The impact of energy efficiency has increased particularly in Germany as a result of the energy transition and the increasing competition based on globalization. The energy and cost saving potential is especially high in energy-intensive industrial branches. In the non-ferrous melting and die-casting industry for example the energy consumption per ton of good casting usually ranges between 2000 and 6000 kWh. As a result, the amount of energy costs generally exceeds 25% of gross value added.

Various research projects have already aimed to exploit the savings potential in companies in the melting and die casting industry. In consequence of the high competitive pressure, however, many measures fail due to the necessary investment costs or the necessary payback period. In the Green Factory Bavaria project E|Melt a demonstrator system is being developed which allows an assessment of various efficiency measures without intervening in ongoing operations (see figure 1). By taking into account all relevant parameters for the operation, the investigations reduce the inhibition threshold for investments in the industry. Consequently the available energy efficiency potential can be more successfully exploited.

Figure 1: Structure of the demonstrator system

The efficiency examinations are based on a specially developed and validated material flow and energy simulation. This simulation tool is adapted to a wide range of companies and can cover different intralogistic optimization measures. The examination of a partner company has revealed that reductions in energy consumption within the furnaces can be achieved by optimized charging intervals (up to 20 %) or a preheating chamber for aluminum (up to 9 %) (see figure 2).

Figure 2: Energy efficiency potential in the examined partner company

The investigation of optimization approaches in two different industrial partners has shown that additional operational structures and control strategies have to be implemented into the model.