

Energetic and exergetic process analyses:

Through the energy flow balance in technical systems and processes, the efficiency of energy conversion and transport processes can be calculated as the fraction of the energy added that is converted to network output (at the end of the process). However, it is often not possible to find the cause of the losses and make corresponding improvements.

This can be easily explained using the example of a heat pump or a cooling device. In these examples, the efficiency is essentially determined by the thermodynamic losses in the flow regulator and in the heat exchangers. An energy balance will show that there are almost no energy losses in these components because of good insulation. An **exergetic** examination shows that thermodynamic losses are generated by irreversibilities (pressure drops in the flow regulator without the removal of work and temperature differences during heat transfer), which ultimately lead to a higher electrical consumption for the compressor. An improvement of process can only be achieved through exergetic optimization (adjusting the temperature difference of the secondary circuits to the primary circuit and optimising supercooling in the condenser).