

Megatrends Supporting Energy Efficiency and Requirements for Effective Implementation

Abstract

This paper aims to clarify upcoming energy efficiency related development in the next 15 years, mainly on a general level but also help end users understand the development and changes in energy intensive industry. There are a few key megatrends linked to energy efficiency:

- 1) Governments' target to cut correlation between economic growth and primary energy use and to improve energy security
- 2) Global competition, where companies in countries with high energy costs have to compensate the energy related competitive disadvantage with more intelligent energy usage
- 3) Growing importance of regional trade unions (NAFTA, MERCOSUR, ASEA, EU, EurAsEC) in energy politics and usage of energy trade as a political instrument.

Energy efficiency (EE) is the element that addresses all above mentioned megatrends. While the impact of EE to life time costs is self-evident on micro-level, on macro-level EE has an impact to energy security and infrastructure investments. Reduced energy consumption diminishes energy prices [1] and improves the trade balance [2]. Also, it positively influences energy security and reduces investment needs in new power generation capacity, in transmission and distribution grid investments and grid balancing. All these elements have an impact to the industrial competitive situation, especially in Europe where energy prices for industry are 2-3 fold compared to the USA.

Monitoring energy consumption on an everyday basis is essential to managing energy costs and improving the productivity and competitiveness of European enterprises. Running old inefficient equipment is a general practice, in the domestic, commercial and industry sector. Several examples prove that a demand-side market does not focus on life time costs in purchasing electrical motors but concentrates on capital expenditures instead [3]. This market failure must be fixed with supply-side regulation, as is done in the form of MEPS in many countries and regions. Examples from the USA and EU provide clear evidence that for a change in market behavior, voluntary EE agreements do not suffice but mandatory regulation is needed. [4] Regulation shall be ambitious and drive technological progress. In this sense European legislation lags behind the US.

The drawback is that MEPS cover only new products. An extensive study [5] in the USA focusing on installed base and user behavior in motor market shows that for every new motor sold 3 to 5 motors are repaired. As a consequence ANSI approved EASA standard AR100-2010, "recommended practice for the repair of rotating electrical apparatus" ensuring that the efficiency of motors remains at a good level after rewinding.

Existing MEPS have differences in power ranges, voltage levels, and in other details. These differences are technical barriers for global motor trade. Therefore international standardization organizations, industrial federations and governments should take action towards unified energy efficiency regulation.

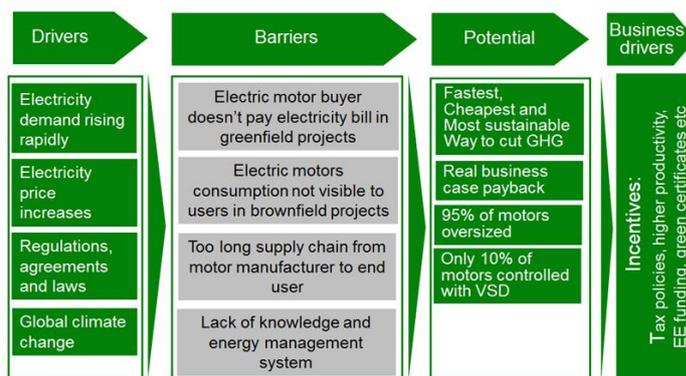


Figure 2. Barriers to buying new motors

The World Market for Low Voltage Motors
Legislative Timeline - 1997 to 2017

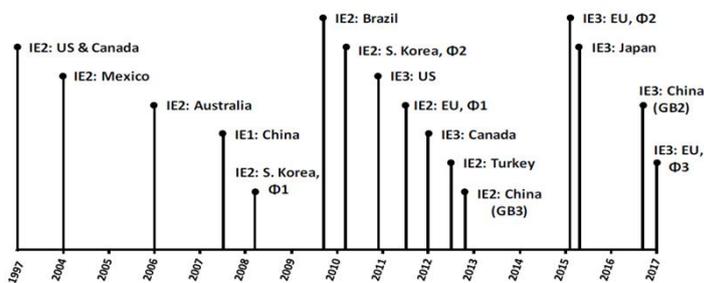


Figure 3: Regulation timeline for LV motors 1997-2017 (IHS 2013).

Conclusions

From this study it can be concluded that motor markets do not work like the efficient market hypothesis presumes. In an ideal world end users would choose energy efficient motors that help in saving energy, thus relieving a company's cost pressures that stem to a large part – especially in the manufacturing industry – from electricity. This is on micro level. The joint behaviour of many companies produces the macro level, where energy efficient equipment alleviates the pressure on electricity distribution networks and even diminishes the need for building new power plants.

The declining energy prices, due to shale gas, give US companies an edge over European companies that have to pay a higher price for their energy. This could be fought with a widespread usage of energy efficient motors, but instead Europe lags behind the US in regulating the markets. In Europe only IE2 class motors are mandatory whereas the USA mandates the use of IE3 motors.

Also problematic to a wide scale adoption of new motors are the differences in Minimum Efficiency Performance Standards (MEPS). The MEPS are different in different parts of the world which makes multinational companies' international sourcing difficult. Also motor manufacturers suffer from having to pursue the national guidelines which compel them to produce smaller series.

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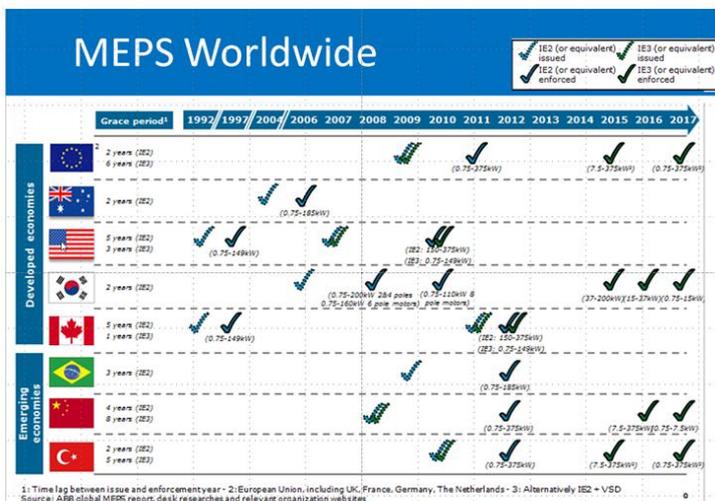


Figure 1. MEPS Worldwide. (ISR – University of Coimbra, June 11, 2013)