Journal of Energy Technologies and Policy
ISSN 2224-3232 (Paper) ISSN 2225-0573 (Online)
Vol.7, No.3, 2017

The Research Progress of the Social Acceptability of Personal Carbon Trading in UK

Shanqi Wang Chong Ren*
School of Public Affairs, University of Science and Technology of China, 96 Jinzhai Road, Hefei 230026, China
* Corresponding author E-mail: ustcwsq@mail.ustc.edu.cn

The research is financed by Anhui Natural Science Fund Committee. No.1408085QG145 (How innovation drives development-collaborative innovation research); by Ministry of Education of China. No. WK216000002 (Low carbon technology based on CDM)

Abstract
Nowadays, the global warming has become a crucial issue result from a large number of greenhouse gases emissions, and individual carbon emissions account for a large proportion of total carbon dioxide emissions. In the current climate background, Personal Carbon Trading (PCT) which aimed at reducing carbon emissions from household energy and personal transportation has aroused widespread concern in the community. Social acceptability, as a significant evaluation index of whether the policy can be implemented, has become a hot topic in the research of Personal Carbon Trading. UK has studied this area for decades, this paper reviews the relative research progress in UK, analyzes a variety of influencing factors in the social acceptability of Personal Carbon Trading, compares Personal Carbon Trading with other carbon reduction alternatives in the social acceptance, sums up the research methods used in those studies. It is obvious that these studies are meaningful for improvement of the personal Carbon Trading scheme and promotion of new idea as new effective policy implementation to control the carbon emission.

Keywords: Personal Carbon Trading; Social Acceptability; Carbon Tax； Up-streaming system; Research Method

1. Introduction

The policy tools for carbon emission reduction mainly include Carbon Tax, Upstream-Trading and Personal Carbon Trading (PCT). One of the reasons for the immediate and pervasive concern of the PCT was that the PCT could have more social support than its alternative solutions (Feasta, 2003; Low R, 2005; Howell R, 2007; IPPR, 2008). Britain's research on the PCT focuses on social acceptability, the impact on behavior, technical feasibility, the relationship with current policy, fairness and efficiency, effectiveness and so on. Social acceptability as an important evaluation index of whether the policy can be carried out, has become a hot topic in the research of personal carbon trading.

British academia has different interpretations on the concept of social acceptability. According to the existing research conclusions, the social acceptability of the PCT can be summarized as the basic attitude of the community to the PCT program, that is, whether it is accepted and acceptance level of the PCT (Roberts S and Thumin J, 2006; DEFRA, 2008; Owen L et al., 2008; Fawcett T, 2010; Bristow A L et al., 2010). Influence factors of PCT social acceptability have always been the top priority of the study. Understanding what factors affect the public and the government's views on the PCT is conducive to designing the PCT program scientifically and rationally, and can also adopt well-directed measures to intervene actively in their attitude to the PCT. Almost all of the research on PCT acceptance are compared with the alternative carbon reduction program, and this paper analyzes the comparison between individual carbon trading, carbon tax and upstream trading system. In comparison with the alternative schemes, the advantages and disadvantages of different carbon reduction schemes can be drawn, and then we can avoid weaknesses and have a definite object in view in practice. At the same time, research methods are also being innovated constantly in the process of enriching the research content.

Therefore, this article focuses on the social acceptability of PCT, the contents are arranged as follows: The first part is the introduction, the second part discusses the influence factors of social acceptability, the third part discusses the comparison between individual carbon trading and alternative carbon reduction plan, the fourth part is research methods, the last part is the summary and prospect.

2. Influencing factors of social acceptability

Scholars conducted a number of researches and on the social acceptability of the PCT, and attempted to reveal the key factors influencing social acceptability, and tried to take some measures to positively affect positively people's attitude towards PCT (Howell R, 2007; Owen L et al., 2008; Bristow A L et al., 2010； Capstick S et al., 2009; Wallace A et al, 2010). The factors that affect the social acceptability of the PCT can be divided into individual factors, the program's own factors and environmental factors.

2.1 Individual Factors

Different individuals have differing perceptions of the same policy (Parag Y et al., 2011). The social background, the knowledge level and the economic situation of the individual have a certain degree of influence on their understanding of the policy, meanwhile the public policy's distribution effect will bring the different influence to the different interest groups, and therefore individual differences play a crucial role in influencing the attitudes of individuals towards the PCT.

2.1.1 Economic Factors

Based on the hypothesis of rational man, the starting point of individual behavior is to maximize the economic benefits, so the economic factor is a very significant factor in individual factors. Studies have found that the poor have less carbon emissions than the rich, that is, the individual's economic situation determines their consumption (Dresner S et al., 2004; Howell R, 2008). While personal consumption significantly affects people's perception of the PCT that low emission individuals are more likely to accept PCT than high emission individuals (Capstick S et al., 2009). The possible reason is that the PCT can bring some economic incentives, low-income people can reduce their carbon emissions, thereby selling excess carbon units to obtain profitable returns (Howell R, 2008).

2.1.2 Psychological Factors

Compared with other carbon reduction policies, PCT can intangibly affect people's psychological and then contribute to the occurrence of carbon reduction behavior (Capstick S et al., 2008; Matthews L, 2010). This makes the PCT more attractive in situations where other policies are generally difficult to achieve. Starkey think that there are four kinds of psychological factors affecting people, including Engagement, Consciousness, Responsibility and Empowerment (Starkey R, 2012). But in many psychological factors, the majority of current research are on the sense of responsibility. Owen L, et al (2007) interviewed 92 samples using the group interview method in 2008 to investigate their views on the PCT revealed that the PCT would increase the concern of the PCT program by stimulating people's moral responsibility. The reason is that people in the PCT program are easy to see their own consumption situation, thereby enhancing the awareness of environmental protection (Howell R, 2007).

2.1.3 Political Trust

Political trust is comprised of the public's trust in the government and politicians.Government is a very important subject because the PCT is a top-down implementation of the program. In Europe, free economy finds its way ever deeper into the people's mind, and people is also alert to the drawbacks of the planned economy, so a part of the public is always suspicious of the intentions and behavior of the government. Levett (2005) argued that the PCT meant Soviet-style state control, which would remind people of the wars and the hard times of life. Owen L, et al (2008) found that the public's attitude to the carbon reduction program is not related to their environmental awareness, but with their attitude towards the government and government intervention. They will take the PCT program to be excluded as a government intervention in the public life.

But paradoxically, they refuse government intervention while expecting the government to act, such as hope that the government will actively improve public transport and invest in the development of new energy, which in turn provides an opportunity to reduce people's resistance to government participation in the PCT. Owen L, et al (2008) showed that the way of the PCT proposed will significantly affect the attitude of people on it. Reducing the use of "allocation" and other sensitive words in the interpretation on PCT may get better results (Howell R, 2007).

Likewise, the public's attitude towards politicians has an important influence on the social acceptability of the PCT. Jagers S, et al (2010) argued that public trust in politicians is positively related to support for PCT, compared with people who distrust politicians, the people who trust politicians are more positive towards PCT. This applies not only to the PCT, but also to the carbon tax.

2.1.4 Environmental Concerns

Capstick and Lewis (2009) argued that those who cares about the environment prefer the PCT program and are more likely to adopt carbon-saving measures than those who are indifferent to the environment. This conclusion was also supported by the follow-up study (Capstick S et al., 2010; Hendry A et al., 2013). Wallace's research also confirmed this view, which showed that public attitudes toward new energy and willingness to use low carbon vehicles have a significant impact on PCT support, the more positive attitudes towards new energy, the stronger willingness to use public transport or bicycles, the more support the PCT (Wallace A et al, 2010). In the final analysis, support for green energy and low carbon transport is often due to their strong awareness of environmental protection. In fact, regardless of PCT or carbon tax, they will gain higher support from the strong sense of environmental protection. They not only set an example with their own conduct, but also hope that to constrain others through public policy in order to achieve the goal of improving the environment.

In addition to the above four factors, the individual's perception of fairness also affects their attitude towards PCT. The sense of fairness varies from person to person, ultimately this is a self-serving bias (Wallace A et al, 2010). An individual's judgment on PCT fairness is based on its impact on self-interest. People who feel

fairness will actively treat the PCT; on the contrary, they will produce resistance.

2.2 PCT Program Design

PCT still only stay in the theoretical stage, to be operational need to be refined into specific programs. Such as whether to include carbon emissions in the aviation sector, the relationship between adults and children in the allocation of carbon emission rights, how to compensate for vulnerable groups affected by the PCT program, different details can be combined into different PCT programs, the evaluation of the PCT program will vary due to different program design.

Bristow A, et al (2008) studied the social acceptability of the PCT from nine aspects. They were the allocation of emission rights, the disposal of surplus emission rights, the validity of the emission rights, the purchase limits, coverage, transaction mode, management theme of carbon account, the carbon price decision, carbon price level of different units; he studied the social acceptability of carbon tax from two aspects: the collection of objects and purposes, tax rates. The authors combine and design their own content to form different PCT programs and carbon tax schemes that people choose according to their preferences. Studies have shown that the design has a significant impact on the social acceptability of PCT .

The distribution of initial carbon emission rights in the above-mentioned nine areas is critical to social acceptability. The reason is that people prefer more equitable policy options (Fawcett T et al., 2003; Howell R A, 2013) and the allocation of initial carbon emissions rights from the source to determine whether the PCT program is fair. How to allocate carbon emissions right fair? PCT studies are based on the average allocation of carbon units as a starting point. That is, everyone has the same emissions and protected rights. Some scholars believe that the average allocation is fair, such as Hillman and Fawcett (2004), Fleming (2007). While others argue that per capita allocation of carbon units or allowances is unfair, Starkey (2008) said that there is no evidence that equitable allocation of carbon units is fair and Hyams (2009) even thought that inequitable allocation of carbon units is fair.

But the need to be cautious is that there is no clear definition and measurement of fairness in academia, Mill (1951), Rawls (1999) and Sandel (1982) and other generations have not reached a consensus, different understanding of fairness is bound to affect people's judgment of PCT.

In fact, not only the program itself, but also the way to propose and describe the PCT and its background has a significant impact on social acceptability. The public is provided with more information, such as a detailed explanation of the PCT concept, implementation rules, etc., which will enable them to understand the PCT better and reduce conflict.

2.3 Social Factors

In addition to individual factors and design scheme, the factors that influence the social acceptability of the PCT include social factors, which refer to other existing social public policies (such as carbon taxes), technology and management systems (such as banking systems).

2.3.1 Tax Rates of Carbon Taxes

The PCT and the carbon tax as a pair of alternatives to carbon emissions interrelate with each other. In general, the increase in the carbon tax rate is positively correlated with public support for the PCT. Based on education, income, gender, and political preference, Jagers S, et al (2010) selected 2,000 samples in the registry office. They found that the relationship between the carbon tax rate and PCT support when using the questionnaire method to test their attitudes toward the PCT. In the above samples, 51% of them supported both the carbon tax rate and the PCT program, and 21% did not support the tax rate but support the PCT program.

2.3.2 Technical and Management Support

A policy that was not was not feasible at all can't win the support of public, and the existing technical support enabled the PCT to be operational, which had won some support for the PCT. Lane C, et al (2008) argue that there is no insurmountable technical barrier to the implementation of PCT. RSA (2007) also explores a variety of ways to add individual carbon accounts or transactions to existing trading and banking systems. But this does not mean that there is no difficulty in implementing the PCT. In the research sample of Owen L, et al (2008), there is a great deal of concern about the technical and managerial hurdles to implementing carbon reduction programs. Technical obstacles such as installing energy-saving appliances in all of the families, management hurdles such as the acceptance of these programs rely on education and people's awareness of self-consciousness; these obstacles are hard to overcome.

As explained by Löfgren and Nordblom (2009), when interpreting the consequences of attitudinal studies, it is necessary to take account of the context in which the policy is located. Because these studies are conducted in the UK context, social acceptance factors that these studies have shown in other countries may play a different or even the opposite role.

3. Comparison of Social Acceptability of PCT with Alternatives

The main policy tools to reduce carbon emissions are PCT, carbon tax, uplink trading system and policy incentives to implement carbon reduction technologies. The carbon reduction tools have their own advantages and disadvantages, and the social recognition is also different. The study of social acceptability of the PCT is conducted in a comparative study with alternatives rather than in isolation. Policy incentives are generally used in conjunction with other programs, so this paper focuses on PCT and carbon tax, uplink trading system comparison.

3.1 Comparison of Carbon Taxes

Carbon tax is one of the environmental taxes, mainly for carbon content or carbon emissions of fossil fuels (such as gasoline, diesel and natural gas, etc.). It aims to reduce carbon dioxide emissions. Carbon tax is essentially a Pigouvian tax, by bringing the negative externality into the price system to achieve the purpose of reducing carbon emissions. Carbon tax has already been levied in the home energy and automobile energy, and even the aviation field.

In the public view, the PCT and the carbon tax have their own strengths, and can not simply summed up what kind of tools better, the public expressed support for a carbon reduction tools, but also noted that it exists on the other hand defect. Why people that have different attitudes towards PCT and carbon taxes, the factors are as follow:

3.1.1 Effects

The implementation of the PCT is superior to the carbon tax, which is main reason why people prefer the PCT (Feasta, 2003; Fleming D, 2007).

The implementation of the PCT is more effective because 1) The PCT will set a upper limit on emissions, which directly guarantees the achievement of carbon reduction targets, while carbon taxes are only to raise the cost of pay. For the public, it is easier to pay than to reduce carbon emissions, and they will be accustomed with tax, which is not conducive to achieving emission reduction targets (Roberts S et al., 2006; Hoel M et al., 2002; Hepburn et al., 2006), and furthermore, people are not willing to make sacrifices if they can not ensure that the carbon tax can achieve the goal; 2) Whether carbon reduction target of carbon tax can be achieved depends on the level of elasticity of demand for carbon intensive products or services, and if the elasticity of demand is low, even if the tax rate is very high, there is no significant impact on carbon emissions, such as in the short and medium term household heating and electricity demand elasticity is very low (Pearson, 1991), even if household carbon emissions do not rise to fall instead (ECCM, 2003).

3.1.2 Efficiency

The short-term efficiency of the carbon tax is high, but in the long run, the efficiency of the PCT is high.

The carbon tax utilizes price instruments, and the PCT utilizes quantitative tools. According to the theory of Weitzman, under deterministic conditions, by using price and quantity mechanisms, the economic efficiency of reducing pollutant emissions is the same, but when the marginal cost of emission reduction is uncertain, which tool is more efficient depends on the relative slope of MC (marginal cost) and MR (marginal revenue curve). If the marginal revenue curve for emission reductions is more flat than the marginal cost curve, the price tool is more efficient; otherwise the quantitative tool is more effective (Weitzman M, 1974). Because the marginal revenue is a function of greenhouse gas accumulation and is weakly correlated with short-term emission reductions, the MR curve can be approximately vertical in the short term, so the economic efficiency of carbon taxes is higher than PCT's in short term. However, in the long run, climate change will bring more and more harm, a little increase in the concentration of climate can produce great harm, in this case the quantitative tool is more effective (Hepburn, 2006; Pizer,2002).

Moreover, the PCT is much faster and more accurate in responding to the market and people's needs because carbon price is entirely depended on the market and accurately reflects demand and supply situation (Fleming D, 2007). But though the carbon tax will be adjusted according to the inflation and economic changes, the existence of time-delay affects its efficiency.

3.1.3 Fairness

Fairness includes both the distribution principle and the allocation result. In comparison with carbon taxes, it mainly studies the PCT and carbon taxes on the allocation effect caused by different people. With regard to the allocation result, PCT is more fair than the carbon tax, which PCT than the carbon tax is more popular among the public.

Although there are a number of low-income people under the PCT and carbon tax schemes will benefit the damage, but the proportion of low-income people under the carbon tax program is significantly more than that of the PCT program. Thirty-five percent of the 10% of people with the lowest income under the carbon tax will get worse, but this percentage is 18% under the PCT (Dresner S, 2004). Even if the carbon tax is used to compensate for the loss of low-income people, it also still not enough to make up for the defects of fairness when compared with PCT (Roberts S, 2006).

As far as the distribution principle is concerned, the fairness of the PCT is explained in Section 2.2, and, unlike the result of allocations, many people believe that the principle of carbon tax distribution is equitable because it treats all people equally (Howell R, 2007).

3.1.4 Clear Objectives and Incentives to Reduce Emissions

Compared to the carbon tax, the objectives and time-to-implementation of the PCT is clear, and because of the periodicity of the emission limits, carbon tax is more likely to change with market conditions.

The PCT will provide economic incentives for people to reduce carbon emissions (Hillman M, 2004). People benefit by selling the remaining carbon units, the carbon tax only to people "punishment" and no income, and the positive strengthening of the PCT as a result of the economic stimulus makes people pay more attention to their own carbon emissions reduction behavior; In addition, compared with the carbon tax, PCT also brings psychological incentives, when people are more concerned about their emissions, it can inspire people's sense of participation (Matthews L, 2010), and compared with the carbon tax whose tax rate directly determined by the state, people's sense of ownership is stronger, because they are part of the market determining the carbon unit price, so that people are more willing to accept PCT (Fleming D, 2007).

3.1.5 Costs

Compared with the carbon tax, PCT's cost is higher due to its concept, implementation and management are much more complex and difficult to understand (Dresner S, 2005). High cost is one of the biggest drawbacks of the PCT program, and also one of the reasons why people turn to support carbon taxes (Howell R, 2007). At the same time, the revenue generated by the PCT is less than the carbon tax, and for every unit of fossil fuel consumed, a corresponding proportion of carbon tax revenue is generated, but in the early days of the PCT, carbon allowances were distributed for free, although there is a certain proportion of carbon units for auction later, but the proportion is very few. Although the methods of estimating costs are different, the conclusion is similar, the total cost of PCT is much higher than carbon tax and upside transaction (Lockwood, 2009). The cost is too high to affect the economic efficiency of the implementation of the PCT, which is also one of the reasons why the PCT appears inferior.

3.2 Comparison with Upstream Transactions

The PCT is a typical downstream scheme that involves carbon trading with the upstream trading system, the difference is the PCT program allocates carbon emission limits to specific consumers after the country has set emission limits, while the upstream system is allocated directly to the raw material suppliers.

Up and down programs have the meaning of enforcement, emphasizing equality, allowing transactions, there are some similar problems with the implementation process, such as how to treat children, and limiting the total emissions. At the same time, there are some differences, the upstream scheme is more simple, transparent, cheap, easy to implement and cover a wide range, while the visibility of the downstream scheme is higher, it will also bring additional behavioral changes (Matthews L, 2010).

Sorrel believed that the upstream system would lead to better economic efficiency, environmental effects and social equity and a higher degree of political acceptance than the PCT, especially when it is used combined with the EU ETS (Sorrell S, 2010). The PCT is difficult to popularize in a short time because it is expensive, difficulty in implementation and social acceptance. However, Owen's study (2008) showed that the social acceptability of the upstream program was the lowest in the survey of social acceptability of the PCT, carbon tax, and upstream program.

Most of the studies on social acceptability are contrasted with the two alternatives to PCT and carbon tax, and few studies have been done on the upstream program.

4. Research Methods

Tab.1 The main research method of personal carbon trading

Scholars	Years	Research Methods
Howell	2007	Group Interview
Owen	2008	Group Interview
Bristow	2008，2010	Stated Preference Method
Capstick	2009	Computer Simulation; Questionnaire
Wallace A	2009，2010	Questionnaire，Semi-Structured Interviews
Jagers	2010	Questionnaire

Howell (2007) used a group interview to study the public's acceptance of the PCT. A total of 35 samples, the 5 groups of homogeneous groups, each group has about 6 to 8 members. The first four groups are classified according to their carbon emissions, whether they are members of the religious, environmental protection and world development Organization, which are 27 students, all recruited through email; The fifth group was recruited through leaflets in the Quaker Church or church, and compared with the student groups to

see if age and experience affected the acceptance of the PCT. One week prior to the interview, participants were sent a briefing that included basic information about the research purpose, the relevant research terms, and they would do a questionnaire before and after the formal interview to investigate whether the interview would change their views on the PCT, the interviews process was conducted in strict accordance with the standards of group interviews, each group of interviews lasted 90 minutes.

Owen (2008) used the same method the next year, with more samples, 92, they were divided into 12 groups according to the location (these sites are representative of rural, urban and suburban), age, environmental concerns, social status and economic conditions. The duration of each group interview lasted about 2 hours, followed by the same interview process. Group interviews are more structured than other qualitative researches, such as case study, interviews, and observation method, where the researcher plays a more active role, but this role does not guide the interviewer how to discuss, but to promote the depth of the interview; group interview involves the interactions between members. It encourages full discussion among the participants, even if the sample is small, but can still fully understand the experience and beliefs of the participants (Morgan, 1998), and it can also inspire a lot of new ideas. Group interviewing is an effective method to collect a large amount of information in a short time (Morgan, 1997).

For the first time in 2008, Bristow introduced the stated preference method of market research into PCT studies to explore the influence of PCT program design on people's acceptance. The experiment was divided into 2 groups. The first group was a comparison of PCT programs with different elements, and the second group was a comparison of different PCT programs and carbon tax schemes. The two programs were implemented in two different times and place surveys, in order to predict people's choice of different PCT programs, as well as PCT and carbon tax options in the real world. In 2010, Bristow further used this method to study the social acceptability of the PCT. The experiment was extended to four groups. The first and second groups were two different PCT schemes (PCT_A and PCT_B) to compare with each other. The third and fourth groups were compared with the PCT scheme and the carbon tax scheme, respondents selected the different options of schemes to determine their preferences.

Capstick's (2008) innovative use of computer simulation and traditional questionnaire methods to study the social acceptance of the PCT. The author's previous paper investigates people's views on the PCT from a psychological perspective cannot be measured, which attempts to use computer simulation and questionnaires to specifically measure people's response to the PCT. Computer simulations allow participants to complete a simple carbon footprint estimate and then make a series of choices based on the assigned carbon allowance. The questionnaire was used to investigate whether their willingness to comply with relevant emission reductions, including PCT, carbon tax, and neutral tax schemes.

The research of Wallace A (2009, 2010) was divided into two stages. The first stage was a quantitative research using questionnaires. The questionnaire covered energy use, household carbon emissions, and the PCT issues, which would be posted to respondents. In the second stage, the semi-structured interviews which were on the basis of data support provided by the first stage were conducted in the homes of 15 families (including 21 respondents) to investigate people's attitudes to the PCT. The questionnaire survey, interviews and other research methods are very foundation methods of the social sciences, in the study of PCT and its social acceptability, many scholars used them with other new methods together, such as computer simulation, or used a combination of various traditional methods. Each research method has advantages and disadvantages, for instance, the questionnaire has the advantages of time saving, more economical and easy to quantify, which is widely used, but there is no guarantee of the recovery rate, the results of the questionnaire are wide but not deep shortcomings, and interviews can make up for these shortcomings.

With the deepening of the PCT research, not only was the content supplemented and improved a lot, but also its research methods were updated. The research is gradually from qualitative to quantitative, and the research methods of other disciplines are also used in the research of the PCT.

5. Conclusion

PCT social acceptability research has been as one of the most popular of research PCT research. It has made a lot of progress in the last ten years, there are many important contributions in the exploration of influencing factors, the expansion of research methods and the comparison of alternatives research, but there are also many problems. In this paper, while clarifying the research progress and shortcomings, and pointed out the possible future research focus on this field.

1. On the overall situation, the research level is still relatively low. The study of PCT social acceptance is still relatively small, many of which are conducted only as part of the PCT study. Although there are some articles devoted to the study of PCT social acceptance, but the overall number of too few. Further research is needed on the social acceptability of the PCT.
2. In the research method, the sample is small. The qualitative analysis is more than the quantitative analysis. In the selection of samples, the majority of the study also have a small sample size problem, so that there are

some risks when the conclusion is extended to larger groups. The research on the factors that influence the acceptance of the PCT has begun to try many different research methods, and some of them have even introduced the research methods of other disciplines, such as the stated preference method used in market research. Nonetheless, most of them still remain in the qualitative analysis, such as questionnaires, group interviews. For discipline to be more accurate and mature, quantitative analysis tools are essential.

3. The study of alternative programs only focused on the comparison with the carbon tax, less involved upstream transactions. In order for people and government make scientific judgments，it is necessary to make a comprehensive comparison of three carbon reduction tools.
4. First of all, the definition of the content of the study is unclear. There is no author to give a standardized interpretation of social acceptability, and the concept of "fairness" which PCT often involves also has the same problem. These bring obstacles to the conduct of research at the beginning. Therefore, the improvement on these concepts can be used as the future research contents.

Secondly, the specific content of the study is still very fragmented. Taking influence factors of PCT social acceptability as an example, there is still no core factors that are commonly recognized. There are dozens of factors in the literature, and the relationship of inheritance and development between each research is not certain. Most of the literature on the factors affecting the PCT is just a simple list, did not give in-depth explanation and argumentation; only to understand the impact factors is not the ultimate goal of research, how they affect the social acceptance of PCT, is also an important concern.

Finally, the selection of stakeholders is not enough. The study only concerned the public's and the government's attitudes to the PCT. Energy supplier was also important stakeholders in the TEQs as one of the PCT programs, but few papers consider their views.

Throughout the study, although there are many limitations of the study, but the PCT and its social acceptance of the study is still mainly concentrated in the UK. Other countries in this area are far behind. In future research, new methods and new dimensions can be used to test the social acceptability of personal carbon trading. The individual is only one of the influential groups of public policy, it is possible to take into account the attitude of the government and the energy provider to personal carbon trading in the future. As an innovative tool for carbon reduction, the PCT is undoubtedly new method for China to learn from which used more administrative measures to implement carbon emission. At the same time, the people's acceptance of the emission reduction program is directly related to the success of the implementation of public policy. Therefore, in the context of implementing energy-saving and emission reduction in order to achieve sustainable development, promoting the acceptance of the PCT and its social research has important practical and theoretical significance.

References

Bristow, A. L., Zanni, A. M., Wardman, M., &Chintakayala, P. K. (2010).Public Acceptability of Personal Carbon Trading And Carbon Tax.Ecological Economics, 69(9): 1824-1837.

Bristow, A. L., Zanni, A. M., Wardman, M., & Chintakayala, P.K. (2008b).Using Stated Preference to Explore Design Optionsfor a Personal Carbon Trading Scheme' European Transport Conference 2008. Noordwijkerhout, Netherlands, 6–8October2008.

Capstick, S., &Lewis, A. (2009). Personal Carbon Allowances: A pilot Simulation and Questionnaire.UK Energy Research Centre, London.

Capstick S, Lewis A. (2008). Personal Carbon Trading: Perspectives from Psychology and Behavioral Economics. Institute for Public Policy Research. London.

Capstick, S., &Lewis A. (2010). Effects of Personal Carbon Allowances on Decision-Making: Evidence from an Experimental Simulation. Climate Policy, 10(4): 369-384.

DEFRA (2008). Synthesis Report on the Findings from Defra's Pre-Feasibility Study into Personal Carbon Trading. Department for Environment, Food And Rural Affairs, London.

Dresner, S., &Ekins, P. (2004). The Distributional Impacts of Economic Instruments to Limit Greenhouse Gas Emissions from Transport. Policy Studies Institute, London.

Dresner S. (2005). Distributional, Practical and Political Implications of Carbon Taxes and Trading. UK Energy Research Centre, London.

ECCM. (2003). Policy Audit of UK Climate Change Policies and Programs. Edinburgh Centre for Carbon Management, Edinburgh.

Feasta. (2003). Domestic Tradable Quotas as an alternative to Carbon Taxation. The Foundation for the Economics of Sustainability, Dublin.

Fawcett T. (2010). Personal Carbon Trading in Different National Contexts. Climate Policy, 10(4), 339-352.

Fawcett T. (2003). Carbon Rationing, Equity and Energy Efficiency. Valescure：Proceedings of the European Council for an Energy Efficient Economy (ECEEE) Summer Study, Time to Turn Down Energy

Demand.
Fleming D. (2007). Energy and the Common Purpose: Descending the Energy Staircase with Tradable Energy Quotas (TEQs) (2nd edition). The Lean Economy Connection, London.
Howell, R. (2007). Would Personal Carbon Allowances Be Acceptable to The UK Public As A Means of Reducing Individuals' Carbon Dioxide Emissions? Msc Thesis, University Of Edinburgh, Edinburgh.
Howell R. (2008). The Experience of Carbon Rationing Action Groups: Implications for a Personal Carbon Allowances Policy. UK Energy Research Centre, London.
Howell R A. (2013). It's not (just) "The Environment, Stupid!" Values, Motivations, and Routes to Engagement of People Adopting Lower-Carbon Lifestyles. Global Environmental Change, 23(1): 281-290.
Hendry A, et al. (2013). Influences on Attitudes to a Personal Carbon Trading System. Melbourne: Proceedings of the 24th Australasian Conference on Information Systems.
Hillman M, Fawcett T. (2004). How We Can Save the Planet. Penguin, London.
Hyams K. (2009). A Just Response to Climate Change: Personal Carbon Allowances and the Normal-Functioning Approach. Journal of Social Philosophy, 40(2): 237–256.
Hoel M, Karp L. (2002). Taxes versus Quotas for a Stock Pollutant. Resource and Energy Economics, 24(4): 367-384.
Hepburn, C. (2006). Regulation by Prices, Quantities, or Both: A Review of Instruments of Choice. Oxford Review of Economic Policy, 22(2):226-247
IPPR (2008). IPPR Says Public More Receptive to Personal Carbon Trading than Policymakers Believe. Institute for Public Policy Research, London.
Jagers, S. C., Löfgren, Å., &Stripple, J. (2010). Attitudes to Personal Carbon Allowances: Political Trust, Fairness and Ideology. Climate Policy, 10(4): 410-431.
Low R. (2005). An Investigation into the Public Acceptability of the Personal Carbon Allowances Proposal for Reducing Personal Greenhouse Gas Emissions. University of Edinburgh, Edinburgh.
Levett, R. (2005). Carbon Rationing Versus Energy Taxes: a false Opposition. UK Energy Research Centre, London.
Lockwood, M. (2009). A Review of Assumptions in Defra's Assessment of the Potential Effectiveness of Personal Carbon Trading: Background Paper for Research Project on Personal Carbon Trading. Institute for Public Policy Research,
London.Löfgren Å, Nordblom K. (2009). Puzzling Tax Attitudes and Labels. Applied Economics Letters, 16:1809–1812.
Lane C, Harris, B, Roberts, S. (2008). An Analysis of the Technical Feasibility and Potential Cost of a Personal Carbon Trading Scheme, Department for Environment, Food and Rural Affairs, London.
Matthews L. (2010). Upstream, Downstream: The Importance of Psychological Framing for Carbon Emission Reduction Policies. Climate Policy, 10(4): 477-480.
Mill J S. (1951). Utilitarianism in Utilitarianism, Liberty, and Representative Government. New York: E. P. Dutton.
Morgan, D.L. (1998). The Focus Group Guidebook. Sage Publications, California.
Morgan, D.L. (1997). Focus Groups as Qualitative Research (2nd edition). Sage Publications, California.
Owen, L., Edgar, L., Prince, S., &Doble, C. (2008). Personal Carbon Trading: Public Acceptability. Department for Environment, Food and Rural Affairs, London.
Pearson, M. and Smith, S. (1991). The European Carbon Tax: An Assessment of the Commission's Proposals. Institute for Fiscal Studies, London.
Parag, Y., Capstick, S., & Poortinga, W. (2011). Policy Attribute Framing: A Comparison between Three Policy Instruments for Personal Emissions Reduction. Journal of Policy Analysis and Management, 30(4), 889-905.
Pizer, W.A. (2002). Combining Price and Quantity Controls to Mitigate Global Climate Change. Journal of Public Economics, 85(3):409-434
Roberts S, Thumin J. (2006). A Rough Guide to Individual Carbon Trading: The Ideas, the Issues and the Next Steps. Department for Environment, Food and Rural Affairs, London.
Rawls J. (1999). A Theory of Justice (Revised edition). Cambridge: Harvard University Press.
RSA. (2007). Technical Requirements for Personal Carbon Trading, Royal Society for the Encouragement of Arts, Manufactures and Commerce, London.
Starkey R. (2012). Personal Carbon Trading: A Critical Survey, Part 2: Efficiency and Effectiveness. Ecological Economics,73:19–28.
Starkey R. (2008). Allocating Emissions Rights: Are Equal Shares Fair Shares?. Norwich: Tyndall Centre for Climate Change Research.
Sandel M. (1982). Liberalism and the Limits of Justice. Cambridge: Cambridge University Press.

Sorrell S. (2010). An Upstream Alternative to Personal Carbon Trading [J]. Climate Policy, 2010, 10(4): 481-486.

Wallace, A.A., Irvine, K.N., Wright, A.J., &Fleming, P.D. (2010). Public Attitudes to Personal Carbon Allowances Findings from a Mixed-Method Study. Climate Policy, 10(4): 385-409.

Weitzman M. (1974). Prices vs. Quantities. The Review of Economic Studies, 41(4): 477-491.

Wallace A. (2009). Reducing Carbon Emissions by Households: The Effects of Foot Printing and Personal Allowances. De Montfort University, Leicester.