Kellogg–Morgan Stanley
Sustainable Investing Challenge

Foodie City Investment Fund I

A private equity fund incentivizing the transformation of food waste

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食城

China is the largest waste generator in the world…

- 70% of all waste in China is food waste
- 43 million tons of food waste generated per year
  - **Enough to feed ~140 million people per year, the population of Russia!**
- Only ~13% of food waste being processed (~100K tons / day capacity gap)

...and the majority of waste ends up in landfill

Landfill

- Landfill sites are now over capacity
- Risk of land salination and leaching problems
- 1.5 billion m^3 methane released into the atmosphere every year (amount released by 11 million cows!)

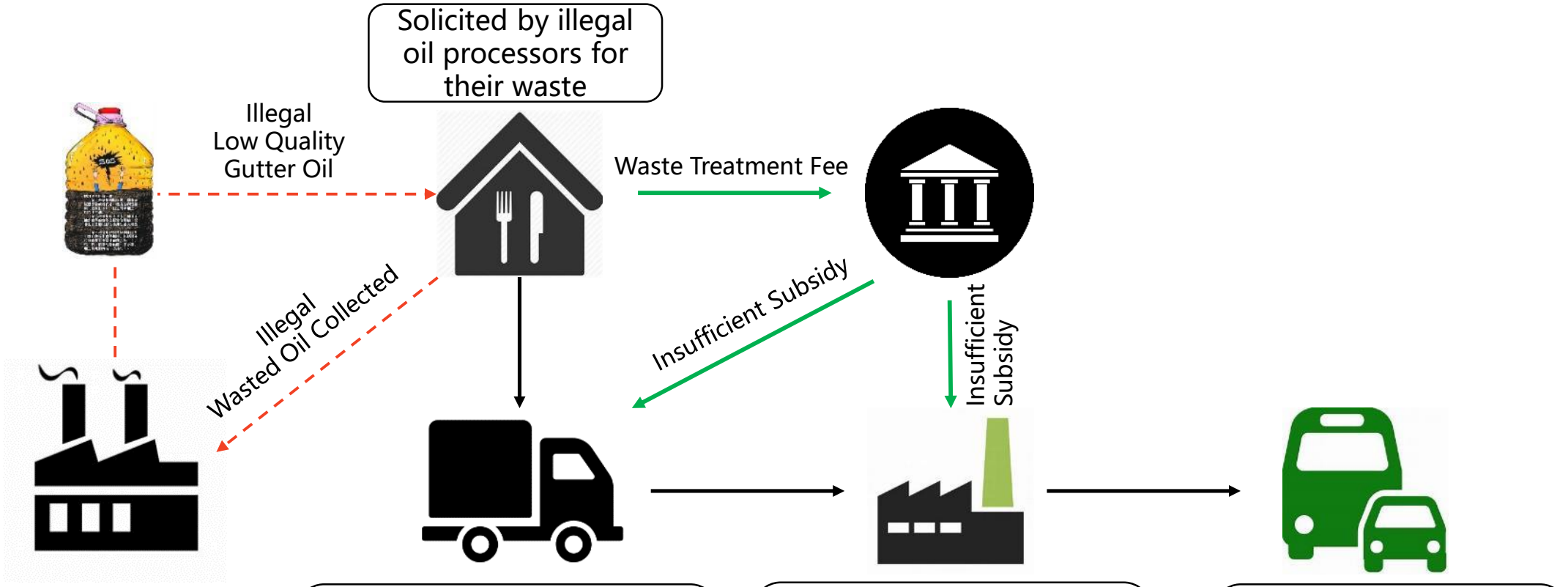
Incineration

- Chinese food waste is oily and water abundant and should be separately treated from household waste
- Fails to extract maximum output value from processing food waste

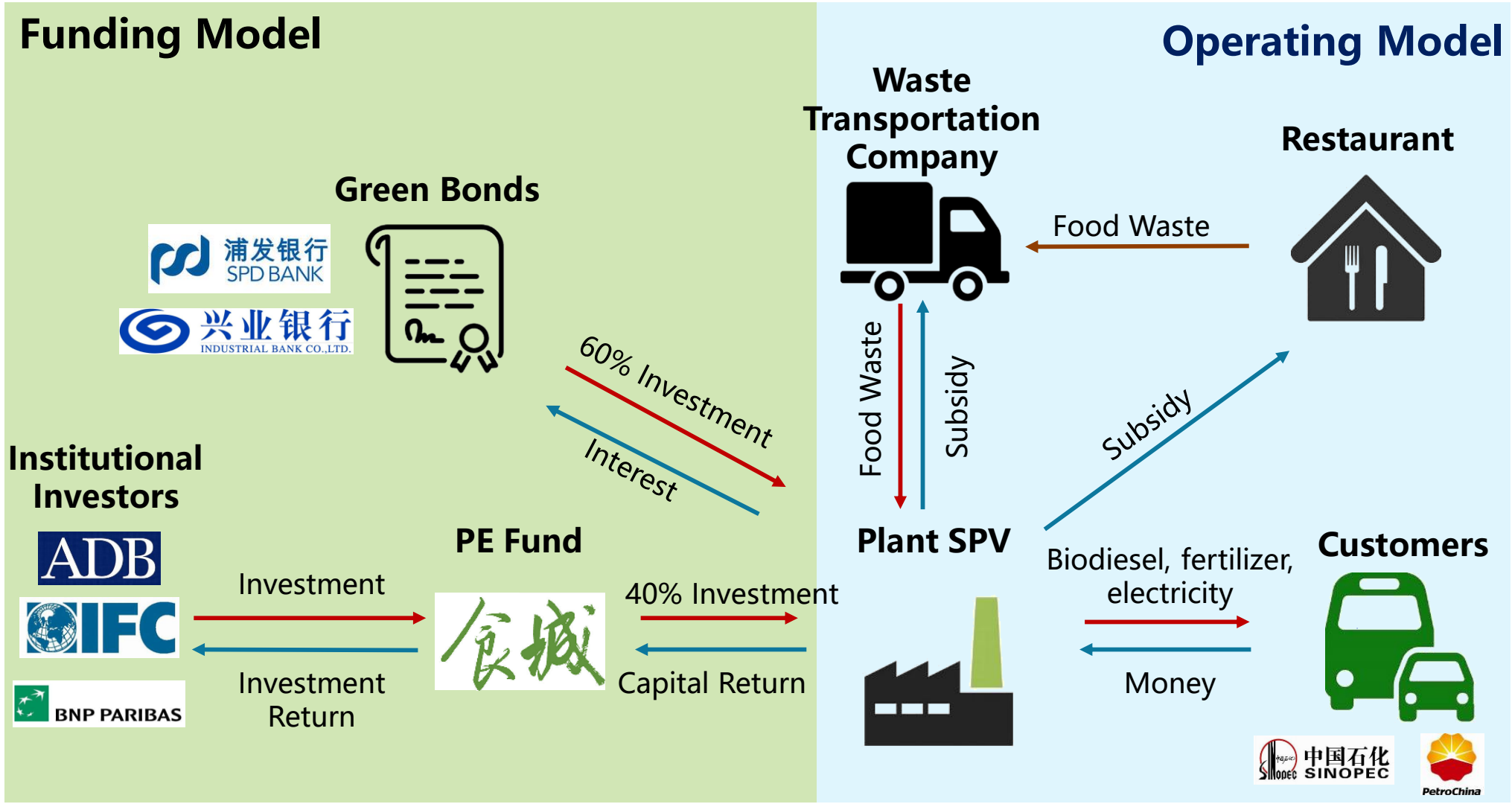
Illegal channels

- Waste oil is processed into “gutter oil” which is used for cooking in low-end markets or for pig farms
- Many recent Chinese scandals demonstrate the dangers of gutter oil

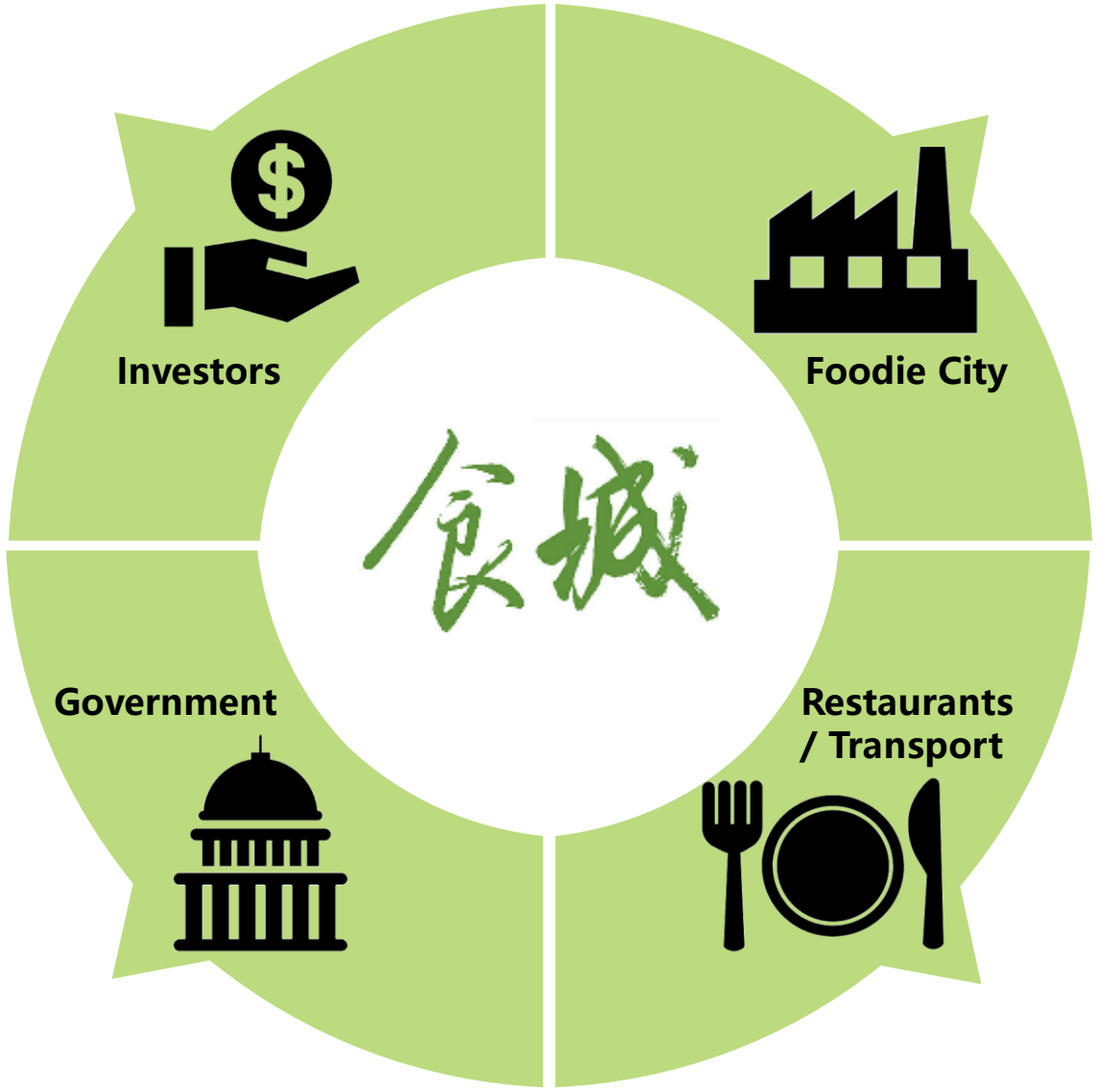
Improper incentives drive inefficiencies



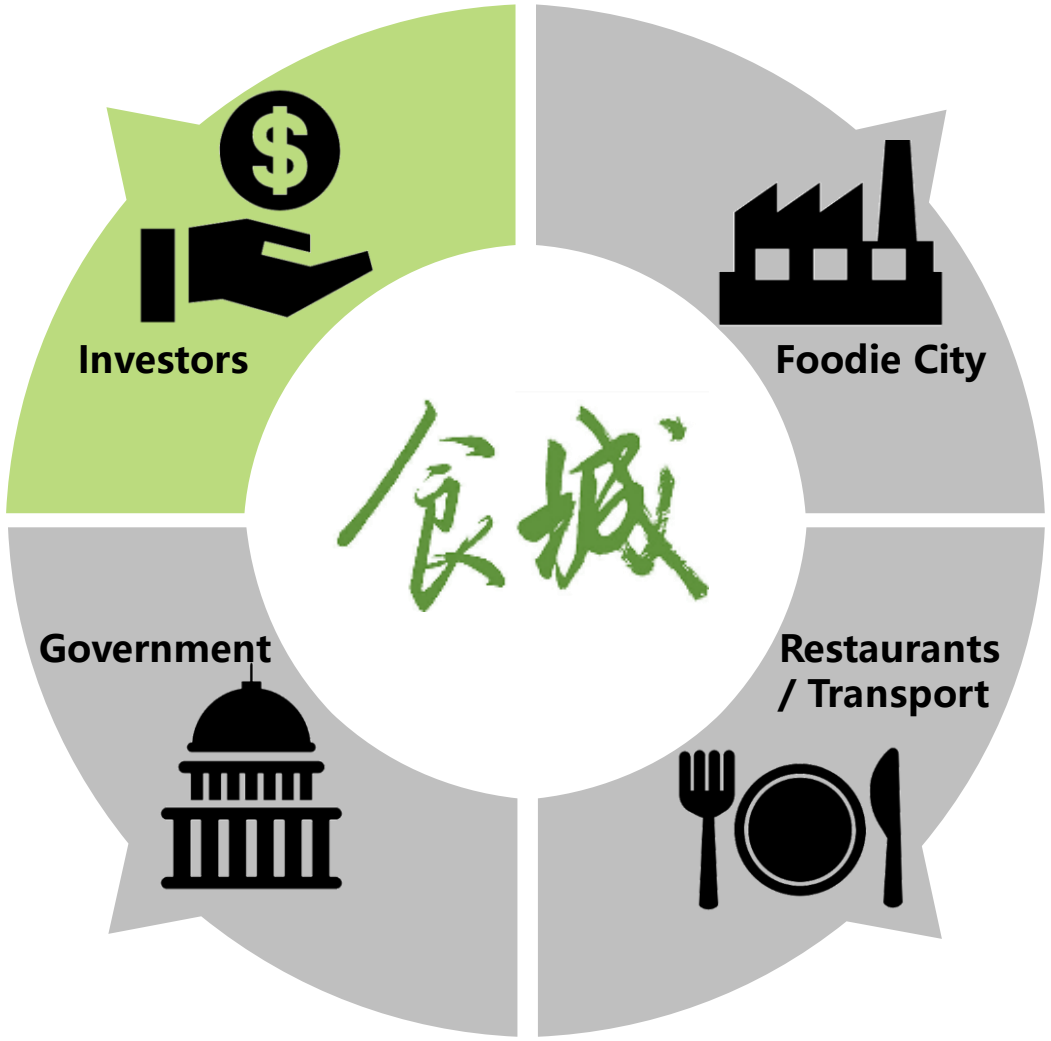
Our model incentivizes all members in the system



Model brings value to all stakeholders



Financial Return and Social Impact for Investors



15.3% expected net IRR

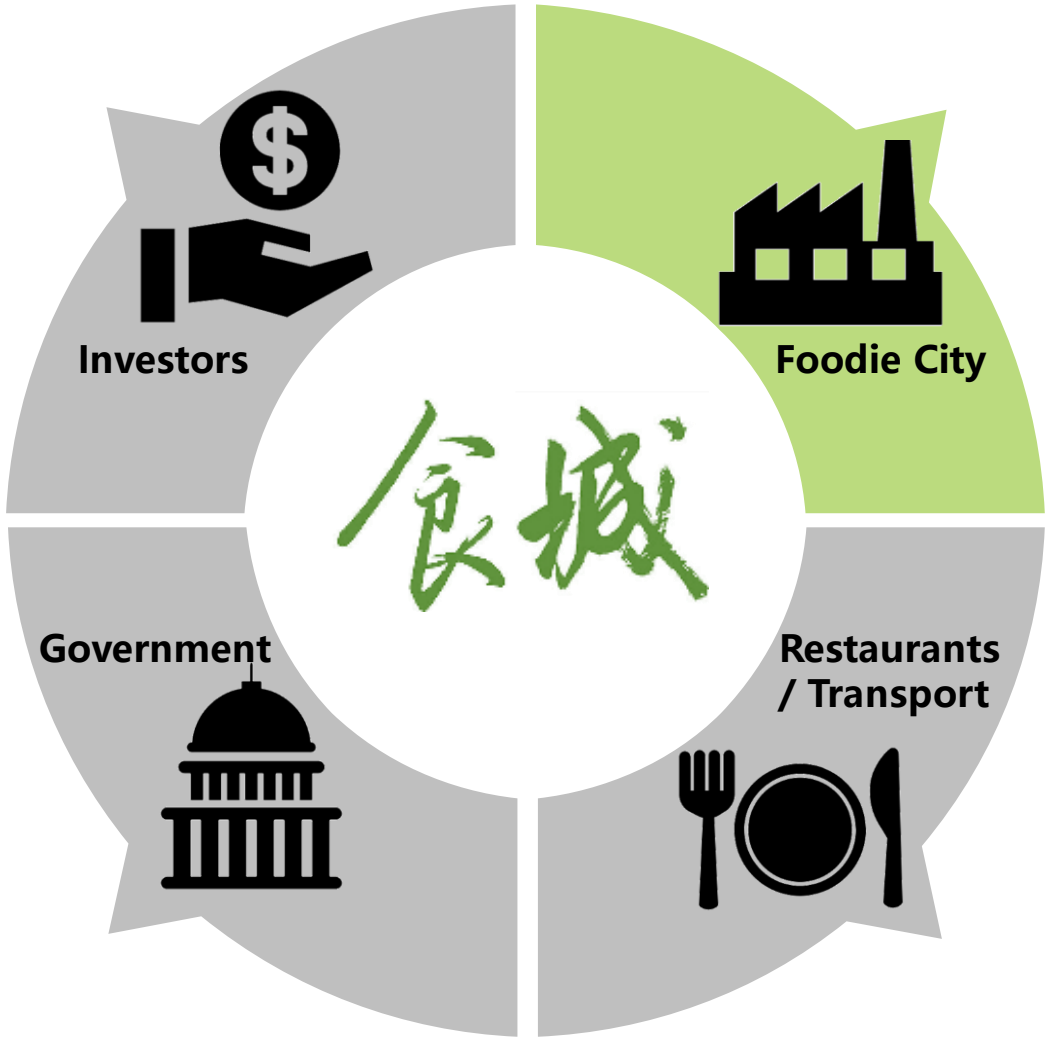
- ✓ Uncorrelated returns
- ✓ Positive alpha

~584,000 tons of food waste[1]

- ✓ Social impact from food waste turned to resources

1. Assumes plants operating at 200 tons / day for 365 days a year, and all 8 plants are fully utilized.

High profits and access to capital for plants



USD 127M[1]

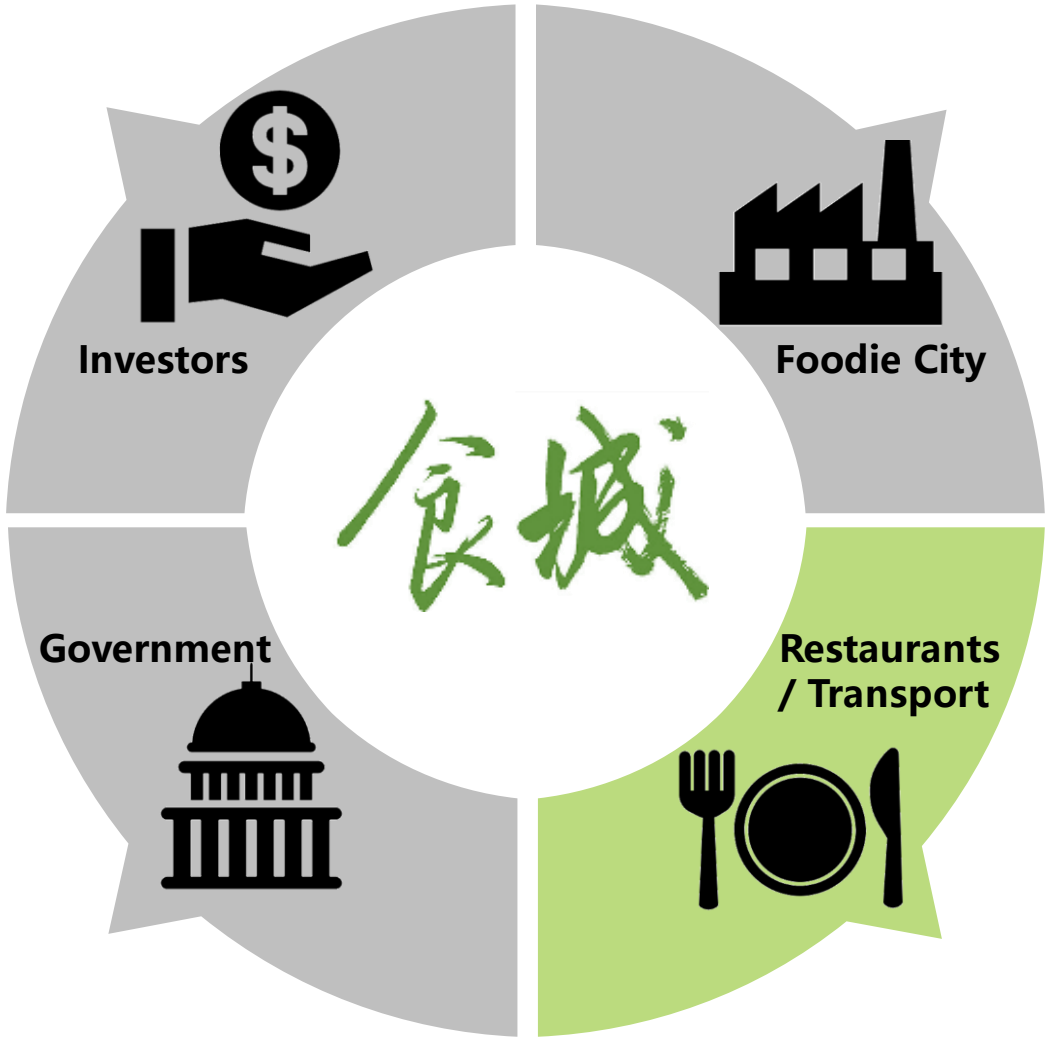
- ✓ Access to previously inaccessible investment capital

15%+
net income margin

- ✓ Highly profitable business model

1. Represents debt and equity investment into 8 plants at $15.9 million per plant.

Extra revenue stream for restaurants and waste transport companies



USD 43M
from disposal of waste oil and food waste[1]

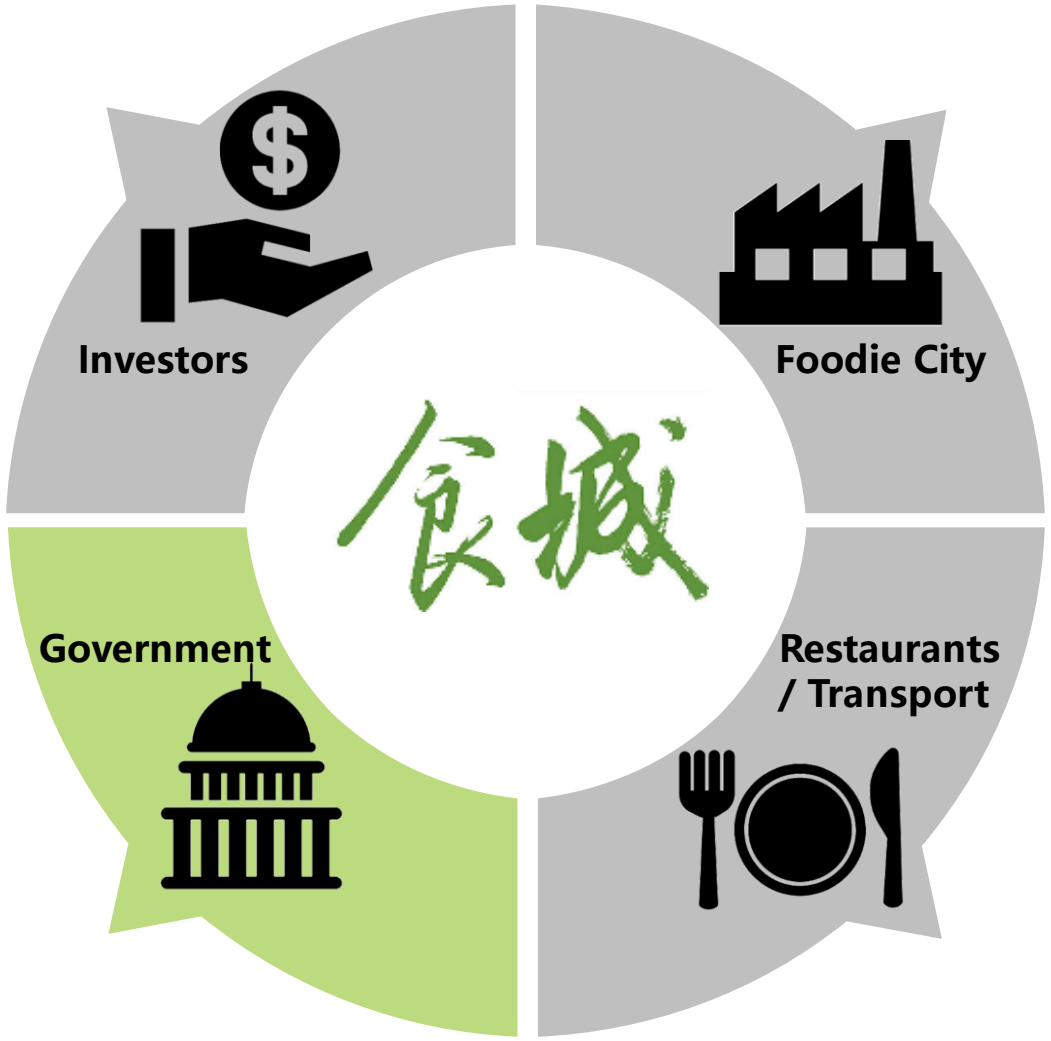
- ✓ Highly profitable business model for cooperating restaurants

USD 19M
from transporting food waste to plants[2]

- ✓ Highly profitable business for partner transport companies

1. Restaurants are paid ~USD600 for every ton of waste oil (73,000 tons of annual capacity per plant, 8 total plants).
2. Waste transport companies are paid ~USD32 for every ton of food waste (73,000 tons of annual capacity per plant, 8 total plants).

Improved food security and decreased carbon emissions



~73,000
tons of wasted oil collected and treated[1]

- ✓ Reduce the amount of "gutter oil" that otherwise may flow back to the table

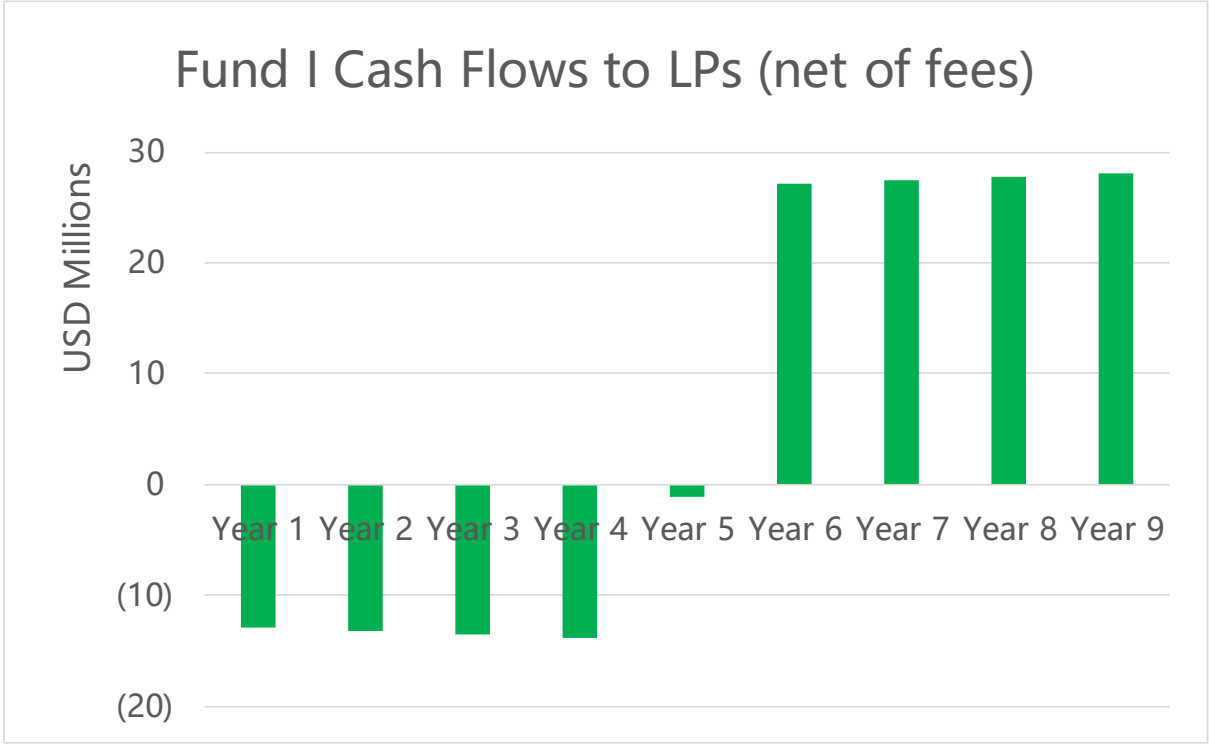
~450,000
tons carbon emission reduction[2]

- ✓ Reduce carbon emissions and alleviate global warming

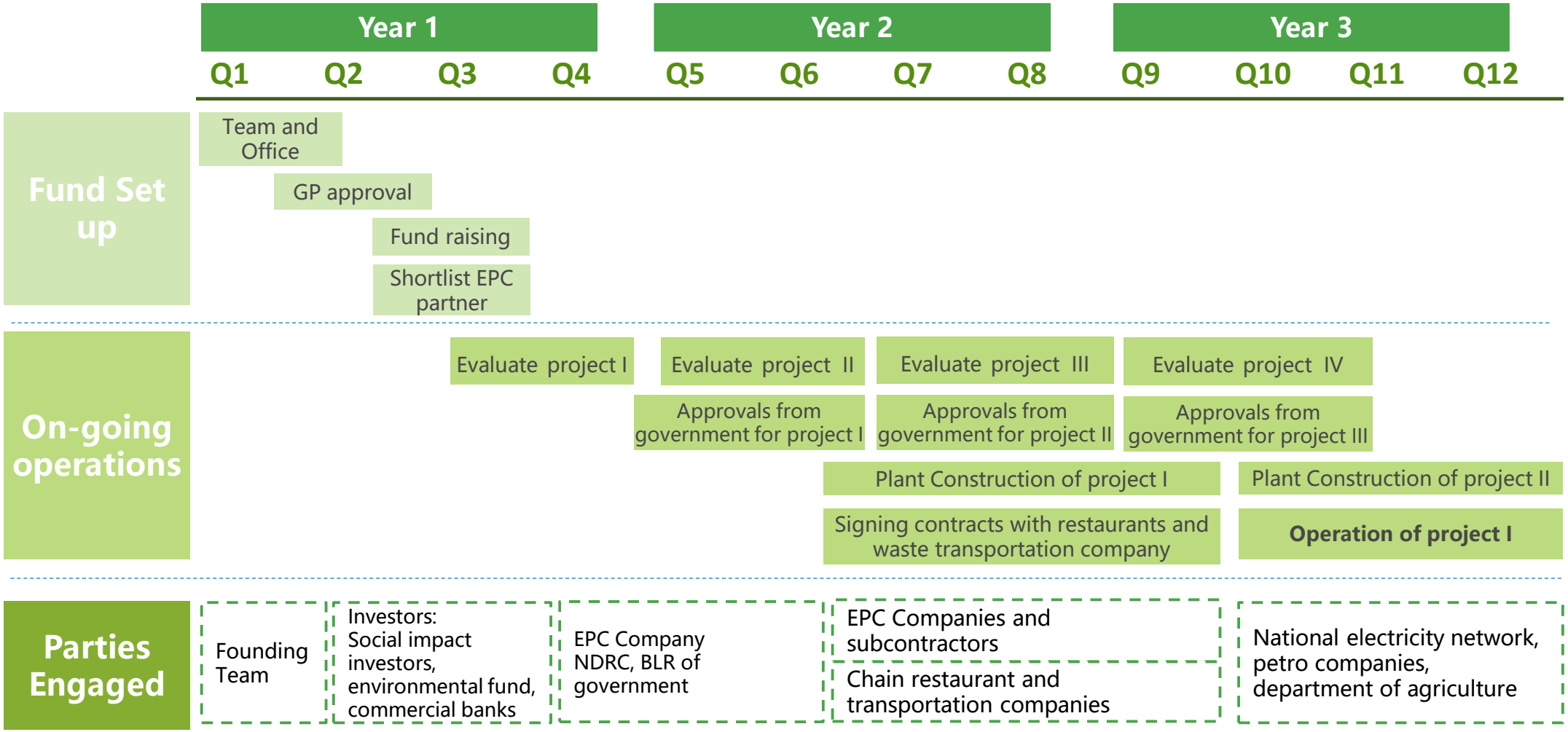
1. Assumes plants operating at 200 tons / day for 365 days a year, and all 8 plants are fully utilized. Wasted oil collection rate is 12.5%
2. http://biofuelsassociation.com.au/biofuels/biodiesel/effect-of-biodiesel-on-emissions/ one liter of biodiesel save approximately 2.5kg of CO_2

Foodie City I offers attractive risk adjusted returns

Fund profile	
Type	Double Bottom Line PE Fund
Horizon	10y (5 year investment period)
Size	USD 50 MM
Target Portfolio	8 total plants
Investment / Plant	USD 6.3 MM
Fees	Mgmt. fee: 2% p.a. Carry: 20% (8% hurdle rate)
Target investors	Impact investors, foundations, institutions
Return	**15.3% net IRR to LPs**



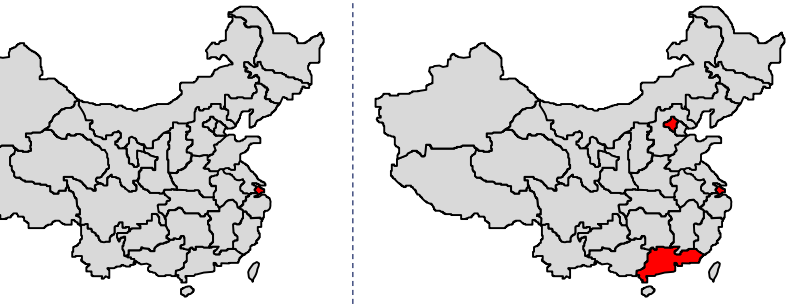
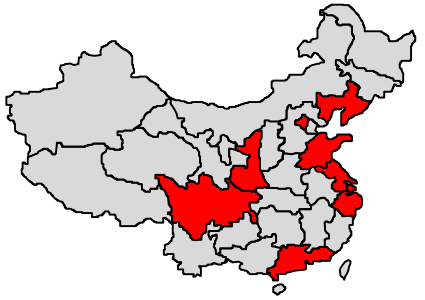
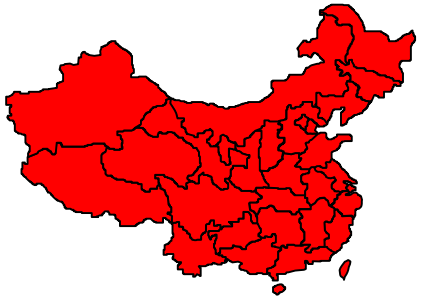
Implementation fully ramped up by year 2



Risks are mitigated through careful planning

Financial Risk	• Price volatility in biodiesel • Delays in bond issuance • Plant cost overruns • Project exit difficulties	• Long term supply contracts with biodiesel users • Reach agreement for bridging loans • Active management team, rigorous KPIs • Build quality asset leading to high demand
Political Risk	• Subsidy cancellation • Cancellation of franchise agreement • Difficulty of permit acquisition	• Project still profitable without subsidy • Active cooperation with government required • Must demonstrate sustainable practices and benefit to country
Business Risk	• Quality and quantity of waste below expectation • Environment pollution risk • Plant operational issues	• Incentivize payments for high quality waste • Follow strictest environmental standards • Hire quality management and robust option package (10%)

Potential for expansion across China

	Fund I (US$50M): Shanghai	Fund II (US$150M): Tier 1 Cities	Fund III (US$1.5B): Tier 1/2 Cities	Fund IV (US$5B): All China
				
Food Waste Used (tons)	584,000	1,752,000	17,520,000	58,400,000
Keyman Investors	IFC AIIB	IFC AIIB	Morgan Stanley	Morgan Stanley
Reduced Carbon Emissions (tons)	450,000	1.4 million	4.1 million	13.5 million

Note: Tier 1 cities defined at Beijing, Shanghai, Shenzhen and Guangzhou.

Strong founding team

Xueyi Liao

Don Wang

Apricot Wilson

Christine Wu

PUB SINGAPORE'S NATIONAL WATER AGENCY

COLLECTIVE RESPONSIBILITY

Blackstone

ARSENAL CAPITAL PARTNERS

Aberdeen Standard Investments

招商銀行 CHINA MERCHANTS BANK

DBS

Thanks to our mentors

Bob Yang
Professor

Elena Loutskina
Professor

Janet Cheng
Private Wealth Management

Jimmy Jen
Venture Capital

Jonathan Chew
Portfolio Manager

Ning Xianfeng
CEO

Ren Lianhai
Professor

Richard Brubaker
Founder

Shailesh Jha
Economist

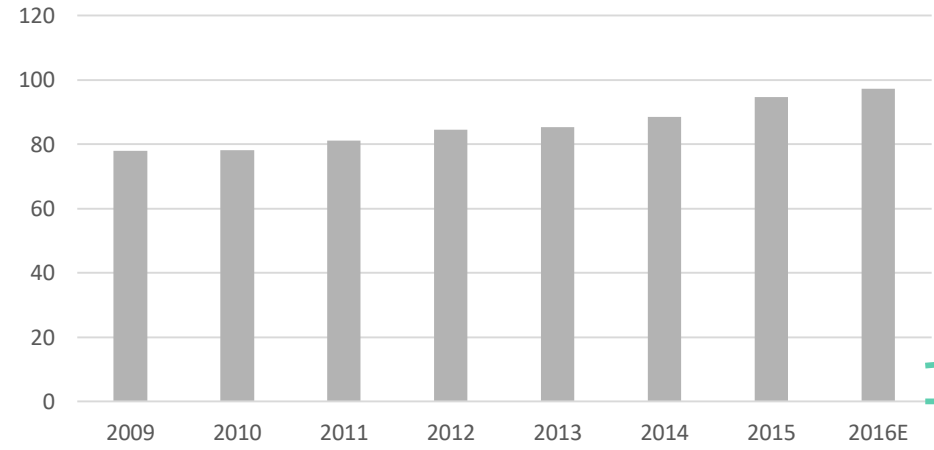
Shutong Liu
Founder

Yue Dongbei
Professor

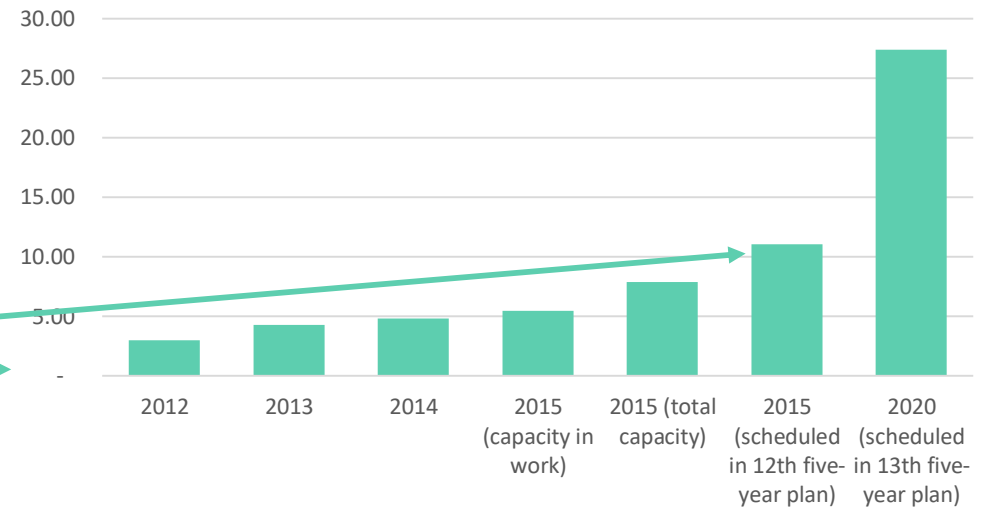
Appendix

The Supply / Demand Gap results in opportunity

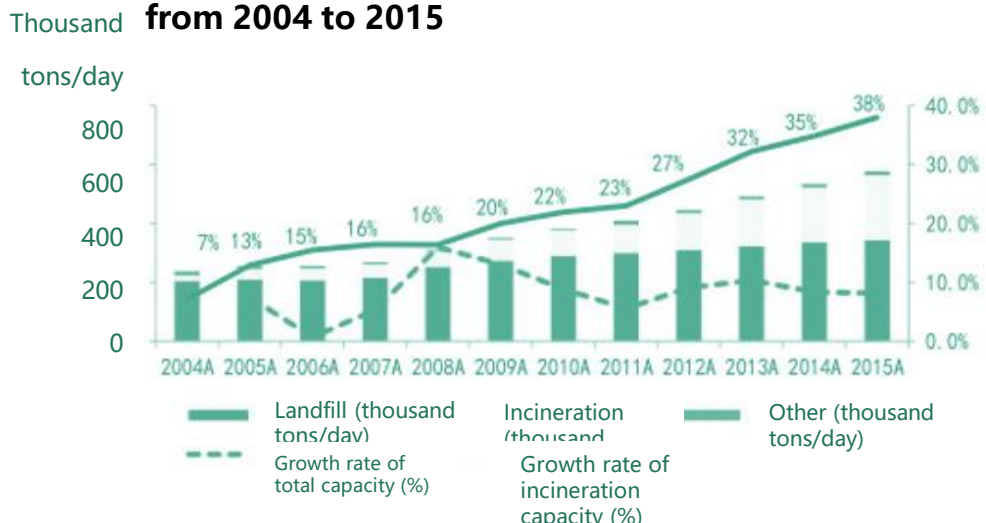
China's Food disposal from restaurant from 2009 to 2016 (million tons)



China's Processing Capacity from 2012 to 2015 and scheduled capacity in five-year plans



Chinese landfill and incineration capacity from 2004 to 2015



- Huge gap between the demanded capacity and current capacity
- It is estimated that building 1 ton/day treatment capacity, USD80,000 is needed
- Hence to realize the target capacity of 75,000 tons/day, about USD3.1bn investment is needed by 2020 which leads to the significance of establishing cooperation between government and social capital in terms of construction and financing

Main Supportive Government Policies - General

Top down Guidance by 13th five year plan with improved regulation since 2015

- **Target of doubling current capacity** 242 treatment plants with a total capacity of 27M tons operational by 2020.
- **Provincial regulations** were issued by nine provinces and municipalities for kitchen waste and Pilot projects were carried out in 100 cities
- **Suspension of new approval for landfill project** while invite for bids for incineration biological treatment projects
- **Municipal information system** built for restaurants to monitor the daily generation and transportation of food disposal

Tax Refund for Food Disposal Plant

- 100% refund for revenue of electricity on condition that 80% of raw material is composed by food disposal (Finance and taxation [2011] No. 115)
- Tax refund of VAT for revenue from sales of biodiesel on condition that the wasted oil accounts for more than 70% of raw material (Finance and taxation [2008] No. 156)

Price subsidy for electricity generated by methane

The subsidy is decided by local government. For instance, a food disposal plant in Shenzhen enjoy the favorable electricity price of RMB0.699/kwh which is 54% higher than the RMB0.453/kwh generated by standard coal burning

Main Supportive Government Policies - Financing

Green Financing is China’ s National Strategy

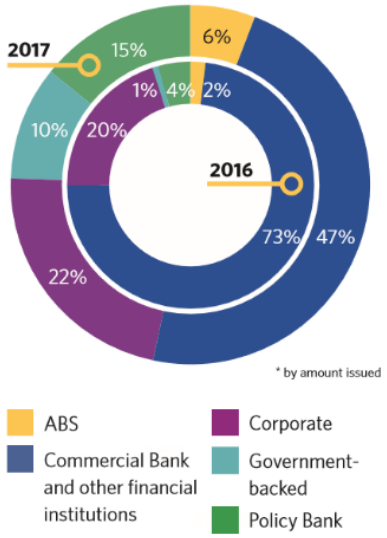
- ***Guideline for Green Credit*** *issued by People’s* Bank of China which oversea China’s commercial banks in 2012 which was further supplemented in following years
- ***Guidelines for the issuance of green bonds***, issued by National Development and Reform Committee in 2015
- ***Guidance on the formulation of a green financial system*** united issued by 7 national department in Aug, 2016
- ***Green bond support project directory*** *issued by People’s* Bank of China which oversea China’s commercial banks

High Growth of China Green Bond Market

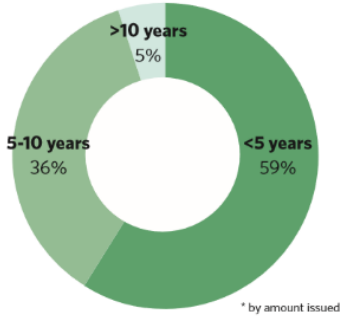
USD33bn

Total green bond issuance from China reached in 2017 - a 4.5% increase year-on-year.

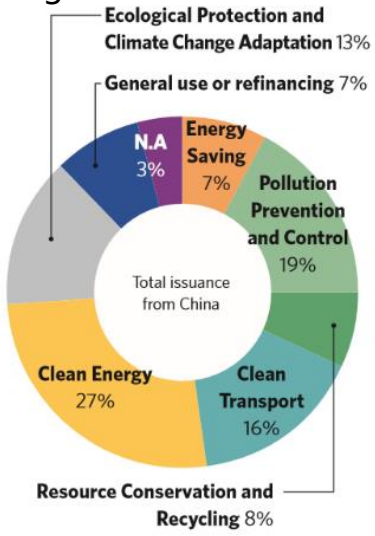
Commercial banks are still the largest source of green bond issuance



59% of the market is composed of bonds with <5 years tenor

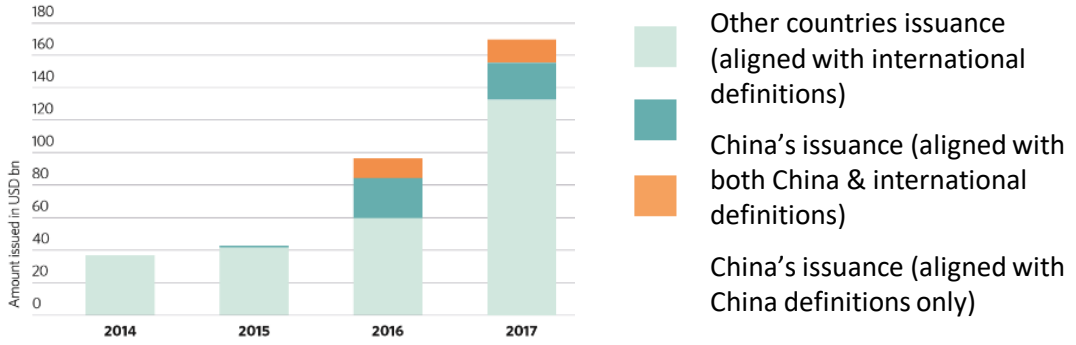


Use of proceeds, by PBoC's Green Bond Endorsed Project Catalogue



The average issuance rate of green bonds in 2017 was 4.82%, up from 3.26% of 2016

China is a major player within a growing global green bond market



Potential partners & investor names

Equity tranche Investors:

Jiangsu Ecological Environmental Protection Development Fund (RMB80bn)
Shaanxi Investment Fund For Environmental Protection Industry (RMB15bn)

EPC Company

Equipment

Customers

Biogas

Electricity
National electricity network

Biodiesel
petro companies

Fertilizer
department of agriculture

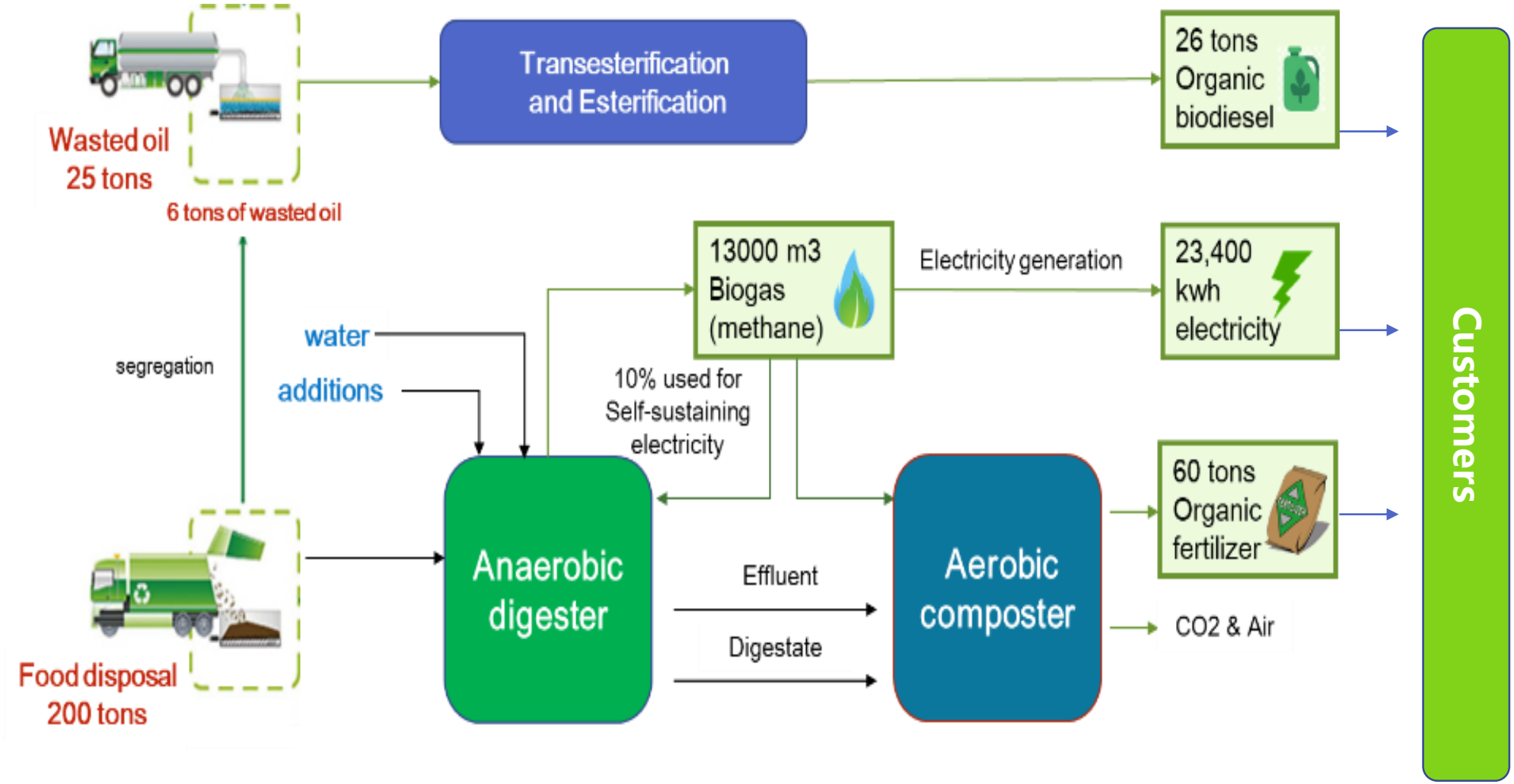
Debt Tranche Investors: commercial banks

Departments of government

BLR of government

Chain restaurant

Plant Details

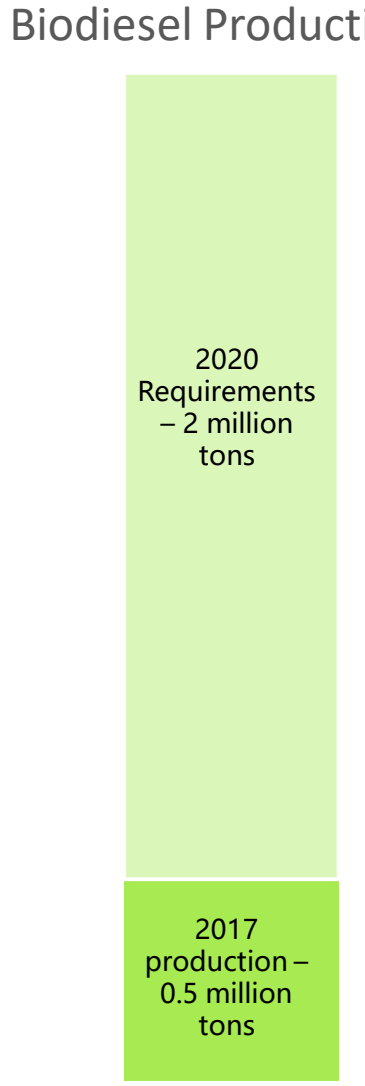


Biodiesel in China

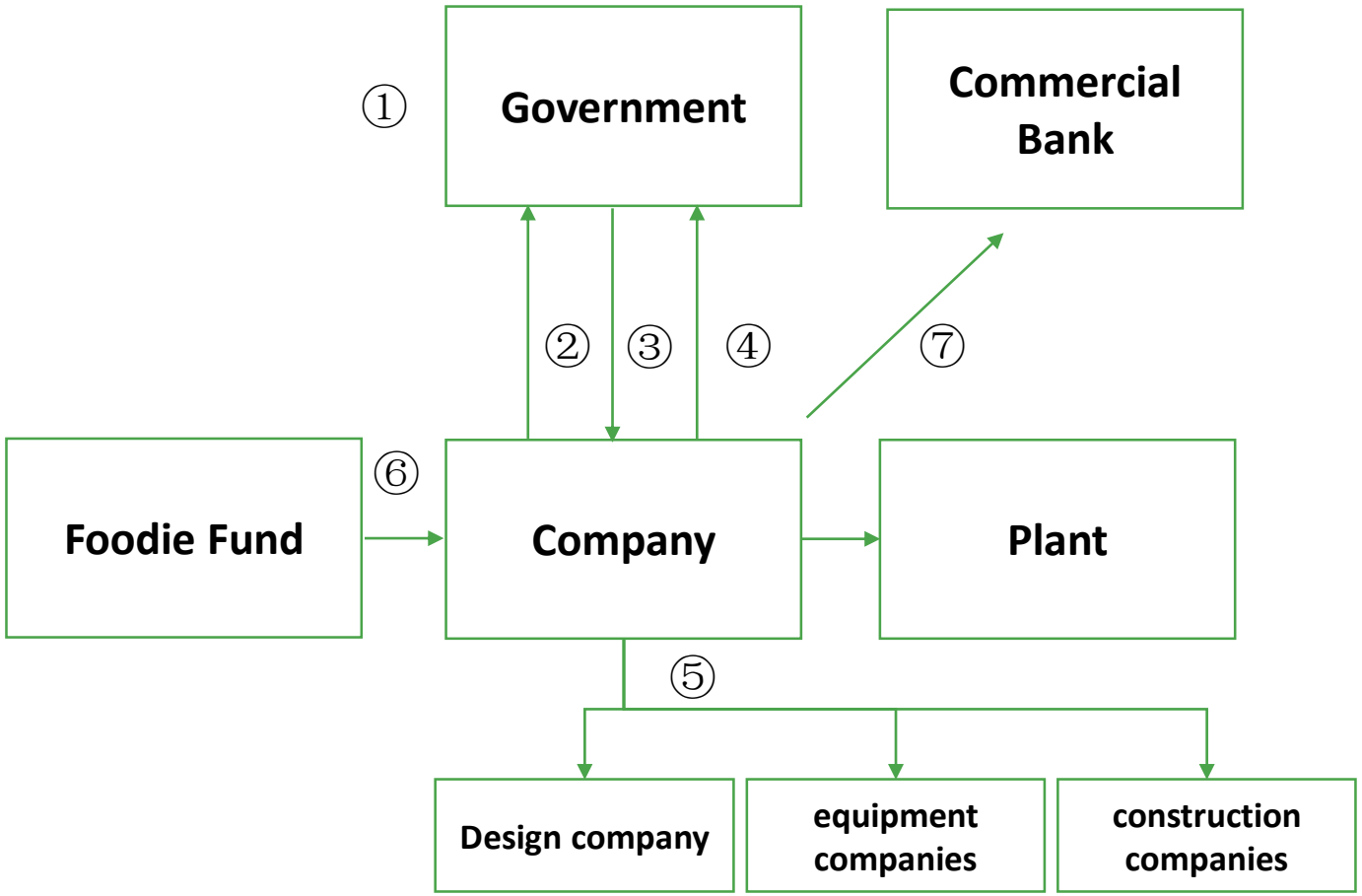
- Biodiesel is one of the products of the transesterification of vegetable oil as part of the anaerobic digestion process
- This fuel is **biodegradable, non-toxic and produces 60% lower carbon dioxide emissions** than petroleum diesel
- **No modification is needed** to engines for them to be able to use biodiesel instead of petroleum diesel

- As a result of its lower emissions, the **Chinese government is supporting the use of biofuel** with its E10 blend mandate
- To support the rise in blended fuels, the government is also **looking to ramp up production** – but targets are unlikely to be reached
- Although **no specific subsidies** are offered, this backdrop means that the government are broadly supportive of efforts to improve the biofuel value chain

- Biodiesel **prices are broadly driven by trends in crude oil** and are therefore subject to considerable volatility



How will the project bidding process work?



① Government develops city plan and calls for bidding

② Submit the project feasibility report to the government

③ Government issue franchise right to the company

④ Company apply for approvals and certificates from the government including land, construction etc.

⑤ Company subcontract the project to design, equipment and construction companies

⑥ Foodie City fund invest in the company

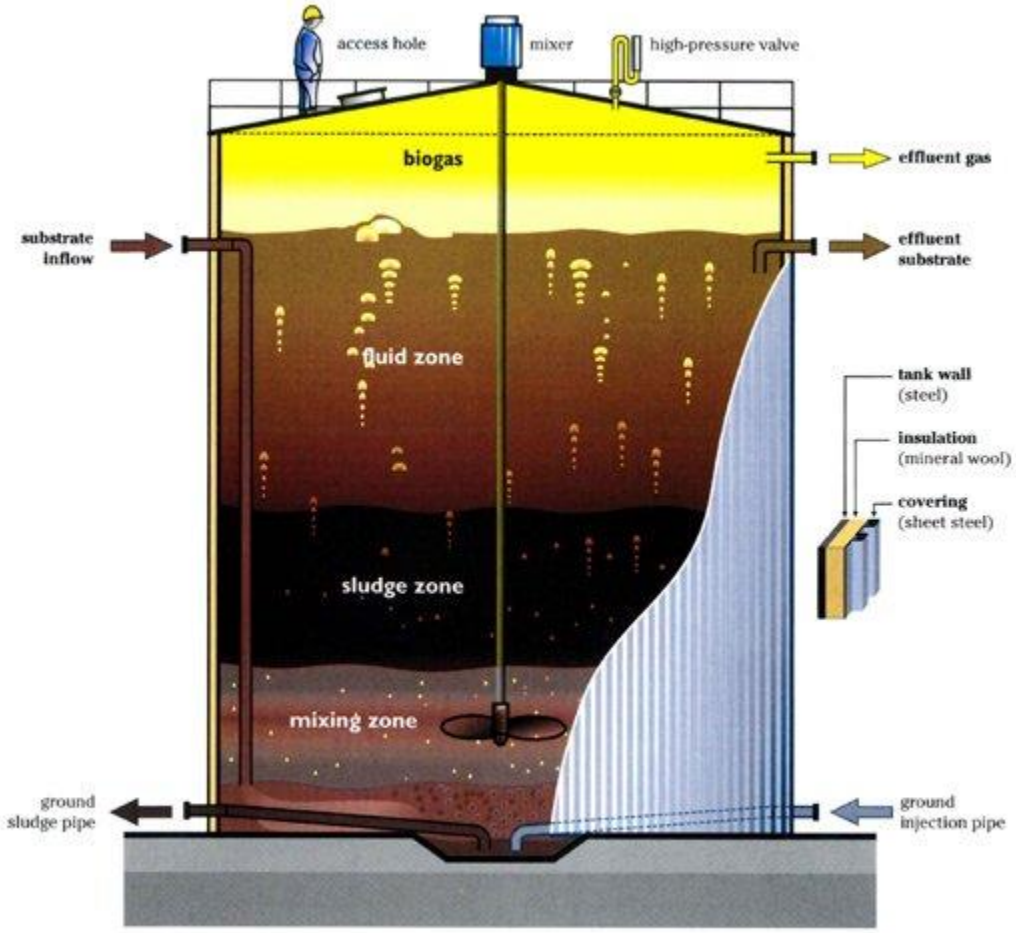
⑦ Company apply to be included in the project of Commercial bank's green bond issuance

Advantages of Anaerobic Digesters

Technology	Sustainable	Impact on the environment	Energy recovery	Fertilizer output	Water recovery	Heavy metal recovery
Landfill	Unsustainable waste of resources ✗	Some CH4 to atmosphere, leachate problems ✗	Partial if landfill gas extracted ✓	No fertilizer outputs ✗	Lost in leachate ✗	Not possible ✗
Incineration	Fertilizer loss negates any energy gain ✗	Toxic ash ✗	Some but Energy wasted ✓	Some P&K output, but N destroyed ✓	Burnt off ✗	Secondary waste ✗
Composting	Energy required ✗	Damage to ozone layer, also leachate problems ✗	None ✗	Incomplete pathogen kill ✓	Lost to atmosphere ✗	Not possible ✗
Anaerobic digestion	Carbon neutral ✓	Total recovery of energy as CH4 CO2 & fertilizer ✓	Maximum overall energy ✓	Clean NPK fertilizer and trace elements ✓	100% ✓	Heavy metals can be recovered from digestate ✓

Source: http://organic-power.co.uk/why_anaerobic_digestion.aspx

Anaerobic Digester



Aerobic Composter

Revenue Build for Plant

USD	Year 1	Year 2	Year 3	Year 4	Year 5
Capacity Utilization	25%	50%	100%	100%	100%
food waste tons	18,250	36,500	73,000	73,000	73,000
subsidy per ton	$23.81	$23.81	$23.81	$23.81	$23.81
biodiesel conversion rate	3%	3%	3%	3%	3%
fertilizer conversion rate	30%	30%	30%	30%	30%
biogas conversion rate (m3 / ton)	65.00	65.00	65.00	65.00	65.00
electricity generation rate (kwh / m3)	2.00	2.00	2.00	2.00	2.00
wasted oil collection rate	12.5%	12.5%	12.5%	12.5%	12.5%
biodiesel conversion rate from wasted oil	80%	80%	80%	80%	80%
electricity sold	90%	90%	90%	90%	90%
biodiesel price / ton	$952	$952	$952	$952	$952
organic fertilizer price / ton	$127	$127	$127	$127	$127
biogas price	$0.10	$0.10	$0.10	$0.10	$0.10
subsidy from government	$434,524	$869,048	$1,738,095	$1,738,095	$1,738,095
sales of biodiesel from food disposal	$521,429	$1,042,857	$2,085,714	$2,085,714	$2,085,714
sales of biodiesel from wasted oil	$1,738,095	$3,476,190	$6,952,381	$6,952,381	$6,952,381
sales of organic fertilizer	$695,238	$1,390,476	$2,780,952	$2,780,952	$2,780,952
revenue of electricity	$210,814	$421,627	$843,254	$843,254	$843,254
total revenue	$3,600,099	$7,200,199	$14,400,397	$14,400,397	$14,400,397

P&L for Plant

USD	Year 1	Year 2	Year 3	Year 4	Year 5
total revenue	$3,600,099	$7,200,199	$14,400,397	$14,400,397	$14,400,397
total subsidy to restaurant	$434,524	$869,048	$1,738,095	$1,738,095	$1,738,095
purchase expense for wasted oil	$1,339,782	$2,679,563	$5,359,127	$5,359,127	$5,359,127
waste water treatment cost	$14,484	$28,968	$57,937	$57,937	$57,937
other materials	$28,968	$57,937	$115,873	$115,873	$115,873
subsidy to logistics companies	$579,365	$1,158,730	$2,317,460	$2,317,460	$2,317,460
total variable cost	$2,397,123	$4,794,246	$9,588,492	$9,588,492	$9,588,492
total contribution margin	**$1,202,976**	**$2,405,953**	**$4,811,905**	**$4,811,905**	**$4,811,905**
% of revenue	**33%**	**33%**	**33%**	**33%**	**33%**
depreciation	$793,651	$793,651	$793,651	$793,651	$793,651
maintenance	$79,365	$79,365	$79,365	$79,365	$79,365
employees	$521,429	$521,429	$521,429	$521,429	$521,429
other cost	$115,873	$115,873	$115,873	$115,873	$115,873
total fixed cost	$1,510,317	$1,510,317	$1,510,317	$1,510,317	$1,510,317
total operation profit	**($307,341)**	**$895,635**	**$3,301,588**	**$3,301,588**	**$3,301,588**
% of revenue	**--**	**12%**	**23%**	**23%**	**23%**

Plant Cash Flow and Exit Analysis

USD	Year 1	Year 2	Year 3	Year 4	Year 5
EBITDA	$486,310	$1,689,286	$4,095,238	$4,095,238	$4,095,238
Less: interest expense	($476,190)	($476,190)	($476,190)	($476,190)	($476,190)
Less: taxes	--	($156,736)	($577,778)	($577,778)	($577,778)
Less: working capital / other	($79,365)	($79,365)	($79,365)	($79,365)	($79,365)
Less: capex	($793,651)	($793,651)	($793,651)	($793,651)	($793,651)
Total Cash Flow	($862,897)	$183,343	$2,168,254	$2,168,254	$2,168,254

Exit EBITDA		$4,095,238
Multiple		5.0x
Enterprise Value		$20,476,192
Plus: Cash		$5,825,209
Less: Bond		($9,523,810)
Equity Value		$16,777,592
Management Equity	10%	$1,677,759
Foodie City Fund	90%	$15,099,833

IRR Analysis of LP Returns of Foodie City Fund I

USD	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Plant Investment	($6,349,206)	--	--	--	--	--
Management Fee	($141,093)	($141,093)	($141,093)	($141,093)	($141,093)	($141,093)
Plant Sale	--	--	--	--	--	$15,099,833
Carry Paid to GP	--	--	--	--	--	($946,841)
Total Returns to LP	($6,490,300)	($141,093)	($141,093)	($141,093)	($141,093)	$14,011,899

gross IRR	18.92%
net IRR to LP	**15.25%**

USD Plant	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
1	(6,490,300)	(141,093)	(141,093)	(141,093)	(141,093)	14,011,899			
2	(6,490,300)	(141,093)	(141,093)	(141,093)	(141,093)	14,011,899			
3		(6,490,300)	(141,093)	(141,093)	(141,093)	(141,093)	14,011,899		
4		(6,490,300)	(141,093)	(141,093)	(141,093)	(141,093)	14,011,899		
5			(6,490,300)	(141,093)	(141,093)	(141,093)	(141,093)	14,011,899	
6			(6,490,300)	(141,093)	(141,093)	(141,093)	(141,093)	14,011,899	
7				(6,490,300)	(141,093)	(141,093)	(141,093)	(141,093)	14,011,899
8				(6,490,300)	(141,093)	(141,093)	(141,093)	(141,093)	14,011,899
Sum	(12,980,600)	(13,262,787)	(13,544,974)	(13,827,160)	(1,128,748)	27,177,237	27,459,424	27,741,610	28,023,797

Project Gross IRR Sensitivity Analysis

Initial Total Plant Investment (USD M)

$14.9	$15.4	$15.9	$16.4	$16.9
21.90%	20.40%	18.92%	17.46%	16.02%

Green Bond Funding Percent

40%	50%	60%	70%	80%
14.41%	16.30%	18.92%	22.83%	29.42%

Biodiesel Price (USD)

$852	$902	$952	$1,002	$1,052
5.29%	12.86%	18.92%	23.95%	28.27%

Biodiesel Conversion Rate

2.0%	2.5%	3.0%	3.5%	4.0%
9.53%	14.61%	18.92%	22.68%	26.03%

Capacity Utilization

70%	78%	85%	93%	100%
-3.23%	4.24%	10.04%	14.82%	18.92%

Employees / Plant

20	25	30	35	40
21.13%	20.04%	18.92%	17.75%	16.53%