

Adaptive reuse as situated architectural research across latitudes. Energy-oriented renovation of industrial heritage: The Ex-Mercati Generali, Turin

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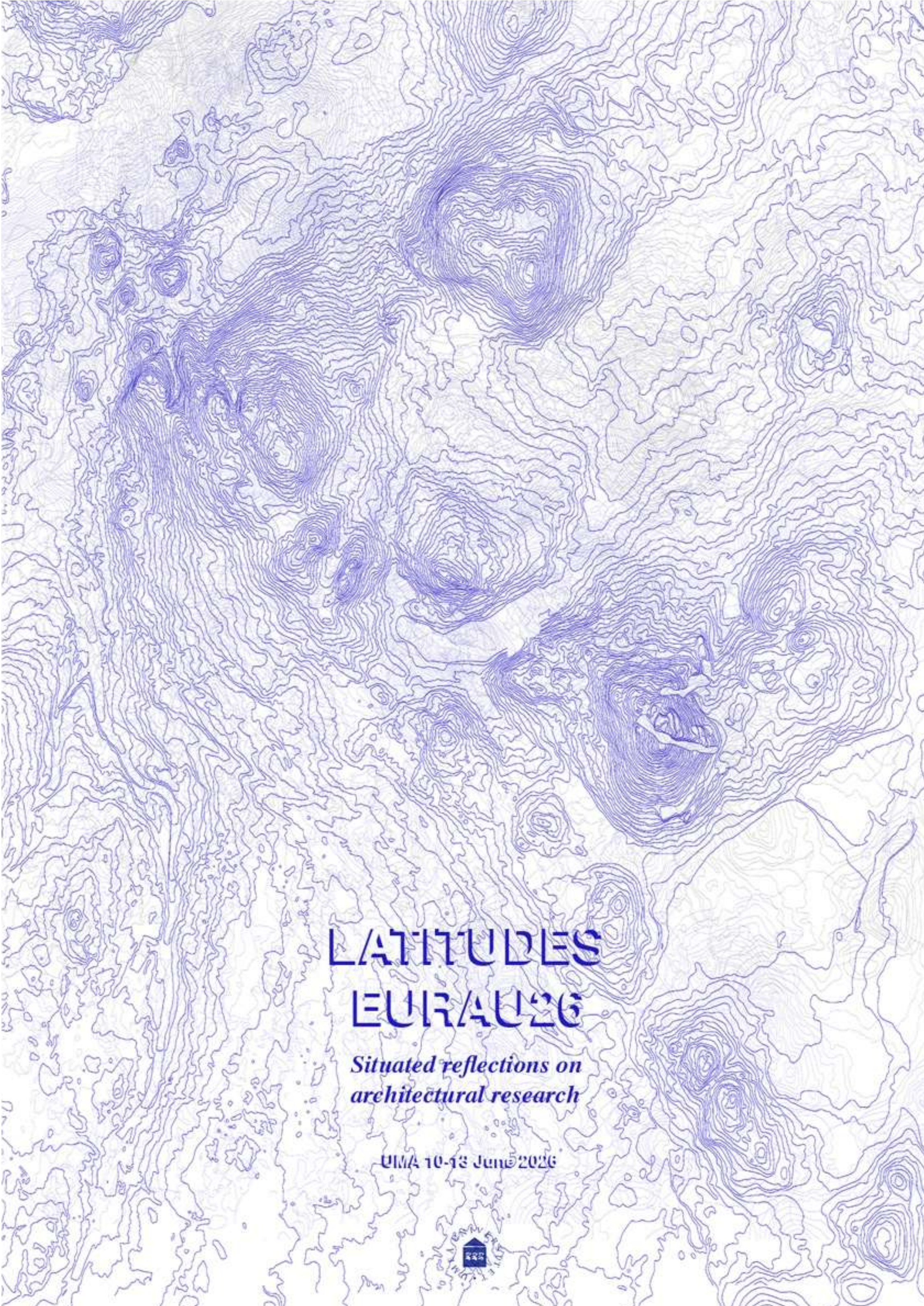
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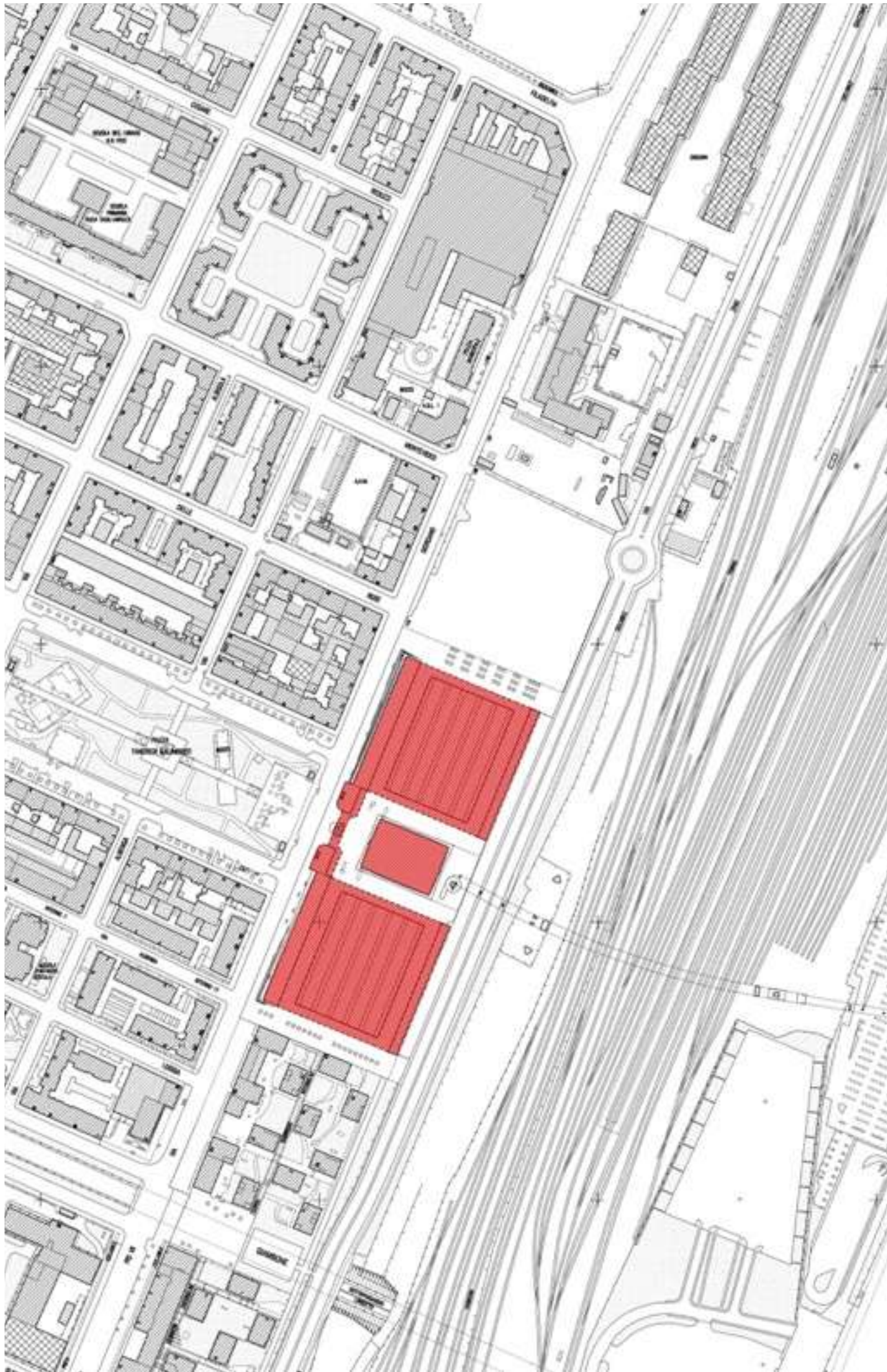


Fig. 1 Urban location and spatial context of the Ex-Mercati Generali (Ex-MOI) site in Turin, highlighting its position within the surrounding urban fabric and infrastructure.

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Architectural research never starts from a blank page. It grows out of a particular place, its climate, building traditions, regulations, and shared ideas about what should (and should not) be changed. In that sense, latitude is more than a coordinate on a map. It is also a standpoint: it shapes the questions we ask, the methods we trust, and the kinds of solutions we consider legitimate. Responding to EURAU26's theme, LATITUDES, situated reflections on architectural research, this paper reframes energy-oriented renovation of industrial heritage as a form of situated architectural research, one that is negotiated across climate, culture, institutions, and time.

The paper draws on a master's thesis focused on the adaptive reuse of the Ex-Mercati Generali (Ex-MOI) in Turin. The complex occupies a strategic position within Turin's urban fabric, shaped by infrastructural connections and surrounding neighborhoods that influence both accessibility and environmental exposure (Fig. 1). Adaptive reuse is often presented as an obvious sustainability strategy: keep what exists, reduce demolition, and limit new construction (Bullen and Love, 2011; Plevoets and Van Cleempoel, 2019). But in heritage settings, improving energy performance is rarely a straightforward technical upgrade and increasingly requires

heritage-sensitive decision-making frameworks (CEN, 2017). It becomes a careful negotiation between measurable performance goals and the preservation of spatial qualities, structural logic, and cultural meaning. This tension is especially strong in industrial heritage, where identity is often inseparable from scale, construction systems, and exposed material expression, while conservation rules and public visibility can strongly limit exterior change. Under these conditions, sustainability cannot be reduced to a universal checklist. It must be worked out through the site's "latitude": climatic needs, institutional constraints, and inherited architectural values. The research examines the Ex-Mercati Generali through three time-based phases to highlight this historical nature: its original construction as a wholesale market in 1933, its modification for the 2006 Winter Olympics, and a modern adaptive reuse concept presented in the thesis. By considering time as an analytical dimension, the building can be transformed from a rigid structure to a dynamic environmental situation. Each phase expresses a different relationship between architecture, technology, and comfort expectations, showing that what counts as "performance" is not stable but changes with social norms and institutional priorities.

Methodologically, the study combines historical and architectural analysis with comparative energy assessment. Archival drawings, photographs, and morphological readings reconstruct assemblies and spatial organization for each phase and identify character-defining elements that constrain feasible interventions. The interior structure, defined by large spans and repetitive modules, frames both heritage value and technical feasibility. Performance is evaluated through transparent indicators: U-values, R-values, qualitative assessment of thermal mass, and identification of critical junctions where thermal bridging and air infiltration concentrate. Windows are assessed separately due to their impact on heat loss and comfort. Rather than seeking a single "optimal" retrofit, the research adopts a scenario-based approach, comparing how design decisions shape performance across three time layers.

Renewable feasibility is examined through photovoltaic modelling using PVGIS-derived production profiles, linking design choices to geographic location and seasonal solar availability (European Commission, Joint Research Centre, n.d.; Huld, Müller and Gambardella, 2012). Latitude thus becomes operational: climate acts as a measurable driver of design decisions. In a mid-latitude context such as Turin, seasonal mismatch between solar production and heating demand highlights the need to combine renewable generation with demand reduction. The methodology also foregrounds uncertainty: where documentation is incomplete, assumptions are stated openly, positioning architectural research as work conducted with partial evidence.

The comparison demonstrates the integrated development of architectural and energy logic. The 1933 design prioritized functionality over thermal performance, reflecting low comfort expectations. The 2006 transformation marks energy as a design concern: insulation, improved glazing, and new services support public uses while remaining largely invisible in the building's architectural reading. The contemporary proposal treats constraint as a design driver. Because heritage value and urban visibility restrict exterior alteration, strategies concentrate on interior layers and the roof: compatible insulation, junction improvements, selective green-roof areas for summer heat and heavy rainfall, and photovoltaic integration calibrated to minimize visual impact. Results indicate that on-site renewable production can meet projected demand and potentially generate surplus energy, enabling local sharing.

Across all phases, operational change proves as significant as material intervention. Usage patterns and comfort standards strongly influence energy behaviour, reinforcing the need to align envelope measures with realistic scenarios of use. Through this case, Latitudes becomes both theme and method. Climatic latitude anchors retrofit priorities in seasonal variation. Institutional latitude defines permissible change. Temporal latitude shows sustainability as historically situated. Together these dimensions frame architectural research as an

encounter between climate science, heritage discourse, regulation, and design practice. The study contributes empirically by demonstrating that energy improvement in industrial heritage can occur without erasing architectural identity. Methodologically, it proposes a transferable logic for retrofit under constraint: reconstruct layered assemblies, evaluate performance comparatively, state uncertainty explicitly, connect renewable feasibility to seasonal profiles, and align technical choices with architectural identity. Rather than offering a universal solution, the framework clarifies what is context-specific and what can travel as design knowledge.

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