

Coordinator: IEC Advisory Committee on Energy Efficiency ACEE - Task Group 6

Coordination and **A**lignment of **I**EC & **I**SO **S**tandards for **E**nergy
Efficient Electric **M**otor Driven **S**ystems
(**CAISEMS**)

A black banner for 'MOTOR SUMMIT 2020 International'. At the top, there are logos for TOP MOTORS, 4E (Energy Efficient Motor Systems), IMPACT ENERGY, and swissenergy. The main text 'MOTOR SUMMIT 2020' is in large white letters, with 'International' below it in a smaller white font. A green play button icon with 'LIVE STREAM' written on it is on the right. Below the main text, it says 'JOIN US FROM HOME VIA LIVE STREAM' in green. At the bottom, the dates '18 & 19 November 2020' are written in large white letters.

Maarten van Werkhoven, IEC ACEE TG6

Speaker: Maarten van Werkhoven



- Independent consultant, based in Amsterdam, Aerdenhout, The Netherlands
 - Mechanical Engineer and Business Management
 - Expertise in energy, technology and sustainability in industry, research and policy
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- International IEA Technology Collaboration Programme 4E EMSA
 - Electric Motor Systems Annex
 - IEC ACEE (advisory committee on energy efficiency)
 - International projects on energy efficiency in industry and buildings
 - Implementation and capacity building programs on electric motor systems



Energy and electric motors

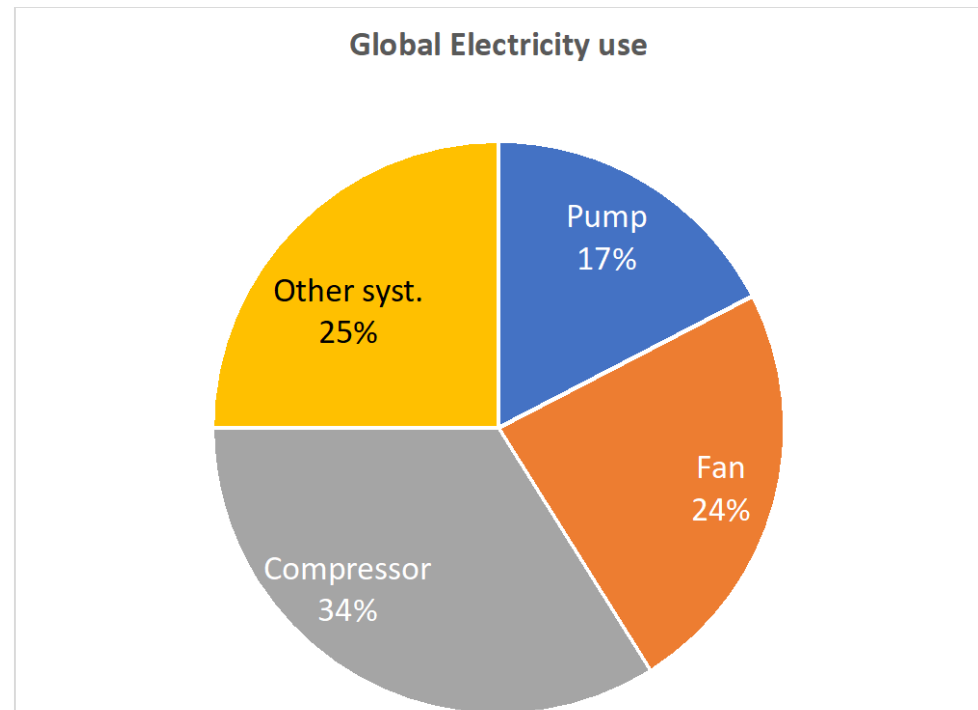
Electricity use - electric motors

Electric motors drive:

- pumps
- fans
- compressors: air & cooling
- other systems:
 - materials operations like milling
 - transport systems
 - other production systems

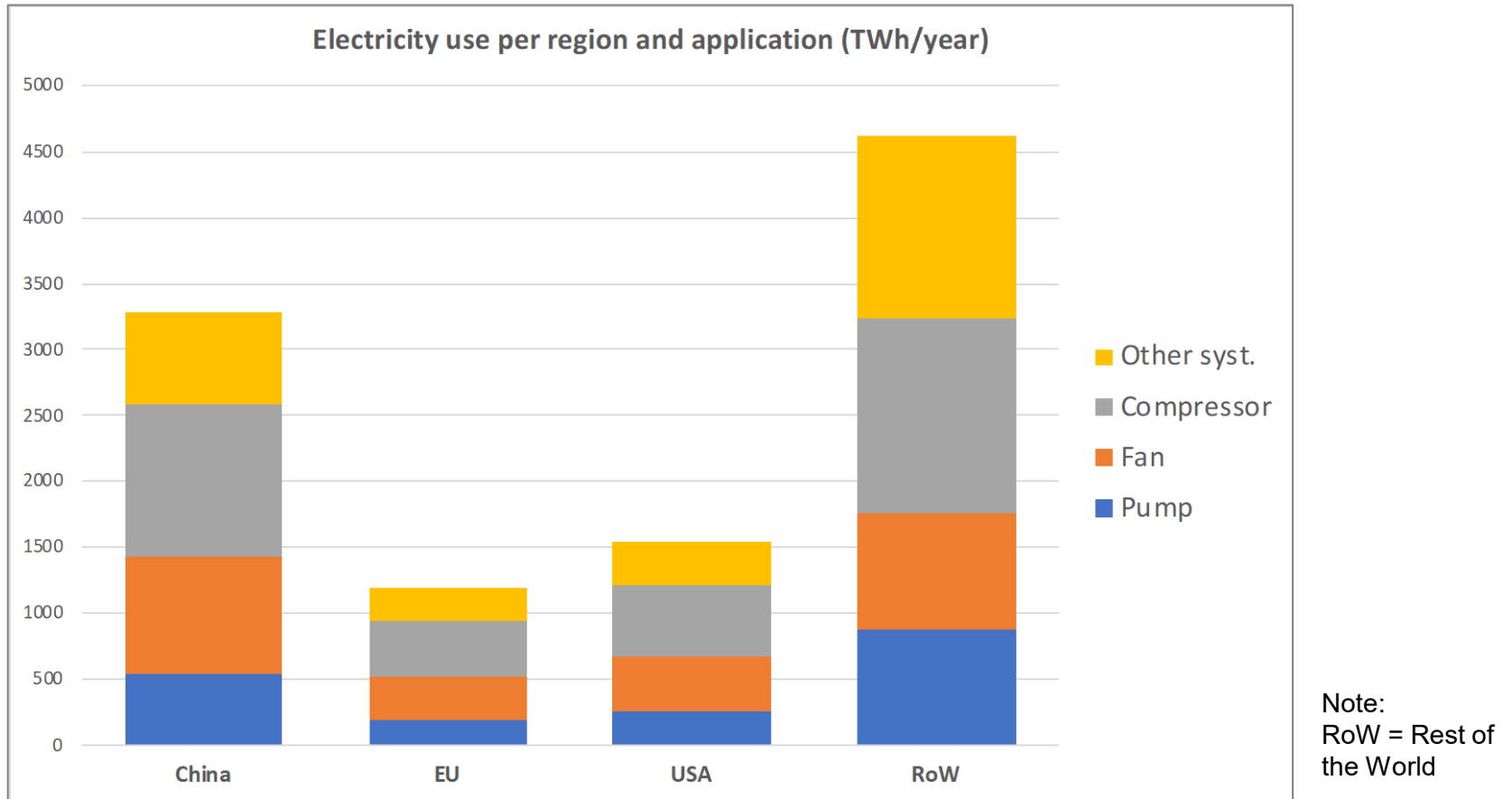
Motors are responsible
for 53% of global electricity use

- Industry share: 60-70%



Sources: LBNL 2019, IEA 2011, IEA WEO 2016

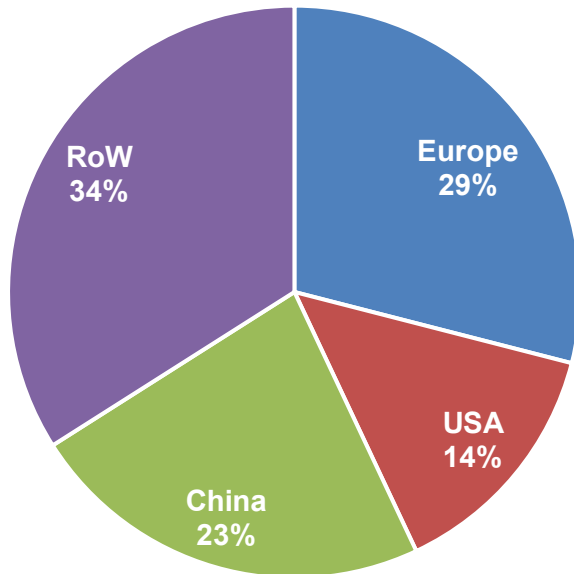
Electricity use - per region & application



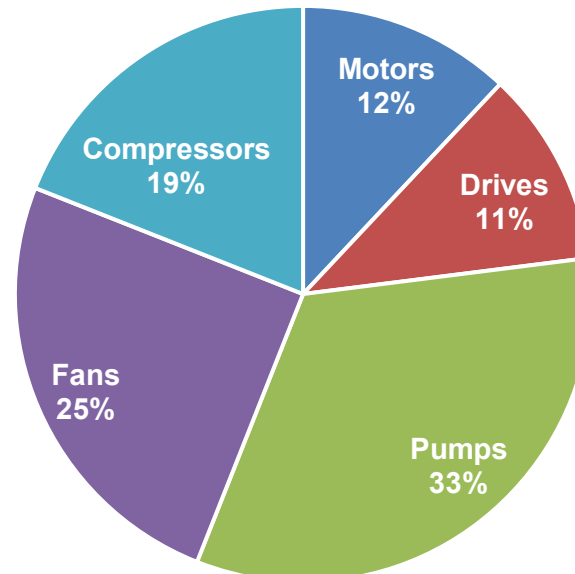
Sources: LBNL 2019, IEA 2011, IEA WEO 2016

World Market for EMDS

Turnover EMDS per region
(\$ 97.6 billion in 2015)



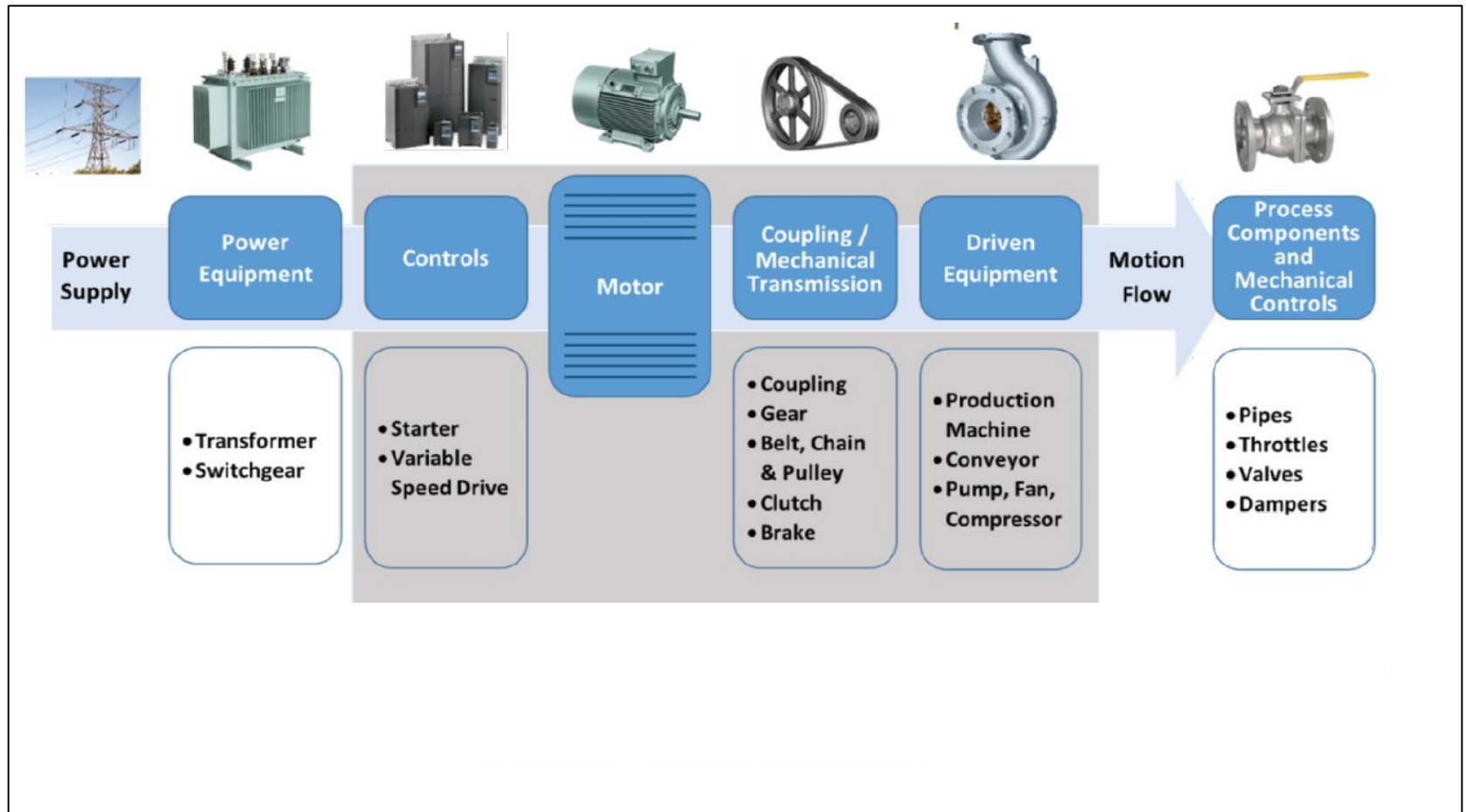
Turnover per EMDS component
(\$ 97.6 billion in 2015)



Source: IHS Markit 2018

Electric motor and driven components -> system

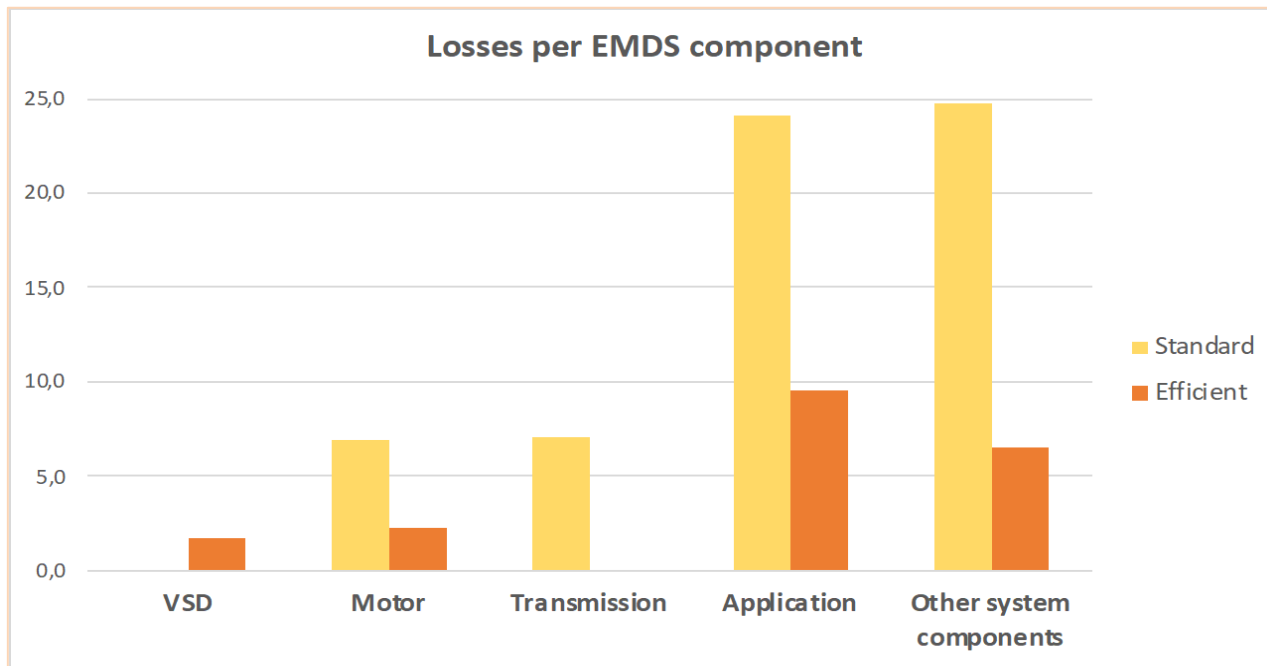
Electric Motor Driven System (EMDS)



Source: IEC ACEE Case Study 2, Motors, 2018

System efficiency: components ➤ system

	<i>power input</i>	VSD	Motor	Transmission	Application	Throttle, valves, piping, other	<i>power output</i>
Standard	100		93%	92%	72%	75% 80%	37
Optimised	57	97%	96%	100%	82%	85%	37



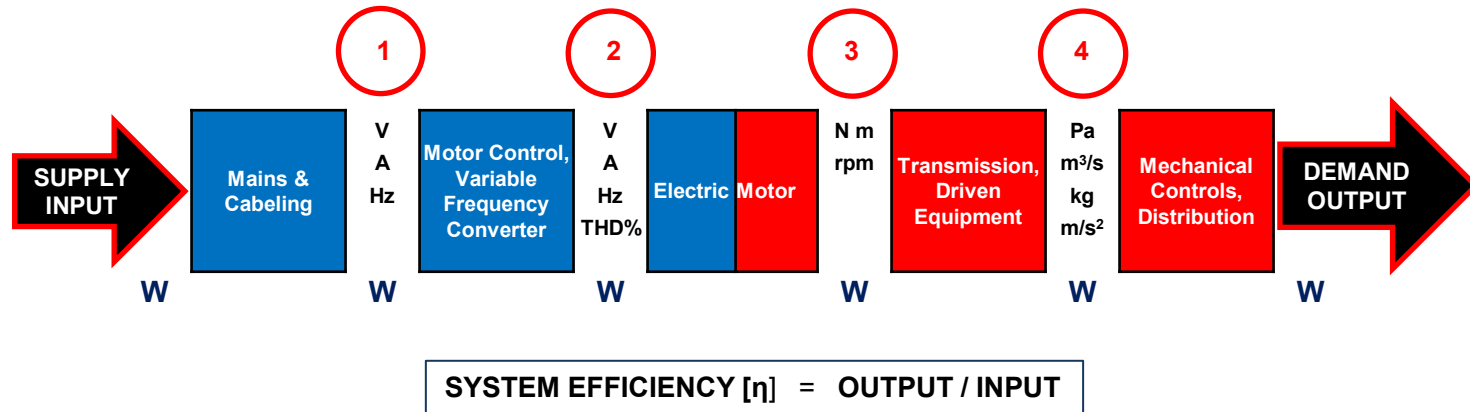
efficiency

37%

65%

Sources:
EMSA MST tool, IEA
WEO 2016, TPA

Complexity of EMDS (constant and variable load)

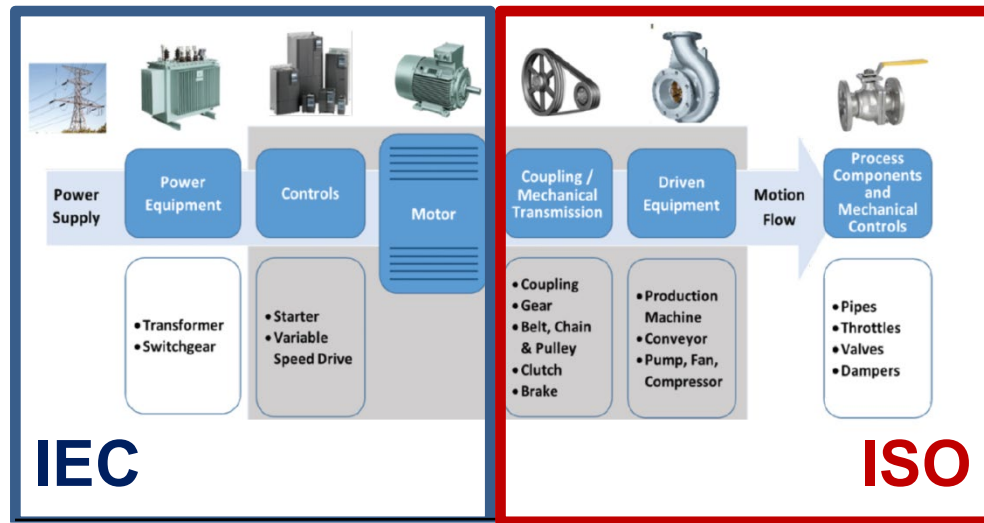


- Cooperation: planning, assembly, testing, operation
- System optimization has big advantages:
 - Lighter, smaller, cheaper
 - High reliability
 - Less waste heat ► more energy efficient
 - Lower peak load (kW)
 - Lower electricity consumption (kWh) and cost (EUR)
 - Improved controls: Start/Stop; peak and part load; hours of operation

Standards

System standards - EMDS

EMDS = Electric Motor Driven Systems

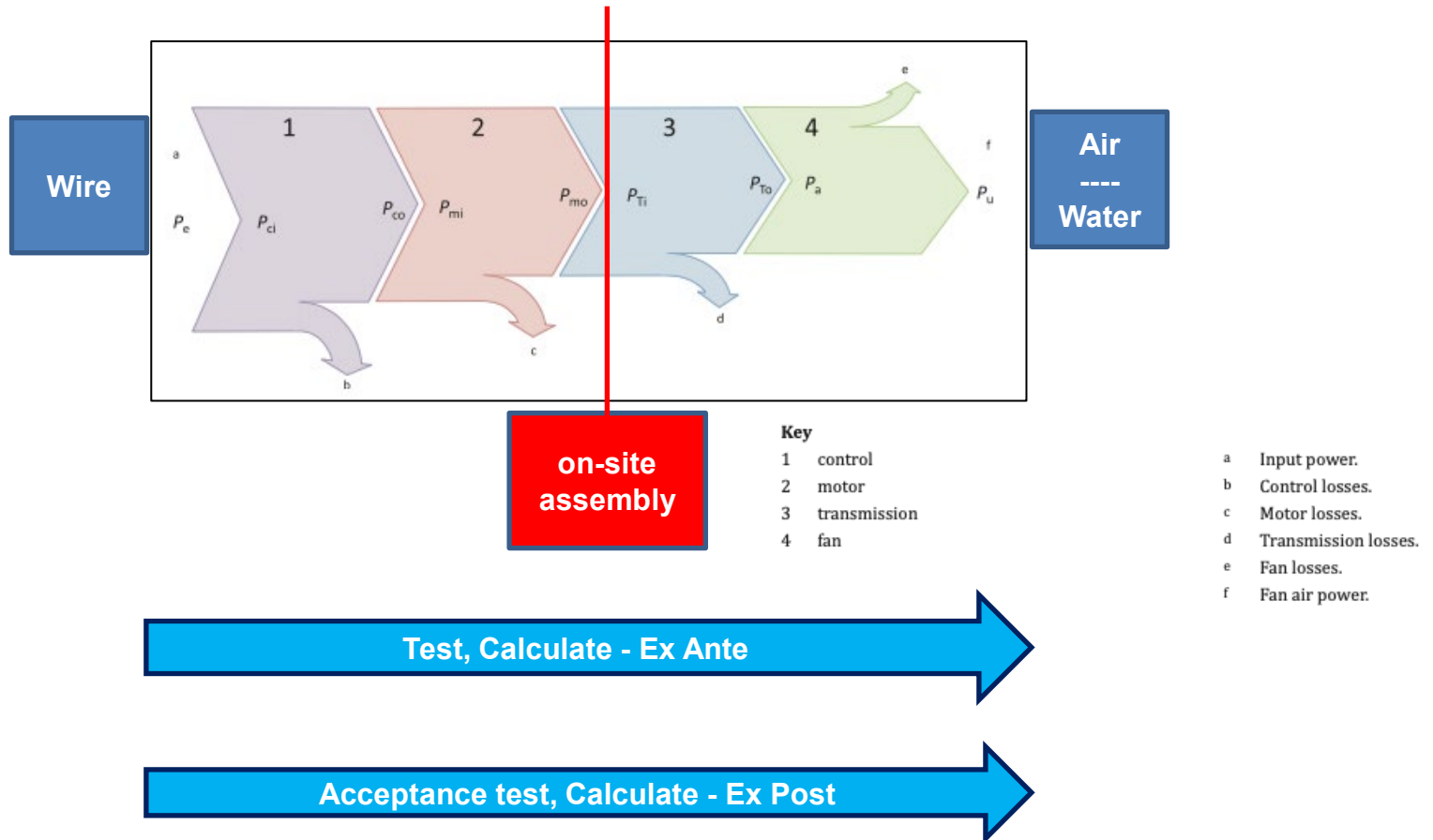


Standardization Bodies

Motor control		Motor	Mechanical equipment		Driven equipment			
IEC TC 121	IEC TC 22 SC 22G	IEC TC 2	ISO TC 41	ISO TC 60	ISO TC 115	ISO TC 117	ISO TC 86	ISO TC 118
Switchgear & controlgear	Adjustable speed drive	Rotating machinery	Pulleys & belts	Gears	Pumps	Fans	Cooling-Compressors	Air-Compressors
1927	1934	1911	1947	1947	1964	1964	1957	1965

Example: Fan system power losses

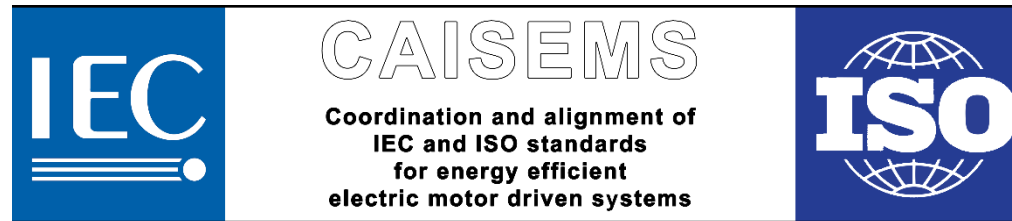
(Source: ISO 12759-2, 2019)



CAISEMS

Coordination and Alignment
of IEC & ISO Standards for Energy Efficient
Electric Motor Driven Systems

System Standards: the CAISEMS project



Coordinator: IEC Advisory Committee on Energy Efficiency ACEE - Task Group 6

- IEC ACEE (Advisory Committee on Energy Efficiency), Task Group 6
- Coordination and alignment of standards for energy efficient electric motor driven systems
- Goals - generic
 - provide a platform to initiate and organize coordination and alignment activities
 - initiate concrete cooperation between IEC and ISO TCs on energy efficient electric motor driven systems
- CAISEMS: 60 members (active & passive)
- 1st meeting: 20 September 2019 Tokyo
- next (4th) meeting: 20 November 2020, telco

Goals and Benefits

CAISEMS Goals

- solid overview of existing IEC and ISO standards for energy efficiency of EMDS
- platform for systems: "wire-to-water / wire-to-air"
- system calculation of efficiency/losses (ex ante): COMPONENTS ► SYSTEM
- interface: MOTOR SYSTEM ► ◀ DRIVEN SYSTEM
- system acceptance test (ex post)
- calculation allows any operating point

CAISEMS Benefits

- facilitating systems optimization through transparency between standards, referencing
- exchange of information among IEC and ISO TCs to **explore opportunities** for coherence, convergence and complementarity
- avoid duplication, unnecessary redundancy or conflicting elements ► ensuring the **"interoperability"** of the different standards falling into EMDS boundaries
- each ISO and IEC TC may have **different energy (product) metrics**, but all these metrics should find a **general combined applicability** for system performance

Next steps

- Liaisons and cooperation with IEC and ISO TCs
- Status
 - Background Documents (ed. 2)
 - Standards, Terminology, Metrics, Operating Points, MEPS (requirements)
 - Work Plan (ed. 2)
 - Develop formal IEC & ISO entity in 2021
 - Decide on first work items
- Building on further involvement, planning and cooperation between stakeholders
- 4th meeting: 20 November 2020, teleconference

Take aways

Take aways

- Efficient Electric Motor Systems can source substantially to **climate goals**
- Internationally **coordinated standards** will enable national governments to establish effective minimum energy requirements for efficient products and beyond
- Internationally coordinated standards will deliver efficiencies **beyond their own individual scope**: suppliers, end users, service industry will profit through increased transparency and inter-operability of EMDS standards
- IEC (electric) and ISO (mechanical) Standard Committees need to **interact more closely**, to deal with energy efficiency in Electric Motor Driven Systems in a timely fashion

Thank you

Contact

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