A Chronology of the C&D Waste Industry 1990-2010

…for some a walk down memory lane!

C&D Recycling Forum
Baltimore, MD
October 4, 2010

Presentation by:
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Gershman, Brickner & Bratton, Inc.
Fairfax, VA

Understanding of the Problem
C&D Waste Quantification – Pre 1990

- In the publication titled EPA's Environmental Outlook – 1980, an estimate was made that 82 million "net" tons of demolition waste required disposal in 1971
- The same 1980 document projected that the net demolition waste generation for 1990 would be over 150 million tons per year
- The 1989 EPA Agenda for Action contained an estimate of only 31.5 million tons per year of total Construction Waste and Demolition Debris (C&D)

What Is This? Who is the Vendor?

…A Bucket Screen by Bezner!

Years: 1990-1993

1990:

Limited manual C&D sorting; while wood grinding and concrete crushing exists (e.g., Star Recycling in Brooklyn, NY)

1992:

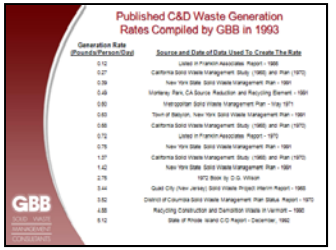
GBB's Construction Waste and Demolition Debris Recycling Conference

1993:

Formation of the U.S. Green Building Council (USGBC)

1993:

C&D Debris Recycling Magazine Premiere Edition

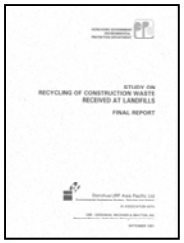


1993:

GBB Published C&D Waste Generation Data

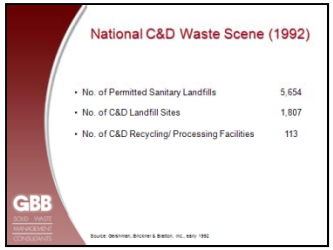
March 1991:

GBB co-authors Government of Hong Kong C&D Recycling Study



1992:

GBB indicates 113 C&D Recycling/ Processing Plants



1993:

GBB Article Demolition Age Magazine

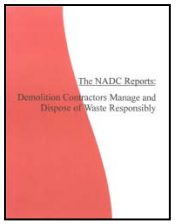
1993:

SWANA publishes C&D Waste Primer (by GBB)

Years: 1994-1997

September 1994:

EPA report notes 1,889 C&D Waste Landfills in the U.S.



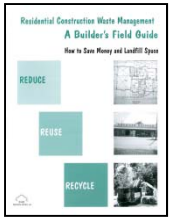
1995:

The NADC Reports [1st PR Document]

American Forest & Paper Association

1996

AF&PA published Wood Recycling Directory



1997:

NAHB's Residential Construction Waste Management - A Builder's Field Guide

1994:

GBB writes four part C&D article for Recycling Today Magazine


Plan First, Buy Later


C&D Primer For Waste Managers


C&D Entrepreneurs

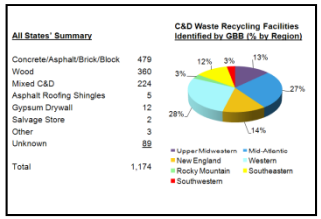

C&D Market Opportunities

1996

CMRA Formation in Boston, MA

1996:

GBB publishes C&D Recycling Plant Estimates



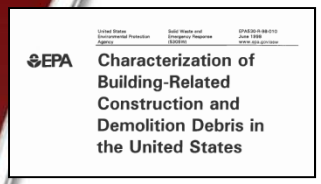
1997:

Best Practices in Wood Waste Recycling done for CWC

C&D recycling forum

GBB SOLID WASTE MANAGEMENT CONSULTANTS

Years: 1998-2001



June 1998:

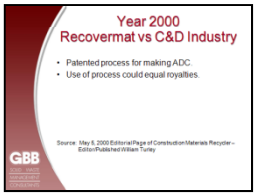
EPA publishes first report of C&D waste generation and characterization

1999:

Star Services formed in Florida with Delta Recycling subsidiaries (10 C&D plants by 2001)

Spring 1999:

C&D Recycler Magazine Published



2000:

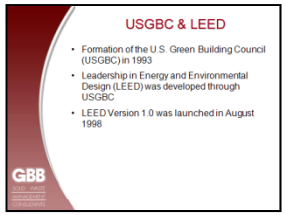
Patent by Recovermat vs. C&D Industry Article

2001:

Central Recycling shuts down C&D plant in Des Moines, IA – Asset sale of $5.4 M – operated 1.5 yrs

August 1998:

USGBC LEED Version 1.0 is launched



1999:

Bill Turley starts publishing Construction Materials Recycler

1999:

CanFibre MDF Wood Waste Plant opens, Riverside, CA

World-Class Medium Density Fiberboard Manufacturing Facility

(cost $100M)

2000:

San Jose, CA increases building permit fees to encourage C&D recycling

2001:

Ag-Fiber & Wood Waste MDF Plant Failures Published

Years: 2002-2005

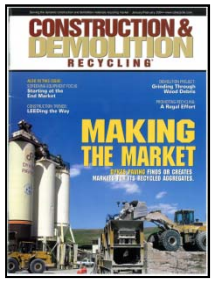
2003:

Massachusetts bans direct LF of certain C&D materials to increase recycling

(A/B/C, metal, wood)

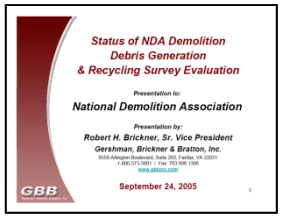
2003:

EPA publishes revised estimates of building-related C&D materials amounts



2004:

1st Edition of C&D Recycling Magazine (was C&D Recycler)



2005:

NDA publishes national demolition industry waste and recycling estimates (report by GBB)

2003:

Nashville Waste-to-Energy System was demolished in Nashville

May 2003:

Enormous Liquidation Webcast held of sale of equipment from CanFibre Riverside Project

2005:

1st Asphalt Shingle Recycling Forum

2005:

New Hampshire puts moratorium on burning C&D wood waste

Years: 2006-2009

2006:

NDA Nashville, TN Conference

2007:

2nd Public C&D Processing Plant opens in Fauquier County, VA

2008:

1st C&D World Magazine Published

2007:

Ze-Gen Inc. installs pilot demonstration of liquid metal gasifier (costing $9M) at New Bedford Waste Services C&D Plant

2007

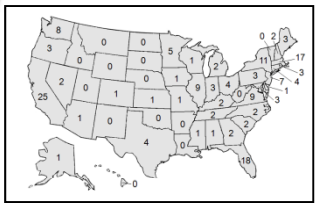
Pulte pulls plug on 100,000 Sq ft facility in VA to prefab homes

After 3 years and manufacturing only 850 houses

2009

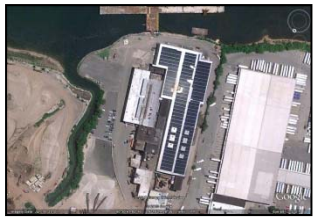
Optical Sorting (wood/plastics) making inroads at C&D Plants

Year: 2010



2010

GBB estimates 165 Mixed C&D Processing Facilities in the US



2010

1st extensive use of solar panels at a C&D facility

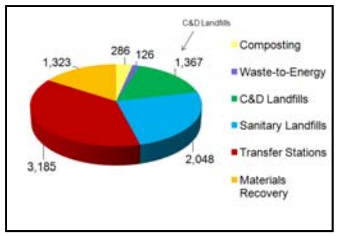
2010

GBB monitoring over 450 companies in the "Alternative Conversion Technologies" business

(many opportunities for C&D derived organic materials)

2010

Waste Business Journal estimates 1,367 C&D Landfills



2010

Taylor Biomass Energy in NY receives $100M loan guarantee

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Alternative Conversion Technologies 2010

(400++ Different Companies with Technology and/or Developer Offerings)

- Biological
  - Aerobic Composting
  - Anaerobic Digestion/ Co-digestion
  - Biodiesel
  - Bioethanol
  - Biological Pretreatment
  - Vermicomposting
- Thermal/Chemical
  - Acid Catalysis & Distillation
  - Direct Combustion
  - Gasification/Pyrolysis
  - Microwave Processes
  - Plasma-Arc
  - Thermal Decomposition

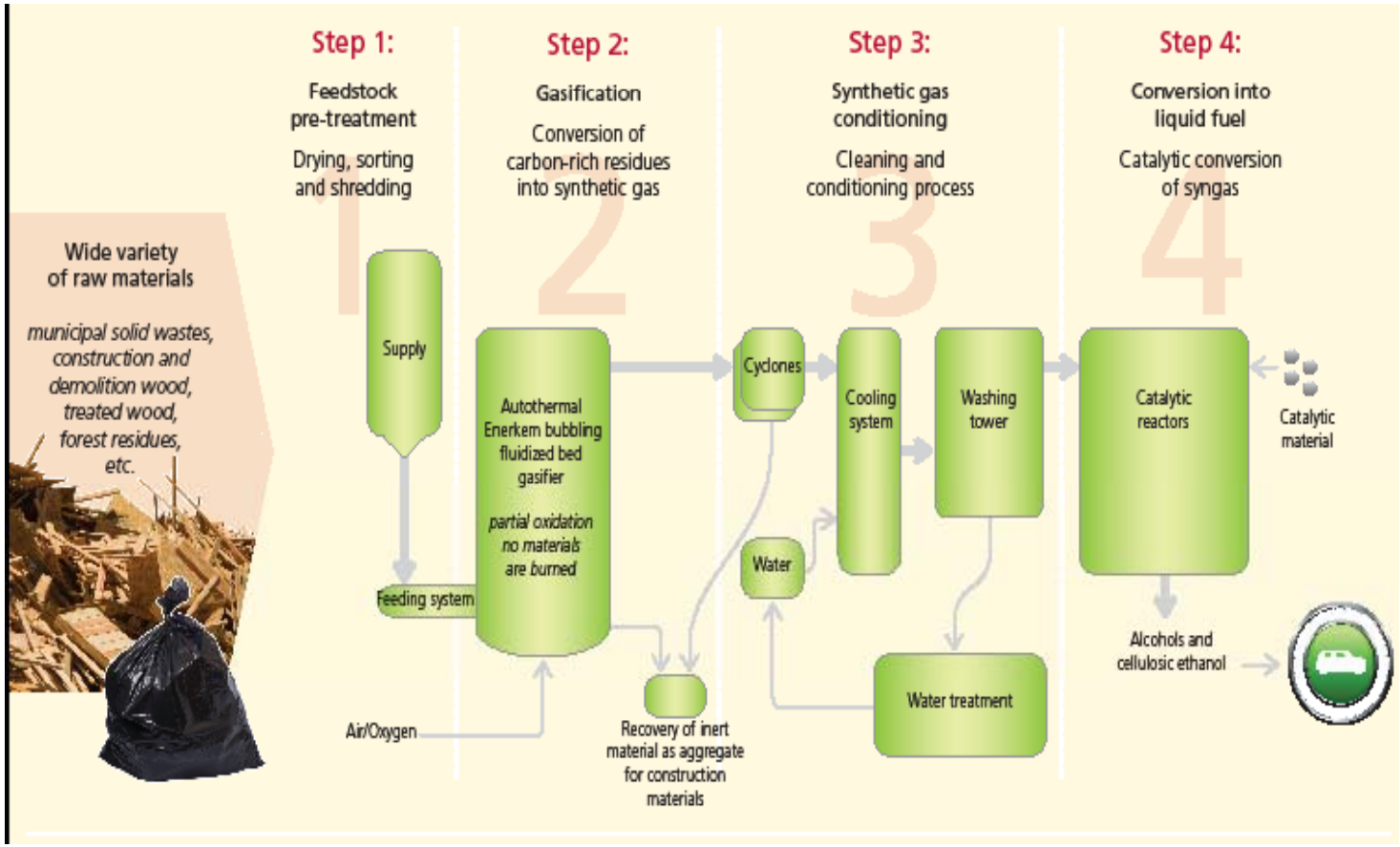
Source: Gershman, Brickner & Bratton, Inc., September 2010.

Summary of Alternative Technology Companies

(Source: GBB as of September 2010)

	Est. Companies
• Potential as Markets for C&D Products	
– Ethanol Fermentation	25
– Gasification, General	165
– Plasma, General	50
– Pyrolysis, General	40
– WTE/Thermal Recycling	30
Subtotal	310
• Other (not prime candidates)	140
• Total Companies Tracked by GBB	450

Enerkem Technology
Biofuel from Thermal Gasification



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Star Recycling – Phase 1 (Brooklyn, New York)

April 1991 – GBB initial visit to Star

- Early 1990's handling 3,500/CY over 20 hrs/day operation
- Lindemann states actual design was 1,100 CY/shift (150-200/CY/hr)
- Initially 12 to 15 sorters on main sort belt
- Landfilling only 15-20% by volume
- Wood waste & Inerts to other Star facilities
- Trommel screen holes – initially 2" and 8" size

Star Recycling (Phase 1)

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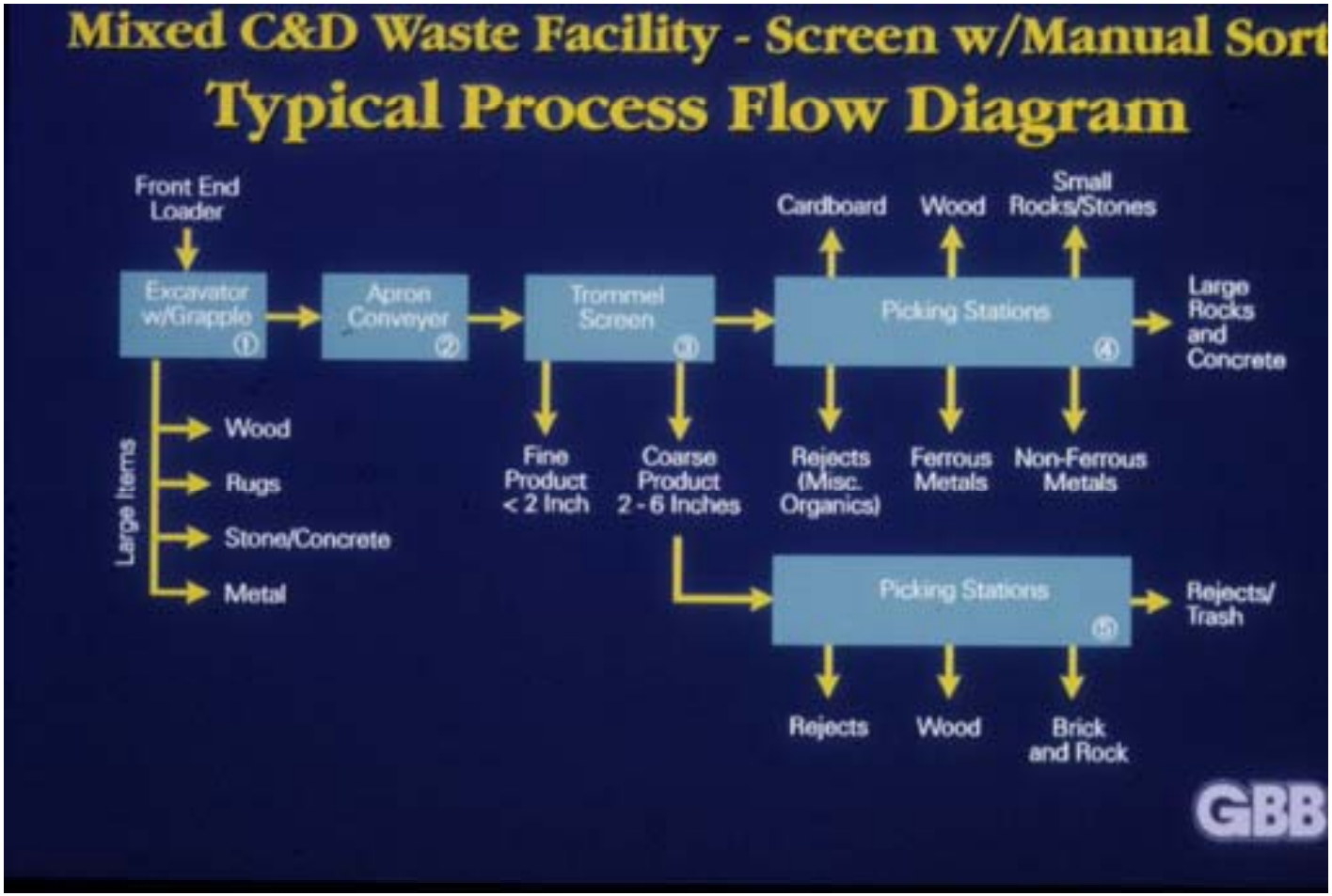
Star Recycling (Phase 1)

Star Recycling – Phase 2
(Brooklyn, New York)

May 1992 – Second GBB visit

- Trommel holes – 2” and now 6” holes
- Second sort line installed and sorting middlings as sorting platform doubled in size
- Middlings now sorted for: wood, rocks/brick/concrete

Star Recycling (Phase 2)



Star Recycling
(Brooklyn, New York)

May 1994 – Third GBB visit

- Receiving 2,500-3,000 CY/day
- Operations: 20-24 hrs/day, 6 Days/Week
- Tipping fees: $13-22/CY
- Radon detectors to identify contaminated soil
- Total plant staffing reported as 65 people
- Sorters: 18-20 primary line; 1-3 secondary line
- Recovery ≈ 85% including ADC
- Wood at 25%, looked at a wood pelletizing system (terminated due to high O&M costs)

Star Recycling (Phase 2)

Star Recycling (Phase 2)

Star Recycling (Phase 2)

Star Recycling – Phase 3
(Brooklyn, New York)

July 1997 – Fourth GBB visit (with WM)

- Added significant G-K equipment to increase to 7,000 CY/day (operating 2-10 hour shifts)
- Reported 70-75% recovered
- High-cab CAT 330 with extra boom length (allows bypass finger screen if down)
- Trommel Screen holes: 2” and now 4” holes
- Sorters: 14-16 primary line/shift; 6 secondary line/shift
- Magnetic Separator added to end of sort belt
- Average Tip Fee: $15/CY

Star Recycling
(Brooklyn, New York)

July 1997 – WM now Sorts/Recyclables:

- Sort Sequence off Primary Belt
  - Trash, rugs, tires, carpets
  - Wood
  - Metal
  - OCC
  - Concrete
- Other items sorted
  - 5 gallon plastic pales
  - Tires (metal rims crimped separated)
  - Air suction tubes (flick paper, etc.)

Star Recycling (Phase 3)

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Star Recycling Phase 3

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Star Recycling (Phase 3)

Star Recycling (Phase 3)

Star Recycling (Brooklyn, New York)

January 1999 operations now with WM staffers

- With success of G-K finger screen/destoner system, old Lindemann trommel taken off-line
- Softness of “recovered material markets” causes temporary shutdown of original sorting line
- Processing 5,200 TPD with 2-10 hour shifts
- Taking old system off-line only reduced overall recovery rate by ten percent to 60-65%
- Materials Reported as Recovered:
  - Concrete/Rock/Block – 18%
  - Ferrous Metals – 11%
  - Non-Ferrous Metals – 5%
  - ADC (<2” fines) – 30%
  - Clean Wood/Pallets – 1-2%

Selective Mixed C&D Waste System Equipment Supplies (In alphabetical order)

- Continental Biomass Industries (CBI)
- Erin Recycling
- General Kinematics
- Krause Manufacturing, Inc.
- Lubo USA
- Machinex Technologies, Inc.
- Sherbrooke OEM Ltd
- Sparta Innovations

C&D Processing/Recycling Facility (Decisions: Issues in 2010)

1. Type of State Permits; incl. Marketable Products e.g. ADC
2. How Much of Facility Inside vs. Outside
3. Height of Tip Floor Building
4. Selection of New vs. Used Equipment
5. Fixed vs. Mobile Equipment
6. Mechanically Pre-Crush vs. Screening First
7. Redundancy Costs vs. Downtime Allowance
8. Equipment Sort (e.g. Optical Sorting) vs. Labor Sorters
9. Sorters Picking Wood (One vs. All (Wood – 30% to 60%)
10. Water Float vs. Air Separators
11. Wood Processing (Direct Flow Feed to Grinder vs. Stockpile & Double Handling Before Grinding)
12. Value of Wood (Mulch vs. Fuel vs. Pellets)
13. Cost of Incremental Residue Disposal
14. Feedstock Value: C&D Tipping Fees
15. Scales (Single vs. Double – In/Out)
16. Marginal Product Separation (Is it Justified)

Thank You for your Attention

Questions for Bob Brickner

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