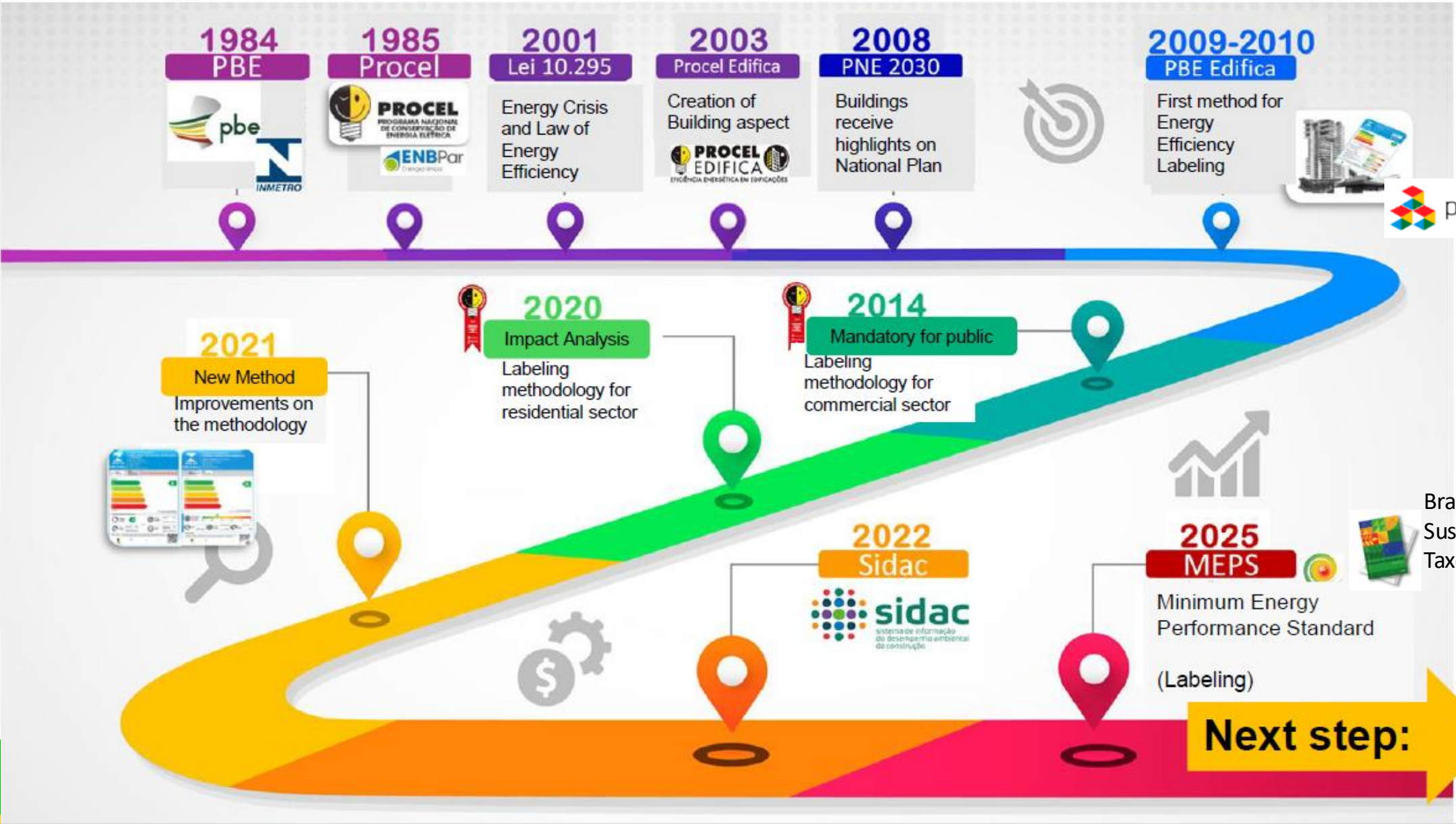
MINISTÉRIO DE MINAS E ENERGIA

SECRETARIA NACIONAL DE TRANSIÇÃO ENERGÉTICA E PLANEJAMENTO

Fourth BEC-WG meeting

Focus on overheating part. 2

National Roadmap for Energy Efficiency in Buildings Policies



Energy Efficiency Policies of Brazil

CGIEE – Regulated Equipment history

2002 and 2005

- Three-phase induction electric motors

2006

- Fluorescent lamps

2007

- Refrigerators and freezers
- Air conditioning
- Gas ovens and stoves

2008

- Gas water heater

2010

- Fluorescent lamps
- Incandescent Light Bulbs
- Electromagnetic ballasts for lamps

2011

- Refrigerators and freezers
- Air conditioning
- Gas ovens and stoves
- Gas water heater

2013

- Transformers

2017

- Three-phase induction electric motors
- Ceiling fans

2018

- Refrigerators and freezers
- Air conditioning
- Transformers

2022

- Air conditioning

2023

- Refrigerators and freezers

2025

NEW

New Buildings

Published MEPS for Buildings

Resolution n. 4/2025

https://www.gov.br/mme/pt-br/assuntos/ee/cgiee-1/portarias-e-resolucoes

	Buildings			2027	2028	2030	2032	2035	2037	2040	Inspection method	Estratégia de adesão
NEW	Público	Federal		A	A	A	A	NZEB	NZEB	NZEB	Label- issued by a certified body or professional	Electronic catalogue for standard public procurement of construction and services: • Procurement notice: Label class A
			Rio Grande do Sul		A	A	A	A	NZEB	NZEB		
		States					A	A	NZEB	NZEB		
		Municipalities	>100 K inhab					A	A	NZEB		
			>50 K inhab							A		
New	Comercial, Services and Residential		**>100 K inhab**			C	C	C	C	C	Label issued by self declaration (must have a registry of technical responsibility and complementary data input in specific system)	Building permits: • Label class C (self-declaration)
			>50 K inhab							C		
	Low-income					C	C	C	C	C		

2035- reevaluate self declaratory strategy

BRAZILIAN REALITY:

- **MILD CLIMATE:** predominantly warm climate;
- Widespread use of natural ventilation as the **PRIMARY COOLING STRATEGY**;
- Relatively **LOW AVERAGE** residential electricity consumption (~150 kWh/month per household);
- Partly associated with limited access to energy services **(energy poverty)**;

WHAT ARE THE BRAZILIAN CLIMATES LIKE?

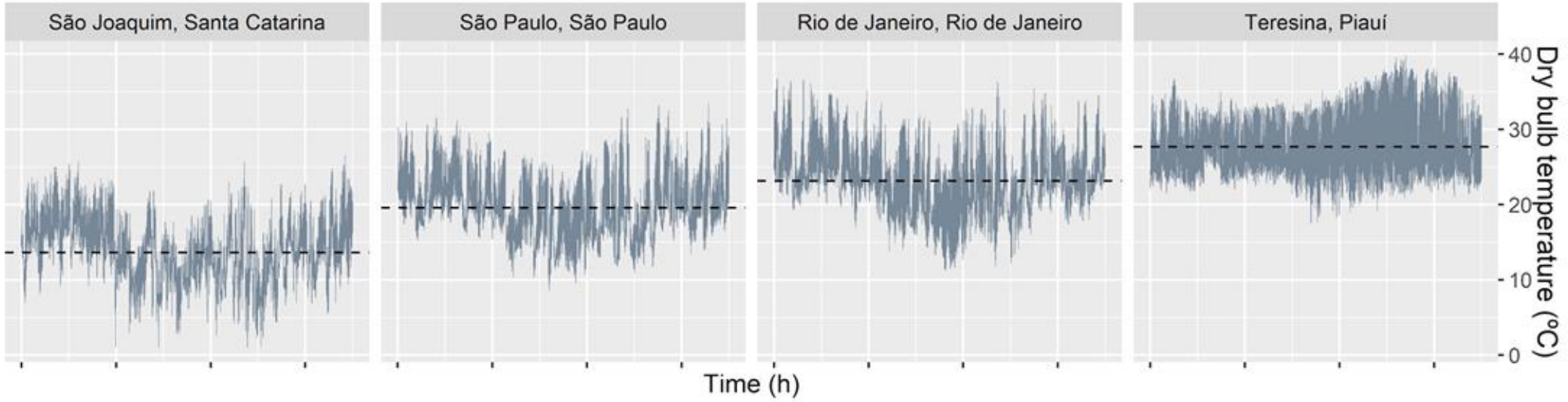
The only country in the world crossed by both the **Equator** and the **Tropic of Capricorn**

São Joaquim, Santa Catarina
Oceanic climate

São Paulo, São Paulo
Subtropical climate

Rio de Janeiro, Rio de Janeiro
Tropical climate

Serra da Capivara National Park, Piauí
Semi-arid climate



BRAZILIAN HOMES

Building systems

In Brazilian housing sector, envelopes are usually **non-insulated** [1]. Low income sector represents approximately 33% of residential buildings in Brazil [2].

The most common building systems used [1,2]:

- Ceramic brick (walls) and ceramic tiles (roof);
- Concrete walls and roofs (slab);
- Fiber cement corrugated sheets;
- Single clear glass.

Standard NBR 15575 Reference Building

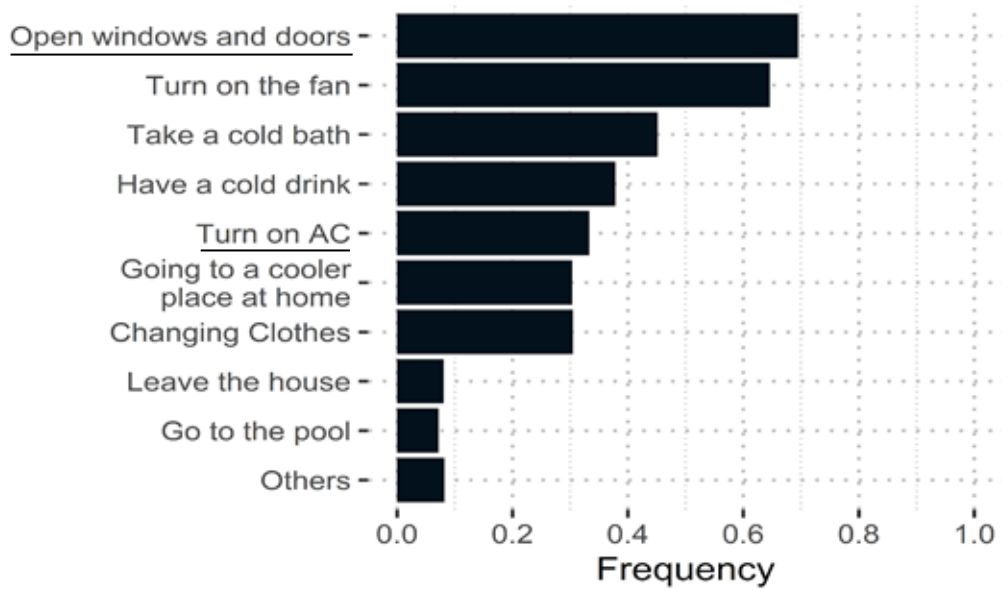
[1] Triana, Lamberts and Sassi, 2015: https://doi.org/10.1016/j.enpol.2015.08.041

[2] Eletrobras, Brasil, 2019: https://eletrobras.com/pt/AreasdeAtuacao/BRASIL.pdf

BRAZILIAN HOMES

Occupant preferences

Regarding cooling preferences, 89% of interviewed occupants prefer **naturally ventilated environments** at home [1].



Data Base: dx.doi.org/10.17632/zwjxzgkkn7.1

Air conditioning is mostly used during the night [2].

[1] RAMOS et al, 2020: https://doi.org/10.1080/09613218.2020.1804314

[2] Teixeira, 2020: https://labeee.ufsc.br/sites/default/files/publicacoes/dissertacoes/Dissertacao_CristianoTeixeira.pdf

BRAZILIAN STANDARDS AND REGULATIONS

Residential buildings

NBR 15575 – Brazilian residential building performance standard:

- Focused on **minimum performance requirements**, including a dedicated chapter on **thermal performance**;
- Although Brazilian standards are formally **voluntary**, they are widely treated as de facto **mandatory** within the formal construction sector, due to their linkage with consumer protection legislation;
- A significant **share of housing production occurs outside the formal sector**, where compliance is more limited.


NORMA BRASILEIRA

ABNT NBR 15575-1

Sétima edição
05.12.2025

Edificações habitacionais — Desempenho
Parte 1: Requisitos gerais

Residential buildings — Performance
Part 1: General requirements

ICS 91.040.01

ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS

Número de referência
ABNT NBR 15575-1:2025
95 páginas

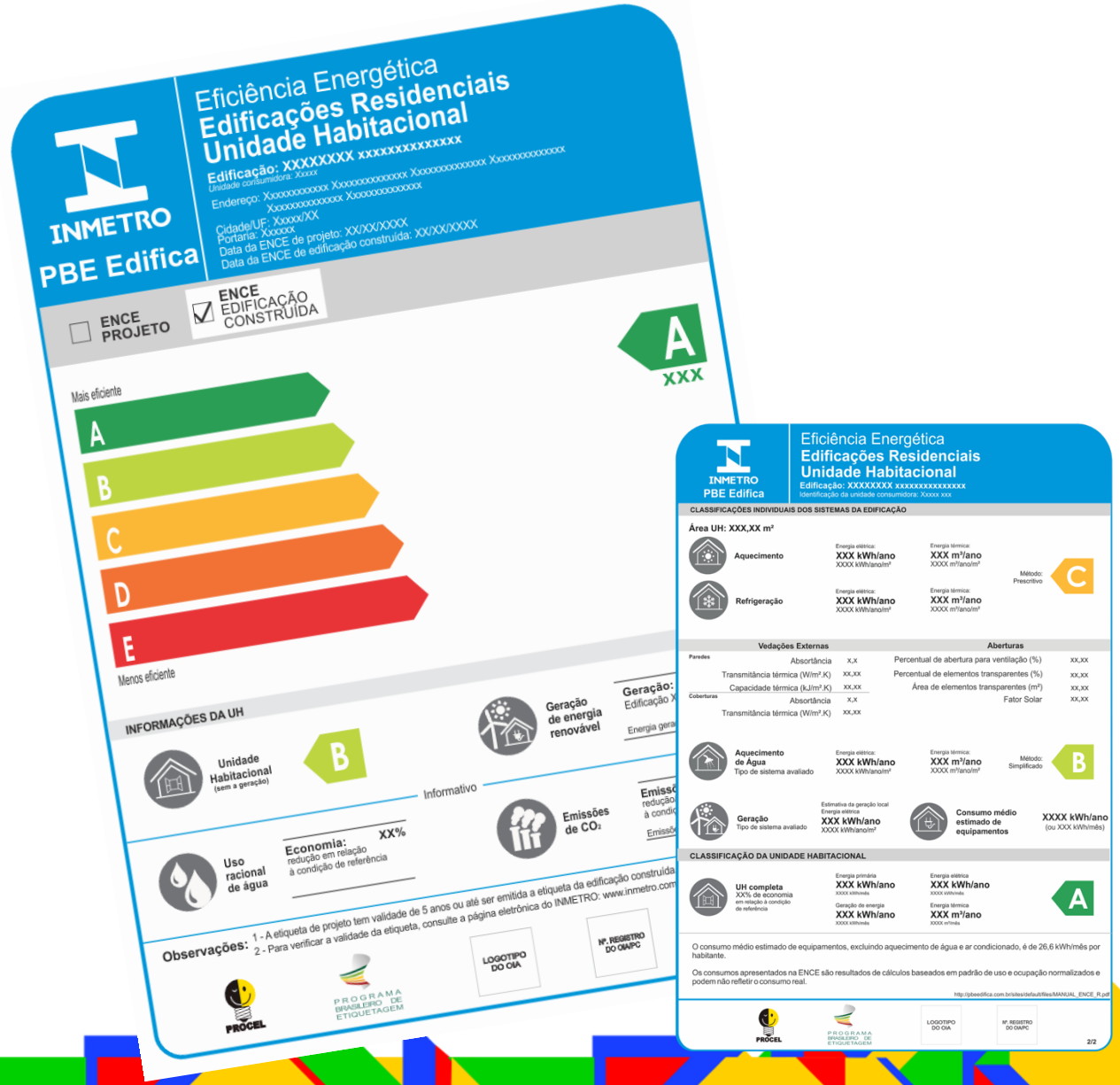
© ABNT 2025

BRAZILIAN STANDARDS AND REGULATIONS

Residential buildings

INI-R – Brazilian regulation for energy efficiency labelling of residential buildings:

- Updated and aligned with NBR 15575 requirements;
- Introduction of Minimum Energy Performance (MEP) requirements.



NBR 15575 - REVIEW OF THE BRAZILIAN RESIDENTIAL BUILDING PERFORMANCE STANDARD

Thermal performance chapter

Challenges:

- Description of occupant behavior when modeling hybrid strategies;
  - Trigger temperatures to open the windows or to turn on the air conditioning system;
  - Occupancy periods;
  - Other internal loads.
- Establishment of comprehensive indicators

Thermal performance evaluation approach:

free-running

- Percentage of occupied hours within a temperature range (18-26 °C, 28 °C, 30 °C);
- Min/max operative temperature in the indoor environment;

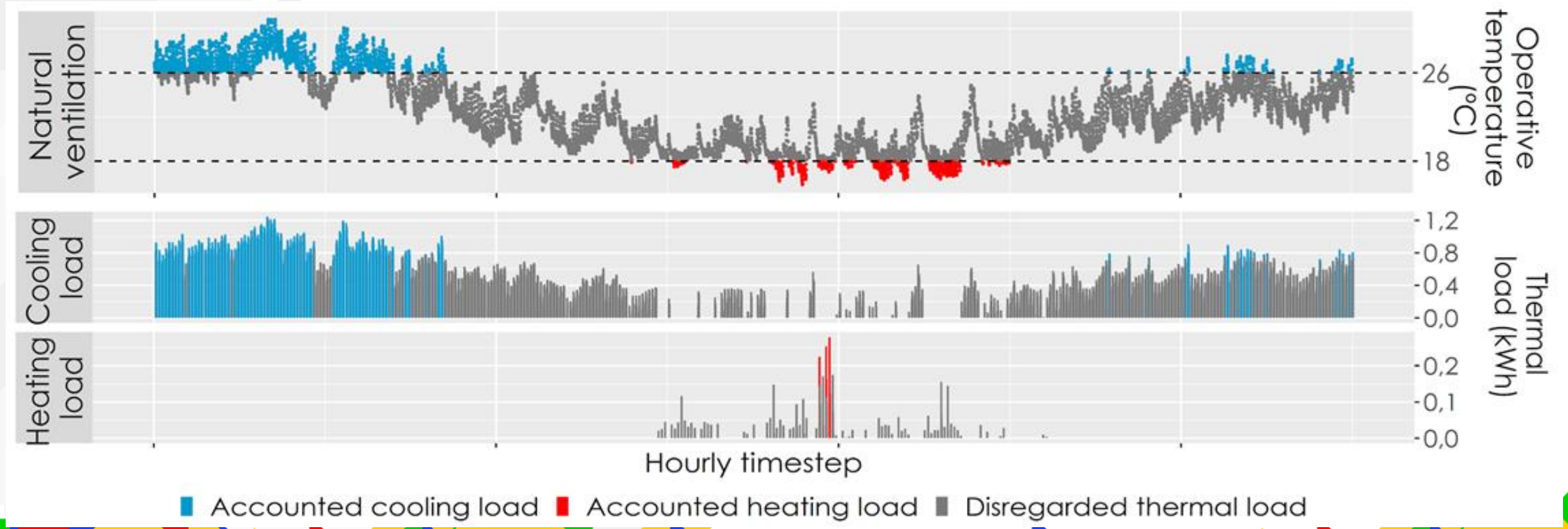
air conditioned

- Cooling (23 °C) and heating (21 °C) loads.

NBR 15575 - REVIEW OF THE BRAZILIAN RESIDENTIAL BUILDING PERFORMANCE STANDARD

Maximum use of bioclimatic strategies

Thermal loads accounted **only** when natural ventilation is not sufficient to guarantee thermal comfort



NBR 15575: STILL USING CLIMATE FROM THE PAST...

Acceptable indoor operative temperature limits are defined as a function of the annual mean external dry-bulb temperature. This simplified adaptative framework adjusts thermal performance criteria according to the local climate, allowing higher indoor temperatures in warmer conditions.

External temperature ranges and associated operative temperature limits

	Annual mean external dry-bulb temperature (TBS_m)	**Operative temperature range (T_o,APP)**
Range 1	TBS_m < 25,0 °C	18.0 °C < To_{APP} < 26.0 °C
Range 2	25,0 °C ≤ TBS_m < 27,0 °C	To_{APP} < 28.0 °C
Range 3	TBS_m ≥ 27,0 °C	To_{APP} < 30.0 °C

WE ARE DESIGNING WITH THE CLIMATE OF THE PAST...

UFSC

UNIVERSIDADE FEDERAL DE SANTA CATARINA
CENTRO TECNOLÓGICO
PROGRAMA DE PÓS-GRADUAÇÃO EM ENGENHARIA CIVIL

Matheus Körbes Bracht

Impact of future climate and heat wave definitions on building energy performance in Brazil

Florianópolis
2026

https://labeee.ufsc.br/sites/default/files/publicacoes/teses/TESE_Matheus_Korbes_Bracht.pdf

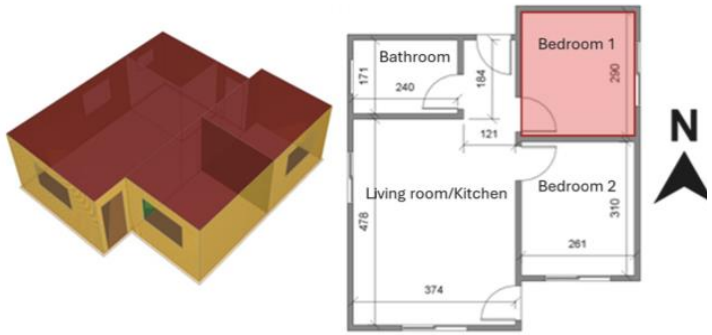


Figure 11 – Simulation model and floor plan of the reference cas

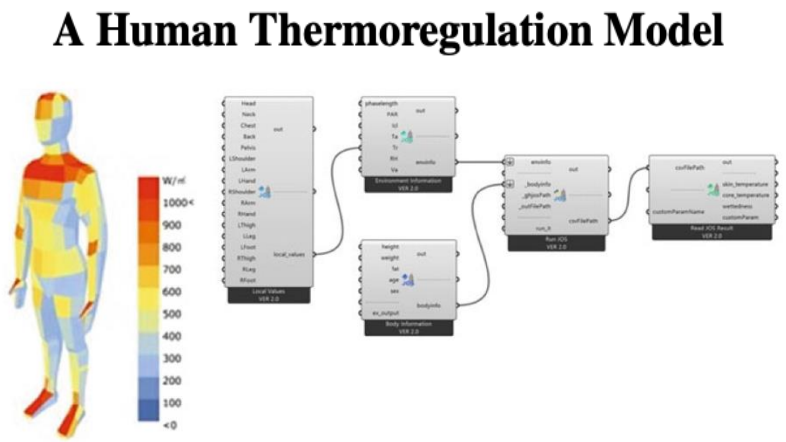
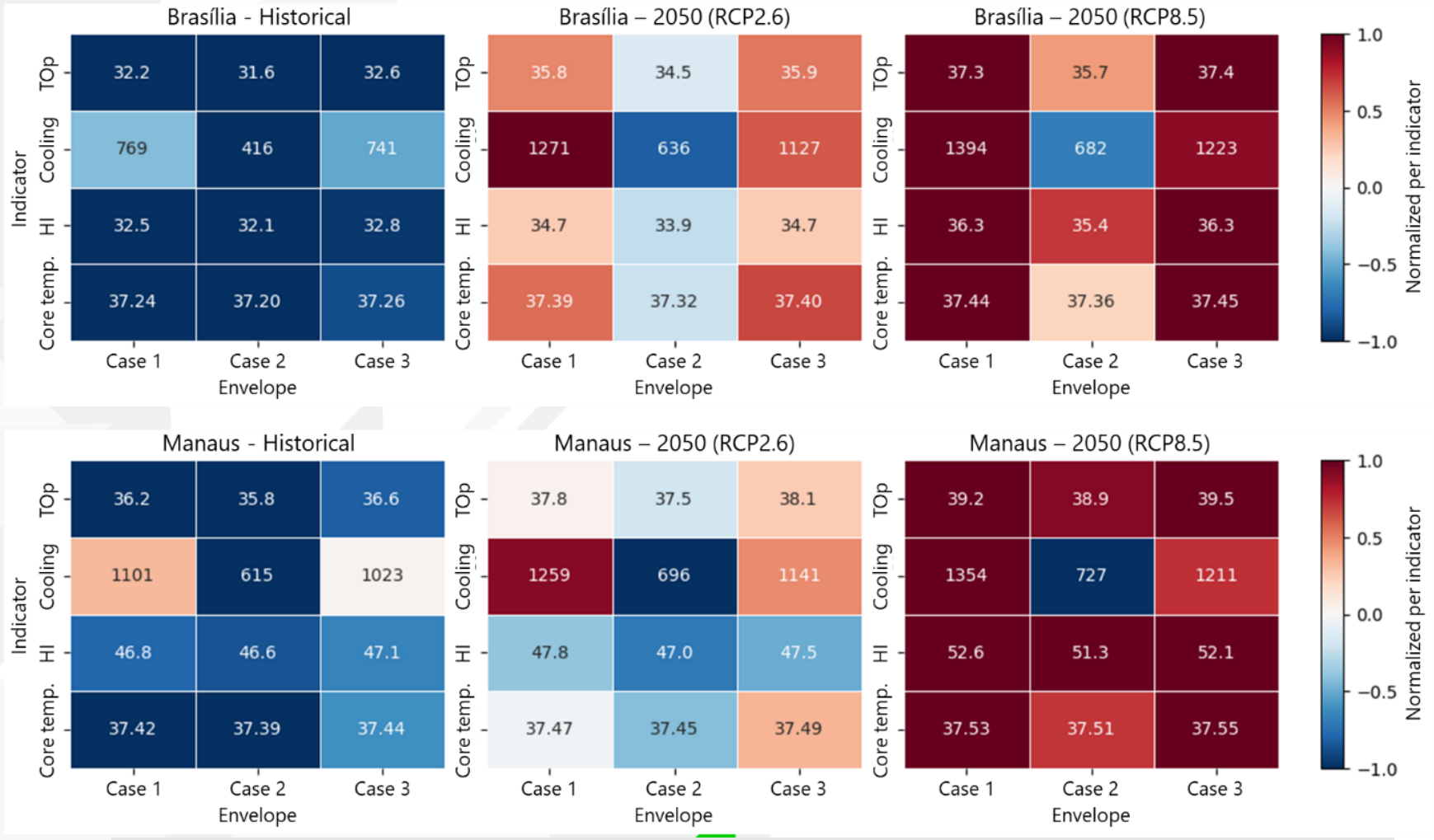


Fig. 1 Use of JOS-3 in the 3D modeling software (cited from [25])

Building simulation results

- **Top – Operative temperature;**
- **Cooling Load;**
- **Heat Index;**
- **Core temperature calculated by the Human Termoregulation Model**



99th percentile of indoor KPI for each scenario and envelope case in Brasília and Manaus

Case 1

Case 2

Case 3

Thank you!