Wood Products Energy Savings Guide

The Oregon wood products industry faces challenges of rising operating costs, rigorous product and safety standards, evolving environmental regulations and increasing competition domestically and abroad. Wood products manufacturers must continuously look for ways to control costs. Because wood products require significant energy input, energy efficiency offers an expanding opportunity to trim operating costs.

Energy Trust of Oregon is dedicated to helping you identify options for improving your plant's energy efficiency over time. We can help you identify the best opportunities for energy savings in your operation and help you understand where to focus your efforts. We've also compiled a list of "next steps" for you to review. Talk with your Program Delivery Contractor, PDC, about which of these steps could have the biggest impact on energy savings at your business.

According to the Oregon Forest Resources Institute, Oregon continues to lead the nation in the production of both softwood lumber and plywood panels. Oregon wood products companies also are at the forefront of creating and manufacturing engineered wood products. But energy costs take a bite out of the industry—impacting our economy and jobs.

Energy Trust of Oregon

COMPRESSED AIR

Could the energy efficiency of your compressed air system be improved? Adjusting compressed air system settings or changing compressed air utilization can pay back rapidly in reduced energy costs.

- ❑ Identify and reduce leaks in compressed air systems to decrease compressor load. Typical simple payback can be immediate.
- ❑ Reduce compressed air system pressure to the minimum that satisfies demand. Every 2 psi of pressure reduction reduces energy use 1 percent.
- ❑ Adjust regulators and valves to optimize flow and reduce pressure drop.
- ❑ Reduce or eliminate open blowing to decrease compressed air demand. Typical simple payback can be a few weeks to months.
- ❑ Eliminate inappropriate use of compressed air, such as for cleaning or cooling. Typical simple payback as short as several weeks.
- ❑ Identify processes, areas and times that allow one or more compressors to be turned off.
- ❑ Ensure that compressor intake air is as cool as possible to maximize compressor efficiency.
- ❑ Reduce or eliminate the run time of standby compressors that operate during nonproduction periods. Use a manual switch to provide timed use of the standby compressor for maintenance purposes.
- ❑ Increase receiver volume to reduce compressor cycling and improve demand response.

Could compressed air capital improvements lead to substantial energy savings? Several proven capital improvements are available that can trim operating costs and improve system performance.

- ❑ Add controls and valves to reduce nozzle airflow when the production process permits.
- ❑ Install Variable Frequency Drives, VFDs, on existing compressors that operate under varying loads. VFDs save energy by adjusting the compressor speed to fit system demand. Typical simple payback of one to six years.
- ❑ Invest in new compressors with VFD. Typical simple payback of one to four years.
- ❑ Use engineered nozzles for compressed air blowing. Upgrading standard nozzles to air-entraining nozzles reduces the volume of compressed air for most processes that require blown air. Typical simple payback can be less than one year.
- ❑ Reduce or eliminate use of oversized compressed air components by installing equipment appropriate for end-use requirements.
- ❑ Consider installing a blower when low-pressure, high-volume airflow would be equally effective.
- ❑ Upgrade compressed air piping. Piping strategies that are more free flowing provide better system performance and energy efficiency.
- ❑ Install zero-loss condensate drains. Typical simple payback can be less than one year.
- ❑ Replace inlet modulation control systems with those that load/unload compressor operation.
- ❑ Install a master control and monitoring system to sequence and maintain the optimum combination of compressors based on demand. Typical simple payback can be less than one year.
- ❑ Upgrade inefficient compressed air dryers to higher efficiency, cycling systems. Typical simple payback of one to four years.
- ❑ Use a small, dedicated compressor to provide compressed air for the dry-fire suppression system.
- ❑ Use a dedicated compressor to support the Thermal Oxidizer, allowing better optimization of pressure for the rest of the compressed air system.
- ❑ When possible, recover heat from the compressor for space heating.

LIGHTING

Could lighting upgrades yield significant energy savings? Upgrading old or inefficient lighting to high-efficiency technology cuts energy use and often provides a higher quality of light.

- ❑ Reduce the number of lamps in overlit areas.
- ❑ Use occupancy sensors to control lights in areas used intermittently. Occupancy sensors can reduce lighting energy use by as much as 90 percent in seldom-used areas.
- ❑ Upgrade High Intensity Discharge lighting systems to newer, more energy efficient technologies to save energy and improve visibility in critical production areas. The switch from Metal Halide or Sodium Vapor lamps to T5 or T8 lighting can reduce lighting energy use by up to 50 percent.
- ❑ Upgrade older linear fluorescent systems to energy-efficient T8 task lighting and T5 high-bay lighting.
- ❑ Consider installing LED lighting as an energy-efficient replacement for other less-efficient technologies. LEDs combine ultra-high efficiency with excellent performance and long life in an increasingly affordable package.
- ❑ Use photo sensors to turn off outdoor lighting when natural light is available. Typical simple payback as short as one year.

DUST AND MATERIAL COLLECTION

Could systems that remove particulates from the production area be improved? Removing dust and wood waste from production areas is energy intensive. Dust collection systems can be optimized to provide high-quality dust collection at less energy cost.

- ❏ Remove unnecessary material-handling fans and duct sections to improve dust collection efficacy and reduce energy use.
- ❏ Rebalance air-handling systems to improve duct flow, increase efficiency and reduce buildup of materials in ducts.
- ❏ Modulate fan speed with Variable Inlet Vanes (VIVs) or VFDs rather than outflow dampers to match airflow to the needs of the collection system. Typical simple payback as short as two years.
- ❏ When applicable, change sheaves to optimize fan speed for a given material-handling need, improving duct velocity while maintaining proper movement of particulates.
- ❏ Replace aging or inefficient two-stage dust-collection systems with energy-efficient systems to reduce cumulative fan power. Typical simple payback of three to six years.
- ❏ Add controls to turn off fan systems that serve equipment used intermittently. Typical simple payback as short as several months.
- ❏ Reclaim and return filtered bag house air to the production area during the heating season.
- ❏ Upgrade to active-cleaning technology in the bag house. Reverse air designs, or mechanical cleaning systems that use shakers to clean filter media, can be upgraded to demand-controlled pulse-jet systems.
- ❏ Use free-flowing cartridge filters in the bag house to reduce fan energy.
- ❏ When applicable, use efficient belts or bucket conveyers in place of inefficient fan conveyance.

BOILER

Could your boiler be operating more efficiently? Hot water and steam system efficiency can be improved through low-cost, operations and maintenance improvements, as well as capital upgrades. Routine maintenance is often all that is needed to reduce boiler system energy use.

- ❏ Eliminate inefficient use of steam, such as for process water heating.
- ❏ Identify and replace leaky steam traps. Typical simple payback of less than one year.
- ❏ Improve boiler and piping insulation to reduce heat loss.
- ❏ Add a condensing economizer to the stack to capture waste heat from the flue. Typical simple payback of two to five years.
- ❏ Install a heat exchanger to capture blow-down heat and use it to preheat feed water. Typical simple payback of two to five years.
- ❏ Optimize excess air to increase combustion efficiency. Typical simple payback as short as two weeks.
- ❏ Install sensors and controls to optimize excess air for all conditions.
- ❏ Upgrade the burner and controls for more efficient combustion. Typical simple payback as short as one year.
- ❏ Install VFDs on feed water pumps to reduce rpm.
- ❏ Consider using VFD controls to modulate the rpm of draft fans.
- ❏ Replace inefficient boilers with high-efficiency models.
- ❏ Replace a single, inefficient boiler with multiple, modular condensing boilers and use controls to bring boilers online according to load.
- ❏ When applicable, produce steam (and electricity) through cogeneration rather than using a natural gas-fired boiler. This improvement is most attractive when an abundance of biomass is available and the plant has a use for low-pressure steam.

DRY KILN

Do kilns offer an opportunity to reduce energy consumption? Several proven technologies can be applied to kiln dryers to increase efficiency, product quality and throughput.

- ❑ Fine-tune kiln fan controllers to reduce wasted thermal energy and overdrying. Typical simple payback can be less than one year.
- ❑ Consider retrofitting existing kilns with combination-venting and heat-exchange systems to control drying and recover exhausted heat.
- ❑ Add VFDs to existing kiln fans to match fan speed to the kiln charge during each stage of drying. This improvement also is likely to improve product quality. Typical simple payback of two to six years.
- ❑ Reduce infiltration and conductive losses from the kiln shell by sealing leaks and adding insulation.

OXIDIZERS

Are thermal oxidizer systems operating as efficiently as possible?

- ❑ Recover heat from the Regenerative Thermal Oxidizer, RTO, or Regenerative Catalytic Oxidizer, RCO, to preheat oxidizer input air or for use in other plant processes.
- ❑ Use structured media rather than random saddle media to reduce pressure drop and fan power.
- ❑ Add VIVs or VFDs to oxidizer fans to increase efficiency and minimize fan energy use.
- ❑ Consider upgrading from RTO to RCO, which is more energy efficient in some applications.

HYDRAULIC SYSTEMS

Is it time to upgrade hydraulic systems? Hydraulic systems can operate with significant energy waste. Improvements can reduce both energy use and production bottlenecks.

- ❑ Remove unnecessary hydraulic pumps from service. Typical simple payback can be immediate.
- ❑ Add controls to shut down specific press pumps when not needed for the press cycle.
- ❑ Install VFD controls on hydraulic pump motors to reduce rpm. Typical simple payback of one to five years.
- ❑ Consider replacing inefficient hydraulic actuators with linear mechanical actuators to help eliminate production bottlenecks.

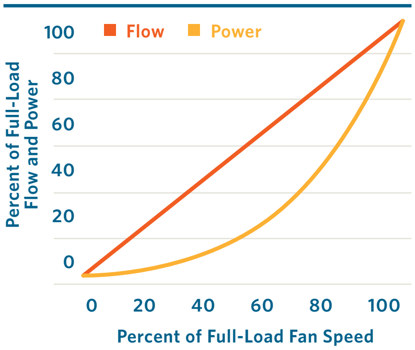
MOTORS, DRIVES AND CONTROLS

Are motors operating as efficiently as possible? Motors that operate inefficiently represent a continual missed opportunity to trim energy consumption.

- ❑ Install controllers on motors that constantly actuate pumps or fans when intermittent operation would suffice.
- ❑ Add VFDs and associated controls to adjust the rpm on motors that require speed modulation in response to process requirements. Typical simple payback of one to five years.
- ❑ Replace oversized motors with high-efficiency motors that are more appropriately sized for the application.
- ❑ Replace standard-efficiency motors that are at the end of their useful life with premium- efficiency motors.
- ❑ Rebuild worn motors to an efficiency similar to original specifications to boost efficiency and throughput.
- ❑ Replace existing pneumatic or hydraulic motors with high-efficiency electric motors.
- ❑ Replace V-belts with cogged belts whenever possible. Typical simple payback of less than one year.
- ❑ Consider correcting power factor when running equipment with a large reactive load.

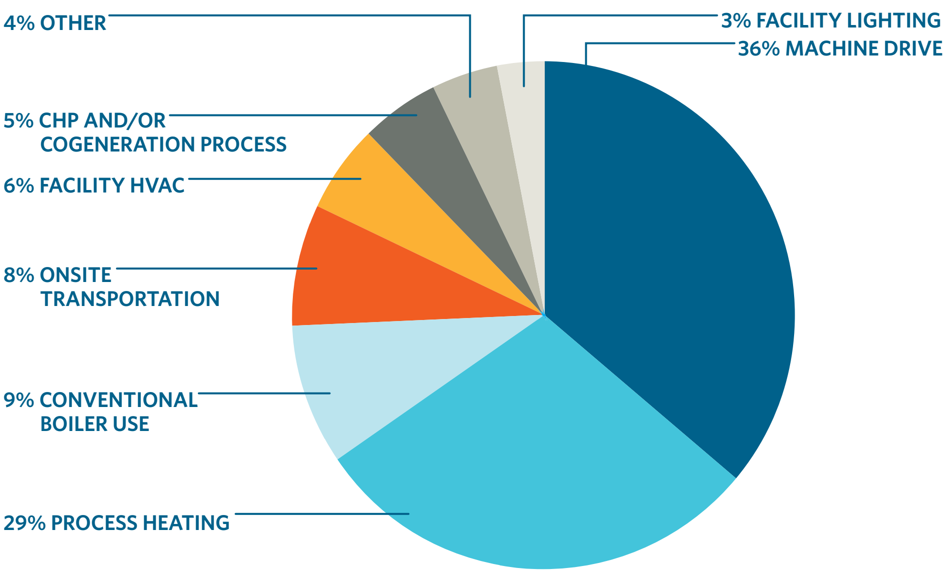
ENERGY TRUST INCENTIVES MAY REDUCE PAYBACK PERIODS LISTED IN THIS GUIDE BY AS MUCH AS 50 PERCENT ON CAPITAL UPGRADES.

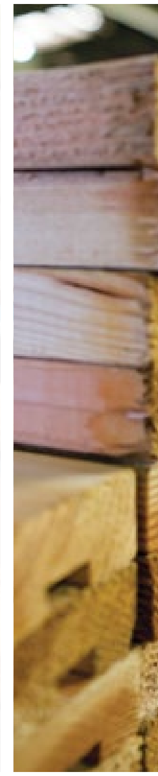
FAN AFFINITY LAWS



Variable Frequency Drives improve fan efficiency by reducing fan speed to the minimum revolutions per minute, rpm, required to satisfy flow requirements. Fan affinity laws show the flow produced by a fan is directly proportional to fan speed, while the power required to produce that flow is proportional to fan speed cubed. For example, at 80 percent of full-load flow, a fan operates at 80 percent of full-load rpm, but uses only 51 percent of full-load power, yielding a steady-state energy cost reduction of 49 percent. At 50 percent of full-load flow, the fan operates at 50 percent of full-load rpm, but uses only 13 percent of full-load power, yielding energy cost savings of 87 percent.

TYPICAL ENERGY USE PROFILE IN WOOD PRODUCTS



ENERGY PLAYS A CENTRAL ROLE IN WOOD PRODUCTS

Energy Trust can help you take control of energy costs and reduce the cost impacts of energy on your bottom line.

Energy Trust provides cash incentives and technical services to help you improve energy efficiency and reduce operating costs. Our PDCs are highly skilled industrial energy experts who understand what works in your business and how to make the most of energy-saving opportunities. Energy Trust PDCs are located throughout Oregon and can work closely with your personnel to achieve your goals.

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Discover how to continuously improve your energy performance.
Talk with your PDC, or call Energy Trust directly at **1.866.202.0576** or visit **www.energytrust.org/industrial-and-ag**.

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