EU-MORE webinar

Electric motors and motor systems: State of play of the EU Ecodesign legislation

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©istock - Hramovnick

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ENERGY

Energy efficiency of products : Ecodesign & energy labelling

- **Ecodesign (ED)**: sets **minimum efficiency requirements** for *energy-related products ("any good that has an impact on energy consumption during use")*

  First rules date from **1992**

  Current Legal basis: Directive 2009/125/EC, based on article 114 TFEU (internal market harmonisation)

- **Energy labelling (EL)**: provides information on energy efficiency and other key performance criteria enabling potential buyers to make informed choices.

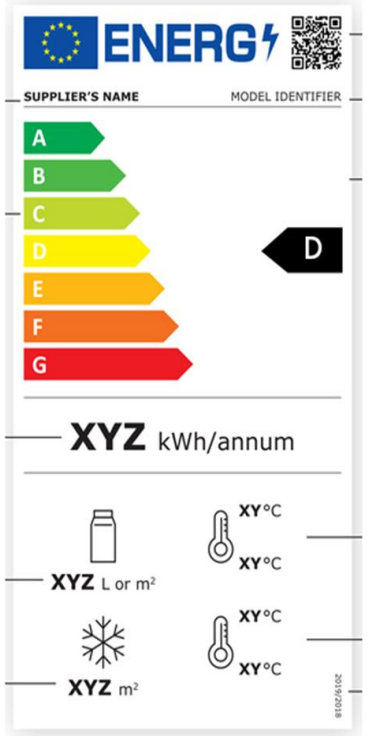
  First labels date from **1979**

  Current Legal basis: Regulation (EU) 2017/1369

Why do we do this ?
Need for action greater than ever

- Climate change & Green deal (Dec 2019): EU carbon neutral by 2050
  - Fir for 55 + Repower EU
- Circular economy & CEAP (Mar 2020)
- Current crisis and war in Ukraine:

  EU Energy security and energy prices
- Empowering consumers
- Ecodesign and energy labelling are key instruments.
- **30 Mar 2022** Commission adopted:
  - ❑ Ecodesign and energy labelling Working Plan 2022-24
  - ❑ Proposal for a new '*Ecodesign for Sustainable Products*' Regulation



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50 Measures in place

Note: Check our web page for more up-to-date info : https://energy-efficient-products.ec.europa.eu/index_en

> 30 Ecodesign regulations

1275/2008	Electric power consumption standby and off mode (repealed with effect from 9 May 2025)
107/2009	Simple set-top boxes (repealed with effect from 9 May 2025)
641/2009	Circulators
327/2011	**Industrial fans**
206/2012	Air-conditioning products and comfort fans (until 30 June 2025)
547/2012	**Water pumps**
932/2012	Household tumble driers (until 30 June 2025)
666/2013	Vacuum cleaners
813/2013	Space heaters
814/2013	Water heaters & storage tanks
66/2014	Domestic ovens, hobs and range hoods
548/2014	Power transformers
1253/2014	Ventilation units
2015/1095	Professional refrigeration
2015/1185	Solid fuel local space heaters
2015/1188	Local space heaters (until 30 June 2025)
2015/1189	Solid fuel boilers
2016/2281	Air heating and cooling products, process chillers
2019/424	Servers and data storage products
2019/1781	**Electric motors and Variable speed drives**
2019/1782	External power supplies
2019/1784	Welding equipment
2019/2019	Household refrigerating appliances
2019/2020	Light sources
2019/2021	Electronic displays (televisions)
2019/2022	Household dishwashers
2019/2023	Household washing machines
2019/2024	Commercial fridges
2023/1670	Mobile phones, cordless phones and tablets (20 June 2025)
2023/826	Off mode, standby mode, and networked standby (9 May 2025)
2023/2533	Household tumble driers (1 July 2025)
2024/1103	Local space heaters (1 July 2025)

17 Energy labelling Regulations

626/2011	Air conditioners
392/2012	Household tumble driers (until 30 June 2025)
811/2013	Space heaters
812/2013	Water heaters & storage tanks
65/2014	Domestic ovens, hobs and range hoods
1254/2014	Residential ventilation units
2015/1094	Professional refrigeration
2015/1186	Local space heaters
2015/1187	Solid fuel boilers
2019/2013	Electronic displays (televisions)
2019/2014	Household washing machines
2019/2015	Light sources
2019/2016	Household refrigerating appliances
2019/2017	Household dishwashers
2019/2018	Commercial fridges
2020/740	*Tyres labelling*
2023/1669	Mobile phones, cordless phones and tablets (20 June 2025)
2023/2534	Household tumble driers (1 July 2025)

2 Voluntary agreements

COM (2013) 23	Imaging equipment
COM (2015) 178	Game consoles

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What are the benefits?

ANNUAL SAVINGS IN THE ECO SCENARIO (WITH MEASURES) COMPARED TO THE BAU SCENARIO (WITHOUT MEASURES) FOR YEARS 2020, 2022 AND 2030. EU27 TOTALS IN ABSOLUTE VALUES IN THE INDICATED UNIT, AND RELATIVE SAVINGS VS BAU IN %

		2020		2022		2030	
	unit	Saving vs. BAU	Saving vs. BAU (%)	Saving vs. BAU	Saving vs. BAU (%)	Saving vs. BAU	Saving vs. BAU (%)
Primary Energy *(PEF 2.5 in 2020; PEF 2.1 in 2022; PEF 1.9 in 2030)*	TWh	1038		1072		1418*	
	PJ	3736	10%	3859	12%	5107	18%
	Mtoe	89		92		122	
Electricity	TWh	334		390		527	
	PJ	1203	12%	1403	14%	1897	18%
	Mtoe	29		34		45	
Final Fuel *(non-electric final energy)*	TWh	202		253		417	
	PJ	728	7%	913	9%	1501	17%
	Mtoe	17		22		36	
Final Energy *(excl. energy sector)*	TWh	531		636		927	
	PJ	1911	9%	2288	11%	3339	17%
	Mtoe	46		55		80	
Energy-related GHG emissions	Mt CO_2 eq	121	9%	135	11%	139	17%
NO_x emissions	kt SO_2 eq	83	33%	98	41%	128	64%
CO emissions	k ton	143	7%	244	12%	504	32%
OGC emissions	k ton	10	7%	14	11%	22	30%
PM emissions	k ton	10	6%	18	11%	39	34%
Drinking water (washing)	M m^3	1507	52%	1618	55%	1885	61%
Paper (printing)	M ton	0.23	15%	0.20	15%	0.15	15%
Filler wire/electrode (welding)	k ton	0	0%	16	1%	82	5%
Acquisition costs	€bn	-25	-5%	-29	-6%	-16**	-3%
Energy costs	€bn	74	12%	111	13%	157	19%
Consumable costs	€bn	7	19%	7	20%	9	25%
Total user expense	€bn	56	5%	89	6%	150	10%
Business revenues	€bn	22	4%	26	5%	16**	3%
Associated jobs	thousands	323	5%	380	5%	172**	2%

Sources:Ecodesign Impact Accounting Overview Report 2023
https://europa.eu/!3cfvJd

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Proposal for a new '*Ecodesign for Sustainable Products*' (ESPR) Regulation

- Will **replace** the current Ecodesign directive aiming at energy-related products ("ErPs").
- Will enable setting of performance & information requirements **for almost all categories of physical good**s placed on the EU market.
- **Wide range** of requirements, including:
  - product durability, reusability, upgradability and reparability
  - presence of substances that inhibit circularity
  - energy and resource efficiency
  - recycled content, remanufacturing and recycling
  - carbon and environmental footprints
  - information requirements, including through a Digital Product Passport
- Will **improve** the current framework on various aspects (e.g. market surveillance etc.)
- **Transitional measures** for regulations adopted under the current framework

  (ongoing work can be pursued under the existing framework until end 2026).
- **Political deal reached in DEC 2023, adoption expected in June 2024**
  https://ec.europa.eu/commission/presscorner/detail/en/ip_23_6257

General info : https://ec.europa.eu/info/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/sustainable-products/ecodesign-sustainable-products_en

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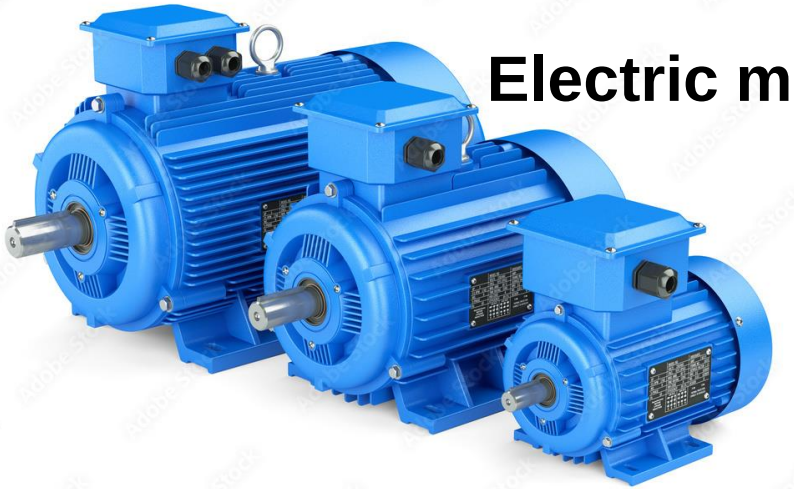
Industry:

Electric motors



(EU) 2019/1781

(Industrial) Fans

(EU) 640/2009

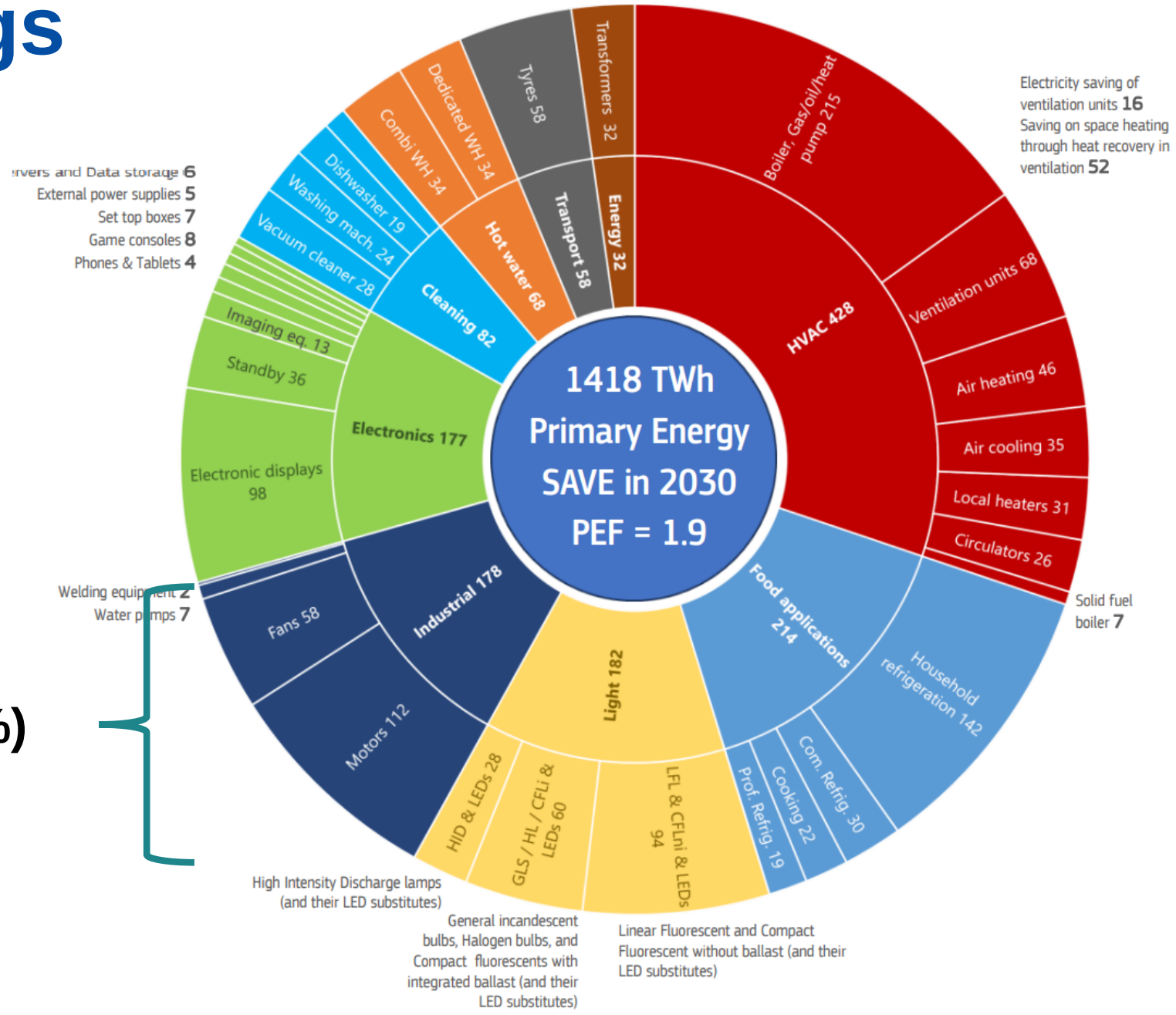
Variable speed drives (VSDs)

Water Pumps

(EU) 547/2012

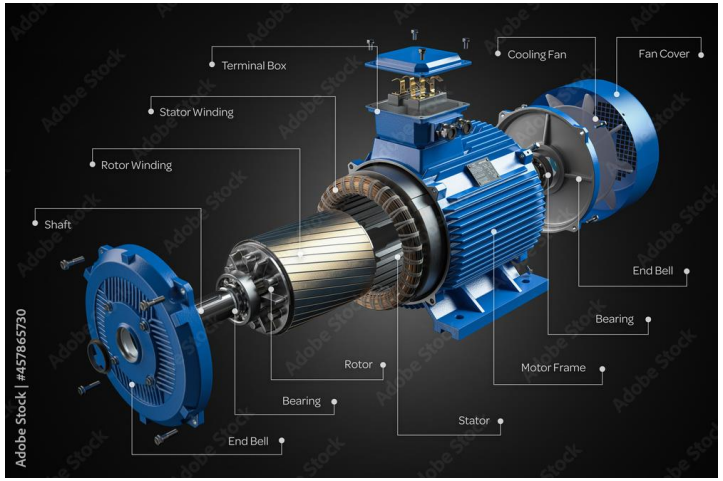
Energy savings

176 TWh/a in 2030 (12%)



Electric motors & Variable speed drives: Regulation (EU) 2019/1781

- Entered into application 01/07/2021
- Replaces former regulation (EU) 640/2009 on ecodesign for electric motors
- Covers:
  - Induction motors 0,12 kW – 1000 kW
  - 2, 4, 6 and 8 poles
  - Single phase and 3 phase
  - 50 Hz and 60 Hz
  - Some exemptions
- VSDs 3 phases input, rated for operation with 0,12 kW-1 000 kW motor: IE2



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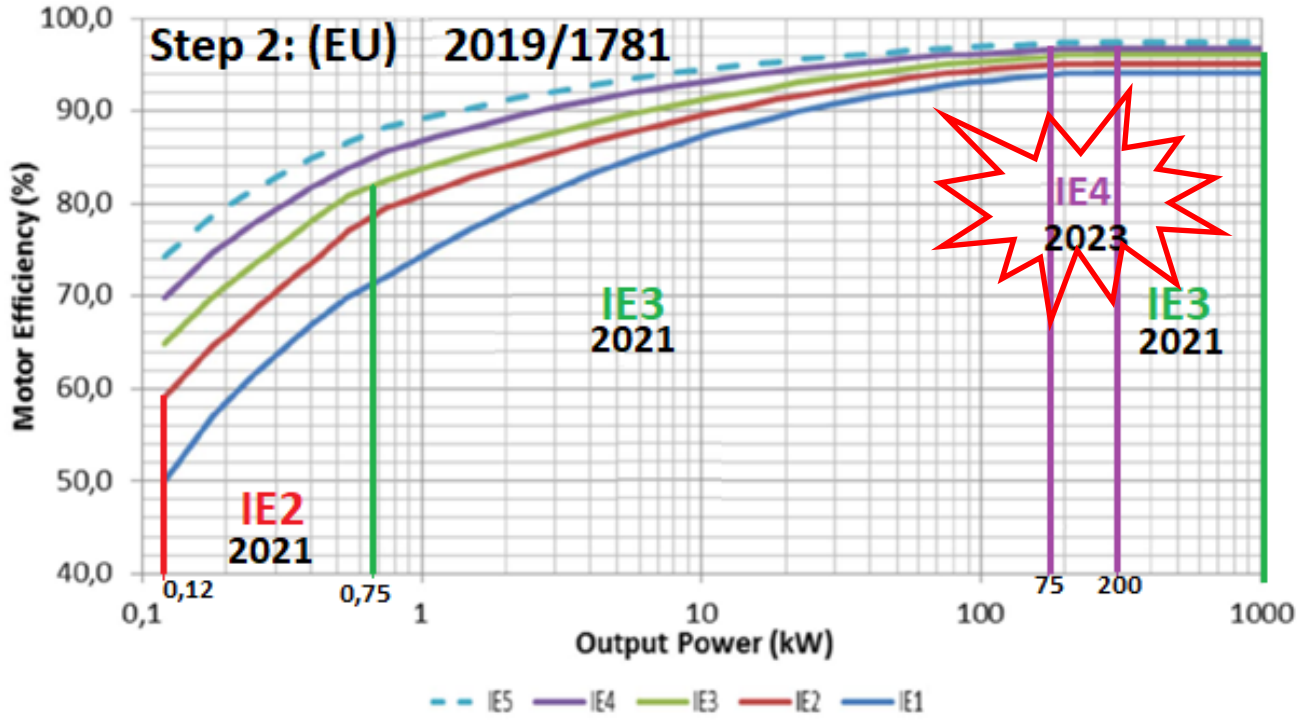
Energy Efficiency of electric motors

Standard EN IEC 60034-30-1 defines Energy classes from IE1 to IE4



World première !
The EU is on the lead

Copied by the US:
from 1 June 2027, IE4 between for motors 100 HP (75 kW) and 250 HP (186 kW)

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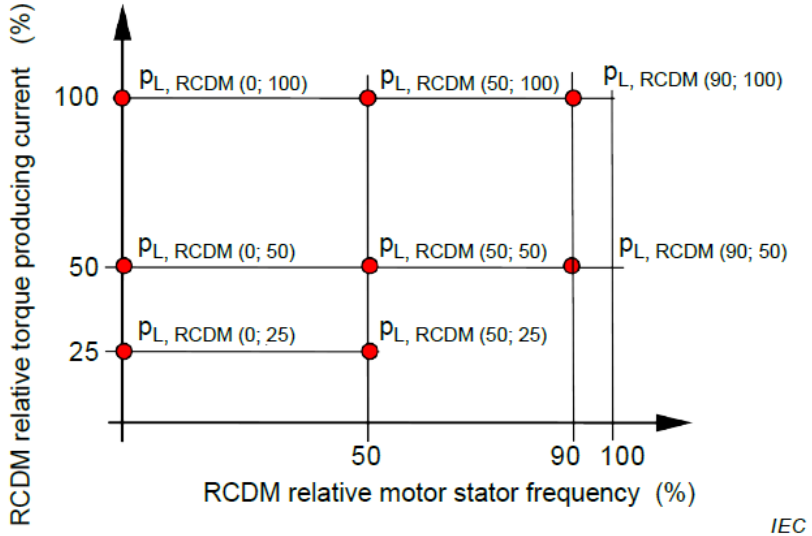
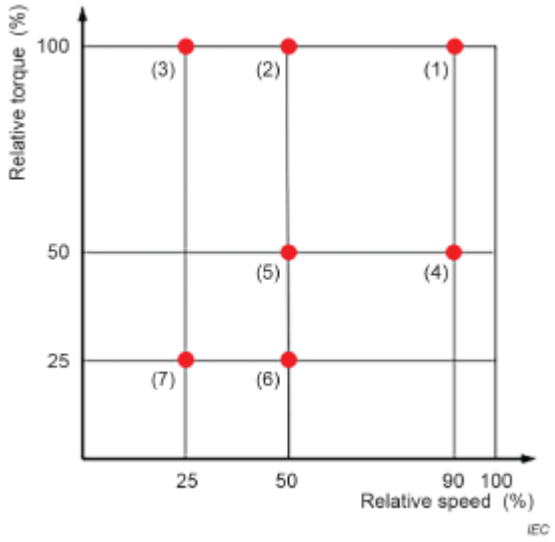
Information requirements at part load/speed for motors and VSDs

8 Points for VSDs
(IEC 61800-9-2)



7 points for motors
(IEC 60034-2-3:2020)



=> Enables calculation and optimisation of electric motor systems efficiency at different loads and speeds

=> Large potential energy savings, not accounted for in our estimations

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Next step: Review of the Regulation

Art 9: Draft revision proposal to be presented to the Consultation Forum by **14 Nov 2023**, addressing the appropriateness of:

(1) resource efficiency requirements, incl. identification of rare earth in PM motors;

(2) the level of verification tolerances;

(3) setting stricter requirements for motors and VSDs

(4) setting MEPs for motors > 1000 V;

(5) setting requirements for combinations of motors and VSDs placed on the market together & integrated variable speed drives (compact drives);

(6) the exemptions

(7) adding other types of motors to the scope, incl. PM motors.

Other aspects e.g. address system losses directly associated with the VSDs

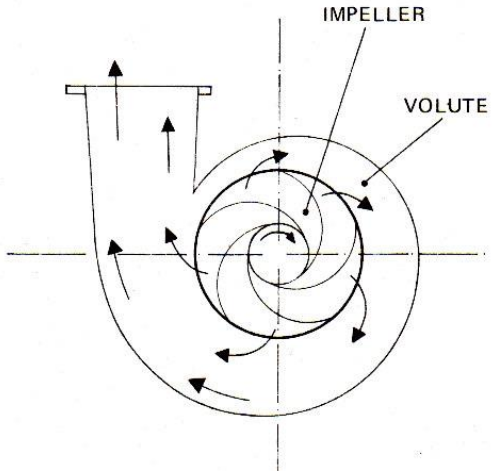
- Will take place in the frame of ESPR => additional aspects to be taken into consideration (e.g. substances of concern, more focus on circularity)
- Kick-off expected in the second half of 2024

Water pumps (EU) 547/2012

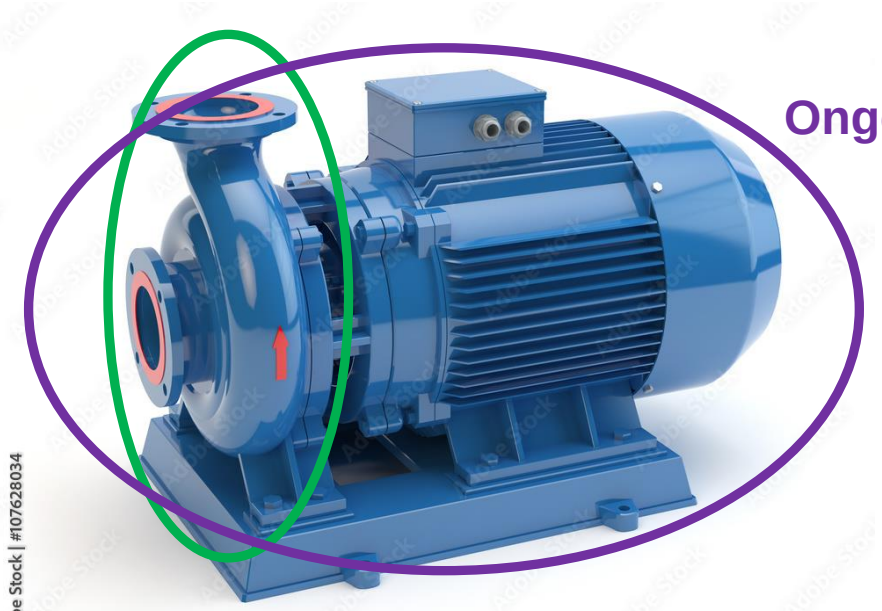
Scope: Rotodynamic water pumps for pumping clean water

- End suction own bearing (ESOB)
- End suction close coupled (ESCC)
- End suction close coupled inline (ESCCi)
- Vertical multistage (MS-V)
- Submersible multistage (MSS)

Each type having its own definition and scope boundaries



Current siutation:
Only the hydraulic part



Ongoing review

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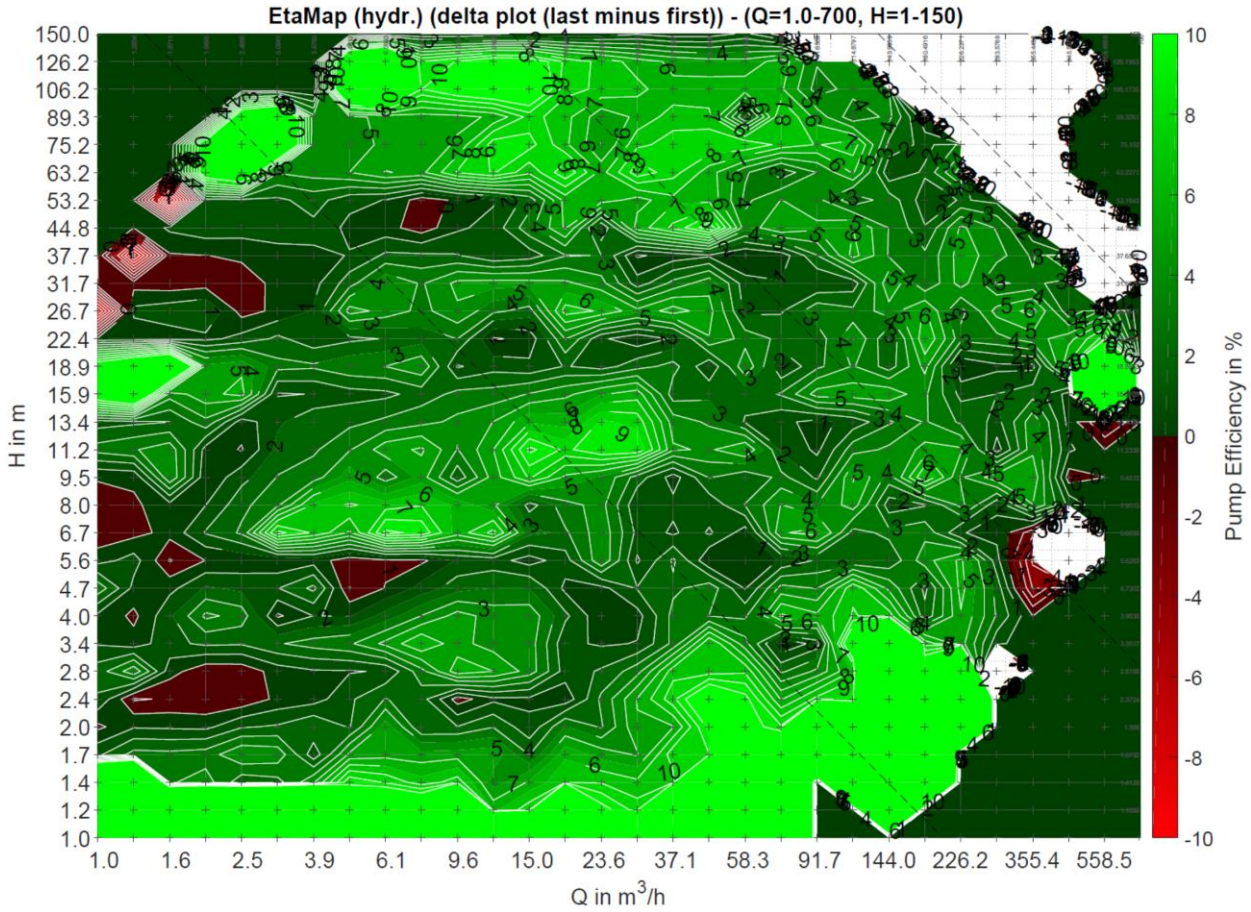
Energy efficiency of water pumps

- Current situation: Minimum Efficiency Index (MEI) based on hydraulic efficiency of the pump body
- Review: Energy Efficiency Index (EEI), of the pump unit (pump body + electric motor + VSD (if any). Metrics established so that a solution with VSD is highly favoured => enables extra energy savings in the pump system.



Comparison of single stage pumps of a product range in a flow vs. head chart at constant flow. Pumps efficiencies are compared for pumps with either trimmed impeller or VSD. In the green regions the pumps in the range benefit from VSD and in the red not [1].

[1] Carravetta (2018), Cost-benefit analysis of VSD use in constant flow conditions. CeSMA, Naples. http://wpage.unina.it/arcarrav/VSD_Carravetta.pdf

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Next steps:

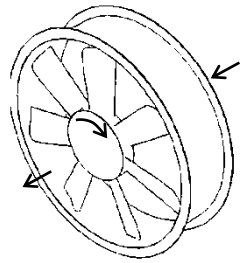
- **Review ongoing under current framework**
- **Prepating for ISC (Q3 2024)**
- **Feedback and WTO expected Q4 2024**
- **Adoption and publication first half of 2025.**

‘Industrial’ Fans - (EU) 640/2009

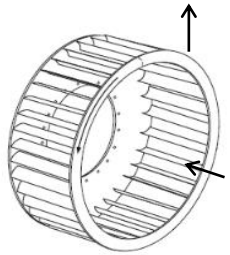
SCOPE: Fans driven by an electrical motor with an electric input power ≥ 125 W and ≤ 500 kW

Comfort fans (<125 W) covered by Regulation (EU) No 206/2012 for air conditioners and comfort fans

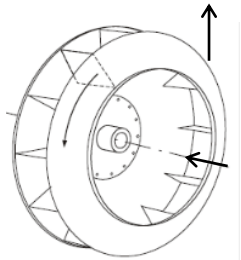
Types:



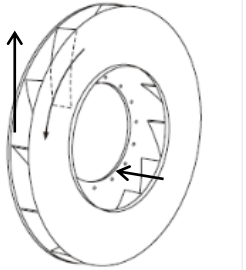
1. Axial



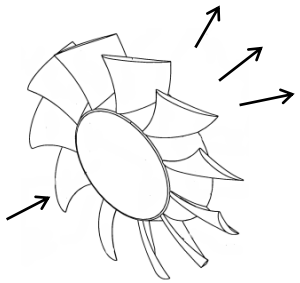
2. Centrifugal Forward-curved



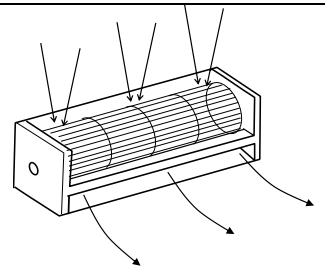
3. Centrifugal radial balded



4. Centrifugal Backward-curved



5. Mixed flow



6. Cross-Flow

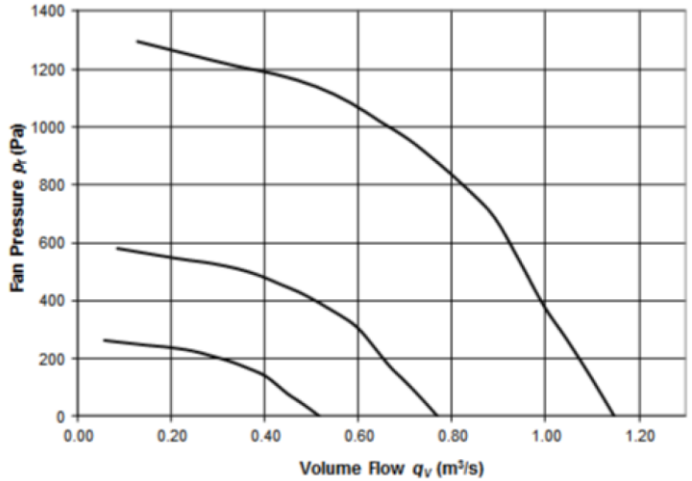
The arrows represent the air flow - for types 2 to 5 the housing is not shown

Review of Regulation (EU) 327/2011 close to an end

- RSB positive opinion in Nov 2019
- Consultation Forums took place April 2022 and June 2023.
- Committee vote took place in Jan 2024, **adoption planned by June mid 2024 (under current framework)**

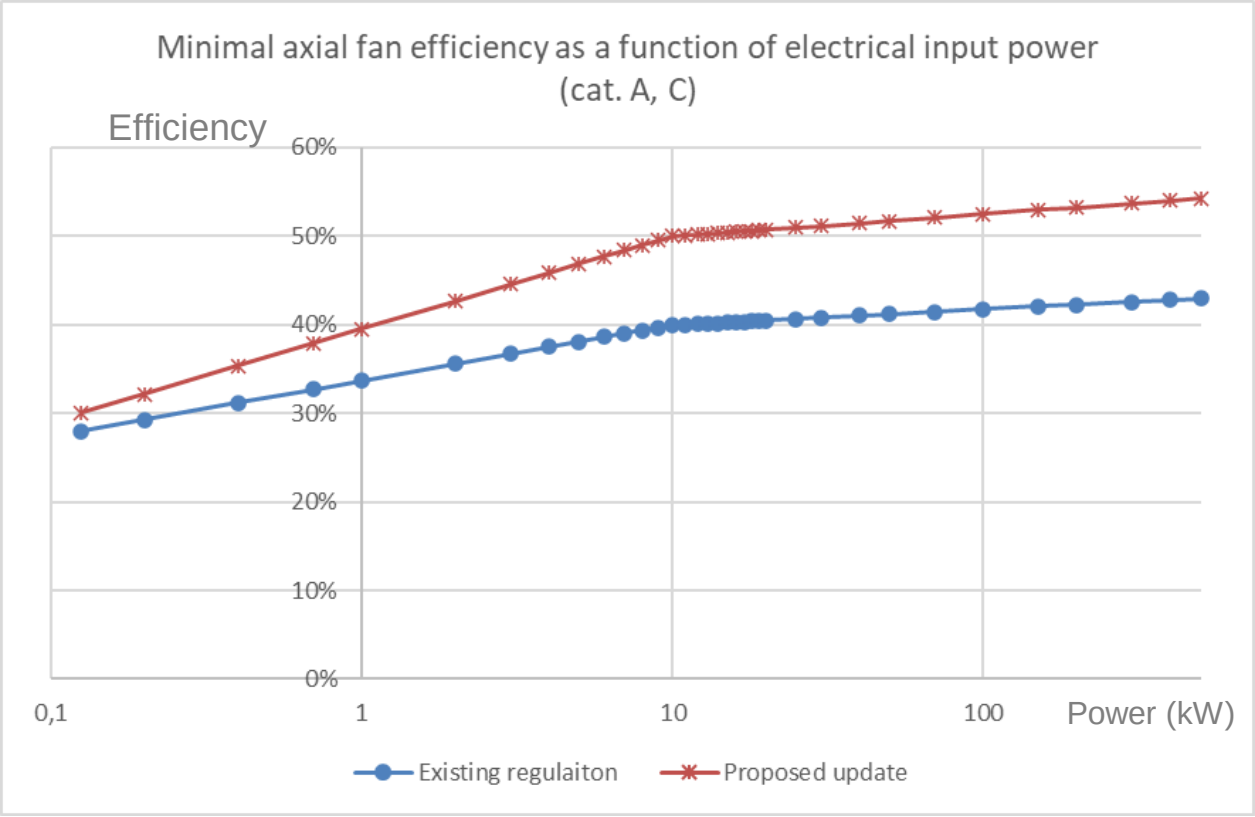
- ✓ Jet fans, with dedicated limit and efficiency formula
- ✓ Increased Meps (N-value), new formula (‘softer for smaller sizes’ e.g. for axial fans)
- ✓ New allowances (for reversible fans, for low noise fans)
- ✓ Resource efficiency requirements (availability of spare parts, Repair and maintenance information …)
- ✓ Updated definitions (centrifugal fan types), new/revised exemptions
- ✓ Allowance for fans with protective grids that cannot be removed
- ✓ Information requirements on partial load: at least 3 performance curves

2 amendments expected soon after publication



Fans energy efficiency

Efficiency depends on fan type – example of axial fans



For smaller fans, market transformation towards fans with more efficient PM motors and integrated VSD

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Energy Efficiency Directive (recast)

ANNEX V - *COMMON METHODS AND PRINCIPLES FOR CALCULATING THE IMPACT OF ENERGY EFFICIENCY OBLIGATION SCHEMES OR OTHER POLICY MEASURES UNDER ARTICLES 8, 9 AND 10 AND ARTICLE 30(14)*

1. Methods for calculating energy savings other than those arising from taxation measures for the purposes of Articles 8, 9 and 10 and Article 30(14).

Obligated, participating or entrusted parties, or implementing public authorities, may use the following methods for calculating energy savings:

(c) scaled savings, whereby engineering estimates of savings are used. This approach may be used only where establishing robust measured data for a specific installation is difficult or disproportionately expensive, for example replacing a compressor or electric motor with a different kWh rating from that for which independent information about savings has been measured, or where those estimates are carried out on the basis of nationally established methodologies and benchmarks by qualified or accredited experts that are independent of the obligated, participating or entrusted parties involved;

Thank you for your attention!

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