



# 2009 Early Adopter Project Case Study Report

Twin Ports Testing, Inc.

IN COOPERATION WITH UW-SUPERIOR  
NORTHERN CENTER FOR COMMUNITY  
AND ECONOMIC DEVELOPMENT

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*This project represents the first formal U.S. training presented by The Natural Step Canada  
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# SUSTAINABLE TWIN PORTS 2009 EARLY ADOPTER PROJECT CASE STUDY REPORT

## Twin Ports Testing, Inc.

### Background

Founded in 1972, Twin Ports Testing, Inc. (TPT) was initially set up to provide non-destructive testing services for pipeline welds and bends. Since then, TPT has expanded to a highly specialized employee base consisting of 35 full-time employees and a wide range of services which include:

- Non-Destructive Testing – a group of analysis techniques used in industry to evaluate the properties of a material, component or system without causing damage;
- Geotechnical Engineering and Construction Materials Testing – soil borings, site evaluation, foundation design, soil/aggregate/concrete testing;
- Environmental Services – phase I investigations (collection of historical property information) & phase II investigations (collection of physical samples), soil & groundwater investigations, environmental remediation;
- Industrial Hygiene – indoor air quality services, mold investigations, asbestos inspections, lead paint inspections;
- Chemistry Lab Services – solid & liquid fuel analysis, pellet fuel & feedstock analysis and coal analysis.

TPT has been testing biomass fuels since the late 1970's. Throughout this time, TPT has provided fuels analysis for numerous bio-energy initiatives including pellet mills and briquetting operations, as well as consulting with large-scale utilities such as industrial heating plants. TPT is well-known and respected in the North American bio-energy industry and is an active member of the Pellet Fuels Institute (PFI). Chris Wiberg, TPT's Chief Operations Officer, is currently the co-chair of the PFI Standards Committee which is working towards fuel standards for the industry. TPT has been instrumental in fostering the development of new carbon neutral fuels. On any given day, TPT receives numerous biomass samples to be tested for fuel characteristics. TPT serves clients from a local, national, and international arena. Because they believe in sustainable fuels, TPT is committed to help grow this renewable energy industry. They hold a wealth of information right here in the Twin Ports.

In addition to their biomass market, TPT has also served the local community by conducting free lead testing of toys and other household items. They work with the Douglas County Lead-Free Task Force whose primary goal is to educate the community on the effects and dangers of lead exposure.

### Beginnings

Assessing the current reality of the organization was the first step in the strategic action planning process. This "B" step of the "ABCD" process requires a thorough and honest look at every aspect of operations. The table below outlines key assets already in place that are in line with the principles of The Natural Step framework which can help TPT move toward a sustainable future.



*Tammy Hippchen and team work on TPT's baseline analysis*

## Baseline Analysis – Sustainable Practices

<p style="text-align: center;"><b><u>Sustainability Principle #1</u></b>  <i>...concentrations of substances extracted from the Earth's crust</i></p> <ul style="list-style-type: none"> <li>○ Biomass waste/residues available for fuel</li> <li>○ Recycling aluminum</li> <li>○ Helping to grow the renewable fuels industry through consulting</li> </ul>	<p style="text-align: center;"><b><u>Sustainability Principle #2</u></b>  <i>...concentrations of substances produced by society</i></p> <ul style="list-style-type: none"> <li>○ Recycling and/or proper disposal of chemicals used in testing procedures</li> </ul>
<p style="text-align: center;"><b><u>Sustainability Principle #3</u></b>  <i>...degradation of the Earth by physical means</i></p> <ul style="list-style-type: none"> <li>○ Recycling cardboard / paper</li> <li>○ Giving away biomass waste</li> </ul>	<p style="text-align: center;"><b><u>Sustainability Principle #4</u></b>  <i>...peoples' capacity to meet their own needs</i></p> <ul style="list-style-type: none"> <li>○ Family-friendly place to work (flexible schedule, good vacation time allowance, benefits)</li> </ul>

The second step in that process was to identify current practices that were in violation of the principles. The table below highlights opportunities for moving toward sustainability by identifying areas where more sustainable actions could be implemented.

## Baseline Analysis – Unsustainable Practices

<p style="text-align: center;"><b><u>Sustainability Principle #1</u></b>  <i>...concentrations of substances extracted from the Earth's crust</i></p> <ul style="list-style-type: none"> <li>○ Fossil fuel to heat and provide electricity</li> <li>○ High vehicle fuel consumption</li> <li>○ High fuel use for testing equipment</li> </ul>	<p style="text-align: center;"><b><u>Sustainability Principle #2</u></b>  <i>...concentrations of substances produced by society</i></p> <ul style="list-style-type: none"> <li>○ Disposal of used batteries (high quantity)</li> <li>○ Emissions (lab &amp; vehicles)</li> <li>○ High chemical usage</li> <li>○ Generating waste and waste disposal in daily operations</li> </ul>
<p style="text-align: center;"><b><u>Sustainability Principle #3</u></b>  <i>...degradation of the Earth by physical means</i></p> <ul style="list-style-type: none"> <li>○ High paper consumption/paper dependent operations (ex: clients are reluctant to accept electronic reports due to legal issues / contracts/signatures)</li> <li>○ Inconsistent recycling program</li> <li>○ Plans for expanding &amp; building on adjacent lot</li> </ul>	<p style="text-align: center;"><b><u>Sustainability Principle #4</u></b>  <i>...peoples' capacity to meet their own needs</i></p> <ul style="list-style-type: none"> <li>○ Seasonal work levels result in layoffs</li> </ul>

## A New Vision for a Sustainable Future

TPT chose to create a new, formal vision statement for their company which represented their overarching commitment to sustainability: **“Providing the expertise for innovative solutions that lead to a sustainable tomorrow.”**

With this clear vision in hand, the process of ‘backcasting’ through the lens of the principles of sustainability began.

A brainstormed list of action ideas were prioritized using The Natural Step’s three strategic questions:

- Does this action provide a flexible platform?
- Does it provide sufficient return on investment?, and
- Does it take us in the direction of our vision?



## Actions – Outcomes – Metrics

A quick brainstorm of action ideas generated a lengthy list of possibilities for TPT.

- Adaptable facility that can be modified
- Ability to invest capital into software systems to decrease paper
- Evaluate processes of vehicle dispatch/fuel usage
- Lights off/power off initiative
- Goal of getting off grid
- Implement consistent recycling program of business equipment and waste from daily operations
- Seek government grants for green building projects when we begin to expand or remodel our facility
- Improve scheduling/efficiency of dispatch vehicles
- Implement consistent paper/office recycling program
- Implement sustainability planning
- Implement green expansion planning
- Work toward a near-paperless option
- Support for green legislation
- Support green initiatives as a company
- Seek tax incentives from government for energy-efficiency upgrades
- Seek energy reduction incentives from WI Focus on Energy program

Using an aspect-oriented approach for identifying specific goals and action plans for implementation, the TPT team created a chart to assist in the strategic planning process. This sample chart shows the aspects of their company in columns and the vision, action example and intended outcome for each. The two action items in bold are explained in detail below.

	ENERGY	WASTE	PURCHASING	SERVICES	PROPERTY FACILITIES	EMPLOYEES
<b>VISION</b>	Use maximum amount of renewable resources and become more energy efficient	Biomass waste is used as resource and solid waste is minimal due to recycling	Use products with maximum post consumer content, use bio-neutral chemicals when possible	Use renewable resources whenever possible, along with efficient use of non-renewable fuel	Use sustainable practices for maintaining facilities and property, and when upgrades are needed	Provide a healthy working environment for all employees
<b>ACTION ITEM EXAMPLES</b>	<b>Install biomass burner to replace or piggyback with existing HVAC system</b>	Use biomass sample waste as an energy resource	Company policy on purchasing sustainable products	Implement a maintenance and dispatch program for vehicles	<b>Lighting retrofit in main facility</b> and replace Exit signs with LED signs	Use non-toxic chemicals for cleaning and building maintenance
<b>OUTCOME</b>	Reduction of our carbon footprint, production of our own electricity and heat	Reduction of fuel and waste disposal costs	Reduction of toxic chemicals = less emissions, closing the loop by reducing demand of virgin materials	Less fuel = reduced CO2 & GHG emissions  maintenance = < vehicle longevity	Reduced energy use, less maintenance, overall energy savings	More productivity from healthy employees, reduced health care costs
<b>BOTTOM LINE</b>	Eliminate paying for electricity & natural gas; reduction of CO2 emissions	Less waste goes into landfills, less costs to waste disposal	Consistent purchasing controls costs	Money saved by buying less fuel and vehicles	40% Energy Reduction; > CO2 emissions	Long term employee retention

Two initiatives were clearly the top priority for TPT: a lighting retrofit in their facility and installation of a micro-combined heat and power appliance (CHP) which would supply both heat and electricity. This economic analysis, based on electricity use, was created to demonstrate to the company’s owners how environmental and economic sustainability go hand-in-hand:

<b>Energy usage:</b>	<b>kWh/yr</b>	<b>CO<sub>2</sub> emissions/yr</b>
Before lighting retrofit:	128,342	88.7 metric tons/yr
After lighting retrofit:	77,006	53.2 metric tons/yr
<i>This lighting retrofit represents a decrease of 35.5 metric tons of CO<sub>2</sub> emissions per year.</i>		
Biomass Burner output:	118,260 - An excess of over 40,000 kWh/yr, which can be sold back to the grid	
Cost of Biomass Burner:	\$25,000	
Cost of Lighting Retrofit:	\$ 9,500	
The State of Wisconsin provided energy incentives in 2009 through its WI Focus on Energy program. Using this incentive, the actual cost to implement both actions would be reduced by \$11,500.		
Cost for lighting retrofit + Cost of biomass burner – State Energy Incentives = \$23,000		
Energy Savings per Year (Natural Gas & Electricity no longer being purchased): \$14,000		
This represents a return on investment of 20 months, and an on-going annual savings in energy expenses of \$14,000. This figure does not factor in the ever-increasing prices of natural gas and electricity over time, which elevates these savings significantly in the long-run. It also does not calculate the potential income generated by selling the excess electricity production.		

### Lessons Learned, Challenges Faced, Barriers Overcome

The challenges and barriers were many and very real as TPT worked through their year-long commitment to this training. Contributions of each team member were valuable, yet team members changed over time, creating the added challenges of re-training, shifting focus and uncertainty. Having most of their employees working on a billable-hours basis presented a barrier to committing the time necessary for training and process work. Attempts to include these employees were short-lived, as the current economy necessitated their focus be on revenue-generating projects. These barriers were largely overcome by the commitment of team member Tammy Hippchen, who took the lead when it came time to create an actionable plan for the company. A late addition to the team, Tammy made quick work of catching up and became the obvious sustainability champion to lead their team’s efforts.

Training presented the common challenges of time, money and commitment to change. Having the framework to maintain their focus on the vision was a vital piece in their continued progress toward sustainability. As upper-level decision makers were wary of large capital investments, careful research and strategic presentation of the long-term benefit was the key to success in gaining buy-in for implementation of this energy-saving action plan.

Training proved to be an investment in the company’s future and its employees. The management team seems to have embraced the systems perspective, bringing a more receptive, process-oriented approach to implementing change. Employee perspectives on new practices are now sought out, as the TPT management team is now fully supporting this transition toward sustainability. Educating employees and requesting their input on sustainable practices has helped the culture at TPT begin to shift to a team approach.

When asked about the overall benefits and challenges of training, the Early Adopter team shared these insights.

- “The biggest challenge we faced was fear of change; the common mentality that ‘it’s been this way for over 30 years and we’ve done fine’ was evident in our company.”
- “My eyes have really been opened to the fact that this is a systematic process. It’s not something that happens overnight and it’s not ‘going green’. I know I, and many others in the training, thought we would be given a



checklist of what to do; that we would complete this year of training and be done, ‘be sustainable’. It was truly eye-opening to understand that it’s a cyclical process that never really ends. It takes time and perseverance to continually look at how your actions are affecting, not only the company’s bottom-line, but the environment and the needs of people as well.”

- “This is about building our future, not about going green. Sustainability is so much more than that.”

### Next Steps

These are some current projects/goals on which the Early Adopter team is working:

- The lighting retrofit described in the action plan is planned to be implemented during 2010, leading to a 40% decrease in electricity use.
- A micro-combined heat and power appliance that is powered by biomass is being researched for installation in late 2010.
- The TPT management team is discussing how to more fully incorporate the principles of sustainability into their business, to set an industry-wide example of ‘walking the talk’.
- Tammy Hippchen is joining forces with Sustainable Twin Ports as one of its newest committee members, hoping to stay closely involved with this important work.



*Twin Ports Testing Early Adopter team members (l to r):  
Chris Wiberg and Tammy Hippchen*

As a leader in the biomass testing industry, TPT understands the potential for growth of the renewable fuels industry. That knowledge has motivated them to make an internal commitment to bring the entire business in line with the principles of environmental, economic and social sustainability. It is not a path free of challenges or roadblocks, but with a clear destination now solidly determined, this journey toward sustainability is one they will continue.

Attachment A

These posters were created for the Early Adopter Project Public Showcase, to share their story with the Twin Ports community.



Our Vision Statement: **Providing the expertise for innovative solutions that lead to a sustainable tomorrow.**



### OUR CURRENT REALITY

- Dependent on fossil fuels for heat and fuel
- Paper dependent due to industry demands for reporting and office needs
- High chemical use
- Inconsistent recycling
- High vehicle fuel use due to industry demands for on-site work
- High energy use for testing equipment
- Current economic status

### OUR "QUICK WIN"

**How much electricity does it take to run a pop machine?**

During our energy audit, we discovered that we were spending between \$800-\$900 a year for electricity to run our current pop machine. Plus, only a handful of employees regularly bought pop from the machine.

**Our Solution**—remove the machine, and provide pop (stored in an existing refrigerator in the break room) for employees to purchase at a reduced rate. TPT purchases the pop, and resells it to employees at 50¢ per can. The difference between what TPT pays for the pop, and the price employees buy it for will be given back to employees.

**Bottom line:** \$800—\$900 yearly savings in electricity, and reduced cost for employees to purchase a can of pop

### WHAT IS OUR BUSINESS?

- **Non-Destructive Testing**  
A group of analysis techniques used in industry to evaluate the properties of a material, component or system without causing damage
- **Geotechnical Engineering/Construction Materials Testing**  
Soil Borings  
Site Evaluation  
Foundation Design  
Soil / Aggregate / Concrete Testing
- **Environmental Services**  
Phase I & Phase II Investigations  
Soil & Groundwater Investigations  
Environmental Remediations
- **Industrial Hygiene**  
Indoor Air Quality Services  
Mold Investigations  
Asbestos Inspections  
Lead Paint Inspections
- **Chemistry Lab Services**  
Solid & Liquid Fuel Analysis  
Pellet Fuel & Feedstock Analysis  
Coal Analysis

### ACTIONS TOWARD SUSTAINABILITY

- Energy Star Rating for tracking our progress as changes to our facility are made
- Adding a compost system for food waste
- Supporting a consistent recycling program
- Implementing a synthetic fuel program for all vehicles
- Monitoring vehicle fuel use and maintenance
- Converting to electronic forms / reports to reduce paper dependency
- Controlling energy thru programmable thermostats
- Switching lights off / power off
- Educating employees and customers on sustainable practices

Sustainable Twin Ports 2009 Early Adopter Project Case Study Report



Watch their video at [www.youtube.com/sustainabletwinports](http://www.youtube.com/sustainabletwinports)

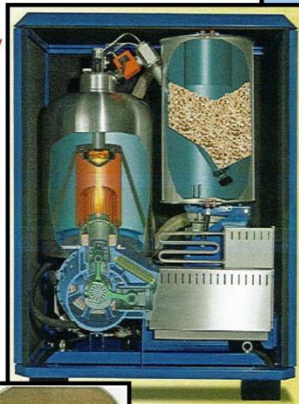
# EARLY ADOPTER VISION FOR SUSTAINABILITY

	ENERGY	WASTE	PURCHASING	SERVICES	PROPERTY/FACILITIES	EMPLOYEES
<b>VISION</b>	Use maximum amount of renewable resources and become more energy efficient	Biomass waste is used as resource, solid waste is minimal due to recycling programs	Use products with the maximum post consumer content, use bio-neutral chemicals when possible	Use renewable resources whenever possible, along with efficient use of non-renewable fuel	Use sustainable practices for maintaining facilities and property, and when upgrades are needed	Provide a healthy working environment for all employees
<b>ACTION ITEM EXAMPLES</b>	<b>Install biomass burner to replace or piggyback with existing HVAC system</b>	Use biomass sample waste as an energy resource	Company policy on purchasing sustainable products	Implement a maintenance and dispatch program for vehicles	<b>Lighting retrofit for our main building</b> and replacement of Exit signs with LED Exit signs	Use non-toxic chemicals for cleaning and building maintenance
<b>OUTCOME</b>	Reduction of our carbon footprint, production of our own electricity and heat	Reduction of fuel and waste disposal costs	Reduction of toxic chemicals used means less emissions, closing the loop by reducing demand of virgin materials	Less fuel used means reduced carbon and greenhouse gas emissions; maintenance results in increased vehicle longevity	Reduced energy use, less maintenance, overall energy savings	More productivity from healthy employees, reduced health care costs
<b>BOTTOM LINE</b>	Eliminating the expense of paying for electricity and natural gas	Less waste goes into landfills, less costs to dispose of waste	Consistent purchasing helps to control supply costs	Money saved by buying less fuel and vehicles	<b>40% Energy Reduction</b>	Long term employee retention

## The "Big Win" Action Items Being Pursued

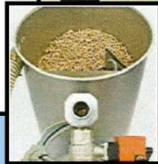
### BIOMASS BURNER

- Micro combined heat and power plant
- Stirling engine (vs combustion engine) results in overall efficiency of nearly 100%
- Burns wood pellets, which are carbon neutral
- Input—15kWh (energy of the pellets)
- Output—13.5 kWh (energy used for hot water, heat and electricity)
- 10.5 kWh = 35,827 BTU of heat



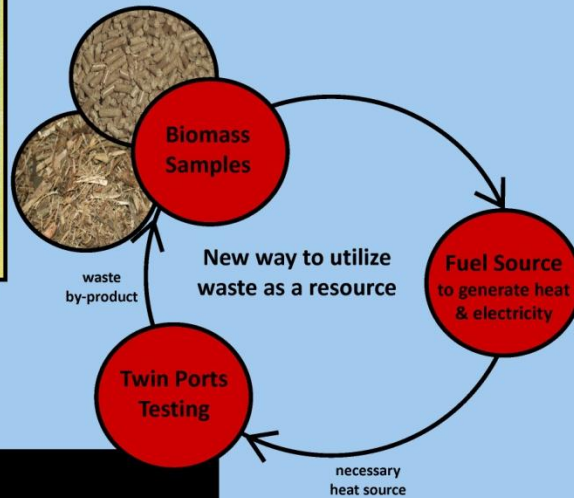
#### What does this mean for Twin Ports Testing?

- A Biomass Burner would generate:
- 100% of our heat with no or minimal fuel costs
  - 100% of our Electricity



### LIGHTING RETROFIT

- Replace existing Exit signs with LED Exit signs = \$56/yr in energy savings
- Replace 8 foot T12 fluorescent light bulbs with T8's = 40% energy reduction



### THE BOTTOM LINE

<b>Energy usage:</b>	
Current kWh usage per year:	128,342
New usage after lighting retrofit:	77,006
Energy produced by Biomass Burner per year: 118,260 (based on running 24/7)	
Cost of Biomass Burner:	\$25,000 (\$15,000*)
Cost of Lighting Retrofit:	\$ 9,500 (\$ 8,000*)
<b>Energy (Natural Gas &amp; Electricity) Savings per Year:</b>	<b>\$14,000</b>

Cost for lighting retrofit plus  
Cost of biomass burner minus  
incentives from  
WI Focus On Energy equals  
**ROI - 20 months**

\*Actual cost based on WI Focus on Energy Incentives

