How Efficient Is "Energy Efficient"?

Dealing with the soaring costs of energy, particularly electricity in Europe

by Luc Rivet, EW Correspondent

"Energy" is the buzzword of the first decade of this century. The soaring price of energy, due to the efforts at "decarbonating" human activities (in other words, reducing carbon-dioxide [CO_2] emissions) has put energy efficiency toward the top of the agenda of any company, notably of the firms selling equipment for the building sector. It is the talk of the town: whether you buy a car, a washing machine or an apartment in the European Union, its energy performance is presented with colored markers with letters of the alphabet.

The Situation

Europe has been at the forefront of the effort to reduce CO_2 emissions. The efforts have had little direct effect, however, since the emissions are only growing more slowly, but with a very negative consequence: increasing the price of electricity to dangerous levels. Germany has seen the price of its electricity at least double over the last 10 years.

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Economists and even the new German "super minister" of energy (and the economy), Sigmar Gabriel, has warned about a dangerous loss of European industry competitiveness, a possible backlash of angry citizens and the danger of seeing energy-intensive companies delocalize their activities. Already, companies such as Bayer and ThyssenKrupp in Germany, and Solvay in Belgium have announced they will transfer activities or build new factories in the U.S., where the cost of energy is much lower. In Germany, because of the intensive use of renewable resources (mainly wind and solar), the electricity tariff reaches the astronomical level of EUR291.9 (US$400)/MWh consumed. That is much higher than in France, which massively uses less expensive nuclear energy, which also has the benefit of emitting no CO_2. Here, the tariff is EUR126 (US$172.66)/MWh. Thanks to shale gas and other developments, North America has become a net exporter of coal and gas, and the price of energy is very competitive. No matter where one is in the world, a high electricity price is making for a good driver of energy efficiency.

Elevator-Industry Preparation

The elevator industry has clearly done its homework. It should first be stressed that both hydraulic and traction elevators consume very little electricity. The energy consumed per trip is negligible, so elevators have not been in the political eye. They rarely represent a few percentage points of the energy consumption of large buildings such as office blocks, with even less in the residential sector. The European Energy Performance of Buildings Directive (Directive 2010/31/EU) looks at all the building services, but elevators were left out due to their good results.

Nevertheless, the industry has measured consumption and reached the conclusion that the area where improvement is needed is in elevator *standby* periods. In addition to the obvious switching

A hydraulic installation in an office building

off of lights when the elevator is not in use, energy savings can be realized in many other components. The manufacturers of such components as controllers and doors have managed to improve and create various sleep modes that switch the elevator off when not in use and quickly switch it back on when requested. For example, continuous pressure is not necessary during standby mode.

A New, Necessary Norm

The European Lift & Lift Component Association (ELCA) set the cat among the pigeons by flatly refusing to consider the new norm prepared in *ISO/DIS 25745-2: Energy Performance of Lifts, Escalators and Moving walks, Part 2: Energy Calculation and Classification for Lifts (Elevators)* as fair to hydraulic technology, which is dominant in many parts of the world, such as North America and Europe. ELCA President Matteo Volpe expressed the great worry of many European elevator manufacturers, regarding the normative process being applied for the first time under the "Vienna Agreement" between the International Organization for Standardization (ISO) and the Comité Européen de Normalisation (CEN). Following this agreement, a norm developed in ISO is automatically applied in CEN, and vice-versa. This should speed up the normative process and avoid double work between CEN and ISO.

Volpe

While the agreement is good, in this particular instance, the result of the ISO's work is not satisfactory. To the surprise of many and without solid reasoning, the draft ISO document mentions in several places (especially in Annex B) that hydraulic lifts are inferior to traction lifts. Many companies are producers and installers of both these technologies, and know about their pros and cons. For example, Table 1 of Clause 3.1 says, "Traction almost always produces significant energy savings" as compared to hydraulic and other drive concepts. This sentence does not give a proper comparison and is simply not true in almost all instances. Energy efficiency depends on energy consumption during movement and standby. This changes from installation to installation. Eighty percent of elevators move less than 30 min. per day. The standby consumption is clearly more significant than the runtime consumption for the large majority of elevators. A major effort to improve standby consumption is being made (and rightly so) by manufacturers. Excluding hydraulic elevators without good reasons in this clause does not take into consideration the reduced consumption of modern hydraulic drives. Some even speak of manipulation to favor another technology.

The word "significant" as used in the ISO document is particularly inappropriate, since the energy used for a reference trip in a residential building is about 25-40 Wh and would cost EUR/US$0.01 (0.04kWh X EUR0.25 [US$0.34]). The total energy used for such a residential lift annually would be approximately 800-1000 kWh and cost EUR250 (US$342.67) (1000 kWh X EUR0.25 [US$0.34]). This is approximately EUR20 (US$27) per month for any elevator. If a modern, efficient hydraulic model consumes a little more in the running phase than a modern electric lift, it is only a few more euros/U.S. dollars per month – approximately US$10. This energy usage is comparable to that of standard kitchen equipment.

Such Slight Energy Consumption

Thomas Birnbaum, managing director of GMV Germany, said of elevator energy usage:

Birnbaum

"This level of consumption is typical of modern, efficient traction and hydraulic solutions. A good hydraulic solution can easily reach better values than a badly designed modern traction elevator (e.g., with high inverter consumption during the whole standby time or inefficient construction with a lot of ropes and rollers in the shaft. Both these inefficient elements are not present in typical residential hydraulic solutions that typically run less than 90 min./day.) The relation of consumption and saving becomes even clearer if you compare this lift consumption to the typical illumination of a lift cabin: four halogen [lights] of 25 W consume EUR220 (US$301.55)/year (4 X 25 W X 24 hr. X 365 days X EUR 0.25 [US$0.34]/kWh / 1000).

"To switch lights off when the elevator does not travel can mean more than

EUR200 (US$274.14) savings per year, more than the consumption of the lift itself, in many cases, in residential and small business buildings!"

Misleading Recommendations Detrimental to Hydraulic Solutions

This example shows how little energy is consumed, and it could well be that the hydraulic lift with efficient technology – especially with its typically lower standby consumption – is more efficient than the traction lift. Birnbaum, referring to his experience in his daily business, adds:

"Even more important: let's not forget that the main cost for the whole lift stock is the maintenance cost that easily reaches a level corresponding to 10 times the energy consumption. Maintenance also impacts the final ecological "footprint" of the lift. In residential buildings with less than 90 min. travel per day, a modern hydraulic or fluitronic lift still consumes a little more than a modern traction lift, but the hydraulic lift is almost always much easier and less costly to maintain."

In the same table of the draft ISO norm, another recommendation says, "Select an energy-efficient drive for the elevator and consider regeneration systems, e.g., variable voltage, variable frequency." This is clearly a wrong recommendation in most cases (when the standby consumption is more significant than the consumption for moving the lift). This recommendation increases the standby consumption and maintenance needs of the installation. There are more examples of recommendations that are not acceptable in an international norm that should be technology neutral. This only adds costs for the lift owner, who is often not the original investor and has had no chance to influence the choice of lift.

A typical hydraulic elevator

(inverters or regenerative systems, for example) that are almost never used, because in schools, residential units or smaller office buildings, the lift moves less than 30 min./day. The "advanced" technology installed requires higher standby energy – more than that of a lift that does not need this equipment. In particular, the "advanced" lift requires more maintenance and spare-parts investments, the costs of which are much higher than the energy savings. These expenses represent energy, too, in the end. This kind of recommendation is, therefore, misleading.

For Volpe:

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Regeneration systems are of no advantage in terms of energy efficiency for most residential buildings and do not serve the customer better. The consequences of such a choice shall often be that the lift installed will be equipped with a highly efficient drive concept that guarantees efficiency with a lot of additional electronic parts

"This series of unacceptable comments could mean that some people in WG 10 TC 178 of ISO, [who have] carried out the work, are trying to drive hydraulic lifts, mainly produced by small and medium-sized enterprises, out of the lift market by bluntly recommending abandoning the hydraulic technology in favor of traction applications. Such recommendations in the European normative system could only lead to advice being given by public agencies, for example, to fully abandon the hydraulic technology or recommend to public officers writing public tenders to always ask for traction lifts for public buildings."

"This is wrong," concludes Volpe, who wonders if some are not trying to influence the normative process to push their own products: "If it were the case, it would be ethically questionable. It is detrimental to the confidence that we all have in technical experts, coming from industry, as compared to experts from Notified Bodies, for example." ELCA considers a review absolutely necessary, at least in CEN for application in Europe.

It is a matter of competition in many markets. North America has a market in which hydraulic applications are very numerous, to the satisfaction of all. ELCA wonders if the American lift community is aware of the process developed in ISO TC 178 on energy-efficiency issues. The market should remain a level playing field for all companies and technologies throughout the world.