



# Spanish indoor air quality regulation reinvented: research as the pathway from prescriptive to performance-based regulations

April 2026

Pilar Linares Alemparte  
Architect MSc. PhD.

1

The slide is titled 'Introduction' and features a vertical sidebar on the left with the CTE logo and a photograph of the building. The main content area contains two lines of text and a flow diagram. The flow diagram consists of three yellow rounded rectangular boxes labeled 'Research', 'Evidence', and 'Regulation', connected by a large, light-colored arrow pointing from left to right. The bottom of the slide includes logos for the Instituto de Investigación Científica y Tecnológica (CSIC) and the Instituto de Investigación en Tecnología (IETcc), along with the author's name and title.

**CTE**  
CÓDIGO TÉCNICO  
DE LA EDIFICACIÓN

## Introduction

Regulation : powerful driver for IAQ

Pre-normative research : foundation : effective, proportionate, and sustainable regulations

Research

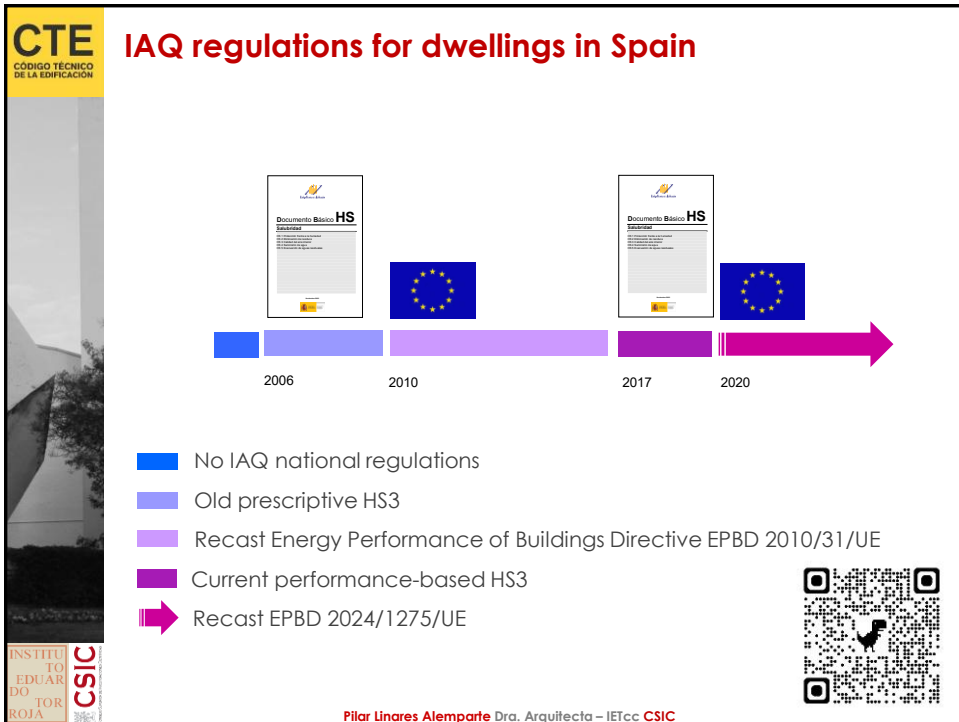
Evidence

Regulation

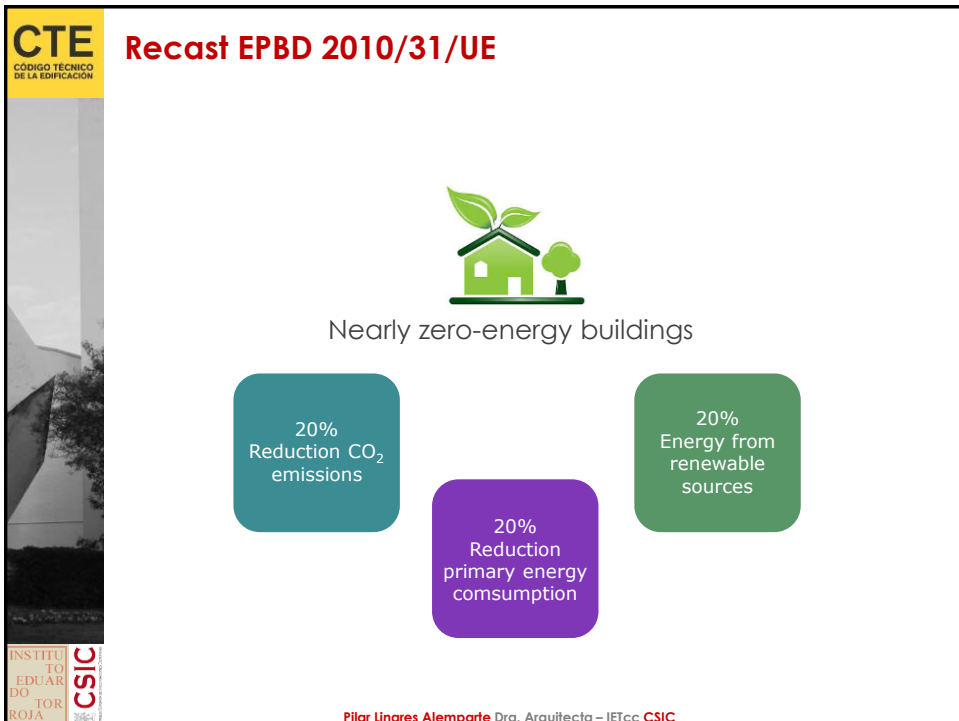
INSTITUTO  
DE INVESTIGACIÓN  
CIENTÍFICA Y  
TECNOLÓGICA  
**CSIC**

Pilar Linares Alemparte Dra. Arquitecta – IETcc CSIC

2



3



4

## Problems of old IAQ regulations

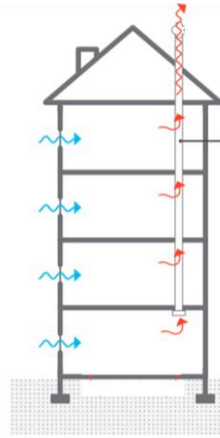
Not efficient enough ventilation systems

The objective / performance was not identified

Rigid prescriptive approach

Continuous air flows were determined

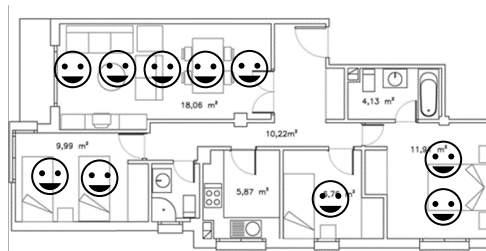
It did not support the use of energy efficient technologies



## Problems of old IAQ regulations

Assumed continuous occupancy in all rooms

Oversized systems and unnecessary energy consumption

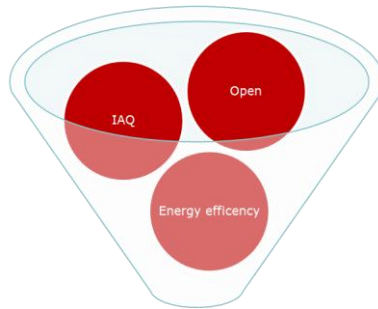


3 bedrooms: 2 double & 1 single: 5 occupants

## The need of research for new IAQ regulations

Supports the use of energy efficient technologies

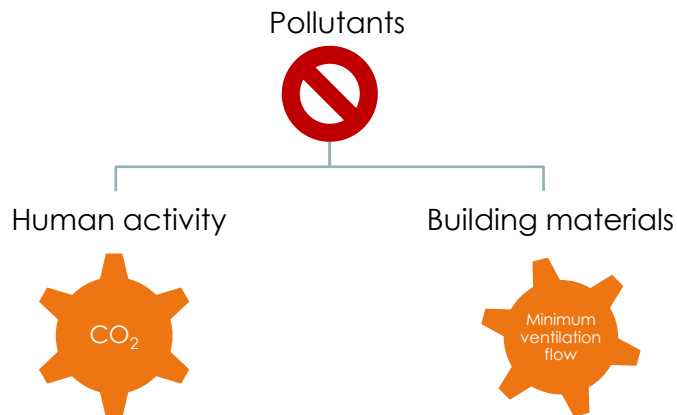
Strengthen the performance-based approach



7

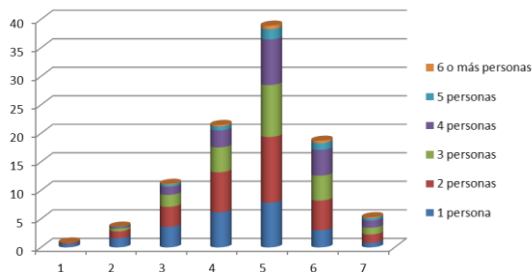
## Research

Identification of measurable and verifiable objectives / performance based on pollutants



8

Realistic data on occupancy



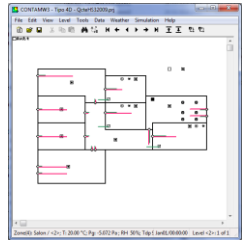
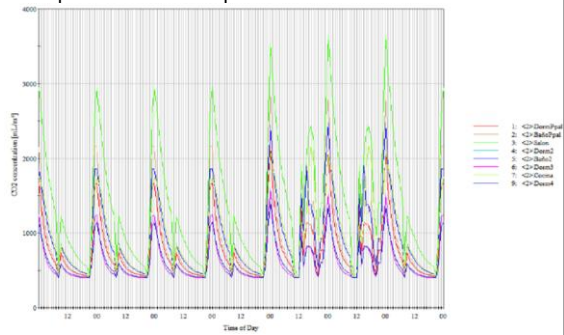
Number of rooms larger than 4m<sup>2</sup>. Bathrooms and corridors are not included.  
National Institute of Statistics of Spain

Number of bedrooms	Number of occupants
0 or 1	2
2	3
≥ 3	4

Occupancy scenarios

ESCENARIOS DE OCUPACIÓN						
	Actividad	Local	Lunes	Viernes	Sábado	Domingo
			a jueves			
Persona 1	Desayuno	Cocina	7:00-7:30	7:00-7:30	9:00-9:30	9:00-9:30
	Aseo	Baño 1	7:30-8:00	7:30-8:00	9:30-10:00	9:30-10:00
	Trabajo	Salón	8:00-17:00	8:00-16:00	.....	.....
	Descanso	Salón	.....	.....	12:00-13:00	12:00-13:00
	Preparación comida	Cocina	.....	.....	13:00-14:00	13:00-14:00
	Comida	Salón	.....	.....	14:00-14:30	14:00-14:30
	Descanso	Salón	.....	.....	14:30-15:30	14:30-15:30
	Aseo	Baño 1	.....	.....	15:30-15:35	15:30-15:35
	Descanso	Salón	.....	.....	15:35-17:30	15:35-17:30
	Descanso	Salón	.....	.....	.....	.....
	Preparación cena	Cocina	20:00-21:00	20:30-21:30	20:30-21:30	20:00-21:00
	Cena	Salón	21:00-21:30	21:30-22:00	21:30-22:00	21:00-21:30
	Descanso	Salón	21:30-23:30	22:00-00:30	22:00-00:30	21:30-23:30
Dormir	Dormitorio 1	23:30	0:00	0:00	23:30	

Simulations to check compliance with performance criteria

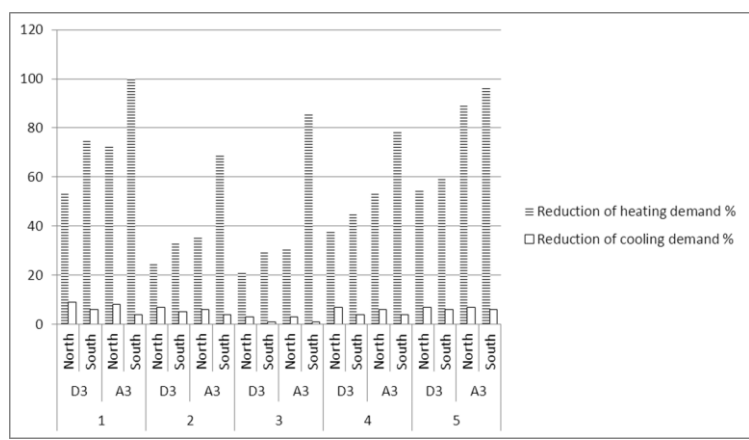


Default values for  $CO_2$  generation  
5 types of dwellings

Pilar Linares Alemparte Dra. Arquitecta – IETcc CSIC

Assessment of energy demand:

- Heating and cooling
- North and South orientation
- Various climate conditions
- 5 types of dwellings



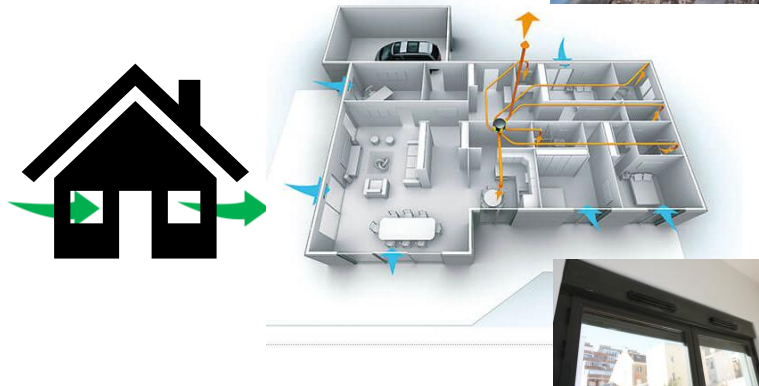
Pilar Linares Alemparte Dra. Arquitecta – IETcc CSIC

## Conclusions

Allows more efficient strategies:

Demand-controlled systems

Advanced mechanical solutions



Pilar Linares Alemparte Dra. Arquitecta – IETcc CSIC

## Conclusions

The pre-normative research provided the evidence needed to move from a prescriptive to a performance-based ventilation framework.

Realistic occupancy patterns, validated indicators and robust simulations ensured better IAQ with lower energy use.

Pre-normative research:

- Guides decision-making
- Allows regulations to be updated more efficiently
- Promotes a flexible and robust regulatory framework

Pilar Linares Alemparte Dra. Arquitecta – IETcc CSIC



**Spanish indoor air quality  
regulation reinvented: research as  
the pathway from prescriptive to  
performance-based regulations**

April 2026

Pilar Linares Alemparte  
Architect MSc. PhD.

**Thank you for your attention**