

Appraising Proposed Recycling Stations

Recycling stations will become more common as the problem of how to dispose of trash grows and as state governments put more emphasis on recycling programs. In an analysis based on several recycling station appraisals, the various elements of appraising a proposed recycling station and the factors that affect the analysis and value of the property are addressed here.

Although recycling is not a new concept, the dedicated recycling station is comparatively new as a real estate investment. What recycling there was in the 1960s and 1970s was handled through dedicated transfer stations or the few transfer stations that were used exclusively for recycling. The new, dedicated recycling stations that have appeared within the past five years, however, are significantly different from their predecessors. Modern recycling stations, also known as Material Recovery Facilities (MRFs), are special-purpose facilities that are clean, well designed and landscaped, and do not have obnoxious odors. An MRF is a highly automated project more complex than an industrial building but less so than a transfer station.

WHAT MAKES AN MRF MORE THAN JUST AN INDUSTRIAL BUILDING

Two characteristics make an MRF more than an ordinary industrial building: construction materials and the presence of approvals. A modern recycling station or MRF is an industrial building with many special-purpose designs. A new MRF is characterized by a high, clear ceiling height; extra heavy electrical capacity and grounding; heavy-duty, reinforced concrete flooring; and specialized recycling equipment. When compared with an ordinary industrial building, these components would be considered superadequate.

There are three types of garbage

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trucks: rolloff, front-loading, and back-loading. The front- and back-loading trucks tilt up to remove their loads, and almost all new MRFs have a clear ceiling height of 33 feet to 36 feet to accommodate this. Further, if a driver neglects to lower the bay, a high ceiling height prevents a truck from backing into the walls or ceiling of a facility as the truck is driven out. Concrete flooring is also heavy-duty because a fully loaded truck can weigh several tons and is commonly driven onto the interior concrete pad to dump its materials. Specialized equipment such as sorting and bailing machines separate and collate the various recyclables, and the layout of a building usually reflects the type of equipment and its optimal workflow arrangement. This equipment, which can cost several million dollars, has a heavy power consumption and the electrical system of the building must be able to withstand this. When compared with an ordinary industrial building, it is clear that an MRF is composed of superior construction materials and is superadequate for almost any alternate use.

An MRF must have a license for hauling solid waste from the state in which it operates. This license is almost a transfer station license and it allows the recycling station to receive solid waste from the county in which it is located, as does a transfer station. It is not allowed to cross county borders or to export general refuse out of state, however, which is a major difference between a recycling station and a transfer station. Approval must be obtained from the Township Planning Board, the County Planning Board, the County Solid Waste Council, and the State Department of Environmental Protection. Specialized information must be presented even before such an operation is considered. The entire approval process usually takes two years to three years and the engineering, legal fees, and applications to the various agencies can cost over half a million dollars. If the cost of machinery, usually several million dollars, the land acquisition cost, and the building construction cost are added to this it is clear that an MRF costs much more than an ordinary industrial building. A comparison between the two is analogous to comparing a nursing home with an apartment building.

COST APPROACH

Several cost data sources can be used to value the improvements.

- A construction budget for the proposed recycling station can be used.
- If possible, the costs of comparable recycling stations could also be used, but because the dedicated recycling station is a relatively new concept it is doubtful that this information can be obtained from other recycling station owners.
- If the subject owner has constructed other stations, the construction budget from these facilities can be used with the cost index trending that an appraiser considers appropriate.
- Cost manual data such as provided by Marshall & Swift can be used. An appraiser must be aware, however, of the added construction features of new recycling stations, such as thicker concrete flooring, higher clear ceiling height, and heavy-duty electrical wiring.

Determining land value is difficult because sales of land approved for a recycling station that include a solid waste license are practically nonexistent at this time. Using land with approvals for a solid waste transfer station would be the next most desirable alternative but again, sale information is scarce. In lieu of this information, similarly zoned land sales without approvals can be used with appropriate adjustments.

As a general guideline, Table 1 presents typical MRF construction costs in dollars-per-square-foot of floor area. Local variations in construction cost must also be considered.

Equipment costs are another major expenditure in a recycling station. Estimates should be obtained from vendors or other industry sources. Table 2 shows the estimated average equipment cost in tons per day.

SALES COMPARISON APPROACH

Because MRFs are relatively new, there are probably no sales available with which to apply a sales comparison approach, and if there were, the contribution of the

equipment would have to be derived. Valuation on a purely industrial basis, the next most reasonable alternate use, is incorrect unless an appraiser properly considers the contributory value of the added construction features and the approvals. It should be noted, however, that the highest and best uses of the alternate use industrial sales are different from the highest and best use of the recycling station. This flaw may have to be considered if no recycling or transfer station sales are available and the client requires a sales comparison approach. If this approach is performed, it is likely to receive the least weight in the final selection of value.

INCOME CAPITALIZATION APPROACH

It is extremely unlikely that arm's-length leases will be discovered during the market search because recycling stations are owner-occupied enterprises. Even if there were leases, separation of the contributory value of the equipment to the total lease rate might also have to be performed if it is a leased turnkey operation. A practical example of a discounted cash flow (DCF) analysis based on a 64,000-square-foot recycling station is presented that includes various expense considerations.

Income

A recycling station's income is derived from recycling material sales to smelters and other endproduct disposers. The range of potential recycling incomes varies depending on material demand. These incomes change regularly and an appraiser should contact at least one recycling owner or municipal recycling coordinator to determine these incomes and their trends. Consolidated Waste Services, one of the largest recycling con-

glomerates in New Jersey, provided the following list of recycling endproduct incomes per ton in June 1992:

Corrugated cardboard	\$10 to \$15
Aluminum	\$800
Newspaper	-\$5 to -\$10
Tin	\$53
Glass	
Green and mixed	Free
Clear and amber	\$20 to \$30
Wood	-\$10
Plastics	
PEP (soda)	\$40
Milk jug	\$60
Other grades	Free or pay to dispose

It is important to note the hours of operation of a recycling station. Some stations work on a 24-hour schedule or daily double shifts because of the strong current demand for these activities. Of course, this affects all income and expense estimates.

Vacancy and collection loss

As a practical matter, there is very little collection loss in the industry. Generally, smelting plants are reputable and pay promptly. As a result of strong demand and the guaranteed recycling volume of municipal contracts, there should be little vacancy loss.

The vacancy loss is directly attributable to the quality of management. Aggressive firms that have multiple operations, including transfer stations, have the lowest vacancy loss; these are generally the larger recycling conglomerates. In the early stages of a DCF analysis, a higher vacancy loss should be taken to reflect the lead time necessary to acquire municipal and corporate recycling accounts.

Administrative costs

Administrative costs are primarily office-related expenses. Larger firms have a

**TABLE 4 Typical MRF Construction Costs:
(dollars per square foot of floor area)**

Item	Description	Average
Site work	Excavation, grading, paving, landscaping, weigh scale	\$ 6.50
Utilities	Electrical, water, sewer	\$ 1.50
Structure	Concrete, structural, doors, fire control, lighting	\$30.00
General conditions	Bonds, building permits, mobilization	\$ 2.00
Contingency		\$ 4.00
Total		\$44.00

SOURCE: Peer Consultants and Cal-Recovery Inc., "Materials Recovery Facilities for Municipal Solid Waste," (Washington, D.C.: U.S. Environmental Protection Agency, 1991).

**TABLE 2 Estimated Average Equipment Cost by Throughput Capacity:
(tons per day)**

Equipment	10	100	500
Sorting system			
Miscellaneous conveyors	\$ 100,000	\$ 400,000	\$ 875,000
Sorting conveyors	\$ 40,000	\$ 400,000	\$1,000,000
Sorting platforms	\$ 60,000	\$ 600,000	\$ 750,000
Trommel screens	\$ 3,500	\$ 35,000	\$ 100,000
Magnet/eddy separators	\$ 7,500	\$ 75,000	\$ 200,000
Processing system			
Balers	\$ 38,400	\$ 383,700	\$ 776,300
Plastic granulators	\$ 10,200	\$ 102,300	\$ 333,800
Glass crushers	\$ 3,000	\$ 30,600	\$ 148,100
Rolling stock	\$ 22,500	\$ 225,000	\$ 425,000
Installation	\$ 26,300	\$ 177,200	\$ 334,600
Contingency	\$ 31,100	\$ 242,800	\$ 494,300
Total	\$342,500	\$2,671,600	\$5,437,100
Cost per ton	\$ 34,250	\$ 26,716	\$ 10,874

SOURCE: Peer Consultants and Cal-Recovery Inc., "Materials Recovery Facilities for Municipal Solid Waste," (Washington, D.C.: U.S. Environmental Protection Agency, 1991).

central administrative staff that apportion this cost to the various facilities. Generally, most firms have separate staffs for each location and because this reflects the market, an appraiser should allocate this expense based on an individual operation rather than apportioning it from a central office staff. Table 3 represents typical staffing requirements for MRFs based on size.

Labor costs

Labor costs include the payroll; payroll taxes; and other benefits of office employees, waste hauler operators, and recycling line workers. By multiplying these staffing requirements for the appropriate sized facility by the average worker wages for each category of worker, the total labor cost of a facility can be derived.

Table 4 presents estimated annual op-

erating expenses for typical recycling stations. Although debt service has been included in the table, it should be deducted to derive the net operating income (NOI).

Utilities

Utilities depend heavily on the hours of operation and the power use of the recycling machinery. Electrical expense is usually significant because the recycling equipment consumes great quantities of electricity. The mean hourly power usage should be determined from the vendors, the electric company should be contacted for their bulk hourly electric rates, and this should be multiplied by the facility's hours of operation to determine this expense. Most facilities also have a material water expense because the recycling facilities must be washed at least once daily, often twice or more depending on the hours of

**TABLE 3 Typical Staffing Requirements of MRFs:
(tons per week)**

Staff	500	1,000	1,500	2,000
Office personnel				
Plant manager	1	1	1	1
Scalesmaster	1	1	1	1
Clerk	0-1	1-2	2-3	2-3
Janitor	0	0	0	1
Plant personnel				
Foreman/machine operator	1-2	2-3	3-4	3-4
Sorters	13-25	16-27	19-32	25-38
Forklift/loader operators	2-3	3-4	4-5	5-6
Maintenance	1	2	3	4
Total	19-34	26-40	33-49	42-58

SOURCE: Peer Consultants and Cal-Recovery Inc., "Materials Recovery Facilities for Municipal Solid Waste," (Washington, D.C.: U.S. Environmental Protection Agency, 1991).

**TABLE 4 Estimated Annual Operation and Maintenance Costs:
(per ton per day)**

Cost Item	Facility Capacity in Tons		
	10	100	500
Labor			
Sorters	\$ 18,750	\$ 237,120	\$ 873,600
Other	\$ 74,880	\$ 249,600	\$ 549,120
Overhead*	\$ 37,440	\$ 194,688	\$ 569,088
Maintenance	\$ 5,850	\$ 58,500	\$ 292,500
Insurance**	\$ 9,100	\$ 91,000	\$ 455,000
Utilities	\$ 3,356	\$ 33,700	\$ 167,588
Fuel	\$ 624	\$ 6,240	\$ 31,200
Outside services and supplies	\$ 14,997	\$ 87,085	\$ 293,810
Operations and maintenance subtotal	\$164,997	\$ 957,933	\$3,231,906
Residue disposal	\$ 16,250	\$ 162,500	\$ 812,500
Debt service	\$139,319	\$ 801,155	\$2,180,344
Total annual cost	\$320,566	\$1,921,588	\$6,224,750
Annual cost [†]	\$ 123.28	\$ 73.91	\$ 47.88

*Insurance, social security, vacation and sick leave

**Workers compensation, property, and liability

[†]Annual cost per ton of daily processing capacity

source: Peer Consultants and Cal-Recovery Inc., "Materials Recovery Facilities for Municipal Solid Waste," (Washington, D.C.: U.S. Environmental Protection Agency, 1991).

operation. This also helps preserve the recycling stations' image as clean and pleasant places to work.

Equipment leasing fees

Because most recycling operators lease their truck fleet and usually lease the recycling equipment, this expense should be calculated based on a vendor's leasing quotations.

Equipment operating costs

This is often the most difficult expense to calculate for proposed construction. The recycling equipment vendor should be contacted to get an idea of the power usage, mean time between service, and service costs. Machinery can get an "extended warranty" that will cover repairs and maintenance and this should be figured into the operating costs. The operating costs for a truck fleet can be similarly calculated using mean repair times and wages.

Disposal costs

Some nonrecyclable material will occasionally be mixed with the general collection refuse. This is usually around 7% of the total materials received by an MRF. These materials will have to be dumped at landfills and an appropriate landfill tipping fee should be calculated into this expense.

Management

The estimate of management fees is usually difficult because recycling facilities are almost exclusively owner-occupied. The management fee should be selected in proportion to a typical owner's annual reward without regard for additional NOI after all expenses and debt service are paid.

Reserves for replacement

This category includes the building, the recycling machinery, and the truck fleet. Most recycling operators lease their truck and recycling machinery, which makes the building the only item necessary for this expense. If the equipment is purchased, an appraiser should get a listing of the equipment used within the operation and contact a vendor to get an idea of its capital costs and expected life. The reserves should include an allocation for each of these elements on a straight-line basis.

Other expenses

Several other expenses, such as real estate taxes, the rental for the truck fleet, payroll taxes, and other miscellaneous expenses should also be considered.

DISCOUNT RATE

Because capitalization rate sales are extremely rare and verification of the var-

TABLE 5 Stabilized Operating Statement

	Price/Ton	Daily Volume in Tons	Daily Income
Recycling Sales of Materials			
Corrugated cardboard	\$ 15.00	15	\$ 225
Aluminum	\$800.00	20	\$ 16,000
Newspaper	(\$ 5.00)	25	(\$ 125)
Glass	\$ 50.00	35	\$ 1,750
Wood	\$ 0.00	10	\$ 0
Tin	\$ 53.00	20	\$ 1,060
Plastics	\$ 30.00	35	\$ 1,050
Maximum approved tonnage/day of facility:		160	\$ 19,960
Days of operation (1)			× 230
Gross potential income			\$4,590,800
Less: vacancy & collection losses/repair downtime (2.50%)			\$ 114,770
Effective gross income			\$4,476,030
Expenses*			
Real estate taxes (2)			\$ 106,602
Labor costs (3)			\$ 491,000
Recycling equipment rental (4)			\$ 427,456
Truck fleet rental (5)			\$ 130,000
Disposal costs (6)			\$ 260,000
Administrative cost (7)			\$ 135,000
General overhead (8)			\$ 311,501
Utilities (9)			\$ 53,920
Management (10)			\$ 223,802
Other (11)			\$ 149,320
Repairs and maintenance (12)			\$ 93,600
Reserves for replacement (13)			\$ 646,050
Total operating expenses			\$3,037,251
Net operating income			\$1,438,779
Capitalization Process			
Net operating income divided \$1,438,779/17%			= \$8,463,406
by capitalization rate			Rounded to
equals value			\$8,465,000)

***EXPENSE DERIVATION SUMMARY**

- (1) 240 maximum workweek days in a year less 10 days for holidays. Site size is 10 acres.
- (2) Cost approach building cost plus land value times a tax rate of \$2.50 per \$100 of value.
- (3) Based on typical staffing requirements for MRFs in Tons Table for a maximum weekly tonnage of 1,000. Includes 2 foremen/machine operators at \$30,000 a year, 22 sorters at \$17,000 a year, 2 forklift/loader operators at \$20,000 a year, and 1 maintenance person at \$13,000 a year.
- (4) Equipment cost equals \$26,716 cost per ton derived from Table 2 for a 100-ton daily limit multiplied by the 160-ton maximum daily allowable tonnage of the subject. This \$4,274,560 equipment cost times 10% equals the yearly rental.
- (5) Estimated \$1,300,000 in waste removal vehicle cost times 10% interest equals truck rental. An appraiser should obtain quotes from the client or vendor for the waste truck costs.
- (6) Table 4 indicates a yearly residue disposal cost of \$162,500 per 100-ton facility. Dividing this by 100 tons equals \$1,625 per ton. Multiplying this figure by the 160-ton maximum daily tonnage of the facility equals \$260,000 per year.
- (7) 1 plant manager at \$70,000 a year, 1 clerk at \$30,000 a year, and 1 scalesmaster at \$30,000 a year. The number of personnel necessary for the facility was derived from Table 3.
- (8) General overhead includes overhead (e.g., health insurance, social security, vacation, sick leave) plus business insurance (e.g., workers' compensation, property, liability). It was derived from Table 4 by adding the overhead and insurance categories together and apportioning them for 160 tons.
- (9) Table 4 indicates a utility cost of \$33,700 per year for a 100-ton facility. Dividing this by 100 tons equals a utility cost per ton of \$3,370. Multiplying by the subject's 160 tons equals \$53,920 per year.
- (10) 5% of effective gross income.
- (11) Other costs include truck fuel and outside services and supplies from Table 4 apportioned over 160 tons.
- (12) Based on estimated annual operation costs for 100-ton capacity apportioned over 160 tons. Estimated at \$58,500 divided by 100 tons times 160 tons.
- (13) Includes building and equipment. Straight-line depreciation based on a building life of 40 years and an equipment life of 10 years. Equipment is estimated at \$1,300,000 for truck costs plus \$4,275,000 for Recycling Equipment divided by 10 years. Building is estimated at \$3,542,000 from the cost approach divided by 40 years.

ious income and expense components even rarer, an appraiser must rely on judgment for the overall rate in direct capitalization or discount rate/reversionary inputs in DCF analysis.

For this analysis, direct capitalization was performed. The following two factors warrant the selection of a higher overall rate for a recycling station than other forms of real estate.

- The nature of the business is management intensive and requires a specialized knowledge of the operations of the facility.
- The high initial investment, the land, and the building and equipment entail more risk than typical pure real estate investments.

Considering these elements, an overall rate of 17% has been selected for the demonstration property.

CONCLUSION

To properly and accurately appraise a proposed recycling station, it is necessary to calculate the value of the real estate used

within the business itself, considering such factors as payroll, equipment costs, and other business-related expenses (see Table 5). Valuing the property as an industrial building is inappropriate because the added value of the business entity is not considered and an alternate use does not make best use of the added construction features of an MRF (a superadequacy for an alternate use). Industry averages supplied by the U.S. Environmental Protection Agency add credibility to proposed MRF expense calculations, and other recycling station owners or municipal recycling coordinators can supply the remaining information. In light of the extremely rapid growth of this industry, public environmental awareness, and the growth in recycling from the waste stream, appraisers increasingly will be asked to appraise these facilities. By valuing a proposed project with consideration for real estate and equipment, the most realistic and credible recycling station value can be obtained and the best understanding of these facilities can be presented to a client.