From electric motors to motor systems: potentials and challenges to deliver and monitor larger savings

streamSAVE+ Dialogue Meeting #03

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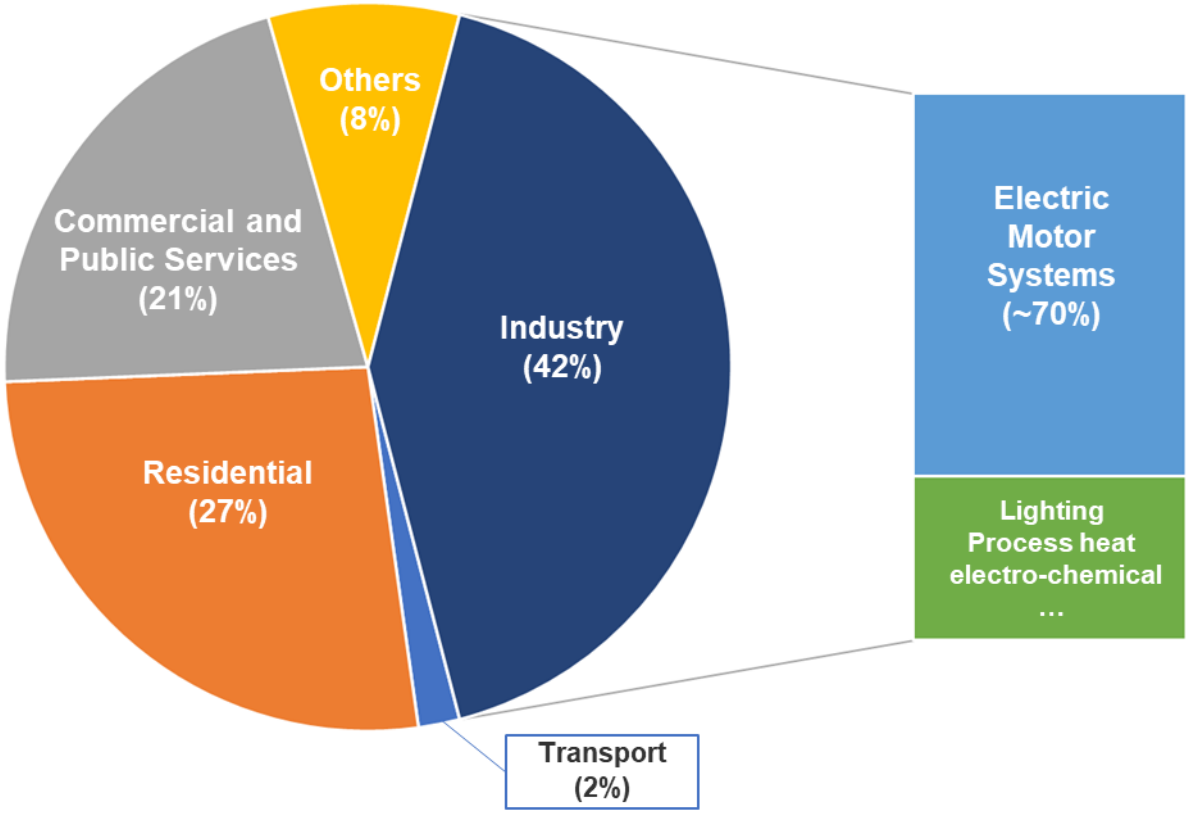
Worldwide electricity use

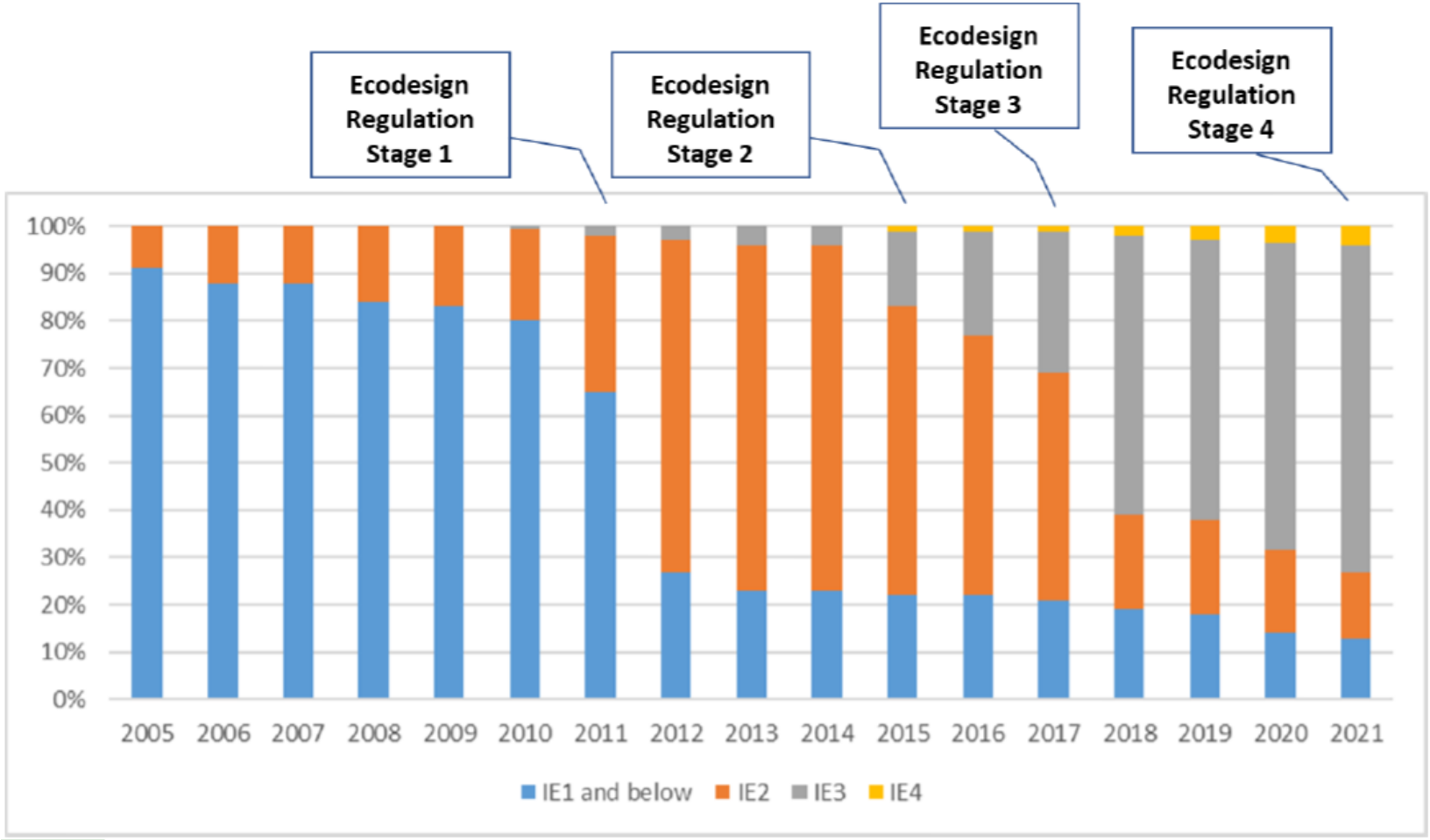
2019 (IEA)



Industry: **9566 TWh**
Transport: **420 TWh**
Residential: **6072 TWh**
Commercial and public services: **4849 TWh**
Others (agriculture and fishing): **1940 TWh**
Total: 22847 TWh

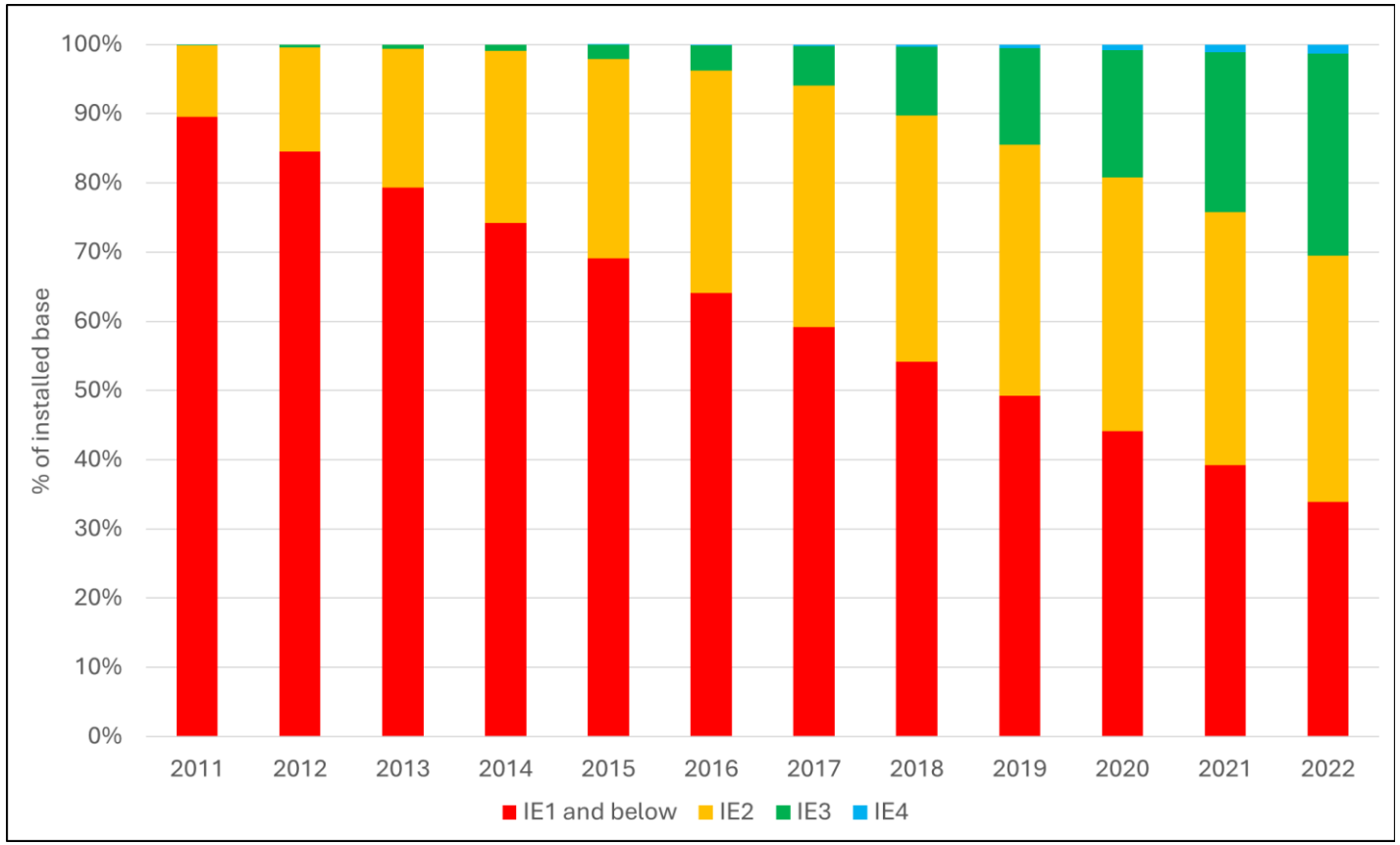
Ecodesign Regulation

Impact on Sales



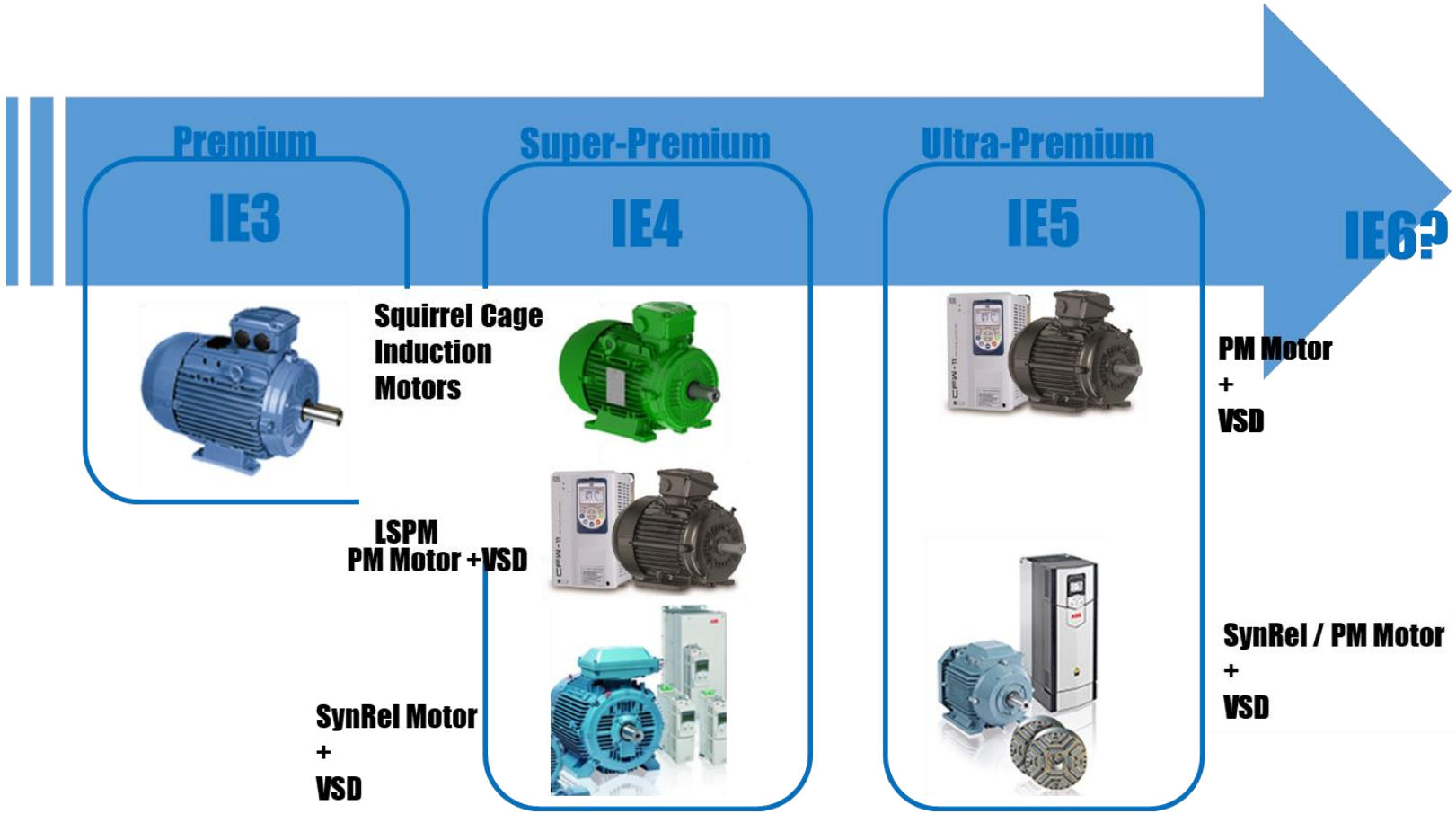
Ecodesign Regulation
Impact on Stock

- Electric motors are responsible for over 50% of the total EU electricity consumption (70% in the industrial sector).
- A large number of old motors with poor efficiency remain in service for years beyond their expected lifetime.



EU-MORE
EUropean MOtor REnovation initiative

Commercial Technologies for Higher Efficiency Motors



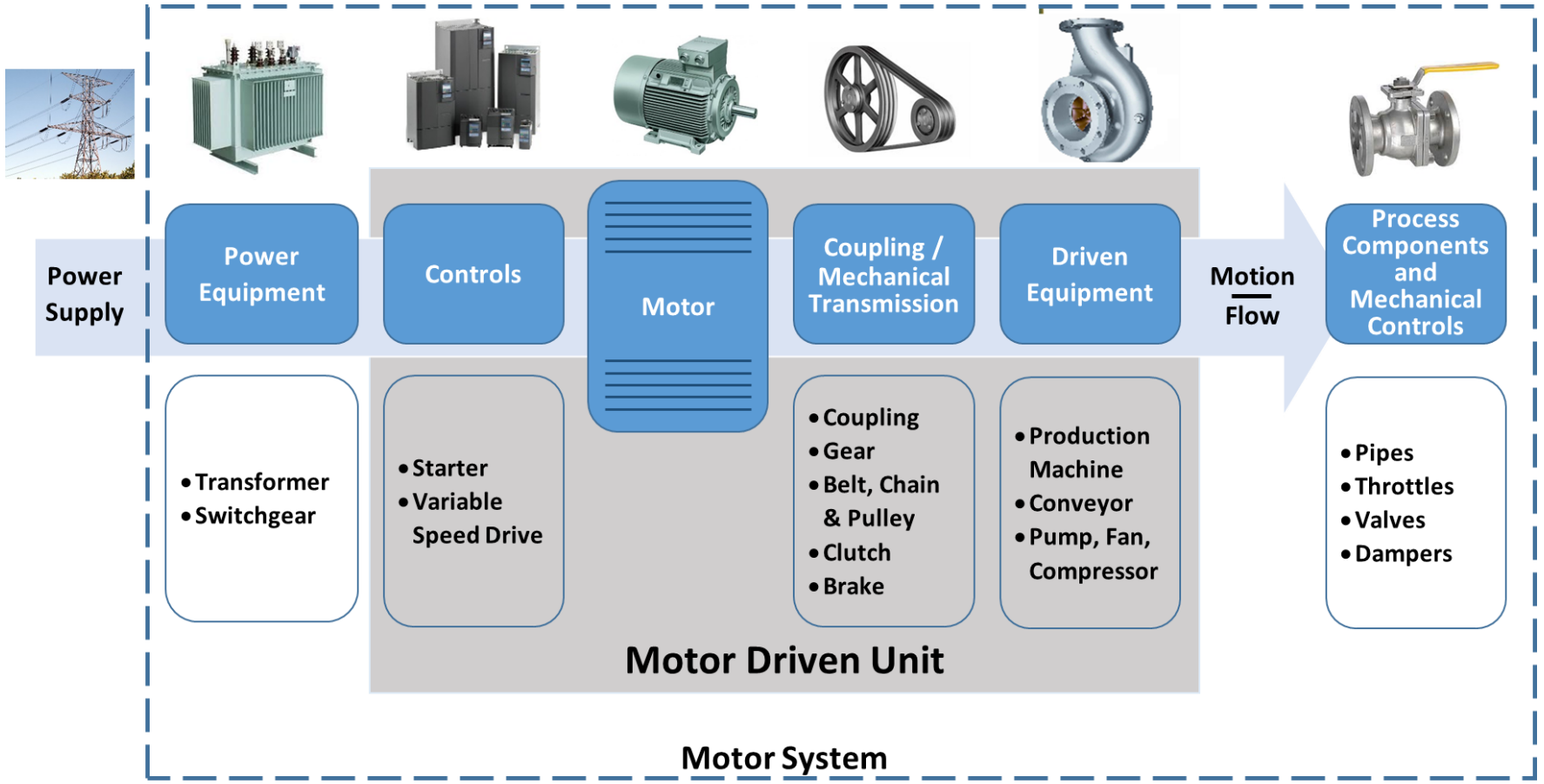
Accelerate the replacement of old inefficient motors
Estimated impact

- Replacing motors with IE2 Class or below.
- Assuming an average 4% gain in efficiency, equal to the average difference between IE1 and IE3

The savings triggered would equal **25 TWh/yr.**

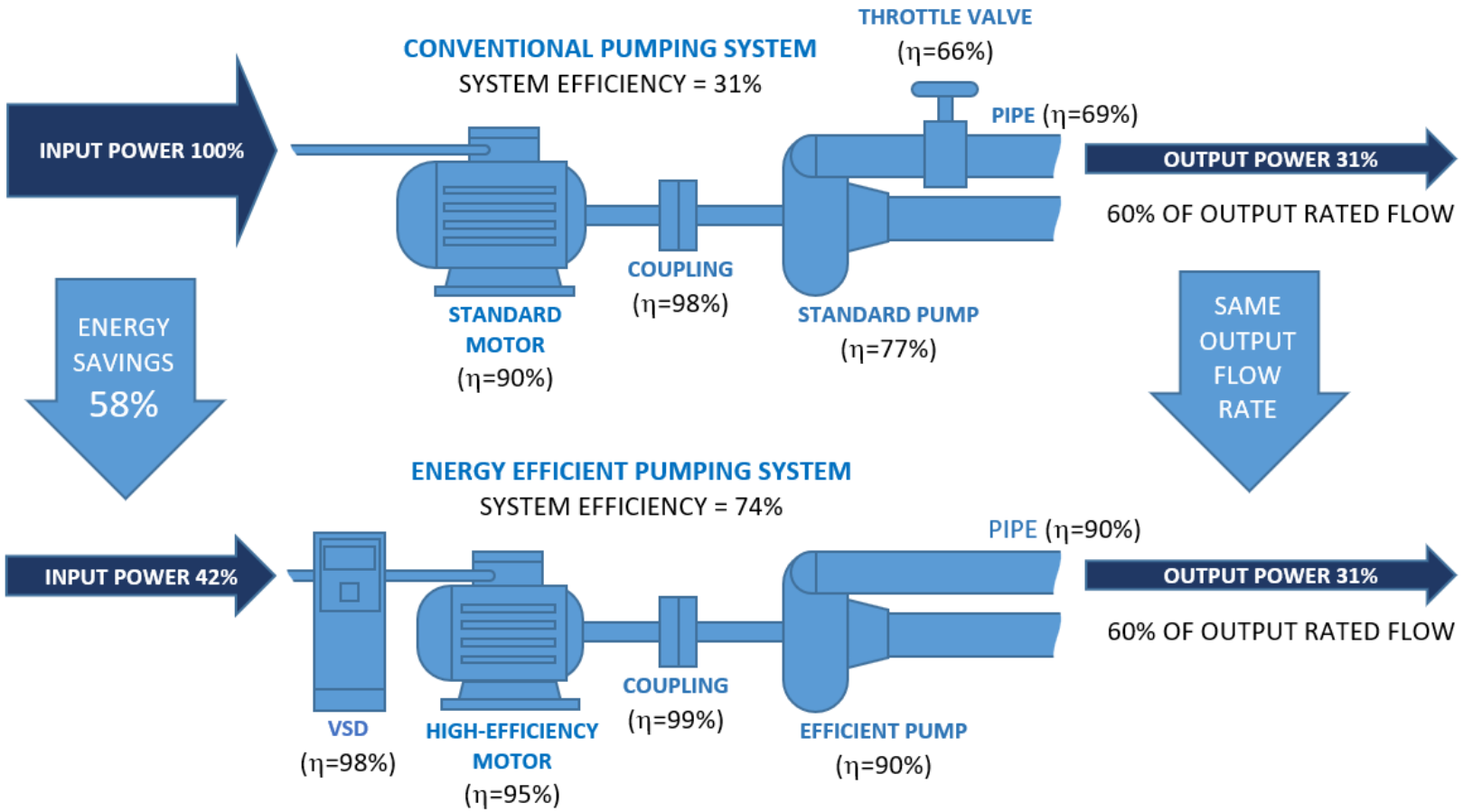
EU-MORE
EUropean MOtor REnovation initiative

Electric Motor Systems

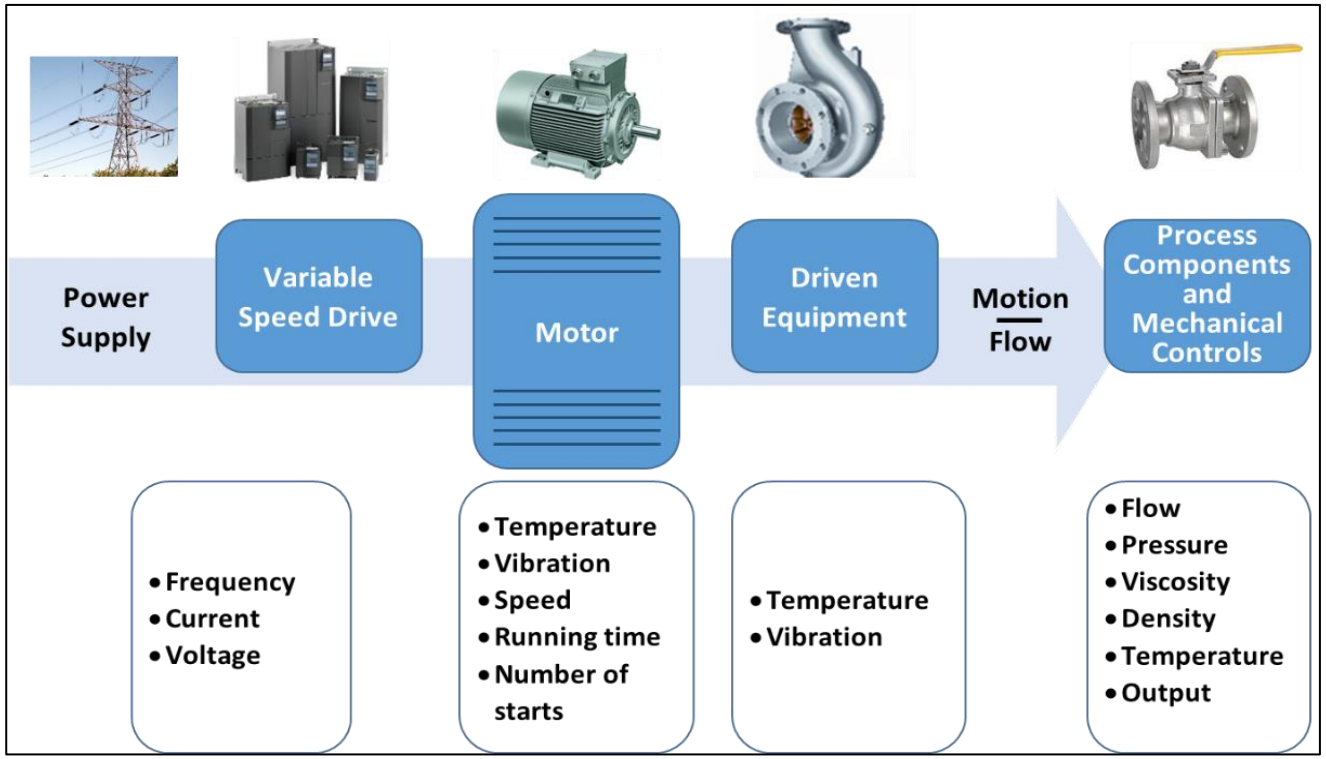


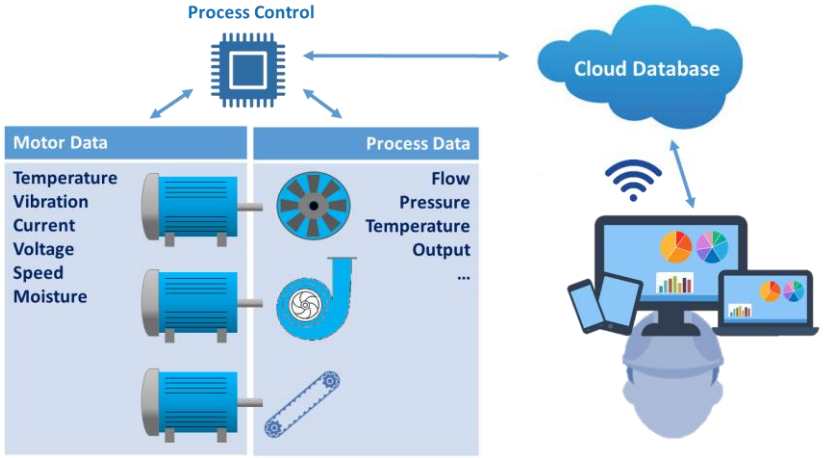
Motor System Optimisation

Example



Digitisation in motor systems





POTENTIAL AREAS OF MEASUREMENTS AND OF APPLICATION OF SENSORS IN MOTOR DRIVEN SYSTEMS
(ADAPTED FROM (KULTERER, DAWODY, WIDERSTROM, & WERKHOVEN, 2022)

Digitisation in motor systems

Digitisation enables motor systems to:

- Detect if, how much, and how long the motor/fan/pump/compressor is operating at suboptimal conditions (efficiency degradation, stall conditions, frequent on/off switching, vibrations etc.)
- Detect abnormal operation conditions (e.g. loads in periods without production, leaks in compressed air systems, dirty filters)
- Facilitate system integration throughout plants and resource optimization by allowing multiple pieces of machinery to be networked together.
- Carry out real time monitoring of the energy consumption of motors. Information can, on the one hand, give a better understanding of how and when the energy is being used and, on the other hand, provide hints on energy efficiency practices leading to optimization.

These features can result in significant process improvements, which, in turn, can lead to energy savings.

Motor System Savings (estimated)

If motor replacement policies also promote audits proposing system-level improvements (e.g. correct sizing, variable speed drive, system digitalisation...) the savings would amount to **75 TWh/year**

Benefits of Motor System Management

Increased Productivity	Improved Reliability	Reduced Costs
Greater control over process requirements	Scheduled downtime instead of breakdown maintenance	More efficient operation
Flexibility in meeting production requirements	Longer production runs between maintenance outages	Reduced maintenance costs
Reduced scrap and rework	Longer equipment life	Lower unit cost

Conclusion

- Despite existing regulations there are still high potential savings available through the use of energy efficient motors
- Adressing the entire motor system offers even greater savings
  - Dedicated motor system audits / management systems
- Digitisation is a major opportunity to help unlock those savings

Thank you for your attention

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