

IMPLEMENTING BY-PRODUCT SYNERGY™

Proposal Submitted to the U.S. Department of Energy

By the Center for Clean Air Policy

Introduction

By-Product Synergy™ (BPS) is defined as *“the synergy among diverse industries, agriculture, and communities resulting in profitable conversion of by-products and wastes to resources promoting sustainability.”* By using by-products as raw materials for other industries, rather than disposing of them as wastes, companies save energy, cut pollutants, reduce raw material consumption, lower landfill demand, gain potential new profit centers and may earn credit for greenhouse gas reductions.

The BPS process involves organizing a cross-section of 15 to 30 companies in a given region and working with their process and environmental engineers to discover ways in which wastes from one company may be converted into useful materials in another. Materials, transportation, heat and steam, or even manpower are potential synergy opportunities. Results are both immediate and long-term: one company's spent caustic, which used to end up in a landfill, becomes another company's raw material. Another company's lightly loaded trucks become a new partner's alternate transportation link, cutting energy consumption and reducing greenhouse gas emissions.

The BPS process opens the participants' minds to a new way of looking at so-called “wastes” and rewards them with new revenues and cost savings. In the initial stages of the project, company engineers and operations staff are exposed to their neighbors' production processes, raw material needs and waste streams. By collaborating with other industries, the participating companies discover ways of integrating that cut pollution and use fewer materials, while improving their own processes and bottom lines. They also come to realize that there are many other synergy opportunities in the community and naturally begin to invite other companies to join the process. In this way, the BPS process becomes a growing collaboration driven by and feeding on the participants themselves. This ultimately results in a more integrated community of SMEs, large companies, academic institutions, NGOs and government representatives.

Project Background

A By-Product Synergy™ (BPS) project will be launched in New Jersey in early June by Applied Sustainability, LLC and CH2MHill with support from individual companies and support from Bob Shinn, Commissioner of the New Jersey Department of Environmental Protection. The goal of the project is to identify by-product synergies and implement the most feasible projects. The BPS process consists of six phases:

Phase 1. Identify industry, regulatory, research, and academic partners. Industry in New Jersey and likely project partners will be identified in the first phase. Establishing good

relationships is one of the keys to success. At this stage, Applied Sustainability (AS) will recruit and train a regional project coordinator and technical advisor. AS will also seek out a project champion (typically a senior executive from the region). Relationships with regulatory, research, and academic partners also will be established to provide assistance in overcoming barriers to implementing synergies. Some by-product synergy project opportunities that may prove technically feasible and environmentally sound will additionally face regulatory barriers to implementation. By partnering with the New Jersey Department of Environmental Protection, the project team will have a unique opportunity to explore and potentially implement options to remove such regulatory barriers.

Phase 2. Conduct recruiting research. This phase identifies the initial pool of companies to recruit for the project. It also provides background on the companies and the region to make the recruiting effort more effective.

Phase 3. Recruit 20 to 30 companies to participate in the project. This phase includes further training of local partners followed by systematic recruiting efforts to attract the numbers and types of companies for the project, both SMEs and larger companies. The recruiting phase culminates in a project launch meeting and the signing of agreements with participating companies. In most cases, small companies will not have the funds required to participate in the by-product synergy project. However, many small companies, such as dry cleaners, have problematic waste-streams that could potentially be re-directed to offer environmental benefits to the local community. The project team is actively seeking funding to support their participation.

Phase 4. Collect and analyze data. Data collection and analysis are performed with the goal of establishing a uniform, accurate database of inputs, outputs and by-products. Synergy identification begins in this stage driven by facilitated brainstorming sessions and plant site visits.

Phase 5. Identify most promising synergies. The project partners will work together in determining ways to overcome barriers to implementing synergies. At the end of this implementation phase, the participants will have identified which synergies are economically viable to implement in the near future, and developed a plan for carrying them out. They will also identify those potential synergies that require further diagnostics and begin undertaking those activities.

Phase 6. Measure and monitor synergy benefits. Synergy benefits will be monitored and measured against a baseline established in the data-gathering phase, resulting in an annual report on environmental, economic and social benefits. A baseline will be established from which synergy benefits are measured and will monitor and report the benefits gained from implemented synergies. Finally, the project group will convene quarterly to further discuss synergy opportunities and measure results.

In each case where BPS projects have been undertaken, it has produced three key results: a more thorough understanding of eco-efficiency throughout participating companies; a

new network of large and small companies, academic institutions and government representatives focused on implementing by-product synergy projects long-term; and measurable by-product synergies judged commercially viable by the project participants.

Project Proposal

The Center for Clean Air Policy is seeking support from the U.S. Department of Energy to participate in Phase 4 and 5 of the project offering expertise on the potential emission reductions of pollutants such as carbon dioxide (CO₂), sulfur dioxide (SO₂), and nitrogen oxides (NO_x) associated with BPS implementation. The Center will develop estimates of emission reductions in Phase 6 of this New Jersey By-Product Synergy project. Phase 6 activities will entail the following four tasks:

Task 1. Identify sources of multiple pollutant emission reductions. For three to five by-product synergies identified for implementation, CCAP will identify the sources of potential reductions in emissions of CO₂, SO₂, and NO_x. For example, BPS projects may reduce transportation, improve energy efficiency, or change process inputs. Each of these actions will have an impact on the level and intensity of emissions associated with production. CCAP will work closely with industry participants to understand process changes associated with the BPS activity.

Task 2. Identify methods for estimating emissions. Once the sources of emission reductions have been identified, CCAP will explore existing protocols for estimating emission reductions. These protocols may include the newly developed World Resources Institute greenhouse gas protocols, the U.S. DOE protocols for the U.S. Initiative on Joint Implementation, and the U.S. DOE protocols for the 1605(b) Voluntary Climate Change Program, as well as individual company protocols (e.g., BP Amoco) where available and applicable. If such protocols have not yet been developed, CCAP will rely on the Intergovernmental Panel on Climate Change Guidelines and our experience and expertise in baseline development and emission estimation to develop methods for measuring emission reductions.

Task 3. Develop data collection mechanism. Estimating emission reductions requires establishing a baseline of emissions before the project is implemented as well as measuring emissions after the project has been implemented. CCAP will identify data needs and will work with the participating industries to develop the data collection tools, which will vary depending on the type of synergy and the industries involved. Where necessary, CCAP will draft confidentiality agreements with industry in order to obtain the necessary data to estimate emission reductions.

Task 4. Estimate emission reductions associated with BPS projects. CCAP will use the data collected from industry to estimate emission reductions of CO₂ and, where feasible, reductions of SO₂ and NO_x associated with the project.

With the leadership and support of Commissioner Shinn, industries will see regulatory benefits of participating in this project and in undertaking by-project synergies. It is

likely that BPS project activities will be integrated into New Jersey's Silver and Gold Track for Environmental Performance. Therefore, quantifying CO₂ emission reductions associated with the BPS projects will provide an additional incentive for industries to implement by-product synergies. The BPS project can potentially identify sustainable development opportunities that improve the environmental quality of communities while promoting economic development. Additionally, the project can improve relationships between local industry, academia, environmental regulators, and financial institutions.

Summary of Qualifications

The Center for Clean Air Policy is an internationally recognized non-governmental organization devoted to developing, promoting, and implementing innovative solutions to major environmental and energy problems that balance both environmental and economic interests. The Center is leading capacity building efforts in Latin American and Eastern European countries to assist government, industry, and other stakeholders in implementing energy efficiency and other measures to reduce multiple pollutant emissions. The Center has an excellent record of bringing together stakeholders from government and industry to facilitate dialogue on a range of environmental policy issues.

Applied Sustainability, LLC is a private company based in Austin, Texas. Applied Sustainability brings together diverse groups representing industry, regulators, technical experts and funding sources to systematically discover and develop synergies that transform a negative – waste- into a positive- a valuable raw material for a neighboring industry. Applied Sustainability has been successful in launching and implementing the by-product synergy strategy in Monterrey, Mexico, North Texas, US, and Alberta, Canada.

Project Budget and Scheduling

Project activities will begin in early June. CCAP is requesting funding in the amount of \$275,000. Approximately \$175,000 is required to conduct work in Phase 4, 5, and 6 of the project. This project budget will cover staffing costs, travel costs, communications, and supplies. The additional \$100,000 is sought to support the participation of small companies that can not afford to participate otherwise. These funds will be used for data collection, developing material balances, and identifying by-product synergies. Problematic waste streams associated with smaller companies, such as dry cleaners, could provide substantial financial and emission reduction benefits to other participating companies and the local community and improve the effectiveness of the BPS project.