Sustainability in the Pulp and Paper Manufacturing Industry

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“Although the information in this document has been funded wholly or in part by the United States Environmental Protection Agency under assistance agreement X9-97220910 to the New York State Pollution Prevention Institute of Rochester Institute of Technology, it has not gone through the Agency’s publications review process and, therefore, may not necessarily reflect the views of the Agency and no official endorsement should be, inferred.”
Overview

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2. My Background
4. A Snapshot of the NYS P&P Industry in Numbers
5. USEPA/NYSDEC Funded Work and Project
6. Example of Implemented Solutions
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About NYSP2I

Vision:

The vision of the NYSP2I is to foster the transformation and development of sustainable businesses and organizations in New York State in a collaborative program committed to making the State a leader in environmental stewardship.

Mission:

The mission of the Institute is to provide a high-impact, comprehensive and integrated program of technology research development and diffusion, outreach, training and education aimed at making New York State more sustainable for workers, the public, the environment and the economy through:

- reductions in toxic chemical use
- reductions in emissions to the environment and waste generation
- the efficient use of raw materials, energy and water
NYSP2I - Core Programs

Research & Development
- Led by Technical Advisory Committee (TAC)
- Four Partner Universities:
  - Clarkson
  - RIT
  - RPI
  - University at Buffalo
- Short & Long-term research

Direct Assistance
- Facilitate the use of P2 for solving environmental problems
  - Assessment & Implementation
  - LE2: Lean/Energy/Environment

Community Grants
- Provide financial & technical support to community organizations
  - Raise awareness & understanding of P2

Professional Training/Outreach
- Workshops & Training
  - Areas of interest for stakeholders
  - Specific Training
    - Environmental Health for New Parents
    - Green Cleaning
    - Life-Cycle Assessment

Sector Projects
- Projects that have the potential to impact NYS on a high level
  - Dry Cleaning
  - Farm to Fork
  - Healthcare
  - Green Buildings

Green Initiatives

Green Technology Accelerator Center
New York State Pollution Prevention Institute

Sustainable Supply Chain & Technology Program
New York State Pollution Prevention Institute

Funding Provided by NYS Department of Environmental Conservation
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My Background

Role at NYSP2I:
• Senior Engineer/Interim Business Manager
  ➢ Strategy development
  ➢ Project Management
  ➢ Proposal writing/development
  ➢ Host industry workshops/roundtables
  ➢ Data analysis
  ➢ Technology/industry research
  ➢ Publications and Conferences
  ➢ Day-to-day operations

Education:
• M.E. Mechanical Engineering
• M.E. Engineering Management
• MBA, Finance & Public Policy

Publications:
• Evolving Role of EHS Manager in Industrial Sustainability Programs — Case Studies Incorporating a Pollution Prevention Approach to Problem Solving. Journal of Environmental Sustainability – Williamson, Fister, Ramchandra.
Sustainability – The Concept

Brundtland Commission:

• Convened by United Nations in 1983

• Created to address growing concern about the accelerating deterioration of the human environment & natural resources and the consequences of that deterioration for economic & social development

• Recognized that environmental problems were global in nature & determined that it was the common interest of all nations to establish policies for sustainable development

“..development that meets the needs of the present without compromising the ability of future generations to meet their own needs”
Many terms for addressing social, environmental and economic initiatives:

- 3Ps—People, Planet, Profit
- Social, Economic, Environmental
- Corporate Social Responsibility
- Corporate Citizenship
- Sustainable Growth

Each company or organization should define how they address sustainability.
Sustainability – The Reality

- Is inter-disciplinary
- Is collaborative - needs cooperation and teamwork
- May need problem ‘re-framing’
- Requires a deep understanding of all stakeholders
- Is iterative
- Requires critical thinking
- May require multiple attempts
Sustainability Continuum

NYS Pulp & Paper Industry Statistics

In 2012†:

• **Number of Establishments: 255**
  (for context, the number of establishments in the NYS manufacturing industry in 2012 were 16,475; 1.54%)

• **Annual Employment: 14,602**
  (for context, the number of employees in NYS across all manufacturing in 2012 were 426,621; 3.42%)

• **Total Value of Shipments: $6,115,366,000**
  (for context, the value of shipments in NYS across all manufacturing in 2012 was $147,879,931,000; 4.13%)

Source:
† - 2012 Economic Census; [http://factfinder2.census.gov](http://factfinder2.census.gov)
NYSP2I’s involvement: Why & How?

• Large concentration of P&P manufacturers in North Country Region

• Industry knowledge, access and strong working relationship between CITEC, Inc. (area RTDC/MEP) and P&P mfgs.

• Toxics Release Inventory (TRI) data showed reporting of:
  – Polycyclic Aromatic Compounds
  – Benzo(g,h,i)perylene
  – Methanol
  – Dioxin and Dioxin-like Compounds
  – Nitrate Compounds

NYSP2I’s involvement: Why & How?

- Initial survey conducted of P&P mfgs. in partnership with CITEC in 2010

- Summary of findings:
  - Electricity consumption, natural gas consumption and waste sludge highlighted as top three operational concerns
  
  - Core environmental concerns (in the words of respondents):
    - Water usage or reuse. Air quality. Better use of sludge
    - Disposing of solid waste (sludge)
    - Reduction of energy consumption. Reduction of permit/water usage fees
    - Improving water and air emissions, more recycling
    - Energy consumption; Non-forming polymer; sludge disposal; Front end water clarification; Effluent clarification (TSS, BOD. Reduce solids, Reduce water temperature)
Outcomes of Industry Interaction

• Monthly conference calls between NYSP2I, CITEC and Clarkson University
  – Research project: Sludge-to-Oil

• Direct Assistance Projects with 2 companies

• Submission to USEPA’s Great Lakes Restoration Initiative (GLRI) RFA in 2011
USEPA – Great Lakes Restoration Initiative

• The Great Lakes Restoration Initiative was launched in 2010 to accelerate efforts to protect and restore the largest system of fresh surface water in the world — the Great Lakes

• Federal agencies use GLRI resources to strategically target the biggest threats to the Great Lakes ecosystem and to accelerate progress toward long term goals.

• FY2010 – FY2014 Action Plan Focus Areas:
  – Toxic Substances and Areas of Concern, including pollution prevention and cleanup of the most polluted areas in the Great Lakes
  – Invasive Species, including efforts to institute a “zero tolerance policy” toward new invasions, including the establishment of self-sustaining populations of invasive species, such as Asian Carp
  – Nearshore Health and Nonpoint Source Pollution, including a targeted geographic focus on high priority watersheds and reducing polluted runoff from urban, suburban and, agricultural sources
  – Habitat and Wildlife Protection and Restoration, including bringing wetlands and other habitat back to life, and the first-ever comprehensive assessment of the entire 530,000 acres of Great Lakes coastal wetlands for the purpose of strategically targeting restoration and protection efforts in a science-based manner
  – Accountability, Education, Monitoring, Evaluation, Communication and Partnerships, including the implementation of goal- and results-based accountability measures, learning initiatives, outreach and strategic partnerships

Source: http://glri.us/index.html
USEPA – Great Lakes Restoration Initiative

• **Project Title:** Toxics Reduction and Sustainability in Paper Manufacturing

• **Period of Performance:** August 1, 2011 – July 31, 2015

• **Total Funding:** $263,246
  (USEPA=$200,000; NYSP2I Cost-share=$63,246)

• **Two Phases:**
  1. **Direct Client Assistance (Lean, Energy and Environment, aka LE2)**
     a. Company Screening and Selection
     b. LE2 Assessments at four manufacturers (4)
     c. Technology Verification/Optimization Study (1)
     d. Implementations (2)
     e. Metrics Tracking
  2. **Technology Transfer (NYSP2I Partners, MnTAP, ISTC, FL-LOWPA)**
     a. Case Studies for LE2 Assessments (4)
     b. Publication (1)
     c. Public Presentation (1)
USEPA – Great Lakes Restoration Initiative

To date:
• Four assessments completed
• One feasibility study completed
• Two implementations completed

Common themes/opportunities:
• Water Use Reduction
• Wastewater recovery and reuse
• Waste Sludge reduction/reuse
• Energy Use Reduction
• NPEs in surfactants
Methods:

- Facility walkthrough
- Process Mapping
- On site data collection
- Project team discussions
- Research
- Subject matter experts
Direct Assistance with NYSP2I: How it works

1. **Phase 1**
   - Initial Contact
   - Company Screening
   - Develop Scope of Work

2. **Phase 2**
   - Assessment
   - Recommendations
   - Feasibility Study *(Optional)*

3. **Phase 3**
   - Implementation
   - Case Study
   - Follow-up
Case Study: Omniafiltra, LLC

Initial Contact
- Visit to the company in 2012 coordinated by RTDC
- The company specializes in manufacturing specialty papers including a variety of filtration media and absorbent boards
- Discussion about how NYSP2I works, and what resources are available to support the company
- Project opportunity and funding from USEPA

Company Screening
- Data Intake Form completed
- Clarification and discussion on data provided
- The ~100,000 sq. ft. building operates 51 weeks of the year at three shifts per day, five days a week and has 30 employees
- Annual electricity usage is 6 million kWh, annual water usage estimated at 200 million gallons
- Broad areas of opportunity identified:
  - Water use reduction and recovery
  - Energy use reduction
  - Material substitution

Develop Scope of Work
**Case Study: Paper Manufacturing Company**

**Assessment**
- Develop a baseline of water usage using existing data and actual measurements using Ultrasonic Flow Meter.
- Identify water and energy reduction/recovery opportunities
- Research alternatives to Nonylphenol Ethoxylate (NPE) based surfactants

**Recommendations**
- Approximately **170,000 GPD (118 GPM)** of water could be recovered for reuse. Over a period of one year, this would equal **43,350,000 gallons**.
- About **75,000 kWh** of electricity could be saved annually by switching to a variable frequency drive and lower HP motor. Cost savings would be ~$10,000 per year.
- Drop-in replacement to one NPE based surfactant identified

**Feasibility Study**
- Not Applicable in this case

Image is from actual readings taken by NYSP2I at the company
**Case Study: Paper Manufacturing Company**

**Implementation**
- Implementation of a closed-loop wastewater recovery system leading to 15.6 million gallons water saved annually
- Involved installation of a self-cleaning filtration system combined with a variable frequency drive (VFD) pump and piping to recover wastewater.
- In the paper manufacturing industry, self-cleaning filtration systems are a proven technology and have been utilized for several years at paper mills.
- They are effective at recovering whitewater for reuse, thus reducing fresh water use, wastewater discharge, energy use (as a result of retained heat in recovered water) and associated costs.

**Case Study**
- In development

**Follow-up**
- In process
Going Forward

Agenda 2030:

By developing and implementing advanced manufacturing technologies, the U.S. pulp and paper industry could, by 2030:

- Double energy productivity – reduce 1,000 TBtu (1 Quad) per year
- Reduce water used per ton by 50 percent - reduce water discharge nationally by 480 billion gallons per year
- Develop new biobased products worth $25 billion in sales per year
- Create 80,000 new jobs related to manufacture of biobased products
- Protect 400,000 existing jobs by making 359 mills in 40 states more sustainable economically, environmentally, and socially
- Dramatically improve the life-cycle sustainability of its products

Going Forward

Agenda 2030:

Going Forward

• Continued engagement with P&P Industry
  – Companies
  – TAPPI
  – Agenda 2020/2030
  – Industry Sustainability (3Es, 3Ps)
  – New Technologies
  – Operational Efficiency/Process Improvement
  – R&D
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