# A Survey of Low-carbon Consumption Behavior Study: As a Example of Immigrants Group in Shanghai

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**Abstract**: Based on CLA theory, this paper presents an analytical framework living carbon consumption of 'immigrants' which is more and more large group influences sustainable urban development building. This framework is applied to compare to different groups at the low-carbon living which including direct and indirect in Shanghai. Then given a supportive data that immigrant is a main group in the process of low-carbon society building. And using Logistic model, try to find out the specific factor of immigrant carbon consumption, then the author get the result that social inclusion is importance factor to immigrant living carbon consumption.
**Keywords**: low-carbon consumption; immigrants; social inclusion

## 1.Introduction

These decades, Climate change has became an internationally recognized problem and it's undoubtly that the Greenhouse Gas (GHG) is the main source. There is ever a report verified that the carbon dioxide is the most important GHG and is projected to account for around 70% of radioactive forcing of climate by the end of the century (Tighta, 2005). Therefore building a low-carbon economy is now the central challenge in our age. Our Energy Future: Creating A Low Carbon Economy, which released by British government in 2003, first raised the conception of 'low carbon economy', and since then the 'low carbon consumption' gradually from energy consumption to other producers' areas and consumer living (Pan, 2011). Since then attempts to change energy-related behavior were targeted at individuals as consumers of energy. Recently, many European localities have started to transform themselves into sustainable energy communities or low-carbon communities. Here, individuals take the role of citizens rather than consumers, and gain the capacity to work together to transform their energy Infrastructure on the local level (Ravenetal, 2008).

China is going through a rapid urbanization process and the urbanization rate will go from 45% in 2010 to an expected 75% by 2050. Under this background, more and more countries transform into the towns, the demand of primary energy increases

5.7% and electricity increase 9.1% per year while the GDP increases10% per year from 1978 to 2008. And the annual growth rate of primary energy closes to double-digit from 2003 to 2008. These data show that at the acceleration of industrialization and urbanization, energy consumption become rigid demand and bring on the carbon emission fast increase. A massive source of embodied energy producing carbon emissions will be generated from large infrastructures, buildings, transportation systems and daily urban household life.

At the same time, the most importance atmosphere is increases urban populations. With fast urbanization, the scale of immigrant is larger and larger, and more and more immigrant people rush into the cities and towns, especially megacity such as Beijing and Shanghai. The Chinese National Bureau of Statistics shows that mobile population achieve 236 million in 2012 in China, equivalent to one of six people is the floating people which nearly 17.43% of total population. There is undoubtly that immigrant influence on the city development is increasing importance. The most rural population gradually change into the non-agricultural group, according to Shanghai Municipal Public Security Bureau reveals that in 23,804,300 resident populations, only 14,269,300 are registered population at the end of 2012, in other words, there are 9,535,00 population are immigrant. The number of urban resident is already nearly close to the rural population, that achieving 660 million and taken up 49.68% of the total population. Clearly, immigrant population plays an important role in the development of Shanghai and their lifestyle is key to the city's development, especially the carbon consumption behavior to building the low-carbon city. Then how to deliver an appropriate low-carbon community mode, it is a key to get familiar with the immigrant's living carbon consumption in city and town.

## 2. Literature Review

The topic of low-carbon consumption has nearly decades development in the academic of Europe and the USA, however in Chinese research are rarely deep into taken. About low-carbon Consumer Behavior Study in abroad mainly from two

aspects (Liu,2010), one aspect focus on the consumer's internal attribute, such as how the attitude, value, habit or personal normal effect the people's act. The theory of Bin's Consumer Lifestyle Approach (CLA), Stern's Attitude-Behavior-Context Model (ABC), Triandis' Theory of Interpersonal Behavior etc all belong to this. Another aspect it's the consumer's external attribute, including financial and taxation policies, regulatory incentives, institutional constraints, social practices and so on. Recently research is increasingly inclined to combine these two aspects together to analysis. Rees，Daly，Duehin hold that the results of environment destroy most can be attribute to the consumer direct activities for instance waste disposal and car use and indirect activities such as products must meet the needs of consumers. Bin proposes an alternative paradigm, called the Consumer Lifestyle Approach (CLA), to explore the relationship between consumer activities and environmental impacts in the US (Bin, 2005).

In addition to a variety of low-carbon consumption theory been discussed, there are many specific low-carbon consumption behavior researches. Heinonen (2011) in his paper *Implications of Urban Structure on Carbon Consumption in Metropolitan Areas* illustrates that the influence of urban density on carbon emissions is insignificant in the selected metropolitan areas. Evaheiskanen (2009)'s *Low-Carbon Communities As A Context For Individual Behavioral Change* through four case studies representing each of these community types, examine how different communities reframe problems on the individual level to reduce carbon emissions. Jukka Heinonen(2011) in the paper of *A Longitudinal Study On The Carbon Emissions Of A New Residential Development* uses three alternative scenarios were built to analyze the effect of different construction phase carbon management strategies. The results would suggest that the construction phase emissions should be taken into more careful consideration if higher energy efficiency of the new residential buildings is expected to contribute to achieving climate change mitigation targets in even the middle term analyzed in this paper. Norman(2006)'s research *Comparing High And Low Residential Density: Life-Cycle Analysis of Energy Use*

*And Greenhouse Gas Emssions,* which study provides an empirical assessment of energy use and GHG emissions associated with high and low residential development. Two case studies from the City of Toronto are analyzed. The results also show that low-density suburban development is more energy and GHG intensive（by a factor of 2.0–2.5）than high-density urban core development on a per capita basis. However Brandon(1999) focus on the domestic energy consumption in the paper of *Reducing Household Energy Consumption：A Qualitative and Quantitative Field Study*. In this research the author discussed the links between global environmental problems and individual behaviour are clearly identifiable, even if consumers do not immediately recognize the connection.

The paper *The Analysis of Correlation between Urban Residents` Behavior and Low-carbon Economic Development* evaluates the developing status of Shandong's low-carbon economy pointing out that city people's behavior and low-carbon economic development are closely related(Yu Junhuaa, Huang Ying, 2010). *Research On Relationship Between Chinese Urbanization Process, Energy Consumption And Carbon Emission* selected 29 provincial panel data from 1995 to 2007, by using Granger causality test, and found both energy consumption and carbon emission are causes of urbanization level.

Domestic immigrant and the increasing rigid demand on the energy in the process of urbanization are both special phenomenon in modern China. In this process, the immigrant impact on energy consumption and carbon emissions is obviously. Therefore it need that to get familiar with the immigrant's carbon consumption if want to correct describe the elements of energy demand and carbon emission. (Hu,Liu, 2012). However fewer focus on the relationship between low-carbon consumption and immigrant group whatever domestic or overseas. Therefore, the author will try to compare the immigrant and local population's lifestyle on the carbon consumption and find out the relationship between the urbanization and immigrant's carbon consumption. And try to analysis the factor of immigrant and carbon consumption.

## 3.**Research Theory, Methodology and Issues**

Urban low-carbon consumption includes the productive and non-productive field. The former named the material production sectors, including the city's first industry and secondary industry sectors; latter refers to non-material production sectors, including urban tertiary industry, political management and public services and resident living. The keys of low-carbon consumption patterns of non-productive are mainly the tertiary industry, political management and public services and resident living (Pan, 2011).

The author uses the Bin's CLA theory which including five factors that the external environment, individual determinants, family characteristics, consumer choices behavior and consequences of consumer behavior. Among these five factors, the external environment is the most important that determine the other four factors. On the consumer level, from macro to seen energy systems and consumer policy, government procurement, customs and consumer-oriented have a significant impact even decisive influence to the development of low-carbon consumption patterns; from the micro to seen family income, personal consumption preferences and family size have an important influence on the construction of low-carbon consumption pattern (Wang, 2010). In this paper, the author employs panel data sources and Logistic models to quantify the relationship between immigrant group choices and carbon consumption at a micro-level. The term Immigrant in CLA refers to whom not born in Shanghai and flows into Shanghai just because of study, business, working or family members. This group's Lifestyle is a way of living that influence and is reflected by individual consumption behavior. The basic premise underlying consumer lifestyle research is that by five factors in CLA understanding immigrant group we can design better public policies.

Figure 1

| External environmental | | Type | Source |
|---|---|---|---|
| | Technology preference | continuous variable | Shanghai |
| | Media effect | ordinal variable | Residents |

| | | | |
|---|---|---|---|
| Individual determinants | | | Living Carbon Consumption Survey |
| | Knowledge | continuous variable | |
| | Congitive | continuous variable | |
| | Self-identity | continuous variable | |
| Household characteristics | | | |
| | Household number | continuous variable | |
| | Location | sort variable | |
| | community type | sort variable | |
| | Housing type | sort variable | |
| | Personal income | sort variable | |
| | Family income | continuous variable | |
| Consumer choice | | | |
| | Purchases attitude | continuous variable | |
| | Expenditure | continuous variable | |
| | Engel coefficient | continuous variable | |

According to the CLA, consumer activities are categorized into three levels. At the highest level, all consumer activities are categorized into two groups: direct influences and indirect influences. If a consumer's activity leads to energy consumption and CO2 emissions while the product or service is in use, these are called direct (on-site) influences, where energy consumption and CO2 emissions occur in the preparation (production and delivery) of a product or service and before its use are called indirect (embodied) influences (Bin, 2005). Therefore according to this, direct influences in this paper include home energy use and personal travel, while indirect influences include housing operation, transportation operation, food consumption, entertainment etc. Within these broad categories two nested levels of activity are defined with increasingly detailed information for each activity (data permitting).

Figure 2

| Consumer actives categorization | | | | |
|---|---|---|---|---|
| Direct influence | | | Type | Source |
| | Home energy | Water | continuous variable | Shanghai Residents Living Carbon Consumption |
| | | Electricity | continuous variable | |
| | | Coal gas | continuous variable | |
| | Working commute | | continuous variable | |

| | | | |
|---|---|---|---|
| Indirect influence | | | Survey |
| | Food and beverage | continuous variable | |
| | Housing area | continuous variable | |
| | Private cars | continuous variable | |
| | Household Electrical Appliances | continuous variable | |

Two approaches are used here to estimate the total energy use and carbon emissions from consumer activities. One compare local and immigrant group living carbon consumption of direct and indirect carbon consumption associated with the individual and family energy activity, the other estimated personal working commute carbon consumption and family living carbon consumption and analysis factors of immigrant group carbon consumption behavior. The energy–CO2 accounting framework is used for direct influences while the expenditure based I–O analysis is used to fill in the indirect influences of consumer expenditures on housing operation, transportation operation, food, clothing, and recreation.

Shanghai Residents Living Carbon Consumption Survey (SRLCCS) provides residential living carbon consumption data on three fuel types (water, electricity, natural gas or liquid petroleum gas) and the knowledge, cognize, attitude to carbon consumption. One of the main purposes of this paper is to demonstrate that energy consumption diversity through compare and analysis the different carbon consumption between local and immigrant, the other is to find out the factors of immigrant's living carbon consumption behavior. The living carbon consumption can be divided into direct carbon consumption and indirect carbon consumption. The author will use SPSS 20. Statistical descript and comparative analysis to explore:

Ⅰ. Compare local and immigrant group living carbon consumption and find out the immigrant group's carbon-consumption's characters from direct and indirect carbon consumption;

Ⅱ. Use logistic method to analyze the main factors of immigrant carbon

emissions from daily working commute and annual family carbon consumption.

## 4. Data Source and Sample Character

Compare to productive carbon emission, reducing the living energy consumption and vehicle's carbon emission is the key of the low-carbon society building. The author chooses the family living carbon emission and personal trip carbon emission as the explained variable. On the one hand the family living carbon consumption are mainly the water, electricity, natural gas or liquid petroleum gas using, on the other hand personal trip carbon emission we choose is the working commute because which inseparable from urban residents daily living carbon consumption.

Shanghai Residents Living Carbon Consumption Survey (SRLCCS) by Fudan Tyndall Centre's project named Explore The Role of High Carbon Emission's Social Groups in the Transformation of Low-Carbon Society. Through multistage cluster，stratified, PPS sampling, the survey received the 2118 effective questionnaire, which local group is 81.4% and immigrant group is 18.6%. This research using SRLCCS ' data, compute the average bills of water, electricity, natural gas or liquid petroleum gas per month and counting the usage, then multiple the unit carbon intensity (see National Energy Conservation Practical Handbook) and then get the carbon emission per month, and multiple 12 get the whole year's carbon consumption usages.

For personal daily commuting travel, the author uses Chinese Public Transportation Carbon Emissions Table and TREMOVE2.4 Handbook by EU, then get the index of carbon intensity. The formula used to estimate the total Carbon emissions from residential end-uses is presented below:

Daily Working Commute Carbon Emission=Transportation carbon intensity * One-way distance * 2

Figure 3 Household energy consumption carbon emissions conversion factor

| | Carbon Intensity |
|---|---|

| | |
|---|---|
| **Transportation** | |
| Private cars, taxis | 135.00（g，KM） |
| Public bus, shuttle bus, shopping bus | 35.00（g，KM） |
| Metro | 9.10（g，KM） |
| Electric bicycles, scooters, motorcycles | 8.00（g，KM） |
| Foot, bicycle | 0.00（g，KM） |
| **Family living carbon consumption** | |
| Electricity | 0.96（kg/ kW -h ） |
| Water | 0.30（kg/ $m^3$ ） |
| Coal gas | 0.72（kg/ $m^3$ ） |

Water Bill：2.93 RMB/.cu.m
Electricity Bill：（6：00--22：00）0.617RMB/kW -h、（22：00--6：00）0.307/kW -h，
Coal gas bill： 2.50 RMB/.cu.m

The immigrant in this research is about the population who not born in Shanghai, including the students, businessman, officer and farmer from other places out of Shanghai. The author uses the crosstab as follows:

Figure 4

| | | Local | | Immigrant | |
|---|---|---|---|---|---|
| | | N | N % | N | N % |
| Gender | Male | 744 | 43.20% | 176 | 44.70% |
| | Female | 980 | 56.80% | 218 | 55.30% |
| Education | Primary School and lower education | 198 | 11.50% | 32 | 8.10% |
| | Junior high school | 422 | 24.50% | 59 | 15.00% |
| | Technical high school or College degree | 487 | 28.30% | 74 | 18.80% |
| | College or University | 597 | 34.70% | 177 | 45.00% |
| | Graduate degree | 16 | 0.90% | 51 | 13.00% |
| Age | Youth（18-35） | 474 | 27.50% | 211 | 53.60% |
| | Mid Adult（36-60） | 680 | 39.50% | 81 | 20.60% |
| | Aged（ab. 60） | 569 | 33.00% | 102 | 25.90% |
| Personal Income（RMB） | 2000 below | 605 | 35.20% | 85 | 21.60% |
| | 2001-5000 | 847 | 49.20% | 156 | 39.60% |
| | 5001-10000 | 209 | 12.20% | 100 | 25.40% |
| | 10001-20000 | 46 | 2.70% | 34 | 8.60% |
| | 20001-30000 | 7 | 0.40% | 9 | 2.30% |
| | Ab. 30001 | 6 | 0.30% | 10 | 2.50% |
| Family Sized | Single Family | 55 | 3.20% | 19 | 4.80% |
| | Two homes | 548 | 31.80% | 118 | 29.90% |

| | | | | | |
|---|---|---|---|---|---|
| | Three homes | 687 | 39.90% | 144 | 36.50% |
| | Four homes | 433 | 25.10% | 113 | 28.70% |
| Residential district | Central city | 697 | 40.40% | 231 | 58.60% |
| | Suburb | 679 | 39.40% | 120 | 30.50% |
| | Exurban Zone | 348 | 20.20% | 43 | 10.90% |

Figure 4 show that the immigrant has higher education than local, especially the high education，above colleague the local group is 35.6% while immigrant group gets 58%. From this data known that some of immigrant are knowledge immigrant. From the age, local has nearly evenly distributed at different ages and immigrant mainly youth, which age from 18 to 35. And from the personal income, immigrant has higher income than local. The local's average income is 3326.03 RMB per month and immigrant is 6002.99 RMB, local is obviously lower than immigrant. Form the residential district, local has 40.4% living in the central, and however immigrant has 58.6%. And local has 20.2% living in the exurban zone, immigrant only 10.9%.

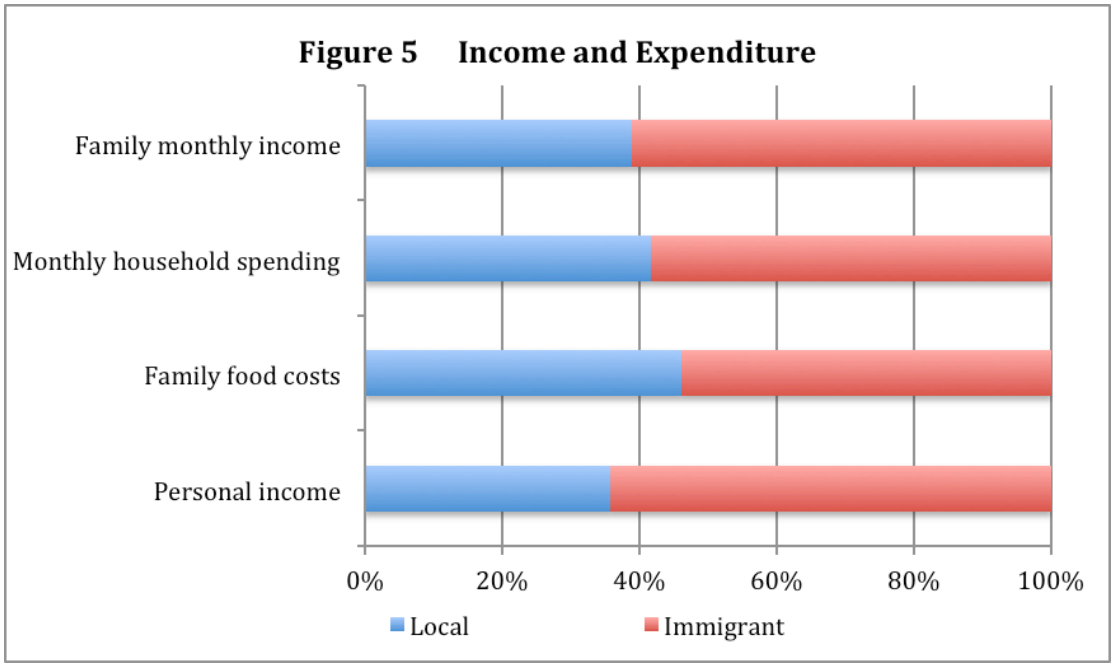


Figure 5 is an illustration of income and expenditure about local and immigrant groups. From the figure can be known that immigrant has higher income and expenditure whatever individual or family.

In general, compare to local, immigrant shows it is a group that younger, higher education, higher income and expenditure, better convenient living condition.

## 5. Compare Living Carbon Consumption

### 5.1 Direct Carbon Emission

Direct carbon emission includes the resident water, electricity and coal gas usages, daily commuting travel and private cars' using. The descriptive statistics as follows:

Figure 6

| Direct Energy Consumption and CO2 Emissions | | | |
|---|---|---|---|
| | | Groups | |
| | | Local | Immigrant |
| Water bill per month | | 41.37 | 42.54 |
| Electricity bill per month | | 121.37 | 137.87 |
| Coal gas bill per month | | 65.23 | 78.72 |
| Family carbon emission per year (ton) | | 1002.45 | 1153.62 |
| Daily commute routine | Non-power-driven | 39.00% | 32.80% |
| | Mini-sized motor vehicle | 16.60% | 9.30% |
| | Small cars | 12.10% | 21.80% |
| | Large cars | 25.90% | 23.30% |
| | Metro | 6.50% | 12.80% |
| | Carbon emission | 800.21 | 1206.01 |
| Vehicle range （km） | | 14048.51 | 15417.49 |

Figure 6 reveals that, the average bills of water, electricity and coal gas are widely higher than local. The average immigrant family carbon emission per year is 1153.62 ton; local family is 1002.45 ton, which is lower than immigrant group.

According to different transportation different carbon intensity (figure 3), the author reclassified the transportation of questionnaire: a) non-power-driven; b) mini-sized motor vehicle; c) small cars; d) large cars; e) large cars; f) metro. From the figure 6, the main daily working commute of 55.6% local people is the low-carbon ways, and immigrant is 42.1%. 21.8% immigrant people choose the main transportation of daily commute routine is small cars such as private cars, taxi, while local is only 12.1%. And the immigrant is twice choosing the metro go to works than

local group. Compute the carbon emission, the average commute carbon emission of immigrant is 1206.01 g per person, and immigrant is 800.21. The local population has a private car with an annual average of 14,048.51 km, while immigrant groups is 15,417.49 km. Obviously, immigrant group is higher carbon consumption on the daily working commute than local group.

### 5.2 Indirect Carbon Emission

China's urban residents diverse lifestyles, food and beverage, clothing, housing, education and culture are the main sources of carbon dioxide emissions. This paper will cover the food, housing, the number of cars ownership, high power household electrical appliance and entertainment to comparing the different between local and immigrant group.

Figure 7

Energy consumption and CO2 emissions by indirect influence from different group

| | | Groups | | | |
|---|---|---|---|---|---|
| | | Local group | | Immigrant group | |
| Food and beverage （RMB ） | | 2434 | | 2860 | |
| Housing area (sq. m.) | | 109 | | 96 | |
| | | N | % | N | % |
| Private cars ownership | No car | 1114 | 64.60% | 219 | 55.60% |
| | One car | 557 | 32.30% | 158 | 40.10% |
| | Two cars | 49 | 2.80% | 16 | 4.10% |
| | Three cars | 4 | 0.20% | 1 | 0.30% |
| The number of high power household electrical appliances | | 7.19 | | 7.25 | |
| Entertainment | Home or community | 1501 | 35.43% | 322 | 32.07% |
| | Outdoors | 866 | 20.44% | 263 | 26.20% |
| | Bar or restaurant | 307 | 7.25% | 71 | 7.07% |
| | Shopping | 957 | 22.59% | 186 | 18.53% |
| | Art and culture | 497 | 11.73% | 131 | 13.05% |
| | Club | 109 | 2.57% | 31 | 3.09% |

Figure 7 show that the number of high power household equipment immigrant is 7.25 little higher local 7.19. And the immigrant group has high expenditure on the food and beverage, average number is RMB 2860, and local group is RMB 2434. Tt

also can find that the immigrant cars ownership is higher than local, the immigrant family has 4.4% which have cars more than two, while local is 3%. The same thing at the number of high power household electrical appliances, immigrant is higher than local. The author reclassified the entertainment according to the character and places, a) home or community such as at home or play cards in the community; b) outdoors, such as park or excursion; c) bar or restaurant; d) Shopping; e) art and culture such as movie, library, museum, theater and culture center; f) club, including KTV, sauna. And the immigrant is inclined to outdoors, art and culture and club; while local group is prefer to stay at home or shopping. It mention that the housing area, it is only one index shows the immigrant lower than local, the main reason maybe the high housing prices.

### 5.3 Low-Carbon Cognition and Attitude

From the view of social model, low-carbon economy is a kind of modest consumer spending，which emphasize on the consumer's self-control and sense, and reduce the unnecessary spending and equitable. It's necessary that examine the motives behind consumer when study residents living carbon consumption. Therefore the author chooses some questions about low-carbon knowledge, cognition and attitude, respectively change from five-point scale into 0-1 scale and calculate sum and mean, then respectively get three index about knowledge, attitude and cognitive. Of course the author compare the low-carbon consumption intention and self-identity. The result reveal that immigrant has a slight higher than local group in low-carbon knowledge, attitude. And carbon-consumption intention, there is 44.6% of immigrant consider to buy the bigger house, while local is only 29%; and 33.3% of immigrant have planning of buying car, while local group only 23.9%. And if buying new car, whether buy the new energy vehicles, the proportions have no clearly different.

Figure 8

Low-Carbon Cognition and Attitude

Groups

| | | Local | Immigrant |
|---|---|---|---|
| Knowledge | | 0.34 | 0.36 |
| Attitude | | 0.7 | 0.71 |
| Cognitive | | 0.7 | 0.7 |
| Planning to buy big housing | Yes | 29.00% | 44.60% |
| | No | 71.00% | 55.40% |
| Planning to buy car | Yes | 23.90% | 33.30% |
| | No | 76.10% | 66.70% |
| Buy NEVs | Yes | 72.30% | 72.60% |
| | No | 27.70% | 27.40% |
| Self -identity | | 0.36 | 0.41 |

From figure 8 can find out that, immigrant group has more knowledge about low-carbon and more active in attitude. However we can draw from the consumption intention, immigrant has larger proportion than local group to buying house and cars. Thus it can be seen, there is no significant between low-carbon knowledge, attitude and consumption intention.

In a word, immigrant is obviously become a one of high living carbon consumption group. They have more intention buy car and large house. And their daily working commute carbon consumptions and family living carbon consumptions are higher than local group. And it is a special phenomenal in Shanghai which different from most any other cities in China is that the immigrant in Shanghai possess higher education level, average incomes and household wealth, they are potential the purchasing power of consumers. Therefore the living carbon consumption behavior of immigrant is key to building a low-carbon Shanghai city in the process of urbanization.

**6. Factor analysis of immigrant carbon-consumption**

In order to further explore the different inner immigrant carbon-consumption behavior, and find out the factors of immigrant living carbon consumption behavior, the author divides the indexes Family carbon consumption and daily working commute into two group which respectively low-emission and high emission, and

using kinds of explanatory variables to find the difference.

Figure 9

| High and low carbon consumption in immigrant | | | | | |
|---|---|---|---|---|---|
| | | Daily working commute | | Family carbon consumption | |
| | | Low | High | Low | High |
| Knowledge | | 0.34 | 0.4 | 0.36 | 0.37 |
| Attitude | | 0.71 | 0.71 | 0.73 | 0.71 |
| Cognitive | | 0.69 | 0.71 | 0.7 | 0.71 |
| Self-identity | | 0.39 | 0.44 | 0.38 | 0.44 |
| Planning to buy big housing | Yes | 42.60% | 50.00% | 43.70% | 46.10% |
| | No | 57.40% | 50.00% | 56.30% | 53.90% |
| Planning to buy car | Yes | 34.00% | 34.50% | 34.90% | 30.40% |
| | No | 66.00% | 65.50% | 65.10% | 69.60% |
| Buy NEVs | Yes | 71.20% | 72.00% | 77.80% | 66.70% |
| | No | 28.80% | 28.00% | 22.20% | 33.30% |
| Residential district | Exurban Zone | 14.10% | 10.40% | 16.10% | 7.90% |
| | Suburb | 21.10% | 27.60% | 28.60% | 19.70% |
| | Central city | 64.80% | 62.00% | 55.40% | 72.50% |
| Community-type | Rural community | 9.10% | 1.90% | 5.10% | 2.60% |
| | Village in the city | 9.70% | 3.10% | 8.60% | 5.80% |
| | Ordinary urban community | 70.30% | 78.30% | 78.30% | 73.00% |
| | High-grade urban commur | 10.90% | 16.80% | 8.00% | 18.50% |
| Housing Type | Village house | 12.80% | 2.40% | 8.60% | 3.20% |
| | Multistory building | 54.10% | 54.80% | 66.80% | 46.30% |
| | Senior/ high-rise | 27.90% | 41.00% | 23.00% | 45.20% |
| | Villa / townhouse | 5.20% | 1.80% | 1.60% | 5.30% |

From daily working commute, low-carbon emission also has lower carbon knowledge and cognitive. And less proportion to buying the big house and have higher proportion living in the central city; the high-carbon emission group has higher knowledge about carbon knowledge and self-identity and has bigger proportion to inclined to buying house, they have higher proportion living in suburb and ordinary urban community, buying the Senior/ high-rise. It mentions that for low-carbon emission in the commute, have higher proportion living in village house, and also have higher proportion living in villa or townhouse than higher carbon emission of

commute. The main reason maybe can explained the group living in villa/townhouse with low carbon emission of commute because of the respondents are female, being housewife.

In order to further find out the factor of immigrant carbon consumption, the author chooses the family carbon consumption and daily working commute carbon consumption as the dependent variables, and select the gender, education, age, period of living in Shanghai, individual income, residential district, community-type, housing type, whether Shanghai registered, whether citizenship, low-carbon knowledge, low-carbon cognitive, low-carbon attitude and self- identity as independent variables (see Figure 1). And make the Logistic regression analyses, see figure 10.

Figure 10

| | Working Commute | | | | Family Carbon Consumption Model | | | |
|---|---|---|---|---|---|---|---|---|
| | Model A | Model B | Model C | Model D | Model E | Model F | G | Model H |
| Age | -.27* | | | | -.056 | | | |
| Education | .617*** | | | | .263* | | | |
| Period of Shanghai | -.008 | | | | .021* | | | |
| Shanghai registered | .258 | | | | .169 | | | |
| Citizenization | .909* | | | | .424 | | | |
| Individual determinants | | | | | | | | |
| Knowledge | | .747 | | | | .043 | | |
| Congitive | | .639 | | | | -.069 | | |
| Self-identity | | 1.719* | | | | 3.344* | | |
| Household characteristics | | | | | | | | |
| Household Electrical Appliances | | | .061 | | | | .14* | |
| Living location | | | -.008 | | | | .341* | |
| Communitation stype | | | .095 | | | | -.071 | |
| Housing type | | | -.066 | | | | .44 | |
| Individual income | | | .66*** | | | | -.313 | |
| Consumer choice | | | | | | | | |
| Purchases attitude | | | | .722 | | | | -.989 |
| Expenditure | | | | .000* | | | | .000*** |
| Engel coefficient | | | | -1.902* | | | | .206 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Constant | -.001 | -1.368 | -.454 | -.557 | .400 | -1.335+ | -2.34** | -.285 |

（+）：p<0.1，*：p<0.05，**p<0.01，***p<0.001
Note：***，**，*，+ represent at 0.1%，1%，5% and 1 are statistical significance.

According five factors of CLA, the author chooses three kind of independent variables which represent individual determinants, household characteristics, consumer choice and another demographic variable, to examine the factors of working commute and family living carbon consumption. The first four models are about daily working commute; the last four models are about annual family carbon consumption. Model A shows that the individual working commute carbon consumption is related with age, education level and citizenization level, which reveal higher education will have higher working commute carbon consumption. And the urban population has more working commute carbon than non-urban population. Also, younger group cost more working commute carbon consumption. Model B examines the relationship between working commute carbon consumption and individual determinants. The result reveals that self-identity is significant to working commute carbon consumption, in other words that who think themselves rank the higher status in society, the higher working commute carbon consumption are. The model C examines the relationship between working commute carbon consumption and household characters and find out that individual income is an important factor to working commute carbon consumption. The model D examines the relationship between working commute carbon consumption and consumer choice and indicate that the expenditure is a key factor to working commute carbon consumption. That is, lower Engel coefficients, higher working commute carbon consumption.

Model E examines the relationship between family living carbon consumption and demographic variable. The result shows that education level and the period living in Shanghai is significance. Model F examines the relationship between family living carbon consumption and individual determinants and the number demonstrate that the self-identity is the most important element in carbon consumption. The people who

think himself higher social status, and the higher family living carbon consumption is. The model G examines the relationship between family living carbon consumption and household characters then get the knowledge that number of household electrical appliances and living location could influence the family living carbon consumption. The model H examines the relationship between family living carbon consumption and consumer choice shows that the expenditure is significance while the Engel coefficients is not. We can conclude that the family size is related to the family living carbon consumption.

## 7. Conclusion

With the urbanization development and further citizenship，the proportion of urban resident is increasing. More and more immigrant flowed into city or megacity. Shanghai, as being one of largest population city and international character, the immigrant has its character differ from most other cities in China. With the structure of immigrant has been changed in Shanghai, the higher education, higher income and younger are increasing. They usually live in downtown and high-grade residential area, and have private car. We conclude that immigrant group become a high carbon emission group through compare with local group and immigrant group through direct and indirect carbon consumption and examine the different at the low-carbon knowledge, cognitive and attitude. What it mention that, the carbon consumption is not related to the low-carbon cognition and attitude. The research finds that immigrant still has higher intention to buying house and car although they have higher low-carbon cognition and active attitude.

Using the three factors from CLA and logistic model find out the elements of immigrant carbon consumption behavior. The models illustrate that whether shanghai registered is no relate. However the citizenization is significant to transportation carbon consumption. And it really merging problem, with Chinese urbanization, the scale of urban resident is expand quickly. And for immigrant, the social inclusion is an important label for them. In order to being a urban resident in Shanghai, theiy

would cost something to show their social status. That is why we can draw from the model that the self-identity is a key factor influencing the immigrant's living carbon consumption.

As a result, the middle class of immigrant group is a high carbon consumption group. Compare with the middle class of local group, their have commons that higher education background, higher income and have large house living in downtown, are all high living carbon consumption. However differ the middle class of local group, the immigrant shows younger, and higher carbon consumption. The most reason is that for this middle class, they have more eager than local group that the identity and social inclusion. That is why the models reveal the atmosphere the citizenzation and self-identity are significant to the living carbon consumption.

And the result for the policy marking that if we want to build a low-carbon city, improve social inclusion and status equal to local and immigrant group, then maybe it's better control the increase of the living carbon consumption in the process of urbanization in Shanghai.

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