ISSN 1307-3729

REHVA

Federation of European Heating, Ventilation and Air Conditioning Associations

The REHVA European HVAC Journal

Volume: 60 Issue: 6 December 2023 www.rehva.eu

Revised EPBD 2024 soon expected

Common language for HVAC professionals and financial sector essential

Articles on Circular Economy, EPD, SRI and IEQ





Belimo RetroFIT+

Enhanced carbon reduction, comfort, and safety through field device retrofits.

HVAC renovation projects have the potential to significantly improve occupant comfort and indoor air quality while delivering substantial energy savings. At Belimo, our decades of retrofit experience along with the reliability and performance of our products make us the ideal partner for customers ready to make simple adjustments to realize immediate results, upgrade with today's technology, or replace their entire HVAC system.

With both standard and custom offerings, we help you find the retrofit solution that's right for you.

Discover the opportunities
www.belimo.com

BELIMO Automation AG
info@belimo.ch, www.belimo.com

BELIMO®

The REHVA European HVAC Journal

www.rehva.eu

Volume: 60 Issue: 6 December 2023

Editor-in-Chief:
Jaap Hogeling
jh@rehva.eu

Editorial Assistant:
France Baggetto
fb@rehva.eu

General Executive:
Ismail Ceyhan, Turkey

REHVA BOARD

President:
Cătălin Lungu

Vice Presidents:
Kemal Gani Bayraktar
Lada Hensen Centnerová
Risto Kosonen
Ivo Martinac
Livio Mazzarella
Pedro Vicente-Quiles
Johann Zirngibl

EDITORIAL BOARD

Murat Cakan, Turkey
Guangyu Cao, Norway
Tiberiu Catalina, Romania
Francesca R. d'Ambrosio, Italy
Ioan Silviu Dobosi, Romania
Lada Hensen, The Netherlands
Karel Kabele, Czech Republic
Risto Kosonen, Finland
Jarek Kurnitski, Estonia
Livio Mazzarella, Italy
Dejan Mumovic, United Kingdom
Ilinca Nastase, Romania
Natasa Nord, Norway
Dusan Petras, Slovakia
Olli Seppänen, Finland
Branislav Todorovic, Serbia
Peter Wouters, Belgium

CREATIVE DESIGN AND LAYOUT

Jarkko Narvanne, jarkko.narvanne@gmail.com

ADVERTISEMENTS

Marie Joannes, mj@rehva.eu

SUBSCRIPTIONS AND CHANGES OF ADDRESSES

REHVA OFFICE:
Washington Street 40
1050 Brussels, Belgium
Tel: +32-2-5141171
info@rehva.eu, www.rehva.eu

PUBLISHER

TEKNİK SEKTÖR YAYINCILIĞI A.Ş.
Fikirtepe Mah., Rüzgar Sk. No: 44C
A3 Blok, Kat:11 D:124 Kadıköy/Istanbul, Turkey

REHVA Journal is distributed in over 50 countries through the Member Associations and other institutions. The views expressed in the Journal are not necessarily those of REHVA or its members. REHVA will not be under any liability whatsoever in respect of contributed articles.

Cover photo: Liam Martens on Unsplash

Contents

Download the articles from www.rehva.eu -> REHVA Journal

EDITORIAL

4 **EU Council and Parliament reached a deal on the revision of the Energy Performance of Buildings Directive**
Jaap Hogeling

ARTICLES

5 **Standardisation and EU common language across the value chain**
Johann Zirngibl & Jana Bendzalova

8 **The energy transition would be easy as technology exists, but who will pay for it? – that is the question**
Csaba Csiky de Csiksomlyó

11 **How to engage retail lenders in home renovation**
Peter Sweatman

14 **What stands between you and a successful Christmas dinner**
Federica Sabbati

17 **IEQ in the EPBD – How to set national requirements in line with revised EPBD?**
Jarek Kurnitski

23 **The SRI Observatory: the site to find everything on building smartness policy and research**
Pablo Carnero Melero

25 **Field Instrumented Follow-up of a Supply Ventilation System in a Nursery**
Christian Feldmann, Louis Stephan & Arnaud Berchouchi

31 **EPDs for ventilation components**
Amund Ona Gjul

35 **Circular economy in the construction industry – BUS-GoCircular project**
Pavla Dvořáková, Karel Kabele, Martin Breen & Jan Cromwijk

42 **Case study: Overestimated performance of CO_2 gas coolers**
Japhet Habimana

PUBLICATIONS

45 **EU must stop 'playing small', EPBD is crucial for reducing emissions from buildings**

ADVERTORIALS

46 **CLIMAVER® light-weight ductwork systems to decarbonise built environment**

48 **Leading the Shift to Sustainable Materials with Bio-Based Uponor PEX Pipes Reducing Carbon Footprint by 90%**

REHVA WORLD

49 **REHVA Strengthens its EU Policy Advocacy Efforts**

50 **MODERATE workshop at the REHVA Brussel Summit- 14th November 2023**
Sofia Bazzano, Alfonso Capozzoli, Mohsen Sharifi & Cristian Pozza

52 **News in the REHVA Family**

53 **EU year of skills: EBC talks about construction skills in SMEunited conference and REHVA Summit**

54 **REHVA Brussels Summit 2023**
Carlota Pérez-Bouzada

IAQ CORNER

62 **The Seven Essentials of Healthy Indoor Air**

EVENTS & FAIRS

63 **Exhibitions, Conferences and Seminars**

64 **TTMD represented international cooperations at ISK-SODEX Istanbul 2023**

65 **Light + Building 2024**

66 **MCE - Mostra Convegno Expocomfort 2024**

67 **Climamed 2024**

68 **44th AIVC, 12th TightVent & 10th venticool Conference**

Advertisers

✓ BELIMO 2
✓ UPONOR 10
✓ SWEGON 16
✓ REHVA REPORT 21
✓ ISOVER / SAINT-GOBAIN 22
✓ SYSTEMAIR 30
✓ EUROVENT CERTITA CERTIFICATION 44
✓ REHVA MEMBERS 70
✓ REHVA SUPPORTERS 71
✓ SRI2MARKET 72

Next issue of REHVA Journal

Instructions for authors are available at www.rehva.eu (> Publications & Resources > Journal Information). Send the manuscripts of articles for the journal to Jaap Hogeling jh@rehva.eu.

EU Council and Parliament reached a deal on the revision of the Energy Performance of Buildings Directive

On the 7th of December 2023, the EU Council, Parliament and Commission reached a provisional political agreement on the proposal to revise the Energy Performance of Buildings Directive. This provisional agreement needs to be endorsed by the EU Council and Parliament in the coming months. The Industry, Research and Energy Committee of the EP will vote on the text on 23rd of January 2024.

> Rapporteur for the Energy Performance of Buildings Directive **Ciarán Cuffe** (Greens/EFA, IE) said: "We have achieved something remarkable this evening. We created a blueprint for the transition towards a zero-emission building stock. With this plan, we add an essential pillar to the EU's decarbonisation plans and begin the long journey towards reducing 36% of Europe's CO_2 emissions".
>
> "That journey will begin with the buildings that are wasting the most energy. Energy wasted is money wasted on bills. We must help citizens to save money, and protect them from volatile energy prices. That is why we have chosen a route that can lower energy bills for everyone, homeowners and renters alike, and addresses the root causes of energy poverty", he added.

The proposed revision of the EPBD aims to substantially reduce greenhouse gas (GHG) emissions and energy consumption in the EU building sector by 2030, and make it climate neutral by 2050. It also aims to have more worst-performing buildings renovated and improve information-sharing on energy performance.

An agreement on solar energy in buildings will ensure the deployment of suitable solar energy installations in new buildings, public buildings and existing non-residential ones which undergo a renovation action that requires a permit.

Regarding minimum energy performance standards (MEPS): in non-residential buildings, it is agreed that in 2030 all non-residential buildings will be above the 16% worst performing and by 2033 above 26%. Member states will be able to take into account the life-cycle global warming potential of the building, which includes the production and disposal of the construction products.

Concerning the renovation target for residential buildings: member states will ensure that the residential building stock will reduce the average energy consumption by 16% in 2030 and a range between 20-22% in 2035. 55% of the energy reduction will have to be achieved through renovation of the worst performing buildings.

Member states will adopt measures to decarbonize heating systems and phase out fossil fuels in heating and cooling with a view to completely phasing out fossil fuel boilers by 2040. Member states will also have to stop subsidizing stand-alone fossil fuel boilers as of 2025. Financial incentives will still be possible for hybrid heating systems, such as those combining a boiler with a solar thermal installation or a heat pump.

The focus of this issue is on the need for a common EU language when implementing this new EPBD. A common language supported by standards for HVAC professional (as included in the set of CEN and ISO EPB standards), but more important a common language between the financial sector and HVAC professionals. The renovation targets mentioned in the EPBD 2024 will require billions of Euro's, the financial sector can provide this, if we are able to standardise our project descriptions. How, was presented at the last Brussels REHVA summit. Several articles in this RJ disclose this in clear language. ■



JAAP HOGELING
Editor-in-Chief
REHVA Journal

Standardisation and EU common language across the value chain

To finance the energy transition and to provide reliable results, professionals, which are not used to talk together, needs to cooperate, to understand each other, to speak a common language. This article shows examples of the common language between the financial sector and HVAC professionals.

Keywords: Financing of energy transition, Building performance indicators, EU taxonomy



JOHANN ZIRNGIBL
REHVA Vice-President



JANA BENDZALOVA
CEO ENBEE

The need for a common language: yesterday and today

Since long time, the need for a common language in the construction sector is well documented. Already in Genesis 11:1–9 it is written that people spoke a single language before they started to construct the Babel tower. But Yahweh, observing the ambitious construction and the people seeking to be equal to God, confounds their speech so that they could no longer understand each other. The Babel tower was not finished.

Today, the challenge is the energy transition. There is a need for a common language between financial institutions and HVAC professionals to successfully complete the energy transition. The financing needed for the energy transition is estimated annually to around 1% of EU PIB (225 – 275 billion €). There will be public funding, but additional private funding is necessary. [1]

Private financial markets need financial "products" to deal with, for example green bonds. In Europe, the EU taxonomy or Green Bond principles define what is green or not green, allowing investors to allocate capital to environmentally sustainable investments. This recognised green investment may have better financial conditions for the investor. Green investment can be also valorised in the Environmental, Social and Governance (ESG) reporting of the company.

To increase the confidence in the green labelling, harmonized frameworks for impact reporting are worked out. **Figure 1** shows indicators for the reporting framework of the ICMA* Handbook - Harmonised Framework for Impact Reporting [2] for "Green" buildings making a significant contribution to environmental sustainability.

* The International Capital Market Association (ICMA) represents financial institutions active in the international capital market worldwide. See www.icmagroup.org



Illustrative Core Indicator Summary Template for Project-by-Project Report

Green Building Projects	Signed Amount a/	Share of Total Project Financing b/	Eligibility for green bonds	Green Building component	Allocated Amount c/	Project lifetime d/	Gross Building Area (GBA)	#1) Final and/or Primary Energy Use e/		
Project name f/	currency	%	% of signed amount	% of signed amount	currency	in years	in m²	kWh/m² of GBA p.a.	% of energy use reduced/ avoided	% of renewable energy generated on site
e.g. Project 1	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX

Figure 1. Indicators for the reporting framework of the ICMA Handbook.

Indicators as Primary Energy Use are listed. The definition of Primary Energy Use is overtaken from the EPBD or from ISO EN standards. Even the calculation of the Primary energy use is mentioned: "*For further guidance on calculation of PE Use, including renewable energy generated on site, ISO EN standards or national methods … may be used*". The ICMA Handbook also provides definition of floor area for reporting the energy performance indicators in kWh/m². The metrics is a Gross Building Area (GBA) also named Gross Floor Area ("GFA") that corresponds to the total floor area contained in a building measured to the external walls.

It is evident that a Handbook for a harmonised impact reporting cannot go further in the details. The problem in the handbook is that it allows for the calculation **ISO EN standards** or **national methods**. But there are national or regional methods in each Member State providing all different results. The problem with ISO EN standards is that there is no software tool allowing calculating easily all the requested indicators. Financial institutions have to solve this for impact reporting at each national level or even at each bank level.

The consequences of the missing common language – no comparability but administrative burden and costs

Today there is no harmonised calculation tool available. The consequences of the missing common calculation tool on the primary energy indicator are shown in **Figure 2** (example of a single-family house equipped with a heat pump and photovoltaic panels).

Depending on the different hypothesis (on-site ambient heat considered or not in the total primary energy, exported energy counted or not, etc), the numerical EP indicators for the same building vary from 26 to 101 kWh/m² p.a. or even to 119 kWh/m².

As already mentioned, financial institutions must provide evidence of compliance with the EU taxonomy in real estate financing. For example, the EU taxonomy defines that the acquisition or ownership of a building built before 31/12/2020 makes a substantial contribution (Green Building) to climate change mitigation if the building:

- has **at least** an Energy Performance Certificate (EPC) **class A; or**
- is within the top 15% of the residential and non-residential building stock.

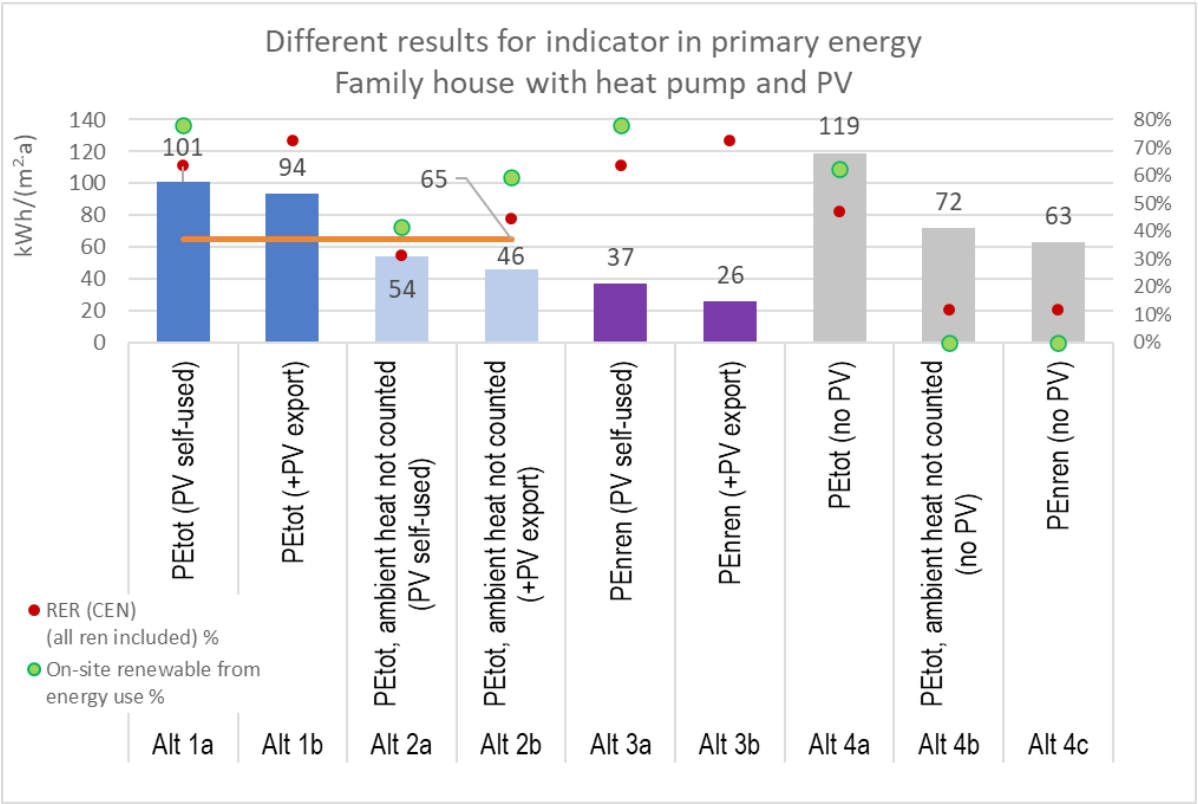


Figure 2. Single-family house equipped with a heat pump and photovoltaic panels.

To identify which characteristic in their national context (information available on the EPC, structure of the building stock, etc) will fulfil the 15% criteria, a German Bank engaged a consultant. The calculation carried out by the consultant showed that single-family houses meet the 15% criteria if they have an energy class of at least B, or if its primary energy demand (PED) is lower than 70 kWh per square meter using the national type of primary energy, calculation method and floor area. This illustrates the non-harmonised framework and the lack of a common language which causes administrative burden and costs.

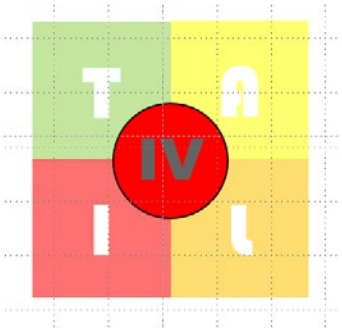


Figure 3. ALDREN TAIL RATING.

HVAC professionals and bankers need to invent a common language

The common language must be based on common indicators **and** the underlying unambiguous calculation methodology. Bankers need indicators that can be understand easily for example the energy performance of a building via the energy classes. HVAC professionals need to deliver comparable, reliable and transparent indicators.

Some indicators exist already, others need to be developed, as for example, indicators related to non-energy benefits as health & wellbeing. These indicators should also allow the financial institution to evaluate the asset value of the building, including energy and non-energy benefits. An example for a new non-energy benefits benchmark is the ALDREN TAIL RATING (see **Figure 3**). TAIL stand for **T**hermal, **A**coustic, **I**ndoor air quality and the **L**ighting performance of a building related to health & wellbeing. [3]

Additional indicators for the real estate market, for example for the assessment of risks related to sustainability and regulatory outlook, could be provided by the HVAC sector. An example is a qualitative indicator of risk including technical obsolescence and financial issues proposed in ALDREN as link between energy and financial valuation.[4]

Conclusion

To finance the energy transition and to provide reliable results, the cooperation between financial institutions and technical know-how in the HVAC sector is necessary. Cooperation needs a common understanding; common understanding needs a common language. Talking to financial institution is a new challenge for HVAC professionals requiring new competences. We should learn from the experience of the Babel Tower. ■

References

[1] COMMISSION DELEGATED REGULATION (EU) 2021/2139 of 4 June 2021 supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by establishing the technical screening criteria for determining the conditions under which an economic activity qualifies as contributing substantially to climate change mitigation or climate change adaptation and for determining whether that economic activity causes no significant harm to any of the other environmental objectives, amended by Commission Delegated Regulation (EU) 2022/1214 of 9 March 2022.

[2] Handbook - Harmonised Framework for Impact Reporting. June 2023; ICMA and the Green Bond Principles, June 2023. https://www.icmagroup.org/sustainable-finance/impact-reporting/green-projects/.

[3] The ALDREN TAIL RATING, https://aldren.eu/comfort-well-being/.

[4] The ALDREN methodology for financial valuation – Indicators and information sharing, https://aldren.eu/cost-value-risk/.

The energy transition would be easy as technology exists, *but who will pay for it?* – that is the question



CSABA CSIKY DE CSIKSOMLYÓ
CEO & Chairman of EnerSave Capital Sari
cdc@enersavecap.com

Csaba is the founder of EnerSave Capital, a Luxembourg based finance facilitator for sustainable assets. With a focus on the energy transition, sustainable energy assets and the repacking of cash flows derived from sustainable investments into green bonds via securitisation. He is a seasoned investment banker, having held senior positions at Merrill Lynch, Prudential Bache, and sat on the board of Creditanstalt IB.

He has a broad experience in energy efficiency solutions and renewable energy generation implemented on an ESCo and on 'As a service' basis. He is also the founder of a UK based regulated entity that is active in the energy transition space.

Around 2017 I was attending a Bloomberg conference in London, where the head of the then Green Investment Bank, today a subsidiary of Macquarie, very eloquently explained the key issues for getting companies to decarbonize; "*the widget manufacturer will not use his own funds to pay for better lighting, but will use those funds to make a better widget, and not on improving the lighting in his production facility. If "you" however propose to him, that you will design it, install it, at no upfront cost, and he can pay from the savings he will sign on the dotted line*".

Sounds easy, but the "you" meaning the installer or manufacturer needs to find the funding for such an installation. And here the problem starts with most bankers, who by reflex are used to lend against collateral, are now asked to put their project finance hat on, which means looking at the future cash flows of the operation and understand that modern lamps are more efficient than old ones and that yes, the consumption will be lower. Generally, a hard ask.

Why did I use lighting as an example and not heat pumps or similar, very simply, lighting is the technology which energy efficiency bankers understand best. Other technologies lag behind in Bankers understanding, but they will get there.

IFRS 16 complicating matters

Recent changes to the International Financial Reporting Standard or "IFRS" and in particular the treatment of leasing arrangements under IFRS 16, which is mandatory for all large or listed companies and investment funds. Long story short IFRS 16 makes leasing arrangements an "on balance sheet" item. This means that unlike earlier rules when leasing agreements have been treated "off balance sheet" meaning that they have been dealt with in the Notes to the financial statement, today they need to be recognised in the financial statements, which makes the treatment more complicated. Practically the practitioner needs to check under which reporting standards your client is reporting his financial statements. If your client reports under Generally Accepted Accounting Principles (GAAP) then there is no issue as companies using GAAP can treat leasing as earlier, but the larger clients will be under IFRS. Just to mark your card.

Creating a funded solution for your clients

Access to funding is the key in rolling out the energy transition, but the numbers are staggering. According to the EU Commission it will take each and every year 300 Billion Euro in investments to meet the 2030 and 2050 objectives, numbers which make climbing the Eiger North-face, look like a walk in the park.

But then let's not get scare and discouraged by numbers, but let's try to look at practicalities how to create replicable solutions which will as we at EnerSave Capital, which I chair, call it, get the "conveyor belt" rolling.

Standardization of contractual agreements

Our firm alongside BNP-Paribas has developed under the EU funded LAUNCH grant launch2020.eu created a standardized legal end client agreement which meets the requirements of end clients as to "off balance sheet" by adopting an "as a service" end client proposition and every participant of the funding value chain was sitting around the table.

This contract which today exists in 12 legal systems and languages is part of the Sustainable Finance Association sefaeu.org tool box and can be used by every practitioner as a standardized contract.

Why is this important? just imagine if every contract's legal terms would be different, it would take an army of lawyers to verify them and this is simply unaffordable. Furthermore, for every financier a pipeline of transactions is of interest, however if these are all under different contractual agreements it is a complication which no one wants or needs.

Think about the car industry, the local VW dealer, will sell any kind of car to you, big small, fast or family vehicle, but the lease or loan agreement will always be the same contractual format.

The end client proposition - a case for "as a service"

The ESCO business model has been in and out of fashion over the past decades. We think it is a pretty clever solution to get scale into the energy transition, if it is done well with responsible people – and the funding by the financial community will be their subject to be able to show the "pipeline" i.e. a series of end clients willing to adopt such a proposal, standardization of contractual agreements, further described below, ESG & EU Taxonomy compliance and finally that it pays for itself around 5 to 7 years.

We see market trends whereby big corporations are willing to amend the ESCO model in the direction of the "as a service" which in essence has two key elements. First, one that the equipment supplier or manufacturer will keep ownership of the equipment and second will sell the output of such an equipment on a full maintenance contract basis.

Actually, and many customers like such proposals as they get what they want, either heating or cooling but they do not have ownership of the equipment which is an asset which they might or might not be able to pay for.

Many clients in the real estate sector need to have alternative proposals to meet their decarbonization goals, and "as a service" ticks many if not all the boxes as affordability, off balance sheet issues, and understand of complex measures.

Practitioners need to note that in today's sales process, the engagement of all relevant parties is essential. These are the building manager, the chief sustainability officer or "CSO" and the chief finance officer or "CFO".

The 'as a service' proposition creates an alignment of interest between building owner and technology supplier. Furthermore, it smooths the procurement process as, it is easy for the CFO to sign up to it, as it does not burden his balance sheet and neither his cash flow, as he only pays for the usage, which he had in a different format on his Profit & Loss statement (P&L) earlier. Todays, energy saving building solutions are complex and interlinked and very often it is hard to comprehend for the building manager having been brought up with less IOT based equipment, and he does not want to take action out of fear for getting it wrong. As under the "as a service" the equipment supplier warrants a contracted output, all the manger needs to do is to define, with the occupants of the building the required output for the good operation of the building and sit back and let it happen. He has a long-term output at a fixed cost basis which the equipment supplier will need to deliver. Finally, the CSO will be able to claim a faster progress on the decarbonization, which is one of his key tasks.

When we talk to the industry it is interesting to see how they engage in this new field of activity, and for many end clients and manufacturers or distributors this represents the creation of long-term relationships instead of one-off sales, which ideally is where everyone would like to be.

Balance sheet issues

This is the big limitation factor, and your banker will this have in mind. What do we mean by this. Lending by bankers happens based on credit assessment, one of the key elements is the applicants balance sheet and its profit and loss account. Generally (simplification has its issues) banks will be comfortable to lend on a 1 to 4 basis, to a client of good repute, meaning that for every unit of equity banks will lend four units of debt.

Now once the 4 units of debt have been spent, there is no more ability to borrow, of which we need to be

mindful. Let's assume for simplification purposes that 1 unit is Euro 1 Mio.

For every lending banker, it will be important for the practitioner to have a plan how to move forward once the 4 to 5 Mio. are spent. This will be a key consideration in the overall lending process.

Finally - De-risking the balance sheet

One of the most practicable solutions is to sell receivables entered into with end clients, in order to permanently remove risk and rewards of such end client contracts is the process via securitization. https://www.pwc.lu/en/pwcacademy/training-library/introduction-to-securitisation.html.

In simplified example, the equipment supplier, sells his receivable to a securitization vehicle, one of which is the firm I chair enersavecap.com and this securitization vehicle then raises capital on the back of these receivable for capital market investors. As such the equipment supplier, will have moved the risk and reward from these contracts from his balance sheet, and will be able to repay its lending bankers and start with a new pipeline of projects, whilst keeping the revenues of ongoing maintenance for themselves.

Final thoughts

The "conveyer belt" is a key tool which EnerSave Capital propagates as a solution in the energy transition. All what is needed is a bit of planning and having a process approach.

Subject to, having contracted with proper credit worthy end clients (no default), and the equipment supplier acting properly (happy clients) and the initial lending banker having been repaid the amounts advanced (happy bankers want to re-lend to good clients) and the securitization investors having been repaid in due course, the equipment supplier is able to create a "conveyor belt" and a pipeline of contracts which will move his equipment out of the door, whilst maintaining a strong client relationship and the ability to upsell should a newer version of his equipment exists which saves even more energy.

To the question, I asked to one of our prospective clients, and a REHVA member, by how much he would expect to increase turnover if he would be able to sell "as a service" in the conveyer belt scenario, he responded "40% within 2-years without affecting of the traditional channels". For a company having a turnover of currently 1.3 Bio. this is a big opportunity. ■





How to engage retail lenders in home renovation



PETER SWEATMAN
Chief Executive of Climate Strategy,
Madrid, Spain
info@climatestrategy.com

European mortgage lenders must align their real estate loans with their net-zero targets. The degree of Paris alignment of mortgage lending is, however, low and the rate of issuance of green mortgages is slow. This article provides insights and recommendations to EU policymakers of how the recast Energy Performance of Buildings Directive can change this.

Keywords: Finance, Mortgage, Bank, Renovation, Sustainability, Retrofit, Energy, Efficiency, Lender, Climate

The most cost-effective way to reduce emissions, improve resilience, address energy poverty and reduce dependence on imported fossil fuels is to invest in energy efficiency. Investing to save energy creates local jobs, saves money, delivers longer and healthier lives for fragile communities and provides the base of Europe's energy transition by placing energy efficiency first.

In 2023, the EU adopted an updated Energy Efficiency Directive that contains an economy-wide final energy consumption target which represents a 21% reduction

by 2030 on 2021's actual energy use. Meeting this target will be historic and requires actions that are over and above what has gone before. Success will deliver significant economic and security benefits to countries, yet it cannot be met unless building renovation rates increase significantly.

Buildings are in the spotlight because they are collectively the most significant energy users in Europe and are highly inefficient. As energy prices increase, and renovation receives more public financial support, the demand for energy efficiency investments is rising, and yet retrofit rates are still far below those anticipated by the EU Green Deal, or in most Member States' renovation plans.

"Lack of finance" is frequently cited by building owners and policymakers as one of the most important barriers to action, and yet many banks offering finance for home renovations are underwhelmed by customer demand. In a world where consumers are smothered in financing options for cars (hire purchase), white goods (0% interest, buy now & pay later) and many other competing investments, it's a surprise that so few attractive "point of sale" renovation finance options exist, and how little financial support would-be renovators have.

There are over one hundred thousand bank branches in the European Union and retail lenders process "millions of daily customer interactions" online. Over a quarter of EU homes have a mortgage and this channel to discuss energy savings is underused. Lenders could offer and process the millions of energy renovation loans, or green mortgage top-ups, annually required to deliver the finance needed to upgrade and modernise the EU's buildings. With limited public funding rightly being prioritised for the neediest, the EU's building renovation and energy efficiency targets will be wholly unachievable without the engagement and alignment of mortgage lenders. The required step-change in energy renovation rates will be impossible without mortgage lenders hosting informed and engaged dialogues with building owners on their energy performance and how to resolve this.

European banks with net-zero targets, clear transition plans or science-based emissions reductions trajectories have already identified their mortgage books as containing material climate risks and opportunities. They have also seen the evidence that shows mortgage arrears and defaults in Europe decrease as property energy performance improves. In fact, over 30% of Europe's largest banks have already begun to implement a voluntary Mortgage Portfolio Standard as a result of regulatory changes and to operationalise their overall climate targets, identify data gaps and provide a framework for action for renovation.

Lenders to buildings, their owners and occupants need better data. Fortunately, a host of AI-powered, proxy-based, and innovative solutions are emerging to resolve these data gaps. An ambitious recast of the EU Energy Performance of Buildings Directive (EPBD) can introduce minimum energy performance standards, accelerate the uptake of Mortgage Portfolio Standards and help improve buildings data through improving Energy Performance Certificates (their quality, coverage and visibility), introducing building passports and digital logbooks, and requiring disclosure of embodied carbon emissions in the construction and renovation sectors.

Over 70% of EU homeowners own the homes they live in. The majority of these homeowners can borrow against their homes if they wish to improve their comfort and energy performance - and be paid back through energy savings and value increases. However, many of these homeowners do not meet the income, age or loan-to-value tests required to qualify for more mortgage debt. Private sector lenders therefore need public support to deliver attractive funding to these tens of millions of homeowners. This is potentially a trillion-euro opportunity where EU-level guarantees can be deployed with private capital to better serve the needs of an often older and precarious market segment who need a new blended public-private financial instrument to renovate.

An ambitious recast Energy Performance of Buildings Directive is a once in a decade opportunity for Europe

2023 is the year when EU Governments and citizens began to see that addressing the thermal quality and energy efficiency of buildings through renovation is the bedrock for the delivery of a fair and net-zero emissions economy in Europe. As a vehicle, the recast EPBD seeks to establish the regulatory frame to stimulate increased renovation investments through 2030. This is the moment when mortgage lenders must identify the "low hanging fruit" of the worst performing buildings and support the offer of public and private finance solutions to turn an inefficient and uncomfortable home into a modern, comfortable and climate-friendly one.

Most EU financial institutions are aware that the collateral against which they provide mortgages is

largely inefficient and will fall out of alignment with the net-zero emissions pathway at some point in the coming years. Leadership in offering renovations to mortgage clients has largely been among lenders with voluntary forms of Mortgage Portfolio Standards, Science-based emissions reduction targets or in countries with Minimum Energy Performance Standards. Unlike buying a new home, or car, the renovation process is more complex and execution is provided by a multitude of local contractors whose warranties and standards are all very different. Financial institutions who have been able to make renovation finance programmes work have also been able to rely on supportive measures provided by standards, contractor accreditation, improving technologies (like heat pumps) and increasingly sophisticated measurement tools and AI.

Like LEDs, wind and solar, the "whole package" of energy performance renovation is receiving more and more attention, heat-pump technology has finally started to gain traction and the business process efficiencies of a growing market are slowly becoming apparent. Point of sale financing that packages public and private components to provide the best offer to homeowners is a critical element of successful renovation delivery, and some mortgage lenders are years into building leadership here.

The financial institutions implementing climate risk and mitigation measures, portfolio by portfolio, understand the highly material risk of inaction in mortgages, and are aware that there is a limited window of opportunity to work with Governments to jointly address and deliver shared objectives. This provides a unique backdrop for more formal processes which bring together impacted organisations with experts and policymakers to co-develop voluntary and regulatory approaches which together can accelerate the delivery of energy savings to homeowners.

Business as usual renovation rates do not serve homeowners, governments nor the EU, as they leave buildings exposed to energy price shocks and keep the EU energetically unfit and vulnerable. An ambitious recast EPBD is a once in a decade opportunity for Europe, and it must contain the financial measures recommended in this report to enable millions of EU citizens to save energy and see the real benefits and impacts of the EU's new energy and climate ambitions. We conclude this article with four critical recommendations to EU policymakers. ■

To read more and a fuller analysis of the data behind these conclusions, please download our recent report via this link: https://www.climatestrategy.es/en/informes.php

Four critical recommendations to EU policymakers:

1	Member States need to establish minimum energy performance standards through a framework with clear and measurable interim targets to improve the energy performance of their commercial and residential buildings.	These must be established in line with the collective EU targets, and national energy and climate plans and buildings renovation strategies, with a focus on the worst-performing buildings.
2	Governments need to increase grant funded renovations to the energy poor and increase levels of technical and project development assistance to all residential segments. In addition, an EU-level guarantee facility should be made available to retail lenders engaging in providing home renovations to the elderly and homes with poor economics.	The launch of an EU Renovation Loan would immediately increase the resources available to Member States and offer specific tailored retrofit funding to homeowners unable to refinance or extend their mortgages for renovation. It will also level the playing field across the EU by helping resolve issues of scale, fiscal headroom and speed to market.
3	Mortgage lenders in the EU must play a more proactive role in unlocking the trillions of home equity stored in the buildings owned by their clients. By implementing a voluntary Mortgage Portfolio Standard, these lenders can more easily identify the low-hanging fruit and the climate risks in their property backed loans, and will be able to more efficiently deliver their own sustainable finance and net-zero commitments.	A Commission-led Delegated Act process can convene Europe's leading lenders and experts to build from the many existing best practices and help define technical standards and guidance to achieve these goals.
4	All necessary policy levers must ensure that more and better-quality energy use and performance data is surfaced to the buildings renovation supply chain, and homeowners, to help residential and commercial buildings owners prioritise cost effective renovations, add value to their properties and reduce operating costs.	The complexity of renovation must be resolved by the contractors, financiers and trusted project managers. Digital logbooks, building renovation passports, AI, proxies and improved and advanced EPCs all have a role to play, but fundamentally building owners need support and simplicity.



Photo by Arno Senoner on Unsplash

What stands between you and a successful Christmas dinner



FEDERICA SABBATI
Secretary General,
European Heating Industry
federica.sabbati@ehi.eu

It's 11 am on Christmas eve in Brussels and you are preparing the family dinner when your heating system suddenly breaks down. You frantically look for the number of a heating technician, miraculously find one and beg him to come fix it before your dinner is served. While you are hoping for a free slot in his overbooked schedule, you think back to last summer: holiday or new heating system? I guess you went for 'holiday'. It seemed a good idea then…and a bad choice now, as your technician gives you an appointment for 30 December at the earliest.

If this story resonates with you, it is because installers of heating systems are a 'precious good' and a scarce resource and we realise it only when we need one. Not only they fix your broken heating system, they also literally bring the energy transition into every home, by advising consumers like me and you and by installing the modern technology which is most suitable for our house.

Their role is important, because while the European Union has set ambitious climate goals for buildings by 2050, it has failed to think about how to drive millions of consumers to adopt new technologies. Installers certainly have a pivotal role in influencing consumer choices.

A recent survey conducted by Centerdata reveals that 96% of consumers who had recently purchased a new heating appliance relied on the advice of installers in making their decisions. Installers not only guide consumers but also act as the linchpin between manufacturers and end-users. Manufacturers depend on installers – who are mostly small businesses and heating manufacturers' clients - to install their systems, making them a crucial bridge in the adoption of new technologies.

Buildings need energy-efficient heating

The buildings sector accounts for a substantial 40% of energy consumption in Europe. Addressing it is important to reach climate-neutrality in Europe. The challenge of reaching these goals is underscored by the inefficiency of most European buildings, particularly in their heating systems, which contribute to a staggering 80% of a building's energy consumption. To meet these challenges the focus is on replacing (faster than at today's 4% annual rate!) outdated heating systems with innovative, renewable energy-based technologies such as heat pumps, solar thermal systems, hybrid heat pumps, green gas appliances etc. It is installers and maintenance technicians that actually carry out the replacements of old systems with modern ones.

Reskilling Installers: A Dual Challenge

The heating industry estimates that there are currently 1.5 million installers in Europe. On average, they are 50 years old. Most of them have predominantly worked with traditional gas and oil technologies. To meet the EU's 'REPowerEU' goals, which aim to install 30 million hydronic heat pumps in European homes by 2030, we face a dual challenge. Firstly, 50% of existing installers must be retrained to work with new technologies such as heat pumps and, secondly, our societies need to attract another 750,000 new, young talents to meet the growing demand.

Overcoming the Catch-22 Situation

Despite massive investments from the heating manufacturing industry in new training facilities and programs, there exists a catch-22 situation. Installers, being small independent businesses and the clients of the manufacturing industry, are less motivated to retrain when they already have enough installation and maintenance work today. To address this, the industry is offering them training in essential new skills, including electrification, digitalization, hybridization, system optimization, and the safe use of new refrigerants and green gases.

Teaming up with installer associations and other partners, the heating manufacturing industry is launching campaigns to highlight the benefits of pursuing a career in heating technologies and HVAC (heating, ventilation and air conditioning). These campaigns emphasize the local job opportunities, the secure future and the meaningful purpose of contributing to the energy transition on a grassroots level. An interesting example of such campaigns is 'Zeit zu starten' promoted jointly by the German heating industry and the German installers association (zeitzustarten.de).

Attracting New Talents: A Collaborative Effort

The industry and its partners are making strides, but this is not enough. Public administrations at both national and European levels must play their part. Initiatives such as matchmaking laid-off workers with similar skill sets, nationwide communication campaigns, consideration of targeted and innovative migration policies as well as curricular upgrades that focus on new technologies are essential to preparing the future workforce for the evolving needs of the sector.

Achieving the EU's climate goals requires a concerted effort from all stakeholders. By recognizing the pivotal role of installers, investing in their reskilling, and attracting new talents to the sector, Europe can contribute significantly to the transformation of its buildings. Public administrations must actively support industry efforts, to ensure a smooth and effective transition toward a sustainable and climate-neutral future. And an old, inefficient heating system should never stand between you and a successful Christmas dinner. ■

A new generation of natural refrigerant units

20÷200 kW

chiller, heat pump, multifunctional and freecooling units, air and water source



Doing the right thing has no value, but we know its worth. For us, this was the result to aim for, because it means having given and received in equal measure. To take care of Nature, through Nature. This choice is part of a story that has only just begun.

This is a new generation of natural refrigerant propane units.

MISSION ZERO EMISSION

Discover more about Swegon's Mission Zero Emission.

Swegon

IEQ in the EPBD – How to set national requirements in line with revised EPBD?

Revised EPBD is making an effort to cover IEQ both in renovation and new buildings. While in new buildings demand controlled and smart operation is required to ensure energy performance there is also a slight focus change in renovation to move from avoiding possible negative effects to optimal indoor environmental quality.



JAREK KURNITSKI
REHVA Technology and Research Committee
Estonia

Within 20 years, energy performance of buildings directive (EPBD) has developed to be a comprehensive and technically complex document. The first directive was launched in 2002 and with about 8 years step it has been revised in 2010, 2018 and the ongoing third revision is expected to come into force in spring 2024. REHVA has a long history in the development of technical guidance for harmonised national implementation of IEQ issues which have an important role in EPBD. The role of EPBD is stressed by the fact that there are no other EU polices for indoor air while outdoor air has its own directive. In such a situation, indoor environmental quality (IEQ), indoor climate conditions, ventilation, comfort and recently, **optimal indoor environmental quality** are addressed in many articles in EPBD, but establishing explicit requirements are on the responsibility of Member States (MS). Current revision of EPBD includes new requirements for measuring, control and monitoring of IEQ. Inspired from European Parliament proposal on Article 11a 'Indoor environmental quality', REHVA developed technical guidance to understand IEQ in the building design and operation as well as for possible options how to set national IEQ requirements [1]. While Art 11a may be deleted, its important principles will stay in the EPBD.

IEQ in EPBD articles

IEQ is not an easy issue in EPBD because the mandate is for energy. EPBD addresses an essential requirement that energy improvements cannot result in negative effects on IEQ, but general improvement of IEQ is not in the scope of EPBD, however there is often such need in renovation of old buildings. More specifically this important principle has already been addressed

Toxic air killed more than 500,000 people in EU in 2021, data shows

(The Guardian, 24 Nov 2023) European Environment Agency says half of deaths could have been avoided by cutting pollution to recommended limits.

Dirty air killed more than half a million people in the EU in 2021, estimates show, and about half of the deaths could have been avoided by cutting pollution to the limits recommended by doctors.

The researchers from the European Environment Agency attributed 253,000 early deaths to concentrations of fine particulates known as PM2.5 that breached the World Health Organization's maximum guideline limits of 5µg/m3. A further 52,000 deaths came from excessive levels of nitrogen dioxide and 22,000 deaths from short-term exposure to excessive levels of ozone.

"The figures released today by the EEA remind us that air pollution is still the number one environmental health problem in the EU," said Virginijus Sinkevičius, the EU's environment commissioner.

Doctors say air pollution is one of the biggest killers in the world but death tolls will drop quickly if countries clean up their economies. Between 2005 and 2021, the number of deaths from PM2.5 in the EU fell 41%, and the EU aims to reach 55% by the end of the decade.

The Guardian, 24 Nov 2023: Toxic air killed more than 500,000 people in EU in 2021, data shows

in 2018 EPBD Art 5 and there is no change in the current revision:

> 'When setting minimum energy performance requirements, those requirements shall take account of **general indoor climate conditions, in order to avoid possible negative effects such as inadequate ventilation**…'

IEQ definition in EPBD (Art 2, 57a) has developed to focus to thermal comfort and indoor air quality (IAQ): 'indoor environmental quality means the result of an assessment inside a building based upon parameters such as relating to the **temperature, humidity, ventilation rate and presence of contaminants**, influencing the health and wellbeing of its occupants.' Based on this definition, it can be expected that minimum requirements in these two IEQ domains (thermal comfort and IAQ/ventilation) are to be set in national regulation or building codes.

Revised Art 7 for new buildings and Art 8 for existing buildings stress IEQ for both new buildings and major renovations by stating that 'the issues of **optimal indoor environmental quality** shall be addressed', thus, national regulation at least on thermal comfort and IAQ/ventilation should be established if currently not present. However, Art 9 for renovation according to minimum energy performance standards (MEPS), does not address IEQ issue. MEPS renovation is expected to be typically a light renovation improving energy performance certificate by 1-2 classes that will pose a high risk to deteriorate IAQ in residential buildings if ventilation improvement is not considered.

It is quite evident that ventilation requirements are most crucial in any renovation of residential buildings, independently is it a major, deep or MEPS renovation. While Renovation Wave strategy aims to renovate 35 million units by 2030, by doubling and deepening renovation rates and applying MEPS, there is a serious issue of ventilation. It is well known that additional insulation and replacement of windows will block air change by natural ventilation if ventilation system would not be installed, resulting in mould and other IAQ problems. 'Build airtight and ventilate right' principle is evident for experts, but unfortunately often not followed in residential renovation practice if clear requirements are not established, **Figure 1**.

EPBD IEQ three-fold challenge

According to EPBD scope for renovated and new buildings there are three types of challenges to address IEQ:

1. Minimum energy performance standards **MEPS** – how IEQ and ventilation will be addressed in step-by-step renovation? Currently this is not addressed.
2. **Deep and major renovation** – IEQ requirements should push to install new ventilation systems in residential buildings, that is covered by Art 8.
3. **IEQ in Zero-emission buildings** – demand controlled and smart operation is needed to execute a new vision to transform EU building stock into zero-emission buildings by 2050, that is addressed in Art 11 for technical systems.

While MEPS is new instrument, 2018 EPBD introduced long term renovation strategies with ambitious targets for deep renovation. EU28 deep renovation rate was estimated in 2020 to be 0.2-0.3% per year, and the annual weighted energy renovation rate 1.0-1.2% per year in residential and non-residential buildings respectively [2]. Renovation wave strategy targets to

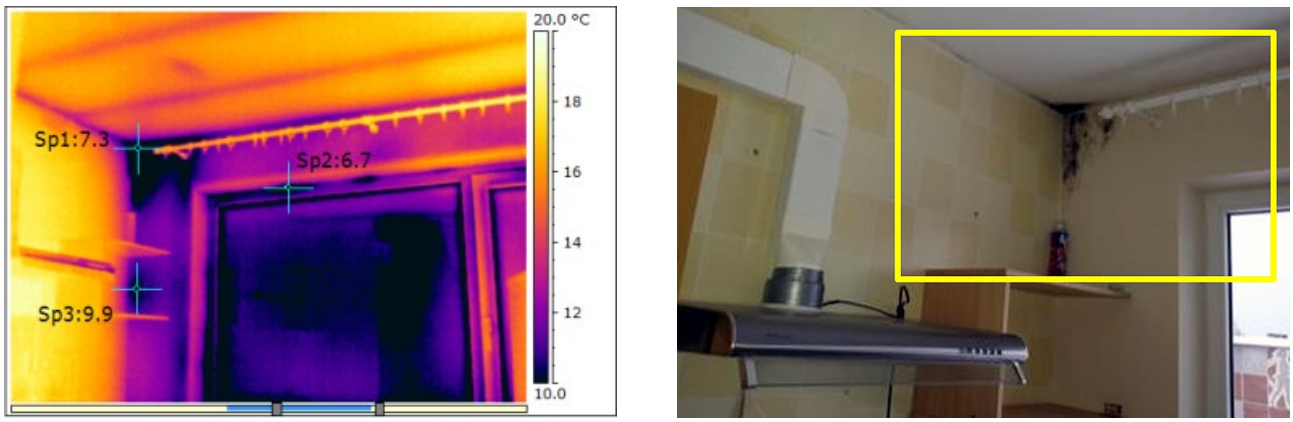


Figure 1. Example of light renovation with deteriorated IAQ. Replaced, new airtight window has blocked ventilation resulting in mould growth on thermal bridges. Thermal image on the left, photo on the right.

double the energy renovation to 2% per year. This will result in high renovation volumes supported by renovation grants and other incentives. While incentives are available, it would be important to set adequate ventilation requirements together with minimum energy performance requirements. Such experience is available for instance from Estonian renovation grants for multifamily apartment buildings, having a requirement to install heat recovery ventilation in major renovation (**Figure 2**) from 2015. This development was based on lessons learnt, as a first generation of renovation grants resulted in poorly functioning ventilation solutions and even in mouldy apartments in some cases. The situation was changed by developing regulation and model solutions for deep renovation.

Zero emission buildings

While for existing buildings the driving force in EPBD is avoiding negative effects on IEQ, in new zero emission buildings (ZEB) the concern is on energy performance of ventilation and air conditioning systems.



Figure 2. Estonian apartment building renovated with KredEx grant (30% of financial support) that requires to install heat recovery ventilation. On the photo, ventilation supply air ductwork and some parts of extract ductwork are installed on the façade before additional insulation, and heat recovery ventilation unit will be installed to the renovated roof.

This is addressed in Art 11 for technical building systems:

- Member States shall require non-residential zero-emission buildings to be equipped with **measuring and control devices for the regulation of indoor air quality at relevant unit level**.
- In existing buildings, the installation of such devices shall be required, where technically and economically feasible, when a building undergoes a major renovation.

This is perhaps the most important new requirement that will have direct implications to construction of future new buildings. Demand controlled ventilation systems with sensors (**Figure 3**) have been in the markets for a long time, but the use has been limited because of quality issues in installation and commissioning. It is not evident that these systems work as designed in operation, therefore there is clear need for the industry to develop a robust and reliable demand-controlled systems which are compatible for



Figure 3. In non-residential new buildings it is expected that demand-controlled ventilation and air conditioning systems contribute to zero emission building energy performance. Temperature and CO_2 based control would be essential for effective ventilation and room conditioning units' operation.

continuous commissioning and do not require too much maintenance. These considerations make it reasonable that the requirement in EPBD is limited to non-residential buildings. 'At relevant unit level' guides to use demand-controlled systems and measure CO_2 and temperature in continuously occupied spaces, such as classrooms, offices, meeting rooms, restaurants, kitchens, shops, gyms, etc.

The wording in EPBD on measuring and control devices for the regulation of indoor air quality in non-residential buildings may raise a question which parameters are actually to be measured. There is no guidance in Art 11, but Art 11a stated that requirements shall be set according to measurable indicators based on to those of the Level(s) framework. Level(s) is European framework for sustainable buildings [3], where IAQ and thermal comfort indicators 4.1 [4] and 4.2 [5] refer to EN 16798-1:2019. If Art 11a is deleted, Level (s) remains a valid reference. As direct monitoring of all indoor air pollutants is impossible in practice, EN 16798-1:2019 supports of using CO_2 concentration that can be continuously monitored as a proxy for ventilation that is the most important factor for good IAQ. There are also low-cost sensors for PM2.5 monitoring to ensure that outdoor air for ventilation is clean or adequately filtered and there are no significant indoor sources of particulate matter. Thus, to control IAQ, ventilation and filtration requirements should exist, and the use of low polluting building materials should be promoted to limit indoor sources. Ventilation and thermal comfort requirements are specified in EN 16798-1:2019 and fine particle filters of ePM1 or ePM2.5 may be recommended as specified in EN 16798-3:2017. While IAQ guidance for non-residential buildings is quite detailed in these standards, **operation of ventilation systems for optimal indoor air quality** is not covered in existing standards. Thus, to implement EPBD requirement on regulation of IAQ will need some guidance development how to select relevant CO_2 setpoints for common space categories, as these depend on occupant density and indoor climate category. Some guidance is provided in REHVA document [1] and this topic is also dealt in the ongoing revision of EN 16798-1:2019.

Ventilation and IAQ in residential buildings

Ventilation requirements for residential buildings is another topic that is not covered in detailed fashion in existing standards because of diverse practices and requirements in MS. EN 16798-1:2019 specifies just 0.42 ℓ/s m² (0.6 ach) total ventilation of a whole residence and 7 ℓ/s per person supply air flow requirements which is not enough to design adequate supply or intake air to bedrooms and living rooms as well as extract air flow rates to wet rooms and kitchens. These general requirements are developed further in REHVA GB 25 [6], offering one possible example on a table to be used in the regulation, **Table 1**.

Table 1. *Example of possible ventilation requirements for residential buildings.*

	Supply airflow rate, ℓ/s	Extract airflow rate, ℓ/s
Living rooms[1] >15 m²	8+0.27 ℓ/(s·m²)	
Bedrooms >15 m²	14	
Living rooms and bedrooms 11-15 m²	12	
Bedrooms <11 m², 3rd and successive bedrooms in large apartments	8	
WC		10
Bathroom		15
Bathroom in one room apartment		10
Utility room		8
Wardrobe and storage room		6
Kitchen[2]		8
Kitchen[2], one room apartment		6
Kitchen, cooker hood in operation		25
Average airflow rate of a whole residence ℓ/(s m²)	0.42	
Staircase of an apartment building, ACH	0.5	

[1] Transfer air from bedrooms can be used as a part of supply air, but 12 ℓ/s is minimum outdoor air rate
[2] Airflow rate in the kitchen when cooker hood is not in operation

Conclusions

- EPBD revision maintains in Art 5 an important principle of taking into account general indoor climate conditions, in order **to avoid possible negative effects such as inadequate ventilation**, when setting minimum energy performance requirements.
- Art 11 stresses that zero emission energy performance needs smart controls by establishing new ambitious requirement for installation of **measuring and control devices for the regulation of indoor air quality at relevant unit level in non-residential ZEB.**
- Art 7 and 8 require to address the issue of **optimal indoor environmental quality** in new buildings and major renovation indicating that national IEQ requirements are to be established if not yet present.
- Art 8 and 9 (MEPS) **DO NOT address IEQ issue in MEPS renovation** – in national implementation it is recommended to extended IEQ requirements from major renovation to MEPS renovation too.
- IEQ is defined in EPBD as **temperature, humidity, ventilation rate and presence of contaminants**, with reference to Levels(s) framework and EN 16798-1:2019.
- When the final wording of EPBD is available, REHVA will update the guidance document on how to set national IAQ/ventilation and thermal comfort requirements. ■

References

[1] REHVA 2023 Proposed modifications and guidelines for implementation of Article 11a 'Indoor environmental quality' in EPBD draft, June 2023. https://www.rehva.eu/fileadmin/user_upload/2023/EPBD_IEQ_Guidance.pdf

[2] Zangheri, P. et Al., Progress of the Member States in implementing the Energy Performance of Building Directive, Publications Office of the European Union, Luxembourg, 2021, EUR 30469 EN, ISBN 978-92-76-25200-9, doi:10.2760/914310, JRC122347 .

[3] Level(s), European framework for sustainable buildings. https://environment.ec.europa.eu/topics/circular-economy/levels_en

[4] Dodd N., Donatello S. & Cordella.M., 2021. Level(s) indicator 4.1: Indoor air quality user manual: introductory briefing, instructions and guidance (Publication version 1.1)

[5] Dodd N., Donatello S., & Cordella M., 2021. Level(s) indicator 4.2: Time outside of thermal comfort range user manual: introductory briefing, instructions and guidance (Publication version 1.1)

[6] REHVA Guidebook No 25, Residential Heat Recovery Ventilation. https://www.rehva.eu/eshop/detail/residential-heat-recovery-ventilation

READ THE NEWEST REHVA REPORT



Replacement of Gas Boilers with Heat Pumps, District Heating, and Hybrid Solutions: Report on the Shift Away from Natural Gas in Buildings

10€
PDF only

rehva.eu
info@rehva.eu

REHVA
Federation of European Heating, Ventilation and Air Conditioning Associations

isover
SAINT-GOBAIN

DESIGNING SUSTAINABLE HVAC SYSTEMS WITH CLIMAVER®

The innovative pre-insulated duct system that is duct and insulation in one!



GO GREENER
up to 42 points for green building rating

REDUCE ENERGY BILLS
best-in-class airtightness (better than class D)

PROVIDE ACOUSTIC COMFORT
up to 90% sound absorption

ENSURE FIRE SAFETY
up to Euroclass A1

www.isover-technical-insulation.com

SAINT-GOBAIN

The SRI Observatory: the site to find everything on building smartness policy and research



PABLO CARNERO MELERO
Technical and EU project Officer, REHVA*
pcm@rehva.eu

The policy and research context surrounding the Smart Readiness Indicator (SRI) is dynamic and geographically diverse. The SRI Observatory is the site to stay up to date on the latest Smart Readiness Indicator (SRI) policy developments at the EU level, to track and compare national implementation status, and to find out about the most relevant research developments in the field of building smartness. It is a result of the Smart Square EU-funded project and was recently launched during REHVA Brussels Summit in November 2023.

Policy context of the SRI

The 2018 amendment of Directive 2010/31/EU on the energy performance of buildings (EPBD) [1] outlined the impact of the energy system digitalisation in the energy landscape, from integration of renewables to smart grids and smart-ready buildings. As a result, smart-ready systems and digital solutions in the built environment are to be promoted through the provision of targeted incentives. Consequently, the introduction of the Smart Readiness Indicator (SRI) as a common European scheme for rating the smart readiness of buildings.

The power to adopt acts to supplement the directive and to establish the definition of the SRI and the calculation methodology was delegated to the European Commission. The powers regarding the modalities for its implementation were also conferred to the Commission with a view to ensuring uniform conditions for implementation of Directive 2010/31/EU. As a result, the Commission Delegated Regulation 2020/2155 [2] and the Commission Implementing Regulation (EU) 2020/2156 [3] were published.

* **Pablo Carnero Melero** has been working as a consultant for REHVA since February 2023, balancing the role of Technical and EU Project Officer with the secretariat of the Technical Research Committee. His research and practice have traditionally been linked to energy performance and decarbonisation of existing buildings, integrating more recently the topic building smartness. Beyond his technical background, he is passionate about the social and economic aspect of energy access and use. He has collaborated in the past with local initiatives in the field of energy poverty and has been involved in educational programs for the upskilling of architects in dwelling energy renovation. He is based in València (Spain). (LinkedIn: https://www.linkedin.com/in/pcarnerom/)

In mid-2021, the SRI Support Team was set up by VITO, WSEE, R2M Solution, and LIST under a service contract of two years. The primary objective was to offer technical assistance to the Commission services and EU countries throughout the testing and implementation phases of the SRI. This involves aiding the Commission in establishing and maintaining a permanent setup to support the widespread adoption of the SRI across the EU, collaborating closely with both EU countries and relevant stakeholders. Additionally, the role includes providing technical support to the Commission services in crafting guidance for SRI implementation, encompassing design considerations, and exploring additional technical support at the EU level to enhance the effective implementation of the SRI. Furthermore, assistance is extended to the Commission services in promoting the SRI. In 2022, some countries launched a voluntary test phase of the SRI, while four EU-funded projects were funded under the LIFE-2021-CET-SMARTREADY topic. They aimed at creating the conditions for a global improvement of smart readiness of European buildings.

SRI Observatory

As a result of Smart Square [4], the SRI Observatory has been produced. It is the site to stay up to date on the latest Smart Readiness Indicator (SRI) policy developments at the EU level, to track and compare national implementation status, and to find out about the most relevant research developments in the field of building smartness.

It is the first freely accessible online resource to gather all relevant information on the SRI policy scenario together with the latest research findings on the topic of smart buildings. With a user-friendly structure, the SRI Observatory digests the provisions laid by the EPBD and related regulations and provides easy to understand snapshots of the most relevant aspects. It also brings forward interactive maps to track the progress of the transposition of the common Union scheme in the different countries. Currently, the national information is centred on the non-committal SRI test phases, spanning an overall assessment, coordination details, timeline, and description of the pursued activities. However, as the implementation makes way through the testing, the site will adapt accordingly. The structure of the SRI Observatory enables to compare the development of the SRI scheme testing cross-country. In addition, the site is a repository of the body of research on building smartness. It centralises the information on the diverse EU-funded initiatives related to the promotion and market up-take of the SRI, while mapping the most relevant scientific peer-reviewed publications on building smartness. At the SRI Observatory, the 2023 outlook on the SRI can be downloaded free of charge. Additional annual reports on the SRI will be made available in the coming years. Also, as a result of the Smart Square project, other resources have been produced to increase the knowledge on the SRI; markedly, the SRI FAQ and the SRI Virtual Training Centre. They can be freely accessed through the SRI Observatory.

The SRI Observatory was launched during REHVA Brussels Summit in November 2023 and will be under Smart Square project framework until 2025. Afterwards, it will be further exploited by REHVA, ensuring the sustainability of this resource that so much has to offer to public authorities and other stakeholders from across the smart building value chain. ■

References

[1] The European Parliament and The Council of the European Union, Directive (EU) 2018/844 of the European Parliament and of the Council of 30 May 2018 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency, vol. 276 LNCS, no. May 2010. Strasbourg: The European Parliament and the Council of the European Union, 2018, pp. 75–91. Accessed: Jun. 16, 2022. [Online]. Available: http://data.europa.eu/eli/dir/2018/844/oj.

[2] European Commission, Commission Delegated Regulation (EU) 2020/2155 of 14 October 2020 supplementing Directive (EU) 2010/31/EU of the European Parliament and of the Council by establishing an optional common European Union scheme for rating the smart readiness of buildings. Brussels: European Commission, 2020, pp. 9–24.

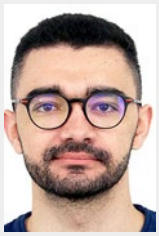
[3] European Commission, Commission Implementing Regulation (EU) 2020/2156 of 14 October 2020 detailing the technical modalities for the effective implementation of an optional common Union scheme for rating the smart readiness of buildings. Brussels: European Commission, 2020, pp. 25–29.

[4] Smart Square research project funded by the European Union, under the Grant Agreement № 101077241.

Field Instrumented Follow-up of a Supply Ventilation System in a Nursery







CHRISTIAN FELDMANN
Consultant
AICVF Member, REHVA Fellow
ch.feld@yahoo.com

LOUIS STEPHAN
Head of R & D Dept
VMI-VENTILAIRSEC
louis.stephan@vmi-technologies.com

ARNAUD BERCHOUCHI
Ventilation Systems Engineer
VMI-VENTILAIRSEC
arnaud.berchouchi@vmi-technologies.com

Supply ventilation system is a ventilation process which consists in introducing filtered outside air, possibly preheated, into a building. The air evacuation is ensured by passive air outlets (which can be identical to the air inlets used in the Exhaust ventilation installations, or even by simple vertical ducts with natural draft)

In France, since the 1980's, Supply ventilation systems were first used in the renovation of existing dwellings, then in new buildings. New fields of use, in particular in small tertiary buildings, are now opening up to this technology. The application to a nursery is analysed in this article.

Application of a supply ventilation system in a nursery

This process has been implemented in a collective day care centre (nursery) located in the southern Parisian suburbs and has been the subject of an instrumented follow-up of several months.

Two "activity rooms" for older children were equipped with this ventilation process.

One of these two rooms was instrumented to measure the concentration of CO_2, TVOC and solid particles PM2.5.

The air supply to the rooms is ensured by air vents connected with an supply ventilation unit which takes the fresh air from outside. The supply ventilation unit consists of a fan, filter and preheater. (**Figure 1**)

The airflow in the rooms served is controlled by an algorithm that adapts the fan speed to the set values of the CO_2 concentration.

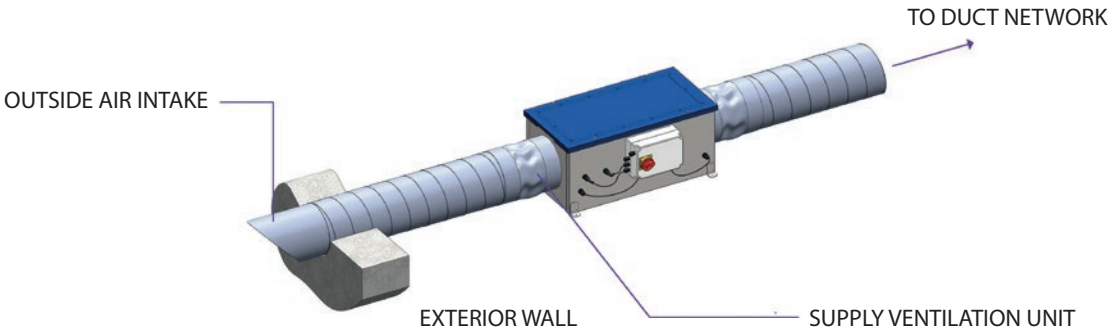


Figure 1. Supply ventilation unit and connections to outside air intake and air distribution network.

The supply ventilation unit is installed in an adjacent room. A network of ducts ensures the routing of air between the ventilation unit and the air vents located in the rooms.

An example of the installation of a supply ventilation system in a nursery is illustrated in **Figure 2**.

On-field experimentation of the process

The studied room, one of the activity rooms of the nursery, of a surface of 48 m², has a completely glazed frontage. It communicates directly with the outside by a double door. The glazed facade has in the upper part two small windows of a surface of 0,30 m² each.

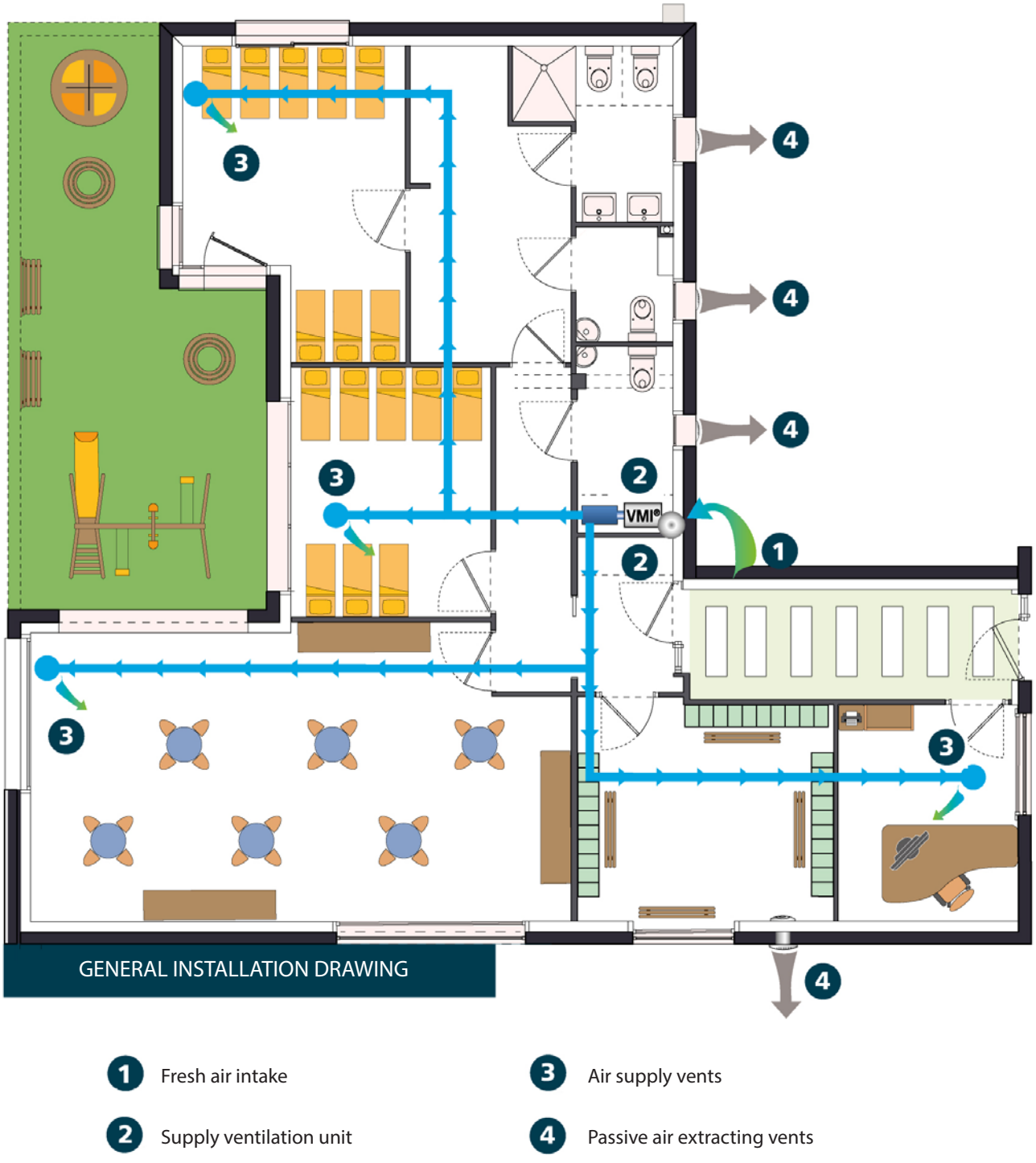


Figure 2. The fresh air taken from outside the building and after passing through the ventilation supply unit is routed through the distribution network to the various premises of the nursery. Air is evacuated outside by passive exhaust vents mounted on the windows frame.

Two passive air extracting vents are located in the frame of each of the windows.

The mechanical airflow to the rooms is controlled by an algorithm that adapts the rotation speed of the fan according to the setpoint values defined for the CO_2 concentration.

The supply ventilation unit is installed in an adjoining room. A network of ducts ensures the routing of the air between the unit and the supply vents arranged in the rooms. Passive air extracting vents ensure the evacuation of air.

Measured quantities and measuring devices

The indoor air quality is evaluated by measuring the following characteristic quantities:

- Temperature (°C) by: E4000NG Nanosense sensor (accuracy ± 0.3°C)
- Relative humidity (%) by: E4000NG Nanosense (accuracy ± 2%).
- CO_2 concentration by: E4000NG Nanosense sensor - NDIR technology (accuracy ± 50ppm).
- Concentration of total VOC by: E4000NG sensor (SnO2 (tin dioxide) semiconductor metal oxide sorption technology, accuracy ± 15%).
- Concentration of fine particles (PM10, PM2.5, PM1) by: P4000NG sensor (Laser diffraction process), accuracy ± 15%.

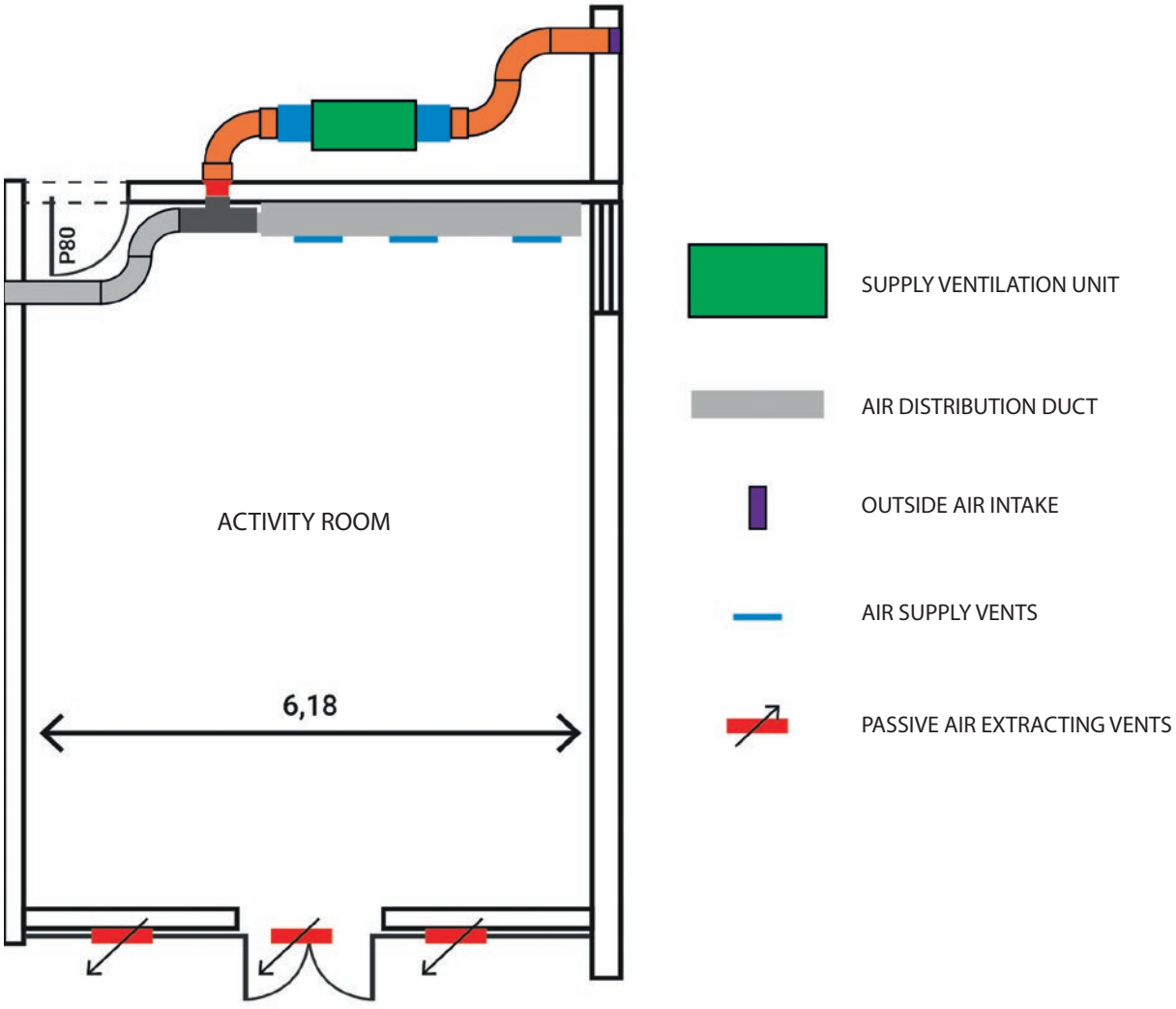


Figure 3. Ventilation system diagram.

The concentration of CO_2, Total VOC and PM is measured and recorded by the sensors. On each sensor an interface allows the recovery of recorded data.

Methodological approach

It was not possible, at the risk of being opposed by the management of the establishment or the lack of cooperation of the staff, to impose methodological constraints that were too strong for this measurement campaign.

The approach finally retained allowing a realistic evaluation of the performances of the system, taking in account the required limited disturbing the current practices of the use of the room is as follows:

- The period of measurements includes two weeks of operation with the supply ventilation system followed by two weeks of operation of air renewal by simple opening of the doors and windows.
- The manoeuvres of opening and closing of the external door, which correspond, partly, to the entries and exits of the children, and of the windows are left with the free choice of the nursery staff. The latter are kept informed of the operating status of the ventilation (days "with" and days "without" operation of the supply ventilation system) but without any particular instruction concerning the opening of the windows being imposed on them.

The data analysed correspond to the periods of occupation of this room during two consecutive calendar weeks, excluding weekends (the nursery being closed), from Monday to Friday and from 8 am to 7 pm.

Results

The following compares the concentrations of pollutants measured in the room during the periods,

- of operation of the supply ventilation system
- of air renewal by simple opening of the doors and windows

Evolution of the CO_2 concentration in the air of the room

It is noted that, during operation of supply ventilation system, CO_2 concentration does not exceed 1 100 ppm. This reaches 1 700 ppm during the operating phase by simply opening the doors and windows.

Evolution of the concentration of Total Volatile Organic Compounds (TVOC)

We note strong amplitudes of the TVOC concentration for the two operating modes.

The average TVOC concentration calculated for the two operating modes is:

- during operation of Supply Ventilation System: 1845.29 µg/m³ ± 291
- during air change by simple opening doors and windows: 3638 µg/m³ ± 503

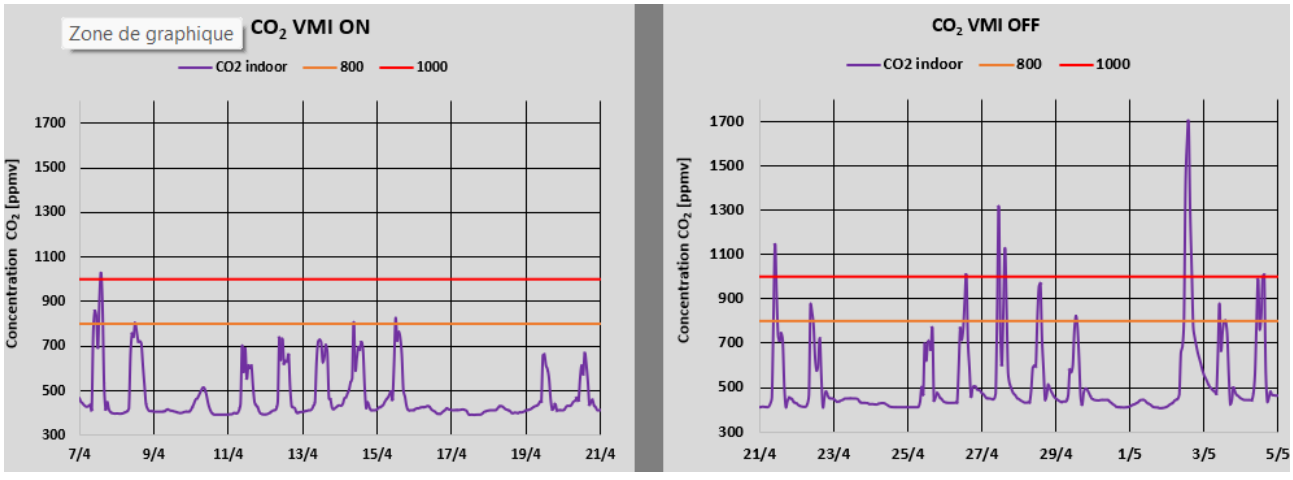


Figure 4. The curve on the left corresponds to the case where the Supply Ventilation System is in operation, the one on the right to that where the renewal of air is ensured by the opening of the doors and windows.

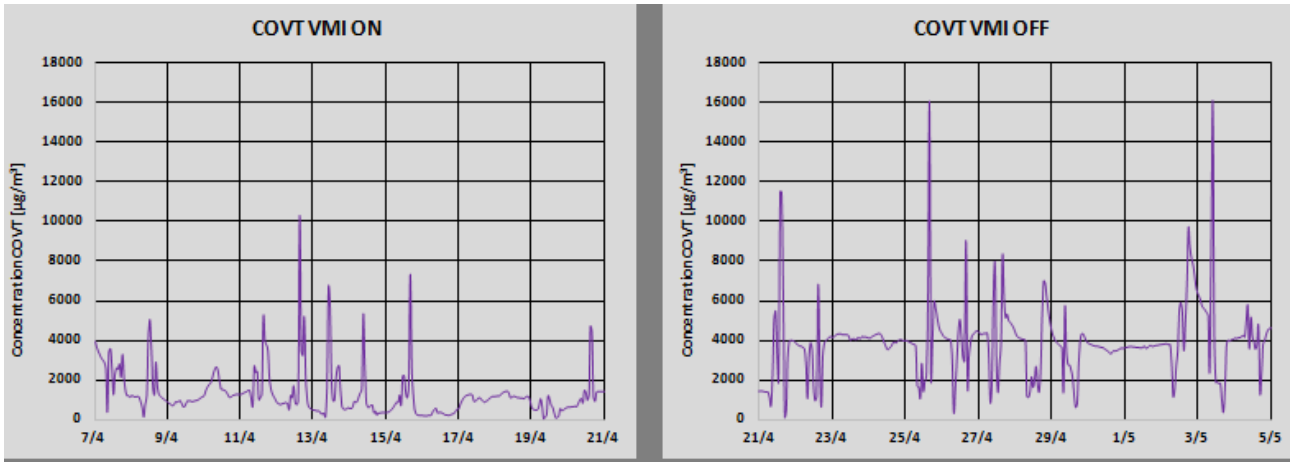


Figure 5. Evolution of the TVOC concentration - The curve on the left corresponds to the case where the Supply Ventilation System is in operation, the one on the right to that where the renewal of air is ensured by the opening of the doors and windows.

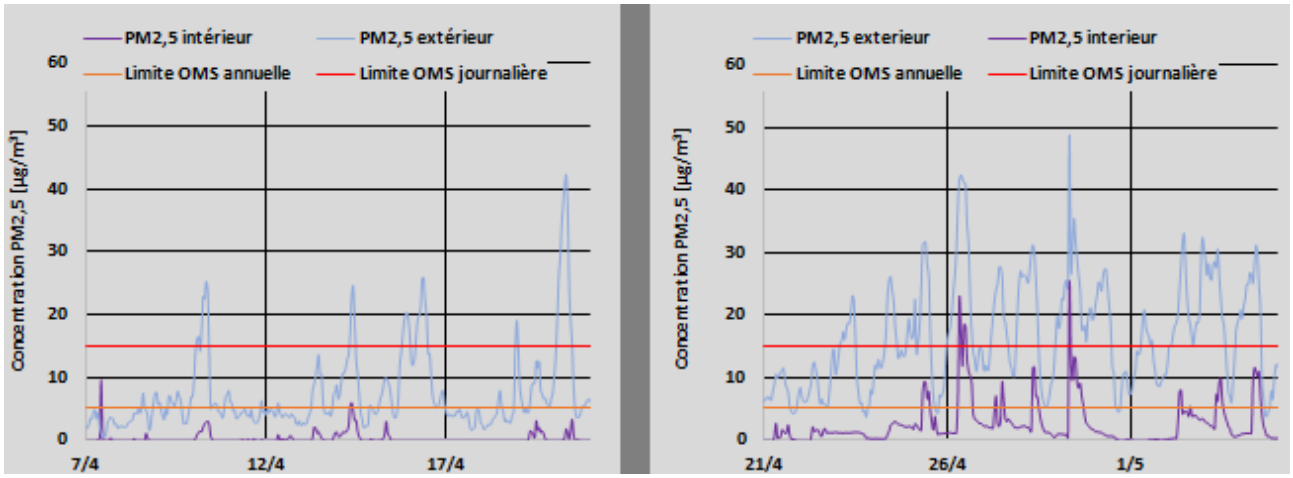


Figure 6. Comparative changes in the concentration of Particles Matter (PM2.5) between outdoor and indoor air, with Supply Ventilation System in operation (left) and by simply opening doors and window (right).

Evolution of Particulate Matter (PM2,5)

It should be noted that, during the supply ventilation operating sequence, the PM2.5 concentration in the indoor air of the room does not exceed 2 µg/m³ while the air renewal is higher. We note the very clear damping effect of the indoor concentration in response to the outdoor concentration peak, linked to the presence of a filter in the supply unit.

The dynamics observed when air renewal is ensured only by the simple opening of doors and windows is very different, in the latter case the internal concentration frequently exceeds the thresholds defined by the World Health Organization.

Conclusion

The controlled introduction by mechanical supply of fresh air directly into the premises makes it possible to maintain the concentrations of three characteristic pollutants at levels well below the threshold values prescribed by the WHO.

Such a device allows, in addition to the adaptation of the flow, an effective filtration of the outside air introduced into the premises. It also authorizes, when the configuration of the premises lends itself to it, to install the air intake in the zone where the outside air is the least locally polluted (in a courtyard or an interior garden for example, rather than on the facade facing the street). ■

systemair

geniox

Higher Performance Same Unit Size #HygienicByDesign

Elevate the performance of your HVAC system without compromising unit size. Geniox AHUs equipped with ECO heat exchangers represent a paradigm shift in HVAC technology.

They deliver improved efficiency and reduced pressure drop while maintaining a sophisticated, compact footprint.



EUROVENT CERTIFIED PERFORMANCE
AHU N°20.12.005
Range: Geniox-2 H
www.eurovent-certification.com
HYGIENIC

Our Geniox series also seamlessly aligns with our #HygienicByDesign initiative. Each unit can, for example, be configured with the forward-thinking Eurovent Hygienic Air Handling Unit (HAHU) certification, which makes hygiene the norm through an easy-to-understand 1-3 star rating system.

systemair.com/genioxECO

Scan this code to see how this will benefit your projects!

EPDs for ventilation components



AMUND ONA GJUL
Market manager
Systemair
amund.ona.gjul@systemair.com

Amund Ona Gjul, in his capacity as Convenor of the CEN/TC 156 WG 26, outlines the scope and vision when creating complimentary Product Category Rules (c-PCRs) for ventilation components. He dives deeper into why a common European framework is urgently needed, and what is at stake, for both the industry and the environment.

Keywords: EPD, c-PCR, Product sustainability, CEN/TC 156 WG26, energy efficiency, indoor environment

Backdrop

Demands for Environmental Product Declarations (EPDs) are on the rise. Originating from construction projects in Europe and elsewhere, they trickle down the construction works supply chain affecting both producers of ventilation components and their suppliers. As a result, companies, national and European industry associations are now playing catch-up to a development which has been years in the making.

Emerging initiatives have brought forth a range of perspectives and opinions on a relatively unfamiliar topic for many, sometimes resulting in extensive and unproductive discussions on already established fundamental principles. Amidst an influx of new three-lettered abbreviations, not recognising that the context is established, and the basic framework is already in place, we find ourselves debating the destination and the means of transportation. Meanwhile, the EPD train is already in motion.

One aspect is seemingly agreed upon: EPDs can be expensive and time consuming to make. The need to avoid diverging national requirements, resulting in several sets of EPDs per individual product, with differing declared environmental impact in each one, is perhaps also a non-controversial standpoint. This is also the main motivation behind the CEN/TC 156 WG 26 initiative: To create a European standard for the complementary Product Category Rules for ventilation component, avoiding the undesired scenario described above.

In this article, I will try to explain the scope and overarching goals behind the CEN/TC 156 WG 26 efforts, that I hope most professionals can support. The industry needs to get behind the efforts in CEN, creating a European standard for how EPDs for ventilation components should be made.

Mandate and Scope of WG 26

The mandate for the new Working Group in CEN is to create a European standard for the complementary Product Category Rules (c-PCR) for ventilation components. The standard will prescribe how EPDs within this product category should be made, and perhaps more important, how they should be used.

With regards to scope, the standard will apply to all products covered by CEN product standards within ventilation, including air handling units, fans, air distribution products, dampers, ducts and duct fittings, fire dampers, sound attenuators and more. Air filters

will be left out of the scope as these are addressed in CEN/TC 195.

The industry needed this standard two years ago. Time is therefore of the essence. Facilitating and ensuring an effective process towards a published standard is an un-written part of the mandate of the new Working Group.

Overarching Goals

A standard which is not being used has little or no value to anyone. We are tasked with putting together a consensus-based set of rules suited for Europe-wide use, that at least the large majority can stand behind and support.

There will be many differing points of view and interesting discussions in this process. My own outlook has certainly matured since I first was presented these topics a few years ago. To facilitate productive discussions in the working group, and to help us reach a consensus, we will rely on four overarching goals in our work. When creating the standard defining how EPDs for ventilation components should be made and used, we will aim to achieve the following:



These goals are hopefully uncontroversial for everyone. During our work in CEN, viewpoints, ideas and suggestions can be evaluated against these goals. Not based on the good intentions behind any given suggestion, but rather on what the actual real-life consequences are likely to be. For the users, the industry, and for the environment.

One might think that these goals represent diverging requirements. However, having worked with these issues for a few years, my opinion is that these goals are complimentary to one another.

1. Rules that deliver on what is demanded

By now there should be no doubt about the general context and basic framework regarding EPDs. "complementary" refers to EN 15804 "Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products". The context for EPDs is business-to-business communication and documentation of environmental performance of construction products, and the basic framework is defined in EN 15804. With regards to EPDs, the ventilation industry is a small part of a much larger construction products industry.

EPDs are primarily used by environmental consultants performing Life Cycle Assessments (LCAs) of buildings. Such assessments are increasingly becoming mandatory in European markets, through local building codes. EPDs also give credits in BREEAM and other voluntary certification programs, driving requests and in some instances demands for EPDs.

The definition of an EN 15804 EPD can be found in the standard, and is well worth a citation:

"An EPD communicates **verifiable, accurate, non-misleading** environmental information for products and their applications, thereby supporting scientifically based, fair choices and stimulating the potential for market-driven continuous environmental improvement."

There are several ways of making EPDs. But when developing the general rules for our product category, "accurate" and "non-misleading" form the guiding principles. The information provided in the EPDs must be accurate and non-misleading.

Understanding what information is needed in the construction projects, is also crucial. EPDs are a good source for some types of environmental information. However, some project-specific aspects cannot be obtained from a general EPD. In fact, any scenario-based environmental impact declared in a EPD must be omitted from the building LCA and substituted with building specific values. Any sensible evaluation of a product should also be done based on its contribution to the environmental performance of the specific building in question. This is quite clearly stated in EN 15804, which recognises that the environmental performance of some products is application dependant – more so for some product categories than others.

Reaching the first goal requires us to understand and recognise what EPDs are, what they are used for and why they are needed. We must take ownership of the environmental data known to be generally valid for all projects. Project specific pieces of the LCA puzzle, beyond what is demanded in EN 15804, is not warranted nor asked for in the projects.

2. Rules that promote better sustainability

Appearances can be deceiving, and not every environmental policy ends up promoting better sustainability. In fact, when implementing EPDs for ventilation products, it is very easy to end up the exact opposite of the original good intention. The crucial first step is recognizing the difference between HVAC equipment and ordinary construction materials.

A piece of plywood does not consume electricity - many of our products do. And those that do not, are all important building blocks of larger installations, indirectly determining the energy efficiency of the completed system. A bucket of paint or a steel girder does not recover thermal energy – many of our products do.

And as a REHVA Journal reader, you are aware that these crucial factors vary from project to project, making the energy use and environmental impact highly application dependent. This also means that the energy optimal solution for one application is not automatically the best for another application.

In fact, quite the opposite is true, evident by the unparalleled diversity among products within the ventilation industry. This is also the reason why air handling units from one single supplier can be tailor-made, with countless variants of essentially the same product.

When it comes to making rules that actually end up promoting better sustainability, ensuring project optimal product selection will be key. The biggest pitfall in this entire endeavour is trying to make the EPDs into something that they can never be for our type of "construction products": a complete and universally valid environmental answer sheet for all projects throughout Europe.

This type of oversimplification will inadvertently promote sub-optimal product selection, excess energy use and worsened overall sustainability on a building level. Hopefully, no one is interested in such an undesirable outcome.

We must recognise the potential importance of EPDs, and the role they might play in the projects going forward. The standard should not only contain the rules for how the EPDs should be made. It should also contain crucial information about how EPDs for ventilation components should be used (and not used). Information that points EPD users in the right direction for project specific calculations (product selection tools) should perhaps be mandatory in EPDs for ventilation components.

Despite manufacturers' efforts to reduce products down to the thirteen different environmental indicators required in an EPD, EN 15804 states that the "comparison of environmental aspects and impacts need to be undertaken in conjunction with the social and economic aspects and impacts related to the building". This statement has special relevance for HVAC equipment, which is critical for achieving a good indoor environment.

In addition to providing comfortable and healthy indoor conditions, and liveable buildings for people, good indoor environments have profound environmental consequences as well. It is directly affecting the number of people needed for a certain productive output, either enabling or limiting people's full potential. The problem is that these issues are not part of any metrics in use today.

Compared to modern dwellings, dirt floor caves with a fire pit and some animal hides have very low embedded emissions indeed. However, it makes no sense to talk about energy efficiency or product sustainability without first acknowledging the importance of, and setting requirements for, the indoor environment. We must try to make sure that EPDs for ventilation components do not push this issue in the wrong direction.

3. Rules that support digital workflows

The third overarching goal is creating a set of rules that enables and supports digital workflows. We do so for the benefit of the makers of EPDs, but also for the users of EPDs facing new demands.

EPDs for ordinary construction materials have been around for the last ten years or so, and the number is increasing exponentially year on year. They usually take the form of a PDF document, with the environmental performance (or impact) listed in a results table. With the shift towards digital platforms and digital data management, we should acknowledge that these PDFs already can be considered obsolete. We must try to look forward and plan for what will likely be required in a few short years.

For the main use of EPDs, performing LCAs for buildings, the embedded emissions of the building is the sum of all materials and components used in the construction. In light of Virtual Design and Construction (VDC) and Building Information Modelling (BIM), it is almost inevitable that machine readable EPDs will become the norm. For the industry to avoid costly, duplicated work and a complete revision of the standard in question, we must have the foresight to create a set of rules that enable digitally "manageable" EPDs in a BIM context.

For manufacturers an important question is how to serve the need for EPDs most effectively, without tying up valuable engineering recourses in time consuming production of PDF files. Technical personnel are needed elsewhere, first and foremost in product development making better, more efficient, and more sustainable products.

Linking ERP systems together with EPD generators is one solution already in use in other sectors, with automated generation of project specific EPDs for every order. If we would like the possibility to peruse similar solutions for ventilation products, the key will be to avoid unnecessary complexity that results in a cumbersome and impractical set of rules that do not accommodate digital, automated processes.

4. Enabling cost-efficient creation of EPDs

The industry must come to terms with two basic realities:

1. EPDs are expensive to make, and there is little or no willingness to pay a premium for this documentation.
2. EPDs will most likely become a matter of purchasing hygiene, something expected as part of the product delivery.

We do not want to create rules that complicate EPDs to the point that they disable small to medium sized companies in the industry, not able to employ dedicated personnel or hire expensive consultants. It is also very important for multinational companies with a large product portfolio. Any manufacturer should ask the following questions:

- How many EPDs will my company make in the next few years?
- How many new people will we hire for these tasks?
- How many consultants will we be hiring to assist us?

Make no mistake. In the beginning, the full burden will be carried by the manufactures. In the end, the cost of the EPDs will be borne by the building owners, who will have a little less money to invest in better technical systems, indoor environments, and energy efficiency. Putting an unnecessary premium on products, due to unwarranted complexity of EPDs, is in no-one's interest.

In sustainability terms, cost-efficiency is also important. With a general validity of 5 years, costly creation and updating of EPDs might impede the all-important incremental product development that is a hallmark of the ventilation industry. Small changes for increased efficiency that in sum make a big impact (for the customers' wallets and the environment) are put on hold until the valid EPD expires. Using engineering resources on EPDs instead of product development is also most likely a disservice to the environment in the long run.

Creating rules that enables the cost-efficient creation and updating of EPDs is therefore the final overarching goal. In conjunction with the other goals, the biggest pitfall will be a self-imposed and costly set of rules, with un-wanted and un-warranted complexity that no-one is asking for.

Conclusion

It is my hope that these goals form a solid foundation to start from. And in my view, they are mutually inclusive: the disregard for one will affect the others negatively. This insight is cause for both hope and concern on my part, and my reason for accepting the nomination as Convenor.

The upside is the true opportunity we have of making a set of practical, cost-efficient, and future-proof rules that serves all needs and promote better sustainability. The downside is the very real possibility of a self-imposed bureaucratic and expensive burden, potentially unparalleled in its negative consequences for both the industry and the environment.

To ensure a desirable outcome, the key will be to limit the scope to what is actually asked for and to adhere fully to the basic premise and framework already in place.

In other words – Keep it simple.

The first meeting of the CEN/TC 156 WG 26 takes place in January 2024 in Oslo, Norway. ■

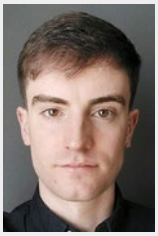
Circular economy in the construction industry – BUS-GoCircular project



PAVLA DVOŘÁKOVÁ
Assistant professor at the Department of Indoor Environmental and Building Services Engineering at the Faculty of Civil Engineering at Czech Technical University in Prague, Czechia
pavla.dvorakova@fsv.cvut.cz
(corresponding author)



KAREL KABELE
Full-time professor at the Department of Indoor Environmental and Building Services Engineering at the Faculty of Civil Engineering at Czech Technical University in Prague, Czechia
kabele@fsv.cvut.cz



MARTIN BREEN
Researcher with the Technological University of the Shannon, Ireland
Martin.Breen@tus.ie



JAN CROMWIJK
Educational technologist in ISSO - the Dutch Knowledge Centre for the building and building services sector. Netherlands
j.cromwijk@isso.nl

The construction industry, notorious for waste and emissions, is shifting gears towards a circular economy. Even the new EPBD recast proposal emphasises the circular economy as a necessary approach. Explore BUS-GoCircular project, redefining construction practices. Discover how this initiative, driven by a groundbreaking qualification framework, revolutionizes skills and resources to reshape the industry's sustainable future.

Keywords: Circular economy, Construction industry, Sustainability, Qualification framework, EPBD recast proposal, Circular construction skills, Training programs

INTRODUCTION

The circular economy is an approach that is an essential part of sustainable development. It is obvious that the current linear approach (take-make-waste) is in direct conflict with sustainability [1]. In the current economy, we take materials from the earth, make products from them, and eventually throw them away as waste - the process is linear. In a circular economy, on the other hand, waste ceases to be generated [2]. The circular economy aims to maintain the value of products, materials and resources for as long as possible in the economic cycle and return them to the production cycle at the end of their life, while minimising waste generation [3].

The circular economy has the potential to tackle climate change and other global issues such as biodiversity loss, waste and pollution by decoupling economic activity from the consumption of scarce resources.

The circular economy is based on three principles:

- Eliminate waste and pollution
- To ensure the circulation of products and materials (with their highest value)
- To regenerate nature

By supporting the transition to renewable energy and materials, the circular economy is a resilient system that benefits business, people and the environment [2].

CIRCULAR ECONOMY IN THE CONSTRUCTION INDUSTRY

The construction sector consumes almost half of the world's extracted materials annually and contributes significantly to greenhouse gas emissions.

During their lifetime of operation, buildings are responsible for 40% of EU final energy consumption, and 36% of greenhouse gas emissions. The embodied emissions from the rest of the building life cycle are estimated to contribute at least a further 10% [4]. More than 50% of all extracted materials [5] are attributed to buildings, while construction is responsible [6] for around 2.3 billion tonnes of waste generated per year in the EU, or 36% of the total [7].

The way we design, build, and ultimately demolish is rooted in a linear "take-make-waste" economy. By applying circular economy principles to the design of buildings, infrastructure and other elements, we can reduce greenhouse gas emissions while creating urban areas that are more liveable, productive and comfortable. The circular economy has the potential to reduce global CO_2 emissions from building materials by reducing demand for steel, aluminium, cement and plastic. It could also make the sector more resilient to supply shortages and fluctuations in raw material prices.

By using new technologies and innovative business models, we can increase the value of our buildings if we rethink the way we design them. This will keep resources and building materials economical and prevent them from becoming waste.

Policy makers at all levels of government, investors and construction clients (developers, infrastructure operators and building owners) are key players in the transition of the construction sector to a circular economy. Policymakers can use policy levers such as public procurement to stimulate demand for circular solutions and facilitate the emergence of public-private partnerships. Investors can engage in public-private partnerships to develop circular projects, encouraging research into new techniques that eliminate structural waste and preserve or enhance value. Clients in the building industry can support public-private partnerships to develop circular projects and develop a fact base demonstrating the value of the circular economy in the built environment [8].

The circular economy is one of the recognised principles for ensuring a sustainable future and the question is how to bring it into the construction sector in the most effective way. A problem that may slow down or limit the successful application of this principle is the lack of a skilled workforce across all levels and professions in this sector. This issue is addressed in the European H2020 project BUS-GoCircular. The aim of the project was to map the situation in the European construction industry in terms of circular skills, to develop a task-based qualification framework and to produce learning materials that would be freely available to the general public.

CIRCULAR CONSTRUCTION SKILLS QUALIFICATION FRAMEWORK

Task-based qualification framework of circular construction skills is built on the idea of key elements of circular economy that defines most of the concepts associated with the circular economy.

Key elements of circular economy

According to [9], 8 key elements need to be addressed for a successful application of the circular economy. The following three are the most basic and supporting elements:

I. Prioritizing renewable resources: striving to ensure the efficient use of renewable, reusable and non-toxic sources of materials and energy.
II. Preserving and extending what is already produced: While resources are in use, they are maintained, repaired and upgraded to maximise their lifetime and, where appropriate, give them a second life through take-back strategies.
III. Resource recovery: Using waste streams as a source of secondary raw materials and for re-use and recycling.

In addition to the three basic elements, five supporting elements can be defined:

i. Design for the future: the design needs to take a system perspective, use the right materials, design for durability and design for long-term future use.
ii. Collaboration to create shared value: Collaboration across the supply chain, internally with-in organisations and with the public sector to increase transparency and create shared value.
iii. Rethinking the business model: Consider opportunities to create more value and align incen-tives that build on the interaction between products and services.
iv. Incorporate digital technologies: Enable to monitor and optimise resource use and strengthen links between supply chain actors through

digital, online platforms and technologies that provide information.

v. Strengthening and developing knowledge: Developing research, structuring knowledge, fos-tering innovation networks and disseminating results fairly are essential.

The supporting elements support the application of circular economy by removing some of the barriers to the basic elements - for example, the use of waste as a resource is difficult to implement if products have not been designed with possible recycling in mind - so design for the future is a supporting element. Product life extension can be enabled through new business models such as rental and resale [9].

Built environment value chain

Task-based qualification framework also takes into account that in the built environment value chain where there are different roles within the different stages of the building. Based on [11] following stages are considered:

Table 1. *Example of key core element, its applications to circular construction and affected professions in different stages according to [10].*

Core key element	Strategy group	Approach to circular construction
Prioritise regenerative resources	Regenerative water	Use grey water for certain applications (e.g. washing)
		Use Plant-Based Biofilters to Purify Household Wastewater
		Sustainable water technology
		Collect and reuse water in humid interior areas, e.g. cellars
		Cascading of water

Plan	Procure	Construct	Operate	EoSL
architect, designer, plumber, electrical installer and technician	procurement officer, project developer	plumber, electrical installer and technician, roofer, gardener (roof and façade), interior planter, arboriculturalist horticulturist	building management, plumber, gardener (roof and façade), interior planter, arboriculturalist horticulturist	demolition/ deconstruction labourer, site analyst, deconstruction auditor, urban miner

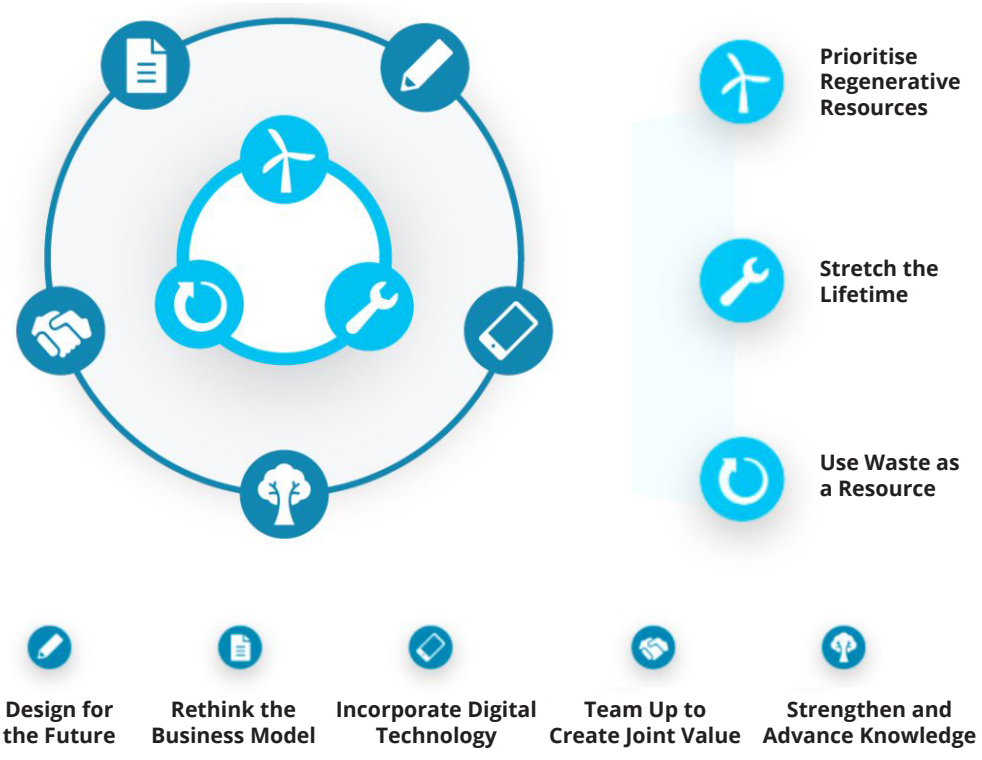


Figure 1. The key elements of the circular economy. [10]

1. Plan: design and commission (new and existing buildings);
2. Procure / source: materials, products and services (new and existing buildings);
3. Construct: build and fit-out (new buildings);
4. Operate: maintain, renovate and manage (existing buildings);
5. End of service life (EoSL): Deconstruct, dismantle, repurpose, sort and process
6. Governance: ambition setting through policy and standards, and compliance

The sixth point doesn't represent stage, but greatly influences attitudes to building projects.

BUS-GoCircular Qualification framework

The qualification framework for the application of circular economy principles consists of 9 main tasks and each task is further divided into 8-10 sub-tasks. For each sub-task, the profession that can implement the principle in its activities is also indicated (e.g. architect, civil engineer, plumber, roofer) by its abbreviation (e.g. AR, CE, P, R). For each sub-task, 'Units of Learning Outcomes' (ULOs) are further defined, where each unit is described by competence, skills and knowledge. Information on which professionals are needed for each subtask is added. By linking the sub-tasks to the corresponding professions, it can be decided which learning objectives the members of the profession should have and therefore which learning outcomes should be obtained.

The Qualification Framework is one of the significant outputs of the project in its comprehensiveness and scope and is freely available on the project website. In addition to providing an orientation on the issues, it can help to define the necessary competences/knowledge for almost any area of the construction industry, and thus tell in which direction to focus further training of relevant professions.

#	Task	Subtask	ULO Nr.	Profession(s)
1	Prioritise regenerative and efficient use of resources		81	
1.1		Design with bio-based, non-toxic and/or non-critical materials	1, 2, 3, 4	AR, MS, ME, CE, EE, UP, AM, C
1.2		Replace energy sources with less impactful alternatives	8	AR, EE, EL, MS, PM
1.3		Apply suitable energy efficiency measures to the building design (taking into account building purpose and climate)	9	AR, EE, EL
1.4		Generate energy from renewable sources - e.g. solar, sustainable biomass	10	AR, EE, EL
1.5		Apply measures that replace freshwater with less impactful alternatives	6	P, Gd, R, El
1.6		Enact water efficiency measures	7, 15	P, Gd, R, El
1.7		Source bio-based, reusable, non-toxic and non-critical materials	1, 2, 3, 4, 5, 36	MS, PM
1.8		Source local and lightweight materials	74	MS, PM

Figure 2. Example of Task 1 and its subtasks, including corresponding ULO numbers and relevant professions from the Qualification Framework. [12]

ULO Nr.	Competence	Skills	Knowledge
1	Design with bio-based materials as an alternative for conventional construction materials	• Select bio-based materials for the construction project at hand • Consider the purpose of the building and the context of the entire building solution, as well as construction requirements • When biobased materials are not an option, select low impact materials • Integrate use of the Material Circularity Indicator (make sure it is not higher than X) • Ensure use of materials that have little to no volatile organic compound (VOC) emissions	• Types of bio-based materials in construction such as hemp, seaweed, cork, bamboo, sustainably sourced wood, agricultural residues • Advantages and disadvantages of biobased materials • Seven functional requirements of building walls • Alternative forms of concrete

Figure 3. Example of Unit of Learning Outcomes, consisting of competences, skills, and knowledge components from the Qualification Framework. [12]

Skills mapping

At the same time, the project mapped and analysed the current level of knowledge of circular economy principles among construction workers. To this end, an extensive questionnaire survey was carried out in seven European countries. The questionnaire was based on the areas of the qualification framework and looked at the level of knowledge the respondent feels he/she has in the area and also what the level of knowledge should be for the successful application of circular economy principles in his/her profession. The results of the survey were further discussed and corrected in each country with the help of external advisory boards composed of experts working in the construction sector. The survey shows that there are differences between countries and therefore there is a great potential for the development of training programmes for the whole construction sector within Europe.

OUTPUTS OF THE BUS-GOCIRCULAR PROJECT

Eleven learning modules for trainers

Based on the results of a survey of current and necessary skills and the structure of the qualification framework, the project developed a bank of freely available materials for the development of training programmes. In order to better navigate the available materials, 11 learning modules were created covering 52 skills and 38 occupations in the construction industry.

Training material for public procurers

Another training material aims to help public procurers and policymakers better understand how they can stimulate demand for circular construction skills through public procurement. It is in the form of a presentation and can be used as a self-study tool with links to other resources to learn more about the topic.

BUILD UP Skills Advisor app

Learning outcomes from the framework will also be added to the BUILD UP Skills Advisor app, to further increase skills recognition for professionals and craftsmen. The BUILD UP Skills Advisor app is a free tool for practitioners and craftsmen to look for opportunities for trainings in Europe and some specific EU countries. It also contains a community-managed content repository and can facilitate the use of micro-credentials for personal recognition and lifelong learning.

Training plans and training packages for SMEs

Other outputs of the project are training packages for SMEs. These packages consist of attractive training materials, including different formats, and will be freely available after the project to all organisations wishing to upskill their employees in the circular economy. Four different training plans were drawn up depending on the target groups of different SMEs (**Table 2**).

Table 2. *Designed Training plans overview with target SMEs.*

TRAINING PLAN (TP)		SMEs TYPES
TP1	INITIAL CIRCULARITY	ALL
TP2	CONSTRUCTION WORKS IN CIRCULARITY	• Company specialised in specific material systems – installers • Masonry company • Carpenter (wood) company • Another specific profession (welder, plasterer, plumbers) company • Maintenance company • Building company
TP3	CIRCULARITY IN INSTALLATIONS	• Electrical installation company • Water systems installation company • HVAC installation company • RE installations company
TP4	ADVANCE CIRCULARITY	• Sustainable consulting or engineering, architecture´s office • Public management/governance • Demolition company (or building companies) • Waste management company • Material producer • Waste treatment and recycling company

Each training plan consists of several modules, where the topics, format and possible timing is designed. These materials will be available in English and some of them also in 6 more European languages of the project partners (Spanish, Dutch, Czech, Bulgarian, Hungarian and Croatian). Examples of the designed parts of the training plans can be seen in **Figure 4** and **Figure 5**.

	STARTING CIRCULARITY	TP1		21 hours
Essential profiles	Contents	Format for contents	Training methodology *(from report)*	Minimum Time
	COMMON MODULE			
	Module 1. INTRODUCTION TO CIRCULAR ECONOMY IN CONSTRUCTION			6:10 h
Mandatory	**Key principles of circular economy**			
Mandatory	Prioritise regenerative and efficient use of resources	Interactive reading material + quiz	Microlearning courses	
Mandatory	Design for the future	Interactive reading material + quiz	Microlearning courses	
Mandatory	Assemble/construct for the future	Interactive reading material + quiz	Microlearning courses	
Mandatory	Rethink the business model	Interactive reading material + quiz	Microlearning courses	
Mandatory	Stretch the lifetime	Interactive reading material + quiz	Microlearning courses	
Mandatory	Use secondary resources	Interactive reading material + quiz	Microlearning courses	
Mandatory	Incorporate digital technology	Interactive reading material + quiz	Microlearning courses	
Mandatory	Collaborate to create joint value	Interactive reading material + quiz	Microlearning courses	
Mandatory	Strengthen and advance knowledge	Interactive reading material + quiz	Microlearning courses	
	Circularity definition and different vectors			10 min
	Circularity definition. Materials, energy, waste and water	Videos /schemes	Information pills	

Figure 4. Example of part of the "Initial Circularity" Training plan.

	CIRCULARITY IN INSTALLATIONS	TP3	
Essential profiles	Contents	Format for contents	Training methodology *(from report)*
	CONSTRUCT		
	ENERGY		
	Module 2. INSTALL ENERGY EFFICIENCY MEASURES IN BUILDINGS: PASSIVE		15 min
Mandatory	1 case study with Main passive design strategies for four season climates: crossed ventilation, solar protection, isolation, solar energy-inertia, solar captors to store passive energy, airtightness	Video /schemes	Information pills
	Conduct airtightness test	Video	Information pills
	Module 3. INSTALL ENERGY EFFICIENCY MEASURES IN BUILDINGS: ACTIVE		2:15 h (*6:30h)
Mandatory	Apply smart solutions to installations and manage correctly (termostates, timetibles)	Video	Information pills
	Systems and solutions that make intallations accesible to repair	Reading material/guides	Information pills
	Sectorize installation to be adaptable to changes and reparations	Video/ Reading material	Information pills
Mandatory	Energetic efficient systems that generates heat/cold (heat water pumps, underfloor heating, centralized systems versus individual, waste heat/district heating, etc.)	Video/ Reading material	Information pills
	Efficient lighting systems	Video	Information pills
Mandatory	Regulations related to energy limitations and with regards to energy source	Reading material	Information pills
	Install underfloor heating	Video / Guide	Information pills
	Connection to district heating	Video / Scheme	Information pills
	2 cases studies of underfloor heating + connection to district heating	Video	Information pills
	Optional: 1 workshop of underfloor heating	Visual demonstration + exercise	Workshop practical

Figure 5. Example of part of the "Circularity in Installations" Training plan.

Train the Trainers program

The project also provided a train the trainer programme for people from a wide range of professions working in the education sector. The first training of trainers took place in January 2023 in Prague and was a face-to-face event. Further trainings took place online in June and November 2023. During the course, participants were introduced to the project outputs to date, all available materials and teaching methods. The course also has its interactive part, where future training programmes were created in groups divided by professions. During these three courses, a total of 57 trainers of various professions from 16 countries were trained, who can further disseminate the idea of the circular economy in the construction industry in the form of training targeted at various groups of professionals.

Conclusion

According to the current state of knowledge, the circular economy is one of the strategies leading to a sustainable construction industry. Greater application of circular economy means that less waste will be produced, making it easier to greater reuse and recycling of products and materials at the end of their useful life; and helping to reduce environmental impacts and life cycle costs. However, a properly trained workforce across the construction sector is essential for its implementation.

The results of the BUS-GoCircular project can be found at: https://busgocircular.eu/. ■

Acknowledgements

This paper is based on the results of the project BUS-GoCircular, which has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101033740. The contents of this paper reflect only the author's view and the Agency and the Commission are not responsible for any use that may be made of the information it contains.

References

[1] Circular Economy & SDGs, How circular economy practices help to achieve the Sustainable Development Goals: https://circulareconomy.europa.eu/platform/sites/default/files/3228_brochure_sdg_-_hch_cmyk_a4_portrait_-_0520-012.pdf.

[2] What is a circular economy? | Ellen MacArthur Foundation, dostupné z: https://ellenmacarthurfoundation.org, cit. 30.11.2023.

[3] Cirkulární Česko - Ministerstvo životního prostředí (mzp.cz), dostupné z: https://www.mzp.cz/cz/cirkularni_cesko.

[4] Impact Assessment for the amendment of the Energy Performance of Buildings Directive, SWD(2016) 414.

[5] IEA, 2019. Material Efficiency in Clean Energy Transitions reports estimates that 10-20% of EU buildings' CO2 footprint represents the embodied carbon.

[6] DG GROW, 2021. https://ec.europa.eu/growth/industry/sustainability/buildings-and-construction_en.

[7] Eurostat, 2018. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Waste_statistics.

[8] Reimagining our buildings and spaces for a circular economy, Ellen MacArthur foundation. https://ellenmacarthurfoundation.org/topics/built-environment/overview.

[9] The key elements of the circular economy - Circle Economy (circle-economy.com), https://www.circle-economy.com/circular-economy/key-elements.

[10] Framework for circular interventions in the construction value chain, https://busgocircular.eu/wp-content/uploads/D2_1_Framework_for_Circular_Economy_interventions.pdf.

[11] Schober, K-S (2021). It's time for construction to embrace the circular economy. Roland Berger. https://www.rolandberger.com/en/Insights/Publications/It%E2%80%99s-time-for-construction-to-embrace-the-circular-economy.html.

[12] Circular construction skills qualification framework, https://busgocircular.eu/wp-content/uploads/D2_3_Circular_construction_skills_qualification_framework.pdf.

[13] Content and methodology proposal "BUS-GoCircular Fundamentals Training Packs", https://busgocircular.eu/wp-content/uploads/D3_4_BGC_Fundamentals_Training_Packs.pdf.

Case study: Overestimated performance of CO_2 gas coolers



JAPHET HABIMANA
j.habimana@eurovent-certification.com

CO_2 gas coolers are growing in popularity and for good reason. With HFC refrigerants being phased down in the heat exchanger market due to their high Global Warming Potential (GWP), the refrigerant R-744 (CO_2) is becoming a serious alternative to eliminate the greenhouse effect caused by the halogenated carbons in HFCs refrigerants. In addition, R-744 is a non-toxic, non-flammable, and natural refrigerant.

However, in the race to embrace green technology, we need to remember how important it is that specifiers and system designers have access to reliable data on real-life system capabilities, so that systems are successfully designed and installed, operating as specified. If not, the reputation of the technology (and those who specify, design and install it) can be unfairly damaged, when supposedly sustainable systems do not operate as expected.

Deviancies in claimed and real performance cause big problems. And so, investigations were undertaken on the impact of an overestimation of CO_2 gas cooler performance on the efficiency of the refrigeration plant, specifically on the system's annual power consumption and its related cost. Simulations were performed to estimate the efficiency of the thermodynamic cycle, coupling some theoretical and empirical rules to the rated thermal capacity of the CO_2 gas cooler. The comparison was made between a Certified CO_2 gas cooler (**Case Study 1**) and an uncertified CO_2 gas cooler **(Case Study 2**).

The main assumptions for the simulations were:

- Two temperature levels:
  - Medium temperature (MT): Tevap, MT = –8 °C; Qevap,MT=250 kW
  - Low temperature (LT): Tevap, LT = –30 °C; Qevap, LT = 100 kW
- Design ambient temperature: 35°C
- Maximum operating pressure: 95 bar
- Design gas cooler capacity (SC20) = 490 kW
- Electricity specific cost: 0,25 €/kWh.



The new CO_2 test rig. (image credit: Lu-Ve Group)

Case study 1: Certified CO_2 gas cooler

The simulation was performed on a certified unit with a design capacity in line with the real performance of the CO_2 gas cooler. The following results were obtained.

Economic simulation considering an energy cost of 0.25 €/kWh

Plant consumption	1.456 MWh/year
Gas cooler fans' electricity cost	8.134 €/year
Compressor electricity cost	355.746 €/year
Total cost	363.880 €/year

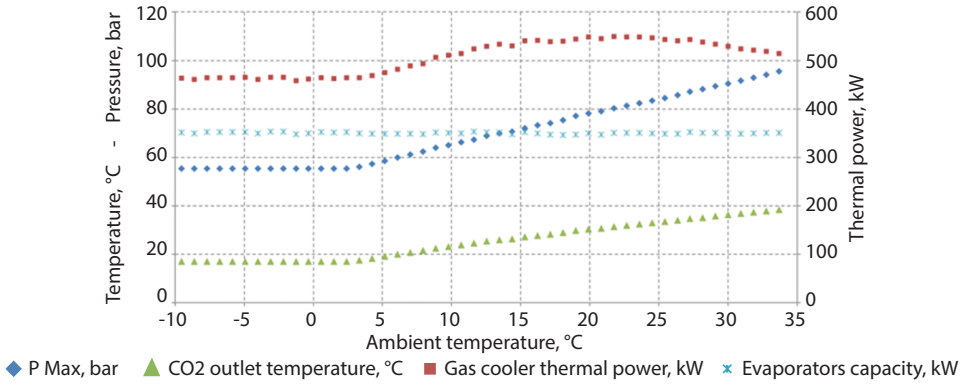


Figure 1. Case Study 1- Performance simulation of a certified gas cooler.

Case Study 2: Uncertified CO_2 gas cooler

The second simulation is for an uncertified CO_2 gas cooler, with a design capacity higher than the real capacity. In this instance, the uncertified manufacturer applied a 25% oversizing coefficient, which resulted in a real thermal capacity lower than the declared one.

Economic simulation considering an energy cost of 0.25 €/kWh

Plant consumption	1.518 MWh/year
Gas cooler fans' electricity cost	8.633 €/year
Compressor electricity cost	370.824 €/year
Total cost	379.457 €/year

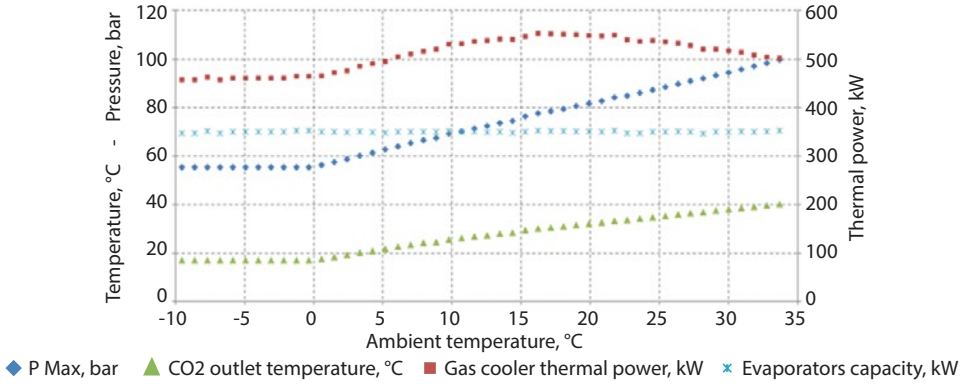


Figure 2. Case study 2- Performance simulation with non-certified gas cooler.

In the Case Study 2, the compressor had to compensate for the lack of capacity of the gas cooler, to keep the useful effect at the evaporators as expected. Additionally, the maximum pressure reached by the system in the design condition is over 99 bar, more than 4 bar higher than the design maximum pressure.

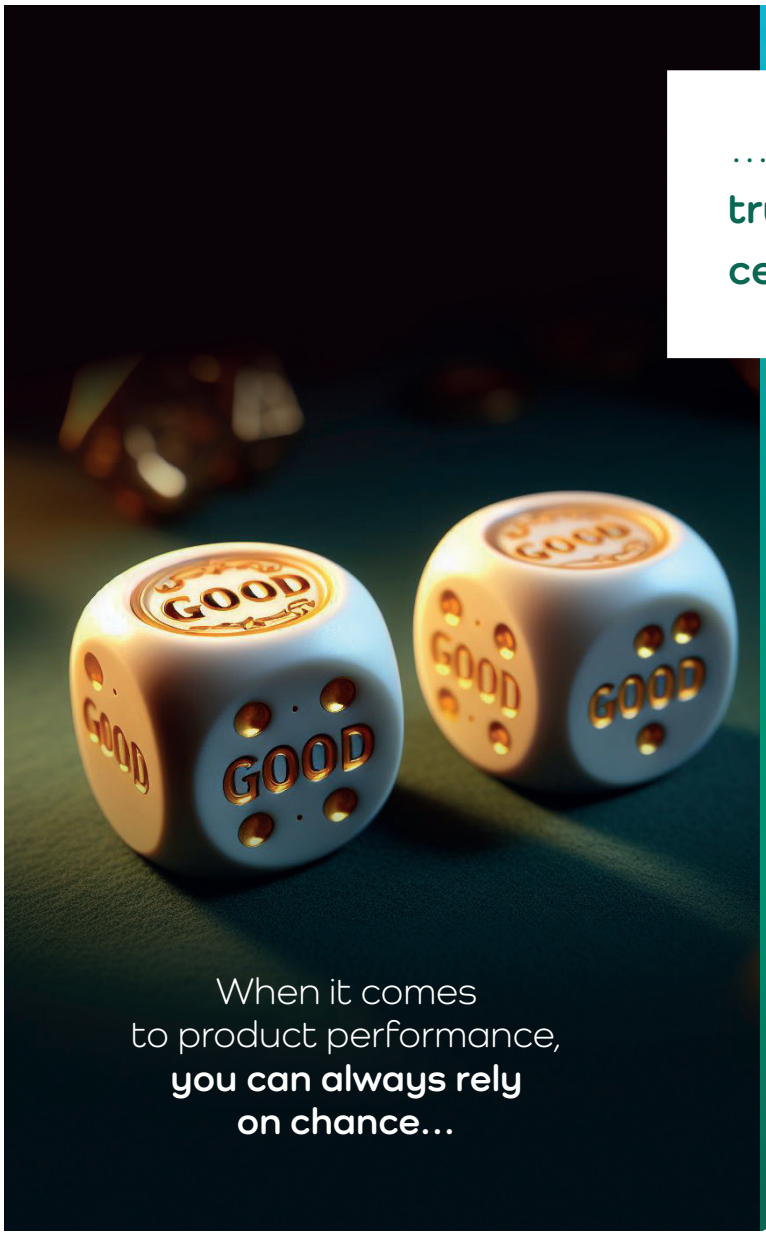
While the difference between the 2 simulations may appear insignificant, the effect on the annual consumption and therefore cost, is absolutely non-negligible (see summary on the right).

The annual cost increase in a gas cooler with a capacity 25% lower than expected is therefore around 15.600€, resulting in 156.000€ over a 10-year lifetime. The higher the gap between declared and real gas cooler capacity, the higher the impact on plant energy consumption. When it comes to long-term costs and sustainability, the benefits of choosing products with Eurovent Certified Performance is clear.

Summary of consumption and cost increase due to the use of uncertified CO_2 gas cooler		
Plant electricity consumption	+4.2%	62 MWh/year
Gas cooler fans electricity cost	+6.1%	499 €/year
Compressor electricity cost	+4.2%	15.078 €/year
Total cost	+4.3%	15.577 €/year

To find certified gas coolers, please visit www.eurovent-certification.com

For more information on the ECP Heat Exchangers programme, please contact the author. ■



When it comes
to product performance,
**you can always rely
on chance...**

...But to be sure,
**trust Eurovent
certification instead.**



EUROVENT
CERTIFIED
PERFORMANCE
www.eurovent-certification.com

Trust is our business

With Eurovent certification, you can be sure you're making an eco-friendly choice for reliable, sustainable HVAC-R products.

Reduce your carbon footprint with confidence,
opt for Eurovent certification.

SCAN ME

www.eurovent-certification.com

Eurovent Certita Certification is recognised as a world leader in third-party product performance certification in the Heating, Ventilation, Air Conditioning, and Refrigeration fields.

EU must stop 'playing small', EPBD is crucial for reducing emissions from buildings

BPIE reports that the reduction of CO_2 emissions from the EU building stock is severely off track and not moving fast enough, according to the 2nd edition of the EU Buildings Climate Tracker, Developed by BPIE, the Buildings Performance Institute Europe.

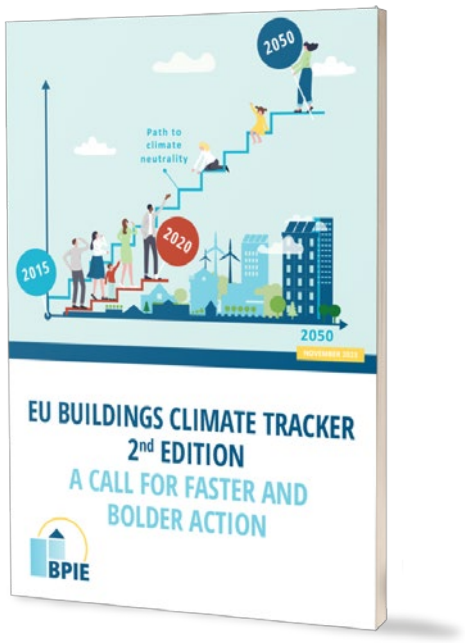
According to the report, EU must urgently step up efforts to reduce harmful emissions from the buildings sector. The tracker shows that there is a huge gap between where the building stock should be on the path to climate neutrality, and where it really is.

The EU Buildings Climate Tracker is a tool to monitor the progress of the building stock in the European Union towards the goal of achieving climate neutrality by 2050, covering the period from 2015 until 2020. It measures the progress in the form of a points-based index, composed of a set of five indicators, including CO_2 emissions, final energy consumption, renewable energy share, investments in renovation, and domestic energy expenditures.

There is a significant overall decarbonisation gap of over 10 points between where we are today and where we should be on the path to climate neutrality, according to the tracker. Central and Eastern Europe shows the largest gap since the beginning of the tracker period in 2015, with 21 points off the required decarbonisation path.

"As the main legislative instrument to advance the decarbonisation of buildings in the EU, the Energy Performance of Buildings Directive (EPBD) must unequivocally put us on the path to meet our 2030 targets and climate neutrality," says **Oliver Rapf**, Executive Director of BPIE.

According to the report, strong and unambiguous EPBD provisions are paramount to tackle the gaping lack of progress in the decarbonisation of the EU building stock. Minimum energy performance standards (MEPS) should be designed to address the worst-performing buildings first to deliver Europe's renovation wave.



Some of the findings are:

- In 2020, CO_2 emissions from energy use in buildings reached 422 Mt CO_2, more than 18% higher than the required goal value.
- The share of renewable energies for heating and cooling was around 30% lower than required, which calls for a clearer roadmap to decarbonise the heating and cooling sector.
- Accumulated investments in renovation in 2020 were 40% lower than required.

View the report at bpie.eu ■

CLIMAVER® light-weight ductwork systems to decarbonise built environment



As the world's population continues to grow and natural resources become scarce, climate change has become a daily reality and an unprecedented challenge. Buildings account for 33% of global energy consumption and 39% of greenhouse gas emissions. Hence the importance of energy efficiency and carbon neutrality for sustainable buildings today. What few of us have in mind is that HVAC can represent up to 80% of the total energy consumption of buildings. It makes perfect sense that sustainable HVAC systems help minimise the environmental impact of buildings where people spend 90% of their time. Energy efficiency and carbon neutrality have therefore become prerequisites for today's buildings towards decarbonisation. At every stage of its life cycle, a building designed, built or renovated in a sustainable way should help improve people's comfort, safety and well-being while minimising the consumption of energy and natural resources, reducing the environmental footprint and resulting in lower running costs and increased property values.

CLIMAVER® light-weight ductwork systems offer the greatest thermo-acoustic comfort and contribute to

- Reduce the environmental footprint of buildings (more than 60% lower embodied energy and GWP vs conventional ductworks)
- Save on energy bills (better than Class D in air-tightness with <0.2% leaks)
- Create a pleasant acoustic environment (the sound pressure can be reduced by more than 20 dB per metre of CLIMAVER® duct)
- Ensure fire safety (fire classes vary from B-s1,d0 to A1)
- Optimise logistics reducing emission and costs

Total Use of Energy & Global Warming Potential (GWP) in Product, Transport, Installation, Use and End-of-Life Stages of LCA

Ductwork System	Description, Thickness	Total Use of Energy [MJ/m^2]	GWP [kgCO_2equivalent /m^2]
CLIMAVER® APTA, A1	Glass wool prefabricated duct, 36 mm (R-1 m^2 K/W)	59.3	3.61
CLIMAVER® A2 NETO, A2-s1,d0	Glass wool prefabricated duct, 33 mm (R-1 m^2 K/W)	65.4	3.90
Galvanized rectangular ducts insulated with glass wool, A2-s1,d0	Galvanized steel, 0.7 mm and glass wool insulation, 35 mm (R-1 m^2 K/W)	195.6	16.41
PIR board faced on both sides with aluminium foil, B-s3,d0	PIR insulation core, 22 mm thick (R-0.93 m^2 K/W)	193	10.3

Providing a thermal insulation on 1 m^2 of product with a thermal resistance of 1 m^{2}K/W (without net recycling benefits as "Reuse/recovery/recycling potential). Reference Service Life 50 years. (Cradle to Grave: Mandatory stages = A1-3, A4-5, B1-7, C1-4. Optional stage = D not taken into account)

Comparative CO_2 footprint of ductwork in office and school buildings

Building Type	Area, ref (m^2)	Share of HVAC in total building CO_2 footprint (%)	% of reduction in total building CO_2 footprint by replacing metal ductwork with CLIMAVER® Neto	Impact on CO_2 footpint reduction by replacing metal ductwork with CLIMAVER® Neto [$kgCO_2$equivalent /m^2 ref]
Office	491	20	–4.8	–41
Office	4 125	17	–5.5	–47
School	2 785	15	–3.8	–30
School	4 383	11	–1.9	–15

Case Study, France

In accordance with the EU regulatory framework, RE2020 in France, which entered into force by 1 January 2023, aims to reduce the CO_2 footprint of buildings, improve energy performance, and reduce building consumption, by guaranteeing that buildings will be adapted to future climate changes. The objective also addresses CO_2 limits to be reduced by every 3 years. The impact of each element in the construction of new building varies and HVAC emerges as one of the top three contributors with the greatest impact in terms of CO_2 footprint in buildings, representing 14% of the total in average.

Saint-Gobain Isover France has carried out various technical studies, on HVAC, particularly in relation to carbon and types of ductwork and realised a carbon study by LCA (RE2020 scope) to estimate the carbon gain with the use of CLIMAVER® compared to a standard metal ductwork. 4 project typologies (Primary Education, College, Small Tertiary - Office, Medium Tertiary - Office) with different variant cases were covered in this reference study.

The carbon gain in buildings with CLIMAVER® is undeniable and allows a significant reduction in the CO_2 impact of ductwork from 45 to 80% depending on the case for a gain of 15 to 47 $kgCO_2eq/m^2$ vs metal ductwork.

Studies highlight that CLIMAVER® has significant benefits in reducing not only the energy consumption of ductwork in operational phase, but also the carbon footprint of ducts during the design phase of HVAC systems in new or refurbished buildings. LCA evaluations show high reductions with CLIMAVER® (in embodied energy of 56 – 80% and in embodied CO_2 of 68 – 86% compared to an insulated metal duct with a sheet thickness of 0.51 – 1.2 mm). Reference studies for 4 different building types from RE2020 also show how CLIMAVER® reduces the CO_2 footprint of the total building by 1.9 – 5.5%.



CLIMAVER® is a self-supporting duct for air-conditioning, ventilation and heating systems. CLIMAVER® has been designed to offer excellent acoustics, excellent thermal performance and a high level of air-tightness making the system energy efficient. In one unique operation, the insulation is fully integrated to the duct system saving both installation time and cost on the jobsite. Furthermore CLIMAVER® contributes to higher scoring in green building labelling schemes. ■

For more information: isover-technical-insulation.com

Leading the Shift to Sustainable Materials with Bio-Based Uponor PEX Pipes Reducing Carbon Footprint by 90%

Uponor is shaping trends and setting new standards in the transition to renewable and recycled raw materials. This way the company supports its customers in making sustainable choices: Uponor started offering bio-based PEX pipes in 2022 with a reduced carbon footprint of up to 90 per cent compared to fossil-based PEX pipes currently on the market.

- **Uponor Introduced first bio-based PEX pipes on the market**
- **Pipes feature ISCC certified renewable raw material**
- **The same outstanding product characteristics as our conventional Uponor PEX pipes and a reduced carbon footprint of up to 90 per cent**



When Uponor introduced PEX pipes to the world market in 1972, the company set a new standard with its revolutionary plastic pipes. Since then, Uponor has been constantly improving the product and corresponding processes. Now Uponor is launching a new innovative initiative: the world´s first bio-based PEX pipes with ISCC certification based on the mass balance approach. The new PEX Pipes Blue are part of Uponor's commitment to renewable raw material and will allow for construction projects to be more sustainable in future.

"In the spirit of constantly improving the carbon footprint of our products, the new PEX Pipes Blue are an important step forward: This new initiative helps our customers to achieve their sustainability goals in all types of projects. We need sustainable solutions for buildings and all parts of a construction project including the pipes in the plumbing and underfloor heating system," says **Christine Schurz**, Brand and Sustainability Director Uponor Building Solutions - Europe.

Product carbon footprint reduced of up to 90 per cent

The significantly low carbon footprint of new PEX Pipes Blue compared to fossil-based PEX pipes is based on Environmental Product Declaration (EPD) calculations according to the standards EN15804+A1, CML / ISO21930.

The EPD uses life cycle assessment (LCA) to comprehensively evaluate a product´s environmental impact along its entire life cycle. All the data is verified by an independent third party.

Value chain transparency through ISCC certification

The entire supply chain of PEX Pipe Blue products is certified by International Sustainability and Carbon Certification (ISCC), an independent organisation that ensures traceability and transparency throughout entire supply and production chains.

The renewable raw material supply is based on the so-called mass balance approach. This means that for every tonne of ISCCcertified renewable raw material that is put into production, an equivalent amount of PEX pipes can be claimed as ISCCcertified. The use of ISCC certified bio-based material contributes to the replacement of fossil resources by renewable raw materials. To ensure that all ISCC requirements are met, Uponor's ISCC certificate is audited annually by an independent third party. ■



REHVA Strengthens its EU Policy Advocacy Efforts

During Autumn 2023 REHVA makes a significant evolutionary step in its engagement and influence of the EU level decision-making processes, in its continued commitment to ensure the voice of building professionals is not only heard but also acted upon in crucial EU legislative processes.

At the recent REHVA Member Association plenary meeting, the decision was made to establish an "EU Policy Advocacy" group. This group aims to enhance REHVA's influence in vital EU policies such as the EPBD (EED & RED) and the Ecodesign.

REHVA's national Member Associations have a critical role to play in the overall success of these advocacy efforts, both at the EU and national levels.

REHVA as a Pan-European Federation remains committed to boosting the interests of building professionals and ensuring a technology-inclusive approach in shaping EU legislation.



For more information, visit REHVA's website or contact info@rehva.eu. ■





MODERATE workshop at the REHVA Brussel Summit- 14th November 2023

Enabling Sustainable Building Performance: Data Exchange Innovations by the MODERATE Project

MODERATE is a Horizon Europe-funded project that started in June 2022. It aims to develop a marketplace platform that improves availability and interoperability between datasets for the building industry, leveraging open data and open-source solutions. The objective is to promote data exchange between different producers and consumers while complying with legal and ethical constraints. The project innovates data collection, data synthesis, and data-driven services for building system management, building asset optimization, and informed decision-making.

Author:
SOFIA BAZZANO
EU Project & Financial Officer, REHVA

Co-authors:
ALFONSO CAPOZZOLI
Associate Professor, Department of Energy (DENERG), Politecnico di Torino

MOHSEN SHARIFI
Researcher, VITO

CRISTIAN POZZA
MODERATE, Coordinator & Senior Researcher, EURAC Research

The project workshop entitled "Enabling Sustainable Building Performance: Data Exchange Innovations by MODERATE Project" was held on 14th November 2023 during the Policy Conference of REHVA Brussels Summit at the Thon Hotel Bristol Stephanie, Brussels. The workshop was designed to explore the pivotal role of data exchange in achieving sustainable building performance.

In an era marked by growing environmental concerns and energy efficiency demands, this workshop focused on key objectives critical to advancing the field:

Understanding EPBD Article 14: Gain insights into the significance of data exchange as outlined in the Energy Performance of Buildings Directive (EPBD) Article 14. Explore how this directive can be leveraged to drive sustainability in building operations.

MODERATE Models Unveiled: Discover cutting-edge models developed by the MODERATE Project, designed to harness data for optimizing building performance. Explore their capabilities and applications.

Expert Insights and Best Practices: Engage with industry thought EPB experts, leaders and practitioners to delve into best practices for sustainable building data exchange. Learn from real-world case studies and explore the potential challenges and opportunities in this domain.

Data-Driven Sustainability: Examine the practical implications of data-driven insights in achieving energy efficiency and environmental sustainability goals within buildings.

The session opened with a presentation by **Sofia Bazzano**, EU Projects & Financial Officer at REHVA, who commenced the workshop with a comprehensive introduction to the MODERATE project, shedding light on its fundamental goals and the rationale behind its initiation.

Afterward, the session continued with a Keynote: EPBD RECAST (Article 14 Data Exchange & Links to Other Articles). Mrs. **Elina Hautakangas**, Policy Officer from Unit A1, Policy & Coordination at DG ENER, delivered a keynote address focusing on the recast of the Energy Performance of Buildings Directive (EPBD). She specifically delved into the new provisions in EPBD proposal related to Data (Article 14: Data Exchange) as well as the new provisions in EPBD proposal related to Data (Article 19: Databases for Energy Performance of Buildings). A key takeaway from the presentation was the emphasis on moving forward with the EU BSO (Building Stock Observatory) as well as the need for reliable and harmonized data from trustable sources.

Mr. **Mohsen Sharifi**, researcher from VITO, took the stage to present the MODERATE project's data-driven models, services, and various use cases. His presentation delved into the innovative approaches and methodologies employed in the project, showcasing the potential impact on enhancing building energy efficiency. Mr. Mohsen Sharifi's presentation on the MODERATE Data-Driven Models, Services & Use Cases showcased the project's commitment to overcoming challenges in data exchange. By addressing privacy concerns through synthetic data generation and providing a marketplace for data analytics, MODERATE emerges as a pioneering initiative facilitating the realization of data-driven techniques in a privacy-conscious and collaborative environment.

A dynamic round table discussion followed, moderated by **Alfonso Capozzoli**, Associate Professor at DENERG, PoliTO. The panel included esteemed experts in the field of Energy Performance of Buildings (EPB), such as **Jaap Hogeling** (EPB.Center), **Jana Bendzalova** (ENBEE), **Damir Dovic** (University of Zagreb), **Razvan Calota** (Technical University of Civil Engineering of Bucharest), **Tomasz Cholewa** (Lublin University of Technology, PZITS), and **Vlasta Zanki** (Croatia Green Building Council). The discourse centered around current challenges, best practices, and the future trajectory of EPB standards.

The workshop concluded with an engaging Q&A session. Attendees had the opportunity to pose questions and seek clarifications on various aspects of the MODERATE project, EPBD recast, and the insights shared during the round table discussion. The session provided a platform for fruitful interactions between the participants and the experts, fostering knowledge exchange and collaboration.

The MODERATE workshop at the REHVA Brussels Summit proved to be a valuable platform for exchanging ideas, sharing expertise, and advancing the discourse on data-driven models for building energy performance. The event reached around 50 participants and successfully brought together key stakeholders and policymakers fostering collaboration and laying the groundwork for future advancements in the field. ■

Acknowledgements: This Article has been prepared under the MODERATE project which has been funded by the European Union's Horizon Europe innovation program under Grant Agreement No. 101069834. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them.

MODERATE

For more information, see the project website: moderate-project.eu and follow us on LinkedIn & Twitter.

Funded by the European Union

News in the REHVA Family

REHVA is happy to welcome a new Supporter: Sunfly!

During the REHVA Brussels Summit, the REHVA Team had the chance to meet Sunfly's representatives. REHVA is thrilled to count a new Supporter and is enthusiastic of the future work we will produce together.

Sunfly is China's first HVAC manifold supplier and focuses on research produce twenty years in HVAC industry.

This is not the only good news that REHVA has to share.

Airscan has joined REHVA as an Associate Organisation!

Airscan aims to improve air quality in buildings and cities. We offer a complete range of solutions for air quality assessments, in- and outdoor air quality monitoring and green building certifications such as BREEAM, Well, Leed, DGNB and MyCREST.

You want to be a part of the REHVA family?

Connect with us on social media and send us an email info@rehva.eu

Visit rehva.eu and become a REHVA Supporter!

GET NOTICED!

PUBLISH AN ADVERTISEMENT IN THE REHVA JOURNAL

REHVA Journal READERS

1. HVAC manufacturers
2. HVAC engineers
3. Policy Makers and EU stakeholders
4. Building services professionals
5. Academics



REHVA Journal OUTREACH

- 6 issues per year
- 450 copies per issue shipped worldwide
- 12000 views/issues online

More information on www.rehva.eu/rehva-journal

EU year of skills: EBC talks about construction skills in SMEunited conference and REHVA Summit

In line with its action during the European Year of Skills (EYS), EBC was invited to bring a construction perspective at various events addressing the skills needs of the European Union this month.

On 30 November, SMEunited discussed skills and training, starting with a first panel dedicated to the effort of European Social Partners on the future of training policies to maximise take-up, lifelong learning, and employability, with the participation of SGI Europe and ETUC.

In a second panel, EBC Secretary General **Fernando Sigchos Jiménez** exchanged with SME representatives Thomas Mayr from the Austrian Federal Economic Chamber WKÖ, André Weiss from the German Confederation of Skilled Crafts ZDH and Silvia Miró from the Catalan SME employer's organisation PIMEC. The focus was on concrete examples in terms of upskilling and reskilling in SMEs, specific incentives and solutions that work for SMEs, and how to increase the take up of training by entrepreneurs and workers.

He explained that deconstructing persistent stereotypes about construction and highlighting the changing nature of professions are daily activities of construction SMEs. He pointed out that construction is fertile for entrepreneurial venture and offers a guarantee of employment with attractive remuneration, with the need to showcase the added value of contributing to combat climate change by making our buildings climate neutral. To conclude, he explained the Construction Blueprint project and the Pact for skills in construction, activities conducted in close collaboration by EBC, FIEC and EFBWW at the European sectoral level.



Earlier this month, on 13-14 November, the REHVA Brussels Summit included discussions on the Energy Performance of Buildings Directive (EPBD), Indoor Environmental Quality (IEQ), training needs and the skills shortfall in the digital transition among others.

EBC Policy Officer **Spyros Mathioudakis**, presented EBC's engagement for a stronger skills policy framework at EU level to support and guide the national and local authorities, as education and training are national competence. He referred to the efforts to secure stronger provisions on skills in European legislation such as the EPBD and the Energy Efficiency Directive (EED), as well as EBC's active role in bridging the gap between innovation and research in construction and SMEs through its involvement in the training approaches of several Horizon Europe, Erasmus+ and LIFE projects.

He then exchanged with Amandine De Coster-Lacourt, Project Adviser at the European Climate, Infrastructure and Environment Executive Agency CINEA, REHVA Vice-President Livio Mazzarella, and Laure Itard, coordinator of the Brains4Buildings project in the session devoted to the importance of reshaping renovation skills for a Digital-IEQ shift. ■

Read full article: EU Year of Skills: EBC talks about construction skills in SMEunited conference and REHVA summit - EBC Construction (ebc-construction.eu)

REHVA 3 BRUSSELS SUMMIT 13-14 November 2023

REHVA Brussels Summit 2023 – Day 1

On 13-14 November 2023, REHVA had the pleasure to host the REHVA Summit in Brussels.

The first day of the Summit was dedicated to REHVA Strategic activities with meetings of the standing committees: Publishing and Marketing Committee PMC, Education and Training Committee, Technology and Research Committee, and Supporters Committee.

The PMC reunited to discuss the 2024 marketing goals and shared very interesting exchange concerning the future of REHVA, its dissemination and its image. The main goal for REHVA is to better disseminate its knowledge, sell its insightful guidebooks and share experiences with the professionals of HVAC.

We have had the chance to welcome certain representative of our supporters who exchanged with us marketing advice, and who helped us create new perspective. We also had the pleasure to welcome our newest Supporter: Sunfly.

Jaap Hogeling, our editor-in-chief of the **REHVA Journal**, addressed a few words to the Publishing and Marketing Committee. He presented the 2024 publication plan of the REHVA Journal, which is now available on the REHVA website. We have had amazing feedbacks from our supportive readers this year and hope to be as efficient in the following year.

REHVA's Technical Research Committee (TRC) gathered during the Brussels Summit over 50 technical experts from all over Europe to review the latest advancements in the HVAC field by the respective active task forces. Particularly vivid were the discussions related to the technical support for the EPBD implementation, considering the ongoing trialogue. A guidance document will be published soon. In addition, progress was reported in the development of technical documentation in other relevant fields of research; namely, occupant targeted ventilation, wastewater heat recovery, and heat pump roll-out. In addition, ideas were exchanged regarding the wide outreach and marketability of REHVA's knowledge dissemination. Therefore, the need for joint cross-committee collaboration, especially with REHVA Supporters was stressed. New TRC members from the Romanian member association were welcomed to the committee, acknowledging their expertise and optimist about their contributions to the committee's work. Lastly, the committee recognised the importance of continued active participation of the mottled network of technical experts and HVAC companies' representatives to produce valuable knowledge for the European HVAC designers and building service engineers.



REHVA Brussels Summit 2023 – Day 2



Author:
CARLOTA PÉREZ-BOUZADA
EU Project & Communication Officer, REHVA

Co-authors: Johann Zirngibl & Pablo Carnero

On the 14th of November, REHVA hosted the annual Policy conference. This year's conference was centered around the theme "Indoor Environmental Quality, Digitalization and Skills in the Decarbonization of Buildings". The event aimed to delve into these interconnected aspects, addressing pressing concerns in the building industry. Speakers from various sectors, including the European Commission, industry leaders, and experts in the field, contributed to the discussions. This report offers a comprehensive summary of the sessions, featuring insights and key points covered during the conference.

Please access recordings and presentations for further review and information at this link:
https://www.rehva.eu/knowledge-base/event-presentations/event-detail/rehva-brussels-summit-2023

Session 1: The EPBD Refresh: IEQ and Skills in the Digital Age

In the first session, **Silvia Rezessy from DG ENER**, presented the current legislation addressing indoor environmental quality followed by an overview of the current state of the Energy Performance of Buildings Directive (EPBD) and its priorities: renovation, decarbonization, modernization, and system integration. The directive aims for zero emissions in new buildings by 2030 and a zero-emission building stock by 2050. Key provisions focused on Minimum Energy Performance Standards (MEPS) for existing buildings, emphasizing EPC class upgrades by certain deadlines. Moreover, the regulations stipulate Indoor Air Quality (IAQ) requirements after substantial renovation endeavours, underscoring the significance of air quality in refurbished spaces. Despite being urged to adopt a more ambitious stance on IAQ, Silvia highlighted that the Commission is exerting its full negotiation power to maintain the existing provisions. Discussions raised concerns about the shortage of skilled workers in the construction sector, estimating a need for additional trained professionals by 2030. Is our workforce sufficient and sufficiently skilled for the fitfor55 targets? The EU has allocated substantial funding through various channels and programs, including the European Social Fund+ (ESF+), the European Regional Development Fund (ERDF), the Just Transition Mechanism (JTM), and Recovery and Resilience Plans (RRPs), to develop green skills. The strategy outlined for workforce development emphasized enhancing skills through education, cross-sector collaboration, talent attraction, financial incentives, and aligning skill development with funding and procurement. Moreover, all directives play a pivotal role in nurturing skill development, starting with the EPBD and extending to the EED and RED. In summary, the strategy to address the evolving workforce requirements encompasses enhancing skills through education alignment, fostering collaboration across various sectors and governance levels, attracting talent to stimulate clean energy demand, providing financial incentives coupled with strategic communication, and intertwining skill development with funding and procurement mechanisms.

REHVA BRUSSELS SUMMIT
13-14 November 2023

Following Silvia's presentation, **Jarek Kurnitski, as the REHVA TRC chairperson,** delved into the intricacies of Indoor Environmental Quality (IEQ) within the revised Energy Performance of Buildings Directive (EPBD) from 2002 to 2023. He emphasized the complexity of IEQ requirements and the ongoing trilogue discussions aiming to introduce new standards for monitoring and measuring IEQ. REHVA's technical guidance has influenced Member States in these negotiations, focusing on clarifying IEQ substance, differentiating between regulatory aspects and technical guidance. While the EPBD prioritizes IEQ in new constructions and major renovations, challenges remain, particularly in addressing IEQ concerns in renovation standards, specifically regarding ventilation requirements in residential buildings. The proposed revisions aim to include IEQ aspects comprehensively, considering factors like temperature, humidity, ventilation rate, and contaminants, looking ahead to updating guidance documents aligned with EPBD revisions. Looking ahead, upon the release of the final wording, REHVA aims to update its guidance document. This update will encompass the implementation of national standards concerning thermal comfort and indoor air quality/ventilation requirements in line with the EPBD revisions.



Catalin Lungu, REHVA President, **Sylvia Rezessy**, Policy Officer, Unit B3, Buildings and Products, DG ENER, **Jarek Kurnitski**, Chairperson, Technology & Research Committee, REHVA.

Session 2: Reshaping Education & Training: Navigating IEQ & Digitalization

Amandine De Coster-Lacourt from CINEA introduced the BUILD UP Skills initiative, launched in 2011 with significant EU funding and 94 projects since its inception. The initiative focuses on analysing skills gaps, developing tailored training schemes, and enhancing skills uptake in the construction sector. It collaborates with stakeholders to create National Skills Strategies for 2030, aiming to identify and address workforce gaps. Amandine highlighted subsequent initiatives like BIMplement, NETUBIEP, NS4nZEBs, and RepowerEdU, emphasizing the need for targeted upskilling interventions, particularly in small businesses. Implementation of training at construction sites and integrating skills into procurement processes show promise in addressing skill shortages. Scaling successful initiatives to a national level is the next crucial step in advancing the construction industry's skill landscape.

Livio Mazzarella, REHVA Vice-president, continue the discussion with the importance of Indoor Environmental Quality (IEQ) and sustainability pillars in renovation efforts. IEQ encompasses multiple facets such as ventilation, thermal comfort, air quality, safety measures, and more to ensure healthier and safer indoor environments. Renovation practices now focus on three essential sustainability pillars: environmental, economic, and social, aligning with IEQ principles for healthier spaces. The European Green Deal, initiated to combat climate change and promote economic growth, emphasizes cleaner energy technologies, energy-efficient buildings, and the need for future-proof jobs and skills aligned with ecological transition. In the European Year of Skills 2023, there's a strong emphasis on upskilling and reskilling opportunities, aligning with the Pact for Skills initiated by the European Commission. The HVAC industry requires professionals to update their skills, including proficiency in hourly simulation techniques, energy efficiency contracts, digital skills, and soft skills for effective collaboration. Moreover, the role of Sustainable HVAC Systems in Smart Buildings was highlighted, necessitating adaptive control mechanisms and energy-efficient components. REHVA is actively involved in supporting the implementation of energy directives, addressing qualification gaps, and developing EU-wide HVAC training courses to meet the evolving needs of professionals in the construction industry.

Spyros Mathioudakis, Policy Officer at the European Builder Confederation (EBC), presented EBC's vision, focusing on reshaping renovation skills for a digital-IEQ shift. EBC exclusively represents crafts, micro, small, and medium-sized enterprises within the construction sector at the EU level. Its primary objectives include advocating for the needs of these entities in European legislative processes, emphasizing the role of skills in the construction sector, establishing a unified regulatory system, incorporating relevant provisions into EU laws, supporting skill enhancement, promoting the sector's attractiveness through communication campaigns, facilitating dialogue between SMEs and training organizations, and encouraging the exchange of successful practices in dual vocational training.

Laure Itard, Project Coordinator at Brains4Buildings, highlighted "The Brains4Buildings Dutch Initiative." The four-year project, in collaboration with TKI Building & Technology, unites 40 partners, including various industry stakeholders, under the initiative. Its primary focus is to leverage data from Smart Meters, Building Management Systems, and the Internet of Things. The project aims to develop methods that reduce energy consumption and carbon emissions while improving comfort levels and adapting to user preferences and behaviours within building environments.

Smart Readiness Indicator (SRI) Observatory "launch before lunch"

Sylvain Robert, Project Adviser at CINEA – LIFE Climate & Energy Unit, introduced the Smart Readiness Indicator (SRI). He explained the history of the SRI and outlined the main technical and policy milestones spanning from the EPBD and related regulations. He gave a glimpse of the current status of the scheme implementation, with non-committal test phases being performed in 8 Member States. The role of the European funded projects, markedly under the LIFE programme, in supporting the market uptake of the scheme was outlined.

Pablo Carnero, Technical and EU Project Officer at REHVA, introduced the SRI Observatory, as an outcome of the LIFE Smart Square project. He went over the main content of this online site to stay up to date on the latest SRI policy developments at the EU level, to track and compare national implementation status, and to find out about the most relevant research developments in the field of building smartness.



REHVA BRUSSELS SUMMIT
13-14 November 2023

Session 3: Funding the Future: Decarbonisation & IEQ Meets Digital and the Skills Shortfall

Federica Sabbati, Secretary General at the European Heating Industry (EHI), addressed the skills shortage in the heating and installer sectors, outlining strategies for short-term and medium-to-long-term solutions. In the short term, the focus involves reskilling existing installers, expanding training facilities, and providing financial support during vocational training. For the medium-to-long-term, efforts aim to attract young talent to these sectors through international apprenticeship programs and harmonized accreditation requirements. To support the REPowerEU target of installing 30 million hydronic heat pumps by 2030, proposed actions include developing common technical standards, expanding training topics, and initiating various efforts to attract new workers, including legal migration schemes and youth-focused campaigns.

Csaba de Csiky, Chairman at EnerSave Capital and SEFA Founding Member, discussed the importance of standardization in financing the building transition, highlighting three key aspects: legal contractual frameworks, energy parameters for sustainable buildings, and data standardization. Emphasizing the pivotal role of finance, Csaba underscored the significance of standardized contracts in facilitating trade of Sustainable Energy Assets, accelerating deal closures, and fostering market growth in energy efficiency. The shift towards an "HVAC as a Service" model in the HVAC sector is considered essential, aiming to explore new client opportunities and standardize services through platforms like ENERGATE. Standardized contracts offer advantages such as contract multiplication, off-balance sheet treatment, and versatile use, while securitization amalgamates ESCO's receivables, meeting investor requirements and driving market growth in energy efficiency.

Expert Insight: Funding the Leap to Decarbonised, Healthy & Digital Buildings

Johann Zirngibl, REHVA Vice-President, as moderator highlighted the substantial financial requirements, estimated at around 1% of the EU's GDP annually (approximately 225 – 275 billion euros), for funding the energy transition. These costs are primarily due to the extended payback periods, ranging from 3 to 30 years, associated with building energy renovations. To meet these financial needs, both public and private funding are essential. Various innovative funding options were proposed, such as leasing, HVAC as a service, pay-as-you-save schemes, and energy performance contracts.

- Ilari Aho, Vice-President Sustainability & Regulatory Affairs, Uponor (EHI/WGBC)
- Mikael Börjesson, Director Competence, Sustainability and External relations, Swegon (Eurovent Association/Eurovent Certita Certification)
- Julie Kjestrup, Head Policy & Thought Leadership, Velux (EuroACE)
- Risto Kosonen, Vice-President, REHVA
- Henk Kranenberg, Senior Manager, Daikin Europe (EPEE, EHPA, Eurovent Association)

The exchanges with the panellists concerned their experience on funding possibilities towards decarbonized, healthy & digital buildings to reduce the initial investment step. The discussion showed that the huge demand is not there for the moment. For many stakeholders, to minimize risk and increase thrust is a key factor. Concerning the financial sector, there are buildings that banks are not willing to give loans because the value of the building is too low and the risk of the investing bank too high. The funding situation also very different in the different building segments: residential, public, and commercial buildings. Innovative funding is successful in larger projects. Key for unlocking the potential of innovative funding schemes is to increase the attractiveness of small and medium scale projects towards the financial institutions. The joint efforts should be in business model innovation rather than technology innovation. ■

Did you participate in the REHVA Brussels Summit held on November 13-14?

Your insights are valuable to us!

Please spare 4 minutes to fill out this anonymous survey; your input will greatly help us make next year's edition an event greater success.

COMPLETE THE SURVEY NOW

REHVA Brussels Summit 2023 – Energate expert talk

13th November 2023



CARLOTA PÉREZ-BOUZADA
EU Project & Communication Officer, REHVA

THE ENERGATE PROJECT:

ENERGATE will provide a smart energy marketplace for sustainable investments in buildings. The ENERGATE marketplace will be implemented through an ICT-based platform, which, on the one hand will aim to mobilise and accelerate the creation of National Energy and Climate Plans (NECP)-compatible credible project pipeline and on the other, it will aim to facilitate the financial closure and project implementation by offering standardisation, risk mitigation and appropriate "packaging" of investments. This will require a fully integrated matching and blending mechanism, fund management and of course the appropriate measuring and verification protocols. Here is a link to the website: https://energate-project.eu/.

THE ENERGATE EXPERT TALK:

The ENERGATE Expert Talk commenced with a keynote address by **Peter Sweatman**, Chief Executive and Founder at Climate Strategy & Partners. Peter, as sustainable finance expert, highlighted key points regarding the EU Renovation wave, emphasizing the untapped opportunities it presents, juxtaposed with the dearth of information and qualified services hindering renovations.

The discussion brought forth several pivotal insights regarding the imperative nature of annual deep renovations, estimated at 3.5 million, to effectively propel the energy transition. This staggering figure underscores the urgency and scale required to meet the evolving energy efficiency goals. A significant opportunity emerged from recognizing the vast potential locked within the €10 trillion home equity in Energy

ENERGATE ENERGY EFFICIENCY MARKETPLACE

Co-funded by the European Union under project ID 101076349. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them.

Renovation Loans (ERLs). This substantial equity represents a formidable resource that could be harnessed to provide substantial financial support for renovation endeavours. Amidst these deliberations, the importance of standardized processes offered by numerous authorized lenders stood out prominently. These standardized procedures are instrumental in streamlining the complex financing landscape, ensuring efficiency and reliability in securing funds for such critical projects. Peter advocated for the strategic utilization of existing financial tools like Zero Coupon, Guarantee, and Targeted Longer-Term Refinancing Operations (TLTRO) to further facilitate and bolster these renovation initiatives. Leveraging these established mechanisms could significantly support the financial aspects of the projects. Furthermore, the conversation underscored the necessity of aligning the interests of lending institutions with those of EU entities and customers. A concerted effort in this alignment is crucial to foster a collaborative approach that ensures sustainable financing and promotes the common objectives of all stakeholders involved. There was a clear call for instilling confidence among Member States to actively engage in renovation projects. Building this confidence is essential to encourage their enthusiastic participation and commitment toward achieving sustainable development goals within the region. Finally, the discourse emphasized the vital need for standardized legal contractual frameworks. These frameworks play a pivotal role in providing transparency, consistency, and security in financial agreements, ensuring that these initiatives are underpinned by robust and reliable contractual structures.

Following Peter, **Csaba de Csiky**, from the ENERGATE consortium, introduced the project, portraying it as a milestone initiative in energy project financing. He stressed the project's ability to bridge the institutional investor gap by amalgamating assets from various developers within a standardized quality and legal contractual framework.

The emphasis was placed on the importance of standardization across multiple dimensions within the project. This included standardization in three critical aspects: legal contractual frameworks, defining energy parameters for sustainable buildings, and standardizing data formats.

The key conclusions drawn from the discussion were centered on the pivotal role of finance in scaling sustainable energy assets in both the EU's Business-to-Consumer (B2C) and Business-to-Business (B2B) markets. It was underscored that standardized contracts play a crucial role in facilitating scalability. These contracts serve as the fundamental basis for trading Sustainable Energy Assets through securitization, thereby expediting deal closures and fostering market growth in energy efficiency. The discourse emphasized the importance of transitioning the HVAC (Heating, Ventilation, and Air Conditioning) sector to adopt an "HVAC as a Service" model. This transition was highlighted as crucial by REHVA Supporters, as it not only opens avenues for new potential clients but also standardizes services through the ENERGATE platform. ENERGATE's Smart Marketplace for Sustainable Investments was outlined as a platform that streamlines access to sustainable finance for renovation projects. It achieves this through matchmaking mechanisms and standardized presentations to potential investors. Furthermore, the advantages of employing standardized contracts were elucidated. These advantages include enabling contract multiplication and replication, providing off-balance sheet treatment, offering standardized flexibility for multipurpose use, and ultimately supporting the process of securitization. The role of securitization was underscored as a catalyst in meeting institutional investor requirements by commingling Energy Service Company (ESCO) receivables. This strategic approach is seen as a significant driver in propelling market growth in energy efficiency initiatives.

After Csaba, **Johann Zirngibl**, REHVA Vice- President, emphasized the importance of standardization across the renovation value chain and the crucial role of financial markets in driving the energy transition. There is a need for a common language between financial institutions and REHVA HVAC experts. Financial markets must play an important role in helping to address environmental issues. Therefore, Green bonds, the taxonomy, etc are defining what is green or not green to allow investors to assess and allocate capital to environmentally sustainable investments

After the presentation followed a panel discussion with:

- **Céline Carré**, Head of European Public Affairs, Saint-Gobain
- **Emil Iakabos**, CEO, East European Business Center E.E.B.C. (2-3 min intro)
- **Henk Kranenberg**, Senior Manager, Daikin Europe (2-3 min intro)

Céline Carré, provided insights emphasizing the acceleration of EU renovation objectives through financial standardization. She highlighted the significance of aligning the perspectives of financial institutions and consumers. Céline emphasized the necessity for standardized scaling methods and enhanced information dissemination strategies to achieve these goals. Henk Kranenberg, emphasized the pivotal role of trust-building in the renovation landscape. He underscored the importance of fostering partnerships based on mutual trust. Henk also discussed the transition towards selling services among the array of solutions being considered. Emil Iakabos expressed concerns about standardized contracts potentially favouring financial institutions' interests over those of customers. He brought attention to the need for balancing the advantages of financial standardization with the protection of customers' interests. Peter, during the discussion, advocated for a low-trust system, placing emphasis on leveraging data and evidence for informed decision-making processes. Csaba, offering his perspective, highlighted institutional reluctance stemming from apprehensions about stranded assets. He stressed the importance of incentivizing renovations to address these concerns and encourage participation.

The discussion also delved into the potential use of Lifecycle Assessment as a tool for bankers. While recognized as having potential value, its effectiveness in justifying 'green premiums' within the dynamic market was questioned.

In the closing remarks, there was an emphasis on the crucial role of regulations in driving the renovation market. Public funding was underscored as indispensable for ensuring energy security and delivering returns to the state, thereby solidifying the significance of governmental support in this domain.

WHAT ENERGATE SHOULD AIM FOR FOLLOWING THE DISCUSSION?

- ✓ *Bridge for Institutional Investors*: ENERGATE is positioned as a crucial initiative aiming to bridge the gap for institutional investors in energy project financing. The project intends to aggregate assets from various developers within a standardized quality and legal contractual framework. This approach aims to make these investments more attractive and feasible for institutional investors.
- ✓ Standardization for Financial Scaling: The platform emphasizes the significance of standardization in legal contractual frameworks, energy parameters for sustainable buildings, and potentially in other unspecified areas. Standardized approaches are seen as pivotal for scaling financial support in the energy sector.
- ✓ Advantages of Standardized Contracts: The platform promotes the use of standardized contracts, highlighting their benefits such as enabling contract multiplication, providing off-balance sheet treatment, offering standardized flexibility, and serving multiple purposes within energy project financing.
- ✓ Securitization and Market Growth: ENERGATE explores the role of securitization in energy financing, allowing the comingling of ESCO's (Energy Service Company) receivables. This process aims to meet institutional investor requirements and expedite market growth within the energy efficiency sector.
- ✓ Transition to Sustainable Buildings: ENERGATE's role is not solely financial but also about facilitating the transition to sustainable buildings. It aims to create opportunities for HVAC providers and other stakeholders to find potential clients within its platform, encouraging standardization of services aligned with the platform's categorization. ■

See you online!

energate-project.eu | ENERGATE Project | #energate_eu

OUR TEAM

Coordinator EPU N·T·U·A

flexiwatt · IEECP · REHVA · SUSTAINABLE CITY · enerbrain · GGGI · EnerSaveCapital · GREENESCO · commuty · LDK CONSULTANTS · RIGA PLANNING REGION · ENGINEERING

BELIMO

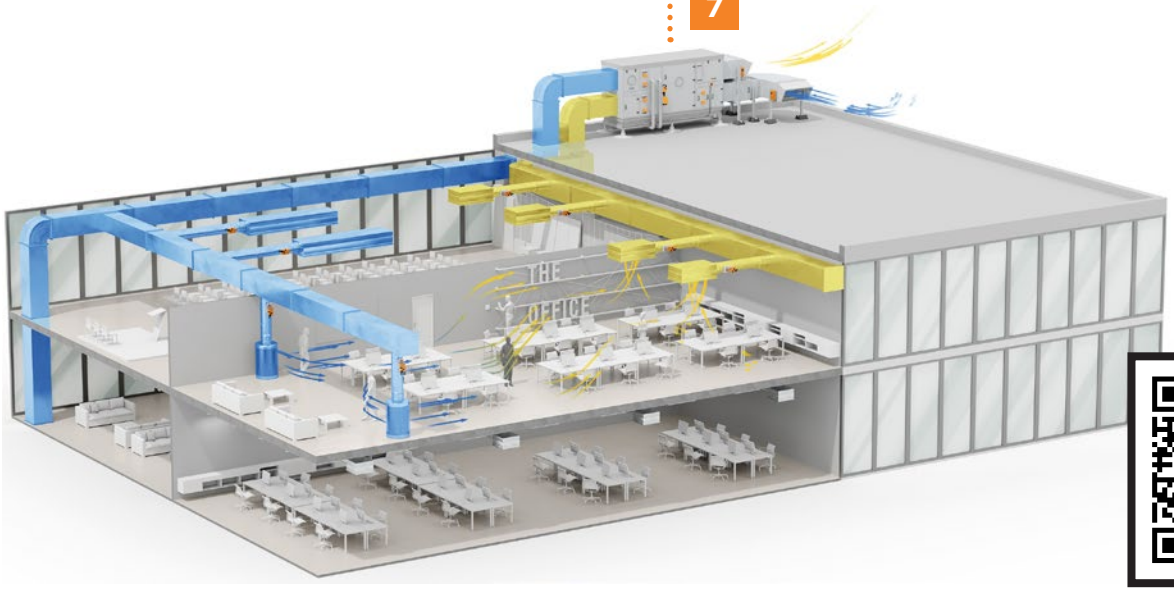
The Seven Essentials of Healthy Indoor Air

7. Proper amount of outside air

Today, a large proportion of small and medium-sized non-residential buildings do not have an automated, mechanical fresh air supply. It is often assumed that, from time to time, users ventilate by opening a window. If this does not occur, the concentration of infectious aerosols can greatly increase. A ventilation system with central air conditioning is therefore part of the minimum standard equipment to supply healthy indoor air when planning a new building or renovation. Many countries have issued recommended or mandated standards on mechanical ventilation in commercial buildings, as well as required minimum air exchange rates depending on the type of building and number of occupants. Other considerations focus on poor inner-city air quality in many countries. Ideally, outside air variables are measured before the air is mechanically introduced into a building. An automated system can supply more outside air when pollution levels from traffic and industry are low, and return to the minimum required ventilation rates when pollution levels increase.



7



Learn more about Belimo's 7 essentials of healthy indoor air:
https://www.belimo.com/ch/en_GB/indoor-air-quality/7-essentials-iaq

Scan the QR code

Exhibitions, Conferences and Seminars

Please send information of your event to Ms Marie Joannes mj@rehva.eu

January 2024		
19-24 January 2024	ASHRAE Winter Conference (ashrae.org)	Chicago, USA
March 2024		
3-8 March 2024	Light+Building 2024 (light-building.messefrankfurt.com)	Frankfurt, Germany
12-13 March 2024	53rd AiCARR International Conference (aicarr.org)	Milan, Italy
12-15 March 2024	MCE 2024 (mcexpocomfort.it)	Milan, Italy
April 2024		
22-25 April 2024	Roomvent 2024 (link)	Stockholm, Sweden
May 2024		
15-17 May 2024	REHVA Annual meeting 2024 (rehva.eu)	Istanbul, Turkey
June 2024		
9-11 June 2024	BuildSim Nordic 2024 (buildsimnordic2024.ibpsa-nordic.org)	Espoo, Finland
July 2024		
25-27 July 2024	IBPC 2024 (ibpc2024.org)	Toronto, Canada
October 2024		
9-10 October 2024	AIVC 2024 Conference (aivc.org)	Dubin, Ireland
June 2025		
4-6 June 2025	CLIMA 2025 (climaworldcongress.org)	Milano, Italy



TTMD represented international cooperations at ISK-SODEX Istanbul 2023

ISK-SODEX, which brings together representatives of the air conditioning sector from all over the world under one roof every two years and contributes significantly to the growth momentum of the sector with the collaborations it prepares the ground for, has ended.

Organized by Hannover Messe Sodeks Fair under the co-organization of TTMD, ISKAV, DOSIDER, İSKİD, İZODER and with the support of POMSAD, SOSİAD, ESSİAD, MTMD and KBSB, ISK SODEX Fair was held at Istanbul Expo Center between 25-28 October 2023.

Nearly 1,000 exhibitor brands from 19 countries participated in ISK-SODEX, where environmentally friendly, energy-recovering and highly efficient sustainable products stood out on an area of 120,000 square meters at the Istanbul Expo Center, while a total of 89,694 people, 15% of whom were from abroad, visited the fair. ISK-SODEX, where 25 sectoral forums and panels were held for 4 days, hosted nearly 1,000 participating brands, while nearly 300 VIP purchasing professionals from 69 countries were hosted at the fair.

TTMD participated in ISK SODEX this year with its international co-operations AEE (Association of Energy Engineers), EHPA (European Heat Pump Association), IBPSA (International Building Performance Simulation Association), IEA EBC TCP (International Energy Agency Energy in Buildings and Communities Technology Collaboration Program), IEA ES TCP (International Energy Agency Energy Storage Technology Collaboration Program), IEA SHC TCP (International Energy Agency Solar Heating Cooling Technology Collaboration Program) and REHVA (Federation of European Heating, Ventilation and Air Conditioning Associations).

At ISK-SODEX Fair, which was attended by industry professionals from 114 countries including Germany, Italy, Greece, Romania, Bulgaria, Bulgaria, Kosovo, Azerbaijan, Uzbekistan, Georgia, Morocco, Tunisia, Egypt, Iraq, the booth where TTMD and its international co-operations took place attracted great attention. In addition, EHPA representatives participating in the fair had the chance to develop various business and partnerships by making B2B meetings. At the TTMD booth, information was given about the CLIMAMED Congress to be held in Istanbul in 2024 and the TTMD International HVAC&R Technologies Symposium, which is planned to be held online in October 2024. TTMD informed the participants about international co-operations and their impact in leveraging the innovation towards decarbonization.

ISK-SODEX, which also hosted the Buyer Delegation Program organized by the Turkish HVAC&R Exporters Association (ISIB), hosted nearly 300 VIP purchasing officials from 69 countries within the scope of the program. Purchasing professionals met with exhibitors for 3 days and held bilateral meetings. The next ISK-SODEX exhibition, which brings the global air conditioning industry together every 2 years, will be held at Istanbul Expo Center on October 22-25, 2025.

Contact information: Bestekar Cad. Çimen Apt. No. 15/2 K.Dere / Ankara Tel: 312 419 45 71 72 ttmd@ttmd.org.tr www.ttmd.org.tr ■





light+building 2024 : be electrified

March 3-8, 2024
Frankfurt, Germany
www.light-building.messefrankfurt.com



During Light + Building from 3 to 8 March 2024, Frankfurt Fair and Exhibition Centre will revolve fully around the motto 'Be Electrified'. Over 2,000 national and international exhibitors have so far registered to make live presentations of their innovations from the fields of intelligent lighting technology and future-oriented home and building-services technology. All will be showing solutions for the sustainable, safe and convenient use of homes and buildings. For architects, interior architects, designers, planners and engineers, as well as for artisans, the trade and industry, Light + Building is the leading innovation show for the built-up world.

Ahead with intelligent building-services technology

Tomorrow's homes and buildings will use regenerative sources of energy, have efficient and economic energy-management systems and simultaneously offer not only comfort but also safety and security. Forming the basis for this, the electro-technical infrastructure is the prerequisite for home and building automation, energy storage and management, the integration of photovoltaic systems and charging stations, as well as electricity-based sources of heat. The focus in the western section of Frankfurt Fair and Exhibition Centre – in Halls 9, 11 and 12 – will be on the latest products and solutions for these subject areas. Branded 'Intersec Building', the safety and security section will be in Hall 9.0. Many of the sector's key players are to be found among the over 2,000 exhibitors. The Contactor search engine offers a compact overview of all exhibitors and their product portfolios at www.light-building.com/contactor.

Events: that extra special trade-fair experience

The Building Plaza in Hall 9.0 is the meeting place for knowledge transfer, a positive experience and inspiration in the field of building-services technology. This is the location, for example, of the 'Energiewendebauen' congress, which will provide a comprehensive update on innovations for sustainable energy supply in buildings and neighbourhoods at the interface between research and practice. One day will be dedicated to the subject of connected safety and security with several events. The European industry organisation REHVA will also provide information on energy efficiency and comfort in heating, ventilation and air-conditioning systems. Also within the framework of Light + Building, the 12th German Energy Consultants' Day will focus on energy-efficient construction and modernisation.

Up-to-the-minute information about the programme of events can be found at www.light-building.com/events ■

mostra convegno expocomfort

In the business of building businesses

MCE - Mostra Convegno Expocomfort 2024

March 12-15, 2024
Fiera Milano

MCE - Mostra Convegno Expocomfort presents the news for its 43rd edition to be held in Fiera Milano from March 12 to 15, 2024.

MCE, the sector's prestigious showcase, has broadened its horizons with its leading role over the years, governing the increasingly wide-ranging and essential changes, following a path to increase its part as a global business platform. At the show, companies in the sector meet new customers and forge stronger relationships with those who design, install and build comfortable living solutions and systems in the industrial, residential and commercial sectors. This new approach is profoundly transforming the offer of MCE, which from a biennial event to create the business, enters the market with a new look and a new positioning, in tune with the new RX market position.

The first change was made to the image, giving it a modern, digital soul, encapsulating both the legacy of the past and the path to future evolution. The new claim "*Beyond Comfort*" is the container for a series of initiatives whose key element is the declination of all MCE activities on the three guidelines influencing the world: "Innovation", "Sustainability" and "Energy Efficiency".

"*The concept of comfort is constantly evolving. Technological innovation and sustainability not only environmentally friendly are the areas that most impact change;* air quality, thermal and acoustic comfort, new energy sources, RECs, and industrial efficiency are some of the aspects that MCE will place at the core of its activities. – *stated Massimiliano Pierini, Managing Director of RX Italy –. The main mission of MCE's new visual identity is to take our exhibitors and partners into tomorrow's world, to inspire and support their strategic company's vision".*

Most importantly, this edition will be the first to introduce the ground-breaking concept layout devoted to *Indoor Climate*, which will represent technological convergence, offering a unique and exclusive overview of the solutions that the new requirements imposed by the market evolution demand.

"*The format of the 43rd edition of MCE stems from listening to our primary stakeholders, Exhibitors and Visitors, with whom we collaborate and dialogue by involving their representative associations in the Scientific and Promoting Committee.* - said Massimiliano Pierini. – *The first significant innovation is the shift away from the usual hot/cold split to pursue the concept of Beyond Comfort, which sees the indoor climate and, thus, the integration of diverse technologies as its focus."*

The new allocation of the spaces aims to assist professionals during their visit by highlighting the latest innovative solutions that offer optimal comfort in all living and working environments. The exhibition layout will provide a logical pathway that will allow visitors to optimise their time and guided tours for technological solutions while at the same time providing better visibility for exhibiting companies, facilitating the meeting of supply and demand. We will add connections enabling direct access between the various halls to simplify the pathway.

"*The industry is ready to return to the sector's leading event showcasing all the most innovative technologies in indoor climate and energy efficiency on the conventional scheduled date."* - concluded Pierini. *"We are currently working on creating a well-balanced event with critical points of interest in each hall, in line with the new requirements imposed by an evolving market. By implementing this, we can better handle an increase in exhibitors, manage our space more efficiently, and enhance the experience for visitors."*

MCE - MOSTRA CONVEGNO EXPOCOMFORT is built by RX, a company in the business of building businesses for individuals, communities and organisations. We elevate the power of face-to-face events by combining data and digital products to help customers learn about markets, source products and complete transactions at approximately 400 events in 22 countries across 42 industry sectors. www.rxglobal.com ■

Climamed Mediterranean Congress of Climatization

istanbul 2024

CALL FOR PAPERS

17-18 MAY 2024 istanbul

The 11th HVAC Mediterranean Congress, Climamed 2024, integrated in the 3 years cycle of REHVA related conferences (Clima, Climamed and Cold Climate), is under the responsibility of a set of five HVAC associations of Southern Europe countries, that assure the membership of the respective countries in REHVA:

- AiCARR (Associazione Italiana di Condizionamento dell'Aria, Riscaldamento e Refrigerazione), from Italy;
- AICVF (Association des Ingénieurs et techniciens en Climatique, Ventilation et Froid), from France;
- ATECYR (Asociación Técnica Española de Climatización y Refrigeración), from Spain;
- OE (Ordem dos Engenheiros), from Portugal;
- TTMD (Turkish Society of HVAC and Sanitary Engineers), from Türkiye.

Climamed 2024 will be hosted by TTMD Turkish Society of HVAC and Sanitary Engineers in İstanbul, between 17th-18th of May 2024, with the motto of **"Towards Decarbonized Buildings and Cities"** intending to represent a meaningful contribution to the solution of the problems posed to humanity by Urban Heat Island phenomenon.

The congress expects researchers to contribute to the congress in the following areas:

- Low Energy Cooling Systems
- Internet of Things and GIS for HVAC Construction and Monitoring
- Urban Microclimate and Warm Climate HVAC Solutions and Regulations
- Ventilation Systems and Strategies
- Sustainable Energy Use in Buildings and Energy Efficiency
- Building Management, Maintenance and Commissioning
- Standardization & Regulations
- Advances in Systems and HVAC Equipment for the Resilience to Climate Changes
- Zero Energy Buildings and Retrofitting
- Modeling, Simulations and Integrated Design
- Indoor Environmental Quality and Occupants' Behavior



The abstracts should be submitted through Climamed website by 2nd of February, 2024.

www.climamed.org www.live.ttmd.org.tr

AIVC TightVent Europe BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM venticool the international platform for ventilative cooling

44th AIVC, 12th TightVent & 10th venticool Conference

October 9-10, 2024
Croke Park, Dublin, Ireland



Retrofitting the Building Stock: Challenges and Opportunities for Indoor Environmental Quality

Conference Scope

In a world striving to achieve carbon neutrality by 2050, it is imperative to strike a balance that sustains both our environment as well as the health and comfort of the individuals inhabiting buildings. Considering that 90% of the current buildings are projected to remain in the year 2050, retrofitting the existing building stock is paramount to reaching decarbonization goals.

From the perspective of climate goals, reducing energy use in the built environment via energy retrofit and climate neutral newly constructed buildings are critical. However, it is crucial to prioritize indoor environmental quality when reducing energy usage to meet climate targets. Well-designed and executed retrofits are needed to reduce carbon emissions while ensuring healthy indoor environments. Building retrofit professionals, energy conservation experts, ventilation system designers & installers, and indoor air quality specialists must collaborate on innovative solutions to achieve these multifaceted objectives. AIVC 2024 will serve as a multidisciplinary platform to address the emerging challenges by exchanging cutting-edge ideas, research findings, policies and industrial experiences.

The conference organizers invite contributions centered around the pivotal role of ventilation, airtight building and ductwork designs, and ventilative cooling solutions in enhancing Indoor Environmental Quality (IEQ) and overall health in existing buildings. Case studies demonstrating innovative solutions are also welcome.

Conference Concept

The conference will consist of parallel sessions largely devoted to:

- Smart ventilation, Indoor Air Quality and health
- Building and ductwork airtightness
- Ventilative cooling – Resilient cooling

The conference will consist of a mixture of invited presentations and presentations in response to a call for papers, organized in structured sessions focused on the conference topics. Some sessions will consist of presentations from the call for papers only, while other sessions will be topical sessions with presentations proposed by a session organizer or by the organizing committee. The conference is combined with an exhibition by industry partners.

Conference topics

Smart ventilation, Indoor Air Quality and health:

- Integration of ventilation in building energy retrofits
- Associated health benefits of energy retrofits
- Strategies to reduce exposure to outdoor and indoor air pollutants (filtration, air cleaning, source control)
- Resilient approaches in IAQ management (infection control, hazardous events, etc.)
- Inspection, monitoring, maintenance, reliability and durability of ventilation systems

- Model based data analytics and control strategies for smart ventilation, including the role of consumer-grade IAQ sensors
- Building Information Modelling (BIM), Life Cycle Assessment (LCA) and ventilation systems
- Standards, policies and legislation.

Building and ductwork airtightness

- Role of airtightness in building energy retrofits
- Energy and IAQ impact of envelope and ductwork leakage
- Innovative measurement and airtightening techniques
- Compliance schemes for airtightness
- Long-term performance: durability of airtightness

Ventilative cooling - Resilient cooling:

- Role of ventilative and resilient cooling in building energy retrofits
- Occupant IEQ perception and satisfaction
- Resilient approaches to extreme heat events and climate change
- Control strategies and personal comfort control
- Standards, legislation and compliance tools

Conference organizers

The conference is an initiative from:

- the International Network on Ventilation and Energy Performance (INIVE) on behalf of the Air Infiltration and Ventilation Centre (AIVC), the Building and Ductwork Airtightness Platform (TightVent Europe), and the platform for resilient ventilative cooling (venticool);
- the University of Galway;
- the Maynooth University; and
- the Sustainable Energy Authority of Ireland (SEAI)

Important dates

The AIVC board offers authors the opportunity for a peer review of their paper. The procedure will be twofold including 2 separate calls for abstracts & papers depending on whether the authors are interested in the peer review of their papers or not.

The AIVC scientific committee seeks ideas for topical sessions organised within the conference. Proposals focusing on the main conference themes & topics are welcome.

- Authors **INTERESTED in the peer review of their papers** (review of abstract and paper) should submit their abstracts by: **January 8, 2024**

- Authors NOT INTERESTED in the peer review of their papers (only review of abstract) should submit their abstracts by **March 18, 2024**

- The deadline to submit proposals for **topical sessions** is **January 8, 2024**

Detailed information & other important deadlines for the call for abstracts can be found at:
https://aivc2024conference.org/call-for-abstracts-papers/

Detailed information & other important deadlines for the call for topical sessions can be found at:
https://aivc2024conference.org/call-for-topical-sessions/

Conference website

For further information please visit:
https://aivc2024conference.org/ ■



REHVA
Federation of European Heating, Ventilation and Air Conditioning Associations

MEMBERS

ATIC vzw–asbl – Belgium
www.atic.be

BAOVK – Bulgaria
www.baovk.bg

STP – Czech Republic
www.stpcr.cz

DANVAK – Denmark
www.danvak.dk

EKVU – Estonia
www.ekvy.ee

FINVAC – Finland
www.finvac.org

AICVF – France
www.aicvf.org

VDI–e.V. – Germany
www.vdi.de

ÉTÉ – Hungary
www.eptud.org

MMK – Hungary
www.mmk.hu

AiCARR – Italy
www.aicarr.org

AHGWTEL/LATVAC – Latvia
www.lsgutis.lv

LITES – Lithuania
www.listia.lt

AIIRM – Republic of Moldova
www.aiirm.md

TVVL – The Netherlands
www.tvvl.nl

NEMITEK – Norway
www.nemitek.no

PZITS – Poland
www.pzits.pl

ORDEM DOS ENGENHEIROS – Portugal
www.ordemengenheiros.pt

AFCR – Romania
www.criofrig.ro

AGFR – Romania
www.agfro.ro

AIIR – Romania
www.aiiro.ro

KGH c/o SMEITS – Serbia
www.smeits.rs

SSTP – Slovakia
www.sstp.sk

ATECYR – Spain
www.atecyr.org

SWEDVAC – Sweden
www.emtf.se

DIE PLANER – Switzerland
www.die-planer.ch

TTMD – Turkey
www.ttmd.org.tr

CIBSE – United Kingdom
www.cibse.org

Network of 26 European HVAC Associations joining 120 000 professionals

REHVA Office: Rue Washington 40, 1050 Brussels - Belgium • Tel: + 32 2 514 11 71 - info@rehva.eu - www.rehva.eu

REHVA
Federation of European Heating, Ventilation and Air Conditioning Associations

SUPPORTERS

Leaders in Building Services

Daikin Europe – Belgium
www.daikin.eu

EPEE – Belgium
www.epeeglobal.org

EVIA – Belgium
www.evia.eu

Velux – Denmark
www.velux.com

Granlund – Finland
www.granlund.fi

Halton – Finland
www.halton.com

Uponor – Finland
www.uponor.com

Eurovent Certita Certification – France
www.eurovent-certification.com

LG Electronics – France
www.lgeaircon.com

Saint-Gobain – France
www.saint-gobain.com

Viega – Germany
www.viega.com

Aermec – Italy
www.aermec.com

Rhoss – Italy
www.rhoss.com

Royal Haskoning DHV – The Netherlands
www.royalhaskoningdhv.com

SMAY – Poland
www.smay.eu

E.E.B.C. – Romania
www.eebc.ro

Dosetimpex – Romania
www.dosetimpex.ro

Sunfly Europe – Serbia
www.sunflyeurope.com

Camfil – Sweden
www.camfil.com

Fläkt Group – Sweden
www.flaktgroup.com

Lindab – Sweden
www.lindab.com

Swegon – Sweden
www.swegon.com

Systemair – Sweden
www.systemair.com

Belimo Automation – Switzerland
www.belimo.com

Arçelik – Turkey
www.arcelikglobal.com

Friterm Termik Cihazlar Sanayi ve Ticaret – Turkey
www.friterm.com

REHVA ASSOCIATE ORGANISATIONS:

Airscan – Belgium
www.airscan.org

ECI – Belgium
copperalliance.org

OAER – Romania
www.oaer.ro

ISIB – Turkey
www.isib.org.tr

SRI2MARKET

Inspiring action for smarter buildings



SRI2MARKET uses good practices to support the rolling out of the Smart Readiness Indicator (SRI) in Austria, Cyprus, Greece, Spain, Croatia, and Portugal.

HOW?

Setting up national campaigns

- Consulting national stakeholders
- Adapting the SRI calculation to national specificities
- Providing recommendations for policy makers and building owners
- Designing public funding schemes
- Exploring alternative paths to SRI certification

Developing a SRI assessment tool

- Enhancing the SRI calculation
- Running pilot cases to test the tool
- Training assessors
- Linking with Energy Performance Certificates

Get in touch
Dimitris Athanasiou
dimitris@ieecp.org

ieecp.org/projects/sri2market

Co-funded by the European Union under grant no. 101077280.