

# Korea's MEPS Plan for High Efficiency 3-Phase Induction Motors

- Challenge for US\$ 1 billion Saving -

9 Apr 2007

**KEMCO**

Motor Summit

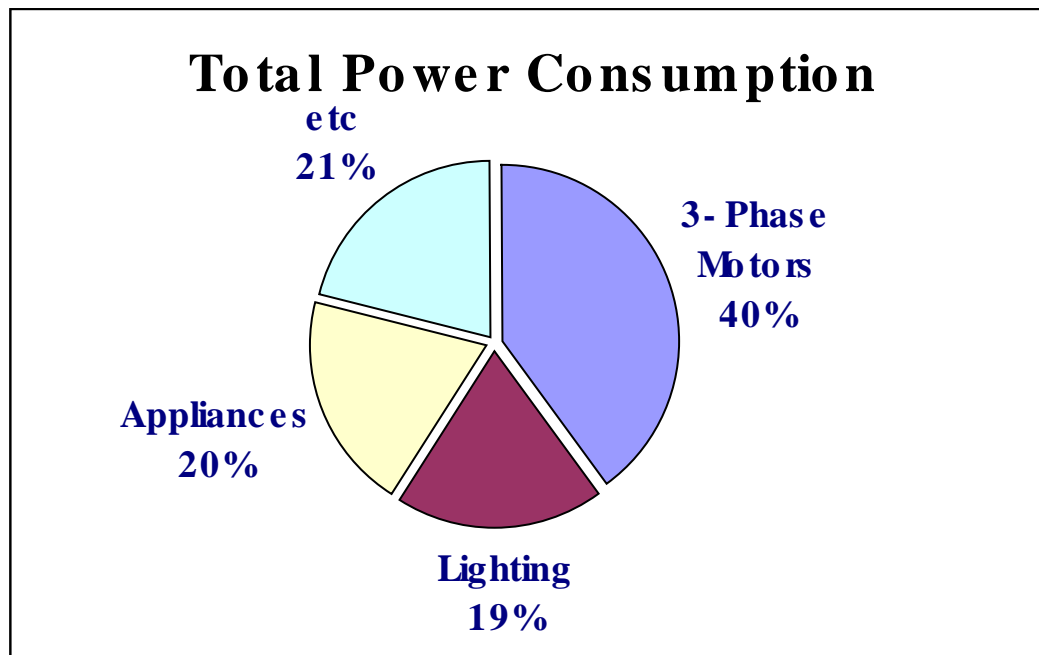
10 April 2007, Zurich



# Present state in Korea

## ◆ 3-phase induction motors

- 40%(132,965 GWh) of total power consumption(332,413 GWh)



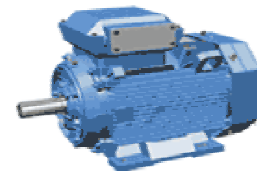
# Manufacturers and test laboratories

category		Main manufacturer
Manufacturers	Major companies	Hyundai Heavy Industries Co.,Ltd., Hyosung Corporation, OTIS Elevator Korea Co.,Ltd.
	Minor companies	Iljin heavy Industries Co.,Ltd., SPG Co.,Ltd., Eulji Electrical Machinery Co.,Ltd., Shidae Electric Co.,Ltd., Dooch Co.,Ltd., Wilo Pumps Ltd., Grundfos Pumps Korea Ltd., Goulds Pumps Co.,Ltd., and etc
Test laboratories and institutes		KERI, KTL, SBC



- ◆ **Hyundai Heavy Industries, Hyosung Corporation**  
- started to export high efficiency motors to USA and etc in 1980s

# The progress of Motors



Genera tion	Induction motors	Efficiency criteria	Diss emin ation	Status
1 <sup>st</sup>	General motors	-	<b>90%</b>	<ul style="list-style-type: none"> <li>- Korea : main induction motors</li> <li>- USA, Canada : exclusion from the market</li> </ul>
2 <sup>nd</sup>	High efficiency motors	More efficient than standard motor by 4~5%	<b>10%</b>	<ul style="list-style-type: none"> <li>- Korea : Implementation of certification and Rebate program</li> <li>- MEPS : USA(1997), Canada(1995)</li> </ul>
3 <sup>rd</sup>	Premium motors	More efficient than high efficient motors by 5~6%	<b>0%</b>	<ul style="list-style-type: none"> <li>- Korea : supporting the development of technology (since 2005)</li> <li>- USA : support rebate</li> </ul>

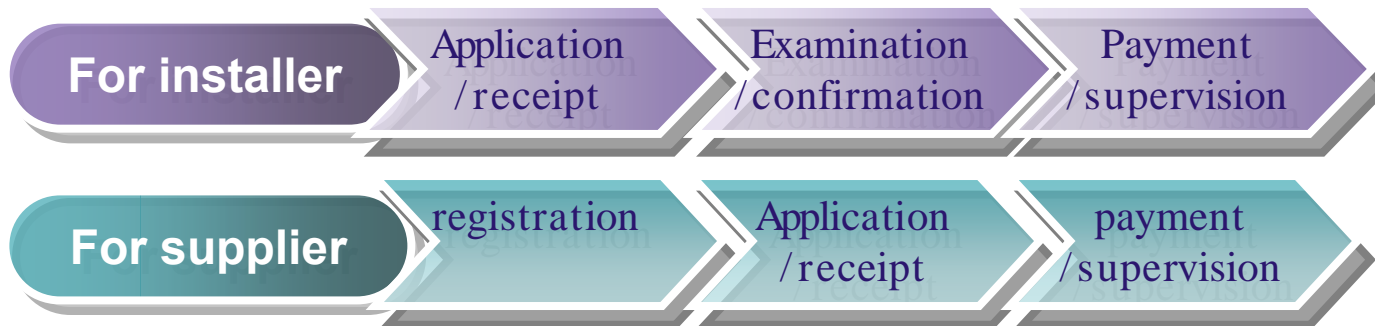
# Policies to promote high efficiency motors

- High Efficiency Certification Program for Motors (since 1996)

- Rebate for High Efficiency Motors (since 2002)

: installer (End-User) - US\$ 240/ saved power (kW) (about 4~5% of output power)

supplier (Manufacture) - US\$ 40/ saved power (kW)



- Support R&D related to premium motors(2005-2008)

: total US\$ 4.56 million



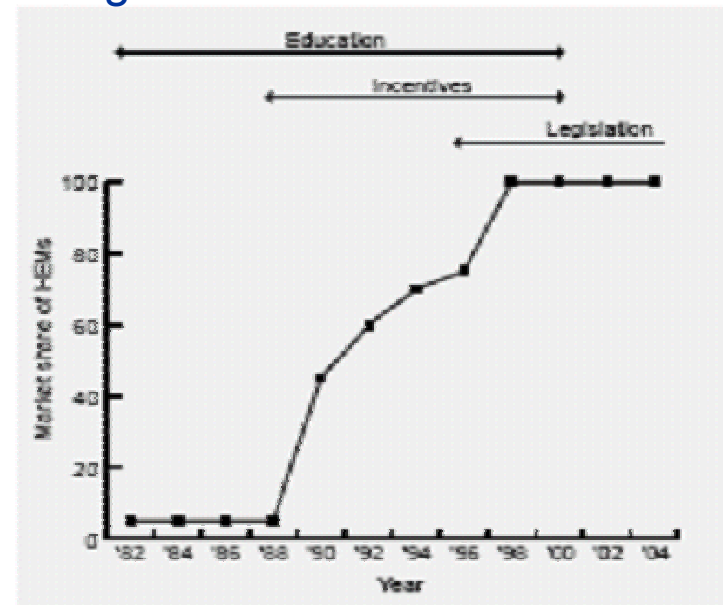
# Market share of high efficiency motors

year	sales	Sum of capacity (HP)	Market Share	Policy
1998	7,714	73,987	1.6%	High Efficiency Motors Certification (1996)
1999	9,987	90,788	1.7%	
2000	10,561	115,844	2.0%	
2001	12,285	149,999	2.5%	
2002	17,589	256,473	3.9%	Rebate for High Efficiency Motors
2003	29,363	510,546	7.8%	
2004	25,973	476,387	6.7%	
2005	38,351	699,157	10.0%	

# Best Practices of Market transformation

## ◆ USA(DOE)

- Enforced Motor Challenge Program before implementing MEPS (Rebate)
- Implemented MEPS from 1997 through EPC Act established in 1992 (aim to promote high efficiency motors by 75%)
- Impose US\$ 110 per each motor when producing motors below MEPS
- Rebate for premium motors



## ◆ British Columbia, Canada

- Implemented MEPS from 1995 and discontinued Rebate,

# We recognized the need to implement MEPS

- National Energy Saving Committee
  - decided to implement MEPS from 2008 (2004.8)
- Aim to promote high efficiency motors
- Exclude general(standard, non-standard) motors from the market
- Promote technical development for premium motors

## **MEPS** (Minimum Energy Performance Standard)?

Energy efficiency standards which prohibit productions and sales activities of low efficient appliances.

It's possible to impose up to US\$ 20,000.



# Agreement on Improving Energy Efficiency of Motors (July 2006)

## The Agreement between Government and Manufactures

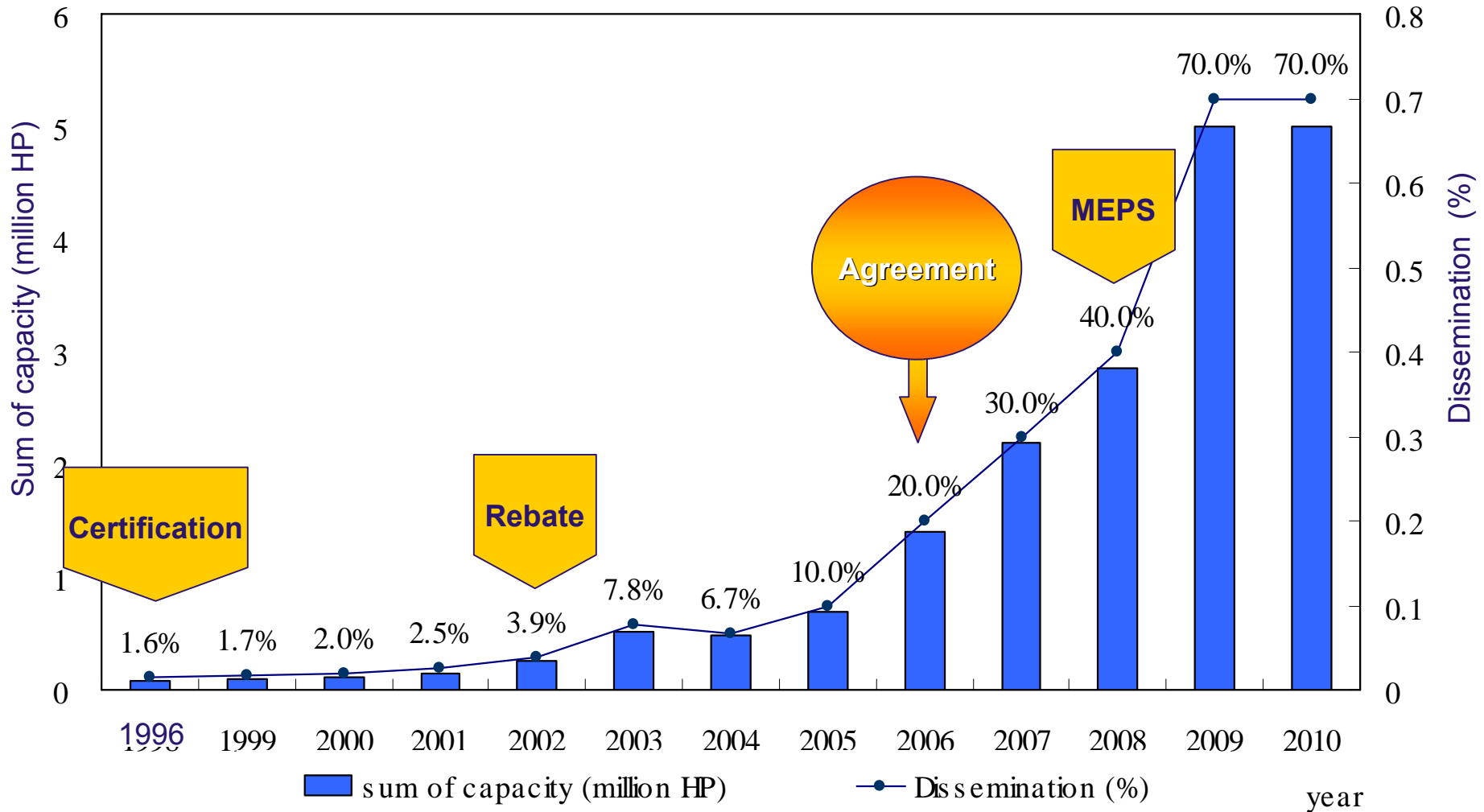
1. We will work together for adopting the MEPS for motors and promoting dissemination of high efficiency motors.
2. Manufacturers will do their best for relevant R&D and productions, and government will endeavor to promote the market transformation.
3. Each manufacturer will cooperate in enforcement of MEPS to improve the energy efficiency of motors by 5%, and government will support in establishing a firm foundation to improve it.

Delegate of Government : [Minister of MOCIE](#)

Manufacturers (10 companies including Hyundai Heavy Industries Co.,Ltd., Hyosung Corporation, Grundfos pumps Korea Ltd.)



# Market Transformation Scenario of high efficiency motors



# Korea's MEPS Scope and Test method

## ◆ Scope of MEPS

- The target motors should meet all conditions( ~ )

3-phase induction motors for below 600V  
output power : 0.75kW ~ 200kW  
2, 4 or 6 poles  
T-frame  
single speed  
foot-mounted or flange type  
design A and B



## ◆ Test method

- Test method : **KS C IEC 61972**
- The nameplates of motors should include full-load efficiency

# Korea's MEPS criteria

## ◆ Nominal Full Load Efficiency

(%) ↓

Output (kW) ↓	Open Motors ↓			Enclosed Motors ↓		
	2 poles ↓	4 poles ↓	6 poles ↓	2 poles ↓	4 poles ↓	6 poles ↓
0.75 ↓	82.5 ↓	82.5 ↓	80.0 ↓	81.6 ↓	82.5 ↓	82.0 ↓
1.5 ↓	84.0 ↓	84.0 ↓	85.5 ↓	84.0 ↓	84.0 ↓	86.5 ↓
2.2 ↓	84.0 ↓	86.5 ↓	86.5 ↓	85.5 ↓	87.5 ↓	87.5 ↓
3.7 ↓	85.5 ↓	87.5 ↓	87.5 ↓	87.5 ↓	87.5 ↓	87.5 ↓
5.5 ↓	87.5 ↓	88.5 ↓	88.5 ↓	88.5 ↓	89.5 ↓	89.5 ↓
7.5 ↓	88.5 ↓	89.5 ↓	90.2 ↓	89.5 ↓	89.5 ↓	89.5 ↓
11 ↓	89.5 ↓	91.0 ↓	90.2 ↓	90.2 ↓	91.0 ↓	90.2 ↓
15 ↓	90.2 ↓	91.0 ↓	91.0 ↓	90.2 ↓	91.0 ↓	90.2 ↓
18.5 ↓	91.0 ↓	91.7 ↓	91.7 ↓	91.0 ↓	92.4 ↓	91.7 ↓
22 ↓	91.0 ↓	92.4 ↓	92.4 ↓	91.0 ↓	92.4 ↓	91.7 ↓
30 ↓	91.7 ↓	93.0 ↓	93.0 ↓	91.7 ↓	93.0 ↓	93.0 ↓
37 ↓	92.4 ↓	93.0 ↓	93.0 ↓	92.4 ↓	93.0 ↓	93.0 ↓
45 ↓	93.0 ↓	93.6 ↓	93.6 ↓	93.0 ↓	93.6 ↓	93.6 ↓
55 ↓	93.0 ↓	94.1 ↓	93.6 ↓	93.0 ↓	94.1 ↓	93.6 ↓
75 ↓	93.0 ↓	94.1 ↓	94.1 ↓	93.6 ↓	94.5 ↓	94.1 ↓
90 ↓	93.6 ↓	94.5 ↓	94.1 ↓	94.5 ↓	94.5 ↓	94.1 ↓
110 ↓	93.6 ↓	95.0 ↓	94.5 ↓	94.5 ↓	95.0 ↓	95.0 ↓
132 ↓	93.6 ↓	95.0 ↓	94.5 ↓	94.5 ↓	95.0 ↓	95.0 ↓
160 ↓	94.5 ↓	95.0 ↓	94.5 ↓	95.0 ↓	95.0 ↓	95.0 ↓
200 ↓	94.5 ↓	95.0 ↓	- ↓	95.0 ↓	95.0 ↓	- ↓

# The effect estimated by implementing MEPS

## ◆ Save US\$ 1 billion

- The market share of 3-phase induction motors will increase by 70%.
- Estimated national benefit is US\$ 1 billion .  
: energy conservation : US \$ 1.4 billion  
Increasing manufacturing cost : US\$ 0.4 billion
- Efficiency improvement by 5% results in total power consumption reduction by 2%

category	contests
Total sales of power in 2005	332,413 GWh
Power Consumed in 3-phase induction motors (assumed to be 40%)	132,965 GWh
Rate of reduction of loss	31 %
Rate of raise of price	29 %
Total profit of 100% replacement	\$US 1.95 billion
Total cost of 100% replacement	\$US 0.58 billion
Net profit of 100% replacement	\$US 1.37 billion
Total profit of 70% replacement	<b>\$US 1.37 billion</b>
Total cost of 70% replacement	<b>\$US 0.41 billion</b>
Net profit of 70% replacement	<b>\$US 0.96 billion</b>



# Obstacles to MEPS in Korea

## ◆ Minor companies' lack of ability for technology development

- Insufficient experienced human resources for R&D
- Insufficient fund for making equipments and expanding test facilities

## ◆ Lack of test laboratories

- Korea's test procedure for motors requires 5 samples of motors



category	Capacity of test
KERI	Available under 200kW (test one model at a time)
KTL	Available under 30kW (test one model at a time)
SBC	Available under 15kW (test one model at a time)
Major companies	Available (self-certify testing)
Minor companies	Not available

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*Thank You !*

If you have any question,  
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