Analysis on Influencing Factors for Carbon Emissions of Urban Passenger Transport

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ABSTRACT

Air pollution caused by vehicle use has been a longtime concern. In recent years, with the concept of low-carbon economy and low-carbon city arising both at home and abroad, environmental problems in the transportation field have attracted attention all over the world. Based on this background and study of carbon emissions in transportation field, this paper selects residents’ trip survey data from the cities of Huizhou, Dongguan, and Rizhao, calculates carbon emissions of residents’ daily travel by using distance-based calculation method, and then comes to the conclusion that the main influencing factors for carbon emissions of urban passenger transport are carbon emission factors, residents’ average trip rate, sharing proportion of different transportation modes, and average trip distance. In the end, it puts forward some measures and advice for energy conservation and emission reduction.

1 INTRODUCTION

In recent years, the world economy and the aggregate economic volume have grown rapidly. A lot of energy was consumed along with the rapidly aggregated economic volume, and emissions discharged because of this cause serious air pollution. These discharged gases include carbon dioxide, methane, nitrous oxide, and other six kinds of greenhouse gases. Carbon dioxide has the greatest impact on climate change. Those generated by the use of transport account for a large proportion of total emissions.

The Oslo Climate and Environmental International Research Center published a report in the "National Academy of Sciences" magazine of the United States in 2008 that showed that emissions released from fuel used by automobiles, ships, airplanes, and trains was one of the main factors that contributed to global warming. The report also pointed out that, over the past 10 years, the total carbon dioxide...
emissions all over the world increased by 13%, but the carbon dioxide emissions from transport grew by 21%. It is also predicted that by the year 2050, global carbon emissions from transport will increase by 30% to 50% compared with the year 2008 (Huang Rui, 2008).

Fortunately, countries around the world have begun to be aware of the environmental and climatic problems caused by carbon dioxide and the importance of energy saving and emission reduction. At the same time, many countries have already started trying to implement the relevant measures of energy saving and emission reduction in industrial areas. However, in the field of transport, traffic pollution has become difficult to control because of vehicles scattered in the hands of hundreds of millions of people. Therefore, to explore the law of the urban transport carbon emissions and its influencing factors and to find effective measures for reducing carbon emissions in the transport field are significant for achieving energy-saving and emission-reduction targets.

Studies on urban carbon emissions, both at home and abroad, were nearly all based on the whole city or the simple road traffic problems at first, and rarely combined the two elements. Recently, with the concept of the low-carbon city and transport arising both at home and abroad, some experts and scholars began to research the relationship between characteristics of urban traffic and carbon emissions in the transport field, one after another. Based on the French national traffic survey data in 1994, Jean-Pierre Nicolas and Damien David analyzed the carbon dioxide emissions of residents’ daily travel and their impact factors (Jean-Pierre Nicolas, Damien David, 2009). From a comparative perspective of the city bus and car, Fengbao Wang discussed the strategies of energy saving and emission reduction of urban transport (Wang Fengbao, 2008). According to the development trends of motor vehicles in China and their fuel consumption trends in the next twenty years, Yali Yu summarized the application of renewable energy in vehicles, and put forward some suggestions on sustainable development of vehicles (Yu Yali, 2007).

This paper takes passenger transport in the cities of Huizhou, Dongguan and Rizhao as examples, and calculates carbon emissions of their urban passenger transport during daily travel, studies the relationship between choices of transportation modes and carbon emissions of urban passenger transport, tries to determine the main factors that affect carbon emissions of urban passenger transport, and finally puts forward a number of strategies about energy saving and emission reduction with the hope that all these would act as references for energy saving and emission reduction in urban transport field.

2 CALCULATION METHOD AND DATA
2.1 Methods commonly used to calculate carbon emissions

At present, there are two main methods commonly used to calculate carbon dioxide emissions of vehicles; one is based on the fuel consumption, and the other is based on the distance vehicles travel.

*Fuel-based methodology (GHG Protocol, 2003)*

In the fuel-based method, the carbon dioxide emissions = fuel consumption × emission factor for each fuel type.

Emission factor here is related to the fuel’s heat content, the fuel’s carbon content, and the degree that the carbon is oxidized. When using the fuel-based method, first we should collect fuel consumption data according to the fuel type, and then in accordance with the formula above, fuel consumption data should be multiplied by the corresponding emission factor for each kind of fuel, and then we can get the carbon dioxide emissions.

*Distance-based methodology (GHG Protocol, 2003)*

In the distance-based method, the carbon dioxide emissions = distance the vehicle traveled × emission factor for each vehicle type.

Emission factor here has a relationship with the transportation mode, driving condition, weather, and the individuals’ driving habits and other factors. When using distance-based method, at the beginning we should collect mileage data according to vehicle type and the fuel type used, and then according to the formula, the mileage data of each vehicle should be multiplied by the corresponding emission factor, and we can get the carbon dioxide emissions.

These two calculation methods have their own advantages and disadvantages, so in practice which one to apply should be decided according to the information and data available.

2.2 The data and calculation method used

Calculation data used in this paper comes from residents’ trip surveys of —the cities of Huizhou, Dongguan, and Rizhao, which were conducted by the School of Transportation Engineering, Tongji University, during the year 2004 to 2008. Considering that we can get the residents’ average trip distance from the residents’ trip survey data, in this paper we choose the distance-based method.

2.3 Selection of emission factors

Currently, there is no uniform standard with regard to emission factors for carbon dioxide. Mobile model developed by the U.S. Environmental Protection Agency is one of the most commonly used models. However, whether Mobile or other models, they are all too complicated for calculations of carbon emissions of urban passenger transport. Therefore, the emission factors this paper use come from the report “Traffic of China: the energy consumptions and emissions of different transportation modes”, which was finished by Institute for Energy and
Environmental Research Heidelberg & Comprehensive Transportation Institute of Chinese National Development and Reform Commission. The emission factor for each transportation mode is listed in the following table 1.

Table 1. Emission Factor for Each Transportation Mode. (IFEU&ICT, 2008)

<table>
<thead>
<tr>
<th>Transportation mode</th>
<th>walk</th>
<th>bicycle</th>
<th>bus</th>
<th>taxi</th>
<th>car</th>
<th>motorcycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emission factor</td>
<td>0</td>
<td>0</td>
<td>66</td>
<td>276</td>
<td>239</td>
<td>82</td>
</tr>
</tbody>
</table>

3 CALCULATION RESULTS AND ANALYSIS

3.1 Survey data of urban passenger transport and calculation results of carbon dioxide emissions

Survey data of Huizhou and calculation results of carbon dioxide emissions

Size of the survey area: urban area, total of 2672 square kilometers.
Population of the survey area: 1,430,000.
Sample size: according to the total households that the committees reported, using the random home visit method, the number of households investigated is determined with the sampling rate 5%. In this survey, 6,503 effective forms were received, so the actual survey number is 6,503 households and the actual survey number of people is 17,482.
Survey findings: residents’ average trip rate per day of Huizhou is 2.67, the sharing proportion of residents’ trip mode structure and residents’ trip distance are listed in table 2 and table 3 below.

Table 2. The Sharing Proportion of Residents’ Trip Mode Structure of Huizhou in the Year 2004. (Tongji University, 2004)

<table>
<thead>
<tr>
<th>Transportation mode</th>
<th>walk</th>
<th>bicycle</th>
<th>bus</th>
<th>taxi</th>
<th>car</th>
<th>motorcycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage (%)</td>
<td>37.05</td>
<td>19.28</td>
<td>5.72</td>
<td>0.56</td>
<td>2.17</td>
<td>30.51</td>
</tr>
</tbody>
</table>

Note: others include company business car, shuttle bus, exclusive car, and so on.

Table 3. Residents’ Trip Distance of Huizhou in the Year 2004. (Tongji University, 2004)

<table>
<thead>
<tr>
<th>Transportation mode</th>
<th>walk</th>
<th>bicycle</th>
<th>bus</th>
<th>taxi</th>
<th>car</th>
<th>motorcycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance (km)</td>
<td>1.40</td>
<td>2.87</td>
<td>6.87</td>
<td>7.40</td>
<td>6.56</td>
<td>4.94</td>
</tr>
</tbody>
</table>
After acquiring the above data, we can calculate carbon dioxide emissions. The formulas are listed below:

Carbon dioxide emissions per person & day = residents’ average trip rate per day × the sharing rate of residents’ trip mode structure × residents’ trip distance × emission factor for each vehicle type.

Carbon dioxide emissions of the entire urban passenger transport per day = population of the whole urban × carbon dioxide emissions per person & day.

After calculation, carbon dioxide emissions of residents’ trips of Huizhou are listed in the following table 4.

**Table 4. Carbon Dioxide Emissions of Residents’ Trips of Huizhou.**

<table>
<thead>
<tr>
<th></th>
<th>walk</th>
<th>bicycle</th>
<th>bus</th>
<th>taxi</th>
<th>car</th>
<th>motorcycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon dioxide</td>
<td>0</td>
<td>0</td>
<td>0.069</td>
<td>0.031</td>
<td>0.091</td>
<td>0.330</td>
</tr>
<tr>
<td>emissions per person</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&amp; day (kg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbon dioxide</td>
<td>0</td>
<td>0</td>
<td>99.025</td>
<td>43.669</td>
<td>129.900</td>
<td>471.879</td>
</tr>
<tr>
<td>emissions of the</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>entire urban passenger</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>transport per day</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ton)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Survey data of Dongguan and calculation results of carbon dioxide emissions**

Survey time: the year 2008.
Size of the survey area: urban area, total of 233 square kilometers.
Sample size: using the random home visit method, this survey investigated 4,173 household residents and 2,980 temporary household residents. Considering that there is large population of temporary foreign residents in Dongguan, the survey should include a certain proportion of foreign immigrants. In this survey, effective records are 7,152 households, people with trip record are 15,812, and trip records are 43,728.

Survey findings: residents’ average trip rate per day of Dongguan is 2.82, the sharing proportion of residents’ trip mode structure and residents’ trip distance are listed in tables 5 and table 6 below.
Table 5. The Sharing Proportion of Residents’ Trip Mode Structure of Dongguan in the Year 2008. (Tongji University, 2009)

<table>
<thead>
<tr>
<th>Transportation mode</th>
<th>walk</th>
<th>bicycle</th>
<th>bus</th>
<th>taxi</th>
<th>car</th>
<th>motorcycle</th>
<th>others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage (%)</td>
<td>41.5</td>
<td>17.1</td>
<td>13.0</td>
<td>0.7</td>
<td>8.9</td>
<td>13.7</td>
<td>5.1</td>
</tr>
</tbody>
</table>

Note: others include company business car, shuttle bus, exclusive car, and so on.

Table 6. Residents’ Trip Distance of Dongguan in the Year 2008. (Tongji University, 2009)

<table>
<thead>
<tr>
<th>Transportation mode</th>
<th>walk</th>
<th>bicycle</th>
<th>bus</th>
<th>taxi</th>
<th>car</th>
<th>motorcycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance (km)</td>
<td>1.55</td>
<td>3.07</td>
<td>8.75</td>
<td>8.27</td>
<td>8.13</td>
<td>5.40</td>
</tr>
</tbody>
</table>

After calculation, carbon dioxide emissions of residents’ trips of Dongguan are listed in table 7.

Table 7. Carbon Dioxide Emissions of Residents’ Trips of Dongguan.

<table>
<thead>
<tr>
<th>Carbon dioxide emissions per person &amp; day (kg)</th>
<th>walk</th>
<th>bicycle</th>
<th>bus</th>
<th>taxi</th>
<th>car</th>
<th>motorcycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.212</td>
<td>0.045</td>
<td>0.488</td>
<td>0.171</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Carbon dioxide emissions of the entire urban passenger transport per day (ton)</th>
<th>walk</th>
<th>bicycle</th>
<th>bus</th>
<th>taxi</th>
<th>car</th>
<th>motorcycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>66.795</td>
<td>14.215</td>
<td>153.860</td>
<td>53.973</td>
<td></td>
</tr>
</tbody>
</table>

Survey data of Rizhao and calculation results of carbon dioxide emissions

Survey time: the year 2006.
Size of the survey area: urban area, total of 1,915 square kilometers.
Population of the survey area: 1,110,000.
Sample size: the actual sample size in this travel survey is 1,980 households, the number of residents is 32,212, and valid questionnaires are a total of 4,536 people.
Survey findings: residents’ average trip rate per day of Dongguan is 3.43, the sharing proportion of residents’ trip mode structure and residents’ trip distance are listed in tables 8 and table 9 below.
Table 8. The Sharing Proportion of Residents’ Trip Mode Structure of Rizhao in the Year 2006. (Tongji University, 2006)

<table>
<thead>
<tr>
<th>Transportation mode</th>
<th>walk</th>
<th>bicycle</th>
<th>bus</th>
<th>taxi</th>
<th>car</th>
<th>motorcycle</th>
<th>others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage (%)</td>
<td>28.71</td>
<td>26.57</td>
<td>7.77</td>
<td>1.21</td>
<td>10.67</td>
<td>17.2</td>
<td>7.87</td>
</tr>
</tbody>
</table>

Note: others include company business car, shuttle bus, exclusive car, and so on.

Table 9. Residents’ Trip Distance of Rizhao in the Year 2006. (Tongji University, 2006)

<table>
<thead>
<tr>
<th>Transportation mode</th>
<th>walk</th>
<th>bicycle</th>
<th>bus</th>
<th>taxi</th>
<th>car</th>
<th>motorcycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance (km)</td>
<td>1.46</td>
<td>3.03</td>
<td>7.08</td>
<td>8.00</td>
<td>6.57</td>
<td>5.49</td>
</tr>
</tbody>
</table>

After calculation, carbon dioxide emissions of residents’ trips of Rizhao are listed in the following table 10.

Table 10. Carbon Dioxide Emissions of Residents’ Trips of Rizhao.

<table>
<thead>
<tr>
<th></th>
<th>walk</th>
<th>bicycle</th>
<th>bus</th>
<th>taxi</th>
<th>car</th>
<th>motorcycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon dioxide</td>
<td>0</td>
<td>0</td>
<td>0.125</td>
<td>0.092</td>
<td>0.575</td>
<td>0.266</td>
</tr>
<tr>
<td>emissions per</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>person &amp; day (kg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbon dioxide</td>
<td>0</td>
<td>0</td>
<td>138.234</td>
<td>101.719</td>
<td>637.889</td>
<td>294.803</td>
</tr>
<tr>
<td>emissions of the</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>entire urban passenger</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>transport per day (ton)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.2 Analysis of the calculation results
Carbon dioxide emissions of residents’ daily trips per person and day of the three cities–Huizhou, Dongguan and Rizhao–are 0.521kg, 0.916kg, and 1.056kg respectively, which can be seen in figure 1.
From table 4, table 7, and table 10, we can see that walking and cycling are both environmentally-friendly transportation modes, the carbon dioxide emissions of which are zero. The order of carbon dioxide emissions per person and day of the rest transportation modes, as shown in figure 2, for Huizhou is motorcycle > car > bus > taxi; for Dongguan is car > bus > motorcycle > taxi; and for Rizhao is car > motorcycle > bus > taxi.

In Huizhou, motorcycles take up a large proportion of all residents’ trip modes, accounting for 30.51%, which is far higher than that in Dongguan and Rizhao; therefore, carbon dioxide emissions from motorcycles rank first among all the transportation modes in Huizhou. Dongguan and Rizhao are both economically developed cities, and their residents have high income levels, so the proportion of private cars is much higher. Furthermore, emission factor of cars is much higher than that of other transportation modes, thus in the two cities, carbon dioxide emissions of cars are much higher than those of the remaining transportation modes. But there is one difference between Dongguan and Rizhao: in Dongguan, carbon dioxide emissions of cars are higher than that of motorcycles, which is different from Rizhao. This may be related to the two cities’ construction of transportation.
infrastructure, the degree of public transportation development, as well as the
close attitude toward motorcycles. The economy of Dongguan is relatively developed, and
its transportation infrastructure is better constructed, so more residents would choose
to travel by public transportation. In addition, Guangdong Province has begun to
take measures to restrict the use of motorcycles in the early years, and later in the
year 2007 Dongguan also began to restrict motorcycles’ driving in the downtown
area. Thus in Dongguan, the trip proportion of motorcycles is lower. Carbon dioxide
emissions of the entire urban passenger transport per day (all the transportation
modes) of the three cities are similar to carbon dioxide emissions per person and day,
so here we will not repeat them.

3.3 Analysis on influencing factors for carbon emissions of urban passenger
transport

From the calculation formula of carbon dioxide emissions discussed above we
can find that the main influencing factors for carbon dioxide emissions of urban
passenger transport are carbon dioxide emission factors, residents’ average trip rate,
the sharing proportion of residents’ trip mode structure, residents’ travel distance, etc.

Carbon dioxide emission factors are the inherent property of vehicles, which
are decided by types of vehicles. So by improving the transportation modes, such as
the use of clean energy vehicles, or encouraging the residents to choose public
transportation which has lower average carbon emission, the carbon emissions can
be reduced effectively. In addition, carbon dioxide emission factors are impacted by
road conditions, weather, individuals’ driving habits and other factors, so good road
traffic conditions as well as good driving habits also contribute to energy
conservation and emission reduction.

From the calculation formula we can see that residents’ average trip rate is in
direct proportion to carbon dioxide emissions. In theory, an appropriate reduction in
residents’ average trip rate can reduce carbon dioxide emissions caused by daily
travel to a certain extent. However, average trip rate is the symbol of a city’s
economic development level and vitality, so it’s not proper to depress the average
trip rate artificially in pursuit of lower carbon emissions.

The sharing proportion of residents’ trip mode structure, together with trip
distance, affects carbon dioxide emissions. Among the several trip modes that people
usually take, walking and cycling are the most environmental friendly and energy-
efficient ways to travel. These two transportation modes are quite suitable for short
distance trips and should be encouraged and supported. As to bus travel, either the
volume or the per capita occupation of road sources, it has advantages that other
transportation modes can’t match. Furthermore, it also has a unique advantage on
average carbon dioxide emissions. So at the point when the city develops rapidly,
the land use resources for traffic are increasingly strained, and the environmental
pollution caused by traffic is getting more and more serious, vigorously developing and encouraging the development of public transportation is a good choice for development of urban transport. In the matter of average carbon dioxide emissions, per capita occupation of road resources and per capita energy consumption, private cars don’t have any advantages. Thus when making urban transport planning, each city needs to, according to its actual situation, make proper restrictions on the ownership and use of private cars, encourage citizens to take public transportation so as to alleviate the problems brought by urban transport, and achieve the energy saving and emission reduction goal.

The average trip distance is determined by each transportation mode itself. Each transportation mode has a most suitable trip distance range of its own, for example, walking and cycling are proper for short distance travel, while bus and private car are perfect for travelling longer distances. Trip distance alone doesn’t influence the carbon emissions directly; it does so when combined with the sharing proportion of trip mode structure. Therefore, how to deal with the link between various transportation modes, and allowing them to exert their largest functions in their respective most suitable trip distance ranges is the optimum solution to the problems brought by urban transport and achieving the energy saving and emission reduction goal in the urban transportation field.

4 MEASURES AND SUGGESTIONS

Energy saving and emission reduction in the field of urban passenger transport is a long process that cannot be completed overnight. From the practice of major cities both at home and abroad, we can see that energy saving and emission reduction in the field of urban passenger transport is mainly proceeded by promoting public transport, developing clean sustainable and alternative energy, etc. China should learn from the experience of foreign cities and formulate corresponding policies by combining with national conditions.

Give priority to the development of public transport, and encourage cycling, walking, and other non-motorized transportation modes

China has a large population, urban areas are densely populated, and land resources are scarce. Therefore, giving priority to public transport is a realistic option. The public transport mentioned here includes not only conventional bus, but also bus rapid transit and rail transit. Studies have shown that the carbon monoxide, hydrocarbons, nitrogen oxides, and other emissions discharged during peak hours per kilometer bus are 17.1%, 6.1% and 17.4% respectively, compared with that of car (Zhu Zhaofang et al., 2008). At present, many cities in China attach great importance to public transport. Beijing, Shanghai, Guangzhou, and other cities have set up bus lanes coupled with signal priority measures at the intersections, which
yield good transportation, economic, and environmental efficiencies. In addition, rail transit and bus rapid transit are also better than car in per capita carbon emissions, so cities with favorable conditions may consider the construction of rail transit and bus rapid transit.

Cycling and walking are zero-emission and environment-friendly transportation modes, which can not only protect the environment, but are also beneficial to the users’ physical and mental health. Encouraging the travelers to use green forms of transport or to connect with public transport, is helpful for environmental protection, energy saving and emission reduction.

Use clean fuels and exploit sustainable alternative energy

Using clean fuels and exploiting sustainable alternative energy are important measures to reduce carbon emissions. Clean fuels here mainly refer to liquefied petroleum gas (LPG), compressed natural gas (CNG), liquefied natural gas (LNG), etc. Besides, hybrid vehicles, fuel cell cars, hydrogen fuel cars, and electric vehicles are also the focus of research and development in recent years. Research shows that these clean fuels and sustainable alternative energy sources have significant effects on reducing the emission of pollutants.

Car-sharing and bike-sharing

In recent years, novel ways of travel--car-sharing and bike-sharing--have arisen both at home and abroad. Their emergence undoubtedly has great significance for energy saving and emission reduction, in which car-sharing is known as the revolution of individual transportation mode and the way of travel in the 21st century (Cheng Weili, 2007). Car-sharing and bike-sharing means that travelers do not need to purchase cars and bikes but can use them. Travelers just need to cover the corresponding costs according to the length of time the vehicles were used. The emergence of car-sharing will make part of the trips by private car transfer to it, thus the mileage traveled by car and the energy consumption will be reduced, and carbon emissions will be reduced accordingly. Cycling has always been a green and environmentally-friendly way of travel. It causes no air and noise pollution, and can provide travelers with conventional mode, while also acting as the connection tool for bus and metro.

Therefore, car-sharing and bike-sharing play extremely important roles in energy saving and emission reduction, and the government should support and standardize them at the policy level. With regard to car-sharing in China, there are currently legal problems, such as how to distinguish it from the illegally-operated so-called “black car”. As to bike-sharing, Beijing, Hangzhou, Shanghai, and other cities have gradually implemented this activity, and Hangzhou has received good results since its implementation.

Traffic demand management (TDM) and other management measures
Traffic demand management (TDM) can also reduce fuel consumption and protect the environment. Most cities in China are compact, and cannot alleviate traffic congestion through suburbanization as in the United States and other developed countries. So for China, a viable approach is to implement the TDM strategy while giving priority to the development of public transport (Qiu Baoxing, 2007). TDM mainly includes staggering the working hours; establishing toll zones in central parts of cities, so as to reduce the number of cars entered; reducing the number of parking spaces in downtown and raising the parking fees; and restricting daily use of private cars according to the cars’ license numbers, etc.

5 CONCLUSIONS

Environmental pollution caused by traffic is getting increasingly serious, so carrying out a study on carbon emissions of urban passenger transport and its influencing factors is of great significance. This paper selects the trip survey data of three cities (Huizhou, Dongguan, and Rizhao), calculates carbon emissions of residents’ daily travel, and then conducts a brief analysis. However, there is no subway constructed in the three cities, so this paper doesn’t analyze the carbon emissions of metro for the lack of survey data. Finally, based on the specific conditions in our country, it sums up a number of measures and proposals on energy saving and emission reduction.

REFERENCES


