

## A Research on the Current Status and Problems on Domestic Urban Greening Construction During New Urbanization Process

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### Abstract

Along with the new trend of new urbanization, promoting green-town development, combining the concept of ecological civilization with urban development and achieving the balanced development of urban-rural construction and ecological environment have become significant measures towards the development of new urbanization. According to *The National Plan of New Urbanization*, the paper analyzes the current status and problems on the greening degree during new urbanization process in China from three perspectives, green production method, green lifestyle and green consumption means.

**Key words:** Greening; New urbanization; Ecological environment

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### INTRODUCTION

Along with the new trend of new urbanization, promoting green-town development, combining the concept of ecological civilization with urban development, focusing on cultivating green production method, lifestyle

and consumption means and achieving the balanced development of urban-rural construction and ecological environment have become significant measures towards the development of new urbanization. Pacing up to construct green energies, impelling the scaled and multiple application of solar energy, wind power as well as geothermal energy and increase the proportion of new energy usage are also very important. We should strictly enforce the energy-saving standard, implement the energy-saving transformation of regional as well as public buildings, improve the standard and certification system of green buildings, encourage the application of green building materials, and strongly promote the industrialization of buildings. Besides, actively advocate green travel habits, improve the travel conditions of walking, cycling and public transit, encourage the popularization of new energies and clean-energy cars, especially the pilot exercises in the public transit field, reasonably control the holding volume of motor vehicles, take measures to limit the traffic and emissions, and strictly control the over-emission vehicles on the road. Perfect the waste goods recycling system and the waste classification system, and enhance the disposal and recycling use of urban pollutants such as wastewater and waste residues. Carry out the plan of the air-protection activity from pollution, improve the urban air quality, establish the project of urban water-use safety, guarantee urban residents' health of water use, perfect the protection and treatment towards forests, soil, wastelands and wetlands in key regions, and increase the area of urban greenery. Actively disseminate the concept of green and healthy life towards urban residents, cultivate ecological culture, lead the awareness of green consumption and encourage a lifestyle which is simple and suitable, green and low-carbon, as well as civilized and economic.

## 1. BUILDING GREEN PRODUCTION METHOD

### 1.1 Green Energy

**1.1.1 The Implication and Characteristic of Green Energy**  
 Green energy is also referred to as clean energy, which is the symbol and synonym for environment protection and a healthy ecological system. The development of green energy is also an important way of achieving green production method. Green energy has two definitions, broad sense and narrow sense. Narrowly speaking, green energy refers to renewable energy resources, such as water, biological resources, solar energy, wind power, geothermal energy and tidal energy, etc., these energies are renewable infinitely and cause zero pollution during the employing process; broadly speaking, green energy refers to the energies that cause low or even no pollution to the eco-environment during production or consumption process, such as natural gas, clean coal and nuclear energy, etc..

#### 1.1.2 Types of Domestic Green Energy and Its Utilization Methods

In China, green energy mainly includes solar energy, wind power, biomass energy, nuclear energy, geothermal energy and tidal energy, which is mainly used in power generation (see Table 1) and takes electricity as the main

energy medium. As national economy develops steadily, the demand towards electricity from every walk of life has rapidly grown, and electric power is significant in economy development. According to statistics, during the time of the 12<sup>th</sup> five-year plan, the annual growth rate of domestic electricity demand should reach 8.5%, with a 500 billion degree increase on electricity; the growth rate of electricity demand during the 13<sup>th</sup> five-year plan is estimated to be 5.5%, which means a fast growth of electricity demand in future ten years. This situation of China urges us to strive to improve the functions of green energy in power generation field, and actively popularize the application of green energy to satisfy the increasing electricity demand nationwide. New energy industry is one of the key fields that the nation highly supports. Since the enforcement of Renewable Energy Law in 2006, the government has then on carried out a series of policies to support the development of new energy resources, for instance, *The Trial Measures of Prices and the Cost Sharing Management for Renewable Energy Power Generation*, *Renewable Energy Power Generation Related Regulations*, *Enforcement Advice on Accelerating the Implementation of Solar Photovoltaic Building Application*, and *Interim Measures of Offshore Wind Power Development and Construction Management* etc..

**Table 1**  
**Types of Domestic New Energy and Main Utilization Methods**

Types of Energy	Main Utilization Methods
Wind power	Wind power generation
Solar energy	Photovoltaic and solar-thermal power generation, solar water heater, solar cooling system
Biomass energy	Biomass power generation, bio-gas, the combustion of ethanol, biodiesel
Nuclear energy	Nuclear power
Geothermal energy	Geothermal power generation, geothermal heating, geothermal farming
Tidal energy	Tidal power generation

#### 1.1.3 The Current Status of Domestic Wind Power Generation

With vast territory, abundant resources and long coastline, China has substantial wind power. Estimated by the weather bureau, the national density of wind power is 100 W/m<sup>2</sup>, the gross reserves of wind power resource are around 1.6×105MW, the gross reserves of 10m-level wind power in China are 3.226 billion kw, and exploitable wind power reserves are 2530 million kw, with great value of development and utilization.

China started the construction of wind power plants in 1980s. Since 2003, the construction of wind farms has come on a scaled and international stage, till 2006, installed capacity has doubled and formed an explosive growth during the four years. According to the statistics of CWEA, 2013 has seen the 14.49 million kw increase in electric grid capacity of wind power, accumulating to 77.16 million kw, with a year-on-year growth of 23%.

The annual generated energy was 134.9 billion kw·h, with a year-on-year growth of 34%. The wind power utilization time reached 2,074 hours, with a year-on-year growth of 184 hours. 2013 has also seen a 9,356 set increase in the equipment of wind turbines, whose capacity reached 160.9 million kw, with a year-on-year growth on installing about 24.1%, accumulating to 63,120 sets of wind turbines. Installed capacity accumulated to 914.1 million kw, with a 21.4% year-on-year growth, and kept on steady development. In 2013, the grid capacity of wind power shares a proportion of 6.2% of 1.25 billion kw, the total national electricity installing capacity; the electricity generated by wind power shares a proportion of 2.5% of 5,350 billion kw·h, total national generated energy. The statistics above show that the construction of national wind power is significantly improved both on scale and quality, which also symbolizes a good trend of the development of wind power industry.

### 1.1.4 The Current Status of Photovoltaic Solar Energy Development

China is abundant in solar energy resources, with  $50 \times 10$  kJ received on the earth's surface annually. Most areas receive annual average daily radiation more than  $4 \text{kw/m}^2$ . Thus, the solar energy in China has substantial potential in exploitation and development.

The domestic photovoltaic power generating industry started in 1970s, after the development of 40 years, photovoltaic power industry is in a fast developing phase. With the healthy background of quick development of photovoltaic industry around the globe, China successively launched Brightness Program and Township Electrification Program, etc., to emphasize the development of domestic photovoltaic industry. In 2012, MIIT announced The 12th Five-year Plan of Photovoltaic Solar Energy to encourage the sustainable development of solar energy industry. In 2013, national solar energy cell business achieved a 19.95% increase in cumulative production, the sales revenue of primary manufacturers of crystalline silicon solar cell appeared positive growth, the gross sales is estimated to reach around 3 billion RMB, with a year-on-year growth 15%~20%. What's more, global installed capacity of photovoltaic system increased over 37 GW (370 million kw), and the installed capacity in China increased by 11.3 GW, No.1 around the world. Based on this background, the global photovoltaic power industry is in a good and arising tendency with expanding scale of industry and lowering production costs. At present, domestic photovoltaic power industry is taking active part in the international competition and keeping up with the international advanced level.

### 1.1.5 The Current Status of Domestic Biomass Energy Development

Biomass energy is the fourth largest energy globally after coal, gasoline and natural gas. China is one of the world's biggest countries in terms of agricultural production, which stands for abundant exploitable biomass energy, including straw, fuel wood, animal feces, domestic waste and industrial organic waste residue as well as wastewater, etc.. According to *The 2013 China Statistics Report on Biomass power-generation construction*, 28 provinces (cities, districts) nationwide have developed biomass power programs, the domestic total capacity approved has reached 12,226.21 MW, in which grid capacity reached 7,790.01 MW, 63.72% of the approved capacity; national (except Hong Kong, Macau, and Taiwan) power-generation capacity of biomass energy was 35.602 billion KW, and the annual equivalent full load hours of operation of domestic biomass power generation was 5,844 hours. From the types of biomass power generating technology, the gross grid capacity of direct combustion power generation of forestry biomass was 4,195.3 MW, accounted for 53.85%; grid capacity of waste combustion power generation was 3,400.29 MW, accounted for

43.65%; grid capacity of bio-gas power generation was 194.42 MW, accounted for 2.5%. It is estimated that at the end of 2014, the installed capacity of biomass power may reach 1.1 million KW, and electricity output shall reach 50 billion KW.

### 1.1.6 The Current Status of Domestic Nuclear Power Development

With a vast territory and huge population, China has great demand toward energy. The demand to develop nuclear energy in China is much more urgent than the developed countries. Nowadays, as an important clean substitute energy resource, nuclear energy is facing great opportunities. Till the first half of 2014, the number of nuclear power unit that's been put into operation is 20 sets. Experts believe that 2014 and 2015 is the peak for nuclear power unit production, and nuclear power unit scale is estimated to increase by 2.5 million KW. Till 2050, domestic nuclear power shall reach around 400 million KW hopefully, and annual generated power is accounted for 1/4; it can substitute over 1 billion ton of coal, with 2.5 billion ton of  $\text{CO}_2$  emission reduction.

## 1.2 Green Building

### 1.2.1 The Definition of Green Building

Green building encourages that we should premise on energy and resource saving, lighten the load of buildings to the environment, provide safe, healthy and comfort living conditions as well as advocating the concept of the harmonious balance of human and natural environment and sustainable development. Green building is inherent, but an acquired new construction concept along with the introduction of the sustainable development concept in the construction business. With growing population and lessening land resources at present, engineers are seeking new construction forms to suit the living changes that's taken in human society.

### 1.2.2 The Current Status of Green Building Development

The concept of green building was introduced into China in 1990s. For the development of green building, China has successively carried out a series of policies and authority files. During recent years, as the Chinese green building standard system perfects, the implement of green building deepens and the national financial support strengthens, domestic green building is in a trend of fast development.

By 2013, the number of national green building evaluation and identification projects has reached 1,260, including 480 one-star projects, 530 two-star projects and 312 three-star projects. Since 2011, the increase of national green building identification reached a peak, and during the coming years from 2012 to 2014, the increase of green building identification has been maintained at a high level. According to *The Action Plan of Green Building*, during the time of the 12<sup>th</sup> five-year plan, domestic new green buildings are to reach 1 billion  $\text{m}^2$ ; by the end of 2015, the increasing urban construction reaching the green

building construction is accounted for 20%. On the other hand, the government-invested buildings such as state organs, schools, hospitals, gyms and museums etc., and the indemnificatory houses in municipalities directly under the central government, cities specifically designated in the state plan and provincial capital, as well as large public buildings with monomer construction area over 20,000 m<sup>2</sup>, such as airports, bus stations, hotels, malls, and office buildings etc. The green building standard is fully implemented since 2014, green public buildings shall achieve greater breakthroughs this year.

## 2. BUILDING GREEN LIFESTYLE

### 2.1 Green Transport

#### 2.1.1 The Definition of Green Transport

Green Transport, broadly speaking, means to take low-pollution and low-consumption conveyances beneficial to the urban environment to complete traffic and transportation service. Narrowly speaking, Green Transport refers to the sustainable, energy-saving and low-consumption traffic and transportation system built to lower the costs of construction and maintenance, beneficial to ecological environment, and suitable for human living conditions.

Green Transport can also be referred to as sustainable transport, which is a new concept. It emphasizes on the greenness of urban transportation, achieving the maximum transport efficiency under the circumstances of reduce environment pollution and relieve the travel pressure, namely maximizing the realization of people's transport demand. The concept is the organic unity of the three aspects, accessible and ordered; secure and comfortable; low consumption and pollution. Recent years have seen the deepening of Green Transport concept into the development of our urban construction, which has also become the guiding ideology of modern urban rail transit network planning.

As for mode of transportation, Green Transport system includes pedestrian traffic, cycling traffic, conventional public transit and rail transit. As for vehicles, it includes all kinds of low-pollution vehicles and electrified vehicles, such as electric cars, natural gas cars, solar energy cars, light rail, subways and etc..

#### 2.1.2 Current Status of Green Transport Development

As the level of urbanization and motorization upgrade, problems such as over consumption, heavy automobile exhaust pollution etc. are urgent to solve, and Green Transport industry gradually becomes a significant affair. During recent years, domestic Green Transport has also prospered with the promotion of a series of related laws and policies. In 2003, the Ministry of Public Security and the Ministry of Construction (MOC) jointly promoted new technologies on applied traffic engineering and the new

concept on traffic operation to advocate Green Transport, create Green Transport Demonstration City, and to build low-carbon, energy-saving, unimpeded, convenient and highly efficient urban traffic environment. The 11<sup>th</sup> Five-year Plan of Highway and Waterway Transportation Development pointed out, that the development of domestic highway and waterway transportation should hold on to the principles of People-Oriented and Sustainable Development.

On 22nd September, 2007, MOC carried out the first Urban Public Traffic Week and Car Free Day in China, appealing to citizens to travel by public transit or on foot to reduce urban traffic pressure and lighten the load of environment pollution. On 22nd September, 2009, MOC carried out Car Free Day activities, themed by Healthy, Environment-friendly Walk and Bicycle Transport, strongly advocating the travel methods beneficial to citizens and urban environment. On 9th November, 2011, the Ministry of Communications issued Notice on Matters Concerning State Public Transit City Construction Demonstration Project, to organize and build Public Transit City construction demonstration project during the time of the 12<sup>th</sup> five-year plan, and strive to achieve the initial completion of 1 or 2 international leveled national Public Transit Cities and several domestically advanced national Public Transit Cities at the end of the 12<sup>th</sup> five-year plan. Right now, the railway mode in Beijing and Shanghai, the BRT mode in Guangzhou and Dalian, as well as the personalized transport in Hangzhou and Xiamen have all gained certain achievements. Besides, the Ministry of Communications has established 26 low-carbon transportation system pilot cities including Chongqing, Shenzhen, Hangzhou, etc., and has built a series of Green Transport system. On the other hand, since 2011, the Ministry of Transport and the Ministry of Finance jointly established the special fund of 1.5 billion RMB for transportation energy-saving and consumption-reducing projects, and practiced the policy of Substituting subsidies with rewards towards 781 transportation energy-saving and consumption-reducing projects, whose energy-saving capability equals to 1.5415 million ton of standard coal and the burning capacity of 1.9625 million ton of standard oil. *The 12<sup>th</sup> Five-year Plan of Public Transportation Development* pointed out, to pay efforts to build Green Transportation systems and to balance urban transportation and the ecological environment.

### 2.2 Urban Environmental Treatment and Cyclic Transformation of Industrial Parks

Integral urban environmental treatment and cyclic transformation of Industrial Parks are an important part during urbanization process, concerning the prevention and cure of urban environment pollution and the low-carbon cyclic use of all kinds of resources.

During recent years, in the integral treatment of urban environment, energy-saving, consumption reducing

and the protection of ecological environment are jointly encouraged, with an increase of 4.6 million ton on the accumulated urban sewage daily dispose capacity in five years; energy consumption per unit of GDP was reduced by 17.2%, chemical oxygen demand reduced by 15.7% and the total amount of sulfur dioxide emissions by 17.5%. Based on the current situation that many parts of China is severely influenced by the heavy haze weather, China Environmental Protection Department completed the revision of environmental air quality standard, and raised the motoring index as PM 2.5 etc.. Meanwhile, measures as the protection of natural forests, returning farmland to forest as well as the prevention and control of desertification are also taken simultaneously, in five years, the accumulated completion of afforestation reached 2.953 million hectares, cured deserted and stony land reached 1.196 million hectares, integral treatment of soil erosion area cured 246,000 km<sup>2</sup>, and the area of renovated land reached 180,000 km<sup>2</sup>.

The Advice on Promoting the Cyclic Transformation of Parks issued by the Development and Reform Committee and the Ministry of Finance set the cyclic transformation goal towards parks of implementing cyclic transformation towards over 50% of the national parks as well as over 30% of the provincial parks during the time of the 12th five-year plan, to build demonstration parks of cyclic transformation, and establish a system of park cyclic transformation for further promotion in the future; strive to improve the resource productivity of the parks and the utilization efficiency of solid waste, water circulation and living garbage, meanwhile reduce the emission rate of dominating pollutes and ultimately achieve the goal of zero pollution. *The Development Strategy of Circular Economy and the Recent Action Plan* issued by the State Council proposed the national goal of circular economy at the end of the 12<sup>th</sup> five year plan is 15% raise of the dominating resource productivity and 18,000 billion RMB of the total output value of resource recycling industry.

### 3. BUILDING GREEN CONSUMPTION MEANS

#### 3.1 The Definition of Green Consumption

Green Consumption, also referred to as sustainable consumption, is a moderate consuming behavior, within which process, the protection towards the natural and ecological environment is emphasized. Not only does Green Consumption include the purchase of green products, but also the save of energy, the recycle utilization towards resources, and the protection towards existence, species and the environment, etc..

#### 3.2 The Current Status of Green Consumption

Green Consumption is one of the heated topics of the society nowadays. Though the Green Consumption in China started late, recently years have seen the relevant

government departments implementing a series of policies of subsidy and supports to encourage the construction of Green Consumption. Since 2008, the state council stipulated the measures of the paid use of plastic bags in all commodity retailing places; restaurants are not allowed to use disposable chopsticks and lunch boxes. On 5th June, 2012, World Environment Day officially proposed the slogan of Green Economy and Green Consumption, the United Nations sustainable consumption partnership was established for the appeal UNEP (United Nations Environment Program), which changed the immethodical “free-ranging” situation without guidance of domestic Green Consumption, and clarified as well as popularized the concept of Green Consumption. In 2013, the eight events of Green Consumption appealed citizens to practice economy and pay attentions to environment protection, such as the proposal Practice Economy, Against Waste, and the Eight Rules after the new government taking office as well as the Clean Plate Campaign launched by folks, these actions have positively led the Green Consumption behaviors of the public.

### 4. PROBLEMS AND DIFFICULTIES DURING THE GREEN URBANIZATION PROCESS

Earlier, the paper analyzes the domestic current status of greening level during Green Urbanization process from three perspectives, green production method, green lifestyle and Green Consumption. It shows that the concept of ecological civilization has gradually been blended into urban development. However, on the other hand, during the Green Urbanization process, there are also problems and difficulties from all aspects that restrict the urbanization development.

#### 4.1 Defective Policies and Systems

Recent years, China has drawn up a series of related laws and policies to actively promote the process of Green Urbanization; both the 11th and the 12<sup>th</sup> five-year plan emphasized on the construction of green cities and building urban living environment beneficial to the ecological environment and human sustainable development. But, our regulations and policies are still defective on some details, which restrained the development of Green Urbanization. For instance, on account of the laws and systems on new energy, problems such as retardation of legislation and failure to abide the law still exist; The plan that was proposed during two sessions in 2008 to promote the development of Green Consumption through legislation isn't match with any feasible methods even till now; As for Green Consumption, the national government haven't established unified green examine standard and certification bodies, and still lacks supervision and regulation system and corresponding departments, which lead to the

unstandardization of the products, and made the doubts of purchase from the consumers hard to eliminate

#### 4.2 Immature Technology Level

Though national government has increased input towards research and development, with certain achievements gained in all fields, on the whole, domestic technology level is still immature, which has become the key factor that restrained the development of Green Urbanization. Compared with developed countries, the high-tech applied in the promotion of Green Urbanization process is still very limited in China, with an evident lack of R&D fund input, relative retardation of R&D technologies and a lack of related specialized intellectuals. For example, although domestic technology of new energy has gained significant development, overall it is still in the primary phase, wind power, solar energy, biomass energy and nuclear energy all urge for the financial and technological input to increase the installed capacity and seek for better generalization; on Green Transport aspect, the R&D of clean-energy automobile has gained certain achievements, while it still demands the financial and technological input from the government for deeper and wider generalization as well as popularization.

#### 4.3 Lack of Social Guidance

Green Urbanization is a process full of challenges with heavy burden and a long way. China is now in the primary phase. During this phase, the guidance of public opinions in society is not sufficient enough, which has become a dominant factor which restricts the development of Green Urbanization. In this phase, the public's understandings towards all kinds of green concepts are still shallow, which urges society to actively propagandize and advocate green concepts, generalize new energy-saving technologies and deepen the public understandings towards the concept of Green Urbanization.

#### 4.4 Weak Green Sense of the Public

Currently, though the green sense of domestic residents has been improved, the green sense of the whole society group is still very weak, especially in the group of rural residents. On account of the issue of Green Consumption, most consumers only concern about the price, quality and preference during purchase, hardly about the influence the goods practice on the environment during using process and barely about the influence during its production process. To actually implement Green Urbanization,

improving the green sense of the public themselves is the key factor. We need to improve the quality of urban residents, promote the generalization of green knowledge education and strengthen public green sense from the root.

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