

Data input and summary of results:

Tianjin TEDA Sewage Methane Recovery Project

Only enter figures in green cells

Orange cells = defaults and can be over-ridden

See results in yellow cells. Do not alter Yellow cells.

INPUTS

PROJECT DATA		Source
Year project starts construction	2008	
Year project starts operating	2009	
Year Crediting Period starts	2009	
Project lifetime (years)	10	
Installed Capacity of Project units (MW)	1	FS p.24
Power supplied to the grid (MWh/yr)	6,480	FS p.58

BASELINE DATA		Source
Name of Grid	List of Grids North China	
OM (tCO ₂ e/MWh)	1.12072900	
BM (tCO ₂ e/MWh)	0.93975960	
Grid CEF (tCO ₂ e/MWh)	1.03024430	
Crediting period (years)	21	

FINANCIAL PARAMETERS		Source
Pre-operational costs (RMB)	0	
Total Equity Investment Costs (RMB)	8,207,500	FS p.59
Fixed asset investment	7,707,500	FS p.59
Working Capital	500,000	FS p.59
Operating Costs (RMB/MWh)	234.27	FS p.57&58, see table on the right
Contingencies	0%	
Insurance		
Electricity tariff(excluding VAT)(RMB/MWh)	427.00	FS p.58: 500RMB/MWh including VAT
Rate of increase of tariff (%/yr)	0.0%	
Income tax	33%	FS p.59
VAT on electricity	17%	FS p.59
Discount rate	12%	
Depreciation	10%	
City Maintenance and Construction Tax :County and Towns	5%	FS p.59
Business Taxes	0%	
Educational Surcharge Tax	3%	FS p.59
Price of carbon (RMB/tCO ₂)	70.00	
Validation and registration costs (RMB) - LS project	400,000	
Verification costs (RMB)	80,000	
Exchange rate (US\$/RMB)	8	
Benchmark IRR	12%	Economic evaluation measurements and parameters of constructive projects (version 3)

RESULTS FOR 10 YEARS OPERATION

	Emissions		CERs
	Baseline	Project	
TOTAL CERs (tCO ₂ e)			
1 yr	60,075	7,217	52,858
10 yrs	600,746	72,166	528,580

FINANCIAL RESULTS	
Electricity Only	
Cash Flow Net Present Value (RMB)	-1,713,977
Equity IRR	6.38%
Electricity+Carbon	
Cash Flow Net Present Value (RMB)	2,689,589
Equity IRR	19.13%

	Source	
Operating costs (RMB)	1518100	FS
Methane treatment fee	760500	FS p.57
Staff salary and welfare	456000	FS p.57
Management fee	456000	FS p.57
Maintenance fee	256000	FS p.58

Financial analysis: Tianjin TEDA Sewage Methane Recovery Project

PROJECT CASH FLOW		0	1	2	3	4	5	6	7	8	9	10	Total
Project Year		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
REVENUE													
I) Electricity generation													
Tariff (RMB/MWh)	427.00												
Rate of increase and evolution of tariff	0%	427.00	427.00	427.00	427.00	427.00	427.00	427.00	427.00	427.00	427.00	427.00	
Project power supply to the grid (MWh)	0	6,480	6,480	6,480	6,480	6,480	6,480	6,480	6,480	6,480	6,480	6,480	64,800
Gross electricity revenue (RMB)	0.00	2,766,960.00	2,766,960.00	2,766,960.00	2,766,960.00	2,766,960.00	2,766,960.00	2,766,960.00	2,766,960.00	2,766,960.00	2,766,960.00	2,766,960.00	27,669,600.00
VAT	17%	0	-470,383	-470,383	-470,383	-470,383	-470,383	-470,383	-470,383	-470,383	-470,383	-470,383	-4,703,832
CARBON REVENUE													
II) Carbon sales													
Projected emission reductions (tCO ₂ /yr)	70.00	0	52,858	52,858	52,858	52,858	52,858	52,858	52,858	52,858	52,858	52,858	528,580
Price of carbon (RMB/tCO ₂)	70.00	-	0.00	3,700,059.14	3,700,059.14	3,700,059.14	3,700,059.14	3,700,059.14	0.00	0.00	0.00	0.00	18,500,295.71
Carbon revenue (RMB)													
TOTAL REVENUE with Carbon (RMB)		0.00	0.00	6,467,019.14	6,467,019.14	6,467,019.14	6,467,019.14	6,467,019.14	2,766,960.00	2,766,960.00	2,766,960.00	2,766,960.00	43,402,935.71
COSTS & INVESTMENT													
a) Investment													
Pre-operational Costs	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Equity Investment	8,207,500	8,207,500											8,207,500
Fixed asset investment	7,707,500	7,707,500											
Working Capital	500,000	500,000											
SubTotal : Total Investment		8,207,500											8,207,500
b) Operational costs													
Electricity Plant - Operating Costs (RMB/MWh)	234.27	0	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	15,181,000
Insurance	0.00%	0	0	0	0	0	0	0	0	0	0	0	0
Contingencies	0%	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL CASHFLOW OUT (RMB)		8,207,500	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	23,388,500
CASHFLOW WITHOUT CARBON													
Depreciation	693,675	0	693,675	693,675	693,675	693,675	693,675	693,675	693,675	693,675	693,675	693,675	6,936,750
Principal payment on loan	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest payment on loan	0	0	0	0	0	0	0	0	0	0	0	0	0
Return of working capital	0	0	0	0	0	0	0	0	0	0	0	0	0
Return of Fixed asset residues	0	0	0	0	0	0	0	0	0	0	0	0	0
City Maintenance and Construction Tax	5%	0	23,519	23,519	23,519	23,519	23,519	23,519	23,519	23,519	23,519	23,519	235,192
Educational Surcharge Tax	3%	0	14,111	14,111	14,111	14,111	14,111	14,111	14,111	14,111	14,111	14,111	141,115
Business Tax	0%	0	0	0	0	0	0	0	0	0	0	0	0
Gross profit before tax	0	517,554	517,554	517,554	517,554	517,554	517,554	517,554	517,554	517,554	517,554	517,554	5,175,543
Cumulative (for carryforward tax)	0	517,554	1,035,109	1,552,663	2,070,217	2,587,772	3,105,326	3,622,880	4,140,435	4,657,989	5,175,543	5,175,543	28,465,489
Income tax	33%	0	170,793	170,793	170,793	170,793	170,793	170,793	170,793	170,793	170,793	170,793	1,707,929
Net profit after Tax	0	323,242	323,242	323,242	323,242	323,242	323,242	323,242	323,242	323,242	323,242	323,242	3,232,423
Without carbon cashflow (after tax)		-8,207,500	1,040,436	1,040,436	1,040,436	1,040,436	1,040,436	1,040,436	1,040,436	1,040,436	1,040,436	2,311,186	12,386,645
Cumulative		-8,207,500	-7,167,064	-6,126,627	-5,086,191	-4,045,754	-3,005,318	-1,964,882	-924,445	115,991	1,156,428	3,487,614	6,935,228
CASHFLOW WITH CARBON													
City Maintenance and Construction Tax	5%	0	23,519	23,519	23,519	23,519	23,519	23,519	23,519	23,519	23,519	23,519	235,192
Educational Surcharge Tax	3%	0	14,111	14,111	14,111	14,111	14,111	14,111	14,111	14,111	14,111	14,111	141,115
Business Tax	0%	0	0	0	0	0	0	0	0	0	0	0	0
Gross profit before tax	0	-2,249,406	4,217,613	4,217,613	4,217,613	4,217,613	4,217,613	4,217,613	517,554	517,554	517,554	517,554	20,908,879
Cumulative (for carryforward tax)	0	-2,249,406	1,968,208	6,185,821	10,403,435	14,621,048	18,838,662	19,356,216	19,873,770	20,391,325	20,908,879	20,908,879	20,908,879
Income tax	33%	0	1,391,812	1,391,812	1,391,812	1,391,812	1,391,812	1,391,812	170,793	170,793	170,793	170,793	7,642,234
Net profit after Tax	0	-2,287,036	2,788,170	2,788,170	2,788,170	2,788,170	2,788,170	2,788,170	309,131	309,131	309,131	309,131	12,890,339
Carbon Offset-Validation, Registration, and Verification	400,000	400,000	80,000	80,000	80,000	80,000	80,000	80,000	0	0	0	0	880,000
With carbon cashflow(after tax)		-8,607,500	-1,635,731	3,439,476	3,439,476	3,439,476	3,439,476	3,439,476	1,040,436	1,040,436	1,040,436	2,311,186	12,386,645
Cumulative		-8,607,500	-10,243,231	-6,803,755	-3,364,279	75,197	3,514,673	6,954,150	7,994,586	9,035,022	10,075,459	12,386,645	24,773,290
Construction Written Down Value		7,707,500	7,013,825	6,320,150	5,626,475	4,932,800	4,239,125	3,545,450	2,851,775	2,158,100	1,464,425	770,750	
After Income Tax													
Net Present Value (RMB)		2,689,589											-1,713,977
Equity IRR	19.13%												6.38%
Discount rate	12%												
Sensitivity Analysis													
Increase in Electricity Tariff													
Tariff Increase (%)	19%												
Electricity Revenues		0	3,280,784	3,280,784	3,280,784	3,280,784	3,280,784	3,280,784	3,280,784	3,280,784	3,280,784	3,280,784	32,807,845
Total cashflow out	8,207,500	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	23,388,500
City Maintenance and Construction Tax	0	27,887	27,887	27,887	27,887	27,887	27,887	27,887	27,887	27,887	27,887	27,887	278,867
Educational Surcharge Tax	0	16,732	16,732	16,732	16,732	16,732	16,732	16,732	16,732	16,732	16,732	16,732	167,320
Business Tax	0	0	0	0	0	0	0	0	0	0	0	0	0
Gross Profit Before Tax	0	1,024,391	1,024,391	1,024,391	1,024,391	1,024,391	1,024,391	1,024,391	1,024,391	1,024,391	1,024,391	1,024,391	10,243,908
Cumulative (for Carryforward Tax)	0	1,024,391	2,048,782	3,073,172	4,097,563	5,121,954	6,146,345	7,170,736	8,195,126	9,219,517	10,243,908	10,243,908	56,341,494
Income Tax	0	338,049	338,049	338,049	338,049	338,049	338,049	338,049	338,049	338,049	338,049	338,049	3,380,490
Without Carbon Cashflow		-8,207,500	1,380,017	1,380,017	1,380,017	1,380,017	1,380,017	1,380,017	1,380,017	1,380,017	1,380,017	1,380,017	6,863,418
IRR +10%	12.00%												
Reduction in Total Equity Investment													
Reduction in investment costs (%)	28%												
Total Equity Investment	8,207,500	5,929,919											
Electricity Plant operating costs	0	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	15,181,000
Insurance	0	0	0	0	0	0	0	0	0	0	0	0	0
Contingencies	0	0	0	0	0	0	0	0	0	0	0	0	0
Depreciation	0	693,675	693,675	693,675	693,675	693,675	693,675	693,675	693,675	693,675	693,675	693,675	6,936,750
Total cashflow Out	8,207,500	5,929,919	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	1,518,100	21,110,919
City Maintenance and Construction Tax	0	23,519	23,519	23,519	23,519	23,519	23,519	23,519	23,519	23,519	23,519	23,519	235,192
Educational Surcharge Tax	0	14,111	14,111	14,111	14,111	14,111	14,111	14,111	14,111	14,111	14,111	14,111	141,115
Other Business Tax	0	0	0	0	0	0	0	0	0	0	0	0	0
Gross profit before tax	0	710,049	710,049	710,049	710,049	710,049	710,049	710,049	710,049	710,049	710,049	710,049	7,100,490
Cumulative (for carryforward tax)	0	710,049	1,420,098	2,130,147	2,840,197	3,550,2							

Emission reduction calculations (CERs): Tianjin TEDA Sewage Methane Recovery Project

Project year	0	1	2	3	4	5	6	7	8	9	10
Calendar year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Crediting Year	0	1	2	3	4	5	6	7	8	9	10

Project power supply to the grid schedule (MWh/y) 6,480 6,480 6,480 6,480 6,480 6,480 6,480 6,480 6,480 6,480 6,480

Baseline emissions

CEF (tCO ₂ /MWh)	1.030	1.030	1.030	1.030	1.030	1.030	1.030	1.030	1.030	1.030	1.030
Baseline emissions (tCO₂/y)	-	60,075	60,075	60,075	60,075	60,075	60,075	60,075	60,075	60,075	60,075
Cumulative baseline emissions (tCO ₂)	-	60,075	120,149	180,224	240,298	300,373	360,448	420,522	480,597	540,672	600,746

Project Emissions

Project Emissions (tCO ₂ /MWh)											
Project Emissions	0	7217	7217	7217	7217	7217	7217	7217	7217	7217	7217
Cumulative Project Emissions	0	7217	14433	21650	28867	36083	43300	50516	57733	64950	72166

Emission reductions

Crediting period (y)		21									
Net Emission Reductions (tCO₂/y)	-	52,858	52,858	52,858	52,858	52,858	52,858	52,858	52,858	52,858	52,858
Cumulative (tCO ₂)	-	52,858	105,716	158,574	211,432	264,290	317,148	370,006	422,864	475,722	528,580

ERUs summary (tCO ₂ e)	Emissions Baseline	Emissions Project	ERs
1 yr	60,075	7,217	52,858
10 yrs	600,746	72,166	528,580

Emission Reduction calculation as per AMS III H - Option (iv)			
BASELINE EMISSIONS			
Baseline emissions	$BE_y = BE_{bio,y} + BE_{grid,y}$		
BE_{bio,y}	$BE_y = Q_{y,ww} * \sum_i (COD_{y,removed,i} * B_{o,ww} * MCF_{ww,treatment,i}) * GWP_{CH_4}$	53,399	
Q _{d, ww}	Volume of waste water treated per day	1,500	m ³ /yday
	Number of days	300	days/year
Q _{y,ww}	Volume of waste water treated per year	450,000	m ³ /year
COD _{y,ww, untreated}	COD of untreated waste water	0.035	ton COD/m ³
COD _{y,ww, treated}	COD of treated waste water	0.0014	ton COD/m ³
COD _{y,removed,i}	COD removed by the anaerobic wastewater treatment system "i"	0.033635	tons/m ³
B _{o, ww}	Methane producing capacity	0.21	ton CH ₄ / ton COD
MCF _{ww, treatment ,i}	Methane correction factor for the anaerobic wastewater treatment system "i"	0.8	
GWP _{CH4}	Global Warming Potential of Methane	21	ton CO _{2 e} /ton CH ₄
BE_{grid,y}		6,676	
EG _y	Electricity supplied by the project p to the grid in year y (MWh)	6480	MWh
EF _{grid,CM}	Baseline emissions in year y (tCO ₂)	1.0302	tCO ₂ /MWh
Baseline emissions		60,075	ton CO_{2 e}/year
PROJECT EMISSIONS			
PE_y	PE_{y,ww,treated}+PE_{y,fugitive}		
PE_{y, ww, treated}	Q_{y,ww}*COD_{y,ww, treated}*B_{o,ww}*MCF_{ww, final} *GWP_{CH4}		
Q _{y,ww}	Volume of waste water treated in the year	450,000	m ³ /year
COD removal efficiency		96%	
COD _{y,ww, treated}	COD of treated waste water	0.0014	ton COD/m ³
B _{o ww}	Methane generation capacity	0.21	ton CH ₄ /ton COD
MCF _{ww, final}	Methane conversion factor	0.2	
GWP _{CH4}	Global Warming potential of Methane	21	ton CO _{2 e} / ton CF
PE_{y, treated}		542	ton CO_{2 e}/year
PE_{y, fugitive}	PE_{y, fugitive,ww}+PE_{y,fugitive,s}		
PE_{y,fugitive,ww}	Fugitive emissions through capture and flare inefficiencies in the anaerobic wastewater treatment in the year "Y"		
PE _{y,fugitive,ww}	(1-CFE _{ww}) * MEP _{y,ww, treatment} * GWP _{CH4}		
CFE _{ww}	Capture and flare efficiency of methane recovery and combustion equipment	0.9	
MEP _{y,ww, treatment}	$Q_{y,ww} * \sum_i COD_{y,removed,i} * B_{o,ww} * MCF_{ww,j}$		
Q _{y,ww,}	Volume of waste water treated in the year	450,000	m ³ /year
COD _{y,ww, treated}	COD of treated waste water	0.0014	ton/m ³
COD _{y, ww,untreated}	COD of untreated wastewater	0.035000	ton/m ³
B _{o ww}	Methane generation capacity	0.21	ton CH ₄ / ton COD
MCF _{ww,j}	Methane correction factor for the wastewater treatment system "j" equipped with metha	1	
GWP _{CH4}	Global Warming Potential of Methane	21	ton CO _{2 e} /t CH ₄
PE_{y,ww, fugitive}		6675	ton CO_{2 e} /year
PE_{y,fugitive,s}	Neglected		
Project emissions		7,217	ton CO_{2 e}/year
Emission Reductions		52,858	tons CO_{2e}/year