

Special Feature

Contributing to Solutions to Customers' Problems through New Technologies and Services

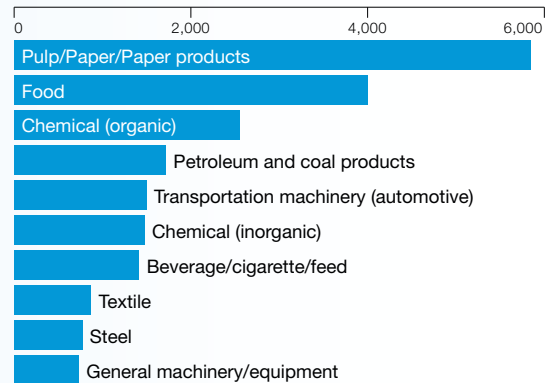
Through innovation in electric and thermal energy technologies, Fuji Electric aims to provide society with technologies and products that contribute to solutions for customers' problems. These special features introduce some of the initiatives intended to bring us closer to that goal.

1 Saving Energy through Reuse of Factory Exhaust Heat

With changes in the energy situation in recent years, factories and other production sites have also turned to smart energy systems that enable them to use energy intelligently. One method that is garnering attention is reusing factory exhaust heat. Expectations for reuse are high, particularly in industries that make wide-ranging use of heat applications, including the pulp, paper and paper products, food, and (organic) chemical industries.

Applying technology honed through the manufacture of vending machines, Fuji Electric developed one of the industry's first products to make use of a heat pump for heat exchange. By targeting industries with significant volumes of reusable steam, we will promote efficient use of heat energy within factories to contribute to our clients in the industrial sector.

Reusable Steam Volume by Industry (Ton/hour)

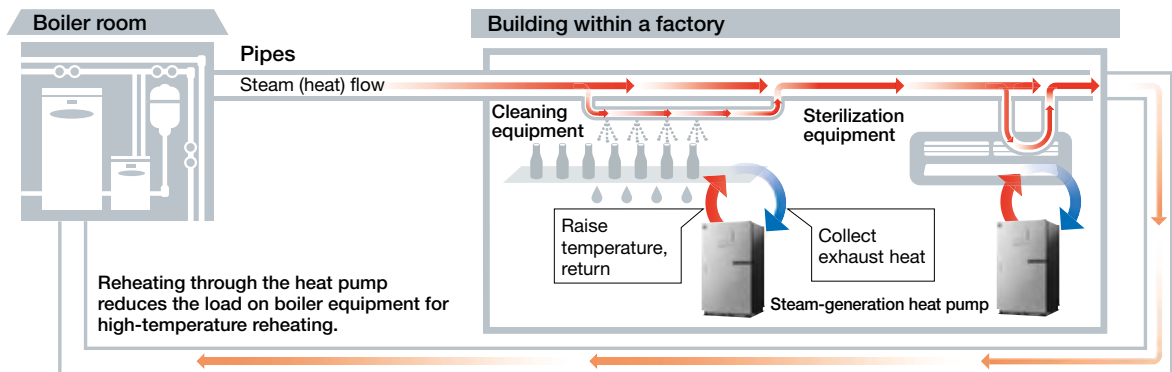


(Fuji Electric estimates based on data from Fuji-Keizai Co., Ltd.)

Reusing Heat Energy through Steam-Generation Heat Pumps

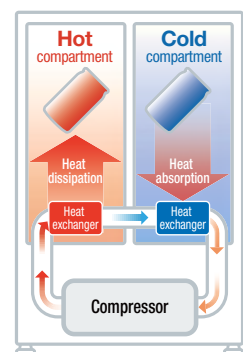
During the production process, factories use and emit a great deal of heat, particularly in cleaning and sterilization equipment. Steam-generation heat pumps can collect and re-heat the exhaust heat from such equipment, making it available for reuse.

Because this method reduces the high-temperature reheating load on boiler equipment, it can lower fuel costs and enable the factory to save energy.



Explanation What is a "heat pump?"

Because the equipment pumps heat from a "cold side" to a "hot side," similar to a system used for pumping water, it is known as a "heat pump." In vending machines, the heat absorbed in the cold compartment where beverages are chilled is condensed in a compressor, and the heat generated in this process is then used to heat beverages in a hot compartment. This greatly reduces the amount of energy used for heating, and contributes to energy saving.



Vending machine heating and cooling system

Saving Energy by Utilizing Surplus Heat from Diesel Engines

Energy Use Reduced by More Than Half

Fuji Electric Power Semiconductor Co., Ltd.'s Iiyama Factory is a manufacturing base for power semiconductors used in automobiles. To ensure a stable supply of electric power to sustain the factory's operation 24 hours a day, 365 days a year, power is generated on site using a diesel engine generator. The exhaust heat generated by this engine is reused in the factory's heating, ventilation, and air conditioning, but about 50% of the overall exhaust heat remained unused. We evaluated possible ways to use that heat more effectively to achieve greater energy savings.

Our attention was drawn to the steam supplied to the factory's clean rooms. Power semiconductors are precision components, and any static electricity generated and released in the manufacturing process can have a negative impact on quality. To prevent this, particularly in the winter season when the air is dry, steam is generated and supplied to the clean rooms using a dedicated boiler. In March 2015, the factory began field testing a steam-generation heat pump developed at Fuji Electric's Mie Factory, aiming to make further energy savings by using the exhaust heat from their diesel engine to generate a supply of steam for the clean rooms.

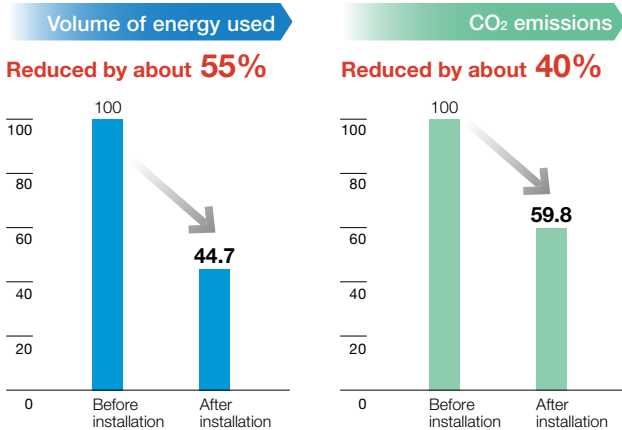


Power semiconductor post-process

The steam-generation heat pump itself is about the size of a typical vending machine. It is simple to operate and can be installed in just a few hours without requiring any special construction. After installation, the volume of energy used in April was down about 55% compared to before, while CO₂ emissions dropped by about 40%. Use of the boiler was also reduced. With energy savings exceeding original estimates, the factory intends to continue its testing to verify product quality and accelerate efforts to commercialize the product.

Post-deployment effects

(%)



Steam-Generation heat pump

Voice Message from the Factory Staff



Hirofumi Uehara
General Administration Department,
Iiyama Factory
Fuji Electric Power Semiconductor Co., Ltd.

The installation of the steam-generation heat pump has enabled us to reduce fuel costs significantly compared to the energy conservation plan we had created previously. Our location along the Sea of Japan means our need for heating between October and June is high, and we now expect to reduce our annual fuel costs and CO₂ emissions well beyond our original estimates.



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