

Karnataka Waste-To-Power Business Proposal

Wheelabrator Technologies Inc. - Constructs and Operates Waste to Energy Plants - Use This as our Cost Model

Total Plants	Total Power Production (MW)	Total Solid Waste Processed Daily (tons)	Total Construction Cost
16.00	671.00	23,750.00	\$ 2,200,000,000.00
Each Plant			
	41.94	1,484.38	\$ 137,500,000.00

State of Karnataka - contains city of Bangalore, a metropolis which produces the trash with highest calorific content in India.

Total Power Production	Target of Total Production	MW Target
20,000.00	0.50%	100.00
Total Waste Produced Annually (tons)	Annual Waste Required for 1 Megawatt	Solid Waste Burn Target
2,190,000.00	12,919.15	1,291,915.05
Total Operational Costs*		
\$ 7,620,000.00		

*The Govt. of India, Ministry of Power, estimates the average cost of power production is around \$0.0762/kWh, including plant labor costs.

Initial Cost to Purchase Garbage Truck Fleet (500 trucks @ \$100,000)	\$ 50,000,000.00	(based on proportional value for waste collection in NYC)
Expenses for Waste Collection Division		
Growth rate of garbage	1.33%	
Inflation Rate	4.30%	
Electricity demand growing 8.3%; we increase production 3% annually.	3%	
Cost of electricity is between two and three rupees per unit		
Simplifying assumptions= 2.Srupees /kilowatt hr = \$.05 cents USD per kilowatt hr	\$ 0.05	
http://216.239.57.100/search?q=cache:TPuMj7n-55C:www.helio-international.org/Helio/anglais/reports/India.html+electricity+use+in+india&hl=en&ie=UTF-8		
total consumption of electricity (Million KWH) in Karnataka	20000	
http://agricoop.nic.in/statistics/consum10b.htm		
Expenses increase at 4.33% annually (1.33% garbage growth + 3% Generation Growth)	4.33%	
Plant Start-up Cost	\$ (137,500,000.00)	

Trash Burned Each Year for Power (tons)	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	1,291,915.05	1,330,672.50	1,370,592.68	1,411,710.46	1,454,061.77	1,497,683.63	1,542,614.13	1,588,892.56	1,636,559.34	1,685,656.12
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
	1,736,225.80	1,788,312.57	1,841,961.95	1,897,220.81	1,954,137.43	2,012,761.56	2,073,144.40	2,135,338.74	2,199,398.90	2,265,380.86

Assume we are paid \$30/ton to manage waste by the state; this increases by 3% each year, in real terms. Currently, cities pay 1500 rupees/ton (approx \$30) to collect and manage waste. (<http://www.indiatogether.org/environment/articles/wastefact.htm>)

Cost of waste disposal per ton for state	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	\$ 30.00	\$ 32.23	\$ 34.62	\$ 37.20	\$ 39.96	\$ 42.93	\$ 46.12	\$ 49.54	\$ 53.22	\$ 57.18
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
	\$ 61.42	\$ 65.99	\$ 70.89	\$ 76.16	\$ 81.81	\$ 87.89	\$ 94.42	\$ 101.43	\$ 108.97	\$ 117.07

Yearly tons of garbage produced	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	2,190,000.00	2,219,127.00	2,248,641.39	2,278,548.32	2,308,853.01	2,339,560.76	2,370,676.92	2,402,206.92	2,434,156.27	2,466,530.55
Cost of waste disposal for state (revenue for firm)	\$ 65,700,000.00	\$ 71,519,578.34	\$ 77,854,643.63	\$ 84,750,856.69	\$ 92,257,922.91	\$ 100,429,950.46	\$ 109,325,840.34	\$ 119,009,710.86	\$ 129,551,359.81	\$ 141,026,367.54
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
	\$ 153,518,644.60	\$ 167,117,027.85	\$ 181,919,929.47	\$ 198,034,043.35	\$ 215,575,514.13	\$ 234,670,774.30	\$ 255,457,455.53	\$ 278,085,380.58	\$ 302,717,643.28	\$ 329,531,783.94

(power demand is increasing 8.5% per year - we generate .5% of total power to start)

Plant Electricity Production (megawatts)	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	100	103	106.09	109.2727	112.550881	115.9274074	119.4052297	122.9873865	126.6770081	130.4773184
Sale of Electricity (million \$)	\$ 5,000,000.00	\$ 5,371,450.00	\$ 5,532,593.50	\$ 5,698,571.31	\$ 5,869,528.44	\$ 6,045,614.30	\$ 6,226,982.73	\$ 6,413,792.21	\$ 6,606,205.97	\$ 6,804,392.15
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
	\$ 134,3916379	\$ 135,3916379	\$ 136,3916379	\$ 137,3916379	\$ 138,3916379	\$ 139,3916379	\$ 140,3916379	\$ 141,3916379	\$ 142,3916379	\$ 143,3916379
Sale of Electricity (million \$)	\$ 7,008,523.92	\$ 7,060,673.92	\$ 7,112,823.92	\$ 7,164,973.92	\$ 7,217,123.92	\$ 7,269,273.92	\$ 7,321,423.92	\$ 7,373,573.92	\$ 7,425,723.92	\$ 7,477,873.92

Revenue from waste management	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	\$ 65,700,000.00	\$ 71,519,578.34	\$ 77,854,643.63	\$ 84,750,856.69	\$ 92,257,922.91	\$ 100,429,950.46	\$ 109,325,840.34	\$ 119,009,710.86	\$ 129,551,359.81	\$ 141,026,367.54
Electricity Sales	\$ 5,000,000.00	\$ 5,371,450.00	\$ 5,532,593.50	\$ 5,698,571.31	\$ 5,869,528.44	\$ 6,045,614.30	\$ 6,226,982.73	\$ 6,413,792.21	\$ 6,606,205.97	\$ 6,804,392.15
Cost of operating plant	\$ (7,620,000.00)	\$ (8,291,793.68)	\$ (9,022,813.96)	\$ (9,818,282.39)	\$ (10,683,880.82)	\$ (11,625,792.05)	\$ (12,650,743.96)	\$ (13,766,057.59)	\$ (14,979,699.38)	\$ (16,291,826.87)
Sanitary Disposal of Remaining Waste Cost (approx \$25/ton,inc. 3% annually)	\$ (16,300,338.14)	\$ (17,737,406.92)	\$ (19,301,170.41)	\$ (21,002,798.27)	\$ (22,854,444.87)	\$ (24,869,336.15)	\$ (27,061,864.08)	\$ (29,447,689.44)	\$ (32,043,853.69)	\$ (34,888,900.71)
Waste Transportation and Collection Costs (approx \$18/ton,inc. 3% annually)	\$ (39,420,000.00)	\$ (42,495,128.10)	\$ (45,860,311.31)	\$ (49,633,015.47)	\$ (53,853,015.47)	\$ (58,581,334.58)	\$ (63,961,371.83)	\$ (69,801,313.34)	\$ (76,241,313.34)	\$ (83,361,313.34)
Profit/Loss	\$ (146,250,000.00)	\$ (1,207,876.30)	\$ 2,474,328.55	\$ 7,951,087.34	\$ 13,943,276.98	\$ 20,495,780.76	\$ 27,657,415.66	\$ 35,481,277.19	\$ 44,025,116.78	\$ 53,351,752.72
		(startup cost, 30% government subsidy included)								

Revenue from waste management	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
	\$ 141,026,767.54	\$ 153,518,644.60	\$ 167,117,027.85	\$ 181,919,929.47	\$ 198,034,043.35	\$ 215,575,514.13	\$ 234,670,774.30	\$ 255,457,455.53	\$ 278,085,380.58	\$ 302,717,643.28	\$ 329,531,783.94
Electricity Sales	\$ 6,804,392.15	\$ 7,008,523.92	\$ 7,060,673.92	\$ 7,112,823.92	\$ 7,164,973.92	\$ 7,217,123.92	\$ 7,269,273.92	\$ 7,321,423.92	\$ 7,373,573.92	\$ 7,425,723.92	\$ 7,477,873.92
Cost of operating plant	\$ (16,300,338.14)	\$ (17,737,406.92)	\$ (19,301,170.41)	\$ (21,002,798.27)	\$ (22,854,444.87)	\$ (24,869,336.15)	\$ (27,061,864.08)	\$ (29,447,689.44)	\$ (32,043,853.69)	\$ (34,888,900.71)	\$ (37,943,009.25)
Sanitary Disposal of Remaining Waste Cost (approx \$25/ton,inc. 2% annually)	\$ (20,768,526.85)	\$ (20,296,044.63)	\$ (19,794,817.28)	\$ (19,263,788.67)	\$ (18,701,868.38)	\$ (18,107,930.69)	\$ (17,480,813.46)	\$ (16,819,316.99)	\$ (16,122,202.87)	\$ (15,388,192.81)	\$ (14,615,967.35)
Waste Transportation and Collection Costs (approx \$18/ton,inc. 2% annually)	\$ (47,232,777.41)	\$ (47,860,973.35)	\$ (48,497,524.30)	\$ (49,142,541.37)	\$ (49,796,137.17)	\$ (50,458,425.80)	\$ (51,129,522.86)	\$ (51,809,545.51)	\$ (52,498,612.47)	\$ (53,196,844.01)	\$ (53,904,362.04)
Profit/Loss	\$ 63,529,517.29	\$ 74,632,743.61	\$ 86,584,189.77	\$ 99,623,625.08	\$ 113,846,566.84	\$ 129,356,945.40	\$ 146,267,847.82	\$ 164,702,327.51	\$ 184,794,285.47	\$ 206,689,429.66	\$ 230,546,319.22

Cost of Capital Calculation - Goldman Integrated Model		
US Risk-Free Rate	A	India 5.00%

US Market Risk Premium	B	4.51%
Comparable Beta	C	1.5
Country Premium	D	6.00%
Cost of Equity	$E=A+(B \cdot C)+D$	17.77%
NPV using Cost of Equity		\$43,646,893.33

(Data Source: http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html)