AIRZONE

Decarbonising buildings with HVAC control

AIRZONE'S ROLE IN ACHIEVING EPBD AND IEQ STANDARDS

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Introduction

The European Union's commitment to achieving climate neutrality by 2050 has fundamentally transformed the building sector through the revised Energy Performance of Buildings Directive (EPBD). With buildings responsible for 40% of EU energy consumption and 36% of greenhouse gas emissions, the directive introduces unprecedented requirements for building automation that directly impact public institutions, designers, energy service companies, and building owners across all EU member states.

The revised EPBD represents a significant transition from voluntary energy efficiency measures to mandatory building automation and control systems[1] (Article 13.9). These regulations might create immediate compliance challenges, but, at the same time, they represent a long-term opportunity for organizations implementing smart building technologies.

The directive's requirements for individual room temperature control[1] (Article 13.3), indoor air quality monitoring[1] (Article 13.10d), and demand response capabilities[1] (Annex IV) make HVAC control technology essential for regulatory compliance.

Implementation timelines

The implementation timeline for EPBD compliance is demanding, with critical deadlines approaching rapidly. Non-residentials buildings with heating systems exceeding 290 kW must have implemented building automation and control systems by 31 December 2024, while those exceeding 70 kW face requirements by 31 December 2029[1] (Article 13.9). Indoor air quality monitoring systems must be operational by May 29, 2026[1] (Article 13.10d), across all non-residential buildings, include offices, educational institutions, healthcare facilities, and commercial spaces, particularly those that are newly constructed or undergoing major renovations, as stipulated in the revised directive.

Organizations acting strategically now will better position themselves to meet regulatory deadlines, access green financing opportunities, and demonstrate leadership in sustainable building practices. HVAC control technology provides a pathway to compliance that delivers measurable energy savings, improved occupant comfort, and enhanced building performance.

The revised EPBD: Critical requirements and implementation roadmap

Mandatory building automation and control systems

The revised EPBD establishes clear requirements for building automation and control systems (BACS) that fundamentally change building operation and management[1] (Article 13.9). The implementation roadmap creates a phased approach based on building heating system capacity:

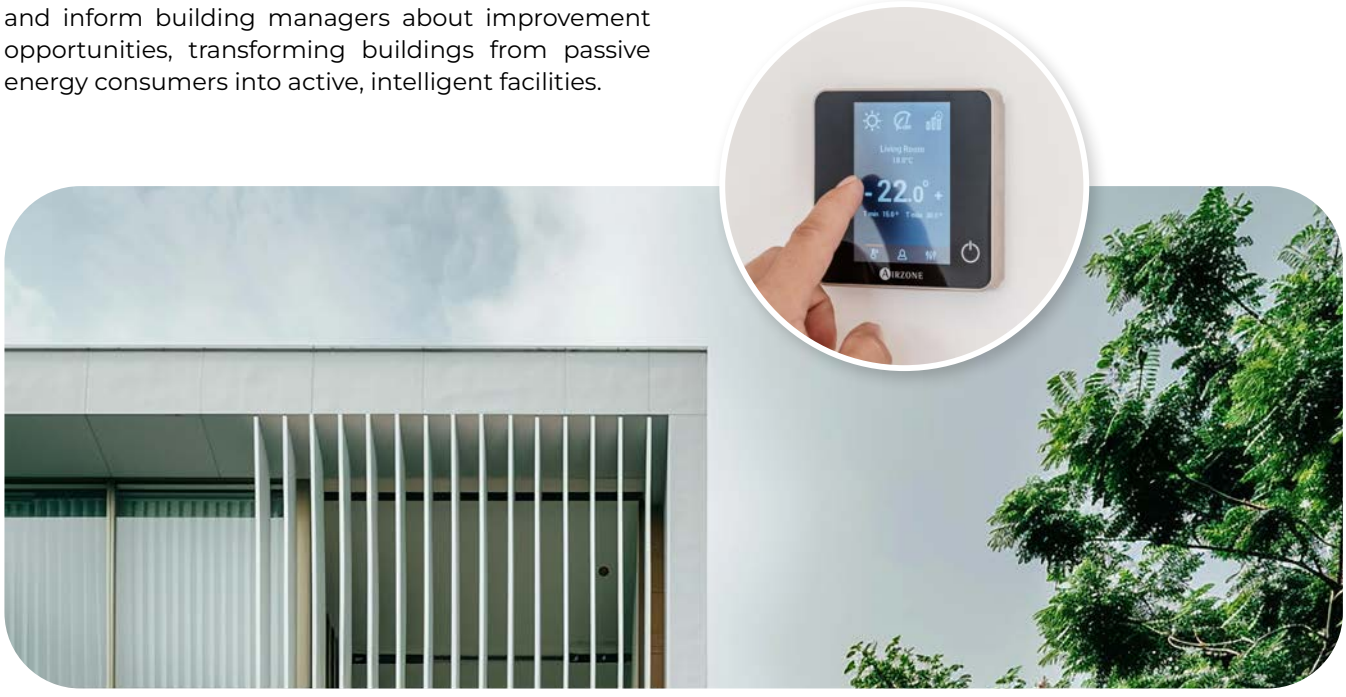
- **NON-RESIDENTIAL BUILDINGS >290 KW:** Building automation systems required by 31 December 2024
- **NON-RESIDENTIAL BUILDINGS >70 KW:** Building automation systems required by 31 December 2029

These systems must provide continuous monitoring and logging of energy consumption for heating, cooling, ventilation, and other building systems. They must automatically detect efficiency decreases and inform building managers about improvement opportunities, transforming buildings from passive energy consumers into active, intelligent facilities.

Individual room temperature control requirements

The EPBD emphasizes self-regulating temperature control at the individual room level[1] (Article 13.3), recognizing that precise zoning is essential for both energy efficiency and occupant comfort.

Individual room temperature regulation must maintain desired comfort conditions while optimizing energy consumption based on actual occupancy and usage patterns. Systems must provide automatic temperature adjustment based on occupancy sensors, time schedules, and external weather conditions.



Indoor Air Quality monitoring and management

The EPBD introduces comprehensive indoor air quality monitoring requirements[1] (Article 13.5) operational by May 29, 2026[1] (Article 13.10d). These requirements recognize the critical importance of indoor environmental quality for occupant health, productivity, and well-being.

Indoor air quality monitoring systems must track humidity, temperature, and other parameters that directly impact occupant health and comfort. To comply with these requirements, systems must be capable of real-time monitoring and automatic adjustment of ventilation and filtration[2] (Annex X).

Demand response and grid integration capabilities

The EPBD includes requirements for demand response capabilities that position buildings as active participants in the energy transition[1] (Annex IV, 2c). Buildings must be equipped with systems that respond to grid signals and optimize energy consumption based on renewable energy availability and grid conditions.

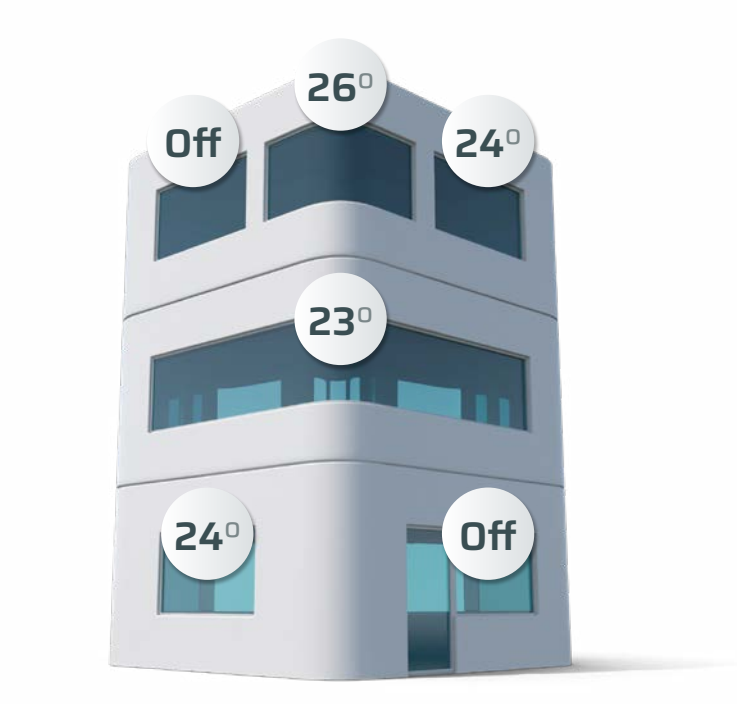
Demand response capabilities require buildings to implement communication protocols such as OpenADR and EEBus that enable participation in grid balancing programs and renewable energy integration initiatives[1] (Annex IV, 2c). These protocols allow buildings to receive grid operator signals and automatically adjust energy consumption patterns.

Deadline	EPBD Requirement	Airzone-Compatible Solutions
2025	Non-residential buildings >290 kW must have BACS installed.	Easyzone 25 and Flexa 25 integrate with BMS via Modbus/BACnet.
2027	Smart Readiness Indicators for buildings over 290 kW must be approved.	Airzone Cloud and energy meters enable detailed monitoring.
2030	All buildings must be demand-response ready (able to react to grid signals).	Easyzone and Flexa 25 support demand response via open protocols (OpenADR / EEBus).

HVAC control technology: essential for EPBD compliance

The foundation of modern building automation

HVAC control has the potential to become a central element of modern building automation, thanks to its strong impact on energy efficiency, making it a key enabler of EPBD compliance. According to the recast directive, all large buildings must implement building automation and control systems that ensure optimized energy use and indoor environmental quality[1] (Article 13.9). Given that HVAC systems account for a significant share of a building's total energy consumption, climate control represents the greatest opportunity for energy savings. Unlike traditional systems that treat the building as a single climate zone, zoning HVAC control divides buildings into independent areas, each tailored to its specific thermal load, occupancy pattern, and comfort needs. Sensors monitor temperature, humidity and occupancy in real time, while algorithms continuously optimize heating, cooling, and ventilation for each zone. Airzone systems integrates with external presence detectors and building automation platforms to enable this targeted control, which typically reduces energy consumption by 20 to 30 percent[3, 4], significantly improving both comfort and efficiency.



Energy optimization and carbon emissions reduction

By conditioning only occupied areas to the exact level required, zoning eliminates the energy waste associated with oversized or static HVAC systems. This granular approach to energy management aligns directly with the EU's decarbonization goals. Over time, the energy savings compound, resulting in meaningful reductions in carbon emissions and operating costs, especially for commercial buildings.

Airzone's system also supports demand response features, allowing buildings to shift energy use to off-peak times or periods of high renewable energy generation[3, 4]. This helps reduce reliance on fossil fuels and supports grid stability.

Indoor Air Quality management integration

Meeting EPBD indoor air quality requirements can be challenging, especially when trying to balance ventilation with energy efficiency. Airzone addresses this through its AirQ sensor, which provides zone-level monitoring of CO_2, VOCs, PM10, PM2,5, humidity, and temperature[5]. In addition to fulfilling monitoring requirements, Airzone systems also enhance indoor wellbeing by integrating solutions like ventilation control and ionization-based purification technologies that help maintain a healthy environment[6] in every room.

Airzone's comprehensive HVAC control solutions

Proven EPBD compliance

Airzone's HVAC control solution provides a complete, ready-to-deploy solution for full EPBD compliance. Designed specifically for the European market, the system integrates self-regulating temperature control, indoor air quality monitoring, energy tracking, and demand response into a single solution. Its modular architecture ensures compatibility with all building types and HVAC systems, from heat pumps to chillers. The platform is designed to align with EPBD requirements across temperature control, air quality monitoring, automation, and demand response. In markets such as the Netherlands, it also supports compliance with local transpositions like the Environment Buildings Decree (BBL)[7], such as the requirement for individual room temperature control (Articles 4.248 and 5.21), and the monitoring of indoor environmental conditions in non-residential buildings, including CO_2 levels (Articles 3.143 and 4.243).

Individual room temperature regulation

At its core, Airzone delivers highly precise room-by-room temperature control. This directly addresses the EPBD's requirement for self-regulating devices in each room or zone[1] (Article 13.10). The system allows users to define and schedule temperatures for each space according to occupancy patterns and usage needs. This ensures comfort is maintained while energy use is minimized. Room-level zoning also enables smarter scheduling, such as pre-conditioning conference rooms before meetings or adjusting private offices to individual preferences. These strategies further improve operational efficiency and user satisfaction.

Demand response and grid integration capabilities

In addition to optimizing internal building performance, Airzone's platform supports broader energy ecosystem goals through demand response readiness. As required by the directive[1] (Annex IV, 2c), systems must be capable of interacting with the grid to optimize energy use. Compatible with OpenADR and EEBus protocols, Airzone's system can automatically adjust HVAC operation in response to grid signals, pricing fluctuations, and renewable energy availability. This allows buildings to actively participate in grid optimization efforts, lower energy costs, and reduce their carbon footprint, all without compromising comfort.

Implementation and technical framework

Phase 1

COMPLIANCE ASSESSMENT AND PLANNING

The first phase of EPBD compliance implementation requires comprehensive assessment of existing building systems and development of compliance plans. This begins with detailed building audits that evaluate current HVAC systems, control capabilities, and energy performance baselines against EPBD requirements.

Building owners must conduct thorough assessments to identify specific EPBD requirements applying to their buildings. Assessment should include evaluation of existing infrastructure compatibility, identification of zones requiring individual room temperature control (Article 13.3), and assessment of indoor air quality monitoring requirements[1] (Article 13.10). This comprehensive evaluation provides the foundation for developing cost-effective compliance strategies.

Phase 2

SYSTEM DESIGN AND TECHNICAL SPECIFICATION

The second phase involves detailed system design and engineering to ensure optimal performance and full EPBD compliance. This requires collaboration between building owners, consulting engineers, and technology providers to develop customized solutions meeting specific building requirements.

System design must consider existing HVAC infrastructure, building layout, occupancy patterns, and specific compliance requirements. The design process should evaluate integration requirements with existing building management systems and IT infrastructure.

Detailed specifications should address zone configuration, sensor placement, control algorithms, and communication protocols required for EPBD compliance.

Phase 3

IMPLEMENTATION AND SYSTEM INTEGRATION

To meet the requirements set by the revised EPBD, the implementation of smart zoning and monitoring technologies should follow a structured approach that ensures compliance while minimizing operational disruptions.

A phased installation strategy is recommended, allowing buildings to remain functional during upgrades. Priority should be given to critical areas that require immediate compliance with indoor environmental quality or energy performance standards, while non-critical zones can be upgraded progressively. This approach aligns with the requirements for individual room temperature control systems and control by zone or functional area as established in the EPBD.

System commissioning is a key step in ensuring that all installed components perform according to design specifications. This includes verifying zoning functionality, indoor air quality monitoring, energy performance tracking, and the seamless integration of new systems with the building's existing infrastructure. Proper commissioning also supports long-term efficiency and ensures that buildings are prepared for future smart readiness and demand response capabilities[1] (Article 13).

Phase 4

PERFORMANCE OPTIMIZATION AND CONTINUOUS COMPLIANCE

The final phase involves ongoing system optimization and continuous improvement to ensure sustained EPBD compliance and optimal building performance. This includes regular performance monitoring, system tuning, and preventive maintenance.

Performance monitoring should include regular analysis of energy consumption, indoor air quality, and occupant comfort to identify optimization opportunities. This data should be used to fine-tune control algorithms and improve system performance.

Regular maintenance schedules must be established to ensure equipment operates properly and system performance is maintained. Preventive maintenance programs extend equipment life and prevent performance degradation. Airzone's AirQ Sensors, however, are self-calibrating and do not require manual recalibration, reducing maintenance requirements while ensuring continuous air quality monitoring accuracy[5].

Conclusion and next steps

The imperative for EPBD compliance

The revised Energy Performance of Buildings Directive represents a significant evolution in the EU's approach to building energy performance and decarbonization. With implementation deadlines approaching rapidly, building owners and operators must act decisively to ensure compliance while positioning their facilities for long-term success.

HVAC control technology emerges as the most effective solution for achieving EPBD compliance, providing the precise control and monitoring capabilities required by the directive while delivering measurable energy savings and improved occupant comfort. The technology's ability to address multiple compliance requirements simultaneously makes it essential for any comprehensive EPBD compliance strategy.

The business case for HVAC control extends beyond regulatory compliance to encompass operational cost savings, improved occupant satisfaction, enhanced property values, and access to green financing opportunities. Buildings equipped with advanced automation systems are increasingly attractive to tenants and investors.

Immediate action required

The window for strategic EPBD compliance planning is closing, with the first major deadline already passed in January 2025. Organizations must begin planning immediately to ensure timely compliance while maximizing HVAC control implementation benefits for future deadlines.

The first step involves conducting comprehensive assessments of existing facilities to identify specific compliance requirements and develop strategic implementation plans. These assessments should consider immediate regulatory requirements and long-term sustainability goals.

Airzone's competitive advantage for EU market success

Airzone's comprehensive understanding of EPBD requirements, combined with proven solutions specifically designed for European markets, positions the company as the ideal partner for organizations seeking regulatory compliance while maximizing building performance. The company's focus on retrofit solutions addresses the reality that most EU buildings requiring EPBD compliance are existing facilities needing cost-effective upgrade solutions.

Airzone's commitment to ongoing innovation and compliance with evolving regulations ensures that organizations investing in Airzone solutions will be prepared for future regulatory changes. The company's European heritage and deep understanding of EU regulatory requirements provide additional confidence for stakeholders navigating complex compliance landscapes.

Contact Airzone for EPBD compliance guidance

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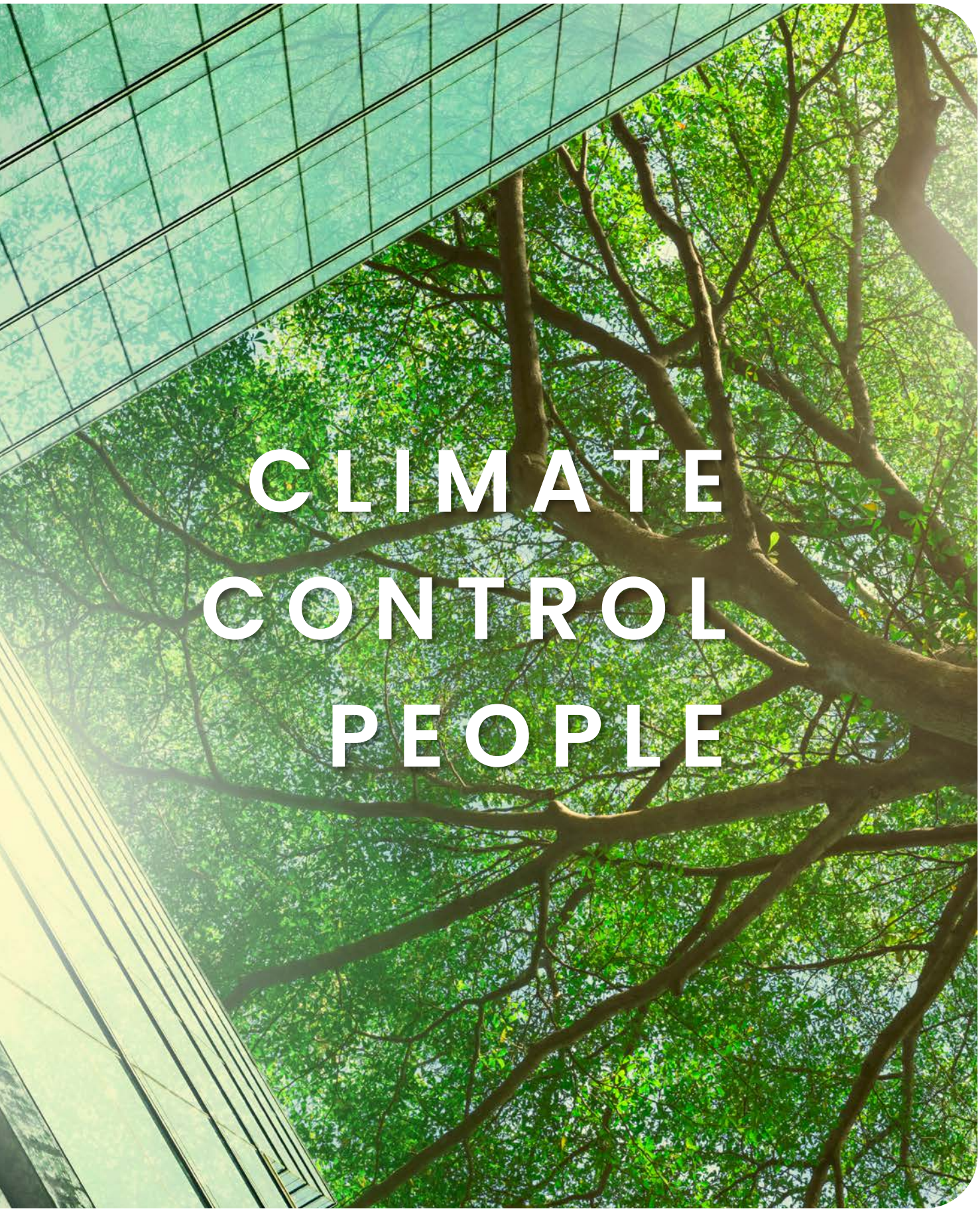
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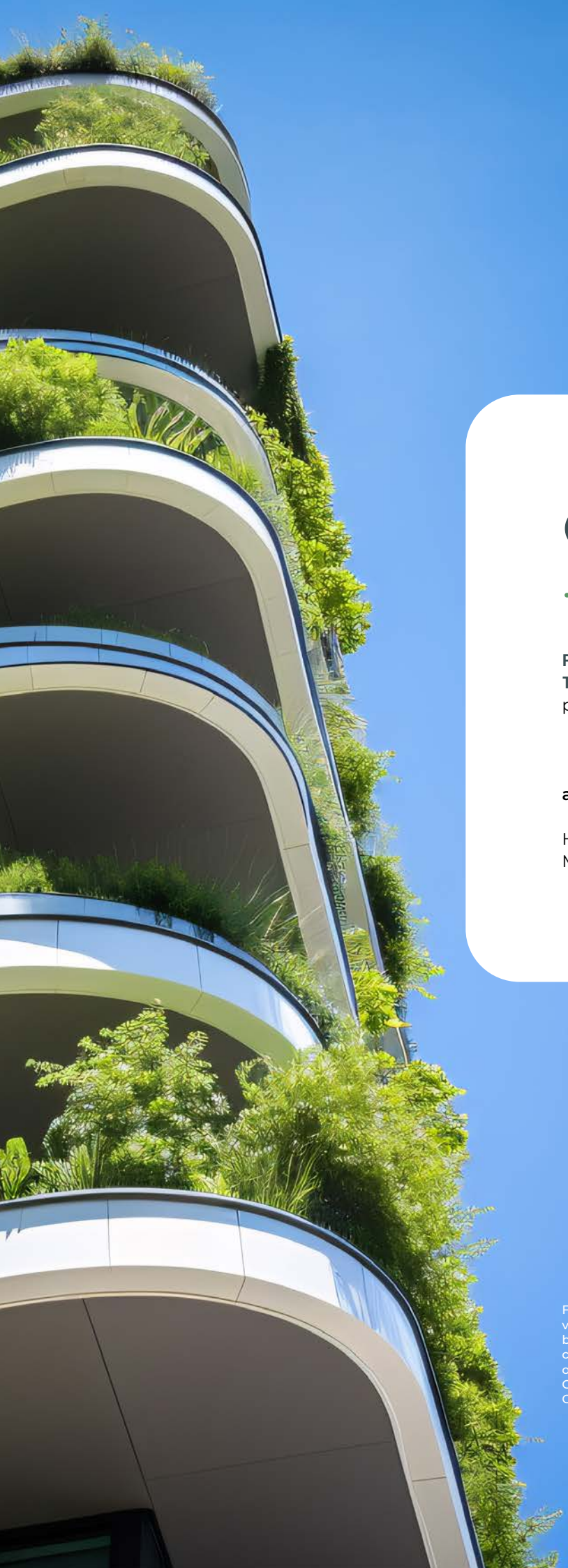

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