CEMEP
European Committee of Manufacturers of Electrical Machines and Power Electronics

* here, we are referring to large industrial grade electric motors, ranging from about 100 W to 100s of kW.

Electric Motors* are everywhere

Hidden but working for you — and essential.

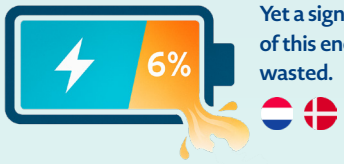
You may not see them, but they are all around you

- pumping clean water to your tap, circulating air in buildings, operating water treatment plants, lifts, cranes, conveyor belts, and keeping machinery running in factories — and many other places.

Highly relevant with water/ waste water, commercial buildings, chemicals, and many other industries

Did you know?

Motor driven applications consume nearly 50 % of all electricity used in the European Union.



Yet a significant amount of this energy is still wasted.

Research shows that up to 6% of total electricity consumption in the EU could be saved by using Variable Speed Drives.
That is more than the combined annual electricity use of the Netherlands and Denmark.

What is the solution?

By default, a motor runs at full speed. In many applications — such as conveyor belts or fans — lower speeds are needed. A **variable speed drive (VSD)** automatically adjusts motor speed to match demand, reducing energy waste (e.g., from brakes or throttles), maintaining performance, and often paying for itself in less than one year.

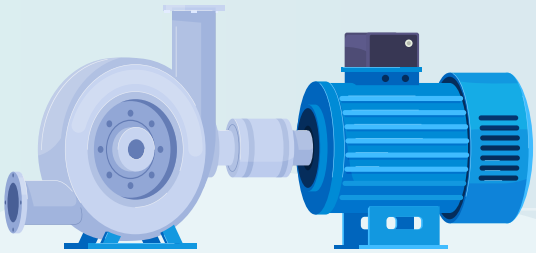
VSDs reduce energy use by controlling motor speed according to demand.

The impact of Variable Speed Drives (VSDs)

A major study by the Fraunhofer Institute for Chemical Technology (ICT), commissioned by CEMEP, highlights the crucial role VSDs play in improving energy efficiency across the European Union. The study shows that VSDs significantly reduce energy use in key motor-driven applications such as pumps, fans, compressors, transport systems and material processing. This is a comprehensive meta-study based on more than 100 references.

A way to improve the regulatory system

Since 2011, regulations have focused on improving the energy efficiency of individual motor components by introducing higher energy efficiency classes. This has led to increased material consumption, in particular copper, steel and aluminium. As a result, costs for manufacturers and users have risen, while overall energy savings have been modest. To make a real difference, component optimisation should be replaced by a system approach.



Did you know?

100s of millions of electric motors are running in the EU right now. **Only 20%** of them have VSDs installed.

Application specific savings potential by the study

The savings potential of VSDs depends on the applications:

- **Variable-flow pumps, fans and compressors** have the highest potential. Around 40% total savings are possible, with approximately 30 % still untapped, especially in pumps and fans. A detailed factsheet for these applications is available on the CEMEP website.
- **Pumps and fans delivering constant flow** still offer potential, for example by avoiding the over dimensioning of motors.
- **Transport and material processing applications** show a savings potential of around 15%.

Much of this has already been realised by the market.

A system approach that works

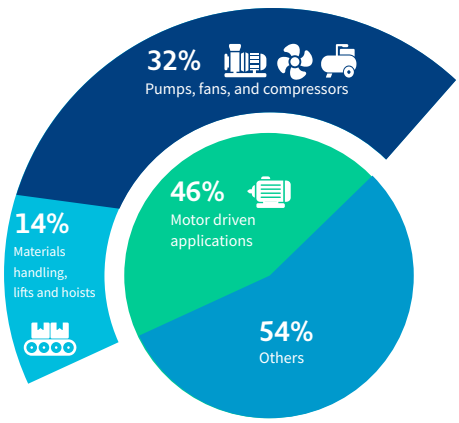
VSDs can provide a much more effective solution. They have been available at scale for decades and are well proven. At the same time, their functionality has improved dramatically. Modern VSDs can now offer:

- **Recovery** of energy back to the grid
- **Prediction** of faults before failure occurs
- **Real-time** optimisation of motor operation
- **Remote monitoring** and diagnostics
- **Cloud connection** and access to digital tools and applications

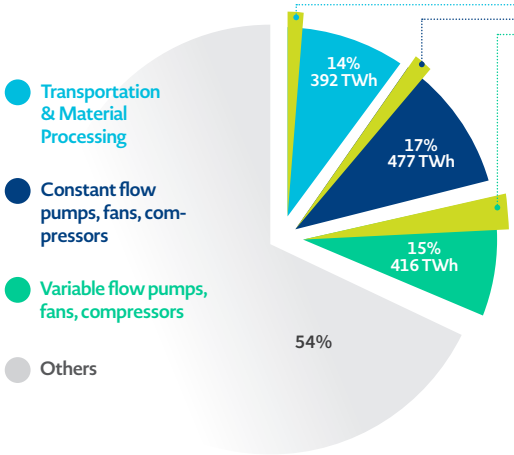
What can we do? CEMEP recommends...

- **Increase transparency and raise awareness** of energy and CO_2 savings potentials, among end-users.
- **Replace or retrofit inefficient technologies** in existing installations wherever possible.
- **Support the use of VSDs to achieve minimum energy consumption** in a commercially viable way, with payback period of less than one year in many cases.
- **Avoid further ineffective component-based legislation** that leads to higher cost, complexity and demand for critical materials without significant energy savings.

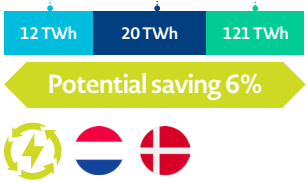
EU Total Electrical Energy Consumption 2021 (%)



» Total Energy Consumption 2776 TWh



Potential savings with VSDs (TWh)



Using Variable Speed Drives could save up to **6%** of the EU's electricity, exceeding Denmark's and the Netherlands' combined annual consumption.

Looking ahead: *A more electric future*

cemep.eu

» ***As we move towards*** achieving net zero, our society will become increasingly electric, moving away from fossil energy sources. This shift will make the potential benefits of VSDs even greater.