
The Institution Recycling Network



Economics of the 3Rs

Green Office / Green Facility Conference
June 15, 2010

About IRN



IRN is a recycling cooperative that serves colleges, healthcare facilities, independent schools, and environmentally progressive businesses and private organizations

About IRN



What We Do For Our Clients:

- **One Contact to Recycle Anything that Needs Recycling**
 - **Aggregate Tonnage to Gain Market Clout**
 - **Aggregate Purchasing Demand to Get Great Pricing**
 - **IRN Staff Dedicated to Planning, Managing & Optimizing Recycling**
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About IRN



Services

- **80+ Materials Recycled**
 - **Purchasing Recycling Supplies & Equipment**
 - **Transportation**
 - **Vendor Qualification**
 - **Material Tracking, Recordkeeping, Reporting**
 - **Planning, Education and Training**
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The Bottom Line

More Recycled

Improved Efficiency

Better Documentation

Reduced Cost

Economics of the 3Rs



1. **Establish a Cost Baseline Format**
 2. **Confirm Current Services**
 3. **Compile Tonnage and Cost Data**
 4. **Calculate Existing Costs**
 5. **Step Back and Consider Your Options**
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Economics of the 3Rs



- 1. Establish a Cost Baseline**
 - **Get a listing of all commodities handled through the program**
 - **Know labor and equipment used to handle materials**
 - **Make sure all cost elements are documented (nothing is free)**
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Tonnage Tracking

Commodity	Vendor	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTALS	% of Waste Stream
Appliances		0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
Beverage Containers		0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
Books		0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
C&D Recycling		0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
Carpet		0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
Cardboard		0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
Confidential Documents		0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
Electronics		0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
Fixed Assets		0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
Grass Clippings		0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
Leaf and Yard Waste		0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
Mattresses		0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
Metals - Light Iron		0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
Metals - Non Ferrous		0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
Mixed Debris Recycling		0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
Mixed Paper		0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
Pallets		0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
Surplus		0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
Textiles		0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
Tires		0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
Universal Wastes		0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
Waste Oil		0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
Wood Wastes		0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
Mixed Debris Disposal		0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
* Solid Waste		0	0	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!
* required															
Total Weight		0	0	0	0	0	0	0	0	0	0	0	0	0	100.00%
														Recycling Rate:	#DIV/0!

Economics of the 3Rs



2. **Confirm Current Services**

- **Service frequencies**
 - **Equipment sizes and equipment types**
 - **End markets and destinations**
 - **Internal and external material handling labor**
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Economics of the 3Rs



3. **Compile Tonnage and Cost Data**
 - **Wade through invoices and purchase orders**
 - **Stay focused on tonnage costs, transportation costs, and equipment fees**
 - **Pin down labor costs both internally and externally**
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Tonnage/Cost Model

Commodity	Destination Market	Current Monthly Volume (pounds)	Current Annual Volume (pounds)	Commodity Revenue/Cost (per pound)	Commodity Revenue/Cost (per ton)	Total Annual Commodity Revenue/Cost	Number of Monthly Services	Number of Annual Services	Transportation Cost (per service)	Transportation Costs Per Year	Equipment Rental Cost (per month)	Equipment Rental Cost (per year)
Appliances		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Beverage Containers		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Books		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
C&D Recycling		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Carpet		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Cardboard		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Confidential Documents		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Electronics		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Fixed Assets		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Grass Clippings		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Leaf and Yard Waste		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Mattresses		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Metals - Light Iron		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Metals - Non Ferrous		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Mixed Debris Recycling		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Mixed Paper		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Pallets		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Surplus		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Textiles		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Tires		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Universal Wastes		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Waste Oil		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Wood Wastes		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Mixed Debris Disposal		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
* Solid Waste		0	0	\$0.0000	\$0.00	\$0.00	0.00	0.00	\$0.00	\$0.00	\$0.00	\$0.00
TOTALS		0	0			\$0.00				\$0.00		\$0.00

Total Commodity Revenue/Cost	\$0.00
Total Transportation Cost	\$0.00
Total Equipment Cost	\$0.00
Total Revenue/Costs	\$0.00
Average Revenue/Cost Per Pound	#DIV/0!

Economics of the 3Rs



4. Calculate Existing Costs

- Plug in raw data to baseline model
 - Remember that everything must drive down to cost per pound
 - Use expertise to qualify assumptions. Note assumptions when possible (others will question you)
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Tonnage Tracking

Commodity	Vendor	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTALS	% of Waste Stream
Appliances		500	0	0	500	0	0	500	0	0	500	0	0	2,000	0.33%
Beverage Containers		200	200	200	200	200	200	200	200	200	200	200	200	2,400	0.39%
Books		0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
C&D Recycling		0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
Carpet		0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
Cardboard		4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	48,000	7.81%
Confidential Documents		200	200	200	200	200	200	200	200	200	200	200	200	2,400	0.39%
Electronics		500	500	500	500	500	500	500	500	500	500	500	500	6,000	0.98%
Fixed Assets		100	0	0	100	0	0	100	0	0	100	0	0	400	0.07%
Grass Clippings		0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
Leaf and Yard Waste		0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
Mattresses		0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
Metals - Light Iron		100	100	100	100	100	100	100	100	100	100	100	100	1,200	0.20%
Metals - Non Ferrous		0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
Mixed Debris Recycling		2,000	0	0	2,000	0	0	2,000	0	0	2,000	0	0	8,000	1.30%
Mixed Paper		3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	36,000	5.86%
Pallets		450	450	450	450	450	450	450	450	450	450	450	450	5,400	0.88%
Surplus		800	800	800	800	800	800	800	800	800	800	800	800	9,600	1.56%
Textiles		0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
Tires		0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
Universal Wastes		100	100	100	100	100	100	100	100	100	100	100	100	1,200	0.20%
Waste Oil		0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
Wood Wastes		0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
Mixed Debris Disposal		1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	12,000	1.95%
* Solid Waste		40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	480,000	78.10%
* required															
Total Weight		52,950	50,350	50,350	52,950	50,350	50,350	52,950	50,350	50,350	52,950	50,350	50,350	614,600	100.00%
														Recycling Rate:	19.95%

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Tonnage/Cost Model

Commodity	Destination Market	Current Monthly Volume (pounds)	Current Annual Volume (pounds)	Commodity Revenue/Cost (per pound)	Commodity Revenue/Cost (per ton)	Total Annual Commodity Revenue/Cost	Number of Monthly Services	Number of Annual Services	Transportation Cost (per service)	Transportation Costs Per Year	Equipment Rental Cost (per month)	Equipment Rental Cost (per year)
Appliances		167	2,000	\$0.2600	\$520.00	\$520.00	0.3	3.0	\$100.00	\$1,200.00	\$0.00	\$0.00
Beverage Containers		200	2,400	\$0.0300	\$60.00	\$72.00	2.0	24.0	\$50.00	\$600.00	\$0.00	\$0.00
Books		0	0	\$0.0050	\$10.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
C&D Recycling		0	0	\$0.0425	\$85.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Carpet		0	0	\$0.0600	\$120.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Cardboard		4,000	48,000	(\$0.0500)	(\$100.00)	(\$2,400.00)	1.0	12.0	\$100.00	\$1,200.00	\$0.00	\$0.00
Confidential Documents		200	2,400	\$0.1000	\$200.00	\$240.00	1.0	12.0	\$250.00	\$3,000.00	\$0.00	\$0.00
Electronics		500	6,000	\$0.2400	\$480.00	\$1,440.00	1.0	12.0	\$100.00	\$1,200.00	\$0.00	\$0.00
Fixed Assets		33	400	\$0.0900	\$180.00	\$36.00	0.3	3.0	\$150.00	\$1,800.00	\$0.00	\$0.00
Grass Clippings		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Leaf and Yard Waste		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Mattresses		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Metals - Light Iron		100	1,200	(\$0.0500)	(\$100.00)	(\$60.00)	0.3	3.0	\$150.00	\$1,800.00	\$0.00	\$0.00
Metals - Non Ferrous		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Mixed Debris Recycling		667	8,000	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Mixed Paper		3,000	36,000	(\$0.0250)	(\$50.00)	(\$900.00)	4.0	48.0	\$100.00	\$1,200.00	\$0.00	\$0.00
Pallets		450	5,400	\$0.0660	\$132.00	\$356.40	1.0	12.0	\$75.00	\$900.00	\$0.00	\$0.00
Surplus		800	9,600	\$0.0900	\$180.00	\$864.00	1.0	12.0	\$150.00	\$1,800.00	\$0.00	\$0.00
Textiles		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Tires		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Universal Wastes		100	1,200	\$0.2825	\$565.00	\$339.00	0.5	6.0	\$125.00	\$1,500.00	\$0.00	\$0.00
Waste Oil		0	0	\$0.0000	\$0.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Wood Wastes		0	0	\$0.0250	\$50.00	\$0.00	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00
Mixed Debris Disposal		1,000	12,000	\$0.0450	\$90.00	\$540.00	0.5	6.0	\$150.00	\$1,800.00	\$0.00	\$0.00
* Solid Waste		40,000	480,000	\$0.0400	\$0.00	\$19,200.00	8.00	96.00	\$150.00	\$14,400.00	\$0.00	\$0.00
TOTALS		51,217	614,600			\$20,247.40				\$32,400.00		\$0.00

Total Commodity Revenue/Cost	\$20,247.40
Total Transportation Cost	\$32,400.00
Total Equipment Cost	\$0.00
Total Revenue/Costs	\$52,647.40
Average Revenue/Cost Per Pound	\$0.086

Economics of the 3Rs



5. **Step Back and Consider Your Options**
 - You now know the cost/revenue per pound for each commodity
 - Options for changes in material handling systems, material sorting, or material specifications should jump off of the page
 - Options to adjust contracts and/or commitments to vendors will come from a new knowledge base
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Economics of the 3Rs



Costing Variables

- **Transportation**
 - **Commodity (per ton revenues/costs)**
 - **Labor**
 - **Equipment**
 - **Storage**
 - **Liability**
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Economics of the 3Rs



Program Costs – Transportation

- **Utilization**
 - Maximizing cubic density per vehicle
 - Scheduling services during off-peak activity
 - Combining transportation services for multiple commodities
 - **Service selection**
 - Distance to market (haul versus commodity cost)
 - Hauler and end market combination
 - Separate transportation costs from commodity costs
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Economics of the 3Rs



Program Costs – Commodities

➤ Specifications

- Are you maximizing commodity value?
- Will volumes gained from downgrading specifications improve your commodity cost/revenue ratio?

➤ End markets

- Distance to market (haul versus commodity cost)
 - Will multiple commodity streams sent through one vendor improve costs/revenues?
 - Will end markets partner with you to improve cost/revenues?
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Economics of the 3Rs



Program Costs – Labor

➤ Utilization

- All commodities are being moved now, so your labor is allocated
 - Can economies of scale be gained through commodity separation and consolidation?
 - Can labor shifts be made to handle specific commodities?
 - Can collection services be reduced based on certain commodity characteristics?
 - Evaluate “in-house” labor versus vendor labor
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Economics of the 3Rs



Program Costs – Equipment

- **Selection**
 - Match equipment technology to commodity volume
 - Match equipment to labor force capability
 - Match equipment to site location and site activity
- **Seek expertise**

Economics of the 3Rs



Current Cost Assumptions (all methods)

- ❖ Solid Waste Disposal \$0.04 - \$0.05 lb.
- ❖ Transportation \$0.01 - \$0.02 lb
- ❖ Equipment Lease/Rental \$0.01 lb
- ❖ Standard Average \$0.07 lb
- ❖ *Material Handling \$1.60 lb (too many variables)*
- ❖ *Storage (not generic)*
- ❖ *Liability (violation fines vary)*

Economics of the 3Rs



New England Averages (no transportation)

- ❖ Appliances \$0.12 lb
- ❖ Beverage Containers \$0.10 lb
- ❖ Electronics \$0.24 lb
- ❖ Fibers \$0.02 lb
- ❖ Metal \$0.04 lb
- ❖ Wood \$0.03 lb
- ❖ Surplus \$0.08 lb
- ❖ Universal Waste \$0.30 lb

Reduce/Reuse/Recycle

What are your problematic commodities?

Core Recycling Programs

- Beverage and Kitchen Containers
- Construction Debris
- Electronics
- Fixed Assets
- Fibers
- Furniture and Equipment
- Metals
- Plastic
- Universal Wastes
- Wood



IRN

The Recycling Network



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