Fachverband Gebäude-Klima e.V.

Ventilation and Air-conditioning:

Market and requirements

Guenther Mertz
Managing Director

About Fachverband Gebäude-Klima (FGK)

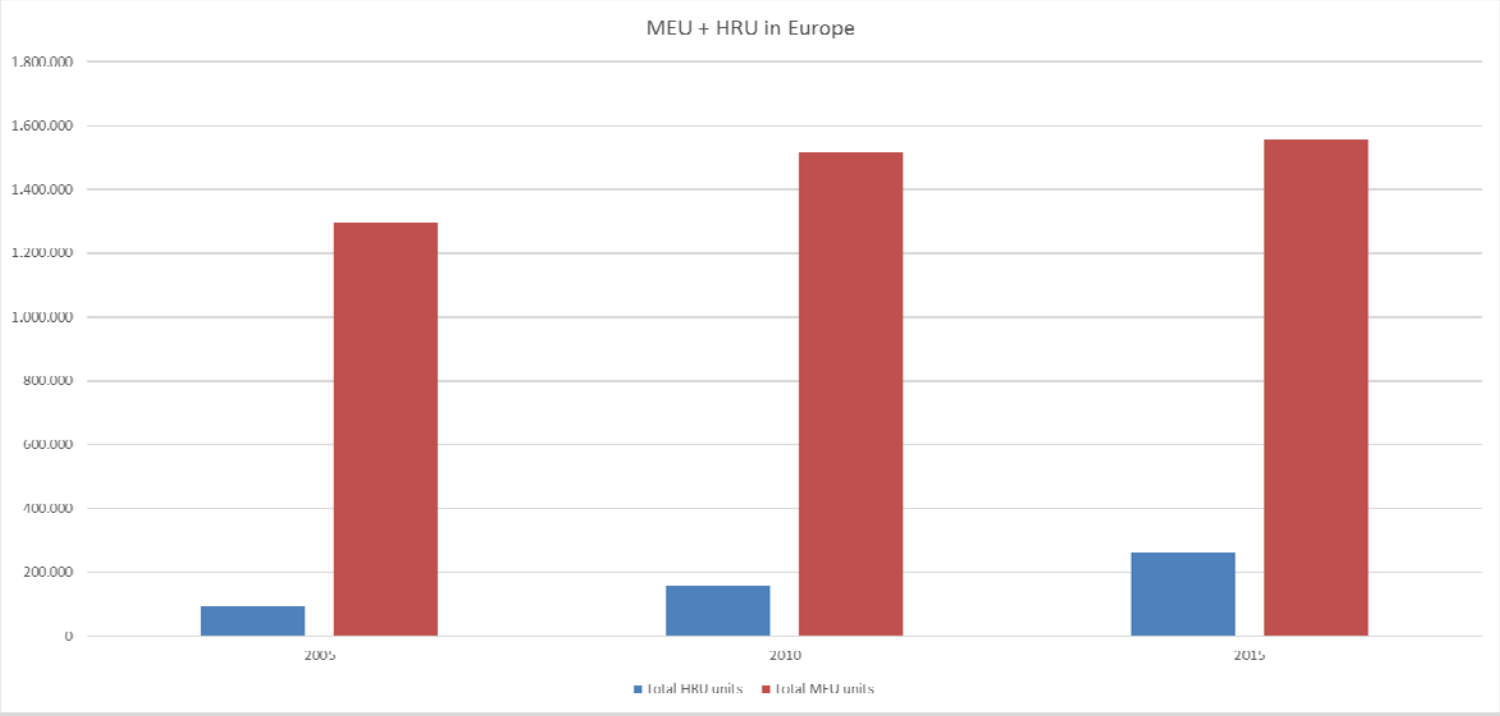
- Leading association of the air-conditioning and ventilation industry in Germany
- Established 1970
- Located in Berlin and Baden-Wuerttemberg
- 300 member companies: component manufacturers, technical planners and consulting engineers, distributors, plant manufacturers, facility managers, associations and institutions
- Representation of all business segments – from residential ventilation to cleanroom technology
- Turnover 2015 approx. € 6.5 bn; approx. 45,000 employees

About Fachverband Gebäude-Klima (FGK)

- Working Groups:
  - Room-climate effect
  - Evaluation methods
  - Fans
  - Energy-efficient room air-conditioning systems and heat pumps
  - Residential ventilation
  - Maintenance and cleaning of ventilation and air-conditioning systems
  - Air moistening
  - Heat and cold recovery
  - Air ducts
- International Partner Associations:
  - EVIA - European Ventilation Industry Association
  - EPEE - European Partnership for Energy and Environment

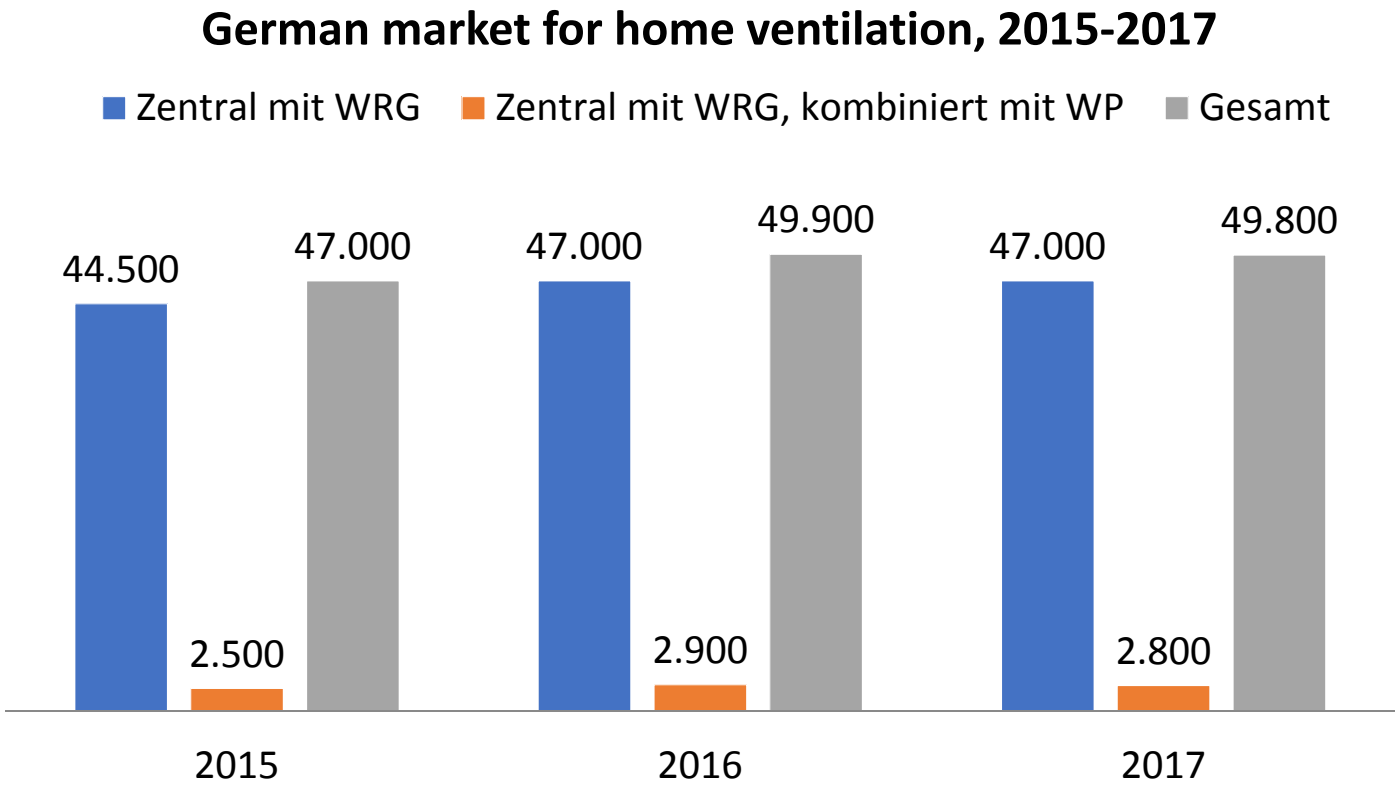
Trend residential units for a single dwelling in Europe

- Growing market
- Mechanical extraction units are dominant in Europe

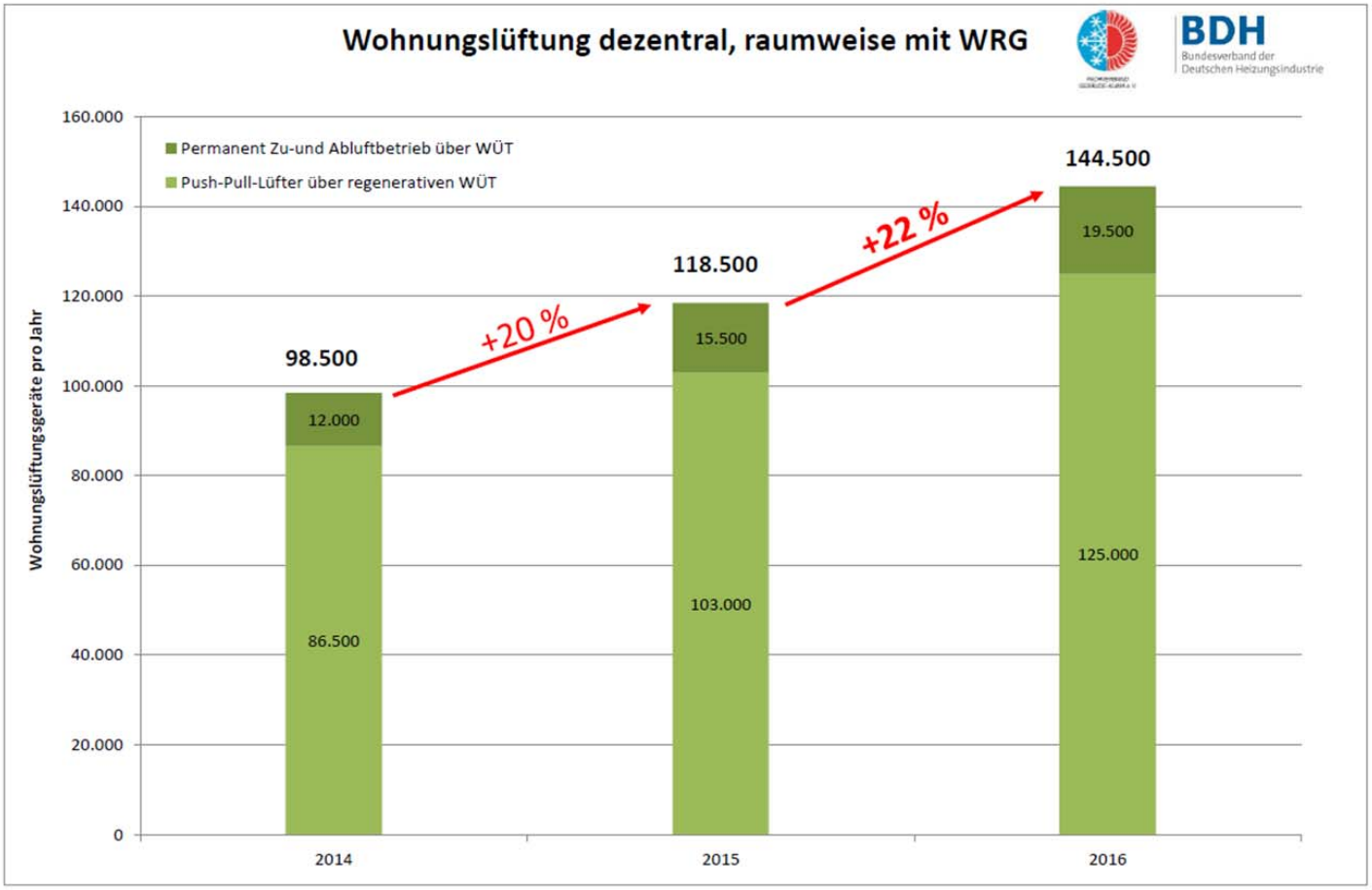


MEU: Mechanical extraction unit
HRU: Heat recovery unit

Market development: central residential ventilation with heat recovery



Market development: decentralized, room by room



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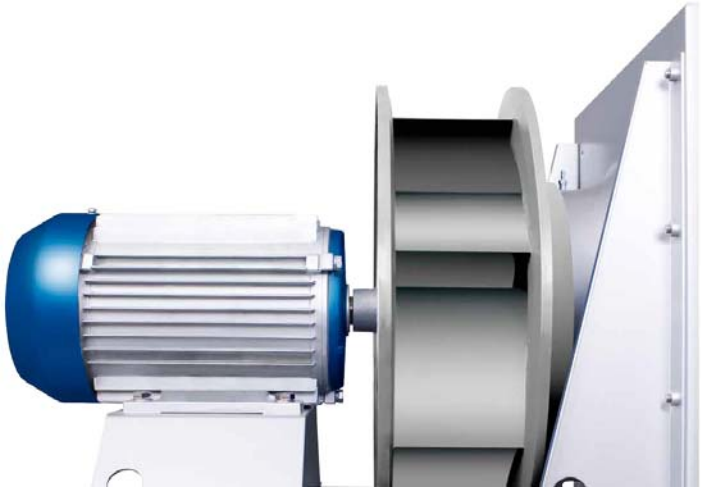
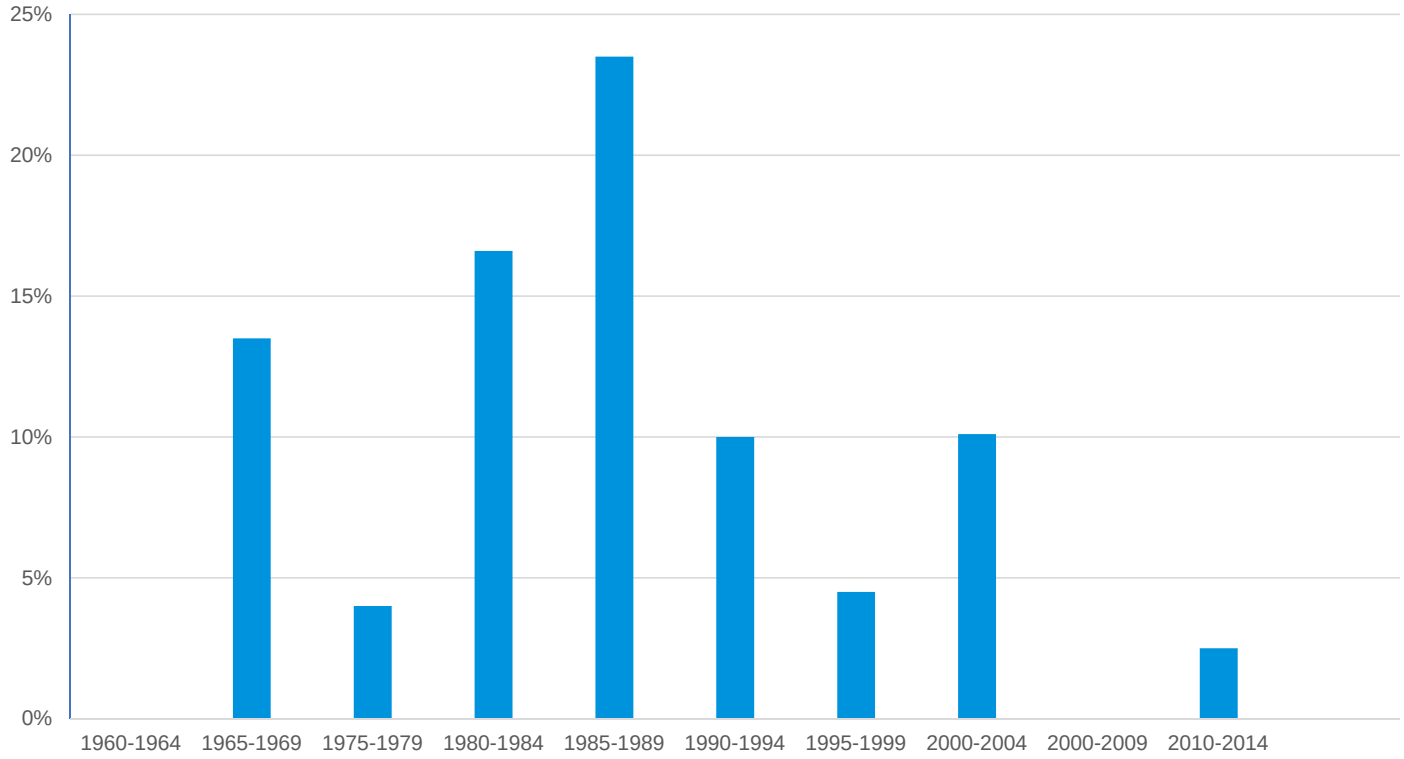
Air-handling units 2017: manufacturers in Germany

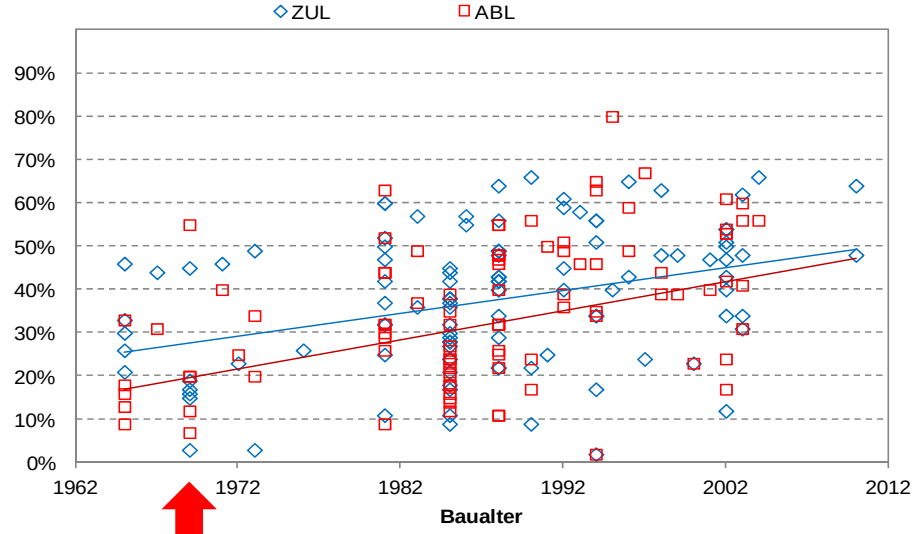
- Turnover: € 810 million
- Units: 84,000



Age distribution of inspected air-conditioning systems



Fan system efficiencies depending on the year of construction



Problematic cases

	Weighted on mean, based on inspections	Benchmark
Supply air	42 %	70 %
Exhaust air	38 %	70 %

Fan exchange: status quo and savings potential

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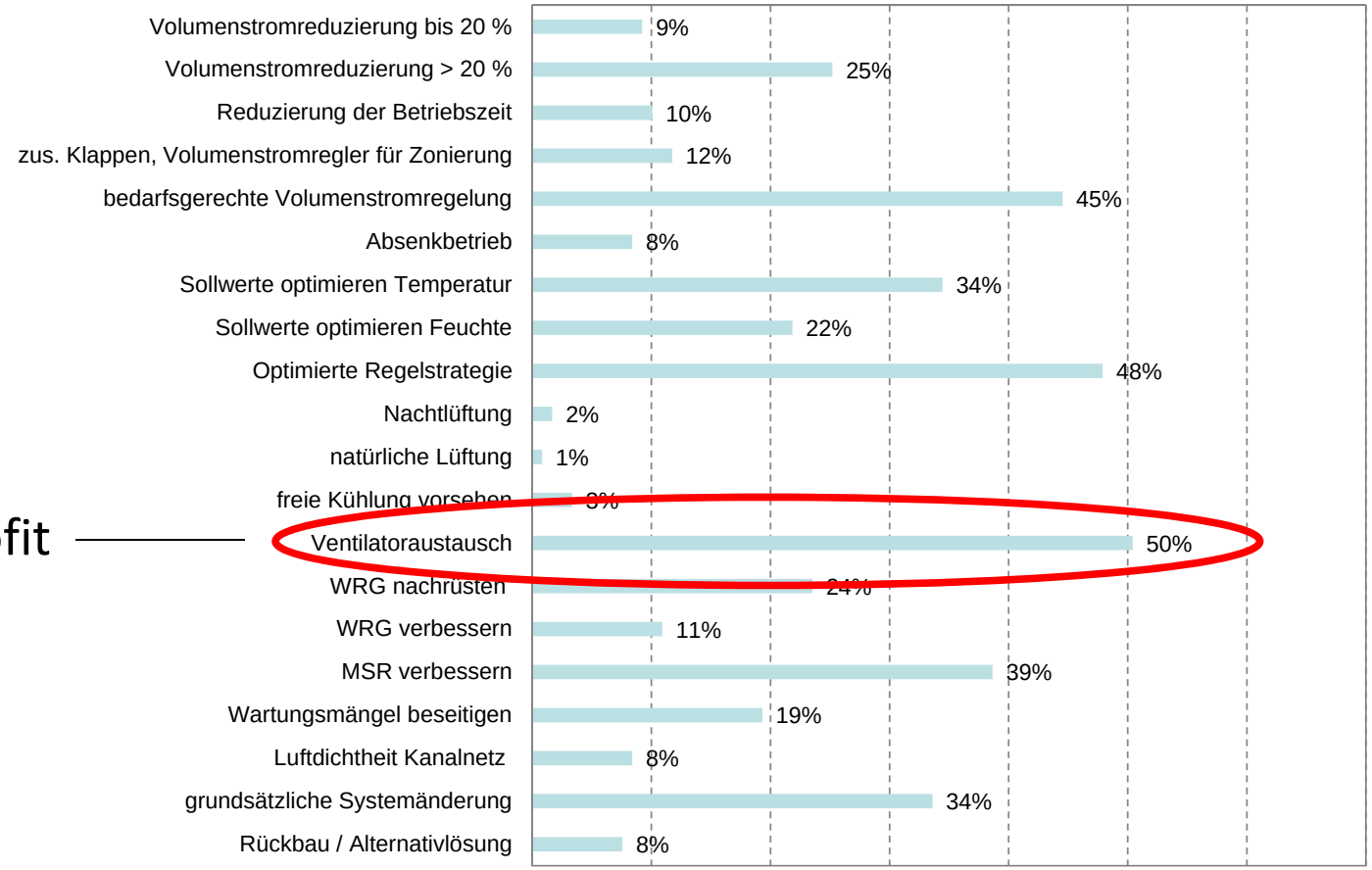

Fan retrofit

Energy savings

- Estimated savings based on ErP Regulation in 2020
- EU 326/2011 fans
- EU 1253/2014 ventilation units
- Better IAQ
- Less energy

Product	End energy	Primary Energy
Residential ventilation (Heating)	222 TWh	244 TWh
Ventilation NR – Heating	150 TWh	165 TWh
Ventilation NR – Electricity	16 TWh	40 TWh
Ventilation NR – Cold	8 TWh	8 TWh
Fans – all Applications	34 TWh	82 TWh
Total 2020		**539 TWh**
Demand EU 27		~20,000 TWh
Savings Potential		2-3%

Ventilatortausch
macht's effizient.

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GRUSSWORT

Unter der Schirmherrschaft des
Bundesministerium für Wirtschaft und Energie

Peter Altmaier,
Bundesminister für Wirtschaft und Energie

Liebe Betreiber von Klima- und Lüftungsanlagen,

Sie sind Inhaber oder Nutzer eines Industrie-, Gewerbe- oder Bürogebäudes oder eines Einkaufs- und Dienstleistungszentrums und überlegen sich, ob eine Sanierung Ihrer Anlage für Sie sinnvoll ist?

Die Antwort ist: Ja. Denn die Systemwirkungsgrade von modernen, energieeffizienten Ventilatoren liegen rund doppelt so hoch wie die alter, ineffizienter Modelle. Durch den Einbau moderner Ventilatoren sind Stromeinsparungen von bis zu 50 Prozent möglich. Das hält Ihre monatlichen Betriebskosten niedrig, verbessert den Wert Ihrer Immobilie und schont die Umwelt. Darüber hinaus steigern Effizienzmaßnahmen wie der Einbau moderner, leiserer Ventilatoren auch den Komfort für Ihre Mitarbeiter. Sicherlich können Sie mit Ihrem Engagement für Energieeffizienz auch bei Ihren Kunden punkten.

Das BMWi unterstützt Investitionen in moderne, energieeffiziente Ventilatoren auch finanziell. Näheres dazu finden Sie auf der Webseite „Deutschland macht's effizient" unter www.machts-effizient.de.

Ich freue mich, dass Sie durch die Industriekampagne „Ventilatortausch macht's effizient" eine Vielzahl wichtiger Informationen erhalten und gute Beispiele aufgezeigt werden, wie die Sanierung von Klima- und Lüftungsgeräten erfolgreich durchgeführt werden kann. Für Ihr Investitionsvorhaben wünsche ich Ihnen viel Erfolg!

Ihr

DEUTSCHLAND MACHT'S EFFIZIENT.

Best practice: fan exchange campaign

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Renovation of the ventilation system of an office building, Ingolstadt

- 18 new radial EC fans
- Holistic optimization of the air-conditioning systems
- Elimination of silencers through acoustic improvement
- CO_2 savings: 40.1 tons/year
- Cost saving: € 10,577 /year
- Investment costs: € 28,350 (fans and conversion costs)
- Amortization period: 1.7 years, 2.7 years (incl. conversion work)

Best Practice: fan exchange campaign

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Retrofit for EC centrifugal fans: supply-air system for Media-Markt, Berlin

- 6 new fans
- 70 percent reduction in energy costs
- Duration of implementation 3 months
- High degree of efficiency
- Low noise level
- Low operating costs
- Total air flow: 77,000 m³/h at 1,224 Pa
- CO_2 savings: 70%.
- Cost saving: € 13,284 / year
- Amortization period: 1 year

CO_2 as an indicator: UBA Guideline on CO_2 in schools

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CO_2 concentration [ppm]	Hygiene assessment		Recommendations
< 1000	Acceptable		No further requirements
1000 - 2000	Noticeable conspicuous		Consider further ventilation actions: Raise ventilation rate, improve ventilation
> 2000	Not acceptable		Check possibilities of ventilation Check further solutions

Measurement CO_2 in existing schools
Hellwig, Antretter, Holm, Sedlbauer, Fraunhofer ISE, 2009

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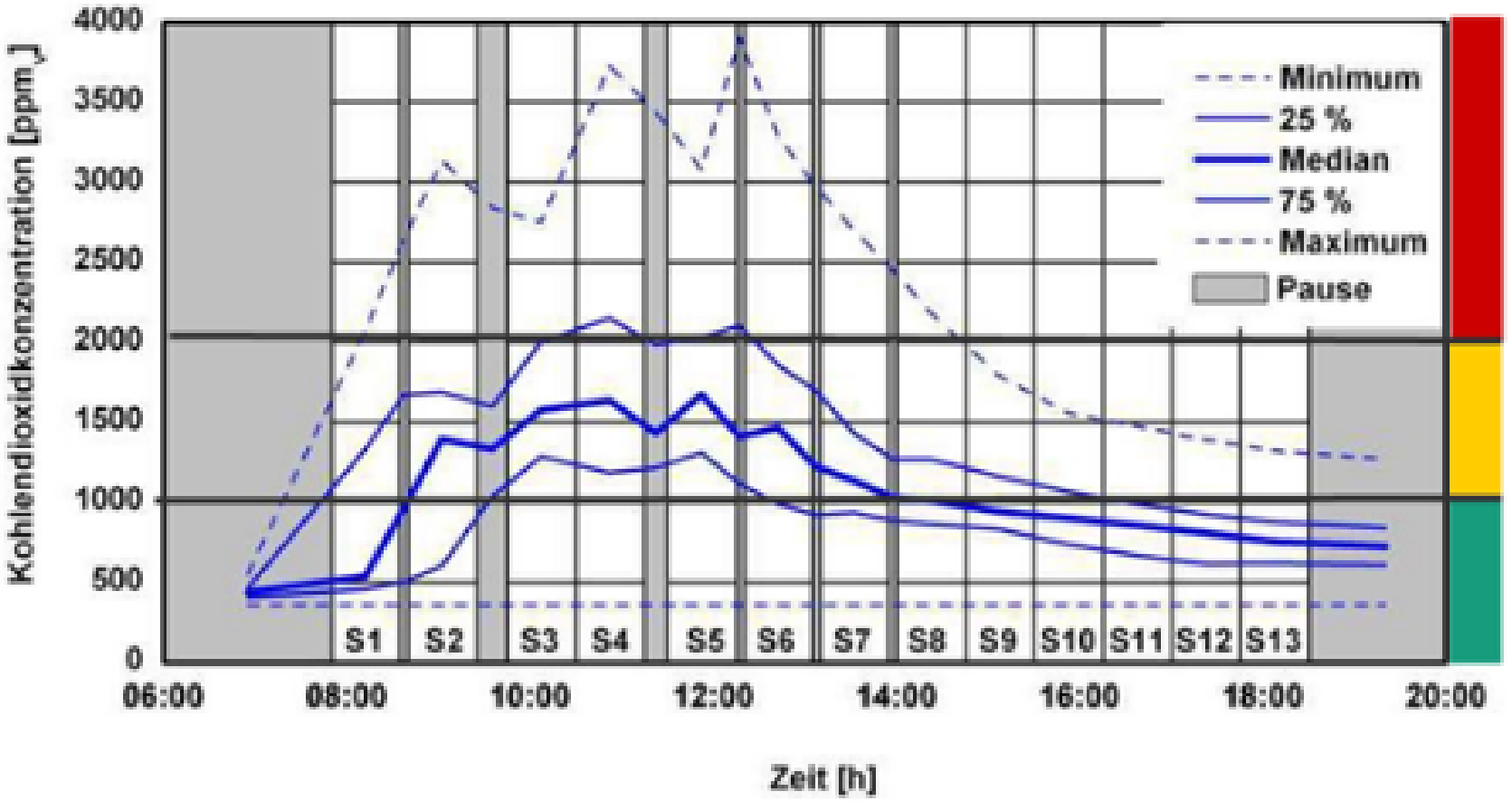

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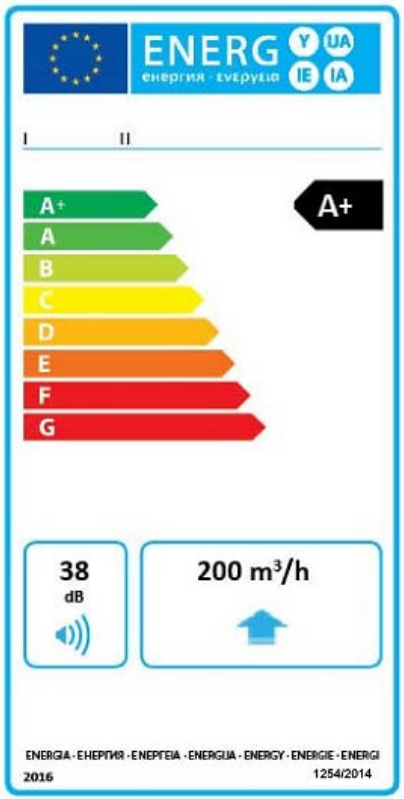
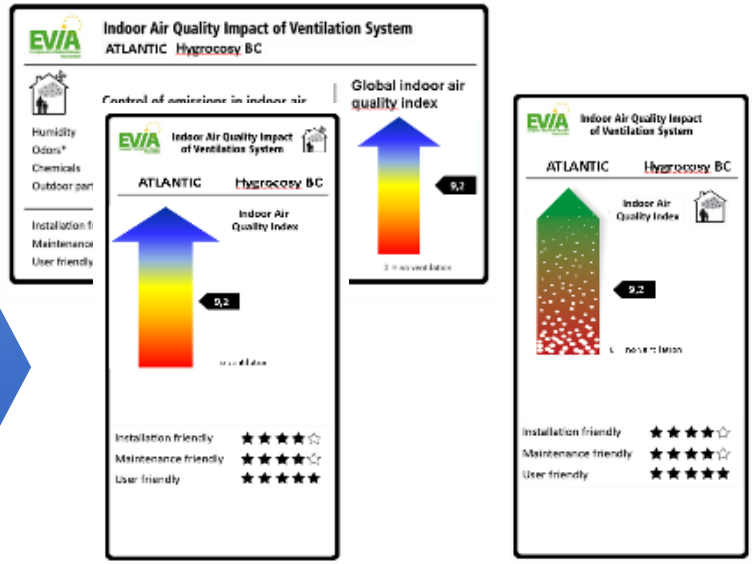
Currently in ErP Label:
No indicator in energy labelling of ventilation units

- Moisture removal
- Thermal comfort
- Particle removal
- VOC and odours removal
- CO_2 level





EVIA's mission in EPBD review

- EVIA recommends that the following aspects shall be considered in the revision of EPBD:
  - Requirements on indoor air quality and thermal comfort
  - Regular inspections of ventilation systems
  - The use of demand controlled options
  - The use of heat recovery as a waste energy technology
- Nearly zero-energy buildings need a dedicated ventilation system to avoid negative effects such as bad indoor air quality caused by inadequate ventilation.
- This can be made with minor changes in the regulation.

IAQ in buildings and ventilation systems – basic aspects

- Ventilation for building protection
  - Damage prevention
  - Moisture prevention
- Indoor air quality
  - Pollutant removal
  - Perceived air quality
- Outdoor and outdoor air quality
  - Fine dust
  - Odours
  - Noise
- Hygiene aspects of ventilation systems
  - Maintenance
  - Cleaning

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Example 1: **Two people in an office (A = 20 m², V = 50 m³):**

How long will it take to reach 1,000 ppm / 2,000 ppm of CO_2 in the office?

Outdoor air exchange rate	**1,000 ppm**	**2,000 ppm**
0.00 h^{-1}	37 min.	112 min.
0.25 h^{-1}	41 min.	152 min.
0.50 h^{-1}	45 min.	330 min.
1.00 h^{-1}	----	---

Example 2: **Loss of thermal energy in 120 m² home (by opening the window (outdoor air = 0 °C, room = 22 °C)**

a) Opening window
for 10 min per hour: loss = 1,200 W per hour

b) Mechanical ventilation
with heat recovery (80 %): loss = 240 W per hour

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Thank you for your attention and always stay cool with an appropriate and efficient AC system