

The status of rural garbage disposal

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Abstracts. With the development of rural construction and the improvement of the living standard of residents, the production of rural living waste is increasing day by day. These wastes not only pollute the environment, destroy the rural landscape, but also spread disease, threaten the life safety of human beings, and become one of the public hazards. The problem of rural living waste is a major environmental problem facing China and the world. This paper make a summary analysis about the present situation of municipal waste in China, this paper expounds the problems in rural garbage treatment, and in view of status quo of municipal waste in China put forward comprehensive countermeasures.

1. Rural household garbage production and processing

With the continuous development of China's national economy and the increasing living standard of the people, a large number of rural garbage will be produced every day, which has become an important source of environmental pollution. Many cities in China have more than 1kg/(human) per capita living waste per capita [1]. At present, the city life garbage discharge one hundred million tons, accounting for 26.5% of the world's waste discharge total, and by 8% a year -- a rate of 9% growth, rural life garbage output is about 352 million t in 2010, the highest in the world [2]. Over 500 million m² of land has been occupied by municipal refuse in China, and the annual economic loss is as high as 30 billion yuan. By the end of 2008, 655 cities in the country had a total of 1.52 x 10⁸t of living waste, 453 of all kinds of living sites, 27.2 x 10⁴t • d⁻¹, and a concentration of about 9400 x 10⁴t, with a concentration of about 62 percent. Among them, 363 municipal solid landfill sites were treated with 21.5 x 10⁸t • d⁻¹, and the amount of landfill disposal was about 7 664 x 10⁴t. The processing capacity of 17 rural refuse compost plants is 0.79 x 10⁴t • d⁻¹, and the processing capacity is 250 by 10⁴t. City life waste incineration plant 67, processing capacity 4.58 x 10⁴t • d⁻¹, processing capacity 1 466 x 10⁴t. According to the statistics of treatment, the proportion of landfill, compost and incineration accounted for 81.7%, 2.7% and 15.6% respectively. According to the statistical analysis of the traffic volume, the proportion of landfill, compost and incineration accounted for 50.4%, 1.6% and 9.6% respectively [3, 4].

Although in recent years, certain achievements have been made in the city life garbage disposal in our country, but the overall living garbage processing capabilities are not obvious, capacity growth lags behind the garbage output growth, a large number of rural living garbage because it could not get timely treatment and piled up in the suburbs, occupy a large area of land, part of the city is faced with the threat of junk siege. In the next 30 to 50 years, it is the peak of population and ruralization in China, which can be predicted: the transport system and the ability of clean and transportation of rural life refuse are increasingly severely challenged [5].



2. Main treatment methods and status quo

The goal of solving the garbage problem is to reduce, reduce, resource, energy and harmless treatment. There are three kinds of rural waste disposal methods which are widely used in China and the world.

2.1. *The landfill*

Landfill is one of the earliest and most widely used garbage disposal techniques. The early landfill disposal was simply landfill, without taking into account the problem of landfill gas and leachate treatment, which caused serious environmental pollution. It was not until the 1930s that the concept of "sanitary landfill" was first proposed in the United States [6]. Sanitary landfill method is simple in technology more mature, operation management, large capacity, low investment and operation cost, applicable to all types of waste [7], is the main way of garbage disposal in the world today [8]. However, there are some disadvantages to landfill disposal: (1) it occupies a large amount of land resources, so that the site selection of new landfill site is difficult. (2) the landfill leachate is not properly treated and can cause pollution to the surrounding environment of soil and groundwater; (3) methane and other gases produced by landfill waste fermentation are both the fire and explosion hazards [9].

Landfill is the main way for our country to deal with the waste of rural life [9], and the landfill disposal capacity of our country accounts for about 80% of the total amount of garbage. From the perspective of the development of nearly 10 years, significant advances in technology of municipal solid waste landfill in: in terms of landfill anti-seepage, guangzhou, shenzhen and so on many new waste sanitary landfill site adopted advanced HDPE membrane [10] seepage control technology; For the treatment of landfill gas, some large landfills can collect and use landfill gas for electricity generation and other USES [11, 12]. The related research of landfill leachate treatment technology is more and more [13-15], and its treatment methods mainly include physicochemical treatment, biochemical treatment, land treatment, etc. [16, 17]. Because in general, high concentration and difficult to treat landfill leachate water quality is not stable, the processing of a single technology is hard to meet the requirements of standards, most landfill in China adopted a "chemical pretreatment (coagulation precipitation, ammonia nitrogen to remove, chemical oxidation, etc.) + biological subject (anaerobic, anoxic and aerobic, etc.) + physicochemical depth (adsorption, reverse osmosis, catalytic oxidation, etc.)" [18] the combination of technology, processing cost is higher, and lower cost of land treatment method such as injection method, mineralized refuse bioreactor bed process less actual application.

Although domestic leachate treatment etc, the application of advanced technology [19], but is limited by economic factors, the general application situation is not ideal, there is a considerable amount of landfill facilities is insufficient, prevention and control technology, and the lack of standard operation management and effective supervision, environmental pollution problems [20, 21].

2.2. *Burned*

Incineration has been used for more than 100 years, but the control of incineration (combined with flue gas treatment, waste heat utilization, etc.) appeared decades ago. Currently, there are nearly 2,200 waste incinerators in the world, of which about 900 are incinerated. The total processing capacity is 57.6 million t/d, and the amount of waste incineration in the year is about 150 million t [22]. Municipal solid waste incineration with less land, site selection, processing time is short, the reduction was significantly (weight loss 70% commonly, let general 90% reduction), a complete innocuity and the advantages of recyclable garbage incineration of waste heat has become important to solve the problem of waste a lot of city plan [23]. The selection of waste incinerator is very important, which is directly related to the investment of equipment, operating expenses and the adaptability of existing waste. The basic principles and requirements of the selection of waste incinerators: effective incineration of disposal of existing waste, low cost of equipment, cost of operation, and high value of energy and resource recycling [24, 25]. Waste incineration technology in the world already have decades of application and development, at present, the incinerator sort is more, in the world in

general can be summarized as three kinds [26] : rotary kiln incinerator, fluidized bed incinerator and the grate type incinerator.

2.2.1. Rotary kiln waste incinerator, the combustion equipment of rotary kiln incinerator is mainly a slow-rotating rotary kiln. The inner wall can be made of brick masonry, and pipe type water wall can be used to protect the roller. Yuan shuguang et al. [27] used the cement kiln to combine the newly developed multi-stage drying incinerator to deal with the rural garbage. Living garbage after dehydration, crushing and sorting of pretreatment, burned into multi-stage drying incinerator for drying and after burning into the cement kiln decomposition, this method is characterized by the garbage disposal is thoroughly, no secondary pollution, saving the cost of processing.

But the technology also has some obvious disadvantages: furnace turn slowly, garbage processing, combustion is not easy to control, the refractory lining wear serious, maintenance frequency is higher, its granularity on the garbage also to have certain requirements. This makes it difficult to adapt to the needs of power generation, and it is used less in current waste incineration generation [28].

2.2.2. Fluidized bed waste incinerator, the fluidized bed incinerator has no movement of the furnace and the grate, the furnace is usually arranged in a vertical position, the porous distribution board is set in the bottom of the furnace, and a large amount of quartz sand is put into the furnace as the heat carrier. Because our country domestic waste calorific value is generally low, and there are parts of the city of incinerators in fluidized bed coal burning garbage incineration technology, such as shaoxing garbage incineration power plant, the plant burning garbage 400 t/d, mixed coal capacity is 100 t/d, output per hour 15 MWH [29]. This technology has just been applied in our country, and it has been mixed with a lot of coal, which is not consistent with the industrial policy of waste incineration, and is still in the experimental stage.

2.2.3. Furnace type refuse incinerator, The use of the furnace waste incinerator has a long history, a variety of varieties, mature technology and high reliability, and the furnace has a compact structure and high thermal efficiency. At present domestic choose grate furnace of incinerator is more, for example: tianjin port of double incinerators, Beijing gaoantun incinerators, incinerators in pudong, Shanghai, shenzhen nanshan incinerators incinerators, ningbo and so on are chosen is grate furnace [28]. The characteristics of the grate furnace is moving grate through activities, promote rubbish from the upper to the lower level, to have the effect of cutting, flip and mixing waste, achieve full burning, it is made of special alloy of grate, wear-resisting, high temperature resistant, furnace wall and patio by water or fire brick wall, ensure garbage under the condition of controlling temperature burning, burning.

However, due to our country rural house refuse low calorific value, high moisture content, ash content, composition diversity [30], so low combustion efficiency and occurs on the burning in the hearth furnace temperature is low, the problem such as flue gas composition complex [31]. It is necessary to carry out in-depth study on the incineration treatment process of rural living waste (mainly including incinerator and gas purification).

2.3. Compost

Domestic waste composting technology for treatment of organic waste an irreplaceable method, with its high degree of harmless, decrement, the effect is obvious, can maximise the characteristics of the life garbage recycling, under China's current economic condition to get a gf application [32].

The composting process causes the microorganisms to decompose the perishable organic matter in the garbage and turn it into organic fertilizer. It is characterized by high degree of harmlessly and can maximize the resource of garbage disposal [33]. However due to the low degree of classified collection of rural garbage, with the improvement of living standard and the diversification of life style, the composition of the municipal waste has become increasingly complex, the factory waste stone, metal, glass, plastic stool is contained in a variety of non-biodegradable components, also include a variety of

poisonous and harmful chemicals, directly affect the quality of our products and composting may pose a potential pollution, you must set up complex sorting, crushing process, which greatly increased the compost processing costs.

And compost treatment equipment technical level is low, prone to foul during fermentation, the process condition is difficult to control, especially the increase in mechanized operation technical problems more, it is difficult to guarantee the composting facilities in the long-term, continuous and stable operation, low efficiency of compost. Compost and compost product is conditioned by the market is bigger, received the product cost and quality constraints, because of the low waste fertilizer fertilizer effect, cost is high, the lack and the competitiveness of the common industrial fertilizers, makes waste composting plant several years of losses, the current number of composting plant appeared a downward trend, at present, only Beijing, sichuan, guangxi, Shanghai waste composting plant in operation [34], in our country the living garbage processing guide is no longer recommended [23].

3. The development trend of rural garbage disposal technology

There are some advantages and disadvantages to the main methods of the disposal of municipal household waste in China, but the overall positive ones are much better than the direct stacking of the past. With the continuous development of science and technology in recent years, the waste disposal industry has come up with some new methods, which are worthy of reference and utilization.

(1) Microbial waste treatment technology. Microbiological treatment is the process of using microorganisms to biodegrade organic compounds and form a stable compound under certain control conditions. The microbiological treatment technology depends on the structure of the microorganism and the metabolism of the environment. At present, there are a lot of scholars have analyzed the characteristics of microorganisms under the environment, use a variety of ways to change process of microorganism quantity, quality, etc., have developed a variety of microbial garbage disposal technology, such as enhanced microbial treatment technology, gene mutation, etc. Adopting microbiological technology to deal with garbage can minimize the pollution caused by garbage disposal to the environment, and have a broad development prospect.

(2) Resource waste building materials technology [35]. Currently, the construction materials used to make the waste are not yet industrialized in China, but the international use of waste production building materials has become mature technology. Russia's patented technology has been awarded the international eureka gold award and several other incentives, which have now begun to industrialize production and transfer technology to other countries. This product can be used in rural construction and industrial buildings, as well as railway track construction. It is characterized by the fact that the waste does not need to be sorted, the production process does not produce harmful waste gas, waste water and sediment can be recycled, and the whole production process is clean production.

From the point of view of technology and economy, rubbish building materials has a strong market competitiveness; From an environmental point of view, its effect is better than that of sanitary landfill, incineration and composting technology. Therefore, waste building materials have broad application promotion prospect.

(3) Rural waste pyrolysis treatment technology [36]. Developed by our country the first municipal waste pyrolysis gasification treatment technology, is combustible part of the city garbage into the specific device, turn them into a combustible gas, and the use of the combustible gas combustion heat generated by the steam power system power. The technology is fully utilized for thermal energy, which is obviously superior to other technologies in terms of economic benefits, thoroughness and pollution control. This technique is used to dispose of garbage, and it is necessary to classify the waste in the early stage, and then the burning part is sorted out from the garbage, and then the pyrolysis treatment is carried out. Rural waste pyrolysis gasification and gasification treatment technology is an independent research and development technology project in China, which is one of the important contributions of China to the world environmental protection cause.

Mentioned above city garbage disposal technology though it is only in the research and development or the trial stage, but its economic benefit and environmental protection have achieved good results, the future will become the main trend of city garbage disposal. As foreign and domestic research institutions and scholars to the problem of rural garbage treatment seriously, garbage disposal technology will be widely in-depth research, which will open many new methods of rural garbage treatment and ways, make the garbage from the original city "blind Angle" has become an important part of rural development.

4. Suggestions

Current rural waste management is basically formed under the planned economy system, environmental health department both perform supervision and management functions, and the specific organization of garbage pickup and final processing, presents the status of the "enterprise management", this is very not adapt to the socialist market economy. Must, therefore, from the Angle of the marketization and industrialization to view and manage the garbage disposal problem, to set up special waste disposal units or company specialized processing to waste, to reduce processing costs, improve the treatment effect, attaches great importance to the environmental impact, the level of industry. Only in this way can we adapt to the demands of the market economy and solve the problem of garbage that is plaguing the city.

It is important to make sure that garbage collection is collected from the source of garbage collection, and the garbage collection and classification can be carried out strictly and scientifically, which will increase the resource value and utilization efficiency of garbage, and lay the foundation for further disposal of garbage. In our effort to learning and the introduction of the garbage disposal technology of developed countries, on the basis of increasing waste treatment technology research and development of human and capital investment, and connecting with the present situation of the city in our country, working to improve our country's existing flaw and the insufficiency in the garbage disposal technology, finally developed a suitable pattern of city system of garbage disposal technology of our country.

In order to improve the management of garbage collection and disposal from environmental standards and legislation, the municipal waste disposal system and facilities that fail to meet the standards should be actively improved to meet the standards. We try to increase the garbage disposal technology and its importance of publicity and education activities, within the scope of the universal set up the idea of environmental protection and efficient disposed of the rubbish, make citizens in thinking to know the importance of garbage disposal for rural development. Only in this way can our city truly get rid of the problems caused by garbage, and finally realize the rural goal of pleasant environment and ecological harmony.

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