Towards Byproduct Synergy

Results of an Exploratory Meeting on Waste to Profit (W2P) Opportunities

April 12, 2007

Hosted by
The Scotts Miracle-Gro Company

Organized by
The Center for Resilience
at The Ohio State University
and the
Solid Waste Authority of Central Ohio
Acknowledgments

This report documents the results of a symposium meeting held on April 12, 2007, at the Scotts Miracle-Gro Company headquarters, in Marysville Ohio. The organizers are indebted to Rich Martinez, Bill Lechner, and Megan Moses of Scotts Miracle-Gro for their assistance in making this event possible, including provision of meeting facilities at the Berger Learning Center, as well as food and refreshments.

The meeting was launched by an informative series of presentations that illustrated the Waste to Profit (W2P) concept, given by Rich Martinez of Scotts Miracle-Gro, Tom Webb of American Electric Power, Mike Long of the Solid Waste Authority of Central Ohio (SWACO), and Andrew Mangan, of the U.S. Business Council for Sustainable Development (USBCSD). Electronic copies of the presentations and other meeting documentation, including this report, may be found at www.resilience.osu.edu/W2P.html.

The motivation for this meeting came from the Partnership for Industrial Ecology in Central Ohio (PIECO), an organization formed by SWACO and the Center for Resilience to encourage a systems approach toward managing waste flows. PIECO recently received a grant from the U.S. Environmental Protection Agency’s Collaborative Network for Sustainability. More information about PIECO is at http://swaco.org/PIECO.aspx.

The planning and facilitation of the W2P meeting, as well as the development of this report, were carried out by Joseph Fiksel, Co-Director of the Center for Resilience (www.resilience.osu.edu), with the assistance of a number of student volunteers from the Industrial Systems Engineering program at The Ohio State University: Rachael Pasini, Kieran Sikdar, Heather Fair, and Cullen Naumoff.

The organizers are grateful for the enthusiastic participation of invited representatives from the following companies, agencies, and non-profit groups:

- Alcoa
- American Electric Power
- Anheuser-Busch
- Ashland
- Battelle Memorial Institute
- Calderon-Grant
- Capital University
- Cardinal Health
- Centennial Associates
- City of Columbus
- Clean Water Limited
- Columbus Green Building Forum
- Design Group
- Dow Chemical
- Environmental Enterprises
- General Motors
- Grossman Group
- Headwaters Resources
- Honda of America Manufacturing
- Keep Franklin County Beautiful
- Kurtz Brothers
- Limited Brands
- Marathon Petroleum
- Millennium Institute
- Ohio BioProducts Innovation Center
- Ohio Environmental Protection Agency
- Ohio State Coal Combustion Products Extension
- Owens Corning
- Plastic Suppliers
- Scotts Miracle-Gro
- Shepherd Advisors
- The Halliday Group
- The Redstone Group
- U.S. Environmental Protection Agency
- Wal-Mart
- Warren Wolf Services
- Worthington Industries
- Zilkha Biomass Energy
Introduction: Waste to Profit

The basic premise underlying this initiative is that waste can be converted to profit. Indeed, the term “waste” is a misnomer, since waste materials are actually residual byproducts of industrial or consumer processes that can potentially be used as feedstocks for other processes. These materials only become wastes when they are wasted; for example, disposed in a landfill or released into the environment.

The concept of “industrial ecology” suggests a shift of industrial systems from a linear model to a closed-loop model that resembles the cyclical flows of natural ecosystems. In nature, there is no waste – one creature’s wastes become another creature’s nutrients. Similarly, rethinking conventional product or process technologies can lead to the discovery of innovative pathways for transformation of wastes into valuable resources. Such practices are not only economically attractive, but they also contribute to environmental sustainability by diverting wastes from landfills and reducing the demand for energy-intensive production of virgin materials.

The state of Ohio generates approximately 20 million tons of waste per year, and imports another 3 million tons per year from neighboring states. These are potential resources for industrial consumption. However, while the logic of W2P is compelling, it often requires the development of new business relationships and enabling technologies. Among the many barriers that exist is simply the inertia of “business as usual”.

The purpose of the April 12, 2007 meeting at Scotts Miracle-Gro was to discuss how companies, agencies, and other interested parties can collaborate to encourage large-scale adoption of W2P practices in Ohio and the surrounding region. The following were the specific objectives of the meeting:

- Explore the potential business benefits of W2P
- Learn about current practices from leading companies
- Discuss how collaborative networks can be established in the Ohio region
- Develop recommendations for follow-up actions

The meeting consisted of a series of presentations that provided examples and lessons learned from leading practitioners, followed by an open discussion session. The following section provides a brief summary of the full presentations, which may be found at www.resilience.osu.edu/W2P.html.

Lessons from Leading Practitioners

Rich Martinez
Chief Environmental Officer
The Scotts Miracle-Gro Company

As the world leader in lawn and garden consumables, Scotts is an active practitioner of waste recycling and recovery. The economics and availability of waste materials tend to be more variable than conventional raw materials, and they may require more intensive testing and processing due to higher levels of chemical, physical, and biological contaminants. Nevertheless, Scotts diverts over 5 million cubic yards per year of wastes from landfill for use in growing media, including soil, yard wastes, rice hulls, and a lot of manure. In order to assure a reliable and economically viable supply of waste-based products, suppliers, users and other stakeholders should collaboratively invest in identifying waste recovery pathways, building a sustainable infrastructure, and ensuring uniform raw material quality.
AEP has 70% of its generating capacity in coal-fired power plants, although wind and natural gas capacity have grown. As the nation’s largest coal user, AEP produces about 8 million tons of coal combustion products (CCPs) per year, including fly ash, bottom ash, scrubber material, boiler slag. About 44% of these CCPs are currently being utilized as resources for concrete, road base asphalt, ice control, structural fill, paint manufacturing, glass manufacturing, roofing and wallboard products, blasting, and other applications. CCP utilization generates approximately $18 million per year in revenues and avoided costs. In addition, AEP’s sustainability-oriented programs include a variety of waste-to-profit practices, ranging from recovery and disposition of surplus assets to development of new technologies for carbon dioxide capture and re-use. For example, AEP earns about $9 million per year in revenue from scrap metal sales.

Mike Long
Executive Director
Solid Waste Authority of Central Ohio (SWACO)

SWACO operates one of the largest public landfills in the nation, handling close to 2 million tons of solid waste annually, about 20% industrial and 80% residential/commercial. For years, SWACO has been trying to reduce reliance on landfills by encouraging waste recycling and re-use. Its mission is changing to emphasize waste elimination as a means to protect the environment, produce energy, and increase economic development and employment. SWACO has set a new “stretch goal” of Zero Waste, which requires new thinking and new tools. Accordingly, SWACO is working with many partners to establish a system of eco-industrial parks that will deploy innovative technologies to transform waste into valuable products such as metals, plastics, and biofuels. SWACO has joined with the OSU Center for Resilience to form PIECO, and is using the Eco-Flow™ model, developed at OSU, to select waste-to-profit pathways that maximize overall profitability and sustainability.

Andrew Mangan
Executive Director
U.S. Business Council for Sustainable Development (USBCSD)

The USBCSD, an affiliate of the World Business Council for Sustainable Development, is a non-profit consortium of U.S. companies that are working together to integrate sustainable development into their business strategies and operations. The organization is based in Texas, where it originated in the mid-1990s from the discovery of a synergy between the waste byproducts of a steel mill and the requirements of an adjacent cement plant. The concept of “byproduct synergy” has matured into a nationwide program spanning eight regions across North America, and is being exported to other countries, including China.

In the United Kingdom, more than 6,000 companies have participated in the UK’s National Industrial Symbiosis Program, producing hundreds of millions of dollars in audited savings and new revenue, enormous energy and environmental resource conservation benefits, and hundreds of new jobs. Between June 2005 and June 2006, the program diverted more than 860,000 tons of waste from landfill sites, reduced carbon dioxide emissions by over one million tons, and reduced the use of industrial water by 260 million liters.

However, establishing byproduct synergy networks requires teamwork, relationship building, legal and contractual efforts, and overcoming traditional barriers such as reluctance to share information. The USBCSD has developed a well-defined, collaborative process for identifying and realizing byproduct synergy opportunities. This process has been successfully implemented in Chicago with funding assistance from local, state, and Federal agencies, and a similar approach could be pursued in Ohio. The USBCSD is prepared to work with PIECO and other groups to explore this opportunity further.
Highlights of Group Discussion

Following the above presentations, the symposium participants engaged in a facilitated group discussion to address the following questions:

- Are there attractive waste to profit opportunities in Ohio and the Midwest?
- Do we need a collaborative organization to coordinate these opportunities?
- What are the important barriers and incentives associated with this approach?
- Is there a case for the formation of a Regional Council for Sustainable Development?

All the responses were recorded and separated into two categories: **Insights** obtained, and **Actions** to be taken. The following is a summary of the discussion.

**Insights**

**Education and Communication**

- It is important to build good will among consumers and the public, which will help to justify funding.
- We can promote a spirit of community innovation that will lead to public benefits.
- The message needs to be personalized in order for consumers to become engaged (e.g., “organic” connotes safety, but “recyclable” has no personal value connotation).
- There is still a general stigma associated with the perception of waste as “garbage”, and we need to dispel that myth through effective media communication.
- Educational initiatives, such as contests at the K-12 level or team projects for college credit, can help to change public perceptions and build broader readiness.
- In communicating to the public, it is important to show hard numbers – quantifiable results of W2P actions.
- The idea of “waste equals food” may be too radical a concept for the public to “swallow”, so we should probably use a different metaphor.
- Resource efficiency enhances competitiveness, and this argument should carry political weight in Ohio.
- Profit should not be regarded as a dirty word by the environmental community; companies must strive to extract the highest possible value from the assets that they own.
- Byproduct synergy effectively reduces carbon emissions, so it may be beneficial to present it as an actionable approach for climate change mitigation, a commitment that many cities are adopting.
- Investors will look favorably upon companies that are responsive to changes in the marketplace; for example, many state and Federal agencies have adopted environmentally preferable procurement policies.

**Organizational Considerations**

- Companies may need to rethink the question of “what type of business am I in?”
- Corporate-level commitment is important; otherwise, business units or plants may be conservative.
- Many thought leaders in the business world are viewing social responsibility as a competitive strategy.
- Empowerment and recognition of employees can stimulate discovery of byproduct synergy opportunities.
- It is helpful to engage technical people early in the process of developing byproduct synergies.
- Some companies such as Wal-Mart designate Environmental Champions to lead these types of initiatives.
- We should consider whether and how to engage active participation from NGOs and government entities.
- Associations exist that encourage similar practices, such as the Investment Recovery Association.

**Economic Considerations**

- If we seek to displace products that are already on the market, competitors may erect barriers.
- Economics is critical, since consumers are unwilling to pay extra for “green” products such as PLA plastics.
- Byproduct material prices are volatile, and will continue to fluctuate as new applications emerge.
• One incentive for W2P would be changing the price signals associated with conventional raw materials.
• The long-term costs of maintaining landfills, including environmental impacts, are not well understood.
• To correctly value the benefits of byproduct synergy, companies should use life cycle cost analysis.
• The financial returns may not be as high as other investment opportunities, so they need to be supplemented with intangible returns such as stakeholder goodwill.

Implementation Recommendations
• Principles based on Dow Chemical’s experience with byproduct synergy: emphasize locality, diversity, closed loop, and gradual change.
• We should use technical analysis to identify the best possible opportunities for utilizing waste streams.
• Trash incineration for energy recovery may be viable, but utilities will need to develop and test technologies for co-firing with waste and fossil fuels.
• Each company should scrutinize their baseline quality requirements for products.
• Information should be disseminated about what types of wastes can be converted into useful byproducts.
• One established approach is to use third-party brokers that actually take possession of byproduct streams.
• Marketers can provide value beyond brokers, e.g., by conducting research to assure byproduct quality.
• As market forces begin to favor environmental products, the problem will arise of how to deal with the old, declining infrastructure.
• The existing regulatory structure may actually create barriers or disincentives. For example, the RCRA terminology should be changed to “co-products”, only treated materials as “waste” as a last resort.
• Systems-oriented tools such as OSU’s Eco-Flow™ model can help provide a big picture that links the available processes and technologies and evaluates economic benefits.

Actions
• Expand the discussion beyond Central Ohio to include a larger region.
• Benchmark with similar initiatives in other cities, such as Kansas City and Cleveland.
• Publicize how byproduct synergies have succeeded for industrial networks in other communities.
• Link the initiative to the broader arena of emerging energy policy at the state and Federal levels.
• Investigate the possible complementary role of the Web-based Ohio Materials Exchange Network.
• Anticipate legal barriers and develop a transparent and open approach to resolving them.
• Recruit a core group of participants to establish momentum for a byproduct synergy program.
• Identify sponsors that will provide the initial seed funding for this type of initiative.
• Organize a follow-up meeting to discuss practical mechanisms for moving forward.

Next Steps
A number of the organizations that participated in this symposium have agreed to move ahead with discussions regarding the establishment of a Byproduct Synergy initiative in the Ohio region. Based on the above insights and recommendations, an action plan and timeline will be developed and shared with all participants.

Questions about the content of this report and the progress of the initiative should be addressed to:
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