



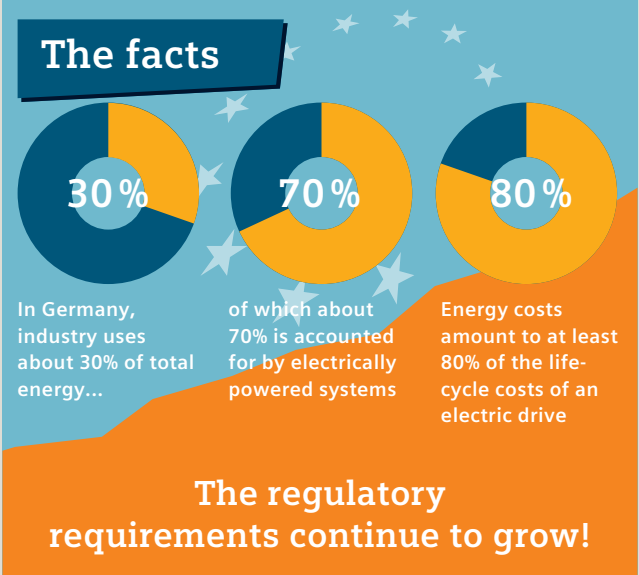
**SIEMENS**

# Energy efficiency in motion

New standard EN 50598 puts the spotlight  
on the entire machine drive system

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# The climate targets of the EU and their impact on industry



The European Commission has defined a sustainable energy industry as a core objective of its Europe 2030 strategy. This includes a reduction of 40 percent in CO<sub>2</sub> emissions, an increase in the proportion of renewable energies to 27 percent and an increase in energy efficiency of 27 percent compared to the figures for 1990. At the same time, there is growing regulatory pressure on industry to further cut back electricity consumption and to implement rapid measures to boost energy efficiency.

Energy-saving drive solutions will play a key role in these efforts, especially considering that nearly 70 percent of electricity requirements in industrial plants is accounted for by electrically powered systems.

## By 2030 CO<sub>2</sub> emissions\* must be cut by 40% – throughout Europe

\* compared to the 1990 level

# Steps to greater efficiency

Since drives offer enormous potential for energy savings, the European Union introduced minimum legal requirements for the energy efficiency of electric motors back in 2011 in the form of the Motor Directive.

However, these measures, which focus exclusively on the motor, are not adequate to achieve the binding targets. With the new European standard series EN 50598, which goes into effect at the end of 2014, the European lawmakers will close this gap and shift the focus from individual drive components to entire drive systems.

## The 3-step plan



1

June 16, 2011: IE 2 motors (0.75–375 kW)

2

January 1, 2015: IE 3 motors (7.5–375 kW)  
or IE 2 motors with speed control

3

January 1, 2017: IE 3 motors (0.75–375 kW)  
or IE 2 motors with speed control

Measures focusing exclusively on the motor are not expected to be sufficient to achieve the binding targets.

### Focus on the new standard

As one of the world's leading providers of drive systems, we are fully prepared for the new standard and are supporting our customers in meeting the requirements of this standard. We offer a comprehensive portfolio covering every area of energy-efficient drive technology – from energy-efficient individual components to an energy-efficient motor system.

# The efficiency standard in detail

The European standard series EN 50598 defines the Ecodesign requirements for drive systems in an electrically powered machine, including energy efficiency and lifecycle analysis. The basis for ascertaining and optimizing the efficiency of electrically powered machines was created with the joint concept drawn up by drive manufacturers and machine builders.

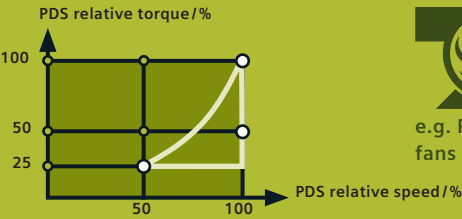
## Introducing and implementing new impulses

The new standard will make an important contribution to improving overall understanding of industrial energy efficiency. In order to achieve a lasting improvement in industry, the interaction as well as application know-how must be taken into account. Firstly, it will be necessary to establish wider specifications for drive systems (see graphic). Secondly, it is imperative to include operation-relevant data with respect to the product approach, such as load profiles for determining energy efficiency. The main energy guzzlers can then be identified and weak spots eliminated in the subsequent analysis.

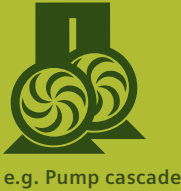
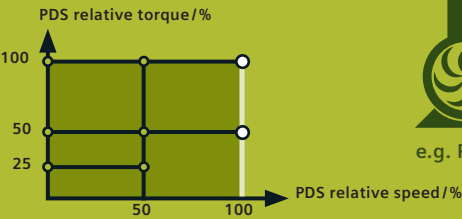
In this way, the new standard introduces important new input and ideas which must be implemented in practice. We are backing this development and will use our expertise to drive it forward.

## Examples for various machines

### Load torques $M \sim n^2$



### Fixed speed drive $n = \text{const}$



# Higher efficiency with the extended product approach

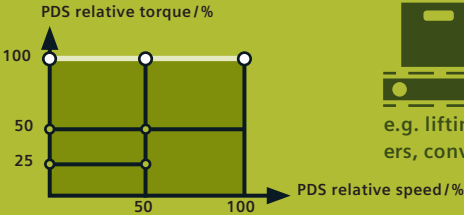
The extended product approach includes a power-driven machine including drive and takes the mode of operation into account. The new standard therefore includes all efficiency-specific variables of machine operation in analysis. Machine builders and system integrators can calculate and optimize the losses of their electrically powered machines with the resulting drive data.

## Precise analysis

Through the inclusion of standardized and application-specific operating values such as load profile and control curve of the driven equipment, the most efficient solution for an electrically powered machine can be calculated by determining the energy efficiency level.

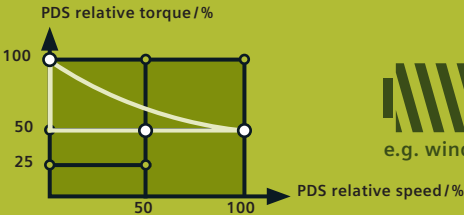
That means that in future it will not be the directive for components that dictates the requirements with regard to the loss level at the individual operating points, but machine builders through the required machine efficiency.

### Load torques $M = \text{const}$



e.g. lifting gear, extruders, conveyor belts

### Load torques $M \sim 1/n$



e.g. winders, winches

# Calculating the loss at defined operating points

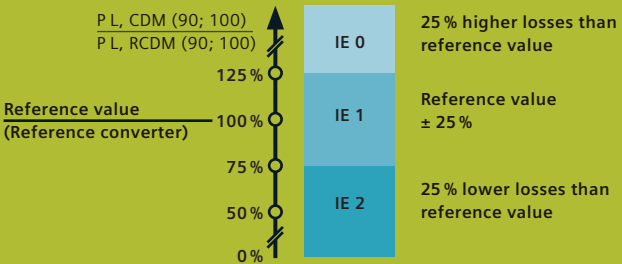
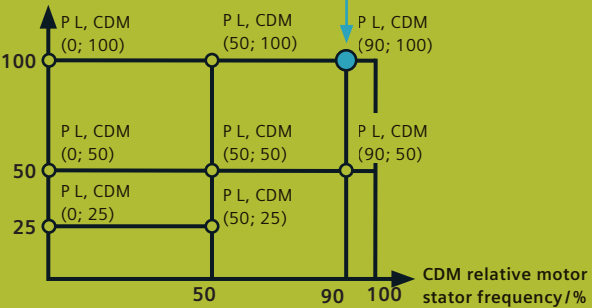
Through the definition of efficiency classes and by determining losses for converters and electrical drive systems, users can in future allocate and determine the energy requirement of their machine on the basis of application-specific load profiles. This is relevant, for example, for pump, fan and compressor applications since in this case up to 70 percent of electricity costs can be saved through the use of efficient drive technology.

## Determining efficiency classes

### Control Drive Module (CDM\*)

CDM relative torque current / %

Determining efficiency classes IE 0 – IE 2



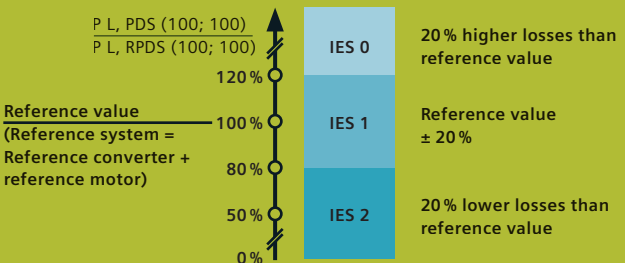
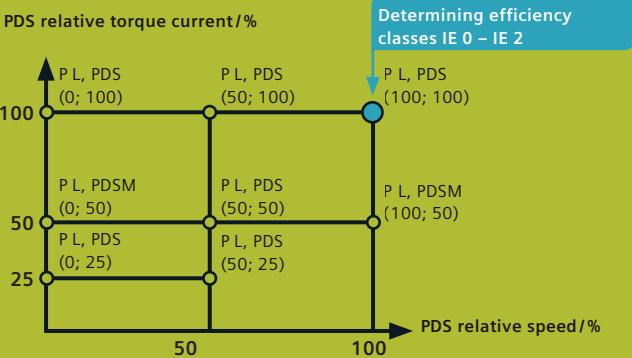
\* CDM = converter

### Simple classification

For the sake of compatibility with all machines, operating points at full and partial load are defined in the new standard at which motor and drive system losses are to be determined.

Information about losses at the operating points under partial load will highlight the advantages of a variable-speed drive. Furthermore, provision is made for the classification of frequency converters and motor systems into efficiency classes which would allow simple categorization.

## Power Drive System (PDS\*)/ motor system



\* Motor system = Motor with converter or motor starter  
PDS = Motor with converter

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Find out information about current legislation and standards which set new standards and binding guidelines.



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