



# 中国城市生活垃圾填埋气体利用 the development of MSW LFG Recovery in China

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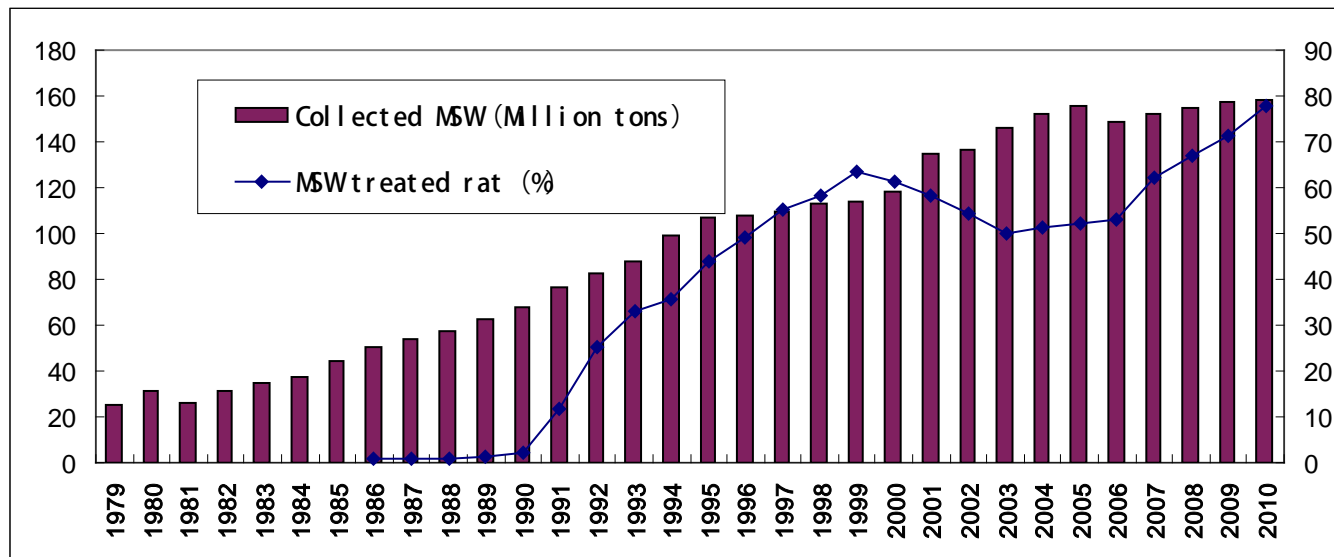


# Main content

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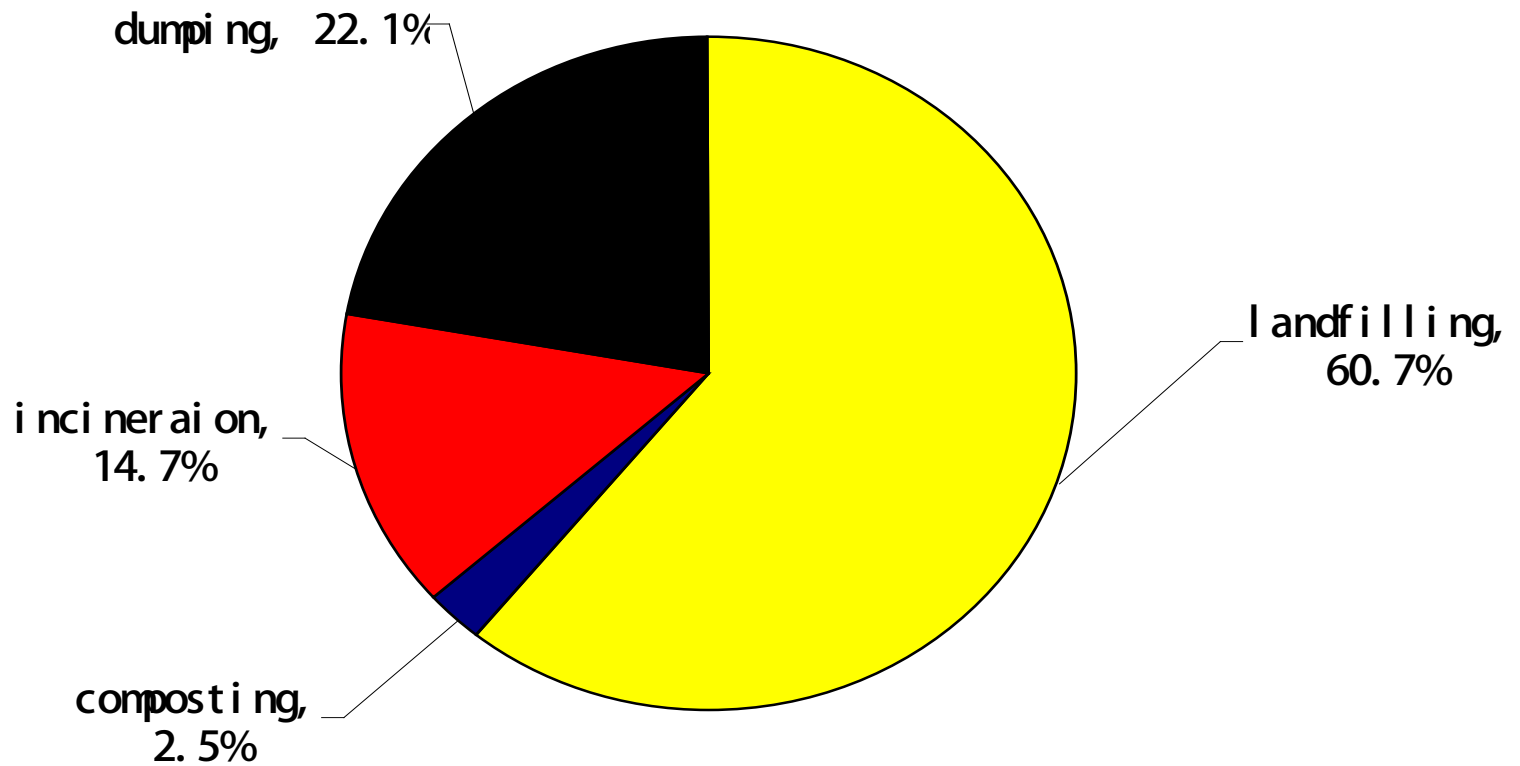
- 1. General situation of MSW Treatment**
- 2. Landfill treatment**
- 3. LFG recovery**
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# 1. General situation of MSW Treatment in China



The average rate of increase in waste collected each year is about 2% between 2001-2010 (see Figure1 ). In 2010, six hundred and fifty four cities across China had generated approximately 158million metric tonnes of MSW for disposal in 628 facilities, And with 158million metric tones MSW ,Landfilling accounted for 60.7%, incineration accounted for 14.7% ,composting accounted for 2.5% ,the rest was dumping .To be clear, this is the quantity of waste for disposal after recycling activities in 2010 alone.

# MSW Treatment Rat in 2010



# Material recycling & MSW collection



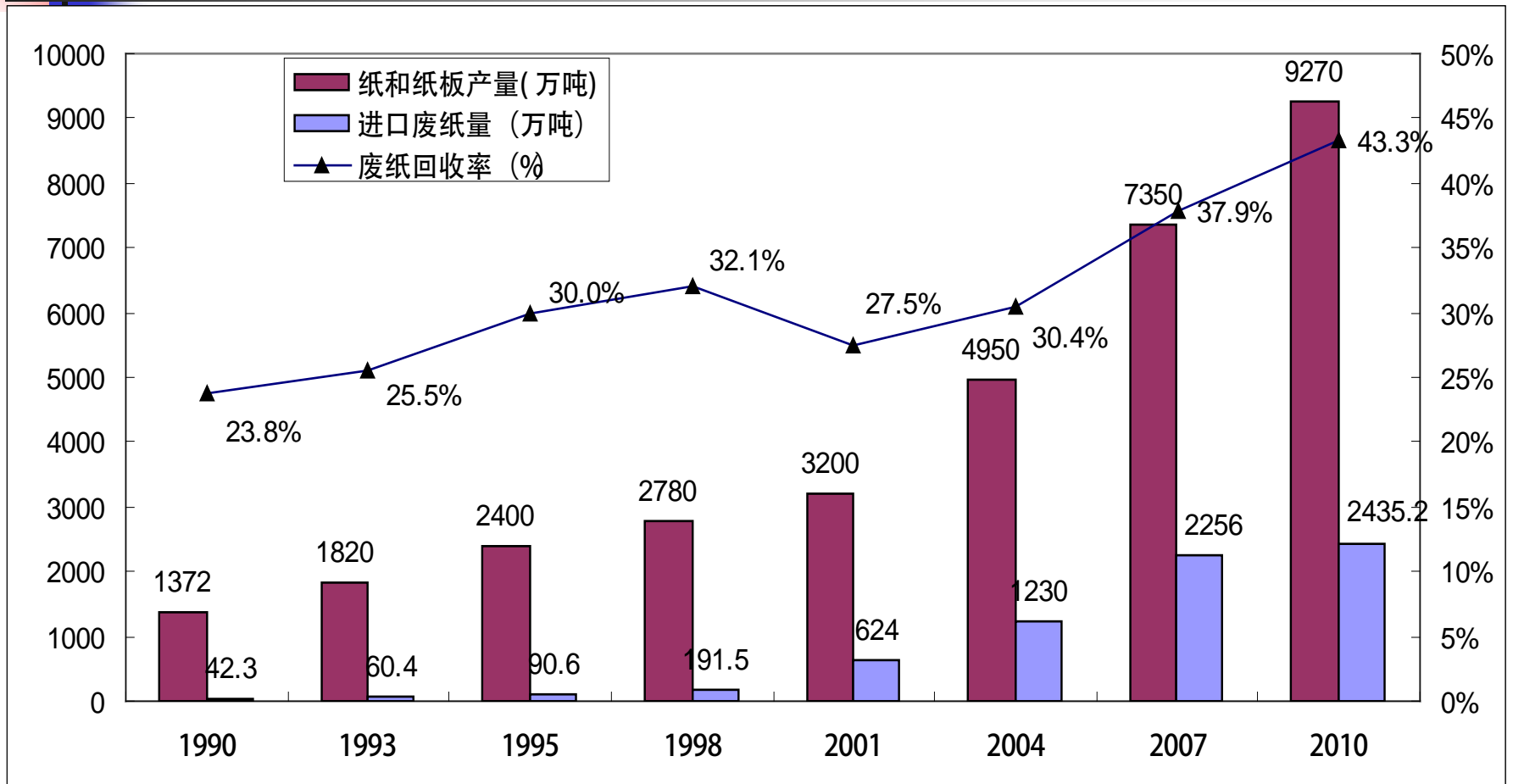
# Material recycling & MSW collection



# Material recycling & MSW collection



# Waste paper







## 2. Landfill treatment

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- For a long time, the prevailing method to treat of solid waste in most of the cities of China was “nature piling” – gouge-filled and pit-filled – methods that do not only use a lot of land resources but also pollute and menace our environment. Specially the leachate from the landfill treatment site, has polluted the water sources and environment because there was no proper collecting & treatment systems.
- Over recent years, as part of the evolution of landfilling in China, and with financial support from nation level, a number of landfills have been commissioned that use liner systems. More and more MSW are treated in sanitary landfill sites. The standard of liner design and construction in China is on par with international standards .

# Landfill liner

衬层铺设



铺设完毕的填埋场



- **HDPE膜防渗使用历史**
- 1995年,HDPE膜首次应用于我国的深圳危险废物填埋场,
- 1997年,我国第一个采用HDPE膜防渗的垃圾卫生填埋场——深圳市下坪固体废弃物填埋场

# Landfill sites





# Landfill operation





## Leachate treatment requirement(GB16889-2008)

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For normal area:

- COD<sub>cr</sub> ≤ 100mg/L
- BOD ≤ 30mg/L
- NH<sub>3</sub>-N ≤ 25mg/L
- TN ≤ 40mg/L
- TP ≤ 3mg/L

For special area:

- COD<sub>cr</sub> ≤ 60mg/L
- BOD ≤ 20mg/L
- NH<sub>3</sub>-N ≤ 8mg/L
- TN ≤ 20mg/L
- TP ≤ 1.5mg/L

# Leachate treatment facilities



# Covering of landfill





# Smell control



# 3. Landfill gas recovery

- Renewable Energy Law of People's Republic of China is implemented from Jan. 1 2006. according to the development program of renewable energy, hydropower, wind, solar, landfill gas, biomass energy use are promote, by the year 2020, renewable energy consumption accounted for the proportion of primary energy consumption will reach 15percent. The price of the electricity from LFG will be priority to electronic net and will get 0.25 Yuan RMB/kW more than the price of the electricity from coal. By the end of 2011, 46 LFG utilization projects had been completed and commissioned throughout mainland China, and the total capacity has reached 96MW.



## The first LFG recovery project in the Tianziling landfill site of hangzhou city in 1998

1998年10月，  
我国第一个  
填埋气体发  
电厂在杭州  
天子岭填埋  
场建成发电。



# LFG flare and recovery



# LFG flare and recovery



# LFG flare and recovery



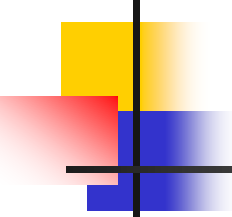
# LFG flare and recovery



河北邯鄲



武汉陈家冲垃圾填埋场



**By the June 05,2012,65 LFG  
recovery Projects have approved by  
NDRC in China with the annual CO2  
reduction 7.91 million tCO2e**





## 4. Trend and challenge

- **Waste to energy will develop quickly.** Comparing with landfill, refuse incineration has many advantages, such as small land occupation, short treatment time, waste heat recovery and great quantity reduce. The population density in many areas of China is very high, especially in east area. The refuse incineration would be an important waste treatment method in these areas. At present, MSW incineration develops very quickly. It is estimated the waste to energy capacity will be increased to more than 150 thousand tons per day in next five years. As the public worried about pollution from waste incineration especially dioxin, Construction of MSW incineration plant encountered strong opposition in some cities such like Beijing, Guangzhou, etc.



## 4. Trend and challenge

- **It is needed to establish household hazardous waste collection system.** The hazardous waste in family life may be fluorescent tube, waste medicine, oil paint, asbestos, waste pesticide and so on. The quantities of this hazardous waste are small but the environmental impact of this waste is great. If hazardous waste is not separated from the garbage, it would be dangerous for the following MSW treatment. There is no waste management system for household hazardous waste in China at present.



## 4. Trend and challenge

- **It is needed that to promote the garbage source separation from village to cities.**
- The infrastructure is weak in the town and village , for example there is not enough hard surface road and household gas , so the content of coal ash and soil in the garbage is relative high. If source separation of the garbage is not promoted , the garbage collection and transport cost is not economic with the long distance transportation. Similarly the biodegradable waste part in the garbage is not suitable for long distance transportation. It is reasonable to separate garbage at source for economic recycling the biodegradable waste and inorganic waste such as coal ash and soil. In China garbage source separation has promoted in some big cities more than 10 years, but it is not successful, and many people are doubtful of garbage source separation in small town. From the practice that already be made, it is more practical to promote garbage source separation in town and village than in city.



# Mixed MSW Composting can not operate

- Composting from the mixed waste collected has a poor quality and is therefore unsuitable for agricultural use. The farmers prefer to use highly effective chemical fertilizers. The most of mechanized composting facilities built in some cities in the past 20 years.
- In recent years, there have been new developments in composting treatment technology such as Steam pretreatment process . The major problems encountered include excessive pursuit for mechanization in the past and poor quality in specialized composting equipment cause unreliable operation and high cost.



# Mixed MSW Composting can not operate

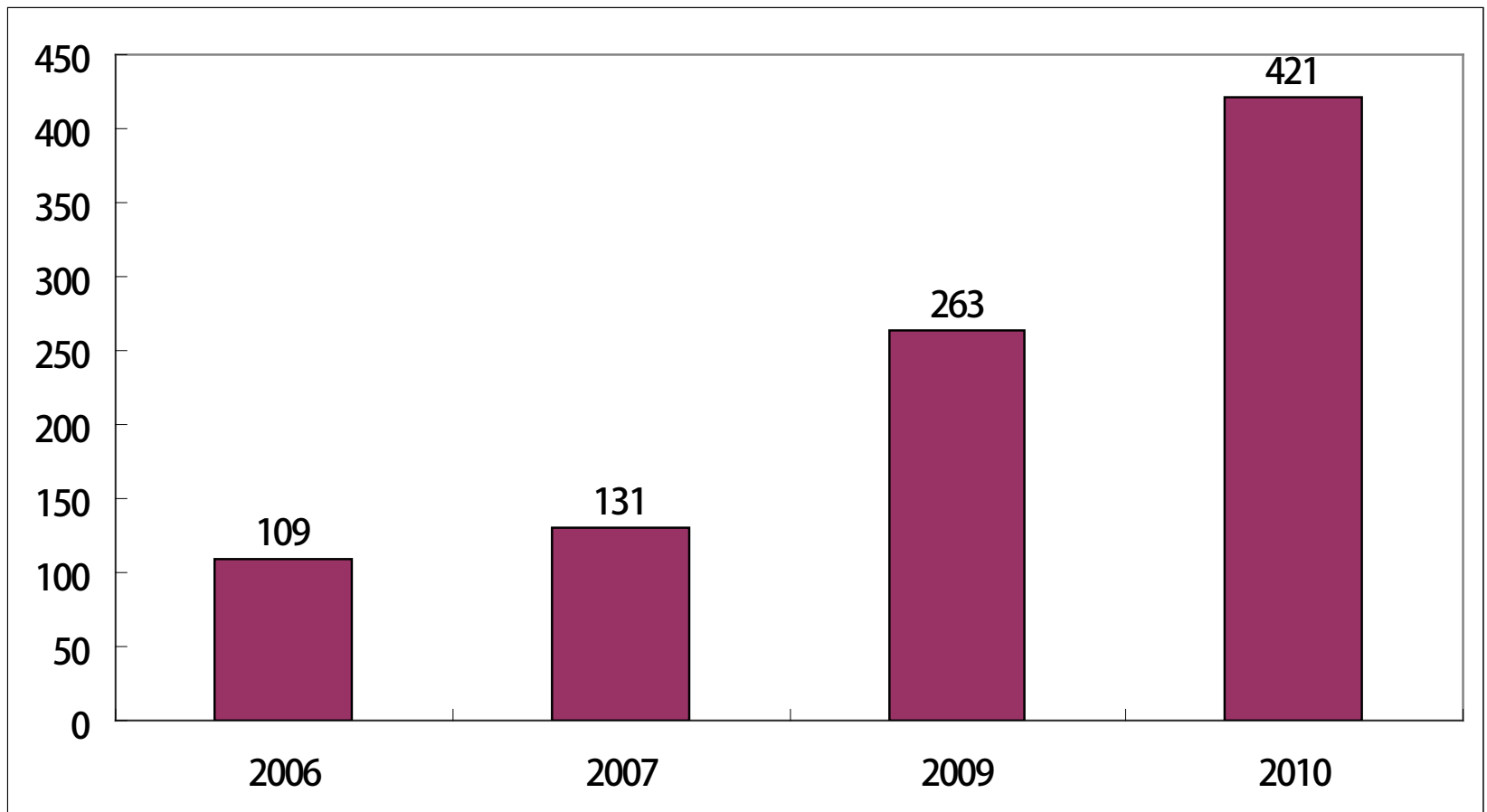


## 4. Trend and challenge

- **More small-scale sanitary landfills will be built for counties.** Small-scale sanitary landfills (landfills with waste intake capacity of below 200 tonnes/day, representing most landfills on a county level) will increase rapidly in 5 to 10 years. Now there are about 1635 counties and there were about 421 landfill sites for counties in 2010 , and it is estimated that The number of MSW landfill sites will be reached to more than 1200 for county level by the end of 2015. With high cost and it is a challenge to reach the environmental requirement for the small scale sanitary landfill.



# More small-scale sanitary landfills will be built for counties.



# LFG recovery for small scale landfill is difficult !

- A relatively high proportion of China's MSW is food waste, while the proportion of fiber, wood and other slowly biodegradable organics is relatively low.
- High moisture Food waste exhibits the fastest biological decomposition among all waste types,
- Low LFG generation and low collection efficiency for small landfill.







# The End

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- Thank you for your attention!

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