Introduction of Energy-Saving and New Energy Auto Industry in Chongqing
1 Development Prospect of Energy-Saving and New Energy Auto Industry in Chongqing

Various countries in the world are seeking for solutions of energy crisis and environmental pollution. New energy automobile is happened to be a major orientation of such research. Many well known automobile manufacturers in the world, such as GM, Toyota, Hyundai and Volkswagen etc. are all placing more focus on research and manufacturing of new energy automobile which includes fuel cell automobile, electric automobile, hydrogen energy automobile, solar energy automobile and so on. In May, 2011, with the promulgation of the "Twelfth Five-year Plan", new energy automobile has been assigned as a key point of development. New energy automobile has many advantages such as high efficiency, energy conservation and low noise etc. All these features are favourable solutions for environmental pollution and energy consumption aroused by traditional automobiles.

The U.S. has proposed to popularize 1 million plug-in hybrid electric automobiles by 2015. So far, package supporting policies are formulated, which include encouragement policy, guarantee policy and restriction policy. Japanese Government has issued Next Generation Automobile Strategy 2010 on April 12, 2010. The Strategy sets a goal of: restraining global warming and using energy efficiently. Make Japan the base for research and manufacturing of next generation automobile as well as the base for export of related product and system; it proposes that in 2020, number of next generation new energy automobiles (hybrid electric automobile, electric automobile and fuel cell automobile) shall take up 50% of total number of automobiles. It also specifies detailed requirement in six aspects of general strategy, resource strategy, battery strategy, infrastructure, system strategy and international standardization.

For European countries, German government published National Development Planning of Electric Automobile in August, 2009, which plans to popularize 1 million electric automobiles in Germany by 2020 with total investment of EUR 500 million. Meanwhile, Germany will also promote the establishment of efficient "automobile charging station" network through various schemes and organizations. In 2010, Israel government "authorizes" Better Place, an American network operator which engages on electric automobile service to implement the electric automobile promotion plan. On one hand, Better Place constructs and operates the network of charging station and battery-changing station (there are 200 charging stations and 50 battery-changing stations to be constructed). On the other hand, Better Place organizes automobile manufacturers to research, develop and sell electric automobiles which are applicable in Israel.
Generally speaking, U.S. is mainly focused on development of plug-in hybrid electric automobile in the future. Japan places emphasis on development of hybrid electric automobile and electric automobile while European countries attach attention to electric automobile, battery and new technologies. New energy automobile in China are still at the stage of exploration and trial operation. According to incomplete statistics of China Association of Automobile Manufacturers, in 2012, 12552 new energy automobiles are fabricated in China, which include 11241 electric automobiles and 1311 plug-in hybrid electric automobiles. New energy automobiles sold in China are 12791 in total, which include 11375 electric automobile and 1416 plug-in hybrid electric automobiles. According to the "Twelfth Five-year Plan", China will invest more than RMB 100 billion in the next 5 years to support the development of new energy automobile. Based on Development Planning of Energy-Saving and New Energy Automobile Industry, the domestic accumulative sales of electric automobile is expected to be 500,000 in 2015, and reaches 5 million in 2020. According to overall growth rate and scale of Chinese automobile market, China will achieve an outstanding development of electric automobile, which is even better than that of U.S. and Japan. As a pilot city of new energy automobile development, Chongqing has already built 4 supporting charging stations in order to fulfil the charging and parking demand of increasing electric buses. There are another 30 electric automobile charging stations under plan and to be built in Chongqing city proper, which include 9 bus battery-changing stations and 15 charging and battery-changing stations for social vehicles. New energy auto industry involves many supporting industries. Besides the regular industrial chains related to automobile manufacturing, it also relates to manufacturing and material industries about battery, electric control and others. Rapid development and national policies support of new energy automobile will bring more opportunities to industries about electric control, battery, motor and upstream manufacturing of such components and parts, as well as raw material industries of lithium and tombarthite, also the charging service industry.

2 Overview of Energy-Saving and New Energy Auto Industry in Chongqing

In China, Chongqing is an automobile manufacturing base with significant importance. It is with favourable industrial foundation and many advantages for new energy automobile development. First of all, key enterprises in Chongqing enjoy outstanding status in the domestic field of new energy automobile, which include automobile and motorcycle enterprises such as
Changan Automobile, Lifan Passenger Vehicle, Hengtong, Wuzhoulong, Racing, Kairui Special Vehicle and Loncin. These enterprises have already held certain degree of influence on domestic electric automobile field and established Electric Auto Industry Association which places main focus on finished automobile manufacturing. Secondly, Chongqing has plentiful talent reserve for technical research and development. There are national level research and development centers of Chongqing Changan, Lifan, Loncin and other entities, as well as many national level research organizations, colleges and universities like China Automotive Engineering Research Institute and Chongqing University, who have undertaken various national level scientific research projects and international scientific cooperation projects. Also, there are third party organizations for technical service and test, such as Chongqing Electric Automobile Productivity Promotion Center and National Motor Vehicle Quality Supervision and Inspection Center. Meanwhile, there establishes Chongqing Energy-Saving Automobile Technology Innovation Association. Thirdly, Chongqing possesses favourable foundation for domestic and overseas cooperation. The technical innovation capacity of Chongqing enterprises is improved through strategic cooperation with domestic top scientific research institutions like China Academy of Engineering and China Academy of Science, as well as cooperation with famous international enterprises like FEV of Germany and Ricardo of Britain. At present, in Chongqing where development of new energy automobile is strongly promoted, there has already existed a diversified production pattern in which enterprises place emphases on different types of new energy automobiles. Changan is focused on new energy passenger car. Hengtong and Wuzhoulong attach importance on new energy bus. Sokon pays attention to new energy micro-car. Kairui and ShinMaywa devote to development of new energy vehicles for special purpose. Loncin and Zongshen put emphases on electric quadricycle and electric motorcycle while Lifan develops battery manufacturing. According to statistics, by the end of 2012, there are 1578 new energy automobiles on their demonstration running in Chongqing. These automobiles are independently developed by Changan Automobile and Hengtong Bus. Among these automobiles, there are 531 public buses, 320 service cars, 25 taxis and 702 private vehicles. Average running mileage of each automobile is 212,500 kilometres. Since establishment, Chongqing Changan New Energy Automobile Company has mainly been working on research and development of Changan Jinxing HEV, Changan Zhixiang HEV, electric road automobile, high power hybrid electric automobile, fuel cell automobile and electric cart, as well as manufacturing and marketing service of relevant components and parts. In the next few years, the Company will take efforts to promote the marketization of hybrid power products and the industrialization of electric products technology based on the diversified development principle of "popularizing low hybrid electric product, focusing on middle hybrid electric power product and accelerating development of electric/plug-in products". At present, the Company has developed three types of hybrid electric automobile, Jiexun,
Zhixiang and CX30, as well as two types of electric automobile of E30 and Benni Love. Hybrid electric automobile fabricated by Changan is already put into market in 13 cities including Chongqing, Hangzhou, Kunming and Nanchang, with total number of 800 which takes more than 50% shares of the entire domestic market of new energy automobile. Mileage of these automobile exceeds 40 million kilometres.

Chongqing Hengtong Bus Co., Ltd. has independently developed gas-electric bus, diesel-electric bus and electric bus. Chongqing Wuzhoulong New Energy Automobile Co., Ltd. has established a product system of independently developed hybrid electric bus and electric bus, which attract attentions on "Wuzhoulong" buses.

Except for enterprises of finished automobile manufacturing, many enterprises of components fabricating are making contributions to the development of new energy automobile. For example, as a branch of Lifan, Chongqing Wanguang New Energy Technology Co., Ltd. which mainly engages on manufacturing of automobile and motor cycle batteries and accessories for such batteries, are devoting itself to provide electric automobile and hybrid electric automobile with better battery; Chongqing Wanly Battery Co., Ltd. is working on automobile battery too; Chongqing Hoxie Motor Factory has already developed hybrid power drive motor, electric automobile drive motor and all-in-one machine of starter and generator.

3 Supporting Service Capacity of Energy-Saving and New Energy Automobile in Chongqing

Since the construction of model city for "thousands of energy-saving and new energy automobiles in ten cities" in 2009, Chongqing has popularized 1578 new energy automobiles and established complete system of planning, monitoring and policies.

In order to guarantee normal operation of electric automobiles, Chongqing has already built charging station at Chayuan, Jiangbei District, bus-only charging and battery-changing station at airport, Hubei District and charging and battery-changing station at Baiheyuan, Nan'an District etc. Among these stations, the one at airport is the largest fast charging station countrywide, with floor space of 2,065 square meters. It can contain 4 buses for charging at a same time and fulfil the operation demand of 30 electric public buses. According to Planning Scheme for Layout of Electric Automobile Charging Station & Battery Changing Station in Chongqing City Proper, there are 30 charging stations and battery-changing stations to be accomplished in Chongqing city proper during the "Twelfth Five-year Plan" to provide centralized charging and battery changing service for electric automobiles.
automobiles. Among the these stations to be built, there is 1 comprehensive charging & battery-changing station, 9 public bus charging & battery-changing stations, 15 social vehicle charging & battery-changing stations and 5 battery distribution stations.

"National New Energy Automobile Manufacturing Base in Liang Jiang New Area" is established in February, 2011 upon the brand awarding of The Ministry of Science and Technology of the People's Republic of China. There is 1 standard charging station, 1 charging & battery-changing station and 2 fast charging stations which are accomplished with 200 AC charging piles. Additionally, there also establishes informatization platform for trial operation management of energy-saving and new energy automobiles. It is to accomplish the informatization monitoring platform and to achieve remote control on 126 hybrid electric passenger vehicle and 91 electric buses.

Besides the policies and public facilities mentioned above, in order to promote development of new energy automobile, there establishes Chongqing New Energy Automobile Operation Company to provide passenger traffic service and lease service, so as to propel the popularization of new energy automobiles in Chongqing.

4 National and Municipal Policies Related to Development of Energy-Saving and New Energy Automobile

4.1 National Policies

In order to implement the decision and arrangement of developing strategic emerging industry and enhancing energy conservation and emission reduction, which are made by State Council, each department and ministry takes specific measures to support and accelerate the development of energy-saving and new energy auto industry: first of all, conduct pilot popularization of energy-saving and new energy automobile; secondly, carry out pilot sales in 5 cities, for which people can get subsidy for buying private new energy automobile; thirdly, offer lump-sum subsidy of certain amount to people who purchase energy-saving automobiles of "Project to Promote Energy-efficient Products for the Benefit of the People".

On February 25, 2011, Vehicle and Vessel Tax Law of the People's Republic of China is promulgated, in which the Clause IV provides that “energy-saving and new energy vehicles and vessels may be exemption from vehicle and vessel tax or may enjoy tax concessions”. Outline of The Twelfth Five-year Plan for National Economy and Social Development of the People's Republic of China which is published in March, 2011, lists new energy automobile as one of the
strategic emerging industries. It proposes to place emphasis on development of plug-in hybrid electric automobile, electric automobile and fuel cell automobile technology; to implement demonstration project of research & development and large scale commercialization for plug-in hybrid electric automobile and electric automobile; to promote industrialization; to support research & development of common hybrid electric automobile; to achieve breakthrough on power battery core technology; to support research & development and industrialization of motor and driving system, as well as electric air conditioner, electric steering mechanism and electric brake staff; to support research on core technology of fuel cell stack, fuel cell engine and other crucial material; to construct genetic platform of new energy automobile. On November 10, 2011, the National Ministry of Finance, Ministry of Science and Technology, Ministry of Industry and Information Technology and Development and Reform Commission jointly issued Notice on Furthering Energy Saving and New Energy Vehicle Demonstration and Promotion Test Site Work which focuses on creating consumption environment of new energy automobile and accelerating improvement of product quality. The highlight of Notice is to put forward more clear sales base lines for automobile enterprises so as to promote consumption of new energy automobile in all round. In order to implement Outline of The Twelfth Five-year Plan for National Economy and Social Development of the People’s Republic of China, Ministry of Industry and Information Technology prepared Guidance on Development for Key Genetic Technology of Industry on July 1, 2011, which provides such requirements as follows:

- General technology of electric passenger car: Main technology: technology of small type electric passenger car; technology of range-extended electric passenger car

- Main content of power battery key technology: key technology of energy type lithium-iron battery; key technology of power type battery; key equipment technology of lithium-iron battery and diaphragm production; technology of battery electrode material; technology of assessment on performance safety; technology of self-excited safety protection.

- Energy-saving technology of automobiles Main technology: hybrid power technology and standard configuration; key technology of moderate hybrid power automobile

- Key technology of dynamical system for commercial hybrid power automobile: Main technology: systemic integration research on hybrid power assembly; technical development of important parts and components of commercial hybrid power automobile.

The government prepares Development Planning of Energy-Saving and New Energy Automobile Industry in particular. The period of planning is from 2012 to 2020. The content of Planning is seen as follows:
● Achieve significant success in industrialization. Production and consumption of energy-saving and new energy automobile increase stably and industrial scale ranks in the leading place worldwide. By 2015, accumulative output and sales of electric automobile and plug-in hybrid electric automobile exceed 500,000; by 2020, production capacity of electric automobile and plug-in hybrid electric automobile reaches 2 million and accumulative output and sales reach 5 million; development of fuel cell automobile and automotive hydrogen energy industry keeps the same with the international level;

● Remarkable improvement of fuel economy: By 2015, the fuel consumption of new energy-saving passenger car shall reduce to less than 6.9 liter/100km. By 2020, the fuel consumption of new energy-saving passenger car shall reduce to less than 5.0 liter/100km and reach international advanced level; and fuel consumption of new commercial vehicle shall approach to international advanced level;

● Enhance research on crucial core technology of new energy automobile: By 2015, speed of electric passenger car and plug-in hybrid electric passenger car shall be no less than 100 km/h under electric driving mode and driving range under common condition shall be no less than 150 km and 50 km; specific energy of battery module shall be more than 150Wh/kg, with cost less than RMB 2/Wh. Cycle life shall be 2000 times or more than 10 years; power density of electric driving system shall be more than 2.5KW/kg, with cost less than RMB 200/KW. By 2020, specific energy of battery module shall be more than 300Wh/kg, with cost less than RMB 1.5/Wh;

● Implement preferential tax policies: Accelerate the research and establishment of vehicle tax policy system based on fuel consumption. Enterprises who engage on relevant business about energy-saving and new energy automobile as well as parts and components may enjoy the preferential tax policies on business income tax upon the certificated qualification of hi-tech enterprise. Enterprises who engage on relevant business about energy-saving and new energy automobile as well as parts and components may be exempted from business tax for the revenue obtained through technical development, assignment and relevant consultation and service.

4.2 Municipal Policies

In order to propel development of new energy automobile like electric automobile, Chongqing Municipal Government lists new energy automobile project as one of the projects where special supporting fund goes to. For
approved new energy automobile project, municipal finance department and development and reform department will appropriate development fund in accordance with construction process to support the research and production of such projects. Additionally, municipal government issues several policies earlier than any other municipalities and provinces, such as Implementation Plan for Pilot Popularization of Energy-saving and New Energy Automobile in Chongqing, Implementation Measures of Financial Subsidy for New Energy Automobile on Demonstration running in Chongqing and Notice on Application Procedure of National Financial Subsidy for New Energy Automobile on Demonstration running in Chongqing. According to these policies, besides the national subsidies, Chongqing Municipal Government will also provide subsidy for the purchase and maintenance of energy-saving and new energy automobiles. For example, people who buy moderate hybrid electric service car and gas-electric low hybrid electric taxi will be exempted from toll charge for 3 years and get subsidy of RMB 6,900 for each vehicle; for individuals who buy a car for private use, government will offer 100 quotas to provide them with the privilege of being exempted from toll charge for 3 years. The 100 individuals will also obtain corresponding national subsidy based on the vehicle type.

Chongqing is the first city in China which promotes "thousands of energy-saving and new energy automobiles in ten cities". In order to accomplish the popularization of new energy automobile, the government prepares Working Plan for Furthering Demonstration Running of New Energy Service Car in Chongqing through taking example of other friendly cities and based on actual situation of Chongqing. The Working Plan provides that:

● Divide the task of new energy service car popularization. Allocate the divided tasks to each municipal departments, counties and districts (municipal districts). Municipal and county-level governments grant the funds to purchase new energy service car based on financial resources. Government Office of Administration shall play the leading role to organize municipal departments to accomplish the task. Administration of service car in each county and district (municipal district) shall organize the county-level departments to finish their task upon assistance and supervision of Government Office of Administration and Municipal Finance Bureau;

● Shorten the time limit of subsidy payment. Municipal Finance Bureau shall appropriate subsidy in accordance with the number reported by automobile companies and the provisions of Implementation Measures and Procedures of Financial Subsidy for New Energy Automobile in Chongqing. Shorten the term of subsidy payment;

● Enhance the publicity of new energy service car popularization. Chongqing Science & Technology Commission shall publicise and popularize new energy automobile through various means. Meanwhile, new energy automobile
companies shall place importance on the quality and after-sale service, so as to achieve the trust and support of client with sound product quality and favourable social service.

5 Development Planning of Energy-Saving and New Energy Auto Industry in Chongqing

5.1 Industrial Cluster

Take full technological advantages (in vehicle production and integration) of leading enterprises in auto industry, strengthen the development of new products, take the development and production of electric automobiles as the principle task, focus on the development and production of hybrid automobiles in the transition period, establish supporting systems to promote energy-saving and new energy automobiles and expand pilot demonstration, to establish a major domestic R&D and production base for electric and hybrid automobiles. Strive to achieve more than RMB 30 billion of output value in 2015.

● Hybrid automobiles: Take full vehicle production advantages of leading enterprises, focus on the development of medium, heavy and plug-in hybrid cars, actively promote the industrialization of diesel-electric buses and gas-electric buses, and strive to make the micro hybrid system with automatic start/stop functions be the standard configuration of passenger cars. The output of hybrid vehicles shall reach 700,000.

● Electric automobiles: Promote the development and industrialization of mini-type range-extended electric automobiles, mini-type electric cars, buses and special electric vehicles. Actively track and cultivate fuel cell automobiles, hydrogen fuel cell automobiles and solar electric automobiles. Strive to produce and sell 300,000 electric automobiles (including low-speed electric automobiles) and plug-in hybrid automobiles.

● Power battery: Based on vehicles' demands for power batteries, bring in worldwide top ten enterprises engaged in power battery to produce power batteries in Chongqing. Vigorously develop lithium ion battery, NI-MH battery, fuel cells, hydrogen power battery and capacitor battery to expand power battery industry. Establish a R&D and production base for anode & cathode materials of lithium iron phosphate batteries and lithium manganese power batteries, diaphragm and electrolyte to promote the development of low-cost, high-capacity, long-life and high-performance batteries.

● Drive motors: Integrate military-industrial motor manufacturers with state-owned and private motor manufacturers to promote the research, development and industrialization of various types of motors to further build Chongqing as a major domestic production base for drive motors of energy-saving and new energy automobiles. Vigorously develop rare-earth permanent-magnet drive motors in which Chongqing has advantages.
Establish R&D and production bases for IGBT, key sensors, high-performance insulation materials and high-performance permanent magnet materials.

- Control system: encourage enterprises to bring in advanced technologies, to strengthen cooperation and to actively develop motor controllers, vehicle control system and batter management system, etc.; and establish a production base for special electric control parts.

5.2 Major Projects

New Energy Automobile Project of Changan Group, Lifan Electric Car Project, Loncin Volpe Electric Vehicle Project, Electric Bus Project of Chongqing Hengtong Bus Co., Ltd., Energy-saving and New Energy Automobile Project (with an annual output of 500,000 energy-saving and new energy automobiles), Lithium-ion Battery, Battery Diaphragms and Anode Materials Project (with an annual output of 1 million respectively), Electrolyte Project (with an annual output of 200,000 tons), Single Cell Project (with an annual output of 1.5 billion single cells), Drive Motor Project (with an annual output of 750,000 drive motors), and the project of producing 2 million vehicle body control modules, motor control systems, bus control systems, batter management systems and vehicle control systems respectively.

Schedule of Sales Revenue for Electric Finished Automobile in 2015

<table>
<thead>
<tr>
<th>Name of Company</th>
<th>Vehicle Type</th>
<th>Total Production (10,000)</th>
<th>Sales Revenue (RMB 100 million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chongqing Changan Automobile Co., Ltd.</td>
<td>Hybrid electric automobile</td>
<td>5</td>
<td>60</td>
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<td></td>
<td>Electric automobile</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>Chongqing Hengtong Bus Co., Ltd.</td>
<td>Hybrid electric automobile</td>
<td>0.2</td>
<td>19</td>
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<tr>
<td></td>
<td>Electric automobile</td>
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<td>15</td>
</tr>
<tr>
<td>Chongqing Wuzhoulong New Energy Automobile Co., Ltd.</td>
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<td>0.5</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Electric automobile</td>
<td>0.2</td>
<td>30</td>
</tr>
<tr>
<td>Sokon Industry Group</td>
<td>Low-speed electric automobile</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Lifan Industry (Group) Co., Ltd</td>
<td>Electric automobile</td>
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<td>100</td>
</tr>
<tr>
<td></td>
<td>Low-speed electric automobile</td>
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<td>20</td>
</tr>
<tr>
<td></td>
<td>New energy bus</td>
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<td>150</td>
</tr>
<tr>
<td>Loncin Motorcycle Company</td>
<td>Mini-type plug-in motorcycle</td>
<td>5</td>
<td>30</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>28</strong></td>
<td><strong>503</strong></td>
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</table>
5.3 Application Demonstration

Vigorously promote light weighting and miniaturization of automobiles; carry out demonstration application of medium and heavy hybrid automobiles, electric mini-vans, electric cars and fast-charging electric buses; establish technical standards and inspection & test systems for energy-saving and new energy auto industry; construct 1~3 special routes for hybrid and electric buses by 2015, and promote more than 10 energy-saving and new energy auto brands.

5.4 Key Technologies to be Developed

Strive to make technological breakthrough in gasoline direct injection, high-pressure common-rail spraying, exhaust turbo charging, new LNG engine, light high-speed diesel engines, lightweight and advanced transmission systems. Study on key technologies related to power battery of electric automobiles, drive motors, and electric control; focus on the development of lightweight and miniaturized energy-saving automobiles, and promote the development of new hybrid automobiles, mini-type range-extended electric automobiles, mini-type electric cars, fast-charging electric buses and special electric vehicles

5.5. Demonstration Park

Establish an international-level energy-saving and new energy automobile R&D headquarter, domestic leading test and evaluation center, a automobile-related common technology R&D platform and a nationwide largest automobile theme park in Liang Jiang New Area. Gather more than 50 enterprises engaged in production of vehicles and key parts (in Chongqing) by 2015; the output value of energy-saving and new energy automobiles shall be up to RMB 20 billion, and establish a national-level high-tech industrialization base for energy-saving and new energy automobile