

Integrated Solid Waste Management

Wuxi New District, PRC

Waste Characterization & Quantification



Presentation Outline

- ❖ Waste Types in WND
- ❖ Characterization & Quantification
- ❖ Future Projections



Waste Types

- ❖ **Municipal**
Domestic, commercial and non-processing industrial waste)
- ❖ **Industrial**
Hazardous and non-hazardous
- ❖ **Healthcare**
Hazardous
- ❖ **Construction and Debris (C&D)**
Residential, Industrial and municipal works



Characterization & Quantification

- ❖ Composition of various waste streams
- ❖ Quantity of various waste streams
- ❖ Seasonal variations
- ❖ Consolidation of data



Municipal Waste - Domestic

- ❖ Waste sampling near residential places
- ❖ After most of the reusable and recyclable items are already collected

<i>Components</i>	<i>Median (%age)</i>	<i>Calorific Value</i>	<i>Moisture Content</i>
Food waste	73	1741	79
Plastic	17	17948	49
Paper	6	7732	45
Metal	0	0	0
Glass	0	0	0
Textile	2	10207	27
Ceramics	0	0	0
wood	0	0	0
Hazardous waste	0	0	0
Coal residual	0	0	0



Municipal Waste - Commercial

- ❖ Waste sampling at markets
- ❖ After most of the reusable and recyclable items are already collected

<i>Components</i>	<i>Median (%age)</i>	<i>Calorific Value</i>	<i>Moisture Content</i>
Food waste	69	1917	81
Plastic	14	20313	43
Paper	6	6687	46
Metal	0	0	0
Glass	0	0	0
Textile	0	0	0
Ceramics	0	0	0
wood	0	0	0
Hazardous waste	0	0	0
Coal residual	0	0	0



Municipal Waste - Industrial

- ❖ Waste sampling at the only collection point
- ❖ Most of the reusable and recyclable items are not collected at this transfer point

<i>Components</i>	<i>Median (%age)</i>	<i>Calorific Value</i>	<i>Moisture Content</i>
Food waste	13.4	7825	81
Plastic	21.2	32949	43
Paper	53.4	10403	46
Metal	1.6		0
Glass	0	0	0
Textile	10.4	13093	0
Ceramics	0	0	0
wood	0	0	0
Hazardous waste	0	0	0
Coal residual	0	0	0



Municipal Waste - Quantification

<i>Transfer Stations (Neighbourhoods Coverage)</i>	<i>Population</i>	<i>Generated Waste Tons/day</i>	<i>Collected/ Treated Waste Tons/day</i>	<i>Treatment Methods Tons/day</i>
Wang Zhuang	109918	68	68	51 IN 17 LF
Nan Zhan	65442	60	50	39 IN 11 LF
Fang Yin	42019	30	21	21 LF
Mei Cun	51134	50	40	33.5 IN 6.5 LF
Shuo Fang	83493	55	25	12.5 IN 12.5 LF
Hong Shan	72936	70	20	20 LF
Industries		82	82	50 IN 32 LF
<i>Total</i>	424942	415	306	186 IN 120 LF



Municipal Waste Composition

Seasonal Variations - Autumn

Food waste is lower – paper waste is higher

Sample Components	Zhujiang 1	Zhujiang 2	Zhujiang 3	Jingyi 1	Jingyi 2	Jingyi 3	Average
Food waste	75	65	59	45	23	41	51
Plastic	10	15	20	24	17	26	19
Paper	10	9	10	27	44	27	21
Metal		1		2			1
Glass	2		4	2			2
Textile	2	10	5		17	6	7
Coal residual	1	1					1
foam	1		2				1

Analysis was only done for composition



Municipal Waste Composition Household Level – Generation Point

From three families on weekly basis for 6 samples from each

	Family 1	Family 2	Family 3
Components	<i>Weight (Kg) / % age</i>	<i>Weight (Kg) / % age</i>	<i>Weight (Kg) / % age</i>
Food	23.0 / 82	16.3 / 71	18.0 / 92
Plastic	0.8 / 3	1.0 / 4	1.5 / 8
Paper	2.5 / 9	2.0 / 9	
Metal			
Glass	1.5 / 5	1.0 / 4	
Textile		1.5 / 7	
Wood		1.0 / 4	
Hazardous	2 Batteries	2 Flourescent	



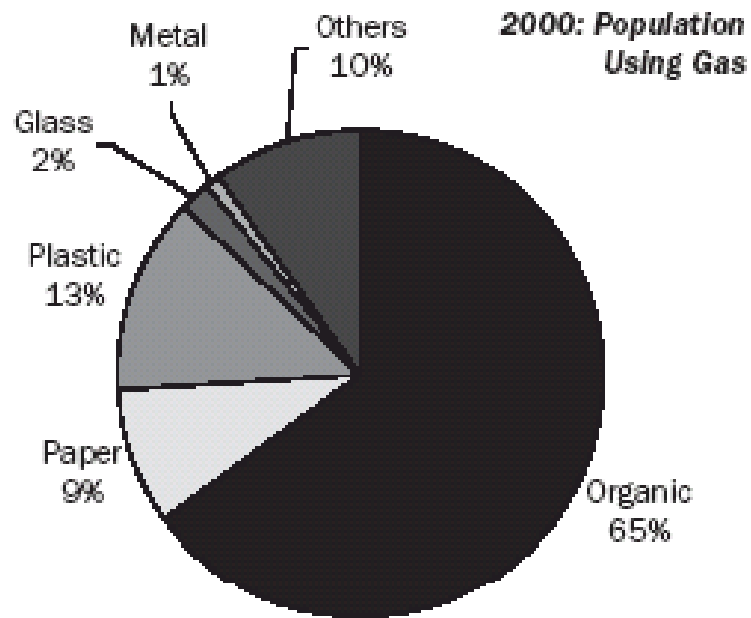
Municipal Waste – Components

<i>Components</i>	<i>Industrial</i>		<i>Domestic + Commercial</i>		<i>Total</i>	
	<i>%age</i>	<i>Weight (tpd)</i>	<i>%age</i>	<i>Weight (tpd)</i>	<i>%age</i>	<i>Weight (tpd)</i>
Food waste	13.40	10.99	71.40	237.75	59.94	248.74
Plastic	21.20	17.38	16.85	56.11	17.71	73.49
Paper	53.40	43.79	6.62	22.05	15.86	65.84
Metal	1.60	1.31	0.38	1.28	0.62	2.59
Glass	0.00	0.00	1.71	5.68	1.37	5.68
Textile	10.40	8.53	2.37	7.90	3.96	16.43
Ceramics	0.00	0.00	0.51	1.69	0.41	1.69
Hazardous waste	0.00	0.00	0.26	0.86	0.21	0.86
<i>Total</i>	100.00	82.00	100.00	333.00	100.08	415.00

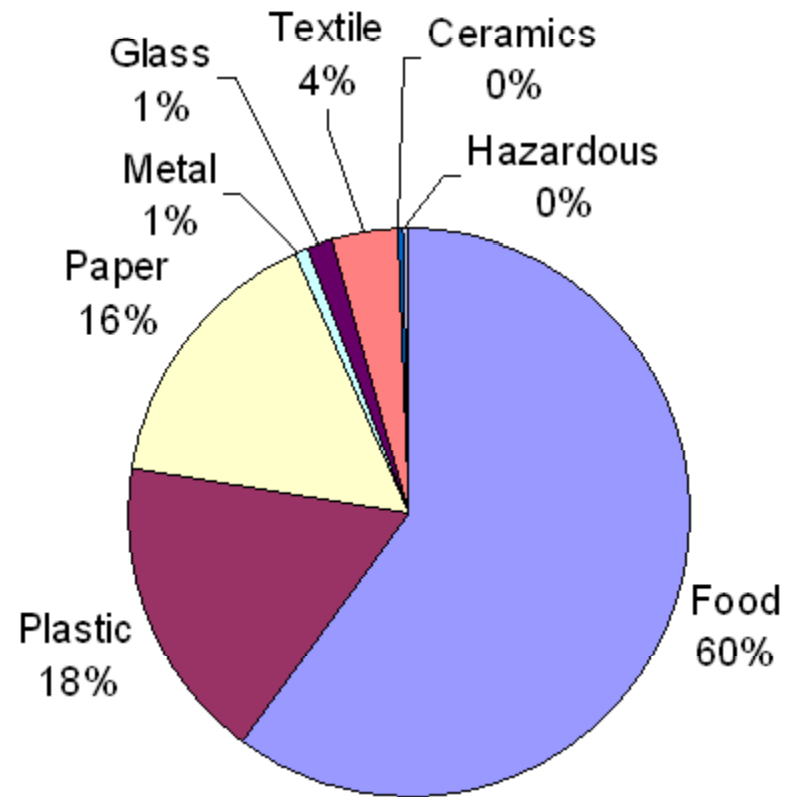


Municipal Waste – Comparison

Waste Composition in PRC
(World Bank 2005)

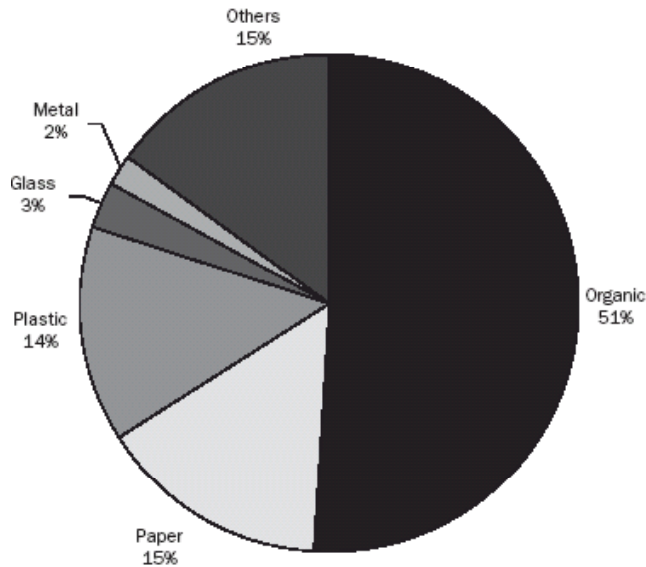


Waste Composition in WND



Future Projections

2030: Projection for Urban Areas in China



Total Municipal Waste Generation Expected in 2030 = 484,000,000 tonnes

Year	Urban Population (Wuxi)	MSW Generation (Wuxi) tons/year	Urban Population (WND)	MSW Generation (WND) tons/year	Organic Waste (50% of MSW) (WND) tons/year
2000	1,127,000	370,220	424,942		
2005	1,192,000	435,080	449,451	151,110	75,555
2010	1,278,000	513,117	481,877	178,213	89,107
2015	1,391,000	609,258	524,485	211,605	105,802
2020	1,538,000	729,792	579,912	253,468	126,734
2025	1,662,000	849,502	626,667	295,045	147,523
2030	1,760,000	963,775	663,618	334,734	167,367

Based on the assumptions:

1. Population growth in WND is same in line with Wuxi
2. Organic waste is not lower than national estimates



Construction Waste – Residential (Year 2005)

<i>Components</i>	<i>Generation Tons/10,000m²</i>	<i>Recovery Tons/year</i>	<i>Treatment</i>
Bricks/blocks	909	92758.63	Refill
Soil	36000	3673609.20	Refill or sell to other construction sites
PVC pipe	0.1	10.25	Landfill
Steel wire	4.55	464.30	Sell for recovery
Wood	81.82	8349.30	Sell as fuel
Paint containers	0.45	45.92	Reuse
Glass	small	102.10	Landfill
<i>Total</i>		3775339.60	



Construction Waste - Industries

<i>Components</i>	<i>Generation Tons/10,000m²</i>	<i>Recovery Tons/year</i>	<i>Treatment</i>
Bricks/blocks	14.12	3212.38	Refill
Soil	36000	8190194.40	Refill
PVC pipe	0.16	36.40	Landfill
Steel wire	3.92	891.82	Sell for recovery
Wood	3.92	891.82	Sell as fuel
Paint containers			Reuse
Glass			Landfill
<i>Total</i>		8195226.82	



Construction Waste – Municipal Works

<i>Components</i>	<i>Generation Tons/10,000m²</i>	<i>Recovery Tons/year</i>	<i>Treatment</i>
Asphalt	38.46	500	Reuse
Concrete	653.85	8500	Refill
Soil	1538.460.16	20000	Refill or sell to other construction sites
<i>Total</i>		29000	



Sludge from WWTP

	<i>Name of WWTP</i>	<i>Sludge Tons/year</i>	<i>Wastewater Treated Tons/year</i>
1	梅村污水厂	600	3000000
2	新城污水厂	1810	9050000
3	硕放污水厂	560	2800000
<i>Total</i>		2970	14850000



Healthcare Waste – Hazardous

No	Name	Solid Waste Tons/year	Hazardous Tons/year	Treatment %
1	凤凰医院	18.15	18.15	100.00
2	梅村医院	9.2	7.2	98.64
3	虹桥医院	25.5	18.5	72.55
4	南站医院	39	9	100.00
5	后宅医院	2.88	2.88	100.00
6	鸿声医院	4.12	4.12	1.00
7	坊前医院	3.06	2.5	81.70
8	硕放医院	3.5	3.5	100.00
9	仁德医院	2.6	2.6	100.00
10	旺庄医院	5.1	3.6	70.59
	<i>Total</i>	113.11	72.05	

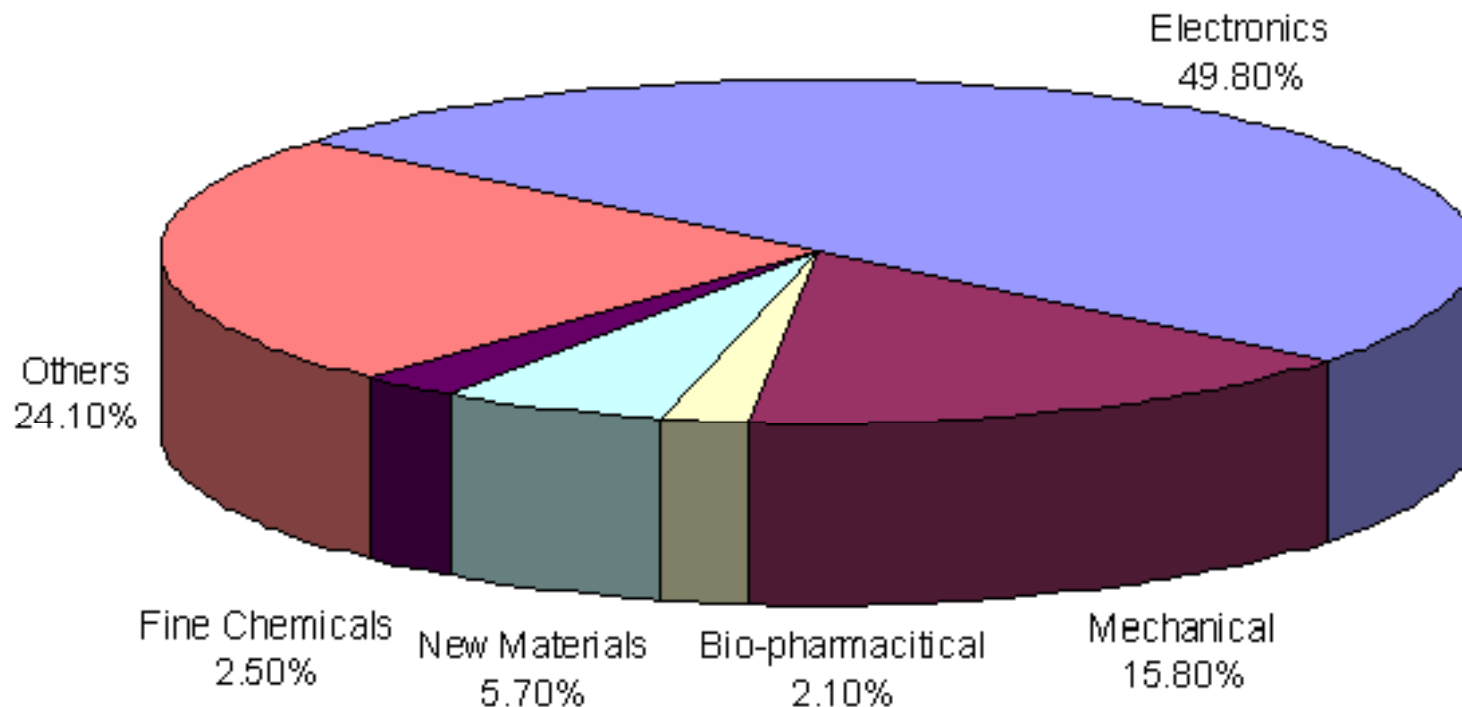


Industrial Waste Generation based on Production

Type	Solid Waste Kg/10000 RMB	Hazardous Kg/10000 RMB	Recovery Kg/10000 RMB	Recover %age	Treatment %age
Electronics	4.31Kg	1.06Kg	2.88Kg	66.82%	18.95%
Mechanical	30.2Kg	4.69Kg	10.20Kg	33.77%	15.19%
Textile	55.1Kg	20.34Kg	14.81Kg	26.88%	71.78%
Chemicals	44.4Kg	16.72Kg	32.43Kg	73.04%	26.89%
Others	/	/	/	8.12%	91.88%



Industrial Composition Based on Production Value



Total Industrial Output Value in 2005: 12,090.00 million Yuan



Industrial Waste - Total

Type	Production 10,000 RMB	Solid Waste Tons/year	Hazardous Waste Tons/Year
Electronics	6,021,313	25,951.859	6382.592
Mechanical	1,910,376	57,693.368	8959.665
Chemicals	302,274.8	13,421.000	5054.034
Others	3,857,026	146,566.981	9411.143
<i>Total</i>	12,090,990	243,633.207	29807.434



Industrial Waste - Composition

	Electronic	Mechanical	Printing & Dyeing	Chemical	Others	WWTP
paper	3141.2176	294.658	/	586.5	288.656	/
plastic	5701.46	152.361	5	921.15	54.534	/
metal	1135.511	7310.477	/	2710.8	1555.509	/
rubber	/	474.01	/	/	/	/
oil	50.981	38.14	/	25	214.45	/
glass	42.4	0.158	/	0.25	44.799	/
wood	206.997	26.548	/	/	26.1	/
sludge	669.89	143.494	1453	272	45.146	2970
hazardous waste	3275.834	3669.97	/	2206.74	1971.665	/
Ordinary industrial waste	1599.9105	155.529	1905.55	2016.5	28633.86	/



Future Projections

- ❖ Municipal Solid Waste based on Population X Economic Growth
- ❖ Construction Waste based on the type and total area
- ❖ Sludge from WWTP based on future plans for new WWTP and total amount of wastewater to be treated
- ❖ Waste from Healthcare Facilities based on number and size of the facilities
- ❖ Industrial Waste based on the type, size and production output of the industry

Important factors to influence waste generation rates

Waste reduction strategies

Waste diversion strategies for reuse and recycling





Thank You...

