

Strategy research of harbin city green transport and sustainable development from low carbon ecological perspective

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Abstract. With quick development of urbanization and mechanization, there exist some problems in the cities, such as traffic jam, traffic safety, and traffic pollution and so on. It is extremely urgent for the city to develop green transport, in order to relieve these problems and push forward low carbon ecological construction in Harbin. Strategy research of Harbin city green transport and sustainable development is done from the eight aspects of building public transport system of integration, bicycle, walking, and slow-moving system and so on based on analyzing demands of low carbon ecology on city green transport development, and Harbin traffic development state.

1. Low carbon ecology demands on urban green transport development

Green transport indicates a kind of traffic concept which traffic tools with less pollution and suitable to urban environment are used to complete socially economical activities. It is put forward under the objective condition which urban and urban traffic face a series traffic problems and developing bottleneck. Green transport comes from harmonious transport system based on sustainable development transport idea. Developing green transport aims at decreasing urban air pollution and noise pollution from transport, and green transport should embody uniform combination of three aspects of smooth and order, safety and comfort, and low energy consumption and less pollution. Connotation can be shown in Table 1, its overall goal is to pursue sustainable economy, sustainable social development, sustainable environment and sustainable resource.

Tab.1 Connotation of green transport

Content	Connotation	Specific requirement	Core realization pathway
Sustainable economy	High efficiency	Travel efficiency optimum of all social strata	Transport development mode of “public transport plus moving slowly”
Sustainably social development	Safety Fair	Minimum traffic accident rate Satisfying travel demand of all social strata	
Sustainable environment	Environment protection	Less traffic pollution	
Sustainable resource	Low consumption	Water conservation, field conservation, energy conservation, wealth conservation	

2. Transport development state in Harbin

Traveling mode of citizen in Harbin is relatively unitary, at present, public traveling ways are only public buses on ground and line 1 of subway. Citizen's travel is influenced due to urban crowd, in the meanwhile, ecological environment and resource of city are also destroyed by fast mechanism. Under this condition, green transport is suitable to real needs of traffic development in Harbin . Harbin will



develops its green transport because of its qualification and condition, however, traffic planning, management, supervision, infrastructure and so on should be further improved. The proposal of general planning 2030 of Harbin points out that estimation of carbon emission amount in Harbin will be calculated including carbon emission of the main aspects of industry, building industry, and traffic, and total carbon of vegetation, in which carbon emission of traffic comes from direct emission caused by energy consumption of automobile. By 2030, total amount of carbon emission in Harbin will be about 218950 thousand tons, but state standard of carbon emission is 28980 thousand tons at that time, which is 7.55 times of carbon emission standard. Moreover, traffic carbon emission will be estimated to be 13860 thousand tons, which takes up 6% gross carbon emission. Therefore, low carbon, energy saving, and carbon emission reduction need to be realized in every walk of life, in order to realize overall goal of carbon emission. Among them is traffic domain, highway transportation must use automobiles burning clean energy, and citizens must choose travel mode of low carbon traffic. Development mainstream of future traffic in Harbin is low carbon, pollution-free, and high efficiency, and green “slow moving traffic” will become new trend of traffic system development in Harbin. It is predicted that contribution rate of public traffic in Harbin will have been 50% by 2030, and walking contribution rate 20%, in which trail traffic and BRT system will have accounted for 40% of contribution rate.

3 Development strategy of green transport and sustainable in Harbin

Lands for city are relatively stressful in Harbin, because of a large population and less land resources. So basic population density condition for developing public traffic is possessed by Harbin, then it is a modern road to develop public traffic with high efficiency and less pollution which is suitable to Harbin. Public traffic development in Harbin should be done according to actual situation, feasible strategies should be made combining near-term and long-term plans, for this reason, convenient, shortcut, multi-level and integrative public traffic system would be constructed. Division of labor of kinds of traffic tool modes is clear, link is close, and transfer is convenient, therefore, efficient network system is formed. The writer put forward eight strategies, in order to realize goals of low carbon, ecology, and green transport.

3.1 Building dynamic network with effective connection which comprises subway, light railway and conventional railway

Subway and light railway will be backbone system of public traffic in Harbin downtown in the future, and be main strength to relieve traffic pressure of passenger transport within downtown, but only one or two lines can't play a role, only to form transport network will can bear large amount of public passenger transport. Light railway facilities should be planned and constructed as soon as possible in Harbin, subway, light railway and conventional railway are effectively connected for convenient transfer, thus integrative and dynamic network can be formed. Overall planning of subway construction in Harbin is “nine lines and one loop line”, and twelve lines, one loop line, and two straight line are preinstalled. At present, subway line 1 has been operated in Harbin, and the whole construction cycle is about twenty years. Unified coordination and synchronous development are considered in process of construction of rail building, light railway, conventional railway and conventional public transport system. Moreover, connection and transfer among them must be thought out, so as to form dynamic network of effective connection.

3.2 Restoring and planning to use railroad and trolley bus

Railroad and trolley bus as the conventional public bus can realize true “green traffic tools” with zero emission and pollution-free. Under the situation of emphasizing ecology, environment protection and sustainable development, railway and trolley buses should be paid more attention to and developed greatly. New style railway bus has been recovered in Shanghai, Tianjin, Changchun and so on, whose features of efficiency, economy, and environment protection have been generally accepted. They can not only bear public transport task, but also become a beautiful scenery in city. Railway and trolley

buses have long operating history in Harbin, recovery or planning of new railway and trolley bus operation will become key element for leading “ice city -Harbin” into green transport era.

3.3 Improving public bus attraction degree to citizen travelling

Harbin became first batch demonstration city of “public transport metropolis” in China in 2012. Developing green public transport needs to use advanced and environment protecting new energy automobile, and public transport lines should be reasonably and scientifically planned, in order to form ground public transport network system with perfect function and obvious level. Application of intelligent transport technique should be paid more attention, and intelligent public transport system with humanization should be built. Public transport stations should be rationally distributed, boarding environment around public transport station should be improved, and enclosed waiting stations are proposed to construct because of much colder winter in Harbin. Drivers’ driving technique and quality should be increased, and boarding environment inside public buses should be made better. Public transport ticket system with cheap price and great variety should be constructed, transfer cost of passengers’ would be reduced, thus various and human-based service would be offered. BRT system and public transportation lane are set up, and precedence system of public transport signal is established, so as to increase public transport speed, reduce delay time, at last, service level of public transport can be constantly improved. Integration public transport of city and countryside and town and village should be built and completed, especially the last one kilometer public transport of “from door to door”, therefore, public transport can increase attraction to traveling choice of citizen.

3.4 Carefully designed, convenient, and shortcut transfer pivot

According to long-term development, land usage and fiscal capacity of Harbin, public transport is generally planned. Connection and transfer of kinds of traffic modes will directly influence quality of traffic network, so it is significant that transfer pivot should be carefully designed, in order to make passengers transfer at will. Priority system of public transport should be established, and public transportation lanes should be set up, so that idea priority, facility priority, efficiency priority, management priority, and safety priority of public transport will be gotten to. A set of complete strategy plan of transportation should be constructed, and effective transfer would be realized among rail transport and other traffic modes. According to features of different passenger flow volume and different passenger demand, all public transport tools would be combined by different level. Railway transport and fast public as backbone of public transport system are laid along passenger transport corridor of compact passenger flow. Conventional public transport lines should be designed by different level, such as conventional public transport backbone line, conventional public transport subsidiary line, conventional public transport branch line, and all these lines combine public transport pivots to realize that different lines can connect smoothly, and satisfy passengers’ demands.

3.5 Paying more attention to protecting bikes and pedestrians and building comfortable environment for pedestrians

Bicycle and walking traffic are the short-distance, effective, pollution-free traffic modes which are good at health and environment and should be greatly encouraged. However, there is a very cold and long winter in Harbin, ice roads are the common situation, so it is unwilling for citizens to choose bicycle to travel. Except this reason, safety by bicycle in Harbin can’t be guaranteed as well. At present, there aren’t bicycle lanes on many road, existing bicycle lanes are mixed with automobile lanes without physical partitions, such as guardrails or other facilities, moreover, continuity of running spaces for bicycles can’t be well guaranteed, so some automobiles usually and illegally occupy bicycle lanes. For this reason, it is vital to attach importance to reasonable planning and construction of special lanes for bicycles and pedestrians and establishing bicycle channel and partitions, in order to develop green transport and realize sustainable development in Harbin zone. In the meantime, snow and ice on roads must be eliminated promptly and traffic lights for bicycles are set up at crossroads to ensure safety for traveling by bicycles. Public bicycle systems are built at main communities, commercial

centers, and public transport bus stations, short-distance traveling superior of bicycle should be made full use of, and close connection between bicycles and public transport buses should be realized.

At the present time, planning of pedestrian street is not valued in Harbin and few planning is to aim at pedestrian street because of no more concerns for pedestrians, so that there aren't integration and continuity in current pedestrian street system, and there are some problems, for example: pedestrian spaces are occupied, and so on. In view of this, constructing comfortable walking environment should be attached importance to, and special pedestrian roads and overpasses at crossroads are built. Vegetation and afforestation should be reasonably arranged for pedestrian's sun-proof in summer, sceneries of pedestrian street are made taking advantage of ice and snow in winter, thus, more citizens are naturally absorbed to travel by foot because they would relax their mind and enjoy their life in such environment. In the view of this, water system and green pergola in Harbin, important scene sites, and green areas in parks of different level will be well made use of, furthermore, athletic facilities and culture of city should be connected to construct the integrate slow-moving system of "bicycle plus walking" which linking the whole city.

3.6 Establish mass participating system

Planning, construction, and management of urban transport are closely interrelated to people's daily life, and implementation of green transport is unable to do without mass' participation. Traffic tool choice of green transport is a determinative question of comprehensive transport and life quality, it needs consensus of people in community to survey new human value again, so that green transport tools are chosen as one of their life styles. Mass' participating in green transport is different from their participating in other activities, or environment protection, and it is more profound and extensive. Green transport is the effective way to solve traveling quality and life quality which has close connection with mass themselves. It is very significant that people can set up temperate traffic traveling thought by improving their inner quality and idea, so as to change their behavior style through the way of complying with green transport.

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