Ohio By-Product Synergy Network
Emerging Paradigms for Materials Management

Presentation to MORPC Education Forum
“Trash to Treasure: Sustainable Materials Management”
November 4, 2011
by
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www.OhioBPS.org
Project Team

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• **Andy Mangan**, USBCSD, Executive Director
• **Kieran Sikdar**, USBCSD, Director of Analytics
• **Daniel Kietzer**, USBCSD, Accounts Manager
Ohio BPS Support Organizations

• The Ohio Department of Natural Resources
• The U.S. Business Council for Sustainable Development
• The Mid-Ohio Regional Planning Commission
  • The Ohio State University
  • Association of Ohio Recyclers
    • Polymer Ohio
  • The Ohio Hospital Association
• Hamilton County Solid Waste District
  • The Ohio EPA
Basic Premise

Waste = Food = Value = Profit
What is BPS?

“By-product synergy is the matching of under-valued waste or by-product streams from one facility with potential users at another facility to create new revenues or savings with potential social and environmental benefits.”

- U.S. Business Council for Sustainable Development
  1997
At first glance, it's hard to imagine how anyone could get excited about slag, a by-product of the steel-making process. But when managers of Chaparral Steel got together with their counterparts at a Texas Industries Inc. (TXI) cement plant, they came up with a surprising discovery: Steel slag could be converted into a valuable raw material for cement production.

Together, they developed a patented process, now being marketed worldwide, that uses steel slag in a cement kiln to create high-quality Portland cement. The partnership has increased profits for both companies, cut energy usage, and reduced greenhouse-gas emissions.
Steel & Cement Synergy

- 5-15% production increase
- $8/ton slag to $70/ton cement
- 10% CO2 reductions
- 25-45% NOx reductions
- 2 EPA climate change awards

8.8 MM tons of CO2 annual reduction potential if applied to entire US cement production
By-Product Synergy Precepts

• What if we were witnessing business opportunity and not just cost reduction?
• What if we began to speak in terms of 100% product instead of zero waste?
• What if we had trading zones where interested parties could safely explore synergistic options?
Barriers & Struggles

- Legal
- Regulatory
- Technical
- Communication

- Economic
- Perception
- Geographic
- Time

www.usbcasd.org
The Keys to Unlocking Synergies

- Signed agreements set up confidential consortium
- Data collection allows for understanding across fencelines
- Regulators engaged from the beginning
- Diverse participants
Fire departments dispose of usable tires before the end of their normal service life. The BPS Network found that usable tires can be utilized by vehicle fleets, and then eventually scrap tires can be utilized as fuel in cement kilns.
Ohio BPS Members

Armstrong
Barnes Nursery
Belden Brick
City of Columbus
Cincinnati Children’s Hospital
Cytec Industries
Dow Chemical
Fairmount Minerals
Frank Road Recycling Solutions
Givaudan Flavors
G&J Pepsi Cola Bottlers
Goodwill Columbus

J.M. Smucker LLC
Kurtz Bros.
Marathon Oil
Mount Carmel Health
MTD Products
Ohio Mulch
Procter & Gamble
Ross Environmental Services
St. Bernard Soap Company
The Ohio State University
Tosoh SMD
United McGill
Worthington Industries
BPS Work Process Overview

**USBCSD Tools**
- Data Templates
- Eco-Flow™ Software
- Barrier Analysis
- BPS Project Charter

**Project Launch**
- Data Collection
- Synergy Identification & Analysis
- Synergy Evaluation & Prioritization
- BPS Action Plan Development & Implementation

**Project Deliverables**
- Materials Database
- Initial BPS Benefits Estimates
- Detailed Benefits Analysis
- BPS Benefit Tracking & Reporting

Approximately 1 year

Working meetings approximately every 2 months

1. Project Launch
2. Data Collection
3. Synergy Identification & Analysis
4. Synergy Evaluation & Prioritization
5. BPS Action Plan Development & Implementation
6. BPS Benefit Tracking & Reporting
Ohio BPS Network
Year 2, Working Meeting 4
November 1, 2011

Hosted by: Mount Carmel Health

Mount Carmel East
Siegel Center Auditorium
6001 East Broad Street
Columbus, Ohio 43213

www.OhioBPS.org
Participant Contributions

• Briefly identify yourself, your organization, and your professional role
• Name the top (up to 5) by-products/wastes and/or resource inputs that present the greatest challenges/opportunities to your organization (see datasheet)
  - Description of material or resource (avoid trade names)
  - Estimated amount and frequency
  - Ideas for possible synergies

3 to 5 minutes each
Recognizing Opportunities

While listening to others….

• Review the by-products and inputs being discussed and make note of any possible matches (synergies) with your organization.

• Use the BPS datasheet to capture your synergy opportunities.

• Please keep this information for later discussions during your work group brainstorming sessions.
Working Groups

1. Biomass – Food, fibers, wood, and other organic materials
2. Residuals – manufacturing residuals such as sand, sludge and ash
3. Recyclables – commonly recycled materials such as metals, glass, rubber, and plastics
4. Other resources – chemicals, fuels, waxes, oils, water, energy, etc.
Work Group Instructions

- Select one person from your group to take notes and report back
- Focus on the resource category that was assigned to your group
- For any synergies already identified, discuss potential benefits, barriers, and solutions
- Discuss any additional ideas for synergies
- Avoid excessive detail

60 minute session
Eco-Flow™ Graphical Interface
Synergies Analyzed

- Water treatment alum & lime material
- Glycerin bottoms for fuel or raw material
- Transportation backhauling
- Paint, welding, baghouse dust, iron fines and incinerator ash for bricks
- Wood waste for compost/fuel
- Cracker bottoms for fuel
- Air filter recycling
Synergy Status

• Implementation
  • Lime Slurry – Caustic Replacement
  • Filter Cake – Compost
  • Food Waste – Energy & Compost

• Developing
  • Foundry sand reuse
  • Manganese & Cosmetics for brick colorant
  • Aluminum oxide reuse
  • Paint sludge for anaerobic digestion
  • Bulk bag reuse
  • Biosolids/sludge for anaerobic digestion
BPS Project Metrics

Direct Metrics
- Landfill diversion
- Offset virgin material
- Hazardous waste reduced
- Water conserved
- GHG Emissions (scope 1 & 2)
- New sales revenue
- Cost savings
- Energy conserved

Indirect Metrics
- Job creation/retention
- Private capital investment
- Return on dollar invested

Life-Cycle Metrics
- Water, energy, GHG
- Air emissions
- Land use
- P and N discharges
- Mineral & fossil fuel consumption
## Ohio BPS Benefit Estimates—2011

<table>
<thead>
<tr>
<th>BPS Metrics</th>
<th>Annual Savings</th>
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<tbody>
<tr>
<td>Total Cost Savings</td>
<td>$3,559,601</td>
</tr>
<tr>
<td>Waste to Landfill Avoided (tons)</td>
<td>30,252</td>
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<tr>
<td>Direct CO₂ Emissions (MT eCO₂)</td>
<td>1,211</td>
</tr>
<tr>
<td>Life cycle CO₂ Emissions (MT eCO₂)</td>
<td>663,571</td>
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<tr>
<td>Life Cycle Water Use Reduction (1000 gal)</td>
<td>31,400</td>
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<tr>
<td>Life Cycle Energy Use (1000 GJ)</td>
<td>96,923</td>
</tr>
<tr>
<td>Life Cycle Nonrenewable Resources (tons)</td>
<td>737,391</td>
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</tbody>
</table>
The Belden Brick Company
“Putting By-Product Synergies to Work for Ohio”

Presented at Ohio BPS Network Meeting
Bradley H. Belden
February 10, 2011
• Belden Brick joined as a charter member of the Ohio BPS network in 2010 with the purpose of locating local materials that could act as environmentally friendly raw material components in lieu of virgin materials.

• Several candidate materials have been identified and tested.

• The obstacle to synergy is that the byproduct materials need to be sized to specification before incorporation into the brick.
You’ve heard of the Terminator
Meet “The Pulverizer”

- The Hercules Airswept Mill system allows grinding, classifying and drying to take place simultaneously.
- Pulverized material from the grinding zone is carried by the air stream to a separator mounted directly above the mill.
- Product-size material is carried to a collection cyclone while oversize particles are rejected and recycled for further grinding.
- The conveying air stream can be heated to flash dry the material being ground.
Honda Transmission
Russells Point

Blast Glass

Mill scale
Swarf
Filter Cake

Belden Brick, Sugarcreek

Eveready Battery, Marietta

Timken Company
Canton

MnO₂

Slag
Benefits

• Create and retain jobs for Ohio manufacturing and help restore Ohio’s sustainability
• Reduce the landfilling of certain ODNR targeted materials such as glass and organics for Belden partners of Honda and Timken.
• Reduce other materials going to Ohio landfills including mill scale and swarf from Timken.
• Allow Belden to produce a “green” brick containing 5 percent or more post-industrial material with a goal of competing vigorously in the LEED era of green building and achieving a competitive advantage.
• Improve many qualities of the brick including increased durability, reduced permeability, and creation of many unique colorizations of bricks.
• Saving energy in the brick-making process.
• Lengthening the life of Belden’s clay mines improving sustainability of a local resource.
• Helping the Stark-Tuscarawas-Wayne and other solid waste districts meet goals for industrial waste recycling as well as helping the state achieve its goals of the recently adopted Ohio Solid Waste Management Plan.
• Demonstrating the benefits of ODNR’s investment in By-Product Synergy as a strategy to increase recycling in the state of Ohio.
Contacts

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THANK YOU!

QUESTIONS?