

# **BNM02: Minimum Efficiency Performance Standards (MEPS) for electric motors**

**Version 3.0**

This Briefing Note and referenced information is a public consultation document and will be used to inform Government decisions. The information and analysis form part of the Evidence Base created by Defra's Market Transformation Programme.

## **1 Summary**

Existing policy measures encouraging the uptake of high-efficiency motors in the UK are reaching the limits of their potential, and sales of these motors have slowed and are near constant at about 17%. Experience from other countries has shown that voluntary incentive measures will lead to between 10% and 20% market penetration by high-efficiency motors. These countries have found that the only other effective method of increasing uptake of high-efficiency motors is through the implementation of mandatory Minimum Efficiency Performance Standards (MEPS).

## **2 Background**

This Briefing Note provides a background as to why adopting agreed MEPS for motors sold in the UK is expected to lead to changes in the market and deliver associated reductions in carbon emissions.

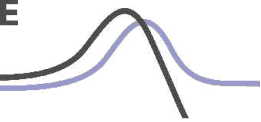
## **3 Electric motor market**

The voluntary EU/CEMEP<sup>1</sup> motor labelling scheme launched in 1999 effectively reduced sales of EFF3 (low-efficiency) motors and by 2003 their sales were 11% of the four pole motor market and 9% of the two pole market, and to date these have continued to decline. At the same time sales of high-efficiency motors were at 12% and this increased to approximately 17% in 2006, though growth is now thought to have slowed.

Analysis of the evidence suggests that to realise further substantial energy savings with electric motors, an MEPS may need to be adopted in the UK; this is discussed in section 3.2 '*Effects*'.

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<sup>1</sup> European Committee of Manufacturers of Electrical Machines & Power Electronics.



## 3.1 MEPS - international practice

MEPS prescribe minimum efficiencies (or maximum energy consumption) that products must achieve and are enforced by law. Experience from other countries where minimum standards have been implemented shows that this is the most effective method of uplifting overall motor efficiency performance levels.

The benchmark has been set in the USA where, as part of the Energy Policy Act of 1992 (EPA Act), minimum efficiencies for the most popular motor types were required to meet prescribed MEPS levels. In addition to this, motor manufacturers agreed a set of higher efficiency levels to label and promote the highest efficiency motors; subsequently, the NEMA Premium standard was launched in 2001.

Approximately 65 - 70% of all motors sold are included within the scope of the EPA Act regulations, and in 2003 around 20% of these motors also met the NEMA Premium standard.

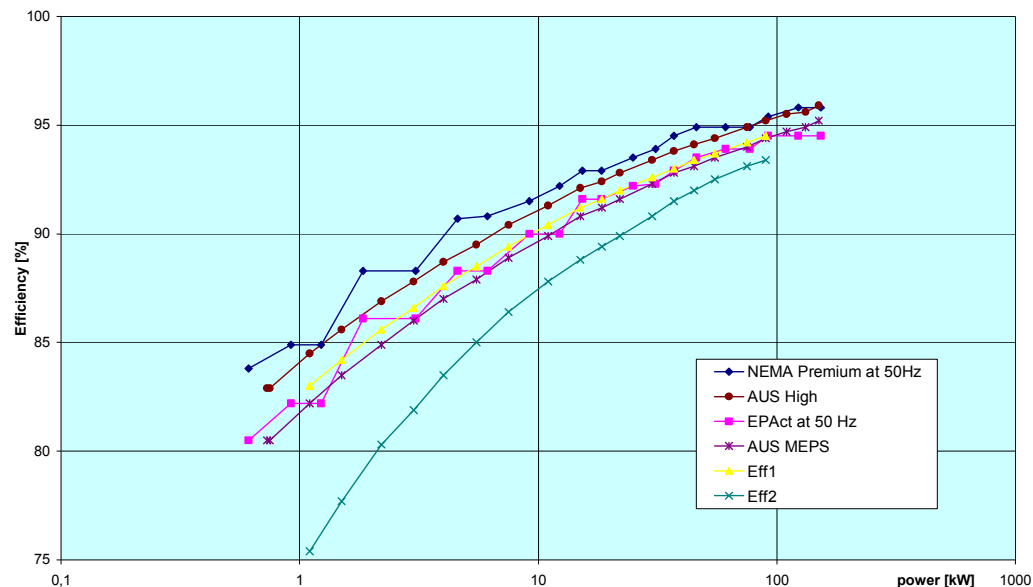
In Australia, a motor MEPS was introduced in 2001 where minimum levels were equivalent to the EU/CEMEP EFF2 class. The MEPS levels have since been raised again in April 2006. The new levels are roughly equivalent to those in the USA (in line with the Australian Government's decision to match the world's best regulatory practice for these products). The effect of this second round of MEPS is that from April 2006 only EFF1 equivalent motors may be imported into Australia (see Figure 1 below for an illustration).

The Australian MEPS are more embracing than the European voluntary EU/CEMEP agreement, in that they cover motors from 0.73 kW to 185 kW (whilst the EU/CEMEP labelling scheme only covers motors from 1.1 kW to 90 kW).

Almost all motor suppliers in the UK are able to offer EFF1 labelled motors. In the UK and Europe (and other 50 Hz markets such as Australia) motors with a step change increase in efficiencies above the EU/CEMEP EFF1 label are now available. The EU/CEMEP labelling scheme as it currently stands does not provide for these motors. It is therefore important to revise the scheme and associated motor test standards. For further guidance on this issue, please refer to Briefing Note BNM01: *Revising EU motor labelling scheme and MTP actions to increase UK adoption of higher efficiency motors*.

Figure 1 shows the relative differences between the minimum efficiency requirements of the various measures applied in Australia, Europe and the USA.

**Figure 1 Comparison of minimum efficiency requirements of measures in Australia, Europe and USA<sup>2</sup>**



## 3.2 Effects

MTP's P1 scenario for motors and the resulting savings compared to a 'business as usual' Reference case are shown in Table 1. This scenario could result in cumulative energy savings of more than 16 TWh by 2020.

The P1 scenario assumes that MEPS are set at the current EU/CEMEP level, EFF1, in the year 2010, and then uplifted in 2015 and again in 2020. Most of the energy savings shown would be due to the MEPS.

**Table 1 Projected effects of an EFF1 equivalent MEPS introduced to the UK**

		Reference	P1 scenario	
	Total stock (million)	Annual electricity consumption (TWh)	Electricity saved per annum (TWh)	Carbon saved per annum (kt)
2010	11.5	152.0	0.1	11.2
2015	12	155.5	1.2	155.0
2020	12	159.0	3.5	429.0

The price premium of an EFF1 labelled motor above that of an EFF2 labelled motor currently ranges between 10% and 30%; it is anticipated that this premium will reduce as sales volumes of EFF1 motors increase.

<sup>2</sup> Source: [www.ecomotors.org](http://www.ecomotors.org). EuP Study for European Commission, Lot 11 – Electric Motors (1 – 150kW). Authors: Almedia, Ferreira, Fong & Fonseca, University of Coimbra.

## 4 Recent developments

In late 2006 a proposal was made to the IEC to develop a new labelling scheme for AC induction motors, and this was accepted. Consequently, an IEC working group is working on the development of a new standard, IEC60034-30, and it is hoped that this standard will be finalised and published in 2008.

In accordance with the requirements of the European Commission's Energy Using Products Directive<sup>3</sup> (2005/32/EC), preparatory studies are currently being carried out to assess the suitability of a number of products for the imposition of implementing measures that will result in a reduction in their environmental impact. Electric motors (1-150 kW)<sup>4</sup> are among the group of products being studied and it is likely that energy efficiency will be a key consideration, and this will lead to the implementation of MEPS. The study is due to conclude in December 2007 and the EuP Consultation Forum will then convene to consider implementing measures. More details are available via [www.mtprog.com/EuP.aspx](http://www.mtprog.com/EuP.aspx).

In the USA, the National Electrical Manufacturers Association (NEMA) and the American Council for an Energy-Efficient Economy (ACEEE) announced<sup>5</sup> on 27 March 2007 that they have reached consensus on federal standards for energy-efficient motors. They have jointly recommended important changes and additions to the current national energy-efficiency standards for industrial electric motors to Congressional energy committees for their consideration in legislation now under development in the USA. This effectively means that minimum performance standards for electric motors will be uplifted from the current levels described under EPCAct to NEMA Premium levels within 36 months from the enactment of legislation.

## 5 Conclusions

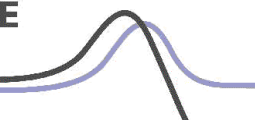
- Introducing EFF1 level motor MEPS in 2010, with subsequent uplifts in 2015 and 2020, could result in up to 3.5 TWh of direct energy savings annually to the UK by 2020.
- Under the current labelling scheme the most suitable MEPS level would be set at EFF1, which leaves no scope to identify and promote future best-in-class products.
- A revised labelling scheme could allow for the setting of both future MEPS levels and definitions of best-in-class products.
- The introduction of MEPS (set at a suitable level, eg EFF1) could be implemented at minimal cost, and would eliminate sales of lower performing motors.

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<sup>3</sup> See MTP Briefing Note: BNXS03: Framework Directive for the Ecodesign of Energy Using Products (EuP Directive)

<sup>4</sup> See: [www.ecomotors.org](http://www.ecomotors.org)

<sup>5</sup> See [www.nema.org/media/pr/20070328b.cfm](http://www.nema.org/media/pr/20070328b.cfm)



## 6 Related critical issues

The following points are discussed in Briefing Note BNM01 *Revising EU motor labelling scheme and MTP actions to increase UK adoption of higher efficiency motors*:

- The current voluntary motors labelling scheme in use in Europe is now lagging behind the market and urgently needs updating to be effective.
- A new internationally harmonised labelling scheme is under development and this may serve to reduce variations in motor efficiency.

### Related MTP information

- MTP Consultation Document – Improving the Energy Performance of Motor Driven Systems
- Briefing Note BNM01: Revising EU motor labelling scheme and MTP actions to increase UK adoption of higher efficiency motors
- Briefing Note BNM06: Energy efficiency test standards for ac induction motors
- Briefing Note BNXS03: Framework Directive for the Ecodesign of Energy Using Products (EuP Directive)
- BNXS01: Carbon emission factors for UK energy use

### Changes from version 2.2

- Updated energy saving figures and carbon emission values in line with revised savings/emission values as defined in BNXS01: Carbon emission factors for UK energy use (13 August 2008).
- Updated Figure 1, 'Comparison of minimum efficiency requirements of measures in Australia, Europe and USA'.
- Restructured section headings to make the document more concise.
- Introduced section 4, 'Recent developments'.

### Consultation and further information

Stakeholders are encouraged to review this document and provide suggestions that may improve the quality of information provided, email [info@mtprog.com](mailto:info@mtprog.com) quoting the document reference, or call the MTP enquiry line on +44 (0) 845 600 8951.

For further information on related issues visit [www.mtprog.com](http://www.mtprog.com)