

# Study on the Utility of "Two network Integration" Model to Solve the Urban and Rural Environmental Problems in China<sup>\*①</sup>

## ——A Case Study of Guangzhou City

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### Abstract

*Environmental problems have always been one of the key issues in China's grass-roots governance. In recent years, because of environmental problems caused by mass incidents began to emerge and show a growing trend. Group on environmental pollution events of the current point of view, the main conflict is mainly the government, enterprises and people contaminated contamination, where attitudes and the role of government is crucial. Urban and rural garbage disposal mode, a lot of talk in the industry to explore. With the "Junk Besieged City", "Garbage village" more and more serious, put in garbage classification, separation and recovery, implementation of the "Two-network integration" imperative. In this paper, through the case analysis, to seek "Two networks integration" model to solve the practical effect of urban and rural environmental problems.*

**Keywords:** Two networks integration; Urban and rural environments; Utility

Since 2014, a large area of the outbreak in eastern China continued haze days, triggered strong public doubts about the ability of government environmental management, environmental issues become a test of the ability of those in power rule is another big problem. Overall, the current environmental problems in China has three characteristics: From the east to the central and western development, industrial pollution to the development of resource pollution and garbage areas. Sichuan Province, according to "New National Urbanization Plan (2014- 2020)", combined with the actual situation in Sichuan preparation of the "Sichuan

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\*\*Author brief introduction : Wei Hong (1991-), female, Han nationality, Guizhou Qiannan people, China West Normal University of Management Master, research direction for local governance.

New Urbanization Plan (2014- 2020)" put forward to improve the level and quality of urban construction in 2015 the concept of green targets and accelerate urban construction. The concept of ecological civilization fully integrated into urban development, efforts to increase green space, and vigorously promote green urban construction, to promote comprehensive urban and rural environment normalization, the formation of clean, beautiful, civilized urban living environment. Yu Jianrong, Professor of CASS Rural Development Institute, Director of the Center for Social problems, said that in the next 10 years, urban and rural garbage area may be a big problem in the future. On the road of rural China towards urbanization, which test the capacity and patience of local governance workers.<sup>[1]</sup> In the process of new urbanization, the problem of urban and rural garbage disposal is directly related to the level and quality of green city construction, and many aspects of urban and rural waste management should be improved.

### **1. China's urban and rural life garbage generated in total.**

Garbage and human life go hand in hand, and, with the improvement of human production and living standards, the number of garbage is also growing rapidly. According to China Association of recycling of renewable resources accounting, in 2014, the national total municipal solid waste generated 241 million tons. Of which 244 large, medium amount of municipal solid waste generated 168 million tons. <sup>②</sup>

Stockpiling from the national total, the country's total municipal solid waste piled up over the years more than 70 million tons, and the annual rate of increase of about 8%. Municipal garbage volume total land area has reached 500 million square meters, equivalent to about 75 acres of arable land. China 's arable land area of 20 million mu, equivalent to the country for every 1 mu of cultivated land there are 3.75 acres used to piling urban living garbage, many cities have been unable to find land for garbage dumping and landfill. If the industrial solid waste in the far away from the city's barren hills piled up into the mountains, then the city life garbage on the side of the residents generated accumulation, always squeezing our living space, the formation of "Garbage besieged city" predicament.

In the vast rural areas, according to the China Association of Recycling Resources Recycling, rural life waste, agricultural waste, the annual amount of conservative estimates in more than 150 million tons. A large number of kitchen waste, waste plastic bags, waste glass, livestock waste accumulation in the village head, forming a "garbage village" phenomenon, occupation of agricultural land, polluted soil, groundwater and air.

### **2. The status of domestic waste disposal, composition and problems.**

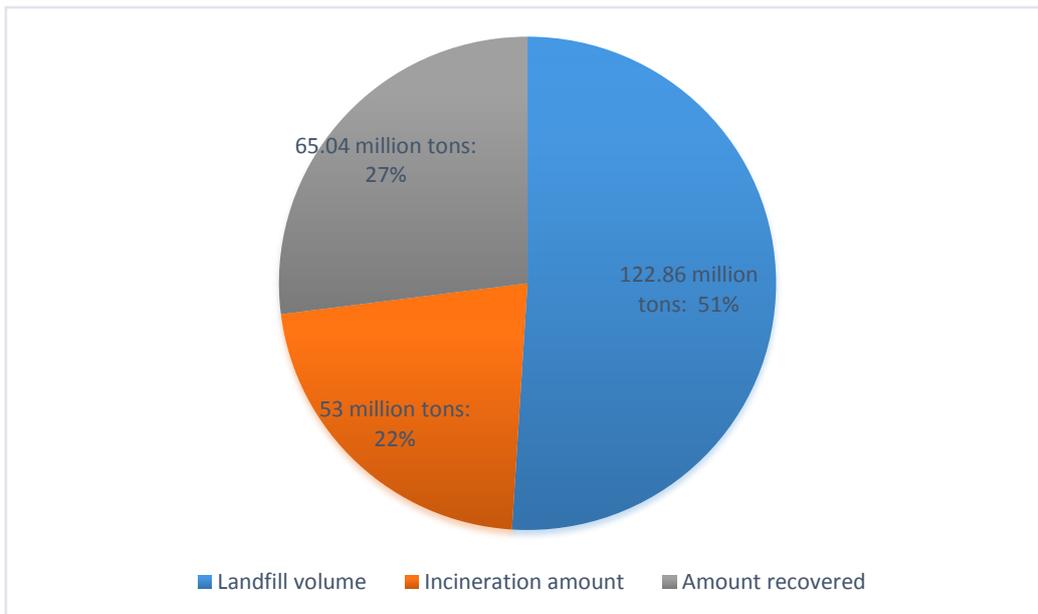
#### **2.1 The status of domestic waste disposal.**

At present, China's urban domestic waste disposal mode is relatively backward, forming a landfill-based, incineration, supplemented by the terminal disposal pattern. By 2014, for example, when the total amount of urban domestic waste generated 240.9094 million tons, of which 121.864 million tons of landfill, accounting for 51%; incineration volume of 53 million tons, accounting for 22%; recovery of 65.04 million tons, accounting for 27% (See Figure 1).<sup>③</sup>

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<sup>②</sup>China Renewable Resources Recycling Association: <http://www.crra.org.cn/>

<sup>③</sup>See China Environmental Protection Online:<http://www.zghbzxw.cn/list.php?id=7&siteid=1>



**Figure 1: The proportion of municipal solid waste disposal in China in 2014**

The treatment of rural life waste is more backward. In some provinces and established a rural sanitation sector as the main garbage removal system, rural waste collection and landfill. Most of the rural areas do not have garbage collection and transportation system, let the rubbish in the village head village tail aging, long-term toxic ingredients in the natural environment of fermentation, proliferation, a direct threat to food and food safety.

## 2.2 The proportion of life waste composition.

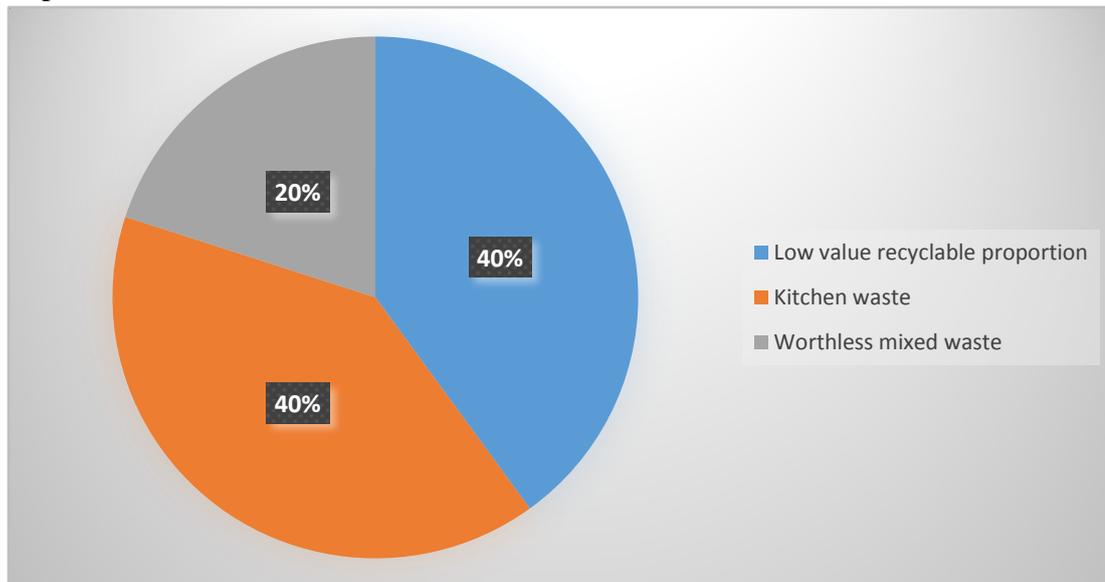
Figure 1 shows, accounting for 27% of MSW recovered (65.04 million tons) from, primarily those higher market value of renewable resources, such as scrap metal scrap metal, old books newspaper paperboard, plastic bottles (barrels), waste electrical appliances. It recovered some varieties mainly driven by the market, which from the army of scavengers in the collection and recycling companies. Into the terminal disposal that is landfill and incineration of the waste, the two total 175.864 million tons, accounting for 73% of the total municipal solid waste.

According to the Guangzhou Municipal Urban Management Committee Technical Analysis Center analysis, which 73% of the waste consists of three major categories of components (See Figure 2):

The first category, Low-value recyclables (Such as waste plastic bags, flexible packaging, waste glass, waste battery lamps, waste textiles, old wood, etc.) account for about 40% of the terminal's disposal. This type of large quantities of low-value, but also contain contains certain toxic ingredients and harmful substances, the environment has long-term hidden hazards, but the recovery and disposal costs higher than their own value, scavengers and recycling companies do not collect, all mixed into the terminal disposal system, Putting more pressure on incineration and landfill.

The second category, Kitchen waste, accounting for about 40% of the terminal into the disposal of content. This type of water large, residents of mixed cast, difficult to separate into the incineration plant, so that greatly increased the difficulty of burning, improved incineration costs, increased emissions of noxious fumes.

The third category, There is no real value of waste, which is various mixtures, about 20% of the terminal disposition.



**Figure 2: Low-value recyclables, food waste and mixed garbage ratio Figure**

### 2.3 The existing problems.

The main reason for the large amount of domestic waste disposal is the system of domestic garbage collection and transportation and the mode of disposal. There are many problems and dilemmas.

First, the garbage mixed delivery. Currently, China lacks of solid waste classification system support, popular ubiquitous "Spectator attitude", the low level of awareness of environmental protection and recycling of resources, affecting the behavior of residents of garbage classified. All kinds of waste mixed with a bag, readily throw it to the trash.

Second, the life garbage mixed collection and transportation. Mixed delivery, resulting in mixed collection and transportation, and regeneration of renewable resources under the business management, garbage removal system under the city management of the sanitation system, the two networks completely separated. In the garbage removal system, there is no classification of garbage collection, classification of transport process design, and even some community pilot classification of delivery, but in the process of collection and transportation of "first mixed". A large number of low-value recyclable materials entering the landfill and incineration disposal system terminal.

Third, in the waste recycling industry chain, the lack of back-end processing and utilization of the chain to undertake front-end resource recovery, but also the lack of appropriate support policy support. Especially those low-value recyclables, the environmental attributes is far greater than the economic value, the market value of the law alone is difficult to drive.

Fourth, the current landfill garbage disposal mode exists mainly natural defects, filling up a lot of land, many cities appear to be filled without the embarrassing situation. A Case Study in Guangzhou in 2014, landfill capacity left a year and a half, by the year 2015, Guangzhou landfill capacity is full, after 2015, Guangzhou did not find land for landfill any longer. The construction of waste incineration plant, the investment is too large, generally small and medium-sized cities unable to build, and incineration is limited by clean technology, will still produce certain harmful gases. Moreover, a large number of low-value recyclable

material burned, the cycle does not comply with resource conservation and development of ideas.

Fifth, the vast rural areas of agricultural waste, such as agricultural film and straw, due to wide distribution, bulk Pengsong, difficult to collect, transportation costs, the use of high cost, comprehensive utilization rate is low, there burning incineration phenomenon, polluting the atmosphere, destroy the soil.

### **3. The integration of the two networks is an effective model to crack garbage siege.**

The concept of green urban construction is the focus of the country's new urban construction, but the current environmental problems in China is particularly prominent, Environmental problems caused by the movement of "Not in my back yard" also began to appear, which very similar to the developed countries have gone. As far as the current environmental pollution mass incidents occur, the main body of the conflict is the government, polluting enterprises and polluted people. In this three-party interests of the game, the government's attitude and role is critical. Promote the integration of the two networks, the implementation of waste separation management, urban and rural environment is the top priority of the current work of the government.

#### **3.1 Integration of two networks in favor of the classification of garbage delivery.**

The 18th National Congress of the CPC put forward the strategy of building an ecological civilization. The CPC Central Committee put forward the concept of green development in the "Thirteen-five" Plan. Recycling development as the basic way to build ecological civilization, the basic requirements of the people to solve the ecological environment. December 20, 2015 to 21, held a central city work conference, proposed to continuously improve the quality of urban environment, urban waste treatment facilities in accordance with the concept of green cycle of low-carbon planning and construction. Central to these development strategies and spirits require us to enhance the promotion of urban and rural living environment improvement, improve the urban and rural living garbage treatment mode. Finding a way to breakthrough "garbage siege" and "rubbish Village". Returned to the urban and rural residents a sky blue, green, water net, gas clear ecological environment.

The key of breakthrough "garbage siege", "garbage Village" and solve the urban and rural environmental issues is to reduce the amount of garbage and resource. The low-value recyclables and 40% of the kitchen waste, which accounts for 40% of the total disposal volume, are separated from the rubbish and incorporated into the resource recovery orbit to become recycled resources, thereby reducing the amount of real waste entering the terminal to 20% (see Figure 2), to minimize the amount of landfill and incineration.

Reference to Guangzhou experience, to achieve the reduction and recycling of waste, it is necessary to establish "classified delivery, classification, classification, transport, classification processing" garbage disposal system. Guangzhou years of practice has proved that this is more scientific and rational life garbage recycling system. In this system, classified delivery is the impact of the various aspects of the latter part of the first link. The renewable resource recycling network and the sanitation system, waste removal network highly integrated to form a coordinated operation of the two wheels, is the key to supporting the effective operation of the system.

### 3.2 Domestic refuse collection system five links.

The establishment of "classified delivery, classification, classification, transport, classification processing" garbage disposal system, the implementation of "two networks integration", including the following five major aspects:

3.2.1 The first is clear life rubbish disposal principles and technical life garbage disposal line. To determine the "first reduction, classification recovery, resource utilization, after the harmless burning, biochemical treatment, and finally landfill," the garbage sorting technology line, The whole process of waste separation management is systematically sorted and summarized. The functions of sanitation system and renewable resource system are integrated. The work contents and responsibilities of each link are clarified, and the whole process of waste separation management is designed. The main promotion of urban environmental management system and supply and marketing cooperatives renewable resource recovery system synergies, but also to mobilize publicity, business, development, street, community, property and other departments linkage.<sup>[2]</sup>

#### 3.2.2 The establishment of classified delivery model.

Using publicity, incentives, punishment and other measures to guide the residents to put in life garbage. Such as Guangzhou, the city government to determine the "sell to sell, harmful alone, wet and dry to separate" principle of waste separation in more than 780 communities to carry out "fixed-point" life garbage classification pilot, the garbage can be divided into recyclables, food waste, hazardous waste and other garbage and other four categories, set the corresponding delivery containers, guide, constraints residents classified according to specifications serving garbage.<sup>[3]</sup> Guangzhou City, the supply and marketing cooperative renewable resource recycling network system of garbage removal and sanitation network integration, set up more than 3100 recyclables Recycle Bin (point) in the city, the Recycle Bin (points) and RCP Merge Settings. The City Sanitation compressor stations and supply and marketing cooperatives also next to a refuse transfer station supporting the establishment of renewable resources, the transfer station, a professional or a combination of renewable resources sorting centers in the street (town), traditional renewable resource recycling and garbage removal site on function points integration, to achieve low garbage and recyclables collection, storage and transportation.

3.2.3 The establishment of classification and delivery system, mixed collection and transportation for the classification of transport. Guangzhou's practice is like this: In terms of urban life garbage removal by the municipal government funded the purchase of 454 sets of special transport vehicles and food waste hazardous waste transport vehicles designed to optimize the collection, transportation lines 704, upgrade compression station 91, to establish a temporary repository for hazardous waste 60, strengthen supervision and management of hazardous waste, the classification of category serving garbage collection, transportation.

In terms of improving the rural refuse collection and transportation system, 36 villages and towns in Guangzhou have completed the construction of one station (compression station) in one town, 6268 natural villages have basically completed more than one collection point of domestic garbage, established a "household classification, village collection, town, transportation, city (district) process "rural waste collection and transportation system.

In terms of coordination and delivery mechanism, Guangzhou City supply and marketing cooperatives to the community recycling site free of charge to the sanitation workers to use, low value recyclables collected by the urban transport system classification and classification of transport, renewable resources by the supply and marketing cooperatives acquired by market enterprises, recycling business and government sharing related costs. City supply and marketing cooperatives to the government on the low value of recyclable 90 yuan per ton of subsidies allocated to the classification, recycling, processing links. Residents, sanitation workers, enterprises and other shared interests, including sanitation workers in the collection and collection of recyclables to increase revenue, supply and marketing cooperatives to reduce transportation costs, to achieve a multi-win situation.

3.2.4 The establishment of classification processing system. Classification is the source of delivery, classification and transportation is a hub, classification is the purpose. Guangzhou's approach is: in the low-value recyclable recycling, the city supply and marketing cooperatives to build three waste glass recycling center, 1 waste plastic (bag) resource treatment project, 4 wood waste recycling treatment center, a large waste furniture dismantling center and garden waste recycling center. The dismantling, processing and recycling of low-value recyclables such as waste glass, waste plastic bags, waste wood, old furniture and garden waste. City supply and marketing cooperatives construction of these projects to ensure that the separation of low-value recyclables have a place.

At the same time, the city supply and marketing cooperatives also develop the "Internet" community garbage collection model, the use of APP mobile platform, the residents of garbage classification points scheduled to launch points and booking home recycling. In the construction of garbage treatment facilities, Guangzhou City, the new or to be built in the waste incineration plant 7, food waste disposal facilities 9. By the end of "Thirteen Five", the Guangzhou daily garbage incineration capacity will reach 16,000 tons of food waste daily processing capacity of 4800 tons.

3.2.5 The establishment of policy support system. The classification of household waste put thousands of households involved, which requires the government in the publicity and guidance, but also the introduction of binding laws and regulations, the behavior of the public to regulate the waste and restraint. In the recycling process, because the low value of recyclables alone is difficult to drive the market value of the law, the Government must introduce financial compensation measures to support the classification of low-value recyclables can continue to operate. Guangzhou Municipal Government has promulgated the "Guangzhou Municipal Solid Waste on the improvement of the classification system of work program", "Guangzhou Municipal Solid Waste Classification Management", "Guangzhou City to buy low-value recyclable materials recycling services management pilot scheme."

These policies, objectives garbage classification management principles, requirements, methods, obligations and rights to regulate and manage the whole process, in order to determine the reduction of solid waste for the purpose of metering charge ladder, as well as ecological compensation measures restricting excessive packaging management Interim Measures, the introduction of the low value of recyclable materials to give 90 yuan per ton subsidy, as the Government to buy business recovery service standards, to encourage renewable resource recycling enterprises to enter the waste separation front-end recycling business.

#### **4. The integration of the two networks is a renewable resource across the viable transition path.**

In recent years, China's economic development has entered a new normal, the traditional industry restructuring, out of backward production capacity, shrinking demand for commodities, coupled with lower international prices affected by major domestic varieties of renewable resources prices fell, scrap even down the price of cabbage. Coupled with rising labor costs, tax burden, renewable resources, significant decline in economic efficiency of enterprises, the industry has entered the most difficult stage of history, leading to a large number of industrial enterprises to suspend or quit, the withdrawal rate of close to 20%, at least 200 million migrant workers no longer engaged in renewable resource industries, rural unemployed back.<sup>[4]</sup> 2016, 2017 renewable resources industry is expected to remain in the doldrums, the outlook is bleak.

In this grim situation, the urgent need to upgrade the industry of renewable resources, from a simple focus on the use of resources and environmental services to the resource utilization both in transition from traditional to renewable resources, new business transformation service provider in the field of environmental protection. Through the transformation, renewable resources, the role and value of re-positioning, access to new space for survival and development.

4.1 To carry out the use of low-value recyclable resources in line with renewable resources industry, public property positioning.

Low-value recyclable classification and recycling and resource utilization, involving urban and rural living environment, because it is labor-intensive, but also related to the bottom of the employment and income of migrant workers, which has significant social commonweal properties. In the new normal economy, the renewable resources industry's social public properties and environmental attributes have been greater than the resource attributes.<sup>[5]</sup>

The implementation of two network integration, to carry out low-value recyclable materials, recovery and resource utilization of renewable resources industry responsibility. Supply and marketing cooperatives have unique organization and service system with Chinese characteristics. The organization is diversified in composition, diversified in assets and special in status. It embodies the policy guidance of the party and government and public service entrusted by the government. Moreover, the supply and marketing cooperatives have established a recycling network covering urban and rural areas, has accumulated a wealth of renewable resources industry experience. Therefore, to carry out the work of resource utilization of low value recyclable materials is also an inevitable choice for the function orientation of urban supply and marketing cooperatives under the new normal conditions. Of course, other renewable resource enterprises also have the conditions and basis for participation.

4.2 Low-value recyclable resources can promote the use of front-end waste reduction.

The fundamental purpose of waste classification is to use, only the back-end use of channels open up, the establishment of renewable processing, recycling industry chain, so that the front-end classification of low-value resources are available, can be used to promote and maintain long-term front-end classification initiative. Therefore, we must conform to the law of industrial development, the establishment of both the key link from the breakthrough, but also explore the various aspects of organic coordination of the operating mechanism, forming a complete classification, recycling, processing, use of industrial chain, to ensure that the

garbage reduction and resource-based system continuous operation. <sup>[6]</sup>The establishment of the back-end processing and utilization of industrial chain, it is renewable resources business long.

4.3 Waste separation and resource utilization of the industrial chain convergence is a new development path of renewable resources.

Low-value recyclable items miscellaneous, a large number, is the focus of domestic waste reduction and difficulties. Guangzhou municipal government on the recovery of low-value recyclable materials, to give 90 yuan per ton subsidy to encourage third-party purchase of government services, to carry out PPP cooperation model. Guangzhou's policies are replicable across the country. For renewable resources enterprises, in the new economic norm, the traditional varieties of market shrinking, prices fell, the operation is very difficult.

Recycling of low-value recyclable materials is an interlocking, organic link of the complete industrial chain. Renewable resources enterprises through the two networks, the purchase of government services, waste separation and recycling industry chain link, not only to improve the quality of urban environment, but also access to local government land and financial preferential policies to support the industry downturn in the development of the situation new development path, to achieve environmental protection enterprises restructuring and upgrading.<sup>[7]</sup>

4.4 "Two networks integration" is to mobilize local financial support for the effective means of enthusiasm.

At present, the national tax policy to "Camp changed to increase" as the main content is being implemented, the central order to fully mobilize the enthusiasm of local government finance, special transfer payments in the initial reduction, including the Ministry of Finance, Ministry of Commerce, "the central government to promote the development of service industry special funds management approach "in subsidies objects and content have great adjustment, the original fixed proportion of direct subsidies of renewable resources sector, on the future allocation varies greatly, independent places allocated increasing margins . How effective means to participate in this part of the allocation of funds to come, we should focus on consideration.

"Two network integration" just provides an opportunity. Due to strong local financial resources, high population density, and high waste disposal costs, the "Two networks integration" will first be promoted in these cities to form a mature model and then to other cities, such as Beijing, Shanghai, Guangzhou, Shenzhen and other large cities.

Urban and rural garbage disposal mode, a lot of talk in the industry to explore. With the "Garbage siege""Garbage village" more and more serious, life garbage classified launch, classification recovery, the implementation of "Two networks integration" is imperative. Perhaps the two networks are not necessarily the best solution, but this model has already emerged, some places (such as Guangzhou) to promote the practice of the two networks have to reduce the amount of garbage disposal, resource utilization, achieved some experience and results, and had to copy and learn from the model. We hope that in practice this model can go further.

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