

The Feasibility Analysis of Green Cement's Economic Benefit in Baoding City

Jing-Yan Li

School of North China Electric Power University BaoDing, Hebei 071000, China

15932022562@163.com

Keywords: green cement, economic benefit, Baoding City

Abstract: With the developing of China's economy and elevating of the consumption level of resident, trash in our city is increasing increase. The stress it brings to the environment is unmeasurable. In order to alleviate the problem of municipal solid waste efficiently, the green cement is emerging. This paper take a pilot run project of a new dry cement production line in Baoding for example for the sake of analyzing the economic benefit of it. The analysis result shows that the green cement has a good economic feasibility.

1. Introduction

As the development of the economy and modern industry in China, the amount of the trash is increasing year by year, and the problem of the trash encircling the city is increasing stick out, which leads to more and more serious environmental problems. Traditional garbage landfill, compost, and incineration techniques are difficult to satisfy the increasing strict requirement of environmental protection. And at the same time, it also brings much pressure to the government decision-making. Therefore, seeking an environmental, efficient, economic, and thorough scheme to solve the problem of municipal solid waste is one of the most critical mission in China. Also, the cement industry is a heavy polluter in China. According to the statistic of the environmental protection administration, the cement industry accounts for 70 percent of the main polluted industry trades.

The waste incineration technology can reduce the garbage capacity up to above 76 percent effectively, and it occupy small space area which is difficult to cause water pollution. Apart from that, the heat produced by waste incineration can also use to supply heat and generate power. These years, the waste incineration technology develops quickly, and may become the mainstream way of garbage disposal. It is estimated that the garbage power will increase to 40 percent by 2020s [1]. But when we consider the effect of waste power plant again, we can find that up to Jun. 2016, there are 74 projects of waste incineration power generation and estimated total investment is about 30 billion. But the total capability to compose garbage is under 150 million ton which is less than 10 percent of the garbage production in China. And due to the unstable running of waste power plant, the power generation benefit is inconspicuous.

Producing green cement using household garbage is an important mean to compose hazardous wastes and municipal solid waste in developed countries, which gains widely acceptance. This paper based on the economy and environmental situation in Baoding, take a pilot run project of a new dry cement production line in Baoding for example to analyze the feasibility of producing cement using garbage to substitute the part of the raw material and fuel. Thus, this paper provides a new idea to promote the circular economy of cement industry.

2. Present garbage disposal in Baoding

The integration in Jing-Jin-Ji area bring also the opportunities and challenges in Hebei provinces, which include the stress of environment and garbage [2]. Although Baoding city has made an achievement these years in composing garbage, the total capacity to compose garbage is deficient, such as mode is single and the technology is deficient [3]. The growth rate of garbage disposal capability is slower than the growth rate of the garbage output, which becomes the main bottleneck of

the urban sustainable development. At present, the current situation of garbage disposal in Baoding is as follows: large garbage output but low water content, behindhand waste collection ways, low efficient waste collection and transportation, obsolete equipment of waste collection and transportation etc.. The specific modes of garbage disposal can be seen as Fig.1.

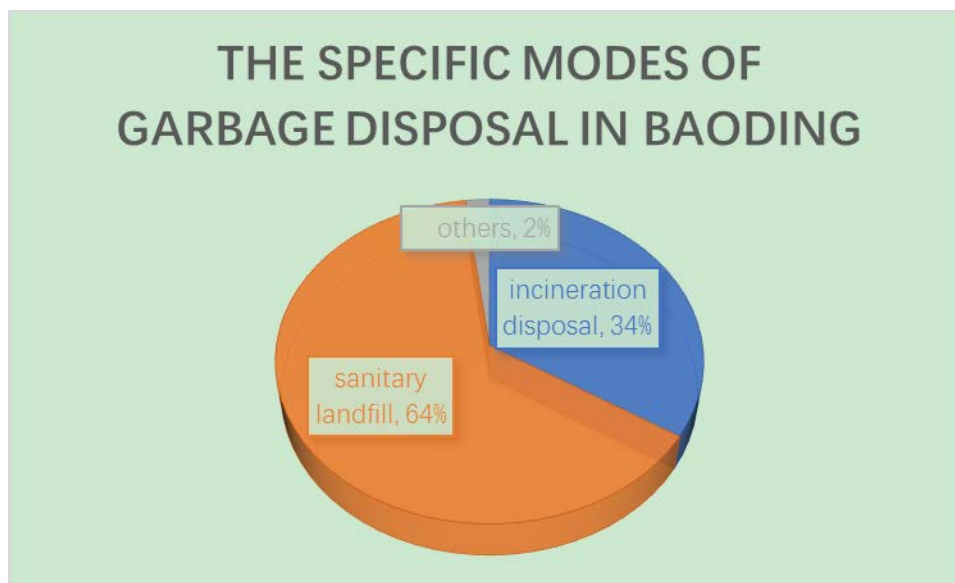


Fig.1 The specific modes of garbage disposal in Baoding

3. Economic benefit analysis

This paper take a pilot run project of a new dry cement production line in Baoding for example to analysis its economic benefit. The specific situation is as follows.

At present this cement industry ambient county can collect garbage to 300 to 400 tons, which mainly adopt methods of garbage landfill and incineration and the percolate is not concentrate disposal which cause to severe pollution to the ambient environment and surface water source. According to the character of the garbage in Baoding, the project locates 300 tons garbage per day.

In the process of producing green cement, garbage can be used for both raw material and fuel which reduce the cost in a large scale. By investigating many literatures can we find that most cement industries take advantage of the garbage generating by its own self or transmitting by other related department, which means that they don not need to pay extra cost, and on the contrary can obtain the corresponding subsidy of the country.

3.1 Investment estimation

The total project investment of the project is 65.83 million, which includes the construction investment 63.33 million (mainly used as introduce waste treatment equipment and modify rotary kiln), interest incurred during construction 1.5 million, initial working capital one million. The total project investment estimation is as Tab.1.

Tab.1 Total project investment estimation

Sequence number	Name of cost or project	Total (10000 yuan)
1	Construction investment	6333.00
1.1	Constructional engineering	2300.00
1.2	Original equipment cost	3144.00
1.3	Civil and erection cost	419.60
1.4	Other costs	469.40
2	Interest incurred during construction	150
3	Initial working capital	100.00
4	Total project investment estimation	6583

3.2 Technological and economic analysis

This project takes advantage the rotary cement kiln to compose household garbage which can compose 90000 tons' garbage at least after the project put into production. This project reduces the ambient household garbage and environmental pollution leading to great social and environmental benefit. This project is a technical transformation project which mainly obtain benefits from government subsidy and power density. The construction investment is 63.33 million, interest incurred during construction is 1.5 million, initial working capital is one million. The construction time is one year and production period is twenty years.

3.2.1 Financial analysis

By investigating many literatures, we find that producing one ton clinker can consume household garbage 0.158 to 0.316 tons, and substitute the coal with 22000kJ/kg calorific value 0.032 to 0.064 tons.

This project's main income is government's subsidy. The project can process garbage 90000 tons at least, according to the subsidy 160 yuan per ton which operate 300 days per year, the industry can make a profit by 14.4 million yuan. At the same time, the income by saving coal is 3 million per year and the benefit by utilizing slag is 0.48 million yuan per year. Therefore, the total income is 17.88 million yuan per year.

The project needs one year to establish, and the evaluation periods is twenty years.

3.2.2 Operating cost analysis

The operating cost of the project can be seen as Tab.2.

Tab.2 The table of operating cost

Sequence number	Names	Cost (10000yuan)
1	The power consumption of burning	131.2
2	leachate treatment	40.76
3	Staff salary and welfare	100.00
4	Operation and maintenance costs	190
5	administration cost	124.50
	annual operating cost	586.46

3.3.3 The financial indexes of the project

The financial indexes of the project can be seen as Tab.3.

Tab.3 The table of financial indexes

Sequenc e number	Names	Unit	Value	remarks
1	Total project investment	1000yuan	6583	
(1)	Construction investment	1000yuan	6333	
(2)	Initial working capital	1000yuan	100	
(3)	Interest incurred during construction	1000yuan	150	
2	Financial analysis			
(1)	operating cost	1000yuan	1788.00	Annual average
(2)	taxes and additional	1000yuan	0.00	Annual average
(3)	added-value tax	1000yuan	0.00	Annual average
(4)	annual operating cost	1000yuan	586.46	Annual average
3	Profitability analysis			
(1)	Financial Internal Rate of Return	%	14.5	the cement industry IRR is 11%
(2)	Static payback time	year	5.48	Not including construction period
(3)	return on investment	%	18.25	

This total investment of the project is 65.83 million yuan, and it can make good economic benefit when it comes to use. The financial Internal Rate of Return is 14.5% which is larger than the cement industry IRR 11% and the static payback time is 5.48 years (Not including construction period) which show that it is feasible. This project has a small risk to contrust and at the same time it make the

cement production line more environmental friendly in the process responding national environmental protection policy. In a word, it has a good social benefit.

4. Conclusions

This paper firstly analyzed the current situation of garbage process in Baoding, then take a pilot run project of a new dry cement production line in Baoding for example to prove the feasibility of it. Then, we can get the following conclusions.

Firstly, the garbage process in Baoding has the same characteristic with other ordinary cities. Judging from the present condition, the growth rate of processing capability is far slower than the growth rate of garbage output, which becomes the main bottleneck of the urban sustainable development. As long as the country increase the subsidy and at the same time strengthen the supervision and management, the garbage disposal and cement industry will drive the joint development of Baoding's environment and economy.

Secondly, the green cement project has a good economic benefit according to the project in Baoding, which shows that the financial internal rate of return is 14.5% which is larger than the cement industry IRR 11% and the static payback time is 5.48 years. All these indicate that the green cement project has a large potential.

References

- [1] Pang Lei, Ni Guicai, Yan Guangxu. The hazard of household garbage and the integrated pollution control countermeasures[J]. *Environment and Sustainable development*. 2004(2):15-16
- [2] Ma Jianli, Guo Bin, Zhou Baohua. The current situation of the Municipal Solid Waste in Hebei province and industrialization analysis[J]. *Environmental sanitary engineering*. 2006,14(1):4-6
- [3] Duan Pengyu. The current situation of Baoding's Urban life garbage dump and the constructing planning[J]. *Resources Economization and Environment Protection*.2016(5):172-172