

ANALYSIS OF CHINESE POLICIES AND MECHANISMS FOR ENERGY EFFICIENT MOTOR SYSTEMS

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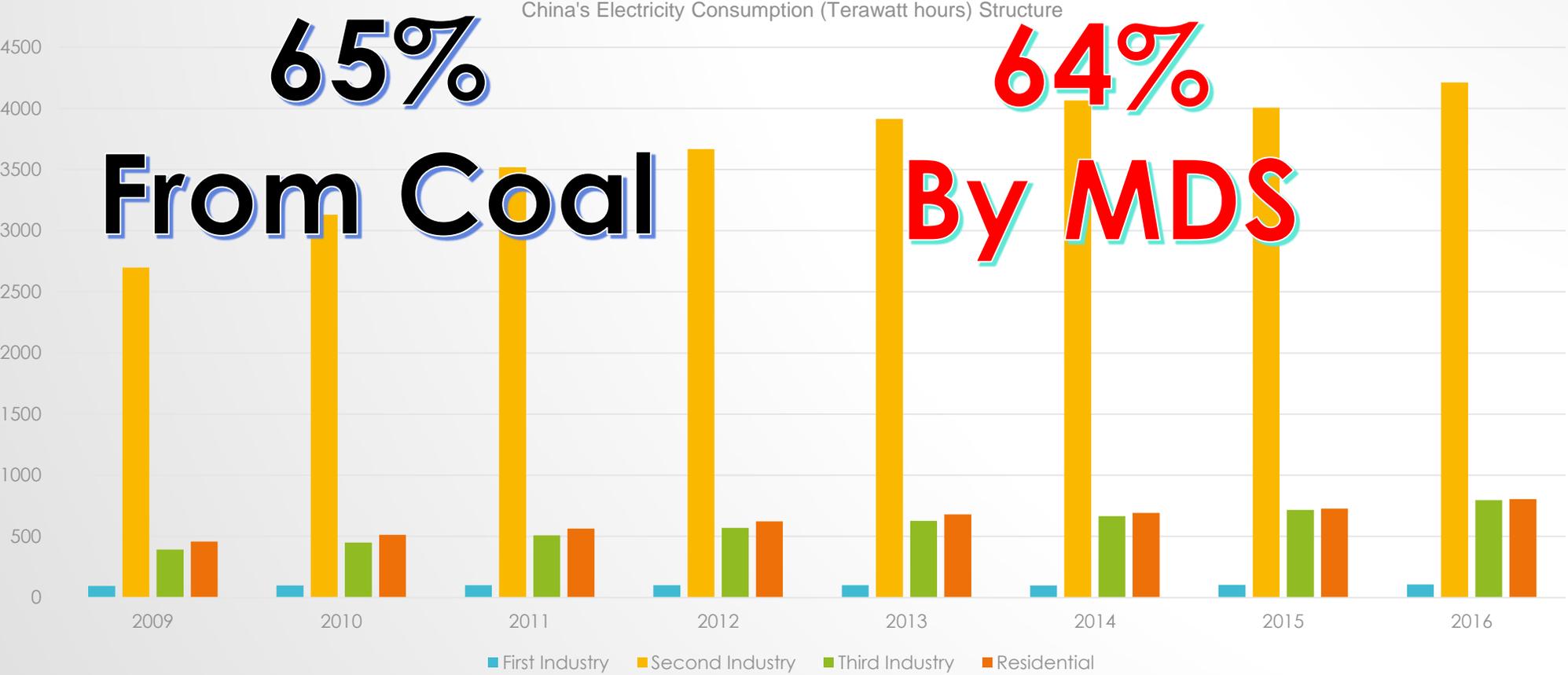
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Electricity Consumption in China (2009-2016)

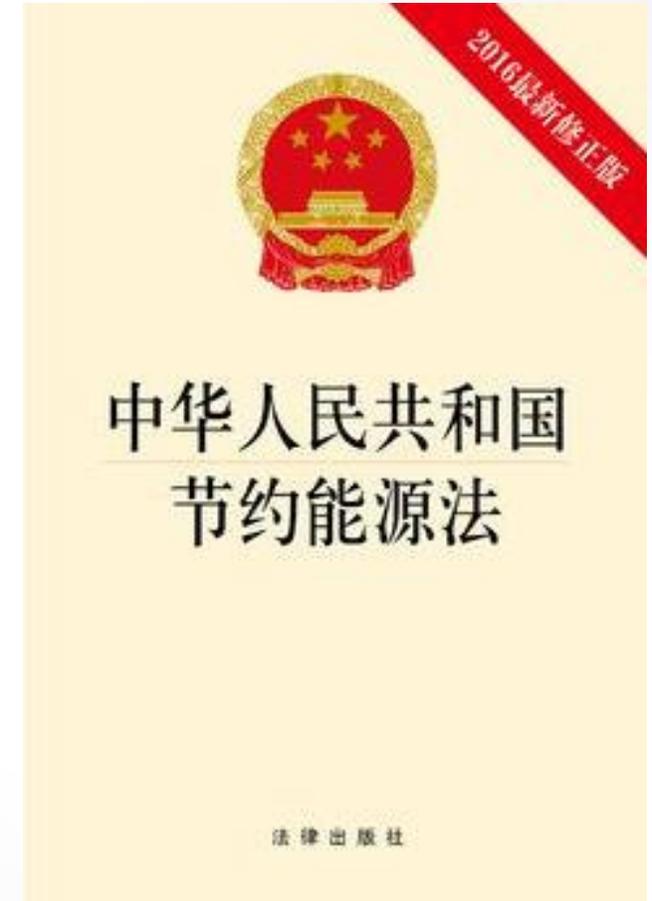


Data Source: National Energy Administration (NEA), China

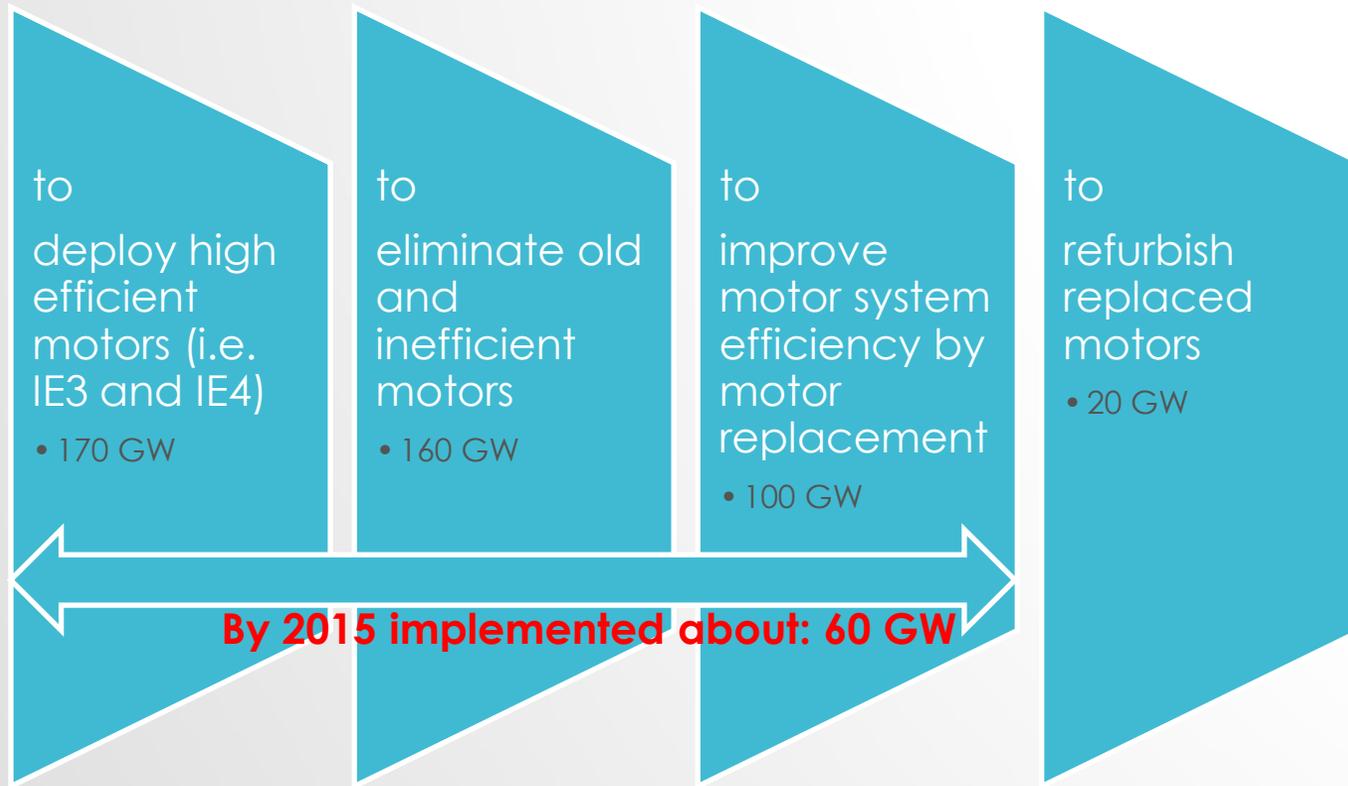
MDS = Motor Driven Systems

Legal Framework - China's Energy Conservation Law

- Version 1, Nov. 1997: article 39, II, encouraging application and innovation on technologies such as efficient motors, fans, pumps as well as speed-adjusting technologies etc.
- Version 2, Oct. 2007: article 31, *the state encourages industrial enterprises to adopt efficient energy-saving motors, boilers, kilns, fans, pumps and other equipment, the CHP cogeneration, waste heat and pressure utilization, clean coal and advanced energy monitoring and control technologies.*
- Version 3, Jul. 2016: article 31 did not change.



National Goals and Action Plan (2013-2015) by MIIT and AQSIQ



Project Mechanism Research & Policy Analysis on China Motor System Energy Efficiency Improvement (2015.12-2016.11)



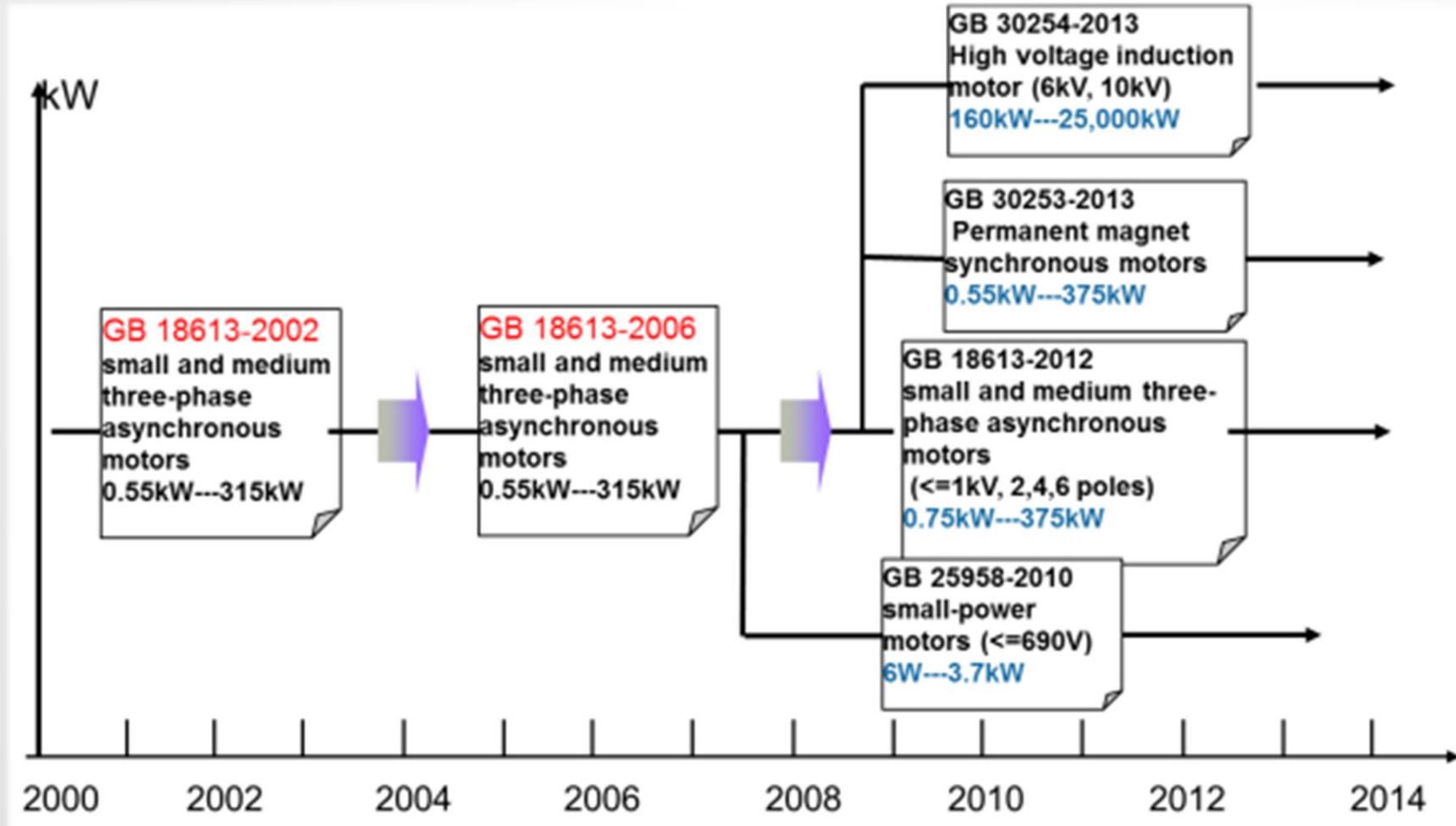
EEMODS'17 ROME



CHINESE POLICIES ON MOTOR SYSTEM ENERGY EFFICIENCY



Minimum Energy Performance Standards (MEPS)



Energy Efficiency Tiers Mapping Between Chinese and IEC MEPS for Electric Motors

GB18613-2006 old MPES	GB18613-2012 new MEPS	IEC60034-30-1	Average EE (%)	EE difference between tiers (%)	Chinese motor models
/	Tier 1	IE4	93.1	1.6	/
Tier 1	Tier 2	IE3	91.5	1.5	YE3 series
Tier 2	Tier 3	IE2	90.0	3.0	YE2, YX3 series
Tier 3	not allowed any more	IE1	87.0	/	Y, Y2, Y3 series

Source: Shanghai Electrical Apparatus Research Institute (SEARI), 2016.

GB18613-2012 under Revision

- **20th April 2016, preparatory meeting for revising Motor MEPS GB18613-2012 was held in Beijing, key points:**
 - Coordination of the existing MEPS;
 - Alignment with IEC standards (extension to 0.12 kW~1000 kW, 50 V~1000 V, 8-pole motors added);
 - Top-runner EE requirement;
 - Implementation of the target minimum allowable values of energy efficiency for motors (addressed in the article 4.4 of GB18613-2012: 7.5 kW-375 kW IE3 due Sept. 2016; <7.5 kW IE3 due Sept. 2017)

The planned increase towards the IE3 level in September 2016 was postponed.

MEPS for Motor-driven System Relevant Products

GB 19762 - 2007 Minimum allowable values of energy efficiency and evaluating values of energy conservation of **Centrifugal Pump for Fresh Water**

GB 21518 - 2008 Minimum allowable values of energy efficiency and energy efficiency grades for **AC contactors**

GB 19153 - 2009 Minimum allowable values of energy efficiency and energy efficiency grades for **displacement air compressors**

GB 19761 - 2009 Minimum allowable values of energy efficiency and energy efficiency grades for **fan**

All these MEPS need to be revised, good timing for international alignment.

New China Energy Label for Small And Medium Three-phase Asynchronous Motors

中国能效标识
CHINA ENERGY LABEL

耗能低
1
2
3
耗能高

2级

生产者名称: 名称
规格型号: AAA-000

效率(%)	00.0
额定功率(kW)	0000
级数	0

依据国家标准: GB 18613-2012

中国能效标识
CHINA ENERGY LABEL

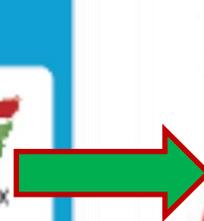
耗能低
1
2
3
耗能高

1级

生产者名称: 名称
规格型号: AAA-000

效率(%)	00.0
额定功率(kW)	0000
级数	0

依据国家标准: GB 18613-2012



Top-runner logo shall be displayed on the label, 30 days after listed as a Top-runner product.

By May 2016, first batch 150 Top-runner product models covering 3 categories: refrigerators, TV, Air-conditioners.

Where Are the Old Motors after Replacement?



Motor recycling factory in Wuxi, Jiangsu Province, China

Refurbished Motor Integrated in CEL (since Oct. 2016)

中国标准化研究院能效标识管理中心

标识中心字【2016】49号

关于将再制造电机纳入中小型三相异步电动机能效标识实施范围内的通知

有关单位及企业：

近年来在国家相关部委政策支持下再制造电机制造逐渐形成一定规模，有一定的市场需求。电机高效再制造是采用环保无污染的方式，最大程度地利用和回收原电机的零部件，通过更换绕组、绝缘、轴承，或转子等部件，最终将低效老旧电机改造成高效电机的过程，是实现资源节约和综合利用有效途径，既落实《循环经济促进法》和推动经济发展方式转变，促进资源节约型、环境友好型社会建设，又可从源头上杜绝旧电机再次流入二级市场，降低企业高效电机使用成本，促进存量电机能效水平的不断提升。

根据《能效标识专家委员会章程》第二十四条要求，专家委员会起草的重要管理文件或技术文件，应提交全体委员进行审查(会议审查或函审的方式)，会议审查需有全体委员的半数到会，必要时应在专家范围内广泛征求意见。审查时原则上应协商一致。如需表决，须有到会委员的2/3以上同意，方为通过。(函审时未按规定时间投票者，按赞成计票)。故以函审的方式征求通用机械产品组低压电机相关十一名成员意见，征求意见成员全票同意将再制造电机纳入能效标识实施范围。

为了便于执法部门和社会对再制造电机进行监督和管理，确保再制造电机能效水平符合我国《节能法》、《产品质量法》

和《循环经济促进法》的有关规定，即再制造电机的质量特性不应低于原型新品，再制造电机的能效水平应不低于GB18613-2012标准的要求。我能效标识管理中心将380V电压，50Hz三相交流电源供电，额定功率在0.75kW-375kW范围内，极数为2极、4极和6极，单速封闭自扇冷式、N设计的再制造电机纳入能效标识的使用，备案和公告范围内。

以上内容2016年10月1日起正式实施，请有关单位和企业提前准备相关事宜。

中国标准化研究院能效标识管理中心
二零一六年九月二十三日

- Basic requirements:
- Quality shall be guaranteed;
- EE complying to existing GB18613;
- 380 V, 50 Hz, 0.75 kW-375 kW, 2,4,6 poles

Enforcement NOT Optimistic

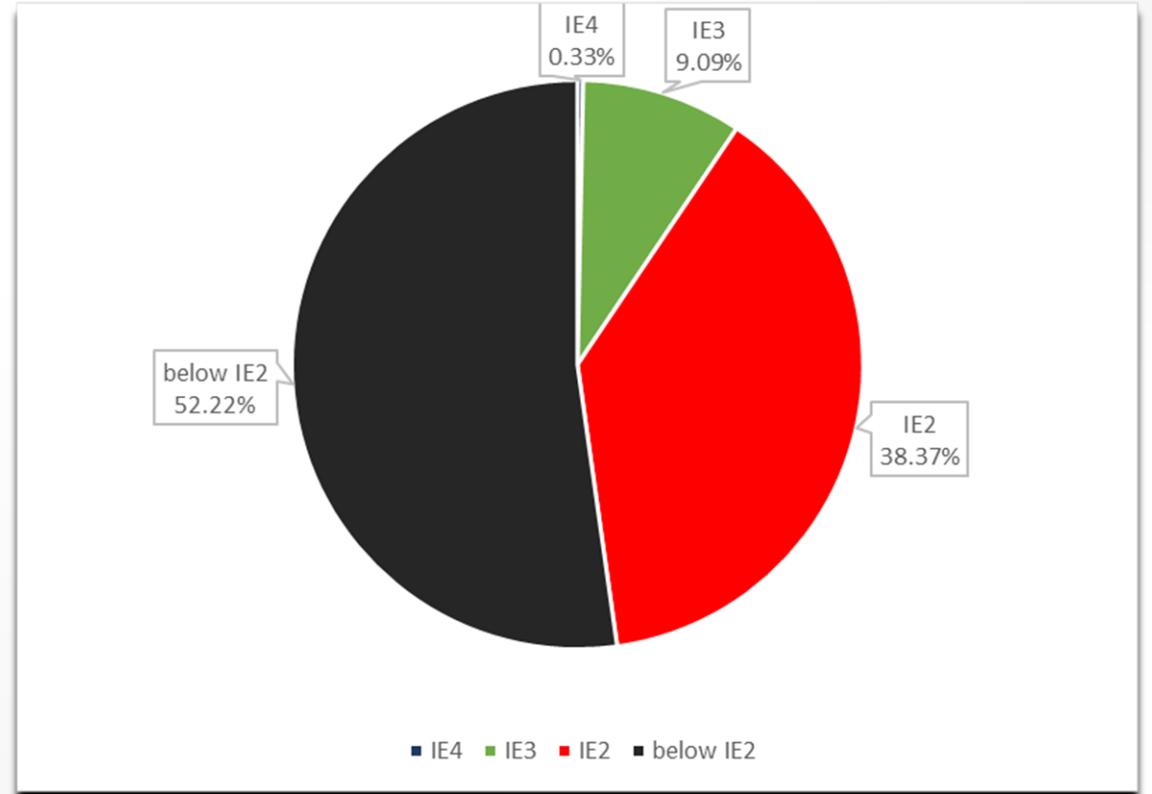


EEMODS'17 ROME Source: motor energy labels in factories, photos taken by ZHENG Tan.

Small and Medium Three-phase Asynchronous Motors Manufactured In China, 2014

EE	Yield (kW)	Export (kW)	Export rate
IE4	470,000	470,000	100.00%
IE3	13,141,419	8,193,675	62.35%
IE2	55,483,378	8,389,087	15.12%
below IE2	75,507,875	4,926,844	6.52%
Total	144,602,672	21,979,606	15.20%

Data source: International Copper Association (ICA) China, 2014.



Financial Incentives (subsidy model list & label)

No. of batches	Date of official announcement	Number of listed motor manufactures	Number of listed models: low-voltage three-phase asynchronous motor	Number of listed models: high-voltage motors	Number of listed models: permanent magnet motors
1	August 1 st 2010	13	996	0	65
2	March 8 th 2011	48	1440	6653	343
3	July 26 th 2011	34	677	8760	459
4	March 21 st 2012	29	737	10669	388
5	December 2 nd 2012	90	4752	14485	935
6	August 28 th 2014	85	2041	10842	1150
Total			10 643	51 409	3 340



Subsidy For Energy-saving Motors (since 2011)

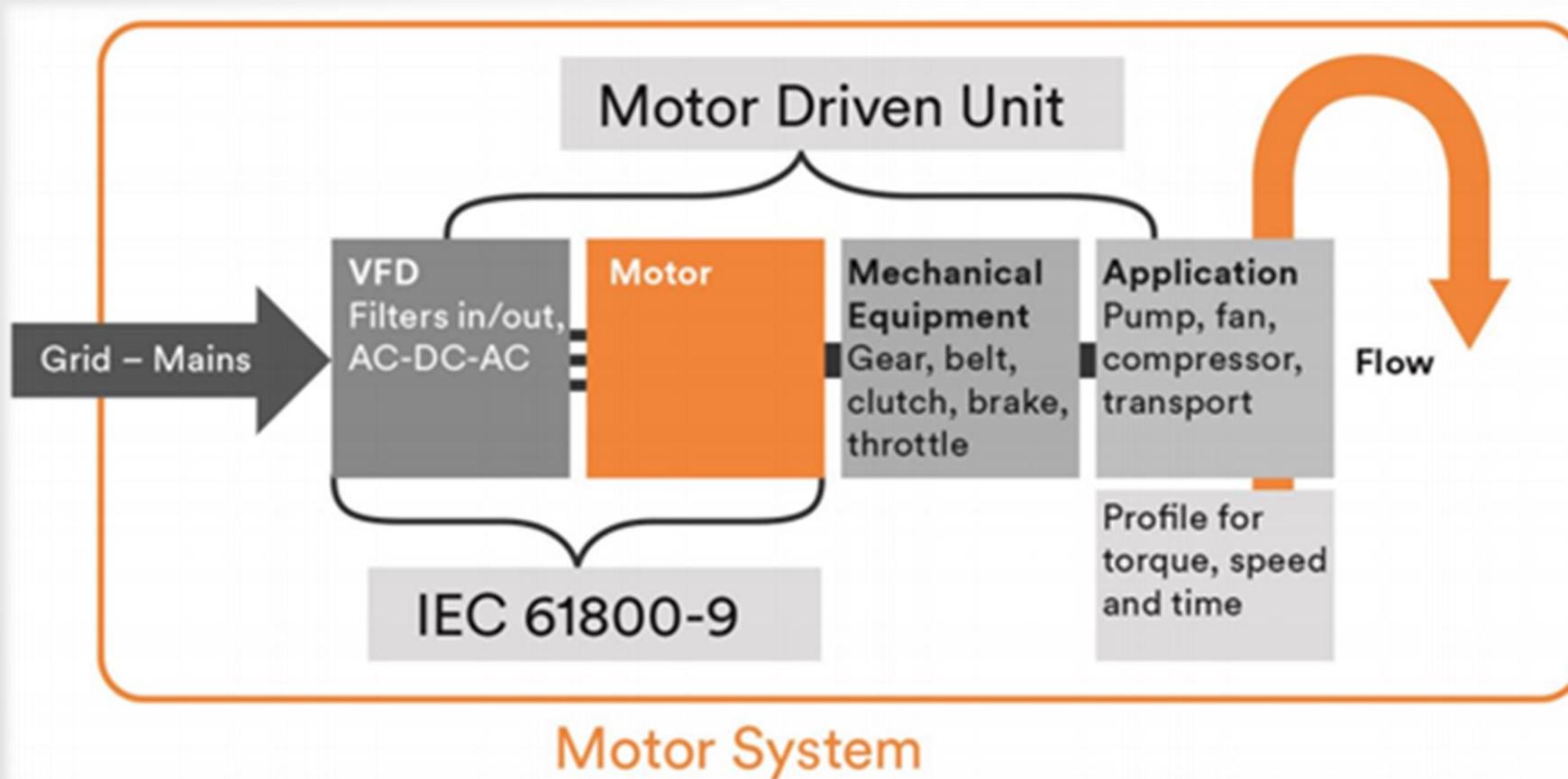
Type	Rated power RP (kW)	Subsidy (RMB/kW)	Subsidy (EUR/kW)
Low-voltage three-phase asynchronous motor	$0.55 \leq RP \leq 22$	58	7.72
	$22 \leq RP \leq 315$	31	4.13
High-voltage motors	$355 \leq RP \leq 25\ 000$	26	3.46
Permanent magnet motors	$0.55 \leq RP \leq 315$	100	13.32

Subsidy program for energy-saving motors stopped since 1st March 2017, by then around 100 GW were subsidized.

MECHANISMS FOR IMPROVING MOTOR SYSTEMS ENERGY EFFICIENCY IN CHINA

FOUR +

Single Equipment + Systems



Source: Impact Energy Inc. 2016.

Existing Stock + Incremental Market (PUSH + PULL)

The Catalogue of Eliminated High Energy Consumption and Backward Mechanical and Electrical Equipment (2009-2016)

Issuing Time	Nr. of models (motors)	Nr. of models (compressors)	Nr. of models (fans)	Nr. of models (pumps)	Nr. of models (transformers)
Dec. 2009	27	33	15	123	4
Apr. 2012	1	/	/	2	1
Mar. 2014	300	/	37	/	/
Feb. 2016	58	/	/	/	52

The Catalog of Energy-saving Mechanical and Electrical Equipment and the Catalog of Energy Efficiency Star (2012-2016)



Energy Efficiency + Comprehensive Environmental Perspectives

- **Green products unification started in 2015**

On 21 September 2015, the Communist Party of China (CPC) Central Committee and the State Council, published the “Integrated Reform Plan for Promoting Ecological Progress”. In this plan, the article 46 was stated to establish a unified system for green products: “Products that are licensed as **environmentally friendly, energy-efficient, water-saving, circular, low-carbon, recyclable, or organic** will be uniformly classified as **green products**, and standardized green product standards, certifications, and logos will be established for them. Improvements will be made to policies on fiscal and tax support and government procurement for the research and development, production, transport, delivery, purchase, and use of green products.”

- Implementation plan announced by the General Office of the State Council in Dec. 2016;
- Measures for the Administration of Green Product Labeling and Certification requested public comments in April 2017.



Training (classroom to factory field) + Green Finance Instruments



- Principles and Guidelines for Exploiting Electricity Saving Potentials of the Electric Motor Systems;
- Guidelines for Energy-saving Technological Upgrading of Motor Systems in the Cement Industry;
- Green Loan (low interest rate);
- Green bond;
- Carbon trade;
- Tax reduction etc.

RECOMMENDATIONS & CONCLUSION



Recommendations

Policy (to)

- Set national middle and long-term goals;
- Strengthen national coordination of policy making, implementation, enforcement, monitoring and evaluation;
- Focus on system optimization;
- Carefully regulate existing stock and incremental market;
- Make Life Cycle Regulation, i.e. design, production, using, reuse, and recycling;
- Strengthen international collaboration.

Mechanism (to have better)

- MEPS (market entrance);
- Supervision, enforcement and benchmarking;
- The catalogues of Eliminated/Energy Saving products (market push and pull);
- Training (awareness raising and capacity building);
- Economic means/models including taxation, green loan, electricity pricing, Energy Performance Contracting (EPC), carbon trade etc.

Grazie 谢谢
Thanks Danke
Merci Gracías
спасибо



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