

2015.03.16-17 | Elite Hotel Ideon | Lund, Sweden



International Workshop on Ventilation and Airtightness in Buildings

Voluntary and Regulatory Frameworks to Improve Quality and Compliance

PRESENTATIONS

The workshop was organised by INIVE on behalf of the QUALICHECK consortium (www.qualicheck-platform.eu); AIVC (Air Infiltration and Ventilation Centre, www.aivc.org); TightVent (Building and Ductwork Airtightness Platform, www.tightvent.eu); venticool (the international platform for ventilative cooling, www.venticool.eu) in cooperation with Boverket and Chalmers University of Technology and with the support of REHVA.











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DISCLAIMER





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International Workshop on Ventilation and Airtightness in Buildings

Voluntary and Regulatory Frameworks to Improve Quality and Compliance

PROGRAMME

Day 1 - Monday 16 March 2015

09:00-10:30 Introduction

- 1. Welcome on behalf of QUALICHeCK Objectives of this workshop QUALICHeCK's approach to quality and compliance. *Peter Wouters, BBRI, Belgium*
- 2. Welcome on behalf of Boverket. Anders Sjelvgren and Wanda Rydholm, Boverket, Sweden
- 3. BUILD UP Skills: European collaboration on improving the competence of the building workforce Ventilation and airtightness aspects. *Horia Petran*, *URBAN-INCERC*, *Romania*
- 4. Addressing compliance and quality in CEN and ISO standards, Jaap Hogeling, Chair of CEN TC 371, ISSO, Netherlands
- 5. Interaction with the audience

10:30-11:00 Coffee break

11:00-11:30 Outcomes of QUALICHeCK

- 1. Approaches to improve compliance and accessibility of energy performance certificate input data. François Durier, CETIAT, France
- 2. Overview of selected approaches to improve the quality of the works. *Heike Erhorn-Kluttig, IBP Fraunhofer, Germany*

11:30-12:45 Building ventilation: industry initiatives - opportunities and challenges for manufacturers

- 1. The role certification can play to improve the reliability of input data. Eurovent certification example. *Sylvain Courtey, Eurovent Certita Certification, France*
- 2. Opportunities and challenges for natural ventilation systems and ventilative cooling solutions in compliance frameworks. *Karsten Duer, Velux, Denmark*
- 3. Assessment of demand-controlled ventilation in various countries and compliance frameworks: practical experience and difficulties encountered by a manufacturer. Yves Lambert, Renson, Belgium
- 4. Market drivers for the ventilation industry in Sweden: the role of AMA and OVK procedures, standardization, and certification. Lars-Åke Mattsson, Lindab, Sweden

12:45-13:45 Lunch break

13:45-15:15 Selected approaches addressing quality and compliance in various countries – Concerns for innovation

- 1. Quality and compliance on building ventilation and airtightness in the Dutch context. Wouter Borsboom, TNO, The Netherlands
- 2. Air-Permeability Testing of New Dwellings & Buildings in the UK: Challenges to Maintaining Standards. Barry Cope, ATTMA, UK
- 3. Overview of competent tester schemes for building airtightness testers. *François Rémi Carrié*, *INIVE*, *Belgium*
- 4. BUILD UP Skills Sweden: Quality assurance of the works and training activities. *Per-Johan Wik, Lund University*, *Sweden*

15:45-17:15 Swedish approach to quality and compliance

- 1. Background on Swedish regulation BBR Ventilation and airtightness, *Wanda Rydholm*, *Boverket*, *Sweden*
- 2. OVK Compliance (regulatory) and energy efficiency measures, as well as guidance to municipal supervisors on the Board's Web (Boverkets), OVK experience and supervision. *Wanda Rydholm*, *Boverket*, *Sweden*
- 3. The Swedish National energy declaration record, Anders Sjelvgren, Boverket, Sweden
- 4. Certification of persons issuing OVK and energy performance certificates. *Magnus Jerlmark*, *Kiwa*, *Sweden*
- 5. Qualification of airtightness testers. *Paula Wahlgren, Chalmers*, *Sweden* and *Magnus Hansén*, *SP*, *Sweden*.
- 6. The AMA framework: ductwork according, practical implementation and presentation of digital training for ventilation installers. *Johnny Andersson, Ramboll, Sweden*
- 7. Discussion

17:15-18:15 Step-by-step demonstration of the inspection of ventilation systems (OVK procedure) supported by video

Wanda Rydholm, Boverket, Sweden and Olle Nevenius, FunkiS, Sweden

Day 2 - Tuesday 17 March 2015

09:00-10:30 Steps to improve the reliability of EPC input data and quality of the works in the Belgian context

- 1. Energy Performance of buildings regulations in Belgium The key puzzle pieces for an effective regulation. *Xavier Loncour*, *BBRI*, *Belgium*
- 2. Building airtightness: Towards improved and reliable declared performances. Clarisse Mees, BBRI, Belgium
- 3. Ventilation: steps towards framework for reliable EPC input data and improved quality/compliance. Samuel Caillou, BBRI, Belgium

10:30-11:00 Coffee break

11:00-12:30 Status on the ground and industry-driven initiatives in the French regulatory context

- 1. Lessons learnt from regulatory compliance checks on ventilation and airtightness: regulatory context, control procedures, results. Sandrine Charrier and Adeline Bailly, CEREMA, France.
- 2. Building regulations can foster quality management : the French example on building airtightness. Sandrine Charrier, CEREMA, France
- 3. French voluntary scheme for homogeneous announcement of ventilation product performance. François Durier, CETIAT, France

12:30-13:30 Lunch break

13:30-15:00 Interactive session – Developing effective compliance frameworks

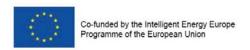
The objective of this session is to identify key questions to address to develop an effective compliance framework. It starts with an introductory presentation regarding legal issues when developing compliance frameworks.

- 1. Legal issues when developing compliance frameworks. Eric Winnepenninckx, UBAtc, Belgium
- 2. Structured discussion on sources of problems regarding input data, quality of the works, and innovation.

15:00-15:15 Coffee break

15:15-16:00 Conclusions and Perspectives

- 1. Summary of country presentations. Arnold Janssens, University of Ghent, Belgium
- 2. Perspectives for effective compliance checks, including feedback from interactive sessions. *Xavier Loncour*, *BBRI*, *Belgium*
- 3. Future steps for QUALICHeCK. Peter Wouters, BBRI, Belgium



Welcome on behalf of QUALICHeCK Objectives of this workshop – QUALICHeCK's approach to quality and compliance.

Peter Wouters, BBRI, Belgium





International Workshop on Ventilation and Airtightness in Buildings

Voluntary and Regulatory Frameworks to Improve Quality and Compliance



Welcome on behalf of QUALICHeCK

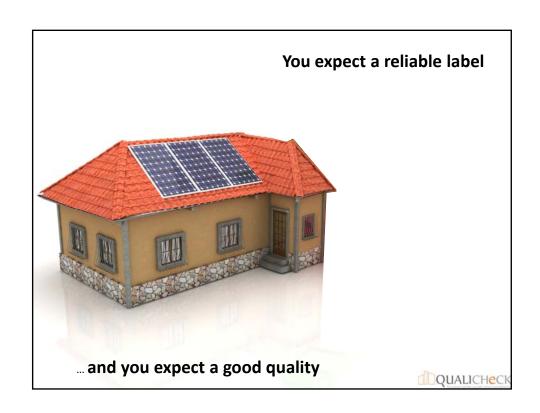
Objectives of this workshop

QUALICHeCK's approach to quality and compliance

Peter Wouters

Manager INIVE EEIG - Coordinator QUALICHeCK











Energy certificates with respect to ventilation and airtightness...

Ventilation

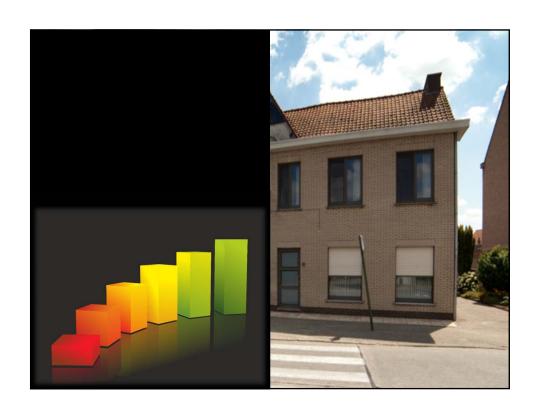
Building Airtightness

- Efficiency of heat exchanger
- Fan consumption
- Ductwork airtightness
- Demand controlled ventilation
- ..
- ...

• Is the declared value correct?

Observation:

In many country no or nearly no control regarding compliance of EPC





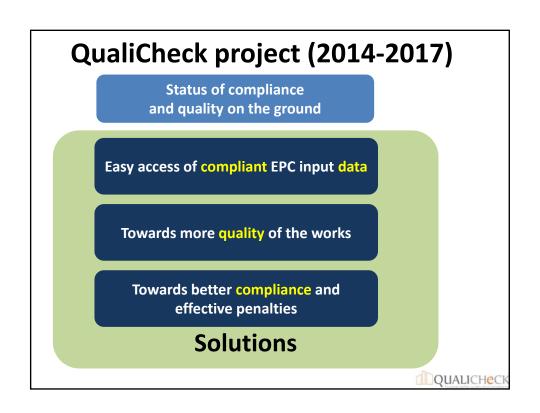


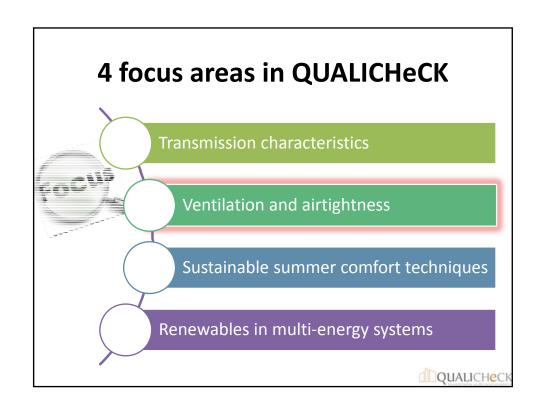
Which problems are often observed?

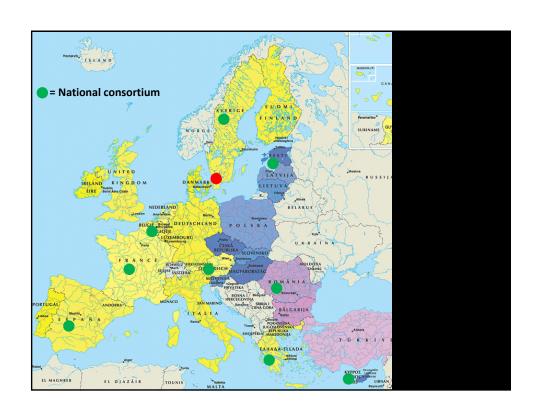
- Air flow rates (→ IAQ)
- Acoustics: from system or from outside
- Draught problems
- Maintenance
- ...
- Problems are found t
- Good execution exists and also not extremely difficult







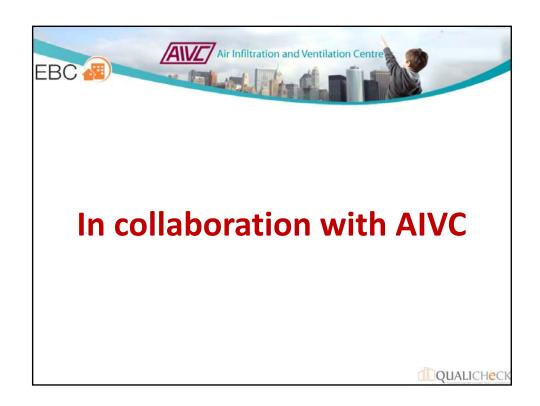














Brussels, Belgium 18-19 March 2014

AIVC Workshop

Quality of Methods for Measuring Ventilation and Air Infiltration in Buildings





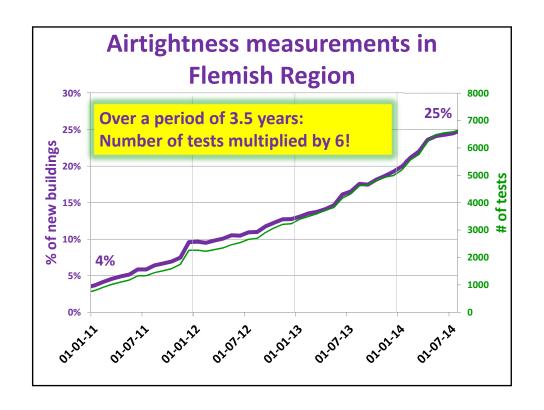


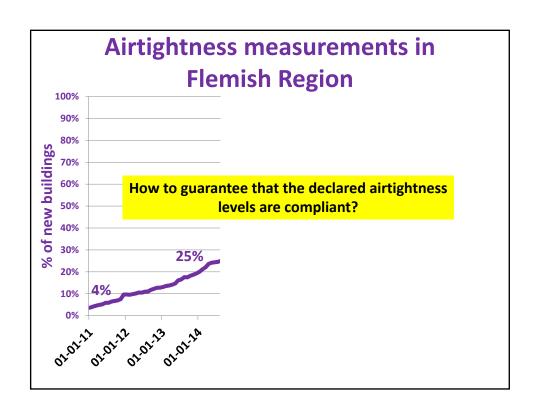




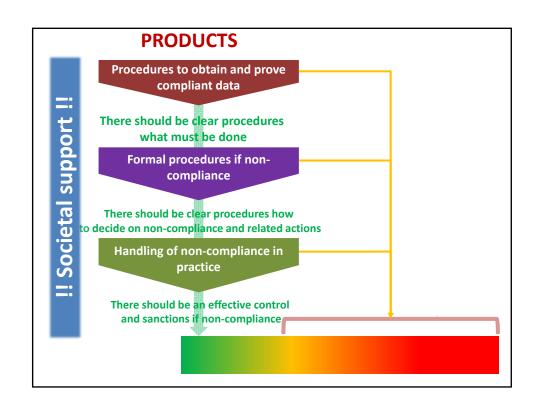
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In collaboration with TightVent Europe





PRODUCTS ... THE WORKS Efficiency of a heat exchanger Possibility to have Airtightness of a building efficient maintenance Procedures to obtain and prove Procedures to obtain and prove compliant data quality of the works There should be clear procedures what must be done Formal procedures if non-compliance There should be clear procedures how to decide on non-compliance and related actions Handling of non-compliance in practice There should be an effective control and sanctions if non-compliance



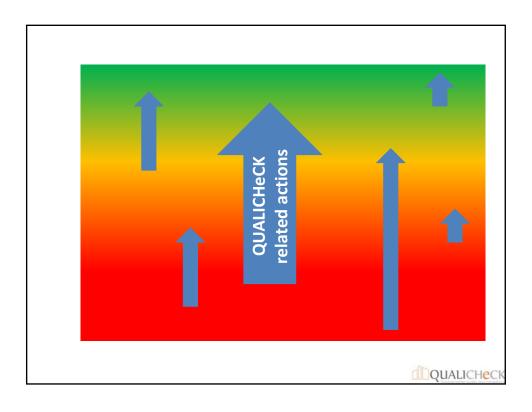
Compliance is needed: What ambition level to be reached?

• In theory:

- Effective framework resulting in good compliance

• In practice:

- Not always evident to achieve
- Countries have a different starting point, quality/compliance is a subjective concept
- There might be different (political and societal) views of compliance and sanctioning







09:00-10:30 Introduction

- · Welcome on behalf of Boverket
 - Anders Sjelvgren and Wanda Rydholm, Boverket, Sweden
- BUILD UP Skills: European collaboration on improving competence of building workforce - Ventilation and airtightness aspects.
 - Horia Petran, URBAN-INCERC, Romania
- Compliance and quality in CEN/ISO standards
 - Jaap Hogeling, Chair of CEN TC 371, ISSO, Netherlands

QUALICHeCK

11:00-11:30 Present outcomes of QUALICHeCK

Approaches to improve compliance and accessibility of energy performance certificate **input data**

- François Durier, CETIAT - France

Overview of selected approaches to improve the quality of the works

- Heike Erhorn-Kluttig, IBP Fraunhofer - DE





QUALICHECK

11:30-12:45 Building ventilation: Industry initiatives - opportunities and challenges for manufacturers

- About the role certification can play to improve reliability of input data: Eurovent certification example
 - Sylvain Courtey, Eurovent Certita Certification, France
- Opportunities and challenges for natural ventilation systems
 & ventilative cooling solutions in compliance frameworks
 - Karsten Duer, Velux, Denmark
- Assessment of demand-controlled ventilation in various countries and compliance frameworks: practical experience and difficulties encountered by a manufacturer
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- Market drivers for ventilation industry in Sweden: the role of AMA/OVK procedures, standardization, and certification
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Swedish approach to quality and compliance

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- · The Swedish National energy declaration record
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- Certification of persons issuing OVK and energy performance certificates



- Magnus Jerlmark, Kiwa, Sweden
- Qualification of airtightness testers
 - Paula Wahlgren, Chalmers, Sweden and Magnus Hansén, SP, Sweden.
- The AMA framework: ductwork according, practical implementation and presentation of digital training for ventilation installers
 - Johnny Andersson, Ramboll, Sweden



17:15-18:15

Step-by-step demonstration of the inspection of ventilation systems (OVK procedure) supported by video

Organisers:

- Wanda Rydholm, Boverket, Sweden
- Olle Nevenius, FunkiS, Sweden





Day 2 - Tuesday 17 March 2015

09:00-10:30 Steps to improve the reliability of EPC input data and quality of the works in the Belgian context

- Energy Performance of buildings regulations in Belgium The key puzzle pieces for an effective regulation
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- **Building airtightness**: Towards improved and reliable declared performances
 - Clarisse Mees, BBRI, Belgium
- Ventilation: steps towards framework for reliable EPC input data and improved quality/compliance
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QUALICHECK

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 - Sandrine Charrier, CEREMA, France
- French voluntary scheme for homogeneous announcement of ventilation product performance
 - François Durier, CETIAT, France



13:30-15:00 Interactive session –

Developing effective compliance frameworks

Objective of this session?

To identify key questions to address to develop an effective compliance framework

Introductory presentation:

Legal issues when developing compliance frameworks

- Eric Winnepenninckx, UBAtc, Belgium

Structured discussion

Sources of problems regarding input data, quality of the works, and innovation



15:15-16:00 Conclusions and Perspectives

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QUALICHECK





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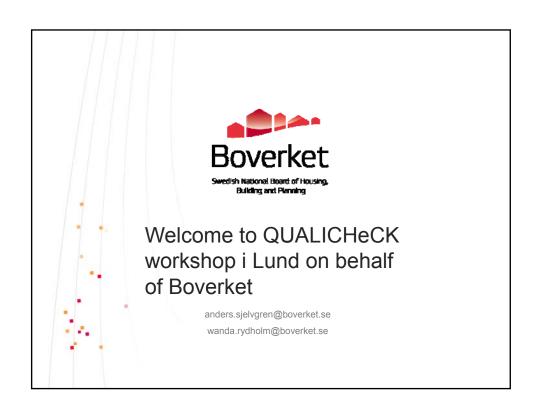


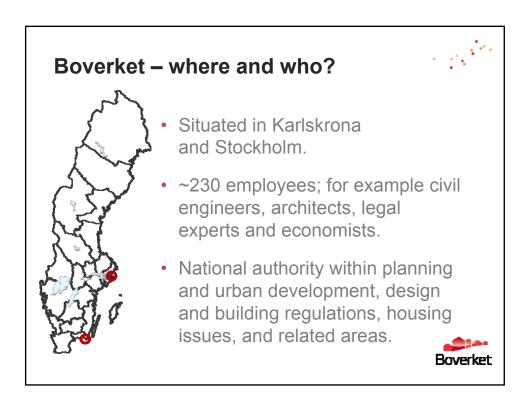
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Voluntary and Regulatory Frameworks to Improve Quality and Compliance

Welcome to QUALICHeCK workshop in Lund on behalf of Boverket

Anders Sjelvgren and Wanda Rydholm, Boverket, Sweden





Boverket - why and what?



- National authorities are separated from the political government, but the outline of the work of Boverket is set by the Ministry of Industry Authorities Affairs, such as:
- Evaluations and investigations on the behalf of the Ministry.
- Supervision and development of building subsidies.



Boverket – why and what? continued



- Interpretation of legislation into development of provisions and standards.
- National responsibility for EU directives within the field of competence, e.g. the construction products directive, CPD, and the energy performance of buildings directive, EPBD.



Boverket - how?

- e po^{liti}
- Boverket does not make urban plans or design buildings, and there is no laboratory for measurements or analyses, but we do...
- Provide expert advice to government and legal courts.
- Advise the government, local and regional authorities, and the general public.



Boverket - how? - continued



- Publish housing statistics and other reports on the development within the sector.
- Provide information to those involved in spatial planning, housing, construction, and building inspection.



Boverket's regulations for building works on website



- 1. Legislation
- 2. Ongoing regulatory work
- 3. PBA knowledge bank
- 4. Subject pages
- 5. Regulatory hierarchy
- 6. And more... on:

http://www.boverket.se/en/start-in-english/building-regulations/national-regulations/



BUILD UP Skills: European collaboration on improving the competence of the building workforce - Ventilation and airtightness aspects

Horia Petran, URBAN-INCERC, Romania



BUILD UP Skills: European collaboration on improving the competence of the building workforce - Ventilation and airtightness aspects

Horia Petran

Coordinator BUILD UP Skills QualiShell



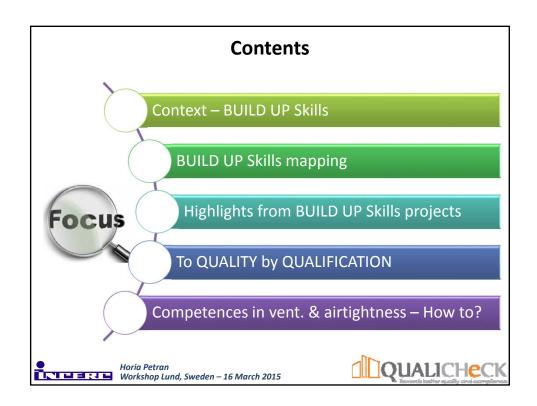


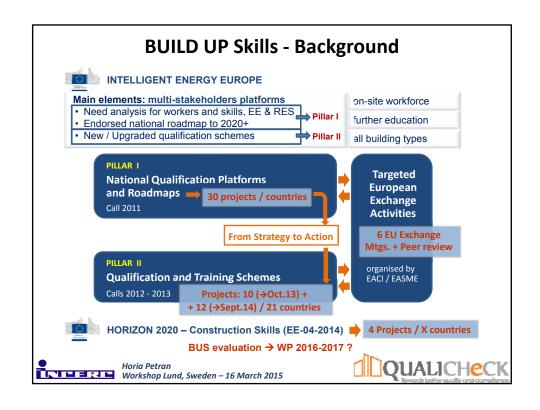
INCD URBAN-INCERC hp@incerc2004.ro

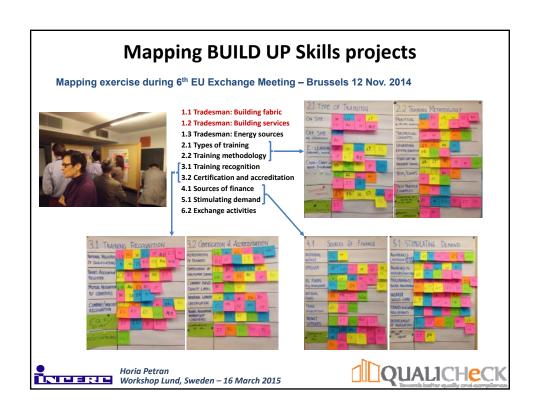
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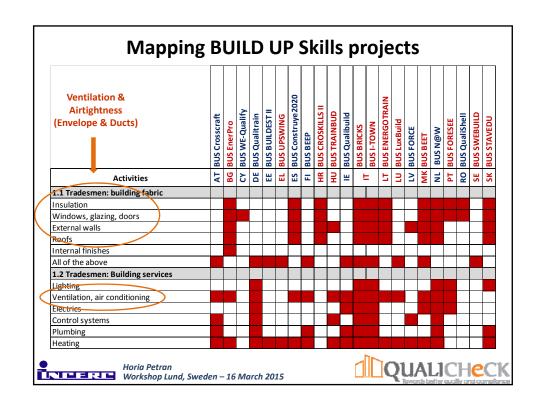
Voluntary and Regulatory Frameworks to Improve Quality and Compliance

16 March 2015 – Lund, Sweden









Highlights BUILD UP Skills projects Luxembourg's Building skills for 2020 targets **BUILD UP Skills Bulgaria II** LUXBUILD2020 • National Centre of Excellence for EE and RES · Accompanying measures such as mind changing campaigns - mobilize the companies in buildings - professional capacity of trainers in order to push their interest and Set of technological competences (training responsibility for better qualification of their contents) - Civil & Electric (RES in buildings). workforce, State Educational Requirements - Review and • Centre of excellence for building crafts and a update qualification framework → 2020 targets 10 new training programs for selected • Multi-step qualification schemes for blue professions + cross-craft training collar workers · Training facilities and materials for practical training (upgrade) In-company tutoring and training the trainers and coaches/tutors · Website - repository for the teaching tools QUALICHECK Horia Petran Workshop Lund, Sweden – 16 March 2015

Highlights BUILD UP Skills projects

BUILD UP Skills CROSSCRAFT - Qualification scheme for across-the-crafts training of professionals in the construction (Austria)

- professionals in the construction industryCompetences (imparted by the developed
- courses):
 - Understanding the importance of nearly zero energy building standards
 - Understanding of the interplay of the trades
 - Avoiding the most common faults and errors and their impact

with Increased Competence, Knowledge and Skills (Italy)

BUILD UP Skills BRICKS - Building Refurbishment

- Start develop. national standards (UNI/CEI) for the different workers profiles based on EQF and produce the first draft standards
- Certification procedure with accredited bodies
- Produce learning content for VET systems
- Promote/implement:
 - local good practices at national level
 - training of trainers + their qualification
 - pilot studies on site training of workers
 - quality label for the enterprises recruiting qualified workers
- endorsement campaign and mutual recognition (Italian regions & chambers of commerce, EU)



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Highlights BUILD UP Skills projects

BUILD UP Skills BEET - BUILD UP Skills -Builders' Energy Efficiency Training (FYR Macedonia)

- Focus: building envelope, glassing, roofing, energy infrastructure & HVAC systems
- · Developing large scale training schemes:
 - by upgrading national education system with voluntary qualification schemes,
 - by ensuring recognition of skills obtained in non-formal/informal contexts
- Building capacity of trainers and training providers
- Designing incentives to boost the demand for qualified workers (incl. proposal for a paritarian fund for training – EEB).

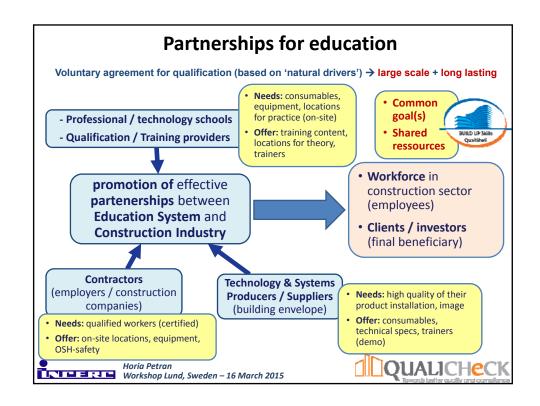
BUILD UP Skills QualiShell - National Qualification Scheme for Construction Workers to Ensure High Performance Building Envelopes (Romania)

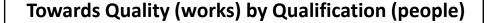
- Cont. involvement of relevant stakeholders (Romanian Qualification Platform) - support implementation of Qualification Roadmap
- · National qualification schemes for:
 - Opaque building envelope insulation systems installers (ETICS installers)
 - Window system fitters (installers of thermal insulation carpentry and efficient glazing)
- Mechanisms for large-scale and long lasting implementation of the qualification scheme:
 - use of existing networks,
 - evaluation of competences acquired in non-formal and informal environments,
 - effective partnerships between education system and construction sector



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- Quality = conformance to requirements (Crosby)
 - Relative to requirements (expectations):
 - Poor requirements → low quality,
 - Ambitious requirements → high quality
- QUALITY CHeCK:
 - By compliance & control: (∃) reliable system procedures
 - 'Policeman' at every 'street corner'?
 - By developing skills and competences understanding concept (e.g. comfort, efficiency, nZEB) and technology
 - Development of self-control by qualification & productivity
- Paradigm shift among builders:
 - 'What if I **train** them and they **leave** / ask more money?'
 - 'What if I do not train them and they stay?'

NINE

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Competences in vent. & airtightness – How to? Construction Commissioning Energy AHU efficient **Building** Storage, B2B (site), ventilation Fans. Transp., Distrib., (High EP, Ducts distrib. Local **Building &** nZEB...) storage **Ductwork** Contr. airtightness Construction Producer Beneficiary (IIII (24) IIII (components / systems) Market → Bad Image! Investing in qualification pays back! > training fund (%sales) Horia Petran Workshop Lund, Sweden – 16 March 2015 Dualicheck

Competences in vent. & airtightness – How to?

- Certification of competences:
 - ✓ Basic competences related to ventilation systems installer,
 - ✓ Add. competences → EE & RES (understanding concept),
 - ✓ Add. competences embedded in other occupations (insulator, window fitter, roofer etc.) → cross-craft
- Recognition of competences:
 - ➤ Who: EDU system, industry (producers, builders) consumers,
 - **How:** approved training or evaluation in authorized centres,
- Stimulating quality request → beneficiaries
- Financing qualification schemes:
 - ➤ Who: employer, employee, external source (public/private),
 - **How:** taxes for training, producers fund, quality labels etc.

Horia Petran
Workshop Lund, Sweden – 16 March 2015



ESCO Portal – facilitating dialogue LABOUR – EDU?

- ESCO = Multilingual classification of European Skills, Competences, Qualifications and Occupations.
- part of the Europe 2020 strategy.
- Project launched by EC in 2010 open stakeholder consultation
- first version published on 23 October 2013
- will be completely revised until 2017
- Identifies and categorises skills, competences, qualifications and occupations relevant for the EU labour market and education and training:
 - relationships between different concepts
 - -open IT format,
 - –available for use free of charge (everyone)
 - -can be accessed via the ESCO portal

ESCO_v0: occupations & skills 'Ventilation' 'Airtightness'

- Plumbing, heating and ventilation instructor
- Insulation installer (ventilation systems)
- Piping insulator (heating, ventilation and air conditioning)
- Ventilation duct cleaner
- Sheet metal worker (ventilation systems)
- · Ventilation installer
- · Ventilation technician

Skills / Competences:

- Heating, ventilation and air cond. (fitting)
- Insulation (heating/ventilation/sanitation)
- Ventilation adjustment
- Ventilation cleaning
- Ventilation fitting
- Ventilation insulation
- · Ventilation sheet metal work
- Ventilation systems (maintenance)



Horia Petran Workshop Lund, Sweden – 16 March 2015



Thank you!





Horia Petran



București, Șos. Pantelimon 266 Tel. 021 2550835

hp@incerc2004.ro



Horia Petran Workshop Lund, Sweden - 16 March 2015



EU Mandate (M480) for CEN to develop the second generation CEN-EPBD EPB-standards: COMPLIANCE and QUALITY

Jaap Hogeling, Chair of CEN TC 371, ISSO, Netherlands





EU Mandate (M480) for CEN to develop the second generation CEN-EPBD

EPB-standards: COMPLIANCE and QUALITY

Jaap Hogeling
Chair CEN TC 371 Program Committee
on EPBD
j.hogeling@isso.nl





Current status of the draft prEN15603 and connected TR

EN TR

- Mid-May 2015 draft prEN15603 ready for CEN TC371 acceptance for enq.
- 2. Start Enquiry: mid-September 2015
- 3. Closure Enquiry mid December 2015
- 4. Ready for FV April 2016 (or if FV can be skipped this is the submission to CCMC date for publication)
- First revised version draft-TR
- June 2015 draft TR to CCMC
- September draft TR out for enquiry (TCA)
- December closure TCA
- February 2016 TC decides to publish TR

Overall status of work in the TC89/169/228/247

TC89 on thermal performance of building and building components standards currently out for enquiry:

prEN ISO/DIS 52010-1

Overarching assessment procedures for external environment conditions — Part 1: Conversion of measured hourly weather data to input for energy calculations

CEN & ISO ENQ closes by 22/04/2015

EN ISO/DIS 52016-1

Calculation of the energy needs for heating and cooling, internal temperatures and heating and cooling load in a building or building zone — Part 1: Calculation procedures **EN ISO/DIS 52017-1**

Calculation of the dynamic thermal balance in a building or building zone — Part 1: Generic calculation procedure

CEN & ISO ENQ closes by 29/04/2015

CEN TC 89 related standards expected to go out for enquiry (3M's)

prEN ISO/CD 52003-1

Indicators, requirements and certification – Part 1: **General** aspects and application to the overall energy performance

Expected: CEN & ISO ENQ 15/08---15/11 prEN ISO/DIS 52018-1

Indicators for partial EPB requirements related to **thermal energy balance and fabric** features — Part 1: Overview of options

Expected: CEN & ISO ENQ 30/04—31/07

CEN TC 89 related standards expected to go out for enquiry (3M's)

Out for enquiry by 15/04:

EN ISO 13789, EN ISO 13370, EN ISO 6946, EN ISO 10211, EN ISO 14683, EN ISO 13786

Hygrothermal performance of building components and building elements

Out for enquiry by 15/05

EN ISO 10077-1, EN ISO 10077-2, EN ISO 12631 EN ISO 52022-1, EN ISO 52022-3

Thermal, solar and daylight properties of windows and facades

9 parts of TC 156 - prEN 16798-Family

	Overarching		Tec	hnical Buildin	g Systems		
	Descriptions		Descriptions	Cooling	Ventilation	Humidifi- cation	Dehumi- dification
sub1	M1	sub1		M4	M5	М6	M7
1	General	1	General	prEN 16798-9	prEN 16798-3		
2	Common terms and definitions; symbols, units and subscripts	2	Needs				
3	Applications	3	Maximum Load and Power	prEN 16798-11			
4	Ways to Express Energy Performance	4	Ways to Express Energy Performance	prEN 16798-9	prEN 16798-3		
5	Building Functions and Building Boundaries	5	Emission & control		prEN 16798-7	prEN 16798-5	prEN 16798-5
6	Building Occupancy and Operating Conditions prEN 16798-1	6	Distribution & control		prEN 16798-5		
7	Aggregation of Energy Services and Energy Carriers	7	Storage & control	prEN 16798-15			
8	Building Partitioning	8	Generation & control	prEN 16798-13	prEN 16798-5	prEN 16798-5	prEN 16798-5
9	Calculated Energy Performance	9	Load dispatching and operating conditions				
10	Measured Energy Performance	10	Measured Energy Performance				
11	Inspection	11	Inspection	prEN 16798-17	prEN 16798-17	prEN 16798-17	prEN 16798-17

TC 156 - prEN 16798-Family

- 5 prEN's out for enquiry (closing 27/04)
- 2 prEN's out for enquiry by March (4M)
- 1 prEN out for enquiry by April
- prEN 16798-1 (former EN15251) out for enquiry by 14th April

NEXT: Reaction on enquiry and update of the draft standards, connected TR and EXCEL files Draft standards ready for FV and draft TR's for TCA expected by December 2015

CEN/TC 169 - Light and Lighting

prEN 15193-1: Energy performance of buildings - Module M9 - **Energy requirements for lighting - Part 1: Specifications**

Time schedule

- Public Enquiry closed by January 2015
- NEXT:Preparation of observation to comments (appr. 500 comments) and
- Final Excel files

prCEN/TR 15193-2:

Energy performance of buildings - Module 9 - Accompanying Technical Report on Energy requirements for lighting standard

- > TCA: Enquiry within CEN/TC 169 closed by January 2015 (appr 200 comments)
- NEXT: Preparation of observation to comments parallel to prEN 15193-1

NEXT: Draft standards ready for FV and draft TR's for TCA expected before end of 2015

Status work CEN/TC228 on heating system and hydronic cooling systems

- Enquire of 10 prEN's finished
- Enquiry of all standards will close by 27 March 2015
- Next: Reaction on enquiry and update of the draft standards, connected TR and EXCEL files
- Draft standards ready for FV and draft TR's for TCA expected by September 2015

Status Work of CEN/TC247

- The set of draft prEN's on Contribution of Building Automation, Controls and Building Management — and their accompanying TR's
- Still in process to be published for enquiry
- Expected prEN's and draft TR's August 2015
- Expected Closure enquiry November 2015
- TR's and FV versions ready by end of 2015--01/2016

ARTICLES

- 6 Subset of EPB standards on the energy use and the thermal performance of buildings and building elements Dick van Dijk, Marleen Spiekman,
 - Dirk Van Orshoven & Wim Plokker
- 17 Indoor environmental input parameters for the design and assessment of energy performance of buildings Bjarne W. Olesen
- 24 Ventilation for non-residential buildings – Performance requirements for ventilation and room-conditioning system Claus Händel
- 31 Calculation of the energy performance of ventilation and cooling systems Gerhard Zweifel
- 38 Guidelines for inspection of ventilation and air conditioning systems – Revision of EN 15239 and EN 15240 François Rémi Carrié & Anne-Marie Bernard
- 41 Inspection of boilers and heating systems – Revision of EN 15378-1



Set of EPB standards: unambiguous but flexible

(allowing national choices, boundary conditions and input data)

 The EPB standards need to be unambiguous to be fit for direct use in the context of building regulations, certification rules or inspection schemes. The EPB standards also need to allow flexibility, taking into account national or regional differences in climate, culture and building tradition, building typologies, policy and legal framework (mandate M/480).

Set of EPB standards: unambiguous but flexible (allowing national choices, boundary conditions and input data)

- → Each EPB standard contains:
- Annex A (normative): template for choices and input data needed for using the standard
- Annex B (informative): informative default choices and input data
- · In general:
 - Each individual user of the EPB standard is free to create his/her own data sheet according to the template of Annex A (~ replace the default choices and values of Annex B)

Explained in notes in each EPB standard Annex A and Annex B

In particular for the application within the context of EU Directives transposed into national legal requirements. These choices (either the default choices from Annex B or choices adapted to national/regional needs), but in any case following the template of the Annex A can be made available as National Annex or as separate (e.g. legal) document.

Intro to template given in Annex A of each EPB standard

- For the correct use of this [CEN or ISO]
 Standard this template shall be used to specify the choices between methods, the required input data and references to other standards.
- NOTE 1 A complete set of informative default choices, input data and references are provided in Annex B.
- NOTE 2 Following this template in Annex A is necessary but not enough to guarantee consistency of data.

NOTE 3: In particular for the application within the context of EU Directives transposed into national legal requirements:

the values and choices can be imposed by national / regional regulations. If the values and default choice of Annex B are not adopted because of the regulations, policies or national traditions, it is expected that:

- -national or regional authorities prepare data sheets according to the template in Annex A. In this case the National Annex (e.g. annex NA, NB, ..) should provide a reference to these specifications;
- -or, by default, the NSB will consider to prepare a National Annex (e.g. annex NA, NB, ..)complying with the template of Annex A, that provides choices, national or regional input data and references specified in the legal documents.

NOTE 4: any user can prepare a datasheet according annex A

- For instance to a national assessment protocol comprising decision trees, tables and pre-calculations.
- NOTE 5 An application document according to the template Annex A is open for different situations e.g.
 - design or certification of new building
 - renovation or certification of existing building
 - for different types of buildings;
 - etc...

Normative references as in clause 2 of all EPB standards:

- Apart from the EN15603 and needed product standards, EPB standards will not include in this clause 2 references to other EPB standards
- The template in Annex A will allow to exercise all required normative references needed
- Annex B will contain all needed normative references usually included in Clause 2 by default

Example of normative ref. given in Annex B

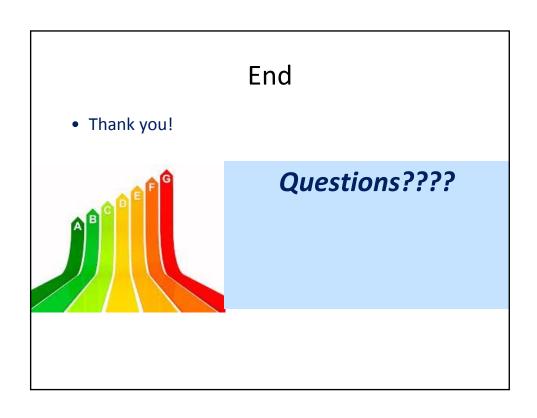
Table B.1 — Normative references									
Reference	Reference document								
M5-5	EN 16798-7, Energy performance of buildings - Part 7: Ventilation for buildings - Modules M5-1, M5-5, M5-6, M5-8 – Calculation methods for the determination of air flow rates in buildings including infiltration								
M3-8-1	EN 15316-4-1 - Heating systems and water based cooling systems in buildings — Method for calculation of system energy requirements and system efficiencies — Part 4-1: Space heating and DHW generation systems, combustion systems (boilers, biomass)								
M3-8-1/1	EN 15316-4-1:2015 - Heating systems and water based cooling systems in buildings — Method for calculation of system energy requirements and system efficiencies — Part 4-1: Space heating and DHW generation systems, combustion systems (boilers, biomass) – Clause 5.4								
M3-8-1/2	EN 15316-4-1:2015 - Heating systems and water based cooling systems in buildings — Method for calculation of system energy requirements and system efficiencies — Part 4-1: Space heating and DHW generation systems, combustion systems (boilers, biomass) — Clause 7.4								

COMPLIANCE and QUALITY assurance using EPB standards

- On national level using EPB standards to comply with the EPBD requires the development of national annexes is paramount
- Outside the legislator context e.g. the voluntary certification scheme for non-res buildings the use of Annex B of all the EPB standards will provide the transparency and compliance with the EPBD

To remind: regarding all EPB standards: NSB's publish these with nat. cover page

- National cover page may include nat. introduction text on the EPB standard: this texts allows the NSB's (MS's) to include information regarding the place of the EPB standard in their national regulation, version indication etc...
- NSB's can publish a National Annex to each EPB standard where they can refer to the Annex A template. A National Annex (NA) is ≠ Annex A and could include more additional information!



Approaches to improve compliance and accessibility of energy performance certificate input data

François Durier, CETIAT, France



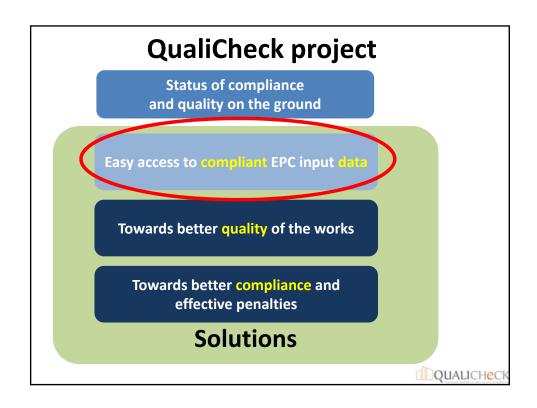
Programme of the European Union

Approaches to improve compliance and accessibility of energy performance certificate input data

François DURIER

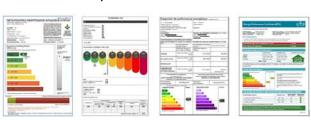


QUALICHECK



Context

- EPBD requires that Member States establish:
 - a certification of the energy performance of buildings, with an Energy Performance Certificate (EPC)
 - an independent control system for the EPCs (verification of a significant sample of all the EPCs issued, including check of the input data and of results stated)



EPC input data

- May describe:
 - Building: location, climate, surfaces, construction products and their implementation, <u>building</u> envelope airtightness,...
 - Systems: <u>ventilation</u>, heating, cooling, domestic hot water production, lighting...
- Essential that EPC input data are:

COMPLIANT
EASILY ACCESSIBLE

QUALICHECK

Compliant EPC input data

In the context of QUALICHeCK:

A quantity used as an input data for:

- the calculation or the assessment of the energy performance of a building and/or
- the declaration of its energy performance in the Energy Performance Certificate (EPC)

is compliant if this data has been established in line with the procedures in force in the context of the applicable legislation.

Evidence of compliance

The evidence that the EPC input data has been obtained according to the procedures may rely on:

- control by an independent third-party (for e.g. certification);
- declaration by the manufacturer;
- proven competence of the expert who is assessing the data;
- ...

QUALICHECK

Easily accessible EPC input data

In the context of QUALICHeCK:

A quantity used as an input data for:

- the calculation or the assessment of the energy performance of a building and/or
- the declaration of its energy performance in the Energy Performance Certificate (EPC)

is easily accessible if it is able to be found, seen and used by taking reasonable time, effort or money.

Some interesting approaches

Product characteristics databases

- · Belgium, France, United Kingdom
- easy access to EPC input data (public website)
- data are compliant with an evidence of their compliance:
 - data controlled by a third-party (Belgium, France),
 - or the manufacturer must provide the data with validated evidence of the product performance (UK)



Some interesting approaches

Product characteristics databases

- Belgium: <u>www.epbd.be</u>
 - Ventilation, thermal insulation, sunscreens
 - Managed by BBRI
- UK: <u>www.ncm-pcdb.org.uk/sap/</u>
 - Ventilation, heating, waste water heat recovery
 - Managed by BRE
- France: www.rt2012-chauffage.com
 - Heating
 - Managed by ATITA/UNICLIMA







Some interesting approaches

Qualification of building airtightness testers

- Czech Republic, Denmark, France, Germany, Ireland, Sweden, the United Kingdom
- ensures compliant data, with evidence of compliance,
- schemes set minimum knowledge and know-how of testers + pre-requisites on the tools used
- voluntary, initiated by national associations of testers, ministries and/or certification bodies

QUALICHECK

Some interesting approaches

Qualification of building airtightness testers



Number of qualified testers in 6 countries, January 2014 (the Swedish scheme started in 2014)

Some interesting approaches

Homogeneous announcement of ventilation product performance

- France
- voluntary rules for publishing characteristics
- makes easier access to the data
- will be presented tomorrow in another session





To know more...

- Several presentations in this Workshop
- QUALICHeCK report:

"How to get compliant and accessible data for the energy rating calculation of a building"

- 8 examples of existing approaches ensuring that data used for the energy rating calculation of a building are compliant (with an evidence for it) and/or easily accessible
- available at http://qualicheck-platform.eu



Towards improved Quality of Works

Heike Erhorn-Kluttig, IBP Fraunhofer, Germany



Towards improved Quality of Works



Heike Erhorn-Kluttig, Hans Erhorn, Fraunhofer Institute for Building Physics

Workshop "Voluntary and Regulatory Frameworks to Improve Quality and Compliance"

Lund, 16 March 2015



















Quality of Works within QUALICHeCK



Tasks:

- Examples of existing situations regarding the quality of works
- Analysis of the reasons for good and poor quality of works
- Set of possible approaches ('best practices') for improved quality of works

Approach:

- 3 reports based on the tasks
- Factsheets on interesting approaches
- Working together with other focus areas within QUALICHeCK: data collection from participating countries, better compliance and effective penalties
- Market feedback: stakeholders, QUALICheCK platform, events, webinars, road shows, BUILD UP Skills

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Critical Situations on the Construction Site



	QUALICHeCK focus area		nission teristics	١	/entilatior	1	Ę	
Critical situation		Whole component	Thermal bridges	Airtightness of envelope	Airtightness of ducts	Systems	Sustainable summer comfort technologies	Renewables in multi-energy systems
	No or poor specifications of product performances	D1	D1				D1	
	No or poor specifications of execution performances					A2		
	No framework for control of performances							
	Time pressure	S1, S4	S1, S4	S1, S4	S4	S4	S4	S4
	Language barriers at construction sites							
Very general	Insufficient knowledge of new technologies/construction workers not adequately trained	C1 / E1 / R1 / S1 / S4 / AIII / CI	C1 / E1 / R1 / S1 / S4 / AIII / CI	C1 / E1 / R1 / S1 / S4 / S5 / All / Alli / CI	E1 / \$4	E1 / R1 / S4 / AI / AII	C1 / E1 / S4 / CI	C1 / E1 / R1 / S4 / AI / AII/ CI
7.5	Necessary specialists not part of the construction team	C1 / R1 / S4 / AIII / CI	C1 / R1 / S4 / AIII / CI	C1 / R1/ S4 / S5 / AIII / CI	S4	R1 / S4 / AI / AII	C1 / S4 / CI	C1 / R1 / S4 / AI / AII / CI
	Poor communication between planners and contractors	S4 / SIII	S4 / SIII	\$4 / \$5 / \$III	S4 / SIII	S4 / SIII	S4 / SIII	S4 / SIII
	Lack of technical details (improvisation on construction site)	S4 / EI	S4 / EI	S4 / S5 / EI	S4 / EI	S4 / EI	S4 / EI	EU2 / S4 / EI
	Constructed building components/ technologies not documented as a basis for subsequent maintenance						AI	EU2 / AI



Critical Situations on the Construction Site



	_		QUALICHeCK focus area	Transn charact			Ventilation	1	t	
Critic	cal sit	uation		Whole component	Thermal bridges	Airtightness of envelope	Airtightness of envelope of ducts of ducts Systems Summer comfort technologies Renewables in multi-energy			
			Wrong (insulation) material: λ-value, thickness, etc.	D1 / E2 / S2 / CI / RI					D1 / CI	
			Incomplete or incorrectly installed insulation layer: gaps, uneven surfaces		S1 / CI / EI / RI / UKI / UKII				EI	
			Incompatible (insulation) material to specific situations: e.g. vacuum insulation	RI						
			Damages of insulation material during construction	E2 / S1 / RI	RI					
elope			Wet (insulation) material: storage on site, protection during construction	E2 / S1 / RI						
g enve	Opaque	General	Incorrect waterproof layers in wet areas (bathrooms, etc.)	E2 / S1 / RI / SI	RI					
3uilding envelope	ŏ		Not enough drying time for built-in moisture (concrete, wood)	E2 / RI						
ā			Wrong airtightness material			El / Rl				
			Incomplete air or moisture barrier Damages of air or moisture barrier during the implementation	E2 / RI	RI RI	RI RI	RI			
			Joints not realised with insulation according to requirements/design		D1 / RI					
	1	1	Joints not watertight/airtight	E2 / S3 / RI	RI	E2 / RI				
			Incorrectly realised joints due to installations (pipes, ducts)							

Critical Situations on the Construction Site



\	_	_	QUALICHeCK focus area		nission teristics	١	/entilatior	1	t	
Critic	cal sit	uation		Whole component	Thermal bridges	Airtightness of envelope	Airtightness of ducts	Systems	Sustainable summer comfort technologies	Renewables in multi-energy systems
		Compo- nents to ground	Wrong (insulation) material: water resistance	E2 / S1 / RI						
	Opaque	Base slab/ foun- dations	Wrong (insulation) material: pressure resistance	E2 / RI						
0		Ventila- ted roof	Not enough air space for ventilated roof							
envelope			Not enough openings for ventilated roof							
]¥e		Cool roof	Wrong coating for cool roof						US-GI	
ē			Wrong windows or façade elements: U-value	D1 / RI					D1	
l ig			Wrong windows or façade elements: g-value, τ-value	D1 / RI					D1	
Building	arent	General	Joints between windows and walls not insulated		D1 / E2 / DI / DII / EI / RI					
	Transparent		Joints between windows and walls not watertight/airtight	D1 / E2 / S1 / RI	D1 / S1 / DI / DII / EI / RI	D1 / S1 / EI / RI				
		Shading	Top mounted roller shutters uninsulated at contact surface to wall		D1					
		systems	Blinds without sufficient rear-ventilation							



Critical Situations on the Construction Site



/		QUALICHeCK focus area		nission eristics		Ventilation	1	Ę	_
Criti	ritical situation			Thermal bridges	Airtightness of envelope	Airtightness of ducts	Systems	Sustainable summer comfort technologies	Renewables in multi-energy systems
	General	Wrong system components installed: collector peak load, inverter efficiency, fan efficiency, pump efficiency, etc.							
	General	Incorrect setting of hydraulic flows							A1, S1, EU2
		No hydraulic calibration							
	Fixation	Incompatible mounting material: anchors, etc.							
		Wrong diameters of pipes/ducts							
SL		No/poor insulation of pipes/ducts							
ten	Pipes/ ducts	No accessibility for cleaning							
sys	ripes/ ducts	Duct connections not airtight				EU1 / SII			
rvice		Joints with other system components not airtight: fan, AHU				EU1 / SII			
Building service systems	Control	Wrong settings: night setback, CO ₂ /humidity/temperature controls							A1, EU2
Ē		Damaged PV cells							
Вп		Not enough rear ventilation							
		Cables: Mistakes regarding parallel vs. series connection							
	PV system	No connection to inverter							
	system	Insulation behind the arrays not high temp.resistant							
		Incorrect installation on the roof, causing water leakage							
		Incorrect instillation on the roof, causing damages on							0.1

Critical Situations on the Construction Site



\		QUALICHeCK focus area	Transn charact	nission eristics	,	Ventilation	1	t	
Critic	cal situation		Whole component	Thermal bridges	Airtightness of envelope	Airtightness of ducts	Systems	Sustainable summer comfort technologies	Renewables in multi-energy systems
	0.1	Not enough distance/insulation behind collectors at walls/roofs							
	Solar thermal	Insulation behind the panels not high temperature resistant (e.g. integrated in facades)							
S		Storage feed-in at middle/top							EU2
systems		Setting: no priority for DHW							
sys		Storage feed-in at top (DHW) and middle (heating)							
		Too low refrigerant quantity							F1
service	Heat pump	Incorrect positioning of the outdoor unit (too close to walls, in an attic) -> poor performance							F1
Building		Time for defrosting of the outdoor heat exchanger set at a too low value -> poor performance							F1
Bu		Setting of airflow rate on default instead of specific necessary setting/wrong air flow rates							
	Ventilation	Required filters not included					A2		
	system	No electrical connection of the auxiliary heating					F1		
	1	Installation without accessibility for maintenance					A2		

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Documented Examples of existing Situations regarding Quality of the Works





Reasons for poor quality:

- 1. Poor specifications at level of projects, standards, regulations:
 - a. Materials to be used (e.g. material characteristics of insulation, correct construction details (joints), ...)
 - Performances to be achieved (e.g. air- and watertightness, wind resistance for PV panels, acoustical performances of ventilation systems, ...)
 - c. With respect to the execution principle (e.g. under which conditions may roofing be installed
- 2. Lack of competence
 - a. Designer level (see also QUALICHeCK work package "Reliable and easily accessible input data")
 - b. Execution level
 - c. Language barriers
- 3. Critical economic conditions
 - a. Critical financial conditions
 - b. Critical timing conditions
- Lack of control
 - a. By parties involved in the project
 - b. By third parties (government, independent control organisations, ...)

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Documented Examples of existing Situations regarding Quality of the Works



Study	Country	Reported by	Covered areas	Date of study	Transferability	Results/consequences
Field test on combined heat pump and solar thermal systems	Austria	OEGNB	Heat pumps, solar thermal systems	2010-2013	National, international	Revised training material for installers
Study on ventilation systems in classrooms	Austria	OEGNB	Mechanical ventilation systems in classrooms	2008	National, international	Revised training material for ventilation installers
Impact of storm on PV systems	Belgium	BBRI	Installation of PV systems	2010-2013	National, international	Development of design and installation specifications
Cypriot analysis of the National Status Quo within BUILD UP Skills	Cyprus	The Cyprus Institute	Insufficient knowledge/ training, necessary specialists not part of construction team	2012	National, international	Roadmap for policies and actions for construction sector employees
Burgholzhof study	Germany	Fraunhofer IBP	Insulation material, quality of windows, thermal bridges, window seams, roller shutters	2002	National, international	General: U-value definitions of glazings have been revised; practical recom- mendations
Estonian analysis of the National Status Quo within Build Up Skills	Estonia	Tallinn University of Technology	Insufficient knowledge of new technologies/construction workers not adequately trained	2012	National	The number of skilled work- force needs to be increased
Estonian housing stock technical condition - apartment buildings (1990-2010)	Estonia	Tallinn University of Technology	Insulation material, damages on construction site, wet insulation, waterproof layers, built-in moisture, moisture and air barriers, joints	2010-2012	National, countries with similar constru- ctions & climate, partly international	Guidelines for designers and builders
Quality of ventilation systems in residential buildings: status and perspectives in Estonia	Estonia	Tallinn University of Technology	Ventilation systems: Joints not airtight, no accessibility for cleaning/ maintenance, wrong settings, filters not included	2013	National, partly international	Guidelines for HVAC designers and builders
EU project SAVE DUCT	EU (focus on BE, F, S)	BBRI	Ductwork, airtightness	1997-1998	International	Recommendations to use circular ducts and factory- fitted sealing gaskets

17 documented Examples of existing Situations regarding Quality of the Works



Study	Country	Reported by	Covered areas	Date of study	Transferability	Results/consequences
EU project CombiSol	EU (focus on A, F, D, S)	OEGNB	Installation of solar thermal systems	2007-2010	International. Test included systems from 4 countries	Guidelines for manufacturers and installers
Study on common problems with heat pumps	France	Cetiat	Heat pumps	2009	National only	Advice to join the quality label QualiPac
Romanian analysis of the National Status Quo within Build Up Skills	Romania	URBAN-INCERC	Time pressure, insufficient knowledge/training, necessary specialists not part of the construction team	2012	National	Starting point for the defini- tion of a national qualification strategy and a roadmap
Småhuss-kadenämnden (The board for moisture and mould damages in single-family house)	Sweden	Chalmers University of Technology	Time pressure, insufficient knowledge/training, insulation material, construction damages, wet material, waterproof layer, water resistance, hydraulic flows	2001	National, countries with similar construc- tions & climate, partly international	Education and information reg. less risky construction types. Foundations with insulation above concrete slabs are no longer used.
Wrong insulation material in loose fill insulations in attics	Sweden	Chalmers University of Technology	Wrong insulation material; λ-value, thickness, etc.	1998	International	Practical recommendations for improvement
Problems with external thermal insulation composite systems (ETICS)	Sweden	Chalmers University of Technology	Joints not watertight/airtight	2009	National, countries with similar construc- tions & climate	Recommendations for safe ETICS constructions in the Swedish situation
The causes and costs of defects in construction	Sweden	Chalmers University of Technology	General, especially lack of motivation/ control	1999	Probably international	45 % of the detected defects originated from the construction site, mostly by lack of motivation
Factors that affect the building's air tightness	Sweden	Chalmers University of Technology	Building airtightness	2010	National, countries with similar construc- tions	Recommendations for improved building airtightness (0.3 l/sm²)

Example: Burgholzhof: Surveillance of Design and Construction Work



- 500 residential units in low energy level
- Fraunhofer IBP contracted by city of Stuttgart check EP calculations, design of joints, realisation on site



Quality check for all three parts was important:

- Proofs of thermal protection had to be corrected, up to 4 times
- Many of the details had to be improved/clarified by adding material descriptions, etc.
- Windows U-values and g-values did not meet specifications (at that time two types
 U-values: measured acc. DIN and officially published with "safety" allowances,
 g-values deemed less important)
- Thermal separation of balcony plates not accurate, filled partly with mortar or concrete (thermal bridges)
- Window seams filled with polyurethane foam (not durable elastic)
- Insulation material with inferior thermal conductivity
- Top mounted roller shutters create thermal bridges at the location where the shutters are on top of the wall
- Additional insulation on the inner side of cellar walls problematic (pipes, fixtures)

15 Best Practice Examples to solve the critical Situations



Solution	Country	Reported by	Covered areas	Date of solution	Type of solution	Legal/ other	Transfera- bility
Training and certification schemes for installers at AIT	Austria	OEGNB	Installation of heat pumps, PV, solar thermal and ventilation systems	Since 2001	Training and certifica- tion of installers	Voluntary, recommended by klimaaktiv	Yes
Guidelines, check- lists and commissio- ning protocols by professional associations	Austria	OEGNB	Installation of heat pumps, PV, solar thermal and ventilation systems	Since ca. 2005	Guideline, checklist, Comm. protocol	Voluntary	Yes
Voluntary building certification including measure- ments	Austria	OEGNB	Building envelope quality	Pilot phase in 2001, in place since 2003	Quality assessment by third party	Voluntary	Yes
IEE project WE- Qualify	Cyprus	The Cyprus Institute	Knowledge/training, specialisation, material, installation, damages during construction, wet material, roller shutters	2013 + 36 months	Education of workers (training material + training)	Recommen- dative/ volun- tary	In general yes
Scheme of Vocatio- nal Qualifications: I have the qualifi- cations. I certify!	Cyprus	The Cyprus Institute	Knowledge/training, specialisation	2013, ongoing	Education and certi- fication of workers	Recommen- dative/ volun- tary	In general yes
RAL Window and Front Door Installa- tion Guideline	Germany	Fraunhofer IBP	Window installation, airtightness, water tight- ness, thermal bridges at window/wall connection	Since 1998, regular updates	Guideline and education of workers	Accepted rules of technology	Yes
RAL Certification of Window Installation	Germany	Fraunhofer IBP	Window installation, air- tightness, water tight- ness, thermal bridges at window/wall connection	Since 1998	Certification of manufacturer including installation	Voluntary	Yes

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15 Best Practice Examples to solve the critical Situations



Solution	Country	Reported by	Covered areas	Date of solution	Type of solution	Legal/ other	Transfera- bility
Guidelines for dwelling designers, builders, owners	Estonia	Tallinn University of Technology	Technical details, insulation layers, airtightness material, joints	2010-2012	Guideline	Voluntary	Yes
BUILD UP Skills QualiShell project	Romania	URBAN-INCERC	Knowledge/training, qualification of wor- kers, building envelope: transmission charact. + envelope airtightness	2013-2015	Qualification schemes, mechanism for long lasting large scale implementation	Integrated in the national qualification system	Partially
Swedish guidelines on waterproof layers in wet areas (GVK, BBV)	Sweden	Chalmers University of Technology	Waterproof layers in wet areas	Since 1988	Education of workers, guidelines and authorisation of companies	Voluntary, several insurance comp. require work acc. GVK/BBV	Yes. Negotia- tions with insurance companies
Quality framework for ducts	Sweden	Chalmers University of Technology	Air duct tightness	Since 1966	Airtightness test and certification	Voluntary, but applied in 90- 95% of buildings	Yes
Guideline BuildE - Energy efficient	Sweden	Chalmers University of Technology	Communication between planners and contractors	Initiated in 2013	Checklist, guidelines, standardisation of calculation tools	Voluntary	Probably yes
Quality framework CIGA for insulation of cavity walls	UK	Fraunhofer IBP	Cavity wall insulation	Since 1995	Certificate for installers, guarantee for home owners	Voluntary	In general yes. Connection to UK ministries
Quality framework SWIGA for insu- lation of solid walls	UK	Fraunhofer IBP	Solid wall insulation	2010	Certificate for installers, guarantee for home owners	Voluntary	In general yes. Connection to UK ministries
Guideline for selecting cool roofs	US/ Greece	University of Athens	Cool roofs	2010	Guideline	Voluntary	Countries/regi ons with hot climate and limited roof insulation

Example: UK Quality Framework CIGA for Insulation of Cavity Walls



- Cavity Insulation Guarantee Agency (CIGA)
- Established in 1995
- Provision of 25 years guarantee for cavity wall insulation fitted by registered installers in the UK
- Residential and non-residential buildings
- List of system designers and installers
- Guarantee covers defects in material + workmanship
- Since 2013 "hard to treat" cavity insulation guarantee for homes with > 3 storeys or walls with narrow cavities
- CIGA HTT Guarantee was issued for nearly 130000 home owners within 2013

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What's in the pipeline?



Fact Sheet:

"Building regulations can foster quality management: The French example on building airtightness"

Draft Fact Sheet:

"The German Contractor's Declaration – A guarantee for meeting the minimum energy performance requirements on the construction site"

- Contact with organisations being responsible for best practice solutions included in the report
 feedback needed
- Search for additional best practice solutions





The role certification can play to improve the reliability of input data. Eurovent certification example

Sylvain Courtey, Eurovent Certita Certification, France





The role certification can play to improve the reliability of input data. Eurovent certification example.

Qualicheck workshop

16-17 March 2015, Lund, Sweden

Sylvain Courtey

s.courtey@eurovent-certification.com

www.eurovent-certification.com/www.certita.fr/www.certiflash.com



Eurovent Certita Certification



- In June 2013 CERTITA and EUROVENT CERTIFICATION Company, leading product certification companies in the fields of heating, ventilation, air-conditioning and refrigeration (HVAC-R), merged their activities within a new corporation named Eurovent Certita Certification SAS.
- The combined company becomes a major European Certification body, operating 35 certification programmes in residential domestic buildings or in industrial facilities.



Reference Certification Marks













www.eurovent-certification.com/www.certita.fr/www.certiflash.com



Certification programme of **Eurovent Certita**



- Pompes à chaleur (PAC) Groupes de production d'eau glacée (Chillers)
- Climatiseurs DRV (débit de réfrigérant variable)
- Unités de toiture Rooftop



- Echangeurs
- Moto-compresseurs
- Groupes de condensation Refroidisseurs de lait
- Meubles frigorifiques de vente
- Tours de refroidissement



- Centrales de traitement d'air Centrales double flux résidentiel
- Echangeurs rotatifs et à plaques
- Filtres à air M5-F9 Systèmes de ventilation hygroréglable Conduits de fumée



- Ventilo convecteurs
- Poutres froides
- Radiateurs
- Solaire thermique
- Robinets thermostatiques
- Appareils de chauffage à combustibles liquides ou solides



The Eurovent Certified Performance mark (ECP)



- Voluntary third party certification programmes
- Covers all HVAC&R fields: Heating, Ventilation, Air-conditioning and Refrigeration
- Mark recognised in all Europe and beyond
- Accreditation according to ISO 17065 by COFRAC (accreditation n°5-0517, international recognition EA/IAF)
- · Continuous verification process:
 - o Tests performed by independant and accredited laboratories
 - o Factory audits
 - o Check of selection tools

www.eurovent-certification.com/www.certita.fr/www.certiflash.com



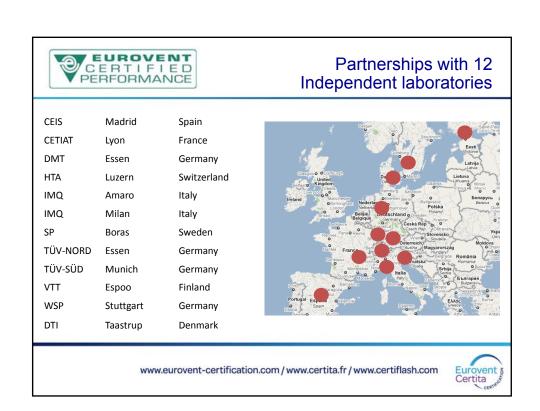


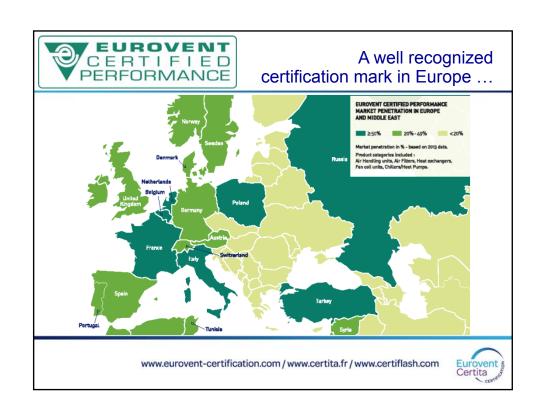
The Eurovent Certified Performance mark – Key figures

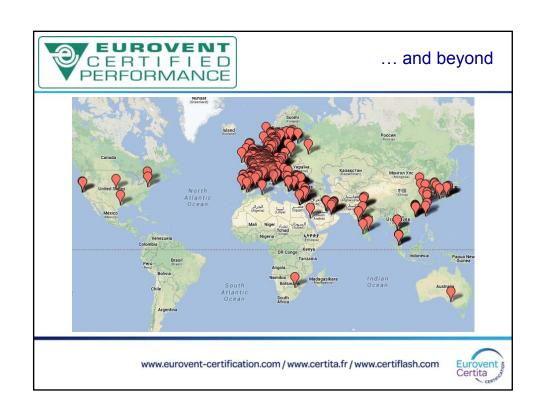
- · 19 certification programmes in activity
- 269 certified manufacturers
- · 320 certified tradenames
- +50 000 certified references
- +80 experts participating to our compliance committees
- 12 European independent laboratories
- · 20 years of experience

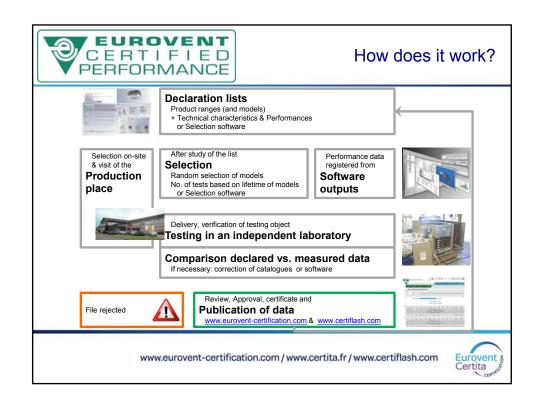


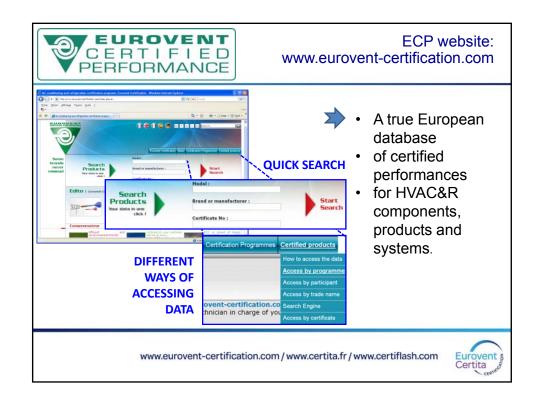














Certiflash www.certiflash.com



- pop-up from search engines
- on manufacturer websites
- Mobile app



www.eurovent-certification.com/www.certita.fr/www.certiflash.com

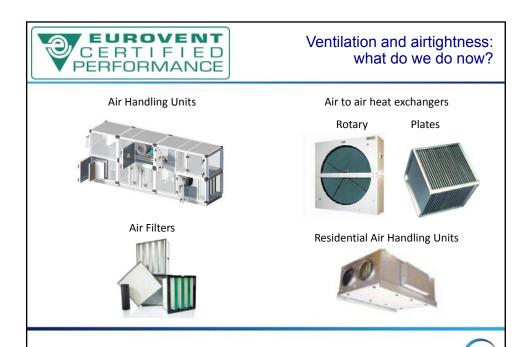




European certified performances database: Examples of uses

- Parterships with software editors in France (Edibatec, Clé@ association):
 - Automatic transfers of the certified performances database for EPBD application in France (RT 2012)
 - Main products covered: heat-pumps, chillers, rooftops, air conditioners
- Upcoming in 2015:
 New partnerships with large institutional organisations in France in order to build white certificate databases based on the ECP database.









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Air Handling Units

- · Certified performances published on ECP website:
 - o Casing Air Leakage
 - o Thermal Transmittance
 - o Thermal bridging factor
 - o Filter by-pass leakage
 - Casing Strength
 - Acoustic insulation
- Certified performances available in certified selection software:
 - o Airflow pressure power input
 - o Sound Power Level
 - o Cooling-heating coils capacity water pressure drop
 - o Heat recovery efficiency







Residential Air Handling Units

- Certified performances:
 - Leakage class
 - Aeraulic performances:
 - o Airflow/pressure curves
 - Maximum airflow [m³/h]
 - o Electrical consumption [W]
 - Specific Electrical Consumption SPI [W/(m³/h)]
 - o Temperature efficiency / COP
 - o Performances at cold climate conditions
 - SEC (Specific Energy Consumption) in [kWh/(m².annum)]
 - A-weighted global sound power levels [dB(A)]

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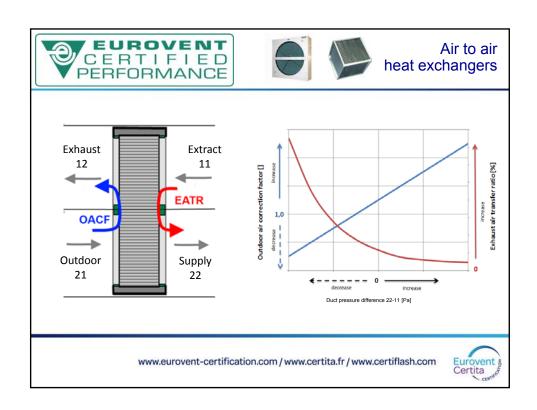


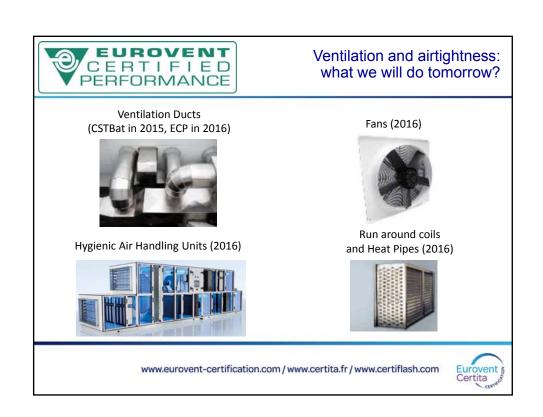


Air to air heat exchangers

- Certified performances published on ECP website and in certified selection software:
 - o Pressure drop
 - Temperature efficiency
 - o Humidity efficiency
- Leakage performances to be certified from 1st of April 2015:
 - EATR (Exhaust Air Transfer Ratio)
 - OACF (Outdoor Air Correction Factor)









Thank you for your attention

Any questions?



Opportunities and challenges for ventilative cooling solutions in compliance frameworks

Karsten Duer, Velux, Denmark



Opportunities and challenges for ventilative cooling solutions in compliance frameworks.

Karsten Duer, VELUX

QUALICHECK QUESTIONS

- ② how to improve the reliability of the input data used to issue Energy Performance certificates;
- 2 how to improve the quality of the works;
- now to take into account innovations in a compliance framework.

VELUX₀

VENTILATIVE COOLING

CONTENT

- Definitions
- Main opportunities
- Main challenges
- Legal stuff
- A case
- Way forward
- Conclusion and outlook

What is ventilative cooling?

- Ventilative cooling refers to the use of ventilation strategies to cool indoor spaces by means of outdoor air.
- Ventilative cooling is relevant in a wide range of buildings and may even be critical to realize renovated or new NZEB.
- Effect of ventilative cooling depends strongly on the air change rate: Large rates are important

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MAIN OPPORTUNITIES/MOTIVATIONS



Low heating demandOverheating

Need for cooling

Air condition:

Air conditioners use about 5% of all the electricity produced in the US, at an annual cost of more than \$11 billion to homeowners [*]

Air conditioning units for post-mounting are available in any DIY store in Europe

#Chillers in buildings are expected to double next 10-15 years

Ventilative cooling

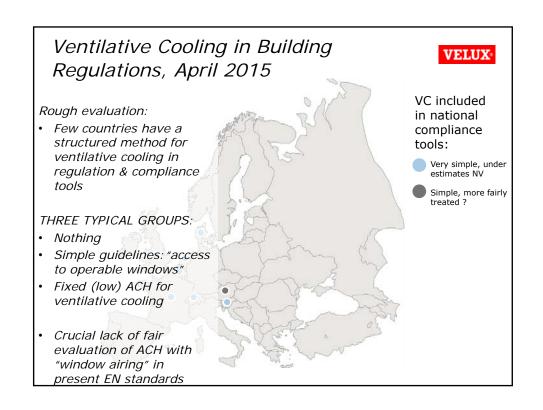
Ventilative cooling can eliminate or bring down significantly the need for mechanical cooling

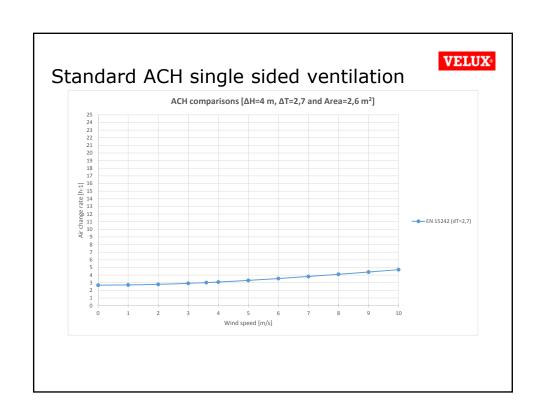
Ventilative cooling shall work together with other passive cooling techniques such as the thermal mass of the building and solar protection.

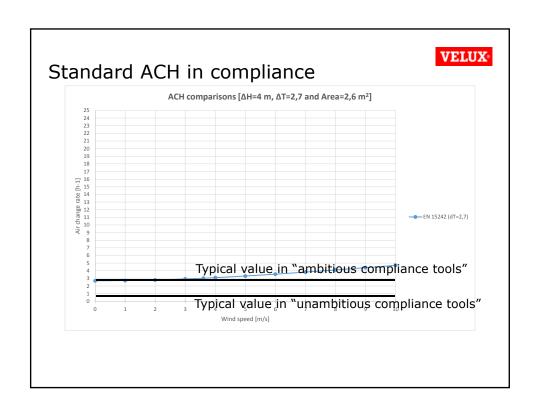
VELUX[®]

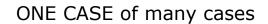
MAIN CHALLENGES

- Forgotten (though ancient) simple technology
- Lack of simple-to-use evaluation tools
- Lack of focus in the design process of buildings
- Lack of integration in most building regulations
- Lack of integration in most simple-to-use compliance tools
- FIRST MAIN CHALLENGE FOR VENTILATIVE COOLING IS NOT TO COMPLY – IT'S ACTUALLY TO BECOME PART OF THE COMPLIANCE SCHEME
- SECOND IS TO DEVELOP THE GOOD EVALUATION METHODS
- THIRD, THE RIGHT PRODUCT SOLUTIONS AND THE RIGHT CONTROL - ALREADY AVAILABLE BUT IMPROVEMENTS CAN BE MADE







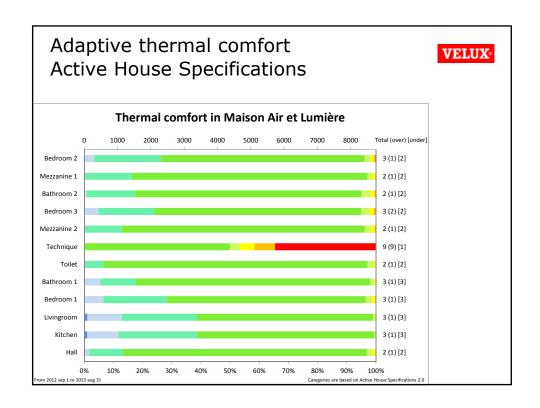








Situated near Paris, 135 m² Active House, Automated operation of windows, shading etc, Window-floor ratio 33% Comprehensive monitoring programme



VELUX^o

- Ventilative cooling really works in practice
- What about the theory?





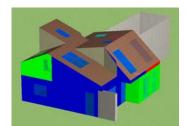
Theory and practice

Multi-zone simulation of airflows using CONTAM

Multi-zone dynamic thermal simulation of indoor air temperatures using French tools PLEIADES + COMFIE

Tracer gas measurements of Air change rate





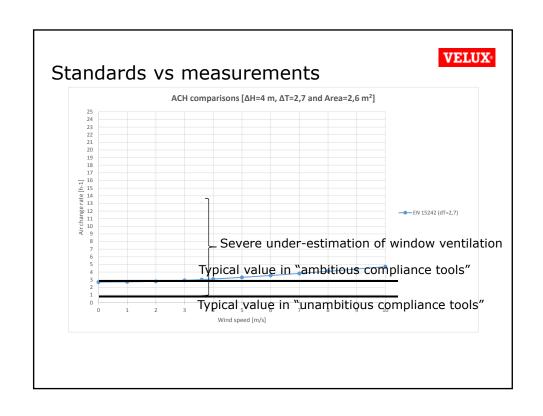
ACH measured & simulated

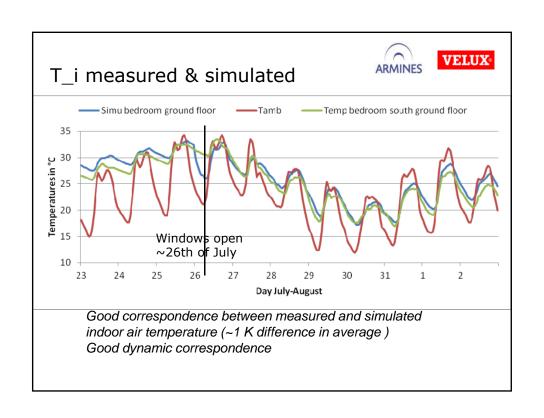


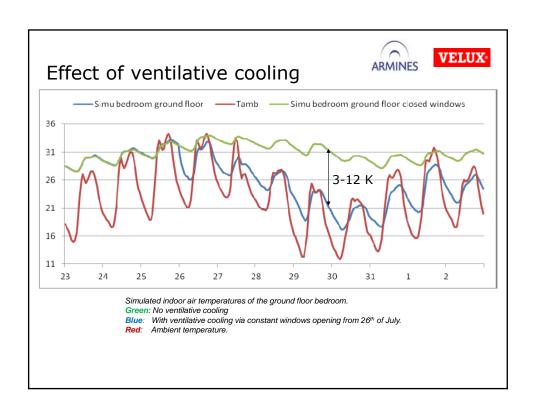
VELUX.

		South bedroom temp	North bedroom temp	Bath room temp	Wind speed m/s	Tracer Gas ACH	Simulated CONTAM ACH
Morning	Closed door	23.7	21.3	22.5	3.6	13.4	13.9*
Wolling	Open door	23.7	21.3	22.5	2.8	22.5	20.6
A frame a an	Closed door	27.1	26.5	26.2	2.3	13.2	16.6*
Afternoon	Open door	27.1	26.5	26.2	2.3	19.8	19.5
Morning	Closed door	24.2	22.5	23.3	3.6	13.4	14
Monning	Open door	24.2	22.5	23.3	3.6	14.6	17.4
Afternoon	Closed door	26.5	25.2	25	2.9	10.6	13.2
Atternoon	Open door	27	26.1	25.6	2.8	13.1	17

Good correspondence between measured and simulated air change rate – max 30% difference per case, 10% difference in average.







LEARNINGS FROM VELUX MONITORING PROJECTS

VELUX°

- ▶ □ how to improve the reliability of the input data used to issue Energy Performance certificates;
- ▶ □ how to improve the quality of the works;
- ightharpoonup how to take into account innovations in a compliance framework.

Main reasons for deviations between predicted and realized performance (prioritized):

- 1. User pattern differs from predicted
- 2. Component "errors" (incl unrealistic test methods)
- 3. Construction errors

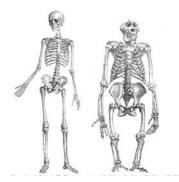
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CONCLUSION

- ▶ ☐ how to improve the reliability of the input data used to issue Energy Performance certificates;
- ▶ □ how to improve the quality of the works;
- ightharpoonup how to take into account innovations in a compliance framework.
- BASE COMPLIANCE ON REALISTIC PHYSICS, REALISTIC USER BEHAVIOR AND EXECUTE WELL

VELUX[®]

Thank you for your attention



Assessment of demand-controlled ventilation in various countries and compliance frameworks: practical experience and difficulties encountered by a manufacturer

Yves Lambert, Renson, Belgium





Assessment of demand-controlled ventilation in various countries and compliance frameworks: practical experience and difficulties encountered by a manufacturer

International Workshop on Ventilation and Airtightness in Buildings Lund, Sweden – 16-17 March 2015 Yves Lambert / Ivan Pollet - Renson Ventilation





Demand Controlled Ventilation

Willem de Gids VentGuide Former TNO

DCV Workshop October 2010 AIVC/Tightvent Brussels

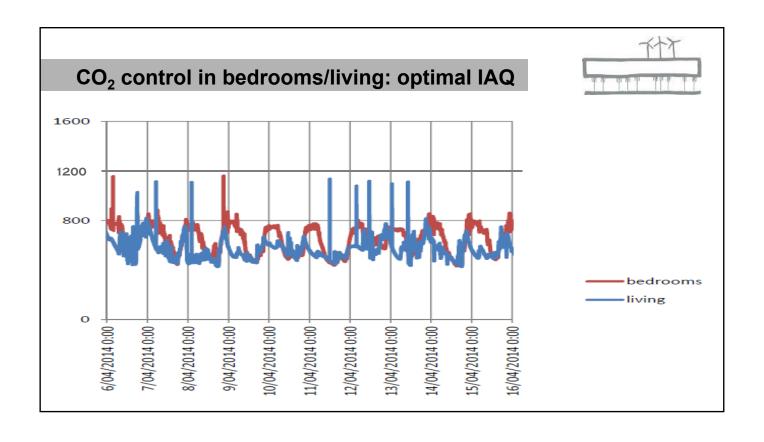


Trends in Developments

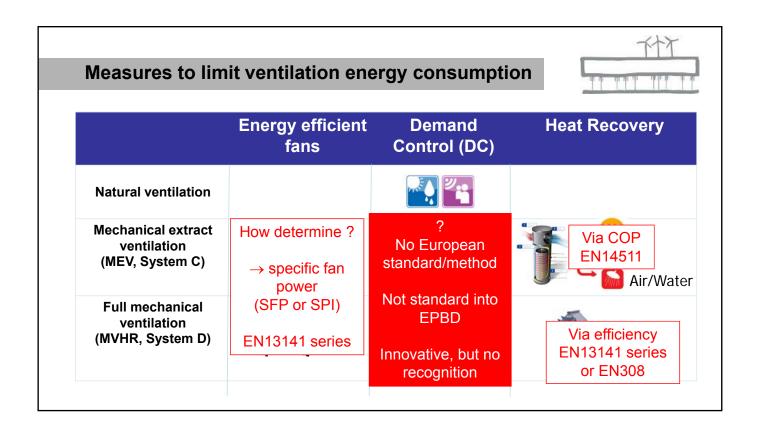
- Demand Control
 - time control
 - presence detection
 - sensor control
 - zonal systems
- Energy
 - heat recovery/heat pump
 - pre heating of ventilation air
 - conservatories
 - · solar wall/roof
 - · dynamic insulation
 - ground heat exchanger

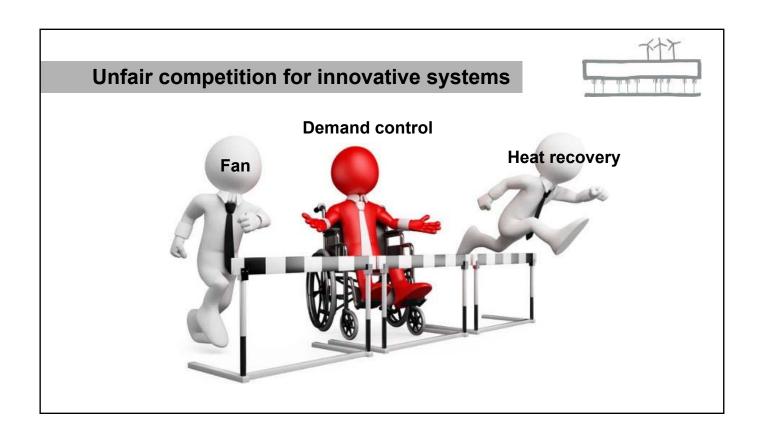


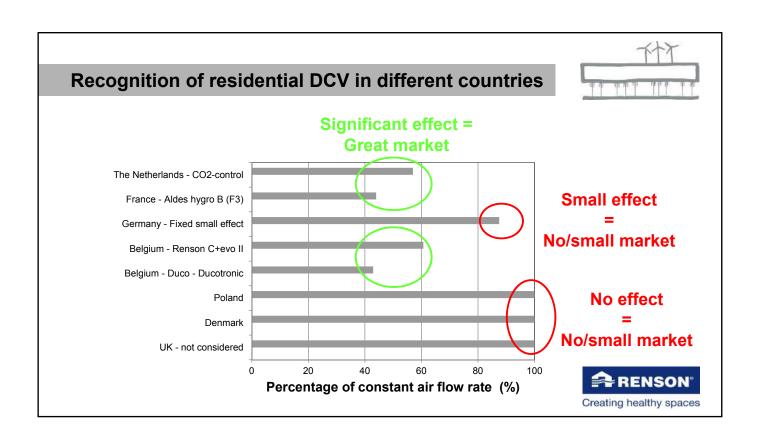
Principle of demand controlled ventilation (DCV) Supply and/or extract rate is function of the pollution level (RH, CO₂, VOC, ...) Continuous monitoring of IAQ and savings on heating and fan electricity consumption For all systems



	English of Chairman	Demond	Heat December
	Energy efficient fans	Demand Control (DC)	Heat Recovery
Natural ventilation			
Mechanical extract ventilation (MEV, System C)		CO ₂	Air/Wate
Full mechanical ventilation (MVHR, System D)		voc	







Assessment and compliance Assessment → Methodology/simulation → No European Standards National methodologies → Eco-design assessment → Test in laboratory (ITT) → Few European standards RH-controlled components others? Compliance → Test in production (FPC) → CE-marking → National certification procedures → Test in-situ → Upcoming national regulations

Assessment: methodology/simulation



Residential EN standards

- → EN15665
- → CEN/TR14788

Non-residential EN standards

 \rightarrow prTR16798-4

Little useful info Effect on energy consumption?

Types of control

Table 10 — Possible types of control of the indoor air quality (IDA-C)

Category	Description	R Room Z Zone
IDA – C 1	The system runs constantly.	
IDA – C 2	Manual control The system runs according to a manually controlled switch.	R Z
IDA – C 3	Time control The system runs according to a given time schedule.	R Z
IDA – C4	Occupancy control The system runs dependent on the presence (light switch, infrared sensors etc.)	R Z
IDA – C5	Demand control (based on the number of occupants) The system runs dependent on the number of people in the space.	R Z
IDA – C 6	Demand control (based on air quality indicator) The system is controlled by sensors measuring indoor air parameters or adapted criteria, which shall be specified (e.g. CO ₂ , mixed gas, humidity or VOC sensors). The used parameters shall be adapted to the kind of activity in the space.	R Z

I shall be specified whether the type of control is

- Individual per each room R
- Centralised per each zone Z

Assessment: methodology/simulation



Residential and non-residential EN standards

- \rightarrow prEN16798-7 (~EN15242)
- → CEN/TR16798-8

$$q_{\text{V;ODA;req}} = \frac{f_{\text{ctrl}} \cdot f_{\text{sys}}}{\varepsilon_{\text{V}}} \cdot q_{\text{V;ODA;req;des}}$$

Pre-normative!

Presence = CO_2 sensor?

On/off control?

Must be realistic

Required outdoor airflow rate	q∨;ODA;re q	m3/h	2100.0 0	(7)	$q_{\text{V;ODA}\text{\tiny{\it Teq}}} = \frac{f_{\text{chi}} \cdot f_{\text{sys}}}{\mathcal{E}_{\text{V}}} \cdot q_{\text{V;ODA}\text{\tiny{\it Teq}},\text{des}}$
				(8)	If VENT_OAFLOW_CTRL = CONST_OA_FLOW fctrl = 1
				(9)	if VENT_OAFLOW_CTRL = ON/OFF_TIME or MULTI_STAGE_TIME fctrl = fop;V
Control factor	fètri	fetn -	1.00	(10)	if VENT_OAFLOW_CTRL = ON/OFF_SENS_OCC, if focc > 0 fctrl = 1 else fctrl = 0
				(11)	Else $f_{\rm ctrl} = f_{\rm occ} + f_{\rm sens} \cdot (1 - f_{\rm occ})$

Assessment: methodology/simulation



Residential national methodologies

The Netherlands: VLA

Belgium: ATG-E

France: Avis Technique

Other?

Multi-zone airflow models (Contam, TRNFLW, ...)

Many variables taken into account to be representative

- Outdoor climate (temp., RH, wind speed/direction, CO₂)
- · Dwelling type
- · Terrain roughness
- Orientation
- Building location
- · Building air tightness
- Occupancy
- Characteristics ventilation system: reference air flow rates, control algorithms, ...
- ...

Assessment: methodology/simulation



Residential national methodologies: barriers

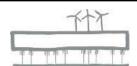
Specific control strategies are often not allowed/considered

- ... although proven in practice
 - · extraction form living rooms
 - · control on RH or VOC
 - · control algorithms

Potential of DCV not recognised

Less innovation

Assessment: methodology/simulation



Residential and non-residential: ecodesign directive (2009/125/EC)

COMMISSION REGULATION (EU) No 1253/2014

of 7 July 2014

implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for ventilation units

ANNEX II

Specific ecodesign requirements for RVUs, as referred to in Article 3(1) and 3(3)

- 1. From 1 January 2016:
 - SEC, calculated for average climate, shall be no more than 0 kWh/(m 2 .a).
- Non-ducted units including ventilation units intended to be equipped with one duct connection on either supply or extract air side shall have a maximum L_{WA} of 45 dB.
- All VUs, except dual use units, shall be equipped with a multi-speed drive or variable speed drive.
- All BVUs shall have a thermal by-pass facility.
- From 1 January 2018:
- SEC, calculated for average climate, shall be no more than 20 kWh/(m2.a).
- Non-ducted units including ventilation units intended to be equipped with one duct connection on either supply or extract air side shall have a maximum $L_{w\Delta}$ of 40 dB.
- All VUs, except dual use units, shall be equipped with a multi-speed drive or variable speed drive.
- All BVUs shall have a thermal by-pass facility.
- Ventilation units with a filter shall be equipped with a visual filter change warning signal.

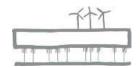




Assessment: methodology/simulation Residential and non-residential: ecodesign directive (2009/125/EC) ANNEX VIII ENERG CO Calculation of the specific energy consumption requirement The specific energy consumption SEC is calculated with the following equation: $\mathsf{SEC} = \mathsf{t_a} \cdot \ \mathsf{pef} \cdot \mathsf{q}_{\mathsf{net}} \cdot \ \mathsf{MISC} \cdot \ \mathsf{CTRL}^x \cdot \ \mathsf{SPI} - \mathsf{t_h} \cdot \Delta \mathsf{T_h} \cdot \mathsf{\eta}_h^{-1} \cdot \mathsf{c}_{\mathsf{ale}} \cdot (\mathsf{q}_{\mathsf{nef}} - \mathsf{q}_{\mathsf{net}} \cdot \ \mathsf{CTRL} \cdot \ \mathsf{MISC} \cdot (1 - \eta_t)) + Q_{\mathsf{deff}} \cdot \mathsf{q}_{\mathsf{net}} \cdot \mathsf{CTRL} \cdot \ \mathsf{MISC} \cdot (1 - \eta_t) + Q_{\mathsf{deff}} \cdot \mathsf{q}_{\mathsf{net}} \cdot \mathsf{CTRL} \cdot \mathsf{MISC} \cdot (1 - \eta_t) + Q_{\mathsf{deff}} \cdot \mathsf{Q}_{\mathsf{net}} \cdot \mathsf{CTRL} \cdot \mathsf{MISC} \cdot (1 - \eta_t) + Q_{\mathsf{deff}} \cdot \mathsf{Q}_{\mathsf{net}} \cdot \mathsf{CTRL} \cdot \mathsf{MISC} \cdot \mathsf{CTRL} \cdot \mathsf{MISC} \cdot \mathsf{CTRL} \cdot \mathsf{MISC} \cdot \mathsf{CTRL} \cdot \mathsf{MISC} \cdot \mathsf{CTRL} \cdot \mathsf{CTRL} \cdot \mathsf{MISC} \cdot \mathsf{CTRL} \cdot \mathsf{MISC} \cdot \mathsf{CTRL} \cdot \mathsf{MISC} \cdot \mathsf{CTRL} \cdot \mathsf{CT$ SEC ~ Fan consumption – Recuperated heating energy + defrosting energy - SEC is Specific Energy Consumption for ventilation per m2 heated floor area of a dwelling or building [kWh/(m2.a)]: ~ National methodologies: ventilation control CTRL **CTRL** ≤ **0**,**5** Manual control (no DCV) 1 Clock control (no DCV) 0,95 Potential of advanced DCV systems blocked by Central demand control 0,85 eco-design! Local demand control 0,65

Assessme	nt and compliance	
Assessment	→ Methodology/simulation	 → No European Standards National methodologies → Eco-design assessment
	→ Test in laboratory (ITT)	→ Few European standards RH-controlled components others?
Compliance	→ Test in production (FPC)	→ CE-marking
		→ National certification procedures
	→ Test in-situ	→ Upcoming national regulations

Assessment: test in laboratory (ITT)



Differences between countries

The Netherlands: not required, voluntary via





Belgium: - ATG-E: performed by manufacturer under supervision of third party



- new procedure under development

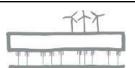
A minimum of laboratory tests needed as a first step

towards compliance

France: - performed by third party = CSTB
- severe test procedure

Other?

Assessment: test in laboratory (ITT)



European test standards

RH (proportionally) controlled air supply/extract devices = OK (EN13141-9/10)

How to test? - CO₂-control

- VOC or odour control

- accuracy of sensors

- durability of sensors

- ...

Lack of practical European test standards

Assessment and compliance Assessment → Methodology/simulation → No European Standards National methodologies → Eco-design assessment → Test in laboratory (ITT) → Few European standards RH-controlled components others? Compliance → Test in production (FPC) → CE-marking → National certification procedures → Test in-situ → Upcoming national regulations

Measurements in production CE marking → European directives: - machine - low-voltage - EMC National certifications/approvals • France: RH-DCV systems = obliged • Belgium: ATG-E → ATG? = voluntary • The NL:?

Compliance



Measurements in-situ

European standards \rightarrow In field test methods

Growing number: EN12599 – EN14134 – EN16211 ...

Growing impact as proof of quality

National initiatives:

• France: CPT – DTU = obliged from ?

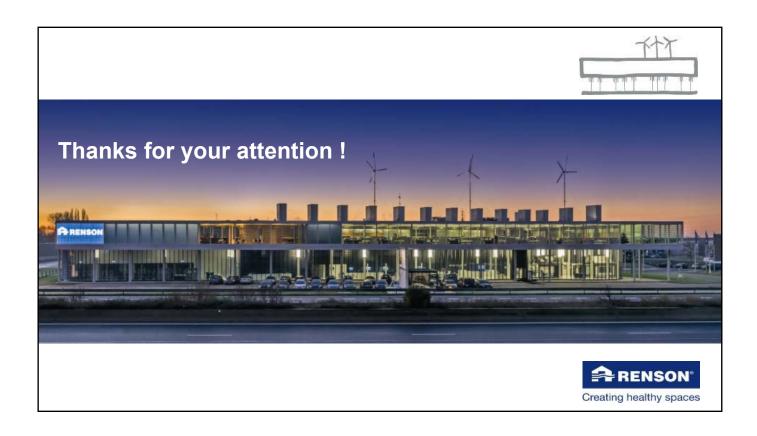
• Belgium: STS = voluntary from 2016, in 2017 requirements

• The NL: Ventilatiekeurmerk = voluntary \rightarrow no success: cost \leftrightarrow added value

Conclusions



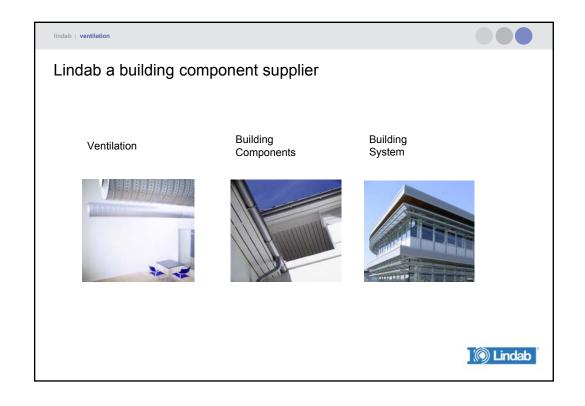
- Demand control ~ added value proven in market for years
- Lack of European national DCV assessment methodologies
- Lab tests more and more imposed, but lack of European test standards
- Compliance in production / in-situ: growing impact interest of industry
- Ecodesign blocks potentials of DCV

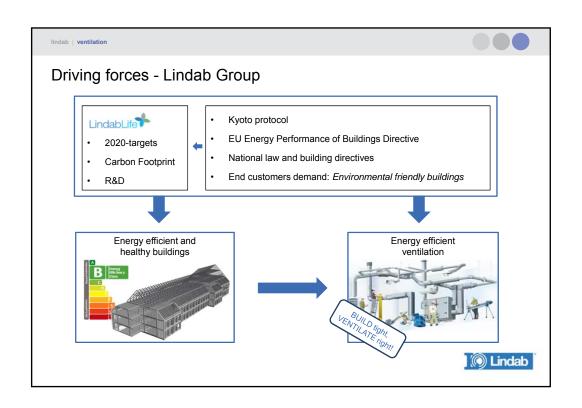


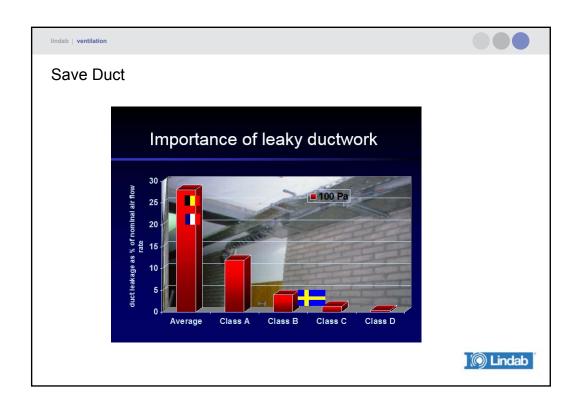
Market drivers for the ventilation Industry in Sweden

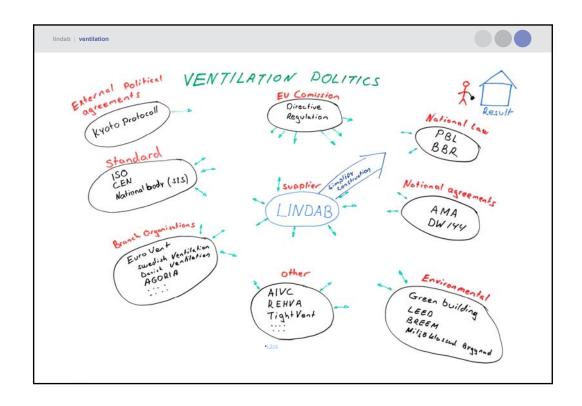
Lars-Åke Mattsson, Lindab, Sweden

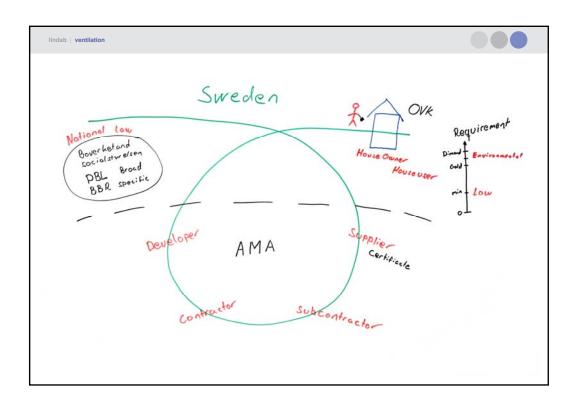


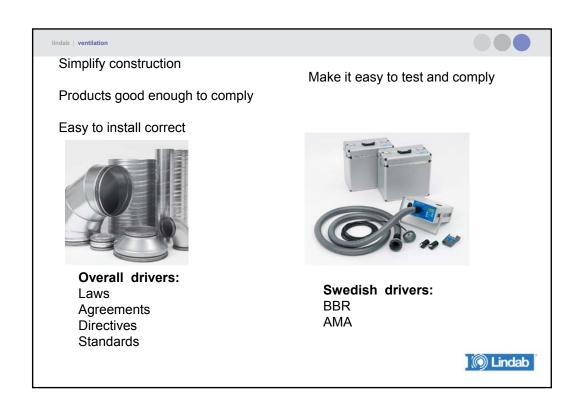












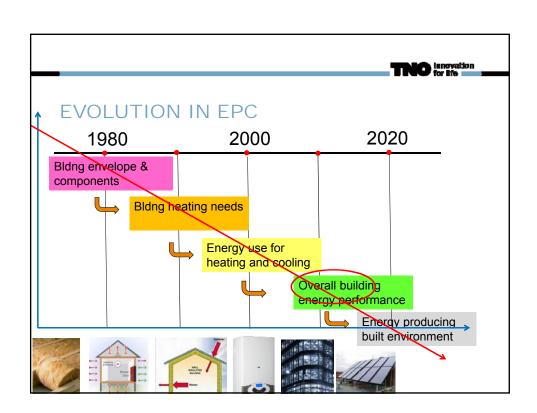


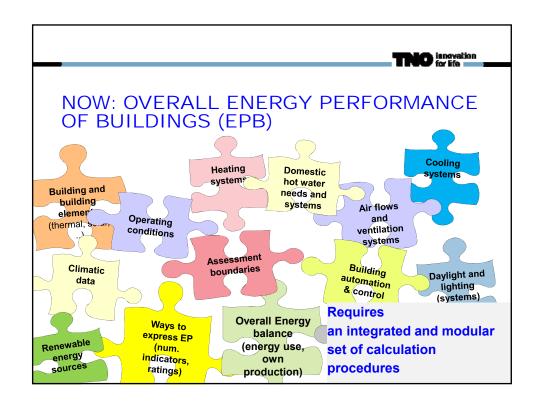


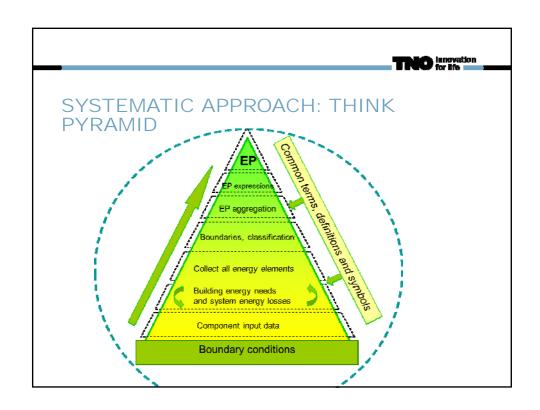
Quality and compliance on building ventilation and airtightness in the Dutch context

Wouter Borsboom, TNO, The Netherlands

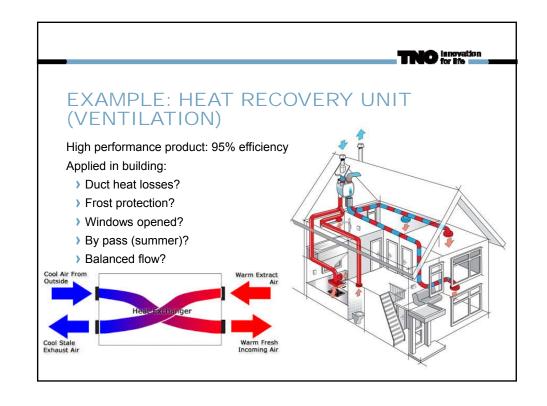


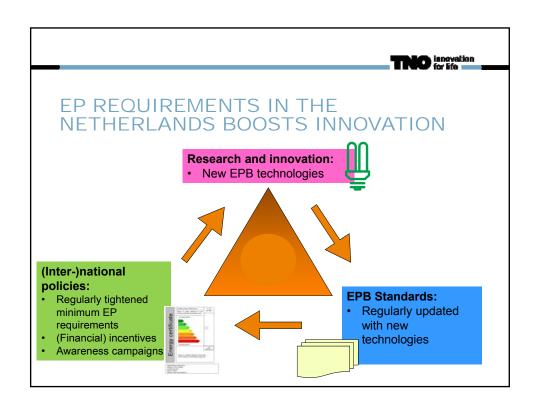


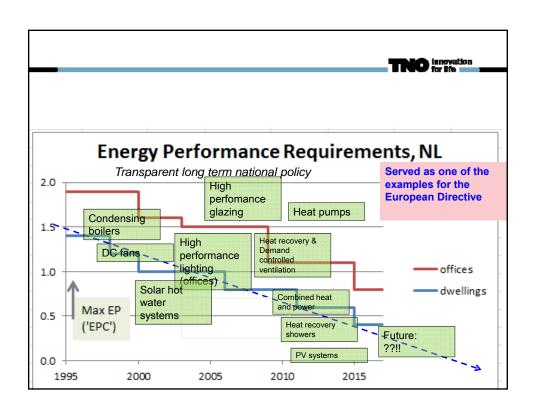














PRINCIPLE OF EQUIVALENCE FOR INNOVATIVE VENTILATION SYSTEMS

In the past:

- Each consultancy company uses its own simulation models
- No interaction between the consultants about the approach
- No common methodology how to conduct a study

As a results there was discussion of the outcome



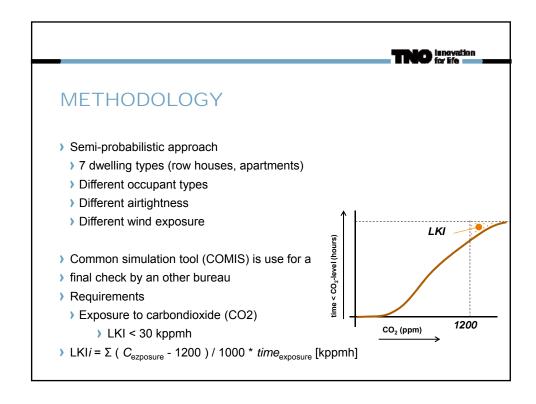


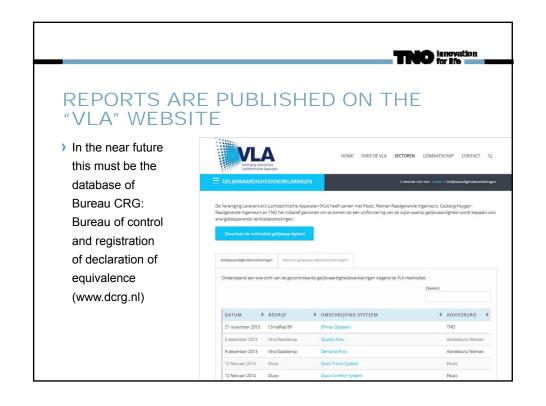
MANUFACTURERS AND CONSULTANCY COMPANIES JOINT FORCES

- > Dutch Association of Air Handling Equipment Manufacturers (VLA)
- > Research institutes / consultancy companies:
 - Nieman
 -) Peutz
 -) TNO

Each report is reviewed by one of the other bureau's

Purpose is to calculate correction factors of the ventilation flow (NEN 8088) to be used in the Energy performance calculation (NEN 7120).





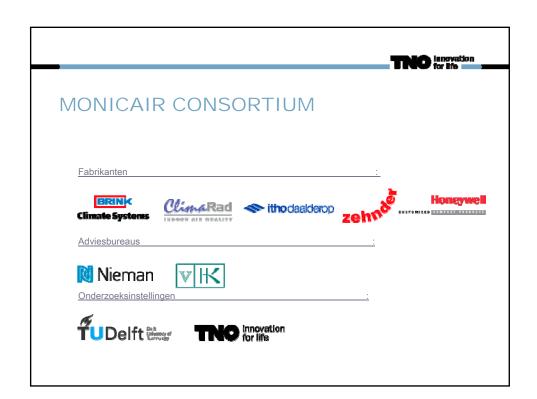


HOW DO VENTILATION SYSTEMS PERFORM IN PRACTICE? MONICAIR

Monicair project: MONItoring & Control of Air quality in Individual Rooms

Field studies aimed at:

- Performance measurements of indoor air quality and energy performance of different ventilation systems.
- Energy performance of dwellings in relation to comfort level and user patterns.
- > Purpose of the study
- > Improve ventilation systems
-) Improve calculation methods, standards, and building regulations.





FACTS AND FIGURES

- > 62 dwellings (row houses, 2 floors, pitched roof)
-) 9 ventilation systems (+ natural ventilation, system A)
- Correct installed
- > 1 year of measurements
- Measurements > 100 million data points
- > Field test including users



MEASURED DATA

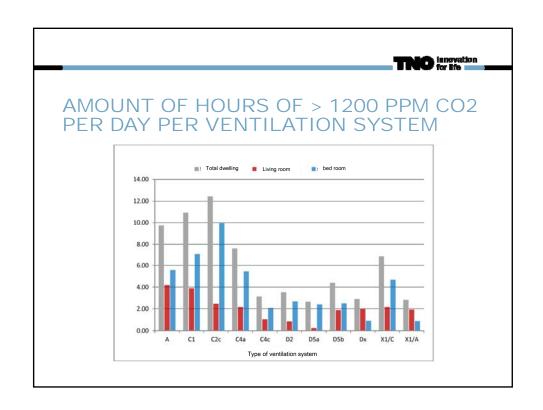
-) IAQ (indoor air quality): CO2-level
- Temperature (air temperature)
- Humidity
- > Presence (PIR)
- > Energy use
 - > Condensing boiler and ventilation-unit
- Weather station





MAIN CONCLUSIONS

- > Large differences between systems which comply to regulations
- Large differences between dwellings
- Occupants almost don't control their ventilation systems. Manual controlled ventilation systems are most of the time in low speed. 53% of the occupant is positive and 5% is negative towards the ventilation systems.
- > Sleeping rooms are critical
- Bigger correlation between ventilation flow and indoor air quality when a mechanical component is in the occupant space
-) Large differences in energy performance





CONCLUSIONS

- CO2 levels are too high even with systems which are build according to regulations.
- > Improvement is needed:
 - Regulations
 - > Standards
 - > Systems
 - Awareness



CALCULATION OF AIRTIGHTNESS

Three different methodologies can be used to determine the airtightness value to be used in the energy performance calculation:

- 1. Calculate a fixed value according to NEN 8088 based on building year, building type
- 2. Use blower door measurements of similar buildings in the past, quality control is important to meet this value
- 3. Calculation bases on SBR reference details, if this outperforms the fixed value according to NEN 8088 a blower door measurement is necessary.

Compliance and quality control will be part of the new system.



QUALITY CONTROL: DUTCH BUILT TRANSPARANT (BOUWTRANSPARANT)

- > Check of the Energy performance calculation
- Near Infrared pictures
- > Blower door and smoke tests
- Ventilation Flow
- > Indicative noise measurement
- > Tools for assessment of construction mistakes Estimation Energy losses









CAUSES OF LEAKAGES AVOIDABLE, MOSTLY IN THE SAME SPOTS

Cause of leakage:	number of times in project	total number of times
Chimney	13	14
Window	9	32
Window frame	9	29
Door	9	12
Roof-facade	5	5
Ventilation grill	5	18
Hatch crawl space	3	3
Door frame	3	3







CLEAR NEED TOWARDS QUALITY CONTROL

- Higher infiltration can not only lead to more energy use but also a need for more installed power for heating or cooling.
- There are also other reasons for quality control: proper functioning of the building and installation and prevention of cold spots which can lead to moisture and mould (mold) grow.









QUALITY INITIATIVES VENTILATION: JOINT EFFORT ASSOCIATIONS

Because 50% of ventilation systems was not according to specifications, in 2012 a plan was made with all significant associations to make sure every ventilation system in 2015 has a good performance.

This was ended in November 2014 by the ministry because of:

- Lack of performance tests, few figures of housing corporations and none of home owners
- No demand of tenants and home owners about quality of ventilation: no incentive to building parties.
- > Solution according to ministry: shift to private compliance test



NEW SYSTEM OF QUALITY ASSURANCE IN THE NETHERLANDS

- Ministry of BZK is preparing a new system of quality assurance
- A shift of activities municipality toward private quality assurance which make use of approved instruments to find out of a building is according to building regulations.
- A possible instrument is the combination of BRL 5019 (check of the building plans) and BRL 5006 (building site supervision).
- > Pilots are now conducted



ALTERNATIVE: PERFORMANCE GUARANTEE, ZERO ENERGY BILL

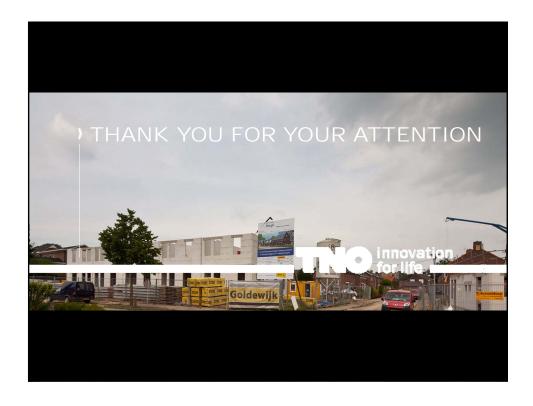
- > Energy cost in Dutch houses is about 45.000 Euro in 20 years
- Contractor retrofits about this amount of money and gives performance guarantee of zero energy bill within certain boundaries.





SPECIAL THANKS FOR CONTRIBUTIONS OF:

- Monicair: Rob van Holstein
- > Bouwtransparant measurements and pictures: Platform31
- > EPBD: Dick Van Dijk, TNO
- > Equality ventilation: Wim Kornaat, Bas Knoll TNO
- Compliance airtightness: Bas Knoll



Air-Permeability Testing of New Dwellings & Buildings in the UK: Challenges to Maintaining Standards

Barry Cope, ATTMA, UK



Air-Permeability Testing of New Dwellings & Buildings in the UK: Challenges to Maintaining Standards

Lund, Sweden – 16 March 2015

Presentation delivered by: Barry Cope – ATTMA Registered Testers Scheme Manager







Who are ATTMA?

- Originally a "Trade Association" formed in 2002, when ATT first appeared in England/Wales Building Regulations (Part L)
- Membership initially restricted to UKAS Accredited firms (ISO17025).
- Authors of the Technical Standards for ATT, listed in Building Regulations (ATTMA TSL1 & ATTMA TSL2)
- Owners of a new ATT Competence Scheme
 - Replaces BINDT Scheme
 - Authorised by Government and names in Part L
 - Majority of UK Testing Firms are Members







Terminology

- DCLG
 - · Government Department in charge of English Building Regulations
- Planning
 - Local Authority/Council Department that decides on what can be built in their area, and imposes various requirements
- Building Control
 - Organisations that check compliance of building work against Building Regulations. Can be either Local Authority or a private "Approved Inspector"
- Part L (of The Building Regulations)
 - Building Regulation that deals with Energy Performance
- BINDT (British Institute of Non-Destructive Testing)
 - Managers of a now ended Competence Scheme for AT testers of Dwellings.



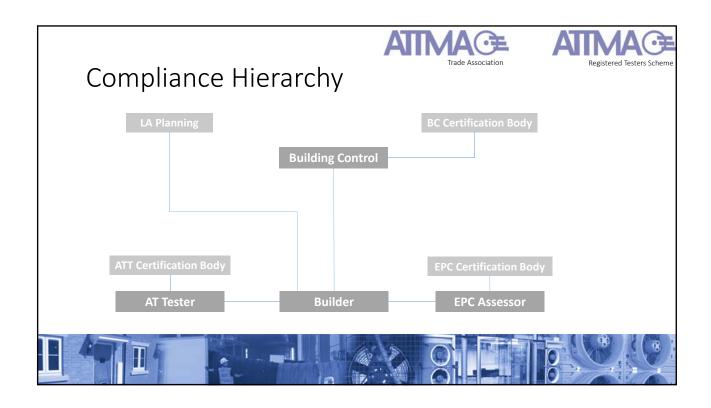


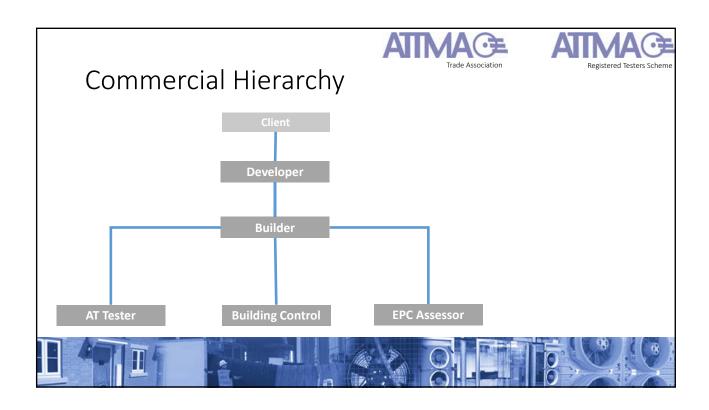


Terminology

- Client
 - The ultimate owner/occupier of a Building Project
- Developer
 - · Company that 'develop' and sells/rents buildings or dwellings.... often 'speculatively'.
- Contractor ("Builder")
 - Company that builds buildings/houses for Developers or Clients. (Sometimes the Developer is also the Builder, e.g. all the large House Builders)
- EPC Assessor
 - Consultant that checks that a new building/dwellings are compliant with Part L using SAP or SBEM calculation methodologies, and produces the Energy Performance Certificate.











Industry Threats

Government

- Deregulation is a policy. Government are wanting to help the Building Industry by reducing and simplifying Regulations.
- Current Building Regulations do require air-tightness testing of new buildings, but are lax about who can test!

Developers

• Many buildings (and most dwellings) are built *speculatively* by firms who may not be very interested in their energy performance.

Builders/Contractors

Primarily interested in completing their contract as quickly and cheaply as possible.
 Energy performance is regarded as a compliance burden more than a desirable quality feature. Only aim to achieve minimum required level of compliance.







Industry Threats

Building Control

• Since this process was partially privatised in the '1990s, it has become commercially subordinate to the Builders. BCOs do not have full and unfettered authority.

Air-Tightness Testers

• They are also too commercially influenced by the Builder, who only wants a "pass" certificate. Many testers are very small firms with little ability or inclination to resist "undue influence". Air tightness testing has become a commodity.

EPC Assessors

Are also appointed by the Builder who has control over the flow of information to them.
 They lack control over the process, work remotely, and provide a 'commoditised' service







Who is the customer?

- In most markets, the end customer drives energy efficiency.
- In the UK Market for dwellings this is not straightforward
 - · There are more buyers than dwellings being built
 - Most new houses are built speculatively. Customers buy the end product and can't specify quality.
 - If the "Customer" is a Landlord, they are less interested in Energy Performance. (Tenants pay bills)
 - Against background of relatively low energy costs, UK customers are still quite ignorant towards energy performance (and air-tightness).







Industry Regulation

- Government recognises Competent Persons Schemes.
 - Members of Schemes can do work without it needing checking by Building Control.
 - Building Control more interested in safety than energy
- Until recently there have been two recognised ATT Competence Schemes
 - · BINDT Scheme (for testers of Dwellings only), and
 - Membership of ATTMA (for UKAS-accredited testing firms, who can test any building)
- These have now been replaced by the new unified ATTMA Scheme.







Lessons Learnt from BINDT Scheme

Problem	Solution	Lesson Learnt
BINDT were not experienced in either Air Tightness Testing or Competent Person Schemes	Control passed to ATTMA	Competent Persons Schemes should be run by focussed organisations.
BINDT Scheme membership was individual Testers only. No control over Testers' Employers	Membership of new ATTMA Scheme is by Testing Firms. Individuals are certified by the scheme.	Vital to capture firms as well as individuals to prevent firms forcing their employed testers to break the rules for commercial benefit.
Very lax auditing of member testers	New Scheme will properly audit both testers and firms annually	ATT Competence Schemes must properly and regularly check on their members to maintain standards – and respect!.







Lessons Learnt from BINDT Scheme

Problem	Solution	Lesson Learnt
BINDT Scheme did not have a technical expert available to support members.	New ATTMA Scheme has fully employed ATT expert available to members	Members need to have a technical point of reference to maintain standards and perceived value
BINDT Scheme did not control test certificates. As a result, there was no traceability	ATTMA Scheme members will use lodgement system to centrally archive test data and generate Certs	Test integrity is massively improved by test data lodgement as it makes the Tester more quality conscious and it prevents corruption of Data by Builders.
BINDT Scheme was underfunded	New Scheme will charge higher fees which will be proportionate to the activity- level of member	Member fee income should be sufficient to enable the Scheme to deliver value, and be effective as a regulator, and should be proportionate to member-company size.







Lessons Learnt from BINDT Scheme

Problem	Solution	Lesson Learnt
BINDT Scheme intended to produced Dwelling-Testers. No means for members to become non-dwelling testers.	New ATTMA Scheme has provides a route for individuals to become more qualified	The scheme must ensure that members stay within their qualification level, but must also enable people to progress.
The existence of two Schemes (BINDT and ATTMA) which were complete different, confused Stakeholders. Building Control	A single Scheme now operates in a harmonised way for all members. Stakeholders can easily check on testers' credentials via ID cards and the website	It is very important to make it simple for external Stakeholders (like builders and Building Control) to understand the Scheme, identify its members and their qualifications.









Key features of the new ATTMA Scheme







Members are Companies

- Individual Testers are Certified but not "Members"
- Why is membership limited to companies?....
 - · To ensure organisational compliance
 - For top-down accountability
 - · Unaffected by staff changes
 - Works better for member firms' marketing activities
 - Its required within DCLG's Conditions of Authorisation
- Companies will join the scheme and be bound by its Rules of Membership and Code of Conduct
- Members (companies) will be audited
- Members are equal stakeholders in the scheme







Members Obligations

- Abide by Scheme Rules & Code of Conduct, including:-
 - · Employ appropriately certified individuals for all testing operations
 - · Test within certification level of individual testing staff
 - Test strictly to ATTMA Technical Standards
 - Do not make false marketing claims.
- Upload ('lodge') all test result data to ATTMA database
- Allow 3rd-party auditing (& corrective actions)
 - Either by UKAS (to ISO17025), or
 - By ATTMA
- UKAS Firms will have to put all their "Level 2 Testers" through the Level 2 Assessment by end of 2015.







Members Obligations

- UKAS Firms will have to put all their "Level 2 Testers" through the Level 2 Assessment by end of 2015.
 - Any that fail or don't sit it will be certified at Level 1.
- Maintain appropriate insurance cover







Members Obligations

- UKAS Firms will have to put all their "Level 2 Testers" through the Level 2 Assessment by end of 2015.
 - Any that fail or don't sit it will be certified at Level 1.
- Maintain appropriate insurance cover







ATTMA Certified Testers

- Are not scheme members...their companies are!
 - Including sole traders and partnerships.
 - Newcomers must be employed by a member company or join as one.
- Can move between member firms
 - Tester certification is portable and independent
- Can be sub-contracted to, or employed by, other member firms.
- Will carry ATTMA Certificates and ID Cards









Tester Certification Levels

- Based on new National Standards (produced for the Government)
 - Level 1 Testers of residential & small, simple non-residential buildings
 - Limited to 1 blower door fan and a maximum volume of 4000m³
 - Level 2 Testers of residential and non residential buildings
 - Level 3 Experts in air permeability
 - EA Trained and authorised to calculate envelope areas for other testers.
 - This is a separate module that is included as part of the above levels
 - Auditor Minimum of Level 2 (to audit Level 1) or Level 3 (to audit Level 1 & 2) and trained in accordance with ISO 19011:2011
 - Existing BINDT members were automatically Level 1
 - UKAS Level 2 testers will still be required to prove competency



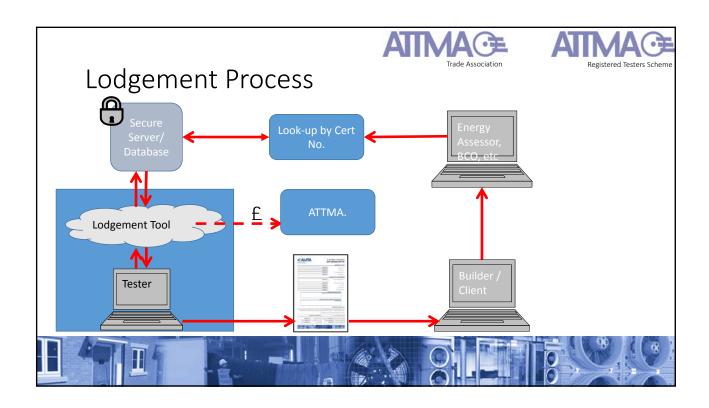


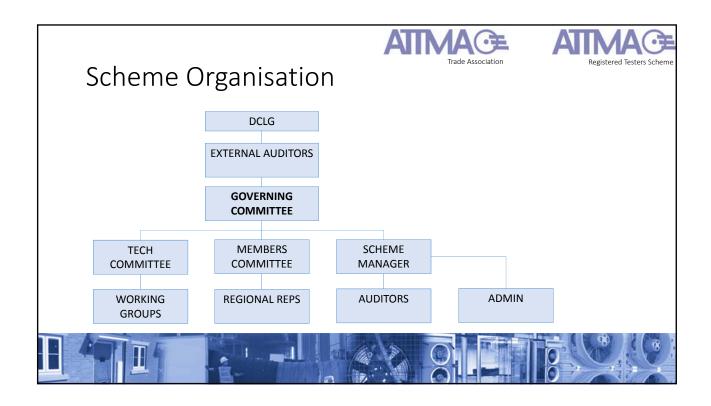


Lodgement of Results

- · To Encourage Responsible Testing
- To Give the Scheme "Teeth"
- To Differentiate ATTMA Tests & Testers
- To Reduce Risk of 'corruption' in test process & data
- To Add a Layer of QA
- To Generate Funds Proportionately
- To Generate Data for Statistical Analysis











Key Improvements

- Companies are Members and accountable
 - Therefore owners/managers of ATT firms (as well as Testers) must ensure standards are maintained
- Increased fees, controls, support, profile...
 - means increased perceived value. *Members must be more fearful of losing their ATTMA status than of losing customers (that don't like failing tests).*
- Lodgement of Test Data
 - means better quality data that is then protected
 - · Forms a means for proportionate membership charging
 - · Generates recognisable ATTMA Test Certificate







Key Improvements

- Full-time scheme manager
 - Testers now feel supported
 - Better handling of complaints
 - · More effective protection of Testers from Builders
 - · Can drive marketing initiatives and PR effort
- Scheme will accommodate all sizes of Firm
 - No more two-tier industry; no more in-fighting!
 - UKAS accreditation is accommodated but not required.







In an ideal world...

- Building Regulations would mandate testing by Qualified Testers only
 - ...and the lodging all test data
- · Building Control Officers would witness tests on site
- ATT Firms would work directly for the Client or Local Authority
 - Therefore they would be free from Undue Influence
 - Same should apply to Building Control and EPC Assessor
- Technology would facilitate real-time uploading of test data
 - To completely eradicate corruption of test data
- Building Regulations would require in-use testing of Buildings
 - To ensure on-going integrity



Overview of competent tester schemes for building airtightness testers

François Rémi Carrié, INIVE, Belgium



Overview of competent tester schemes for building airtightness testers

François Rémi Carrié ICEE

International Workshop on Ventilation and Airtightness in Buildings
Voluntary and Regulatory Frameworks to Improve Quality and
Compliance
Brussels, Belgium

16 March 2015





Context

- Today, several hundreds of thousands of building airtightness tests every year in Europe
- This number continues to grow because of:
 - Regulatory requirements gradually enforced
 - Energy penalties for poor building airtightness in EPCs



Context

- Lessons learnt from a survey conducted within TAAC -TightVent Airtightness Associations Committee (11 countries, not exhaustive)
 - Most countries account for building airtightness in their EP regulations
 - Several countries have minimum requirements either for specific programmes or regulations
 - Mandatory testing applies in several countries (e.g. UK, DK, FR, IE)



Airtightness testing and compliance

- · Significant risk of mistake or fraud
- Compliance may be affected due to:
 - Test not performed although required
 - Test wrongly performed and/or reported
 - Test results are such that the EPC does not meet the regulatory requirements

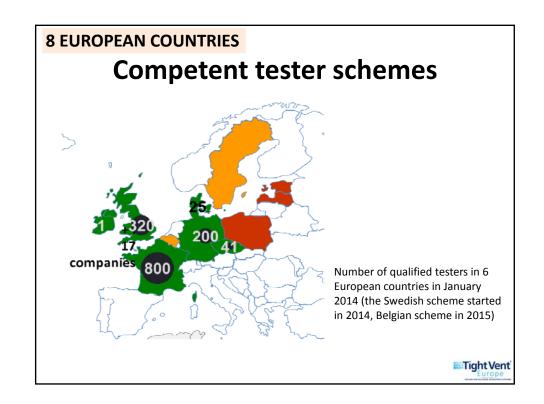


Competent tester schemes

- These schemes have been developed for one or several of the following reasons:
 - Ensure that the testers are competent to perform a test
 - Give a quality seal to airtightness testing
 - Bring trust to the market
 - Avoid the pitfall experienced with EPC experts
 - Follow-up the testers' service

— ...





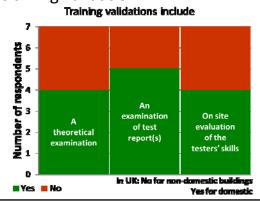
Competent tester schemes

- Key components
 - Tester knowledge (regulatory context, fundamentals of ventilation, infiltration and airtightness measurement)
 - Pre-requisites on tools (equipment, analysis and reporting tools)
 - Minimum standard for the know-how of the tester
 - To use the equipment
 - To use analysis tools
 - To use reporting tools
- These key components are supported by technical documents, training programs and evaluation procedures



Competent tester schemes

- The details of each component varies significantly between countries
 - e.g. training validation





Specific reporting in a database

- Required in some schemes, e.g.:
 - DK, DE, CZ, FR
- It becomes possible to:
 - Analyze large samples and extract meaningful trends (see presentation of CEREMA tomorrow)
 - Track suspicious results... but to our knowledge,
 this is not operational yet in any of the schemes
 - Check consistency between the test results and the data used in the EPC



Is it worth it?

 Over 200 persons at the annual meeting organized by QUALIBAT



ls it worth i	t ?
Ordre du jour de la 3 ^{ème} rencontre nationale des opérate Jeudi 5 mars 2015 à BLUEBAT (LYON) de 14h0	
14 NOS introduction BEPOS, Programme d'Action pour la qualité de la Construction et la Transition Énergétique PACTE	Alain MAUGARD (Président de QUALIBAT)
Actualifé règlementaire au sujet de perméabilité à l'air de l'enveloppe des bâtiments et des réseaux de ventilation présentation des arrêtés modificatifs et des révisions de textes normatifs parus fin 2014 définition de la SIT en remplicationner de la SIVON IT passage de la démarche qualifé annex vi le no certification respect du FD 51-767 et qualification RPZ2 obligations pour la mesure des réseaux de ventilation révision du GA PSO-784 : les modalités de prise d'effect.	Lucille LABAT (CEREMA) Gérard PÉJAIRE (Président de SYN'EOLE)
Perspectives 2015 - révision et prise d'effet de l'30 9972 Évaluation de la pérformance évergétique des bâtiments, enjeux de la normalisation européenne et internationale	Florent TROCHU (AFNOR NORMALISATION) Lucille LABAT (CEREMA)
EFFINERGIE - actions de l'association - le guide d'usage tifinergie - présentation de l'observatoire BBC, des labels Effinergie+ et BEPOS-Effinergie 2013 (nombre de logements certifiés, nombre d'opérations certifiés).	Sébastien DELMAS (EFFINERGIE)
L'étalonnage des matériels de mesures	Lucille LABAT (CEREMA) Daniel JACQUEMOT (QUALIBAT)
Synthèse QLAUBAT - les dossièrs de révision (les interrogations directes), les mentions - le questionnaire de suivi (les attestations de Maître d'Duvrage) - le corpus Qualibat et synthèse des travauus de la commission d'examen Mesure de l'enveloppe (phermométrie, thermographie, infiltrométrie) Audit énergétique	Daniel JACQUEMOT (QUALIBAT) Christophe ACHTE (Président de la commission Mesureur)

Is it worth it?

- Feedback from the French competent scheme holder:
 - Less than 1/3 of applicants get the qualification at the 1st review
 - Over 10% fail after 3 reviews
 - Over 50% fail the follow-up checks (1st review)
 - => Confirms the relevance to check competence



Is it worth it?

• Insurance companies require qualification to insure testers



Summary

- Competent tester schemes have been developed in several countries
- Today, they mostly help:
 - Bring confidence that testers are able to perform tests correctly
 - Avoid wrong reporting due to lack of competence
- With adequate IT developments, they could be used:
 - To track suspicious behaviour and results
 - To check consistency between testers results and the values reported in the EPC

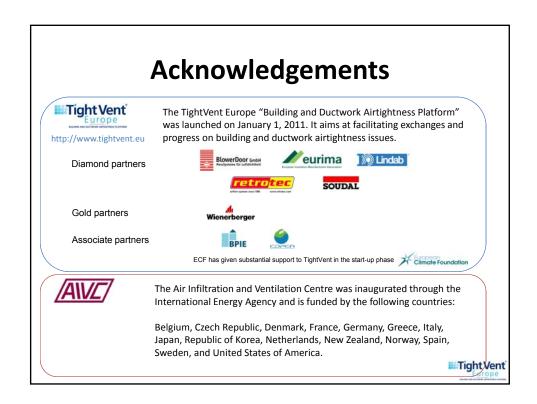


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- The sole responsibility for the content of this publication lies with the
 authors. It does not necessarily reflect the opinion of the European
 Communities. Neither the European Commission nor the authors are
 responsible for any use that may be made of the information contained
 therein.







TightVent Airtightness Associations Committee

- Set up and hosted within TightVent since 2012
 - At present, the participants are from
 - Belgium, Czech Republic, Denmark, France, Germany, Ireland, Poland, Sweden, and the UK
 - Contacts with Estonia, Norway, Netherlands, Latvia
- The scope includes various aspects:
 - airtightness requirements in the countries involved
 - competent tester schemes in the countries involved
 - applicable standards and guidelines for testing
 - collection of relevant guidance and training documents





























Energy agencies of Sweden – BUILD UP SkillsSWEBUILD

Per-Johan Wik, Lund University, Sweden



ENERGY AGENCIES OF SWEDEN SWEDEN — BUILD UP Skills SWEBUILD

16 March 2015 Lund Per-Johan Wik







- Collaboration body
- 14 regional energy agencies in Sweden
- 450 energy agencies in Europe





- Pre studies
- Project management
- Education
- Coordination



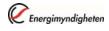


EU-directive background to BUILD Up Skills intiative:

- Energy Performance Buildings Directive (EPBD):
 - New buildings owned and used by public authorities shall be nearly zero energy buildings from 1 January 2019.
 - All new buildings shall be nearly zero energy buildings from 1 January 2021.
 - o Also when larger retrofitting projects are taking place, low energy use shall be taken into consideration.
- This is the reason why the EC finance projects with aim to increase craftsmens competence in building low-energy buildings.







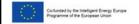
BUILD Up Skills 1:

- 30 countries in Europe.
- · Coordinated by Swedish Energy Agency
 - o Between 2011-2013
 - Sveriges Byggindustrier (builders association), Byggnads (builders trade union), NCC, VVS Företagen (plummers association), WSP (consultancy company), Energikontoren Sverige och SP (Swedish research institute).
- Aim: Roadmap for increasing the of competence for craftsmen employed at the construction site (builders, installers, their management, etc.)

Per-Johan Wik Energikontoret Skåne



16 March 2015





BUILD UP Skills SWEBUILD

BUILD Up Skills 1, a wide reference group:

Bebo (WSP)			SABO		
BELOK (CIT Energy managemen	nt)		SBUF		
BFAB/STF Ingenjörsutbildning			SEK, Svensk els	standard	
Boverket			Skolverket		
Byggnadsindustrins Yrkesnämr	nd, BYN		Svenska Teknik&Designföretagen		
EIO, Elektriska Installatörs Orga	anisationen		Sweden Green	Building Cour	ncil (SGBC)
Fastighetsägarna			Swedisol / Par	ос	
IQ samhällsbyggnad			Svensk Ventila	tion	
Jobblotsen Sverige AB			Sveriges kommuner och landsting, SKL		Isting, SKL
Sveriges Skorstensfejmästares	riksförbund		Trä och möbelföretagen, TMF,		F,
күн			Unionen		
Ledarna			VVS-branschens yrkesnämnd		
Passivhuscentrum					





Energimyndigheten

BUILD UP Skills SWEBUILD Result BUSS I:

- A need and will for capacity building.
- No certain obstacles identified for capacity building.
- The education should consist of a general part with a follow up.
 - •General in connection with the work site.
 - ■Follow up for a specific project, for different categories of craftsmen
- Important to learn how my work influence others

About the same results in Norway and Estonia





Per-Johan Wik Energikontoret Skåne 16 March 2015





BUILD UP Skills SWEBUILD Result BUSS I:

Requested capacity building:

- General knowledge about low-energy buildings.
- Energy efficient building shells
- Air-tightness
- Thermal bridges
- Insulation and insulation materials
- Installation techniques and recycling techniques
 - Heating systems
 - Hot tap water systems
 - Ventilation systems
- Correct calibration of installations











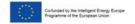
BUILD UP Skills 2:

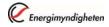
- Energy Agencies of Sweden got the assignment from Swedish Energy Agency to coordinate the next phase of the Build Up Skills project – BUILD UP Skills SWEBUILD.
- Sveriges Byggindustrier (builders association), VVS-Företagen (plummers association), Elektriska Installatörsorganisationen (electricians association), SP (Swedish research institute), Passivhuscentrum (low-energy buildings specialist), WSP (consultancy company), Teknologisk Institut (educational company) och NCC (construction company).

Per-Johan Wik Energikontoret Skåne



16 March 2015



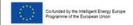


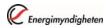
BUILD UP Skills SWEBUILD

BUILD UP Skills 2:

- In total 22 countries in EU are currently running their Build Up Skills 2-proects
- 4 more to start 2015







BUILD UP Skills 2:

- Sweden's project SWEBUILD is running between 2014-2017.
 EU 75% financing, Swedish Energy Agency 25% financing. In totalt ca 2m€.
- The aim of SWEBUILD is to carry out parts of the Roadmap put forward in BUILD UP Skills 1.
- Main objective: To train 500 supervisors in low-energy building techniques, that in turn will educate craftsmen on site.

Per-Johan Wik Energikontoret Skåne



16 March 2015





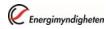
BUILD UP Skills SWEBUILD

Letter of Support:

Energimyndigheten	Yrkeshögskolan KYH
ВеВо	Sveriges Centrum för Nollenergihus
Belok	Svensk Ventilation
BFAB	VentCentrum
Byggmaterialindustrierna	The Danish Construction Association
Byggherrarna	Glasbranschföreningen
Boverket	Swedisol
Byggnadsindustrierna yrkesnämnd	Skanska







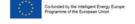
WP2 - Marketing and educational concept:

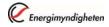
- Analyses about expectations of allready gained experiences regarding training for energy efficient building techniques.
- Awareness raising organisations and members.
- Development of structures for the establishment of life long learning.
- Prepare and support the implementation of life long learning.

Per-Johan Wik Energikontoret Skåne



16 March 2015





BUILD UP Skills SWEBUILD

WP3 - Education material:

- Analyses of existing education material, for example Bygga-Bo-Dialogen, passivhusbyggare.
- Development of learning techniques and coures curriculum for educatoinal purposes and just in time installation instructions, e.g. viscosity of air, heat recovery ventilation, etc.
- Development of easy and self instructing educational material.
- Routines for uppdating the material







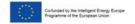
Present situation SWEBUILD:

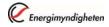
- In collaboration with stakeholders in the building sector put together a concept for capacity building actions.
- Identify how we can reach out to the most important stakholders in the process.
- Collaborate as much as possible with the building sector.
- Create a common understanding for the problem to be solved, for different categories of craftsmen.

Per-Johan Wik Energikontoret Skåne



16 March 2015





BUILD UP Skills SWEBUILD

Near future SWEBUILD:

- Involve all steps in the building process.
- Find the optimal solution for capacity building, meaning training craftsmen at the work sites.
- Make sure the educational actions recive high recognition so it will continue after the project period.
- Identify how the actions will continue after project end 2017.







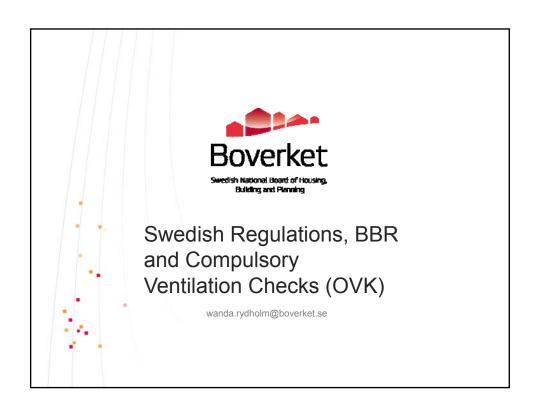
Thank you

http://energikontorensverige.se/vara-projekt/build-up-skills-swebuild/



Swedish Regulations, BBR and Compulsory Ventilation Checks (OVK)

Wanda Rydholm, Boverket, Sweden



Ventilation and airtightness BBR 6:255

e police

Pressure conditions between supply air and extract air installations shall be adapted to the airtightness of the installation, to ensure that transfer of extract air to the supply air does not occur.



BBR 6:255 - continued



Measurements of leakage in sheet metal ducts can be made in accordance with **SS-EN 12237**.

Information on airtightness testing of ventilation ducts: Formas publication Methods for measuring air flow in ventilation installations (**T9:2007**) and instructions in **AMA VVS & Kyl 09** and **SS-EN 15727**.



BBR 6:531 Airtightness



(according to moisture)

Some general recommendations:

To prevent damage due to convection of moisture, the parts of the building that separate spaces with different climatic conditions should have as high airtightness as possible.



BBR 6:531 Airtightness continued



Airtightness can affect the moisture level, thermal comfort, ventilation and a building's heat loss.

A method for determining air leakage is contained in **SS-EN 13829**.



Swedish Planning and Building Act, PBA (2010:900)



Buildings are to provide opportunities for good hygiene, a good working environment and a satisfactory indoor climate.

From the legislation follows in addition that the ventilation systems must be looked after and maintained.



Compulsory ventilation checks SFS 2011:338, OVK



- The owner of a building is responsible for ensuring that all checks are carried out
- before the system is brought into use for the first time
- at regular intervals during the lifetime of the building.



SFS 2011:338 (OVK)



- The municipalities are responsible for supervision of OVK under the Planning and Building Act, PBA, and OVK regulations.
- The municipalities shall keep information on OVK records and status of the results.



SFS 2011:338 (OVK), continued



OVK results (measurements) are also used as a basis for the assessment of indoor environment on complaints or appeals.

If OVK inspection intervals are not followed, or if remarks under OVK protocol are not taken, the municipality may resort to further action, e.g. financial penalty.



SFS 2011:338 (OVK), continued



The building owner shall keep a copy of the OVK record of executed OVK inspections, with suggestions and information that may be relevant to a future energy performance declaration.



Inspection intervals



Every 3 years:

- Day-care centres, schools etc. all types of ventilation
- Blocks of flats, office buildings etc. balanced ventilation

Every 6 years:

 Blocks of flats, office buildings etc. mechanical exhaust and natural ventilation



Inspection intervals, continued



One and two- dwelling house, **FX**-, **FTX**-ventilation (mechanical exhaust with exchanger and balanced ventilation):

 first inspection when the ventilation system is taken into use



Inspectors qualifications

Inspector N: one or two-dwelling
houses, natural and
mechanical exhaust at
schools and in blocks of
flats and office buildings

Inspector **K**: all types of ventilation



Checking of energy uses and savings for ventilation

Performance data to calculate energy uses for ventilation (e.g. flows, effects on fans and motor dampers, SFP, operation times)

Recommendations to the owner of the building regarding energy saving measures for the ventilation system



Checking of air conditioning systems

e py^{ller}

Air conditioning systems which are included in the ventilation systems (e.g. ventilation cooling through cooling battery, chilled beams and the like) subject to mandatory ventilation control and hence the requirement for proposals for energy efficiency.



Checking of air conditioning systems, continued



Cooling in the process ventilation in industry is regulated through the Work Environment Authority regulations and not by the OVK regulation.



Possible energy savings for existing ventilation systems



Energy savings advice are not allowed to impair indoor climate in the building!



Examples of healthy energy savings of ventilation



- Change flows, pressure, steering and operation control to optimum values
- Improve the performance of ventilation systems
- Adjust operation time for different flows to activities and use of the building



Examples of healthy energy savings of ventilation, cont'd



- Improve operation and maintenance of ventilation
- Improve and create correct documentation and proceeding papers on ventilation for users and inspectors





For more information:



 Boverket, the Swedish Board of Housing, Building and Planning, <u>www.boverket.se</u> and specially on OVK:

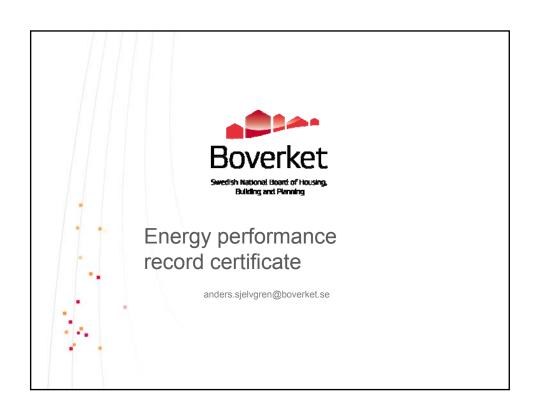
http://www.boverket.se/en/start-in-english/building-regulations/national-regulations/obligatory-ventilation-control/,

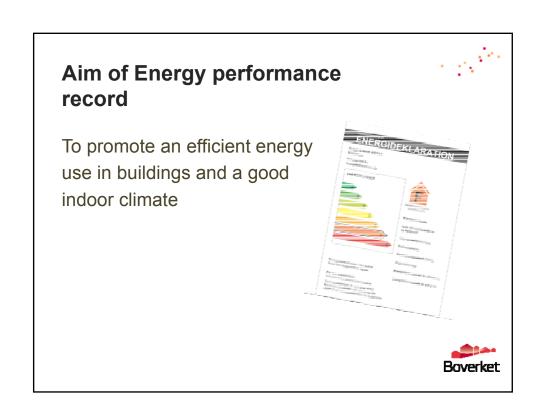
- Swedish Energy Agency, www.energimyndigheten.se
- Work Environment Authority, www.av.se
- Funkis Function Controller, trade association www.funkis.se



Energy performance record certificate

Anders Sjelvgren, Boverket, Sweden





When should an energy performance certificate (EPC) be performed?



- Existing buildings sale/rent
- New buildings
- Public buildings



Who does what in the system for EPCs in Sweden?







Boverket

responsible for regulations, for supervision, and management of the EPC database

Energy expert the EPC is

the EPC is performed by an independent certified energy expert



Who does what in the system for EPCs in Sweden?





Certifying bodies examines and approves the person who wants to be an certified energy expert



Swedish board for accreditation and conformity assessment examines and approves the organisations who issues certificates to energy experts



EPC contains of:



The EPC contains of two main parts:

Energy performance/ energy label

Recommended measures for improved energy efficiency



How does the EPCs promote energy efficiency?



- Information about measures for improved energy efficiency
- The building owners are the main target group
- Incentives for improvement of energy efficiency is created
 - the owners get information about possible measures to take



How does the EPCs promote energy efficiency?



- Information about energy performance/energy label
- The consumers are the main target group
- Incentives for improvement of energy efficiency is created
 - a good energy performance affects the market value



In summary



Energy performance

- Based on measured energy consumption
- The energy expert shall verify the information

http://www.boverket.se/en/start-inenglish/publications/2010/energyperformance-certificate/



Details of the OVK in the EPC



Is there a requirement for regular mandatory ventilation in the building? Yes / No;

Type of ventilation system: the FTX, FT, F recycling, F, S?

Is mandatory ventilation (OVK) performed at the time of EPC? Yes; % Unqualified and wrong; No



Certification of persons issuing OVK and energy performance certificates

Magnus Jerlmark, Kiwa, Sweden





ACTA* = Kiwa + Shield Group

Inventories, inspection, testing and project supervision of hazardous materials in housing and workplaces

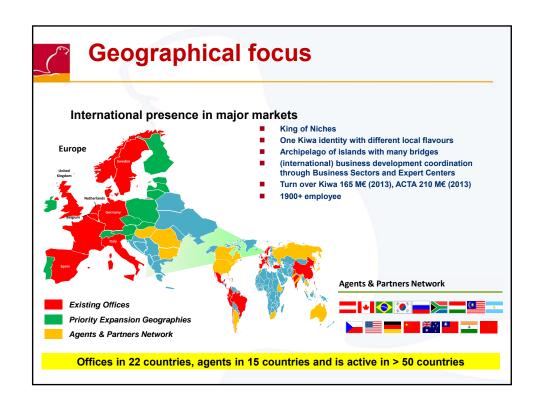




Certification with related testing and inspection strengthened by training, technology and data services for products, processes, systems, persons











Kiwa Sweden

Kiwa Sweden is accredited by SWEDAC for the certification of personell and products and as an authority for third party inspection. Certification and quality control procedures are in accordance with the quality standards ISO/IEC 17020, ISO/IEC 17024 and ISO/IEC 17065

Kiwa Sweden is a Notified Body according to the Construction Products Regulation-CPR 305/2011 As a Notified Body, we are entitled to act as a certifikationand inspection-body. Our registrationnumber is 2392.





Building and Energy

- Markets
 - Building/construction
 - Personell/products/inspection FPC
 - Energy sector
 - F-gas/products/inspection FPC
- Bygg produkter
 - Swedish 'typgodkännande'
 - Swedish Byggproduktcertifikat
 - European (CE, FPC) Nobo 2393 & 0620
 - Inspectionbody for all Nordic countries
 - Access to Kiwa laboratory
 - Member of the Kiwa Expert Glas, Sanitary appliances, polymers, energy using products
- Other Kiwa services













Certification of personell





Certifications Schemes

Today Kiwa Sweden issues authorisations and certificates for groups such as:

- Quality control inspectors,
- OVK Inspectors, (Function supervisors for ventilation systems),
- Energy Experts,
- Environmental surveyors buildings,
- Ventilation cleaners,
- Ventilation system adjusters,
- Safety inspectors for medical gas equipment and
- Safety inspectors for playing areas.





Accreditation/Certification

What is the difference between accreditation and certification?

- Accreditation is carried out by SWEDAC* and they will review the organization and its competence to carry out certification of personell (ISO 17024).
- Certification is performed by an accreditated organisation wich proves an individual's expertise. The person can then act in the role as an Energyexpert, for example.
 - * Swedish board for accreditation and conformity assesment





The certification frameworks

- ISO 17024 (Accreditation standard)
- STAFS (Guidelines), published from SWEDAC and
- BFS 2011:16 OVK1 and BFS 2007:5 CEX1 from Boverket (Requirements)





Content of the certificationscheeme.

The presented requirements in the certificationscheeme for energy expert and ventilation inspectors are produced, based on the law in cooperation with the authorities and technical groups/experts

- Requirements for Technical Education,
- Requirements of practical experience (content and years),
- Suitability for the task (evidenced by the manager or clients),
- Requirements for special skills (inspection and control) and
- Examination for verifying knowledge in the area of certification





The certification process

- Application,
- Registration of the matter,
- Examination of submitted documents and test,
- Decision of certification (5 year validity)
- Publication of certificate on <u>www.boverket.se</u>





Requirements for the certified person during the certification period.

The certified person must maintain their skills during the period of the certificate by;

- If required, conduct training in the field of certification,
- Working as an expert requisite number of hours/projects during the year.

These data shall be reported to the certification body.

The certification body may revoke the certificate if, for example, the certified neglect their duties.





Renewal of the certificate

When the validity of the certificate expires, the certified person must apply for a extended period.

At this time the certification body only examine;

- Completed projects during the certification period,
- If there are any complaints about the certified person?
- A test covered by the news of the regulatory framework





Numbers of certificates

- OVK Inspectors
 - Totally 1457 persons (Kiwa 1066)
 - Last year 213 persons
- Energyexperts
 - Totally 822 persons (Kiwa 642)
 - Last year 172 persons





Statistics

- The review leeds to rejection ore a lower level of the certificate (5%)
- Fail the examination (test) at the first time (8%)





Qualification of airtightness testers

Paula Wahlgren, Chalmers, Sweden and Magnus Hansén, SP, Sweden.

Qualification of airtightness testers

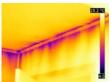






All Hadrolan Instruments Intelligence Streeter

A tester certified in airtightness measurement







Balmini Sesarni Indikisa/Susies

Course in airtightness measurement and ByggaL (Quality Assurance)

The course is aimed at those who carry out airtightness measurements of the building envelope according to SS EN 13829, and that they will show to their employers that they have the compentence to perform this testing in a correct and accurate manner.

The course also provides an understanding of how to execute the work required for good airtightness using ByggaL (method for constructing airtight buildings) during the different stages of the building process.

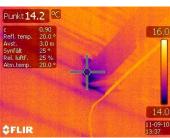
Scope of course: 2 theoretical study days + one half day for practical testing **Responsible for the course:** SP



Course Aim

- To master the following:
 - Airtightness measurement according to SS EN 13829
 - Searching for air leakage
 - Report writing according to SS EN 13829
- To obtain an understanding of how, using ByggaL, one is able to work towards a good construction airtightness during the different phases of the building process.







AF Halmhal Instanti Institute of Souther

A tester certified in airtightness measurement

Examples of assignments and work information

People who have a particular competence and experience in the field of airtightness measurement can:

- Carry out and give an account of airtightness measurements according to SS EN 13829.
- Carry out airtightness measurements and search for air leakge at an early stage of the building process and plan accordingly

In certain case, depending on experience, a person may:

• Give support and advice to different operators in the building process to obtain an airtight building

Responsibility:

- Correctly executed testing and reporting of results
- Regarding other commitments such advice and support in reaching an airtight building, this depends on the responsible person's agreement with the client



All Radiologi Research Institutes of Viscola

Content I

- Theory on air movements (pressure, air flow etc.)
- Consequences by air leakage and air movements (energy, moisture safety, indoor air quality etc.)
- Rules, regulations and certifications of buildings, doors and windows
- Qualification of air tightness testers- responsabilities
- Airtightness measurements according to SS EN 13829
 - Standard
 - Equipment
 - Procedure
 - Measurement accuracy
 - Calculation of surfaces
 - Sectioning a measurement (building, apartment, component)
 - · Back pressure





AF Hubbled Herends Intilates of Service

Content II

- · Using the building's ventilation system
- Air leakage search
 - Procedure
 - Where are the leakages?
- How to build air tight
 - Principles, durability and products
- · Checklists for design and production
- Group excercises on reviewing drawings

Ends with

- · Theoretical test
- Practical test on airtightness measurements and air leakage search



AF Balotol Hearry Indibia d'Assis

Today, 16 tester are certified in airtightness

measurement

www.byggal.se





SP Halislad Demonsk terrilote s/Norsker



Method for the construction of airtight buildings



AF Balotol Hearry Indibia d'Assis

Swedish approach to quality and compliance

Johnny Andersson, Ramboll, Sweden

SWEDISH APPROACH TO QUALITY AND COMPLIANCE

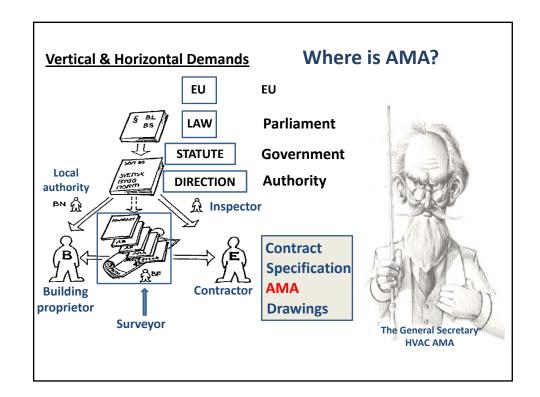
AMA

Allmän Material och Arbetsbeskrivning "General Material and Workmanship Specifications" Example: Ductwork airtightness

Certification of ventilation installers



JOHNNY ANDERSSON RAMBÖLL STOCKHOLM, SWEDEN Johnny.andersson@ramboll.se



AMA vs. Authority regulations

- The AMA requirements are made valid when they are referred to in the contract between the owner and the contractor.
- The AMA requirements cannot change, but are <u>complementary</u>, to <u>statutory rules</u>, regulations and specified building standards laid down by the authorities.
- There is a difference between the two: Authorities are mostly focussed on reducing the risk of injuries to people while
- AMA (not having to deal with that) is instead focussed on reducing property damages and LCC-costs.
- <u>Common</u> interest areas for both are achieve sustainability and low energy use.

AMA

General Material and Workmanship Specifications A SIXTYFIVE YEAR OLD SYSTEM FOR SPECIFYING QUALITY



- AMA is a tool for the employer (developer/future proprietor) to specify his demands on the new building and its installations
- The demands are specified in measurable units and in such a way that the tenderers and contractors understand them and are able to calculate a price.
- If the demands are not specified the normal rule is that the contractor has the right to choose an alternative that will fulfil the demands (e.g. material in heat exchangers) at (to him!) lowest cost.
- Thus as an employer you have to state what you want, check that you get it, and be
 prepared to pay the price for it!

AMA requirements

- Practically all buildings and their installations in Sweden are performed according to the quality requirements in AMA.
- A work of reference you use the parts that are relevant for your project by referring to these parts in your building specification.
- The requirements shall be expressed in measurable terms combined with control methods with known (and possible low) measurement errors.
- They are based on a simple LCC calculations and are decided in cooperation between developers, contractors and consultants.
- It is based on accepted demands these are regularly updated in accordance with technology development and (LCC-)costs. The demands are designed to be suitable for 80 % of all cases
 - in 10 % they might be too high and in 10 % too low and then you change it in your building specification.



COVERS DUCTWORK AIRTIGHTNESS

- The need for tight ventilation ductwork systems was identified in Sweden already in the early sixties. Sweden has thus a long and unbroken tradition of demanding and controlling the tightness of ventilation ductwork as specified in the HVAC-part of AMA.
- During this long period, since 1966, we have raised the tightness requirements in tact with technology improvements (to a great extent influenced by the AMA requirements) and increased energy costs.
- The costs and risks for the contractor to fulfil the requirements in the contract shall be possible to calculate.

Require and control!

Unless otherwise specified the tightness class has to follow AMA demands (Class C).
 AMA also states the requirements for tightness testing.
 (Ductwork system is not specified to be tight – instead the permissible leakage rate at a specified test pressure is stated – that is possible to measure!)

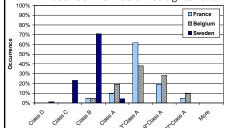


- The duct system leakage has to be verified; normally by the contractor as part of the contract (i.e. the cost for this first test is normally included in the contract lump sum). This test is undertaken as a spot check where the parts to be checked are chosen by the owner's consultant. For round duct systems 10 % and for rectangular ducts 20 % of the total duct surface normally are tested. The result of the leakage test shall be reported on AMA standard protocols and handed over to the owner.
- In case the system is then found to be leakier than required, that part of the tested system shall be tightened and tested. Additionally another equally sized part of the system shall be verified in the same manner. Should this part also be found to leak more than accepted the complete duct installation has to be leak tested and tightened until the requirements are fulfilled. The costs for the contractor can be quite considerable if the tests have to be repeated due to bad test results.

Proven quality!

The AMA requirements have led to high quality ductwork standard in Sweden:

- The duct manufacturers are competing in inventing and marketing tight duct systems that are easy to install. Both circular and rectangular duct connections are provided with rubber gaskets that are very tight compared to older (and foreign) systems. New types of duct joints have reduced earlier laborious installation works.
- The contractors do their best to avoid costly setbacks from inferior duct quality.
- The EU-project SAVE-DUCT found that duct systems in Belgium and in France were typically 3 times leakier than EUROVENT Class A, see Figure 4. Typical duct systems in Sweden fulfilled the requirements for EUROVENT Class B and C and were thus between 25 – 50 times tighter than those in Belgium and France.



Why this large difference between the countries? most probably because Sweden has required tight ducts since the early sixties whereas in the two other countries tightness of ductwork were normally neither required nor tested.

Certification of ventilation installers

Why?:

- The quality of ventilation systems must correspond to demands on air quality, thermal climate, low noise levels, low energy use and sustainability.
- The awareness of the importance of having a well-functioning ventilation system has increased due to information from authorities, researchers, trade organizations and companies.
- Well functioning ventilation is required e.g. by OVK, AMA, environment classification systems and can increase productivity, comfort and well-being and reduce sick-leave.

The Swedish Association of Contracting Companies found that:

- Certification of their ventilation installers is one way for a company to guarantee the quality of deliveries, workmanship and installations.
- It could be used as a natural and long-term development scheme for the employees.
- Customers and authorities are going to require more competence requirements.
- The confidence of the customers when engaging companies with certified installers is increased and they will be more sure of the result of the installation work.
- For the installer himself it means that he has proven to have a good knowledge of his job, both in theory and practice and has got a proof to show this.



Third Party Certification of Ventilation Installers



The Swedish Association of Contracting Companies

has commissioned

INCERT

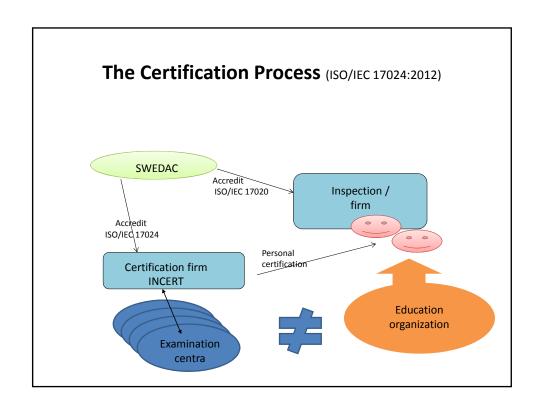
The Certification Organization for Installations

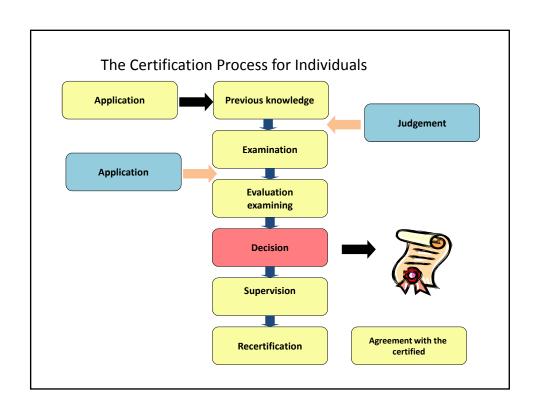
to certify their Ventilation Installers

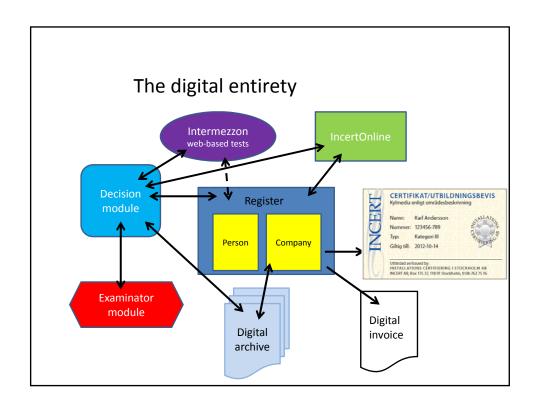
This means that the certification is done as a

Third party certification which means that it is an
independent judgment and assurance that specified
demands related to a product, person, process or
management process has complied with requirements.









Some of the areas included in the certification exam		
#	Main chapters	Sub chapters - examples
1	General	 What is ventilation, air and indoor climate? Common ventilation systems Laws and rules Customer-relations and quality assurance
2	Before installation	 Sustainability and energy efficiency Ventilation mathematics Ventilation principles Drawings and specifications Tools and work planning
3	During installation	Duct systems – dimensions and classes Noise in ventilation systems Fire safety
4	After installation	
5	Environment	

Step-by-step demonstration of the inspection of ventilation systems (OVK procedure)

Wanda Rydholm, Boverket, Sweden Olle Nevenius, FunkiS, Sweden



(working with Ventilation for more then 50 Years)

Chairman of FunkiS

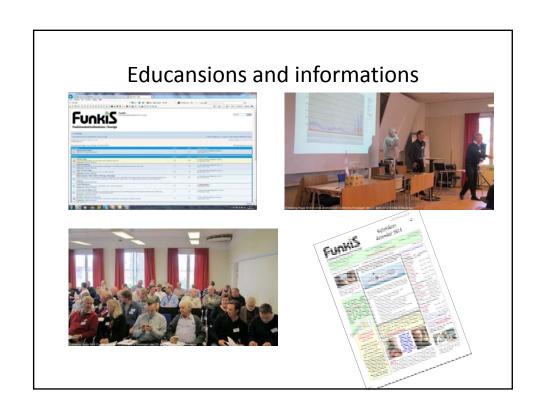
(Funktionskontrollanterna i Sverige)

(Functions Controllers in Sweden)
Air Handeling Systems



- FunkiS (Functions Controllers in Sweden, start 1991) organize the main part of the Certificated Functions Controller in Sweden and many Municipal Officers of OVK. About 1100 members march 2015.
 FunkiS runs Aducations to maintain knowledges about Laws and Regulations and how to deal with radon and ozon.
- FunkiS give technical advice, have an Ethics Group, Anual meetings with fairs and Conferense, local clubs, Publishes Subject Books etc.
- **FunkiS** work close to Boverket to make sustainable indoor climate on behalf of the government





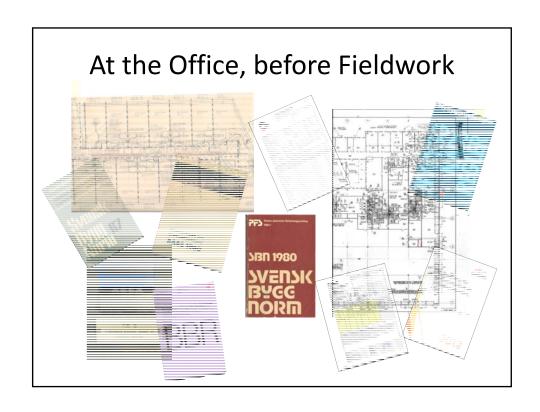
CHECKING VENTILATION SYSTEMS

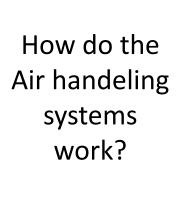
FIELDWORK

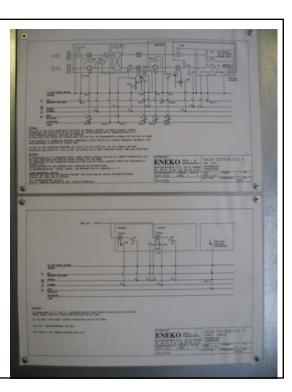
METHODS OF CHECKING AIRHANDLING SYSTEMS AS DONE IN SWEDEN

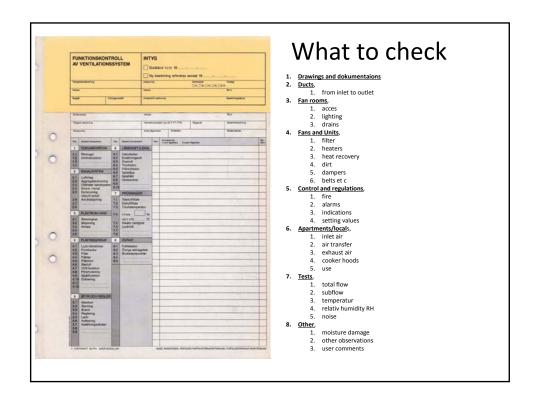
At the Office, before Fieldwork

- · Check all the Basic Data
 - Drawings (paper ore digital, searching at City Archive)
 - Kind of Air Handeling Systems (Natural ore Fans/Units)
 - Operating Instructions (binders, drawings ore digital)
 - Maintenance Instructions (binders, scedules ore digital)
 - Protocols from previous OVK checks (City Archive)
 - Protocols from adjustments
 - Premises current use (rebuilt ore new aktivity, more people then ment when it was built)
 - Name, number and street adress on Block
 - Units name and service area
 - What Year and what Building Regulation is valid for this Building







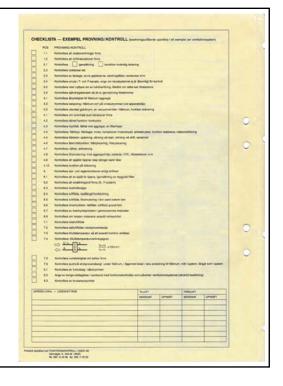


Check List

This is the very first Protocol and it was inspired from the regulations of how to check automobiles.

It has since then been modified very much and today You can find a lot of different Protocols, most of them for digital use.

Bit it is still the same things to be checked.



Assistive Technology





The Equipments we use are calibrated and the result is to be documented were it can be found at the next check.

Air Handeling Units are mostly gathered in technical rooms







Inspect Ducts and Dampers. Are they clean? Are Dampers still in correct positions for balanced air flows?



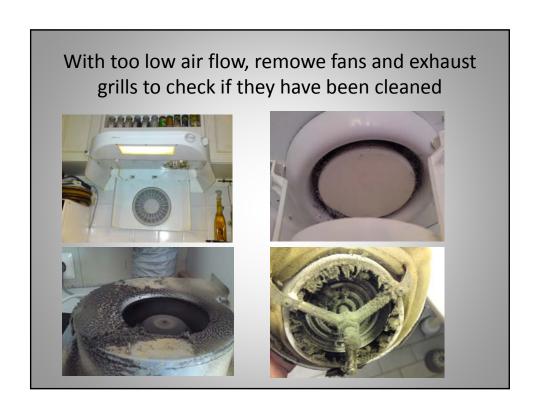


Check all Exhaust Fans and Natural Ventilations Pipes on the Roof.

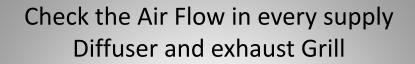
















Digital aquipment with a computer Sometime there is no Air connection

Special attentions to Older Cultural Valuable Buildings

Ventilations requirements and cultural values must be coordinated

Valid for conservation of city areas





Not allways suitable to rent to all kind of use, due to lack of ventilation or Air Condition installations

The end result;
a signed inspections
report with all the
errors and failures
that have to
be fixed before
the installations
are approvde

G = approved (OK) EG = disallowance (not OK)

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There is a Certificate
to be exposed in
the Building Entrance
and sent to the
Municipal Officers of
OVK in the City were
the building is
located



Notification of informations

- There are things we dont check according to the regulation of OVK, but we are obliged to report things that are wrong according to other regulations.
- E.g. Environmental Codes, Work Safety Laws, Buildings Permit Duty, Energy Audits.

Energy Performance of buildings regulations in Belgium - The key puzzle pieces for an effective regulation

Xavier Loncour, BBRI, Belgium





Steps to improve the reliability of EPC input data and quality of the works in the Belgian context



International Workshop on Ventilation and Airtightness in Buildings LUND - 17/03/2015

Program of the workshop



 Energy Performance of buildings regulations in Belgium - The key puzzle pieces for an effective regulation

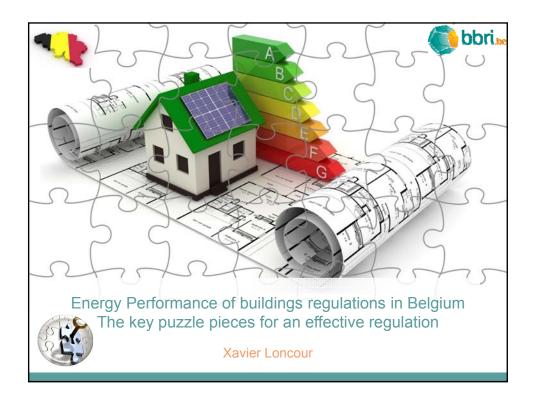
Xavier Loncour, BBRI

Building airtightness: Towards improved and reliable declared performances

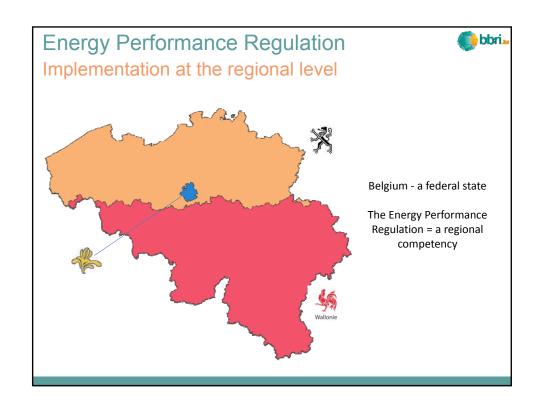
Clarisse Mees, BBRI

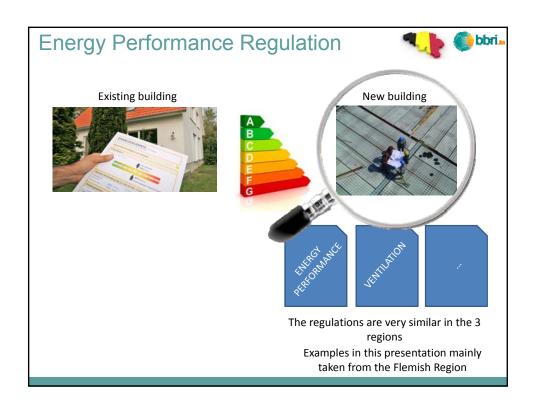
 Ventilation: Steps towards frameworks for reliable EPC input data and improved quality/compliance

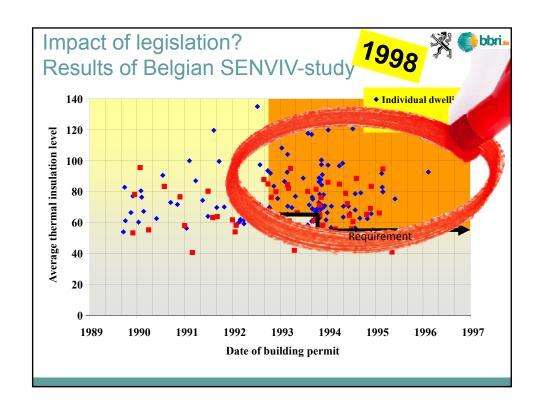
Samuel Caillou, BBRI

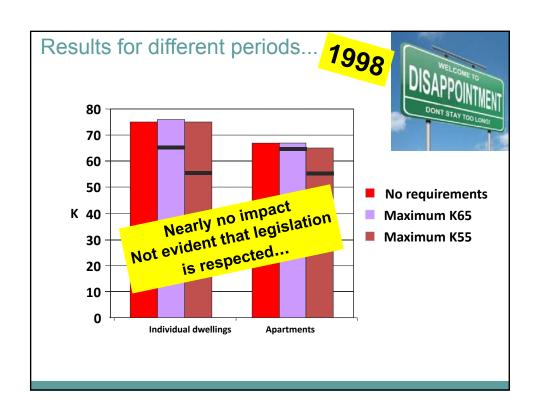




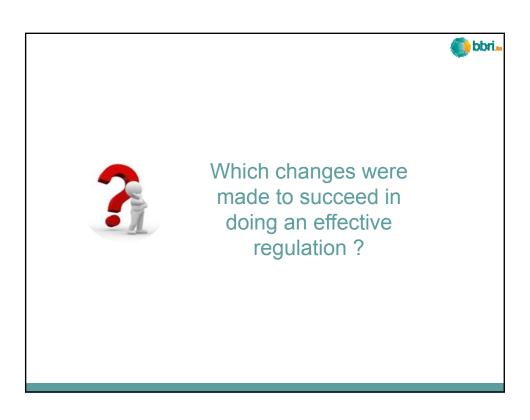




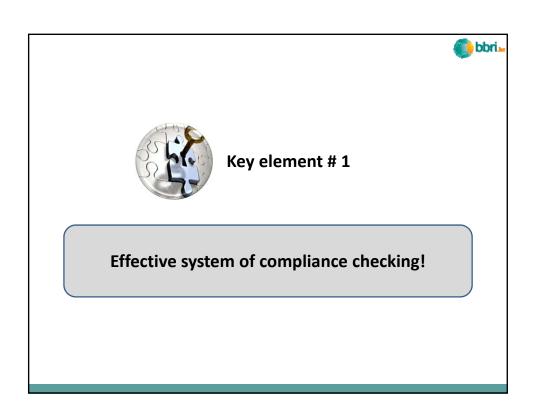




New approach developed including an effective compliance checking							
	Thermal ins	ulation	Energy performance				
	Requirement	In practice	Requirement	In practice			
1994-1997	No→K65→K55	K68	No requirements				
2006	K45	K41	E100	E86			
2007	K45	К39	E100	E80			
2008	K45	К38	E100	E76			
2009	K45	К36	E100	E72			
2010	K40	K33	E80	E64			
2011	K40	K35	E80	E65			
2012	K40	K34	E70	E58			



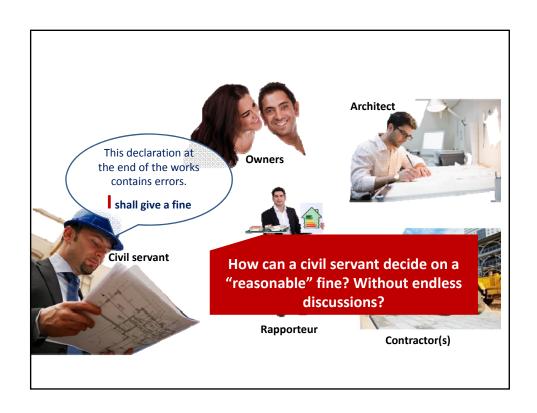










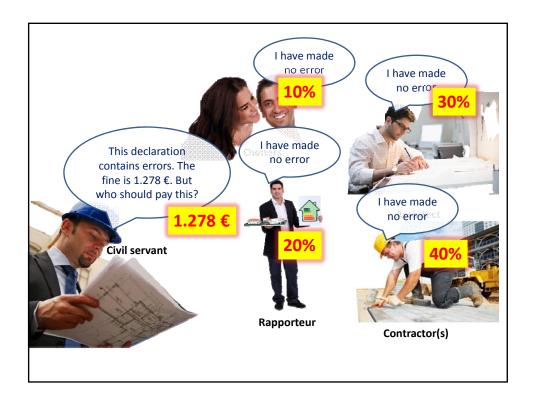


Sanctions in Belgium - Fines



- The sanctions (fines) are imposed directly by the administration (not by a court)
- o The amounts are defined by the law
 - o e.g. transmission losses: 60 € per W/K
 - → Window of 5 m²:
 - Udeclared = 2.5 W/m²K
 - Ureality = 3.0 W/m²K
 - □ Fine = 5 m² * (3.0 -2.5) * 60 = 150 €
 - o e.g. ventilation airflows:
 - o 4€ per missing m³/h
 - o No ventilation in a bedroom 36m³/h → Fines = 144€

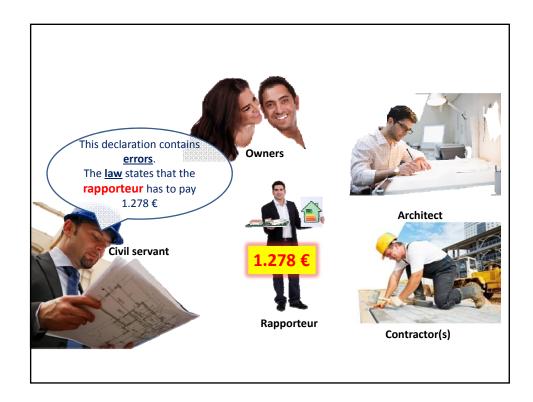
Belgian software: The calculation of fines is included in the software. **Flemish Region 2013**: Fine for about 10% of new Flemish buildings

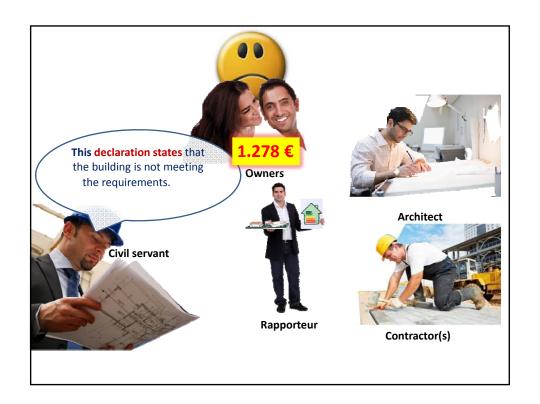


Flemish approach



- o Intensive stakeholders concertation (2002-2004)
- A consensus was reached that the inspectors should <u>not</u> have to investigate which parties are (partly) responsible
 - If declaration wrong → rapporteur pays the fine
 - Of course, rapporteur should be able to transfer to fine to the person who made the error
 - If rapporteur has collected relevant documents (invoices, technical prescriptions, visit,..), he should have a strong case to recover cost from those who made the fault







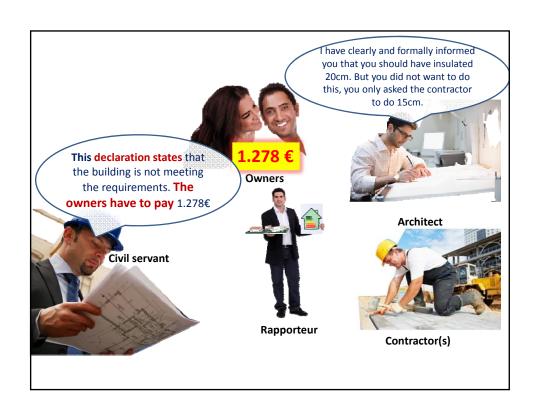
Sanction to owners?

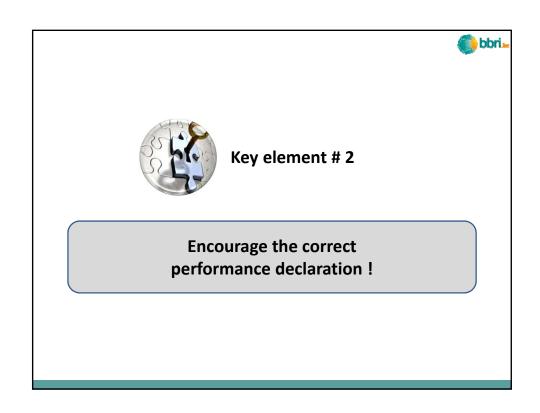


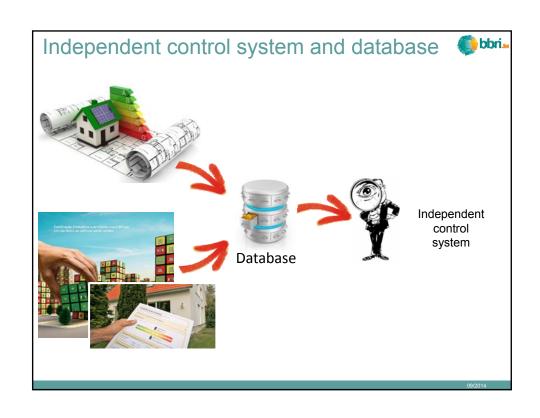
 Private owners are considered non-competent as builders

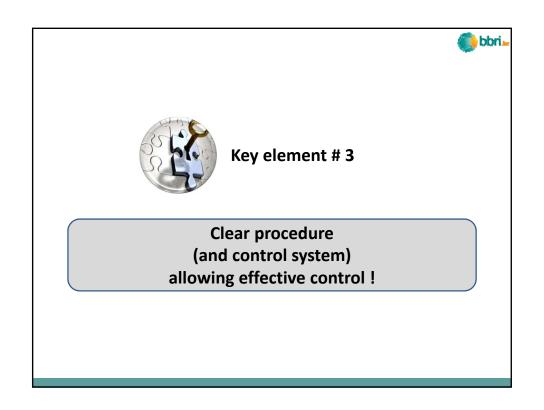
How is it possible that they have to pay the fine?

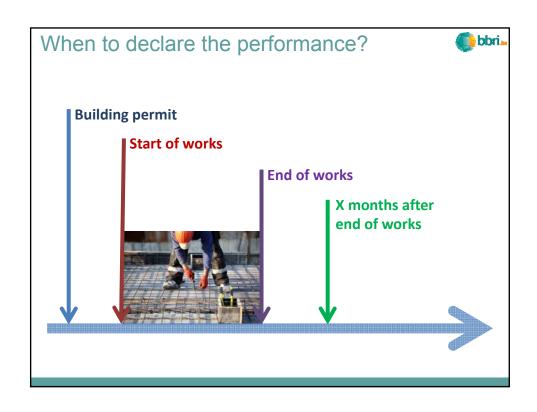
- $\,\circ\,$ In the legislation:
 - "... the architect must inform the owner if certain decisions might lead to non-conformity with the legal requirements"



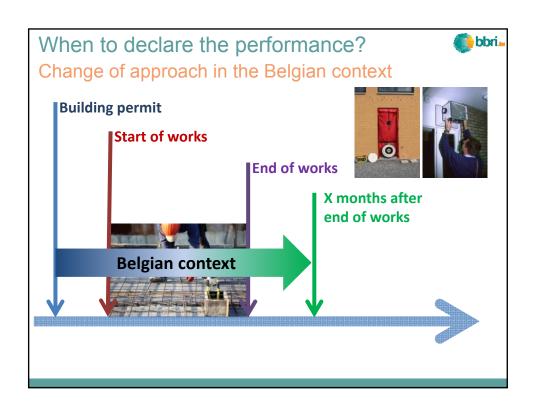


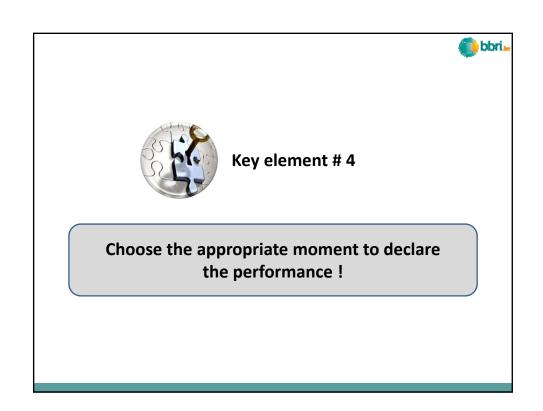




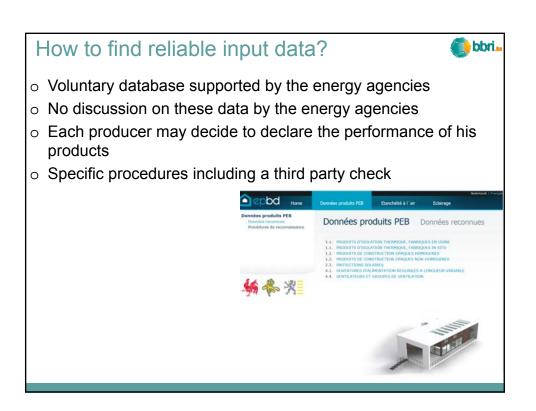


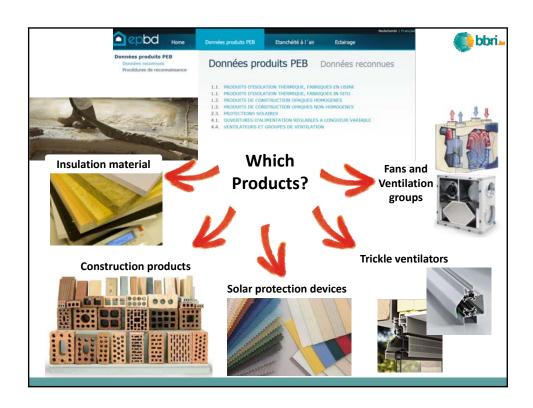


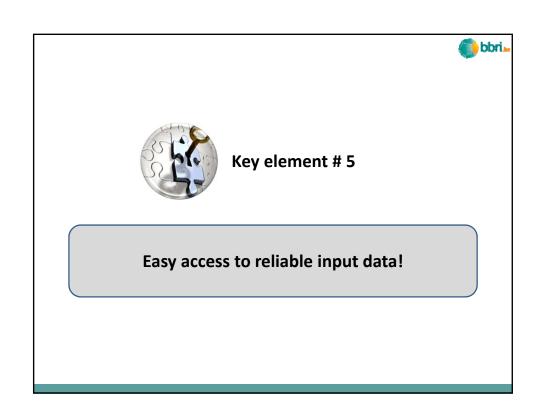


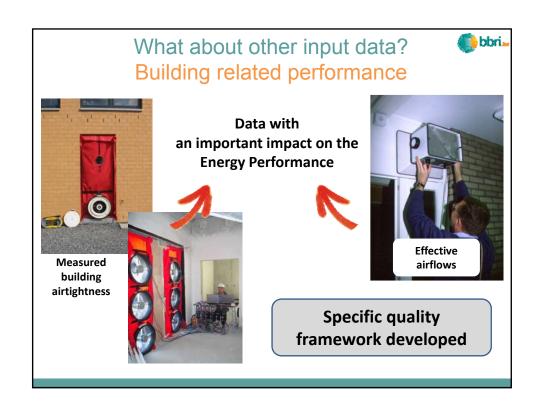


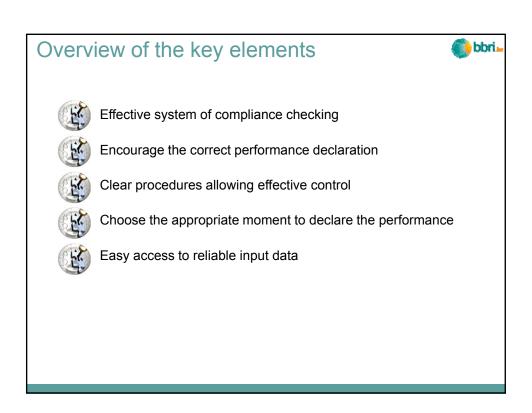




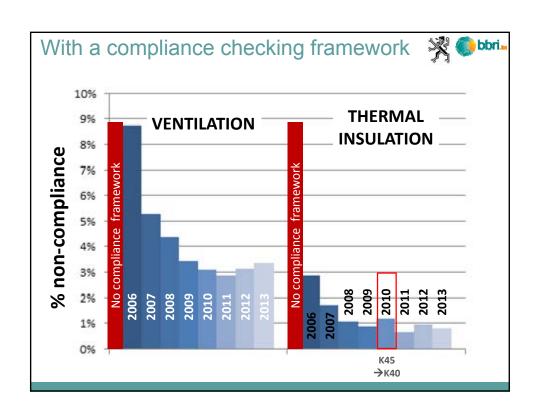




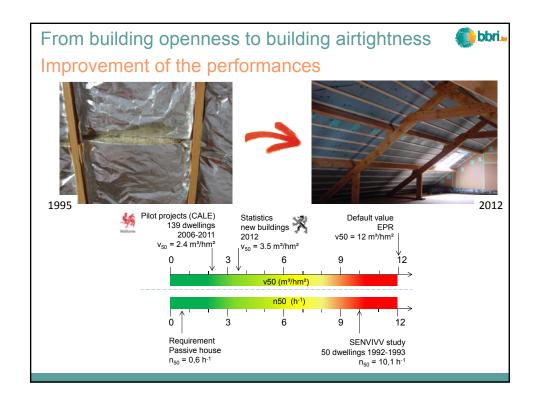












Conclusions



- Several key elements were identified to realize an effective regulation
- Effective regulations have also a positive impact on the quality of the works

no cheating → fair competition

- Implement and improve the national regulation is a continuous process
- Each country has to take his national context into account



Thank you



Xavier Loncour

BBRI
Belgian Building Research Institute
Avenue Pierre Holoffe, 21
1342 Limelette
Belgium
www.bbri.be

Building airtightness: Towards improved and reliable declared performances

Clarisse Mees, BBRI, Belgium





Building airtightness: Towards improved and reliable declared performances

Clarisse Mees (BBRI, Belgium)

Master title - 20-03-15 - Page



Energy Performance Regulation

Airtightness in the EPB

Airtightness is taken into account in the calculation of the EP BUT there is no requirement

- If a test is not realized the energy consumption for heating and cooling is calculated with quite unfavourable v₅₀ air permeability default values.
 - Heating calculations: v₅₀ = 12 m³/(h m²)
 - Risk of overheating and cooling calculations:
 v₅₀ = 0 m³/(h m²)





Energy Performance Regulation

Airtightness in the EPB

Airtightness is taken into account in the calculation of the EP BUT there is no explicit requirement

If a test is realized the result can be used as input data for new buildings (residential buildings, offices and schools).



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bbri

Energy Performance Regulation

Significant influence of the airtightness on the EP calculation

■ Current requirements (for dwellings, offices and schools)

In Flanders: E60In Wallonia: E80

■ Influence of the airtightness

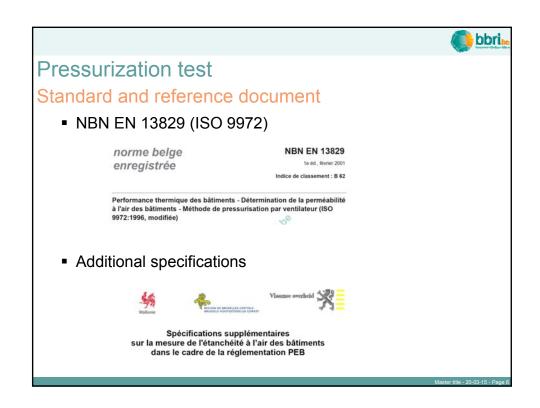
Decreasing of the v ₅₀ (m³/(h.m²))	Decreasing of EP calculated
From 12 to 8	Around 5 points
From 8 to 2	Between 5 and 10 points
From 2 to 1	Between 1 and 3 points

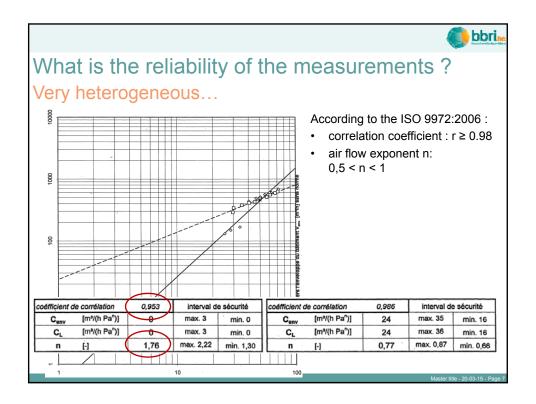


Pressurization test

Objectives

- A pressurization test could be done:
 - to achieve a better EP calculation result
 - to obtain a passive building
 - to check the compliance with a design airtightness specification
 - To find and fix air leakage that could create condensation problems







A quality framework

Pressurization test must be reliable!

■ A quality framework has been developed in Belgium



- 1. Qualification of testers
- 2. Technical criteria for the measurements
- 3. Controls



A quality framework (1/3)

Qualification of testers



- Accreditation
 - National accreditation body
- or Qualification examination
 - Theory
 - 50 multiple choice questions
 - Practice
 - Test of a dedicated building
 - 5 reports in accordance with the technical criteria

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A quality framework (2/3)

Technical criteria for the measurements



- Mainly based on EN 13829 (ISO 9972)
- Periodic calibration of the measurement system
- Preparation of the building
 - Method A + further details
- Mode of test
 - Depressurization & pressurization



Technical criteria for the measurements

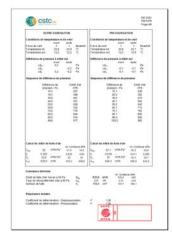
Software



- Any software can be used
 - It must have been tested with a specific set of input values
 - Statement that it has passed the test

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- Any format can be used
 - Minimum content is required
 - Building info
 - Pictures
 - Measurement devices
 - Software
 - Measured values...
 - Statement that all requirements have been met



A quality framework (3/3)

Controls

- Control of the report
- On site control
 - SMS when starting the test
 - SMS at the end of the test + air leakage rate
 - Controller can come on site
 - New measurement with tester's system
 - Check building preparation
 - New measurement with own system

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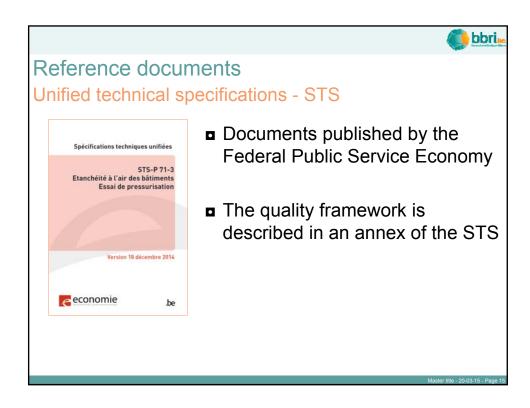
A quality framework (3/3)

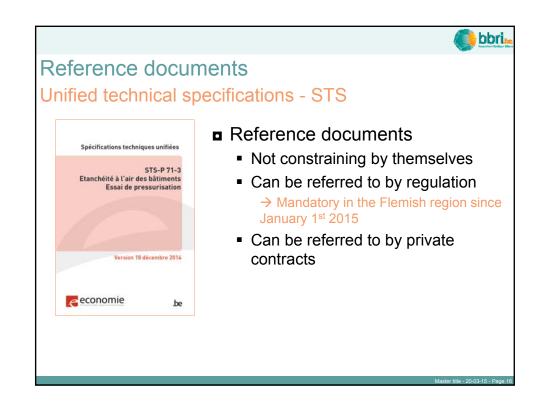
Controls

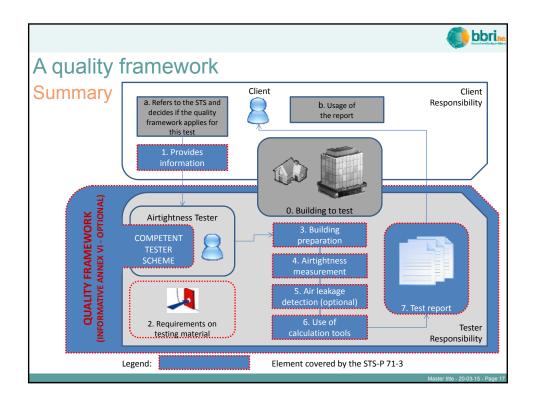
- Control of the report
- On site control
 - SMS when starting the test
 - SMS at the end of the test + air leakage rate
 - Controller can come on site
 - New measurement with tester's system
 - Check building preparation
 - New measurement with own system



→ Declaration of conformity









Financial aspect

Extra cost for the client and for the tester

- An extra cost charged to the customer has to be provided.
 - around 40€ per dwelling;
 - in the case of apartments: 40€ for the first apartment and 10€ for the other ones in the same building.
- For testers cost (and extra-time) is needed:
 - the training (optional)
 - the theoretical exam: 150 € (half day)
 - the practical exam: 475 € (one day)
 - the encoding of the results in order to build up a database (half hour per measure)

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Advantages for the actors

For the clients and the final user

- Availability of a list of recognised competent professional
- Assurance of results and quality

For the authorities

- Reliable input data
- Less control needed at the moment of EP declarations

■ For the airtightness **testers**

- Higher confidence of the owners
- Value for higher quality

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Return of experience

First figures

Effective date in Flanders: January 1st 2015

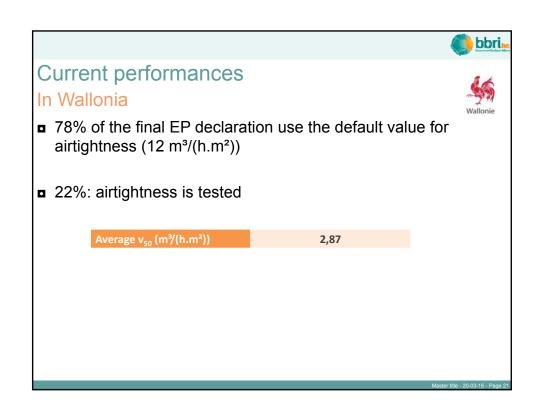
■ Certified companies: 167

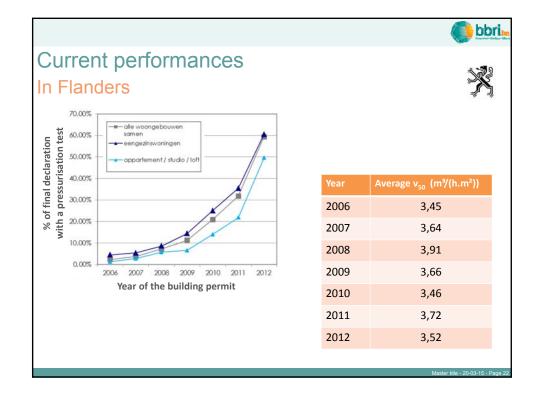
Measures done in this framework: 650

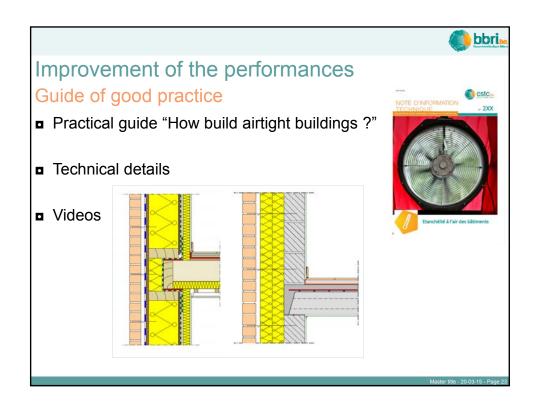
■ Measures controlled: 260

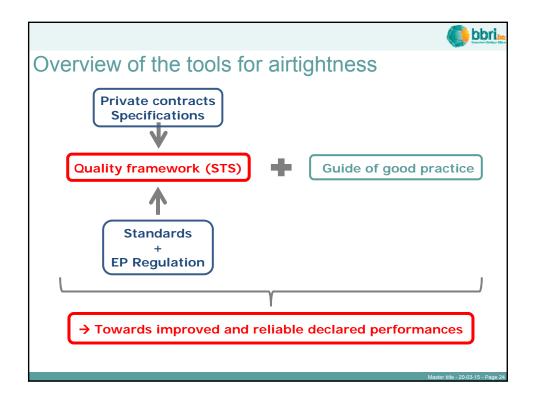
■ Declaration of conformity: 200

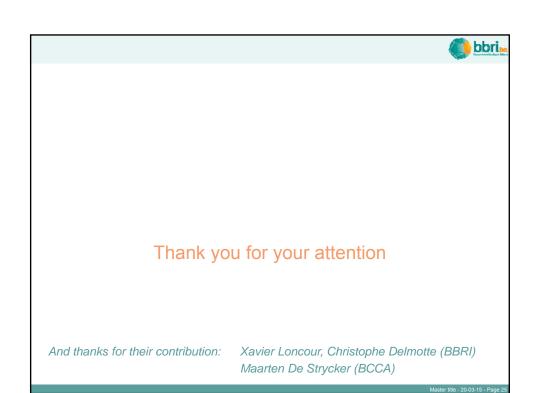
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Ventilation: Steps towards frameworks for compliant EPC input data and improved quality/compliance

Samuel Caillou, BBRI, Belgium





Ventilation:

Steps towards frameworks for compliant **EPC input data** and improved **quality/compliance**

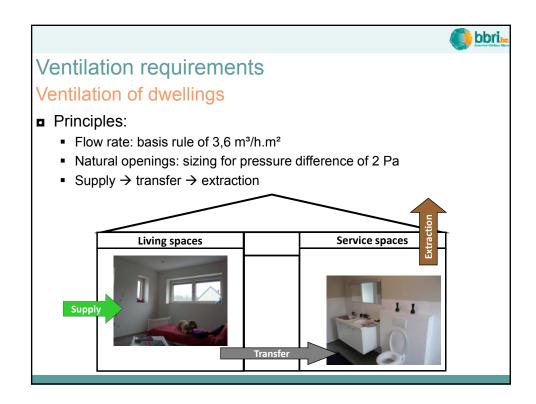
Samuel Caillou (BBRI, Belgium)

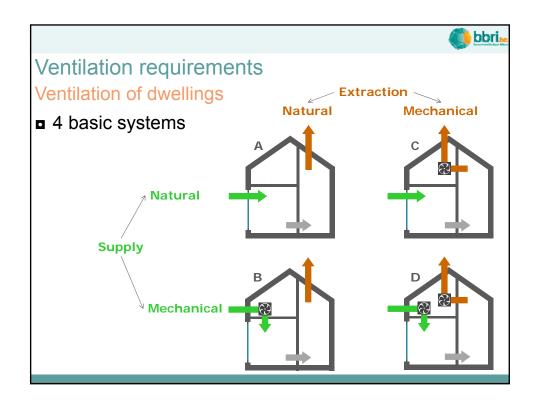




However a Belgian standard exists since 1991

- Before 1991: many problems of dampness
- 1991: first standards for dwelling ventilation
- **1996**: ventilation is mandatory in Walloon Region
- 2006-2008: EPBD transposition in the 3 Regions
 - → Ventilation is mandatory
- Since 2006: many problems of conformity
 - → « FAQ » developed in Flemish Region
- 2015: New project PREVENT
 - → Development of new bases to upgrade ventilation requirements







Ventilation requirements

Ventilation of offices and schools

■ Principles:

■ Basis: EN 13779

■ Flow rate: basis rule of 22 m³/h.pers.

Supply in spaces for human occupation



Ventilation in EP calculation

- Ventilation consumes energy!
 - Ventilation heat losses
 - Electrical consumption of fans



- EP calculation in Belgium
 - « as built » approach!
 - Several calculation methods/values (often)
 - → from « default » to detailed (e.g. measured data)
 - Input data
 - « Product data »
 - « Installation data »



EP calculation: Principle of equivalence Largely used in Belgium for Demand Control Ventilation

- Context
 - EP calculation method is simplified
 - Cannot taken into account for "innovative products"
- Objective of the equivalence
 - Evaluate the equivalent energy savings in the EP calculation method for "innovative products"
- Summary of the principles
 - Paid and under the responsibility of the manufacturers
 - Evaluation (calculations, simulations, etc.)
 by an unique Third Party (Butgb Ubatc)





« Product data »

Examples

- Capacity of natural openings
- Maximum power of fans
- Heat recovery efficiency

Some properties

- Often measured on a product (component or system)
- To be provided by the manufacturer (or supplier)
- To be checked by the **rapporteur** (responsibility)

Some expectations

- Reliability → compliant
- Availability → easily accessible



« Installation data »

Examples

- Mechanical ventilation flow rates
- Electrical power of fans
- Airtightness of the ductworks

Some properties

- Measured (or checked) on site on the fully installed ventilation system
- To be provided by the installer or "measurer"
- To be checked by the **rapporteur** (responsibility)

Some expectations

■ Reliability → compliant



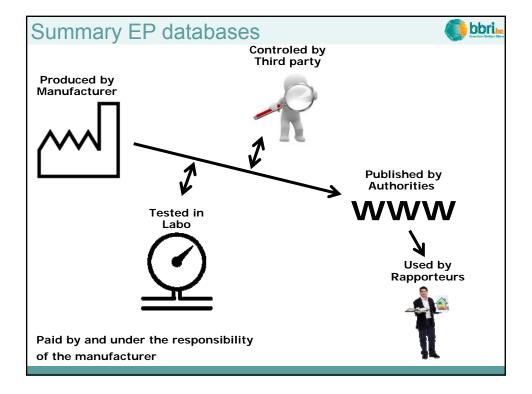






Key principles

- Compliant data
 - Standardized and clear procedures (test methods)
 - Tests in laboratories
 - Control by a third party (Notified Body)
- Voluntary framework
 - Manufacturers and rapporteurs are NOT forced to use it
 - But high demand from rapporteurs → responsibility





Many advantages for all the actors

For the manufacturers

- Higher confidence of the owners
- Higher visibility
- Compliant and unquestionably « product data »

■ For the **rapporteurs**

- No risk on the responsibility of « product data »
- Easier access to « product data »

□ For the authorities

- Higher compliance
- Less controls needed at the moment of EP declarations







Many advantages for all the actors (2)

■ For the designers and installers

- Design and preliminary EP calculation:
 - Impact of the products on EP calculation can be estimated
 - Easier comparaison and selection of products on the market

For the owners

- Higher value for money:
 - They can choose which product performance they want to pay for





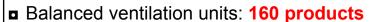


EP databases in Belgium

A success story since many years

■ Trickle ventilators: 26 products

■ Simple fans: 36 products



■ DCV systems: under development...

Other EP products

Insulation materials



Sunscreens

www.epbd.be









Ideas for the future

- Development of databases for other EP products
 - Boilers, Heat pumps, PV, ...

Development of such databases at EU level...

- Construction product market is international
- Test laboratories and Notified Body available in many countries
- Some of these « product data » are defined in EN standards

■ But...

- Need some convergences
 - Of the EP calculation methods
 - Of national standards
- Organizational and administrative challenges



New Belgian approach for higher quality of the works and compliant « installation data » for EP

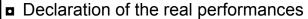


General objectives of the framework

- Reliable evaluation and declaration of the system performances after installation
 - Transparent quality criteria (e.g. acoustic, comfort, etc.)
 - Compliant « installation data » for EP calculation (e.g. measured flow rates, measured power, etc.)







- No minimum quality level required
- Not a global "conform" or "not conform"
- But report with detailed results for each criteria
- Certification of the "ventilation tester", not the installer
 - Applicable whoever has installed (e.g. also for DIY)



bbri

- Voluntary framework
 - But coupling with (EP) regulation can be easy



Clear criteria and procedures

- Performance based criteria
 - Control at the end, after completion of the works
- Standardized and clear procedure (= "STS")
 - Defines the performance criteria
 - Describes how to determine (measure) each criteria
 - Coherent with EP regulation and referring to EN standards



Certification of the ventilation testers

To assure the skills of the certified ventilation testers

- Who can become a certified ventilation tester?
 - Installers, designers, rapporteurs, architects, specific experts or testers, etc.
 - Not required to be independent of the project: can be the installer himself!
- Initial evaluation
 - Training + examination
- Continuous evaluation
 - by a Third Party (certification)
 - Random assessment (e.g. 5-10%)
 of the reports delivered by the ventilation tester
 - Paid by the certified ventilation tester



bbri

Reliable measurement methods

- Measurements
 - Flow rates
 - Electrical Power
 - Airtightness of ductworks
 - Noise level
 - •
- Example of flow rate measurements
 - Not so easy! Many methods give unacceptable errors...
 - See AIVC Workshop 2014
 - "Measurement of airflow rates at air terminal devices: an overview"
 - http://www.aivc.org/resource/measurement-airflow-rates-air-terminaldevices-overview





Many advantages for the final users/actors

- For the building designers and owners
 - Higher value for money:
 - They can choose which performance criteria they want to pay for
 - Design and preliminary EP calculation:
 - Impact of the installation on EP calculation can be estimated
 - Assurance of results and quality

For the authorities

- Higher compliance
- Less controls needed at the moment of EP declarations







Many advantages for professionals

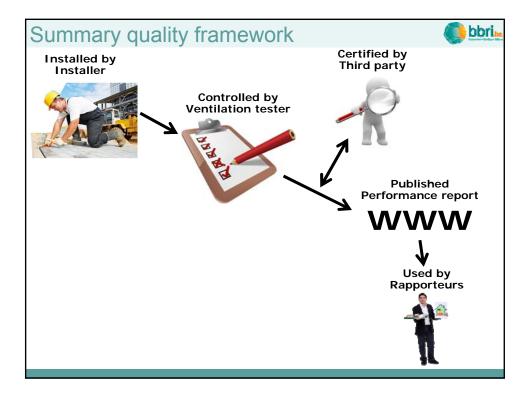
■ For the ventilation **installers**

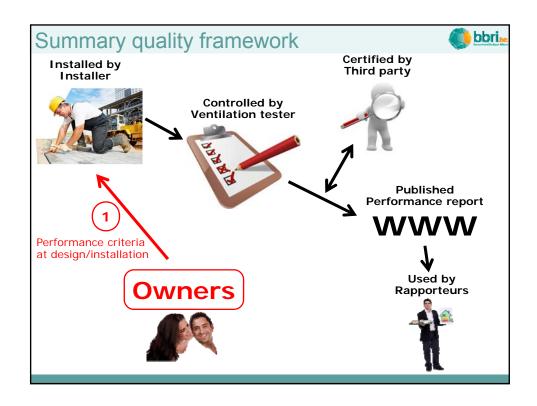
- Higher confidence of the owners
- Value for higher quality
- Compliant and unquestionably « installation data »

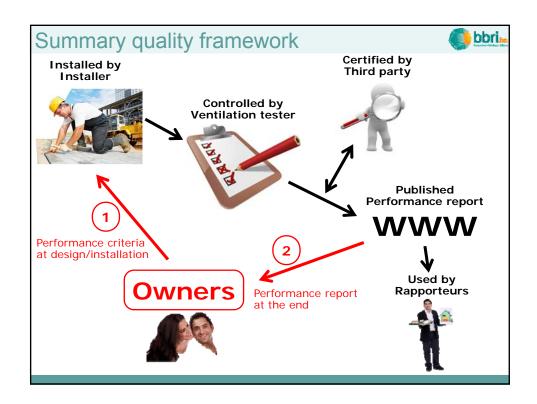


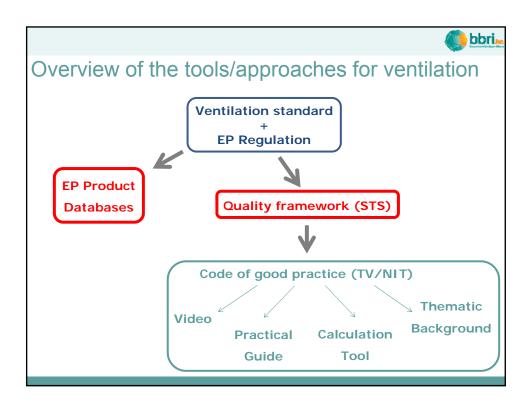
■ For the **rapporteurs**

- No risk on the responsibility of the « installation data »
- Easier access to the « installation data »





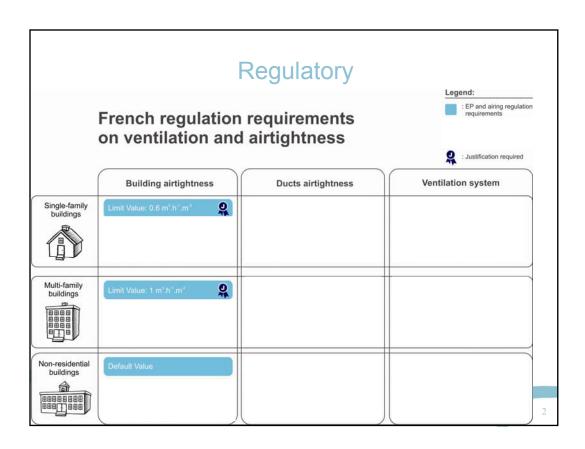


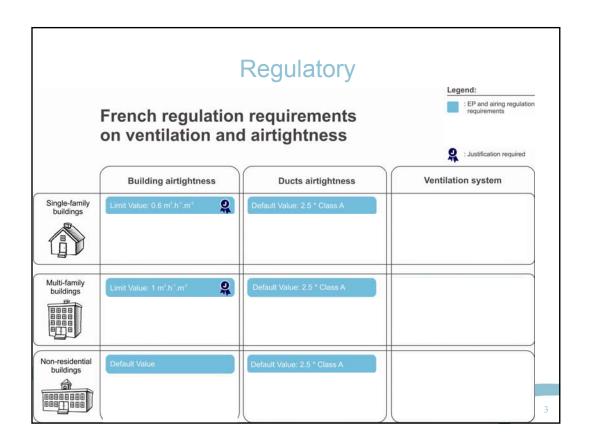


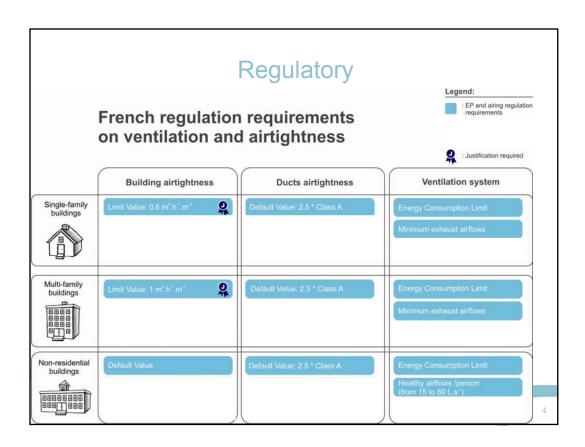
Lessons learnt from regulatory compliance checks on ventilation and airtightness: regulatory context, control procedures, results.

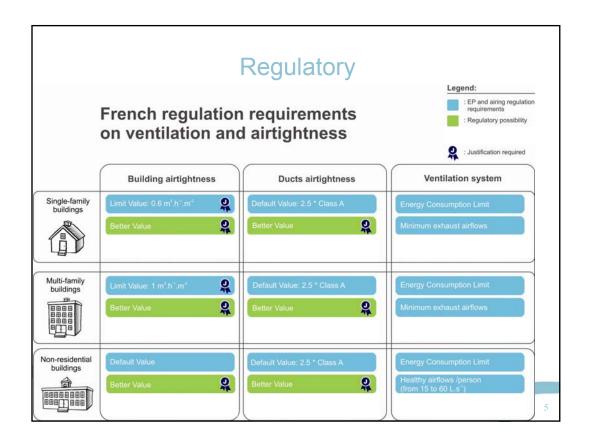
Sandrine Charrier and Adeline Bailly, CEREMA, France.

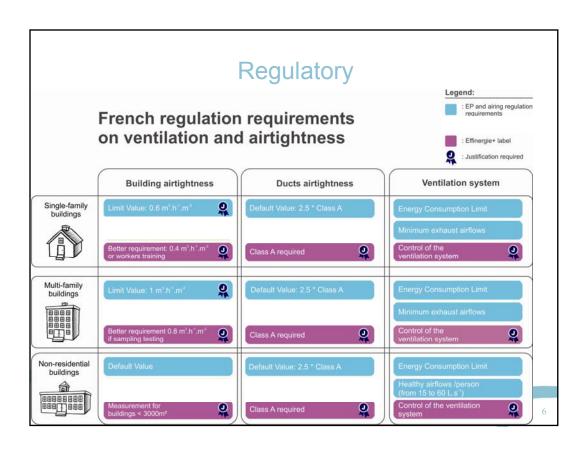


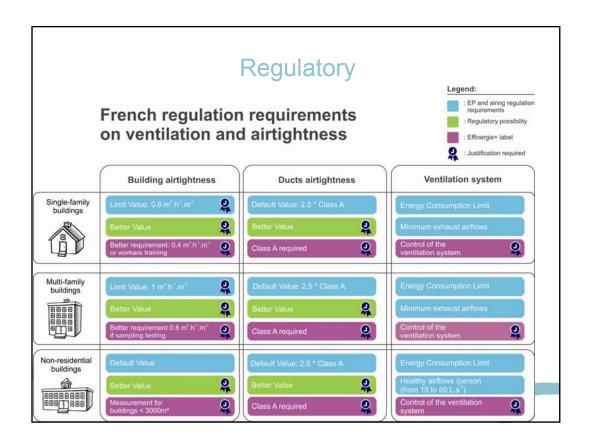


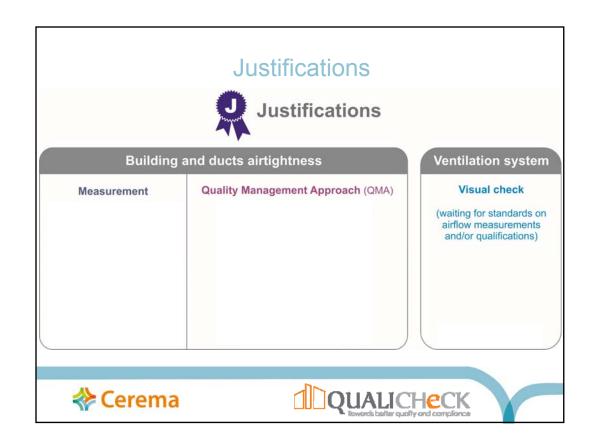


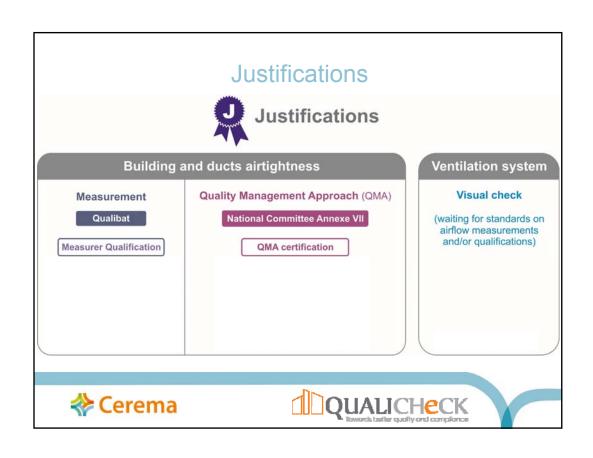


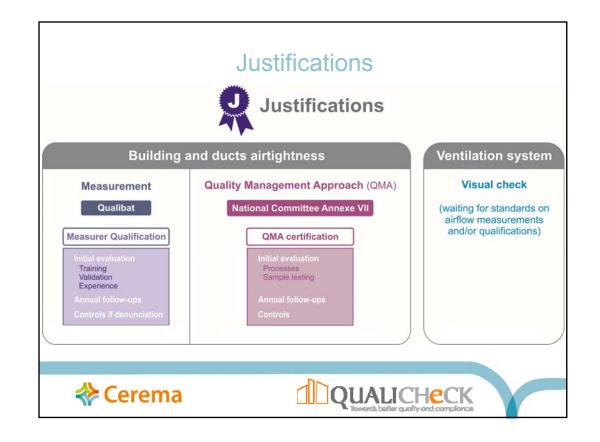


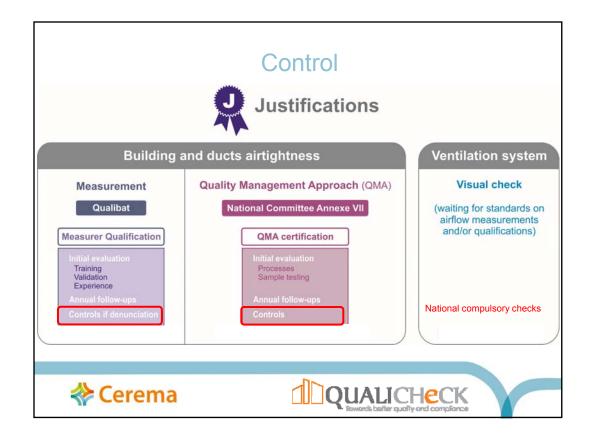


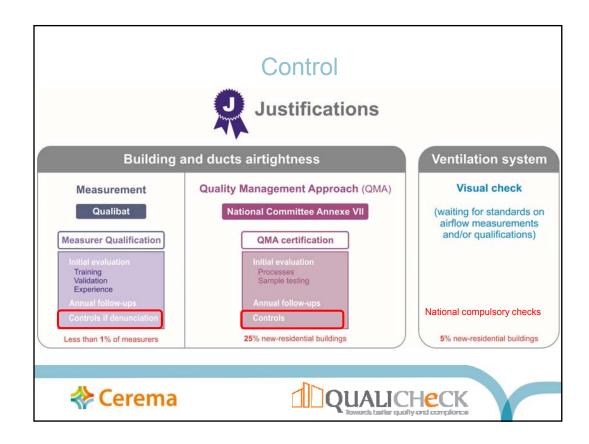










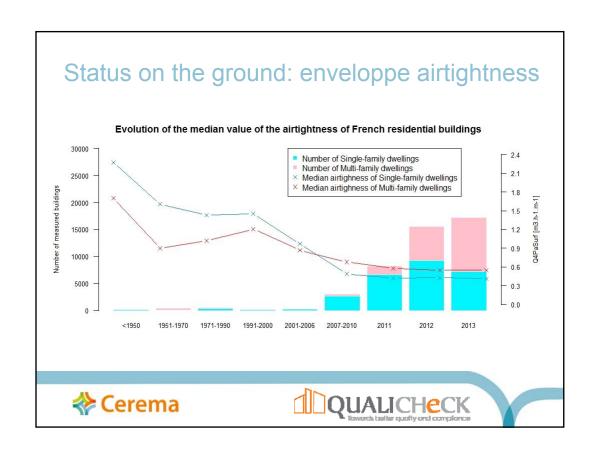


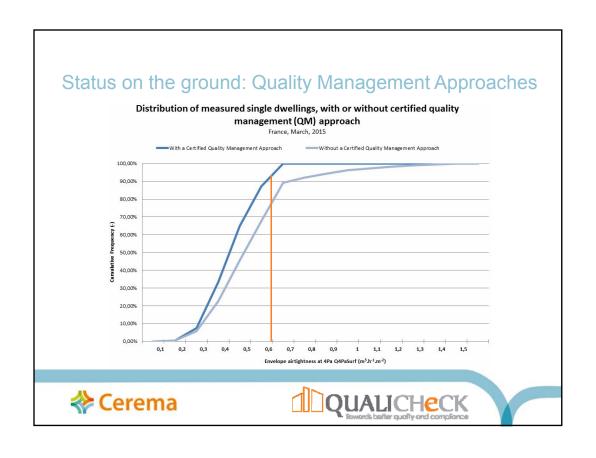
Penalties

- In theory, a non-compliance to regulatory can lead to financial sanctions (from 45000€ to 75000€) and 6 months emprisonment, decided by public prosecutor.
- In facts:
 - For airtightness: compliance to regulation can be asked. New actions so that the airtightness comply with requirements.
 - Ventilation: the non-compliance is noted in the compulsory check report.
 Possibility to cancel if new proofs given.









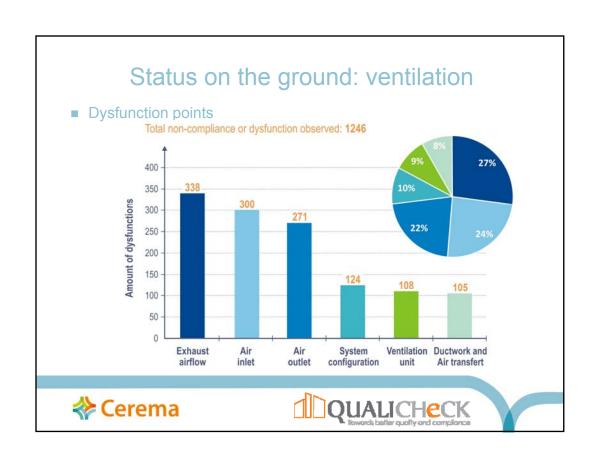
Status on the ground: ventilation

- Ventilation systems have frequent failures
 - French construction technical regulation observatory (ORTEC) compiles the controls data on both sections
 - The recent national statistics* are the following:
 - 50% of the controlled buildings do not meet the requirements in terms of ventilation technical equipment
 - 43% of the controlled buildings do not comply with the regulatory airflow rates
 - 84% of non-complying exhaust flows are insufficient
 - 16% of non-complying exhaust flows are excessive

^{*} French national statistics published by ORTEC in the last report of non-compliance rate for new buildings (CSTB-ORTEC, Synthesis report of ventilation topic, 2005-2009 period)







Synthesis of French actions

- French EP regulation requirements and processes implemented, enabled:
 - To accompany designers and workers to learn, train and apply good treatment of building envelope;
 - To accompany measurers to a good practice of measurement;
 - > To get good applications and practices.





Limits

- For envelope airtightness, are questioned:
 - Third-party testing,
 - Result of commissioning test,
 - Measurers' practice.
- For duct airtightness, lack of referent standards on flow rates measurements. For the moment, few ducts airthightness measures (no analysis possible).





Questions

- Should French next regulation ask for a better building airtightness?
- Or should French authorities focus more on ventilation requirements, without reinforcing envelope airtightness ones?
- Will professionals voluntary involve themselves in ventilation efficient installation, with a QM approach or a voluntary will to have better-than-default value or to comply with the Effinergie+ requirements?
- Will French authorities be able to impulse the same dynamic on ducts airtightness and ventilation efficiency than the one known for envelope airtightness since 2006?
- To encourage the ventilation system consideration, French authorities could:
 - Enable economic motivations,
 - Implement labels or future regulations that impose or highly put forward efficient ventilation systems.





Thank you for your attention

sandrine2.charrier@cerema.fr
adeline.bailly@cerema.fr





Building regulations can foster quality management: the French example on building airtightness

Sandrine Charrier, CEREMA, France



workshop

2015.03.16-17 | Elite Hotel Ideon | Lund, Sweden

International Workshop on Ventilation and Airtightness in Buildings

Voluntary and Regulatory Frameworks to Improve Quality and Compliance

Status on the ground and industry- driven initiatives in the French regulatory context

Building regulations can foster quality management: the French example on building airtightness

Sandrine Charrier - Cerema, France François Rémi Carrié – ICEE, France



Center for studies and expertise on Risks, Environment, Mobility, and Urban and Country

Regulatory requirements on airtightness **Building airtightness** EP and airing regulation Single-family buildings : Regulatory possibility : Justification required 9 buildings 2 ways of justification: ✓ Either by a measurement ✓ Or by a certified quality management approach Non-residential buildings **a** 88888888 Cerema QUALICHECK

Quality Management (QM) approaches

- □ QMA philosophy:
 - An approach during the conception and the construction of the building;
 - For each step, to wonder how envelope airtightness is taken into account;
 - For each step, who does what, when, how;
 - Documents to trace each step;
 - ➤ The application of the approach must guarantee a good envelope airtightness (better than the limit value);
 - Proof of the QMA efficiency: tests on a sample of buildings.





Requirements for a certified quality management approach PROJECT Conception Construction Construction Construction Construction Scope and limit airightness value Technical distalled drawings Workers training Actions and documentation in case of non-compliance List of buildings applying the quality management approach

Quality Management (QM) approaches: requirements

- ☐ Identify the **scope** of the approach regarding the types of buildings concerned;
- □ Fix the **limit airtightness value** (between 0,3 and 0,6m³.h¹.m² for single family dwellings and between 0,3 and 1m³.h¹.m² for multi-family dwellings);
- ☐ Implement **technical detailed drawings** complying with the scope;
- Show the involvement and train the workers (internal to the company or subcontracted);
- Show site supervision documents;
- ☐ Show how remedial actions are implemented and **traced**;
- Prove that the approach is effective, based on measurements on a sample (bar chart of airtightness measured values);
- ☐ Guarantee the actual application of the QMA with time;
- Get the system audited according to quality standards.





Process to get the certification

- ☐ The Ministry in charge of construction set up a national committee to analyse QMA (the Annexe VII committee).
- National Committee:
 - Around 10 experts (used to be 12).
 - Around 10 commissions a year.
- National Committee rule:
 - To analyse candidates' quality management approach (with a public evaluation grid);
 - > To propose the certification;
 - > To analyse the annual follows-up (with a public evaluation grid);
 - Each year, to propose the validation or cancelation of the certification.





Control of the certified QMA

- Two control processes:
 - > Annual follows-up:
 - Files analysis,
 - · Sample testing. Tests by an independant measurer.
 - Control campaign:
 - Set-up and implemented by state controllers:
 - Files control,
 - In-situ audits,
 - Measurement.



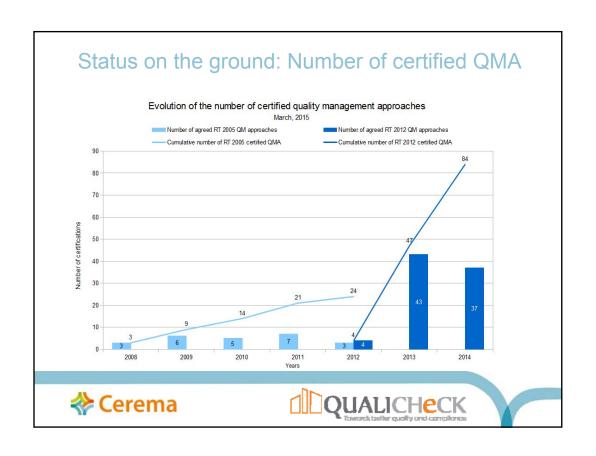


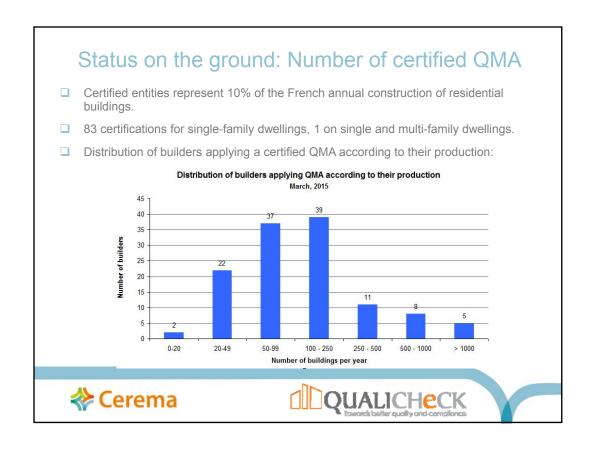
Penalties

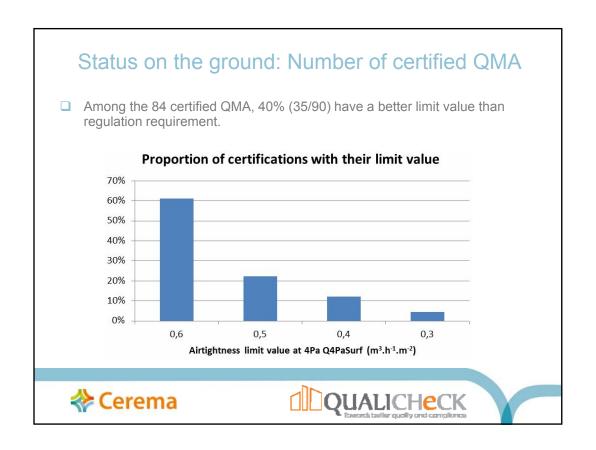
- Failures can lead to the certification cancellation.
 - Would compel the certified entity (builder) to implement systematic measurement,
 - In case of non-compliant measured value (above the limit of the certified QMA), corrections to be adopted for the building airtightness compliance.

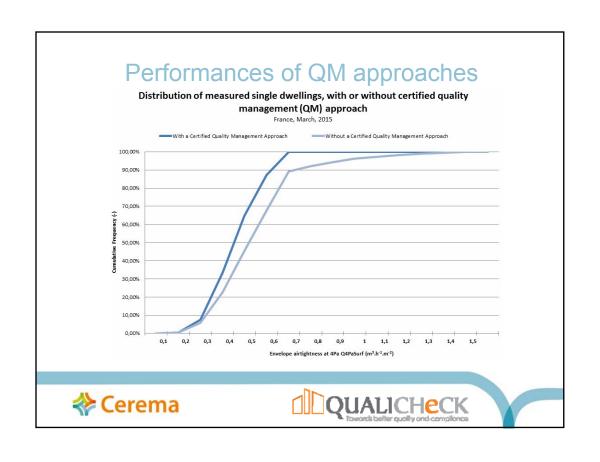


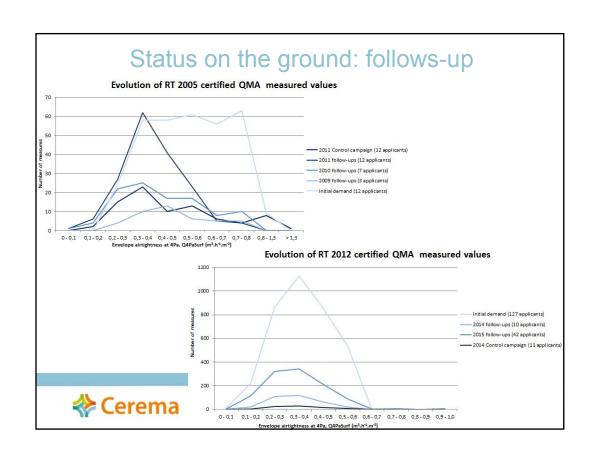


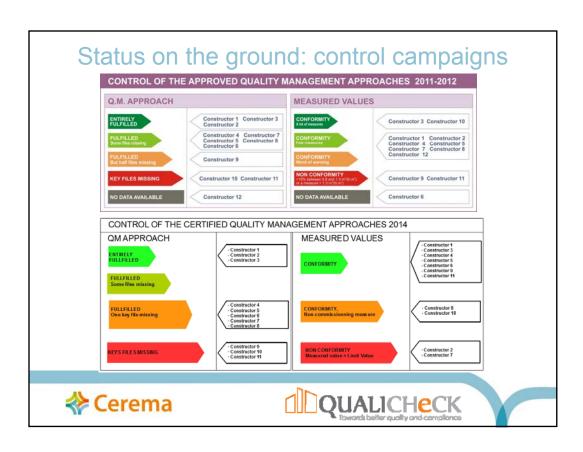












Status on the ground: control campaign

- Consequences of the first control campaign:
 - Only a warning given.
- Consequences of the second control campaign:
 - > A last chance given.
- Issues:
 - ➤ How many certified QMA should be controlled?
 - How many tests for each controlled QMA?
 - What decision to take when 1 measure upon 7 is over the limit value?





Evolutions needed and issues to be faced up

- Control campaign:
 - Pros:
 - Certified entities fear the control campaign,
 - Compel certified entities to an actual application of the certified QMA,
 - Positively welcomed by the majority of the certified entities.
 - Cons:
 - How to analyse results? Which importance to give to them (in particular for a measured value worth than the limit one)?
 - Which sample to control (balance between the cost and the effeciency).





Evolutions needed and issues to be faced up

- Certification process:
 - Because of the increase of the candidates, accredited certification bodies will analyse and deliver certifications for QMA,
 - Begin on July, 2015.
 - Pros:
 - Process attribution more effective (4months delay instead of around 10 months),
 - · Bigger capacity to meet the growing demand,
 - · More liable process: in situ audits.
 - Cons:
 - The State will get less lisibility of QM approaches' evolution and contents,
 - Control campaign set up by certification bodies.





Evolutions needed and issues to be faced up

- ☐ Approaches on multi-family dwellings and on ducts airtightness:
 - Need to find a scheme adapted to the market and to the workers.





Overall evaluation

Pros

Cons

- Encouraging builders to question their current practice and engage a QMA
- ✓ Great market impact
- Reduce testing cost if production is sufficient
- Possible monitoring of the progress as the applicants have to file an annual file
- ✓ Improvement of workers skills

- Cost for developping the approach and independant audits
- Find a good way for each stakeholder to be implicated
- Applicable mostly to single-family builders with a production of at least 50 houses/year
- Examination/approval of the application is time consumming and requires welldeveloped procedures
- Finding independant examiners and confidentiality of the approaches





Thank you for your attention

sandrine2.charrier@cerema.fr

remi.carrie@icee-energy.eu

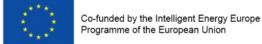




French voluntary scheme for homogeneous announcement of ventilation product performance

François Durier, CETIAT, France



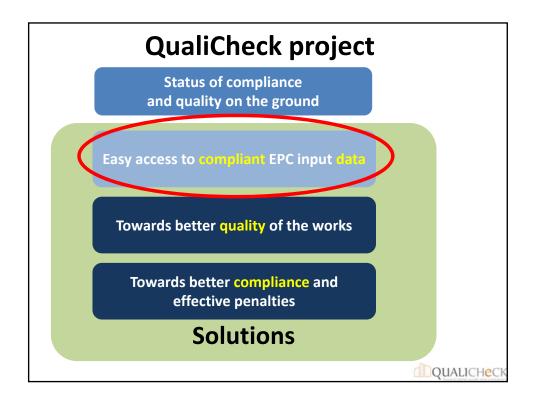




French voluntary scheme for homogeneous announcement of ventilation product performance

François DURIER



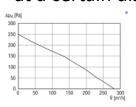


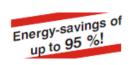
Context

- Ventilation product characteristics may be published in a non-homogeneous way by manufacturers
- Quantities and units may differ because of:
 - ambiguities, interpretations, misunderstandings of the standard,
 - no regulation defining how to publish data
- Could make difficult to find the correct input data for a building energy performance calculation and its energy rating on the EPC

Examples of problems addressed

- Operation curves for fans (flow rate vs. pressure): total pressure? Static pressure?
- Heat recovery efficiency of balanced ventilation fan box: which of the operating conditions of the testing method?
- Noise: sound power level? Sound pressure level at a certain distance?







QUALICHECK

Implemented solution

- A voluntary scheme defining performances to be published by manufacturers of ventilation products
- Launched in 2012 by Uniclima, the French association of manufacturers, with technical support of CETIAT
- Minimum set of product data to be included in the manufacturer documentation, and format under which they have to be displayed

Products covered

- · ventilation and air handling products
- for all types of buildings (residential, commercial or even industrial), new or existing
- rules exist for 19 products:
 - air inlets(2), air exhausts (3), air terminals
 - ducts and fittings (3), fire dampers
 - exhaust fan units (3), balanced fan units (2)
 - smoke extraction fans (2)
 - fan coil units, active chilled beams



Rules

- Product data covered: those for technical sheets, website, catalogue, price list, packaging
- For each product, dedicated rules give:
 - minimum list of characteristics to be displayed
 - conditions for obtaining and displaying them, with reference to standards and certifications
 - list of communication media where the characteristics should be displayed
- Data published according to the rules are identified by a logo



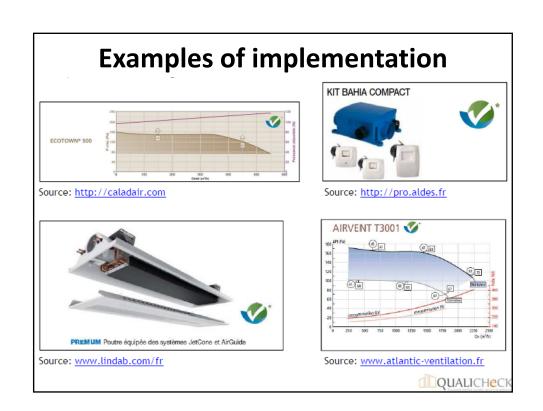


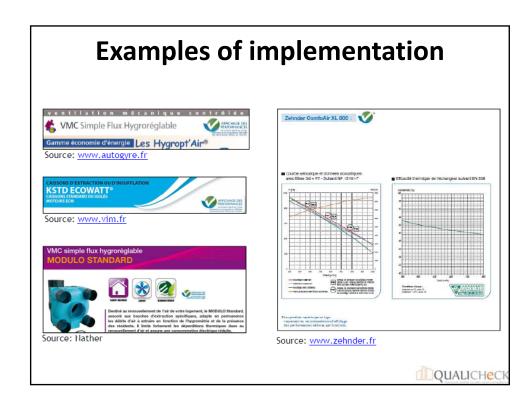
Implementation

- Uniclima estimates that (May 2014):
 - scheme has been used by over 25 manufacturers
 - total number of installed ventilation systems concerned (2013): almost 1 million, based on the number of products put on the market









Organisation of the scheme

- Detailed rules and logo available from Uniclima
- Opened to all manufacturers and distributors, even non-members of Uniclima
- Manufacturers remain responsible for the product data published
- In case of dispute about the compliance of published data, parties involved search for an amicable solution, under the auspices of Uniclima.

AFFICHAGE DES PERFORMANCES



Pros and cons	
Pros	Cons
✓ Voluntary scheme, free access	✓ Interesting only if sufficient number of manufacturers and products
✓ Provides easy access to harmonised data	✓ Data not put together at the same place
✓ Reduces risk of wrong or incomplete data, thus contributes to more surely compliant data	✓ Compliance is not fully guaranteed





To know more...

- <u>www.uniclima.fr</u> (*Recommandations d'affichage des performances produits*)
- QUALICHeCK report:

"How to get compliant and accessible data for the energy rating calculation of a building"

- QUALICHeCK factsheet:
 - "French voluntary scheme for homogeneous announcement of ventilation product performance"

available at http://qualicheck-platform.eu





Legal issues when developing compliance frameworks

Eric Winnepenninckx, UBAtc, Belgium



Legal issues when developing compliance frameworks

Eric Winnepenninckx

UBAtc & UEAtc – Secretary-General

Legal issues when developing compliance frameworks - 20-03-15 - Page



Structure of the presentation

■ Introductory notes

- Exchanging regulatory information in the European Union
- Free movement of good (construction products)
- Setting requirements for construction works



What is UBAtc?



- Belgian Technical Approval Body
- Designated in 2013 for the issuing of European Technical Assessments in the framework of Regulation (EU) N° 305/2011 by the Belgian authorities
- Assumed responsibility for the issuing Technical Approvals serving the needs of Belgian stakeholders in 2009 (previously Federal Public Services Economy)
- Partner in the development of compliance frameworks with (Belgian) certification bodies

Legal issues when developing compliance frameworks - 20-03-15 - Page 3

UEAtc

What is UEAtc?



- De facto organisation of Technical Approval Bodies
- Objectives:
 - Promoting mutual recognition of conformity assessment results, aiming at avoiding useless repetition of activities (tests, inspections, ...)
 - Exchanging (technical) experiences
 - Supporting innovation



Some terms

What is compliance?

- the term **compliance** is used to distinguish the action of doing what is required (e.g. an organization "complies" by making something conform or by fulfilling a regulatory requirement).
- ... **compliance** means conforming to a rule, such as a specification, policy, standard or law.
- conformity assessment is concerned with "fulfilment of specified requirements"

Legal issues when developing compliance frameworks - 20-03-15 - Page 5



Policies based on technical compliance framework Walking a tight rope

- Imposing obligations or providing incentives without technical compliance requirements may lead to bad quality works
- Obligations or incentives based on technical compliance requirements need to be finely tuned, ensuring respect of the **legal framework**



Structure of the presentation

- Introductory notes
- Exchanging regulatory information in the European Union
- Free movement of good (construction products)
- Setting requirements for construction works

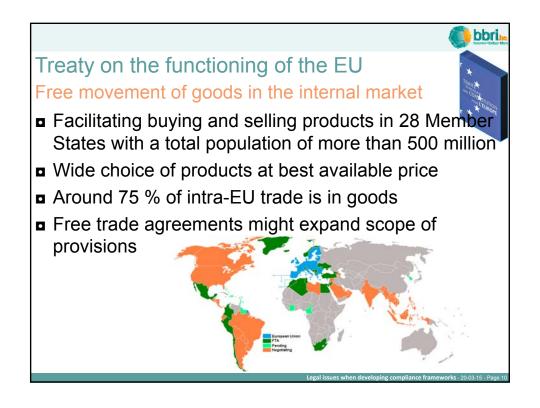
Legal issues when developing compliance frameworks - 20-03-15 - Page 7



Information to prevent new barriers to trade

- Aim: preventing creation of new technical barriers to trade
- **How**: Member states are required at a draft stage to inform the European Commission, and other member states, about their technical regulations
- Applicable legislations:
 - Directive 98/34/EC (1998) laying down a procedure for the provision of information in the field of technical standards and regulations
 - Exchanging information on anything but standards
 - Regulation (EU) N° 1025/2012 (2012) on European standardisation
 - amending Council Directives 89/686/EEC and 93/15/EEC and Directives 94/9/EC, 94/25/EC, 95/16/EC, 97/23/EC, 98/34/EC, 2004/22/EC, 2007/23/EC, 2009/23/EC and 2009/105/EC and repealing Council Decision 87/95/EEC and Decision No 1673/2006/EC
 - Exchanging information on standards





Treaty on the functioning of the EU Articles of the Treaty 34, 35, 36

Article 34 (intra-EU imports)

■ Prohibits 'quantitative restrictions and all measures having equivalent effect' between Member States;

Article 35 (exports from one Member State to another)

■ Prohibits 'quantitative restrictions and all measures having equivalent effect';

Article 36

Provides for derogations to the internal market freedoms of Articles 34 and 35 TFEU that are justified on certain specific grounds

Legal issues when developing compliance frameworks - 20-03-15 - Page 11

Treaty on the functioning of the EU Applicability of Articles 34, 35 and 36



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- Treaty articles 34, 35 and 36 do not apply in case a given product is fully harmonised by more specific EU legislation:
 - → Machinery directive (2006/42/EC) (Machines)
 - →Low Voltage directive (2006/95/EC) (Electrical equipment)
 - →Electromagnetic Compatibility directive (2004/108/EC) (electrical and electronic appliances, systems and installations)
 - → Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS) (2011/65/EU)
 - →Ecodesign directive (2009/125/EC)
 - → Construction products regulation (Construction products)



Treaty on the functioning of the EU

EU directives

- "New approach directives"
 - Directives comprise generally phrased requirements
 - Manufacturers may demonstrate compliance directly or use harmonised standards to this effect
 - Manufacturers issue a declaration of conformity and CE mark their products
 - For the machinery directive, the "putting into service" is also covered





Treaty on the functioning of the EU Construction Products Regulation – CPR

- Regulation (EU) N° 305/2011 (Construction Products Regulation – CPR)
 - Basis for declaration of (product) performance (not conformity!) and CE marking
 - Obligation for manufacturers to declare performance for essential requirements through this mechanism only
 - Relevant for construction products covered by harmonised standards and European Technical Assessments



Harmonized technical specifications

Brief explanation

- Harmonized European standard
 - Standard developed in the framework of an EC mandate to CEN
 - Annex ZA of the standard identifies the essential characteristics relevant for CE marking and the conformity assessment system
 - Manufacturers are obliged to CE mark if products covered by harmonized standard
- European Technical Assessment (ETA)
 - Case-by-case assessment for products deviating from harmonized standards
 - Manufacturers may apply for an ETA (no obligation)

Legal issues when developing compliance frameworks - 20-03-15 - Page 15

The harmonised area





CPR - Article 19

EU member states may specify national requirements for construction products

- For which no harmonised standard exist AND
- Which performances may not or may not fully be assessed on the basis of an existing harmonised standard.

The existence of a harmonised standard (and the corresponding Declaration of performance and CE marking), is insufficient to conclude that EU member states have lost their regulatory prerogatives completely for the concerned construction products.









bbri.

CE marking

- Informs (authorities) regarding construction product performances for the essential characteristics
- is not a quality mark and does not guarantee that CE marked products may be used in each EU member state.

EU member states

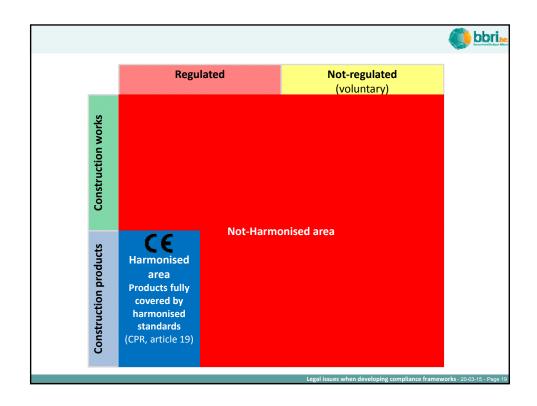
- Maintain their regulatory prerogatives to regulate at the level of the works.
- May use their regulatory prerogatives for construction products for which the essential requirements have not or have not (yet) been incorporated in a harmonised standard or for which the evaluation method(s) is/are inappropriate.

Legal issues when developing compliance frameworks - 20-03-15 - Page 13

CE marking EU Member States



- May foresee national provisions in the not-harmonised area, e.g. by referring to national regulatory or voluntary systems.
- Need to foresee in such cases an equivalence clause, permitting products that have already demonstrated compliance with the regulatory requirement through conformity with equivalent systems (e.g. attestation systems in other countries).





Free movement on goods

Some conclusions

- The treaty on the functioning of the EU foresees mutual recognition
- CE marking facilitates circulation of goods in the EU, preventing barriers to trade; CE marking may address
 - conformity with requirements specified in directives; or
 - Product performance (CPR, Eco-design, ...)
- Members states may (continue to) foresee national provisions in the not-harmonised area



Treaty on the functioning of the EU

Article 101 (restrictions or distortions of competition)

Incompatible with the internal market:

All agreements between undertakings, decisions by associations of undertakings and concerted practices which

- may affect trade between Member States and
- which have as their object or effect the prevention, restriction or distortion of competition within the internal market;
- Standards, terms of access to a particular quality / compliance mark or for approval by a regulatory body and therefore also compliance frameworks may affect trade ...

MESSAGE:

Great care is needed when setting up compliance frameworks in relation to the works

Legal issues when developing compliance frameworks - 20,03,15 - Page 2

bbri

Treaty on the functioning of the EU

Preventing restrictions on competition when elaborating compliance frameworks

- restrictive effects on competition by potentially restricting price competition and limiting or controlling production, markets, innovation or technical development.
- where participation in standard-setting is unrestricted and the procedure for adopting the standard in question is transparent, standardisation agreements which contain no obligation to comply with the standard and provide access to the standard on fair, reasonable and nondiscriminatory terms will normally not restrict competition within the meaning of Article 101

Legal issues when developing compliance frameworks - 20-03-15 - Page 23

Treaty on the functioning of the EU

Preventing restrictions on competition when elaborating compliance frameworks



bbri

MESSAGE:

When specifying requirements, care must be taken that requirements are proportional with the risk, that equivalence is embedded and that mutual recognition is ensured.

MESSAGE:

All parties concerned must be invited to participate, the adoption procedure for specifications must be transparent and specifications are preferably open ended to ensure an inclusive scope and the possibility of alternative solutions



bbri

Subsidiarity principle

- Member states are responsible for ensuring that building and civil engineering works on their territory are designed and executed so as not to endanger the safety of persons, domestic animals and property nor damage the environment: National regulations on construction works
- Regulation (EU) N° 764/2008 (procedures relating to the application of certain national technical rules to products lawfully marketed in another Member State)

 Mutual recognition principle
- Rules which may have a direct influence on the requirements of construction products: Construction products regulation

MESSAGE:

Member states may impose additional requirements, unless these have a direct influence on construction product requirements (if harmonised)

Legal issues when developing compliance frameworks - 20-03-15 - Page 2

CE marking and the Public Procurement Directive (2014/24/E

- Public procurers (member state administrations purchasing goods or services from the private sector)
 - May choose construction products that meet their needs best
 - May foresee requirements that go beyond the essential characteristics foreseen in harmonised technical specifications
- Should as far as relevant and appropriate refer to harmonised technical specifications
- As far as relevant, information in the declaration of performance (accompanying the CE marking) needs to be accepted as proof that requirements have been met

MESSAGE:

Public procurers may specify criteria that meet their needs

Services directive (2006/123/EC)

- Aim: promote the growth potential of services markets in Europe by removing legal and administrative barriers to trade in the services sector
- Member States are to remove unjustified and disproportionate burdens and to substantially facilitate:
 - the establishment of a business, i.e. cases in which a natural or legal person wants to set up a permanent establishment in a Member State, and
 - the cross-border provision of services, i.e. cases in which a business wants to supply services across borders in another Member State, without setting up an establishment there.

MESSAGE:

Care needs to be taken when imposing requirements on workers/companies

...

Legal issues when developing compliance frameworks - 20-03-15 - Page 27

bbri.

bbri

Services directive

Relevance

- Technical competence requirements (proportionate, not intended to exclude foreign service providers, ...)
- Recognition requirements (transparent, non-discriminatory processes)



Some conclusions

Legal provisions

Whereas imposing technical compliance criteria is possible and may be considered necessary, it is essential

- To prevent new **technical barriers to trade** (authorities should use the notification process)
- To ensure **free movement of goods** by allowing CE marked products to circulate without restrictions and by facilitating mutual recognition
- To develop **proportionate**, **inclusive** requirements allowing **equivalence**, using **transparent processes** and **involving all concerned parties**

Legal issues when developing compliance frameworks - 20-03-15 - Page 29

Some conclusions

Technical provisions

Solutions exist

- Specifications for products exist, both at European and national level (European standards, European Technical Assessment and Approvals, confirmation of Technical Approvals with national use, ...)
- Conformity assessment instruments exist which may benefit from mutual recognition (CE marking, voluntary and regulatory compliance marks)

Structured discussion - Sources of problems regarding input data, quality of the works, and innovation

Peter Wouters, BBRI, Belgium





International Workshop on Ventilation and Airtightness in Buildings

Structured discussion Sources of problems regarding input

Sources of problems regarding input data, quality of the works, and innovation



Structure for the discussion

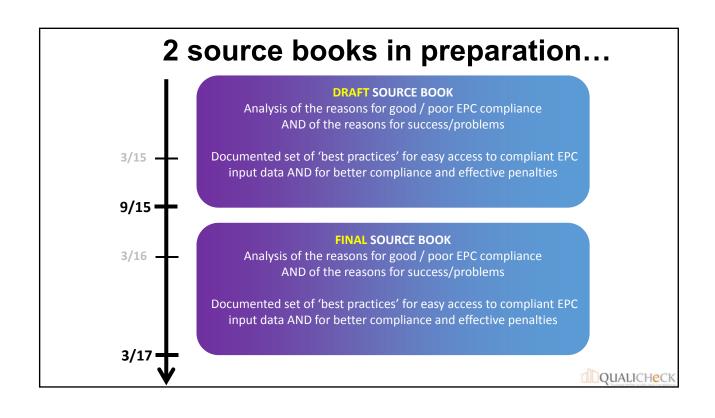
What is the context? → 2 QUALICheCK source books

Is training sufficient or do we need strict compliance frameworks?

3 steps in effective compliance frameworks?

What about innovation? Societal support?

Structure for the discussion What is the context? → 2 QUALICheCK source books Is training sufficient or do we need strict compliance frameworks? 3 steps in effective compliance frameworks? What about innovation? Societal support?



QUALICHeCK source book on "Guidelines for better enforcement of EPC compliance"

- 1. Introduction
- 2. Overall context
- 3. Analysis of reasons for good/poor EPC related compliance
- 4. Documented set of best practices
 - 1. PART 1 Procedures to obtain and prove compliant data
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- About Innovation
- 6. Society and EPC compliance
- 7. Economics of compliance
- 8. Conclusions



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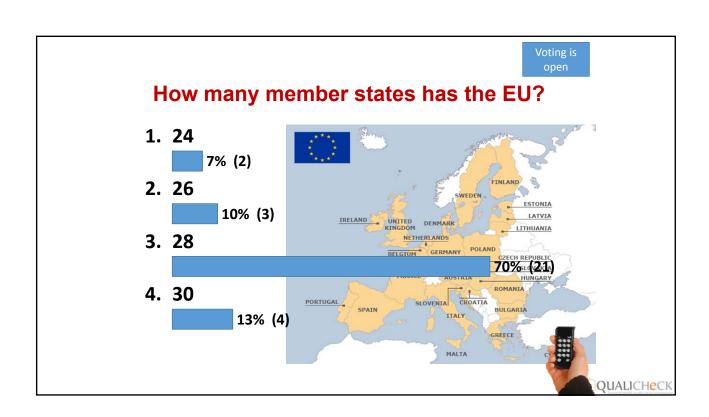


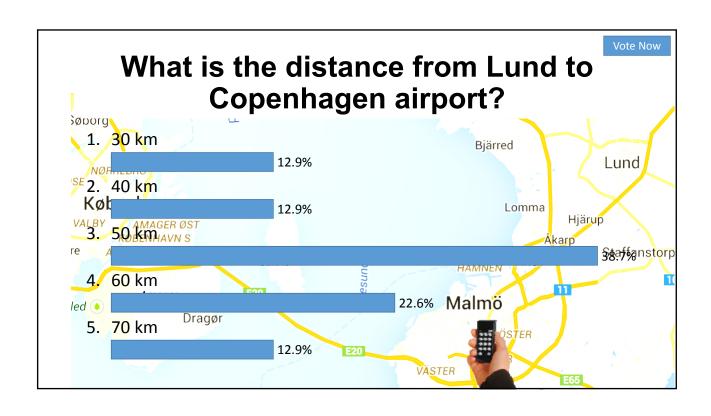
QUALICHeCK source book on "Guidelines for better enforcement of EPC compliance"

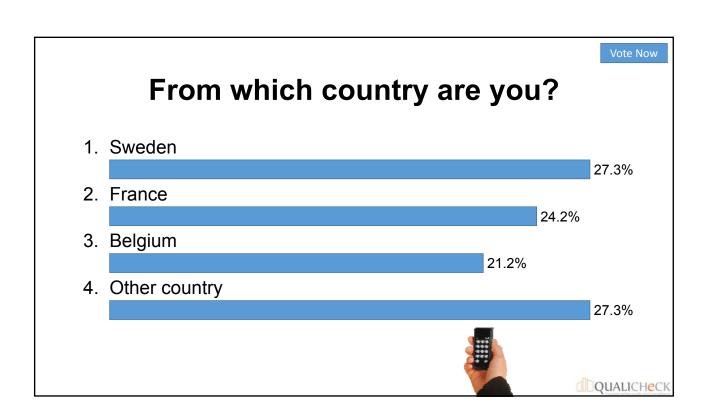
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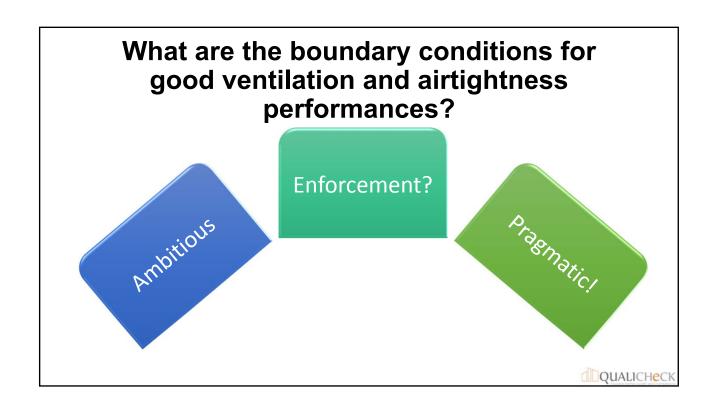






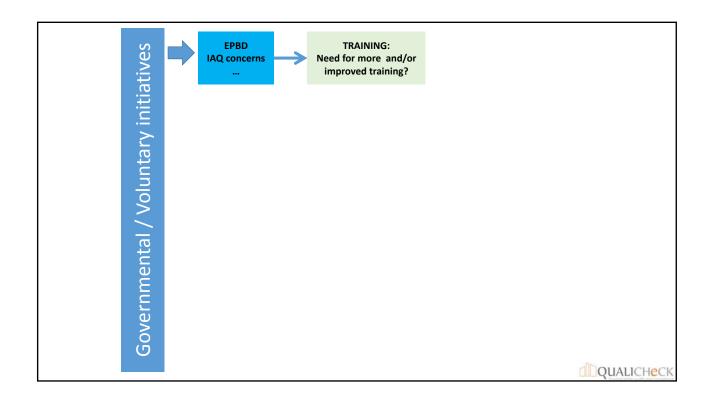


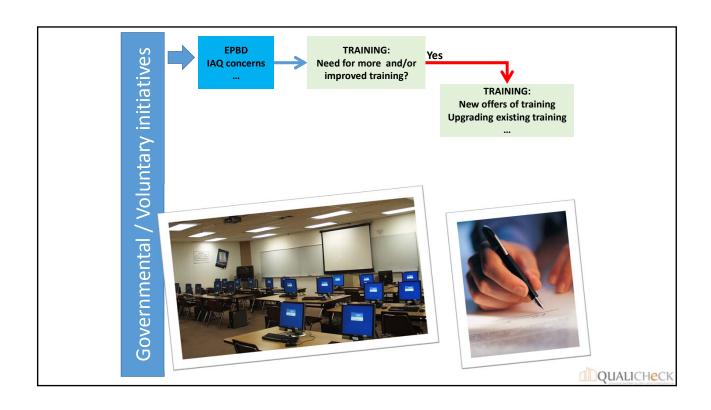
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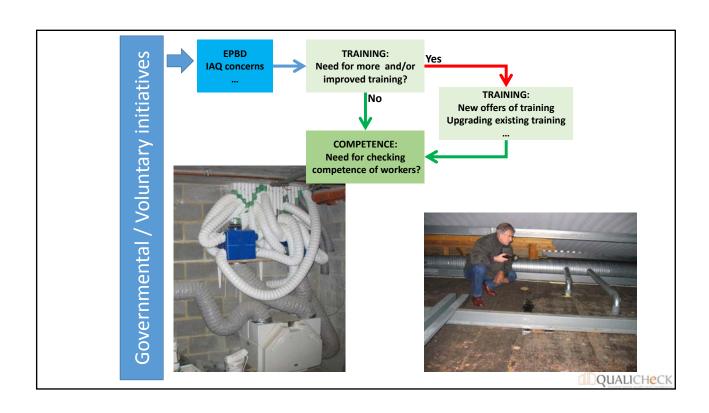


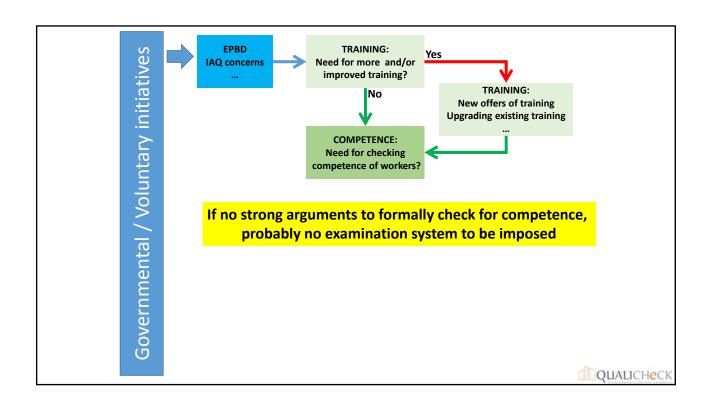
e.g. BUILD UP Skills Combining capacity building with enforcement schemes? Governmental – voluntary?

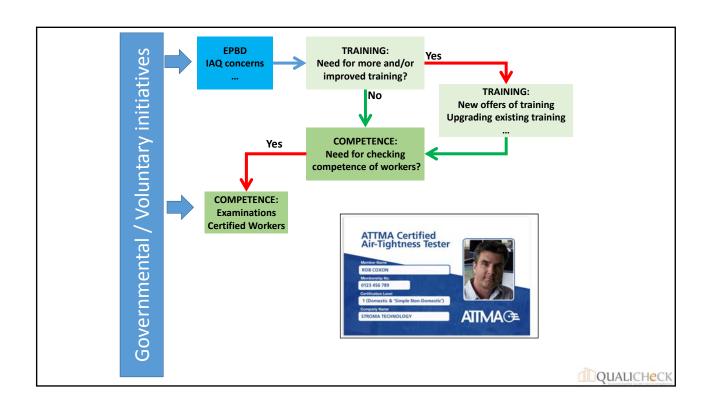


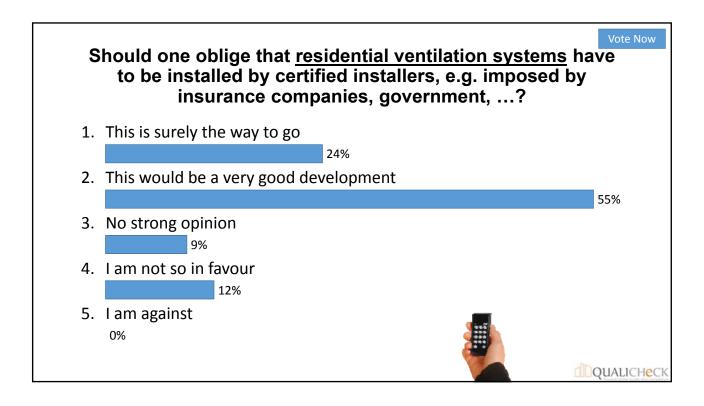












(intense) discussions in Belgian context...

- There is no discussion that it is has major advantages if work is done by competent installers
- But should certification be a requirement?
 - The required competence for a small extraction system requires different competences than for a big central system in an apartment building → one type of certification?
 - What about contractors who not often do the job?
 - No longer possible to have works by do-it-yourself?

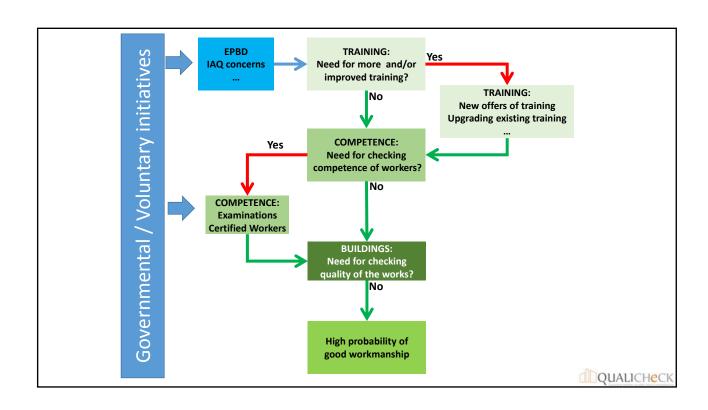
• ...

Is it better to focus on the delivered performances?

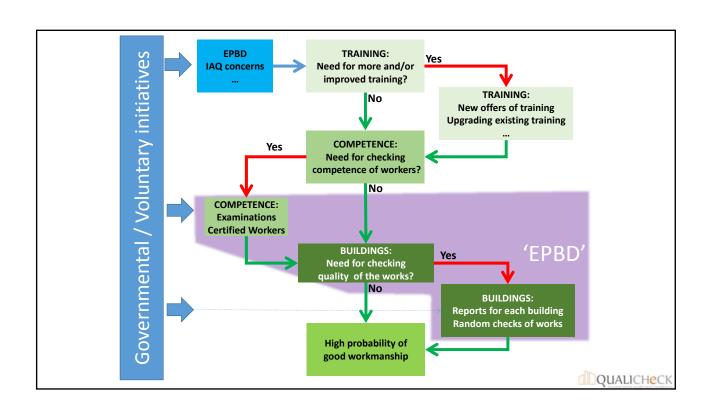
QUALICHeCK wants to collect PROS and CONS Each country has to make its own judgment

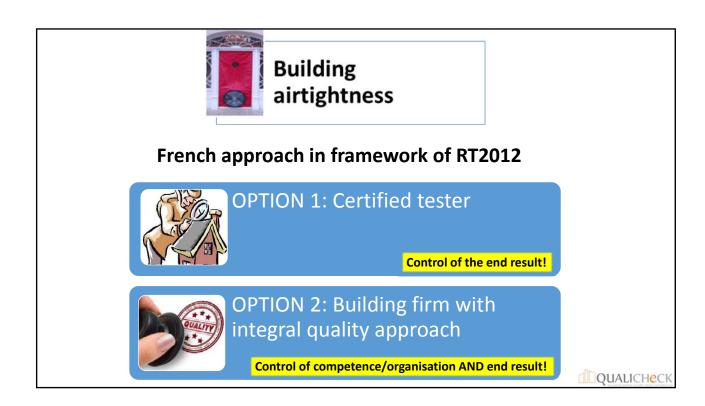














In case there is a need and support for enforcement...

How to create the appropriate boundary conditions?



Structure for the discussion

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Efficiency of a heat exchanger Airtightness of a building

Procedures to obtain and prove compliant data

Possibility to have efficient maintenance

Procedures to obtain and prove quality of the works

There are clear procedures what must be done

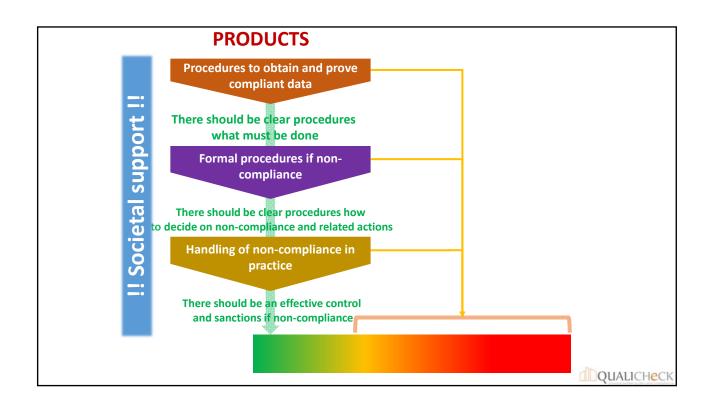
Formal procedures if non-compliance

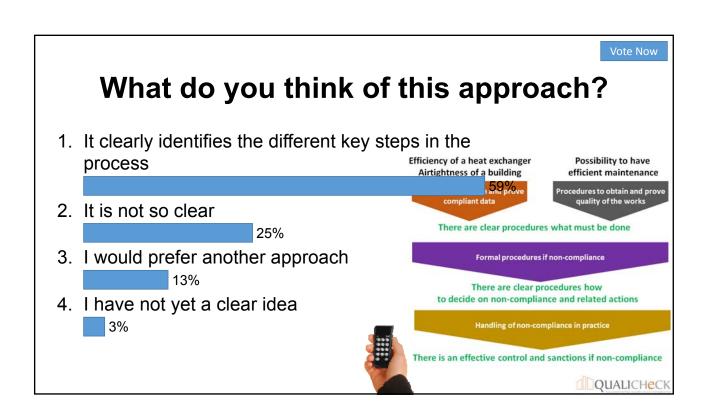
There are clear procedures how to decide on non-compliance and related actions

Handling of non-compliance in practice

There is an effective control and sanctions if non-compliance







Splitting up effective compliance frameworks in 3 steps?



STEP 1: Procedures to obtain & prove compliant data

- Building airtightness
 - Clear rules how to prepare the building?
- Ventilation
 - What are the type and level of performances to be achieved?
 - Are there clear procedures to come to product and system data?

• ...

Procedures to obtain and prove compliant data

Are there clear procedures what must be done?

STEP 1: Procedures to obtain & prove compliant data

- Potential important actions at European level (databases)
- Pragmatic approach is crucial!
 - Swedish approach for ductwork testing is very interesting:
 - Assessment can be done by installers
 - Initial test: only 10% or 20% of total ductwork to be checked
- Pragmatic approach is closely linked to cost aspects and, indirectly, societal support!

Procedures to obtain and prove compliant data

Are there clear procedures what must be done?



STEP 2: Formal procedures if non-compliance

- Are there clearly written procedures?
 - · What kind of control is possible?
 - What kind of sanctions?
 - · Who can be held liable?

• . . .

Formal procedures if noncompliance

Are there clear procedures how to decide on non-compliance and related actions?



STEP 3: Handling of non-compliance in practice

- Rules and procedures are crucial, but little will happen if no action on the terrain.
- Various issues, e.g.:
 - Need to have staff for carrying out control (desk control, on site)
 - Political will to act in case of non-compliance
 - Robust legal system crucial
 - Almost impossible if no (strong) support from major stakeholders

• ...

Handling of non-compliance in practice

Is there an effective control and sanctions if non-compliance?



Vote Now

Residential ventilation performances: What is the situation in your country?

- 1. No attention in governmental frameworks (EPBD, legislation,...)
- 2. Included in procedures, no framework allowing control 6.5%
- 3. Included in procedures, framework allowing control but almost not done

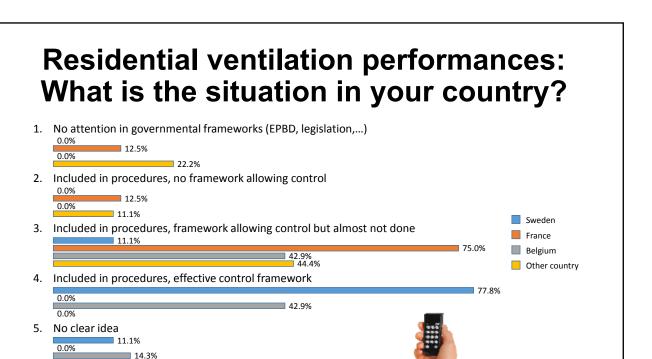
45.2%

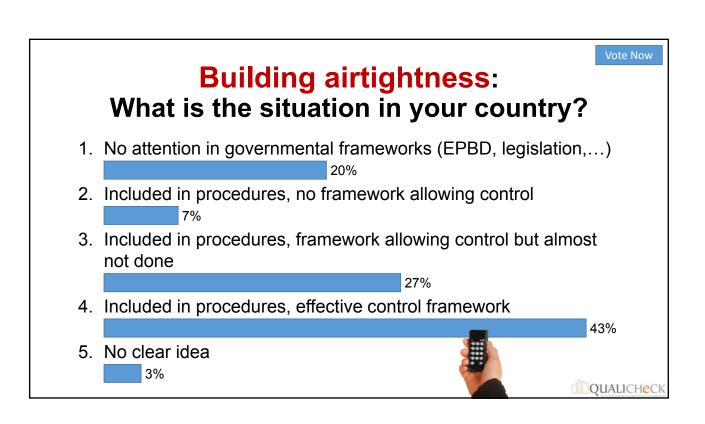
4. Included in procedures, effective control framework

32.3%

5. No clear idea

6.5%





QUALICHeCH QUALICHECH

Vote Now

Ventilative cooling: What is the situation in your country?

1. No attention in governmental frameworks (EPBD, legislation,...)

41.9%

2. Included in procedures, no framework allowing control

35.5%

3. Included in procedures, framework allowing control but almost not done

3.2%

4. Included in procedures, effective control framework

3.2%

5. No clear idea

16.1%



QUALICHECK

Vote Now

Ductwork performances: What is the situation in your country?

1. No attention in governmental frameworks (EPBD, legislation,...)

26%

2. Included in procedures, no framework allowing control

26%

3. Included in procedures, framework allowing control but almost not done

19%

4. Included in procedures, effective control framework

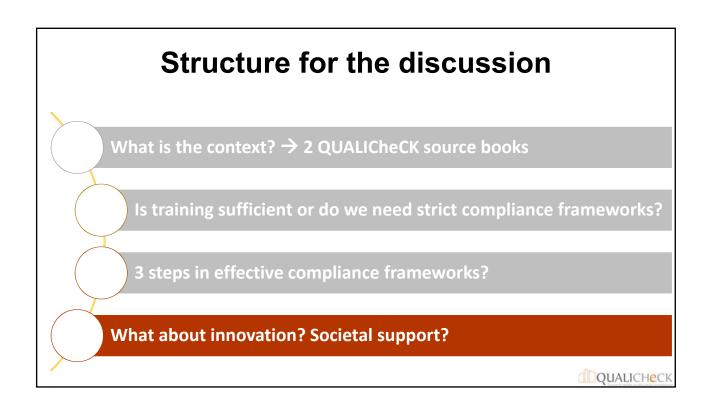
26%

5. No clear idea

3%



Ductwork performances: What is the situation in your country? 1. No attention in governmental frameworks (EPBD, legislation,...) 0.0% 28.6% 33.3% 2. Included in procedures, no framework allowing control 0.0% 12.5% 33.3% 3. Included in procedures, framework allowing control but almost not done 11.1% 0.0% 11.19 4. Included in procedures, effective control framework 0.0% 0.0% 0.0% 14.3%



QUALICHECH

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Strict compliance frameworks and innovation?

- POSITIVE: Strict compliance frameworks can be a major driver for innovation...
 - · See example in Sweden regarding ductwork airtightness
 - Compliance framework can be a very cost-effective governmental measure to stimulate innovation
- CONCERN: If no appropriate procedures for assessing innovative concepts (= not covered by standard procedures), these concepts will have big difficulties to enter into the market

The overall support for a strict compliance framework may strongly reduce if there is no appropriate framework for integrating innovative concepts

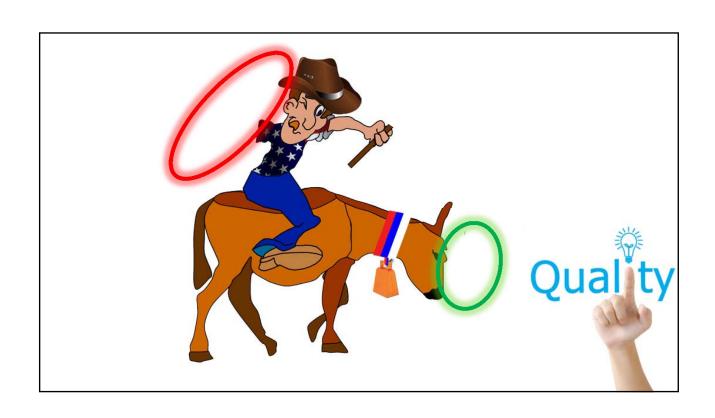


Society and compliance

- Overall impression:
 - Effective compliance framework in most countries not evident at all if no strong societal support
 - Boundary conditions: In most countries, contractors don't like control and surely not fines

1. A need for more effective control BUT probably no societal support 32% 2. A need for more effective control and probably a possibility for societal support 3. No need for a more strict compliance framework 16% 4. No opinion 0%





Summary of country presentations

Arnold Janssens, University of Ghent, Belgium

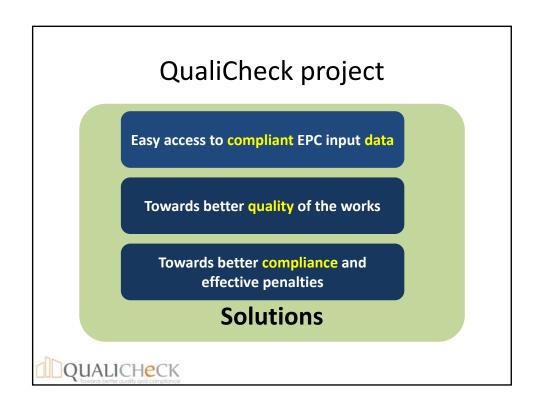


QualiCheck workshop Voluntary and Regulatory Frameworks to improve Quality and Compliance

Summary of country presentations

A. Janssens Ghent University (Ugent)





Workshop objectives

- Increase confidence in declared ventilation and airtightness performance to show compliance with regulations:
 - how to improve the reliability of the input data used to issue Energy Performance certificates;
 - how to improve the quality of the works;
 - how to take into account innovations in a compliance framework.



Overview of solutions

	Ventilation	Airtightness
Reliable EPC input data	Regulated schemesVoluntary schemesSupporting documents	
Quality of the works		
Compliance framework		

In Sweden, Belgium, France



Differences in context

- Sweden
 - Long tradition of checks of compliance with building regulations related to indoor climate
 - EPBD-regulations based on operational rating; compliance of subcriteria (airtightness) seems less of an issue
- Belgium
 - Solutions more recently developed to obtain better compliance with energy performance regulations
 - Reporting of EPC after the end of the works
- France
 - Long tradition of energy performance regulations (RT)
 - Solutions developed in voluntary labeling schemes to show high performance, before moving to regulated schemes



Solutions in Sweden

	Ventilation	Airtightness
Reliable EPC input data	Checked by certified energy experts	
Quality of the works	 Compulsory ventilation checks (OVK since 1991), inc. inspection (3-6 y) AMA HVAC specifications (1950's) Certified ventilation installers (voluntary scheme 2014) 	 AMA ductwork airtightness specifications (1950's) Building airtightness tester (voluntary scheme 2014)
Compliance framework	 Certified OVK- inspectors Municipalities may impose penalties to owner 	

Solutions in Belgium

	Ventilation	Airtightness
Reliable EPC input data	 Checked by EPB- rapporteur EPB-product database (voluntary) 	 Checked by EPB- rapporteur Building airtightness test result in stead of conservative default value
Quality of the works	 Certified ventilation tester (voluntary, under development) 	 Qualification of building airtightness testers (2015)
Compliance framework	 Registered EPB- rapporteur Transparent fine-system imposed to owner 	Declaration of conformity by 3rd party



Solutions in France

	Ventilation	Airtightness
Reliable EPC input data	 Homogeneous ventilation product characteristics 	Based on measured values
Quality of the works	 National random checks Qualification of ventilation controllers (voluntary label) 	 Qualification of airtightness testers Certified QM approach for sample testing
Compliance framework	Penalties in case of non- compliance	 Limiting airtightness requirements for residential buildings (2013) Penalties in case of non- compliance



General elements of solutions

- Homogeneous product databases
 - Concerns: redundancy at international scale
- Testing as a means to improve quality of the works, reliability of input data and compliance
- Dedicated responsibilities for testing, controls and reporting
 - Personnel qualification/certification schemes
 - Importance of 3rd party control
- Systems of penalties in case of non-compliance
 - Not always very strict, sometimes room for negociation



Thank you for your attention! Tack för uppmärksamheten!

Perspectives for effective compliance checks

Xavier Loncour, BBRI, Belgium



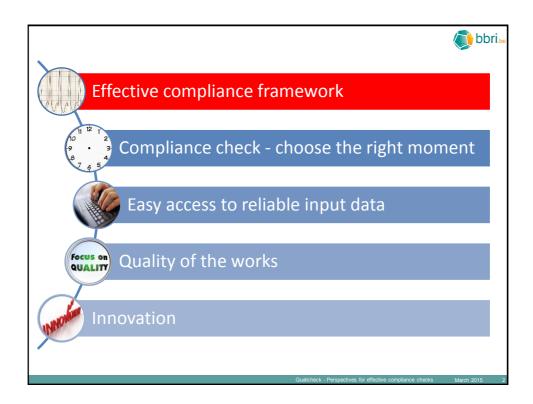
Perspectives for effective compliance checks

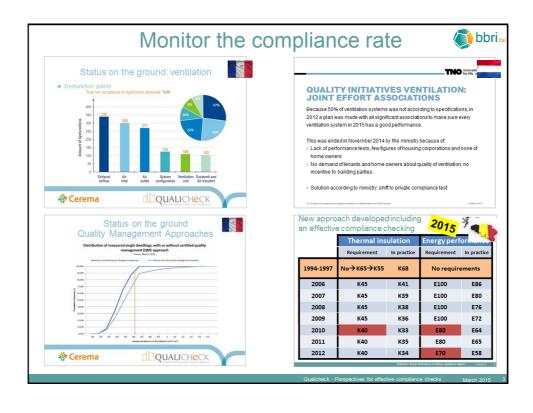


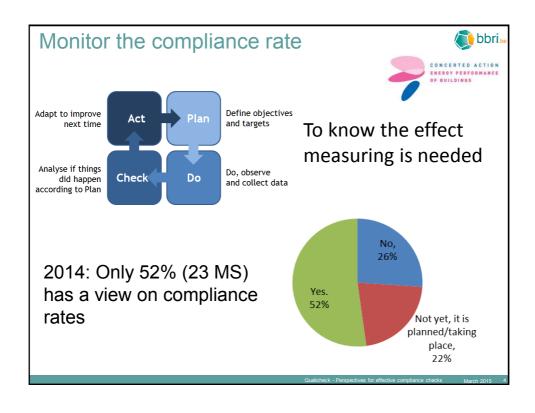
International Workshop on Ventilation and Airtightness in Buildings LUND - 17/03/2015

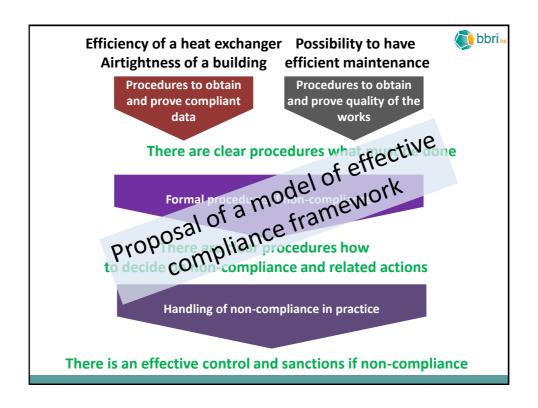
Qualicheck - Perspectives for effective compliance checks

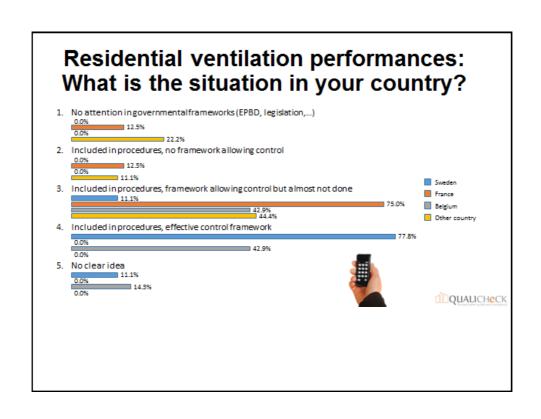
March 2015







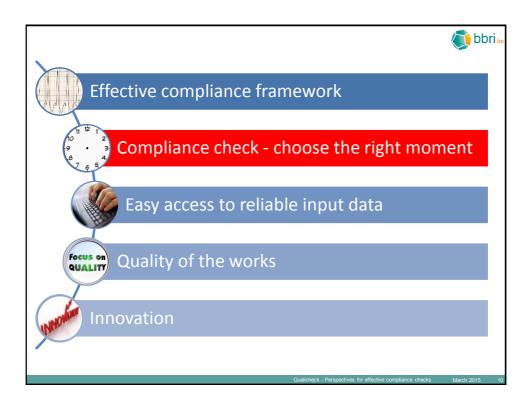


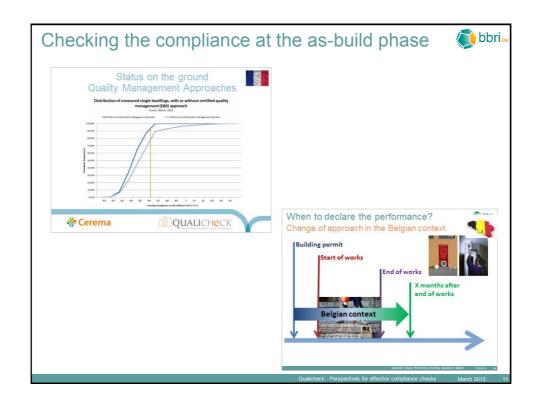


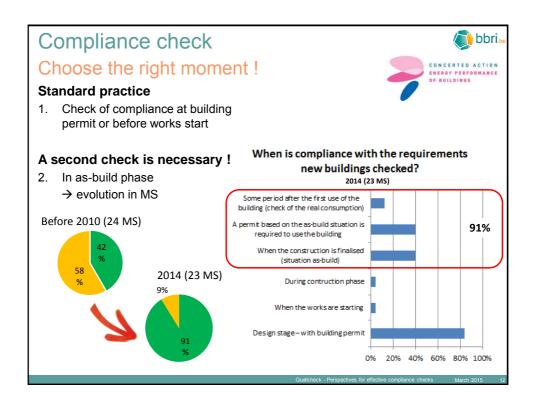
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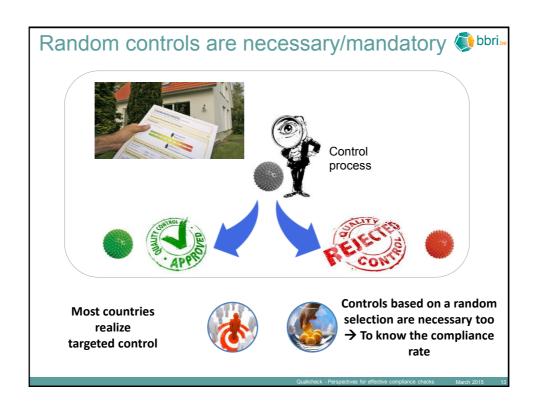


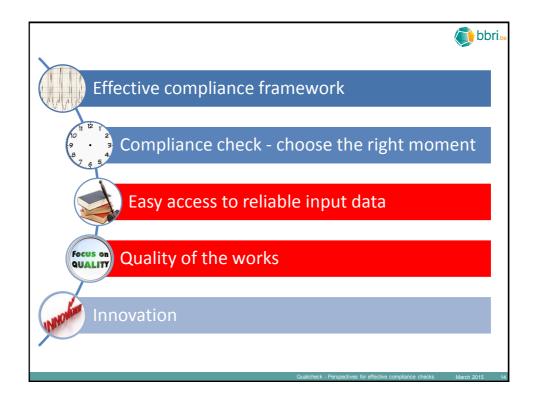


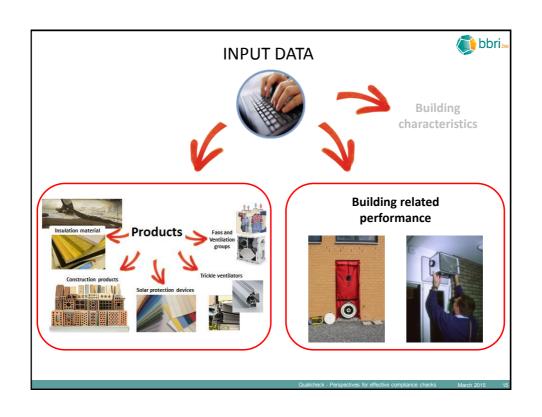


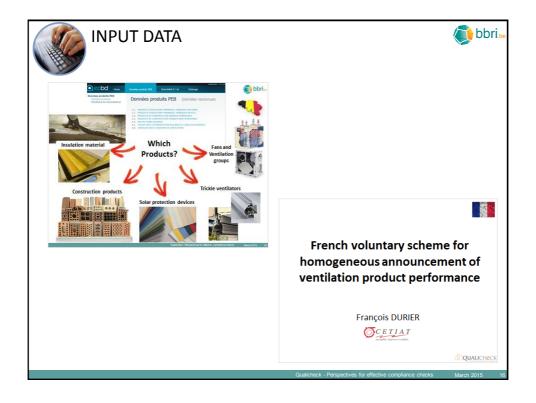


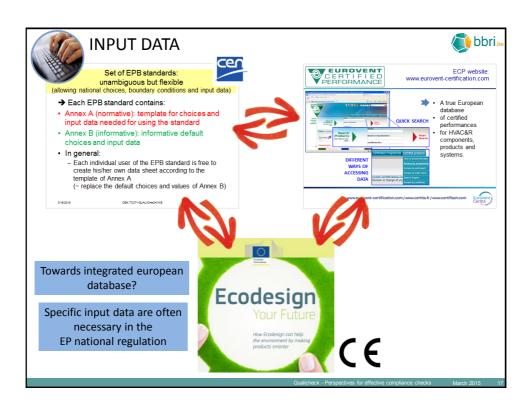


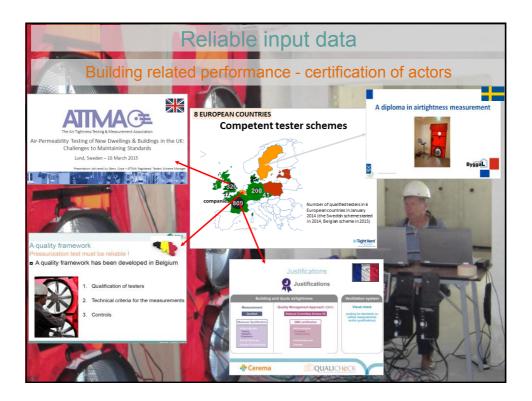


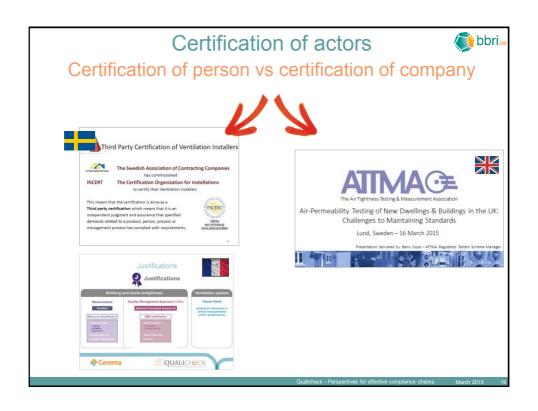


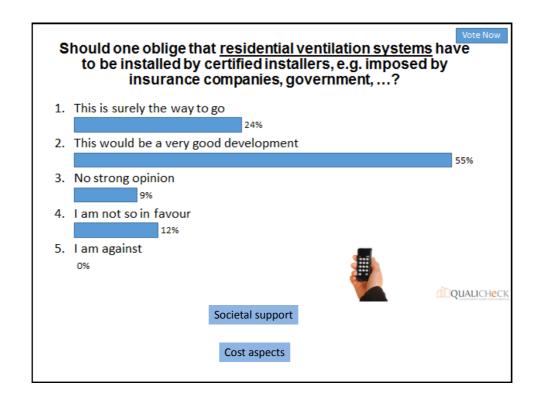




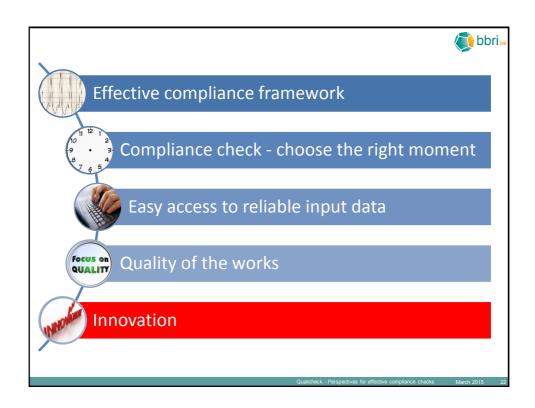
















Approaches to improve compliance and accessibility of energy performance certificate input data

François DURIER







Thank you



Xavier Loncour

BBRI
Belgian Building Research Institute
Avenue Pierre Holoffe, 21
1342 Limelette
Belgium
www.bbri.be

Future steps for QUALICHeCK.

Peter Wouters, BBRI, Belgium



International Workshop on Ventilation and Airtightness in Buildings

Voluntary and Regulatory Frameworks to Improve Quality and Compliance

Future steps for QUALICHeCK

Present <u>draft</u> outcomes of QUALICHeCK

Approaches to improve compliance and accessibility of energy perform certificate input data

- As presented by rance −

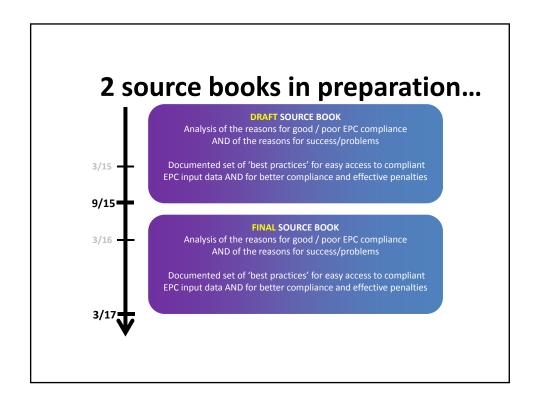
rview of ceedback is welcome over the contract o Overview of ced approaches to uality of the works

Heike Erhorn-Kluttig, IBP Fraunhofer - DE





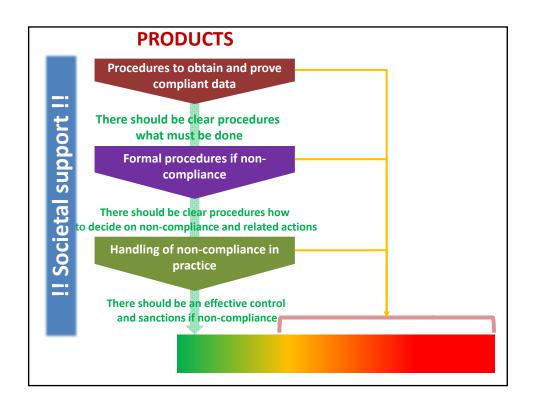
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 3. PART 3 - Practice enforcement enforcement.
 5. About Inne entation of an effective framework for better
- 6. Society compliance 7. Econo of compliance
- 8. Conclusions





Future events

- QUALICHeCK webinar April 17
 - More webinars to follow
- QUALICHeCK 2nd conference
 - Brussels September 4
- AIVC-TightVent-venticool conference
 - September 23-24 Madrid
- 2nd focused <u>workshop</u> sustainable summer comfort
 - Athens March 2016

QUALICHECK

QUALICHeCK factsheets...

- A whole range of factsheets are planned
- We have heard in these 2 days several interesting schemes which could be the basis for factsheets
 - ... we might contact you...





Thanks...

To your as participant

To the authors and presenters

To the session chairpersons

To the organising and scientific committees

To Alexander for logistic organisation

To Boverket and Chalmers





workshop 2015.03.16-17 | Elite Hotel Ideon | Lund, Sweden



International Workshop on Ventilation and Airtightness in Buildings

Voluntary and Regulatory Frameworks to Improve Quality and Compliance