TightVent Europe

BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM


# Challenges for building and ductwork airtightness in nZEB

**Peter Wouters** and **François Rémi Carrié**

INIVE EEIG

TightVent® Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

# Structure of the presentation

- Challenges for nearly-zero energy buildings
- What is TightVent Europe?
- What about ductwork airtightness?
- What about building airtightness?
- Conclusions

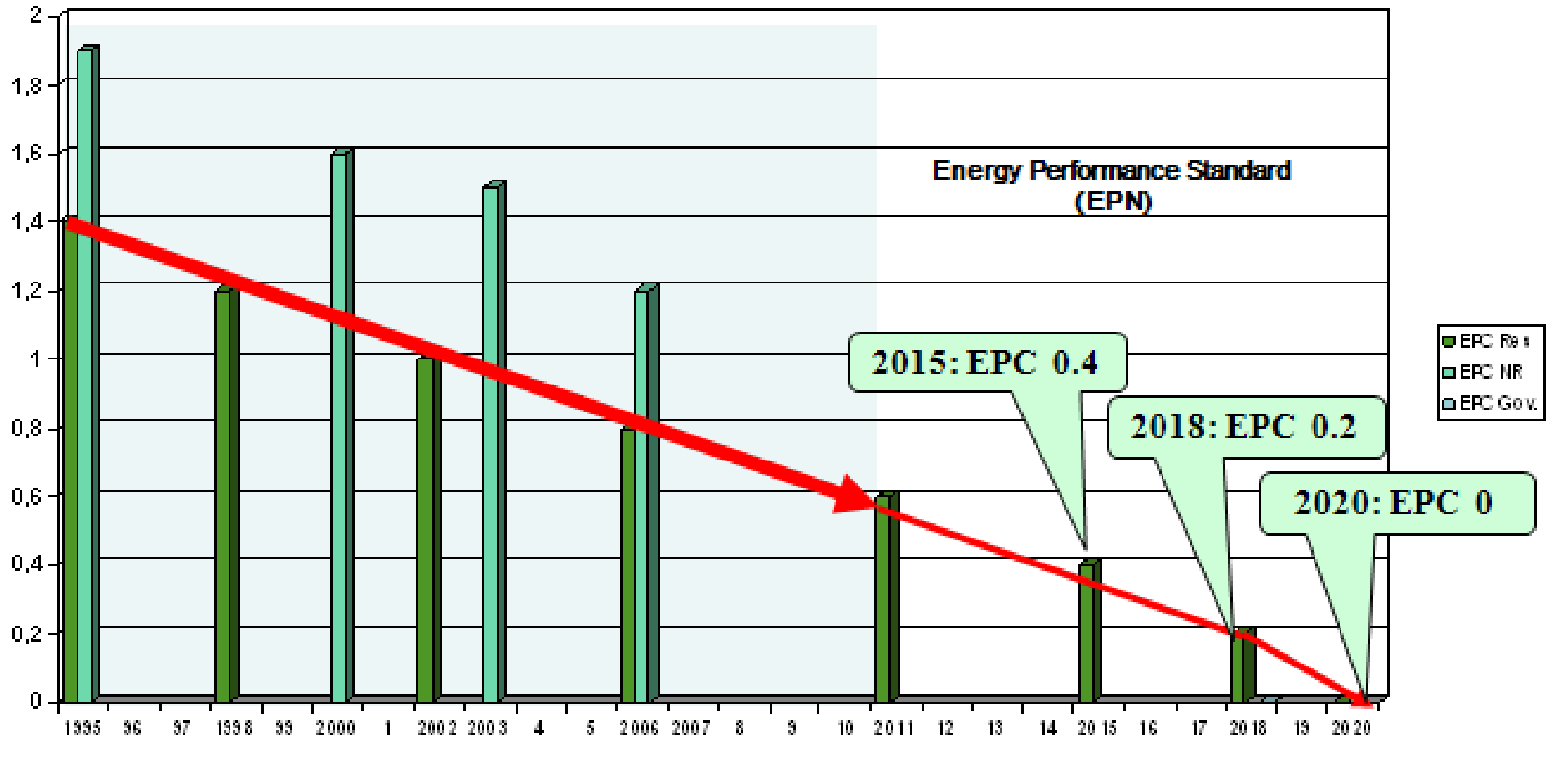
TightVent® Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

# The future

Before 2020 :
Many countries will impose
near zero energy buildings

Tight Vent Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

# Example : Netherlands



TightVent® Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

# The future

Before 2020 :
Many countries will impose near zero energy buildings

***BUILD Tight***
***VENTILATE Right***

***Building Airtightness*** *will implicitly become a mandatory point of attention*

**Energy efficient ventilation systems will become mandatory**

Tight Vent® Europe

BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

International workshop on

# "Large scale national implementation plans for building airtightness assessment : a must for 2020!"

**"We should start now to be ready in 2020"**

June 14-15 2010 in Hotel Crowne Plaza – Brussels (Belgium)

**An initiative of AIVC and INIVE**

## INTERNATIONAL WORKSHOP

## "Large scale national implementation plans for building airtightness assessment"

## Brussels, Belgium - 14-15 June 2010

### Session 1 : Welcome and context for building airtightness

1. General welcome and context of this workshop (including some data on European building market) - P. Wouters, INIVE, Belgium
2. EU IEE activities on energy efficiency in buildings - G. Sutherland, EACI project officer
3. Importance of building airtightness in overall energy efficiency strategies - R. Carrié, CETE de Lyon, France
4. Experiences from practice
   a. Experiences from the USA - M. Sherman, LBL, USA
   b. Meaning of the envelope airtightness in cold and mild climate regions under wider perspectives for energy conservation in residential buildings - T. Sawachi, BRI, Japan
   c. The change and course in airtightness levels of Dutch dwellings over the last 60 years – reasons behind and measures taken - W. de Gids, TNO, Netherlands

### Session 2 : PLANNING of airtight envelopes

1. Intro by the session chairmen
2. Importance of careful airtightness design to avoid improvised solutions on site – the Passive House approach - M. Bodem, ING + ARCH partnership, Nürnberg, Germany
3. Design, market transformation and cost considerations in Norway - P.G. Schild (SINTEF), S. Holøs (SINTEF), T. Aurlien (UMB), T-O. Relander (NTNU), Norway
4. Airtightness prediction - N. Van den Bossche (UGent) and J. Langmans (KU Leuven), Belgium
5. Importance of a correct overall performance assessment – probability assessment of performance and costs - C.-E. Hagentoft, operating Agent IEA ECBCS Annex 55, Sweden
6. Cost considerations - A. Zhivov, USACE, USA

### Session 3 : EXECUTION of airtight envelopes

1. Intro by the session chairmen
2. Overview of available technologies for building airtightness

# Lessons learned - 1

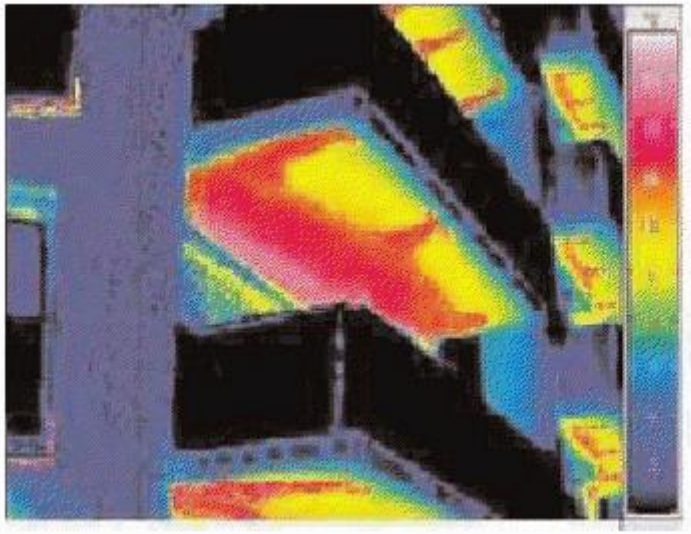
## From June 2010 workshop :

- Airtightness is an important issue for the future
- Airtightness has many aspects and involves nearly all stakeholders
- All countries must develop a strategy for large scale assessment programmes of building airtightness
- There are still several issues without a satisfactory answer

# Lessons learned - 2

## From other technological challenges

- Implementing an effective strategy requires more time than many people think
- Example : an effective legal framework for stimulating avoidance of thermal bridges



# Lessons learned - 3

## From international collaboration

*e.g. EU Concerted Action*

- Many countries are facing similar challenges
- Not evident to have 1 single approach but surely not logical to have independent developments in various countries
- Challenge is to merge subsidiarity principle with efficiency principle

TightVent Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

# Conclusions from “lessons learned”

- It seems very useful to have international collaboration on the topic of building and ductwork airtightness
- The European countries have a common challenge which justifies a common platform
- Important to have a platform in which all stakeholders can participate

➔ *Launch of TightVent Europe*

TightVent Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

# Website


**www.tightvent.eu**

TightVent Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

# Objectives in starting up phase?

1. • Awareness raising about the importance
2. • Awareness raising about the existing approaches
3. • Identifying a long term action plan

TightVent® Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

# Airtightness strategy...

TightVent Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

# Funding partners







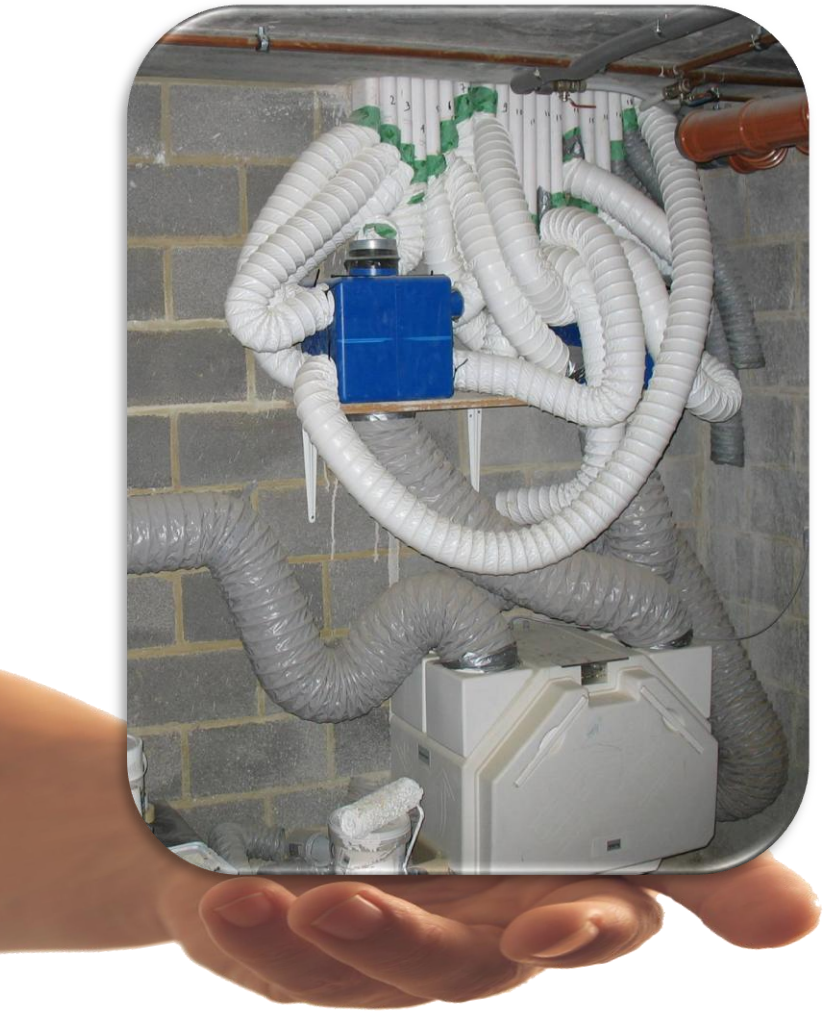

TightVent® Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

# Activities

- Publications
- Conferences
- Webinars
- Newsletter
- BUILD UP community on airtightness
- Website
- …

Tight Vent® Europe

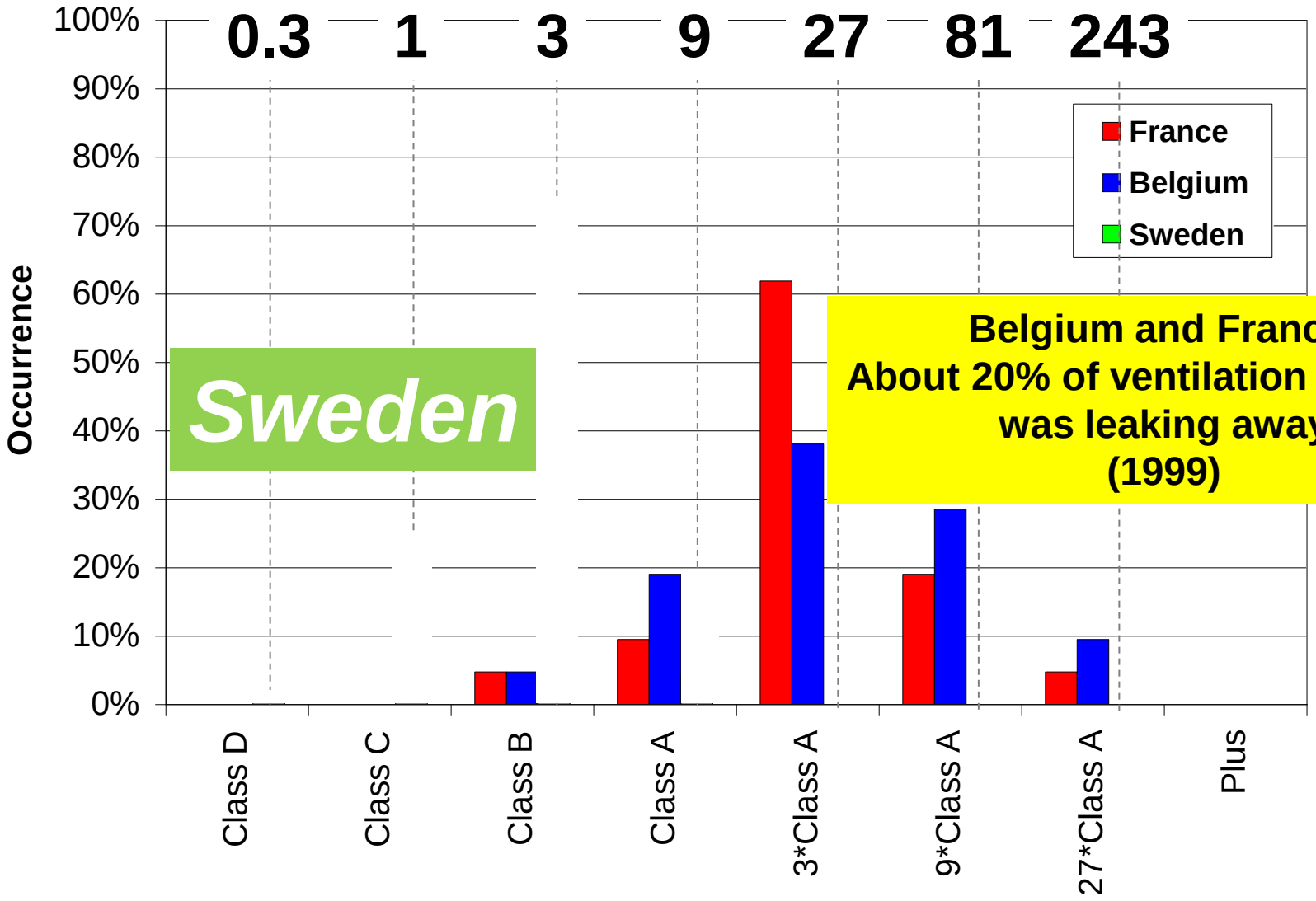
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM



# Ductwork Airtightness

TightVent Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

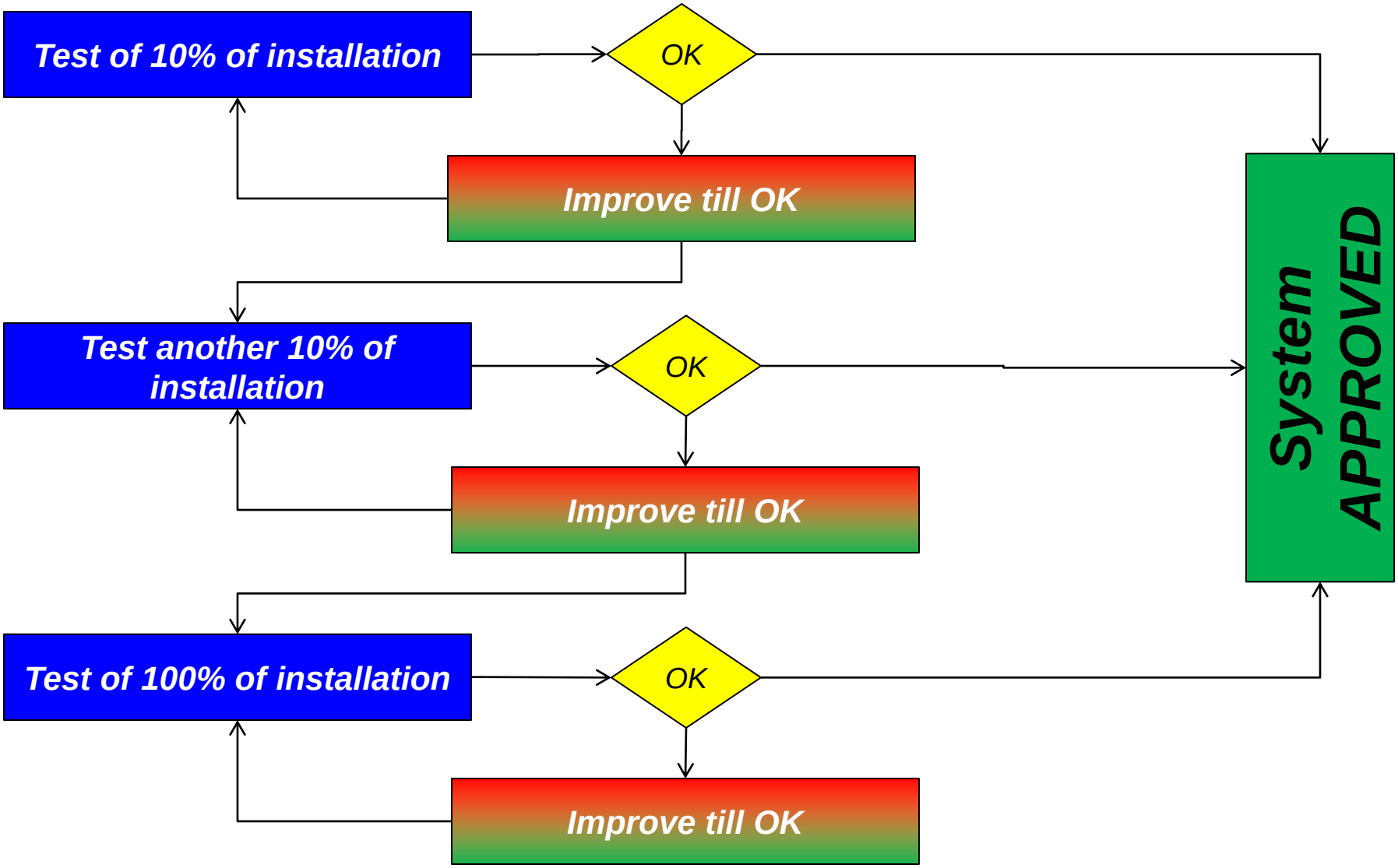
# What about ductwork airtightness ?




*Duct leakage data from the SAVE-DUCT project (Carrié and collaborators, 1999). 21 systems tested in Belgium, 21 in France, 69 in Sweden.*

TightVent® Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

# Ductwork in Sweden



# Control of performances!

***Assessment by a civil servant***

**Government**


Tight Vent Europe

BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

# Control of performances!

**Government**

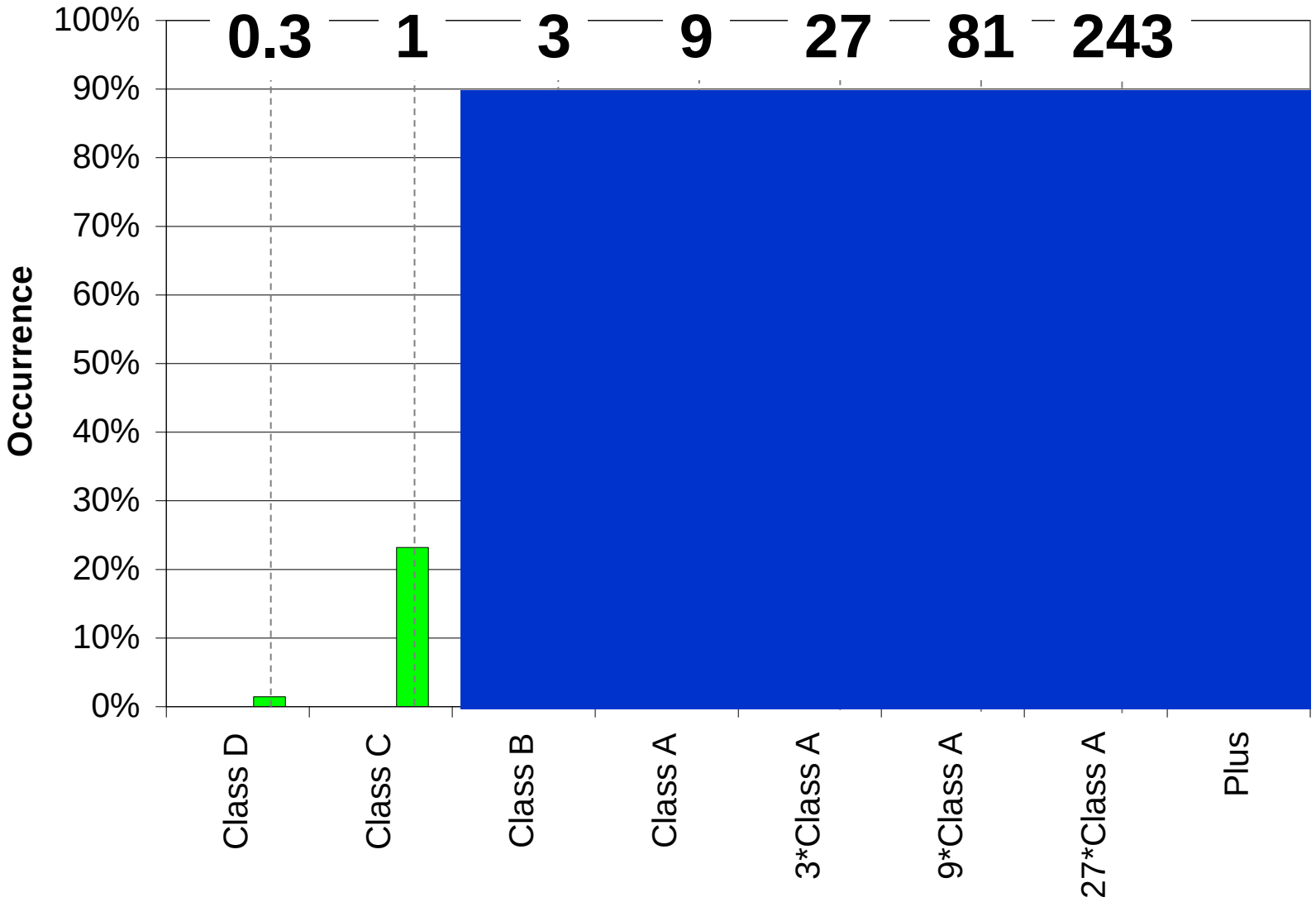
**Accredited organisation(s)**

***Certified building contractor***

***Random checks***

TightVent Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

# Ductwork in Sweden…




*Duct leakage data from the SAVE-DUCT project (Carrié and collaborators, 1999). 21 systems tested in Belgium, 21 in France, 69 in Sweden.*

Tight Vent® Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

# Impact on market…


TightVent® Europe

BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

1. Becoming aware

2. Courses, training

3. Select the good concept

4. Buy and install

5. Assess the remaining leakage


GILBERT

TightVent® Europe

BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

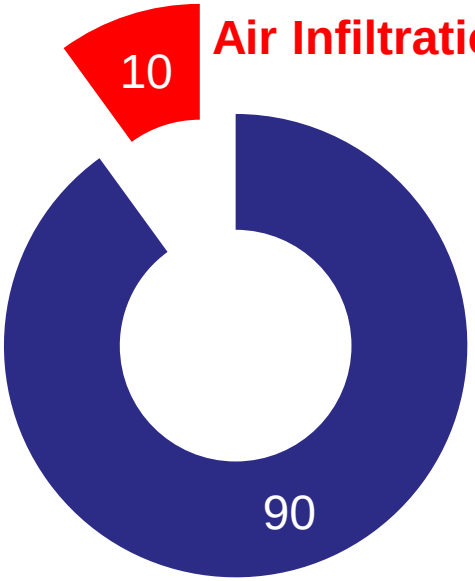
Tight Vent® Europe

BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

# Building Airtightness

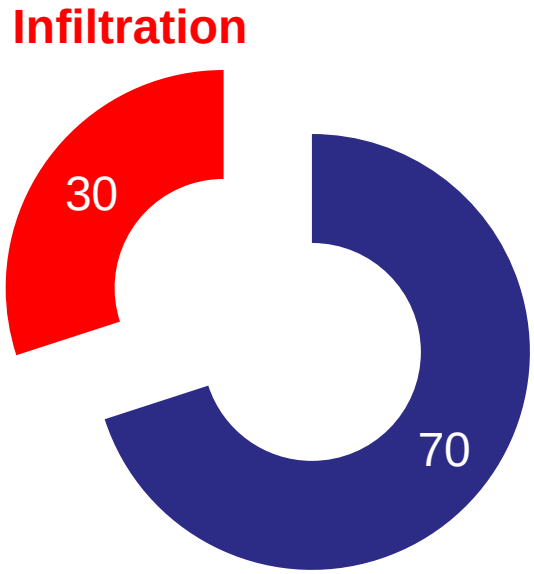
# Importance of building airtightness?

## 2006 legislation




“All the rest”

## Nearly-zero building




“All the rest”

**Example : Flemish legislation – typical dwelling – no assessment of airtightness**

TightVent® Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

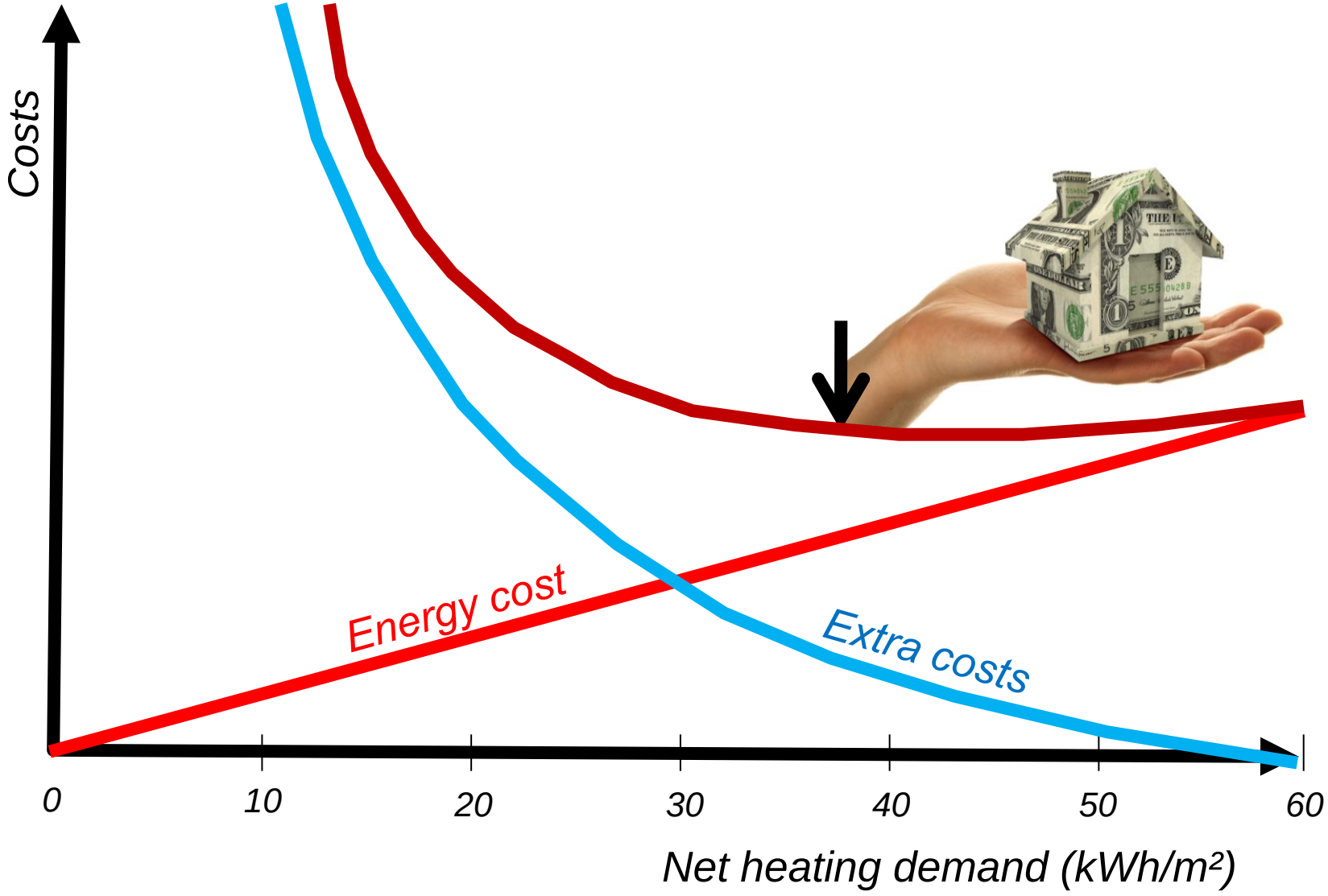
# Requirements regarding airtightness?

- **The future?**
  - **No doubt! In most climates will it be necessary to build "very airtight"!**
- **Should it be as tight as possible?**
  - **E.g. $n_{50} \leq 0.6\ h^{-1}$?**
- **Answer depends on the context…**
  - **Within a passive house context (voluntary context)…**

    It might be the appropriate level for required airtightness

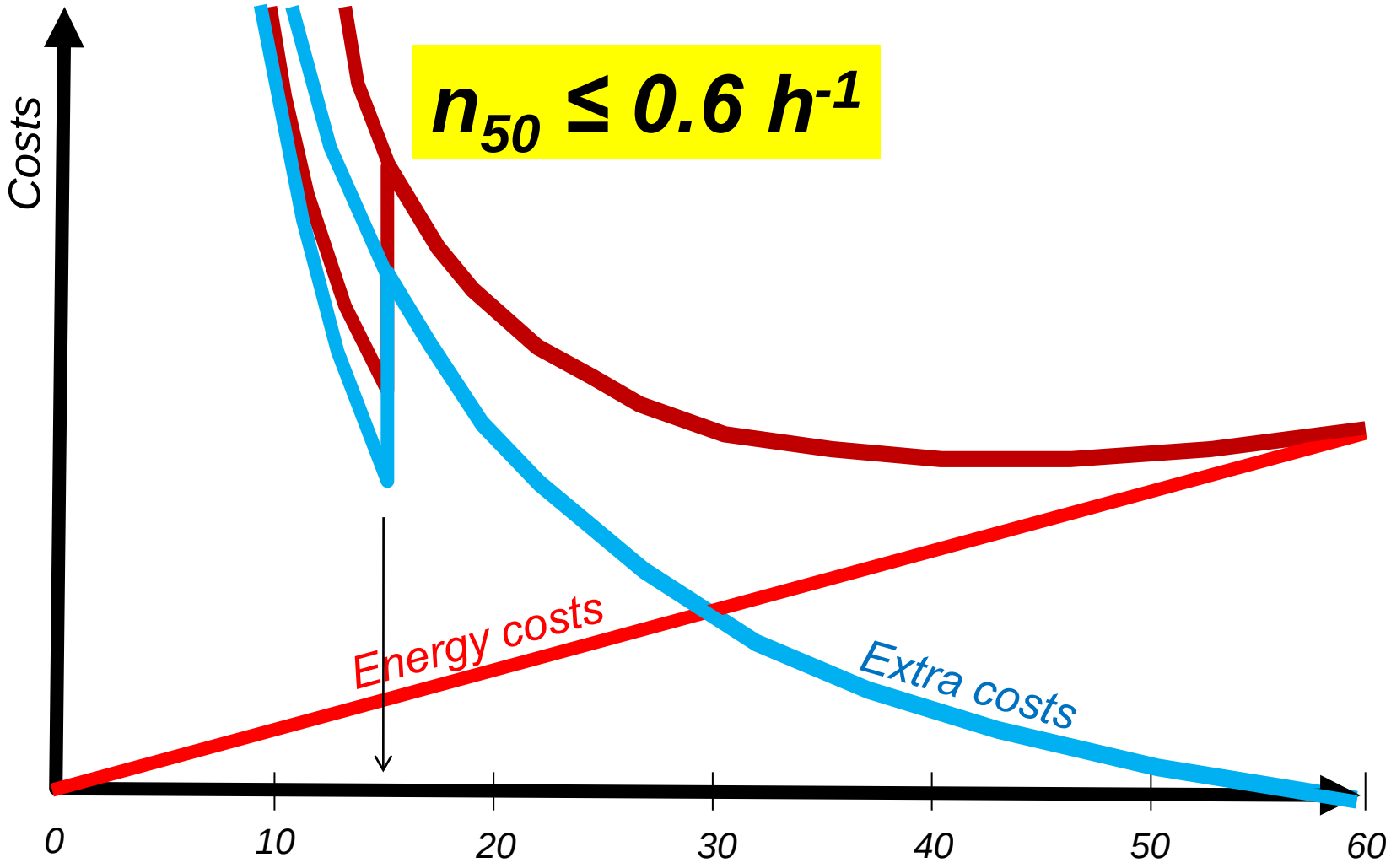
Tight Vent Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

# Cost optimal approach…



TightVent® Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

# Passive house approach…




**≤ 15 kWh/m²**


*This disc area is about*

*55 cm².*

*It corresponds to the requirement for a*

*PassivHaus*


**Dwelling of 275 m³**

*Areas at 4 Pa assuming a discharge coefficient of 0.6*

# Requirements?

- **The future?**
  - **No doubt! In most climates will it be necessary to build "very airtight"!**
- **Should it be as tight as possible?**
  - **E.g. $n_{50} \leq 0.6\ h^{-1}$?**
- **Answer depends on the context…**
  - **Within a passive house context (voluntary context)…**
    - It might be the appropriate level for required airtightness
  - **As a general requirement…**

    → **Various concerns…**
    - Cost-optimality concerns
    - Concerns about impact of organisation of building market
    - Concerns about liability issues

TightVent® Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

# $n_{50} \leq 0.6\ h^{-1}$ Some concerns...

- **Cost-optimallity concerns**
  - This level of airtightness requires a integrated approach from design to control
  - Might be difficult with some buildi… methods
- **Concerns about i… ganisation of building ma…**
  - In … eparated contracts (brickwork, windows, roof, …) whereby not evident to associate the airtightness …ment cannot to one contractor
  - Change is needed if clear evidence, but is there enough evidence?
- **Liability concerns**
  - Who is responsible in case of non-compliance?

**Workshop and publication**
**Philosophy for building airtightness requirements**

TightVent Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

# Philosophy for building airtightness requirements

- July: First draft
- September: First review process
- October: Brussels workshop
- January 2011: Public review process
- April 2011: Publication

TightVent® Europe

BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

# Airtightness:
# not for 1 year but for 50 years…


Expensive! Why not use ordinary tape?

TightVent Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

# Execution of the works is crucial!

INTELLIGENT ENERGY EUROPE

## BUILD UP Skills

The EU Sustainable Building Workforce Initiative

Pillar I

**National Qualification Platforms and Roadmaps**

subject of Call 2011

Pillar II

**Qualification and Training Schemes**

subject of later Calls (2012+)

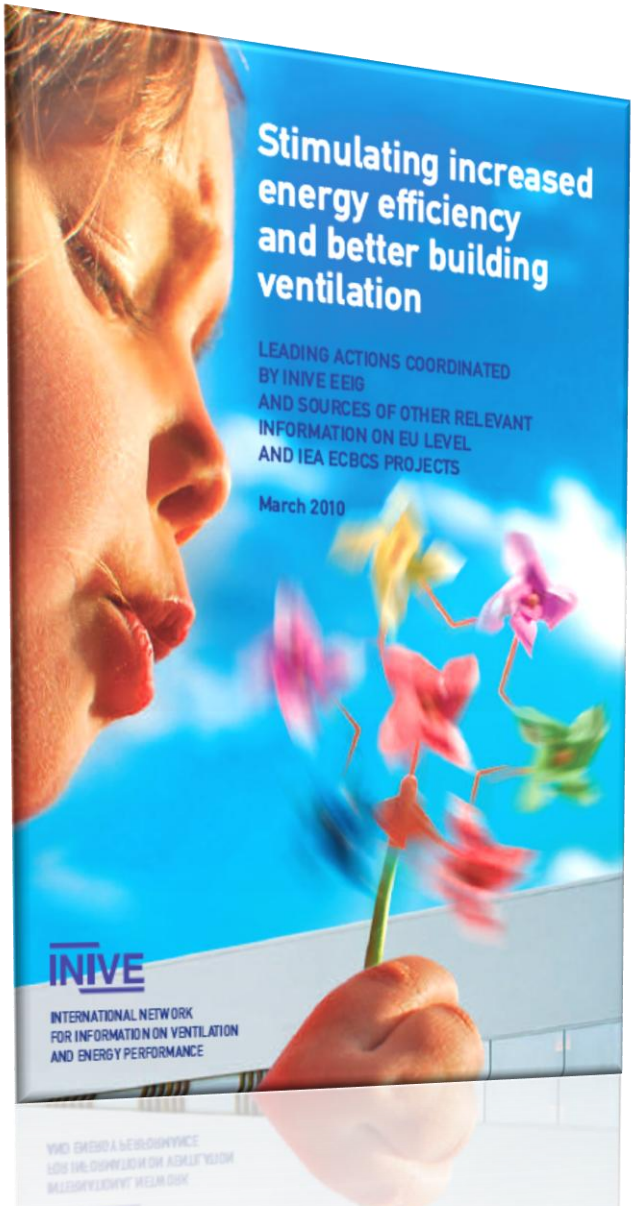
**Targeted European Exchange Activities**

organised by EACI

Tight Vent Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

# Publication

- Published in June 2010
- Includes most reports of the EU ASIEPI project
- There is a whole section on airtightness issues
- Can be downloaded on e.g.:
  - www.inive.org



CONCERTED ACTION
ENERGY PERFORMANCE
OF BUILDINGS

# Implementing the Energy Performance of Buildings Directive (EPBD)

FEATURING COUNTRY REPORTS 2010

www.epbd-ca.eu

Implementing the Energy Performance of Buildings Directive (EPBD)
FEATURING COUNTRY REPORTS
2010

BUILD UP
energy solutions
for better buildings

Register | Login | About

Search | English (en)

Home | News | Events | Publications | Links | Cases | Tools | People

Blogs | Communities

# The European portal for energy efficiency in buildings

I am a BUILDING PROFESSIONAL

I work for a PUBLIC AUTHORITY

I am a BUILDING OWNER or a TENANT

**Discover in *BUILD UP*:**

- Latest news on national and international levels
- Resources on the European legislation in the field, as well as technical publications and links to pertinent networks...
- Upcoming events in your country and Europe...

Learn more

HIGHLIGHTED CASE

## Cool Roofs in Europe - Initiatives and Examples

Five case studies were implemented, within the framework of the Cool Roofs project, to demonstrate cool roof capabilities in real buildings, in terms of improving the thermal conditions in non-air ...

Günther Oettinger
EU Commissioner for Energy

Welcome to BUILD UP, the European web portal for energy efficiency in buildings. As you know, buildings account for 40 % of Europe's energy use and a third of its greenhouse gas emissions. If we want to transform our society into an energy efficient and decarbonised one, energy-intelligent buildings will play a vital role. Therefore I appreciate a lot this platform where policy makers, building professionals and building occupants can get together. I would like to encourage all of you to share your valuable knowledge on how to reduce energy consumption in

# Building Airtightness Platform Europe

+ Join this community

Energy efficient buildings and in particular near zero energy buildings require a specific attention to building airtightness. This platform aims to be the central European information point on all aspects related to Building Airtightness.

▶ Display all description

Facilitators:

Clarisse Mees | Bernd Rosenthal | Peter Wouters | Remi Carrie | Wil de Gids | Wouter Borsboom



## Latest Blog Posts 7 Blog Post(s)

VIEW ALL

Bernd

9 March 2011 | 0 replies | 395 visits

### TightVent and other European initiatives presented at BUILDAIR-Symposium May 2011 in Berlin

For the future default - the nearly-zero-energy building - detailed knowledge in planning, execution and quality assurance is necessary through Blower-Door testing and thermography.

Tight Vent Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

AIVC

**Brussels, Belgium**
**Hotel Crowne Plaza Brussels**
**12–13 October 2011**

**Joint Conference**
**32nd AIVC Conference and 1st TightVent Conference**

# Towards Optimal Airtightness Performance

**In cooperation with :**

International BUILDAIR Symposium

REHVA

TightVent® Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

# Brussels Conference

| Wednesday October 12 2011 | | |
|---|---|---|
| Time | Programme | |
| 08:00-18:00 | Registration | |
| 09:15-10:45 | Opening session | |
| 10:45-11:15 | Break | |
| 11:15-12:45 | Combined session | |
| 12:45-13:45 | Lunch break | |
| 13:45-15:15 | Long oral presentation session | Topical session |
| 15:15-16:45 | Short oral presentations session & Coffee Break | |
| 16:45-18:15 | Topical session | Long oral presentation session |

## Wednesday October 12 2011, evening

Walking dinner

| Thursday October 13 2011 | | |
|---|---|---|
| Time | Programme | |
| 09:00-10:30 | Topical session | Long oral presentation session |
| 10:30-10:50 | Coffee Break | |
| 10:50-11:50 | Workshop discussion | Topical session |
| 11:50-12:00 | Break | |
| 12:00-13:00 | Workshop discussion | Session |
| 13:00-14:00 | Lunch break | |
| 14:00-15:30 | Topical session | Topical session |
| 15:30-15:50 | Break | |
| 15.50-17:00 | Closing session | |

Tight Vent® Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

# Brussels conference: Airtightness related workshops

1. Setting up of a quality framework for airtightness assessment

2. Development and application of air leakage databases

3. Philosophy for building airtightness requirements

4. How tight and insulated ducts should be?

TightVent® Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

# Conclusions

- Building and ductwork airtightness is one of the key challenges for the future
- TightVent Europe has the ambition to be the meeting place for airtightness issues in close collaboration with all relevant initiatives
- In particular building airtightness is a complex issue since it involves nearly all stakeholders and complex liability and cost issues
- An ingelligent and pragmatic framework for compliance is CRUCIAL!

Tight Vent® Europe

BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM