

Effective Utilization of “Heat” = Trump Card to Improve Energy Efficiency

Heat pumps receiving much attention as a technology that will be indispensable to factory management in the future. In this section, first of all, we explain the advantages to be brought about by introducing heat pumps.

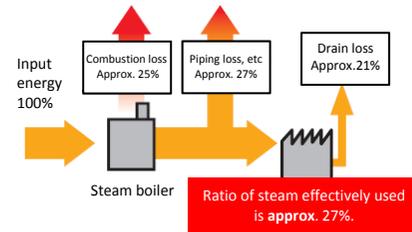
Fixed idea of “heat used in factory = steam”

In factories, as equipment investments are inexpensive and fuel costs have remained relatively low, steam is often used for conveyance in factories. And the highest temperature steam required in production processes is produced by boilers and conveyed to various places to meet all of the demand for high temperature heat to low temperature heat. As a result, about 30% of the energy used in factories is used to produce steam. According to the results of actual measurement the effective utilization ratio of such steam is only about 27% due to accumulation of various losses.

Is a temperature potential like steam necessary for all applications? Temperatures required for respective production processes are different. In consideration of the heat production that fits different needs, there would be still energy conservation potential and some room for reduction of CO₂ emissions even in the industrial sector that is called a “dry duster” as an honor student of energy conservation.

“Statistical survey on consumption structures of petroleum, etc.,” the Ministry of Economy, Trade and Industry, 2001, excluding raw materials

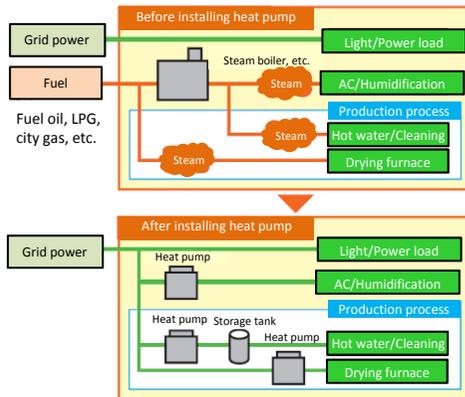
Actual state of steam utilization at a certain factory



Steam reduction by heat pumps

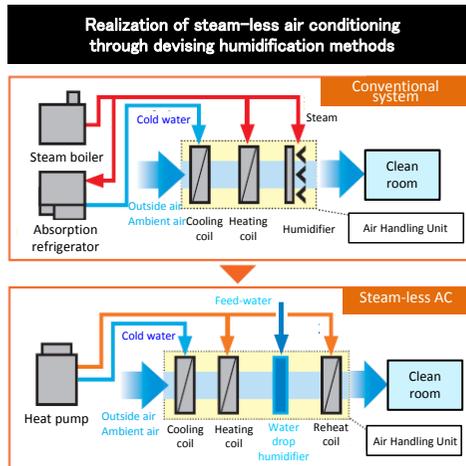
From steam to heat pumps

For heat of lower than 100°C, heat pumps can already be expected to drastically improve efficiency compared with combustion systems. Moreover, heat pumps that can produce steam of 165°C are also commercialized so that a wide range of heat demand in factories can be covered by heat pumps. Various losses can be reduced by installing heat pumps in the vicinity of places of demand for heat and supplying heat from them, and overall energy efficiency of factories can be improved.



Switch to systems without steam

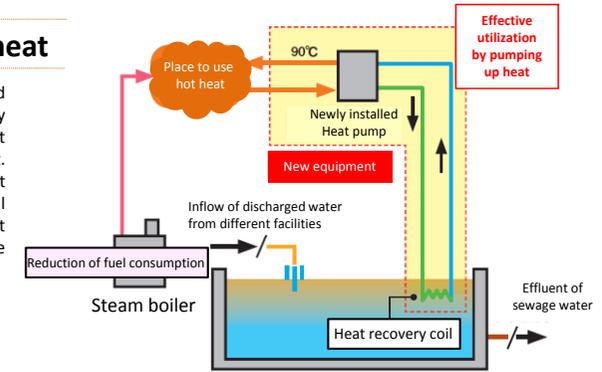
In a place where strict temperature control is required such as clean room, steam has been generally used for humidification and heating. At present, however, factories that adopt reheating systems that make use of water humidification and heat pump exhaust heat have begun increasing.



Utilization of exhaust heat

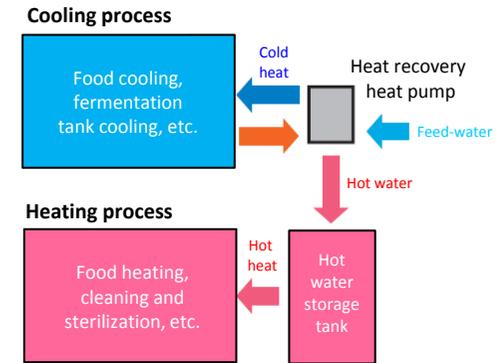
Effective utilization of waste heat

Low temperature potential heat which was disposed of from the factories can be effectively utilized by heat pumps. By the usage of exhaust heat and heat pumps, it is possible to produce high efficiency heat. In addition, if there is any time gap between exhaust heat and heat demand, by introducing a thermal storage tank which stores heat produced by heat pumps, the effective usage of exhaust heat could be realized.



Streamlining of cooling and heating

In various factories for foods, machines, etc., there are both cooling and heating processes in many cases. As heat pumps achieve efficiency nearly twice higher than that of conventional systems by producing heat for both cooling and heating at the same time, overall energy efficiency of factories can be drastically improved by heat pumps.



“Thermal storage” to store and use heat

Advantages of heat storage

Since heat can be efficiently produced independently of demand by storing heat, the potential of highly efficient heat pumps can be fully made use of. Both cold heat and hot heat can be supplied at stable temperatures in large volume as needed because they are stored. Therefore, heat pumps contribute to quality improvement of products and to CO₂ emissions reduction and achievement of energy conservation. If there are both cold heat loads and hot heat loads, both cold heat and hot heat can be utilized to the fullest extent possible without disposing of them by using heat recovery heat pumps and thermal storage tanks that store cold heat and hot heat.

