**COST ANALYSIS OF A:** **Hybrid Bioreactor Landfill - As-Built**

Each spreadsheet in this workbook contains information necessary to estimate the
costs associated with this type of landfill. In each sheet, the yellow boxes represent info. to be inputted.
The following is a summary of the information used in this analysis:

ASSUMPTIONS

*Construction:*
1. Cell is being filled for 5 yrs, during which all construction costs are paid.
2. The bioreactor is operated for 10 years.
*Airspace Recovery:*
2. Because this is an as-built, the airspace benefits will be realized each year.
3. The monetary gain from airspace recovery is found by determining the mass of additional waste that can be placed and the tipping fee.
4. Cost savings due to the deferrement of another cell construction is taken into account.
*Operation and Maintenance:*
5. The operation costs will vary from year to year, depending on when air is being added. All operation costs are based on an electricity cost and by determining the pump/blower hp.
6. The gas collection/extraction system is not used while adding air.
7. While adding air, there is no gas collection/extraction.
8. While the cell is being filled, the gas capture efficiency is low and no methane is being collected for use.
9. The gas engine is built only after the aerobic period has ended.
10. While filling the cell, the degradation constant is low. It increases after the cell has been filled and leachate is being recirculated.
*Leachate*
11. Assumes that leachate treatment occurs only on leachate that is not being reciculated. Recirculation %s are entered and that volume is subtracted from ther leachate produced.
*Closure:*
12. All closure occurs during year 6. No changes to closure due to operating a hybrid system exist.
*Post-Closure:*
13. There are 2 PCC periods. One occurs during the bioreactor period and one afterwards.
*Monitoring:*
14. All monitoring equipment needed is purchased over a 5 year period.

*Landfill Properties:*

| | | |
|---|---|---|
| Waste Receipt/day = | 550 | ton/day |
| Volume = | 4000000 | $yd^3$ |
| Density = | 1100 | $lb/yd^3$ |
| Waste:Soil = | 4 | :1 |
| Area of the landfill = | 33 | acres |
| Tipping Fee = | 40 | $/ton of waste |

***Summary of Information in this Workbook:***

**Type of Landfill =** **Hybrid Bioreactor Landfill - As-Built**

| Type of Cost | | YEARS 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Construction Costs = | | ($4,783,723) | ($4,783,723) | ($4,783,723) | ($4,783,723) | ($4,783,723) | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Total Monetary Gain from AirSpace Recovery = | | $2,389,359 | $1,108,220 | $1,083,506 | $528,391 | $523,773 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $173,988 |
| Total Operation and Monitoring Costs = | | ($1,719,367) | ($1,770,948) | ($1,824,076) | ($1,878,798) | ($1,935,162) | | | | | | | | | | |
| Total Leachate Treatment Costs = | On-Site | ($279,143) | ($287,517) | ($296,143) | ($305,027) | ($314,178) | | | | | | | | | | $0 |
| | Off Site | ($713,365) | ($734,766) | ($756,809) | ($779,513) | ($802,899) | | | | | | | | | | $0 |
| Total Monetary Gain by Reusing CH4 = | | ($106,331) | $1,332 | $130,260 | $203,793 | $267,083 | $373,347 | $373,345 | $373,342 | $373,339 | $360,842 | $286,927 | $223,307 | $168,549 | $121,417 | $80,850 |
| Sinking Fund TEMP Closure Cost = | | ($427,318) | ($427,318) | ($427,318) | ($427,318) | ($427,318) | | | | | | | | | | |
| Sinking Fund FINAL Closure Cost = | | ($1,457,477) | ($1,457,477) | ($1,457,477) | ($1,457,477) | ($1,457,477) | | | | | | | | | | |
| Sinking Fund PCC Cos | **Off site** AFTER bioreactor | ($283,120) | ($283,120) | ($283,120) | ($283,120) | ($283,120) | | | | | | | | | | |
| | **On-Site** | ($271,767) | ($271,767) | ($271,767) | ($271,767) | ($271,767) | | | | | | | | | | |
| | **Off site** DURING Bioreactor | ($575,861) | ($575,861) | ($575,861) | ($575,861) | ($575,861) | | | | | | | | | | |
| | **On-Site** | ($544,126) | ($544,126) | ($544,126) | ($544,126) | ($544,126) | | | | | | | | | | |
| Total Monitoring Costs = | | ($41,595) | ($42,843) | ($44,128) | ($45,452) | ($46,815) | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| *TOTAL COSTS =* | On-Site Cost | ($7,241,487) | ($8,476,166) | ($8,434,991) | ($8,981,504) | ($8,989,711) | $373,347 | $373,345 | $373,342 | $373,339 | $360,842 | $286,927 | $223,307 | $168,549 | $121,417 | $254,838 |
| | Off-Site Costs | ($7,718,797) | ($8,966,503) | ($8,938,746) | ($9,499,079) | ($9,521,520) | $373,347 | $373,345 | $373,342 | $373,339 | $360,842 | $286,927 | $223,307 | $168,549 | $121,417 | $254,838 |
| *TOTAL PRESENT VALUE COSTS =* | On-Site Cost | ($6,896,654) | ($7,688,133) | ($7,286,463) | ($7,389,106) | ($7,043,674) | $278,598 | $265,329 | $252,693 | $240,658 | $221,526 | $167,760 | $124,346 | $89,385 | $61,324 | $122,582 |
| | Off-Site Costs | ($7,351,235) | ($8,132,883) | ($7,721,625) | ($7,814,916) | ($7,460,360) | $278,598 | $265,329 | $252,693 | $240,658 | $221,526 | $167,760 | $124,346 | $89,385 | $61,324 | $122,582 |
| **TOTAL COST =** | **On-Site** | **($34,479,829)** | | | | | | | | | | | | | | |
| | **Off-Site** | **($36,656,818)** | | | | | | | | | | | | | | |