

# Global Motor Energy Efficiency Program

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## ABSTRACT

This paper presents the latest efforts between NEMA and IECEE to develop a “Global Motor Energy Efficiency” or GMEE Program. This program is intended to address the multitude of difficulties that motor manufacturer’s face when complying with the various global country regulations for motor efficiency. This program will provide motor manufacturers with a global systematic method to address multiple existing motor efficiency regulations (US, Canada, Mexico, Brazil, Argentina, European Union, India, China, Russia, Australia, Japan, Korea, etc.) around the globe regarding test standards, laboratory accreditation, certification process and labeling requirements. This international working group consists of members of both NEMA (National Electrical Manufacturers Association), IEC technical standards and IECEE (IEC System for Conformity testing and Certification of Electrotechnical Equipment) organizations along with an international list of motor manufacturers. This paper will share its global findings on the latest national and regional motor efficiency regulations around the globe and discuss how this program will address the existing differences to create one global program. It is expected by the time this paper is presented this program will be formally released and available for use for any electric motor manufacturer.

## Introduction

Electric motor driven systems account for approximately 45% of all global electricity consumption [1]. Over the past twenty years the motor industry has made significant efforts to provide more energy efficient motor products to improve electric motor energy performance. Arguably the most effective stimulus to increase the demand for these energy efficient motors has been MEPS (Minimum Energy Performance Standards) and national energy efficiency regulations. There are many national and/or regional global motor energy efficiency regulations currently in place [2] with many more in development. Table 1 below provides a list of a few of the national and regional Motor MEPS programs operating around the world today.

Efficiency Levels	Efficiency Classes	Testing Standard	Country MEPS (Minimum Energy Performance Standard)	Country MEPS Regulation
	IEC 60034-30-1			
Premium Efficiency	IE3	Low Uncertainty IEC 60034-2-1, IEEE 112B or CSA C390	USA (0.75-375kW)	US DOE 10 CFR Part 431, Effective 6/1/2016
			Europe: 2015* (>7.5kW); 2017* (>0.75kW)	ErP Directive, Regulation 640/2009
			Canada (0.75-150kW)	Canadian EEA, CSA C390
			Mexico (0.75-375kW)	NOM 016-ENER-2010
			Korea: 2015-2017	MOCIE/KEMCO
			Japan	Top Runner
			Canada (15-375kW)	Canadian EEA, CSA C390
High Efficiency	IE2	Low Uncertainty IEC 60034-2-1, IEEE 112B or CSA C390	Australia (0.75-190kW)	AS/NZS 1359:2004
			New Zealand (0.75-190kW)	AS/NZS 1359:2004
			Brazil	NBR 17094-1
			Korea	MOCIE/KEMCO
			Argentina	IRAM 62405
			China	GB 18613-2010
			Europe	ErP Directive, Regulation 640/2009
			Turkey	SMG-2012/2

**Table 1 – Global MEPS Programs**

One of the major MEPS obstacles for motor manufacturers is navigating the various rules and regulations at the national and regional levels. While many of these regulations have similar registration processes, each one varies from the next. Below are important considerations in the typical motor energy efficiency regulation process.

- Motor Efficiency Test Standard
- Product Definition (Scope of Regulated Motors)
- Test Laboratory Qualification
- Registration and Certification
  - Minimum number of test samples
  - Labeling or Product Marking
  - MEPS (Minimum Energy Performance Standard)

In 2010 NEMA attempted to address this lack of enforcement issue with the development and subsequent release of the NEMA Premium License program [3]. This voluntary motor efficiency program provides a certification program based upon the US DOE (Department of Energy) motor energy efficiency regulation codified in the Code of Federal Regulations (CFR) at 10 CFR Part 431. The major deficiency that NEMA attempted to address with this program was the installment of the verification testing process. Each year NEMA randomly selects a motor rating and then instructs the participating members to provide this motor sample from their distribution network to an independent third party motor test laboratory for verification testing. If the motor sample is found to be non-compliant as marked, the manufacturer faces the penalties of the program which can result in fines and revocation of the NEMA Premium license as a participating member. One additional feature of the program is the ability for each member to challenge another participating member or other motor manufacturer not participating in the program. If the challenged motor manufacturer is validated as compliant then the challenger must pay the administrative and testing costs for the challenge. This program has been a global success with 17 global motor manufacturers participating [4].

### **Global Motor Energy Efficiency (GMEE) Program**

In the effort to extend the benefits of the NEMA Premium License, NEMA began looking for ways to expand the global reach of the NEMA Premium License. Following the 2011 EEMODS conference in Washington, DC NEMA, CLASP (Collaborative Labeling and Standards Program) and IECEE members informally met to discuss efforts to develop a global motor efficiency labeling program. The discussion focused on the following key issues that need to be addressed for a successful program.

- Lack of common certification process (registration, sample selection, test laboratory requirements, test standards, efficiency levels and efficiency marking)
- Lack of globally recognized label or mark for motor efficiency
- Lack of enforcement policy (verification testing and border enforcement)
- Global certification program that can be adopted by developing nations and regions
- Benefits to existing national and regional regulations to alternatively accept a globally recognized efficiency program

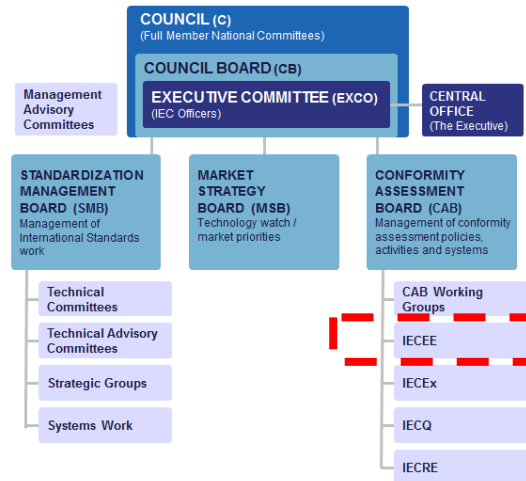
After a series of informative discussions between NEMA and IECEE it was agreed these issues could be best addressed by an IECEE conformity assessment scheme by combining the NEMA Premium License and the IECEE globally recognized CB (Certification Body) Scheme [5]. The IECEE 50 plus global member countries, per Figure 1 below, was a key factor in this decision.



**Figure 1 - IECEE Member Countries**

Working Groups 5 (Strategy-GMEE) and 6 (Technical-GMEE) were formed under the IECEE Policy and Strategy Committee (PSC). With WG5 focused on the planning and marketing of the program while WG6 is concentrated on the technical and certification details of the program. Lastly, a global team of motor manufacturers, NCB's and other interested participants were recruited from NEMA, IEC and IECEE associations to lead this effort.

The IECEE is a multilateral certification system based on International Standards prepared by the International Electrotechnical Commission(IEC) per Figure 2 below. Its Members use the principle of mutual recognition (reciprocal acceptance) of test results to obtain certification or approval at national levels around the world. The IECEE's multilateral Conformity Assessment Schemes, based on IEC International Standards reduce trade barriers caused by different certification criteria in different countries and help industry to access new markets. Removing the significant delays and costs of multiple testing and approval allows industry to market its products faster, whilst reducing financial costs. Reassurance is needed for such users and consumers that their product is reliable and will meet their expectations in terms of performance, safety, durability and other criteria in compliance with International Standards that align with local regulations.



**Figure 2 – IEC Organization**

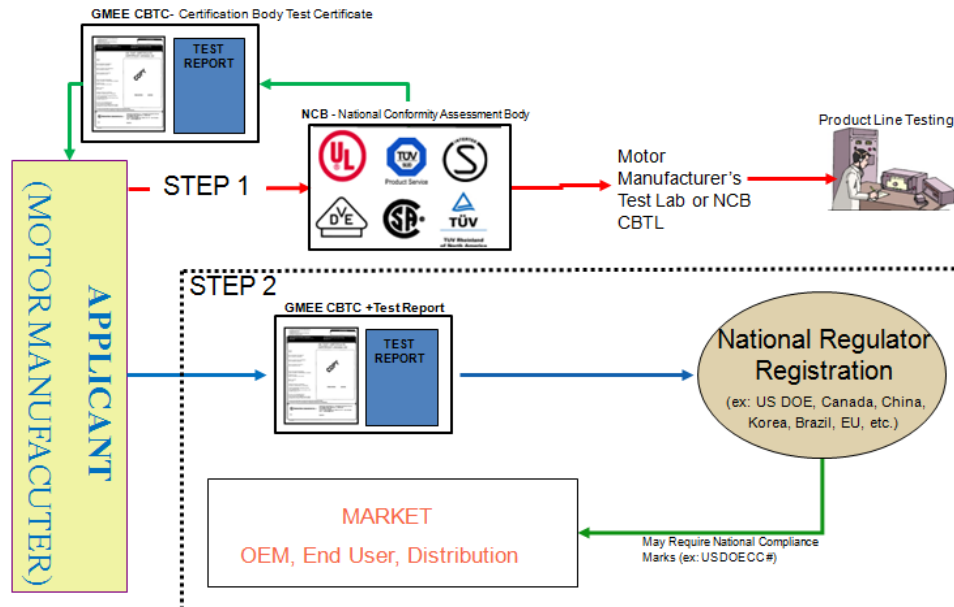
### GMEE Basics

Some useful IECEE Acronyms[5] are provided below.

- IECEE - IEC System of Conformity Assessment Schemes for Electrotechnical Equipment and Components
- NCB - National Certification Body (Examples: SGS, DEMKO, NEMKO, VDE, Underwriters Laboratory, CSA, TUV Rheinland, Intertek, Bureau Veritas, etc.)
- CBTL - Certification Body Test Laboratory
- CBTC - Certification Body Test Certificate
- CB Scheme - "Certification Body" Scheme is a globally recognized conformity assessment procedure
- Regulatory Requirements: The restrictions, licenses, and laws applicable to a product or business, imposed by the government or the national authority.
- Conformity Assessment is the process by which the NCB determines whether a product adheres to specified requirements, such as in the IEC International Standards. There are three types of conformity assessment:
  - **First party:** the manufacturers evaluate their own products. This may include product construction, evaluation and testing in their in-house test laboratories and may provide a supplier's declaration of conformity.
  - **Second party:** the companies buying the product perform their own product evaluations, which may include product assessment and testing by use of their own laboratory.
  - **Third party:** independent parties carry out product evaluation and testing. IECEE Conformity Assessment offers third party services as the best means of providing independency and impartiality.

Figure 3 below provides an illustration on the submission process for GMEE. The process begins when a manufacturer applies to a participating National Certification Bodies(NCB) operating in the IECEE CB Scheme (NCB) for a CB Test Certificate. The NCB works with one of their associated CB Testing Laboratories (CBTLs) to conduct complete testing and evaluation of the manufacturer's product to determine conformity with the IEC standards 60034-2-1 (Efficiency test standard) and 60034-30-1 (IE Efficiency level ratings).

If the product is found to be in compliance with the manufacturer's declared IE level, the CBTL issues a CB Test Report, which is the basis for the NCB issuing a CB Test Certificate. In many cases, per a manufacturer's request, the NCB will also issue its own national approval or certification for the product. The manufacturer can then present the CB Test Report and CB Test Certificate directly to the Regulatory authority, their customer or to other participating NCBs in order to obtain additional certifications.



**Figure 3 - GMEE Process Flow**

The manufacturer can choose to conduct their testing at the NCB's CBTL facilities or at their own test facilities. Testing at the manufacturer's facility may require the NCB to witness the test if the manufacturer does not have an NCB approved test facility. Before conducting testing outside of a NCB/CBTL site, the manufacturer must ensure that all IEC 60034-2-1 requirements (power supply stability, instrumentation accuracy, etc.) at the selected testing site is qualified. Additionally, IECEE registration must be completed by the NCB prior to the start of testing outside of the NCB or CBTL site. Testing can also be split between the manufacturer and NCB/CBTL sites.

To ensure accurate and repeatable test results to IEC 60034-2-1 test equipment guidelines are evaluated at the test facility. Test equipment owned by the manufacturer may be used, but it must be calibrated and must meet accuracy requirements. The calibration provider must be accredited by an Accreditation Body that is recognized as a full member and signatory of the International Mutual Recognition Arrangements (MRAs) for IAAC, ILAC, APLAC, and EA, from National Metrology Institutes' (NMI's) recognized through the International Committee for Weights and Measures (CIPM) MRA.

The GMEE program provides significant benefits to the manufacturer, regulator and customer who wish to export their products to countries that participate in GMEE. These benefits include:

- GMEE program is voluntary and developed to encourage global market access of energy efficient electric motors in established and emerging countries
- Manufacturers can select their NCB of choice
- Manufacturers can test their products at the NCB CBTL or their own test facility
- Manufacturers can declare their own efficiency level (i.e. IE level) to meet the desired country of destinations requirements
- Manufacturers can have their products evaluated once and accepted globally (50 plus member countries)
- Manufacturers can use the CB Test Report and Certificate obtained from one NCB to obtain national approvals in many other member countries through their participating NCBs
- National Regulatory Bodies can be assured GMEE test certificates have been evaluated to the correct IEC standard at the required level of quality assurance
- Customers that use GMEE approved motors can feel confident that when they ship their motor assemblies globally they will not be forced to re-evaluate the motor for energy efficiency regulations

## Conclusion

In summary the GMEE program hopes to provide a consistent certification process for existing and emerging energy efficiency regulations for the global motor marketplace. It is envisioned that this program will accelerate the adoption of higher efficiency motors since emerging countries will now have a globally recognized program to adopt. To learn more about the GMEE program (under the E3 equipment category) and the IECEE please visit the IECEE website at [www.iecee.com](http://www.iecee.com).

## References

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