

venticool
the international platform for ventilative cooling



IEA EBC
Annex 62
The IEA project
on ventilative cooling
EBC

Brussels, Belgium
23 October 2017

Ventilative cooling in buildings: now & in the future
International Workshop

Future challenges and opportunities

Peter Wouters

INIVE - BBRI



Structure of the presentation

- Summer comfort and ventilative cooling assessment in the past
- Present EPBD: Various challenges & Indoor Climate
- EPBD revision - Smartness indicator
- Can BIM be a game changer?
- Conclusions

IEA SHC Task 13 (1989-1994): The PLEIADE dwelling



Passive Low
Energy Innovative
Architectural
DEsign

Philosophy of the building design

A number of objectives

Thermal comfort
- winter
- summer
Indoor Air Quality

A number of techniques

A practical example



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PASCOOL
Project ID: JOU20013
Funded under: [FP3-JOULE 2](#)

Passive Cooling for Buildings
From 1992-11-01 to 1995-09-30

NatVent

[Introduction](#)

[About NatVent](#)

[Products](#)

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Introduction


Welcome to the *NatVent* web site.

A common barrier when adopting natural ventilation in buildings located in urban environments is the potential exposure to external pollutants. Whilst mechanical ventilation systems can draw air through cleaning filters the driving pressures associated with naturally ventilated buildings are too low.

A strategy suitable for naturally ventilated buildings includes, identifying sources of pollution surrounding buildings and positioning air inlet devices in a sensible way.

The interactive design tool identifies all urban sources of pollution and indicates how different ventilation approaches will determine the type of pollution control features required within air inlets. Since size of air inlets in relation to ventilation performance is also an important issue, design tools are attached that calculate appropriate opening areas.

EU NATVENT project
(1996-1998)



Overcoming technical barriers to low-energy natural ventilation in office type buildings in moderate and cold climates.

Barrier Reports

Belgium - Barriers to Natural Ventilation Design of Office Buildings	bbar.pdf
Denmark - Barriers to Natural Ventilation Design of Office Buildings	dkbar.pdf
European - Barriers to Natural Ventilation Design of Office Buildings	eubar.pdf
Great Britain - Barriers to Natural Ventilation Design of Office Buildings	ukbar.pdf
Norway - Barriers to Natural Ventilation Design of Office Buildings	nbar.pdf
Netherlands - Barriers to Natural Ventilation Design of Office Buildings	nibar.pdf
Sweden - Barriers to Natural Ventilation Design of Office Buildings	sbar.pdf
Switzerland - Barriers to Natural Ventilation Design of Office Buildings	chbar.pdf

Technological solutions

Ventilation Technologies in Urban Areas	3.1_air_supply_1.pdf
Air Inlet For Noisy And Polluted Urban Environments	3.1_air_supply_2.pdf
Controlled Air Flow Inlets	3.2_controlled_air_flow.pdf
Heat recovery In Natural Ventilation Design of Office Buildings	3.3_heat_recovery.pdf
Control of Night Cooling with Natural Ventilation	3.4_night_cooling1.pdf
Prototype of Night Ventilator for Cooling	3.4_night_cooling2.pdf
Practical Guidelines for Integrated Natural Ventilation Design	3.5_integration_&_maintenance.pdf



Annex 35

IEA - ECBCS Annex 35 HybVent

[Background](#) [Objectives](#) [Products](#) [Research Programme](#)

Annex 35

Pilot Study Buildings

Annex 35 HybVent - is a taskshared international research project initiated by the IEA Implementing Agreement "Energy Conservation in Buildings and Community Systems (ECBCS)". Annex 35 is a four-year project running from 1998-2002 with about 30 research institutes, universities and private companies from 15 countries world wide participating.



Publications

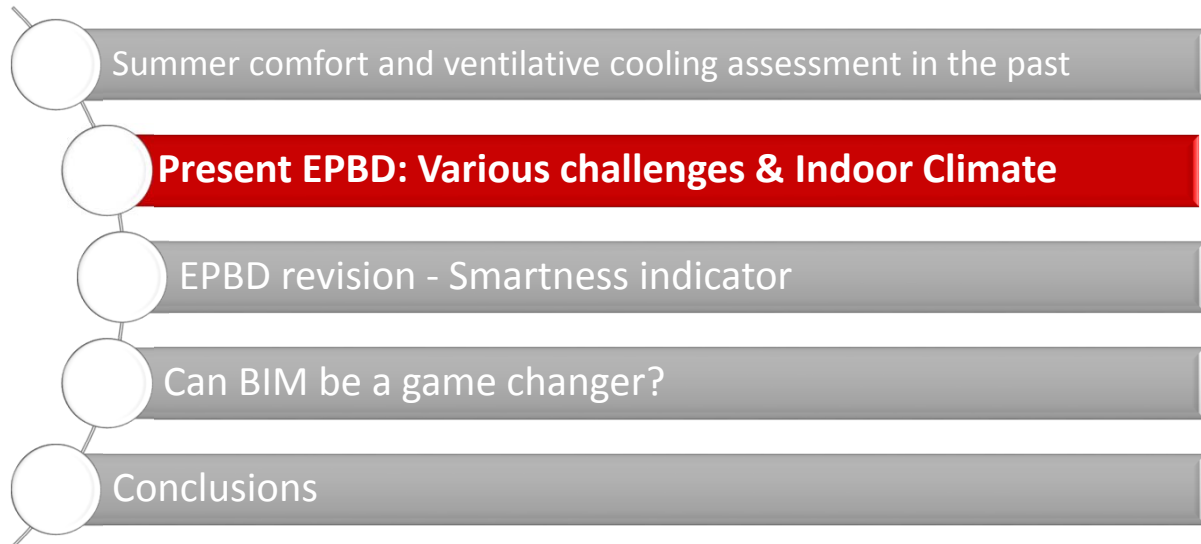
Contacts and Participants

The project has been followed up by an EU project [RESHYVENT](#), which focuses on hybrid ventilation in residential buildings.

Project area

Site guide

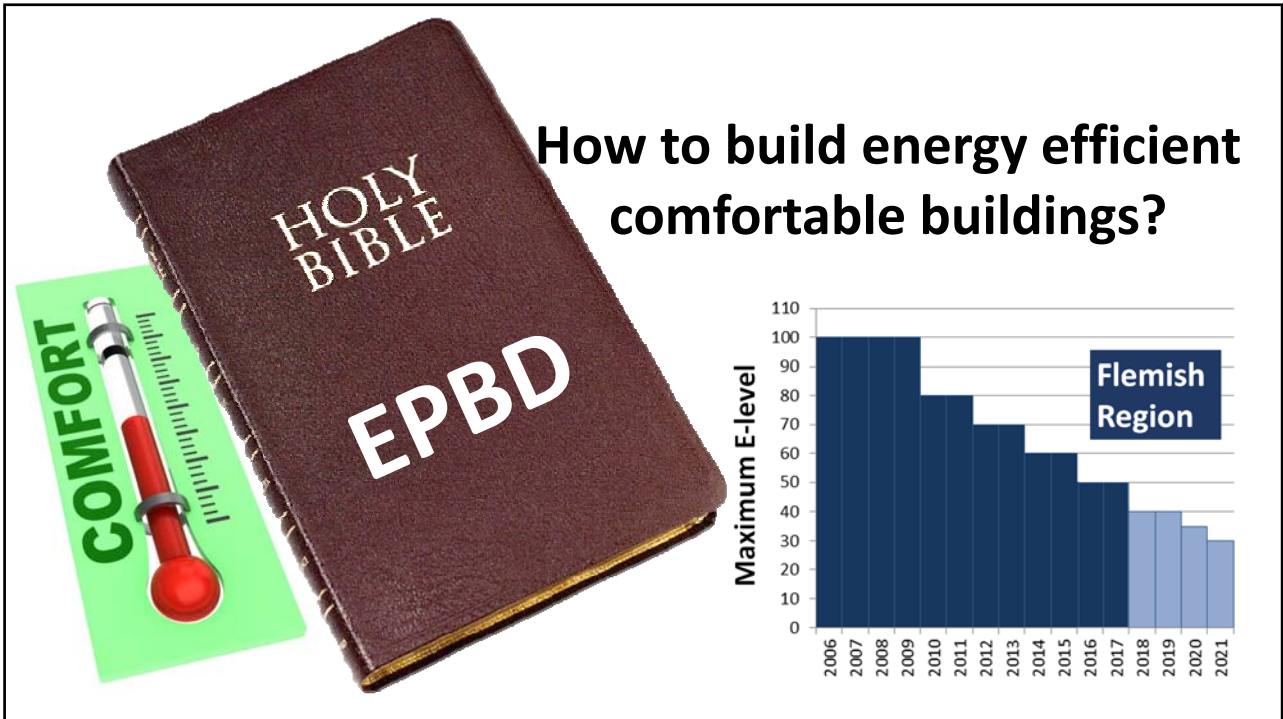
Structure of the presentation



EPBD List of Available Country Fact Sheets

- > Austria
- > Belgium Brussels
- > Belgium Flanders
- > Belgium Walloon
- > Bulgaria
- > Croatia
- > Cyprus
- > Czech Republic
- > Denmark
- > Estonia
- > Finland
- > France
- > Germany
- > Greece
- > Hungary
- > Ireland
- > Italy
- > Latvia
- > Lithuania
- > Luxembourg
- > Malta
- > Netherlands
- > Norway
- > Poland
- > Portugal
- > Romania
- > Slovak Republic
- > Slovenia
- > Spain
- > Sweden
- > United Kingdom | England
- > United Kingdom | Northern Ireland
- > United Kingdom | Scotland
- > United Kingdom | Wales



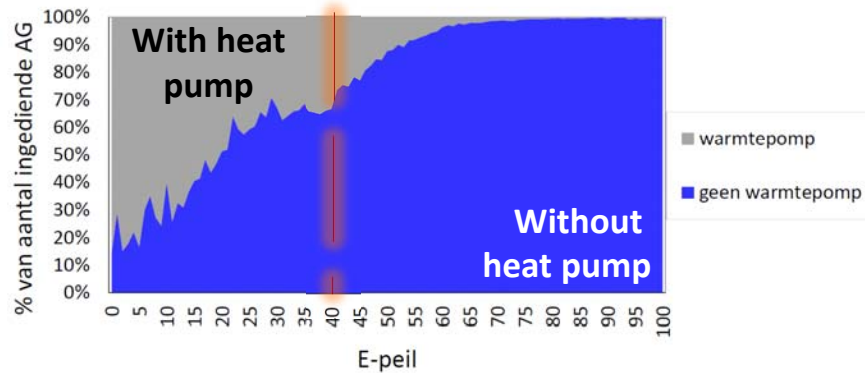


Challenges for NZEB buildings

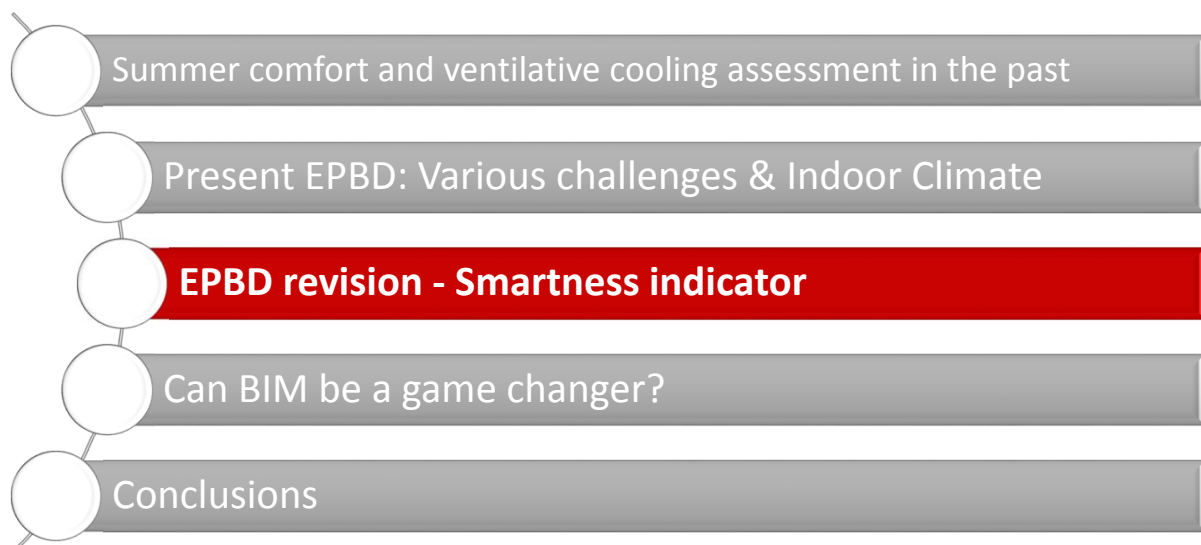
- NZEB = “nearly zero energy buildings”
- **Good indoor climate**
 - Thermal comfort
 - “Warm enough”: nearly no challenge
 - **“Not too warm”: challenging**
 - Not evident given the very high insulation levels and gains
 - In terms of a correct EPBD related assessment
 - Climate change
 - Indoor air quality
 - Acoustical comfort
 - Visual comfort

Link E-peil en toepassen WP woningen

► Percentage geïnstalleerde WP stijgt bij dalend E-peil



Structure of the presentation





Brussels, 30.11.2016
COM(2016) 765 final

2016/0381 (COD)

Proposal for a

DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

amending Directive 2010/31/EU on the energy performance of buildings

From Commission proposal to new Directive...

COUNCIL:

- The Council reached a **General Approach** on 26 June 2017.

EUROPEAN PARLIAMENT:

- The **ENVI** (Environment, Public Health and Food Safety) Committee voted its **opinion** on 7 September
- The **ITRE** (Industry, Research and Energy) Committee voted its report on 11/12 October 2017.

European Parliament
2014-2019



Committee on Industry, Research and Energy

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News & Events

Build Up Home / News & Events / EU Parliament ITRE Committee votes for highly energy-efficient buildings by 2050

EU Parliament ITRE Committee votes for highly energy-efficient buildings by 2050

12 October 2017 / Pan European EU Institutions

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Information about this post

Type of News News from the EU

Themes Energy policies, Legislation, regulations, standards, Energy performance certification, Building envelope (walls, windows,...), Heating, domestic hot water, Air conditioning, cooling, ventilations, air infiltration, Controls, energy management systems, Energy efficiency technologies and resilient-energy-union-wit...

Author(s) (organisation) European Parliament

Submitted by: Arifa Fytrou-Moschopoulou (SYMPRAOSIS TEAM)

Source languages English


Tag Cloud

EPBD - Energy Performance of Buildings Directive (2010/31/EU)
Clean Energy for All Europeans | building energy performance
energy refurbishment / renovation / retrofitting
NZEB - Near Zero-Energy Buildings

Shutterstock / Rpoem Wylejch

New measures to ensure that all new buildings in the EU are as energy-efficient as possible by 2050 were agreed by the Industry, Research and Energy Committee (ITRE) of the European Parliament.

ITRE also voted to enter inter-institutional talks with the Council and Commission, which, if green-lit by the full plenary session on 26 October, means Bendtsen will be able to sit down at the first triilogue meeting, earmarked for 7 November.



BUILD UP The European Portal For Energy Efficiency In Buildings

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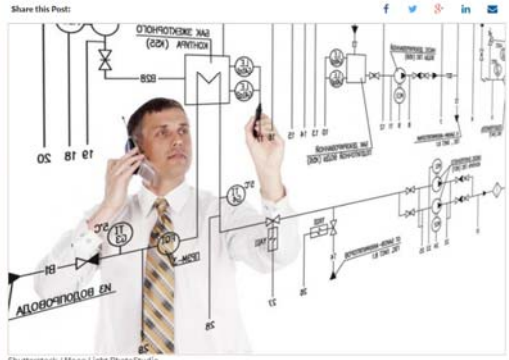
Learn

Build Up Home / Learn / Ask the Experts / What can be said about a smartness indicator?

What can be said about a smartness indicator?

01 March 2017

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Information about this post

Country Pan European

Themes Energy policies, Legislation, regulations, standards, Energy performance certification, Energy efficiency technologies and materials, Building operation, monitoring, energy management

Submitted by: Maria Kapsalaki (INVE EEIG)

Answered by: Peter Wouters (INVE eeig)

Answered on Wednesday, 1 March, 2017

Tag Cloud

smart buildings
EPBD - Energy Performance of Buildings Directive (2010/31/EU)
EC - European Commission
EPC - Energy Performance Certificate
Clean Energy for All Europeans

As part of the proposals released by the European Commission on November 30 2016, the introduction of a 'smartness indicator' is foreseen.

Indoor climate
Smart grid
Building operation

...

What to do if no wind?

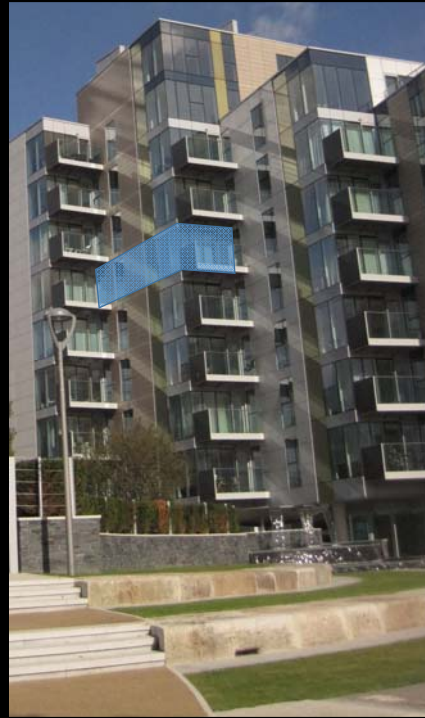
What to do if no sun?

Storage is (still) very expensive

'Flexible/smart' buildings!



**Smartness indicator:
At dwelling level...**



**Smartness indicator:
At building level...**

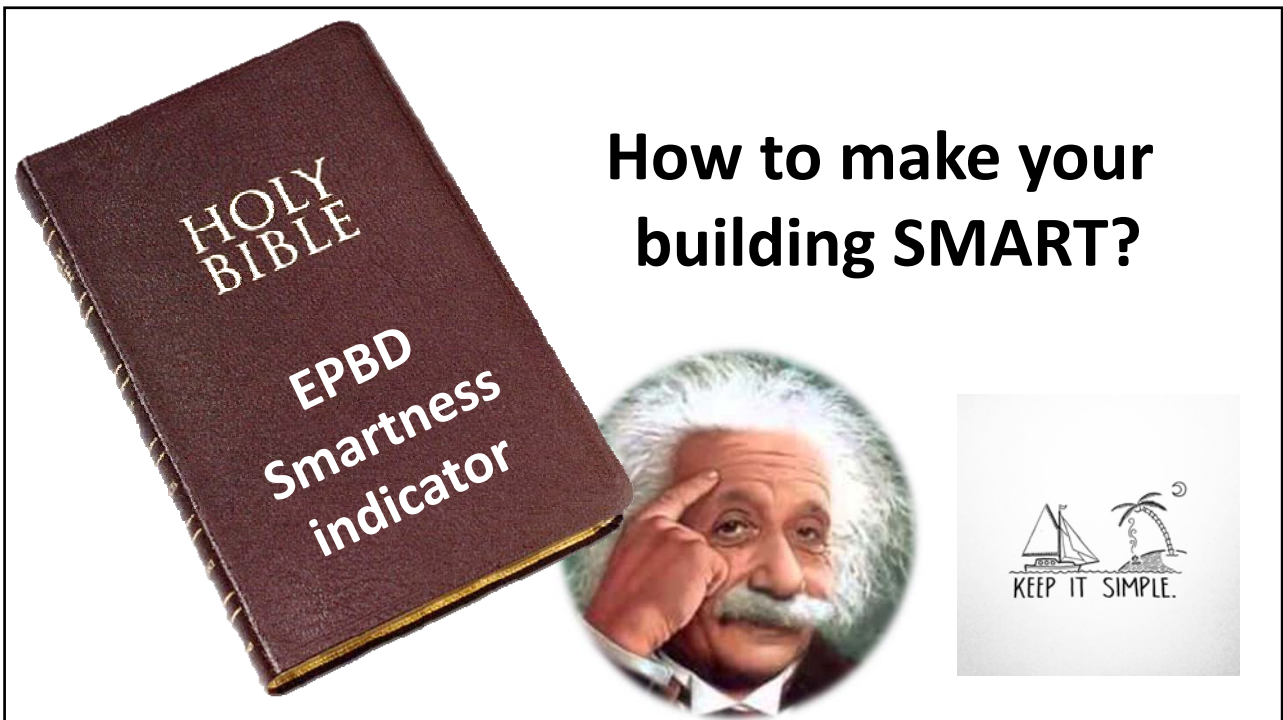


Smartness indicator:
At city level...



Important to stimulate further developments and avoid
to become a barrier for innovation

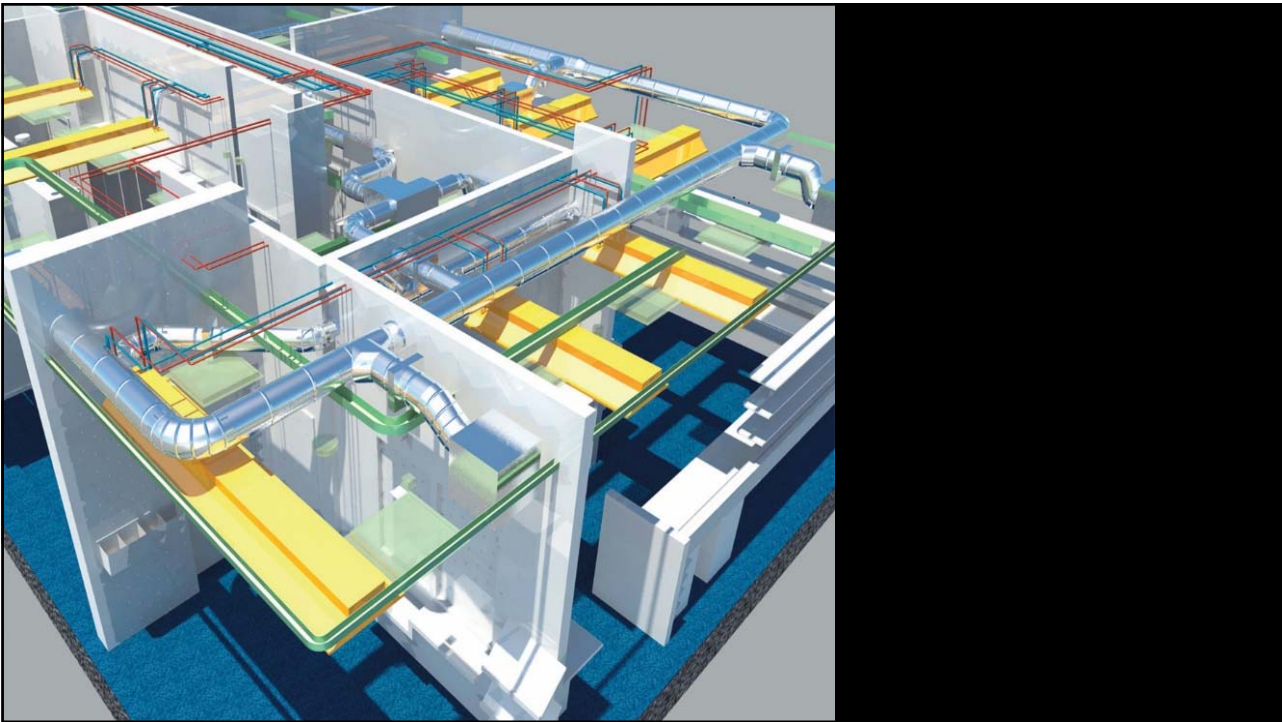
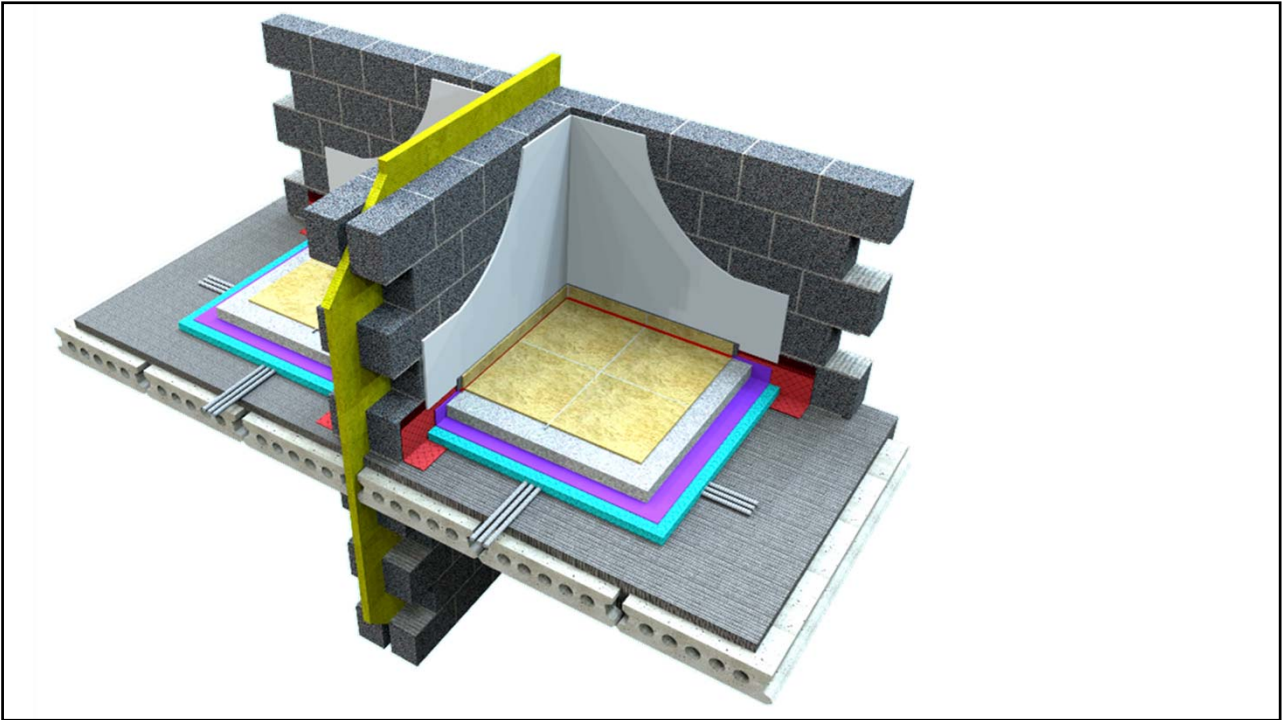
Smart control is very important for robust ventilative cooling strategies



How to make your building SMART?

Structure of the presentation

- Summer comfort and ventilative cooling assessment in the past
- Present EPBD: Various challenges & Indoor Climate
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- Can BIM be a game changer?**
- Conclusions





Can BIM be a disruptive technology for EPC assessment?



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BIM is in many EU countries high on the agenda. This article is focusing on the potential of BIM in relation to the energy performance of building assessment and also in relation to a better quality of the works.

Keywords: EPC, BIM, quality, standardisation, QUALICheck

According to Wikipedia¹, building information modelling (BIM) is a process involving the generation and management of digital representations of physical and functional characteristics of places. Building information models (BIMs) are files (often but not always in proprietary formats and containing proprietary data) which can be extracted, exchanged or networked to support decision-making regarding a building or other built asset. Current BIM software is used by individuals, businesses and government agencies who plan, design, construct, operate and maintain diverse physical infrastructures, such as water, refuse, electricity, gas, communication utilities, roads, bridges, ports, tunnels, etc.

¹https://en.wikipedia.org/wiki/Building_information_modeling

BIM developments in Europe

The future market uptake of BIM is difficult to predict with great accuracy, but it clearly is a development with great potential.

- In terms of requirements, an increased number of countries impose the use of BIM for certain types of projects, e.g.:
- Since 2007, obligatory in Norway for public buildings, in Finland for any project above 2 M€ and in the USA for any major project
 - Since 2012 mandatory in the Netherlands for any major public project
 - Since 2014 mandatory in Hong Kong for any public project
 - Since 2016 mandatory in South Korea for any project above 50 M\$ and in the UK for public projects

QUALICheck responds to the challenges related to compliance of Energy Performance Certificate (EPC) declarations and the quality of the building works. Find out more at <http://qualicheck.com>

The QUALICheck project is co-funded by the Intelligent Energy Europe Programme of the European Union. The sole responsibility for the content of this article lies with the author(s). It does not necessarily reflect the opinion of the European Union. Neither the IESAME nor the European Commission are responsible for any use that may be made of the information contained therein.



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BIM developments in Europe

- In a 2016 report 'Shaping the Future of Construction – A breakthrough in mindset and technology' by the **World Economic Forum**, prepared in collaboration with the Boston Consulting Group, the market view on a whole range of new technologies has been collected.
- From this survey, **it appears that integrated BIM has the highest likelihood AND the highest expected impact on the construction sector in the future** compared to thirteen other new technologies (such as advanced building materials, augmented reality, 3D printing of components, big data analytics...).



Crucial that we further improve our EPBD approaches... But...



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Energy in Buildings and
Communities Program

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ONGOING PROJECTS
COMPLETED PROJECTS

EBC Annex 45 Energy-Efficient Future Electric Lighting for Buildings

Status: Completed (2004-2010)

What can BIM mean for EPC calculations?

- At present, the **calculation of the EPC of a building is an activity on its own.**
 - One has to collect all input data (surfaces, volumes, product and system data, ...) and enter them into the software tool.
 - This can be very time consuming.
- With BIM, and of course depending on the level of development of the BIM approach, **all the input data for EPC calculations are part of the BIM model.**
- Of course, specific tools have to be developed for the EPC calculations, with the ability to use BIM files for input data, and to generate results that are integrated into the BIM.
- Such **BIM approach can very substantially reduce the required efforts** for producing an EPC.



What can BIM mean for EPC calculations?

- For the **assessment of overheating risks.**
 - At present, most countries use simplified procedures which only give a rough indication of the risk of overheating and/or the related energy consumption for achieving appropriate thermal comfort.
 - With a detailed BIM model, much more refined assessment methods can be used without requiring specific efforts for collecting input data.
- Most countries have at present (very) simplified procedures to assess the energy performance of **HVAC systems.**
 - With BIM, a more refined assessment becomes possible as the actual characteristics of the systems are easily available.



BIM and standardisation

- In order to accelerate the market uptake of BIM, **standardisation of protocols is important.**
 - Within **CEN, TC 442** (Building Information Modelling) was created in September 2015.
 - In **ISO, TC 59** (Buildings and civil engineering works) is also dealing with BIM.
- With the market uptake of BIM, and assuming that BIM models will be used for EPC calculations, there might be **new tasks for standardisation in relation to EPBD related standards.** BIM offers the possibility to have a better physical modelling of energy processes



BIM and convergence of national EPC calculation procedures

- At present, there are still **major differences in the national EPC calculation methods.** With the new set of CEN standards, one can expect more convergence in the EPC calculation procedures.
 - However, one observes sometimes very big differences in the visions on the need for simplification and this is often a barrier for further convergence.
- With BIM, there is the possibility to come with limited or no efforts for the user to a more accurate physical modelling of the energy performances and therefore the **possibility of nearly no differences in views between member states/countries.**



BIM and EPC compliance

- At present, data collection for calculating the EPC is in most cases an autonomous activity not linked to other design processes. This might fundamentally change if BIM becomes mainstream.
- All relevant product and system data can then be directly integrated into the BIM objects (brick, thermal insulation, fan, heat pump, ...)
- Moreover, an integrated BIM model will be updated according to design or execution modifications, making that it will effectively represent what is constructed. Therefore, the energy performance calculation can be made for the **as-built building**.



BIMPLEMENT

Accueil » Projets » BIMplement

▲ RÉSUMÉ

NZEB construction needs an enhanced systematic approach for the quality control of the entire process to reduce the gap between designed and actual performances of buildings. This requires a fully qualified and equipped workforce, capable to implement, execute and perform all the necessary labor actions with understanding of the responsibility of their own profession and actions, as well as the relation with the other involved professions and actions.

BIMplement offers the trainers and the learners a range of tools that fit the objective of developing a fully qualified and equipped workforce, capable to implement, execute and perform all the necessary labour actions. Main aim is to achieve an improved quality for NZEB construction and renovation by setting up a large scale, training, CPD and qualification schemes, addressing the entire process phases in a cross-crafts and cross level multidisciplinary approach, strengthened with hands-on and BIM-enhanced workplace learning tools by following

▲ OBJECTIFS

1. To improve the overall quality of renovations and new constructions, based on a BIM-enabled workplace learning, addressing the entire process phases in a cross-crafts multidisciplinary approach
2. To create a new generation of professionals and craftsmen, equipped and enabled by BIM skills, to enhance the overall quality of construction and renovation across the entire process
3. To foster interactions between different trades and professions enabled by a flexible qualification, certification and accreditation methodology for implementing BIM as a workplace learning environment
4. To sustain the qualification and training schemes a replication and exploitation strategy will be developed and validated

At the end of the 2 years project BIMplement has developed a transferable method based on the experience of previous BUS and H2020 Construction Skills projects and on experimentations in territories with craftsmen and small enterprises.

▲ PARTICIPANTS

Pilote : Alliance Villes Emploi (FR)

Partenaires :

- ASTUS Construction (FR)
- STICHTING INSTITUUT VOOR STUDIE ENSTIMULERING VAN ONDERZOEK OP HETGEBIED VAN GEBOUWINSTALLATIES (NL)
- STICHTING OPLEIDINGS- EN ONTWIKKELINGSFONDS VOOR HET TECHNISCH INSTALLATIEBEDRIJF*ST.POL. EN ONTWIKK.FONDS TECH INSTALL.BEDR OTIB (NL)
- Huygen Installatie Adviseurs (NL)
- REGIONINIS INOVACIJU VADYBOS CENTRAS (LT)
- LIETUVOS STATYBININKU ASOCIACIJA (LT)
- INSTITUTO VALENCIANO DE LA EDIFICACION (ES)
- SERVICIO VALENCIANO DE EMPLEO Y FORMACION (ES)
- MOSTOSTAL WARSZAWA SA (PL)
- CONSEIL DES ARCHITECTES D'EUROPE (BE)

BIMEET

Project: BIM-based EU -wide Standardized Qualification Framework for achieving Energy Efficiency Training

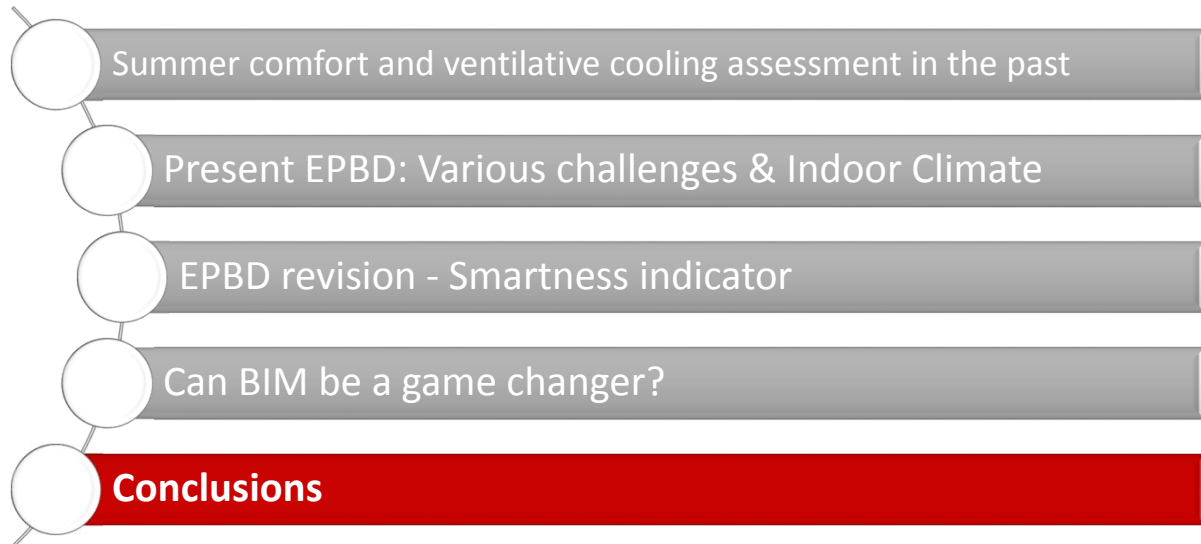
The European Construction sector is facing unprecedented challenges to achieve ambitious energy efficiency objectives (with the aim to generalize Near-Zero Energy Buildings), in an economic crisis context dominated by reduced investments, search for cost effectiveness and high productivity. Moreover the industry is experiencing its digital revolution, with Building Information Modeling (BIM) approach gaining significant interest across Europe. Member states implement very different approaches through regulations and maturity targets, which always face the traditional low-tech and informal practices of construction businesses (a fragmented sector, dominated by SMEs). BIMEET project aims to leverage the take-up of ICT and BIM through a significant upgrade of the skills and capacities of the EU construction workforce. This Coordination and Support Action project is built around a strong consortium relying on educational and research expertise, robust experience of accrediting bodies, training supply chain and a wide engagement of industry led best practice (already committed in an EU-wide expert panel). Through its actions the project will (a) pave the way to a fundamental step change in delivering systematic, measurable and effective energy efficient buildings through BIM training with a view to effectively address European energy and carbon reduction targets; (b) promote a well-trained world leading generation of decision makers, practitioners, and blue collars in BIM for energy efficiency; (c) establish a world-leading platform for BIM for energy efficiency training nurtured by an established community of interest. Its principal outputs are 1) a skills matrix related to BIM and energy efficiency, harmonized thanks to EQF standard, and 2) a training platform contributing to widely disseminate the BIMEET EQF. These results associated with an accreditation scheme will guarantee the sustainability of the project results after its lifetime.

Net-UBIEP

Project: Network for Using BIM to Increase the Energy Performance

The building sector is the largest consumer of energy in Europe, accounting for nearly 40% of the total consumption (EPBD 2010/31/EU). Furthermore the 2030 European Energy [COM(2014)16Final] and Energy Roadmap 2050 [COM(2011) 885 final], strongly requires more focus on the energy efficiency on housing sector. Finally, the Directive 2014/24/EU of the European Parliament and of the Council on public procurement, requires that all member states introduce electronic means to exchange information and communication in procurement procedures. For these reasons we believe that the integrated approach of the Net-UBIEP project, based on Building information Modelling, integrated with energy performance requirements, will be key to solve all the problems in a more effective and efficient manner. The project proposes BIM Qualification Models integrated with energy competences, to widespread a better comprehension of energy issues along all the value chain of building industry so that both existing and new building will have better energy performances. Public Administrations, Professionals (Engineers / Architects), Technicians (Installers / Maintainers) and Tenants will be therefore involved in the Net-UBIEP activities. The definition of the BIM Qualification Models will pass through the identification of specific energy BIM competences for each of the above target needed to implement BIM models during the whole building life cycle. During the project the "integrated" BIM Qualification Models will be validated by stakeholders thanks to the delivering of different training activities (Seminars / Classrooms Courses / E-Learning Courses) addressed to at least six BIM Professional Profiles: BIM Manager, BIM Evaluator, BIM Coordinator, BIM Expert, BIM facility manager, BIM user. Once the schemes will be validated, they will be proposed for standardization to find a broader acceptance at European and international level through regulatory organizations (CEN / ISO).

Structure of the presentation



Conclusions

- The **very important impact of EPBD related legislation** on the building design process is challenging, also in relation to overheating assessment
- A correct integration of **overheating related aspects in a smartness indicator** is also challenging
- **Smart implementation of BIM based EPBD assessment** can on the longer term be a game changer, with particular relevance for overheating assessment

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Future challenges and opportunities

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