CLSA

Snoopin around

Company visit note

8 June 2017

Jinjiang Environment (S$0.87 - N-R)

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Different from others

The very first WTE operator in China and will remain in top-tier

China Jinjiang Environment (CJE) is one of the largest WTE players in China in terms of capacity in operation. Its Circular Fluidized Bed (CFB) incinerator can treat waste with low calorific value, allowing the company to expand its footprint in more locations than others. From now to 2020, CJE has the chance to see over 70% increase in its WTE treatment capacity. However, CJE's consensus 2018 PE is only 6.6x, much lower than the 9.8x 18CL PE of CEI.

One of the largest WTE companies in China

CJE is one of the largest WTE players in China. The company established its first WTE plant in Hangzhou in 1998, about 7-8 years earlier than the first WTE plant of CEI (257 HK). It is currently operating about 10% of the WTE capacity in China by end-2015, followed by 8% by CEI. However, CJE was not listed until Aug-2016, when it launched an IPO in SGX.

CFB technology and diverse locations of projects

CJE has been using its CFB technology in most of its WTE plants. According to the company, its CFB is more adapted to municipal solid waste with low calorific value, which could be found in some regions in China. That is one reason why the company has the most geographically diverse project distribution, from the northern regions such as Inner Mongolia, to the southern regions such as Yunnan.

Net profit up 116% since 2013

CJE's net profit has increased 116% to Rmb598m over 2013 to 2016, a Cagr of 29%. During the same period, revenue was up 106%, a Cagr of 27%. This is mostly driven by the increase in power sales, construction revenue, as well as technical and management services.

Trading at discount versus peers

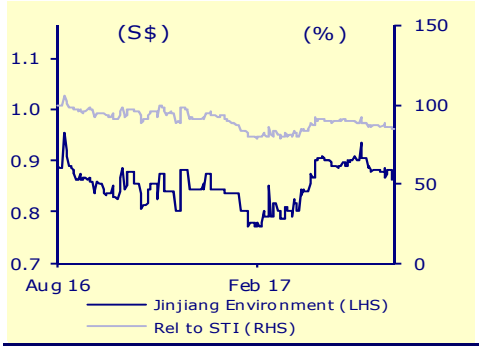
At street's estimates, CJE is trading at 7.4x 2017 PE and 6.6x 2018 PE, as well as 1.1x 2017 PB. This is at a wide discount versus CEI's 12.5x 17CL PE and 9.8x 18CL PE. The street is forecasting 6%/12% earnings growth for CJE in 2017/2018.

Key company data CJE SP			N-R
Market cap			US$771m
Share capital			
12M high/low			S$0.97/S$0.77
3M avg daily vol			0.2 (US$0.2m)
Major shareholders			None
Estimated free float			
Performance (%)	**1W**	**1M**	**12M**
Absolute	0.0	(3.8)	0.0
Relative to index	0.0	(3.8)	0.0
Absolute (US$)	0.1	(2.3)	0.0

Source: CLSA; Note: CJE has been listed in SGX since Aug-2016

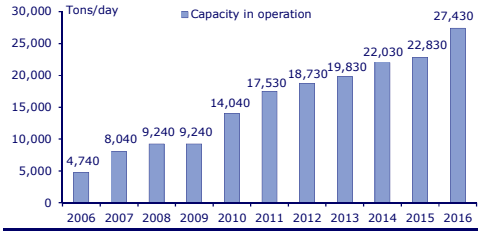
Share price is largely flat, post IPO

Share-price performance



Source: Bloomberg, CLSA; Note: CJE has been listed in SGX since Aug-2016

Strong execution in capacity addition



Source: CJE, CLSA

Financials

Year to 31 December	16A	17IBES	18IBES	19IBES
Revenue (Rmbm)	2,632	2,483	2,948	3,033
Net profit (Rmbm)	598	708	789	873
EPS (fen)	54.90	58.00	65.00	72.00
EPS growth (% YoY)	-	5.6	12.1	10.8
PE (x)	7.8	7.4	6.6	6.0
Dividend yield (%)	5.7	6.9	5.8	5.1
ROAE (%)	15.4	15.4	15.8	15.7
PB (x)	-	1.1	1.0	0.9
Net gearing (%)	-	64.39	102.08	86.39

Source: CLSA

For important disclosures please refer to page 18.

The WTE business

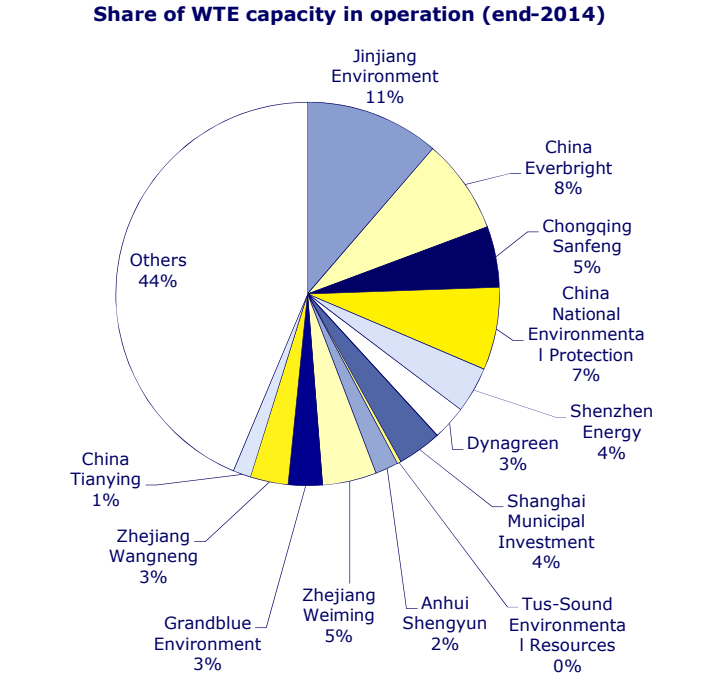
As a pure-play WTE company, CJE develops, constructs and operates WTE facilities for the processing of municipal solid waste ("MSW"). Through incineration, generate electricity and steam for local power grid companies and commercial customers.

One of the largest WTE operators in China

In 1998, CJE became the first private WTE operator in China, after successfully converting a coal-fired facility into a Hangzhou Yuhang WTE plant. Fast forward to the present, operating about 10% of the WTE capacity in China by end-2015, CJE is one the largest in terms of its scale, followed by China Everbright International (257 HK) at about 8%.

Figure 1

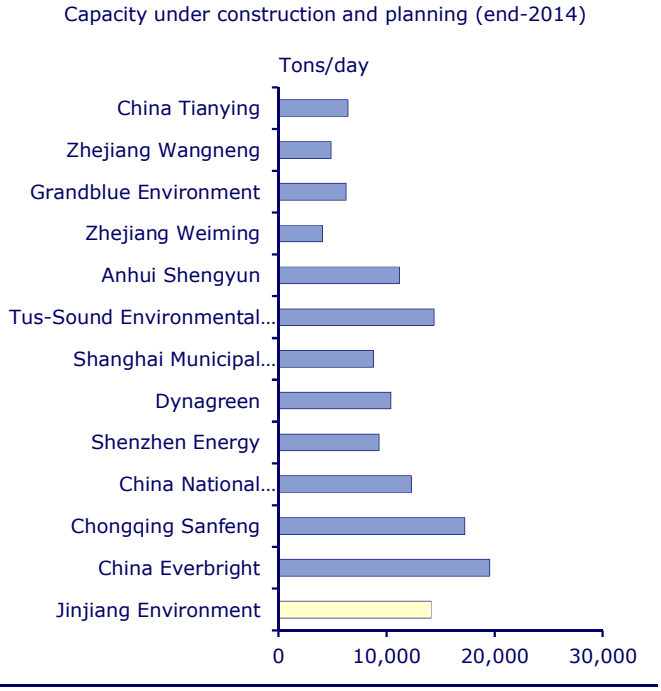
Market share in 2014



Source: Frost and Sullivan

Figure 2

Capacity under construction and planning



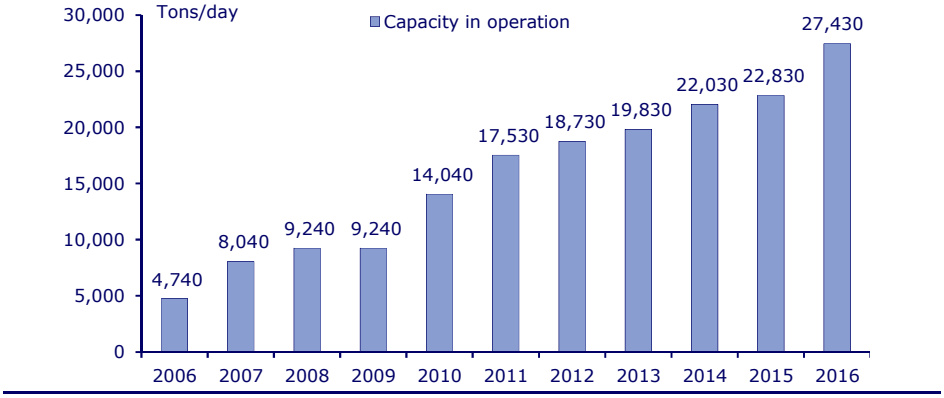
Source: Frost and Sullivan

Capacity up over 4x in ten years

By end-2016, China Jinjiang Environment had 27,430 tons/day of WTE capacity in operation in China. That is up 4.8x versus the 4,740 tons/day in 2006, proving excellent management execution ability.

Figure 3

CJE's WTE capacity in operation



Source: CJE, CLSA

Project pipeline

By end-2016, CJE has 19 WTE facilities in commercial or trial operation, with a total capacity of 27,430 tons/day. By end-2016, it had four projects under construction with a total capacity of 4,800 tons/day. The company said three out of the four projects will be completed in 1H17.

Figure 4

WTE project pipeline

Tons/day	CJE (CJE SP)
In operation	27,430
Under construction	4,800
In preparatory stage	15,260
Total	47,490

Source: CJE; Note: By end-2016

Source of revenue

Like other WTE companies in China, CJE's projects are getting paid by the on-grid tariff revenue from local state grids, waste treatment fees from the local governments and the sale of steam to commercial customers.

The initial waste treatment fee is determined when a concession agreement is signed with local government, subject to the review approval of local governments for revision due to change in CPI, labour cost, etc. For the WTE on-grid power generated, the current on-grid tariff is Rmb0.65 (VAT included) and that is regulated by NDRC.

Figure 5

Revenue sources of WTE projects

WTE revenue sources	Paid by	ASP	Pricing
Waste treatment fee	Local governments	Rmb35-96/ton received by CJE	Generally determined by local governments and that may vary geographically
WTE on-grid tariff	Grid companies	Rmb0.65/kWh (17% VAT included) for all plants approved in/after 2006	Regulated by NDRC
Steam sales revenue	Commercial customers	Rmb127/ton in 2016 and Rmb131/ton in 2015	Reviewed and approved by the relevant local authorities

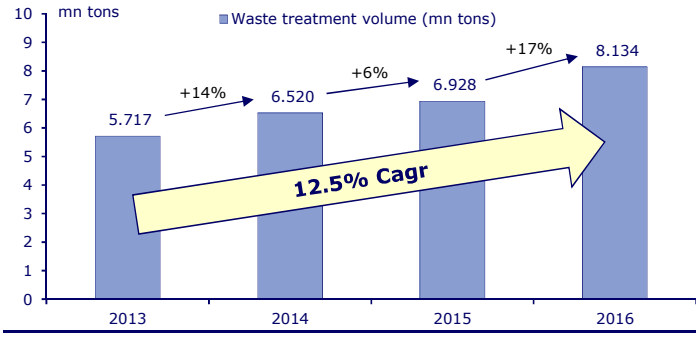
Source: CJE, CLSA; Note: CJE may generally submit annual requests for fee adjustments based on changes in CPI, labour costs and other relevant factors

Key operating parameters

In 2016, waste volume treated and gross power generation of CJE both went up by 17% YoY. However, net generation was only up 15% YoY in 2016, due to the increase in internal power usage. According to our calculations, CJE's per ton net generation was 210 kWh/ton in 2016, down 2% YoY from 214 kWh/ton in 2015.

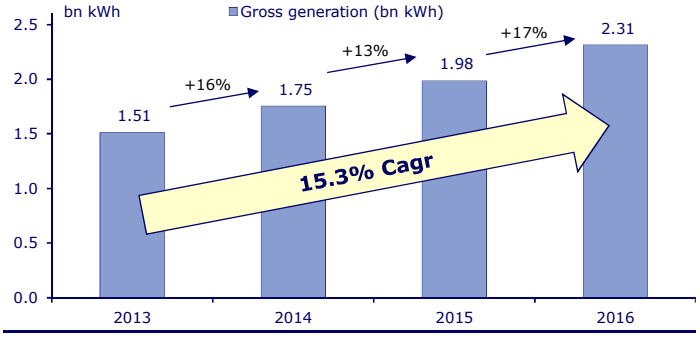
Our calculations reveal that the company's internal power usage rate has been expanding by 1-2ppts during 2013-2016. The company said that this is the result of improvement and upgrade of pre-treatment facilities, and in the future the growth in power generation will be more than offset the growth in internal usage.

Figure 6
Waste volume treated



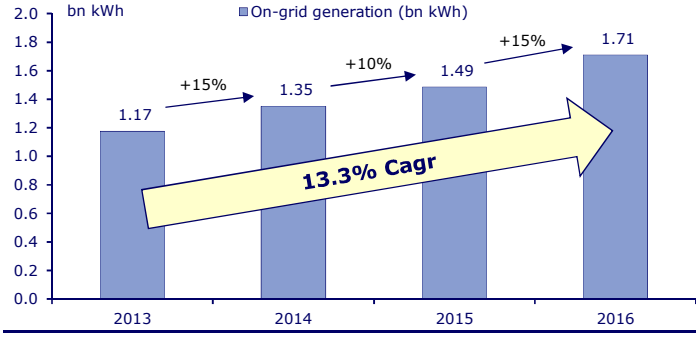
Source: Company, CLSA

Figure 7
WTE gross power generation



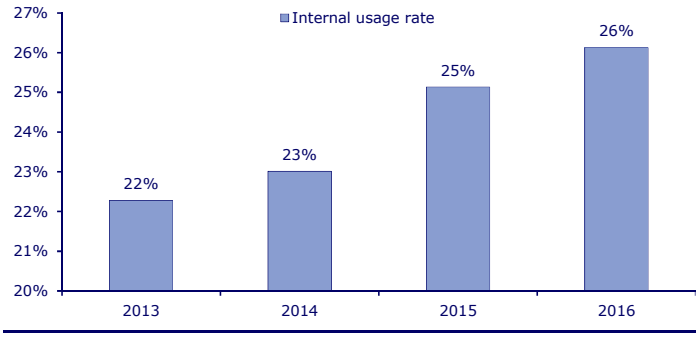
Source: Company, CLSA

Figure 8
WTE on-grid power generation



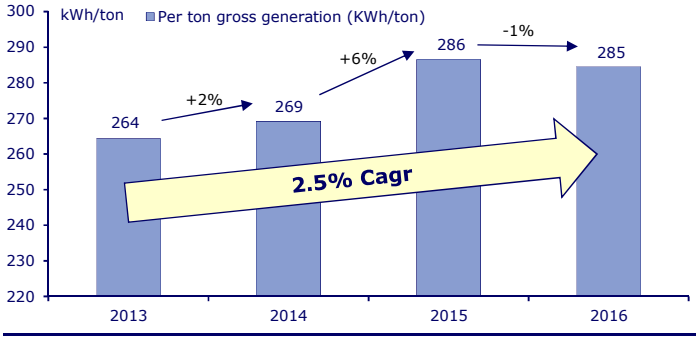
Source: Company, CLSA

Figure 9
Internal power usage rate



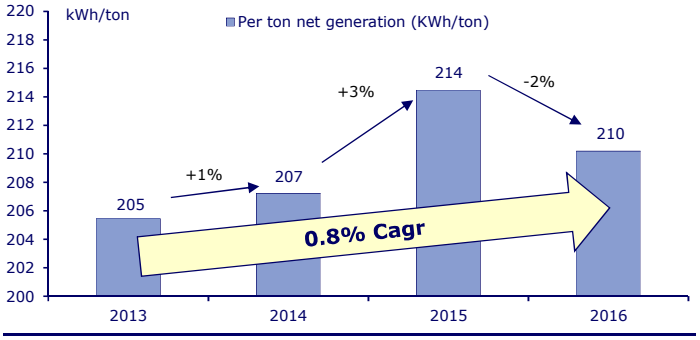
Source: Company, CLSA

Figure 10
Per ton gross generation



Source: Company, CLSA

Figure 11
Per ton net generation (after deducting internal usage)



Source: Company, CLSA

Is the CFB process good or bad?

The answer to this question is not straight forward. Many of the incinerators of CJE are using CFB technology, which the company is proud of. CFB works, but some coal or auxiliary fuel needs to be added during the incineration process. CJE adds coal in its case, and that is because it was much cheaper to use coal (compared to natural gas or oil) when it developed CFB at the outset.

Some people argue that coal is polluting and not environment-friendly. However, CJE argues that its CFB incinerators have advantages in locations where: (1) weather is harsh; (2) temperature is low (which freeze the waste); (3) waste has low calorific value; or (4) complex waste composition.

In fact, currently, Jinjiang only adds 3-5% of coal to maintain the air temperature inside the combustion chamber at 850 degree Celsius. It is also gradually reducing the composition of coal in its fuel mix in its WTE facilities.

Besides, the company said the sulphur content in coal helps to further reduce the generation of dioxin (a by-product of waste incineration that is highly hazardous) during the incineration process.

CJE also argues that, compared to moving grate incinerator, CFB process will have much less slag leftover. Also, as CJE pre-sorts the waste before incineration, its slag is free of heavy metals.

However, it requires higher management and operation skills to keep the CFB incinerators running. The company also admits that it would be easier to manage the operation of moving grate incinerators.

Below is a comparison between CFB and moving grate, which is taken from the industry research section of CJE's IPO prospectus. Again, this is for reference only. We believe the specific conditions and operation management of a WTE plant are also key considerations. The advantages and disadvantages of CFB and moving grate could not be clearly concluded, and they each have their advantages in certain circumstances, in our view.

Figure 12

Comparison of grate and fluidized bed incinerators

	Grate	Fluidized bed
Initial investment	Higher	Low
Adaptability in China	Moderate	High
Operating cycle	3 month	More than 3 month
Auxiliary fuel	Diesel fuel if needed	Coal if needed
Power generation efficiency	Relatively high	High
Start-up time	Long	Short
Burning rate	Low	High
Overload capability	Limited	High
Atmospheric pollutants	Relatively high dioxin and Nox	Low dioxin and Nox

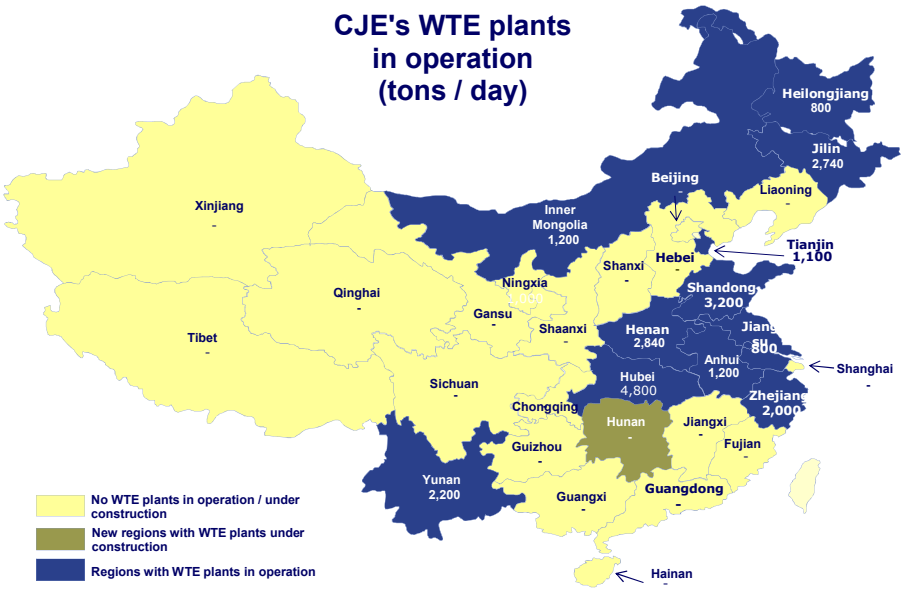
Source: Frost & Sullivan

Distribution of existing projects

By Dec-2016, CJE had 19 WTE facilities in operation, 4 plants under construction and 12 projects in planning. Among the WTE players in China, Jinjiang probably has the most geographically diverse project distribution, from the northern regions such as Inner Mongolia, to the southern regions such as Yunnan.

Figure 13

CJE has the most diverse distribution of WTE plants in operation



Source: CJE, CLSA

More capacity – (1) by expanding existing WTE plants

For future project pipeline, first, CJE intends to expand the waste treatment capacity of its existing WTE facilities. The expansion of existing WTE facilities has the advantages of requiring lesser capital investment and a shorter development time.

Figure 14

Comparison of expansion strategy

	Expansion	Green-field project
Example	Jilin Xinxiang WTE Plant	
Time required	12-18 months (incl. initial negotiations)	24-36 months (incl. initial negotiation)
Capex	Rmb100-150mn	Rmb400mn
Land resources	Easier to overcome	Availability of land resources in certain urban areas present challenges

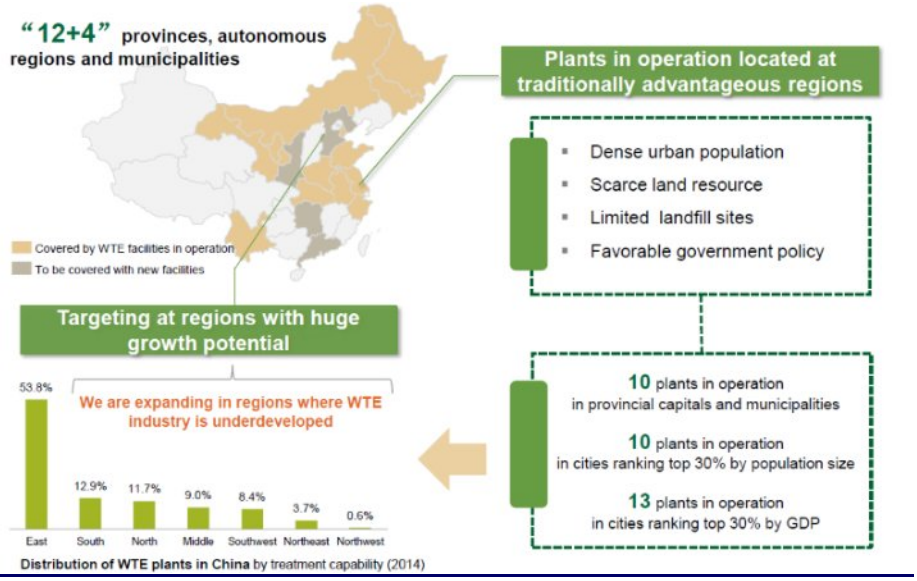
Source: CJE

More capacity – (2) by going to north-eastern and central regions

On top of that, CJE intends to expand its operations mainly in the north-eastern and central regions of the PRC, where, according to Frost & Sullivan, the waste incineration rate was only 11.1% and 15.2% in 2014, respectively, as compared to 48.0% for the eastern region of the PRC.

Figure 15

Expansion into under-penetrated market



Source: CJE

While most of the players in the WTE market are more regional or provincial focused, we can see from the above maps that CJE's WTE projects are distributed across China.

The company said it is pursuing a "differentiated competition strategy". For example, it was the first one to erect waste incinerators in Ningxia in 2013 and Inner Mongolia in 2012.

CJE's view is that its CFB incinerator can be adapted to a variety of situations, such as the higher altitude in Yunnan province and the cold temperature in Inner Mongolia during the winter season.

Giving a specific example, the company explains that, in winter time, the trash in Inner Mongolia will be frozen, and become some kind of "iced trash cube". In the company's view, its CFB incinerators would be able to do the job well in the northern regions such as Inner Mongolia, while it would be technically challenging for grate incinerators.

More capacity – (3) chewing the underperforming WTE assets

CJE intends to focus on exploring potential acquisition opportunities in the PRC, with a view to increasing the scale of its operations and cementing its position as a leading industry consolidator in the PRC. It believes that it is well placed to acquire and turn-around underperforming WTE assets through the adaptation and implementation of their own systems.

Acquiring WTE companies saves the time required to go through administrative procedures. Also, there would be existing infrastructure, grid connection, trash volume and government subsidy.

By end-2014, the big-4 WTE players in China, namely CJE, CEI, Chongqing Sanfeng and China National Environmental Protection, account for less than 35% of the total WTE capacity in China. There are some smaller players in China, which compared with CJE and CEI, would be much less experienced and capitalised.

Our visit to CJE's WTE in Hangzhou

On 19 January 2017, we visited CJE's WTE plant in Xiaoshan district of Zhejiang province. In operation since 2007, it is one of the earliest WTE projects of CJE. Currently with a treatment capacity of 1,300 tons/day, the plant is equipped with three furnaces and two turbine generators. It is using a circular fluidized bed technology that is co-developed by the Zhejiang University and Jinjiang Environment.

On the date of our visit, we saw 5-6 garbage trucks lining up to offload their trash. According to the company, they have installed two fully automatic pre-treatment lines, with line one already in operation and the line two starting sometime before the Chinese New Year. The pre-treatment lines can fully crush the garbage and it can also sort the non-combustible items, such as glass, metal, ceramic and rocks.

Figure 16
Xiaoshan Jinjiang WTE plant

Source: CLSA; Note: Pictures taken by CLSA on 19 Jan 2017

Figure 17
Garbage trucks lining up to offload the trash

Source: CLSA; Note: Pictures taken by CLSA on 19 Jan 2017

The trash will then be sent to a storage pit for storage 3-5 days, which is to drain away the water content of the waste. The company explains that in southern China, the water content is higher. In this plant, the water content in waste is about 10-15%.

Figure 18
Ultra-low emission treatment facility

Source: CLSA; Note: Pictures taken by CLSA on 19 Jan 2017

Figure 19
Control room

Source: CLSA; Note: Pictures taken by CLSA on 19 Jan 2017

Talking about coal usage, currently, it (in Xiaoshan plant) is adding around 3% of coal (of the trash weight) for the combustion process. It was raining the day (Jan-2017) that we visited the plant, and the company needed to add 3% of coal, as the moisture content of the waste is higher. If it is not raining, with dry weather, the percentage would be lower.

Pre-treatment of waste has multiple advantages, according to the company. Before pre-treatment, water content is about 60%. After pre-treatment and storage, it can control water content at 40%. Also, before crushing, the trash has a calorific value of 1100-1300 kCal/ton. After pre-treatment, calorific value can reach about 2000 kCal. The pre-treatment process also reduces the time required for the trash to stay in the storage pile from one week to 3-5 days.

The company also explains that the per ton gross generation is about 360kWh/ton. With 20% internal usage, the net generation is about 300kWh/ton.

Figure 20

Ensuring smooth operation

Source: CLSA; Note: Pictures taken by CLSA on 19 Jan 2017

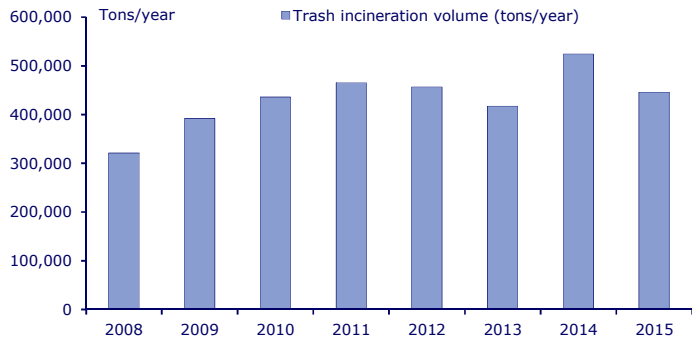
Figure 21

Emission data is shown for public supervision

Source: CLSA; Note: Pictures taken by CLSA on 19 Jan 2017

Figure 22

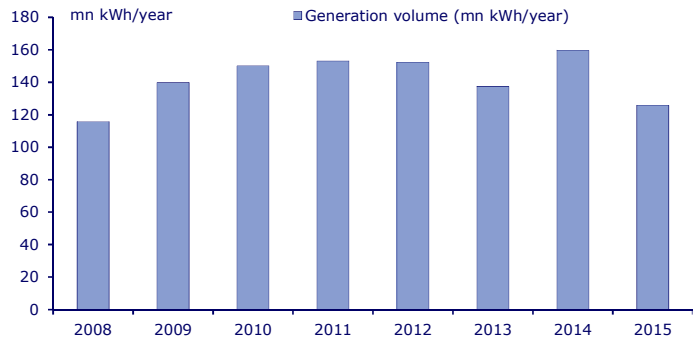
Trash incineration volume in Xiaoshan plant



Source: CJE, CLSA

Figure 23

Power generation volume in Xiaoshan plant



Source: CJE, CLSA

Jinjiang vs CEI

The two companies are the most experienced in the WTE market in China. While the two companies are going for different WTE technologies (CFB vs grate incinerators), the business drivers for the two companies are basically the same – the increasing waste volume in China. Going into inland regions, Jinjiang is building WTE plants with CFB which CJE's management believes has better adaptability to the low calorific value of waste in those regions.

Figure 24

Key features of the big-two WTE players in China

	China Everbright International	Jinjiang Environment
Background of major shareholder	The listed subsidiary of China Everbright Group, which is a central SOE under China's State Council	Private company
Market Cap (US$)	~5,659mn	~771mn
Has been in WTE industry since…	2006	1998
Number of Employee	~3000	1000+
Grate/CFB incinerators	100% grate incinerators	31 CFBs and 3 moving grate incinerators
WTE capacity in operation (end-2014)	14,550 tons/day	20,530 tons/day
WTE capacity in operation (end-2015)	18,550 tons/day	22,830 tons/day
WTE capacity in operation (end-2016)	22,300 tons/day	27,430 tons/day
% of BOT WTE capacity (end-2015)	100%	9%
% of BOO WTE capacity (end-2015)	0%	91%
Market share (2015, in terms of WTE capacity in operation)	7.9%	9.7%
Plan to develop WTE in inland China	Yes	Yes, CJE are expanding in regions where WTE industry is underdeveloped
Considering overseas business	Yes. CEI has projects in Poland, Germany and Vietnam. They are considering the opportunities in OBOR countries, including Southeast Asia, South Asia, West Asia and Eastern Europe	Yes. CJE are also exploring and evaluating opportunities in overseas emerging market such as Vietnam and Indonesia
Other key businesses	Waste water treatment, Biomass incineration, hazardous waste treatment	

Source: CJE, CEI, CLSA

Diversity in the location of projects

If we look at the geographical distribution of CJE, it can be easily seen that CJE is executing its "differentiated competition strategy", with a more evenly distribution of projects across China. For CEI, most of its capacity in operation is in the Jiangsu and Shandong provinces.

Figure 25

WTE capacity in operation – CJE vs CEI (end-2015)

	WTE capacity (tons/day)			Market share	
	CJE	CEI	China total	CJE	CEI
Beijing	-	-	10,400	0.0%	0.0%
Tianjin	**1,100**	-	4,800	**22.9%**	0.0%
Hebei	-	-	10,700	0.0%	0.0%
Shanxi	-	-	5,400	0.0%	0.0%
Inner Mongolia	**1,200**	-	1,400	**85.7%**	0.0%
Liaoning	-	-	-	0.0%	0.0%
Dalian	-	-	1,800	0.0%	0.0%
Jilin	**1,690**	-	3,800	**44.5%**	0.0%
Heilongjiang	**800**	-	1,800	**44.4%**	0.0%
Shanghai	-	-	8,300	0.0%	0.0%
Jiangsu	800	**11,450**	36,500	2.2%	**31.4%**
Zhejiang	2,000	1,500	30,500	6.6%	4.9%
Ningbo	-	-	6,500	0.0%	0.0%
Anhui	1,200	-	7,800	15.4%	0.0%
Fujian	-	-	13,600	0.0%	0.0%
Xiamen	-	-	1,600	0.0%	0.0%
Jiangxi	-	-	200	0.0%	0.0%
Shandong	3,200	**4,200**	16,800	19.0%	**25.0%**
Qingdao	-	-	2,400	0.0%	0.0%
Henan	**2,840**	-	4,900	**58.0%**	0.0%
Hubei	**4,800**	-	11,500	**41.7%**	0.0%
Hunan	-	-	1,600	0.0%	0.0%
Guangdong	-	700	18,400	0.0%	3.8%
Shenzhen	-	-	7,300	0.0%	0.0%
Guangxi	-	-	1,500	0.0%	0.0%
Hainan	-	700	2,400	0.0%	29.2%
Chongqing	-	-	3,600	0.0%	0.0%
Sichuan	-	-	9,500	0.0%	0.0%
Guizhou	-	-	2,600	0.0%	0.0%
Yunnan	**2,200**	-	6,000	**36.7%**	0.0%
Tibet	-	-	-	0.0%	0.0%
Shaanxi	-	-	1,500	0.0%	0.0%
Gansu	-	-	-	0.0%	0.0%
Qinghai	-	-	-	0.0%	0.0%
Ningxia	**1,000**	-	1,000	**100.0%**	0.0%
Xinjiang	-	-	-	0.0%	0.0%
Xinjiang Corp	-	-	-	0.0%	0.0%
Heilongjiang Nongken	-	-	-	0.0%	0.0%
Total	**22,830**	**18,550**	**236,100**	**9.7%**	**7.9%**

Source: NDRC, CJE, CEI, CLSA; Note: By the end of 2015

Supply of waste is always the key to success

As we have been pointing out always, the stability and consistent supply of waste is the key to probability. For example, in its 2016 results, CJE's management said they currently have a problem of waste supply in Baotou of Inner Mongolia. The amount of revenue will be less than expected, and this plant is in operating loss at this moment, according to CJE. In its prospectus, CJE disclosed that the utilisation rate of the Baotou project was 52% in 2013, 57% in 2014 and 60% in 2015. This is quite different from the much higher utilisation rate we usually observe for projects in eastern coastal regions.

On the positive side, management said this is an isolated issue and CJE only owns 42% stake in the Baotou project. Compared to this Baotou project, the utilisation rate of other projects of the company was much higher.

Leading market share

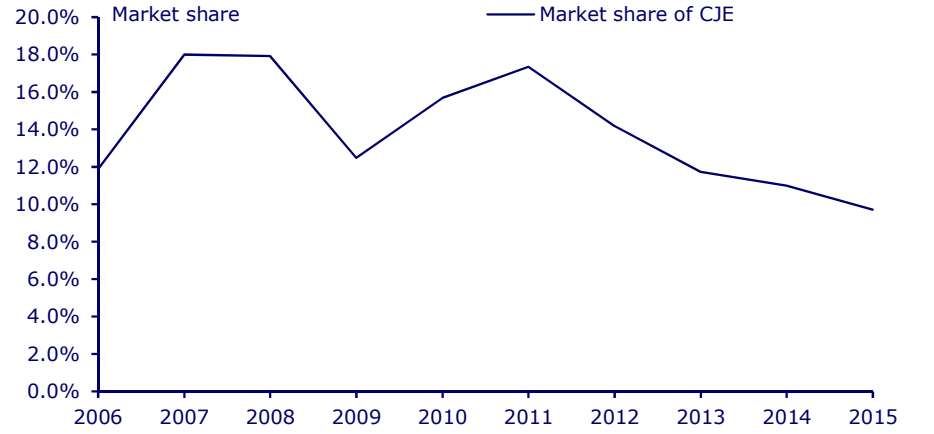
CJE has a leading market share (in terms of capacity) in China. In the earlier years, the company ran as much as 18% of the incineration capacity in China (in 2007 and 2008). However, since 2012, the market share of the company has been declining from high-teens in 2011 to mid-teens in 2012, and to low-teens in 2013 and 2014, and finally to high single digit in 2015.

According to the management of CJE, not many people wanted to do trash incineration five years ago (ie, before 2012). Hence, one of the many explanations for this trend, is that NDRC introduced the universal Rmb0.65/kWh on-grid tariff for WTE projects since 2012. This robust policy has been supporting the development of the WTE sector since then, and it also introduced more competition in new project bidding. The end-result is reducing the market share of CJE.

Although the competition in the WTE industry has been heightened, we believe CJE would be able to maintain its market share roughly at current levels (9-10%). According to the management of CJE, its WTE capacity in operation has the chance to hit 47,490 tons/day in 2-3 years, from its 27,430 tons/day by end-2016. That implies a Cagr growth of around 20% over the period, and is in-line with the Cagr growth as suggested by the Chinese government's "13FYP on waste management facilities construction".

Figure 26

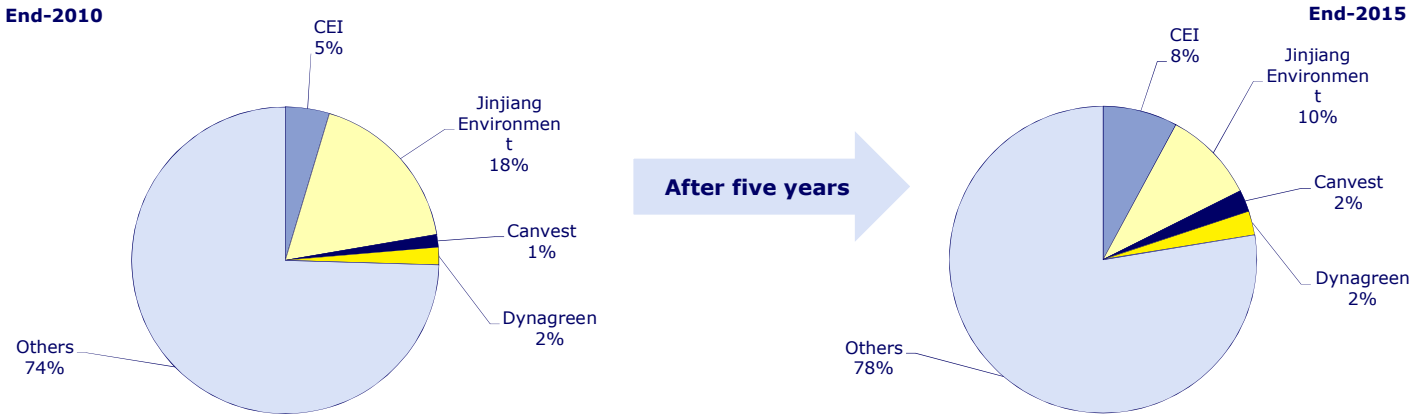
CJE has been maintaining its market share at above 9%



Source: Versus the WTE capacity in urban area; Source: CJE, MOHURD, CLSA

Figure 27

Changes in market share of the WTE sector in China



Source: MOHURD, companies, CLSA

Risk of a WTE tariff cut is not immediate

A government consultation paper about revisiting renewable tariffs was circulated in the media in September 2016 and suggested that local pricing bureaus may be allowed to set the on-grid tariff for new WTE and biomass-generation projects completed after 1 January 2017.

This risk is temporarily out of the picture because as of January 2017, the finalised published version stated that the adjustment of the renewable energy tariff will only be applicable to wind and solar PV, while there will be no changes to tariff policies for WTE and biomass incineration.

What about the future?

In our view, WTE is unlike wind or solar PV in some ways. The first major difference is that WTE is not (and likely will not) be a main pillar in China's energy mix. It is more of a waste management methodology rather than to try to support the energy needs in China.

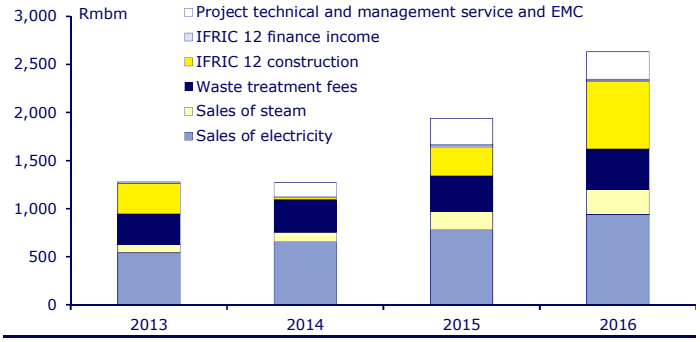
Besides, while wind and solar PV are emerging technology that may in the future see significant (which already happened in the recent 10-20 years) cost reduction, WTE is a rather mature technology to solve the waste management issues.

In view of the above, while local governments may in the future (longer-term) be allowed to set their own WTE power tariff, the mechanism behind tariff setting, we suspect, should be quite different from what we have seen for wind and solar PV.

Key financials - at a glance

Figure 28

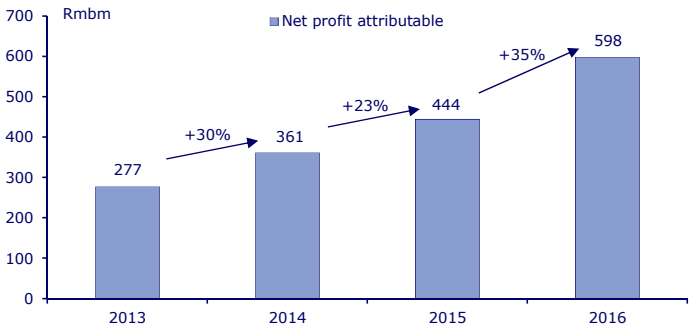
Revenue breakdown



Source: CJE, CLSA; Note: The company acquired Zhuji Bafang WTE and Wenling Green New Energy WTE projects from its parentco in 2016. As this is acquisition under "common control", IFRS requires the company to re-stated its 2015 financials as if the two companies are with the listco during both periods. The financials for 2013 and 2014 presented above are not re-stated for that reason.

Figure 29

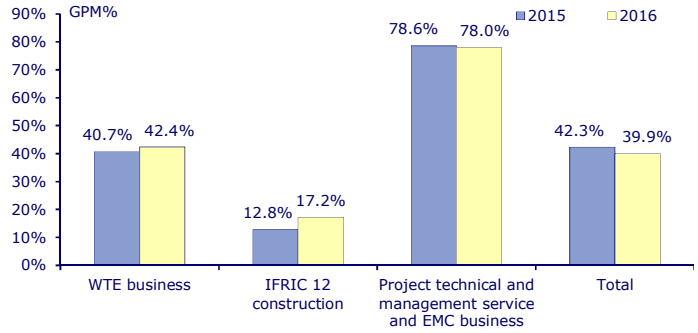
Net profit growth



Source: CJE, CLSA; Note: The company acquired Zhuji Bafang WTE and Wenling Green New Energy WTE projects from its parentco in 2016. As this is acquisition under "common control", IFRS requires the company to re-stated its 2015 financials as if the two companies are with the listco during both periods. The financials for 2013 and 2014 presented above are not re-stated for that reason.

Figure 30

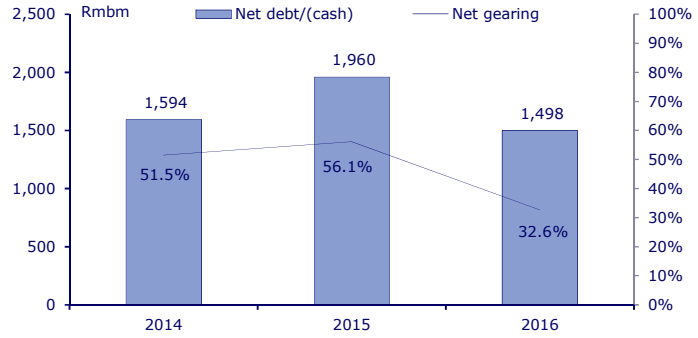
Margin trend



Source: CJE, CLSA; Note: The company acquired Zhuji Bafang WTE and Wenling Green New Energy WTE projects from its parentco in 2016. As this is acquisition under "common control", IFRS requires the company to re-stated its 2015 financials as if the two companies are with the listco during both periods.

Figure 31

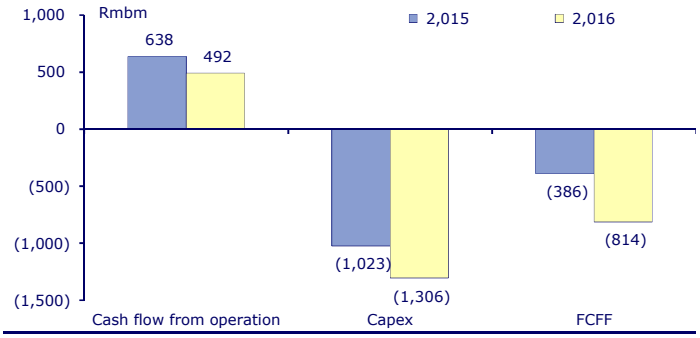
Net gearing, net debt



Source: CJE, CLSA; Note: The company acquired Zhuji Bafang WTE and Wenling Green New Energy WTE projects from its parentco in 2016. As this is acquisition under "common control", IFRS requires the company to re-stated its 2014 and 2015 financials as if the two companies are with the listco during the periods.

Figure 32

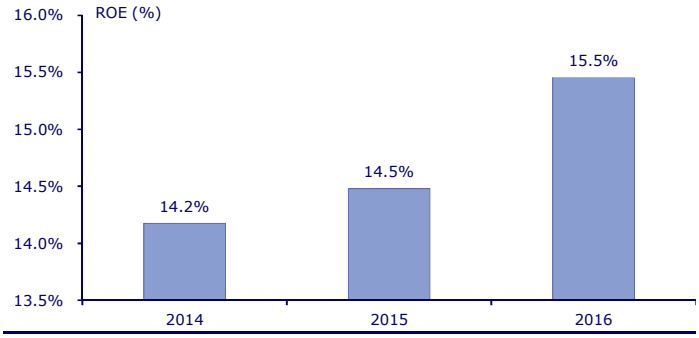
Cashflow



Source: CJE, CLSA; Note: The company acquired Zhuji Bafang WTE and Wenling Green New Energy WTE projects from its parentco in 2016. As this is acquisition under "common control", IFRS requires the company to re-stated its 2015 financials as if the two companies are with the listco during both periods.

Figure 33

ROE



Source: CJE, CLSA; Note: The company acquired Zhuji Bafang WTE and Wenling Green New Energy WTE projects from its parentco in 2016. As this is acquisition under "common control", IFRS requires the company to re-stated its 2015 financials as if the two companies are with the listco during both periods. The financials for 2014 presented above are not re-stated for that reason.

10 things you need to know

1. Company profile and history

- China Jinjiang Environment (CJE) became the first private WTE operator in China in 1998, after successfully converting the Hangzhou Yuhang WTE plant from a coal-fired facility into a WTE facility.
- Fast forward to the present, operating about 10% of the WTE capacity in China by end-2015, CJE is the largest in terms of its WTE capacity in operation, followed by China Everbright International (257 HK) at about 8%.

2. How does the company make money?

- For WTE companies in China, the operators usually sign concession agreements with local government on BOO, BOT or TOT basis, for a term of about 25-30 years.
- Under those concession agreements, the local government will pay waste treatment fee to the WTE operator according to the waste volume (as measure by weight) delivered to the WTE plant.
- When the WTE operator incinerates the waste, it will be able to generate electricity, which is sold to the local grid companies. Grid companies will pay them the on-grid tariff.

3. Ownership structure

- Mr. Dou Zhenggang indirectly owns 61.6% of CJE.
- Mr. Dou also controls Hangzhou Jinjiang Group, which is a private company engaging in environmental protection and energy, non-ferrous metal and chemicals business.
- Radec XIX Ltd holds 14.84% of CJE.
- AEP Investments (Mauritius) Limited holds 6.7% of CJE.
- Other institutional and public investors hold 16.8% of CJE.

4. Management/board composition/auditor

- Most of its senior management team has over 15 years of industry experience and has been with CJE for over 12 years.
- The board is composed of 3 executive directors, 1 non-executive director, and 4 independent directors.
- Deloitte & Touche LLP is the independent auditor.

5. Capital-raising history

- CJE went to an IPO in SGX on 3 August 2016.
- Including over-allotment, the company issued 216.8m shares in its IPO at SG$0.90 per share, raising gross proceeds of ~SG$195m (or Rmb964m).

6. Dividend history

- For its 2016 results, the company proposed final tax-exempt cash dividend of 5.05 Singapore cents per share (about 50% payout).
- The company intends to maintain at least 50% payout for 2017.

7. Cashflow

- As long as sufficient waste volume is received constantly, an established WTE plant should see positive operating cashflow.
- Cashflow from operation was Rmb638mn in 2015 and Rmb492mn in 2016.

8. Key things to note in the accounts

- For its BOO WTE projects, it will be accounted for by the fixed assets model. No IFRIC-12 construction revenue will be recognised.
- For its BOT WTE projects, CJE will account the related P&L and balance sheet items with IFRIC-12.

9. Key strengths

- First mover in the WTE industry in China. Long history of running incinerators.
- Experience in organic and inorganic growth.
- Its CFB incinerators may be more suitable for waste with low calorific value.
- It is also able to use grate incinerators for new projects, depending on whether a local government would prefer CFB or moving grate.

10. Key risks

- Policy risk is one. The government may change the existing WTE on-grid tariff policy (of Rmb0.65/kWh) in the future, although the risk is low in the short-to-medium term.
- Competition in the WTE industry.
- Protests from the public may delay the progress of new projects/ lead to suspension of existing projects.

Appendix 1: CJE's WTE project list

Figure 34

CJE's WTE projects in operation

Name	Province	Capacity (tons/day)	Status	Project model	Constructed or acquired	Operation commenced in	Acquisition date	Consolidation date
Hangzhou Yuhang WTE Facility	Zhejiang	700	In operation	BOO	Constructed	Aug 98		Aug 98
Zhengzhou Xingjin WTE Facility	Henan	2,840	In operation	BOO	Constructed	Sep 02		Sep 02
Wuhu Jinjiang WTE Facility	Anhui	1,200	In operation	BOO	Constructed	Jan 03		Jan 03
Xiaoshan Jinjiang WTE Facility	Zhejiang	1,300	In operation	BOO	Constructed	Jul 07		Jul 07
Zibo Jinjiang WTE Facility	Shandong	2,000	In operation	BOO	Acquired	Jul 07	Jun 06	Jul 07
Kunming Jinjiang WTE Facility	Yunnan	1,200	In operation	BOO	Acquired	Jan 08	Feb 06	Jan 08
Wuhan Jinjiang	Hubei	2,600	In operation	BOO	Constructed	Jun 10		Jun 10
Hankou	Hubei	2,200	In operation	BOO	Constructed	Dec 10		Dec 10
Lianyungang Sunrise	Jiangsu	800	In operation	BOO	Acquired	Apr 10	Feb 11	Feb 11
Jilin Xinxiang	Jilin	1,690	In operation	BOO	Acquired	Sep 04	Sep 11	Sep 11
Yunnan Energy	Yunnan	1,000	In operation	BOT	Constructed	Jun 11		Jun 11
PLT Energy	Inner Mongolia	1,200	In operation	BOO	Acquired	Dec 12	Feb 11	Dec 12
Yinchuan Zhongke	Ningxia	1,000	In operation	BOT	Acquired	Jan 14	Jun 11	Jan 14
Tianjin Sunrise	Tianjin	1,100	In operation	BOO	Acquired	Apr 08	Dec 13	Dec 13
Zibo Green	Shandong	1,200	In operation	BOO	Constructed	Sep 14		Sep 14
Suihua Green	Heilongjiang	800	In operation	BOO	Constructed	Jul 15		Jul 15
Songyuan	Jilin	1,050	In operation	BOT	Constructed	Nov 16		Nov 16
Zhuji Bafang	Zhejiang	1,050	In operation	BOO	Acquired	Sep 04	29 Dec	Dec 16
Wenling Green New Energy	Zhejiang	800	In operation	BOT	Acquired	Feb 16	29 Dec	Dec 16
Wuhu Jinjiang Phase 2	Anhui	1,000	In operation	BOO	Expansion	Dec 16		Dec 16
Lianyungang Chenxing	Jiangsu	700	In operation	BOO	Expansion	Dec 16		Dec 16
Gaomi Lilangmingde WTE Facility	Shandong	800	In operation	BOT	Constructed	1H17		1H17

Source: CJE, CLSA; Note: By end-2016

Appendix 2: The CFB incineration process

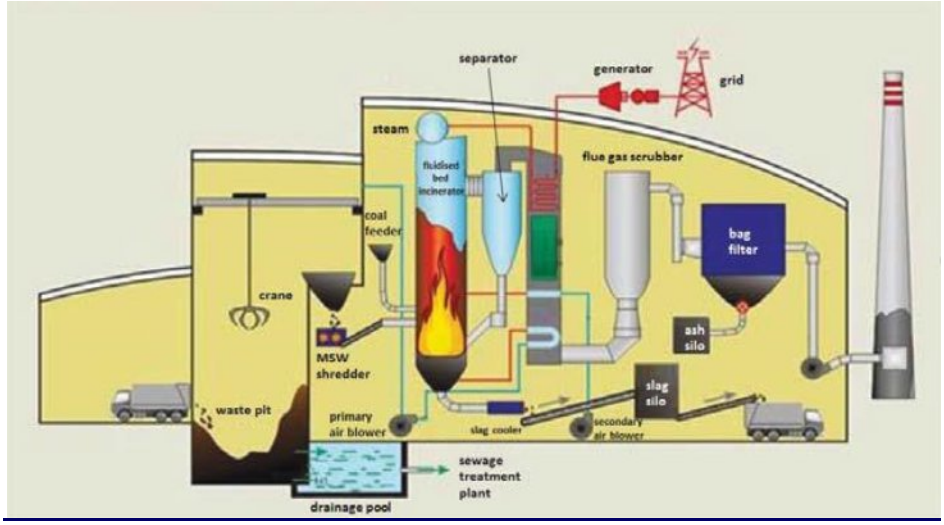
Its CFB waste treatment process can be summarised as follows:

- Municipal solid waste is transported to the WTE facilities using waste transportation vehicles by the local municipal administration authorities.
- The waste transportation vehicles will enter the waste unloading platform where the waste will be unloaded into the waste storage pit where it is stored for decomposition, while waste water (leachate) will be drained away for separate treatment.
- Waste from the waste storage pit is lifted by the gripper, and passes through a shredder. The shredded waste is then transferred using a conveyor system to the waste feeder to be delivered into the CFB incinerator.
- The waste storage pit provides the primary air supply (which is rich in combustible gas, such as methane) required for combustion and the secondary air supply required for supplemental combustion. After the waste and a fuel mixture is delivered into the incinerator, they are first converted into a fluidised state after coming into contact with the scorching bed at the bottom of the furnace chamber, and then undergo combustion after absorbing sufficient heat from the scorching bed.
- The reducible combustible gases generated and any residual fuel is then circulated back into the upper part of the furnace chamber for further combustion. The high temperature flue gas and the accompanying fuels pass through the cyclone separator at the exit on the upper part of the furnace chamber, with the accompanying fuels being separated for re-entry into the furnace chamber for incineration.

- Heat generated from incineration of the waste is absorbed by the residual heat boiler and produces steam, which drives the steam generator units to generate electricity for transmission to the power grid.
- The boiler slag produced by the incineration process is transferred to the slag treatment system. The high temperature flue gas is cooled at the tail part of the CFB boiler before being re-sent into the flue gas treatment system.
- Waste water produced at various stages of the WTE process will be transferred to the waste water treatment system. All pollutants, after undergoing treatment by various systems, will be discharged in compliance with environmental and safety standards.

Figure 35

CJE's differential-density CFB system



Source: CJE

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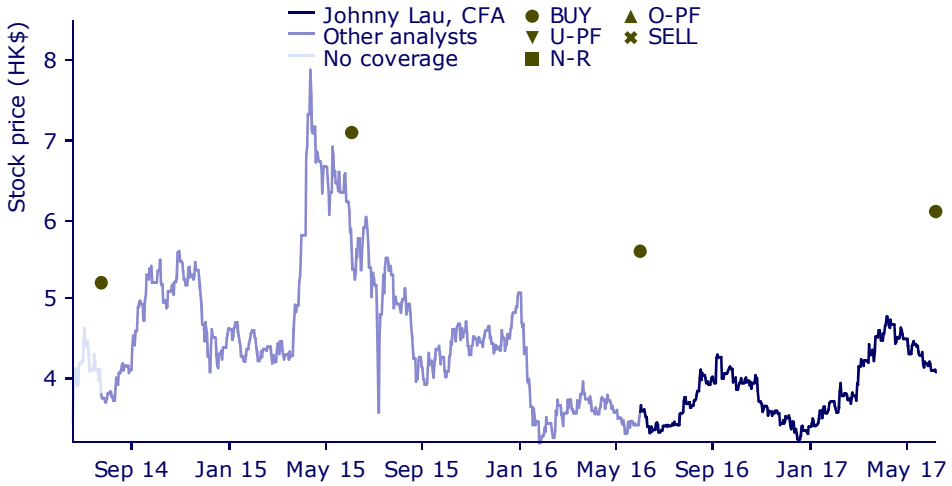
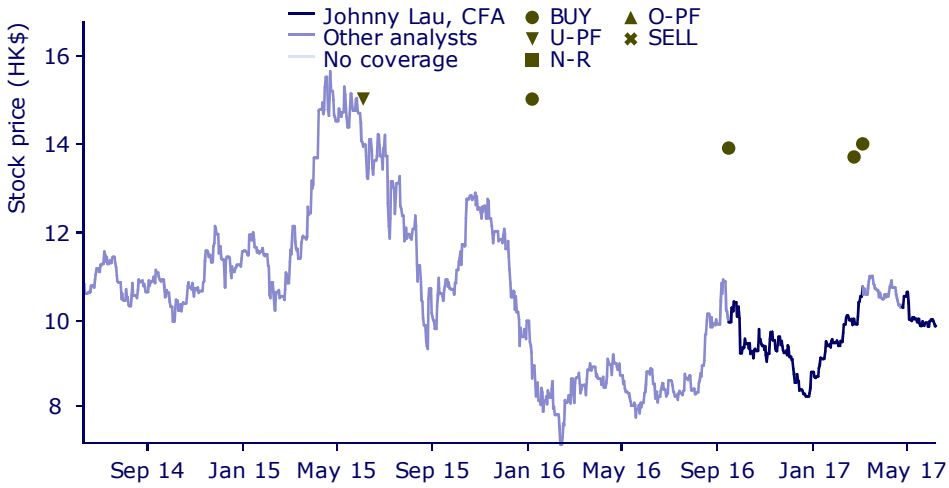


Date	Rec	Target	Date	Rec	Target
08 Jun 2017	BUY	6.10	04 Jun 2015	BUY	7.10
01 Jun 2016	BUY	5.60	24 Jul 2014	BUY	5.20

Source: CLSA

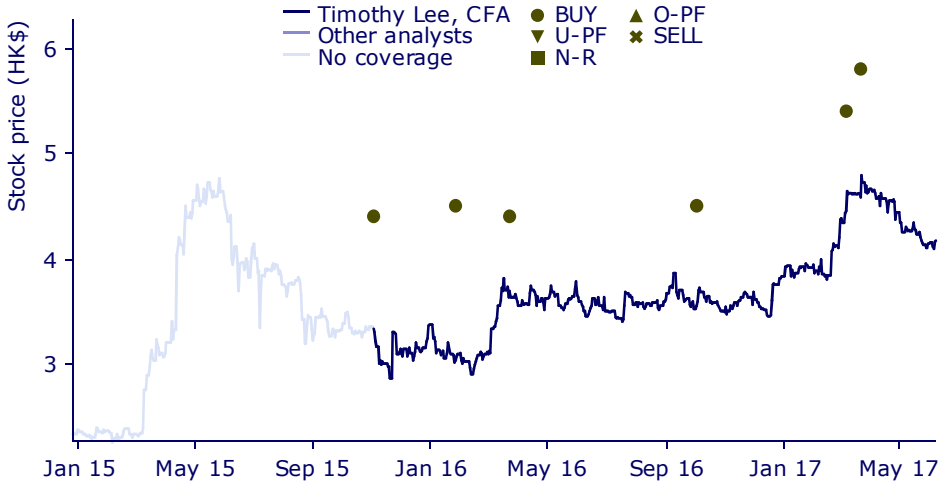
Recommendation history of China Everbright International Ltd 257 HK



Date	Rec	Target	Date	Rec	Target
06 Mar 2017	BUY	14.00	07 Jan 2016	BUY	15.02
23 Feb 2017	BUY	13.70	04 Jun 2015	U-PF	15.02
15 Sep 2016	BUY	13.90			

Source: CLSA

Recommendation history of Canvest Environmental Protection Group Co Ltd 1381 HK



Date	Rec	Target	Date	Rec	Target
22 Mar 2017	BUY	5.80	23 Mar 2016	BUY	4.40
07 Mar 2017	BUY	5.40	27 Jan 2016	BUY	4.50
03 Oct 2016	BUY	4.50	03 Nov 2015	BUY	4.40

Source: CLSA

Equity research coverage of Dynagreen was transferred to Johnny Lau, CFA on 1 June 2016. Prior to that date, the company was covered by Charles Yonts.

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