Lifts offer potential for savings

The ups and downs of energy efficiency

Rising electricity costs and increasingly strict legal regulations are impacting on areas including building services engineering. Lifts still offer unused potential for improving energy efficiency, and thus reducing operating costs.

Around 700,000 passenger lifts and goods lifts are in operation in Germany alone, consuming an estimated 2.2 to 4.0 TWh (terawatt hours) of electricity per year. How much of a building's total electricity demand is actually accounted for by its lift system depends very much on the lift's frequency of use. The frequency of use is far higher in hospitals or hotels, for instance, than in residential buildings where the majority of residents are at work and thus not in the building during the day. Lifts consume a significant proportion of their total electricity consumption in standby operation. In residential buildings with low frequency of use, the power consumed in this mode accounts for over 70 % of a lift's total electricity demand. In office buildings, however, where lift use is far more frequent, standby phases still account for as much as 40% of the lifts' annual power consumption. According to studies, energy savings of up to 60% are feasible by employing new technologies and reducing power consumption during standby mode.

Certified energy efficiency

The German Energy Saving Ordinance (Energieeinsparverordnung EnEV) requires building owners to furnish proof of their buildings' energy efficiency. However, this does not necessarily apply to building services systems: neither the European Directive on the Energy Performance of Buildings (2010/31/EU) nor the EnEV, for instance, specify measures for reducing the power consumption of lifts. Given this, the lift industry took the initiative and worked with testing and inspection organisations and VDI, the Association of German Engineers, to develop the relevant guideline VDI 4707 Part 1 "Lifts – Energy efficiency", aimed at the rational use of energy, i.e. economic, ecological and social sustainability. *Our client* has long-standing experience in the lift sector and was the only third-party testing and certification organisation to be actively involved in the development of the mentioned VDI guideline. At present, the guideline supplies the only procedure for the energy-efficiency certification of lift systems and the associated labelling. VDI 4707 Part 1 "Lifts - Energy efficiency" (edition 2009-03) describes a method that can be used to classify the complete system depending on its category of use, on the basis of its energy demand in standby mode and during travel operation. The draft of guideline VDI 4707 Part 2 "Lifts – Energy efficiency - Components" which aims at the classification of individual components on the basis of their energy efficiency, was presented in June 2012.

Categories of use and factors of consumption

The energy demand of lifts primarily depends on the technical characteristics and the energy efficiency of the lift components. Total consumption is determined in three steps: classification into categories of use, identification of standby demand, and travel demand.

In step 1, the lift is classified into one of five categories of use, where category 1 stands for a very low and category 5 for a very high intensity or frequency of use. In this step, the experts also determine and categorise the average periods in standby and travel operation in terms of hours per day, whereby the type of building and its use plays a defining role. The categories of use in this context extend from category 1, which comprises small residential buildings of up to six flats, to category 5 with office and administration buildings over 100 metres in height in which lifts are in travel mode for more than 4.5 hours per day. The average time in travel operation given in hours per day, for example, can be determined from the mean number of travel operations and the mean duration of travel.

In step 2, the professionals then calculate the lift's energy consumption in ‘sleep’ or standby mode. To do so, they record the energy consumption of all components that are necessary to keep the lift ready for operation, including cabin lights, cabin door (drive mechanism for opening and closing) and cabin fan. The experts add up the energy demands of the individual components to obtain the lift's energy consumption in standby mode and can assign it to a class of energy demand. Labelling of energy consumption ranges from class A (up to 50 watts) to class G (over 1600 watts).

Subsequent assessment of energy demand in travel operation covers the total power consumed by the lift, taking into consideration weight and travel height. A defined test cycle delivers reliable and comparable data. The test cycle includes a reference trip over the entire travel height with an empty cabin travelling upward and downward including opening and closing of the door. Similarly to the determination of standby periods, the power consumed in travel operation is also grouped into energy demand classes. A lift in category of use 1 with an energy consumption of 2.21 mWh/(kg*m) or less in the test cycle, for example, satisfies the criteria of energy efficiency class A, whereas a lift with an energy consumption of 57,09 mWh/(kg*m) in the test cycle would only qualify for energy efficiency class G.

The results in the individual test steps are assessed, taking the lift's frequency of use into account. The energy consumption in standby mode automatically becomes more important for lifts that are used less frequently. The results of all three steps are compared to the reference values established in the VDI guideline and the lift is then assigned to the appropriate class of energy efficiency. Certification in accordance with VDI 4707 Part 1 for planned or existing lifts is carried out by third-party testing and certification organisations such as *our client*.

Opportunities for cost savings and modernisation of existing lift systems

Depending on the weighting of the consumption factors, various measures are considered for improving the energy efficiency of a specific lift system. Experts of *our client* also support lift and building owners in modernisation measures. Which measures are useful choices to unlock potential for savings? How to avoid the installation of undersized or oversized components?

In cases involving lifts with long standby periods, savings can be realised by using intelligent lift control systems and pre-programmed component control. Apart from energy-saving light bulbs or LED lights, components that switch off automatically while the lift is in standby mode offer excellent solutions. These components have a parameterisable and targeted function that switches them off when the lift is in standby mode and automatically re-activates them at the next call of the lift. This type of solution is possible for components including display elements, cabin lights, frequency converters and door drives. An intelligent standby mode makes good sense even for buildings with high frequency of use. However, overall, measures that aim at the optimisation of the drive system, the guide pulleys and the guide rails or at targeted reduction of the lifting capacity prove more beneficial in this context. Energy recovery during travel operation, which converts excessive kinetic energy during cabin deceleration and uses it for further lift operation, also unlocks potential for energy savings.

Since the German Energy Saving Ordinance (EnEV 2009) came into force, permanently open smoke vents in the lift shaft as a fire safety measure are no longer permitted. The reason is that heat escapes continuously through these vents, which is detrimental to the building's overall energy efficiency. A flexible smoke vent and ventilation system for the lift shaft saves energy and provides safety in case of a fire. Installation of such a system is also possible in the majority of existing lifts.

Saving resources, reducing operating costs

Tailored modernisation measures can help lift operators to achieve significant and sustainable reduction of their operating costs. Considerations within the scope of planning and designing new lifts or the modernisation of existing lifts should always cover the entire life cycle of a lift system. This involves choosing energy-efficient components and their intelligent instrumentation and control systems as well as considering energy-efficiency aspects in lift installation, operation and maintenance. *Our client's* "Energy-Efficient Lift System" certification in accordance with guideline VDI 4707 Part 1 guarantees reliable assessment of energy efficiency irrespective of further modernisation measures.

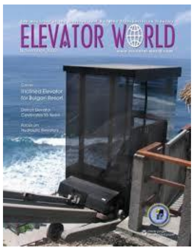
Contact:

Intellisource GmbH
Solmsstraße 6a
60486 Frankfurt am Main
Tel: +49 69 981964-0
Fax: +49 69 981964-45
E-Mail: office@intellisource.de
Internet: www.intellisource.de

This topic has been published in the following magazines:

Distributed Energy
Circulation: 21.000
Advertising Value Equivalency: 5.750 €

EDC magazine
Circulation: 43.000
Advertising Value Equivalency: 6.750 €



Elevator World
Circulation: 7.000
Advertising Value Equivalency: 5.000 €

A & D India
Circulation: 17.000
Advertising Value Equivalency: 3.700 €

Elevatori magazine
Circulation: 8.000
Advertising Value Equivalency: 1.700 €