Mechanical ventilation and IAQ in high performing residential buildings in Germany and Europe
A policy and market outlook

- **Basic aspects: Hygiene, Health, IAQ**
- **European policy and IAQ Parameters**
  - Overview of main regulation
  - Energie Performance of Buildings Direktive (EPBD)
  - Ventilation, Heat Recovery and Renewable Energy (RED)
  - Ecodesign for ventilation units – EVIA IAQ supplement
- **How to address IAQ outside the regulation**
- **Technical aspects**
  - “Smart Buildings”

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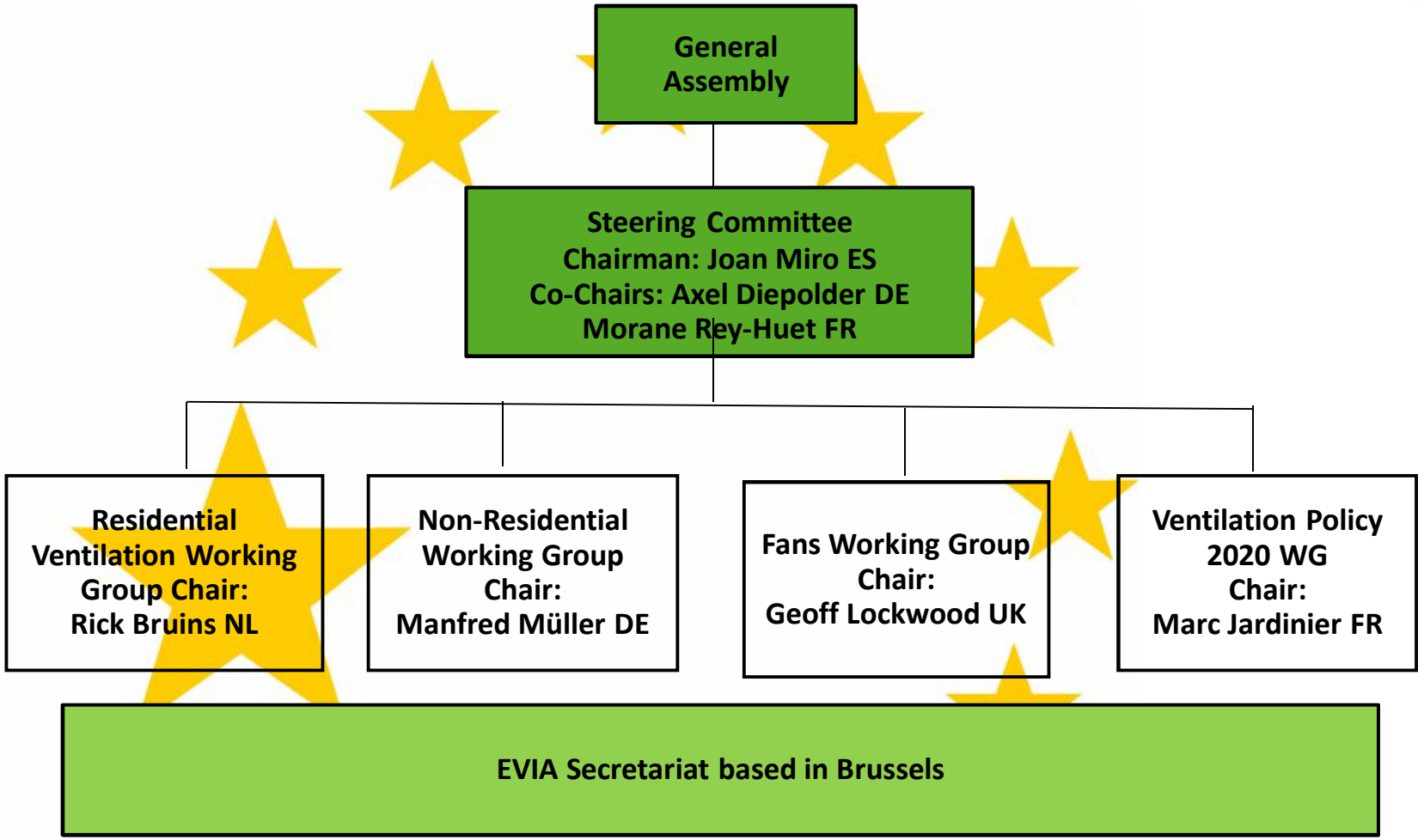
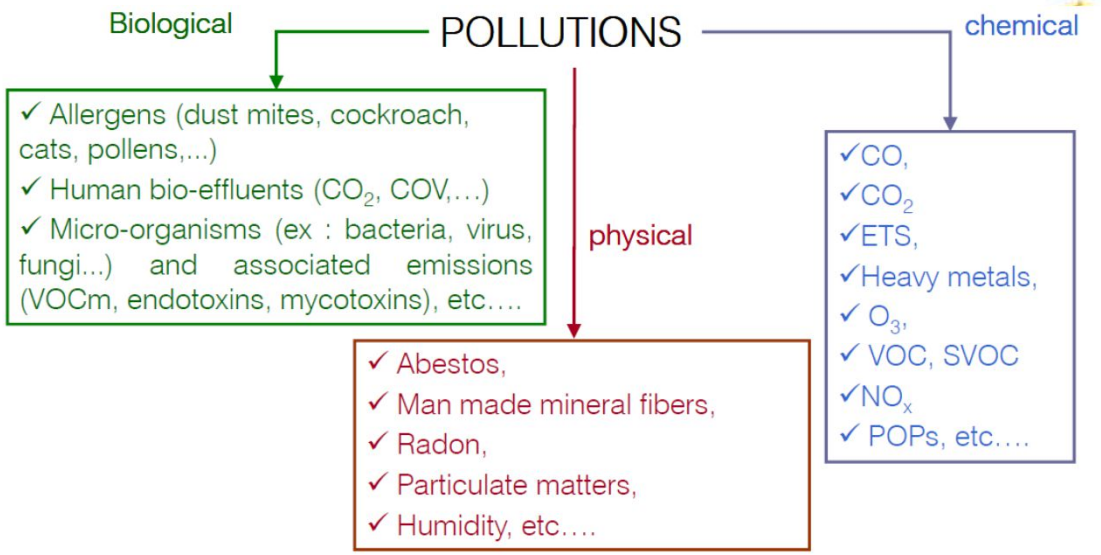
EVIA Structure



- **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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Ventilation Industry

ISH 2017

Is Outdoor Air the Benchmark?

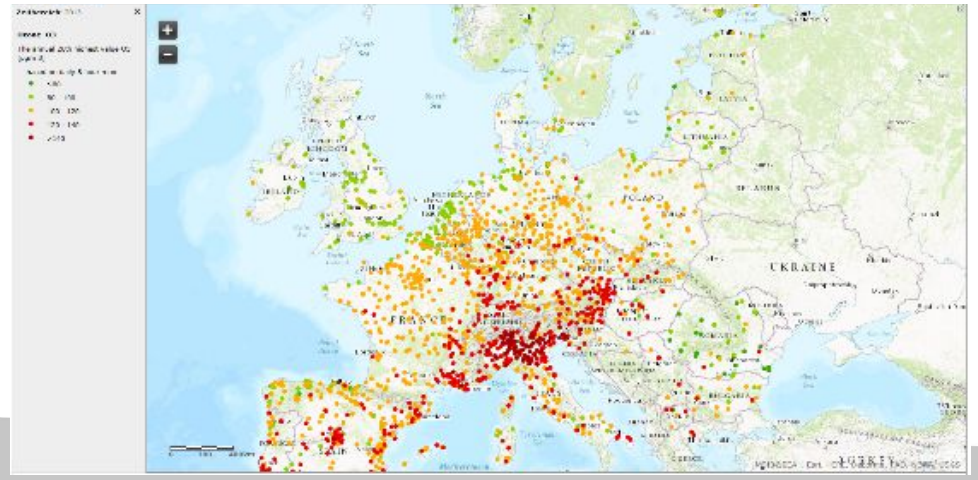
- **Yes and No**
  Depending from the location
- **Ventilation systems can consider**

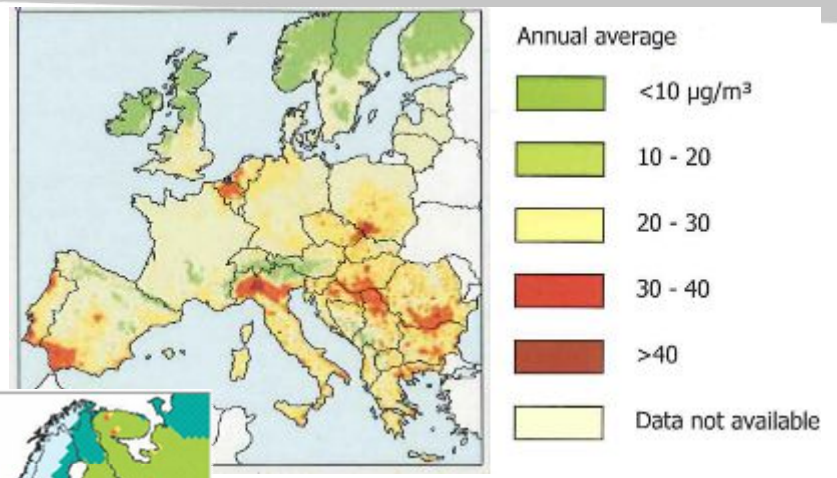
European Environment Agency

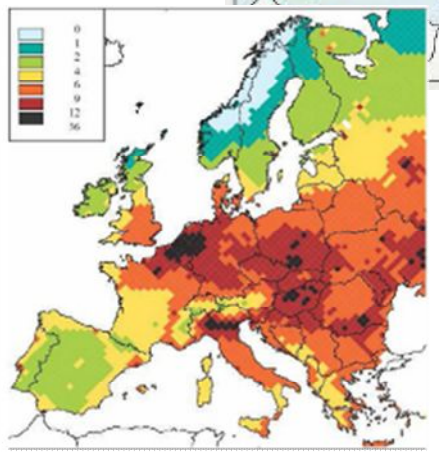
Topics | Data and maps | Indicators | Publications

You are here: Home / Environmental topics / Air pollution / Interactive maps and data viewers / Ozone (O3) twenty-sixth highest daily max 8-hour average in Europe

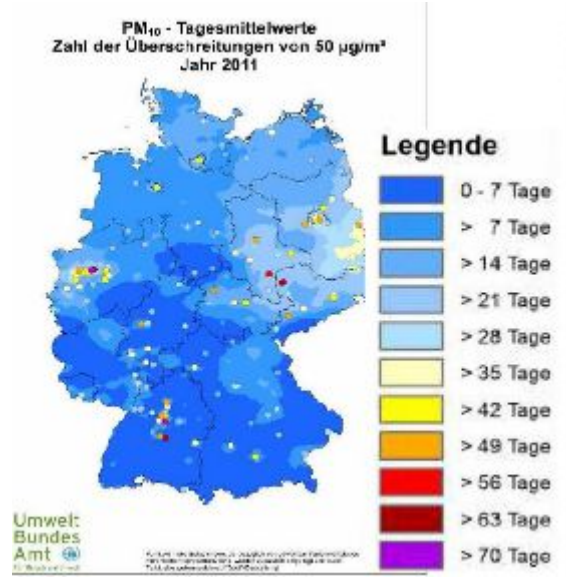
Ozone (O3) twenty-sixth highest daily max 8-hour average in Europe





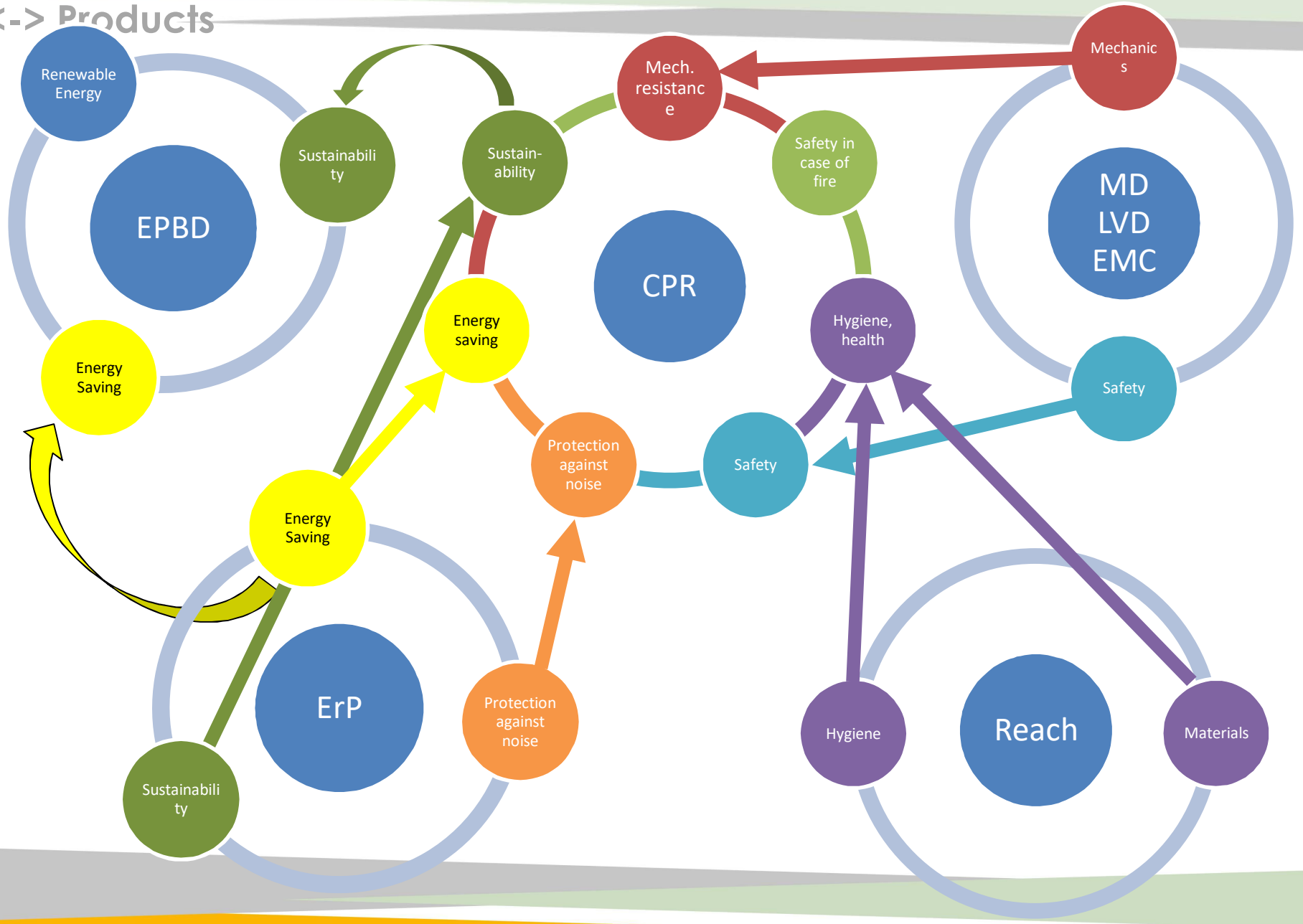


Decreased life expectancy in months due to exposure to fine particulate matter in Europe; Annual emissions 2000
For years, the fine dust values in Germany have not declined but merely reflect climatic or annual deviations.



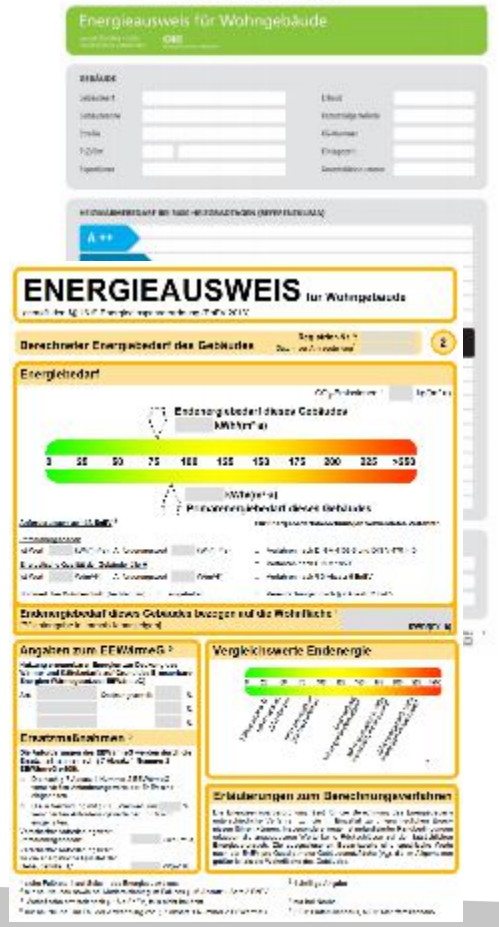
EU-Regulation Buildings <-> Products

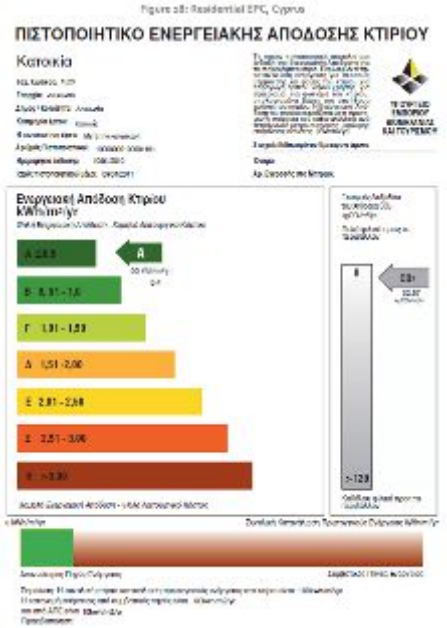
- **EPBD: Energy Performance of Buildings Directive**
- **CPR: Construction Products Regulation**
- **ErP: Ecodesign Directive**
- **MD: Machine Directive**
- **LVD: Low Voltage Directive**
- **EMC: Electromagnetic Compatibility**
- **Reach: Chemical Aspects**

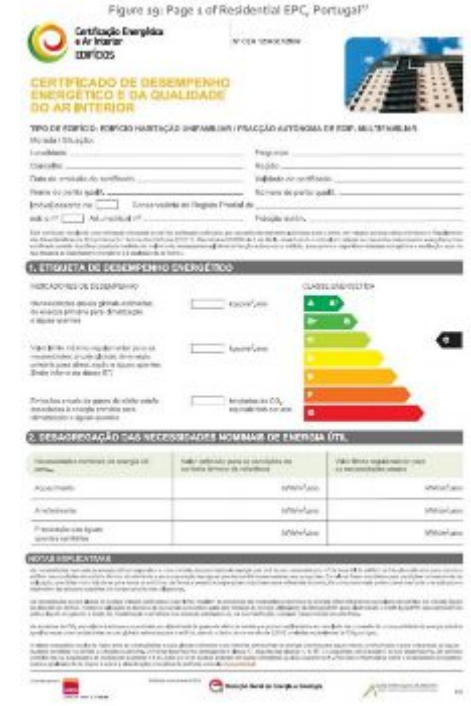


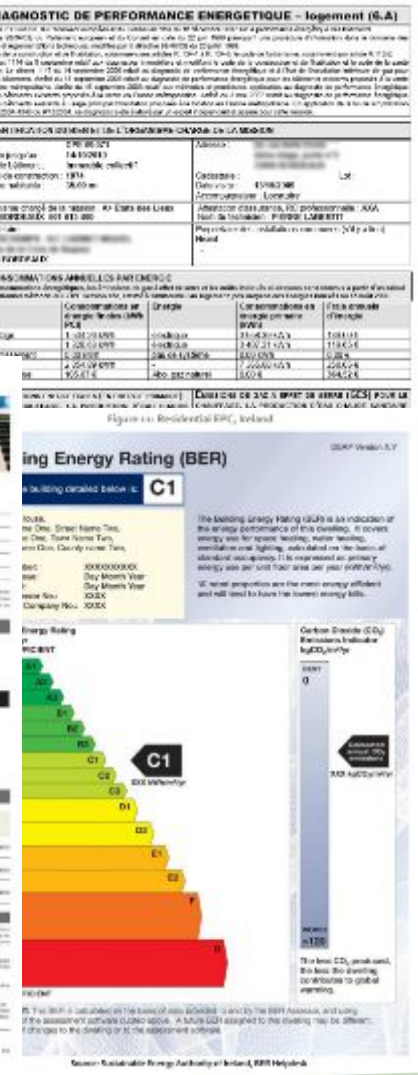
Regulatory Perspective EPBD

Currently - No Indicator for IAQ in Building Certificates



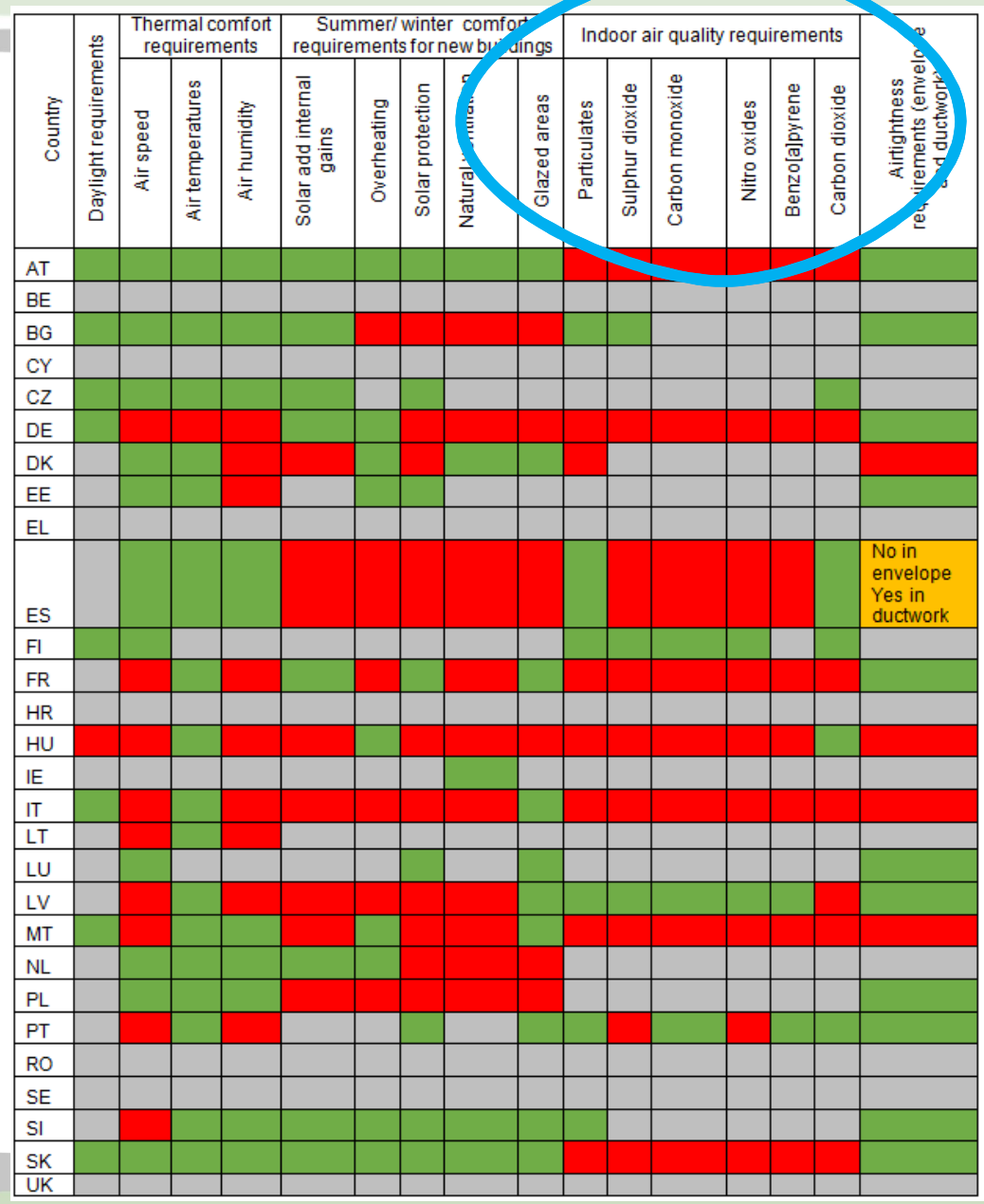






IAQ in Buildings: State of play

- **Thermal comfort, daylight requirements and internal air quality in the EU (New buildings, 2016)**
- **Will be part of the upcoming EU Building Stock observatory. Any updated info is welcome!**
  - green: requirements place,
  - red: no requirements,
  - grey: data not yet available



Laurent Deleersnyder
Directorate-General for Energy
Energy Efficiency
EPBD review
EVIA Seminar 11 May 2016, Brussels

Regulatory Perspective

Energy Performance Directive – Current Version EU 2010/31/EU

- Article 4: These requirements shall take account of general indoor climate conditions, in order to avoid possible negative effects such as inadequate ventilation, as well as local conditions and the designated function and the age of the building.
- No information for the user in the certificate

Energy Performance Directive – Draft "Winter Package"

- **Annex I '2. The energy needs for space heating, space cooling, domestic hot water and adequate ventilation shall be calculated in order to ensure minimum health and comfort levels defined by Member States.**
- **No mandatory information on IAQ-Level for the user in the certificate**
- **No minimum ventilation rate required**

Laurent Deleersnyder
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Policy options being explored

- **Reference: Do nothing more**
  - Leave it in full to subsidiarity and keep on monitoring
- **Option I: Guidance**
  - E.g. "How to avoid negative effects while elaborating the long term renovation strategies", "Communication on best practices"…
- **Option II: Targeted amendments**
  - E.g. "Reporting of indoor environment requirements with cost-optimal calculations"…
- **Option III: Expanding the current logic**
  - E.g. "IEQ parameters on EPCs", "Minimum IEQ requirements with NZEB", "Co-benefits taken into account in cost-optimal calculations",…

Article 8 is updated to take into account the revised definition of technical building systems.

A new paragraph introduces requirements as regards:

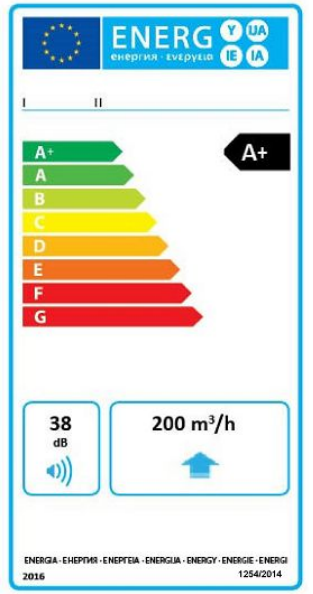
- the introduction of a **'smartness indicator'** rating the readiness of the building to adapt its operation to the needs of the occupant and of the grid, and to improve its performance.
- …In order to digitise the building sector, targeted incentives should be provided to promote **smart-ready systems** and digital solutions in the built environment.
- The smartness indicator shall cover flexibility features, enhanced functionalities and capabilities resulting from more interconnected and built-in intelligent devices being integrated into the conventional technical building systems. The features shall **enhance the ability of occupants** and the building itself to **react to comfort or operational requirements**, take part in demand response and contribute to the optimum, ….

How to link IAQ and thermal comfort to smartness??

Regulatory Perspective

Ecodesign and Energy Labelling EU 1254/2014

- No minimum requirements on IAQ Performance
- No information for required ventilation rates
- No information on filtration
- No information on DCV



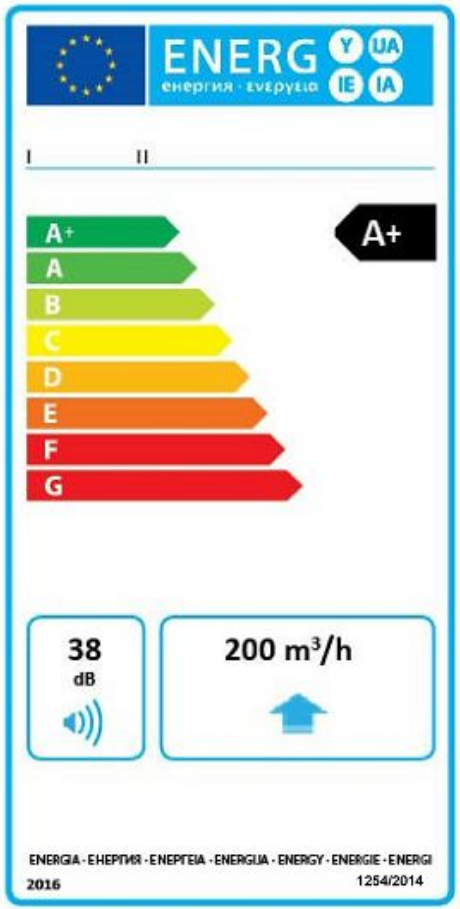
Construction products directive EU 305/2011

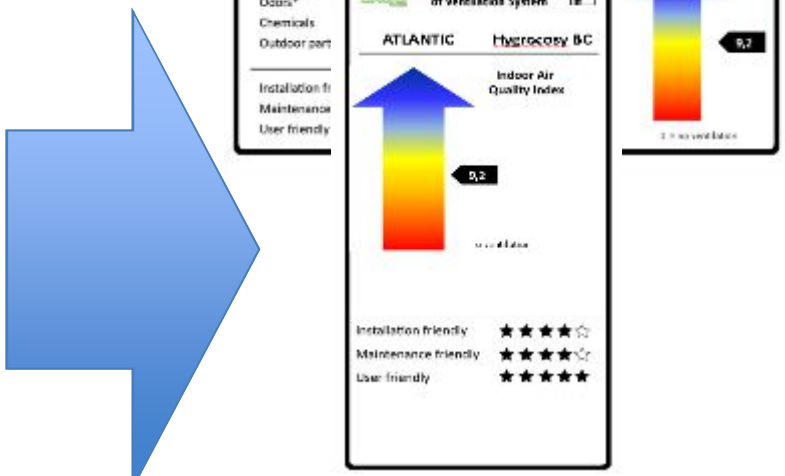
- No minimum requirements and no classification

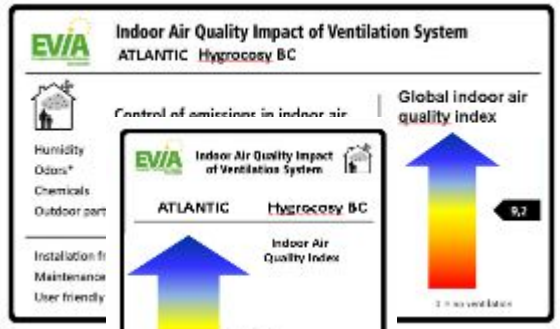
- ☒ Ventilation rate
- ☒ Moisture removal
- ☒ Winter Comfort
- ☒ Particle removal
- ☒ VOC and Odours removal
- ☒ CO_2 level

Currently in ErP Label:
No Indicator in Energy Labelling von Ventilation Units

- **Moisture removal**
- **Winter Comfort**
- **Particle removal**
- **VOC and Odours removal**
- **CO_2 level**







- **Member States shall establish a methodology to calculate an indoor air quality indicator.**
  - The indoor air quality indicator shall be reported in a transparent way in the energy performance certificate
  - The energy performance certificate shall include information about indoor air quality (ventilation rate) and the indoor thermal environment (summer and winter).
- **Energy performance of buildings -- Indoor environmental Quality Indoorenvironmental input parameters for the design and assessment of energy performance of building**
  - EN 16798-1 failed in formal vote – Part of EPBD Mandate M/480
  - ISO 17772-1 was accepted – Not part of EPBD Mandate M/480
- **How to proceed?**
  - Do we need a seccond approach? Not harmonized? Harmonized?

How to adress IAQ outside of regulation

- **My Health My Home**
  www.myhealthmyhome.com
  A Long Term Indoor Air Quality Campaign

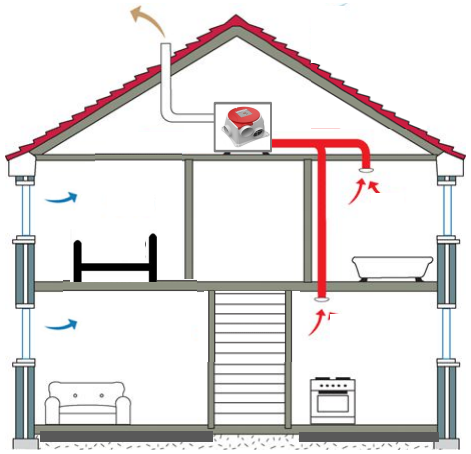
- **“Hygiene in der Wohnungslüftung”**
  www.hygiene-wohnungslueftung.de
  Information how to get a hygiene ventilation system
  - Design, Installation, Maintenance
  - User, Installer, Manufacturer

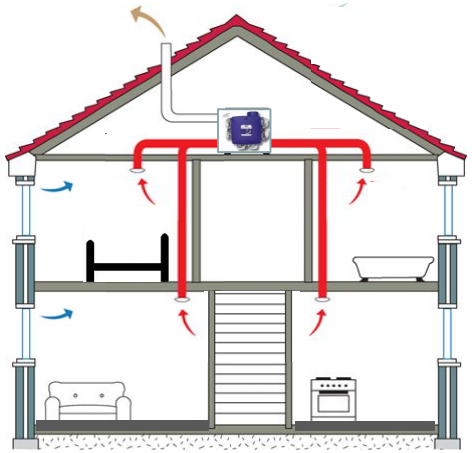
- **EVIA IAQ campaign**

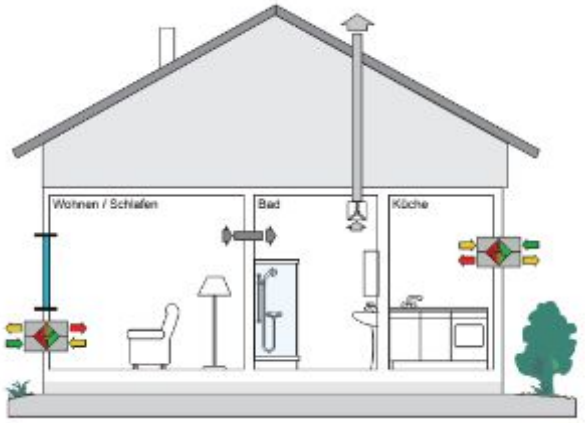
Fachverband Gebäude-Klima e.V

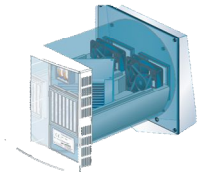
Technology

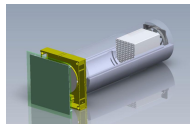
- **Technolgies for the building stock**
- **Technolgies for new buildings**
- **Demand controlled systems**
  - Smart Systems
- **Local systems**
- **Multifunctional systems**

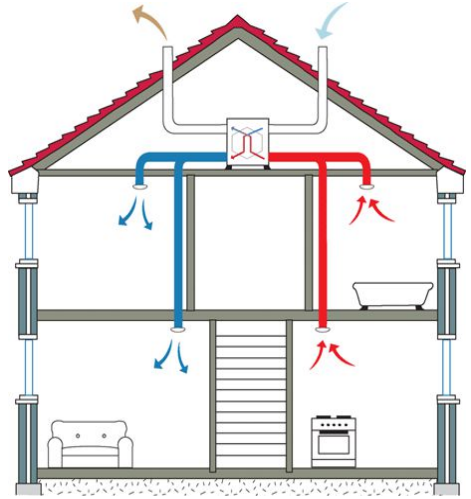






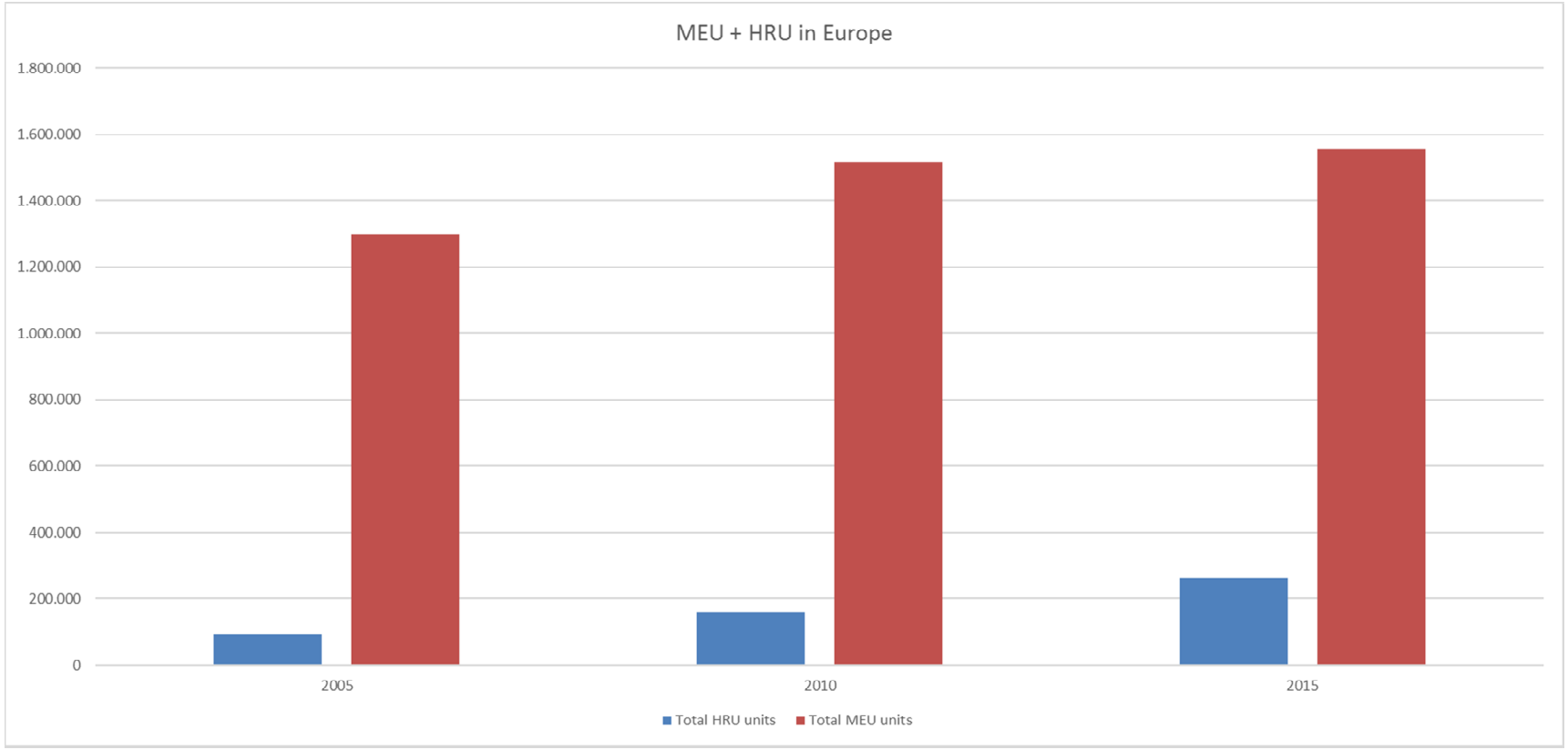






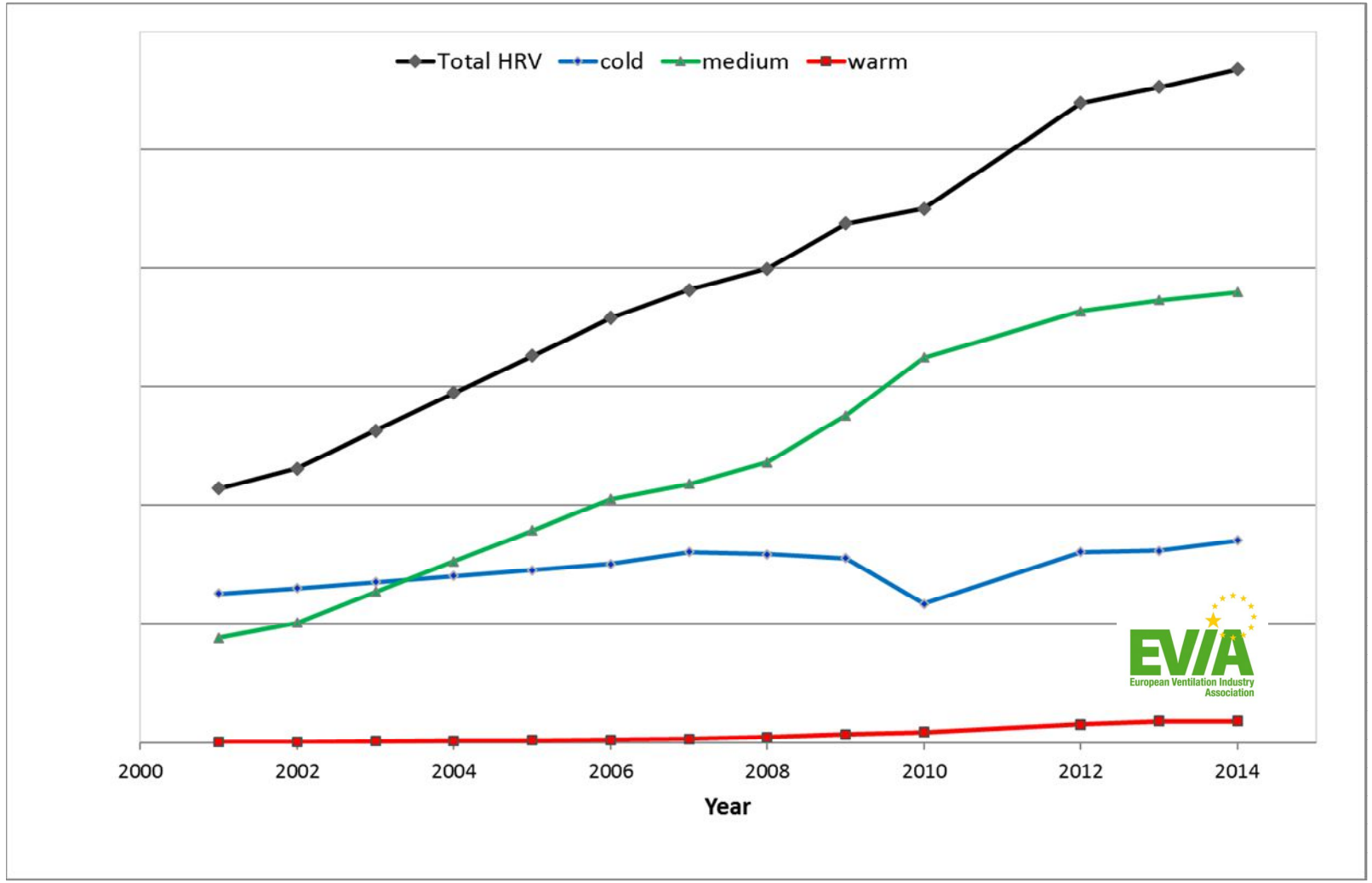
Trend residential units with heat recovery for a single dwelling in Europe

- **Growing market**
- **Mechanical Extract Units are dominating in Europe**



Trend residential units with heat recovery for a single dwelling in Europe

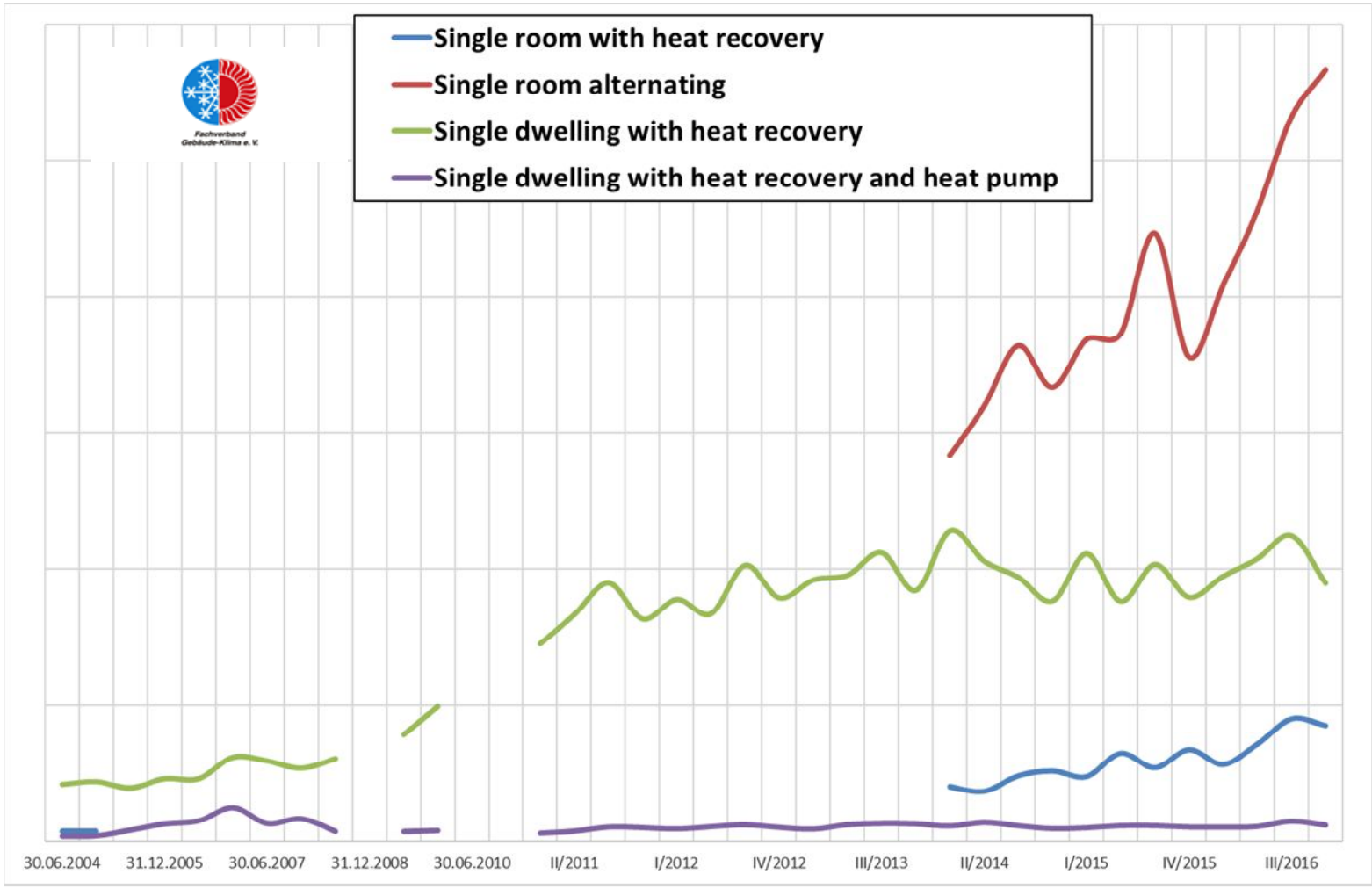
- Growing market
- Developed market in cold climates
- Growing market in medium climates
- No significant data in warm climates
- Cold / enthalpy recovery?



Trend residential units with heat recovery in Germany

- **Single dwelling units:**
  - Strong growing until 2012
  - Stable / light growing since 2013
- **Single room units:**
  - Strong growing
- **No data on exhaust units**

- **Is this just a German issue?**

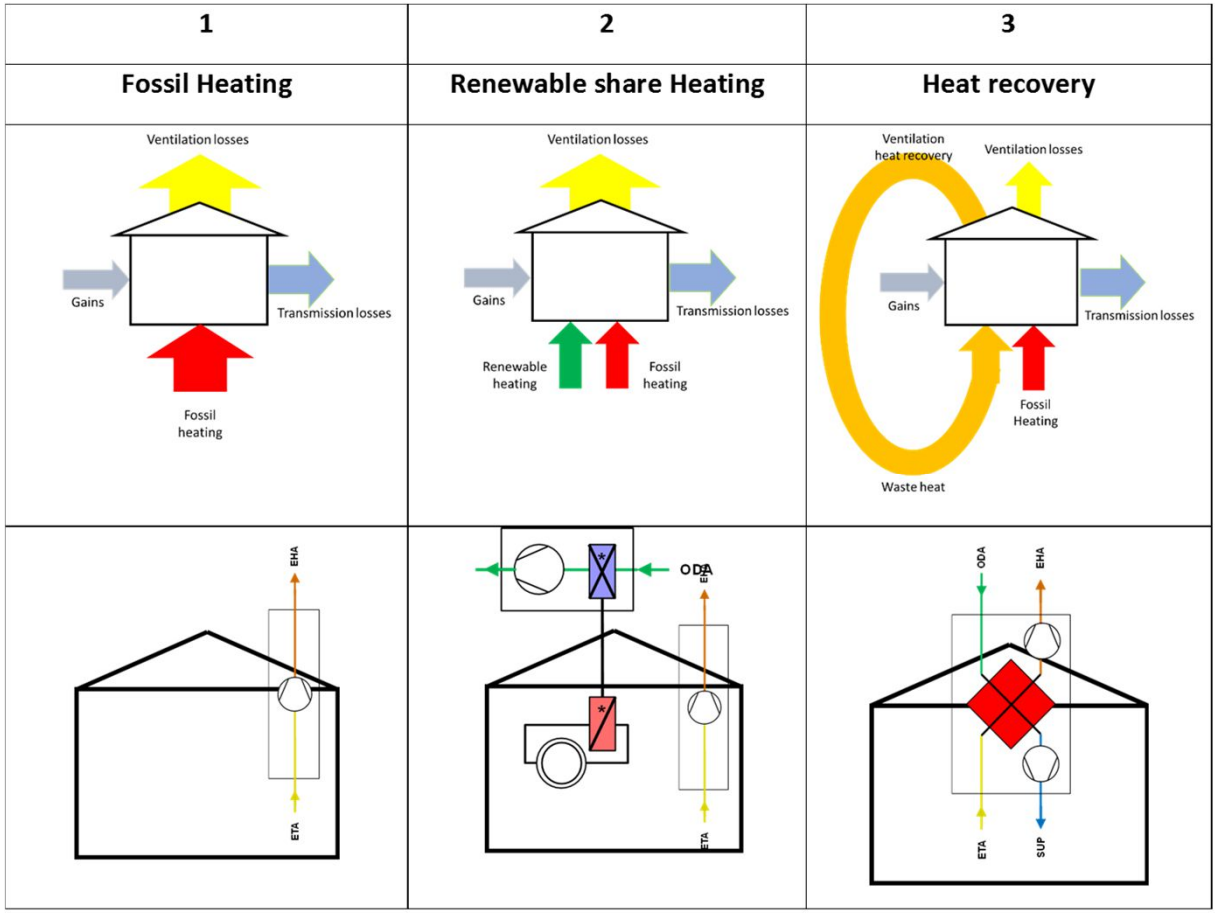


Renewable Energy Directive:
Why Heat Recovery should be treated in the same manner as Renewable Energy

Article 2 Definitions (Commission's proposal 30 November 2016)

- **(y) 'waste heat or cold' means heat or cold which is generated *or dissipated in a building or* as by-product in industrial or power generation installations and which would be dissipated unused in air or water ~~without access to a district heating or cooling system~~;**

External and internal gains (solar, people, machines etc.) – same in each case		
Transmission losses though the building envelope – same in each case		
Fossiln Heating to cover the losses	Fossil heating to cover the losses not covered from renewables	Fossil heating to cover the losses not covered from waste heat use
Ventilation losses (airing + infiltration etc.)	Ventilation losses (airing + infiltration etc.)	Ventilation losses infiltration only
No waste heat recovered	No waste heat recovered	Energy recovered from ventilation losses. Heat recovery or heat pump
	Renewable heating (current regulation)	Waste heat use leads to the same result
	Outdoor air used with heat pumps is considered as renewable energy. Exhaust air will become outdoor air immediately after leaving the building	Recovered exhaust air/waste heat is analog outdoor air use with heat pumps



EVIA´s mission in EPBD and RED 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.**
- **Member States shall take the necessary measures to ensure that minimum indoor air quality requirements for buildings or building units are set.**
- **They shall require minimum user independent ventilation airflow.**
- **These requirements shall take account the intended use of the building.**
- **Member States shall establish a methodology to calculate an indoor air quality indicator.**
  - The indoor air quality indicator shall be reported in a transparent way in the energy performance certificate
  - The energy performance certificate shall include information about indoor air quality (ventilation rate) and the indoor thermal environment (summer and winter).

EVIA members