

**Tusco Display  
Tuscarawas County, Ohio**

**Summary**

Tusco Display’s facilities in Tuscarawas County, Ohio, are an impressive example of how investing in the energy efficiency of buildings can boost profits in a competitive market. The custom fabrication company has used energy efficiency as a strategy to lower costs, improve productivity, and remain competitive in a challenging commodity market with both domestic and international competition. The company’s efforts have resulted in significant operational improvements that boost the value of the enterprise and its underlying real estate. Over the past 10 years, Tusco has realized a 41.4 percent energy use reduction (7,272 MMBtu), equivalent to annual savings of \$56,222 and present value of \$438,789. Upgrades have been made throughout Tusco’s 108,000 square feet of manufacturing space, encompassing the building envelope, lighting, and HVAC



Figure 1: **Tusco Display’s primary manufacturing facility in Gadenhnutten, Ohio is comprised of adjoining buildings constructed between 1946 to 1988, totaling 93,000 square feet. A 400-foot-deep well for a geothermal heat pump sits at the base of the flagpole.**

**Lessons Learned**

- By improving its building, Tusco also improved its competitive position in a tough international market. Energy efficiency in the industrial sector improves bottom line company value, both at the asset and enterprise levels.
- Efficiency efforts in industrial buildings encompass both industrial processes and building performance improvements. These factors are often interdependent, as was the case with Tusco’s conversion to a powder-coating paint process which lowered HVAC costs.
- Lighting retrofits often offer strong payback opportunities and lead to a more-productive work environment.
- Re-roofing presents an opportunity to upgrade above-deck insulation in older buildings that may be un-insulated.
- When available, utility rebates can sometimes offset a significant fraction of retrofit costs and

**“Over the last 10 years, we have increased both production and per-person productivity while cutting energy usage by 41 percent. We will continue to invest in energy efficiency because it’s good stewardship with a long-term, positive impact on our bottom line, too.”**

*—Michael Lauber, CEO, Tusco Display*

systems, as well as the addition of a 15kW solar array. Savings have also been achieved by retiring older equipment and optimizing operations within the facility, which has allowed the company to work more efficiently even as its workforce and sales have grown.

on-bill repayment through a local utility can help finance the remaining investment.

## Background

With operations spanning two facilities in Tuscarawas County, Ohio, Tusco has continually operated at its primary facility in Gnadenuhthen, Ohio, since the company's founding in 1946. Numerous additions through 1988 increased the facility's size to 93,000 square feet, and in late 2011, the company expanded into an additional 15,000-square-foot facility in nearby New Philadelphia, Ohio.

Tusco's primary business involves the design and manufacture of custom merchandizers and displays for retailers such as Home Depot, Lowe's, and Target. The company produces both proprietary displays for consumer products sold within these stores and displays for the retailers themselves. In addition to brands and retailers, Tusco receives contract fabrication orders from third-parties and—owing to its speed and reliability—competing fabricators who need to outsource work to meet deadlines. Tusco's competitive advantage is the speed at which it completes orders. "Our brand clients use us to be responsive to retailers' needs," says CEO Michael Lauber. "The

average time on the floor for a job is 6.1 days. We may not be as cheap as overseas manufacturers, but we're within 500 miles from 75 percent of retail space in the U.S., which puts us one day away from delivery." Efficiency measures have directly enhanced Tusco's competitive edge, improving both the quality of the work environment and worker productivity.

Tusco's fabrication capabilities are wide-ranging, but usually involve transformation of raw materials into finished products, such as turning sheet and tube steel into a custom display rack. "We can cut, form, join, coat, and assemble," says Lauber, "and the energy costs of these vary." As a busy company focused on responding to client needs, Tusco tracks operational energy use, but lacks time to itemize savings for individual measures. When evaluating investments in equipment or building efficiency measures alike, the company is pragmatic: if presented with a new product that saves energy and offers a favorable payback, they will buy it and the savings will be comingled with other efforts. Savings from individual measures are not tracked, but the benefits have added up: energy savings, productivity, and throughput. As a result, efficiency measures are undertaken strategically as part of ongoing operations and replacement schedules. The enhanced work environment, which is better lit, more comfortable and efficient, has also improved worker productivity—allowing the company to move jobs off the floor with increased speed.

Much of the value of these improvements has accrued to the enterprise level and not the underlying asset. An appraisal conducted in 2009 estimated the value of the primary building and land to be only \$1,250,000—a fraction of its annual sales volume and also less value than the equipment it houses. The building's enhanced value-in-use, taking into account its enhanced operation by Tusco, is significantly higher—though this would not be captured in a traditional real estate appraisal. In this case, efficiency upgrades have enhanced the value of the company, as a

## Building Information

**Name:** Tusco Display

**Locations:** Gnadenuhthen, Ohio, and New Philadelphia, Ohio

**Building Type:** Industrial/Manufacturing

**Size:** Two one-story facilities (92,517 square feet and 15,000 square feet), for a total of 108,000 square feet

**Year Built:** Initially constructed in 1948 (in Gnadenuhthen) and 1980 (in New Philadelphia), with various improvements made from 1946 to 1988

result of its efficient operation within the space and improved competitiveness.

## Efficiency Improvements

At Tusco's primary 93,000-square-foot facility, the company has made continuous upgrades to improve building efficiency, including HVAC upgrades, lighting retrofits, an improved building envelope, and the installation of a 15kW solar PV array. These improvements were financed through a combination of operating funds and incentives, including utility rebates and on-bill financing. In addition to its building retrofit efforts, Tusco has also optimized company-wide energy efficiency by replacing older equipment and maximizing the effective use of its facility.

**HVAC Upgrades.** Tusco has undertaken significant HVAC retrofits since its acquisition by new ownership in 1979. In 1987, the company began a multi-year process of installing overhead radiant heaters to replace a large forced air heating system. When the forced air system was retired in the mid 1990s, Tusco saw immediate energy savings, a noticeable improvement in indoor comfort, and a reduction in employee sick days for staff in both the office and manufacturing spaces. In 2006, the company installed a new ground source geothermal heating and air conditioning unit to serve the office portion of the building, replacing an older conventional system with dual heating and cooling components. "It cost less than \$10,000 and made good financial sense, especially with incentives," says Tusco President and COO Gene Reiser.

**Building Envelope.** Tusco has also made ongoing investments in improving its building's thermal envelope, with particular attention paid to improving roof insulation. As the company grew over the years, it expanded its building 14 times, meaning that the roof sections are often replaced as each addition ages. This offers an opportunity to frequently improve insulation.

Each time a roof section needs to be replaced,

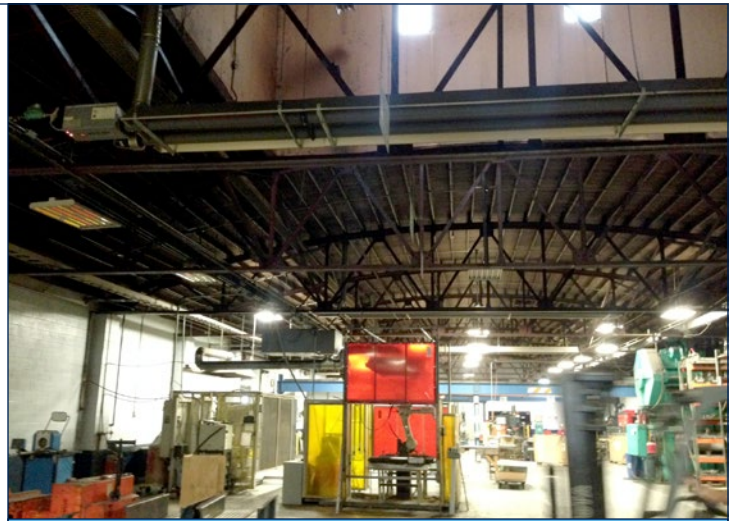


Figure 2: The vaulted wooden truss above this fabrication space is representative of many of the complex's interconnected buildings. Above-deck insulation has been added to the roof to reduce energy loss.



Figure 3: Tusco's 15,000-square-foot facility in New Philadelphia utilized on-bill finance to install T5 fixtures in 2013. Using company funds, an 18-foot-diameter overhead fan was also installed to better circulate indoor air.

it is now Tusco's standard practice to remove the old roof membrane and add new exterior above deck extruded polystyrene (XPS) insulation prior to the addition of the new membrane. Additionally, in 2006 the company replaced all exterior single-pane plant windows with insulated glass blocks.

**Lighting Retrofits.** Tusco has embraced generational lighting changes over the last 25 years. Beginning with standard florescent lights, the company upgraded to metal halide lamps in the early 1990s using a rebate from the local utility

company. These fixtures were succeeded by higher-efficiency T8 florescent bulbs in the mid-2000s. More recently, lamp replacements have been T5s and in some cases, LEDs—again aided by local utility rebates. The benefits of these upgrades are two-fold: reduced operating costs (including maintenance) and improved lighting quality, which leads to a better work environment. And Tusco executives don't anticipate stopping at LEDs. "Moving forward, I'd expect LEDs will be the lighting of choice until something better comes along," Lauber predicts.

At its New Philadelphia facility, Tusco replaced 25 older florescent fixtures with T5s in mid-2013. The retrofit was made possible with an incentive and on-bill repayment arrangement both from AEP Ohio, the local utility. The on-bill repayment structure offers the owner the advantage of financing the upgrade. Under this structure, AEP Ohio makes the improvements, and the user—in this case Tusco—pays back the costs of the retrofit over time via the utility bill.

With a total project cost of \$6,329 to replace older fluorescent bulbs with T5 fixtures in the New

## Energy Improvements

- **Lighting upgrades** including LEDs and T5 bulbs
- **HVAC retrofits** including a ground-source heat pump and new overhead heaters.
- **Building envelope improvements** including above deck roof insulation, glass block windows
- **15kW solar PV array**
- **New manufacturing equipment and processes**
- **Reorganization of facility** to more efficiently use space

Solar PV Generation

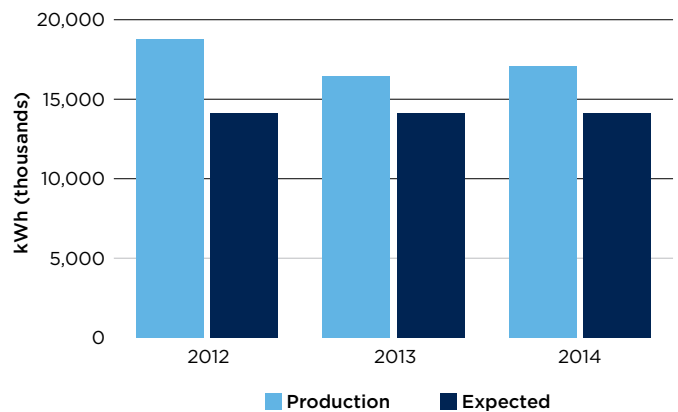


Figure 4: A 15kW solar array installed in late 2011 reduces power needs at Tusco's primary facility.

Philadelphia location, the upgrade was projected to yield \$1,912 (14,588 kWh) in annual savings, equivalent to a 58.8 percent reduction in overall lighting costs at this facility. In addition, Tusco received an incentive of \$4,071 and utilized on-bill finance through AEP Ohio to pay the cost of the upgrade over time. Alongside monthly savings of \$159.33, the monthly on-bill repayment was \$159.96, resulting in a net increase of \$0.63 on each month's bill. After one year of payments, the system was paid off and is now providing Tusco \$1,112 in savings annually. With a triple-net lease in place at this location (with Tusco as the tenant responsible for utility bills), the savings accrue to the company rather than to the building owner.

**Solar PV Array.** Back at its main facility, Tusco installed a 15kW solar array in 2011, which was financed with the assistance of a utility rebate. The system provides only a small percentage of the energy used by the facility, but the company may add additional panels in the future. Instantaneous performance data is available through an online platform. To date, the system has produced more power than was initially modelled when installed.

## Operational Improvements

Like many manufacturers, a large percentage of Tusco's energy costs are associated with the manufacturing process itself—particularly the



Figure 5: Inverters and a monitor allow power production to be monitored onsite as well as instantaneously online.

demands of energy-intensive equipment. As a result, equipment replacement has also reduced energy costs. One strong energy saver was the transition from a wet-enamel painting technique to a powder coating process. Because it was a fire hazard, wet-enamel painting required a large volume of ventilation and make-up air, which vented a significant amount of conditioned air to the building’s exterior. By switching to powder coating, the company was able to lower ventilation rates (air changes per hour), saving energy and allowing Tusco to retire an additional make-up air unit.

In addition to retiring older equipment, Tusco streamlined operations, making operational upgrades that improved utilization of the building itself while allowing the company to grow within the same amount of space. “When we got here in 1979, I thought we needed to add on,” said Lauber. “Over time, we realized we had a lot of machines that just sat there. People had this mentality—remember, we’re a farming community—to

put unused things out in the barn. We adopted a leaner perspective and threw things away, and that’s improved operations.”

These improvements have allowed the company to participate in a demand reduction program offered by AEP Ohio that provides a payment to local companies if they commit to reducing their power use during peak demand periods, which are usually in the summer. In addition to the demand response payment, this move also reduces the monthly demand charges that Tusco pays AEP, Lauber says, noting that “we pay for higher demand. If our energy use spikes, our bill is adversely affected.”

## Results

Tusco’s efforts to improve operational efficiency have resulted in significant energy savings—a cumulative 41.4 percent energy savings over the 10-year period from 2003–2013 at its primary facility. Electricity and gas use declined over that period by 26 percent and 47 percent, respectively. Using current prices, these energy savings translate into \$56,222 in annual savings compared to the 2003 baseline.

## Financial Performance and Property Value

The value of efficiency improvements to owner-occupants is well-documented. Free from the split-incentive, owners can make improvements and immediately realize the full value of energy savings.

In the case of Tusco’s primary facility, the appraised value of the property is small compared to the value of the company itself. Using the sales comparison approach, an appraisal commissioned in 2009 placed a value on the property—which comprises nearly 40 acres and 92,517 feet of

Figure 6: Property Performance Highlights

Property & Operational Improvements	2003	2013	Improvement (%)
Electricity	4,686 MMBtu	3,457 MMBtu	26%
Gas	12,898 MMBtu	6,847 MMBtu	47%
Total Energy Use	17,584 MMBtu	10,304 MMBtu	41%

industrial space—of \$1,335,000. The relatively low cost of the underlying real estate is part of the company’s business model, and contributes to Tusco’s ability to deliver value to clients.

The cost approach was not utilized as buildings in the region trade below their replacement cost. Similarly, the income approach was not used by the appraiser because the property does not produce income for a third-party owner or investor.

However, after the retrofits, an appraiser would be able to make adjustments to reflect the value of recent improvements, including lighting, HVAC, and solar energy generation. For example, the solar PV system, which was not installed at the time of the most-recent appraisal, currently adds \$10,700 to the facility, as calculated using the free online PV Value Tool developed by the Department of Energy’s Sandia National Laboratories. If a new appraisal was commissioned, it is likely that these upgrades would be assigned value via the selection of a different group of comparable properties—or the features would otherwise be used as the basis for adjusting the value.

The value of avoided energy costs is also significant in its own right, beyond impacts to property value. With \$56,222 in annual savings compared to the 2003 baseline,<sup>1</sup> the present value of 10



Figure 7: A metal forming machine in use at Tusco’s primary facility.

years of savings is 438,789, using a 5 percent discount rate.<sup>2</sup>

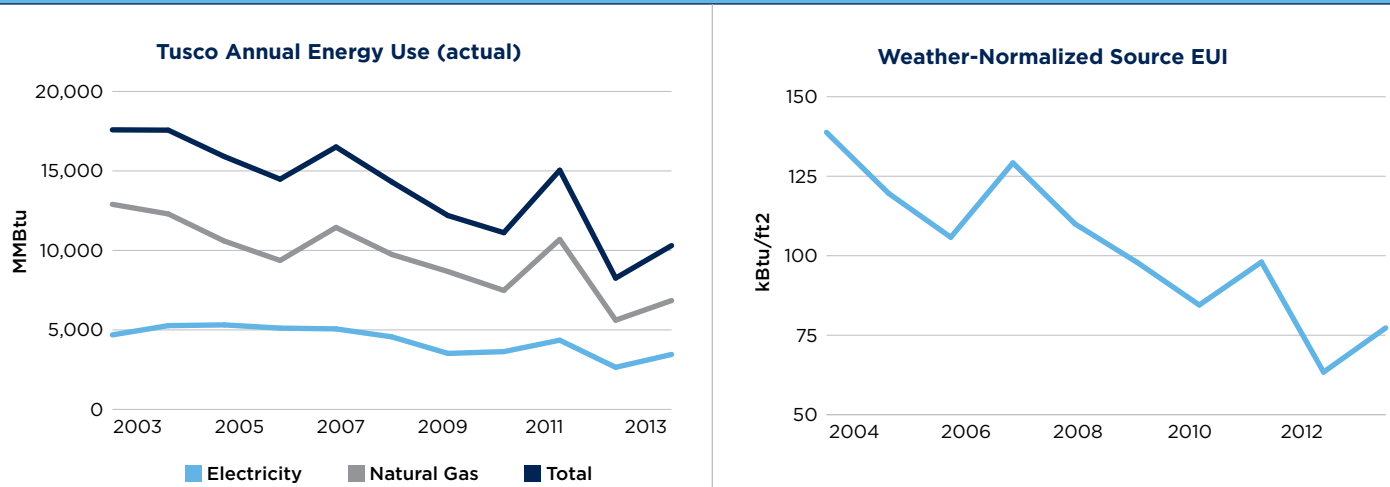
Tusco’s efficiency initiatives have added value at the enterprise level more than to the real estate itself. As an operational facility, the building’s “value in use”—in effect the value of the work going on in the building—is significant. Because of Tusco’s commitment to more-efficient operations in order to stay competitive, the value of

Year-to-year spikes in energy use (such as in 2011) correspond to years with relatively energy-intensive production.

2 Energy prices are escalated by 0.26 percent annually, based on the average increase tracked by the Energy Information Administration (EIA) statewide over the prior five year period.

1 Annual savings are presented as the difference between gas and electric usage in 2013 compared to 2003, calculated with 2013 energy prices. Savings are not production normalized.

Figure 8: Tusco Energy Use



<p>the business itself is enhanced on an operational basis as a result of its efforts. Worker productivity due to a better lit, more comfortable, and intuitive work environment has significant value. Utility savings also contribute to the company's bottom line, and allow it to improve net revenue. A valuation of the business itself would incorporate these factors, but is outside the purview of this study.</p> <p><b>Conclusion</b></p> <p>The retrofits to Tusco Displays' facilities demonstrate that building performance for industrial users can be significantly improved, while adding value to the enterprise and underlying real estate. Tusco's 41 percent reduction in energy use is an impressive accomplishment, all the more so considering it has grown to be a larger company during that time. Energy efficiency is part of doing good business, says Lauber, and has helped Tusco stay competitive. "Either you innovate to</p>	<div data-bbox="873 121 1062 159" data-label="Section-Header"> <h2>Key Results</h2> </div> <ul data-bbox="834 222 1438 730" style="list-style-type: none"> <li>■ Reduced energy use by 41.4 percent over 10 years through a combination of efficiency measures and operational improvements</li> <li>■ Annual savings of \$56,222 compared to the 2003 baseline, and present value of 10 years of savings is over \$438,789, using a 5 percent discount rate.</li> <li>■ Greatly improved work environment due to lighting retrofit and HVAC improvements</li> <li>■ Operational efficiencies that result in more efficient use of production space</li> </ul> <p data-bbox="834 821 1446 968">reduce cost and increase value, or you don't stay in business," he says. "For us in custom design and manufacture, we're all about innovation, and efficiency is part of that."</p>
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