliability generally include internal consistency reliability, replica reliability, retest reliability, and replica retest reliability. Given that the data collected is without repeated measurements, the internal consistency of the data needs to be analyzed to determine the reliability of the survey results. In this

paper, we use SPSS 24.0 to analyze the reliability of the scale, and observe the Cronbach's Alphacoefficient and the TICI value of each item to judge the validity.

**Table 6-2 Reliability Analysis**

| Cronbach's Alpha | Number of items |
|---|---|
| .962 | 33 |

In this study, the overall Cronbach' Alpha coefficient is 0.962, and the Cronbach' Alpha coefficients of each latent variable are 0.856, 0.849, 0.898, 0.940, 0.888, 0.915, respectively, all of which surpassed the critical threshold of 0.7. And the TICI value of all questions is between 0.511- 0.767, all greater than 0.5, which indicates that the survey scale and survey data is reliable.

### 6.3 The Test of Validity

The scale of this study is based on Theory of Planned Behavior and the mature scales from home and abroad. It is subject to expert opinions for revision, and finalized after pre-test analysis. Therefore, the design of this research questionnaire meets the requirements of content validity, which means this section mainly discusses the structural validity of the theoretical model proposed in this study. We used the SEM method to perform verification factor analysis and applied AMOS 22.0 according to the following three standards.

It can be seen from the results in Table 6-3 that the standard factor loading (SFL) of all variables is in the range of 0.55-0.95, which is greater than the critical value of the SFL threshold of 0.5; and is significant at the level of p=0.05. The average variance extracted (AVE) of each latent variable is between 0.456-0.797, and the average variance extracted of low carbon energy saving behavior (AB) is acceptable at 0.456, others are greater than 0.5, and has good polymerization validity. The compositional reliability (CR) of each dimension is between 0.849 and 0.940, both above the critical threshold of 0.7.

**Table 6-3 Analysis on the validity of factors**

| | | SFL | CR | AVE |
|---|---|---|---|---|
| BA | BA1 | 0. 940 | 0. 94 | 0. 797 |
| | BA2 | 0. 780 | | |
| | BA3 | 0. 950 | | |
| | BA4 | 0. 890 | | |
| PBC | PBC1 | 0. 720 | 0. 898 | 0. 749 |
| | PBC2 | 0. 930 | | |
| | PBC3 | 0. 930 | | |
| SN | SN1 | 0. 840 | 0. 849 | 0. 657 |
| | SN2 | 0. 910 | | |
| | SN3 | 0. 660 | | |
| BI | BI1 | 0. 770 | 0. 856 | 0. 599 |
| | BI2 | 0. 740 | | |
| | BI3 | 0. 850 | | |
| | BI4 | 0. 730 | | |
| EGF | EGF1 | 0. 700 | 0. 888 | 0. 571 |
| | EGF2 | 0. 750 | | |
| | EGF3 | 0. 770 | | |
| | EGF4 | 0. 790 | | |
| | EGF5 | 0. 770 | | |
| | EGF6 | 0. 750 | | |
| AB | AB1 | 0. 550 | 0. 915 | 0. 456 |
| | AB2 | 0. 770 | | |
| | AB3 | 0. 610 | | |
| | AB4 | 0. 610 | | |
| | AB5 | 0. 690 | | |
| | AB6 | 0. 650 | | |
| | AB7 | 0. 690 | | |
| | AB8 | 0. 760 | | |
| | AB9 | 0. 700 | | |
| | AB10 | 0. 610 | | |
| | AB11 | 0. 730 | | |
| | AB12 | 0. 680 | | |
| | AB13 | 0. 690 | | |

## 6.4 The Test of Hypothetical Path

**Table 6-4 Standardized Regression Weights**

| | | | Estimate | S.E. | C.R. | P |
|---|---|---|---|---|---|---|
| BI | <--- | BA | .340 | .038 | 4.924 | *** |
| BI | <--- | PBC | .487 | .047 | 7.713 | *** |
| BI | <--- | SN | .610 | .069 | 6.962 | *** |
| AB | <--- | BI | .466 | .077 | 6.508 | *** |
| AB | <--- | EGF | .475 | .077 | 5.104 | *** |

In this paper, AMOS 22.0 software is used to analyze the path coefficients between the variables of the model (see Table 6-4). The criteria is whether the hypothesis is established includes the positive and negative and significantness of the path

coefficient. The standardized regression coefficients of the six hypotheses in this paper are all positive, and significant at the level of 0.001, indicating that the hypothesis is supported, that is, subjective norms, attitudes, and perceived behavioral control of household consumers significantly positively influence their behavior intention of low carbon and energy conservation, while behavior intention and external guiding factors significantly affect their actual behavior.

**Table 6-5 Standardized Direct Effects**

| | SN | PBC | BA | EGF | BI | AB |
|---|---|---|---|---|---|---|
| BI | .610 | .487 | .340 | .000 | .000 | .000 |

**Table 6-6 Standardized Indirect Effects**

| | SN | PBC | BA | EGF | BI | AB |
|---|---|---|---|---|---|---|
| AB | .285 | .227 | .159 | .000 | .000 | .000 |

**Table 6-7 Standardized Total Effects**

| | SN | PBC | BA | EGF | BI | AB |
|---|---|---|---|---|---|---|
| AB | .285 | .227 | .159 | .475 | .466 | .000 |

From the direct effect point of view, the most influential behavior of low carbon energy saving behavior is subjective norms (0.610), followed by perceptual behavior control (0.487), and the least affecting factor is behavioral attitude (0.340). From the indirect effect, the most important influence on the actual behavior of low-carbon energy conservation is subjective norms (0.285), followed by perceptual behavior control (0.227), and the least affected is behavioral attitude (0.159). From the perspective of total effect, the external guiding factors affecting the actual behavior of low-carbon energy conservation are slightly larger than the willingness to act, which are 0.475 and 0.466 respectively. These conclusions are consistent with the aforementioned theoretical analysis, expanding the application of the theory of planned behavior in the low-carbon energy-saving behavior of household consumers.

# 7 Main Conclusions and Policy Suggestion

## 7.1 Main Conclusion

Based on the structural behavioral model, this study analyzes the psychological motivations of household consumers' low-carbon energy-saving behaviors, including the specific path of action and degree of influence, and the influence of external guiding factors on their actual behavior. The main conclusions are as follows: Firstly, subjective norms, perceptual behavior control, behavioral attitudes indirectly affect low-carbon energy-saving behavior through behavioral intentions; secondly, household consumers' behavioral attitudes, subjective norms, perceptual behavior control, low-carbon energy conservation for household consumers behavioral will has a significant positive impact, and the most influential one is subjective norms, followed by perceptual behavioral control, and the least affected is behavioral attitudes. Third, external guiding factors have a positive effect on low-carbon energy-saving behavior, and the degree of influence is large.

## 7.2 Policy Suggestion

Based on the above conclusions, this study believes that the influence of external guiding factors on the low-carbon energy-saving behavior of household consumers should be fully utilized; thus promoting voluntary low-carbon energy conservation by adopting a series of policy measures.

The industrialization process in the western developed countries was accomplished earlier, and the contradiction between energy, resources, environment and economy was exposed earlier. After a long period of exploration, a series of policy measures have been introduced to promote the achievement of energy conservation and emission reduction targets. China's energy-saving and emission-reduction policies started later, but in recent years, government and the society is paying more and more attention to energy-saving work, and a series of legal, economic, and administrative measures have been introduced to promote energy conservation for all. With reference to the external guiding factors verified in this study and the proven and effective maturity policies in foreign countries, combined with China's current national conditions, we propose the following three aspects:

To begin with, promote the concept of energy saving and low carbon through the network and the new media platform to create a good social atmosphere. Media such as radio stations and TV stations can increase the exposure for promoting energy-saving and low-carbon concepts and knowledge in programs, news and interviews. Most of the residents have a preliminary understanding of the current energy-saving incentives, but they are not familiar with the specific content. In particular, the current real-time changes in subsidy programs in China, such as continuity and subsidy policies, may cause consumers to be confused about policies. Therefore, improving residents' awareness and familiarity with subsidy policies is a necessary guarantee for effective policy implementation. Organizational departments can use the official Weibo and WeChat public account to convey the importance of energy saving and low carbon to consumers by describing green environmental stories or other forms to influence consumers' green purchasing behavior.

Secondly, through the organization of various energy-saving emission reduction innovation and efficiency activities, guide consumers to firmly establish a low-carbon environmental protection concept. Paying special attention to the cultivation of ecological awareness of young students, education departments at all levels should regard ecological civilization education as an important part of quality education, and carry out education and teaching focusing on energy-saving, low-carbon, green civilization, water-saving and energy-saving at all levels of schools. And social practice activities: For example, all primary and secondary schools can set up “Campus Environmental Day”, carry out interesting green energy-saving forums, organize environmental knowledge contests, etc., and cultivate environmental awareness among primary and secondary school students. All colleges and universities should encourage college students to carry out green recycling practice activities, and jointly organize a lecture and seminar on low-carbon energy conservation with the Communist Youth League to guide college students to establish a low-carbon energy-saving concept.

Thirdly, using the Energy Conservation Publicity Week and the National Low Carbon Day, we will extensively carry out publicity and promotion activities for low-carbon applicable technical achievements of energy conservation and emission reduction, and publicize simple and practical tips and techniques for energy conservation, emission reduction and low carbon at home and abroad. Promote green

emission reduction new products, new technologies and new processes to attract consumers' favor for green products. The community conducts green consumption promotion activities, encourages the use of old materials and idle logistics, and can set a fixed collection time or collection point. Regularly conduct community lectures to popularize and save skills. Encourage business enterprises to carry out green product procurement and promotion of energy-saving products, and increase consumers' preference for green low-carbon products.

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