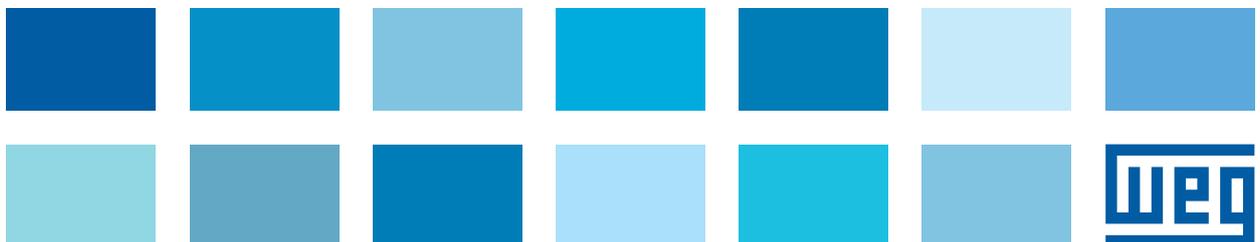


The most efficient route to energy efficiency

You, WEG and the European energy
efficiency standards



Electric motors and the environment

A large proportion of energy consumption – and therefore of carbon emissions – can be attributed to industry. Of that energy consumption, as much as 70% can be directly attributed to electric motors. That is why governments around the world are implementing energy efficiency programmes specifically targeted at electric motors and at reducing their energy consumption.

Almost all major economies around the world already have some form of regulatory scheme for motor efficiency in place. Europe has lagged behind, only putting a voluntary agreement in place in 1999. Signed by 36 motor manufacturers – including WEG, of course – this has helped to reduce sales of the most inefficient motors.

However, around 85% of European motor sales are still in the lowest efficiency bracket, whilst in North America 70% of electric motors sold are in the next two highest efficiency brackets.





‘A concrete contribution’

A European Community Directive – number 640/2009 – was finally put into effect in July 2009, which will ultimately lead to the implementation of mandatory efficiency levels for electric motors sold in the European market. Various elements of the Directive are being introduced and becoming law in phases – beginning in June 2011 – as shown in the timeline on pages 6/7.

EU Energy Commissioner Andris Piebalgs hailed the proposals as, “a concrete contribution to reaching the EU’s energy efficiency and climate protection targets...resulting very quickly in significant energy savings and benefits for society and industry.”

The European Commission estimates that – across the 27 European Union member states – the new legislation could save around 135TWh by 2020. That’s the equivalent to the entire annual electricity consumption of Sweden. At the same time, the measures could save approximately €9bn Europe-wide, and reduce carbon dioxide emissions by around 63 million tonnes.

Questions and answers

As one example of the potential effects of legislation, the UK Government estimates that the benefit of legislation in the UK – to UK industry and business alone – will be in the region of £200m per annum, as well as saving at least 1 million tonnes of CO₂ emissions every year.

But for you and your business, new legislation may also cause some initial problems.

For example, if you need new motors before legislation comes into effect, which ones should you choose? Once legislation is in place, which manufacturer will offer the most cost-effective compliant solution? Will there be a knock-on effect on the performance and efficiency of the machinery in your application when you upgrade your motor? How soon can you expect payback from a new motor? And where can you find answers to all your questions?

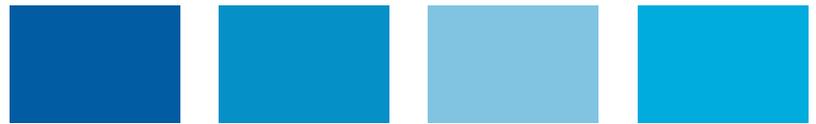
As one of the world’s largest manufacturers of electric motors, WEG – and this brochure – can help.

...we call it **WEGnology**

An aerial photograph of a large industrial facility, possibly a power plant or refinery, featuring several tall cylindrical silos, a complex network of conveyor belts, and various structural steel frameworks. The facility is situated near a body of water, with a road and some trees in the foreground. The sky is filled with dramatic, dark clouds, and the overall color palette is a monochromatic blue-grey.

*“WEG can help motor purchasers
to make the right choices to meet
the new standards and also their
productivity requirements and
sustainability commitments.”*

Milton Castella, Engineering Director, WEG



The energy efficiency legislation

Most major economies already have energy efficiency legislation in place, for everything from refrigerators to lighting to televisions. The EU is catching up with the introduction of the EuP Directive (EcoDesign Requirements for Energy-Using Products), and the European Minimum Energy Performance Standard (EU MEPS) which is aimed specifically at electric motors.

What parameters will the new legislation set?

The new scheme will be based on the efficiency classes defined in the IEC 60034-30 standards, published by the International Electrotechnical Commission (IEC). These range from IE1 (the low efficiency category) up to IE4, the super-premium efficiency category.

What motors does EU MEPS cover?

The new legislation covers 2-, 4- and 6-pole single speed, three-phase induction motors in the power range 0.75-375kW, rated up to 1000V and for continuous duty operation.

What is the first stage?

All single-speed, three-phase squirrel cage induction, 2-, 4- or 6-pole motors with output ratings from 0.75-375kW will be required to achieve at least IE2 efficiency level. This stage comes into effect on 16th June 2011.

What is the second stage?

Motors rated from 7.5-375kW will be required to achieve IE3 efficiency level, or meet the IE2 level and be equipped with a variable speed drive. This stage comes into effect on 1st January 2015.

What is the third stage?

The same regulations will be extended to apply to motors from 0.75-375kW. IE2 motors can still be used if equipped with a variable speed drive. This stage will come into effect on 1st January 2017.

When will IE4 motors become mandatory?

There are no plans to make IE4 rated motors mandatory, because there are no current defined efficiency values for this class. However, it is expected it will cover super-premium technologies such as permanent magnet motors which are available today from WEG.

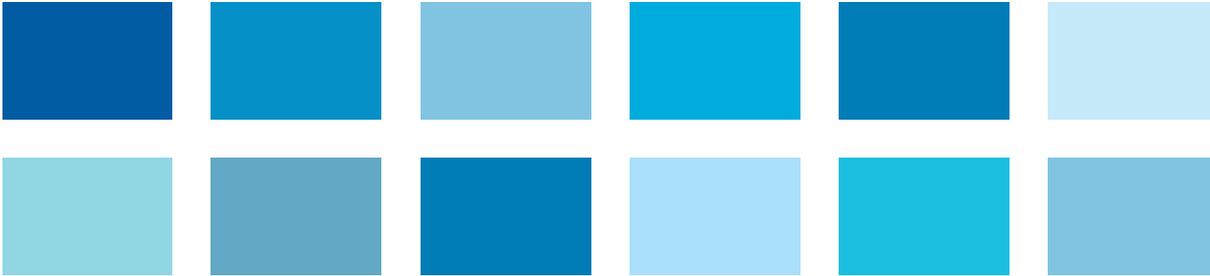
Will Variable Speed Drives (VSDs) come under the legislation?

There will be no minimum requirements set for VSDs as there are currently no harmonised efficiency test standards or classification methods. A mandate has been issued for the development of these.

How can you tell if a motor qualifies?

The scheme requires manufacturers to show the International Efficiency (IE) class and efficiency values on motor rating plates and in product documentation.





The new energy efficiency levels

The new efficiency levels being introduced for electric motors under the European Minimum Energy Performance Standard (EU MEPS) are defined in Table 1. The levels are cross-referenced in Table 2 with approximately comparable energy efficiency schemes in other countries.

The legislation timeline

This is the proposed timetable for the phased introduction of the EU MEPS legislation into the EU.

- **16th June 2011 – Stage 1**
Motors must comply with IE2 efficiency level
- **1st January 2015 – Stage 2**
Motors with a rated output of 7.5-375kW must comply with either IE3 efficiency level or IE2 if fitted with a Variable Speed Drive (VSD)
- **1st January 2017 – Stage 3**
Motors with a rated output of 0.75-375kW must comply with either IE3 efficiency level or IE2 if fitted with a VSD

European efficiency levels (Table 1)

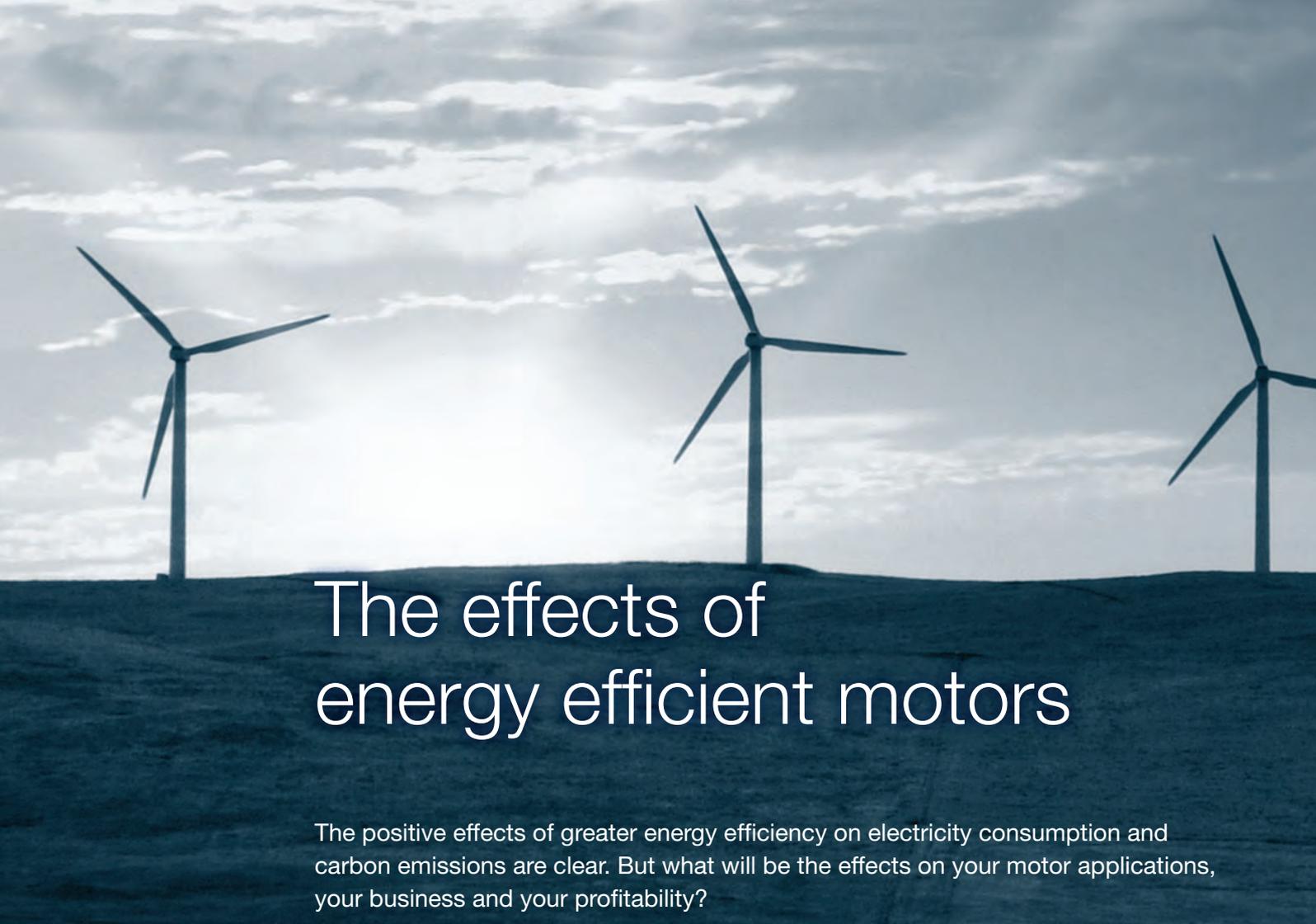
Output kW	IE1 - Standard Efficiency			IE2 - High Efficiency			IE3 - Premium Efficiency		
	Poles			Poles			Poles		
	2	4	6	2	4	6	2	4	6
0.75	72.1	72.1	70.0	77.4	79.6	75.9	80.7	82.5	78.9
1.1	75.0	75.0	72.9	79.6	81.4	78.1	82.7	84.1	81.0
1.5	77.2	77.2	75.2	81.3	82.8	79.8	84.2	85.3	82.5
2.2	79.7	79.7	77.7	83.2	84.3	81.8	85.9	86.7	84.3
3	81.5	81.5	79.7	84.6	85.5	83.3	87.1	87.7	85.6
4	83.1	83.1	81.4	85.8	86.6	84.6	88.1	88.6	86.8
5.5	84.7	84.7	83.1	87.0	87.7	86.0	89.2	89.6	88.0
7.5	86.0	86.0	84.7	88.1	88.7	87.2	90.1	90.4	89.1
11	87.0	87.6	86.4	89.4	89.8	88.7	91.2	91.4	90.3
15	88.7	88.7	87.7	90.3	90.6	89.7	91.9	91.1	91.2
18.5	89.3	89.3	88.6	90.9	91.2	90.4	92.4	92.6	91.7
22	89.9	89.9	89.2	91.3	91.6	90.9	92.7	93.0	92.2
30	90.7	90.7	90.2	92.0	92.3	91.7	93.3	93.6	92.9
37	91.2	91.2	90.8	92.5	92.7	92.2	93.7	93.9	93.3
45	91.7	91.7	91.4	92.9	93.1	92.7	94.0	94.2	93.7
55	92.1	92.1	91.9	93.2	93.5	93.1	94.3	94.6	94.1
75	92.7	92.7	92.6	93.8	94.0	93.7	94.7	95.0	94.6
90	93.0	93.0	92.9	94.1	94.2	94.0	95.0	95.2	94.9
110	93.3	93.3	93.3	94.3	94.5	94.3	95.2	95.4	95.1
132	93.5	93.5	93.5	94.6	94.7	94.6	95.4	95.6	95.4
160	93.8	93.8	93.8	94.8	94.9	94.8	95.6	95.8	95.6
200-375	94.0	94.0	94.0	95.0	95.1	95.0	95.8	96.0	95.8



Efficiency level comparisons (Table 2)

EU MEPS	Europe CEMEP voluntary agreement	US EPAct	Others
IE1 Standard efficiency	Comparable to EFF2	Below Standard efficiency	AS in Australia NBR in Brazil GB/T in China
IE2 High efficiency	Comparable to EFF1	Identical to NEMA Energy efficiency/ EPAct	IS in India JIS in Japan MEPS in Korea
IE3 Premium efficiency	Extrapolated IE2 with 10-16% lower losses	Identical to NEMA Premium efficiency	

Energy efficiency classifications in countries around the world differ widely in what they cover, how they are worded and the parameters they set. The energy efficiency standard developed by the International Electrotechnical Commission was designed to harmonise standards and eliminate these national differences.



The effects of energy efficient motors

The positive effects of greater energy efficiency on electricity consumption and carbon emissions are clear. But what will be the effects on your motor applications, your business and your profitability?

Of course, choosing a reliable, reputable supplier such as WEG will help to ensure a successful transition to new, compliant motors. But there are additional matters – such as your choice of motor, and when and how you upgrade – which also need to be taken into consideration. WEG has the experience and expertise to help you achieve the best result.

Although motors already in the supply chain are exempt from the new standards, any manufactured after June 2011 must be compliant. However, if you need to upgrade an existing motor or invest in a new one before EU MEPS comes into effect, it still makes sense to buy a compliant motor now, for the energy-savings (and, in some countries, carbon tax credits) it will deliver. Replacing a low-efficiency motor with a high-efficiency version will always save money over the life of the motor, and investing in an IE2 or IE3 compliant motor will provide the shortest payback term.

High efficiency motors will increase productivity by improving reliability, and will of course reduce energy consumption. However, there may be knock-on effects on your application: some positive, some negative, but all potentially requiring action.

Mechanical effects

- Most energy loss in motors is dissipated as heat, which is traditionally countered with a cooling fan. Since premium efficiency motors produce less heat, a smaller fan can be used which reduces energy lost via the fan as well as reducing noise.
- The tighter manufacturing tolerances required to produce more efficient motors not only deliver cooler operating temperatures but also help to reduce mechanical stresses. This has the effect of prolonging motor life.
- A more precisely balanced rotor – again due to tighter tolerances – will ensure less energy is wasted and more is converted to torque, which reduces mechanical stress and improves reliability.
- The W22 range of electric motors adheres to IEC standard sizing for IE2 and IE3 efficiency levels, thus eliminating retro-fitting problems.





Electrical effects

- A premium efficiency motor uses less current at full load. The overload protection of the motor will have to be adjusted to compensate.

Installation and application effects

- It is important to check the starting torque on your existing motor, as it can be lower on higher efficiency motors, or can vary according to manufacturer, which means hard to start loads may require an additional or alternative solution. This is something your motor manufacturer can help you resolve.
- It is important to choose the correct size of motor for the application, even if it is replacing a upsized or under-loaded motor. Choosing a motor which will be under-loaded will not improve the efficiency of an energy efficient motor, which typically has its optimum power factor and efficiency at near full load.

Retrofitting effects

- WEG W22 IE2, IE3 and IE4 motors are manufactured to standard IEC frame sizes.
- Upgrading your motors which operate for the longest period in any day or week (water supply pumps, recirculation fans, air compressors, conveyor motors, exhaust fans etc.) will provide the fastest payback.
- Adding a Variable Speed Drive at the same time as upgrading the motor, on any variable torque load (fan or pump, for example), will reduce payback time. Because the VSD slows the motor speed to match the demand for delivery, it consequently reduces power consumption.

With so many factors to be considered, expert help and advice is essential. WEG's experience can help you to find the right motor, for the greatest productivity, shortest payback and longest life.



Achieving energy efficiency with WEG

There's no need to wait until the EU MEPS legislation becomes law, before you start reducing the energy use of your electric motors. Whether you need to invest in new motors for new machinery, or to retrofit a motor, it makes financial sense to choose a compliant model now, which will start to save you energy and reduce your costs immediately.

WEG annually invests millions of pounds in research and development, to create ever more energy efficient electric motors. WEG electric motors offer such high levels of energy efficiency that the return on investment, in most continuous production environments, can result in the equipment paying for itself in little more than a year.

The new W22 range, which exceeds the requirements of EU MEPS, is just one example: potentially reducing the payback term even further, and delivering an even higher return on investment.

A revolution in energy efficiency

The revolutionary new W22 range of three-phase induction motors reduces energy consumption, noise, vibration and cost of ownership. With a revolutionary aerodynamic frame, redesigned cooling system, unique WISE insulation system and new WSeal 'V' Ring with double lip and metallic cap, the W22 range of motors is quieter, more reliable, easier to maintain and more cost-effective.

- Constant efficiency from 75% up to nominal load
- Energy-loss reduction between 10% and 40%
- Exceeds minimum EU MEPS energy-efficiency levels
- High performance
- Maximum durability
- Easy maintenance

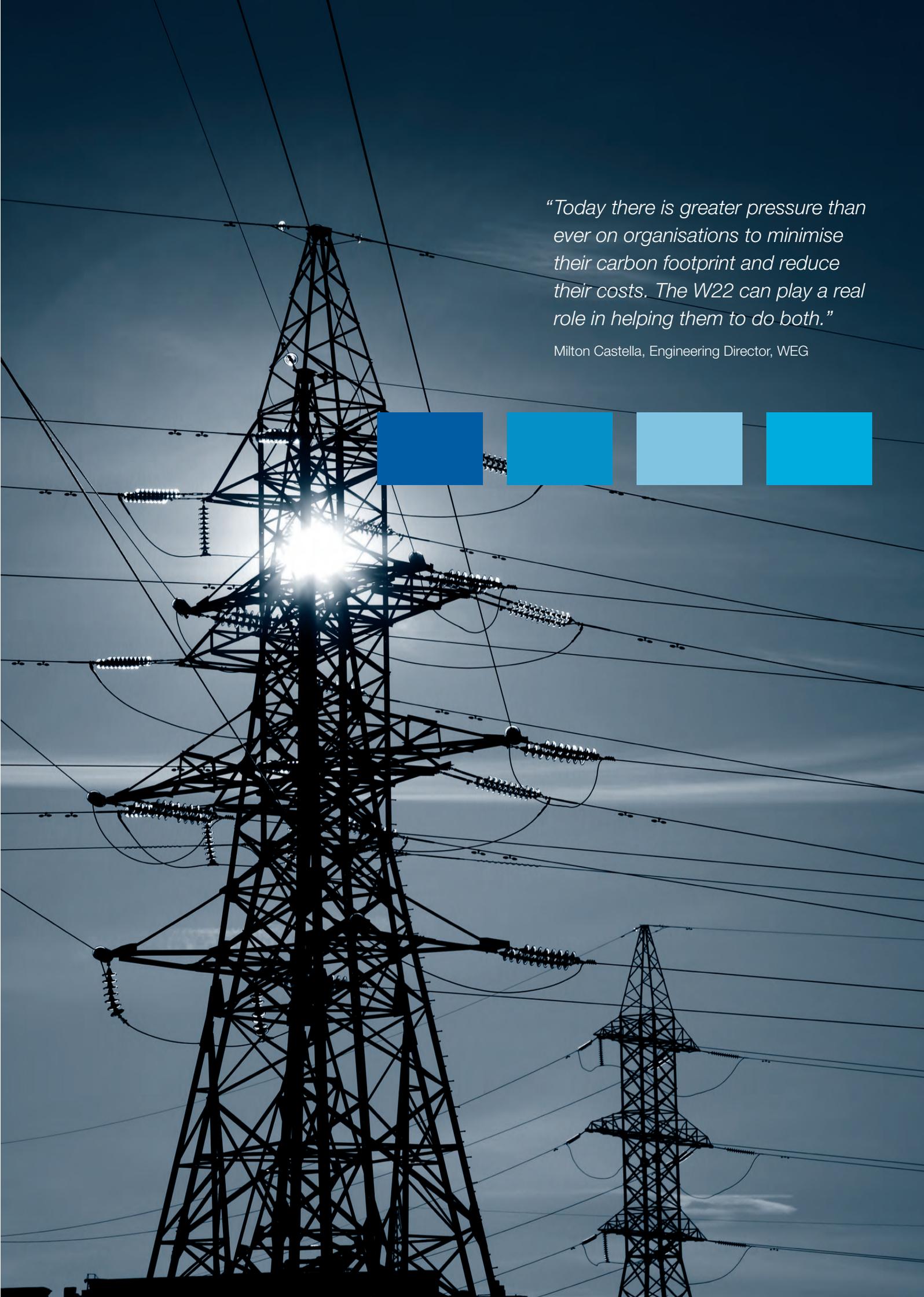
More than just a motor

With the new W22 range, WEG is leading the way in meeting the requirements of EU MEPS. But we are doing more than just manufacturing motors.

WEG can also offer unparalleled expertise to help you prepare for the benefits – and the difficulties – the new legislation will bring. We can help you to avoid the pitfalls of over-reaction or under-reaction; of acting too soon or too late. We can help your business to capitalise on the competitive advantages of energy efficient motors at the optimum time for your business, whether that's now, or later.

In other words, WEG can show you the most efficient route to energy efficiency in your electric motors. And the first step in the right direction is to contact us now, or visit www.weg.net/green





“Today there is greater pressure than ever on organisations to minimise their carbon footprint and reduce their costs. The W22 can play a real role in helping them to do both.”

Milton Castella, Engineering Director, WEG

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