



SEAD

SUPER-EFFICIENT EQUIPMENT AND  
APPLIANCE DEPLOYMENT INITIATIVE

Governments Working Together to Save Energy.

## Energy Efficient Motors: Advantages throughout the supply chain

In crowded markets, it can be hard to make your product stand out from the competition. But when design changes result in improved technical performance an ongoing source of cost savings, and green credentials, it is little wonder that so many OEMs incorporate higher efficiency motors in their designs.

### The benefits of energy efficient motors

For most products that incorporate a motor, the ongoing energy costs that accumulate when the motor is operating dominate the true cost of ownership. Over its lifetime, the cost of a motor can easily exceed 100 times the purchase cost. In fact, the energy costs of using the motor during the first month of use can be as much as the cost of buying it in the first place.

The use of a higher efficiency motor offers a clear way to further enhance the appeal of premium brand OEM products. The cost savings are convincing, and can clinch the sale for those purchasers who have an interest in the lifetime costs of ownership. And the higher price may help give OEMs a higher margin, too. For informed clients who make purchases based on lifecycle costs, or simply want to demonstrate their sustainability credentials, offering higher efficiency motors with your products is a simple way to increase sales.

Not only do clients save money, but through their lower operating temperatures super-efficient motors fail less often, reducing the cost and inconvenience of getting motors repaired. Because these motors have less losses, they emit less heat, reducing the burden on any cooling systems. This reduced heat loss means that less heat is created, and so a quieter fan can be used.

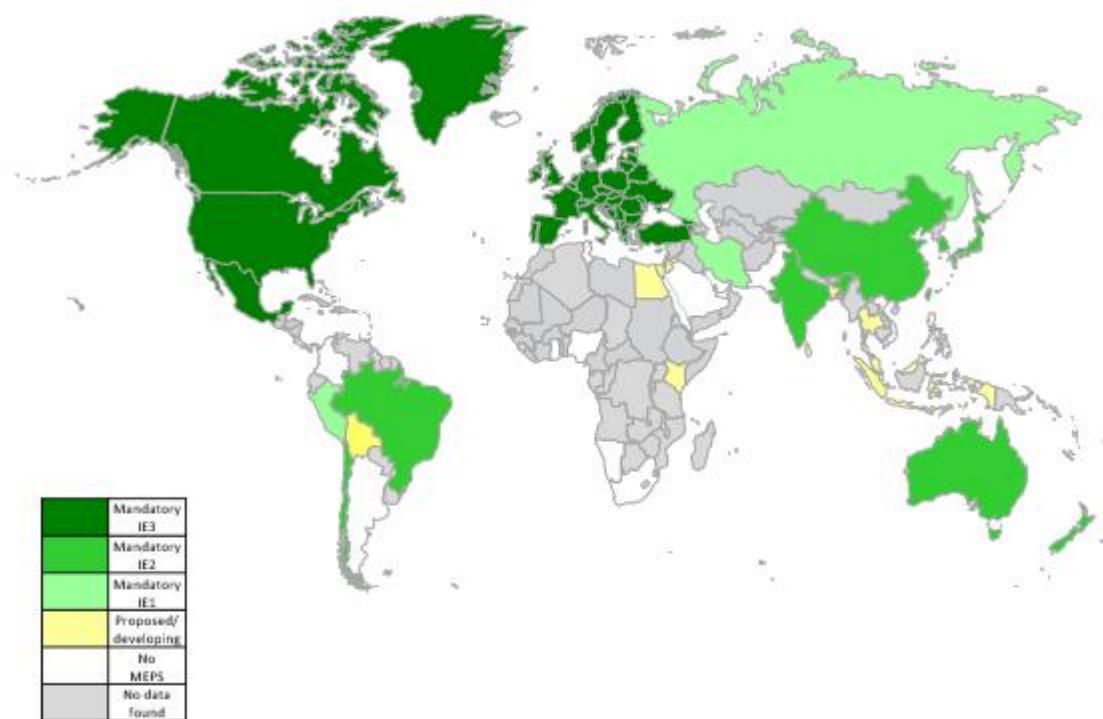


Figure 1: Global MEPS for induction motors

## International Motor efficiency standards

In many leading economies, regulators have put in place minimum energy performance standards (MEPS) that apply to many types of motors. Current regulatory minimum energy performance levels are shown in the map above.

The issue of a new IEC test method in 2014<sup>1</sup> marks almost complete global harmonization on a single motor efficiency test standard. This simplifies testing and reduces costs for selling motors in different markets.

In addition, this single test standard has made possible an internationally-agreed set of tiers that countries can

use for motors MEPS. The tiers are specified in another new IEC standard<sup>2</sup> containing the IE1 to IE4 efficiency levels.

With these two fundamental standards in place, it has become much easier for regulators to see how MEPS in their country compare to those in other economies. The effect of this in major economies has been the gradual raising of MEPS first to IE2, and then on to IE3.

For manufacturers, OEMs and distributors, this results in a reduction in design variants, producing cost savings in production control and stockholding costs. This in turn increases competition and drives down prices further, helping to overcome the small incremental cost of manufacturing higher efficiency motors.

<sup>1</sup> IEC60034-2-1 Ed 2.0 (2014 edition) Rotating electrical machines - Part 2-1: Standard methods for determining losses and efficiency from tests (excluding machines for traction vehicles)

<sup>2</sup> IEC 60034-30-1 Ed. 1.0 2014 Rotating electrical machines - Part 30-1: Efficiency classes of line operated AC motors (IE code)



## Where next for motor standards?

So far, no regulator has implemented MEPS beyond IE3. Instead, the focus is now on expanding the types of motors that are regulated. Currently, the commonly regulated motors are in the 1 – 500hp (0.75 – 375kW) size range. Expanding regulations to cover motors as small as 120W, and including single phase motors, will capture many more models. For OEMs using standard induction motors, it is worth ensuring that new products are capable of using these more efficient designs. The most obvious difference is that the more efficient motors will be slightly longer.

Of course, IE4 induction motors are now available from a growing band of manufacturers, and so it is possible that at some future date regulations may be pushed to higher levels. Now that regulations have increased user awareness of motor efficiency, more and more users understand the cost benefits of paying a bit more upfront

The cost savings of higher efficiency motors are convincing, and a new harmonized IEC test method simplifies testing and reduces costs for selling motors in different markets.

for ongoing savings in energy bills. For premium motors, the presence of an IE4 motor brings a very tangible lifetime reduction in ownership costs that can add to a product's appeal. Financial incentives offered in some countries to buy IE4 motors, plus the use of associated logos or other marketing, can really make these products stand out.

## Why use higher efficiency motors?

Pros	Cons
Lower energy costs	Higher first purchase price
Generate less heat	Can be longer and so hard to fit in to existing designs
Quieter operation	Greater weight
Longer lifetime	
Premium product image	
Higher margin	
Green credentials	

## The SEAD Global Efficiency Medal

The SEAD Global Efficiency Medal is a prestigious award given to products that demonstrate the greatest energy efficiency. The SEAD Award for electric motors seeks to advance energy efficiency by:

- Recognizing products with the best energy efficiency
- Guiding buyers who want to purchase the most energy efficient products
- Demonstrating achievable levels of efficiency with commercially available and emerging technologies

The results of the inaugural 2014 competition reflected the different highest efficiency products available in different regions, and importantly showcased not only IE4 motors, but also hinted at prototype motors approaching IE5. While increasing MEPS beyond IE3 is not yet being seriously discussed, the competition shows motor technology has not yet reached its peak, and increasing electricity prices and lower cost of technology could yet change this position.

It was also clear that for many traditional induction motor manufacturers, the future path for improved efficiency leads to newer types of inverter driven motors. Designs based on permanent magnet rotors or synchronous types offer inherently lower losses than squirrel cage induction motors. Not every product will benefit from variable speed operation, but for those that do, exploring these new types can offer best in class performance for the product. At the



same time, growing confidence with new technologies, especially when they are just part of an OEM product from a trusted supplier, means that consumers are far less concerned by the exact motor technology used.

More information about SEAD can be found at:

<http://superefficient.org/motorawards>

### About SEAD // The Super-efficient Equipment and Appliance

Deployment (SEAD) Initiative of the Clean Energy Ministerial (CEM) and the International Partnership for Energy Efficiency Cooperation (IPEEC) helps turn knowledge into action to accelerate the transition to a clean energy future through effective appliance and equipment energy efficiency programs. SEAD is a multilateral, voluntary effort among Australia, Brazil, Canada, Chile, the European Commission, Germany, India, Indonesia, Japan, South Korea, Mexico, Russia, South Africa, Sweden, the United Arab Emirates, the United Kingdom, and the United States.