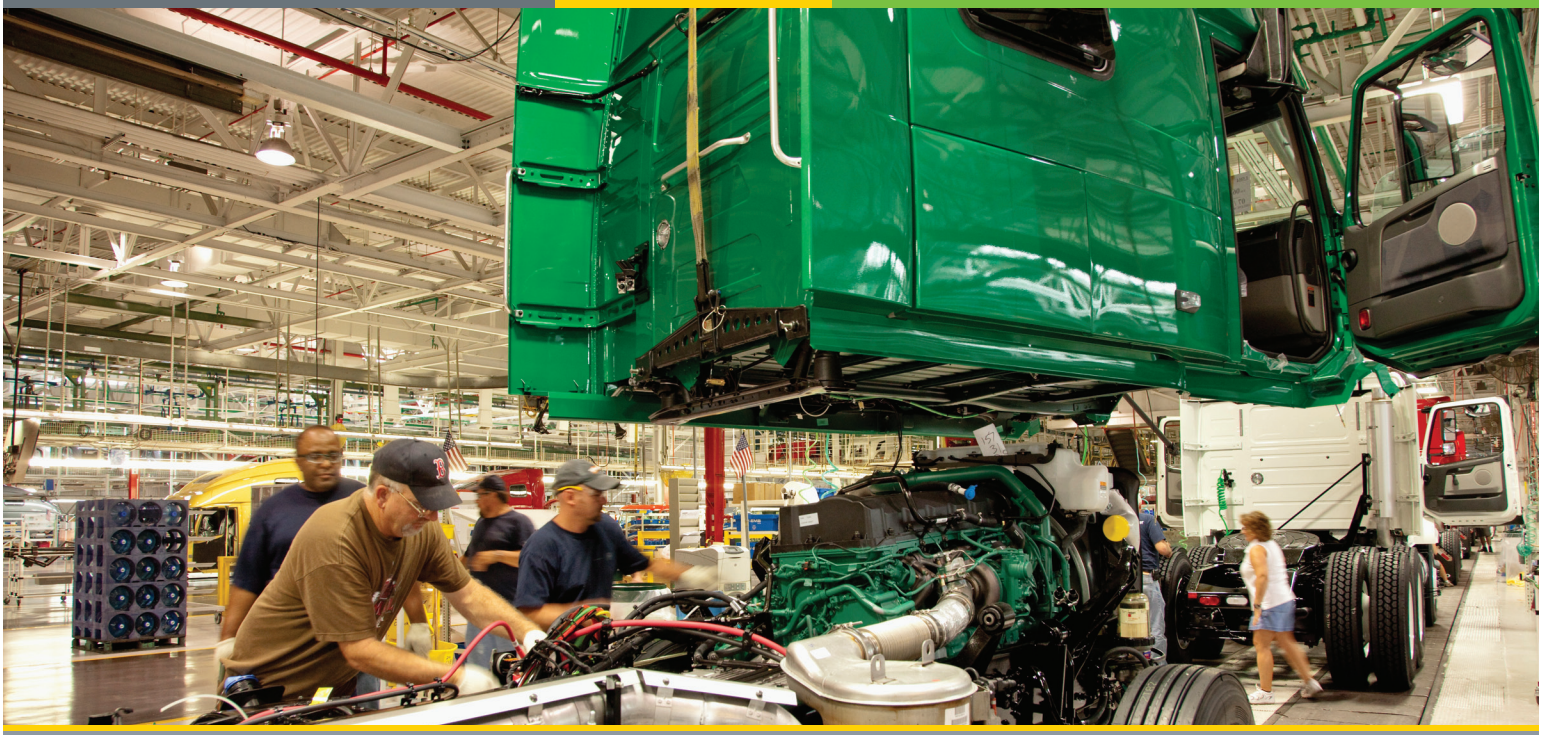

Assembly of a Volvo VNL 780, equipped with a Volvo D13 engine.

Photo Courtesy of Volvo

Volvo Trucks Achieves Lofty Energy and Carbon Goals

Volvo's New River Valley facility achieves plant-wide targets that surpass both corporate and *Save Energy Now* goals; leverages company and ITP resources

The New River Valley (NRV) plant is Volvo Trucks'—a sub-group of Volvo—largest and only North American manufacturing facility. Today, the NRV plant is ramping up the company's energy efficiency efforts. Volvo, a company that is world renowned for its environmental consciousness, recently established a corporate goal to make all of its manufacturing facilities carbon dioxide (CO_2) neutral by 2012. To accomplish this target, the company will need to make use of alternative and renewable energy at its plants in order to provide electricity and heat that does not add any CO_2 to the atmosphere. Volvo realized that it must first focus its efforts on energy efficiency, reducing overall energy use before replacing fossil fuel with renewable energy. Additionally, Volvo Trucks joined the U.S. Department of Energy (DOE) Industrial Technologies Program (ITP) *Save Energy Now* LEADER initiative in December 2009, which requires manufacturers to reduce their facilities' energy intensity* by 2.5% annually over a 10-year timeframe.

The NRV plant managers understood that the plant's energy use was intricately tied to its competitiveness and overall success, which led the facility to establish its own, more robust plant-wide goal to reduce overall energy consumption by 25% in just one year. Meeting this plant-wide goal (based on total energy consumption) will also deliver on the plant's LEADER Pledge (measured by annual energy intensity reductions). Volvo was able to verify in early 2011, after receiving its final utility bill of 2010, that the NRV plant had reached its goal and successfully reduced its energy consumption by 25% in just one year.

Volvo's Focus on Energy

Volvo Trucks' NRV plant—located in Dublin, Virginia—is elevating the company's energy efficiency efforts. The NRV plant is Volvo's largest truck manufacturing facility in the world.[1] Volvo's commitment to environmental care always has included a focus on energy use. As early as 2000, Volvo established goals to reduce the use of coal and oil in its manufacturing plants.[2] In 2008, Patrick Collignon was named plant manager at the NRV facility. Collignon was previously general manager of Volvo Trucks' Ghent, Belgium, plant. Under his direction, the Ghent facility

Energy intensity is a manner by which to measure overall energy efficiency in units of energy per unit of product. Use of this measure rather than total Btu savings avoids potential savings achieved by industrial downsizing or other natural market occurrence.

became the first CO_2-neutral factory in the world.[3] Volvo understood the importance of addressing energy use at the NRV plant before replacing the use of fossil fuels with renewable alternatives. The reason Volvo took this course of action is simple—improving the plant's energy efficiency will reduce its overall energy use, which means the facility will have less consumption to be replaced by renewable energy. Conversely, a plant that installs renewable energy sources before improving its efficiency may experience excess renewable capacity when its consumption drops as a result of efficiency measures. In addition, understanding the importance of energy use in reducing carbon emissions led the NRV plant to create the positions of energy manager and energy advisor in mid-2009. The NRV plant gave the responsibilities of energy manager to its current facilities manager, which is not an uncommon practice in industrial facilities. Volvo was also able to fill the role of energy advisor with one of its own qualified personnel. Both positions were created six months before Volvo Trucks signed the *Save Energy Now* LEADER Pledge, but the personnel are helping the plant fulfill its program commitments over the next 10 years.

After creating these positions, the NRV plant also established an energy committee made up of the following members: energy manager, energy advisor, environmental manager, and associates from other units in the plant, such as the paint unit. Volvo tasked the energy committee with identifying and implementing projects that would reduce the plant's energy use. The company provided the committee with $200,000 in initial funding to carry out efficiency-related tasks. Facing a major U.S. economic downturn, the NRV plant knew that significant improvements in energy efficiency needed to be achieved in order for the facility to survive and continue to be successful. Having corporate willingness to provide human and capital resources, matched with technical assistance and information resources made available by ITP, the NRV plant decided to set its own ambitious goal of reducing its energy use 25% in one year. This target surpasses any requirement or mandate from Volvo's corporate office or ITP's *Save Energy Now* LEADER initiative.[4]

Photo Courtesy of Volvo

Volvo Trucks New River Valley Plant in Dublin, Virginia.

Leveraging ITP Resources: Assessments, SEP, and Peer-to-Peer Exchange

Volvo's NRV facility has experienced a number of benefits as a result of the company's strong partnership with ITP, including three recent energy assessments. Two Energy Savings Assessments were conducted at the plant through ITP's *Save Energy Now* initiative; Volvo selected the first to focus on the facility's process heating system and the second to focus on its fan system. Both assessments successfully identified projects that the plant is currently implementing. Additionally, the NRV plant underwent a third assessment on its compressed air systems through ITP's Energy Management Demonstration project—a project supporting field demonstrations of Superior Energy Performance (SEP), a forthcoming American National Standards Institute-accredited energy management certification program currently under development by the U.S. Council for Energy-Efficient Manufacturing. The standards used in the SEP assessment were developed through the American Society of Mechanical Engineers and provide a basis for industrial facilities to measure energy efficiency and improve performance for a specific system type.[5]

All three assessments provided the NRV plant with quantified, potential savings from a variety of energy projects. Although these savings estimates often matched Volvo's projections, savings verification from an independent contractor served to bolster company-wide acceptance of the importance of project implementation.[6]

Participation in *Save Energy Now* LEADER also provided opportunities for the NRV plant to perform benchmarking with other industrial companies. After attending the *Save Energy Now* LEADER Industrial Sustainability and Energy Management Showcase in April 2010 at Nissan North America's Smyrna, Tennessee, manufacturing plant, an energy information-sharing relationship between the two auto manufacturers developed. Shortly after the Showcase, Volvo and Nissan's energy teams coincidentally attended the same training sessions for ITP's SEP program. The relationship has proven to be beneficial for both companies, as neither company views the other as a direct competitor. Although the companies use many of the same processes within their facilities, the primary difference between the two is that Volvo Trucks manufactures much larger vehicles than Nissan.[7] Part of the Nissan-hosted Showcase involved a tour of the plant floor, highlighting energy efficiency improvements that had been implemented. Volvo is now planning a reciprocal visit for spring or summer 2011, inviting Nissan's staff to tour the NRV plant.

Expanding Volvo Resources: Training Support, Energy Fund, and Employee Teams

Providing the NRV plant's energy committee with abundant resources was critical to helping the facility achieve a 25% reduction in energy use in just one year. Volvo not only allows but also encourages members on the plant's energy committee to attend trainings, workshops, or conferences that would be beneficial to their role—supporting low-cost information gathering and expansion of staff energy skills. Additionally, in late 2009, the NRV plant manager, Volvo's chief operating officer, and the company's Board of Directors provided the energy committee with $200,000 to implement energy projects and achieve the associated savings. Volvo also made the commitment to return any savings achieved by the energy committee to the team's energy fund. As of December 2010—within one year of receiving the initial funding—the energy committee had already increased the fund to $600,000, which equates to an average payback period of four months for the implemented projects. Savings were verified by Volvo's accounting office using the plant's utility bills.

In addition to having the energy committee identify potential projects, in 2009 the NRV plant decided to initiate a contest that would promote employee engagement in identifying and suggesting ways for the facility to improve its energy efficiency. Employees were asked to form into teams of 3–8 people and generate potential improvement opportunities that would help the plant save energy. The company incentivized good employee ideas with prizes and corporate recognition. In total, 25 teams submitted a number of suggestions. Many suggestions aligned with actions of the energy committee, which resulted in the implementation of numerous employee-suggested projects. This contest was a plant-wide manifestation of Volvo's corporate goals to improve energy usage. NRV employees were motivated by the job security and global competitiveness that comes from the plant using less energy. From late 2009 to early 2010, the implementation of employee-suggested projects saved the NRV plant more than 546,543 kilowatt hours (kWh) per month, approximately $33,000 in monthly cost savings. The teams whose suggestions were pursued were recognized in the plant's weekly publication, "Truck Talk." The successes were also highlighted in company meetings, all the way up to the Board of Directors.

Project Successes

One employee-suggested project from the contest had a very large savings impact. The suggestion was to turn down the building temperature by 5 degrees. Not only was this no-cost project easy for the company to implement, but it ended up saving the plant 500,000 kWh per month, or approximately $30,000 in monthly electricity costs.[8]

Another employee idea was to turn off outside loading dock lights at night. Implementing this idea saved the plant 20,160 kWh each month, resulting in monthly electricity cost savings of $1,200. Similar to altering the building's temperature, this project cost Volvo nothing to implement.[9]

NRV's energy committee also installed a high-efficiency radiant heating system in the plant's shipping building, which houses finished trucks. The system uses

Photo Courtesy of Volvo

Volvo's ceiling-mounted radiant heating system.

Radiant Heating involves supplying heat directly to the floor, wall, or ceiling. It uses radiant heat transfer, also known as infrared heating, which transfers heat directly from the hot surface to the room through the radiation of heat. Radiant heating is more efficient than baseboard heating, and often more efficient than forced-air heating because no energy is lost through ducts. It should be noted, though, that a hot water tubing radiant system also experiences energy loss through its coils.

Ceiling-mounted radiant panels are often constructed using aluminum and are heated electrically or via hot water tubing. These ceiling radiant panels differ from other radiant heating systems in that they have a very low heat capacity. Whereas concrete slabs, which are often used in floor radiant heating systems, have a high heat capacity and are ideal for storing heat, they have a much slower thermal response time, meaning it can take hours to reach a target temperature and be nearly impossible to have strategic night or daytime setbacks. The ceiling radiant panels have a much quicker response time and can significantly increase the temperature of a room in minutes. In addition, these radiant panels can be controlled individually, allowing naturally colder rooms, such as a docking bay with large garage doors, to be heated without increasing the temperature setting of the entire building.[10]

electric radiant heating panels attached to the ceiling of the facility. Previously, the building only used convection heating, but the large bay doors at each end of the building gave the interior a wind-tunnel effect. The rushing in of outside air quickly cooled the building, making it difficult to keep a consistently warm temperature solely by using the building's thermostat. The radiant heating project cost Volvo $120,000 to complete, but resulted in an 80% reduction in the building's natural gas usage, as well as electricity savings. Total project savings achieved include an annual reduction in natural gas usage equal to 61,000 therms, annual electricity savings of 70,000 kWh, and a reduction in carbon dioxide emissions equaling 54 tons. Annual natural gas and electricity savings come out to approximately $45,000–$50,000, giving the project a simple payback period of 2.5 years.[11]

Conclusion

In October 2009, the NRV plant set a goal to reduce its energy use 25% in one year, and after receiving its final utility bill for 2010, Volvo was able to verify that it had indeed achieved its goal. Only looking at the three projects detailed above, the NRV plant achieved more than $400,000 in annual energy savings and reduced its annual electricity use by more than 7 gigawatt hours. This accomplishment can be traced back to the outstanding support provided by Volvo, the NRV plant managers, and the resources provided by ITP. Altogether, a solid corporate commitment from Volvo, a steadfast dedication to energy efficiency by NRV's plant managers, technical support made available by ITP, and the eagerness of plant employees to join energy efficiency efforts has helped ensure that Volvo's NRV plant will remain globally competitive, establishing the facility as a leader in energy and environmental responsibility. Through its energy efforts, the NRV plant has achieved other intangible benefits, such as fostering a friendly and constructive relationship with Nissan, surpassing Volvo's corporate energy goals, and improving employee morale through workforce engagement and recognition. Today, Volvo's NRV plant continues to be a leader within the company and an example for other industrial plants and companies.

Endnotes

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[2] Discussion with Michael Kijak and Chad Porter on December 17, 2010.

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[4] Discussion with Michael Kijak and Chad Porter on December 17, 2010.

[5] Achieving Superior Energy Performance, System Assessment Standards, http://www.superiorenergyperformance.net/system_assessment_standards.html.

[6] Discussion with Michael Kijak and Chad Porter on December 17, 2010.

[7] Discussion with Michael Kijak and Chad Porter on December 17, 2010.

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