

Presentation of IEA EBC Annex 62 Ventilative cooling

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Functions of building ventilation

- To provide fresh air for occupants – maintaining life
- To dilute and exhaust pollutants – maintaining indoor air quality for health
- **To provide cooling – maintaining thermal comfort – ‘ventilative cooling’**
- Also to protect the building against moisture – maintaining building structure

Each function requires different air flow rates, air flow distribution and control.

Why ventilative cooling?

10 April 2019

Overheating in buildings is emerging as a challenge both at the design stage and during operation. This is due to a number of reasons:

- high performance standards to reduce heating demand by high insulation levels;
- restriction of infiltration in heating dominated climatic regions;
- the occurrence of higher external temperatures during the cooling season due to changing climate and urban climate not usually considered at design stage;
- changes in internal heat gains during operation not factored in the design.

Such factors have resulted in significant deviations in energy use during operation which is usually termed the energy 'performance gap'. In most energy performance comparative studies, energy use is higher than predictions and post-occupancy studies frequently report overheating problems.

Ventilative cooling can be a solution.

IEA EBC research project Annex 62: Ventilative Cooling

- Duration 2012-2017 <http://venticool.eu/annex-62-home/>
- OA: Per Heiselberg <http://www.iea-ebc.org/projects/ongoing-projects/>

Structure

- Subtask A: Methods and Tools
- Subtask B: Solutions
- Subtask C: Case Studies

Outcomes

- Guidelines for energy-efficient reduction of the risk of overheating by ventilative cooling
- Guidelines for ventilative cooling design and operation in buildings
- Recommendation for integration of ventilative cooling in legislation, standards, design briefs as well as on energy performance calculation and verification methods
- New ventilative cooling solutions including their control strategies as well as improvement of capacity of existing systems
- Documented performance of ventilative cooling systems in case studies

Annex Leadership

Participating countries: 15: Australia, Austria, Belgium, China, Denmark, Finland, Ireland, Italy, Japan, Netherlands, Norway, Portugal, Switzerland, UK, USA

Operating Agent: Denmark, represented by Per Heiselberg, Aalborg University

Subtask A:

Leader: Switzerland, represented by Fountzos Flourentzou, ESTIA

Co-leader: Italy, represented by Annamaria Belleri, EURAC

Subtask B:

Leader: Austria, represented by Peter Holzer, IBRI

Co-leader: Denmark, represented by Theofanis Psomas, AAU

Subtask C:

Leader: China, represented by Guoqiang Zhang, Hunan University

Co-leader: Ireland, represented by Paul O'Sullivan, CIT



Annex 62 Expert meeting – September 2014
In front of Brunel's statue at Brunel University



8th Annex 62 Expert meeting, Gent, Belgium,
October 24-25, 2017

Annex Deliverables

10 April 2019

<http://venticool.eu/annex-62-home/>

The screenshot shows the homepage of the venticool website. At the top left, there are social media icons for Twitter, LinkedIn, YouTube, and Pinterest. The main header features the 'venticool' logo with the tagline 'the international platform for ventilative cooling' and a background image of modern buildings. To the right, there is a logo for 'IEA EBC Annex 62' with the text 'The IEA project on ventilative cooling' and the EBC logo. Below the header, there are two navigation bars: 'INFORMATION ON VENTICOOL' and 'INFORMATION ON EBC ANNEX 62'. The main content area is divided into two columns. The left column has a 'Deliverables' section with a sub-section for 'Annex 62 deliverables' which lists six publications. The right column has a search bar and a 'Recent updates' section with two news items. A blue oval highlights the 'Annex 62 deliverables' list.

[Twitter](#) [LinkedIn](#) [YouTube](#) [Pinterest](#)

venticool
the international platform for ventilative cooling

IEA EBC
Annex 62
The IEA project
on ventilative cooling

EBC

INFORMATION ON VENTICOOL | **INFORMATION ON EBC ANNEX 62**

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Deliverables

Annex 62 deliverables include the following publications:

- Ventilative Cooling. State-of-The-Art Review
- Status and recommendations for better implementation of ventilative cooling in standards, legislation and compliance tools
- Ventilative cooling source book
- Ventilative cooling case studies
- Ventilative cooling design guide
- Ventilative Cooling potential tool – User guide (Version 1.0)

The **ventilative cooling potential tool** (VC tool) aims to assess the potential effectiveness of ventilative cooling strategies by taking into account climate conditions, building envelope thermal properties, occupancy patterns, internal gains and ventilation needs. The tool is freely accessible

Search Site

Recent updates

- Final Preparation Meeting of IEA EBC Annex 80: Resilient Cooling for Residential and Small Non-Residential Building, 12-13 April, 2019, Dubai
- SAVE THE DATE! "Technical day: Activities of IEA TCP on Energy in Buildings and Communities (EBC TCP)" – 11 June 2019, Brussels

Deliverables

Annex 62 deliverables include the following publications:

- [Ventilative Cooling: State-of-The-Art Review](#)
- [Status and recommendations for better implementation of ventilative cooling in standards, legislation and compliance tools](#)
- [Ventilative cooling source book](#)
- [Ventilative cooling case studies](#)
- [Ventilative cooling design guide](#)
- [Ventilative Cooling potential tool – User guide \(Version 1.0\)](#)

The **ventilative cooling potential tool** (VC tool) aims to assess the potential effectiveness of ventilative cooling strategies by taking into account climate conditions, building envelope thermal properties, occupancy patterns, internal gains and ventilation needs. The tool is freely accessible [here](#) including the [user guide](#) and examples ([Example 1 – Copenhagen](#), [Example 2 – Madrid](#)) to guide you through its use.

The research results are published in peer-reviewed journals and conference proceedings. Information on **published articles** is available [here](#).

The **Ventilative Cooling Application Database** containing buildings which make use of ventilative cooling from several countries contributing to the Annex 62 can be found [here](#).

The **venticool newsletter**, produced in collaboration with IEA EBC Annex 62 can be downloaded [here](#).



Recent updates

- [Final Preparation Meeting of IEA EBC Annex 80: Resilient Cooling for Residential and Small Non-Residential Building, 12-13 April, 2019, Dubai](#)
- [SAVE THE DATE! "Technical day: Activities of IEA TCP on Energy in Buildings and Communities \(EBC TCP\)" – 11 June 2019, Brussels](#)
- [AIVC symposium "Quality ventilation is the key to achieving low energy healthy buildings" – 27 & 28 March 2019, Dublin](#)
- [Energy Efficiency and Indoor Climate in Buildings is out! Edition of January 2019](#)
- [AIVC 2019 Conference – Call for Abstracts](#)
- [venticool newsletter issue #13 – December 2018 now available](#)
- [Feedback from the AIVC](#)

State-of-the-art Report: SOTAR 2015

Some Highlights

10 April 2019

Potential: The ventilative cooling potential is favourable in most European countries, especially during night. The possible cooling energy savings is at a level of 30-50% in office buildings and lower in the residential sector.

Available Tools: Design and analysis of ventilative cooling requires combined modelling of air flow and building thermal performance and at different level of detail in each design phase. Designers need clearer guidance regarding the uncertainty in ventilative cooling performance predictions and ways to improve the reliability and robustness

Regulations: It is complex to include ventilative cooling requirements in regulations as it includes aspects related both to ventilation, energy, building construction and comfort. Energy performance calculations in many countries do not explicitly consider ventilative cooling and most available tools used for energy performance calculations are not well suited to model the impact.



Ventilative Cooling

STATE-OF-THE-ART REVIEW

Edited by

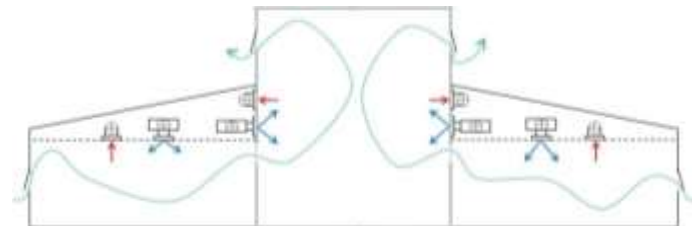
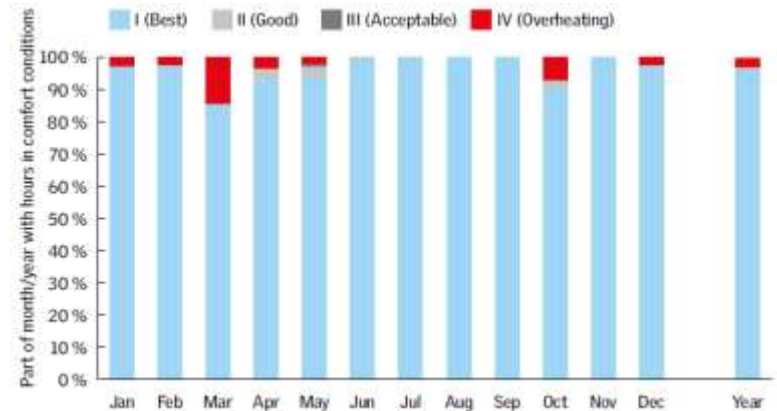
Maria Kokotoni and Per Heiselberg

IEA – EBC Programme – Annex 62 Ventilative Cooling

State-of-the-art Report: SOTAR 2015

10 April 2019

Existing examples: A large number of building using ventilative cooling have already been built around the world. 26 existing buildings were studied and presented.



Design Guide



International Energy Agency International Step
Ventilative Cooling Design Guide

Energy in Buildings and Communities Programme
March 2018



EBC is a programme of the International Energy Agency (IEA)



Design Guide

Principles (including type of components and system integration)

Key Performance Indicators (energy and thermal comfort)

Design Process

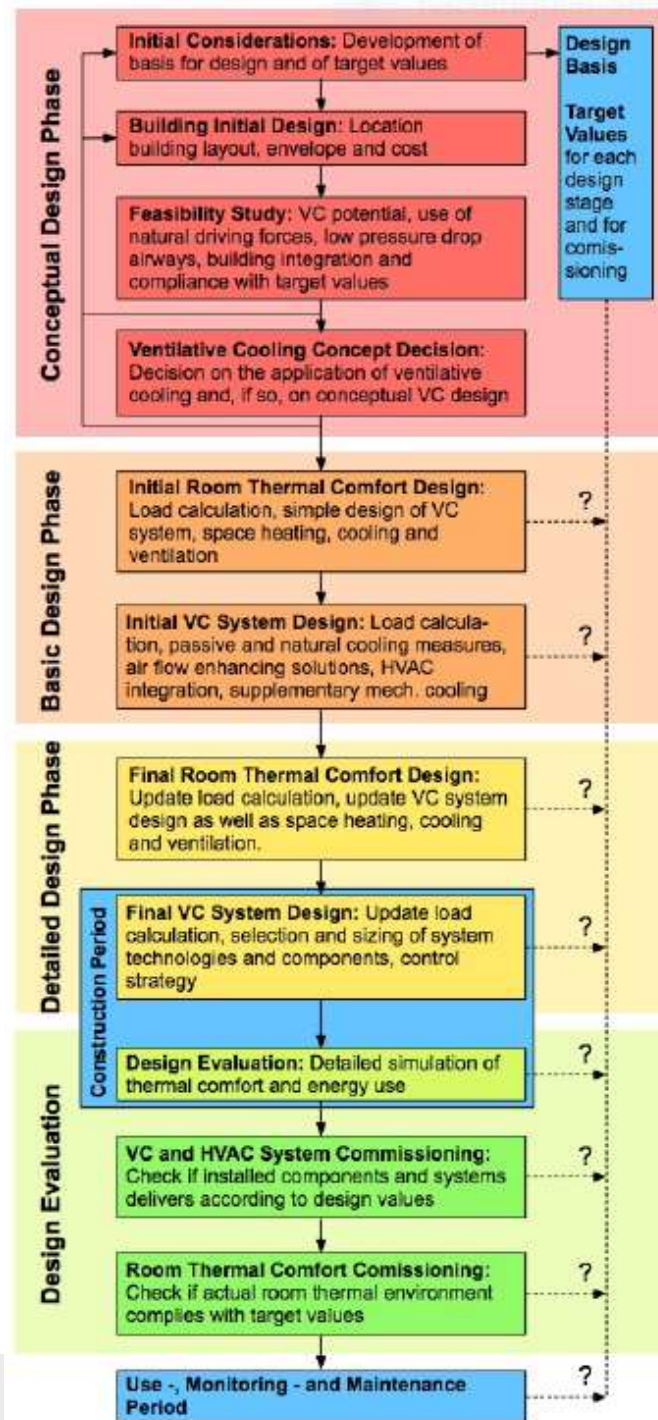
Ventilative Cooling Potential

Design Calculations

Performance evaluation

Control strategies

Case Studies



Key Performance Indicators for Ventilative Cooling were formulated for

1. Thermal comfort : The thermal comfort indicator is based on EN 15251:2007 for long-term evaluation of general thermal comfort conditions, where the combination of the “Percentage Outside the Range Index” (method A) and the “Degree-hours Criterion” (method B) enable the evaluation of both frequency and severity of overheating and overcooling occurrences. The reference comfort temperature can be derived from the Fanger model, the adaptive comfort model or briefed by the building owner/occupants.
2. For energy, two new indicators were developed;
 - (a) the Specific Primary Energy Consumption of a ventilative cooling system, to express the primary energy consumed by the ventilative cooling system per heated floor area and
 - (b) the Cooling Requirements Reduction (CRR), to express the percentage of reduction of the cooling demand of a scenario in respect to the cooling demand of the reference scenario.
3. For components efficiency two indicators were developed;
 - a) Ventilative Cooling Seasonal Energy Efficiency Ratio (SEER_{vc}) of the ventilative cooling system expresses the energy efficiency of the whole system. The SEER rating of a system is the reduction in cooling demand during a typical cooling season divided by the electrical consumption of the ventilative cooling system, in case ventilation rates are provided mechanically and
 - b) the ventilative cooling advantage [-] (ADVVC) indicator defines the benefit of the ventilative cooling in case ventilation rates are provided mechanically, i.e. the difference cooling energy use divided by the energy use for ventilation.

IEA EBC Annex 62 – Ventilative cooling Design Guide http://www.iea-ebc.org/Data/publications/EBC_Annex_62_Design_Guide.pdf

Ventilative cooling potential tool

Example of an office in Dublin

10 April 2019



Ventilative cooling potential analysis

Developed within the IEA - EBC Annex 62 - "Ventilative cooling"

Created by: Eurac Research (co-funded by Stiftung Südtiroler Sparkasse), supported by Politecnico di Torino for evaporative cooling potential evaluation (co-funded by RTDgrant 59_ATEN_RSG16CHG) V1.0

Location

City	Dublin
Country	Ireland
Latitude	53.35 °
Longitude	6.26 °
Time zone (respect GMT)	0 hr

Building data

Building type	Office building
Ceiling to floor height	H 3.00 m
Envelope area	A 268 m ²
Floor area	S 80 m ²
Fenestration area	W 50 m ²
Comfort requirement	category II

Room volume V 240 m³

Fenestration area orientation S 90 ° Inclination

Technical specifications

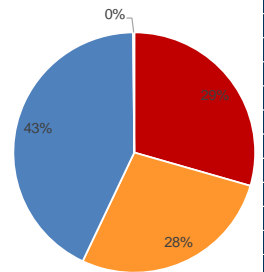
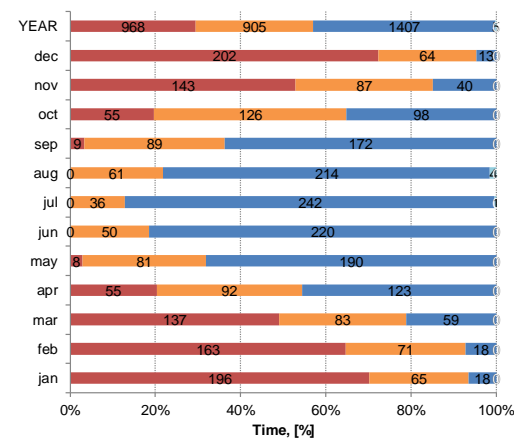
U-value of the opaque envelope	U _o 0.27 W/m ² K
U-value of the fenestration	U _w 1.12 W/m ² K
g value of the glazing system	g 0.3 -
Shading control setpoint	Shd 40 W/m ²
Min. required ventilation rates	r _{min} 0.507 l/s-m ²

Avg. envelope U-value U_{avg} 0.43 W/m²K

r_{min} 0.6083 1/h

Lighting power density	Q _{light} 10.00 W/m ²
Electric equipment power density	Q _{el,equip} 5.00 W/m ²
Occupancy density	Q _{people} 10 m ² /pers

Avg. total internal gains Q_{int} 16 W/m²



Required airflow rates in VC mode [2]

average 3.08 ± st. dev. 1.09 ach

- VC mode [0]: ventilative cooling not required
- VC mode [1]: potential comfort hrs by direct ventilative cooling with minimum airflow rates
- VC mode [2]: potential comfort hrs by direct ventilative cooling with increased airflow rates
- VC mode [3]: potential comfort hrs with evaporative cooling
- VC mode [4]: residual discomfort hrs



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V1.0

Location

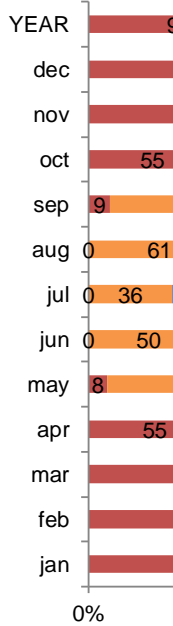
City	Dublin	
Country	Ireland	
Latitude	53.35	°
Longitude	6.26	°
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Building type	Office building	
Ceiling to floor height	H	3.00 m
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Floor area	S	80 m ²
Fenestration area	W	50 m ²
Comfort requirement	category II	
Room volume	V	240 m ³
Fenestration area orientation	90°	Inclination

Technical specifications

U-value of the opaque envelope	U _o	0.27	W/m ² K
U-value of the fenestration	U _w	1.12	W/m ² K
g value of the glazing system	g	0.3	-
Shading control setpoint	Shd	40	W/m ²
Min. required ventilation rates	\dot{m}_{min}	0.507	l/s-m ²
Lighting power density	Q _{light}	10.00	W/m ²
Electric equipment power density	Q _{el, equip}	5.00	W/m ²
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Avg. envelope U-value	U _{avg}	0.43	W/m ² K
Min. required ventilation rates	\dot{m}_{min}	0.6083	1/h
Avg. total internal gains	Q _{int}	16	W/m ²



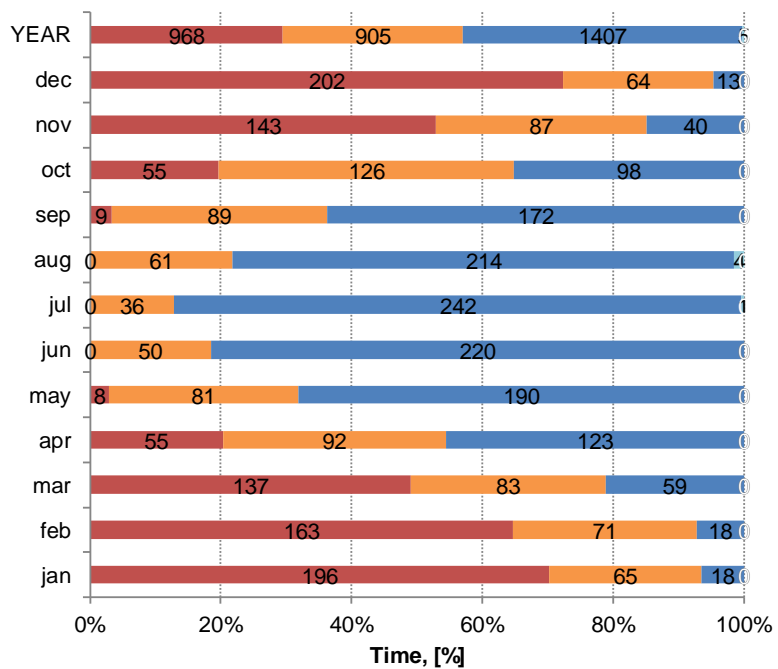
Volume $V = 240 \text{ m}^3$

90° Inclination

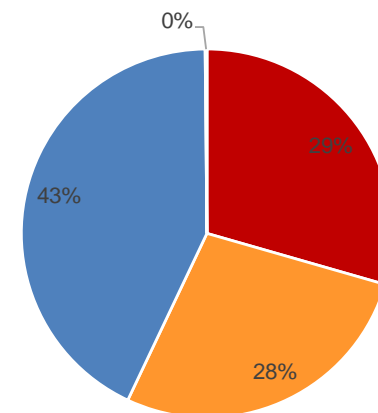
Average $U_{\text{avg}} = 0.43 \text{ W/m}^2\text{K}$

Minimum $\dot{m}_{\text{min}} = 0.6083 \text{ 1/h}$

Maximum $Q_{\text{int}} = 16 \text{ W/m}^2$

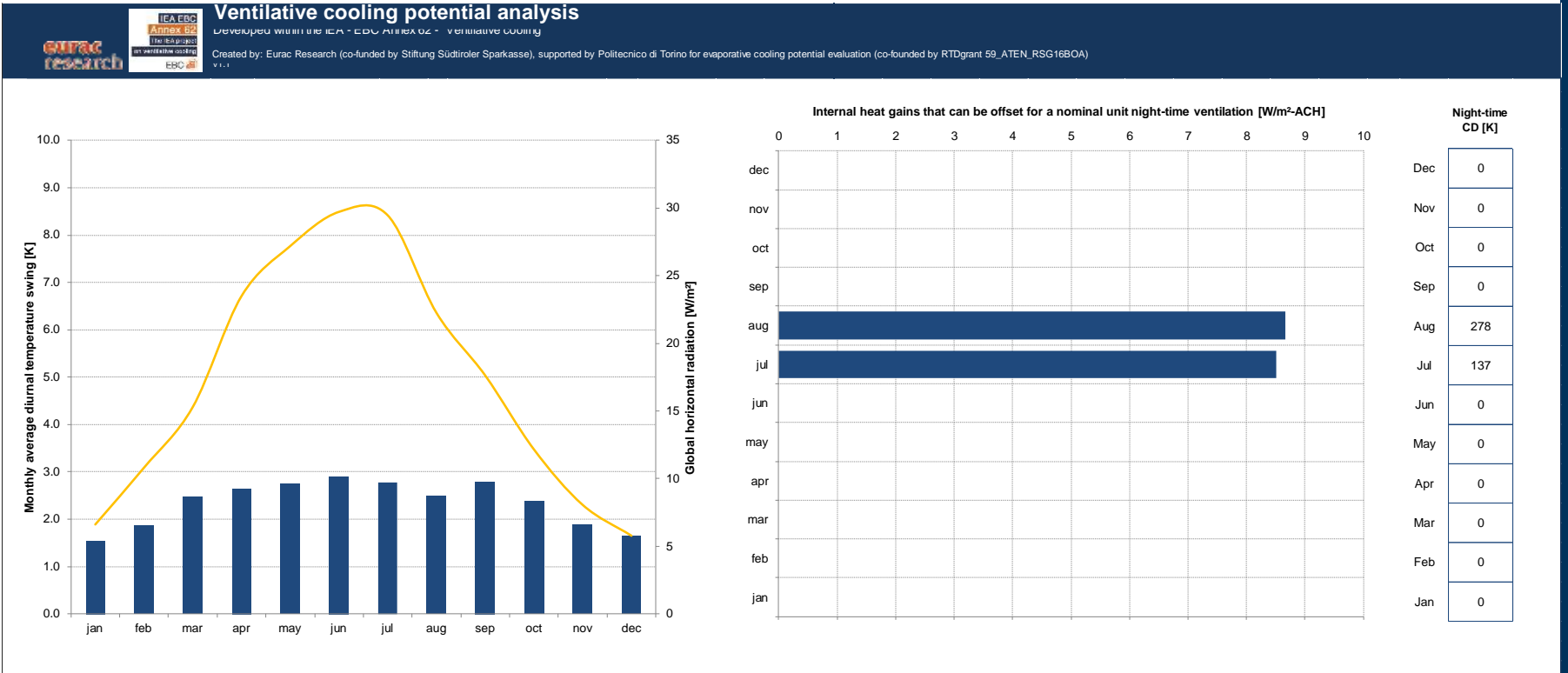


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Required airflow rates in VC mode [2]

average 3.08 ± st. dev. 1.09 ach



Ventilative cooling potential tool

10 April 2019

Extreme counter **example: an office in Dubai**



Ventilative cooling potential analysis

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V1.0

Location

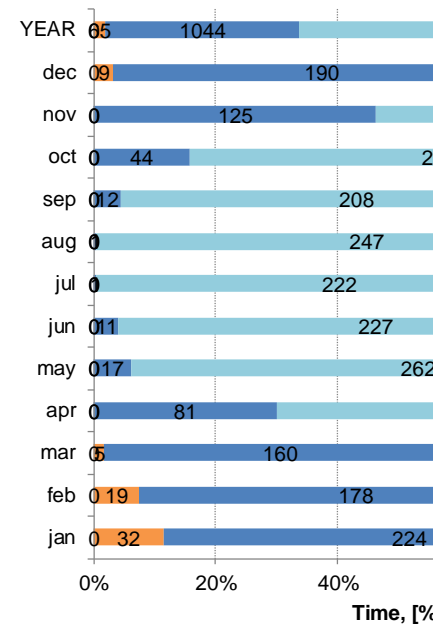
City	Dubai
Country	UAE
Latitude	25.26 °
Longitude	55.30 °
Time zone (respect GMT)	4 hr

Building data

Building type	Office building
Ceiling to floor height	H 3.00 m
Envelope area	A 268 m ²
Floor area	S 80 m ²
Fenestration area	W 50 m ²
Comfort requirement	category II
Room volume	V 240 m ³
Fenestration area orientation	S 90 ° Inclination

Technical specifications

U-value of the opaque envelope	U _o 0.27 W/m ² K	Avg. envelope U-value	U _{avg} 0.43 W/m ² K
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Shading control setpoint	Shd 40 W/m ²		
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Lighting power density	Q _{light} 10.00 W/m ²		
Electric equipment power density	Q _{el, equip} 5.00 W/m ²		
Occupancy density	Q _{people} 10 m ² /pers		
		Avg. total internal gains	Q _{int} 16 W/m ²



Ventilative cooling potential tool

10 April 2019

Extreme counter example: an office in Abu Dhabi

Analysis

ing"

se), supported by Politecnico di Torino for evaporative cooling potential evaluation (co-founded by RTDgrant 59_ATEN_RSG16CHG)

eurac
research

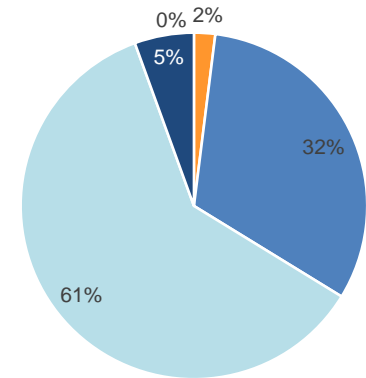
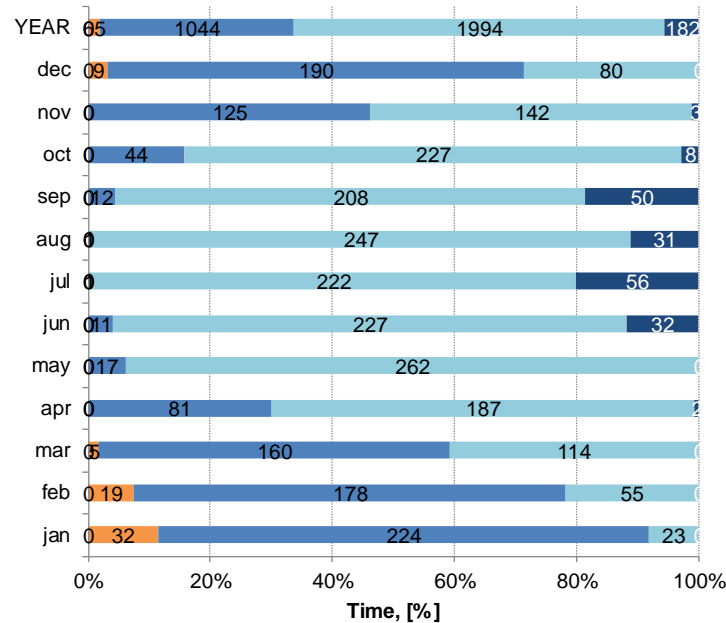
Room volume V m³

Area orientation ° Inclination

Envelope U-value U_{avg} W/m²K

f_{min}

Total internal gains Q_{int} W/m²



Required airflow rates in
VC mode [2]

average ± st. dev. ach

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- VC mode [3]: potential comfort hrs with evaporative cooling
- VC mode [4]: residual discomfort hrs

Source Book

Airflow guiding ventilation

Components

Airflow enhancing ventilation

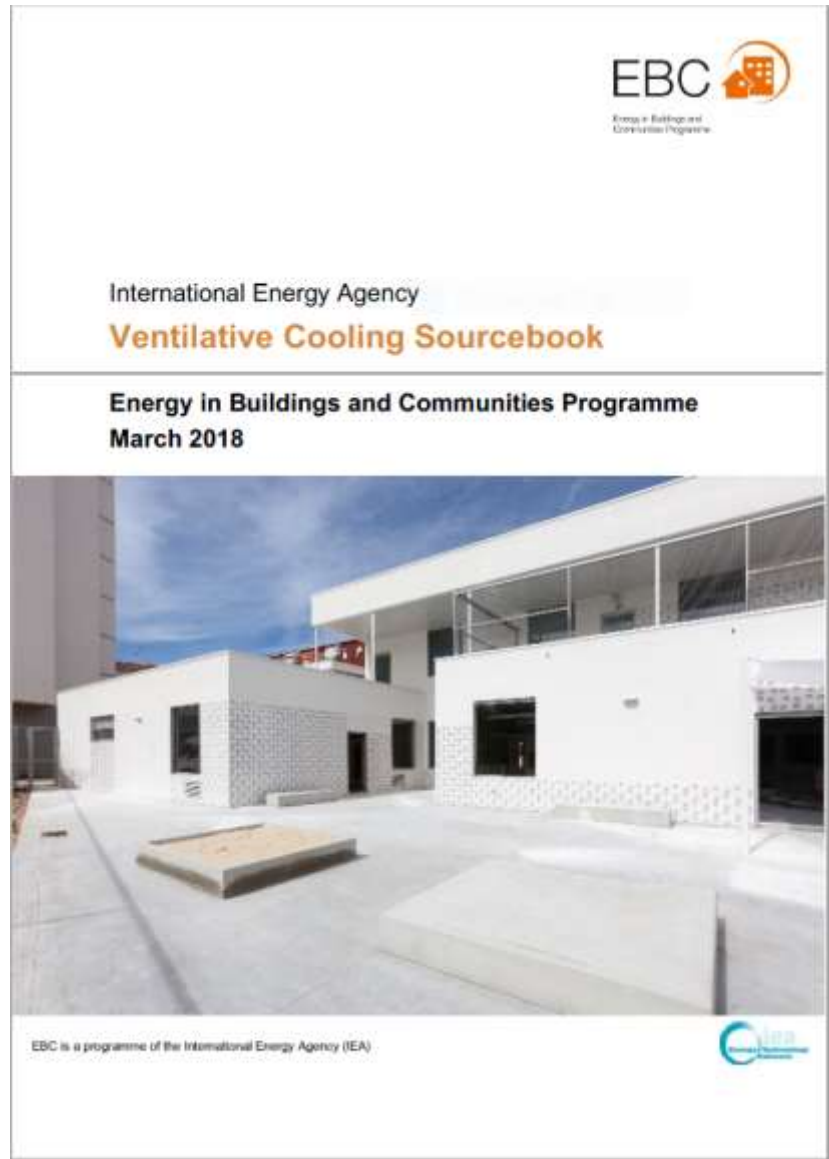
Components

Passive cooling ventilation

Components

Automation components

Includes results of national research projects



Book of Case Studies



15 case-studies studied by annex participants as part of their contribution to the annex

International Energy Agency Rectangular Series
Ventilative Cooling Case Studies

Energy in Buildings and Communities Programme
May 2018



EBC is a programme of the International Energy Agency (IEA).



Book of Case Studies

Pg Information

- 1 Introduction, Local Climate & Key Information
- 2 Building Information & Design Influences
- 3 Energy Systems
- 4 Ventilative Cooling Principles and Components
- 5 Control Strategy overview and description
- 6 Design stage simulation, design criteria
- 7-9 Performance Evaluation
- 10 Lessons Learned
- 11 References & Project Contacts

1 Case Study 1: zero2020 Key Features & Climate

1.1 Introduction - zero2020 Building Details

In 2012, Cook Institute of Technology in Ireland (CIT) completed the construction phase of zero2020, a pilot project which served as the low energy version of their existing 14,000m² teaching building originally constructed in 1970. The newly pilot project covered approximately 1.5% of the total building floor area and is shown in Figure 1. The ventilation system for the retrofit involved a duct-based exhaust fan system, each section comprising 17 air side fans (two sections comprise each vertical louvre bank), with a capacity of 2,075m³/h. Inside the four floor ventilation is supplied using dedicated ducted lines connected either naturally or extracted based on conditions in the occupied space. The ducted exhaust discharge into the air 14m above the free open area for suction and each louvre bank, composed of two sections, and has overall structural opening dimensions of 0.50m (w) x 1.80m (h) with a net opening area for each section of 0.110m² (this was two louvre banks in the test space). The primary intent of the ventilation upgrade is to control the climate of the building and ensure low thermal energy demand and improved comfort levels. An example of a 'strong reference' for zero2020 building design intention, the opportunity to develop and address critical elements in early, unapproved applications, thermal condition, and demand side management.



Fig. 1. Exterior of zero2020 building. View from the 2012 CIT building in the background, Ireland.

Table 1. Key Environmental Impact Indicators

Indicator	Unit	Value
Building Type	Value	Office
Building FTA	m ²	14,000
Reference (Energy Demand)	kWh/m ²	100
Reference (Energy Demand)	kWh/m ²	100
Year of completion	Year	2012
Year test year	Year	2012
Operational FTA (%)	%	100
Operational FTA in (Year test year) (%)	%	100

1.2 Local Climate



4 Ventilative Cooling

4.1 Principle

Design aimed natural ventilation in the new teaching principle adopted due to the relative control of the existing building system and associated improved regarding constant operation of the existing building. Large opening lengths are required to produce buoyancy driven flow in summer periods. Some measures of energy flow into the open plan office space when openings are activated on both levels and test details. Cooling is available during occupied hours through the activation of the openings. A combination of occupancy level, natural openings and high level mechanical openings is available for increasing ventilation cooling (see Figure 4). Although data is reasonably consistent (0-10°C) wind flows the system when a predominantly buoyancy driven flow operated at full length scale during the cooling season. A large cooling strategy is also available.

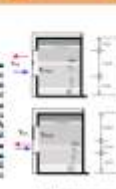


Fig. 4. Simple system description.

4.2 Component

The ventilation system for the retrofit consists of a duct-based exhaust fan system, each section comprising 17 air side fans into a priority of 2,075m³/h. The ducted exhaust discharge into the air 14m above the free open area for suction and each louvre bank, composed of two vertical louvre sections, has overall structural opening dimensions of 0.50m (w) x 1.80m (h) with a net opening area for each section of 0.110m². This is a constant component capacity throughout the building. Figure 5 contains physical components and Figure 11 shows various images of the installed system.



Fig. 5. Interior of zero2020 building showing the installed system.

Table 1. Component Summary

Parameter	Value
Total exhaust fan capacity	10,375m ³ /h
Exhaust fan capacity	10,375m ³ /h
Exhaust fan capacity	10,375m ³ /h
Overall Exhaust Fan Capacity	10,375m ³ /h
Priority (m ³ /h)	10,375m ³ /h
0.110m ² x 1.80m	10,375m ³ /h

7 Performance Evaluation

7.1 Performance Evaluation

Air Change rate (ACR) was measured at the building using a tracer gas concentration decay test. During test periods, July 2012 and August 2014, in July 2012 the ACR decay curve was completed as well. Tests were completed in accordance with the procedures set out in ASHRAE 62.1-2010. The tracer gas sampling system and a single gas sampling location were used during the tests. The test area is located (W, N, S, E) and located (W, N, S, E), measurement locations were: Airflowmeter (A), The Computer Data File (CDF), Sensors, CO₂ sampling location was 0.15m. For further details see [1] and [2].

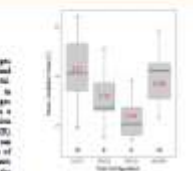


Fig. 6. ACR values for different test periods.

Table 2. Performance Evaluation Summary

Parameter	Value	Unit
ACR (m ³ /h/m ³)	0.15	h ⁻¹
ACR (m ³ /h/m ³)	0.15	h ⁻¹
ACR (m ³ /h/m ³)	0.15	h ⁻¹
ACR (m ³ /h/m ³)	0.15	h ⁻¹

7.2 Indoor Temperature

Indoor air temperature has been measured and recorded in all internal space areas and 2012. The number of occupied hours of an average of a particular indoor temperature above a threshold value is measured using an air conditioning performance indicator. Figure 7 and 11 present hourly indoor air temperature time series from July to August for 2012 and 2011. Table 3 provides summary data on hours of exceedance for each year.

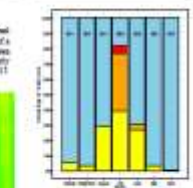


Fig. 7. Indoor air temperature exceedance hours for 2011 and 2012.

Table 3. Indoor Temperature Exceedance Summary

Parameter	Value
Total exceedance hours	10,375
Exceedance hours	10,375
Exceedance hours	10,375
Exceedance hours	10,375

Fig. 8. Indoor air temperature exceedance hours for 2011 and 2012.

Lessons learned from Case Studies

Ventilative cooling Concepts	Natural driven	Mech. Supply Driven	Mech. exhaust driven	Natural night ventilation	Mech. night ventilation	Air conditioning	Indirect Evap. Cooling	Earth to Air Heat Exch.	Phase Change eMaterials
zero2020 (IE)	X			X					
Brunla Primary school (NO)	X			X					
Solstad barnehage (NO)	X		X	X	X				
Wanguo MOMA (CN)		X	X		X	X			
UNI Innsbruck (AT)	X		X	X					
wk Simonsfeld (AT)	X		X						
Renson (BE)	X			X					
KU Leuven Ghent (BE)	X		X				X		
Maison Air et Lumiere (FR)	X								
Mascalucia ZEB (IT)	X			X				X	
Nexus Hayama (JP)	X					X			
CML Kindergarden (PT)	X			X					
Bristol University (UK)					X	X			X
Living Lab (NO)	X								

Building	Performance Metrics												
	Initial costs	Maintenance Costs	Energy Costs	Solar Loads	Internal Loads	External Noise	Internal Noise	Air Pollution	Rain Ingress	Insect Prevention	Burglary Prevention	Privacy	Air Leakage
IE R zero2020	H	M	H	H	L	L	L	L	M	L	H	M	M
NO R Brunla Primary school	H	H	H	L	M	L	L	H	M	L	L	L	H
NO R Solstad barnehage	L	L	H	L	L	L	M	H	L	L	L	L	H
CN U Wanguo MOMA	H	M	H	H	L	L	L	L	M	L	M	L	H
AT U UNI Innsbruck	H	H	H	M	L	M	L	L	M	L	L	L	H
AT R wk Simonsfeld	H	H	H	M	L	L	L	L	L	L	L	L	M
BE R Renson	L	M	L	H	H	H	L	L	L	L	L	L	L
BE U KU Leuven Ghent	H	L	H	H	H	L	L	L	M	L	L	L	H
FR U Maison Air et Lumiere	M	M	L	H	M	L	L	H	L	L	M	L	M
IT R Mascalucia ZEB	H	M	H	H	L	L	L	L	L	L	M	L	M
JP R Nexus Hayama	M	M	H	H	L	L	L	L	M	H	H	M	M
PT U CML Kindergarden	H	L	L	M	M	L	L	L	M	M	M	M	L
UK R Bristol University	H	H	H	L	H	L	M	L	M	M	H	L	L
NO U Living Lab	L	L	H	H	M	L	M	L	H	L	L	L	H

Recommendations for legislation and standards

Annex 62 work revealed that ventilative cooling is in most cases not sufficiently integrated in standards, legislation and compliance tools.

However, it also revealed that there is a broad field of evaluation methods for ventilative cooling, ranging from very simple to detailed that can support a stronger integration of Ventilative cooling in the near future.

To allow for Ventilative cooling to be treated better, the following points are important:

- **Standards:** The support of calculation methods that fairly treat natural Ventilative cooling for the determination of air flow rates including e.g. the dynamics of varying ventilation and the effects of location, area and control of openings
- **Legislation:** Include assessment of overheating, e.g. (a) Requirements to thermal comfort, including adaptive temperature sensation and (b) Requirements to energy performance including cooling
- **Compliance Tools:** They should allow for assessment of increased air flows when efficient ventilative cooling systems are used; Differentiation should be made for:
 - cross- or stack ventilation vs. single-sided ventilation,
 - automated systems vs. manual control
 - large vs. small opening areas

Recommendations for legislation and standards

Work under CEN/TC 156 (Ventilation for buildings) and ISO/TC 205 (Building environment design); work focusses mainly on design aspects of natural and hybrid ventilation and ventilative cooling tackling both overheating and indoor air quality issues.

More specifically,

- Working Group 21 (CEN/TC 156) works towards a technical specification on “Ventilative cooling systems” focussing on overheating prevention.
- Working Group 20 works towards a technical specification on “Natural and hybrid ventilation systems in non-residential buildings” focussing on indoor air quality aspects.
- ISO standard on “Design process of natural ventilation for reducing cooling demand in energy-efficient non-residential buildings” is under development within working group 2 in ISO/TC 205.
- Work on new standard on natural ventilation has started in China.

Future Work on Resilient Cooling: Annex 80

Work on Ventilative Cooling to-date has not considered in detail issues of

- urbanisation and densification,
- climate change,
- extreme climates and
- elevated comfort expectations

There is international current work on these issues; for example a conference organized in Dubai in April 2019 includes Ventilative cooling discussions and how ventilation can be incorporated in the design and operation in climates where traditionally buildings are air-conditioned.

These open issues will be researched in the near future by the work of IEA EBC Annex 80 which started in June 2018 and will be completed in 2023. Comfort at the extremes international conference April 2019. <https://comfortattheextremes.com/>

<http://annex80.iea-ebc.org/>

Benefits of working in an IEA Annex

- Excellent forum for researchers
 - > Three Brunel PhD students directly contributed to the Annex; subtask B (Solutions) and C (Case-studies). All three have completed their PhDs.
 - > Ideas for future research including research proposals
- Exchange of research ideas with peers and industry from many countries
 - > Experts meetings every six months usually 2 days
 - > Nationals seminars organised alongside the expert meetings – opportunities to highlight on-going research of participants in the context of different countries
 - > Visit case-study buildings and facilities of participants. Interact with local students; summer school in Lisbon
- Work at an international context with specific deliverables; opportunities to learn different working cultures
- Participation to initiatives resulting from the work of the annex such as current contribution to ISO and CEN working groups.
- Opportunities to contribute to preparation of international projects such as the new annex 80 on 'Resilient Cooling'.

Thank you!

