Revision of fan regulations in Europe

AMCA European Fan Symposium 2024

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AMCA European Fan Symposium 2024

Presentation Outline

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Background

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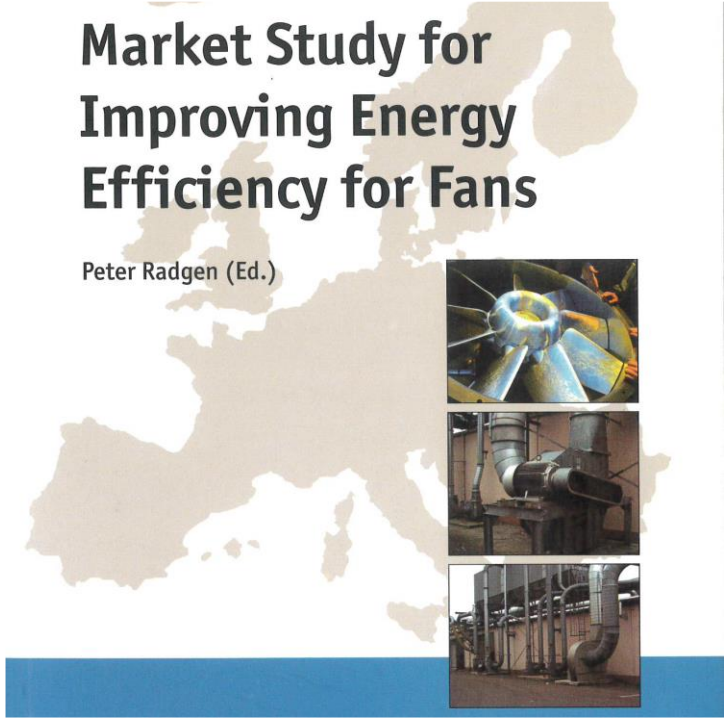
Summary

01

Background – the beginning

SAVE programme and the preparatory study



Energy Using Products Preparatory Studies – Lot 11:

Motors, Water Pumps, Ventilation Fans, Circulators

For: European Commission DG TREN

02

Regulation 327/2011

Regulation 327/2011

COMMISSION REGULATION (EU) No 327/2011 of 30 March 2011 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for fans driven by motors with an electric input power between 125 W and 500 kW

Article 1

Subject matter and scope

1. This Regulation establishes ecodesign requirements for the placing on the market or putting into service of fans, including those integrated in other energy-related products as covered by Directive 2009/125/EC.

— indoor units of household air-conditioning products and indoor household air-conditioners, ≤ 12 kW maximum airco output power,

Jet fan?

Circulating fan?

Table 1

First tier minimum energy efficiency requirements for fans from 1 January 2013

Fan types	Measurement category (A-D)	Efficiency category (static or total)	Power range P in kW	Target energy efficiency	Efficiency grade (N)
Axial fan	A, C	static	$0{,}125 \le P \le 10$	$\eta_{target} = 2{,}74 \cdot \ln(P) - 6{,}33 + N$	36
			$10 < P \le 500$	$\eta_{target} = 0{,}78 \cdot \ln(P) - 1{,}88 + N$	
	B, D	total	$0{,}125 \le P \le 10$	$\eta_{target} = 2{,}74 \cdot \ln(P) - 6{,}33 + N$	50
			$10 < P \le 500$	$\eta_{target} = 0{,}78 \cdot \ln(P) - 1{,}88 + N$	
Centrifugal forward curved fan and centrifugal radial bladed fan	A, C	static	$0{,}125 \le P \le 10$	$\eta_{target} = 2{,}74 \cdot \ln(P) - 6{,}33 + N$	37
			$10 < P \le 500$	$\eta_{target} = 0{,}78 \cdot \ln(P) - 1{,}88 + N$	

Regulation 327/2011

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Article 7

Revision

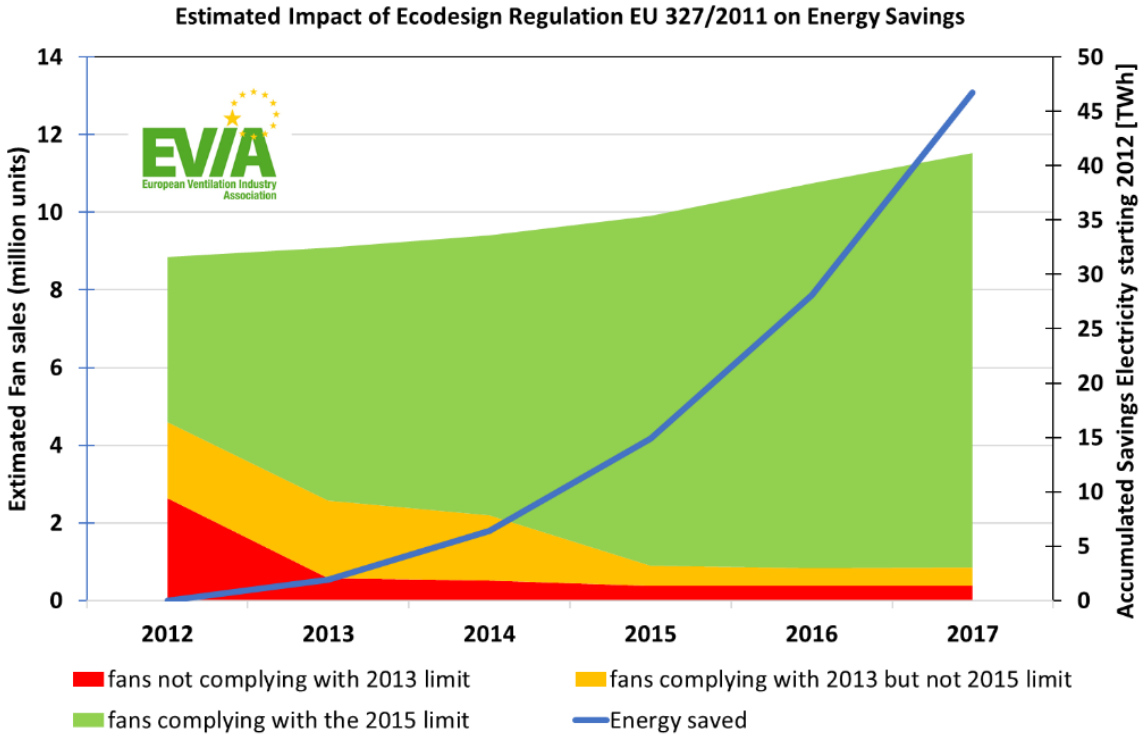
The Commission shall review this Regulation no later than 4 years after its entry into force and present the result of this review to the Ecodesign Consultation Forum. The review shall in particular assess the feasibility of reducing the number of fan types in order to reinforce competition on grounds of energy efficiency for fans which can fulfil a comparable function. The review shall also assess whether the scope of exemptions can be reduced, including allowances for dual use fans.

Regulation 327/2011

Regulation 327/2011

Impact 2012 to 2018

- - 46,800 GWh of electricity
- - 21,5 Mt CO_2



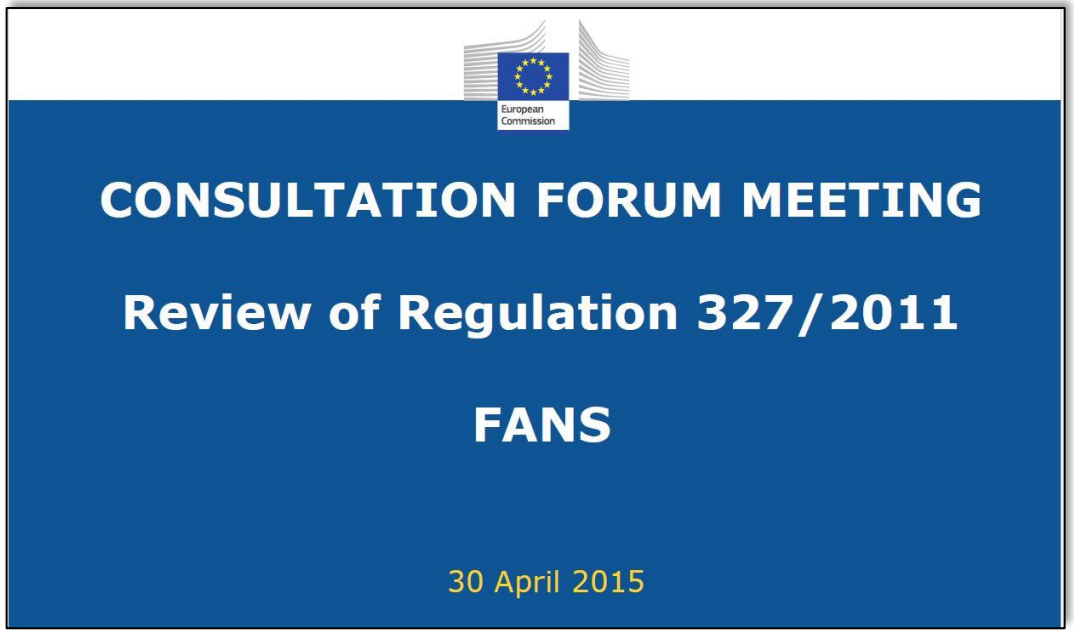
03

The review

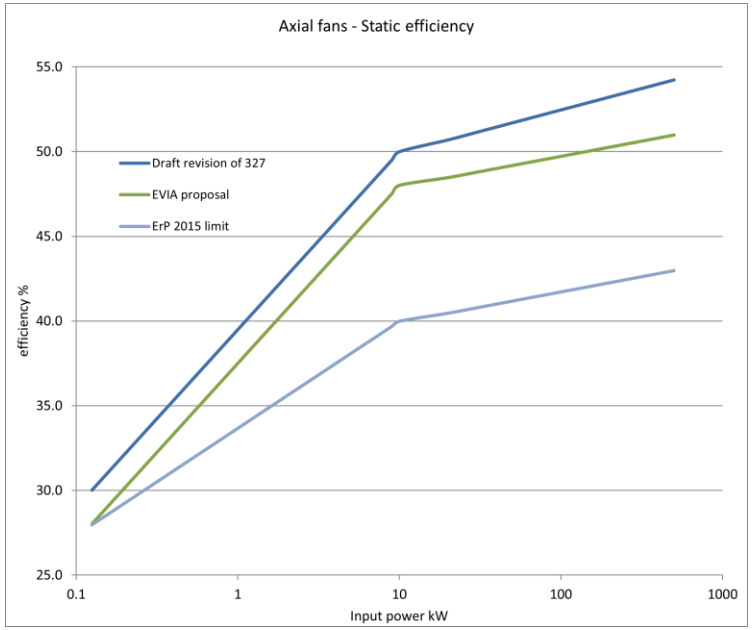
The review of regulation 327/2011

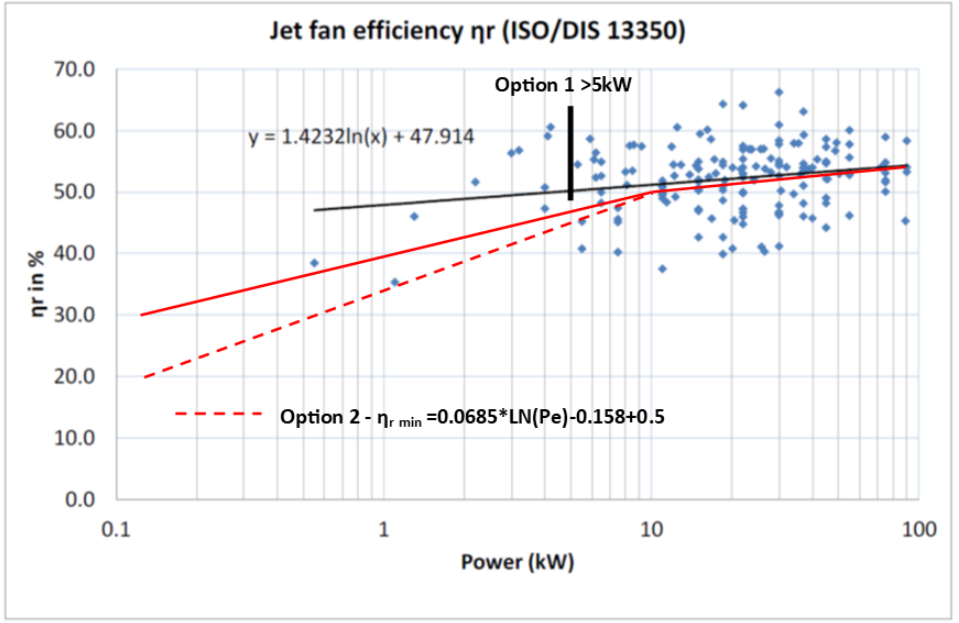
1st Stakeholder meeting October 2014

- Tasks:
  - reduction of fan types possible?;
  - reduction of exemptions possible?;
  - assess adequacy of allowance for dual use fans;
  - requirements for jet fans? (plus impacts);
  - assess adequacy of market surveillance;
  - other information relevant for review (impact 327/2011?).



The review of regulation 327/2011

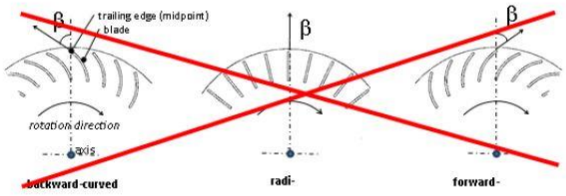


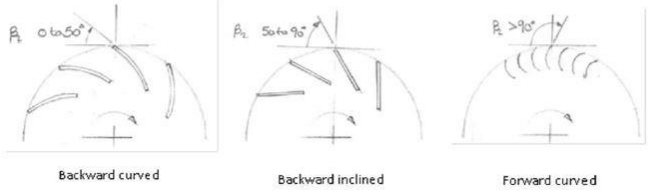


The review of regulation 327/2011

Suggested changes to draft regulation 327: Industrial fans for dust and conveying

the blade is the edge at the tip of the blade at the outlet of the impeller~~of the air conducting surface of the blade and the radial through the fan rotation axis, at the midpoint of the blade's trailing edge and in a plane perpendicular to the fan rotation axis. The angle is defined positive when it is inclined in the direction of the rotation of the impeller~~. A centrifugal fan is defined as 'backward-curved' if $0 \leq \beta_2 \leq$ ~~+~~150°, '~~radial~~backward inclined' if ~~+~~150°$< \beta_2 <$ ~~+~~190° and 'forward-curved' if $\beta_2 \geq$ ~~+~~190°.





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The Issue

If the new efficiency requirements for centrifugal fans proposed in the draft revision would come into force, many of the applications mentioned above can't be put into service in the future, as the fans can't reach the new efficiency requirements (see Figure 1).

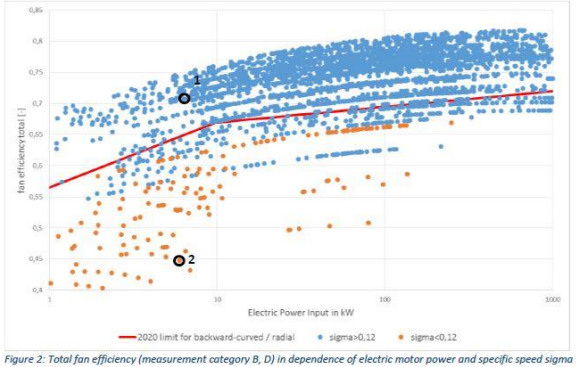

Figure 2: Total fan efficiency (measurement category B, D) in dependence of electric motor power and specific speed sigma at best efficiency point

Figure 2 contains catalogue data provided by relevant HPLV fan manufacturers. The specific speed σ_{bep} is used as parameter characterizing the ratio between volume flow rate and total pressure at best efficiency point (BEP). This characteristic number is defined as:

$$\sigma_{bep} = n * \frac{2 * \sqrt{\pi * q_{v,bep}}}{\left(2 * \frac{p_{f,bep}}{\rho}\right)^{\frac{3}{4}}}$$

The review of regulation 327/2011 - delays

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General Document GEN – 920.00

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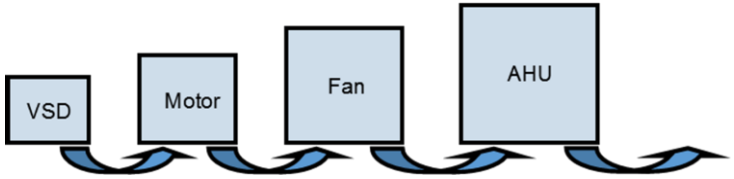
Revision fan regulation 327/2011

Impact Assessment for the revised regulation failed the Regulatory Scrutiny Board (RSB)

The Commission has just been informed that the Impact Assessment for the proposed draft regulation did not pass the Regulatory Scrutiny Board. The Commission will now try to improve on the Impact Assessment by mid-August so that it could be submitted to the RSB in September.



Cascading regulations

Consulation forum of April 2022

New draft of 2022 – key points

- Tier 2 limits as expected
- Performance determine by direct measurement
- More exclusions
- In general clearer definitions – prEN17166
- Jet fan efficiency determined using thrust
- Jet fan limit set for >5 kW?
- Dual use fans as expected
- High pressure-low volume fans as expected
- Scope continues to include fans integrated in other product
- Large fans – no change to scope
- Information requirements for partial load operation
- Material efficiency information requirements
- Resource efficiency requirements
- Product information for incomplete fans
- Annex III measurement & calculations – lot of material from the industry – CEN TC156 WG17 & associations

Issues compared with the draft of 2015

- Tier 1 limits lower than regulation 327/2011
- Industrial fans for dust and conveying not changed
- Permanently fitted guards cannot be removed for MSA assessment
- Bespoke definitions for flow rate and pressure
- Some editorial issues – compensation factors VSD

Consulation forum of April 2022

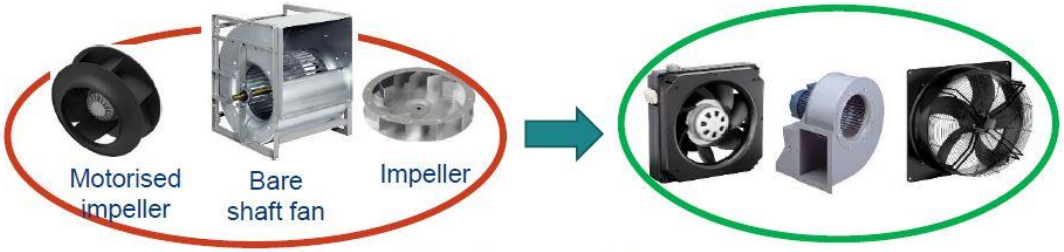
15 questions from the Policy Officer

1. Practical difficulties measuring fans integrated in other products
2. Fan control by user interface
3. Exempting fans in laundry dryers <3 kW
4. Exemption of fans in range hoods
5. Jet fan limits
6. Exemption of fans in large VSD
7. Exemption of fans in wind turbines
8. Backward inclined terminology
9. Exclusion of suction fans
10. Dual use fans <750W
11. Reduction of the 5 kW threshold of forward curved fans
12. Partial-load operation, defining the lower speed curve
13. Tolerances
14. Tolerance of partial load data
15. Guard

3rd consulation forum - June 2022

European Commission

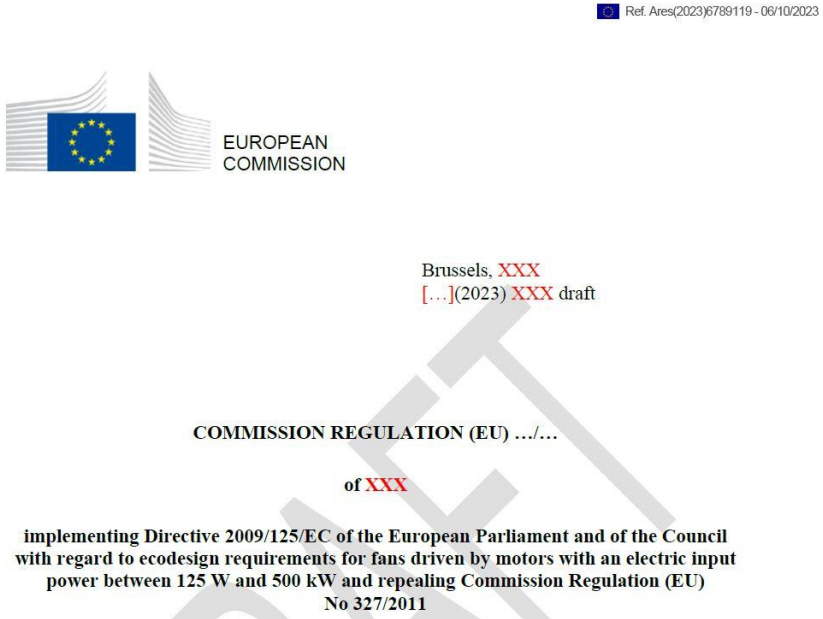
From incomplete fans to complete fans (2022 proposal):



Incomplete fans must be tested in a compliant configuration of a complete fan

Legal issue !
Limited empowerment Art. 11 of ED Directive

Revised draft dated 6th October 2023



Ref. Ares(2023)6789119 - 06/10/2023

EUROPEAN
COMMISSION

Brussels, XXX
[…](2023) XXX draft

COMMISSION REGULATION (EU) …/…

of XXX

implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for fans driven by motors with an electric input power between 125 W and 500 kW and repealing Commission Regulation (EU) No 327/2011

- Circulating fans
- Definition of VSD
- Definition of test points
- Data on rating plate
- Tolerance on partial load data

Revised draft dated 14th February 2024

Brussels, XXX
D093344/02
[…](2024) XXX draft

COMMISSION REGULATION (EU) …/…

of XXX

implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for fans driven by motors with an electric input power between 125 W and 500 kW and repealing Commission Regulation (EU) No 327/2011

- 13-year exemption for spare parts
- 13-year exemption for fans integrated in other product
- 2% tolerance on fan rotational speed

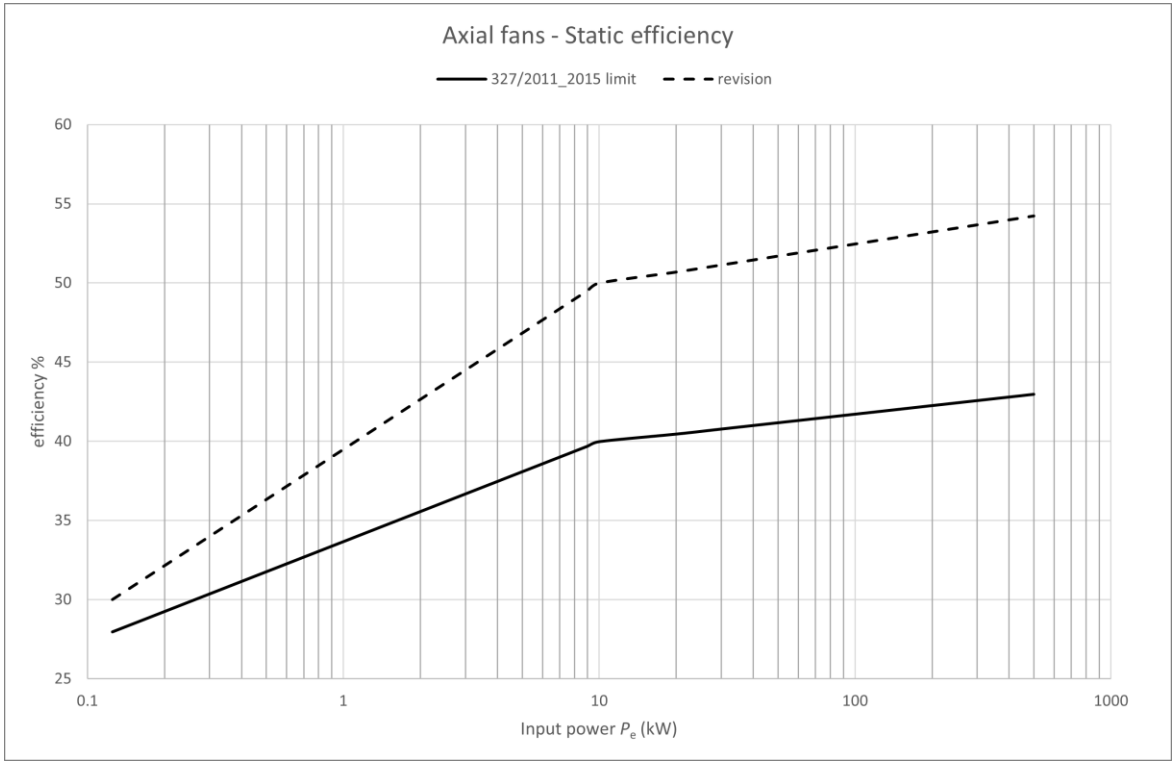
04

The ecodesign regulation for fans 2024/1834 published in the OJ on 3rd July 2024

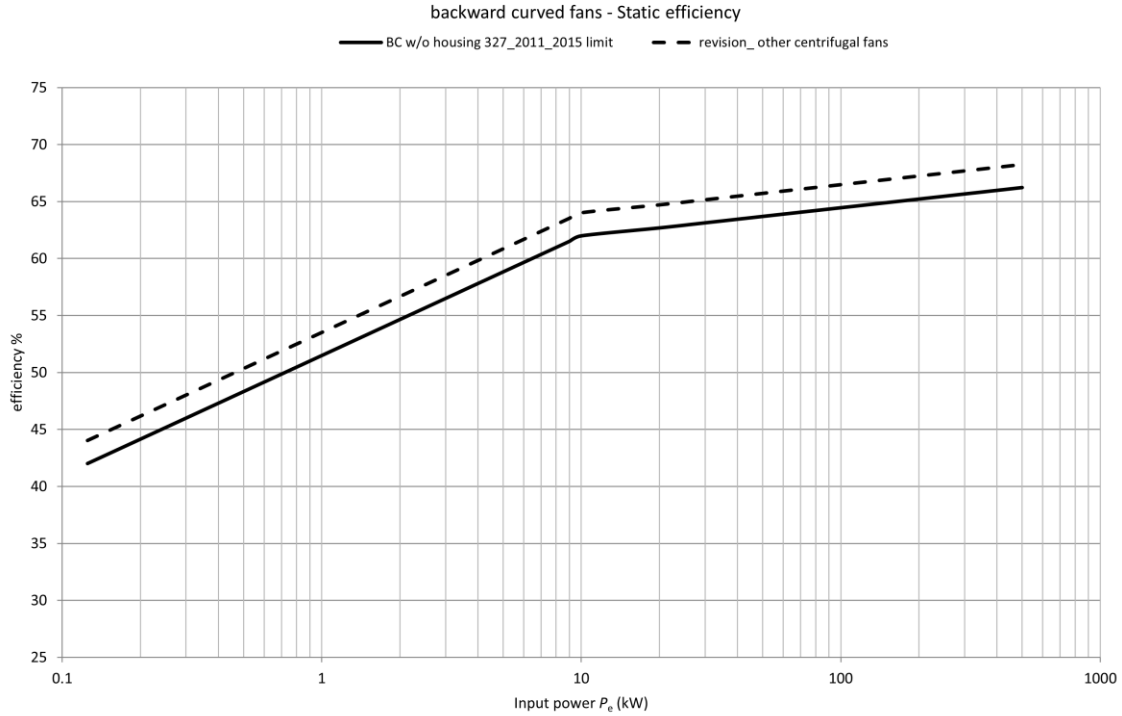
Key points

- The Policy Officer is requesting a corrigendum to modify Article 9.
- The industry has requested a corrigendum to delete the requirement of a tolerance on the rotational speed.
- **Minimum requirements** come into force 2 years after publication in the official journal, except for -
    - Fans integrated in other product - minimum requirements come into force 3 years after publication in the official journal. Until then they shall meet the requirements of 327/2011.
    - Spare parts - minimum requirements come into force 13 years after publication in the official journal, except. Until then they shall meet the requirements of 327/2011.
- Few less fan categories.
- 9 new exclusions, including one for circulating fans.
- Compensation factors for dual use fans as requested.
- Exclusion of industrial fans for dust and conveying as requested.
- Jet Fan included, based on thrust, with limits, for >750 W.
- Bespoke limit for high-pressure low-volume fans as requested.
- Performance determined by direct measurement, with use of scale models.
- New **compensation factor for permanently fitted guards**.
- **Information requirements on partial load** requirement after 3 years.
- **Resource efficiency requirements including spare parts**
- **Material efficiency**

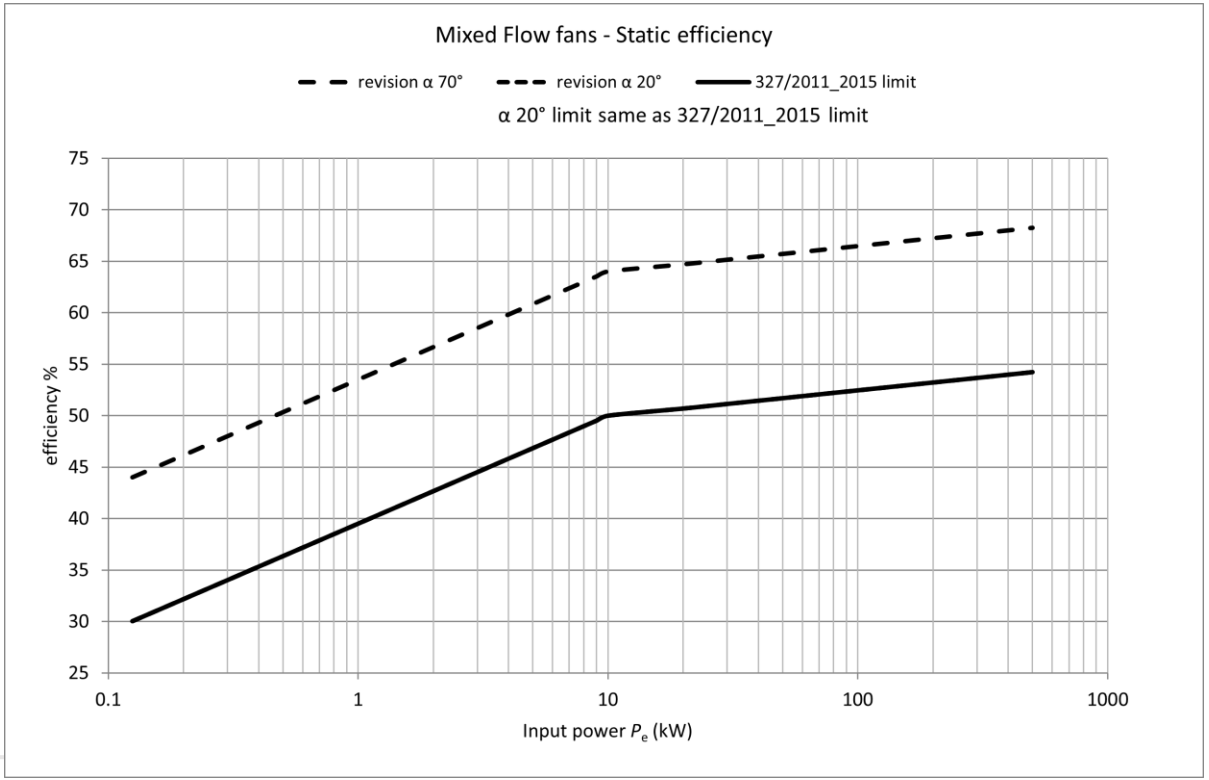
Minimum efficiency requirements



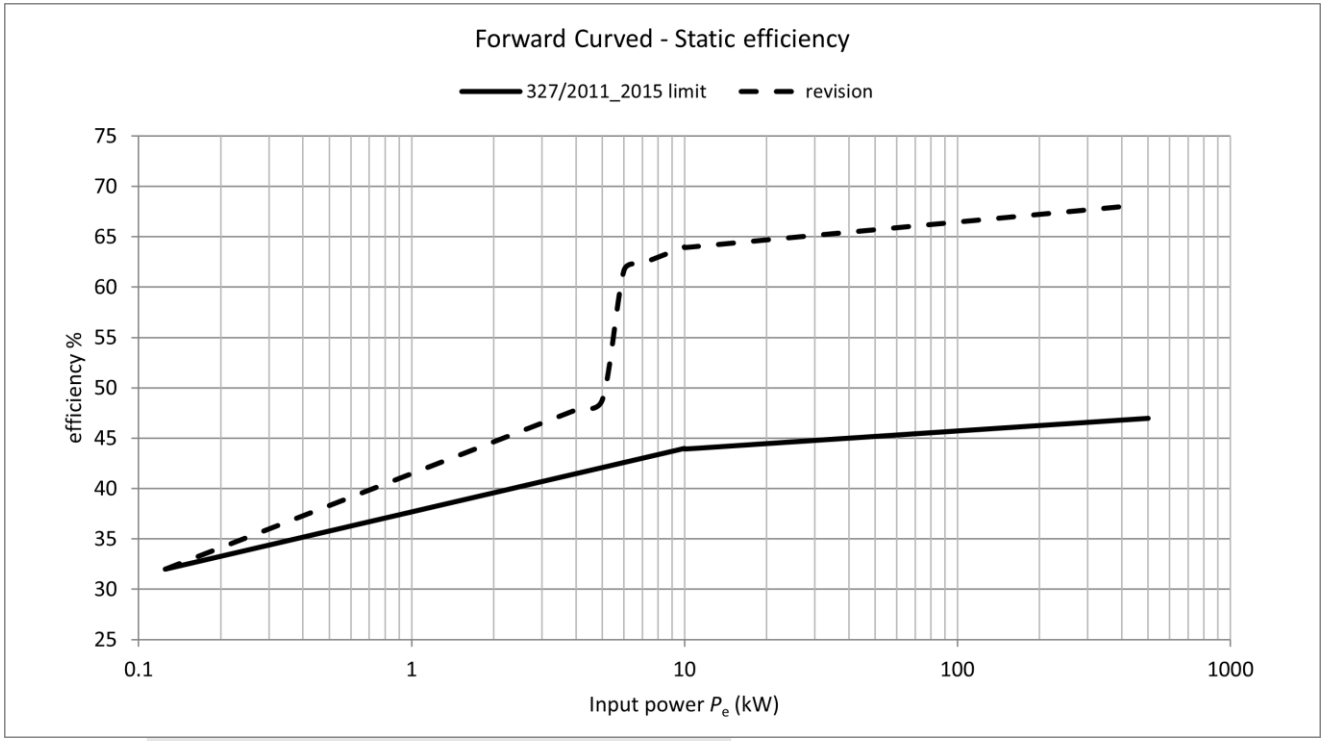
Minimum efficiency requirements



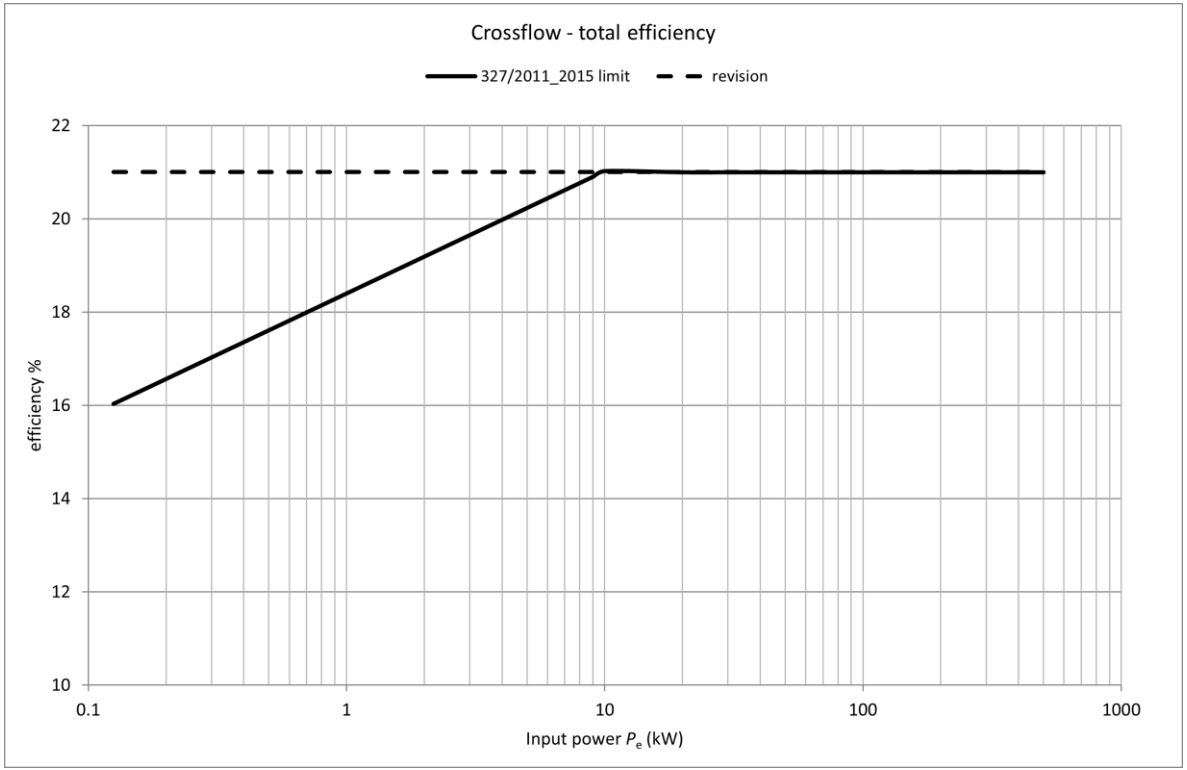
Minimum efficiency requirements



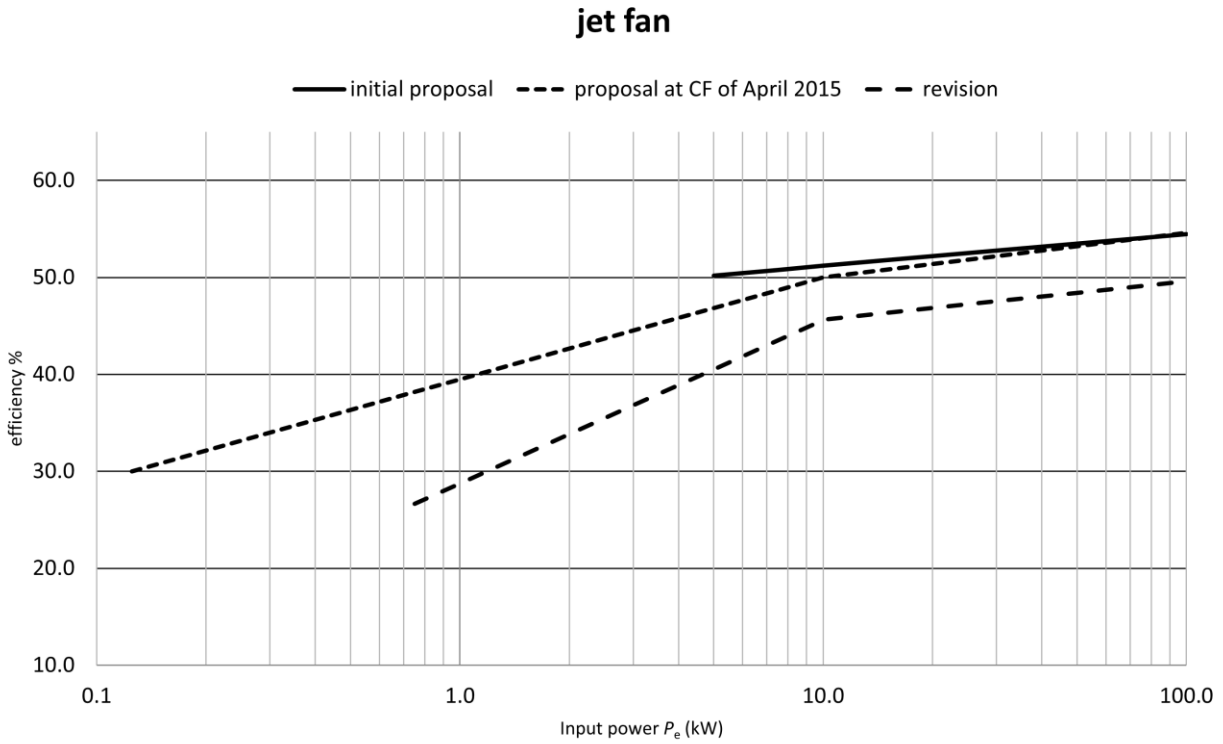
Minimum efficiency requirements



Minimum efficiency requirements

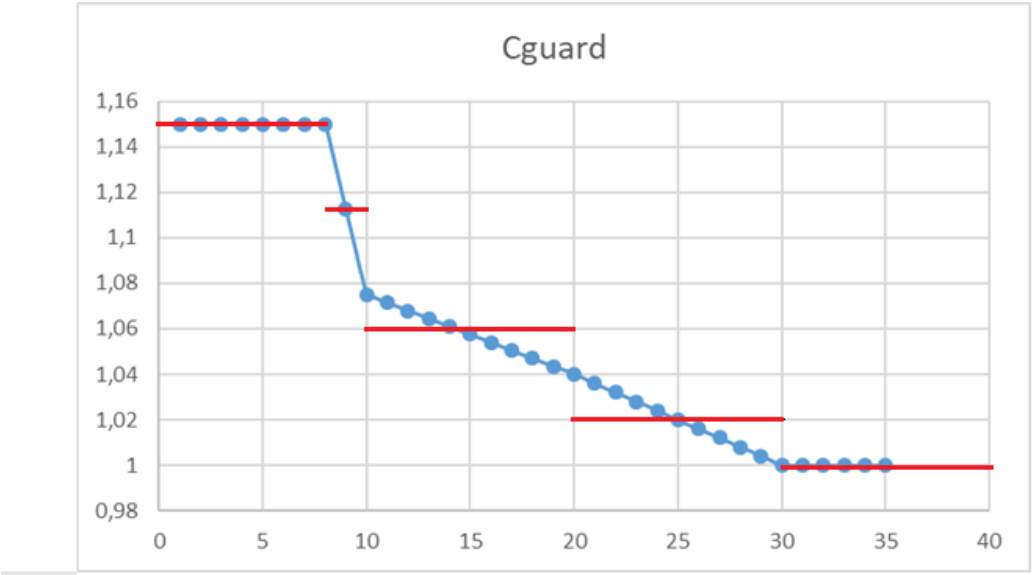


Minimum efficiency requirements



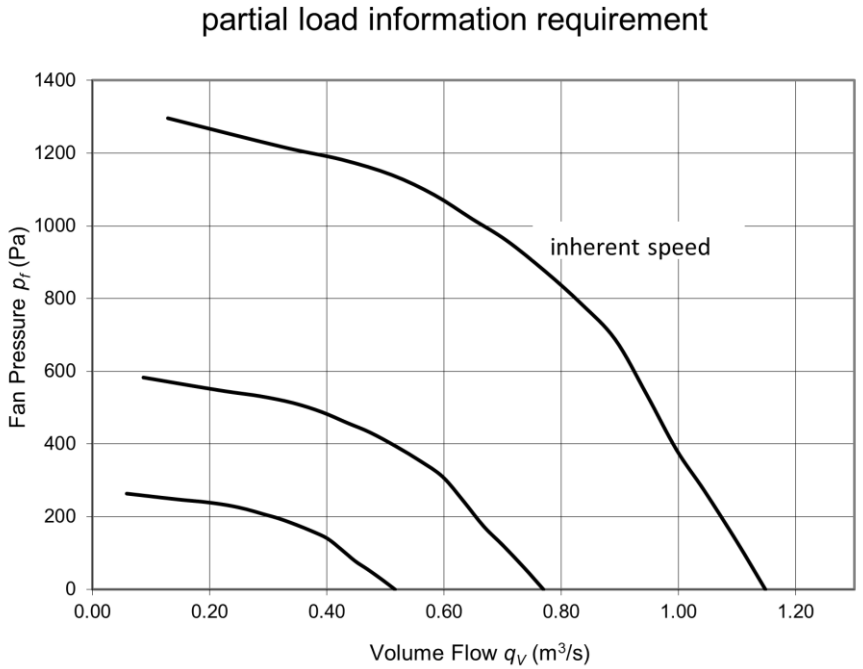
Compensation factor permanently fitted guard

- **A correction factor C_{guard} maybe applied**, with the continuous function rather than fixed values, in function of the opening e:



Information requirements on partial load

- **Information requirements on partial load**
  - at least 3 performance curves:
  - Stated inherent speed
  - lower speed between 40% and 50% of the maximum speed
  - Intermediate in the middle (±10 percentage points) of the two others



Resource efficiency requirements

- Specific provision for fans integrated in **specific energy-related products** take precedence
- **For other fans** – availability of spare parts –
  - (1) motors of which the rated power is lower than 10 kW;
  - (2) motor brushes;
  - (3) impellers;
  - (4) stator elements;
  - (5) mechanical drive components;
  - (6) variable speed drives;
  - (7) sensors;
  - (8) wearing parts (sacrificial elements);
  - (9) joints and fixtures required to install these spare parts;
  - (10) fan bearings;
  - (11) motor bearings when the fan is integrated with the motor above 1 kW.
- Maximum delivery time – 6 weeks
- Access to repair information including but not limited to –
  - Disassembly map
  - Instructions for repair
  - Necessary tools

Resource efficiency requirements

- **Some requirements of the waste electrical and electronic equipment (WEEE) are now applied to fans** –
  - Requirements for dismantling for material recovery and recycling while avoiding pollution:
    - (a) manufacturers, importers or authorised representatives shall ensure that fans are designed in such a way that the materials and components referred to in Annex VII to Directive 2012/19/EU of the European Parliament and of the Council1 can be removed with the use of commonly available tools;
    - (b) manufacturers, importers and authorised representatives shall fulfil the obligations laid down in Article 15(1) of Directive 2012/19/EU.

Material efficiency

- user and installer instructions shall be provided in the form of a user manual on free access websites of manufacturers, importers and authorised representatives, and shall include the following information:
  - (a) how to access professional repair services (internet webpages, addresses, contact details);
  - (b) relevant information for ordering the spare parts made available to end-users, directly from the manufacturer or through other channels;
  - (c) the minimum period during which these spare parts are available;
  - (d) the minimum duration of the guarantee of the fan in years;
  - (e) details of any proprietary tool required for repair;
  - (f) instructions of correct installation;
  - (g) instructions for maintenance;
  - (h) identification of errors, the meaning of the errors and the action required, including identification of errors requiring professional assistance;
  - (i) information on any implications of self-repair

05

What next?

What next?

- Article 8 - Review – 6 years after entry – 2030
  - whether it is appropriate to revise the metrics with an extended and technology-neutral product approach, including part load performance;
  - whether it is appropriate to revise the efficiency limits in line with the new metrics and technological progress;
  - the relevance of regulating fans below 125 W electric power, air circulating fans and large comfort fans;
  - the relevance of regulating jet fans below 750 W;
  - resource efficiency, repairability, reuse and recycling, recycled content and durability;
  - the relevance of the exemptions laid down in Article 1;
  - the relevance of the circumvention provisions laid down in Article 6;
  - the potential of 3D printing of elements;
  - whether it is appropriate to revise the requirements on the storage of product information due to the possible introduction of a digital product passport;
  - the relevance of requiring an energy label
- A corrigendum to amend Article 9 and to change the rotational speed tolerance, table 3 annex IV

What other things are on the horizon?

Ecodesign requirements for sustainable products regulation (ESPR)

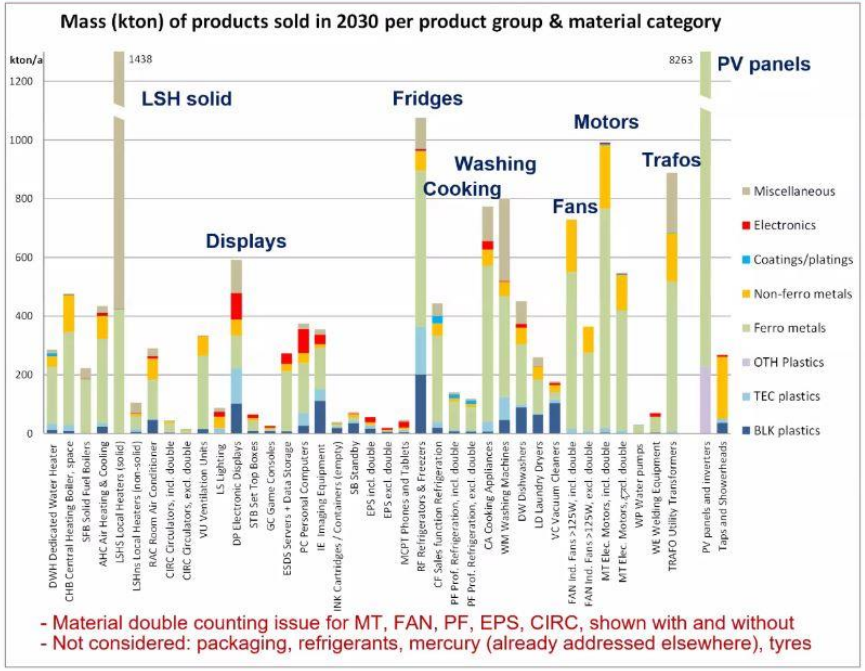
Circular economy
Resource efficiency
Embedded energy
Digital product passports

Ecodesign preparatory study for product specific measures on scare, environmentally relevant and critical raw materials and on recycled content

Mini ecodesign studies to identify measure than can be applied horizontally to other ecodesign regulations

Ecodesign preparatory study for product specific measures on scare, environmentally relevant and critical raw materials and on recycled content

Material content results for sales in 2030



Slide presented at First Stakeholder Meeting (Oct 2023)

Ecodesign preparatory study for product specific measures on scare, environmentally relevant and critical raw materials and on recycled content

Final product selection for further study

Product-material bin	Environmental ranking	Supply risk ranking CRM	Legislative feasibility	Life-time	Comments
Household refrigerators and freezers (white goods) / Plastics	Plastics: 1 All materials: 7 3 highest amounts of materials: - Ferro: 49% - Bulk plastics: 19% - Technical plastics: 15%	15 Top 5: - Bauxite/Al - Silicon metal - Palladium - Coking coal - Copper	Review due December 2025 under ESPR	16.0	Results from this study would need to await the review.
Imaging equipment (ICT / electronics) / Plastics	Plastics: 2 All materials: 3 3 highest amounts of materials: - Ferro: 40% - Bulk plastics: 31% - Technical plastics: 11%	9 Top 5: - Palladium - (Tin) - Bismuth - Bauxite/Al - Antimony	Preparatory study ongoing under ED	5.3	
Electric motors (industrial /B2B) / Ferrous & non-ferrous metals	Ferrous metals: 1 Non-ferrous metals: 1 All materials: 6 3 highest amounts of materials: - Ferro: 75% - Non-ferro: 22% - Technical plastics: 2%	13 Top 5: - Bauxite/Al - Silicon metal - Palladium - Coking coal - Copper	Due for review under ESPR	9.3	No other industrial / B2B are relevant. Results from this study would need to await the review.
Personal computers (ICT / electronics) / Electronics and non-ferrous metals	Electronics: 2 Non-ferrous metals: 2 All materials: 2 3 highest amounts of material categories: - Ferro: 46% - Electronics: 22% - Plastics: 18%	1 Top 5: - Tantalum - Cobalt - Palladium - Bauxite/Al - Magnesium	Review ongoing under ED	5.2	
Household washing machines (white goods) / Ferrous metals	Ferrous metals: 2 All materials: 11 3 highest amounts of material categories: - Ferro: 43% - Misc.: 35% - TEC Plastics: 10%	11 Top 5: - Nickel - Bauxite/Al - (Chromium) - Palladium - Coking coal	Preparatory study ongoing under ESPR	14.9	

CRM content and ranking is for induction motors; Phase 2 study might extend scope with CRM in permanent magnet motors

06

Summary

Summary

- We know what is coming
- We have a bad track record of being late
- We struggle to have a coordinated response
- Fans integrated in other product will be attacked
- System efficiency metric
- Circular economy requirements will dominate the next revision
    - Embedded carbon
    - Critical and scarce materials
    - Repair
    - Re-use

Thank you!

Do you have any questions?
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