



THE GREEN SWITCH

OPPORTUNITIES FOR LOWERING ENERGY CONSUMPTION, COSTS, AND THE ENVIRONMENTAL IMPACT OF ELECTRIC MOTORS AND PUMPS

Introduction

According to the International Energy Agency (IEA), “industry and buildings account for over 90% of global electricity demand today.” This means that energy-related greenhouse gas emissions account for the majority of all anthropogenic emissions. In the U.S. this number reaches approximately 80%.

In that same country the biggest consumers of electricity in the residential sector and in buildings overall are space heating and cooling (air conditioning), lighting, water heating, appliances, and electronics. In the commercial sector, the biggest electricity consumption comes from lighting, heating, ventilation, and air conditioning. In manufacturing, more than half of electricity powers motors (machine drives), with other significant uses covering heating and cooling.



It's not difficult to see the connection. Heating, ventilation, and air conditioning (HVAC), appliances, and other electric machines that use most of the electricity in the grid all have motors. Using this common link in a positive way is a huge opportunity to make a significant contribution to the fight for the natural environment.

In the U.S. alone, about one in three consumers prioritize companies that are committed to actively reducing their impact on the environment, which should be motivating enough for manufacturers of electric motors and pumps. But, in many cases it might not be enough. However, using an environmentally friendly design that is more efficient would save money and energy at the same time, thereby ticking all the boxes for everyone from manufacturers to end users.

Motors

According to the U.S. Environmental Protection Agency (EPA), more than half of the electricity used in manufacturing powers various motors. And if we focus on the industrial energy-related carbon dioxide emissions, they reach over 1,300 million tonnes per year in the U.S. alone. Industry in the country is responsible for almost a quarter of its greenhouse gas emissions.

On a larger scale, and in all sectors, things don't look that different. The IEA notes that electric motors and systems account for over 40% of electricity consumption globally. They also state that, despite the small COVID-related decline in 2020 emissions, "global energy-related CO₂ emissions remained at 31.5 Gt, which contributed to CO₂ reaching its highest ever average annual concentration in the atmosphere of 412.5 parts per million." 40% of 31.5 Gt is 12.6 Gt. This is a significant contribution to climate change.

The problem is growing, and the use of electric motors and systems is not going to stop. It will only increase, requiring more electricity to produce the motors and increasing the release of harmful emissions during their manufacturing process as well as during use.

Industry and manufacturing leaders have a chance to make a huge dent in harmful greenhouse emissions and energy use by replacing their motors and systems with improved designs. ABB's calculations show that if high-efficiency motor systems were adopted globally, it would cut electricity consumption by up to 10%. New, more environmentally-friendly and efficient systems should be used in all motor-powered machinery, using energy in a smarter way, therefore decreasing costs and harmful emissions.



Local and Organizational Obligations

There is a wide range of laws and programs regarding green buildings, but the beginnings of sustainable design weren't universally accepted. The push increased in 1990 when Building Research Establishment's Environmental Assessment Method (BREEAM) was launched. A decade later the U.S. Green Building Council (USGBC) released criteria for improving the environmental performance of buildings through the Leadership in Energy and Environmental Design (LEED) rating system for new constructions. Others, including the Green Building Initiative, followed soon after that.

These ideas are not that new, but they are gaining importance and becoming more prominent. LEED now includes rating systems for existing buildings and even whole neighborhoods. In 2019, New York City introduced Local Law 97, which places carbon caps on most buildings larger than 25,000 square feet in the city from 2024 onwards. The caps will become more stringent over time with the target of achieving an 80% reduction in emissions by 2050.

Such initiatives sometimes tend to be tailored to national priorities and local requirements and at other times they are aimed at going beyond the current expectations and practices to reach goals such as net zero energy. Improved technology will help buildings, and even whole geographical areas, reach environmental goals of their local or national governments as well as more ambitious goals that non-governmental organizations suggest.

The Green Switch: Summary

If the industry could implement scalable motors and pumps that are smaller (and therefore require fewer materials during their manufacture), then we're already contributing towards machines and appliances being greener. But if these motors and pumps can also be more efficient, then we will save on electricity and lower the related emissions.

Good machine designers always consider system efficiency in their work for their customers' sake and for their company's bottom line. Because it's not only about the motor or the controller itself. It's about total system efficiency. This approach is how we can make our machinery and appliances greener.

The complexity of electric machine systems is not an obstacle to making a green difference because they all use motors. And it's the motor and the controller system that affect the energy consumption and the harmful emissions released during use, not the system's complexity. This means that the biggest difference can be achieved in the commercial sector (where more electricity is used and where an upgrade will make the biggest difference) and in HVAC systems (since their numbers will only keep growing).

Consumers' green preferences are not always enough. But knowing that improved motors and pumps will use less electricity and save on manufacturing and use costs should convince manufacturers and industry leaders alike to embrace new technology.



ePropelled designs intelligent motors, motor controllers, and power management systems that help reduce energy consumption and dramatically improve system efficiency at a lower cost. Our patented technology and innovative smart systems are equally at home in the air, on the road, and in water, leading the way towards a greener future.

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