

N. 49

**COMITATO SCIENTIFICO**

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Damiano Cantone (*Università di Trieste*)

Massimo Donà (*Università Vita e Salute San Raffaele*)

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Henrique Pessoa Alves (*Università San Paolo*)

Attilio Petruccioli (*Qatar University, Qatar*)



ARCHITECTURE  
AND SUSTAINABILITY:  
MATTER, QUALITY,  
FORM

Edited by Giulia Setti

This book is funded by CRAFT - Competence Center AntiFragile Territories, a project coordinated by the Department of Architecture and Urban Studies, Politecnico di Milano, as part of the MUR “Departments of Excellence 2023-2027” program.



**POLITECNICO**  
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DIPARTIMENTO DI ARCHITETTURA  
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MIMESIS EDIZIONI (Milano – Udine)

[www.mimesisedizioni.it](http://www.mimesisedizioni.it)

[mimesis@mimesisedizioni.it](mailto:mimesis@mimesisedizioni.it)

Collana: *Architettura*, n. 49

Isbn: 9791222324371

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Piazza Don Enrico Mapelli, 75

20099 Sesto San Giovanni (MI)

Phone: +39 02 24861657 / 24416383

Cover: *Catalogue of existing windows options*. Rotor, Zinneke façade, Bruxelles, Belgium, 2019.

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To Sofia, for her curiosity and infinite love.  
To Alessandro, who is always by my side.



Studio Albori, *Timber and straw house*, Laveno Mombello, Varese, 2022,  
© Luca Boschi.

GIULIA SETTI

MATTER, QUALITY, FORM.  
NEW APPROACHES TO SUSTAINABILITY  
IN ARCHITECTURAL DESIGN

The volume *Architecture and Sustainability: Matter, Quality, Form* explores the contemporary relevance of the relationship between architecture and sustainability and identifies, or hopes to find, strategies and projects to overcome the current and upcoming ecological and environmental crisis. The architecture-sustainability pair has been explored in various ways over the last few decades, but it raises new and urgent questions that are increasingly relevant. Looking at the architectural design from a sustainability perspective, which includes environmental, economic and social aspects, is strategic not only for the quality of individual projects, but for the future of our cities and urban life. The essays, drawings and all the materials collected in this book are the result of research conducted by a group of professors and researchers from the Department of Architecture and Urban Studies – DASTU of the Politecnico di Milano, with the collaboration and support of Mapei S.p.A<sup>1</sup>. This volume has been realized with the support of the Ministerial project Departments of Excellence on Territorial Fragility 2023-2027 and by CRAFT – Competence Center Anti-Fragile Territories, a departmental research center born from the Territorial Fragility project<sup>2</sup>.

The research has led to the definition of an original geography of architecture studios that put issues related to the reduction of

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1 The conference series *Architecture and Sustainability: Matter, Quality, Form* has been the result of research work curated by Giulia Setti and Massimo Bricocoli, with Alessio Battistella, Mauro Marinelli, Francesca Zanotto, and with the collaboration of Kevin Santus, Beatrice Balducci, Thomas Cabai and Giuseppe Tamborini.

2 More information available at this link: <https://craft.dastu.polimi.it/>

the consumption of raw materials and energy, the valorisation of local materials and resources and the care of marginal contexts at the centre of their design practice. In this perspective, the project becomes a form of compensation, where architects often try to design with little, or with as little as possible, drastically reducing waste and consumption and studying processes and strategies for reusing and recovering parts and materials that have already undergone an initial use. Projects, suggestions and ideas have accompanied this work, with the aim of identifying new approaches to the concept of sustainability, so overused yet so necessary and decisive in architectural design. A first result was the organization of a conference series that took place between March and May 2024 at the Politecnico di Milano, with the support of the DASTU department and Mapei S.p.A.<sup>3</sup>, and which allowed the definition of a critical and multidisciplinary debate around this topic. Not so much with respect to the meaning of sustainability, but rather to its design applications in very different contexts and themes.

It has been a real challenge that required knowledge, intuition and the ability to adapt, especially because combining academic research with aspects more closely linked to technical and professional issues – which are the main interests of a big company like Mapei – was not a simple mission and also because the selection of eight architectural firms, within a vast panorama, was a complex and delicate operation. To do this, we tried to identify some fundamental research areas where we could study the relationship between sustainability and design, subsequently, we identified architectural practices that we thought would convey an idea of sustainability that was not so much quantitative but mostly qualitative. Therefore, offices that had environmental implications on their agenda and that they considered these as a founding principle of every design action. Not an easy task, but we think – and I speak on behalf of all the colleagues with

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3 Five seminar days were organized in the spring of 2024, which saw the participation of international design studios, representatives of the Mapei S.p.A. group and DASTU professors and researchers involved as discussants.

whom I have worked and discussed these issues – that we have constructed a rather interesting fresco, certainly not exhaustive, but capable of providing an original vision on a central issue for contemporary architecture and, more generally, for the future permanence of the human species on Earth.

The book is composed of four parts, each of them presents the work of architects and offices that have considered the concept of sustainability – and non-sustainability – in technological, urban, architectural and social aspects, with particular attention to the innovative use of materials, to experimental technological and typological solutions. The volume proposes a critical reading of environmental issues in architectural design, with the aim of building shared knowledge capable of opening a new season of architecture, oriented towards developing new solutions to limit the consumption of resources and to meet the need for greater efficiency required by European and global standards. Each section of the book addresses a central topic exploring the relationship between architecture and sustainability: *Circularity and Reuse*; *Appropriate Technology*; *Materials, Techniques, Local Care* and *Alpine Ways*. It does so with a critical essay and a series of authorial drawings and diagrams that interpret some particularly significant projects around the theme.

The first part *Circularity and Reuse* addresses an essential issue: the recovery of waste materials from construction sites or other sectors. In the essay by Francesca Zanotto, entitled *The Composite Language of Reuse*, the different design possibilities that can be experimented through practices of reusing materials are described. The idea of reusing waste from construction sites or abandoned buildings is certainly not new, but it has found a new testing ground precisely because of the pressure of growing environmental concerns about resource exhaustion. The limited resources available on the Planet are a huge problem in the field of architecture, it is necessary to educate a critical awareness on the capacity of materials, and waste, to be reused numerous times.

Rotor and 51n4e are two architecture studios both based in Brussels, they were chosen because, starting from their foundation, they have put the issues of reuse, adaptation and recovery at the center of the design agenda. Through a series of interpretative

drawings, made by Beatrice Balducci, two projects were studied that, in our opinion, are emblematic of the care and attention towards recycling processes. Rotor builds its projects starting from a survey of available pieces, in this case, windows, which are measured and catalogued and then chosen based on the needs of each project. While 51n4e works on the urban and social integration of the design, adapting existing materials in minimal interventions that do not erase pre-existing elements but, on the contrary, are placed alongside what already exists.

The second part of the volume is instead dedicated to *Appropriate Technology* and, therefore, to the relationship between design and construction techniques. Alessio Battistella describes with great precision the history and evolution of this concept and its design applications in the essay *Appropriate Technology in Architecture. From Human Resourcefulness to Systemic Resilience*.

The choice of the most appropriate technologies, we could say the most sustainable, for a certain place is the result of different factors that are combined. It seemed to us that the projects of Anupama Kundoo and TAMassociati provided two different, and complementary, keys to reading the topic, addressing the issue of technology as a strategy for engaging with the complex material, climatic, and political ecologies of the Anthropocene. For Anupama Kundoo, technological choices derive from the need to preserve local building traditions and materials, preferring an almost artisanal architecture, while for TAMassociati architecture is a political infrastructure that must guarantee well-being, dignity and civil commitment. Therefore, technological performance and energy efficiency are essential when building in fragile contexts, marked by wars, inequalities and climate crises, and where the economic sustainability of the project is an essential aspect. The drawings made by Giuseppe Tamborini try to highlight these aspects, in particular the care for traditional materials in Anupama Kundoo's works and architecture understood as an environmental, political and social process in TAMassociati.

The third part is instead dedicated to materials and care of places, the section entitled *Materials, Techniques, Local Care*

opens with an essay by Giulia Setti, *The poetry of materials. Exploring Techniques and Environment in Design Practice*, which tries to outline the issue of the relationship between materials, techniques and the concept of care, or of *taking care* as it is said in its English translation. The architecture practices chosen in this part express are Harquitectes and studio Albori, because, since the beginning of each project, they give a particular attention to the places and contexts of the different design interventions. The design research of Harquitectes is concentrated on the typological evolution of the domestic space and on the environmental comfort, hence the care towards the choices of materials and construction technologies. Studio Albori's research, on the other hand, often starts from the idea of recovering waste materials that find new meanings and new uses. It is a very careful and precise work that catalogues and selects only what can be reused and, therefore, the projects show high care for waste reduction. The drawings that accompany this section, made by Kevin Santus, reflect on these aspects, in particular for Harquitectes on the relationship between environment and technology through some significant *climate sections*, while for studio Albori an abacus of residual parts has been redrawn and used to assemble the temporary pavilion built at the Hangar Bicocca on the occasion of the *Architecture as Art* exhibition.

The fourth and last section, entitled *Alpine Ways*, is dedicated to the sustainability of design interventions in Alpine contexts and offers an original reading of the capacity of architecture to adapt to fragile contexts with projects that are often minimal and of great delicacy. The essay by Mauro Marinelli, *Alpine Ways*.

*Alternative Paths to Sustainability in the Architectural Experimentations of Innauer Matt and StudioSer*, describes these aspects very well and identifies interesting cultural positions with respect to design strategies in fragile mountain areas.

Innauer Matt and StudioSer were chosen because their projects show a particular attention to the landscape and resources of these landscapes; they are minimal, small-scale architectures, obsessively attentive to the choice of materials and integration into the existing urban fabric. It is a very valuable and

precious work that, in our opinion, celebrates a new form of sustainability that builds by limiting interventions and dialoguing with local communities. The drawings, made by Thomas Cabai, tell us about these approaches, defining a grammar of minimal interventions and materials, in the case of StudioSer, and a careful study of the materials and construction technologies specific to Innauer Matt's projects.

At the end of the book, there is an interview conducted by Massimo Bricocoli to Simona Giorgetta, board member of Mapei S.p.A., that explores the complex intersection between a family company, like Mapei, and their approach to sustainability in architecture. The need to connect technical aspects and cultural issues has characterized all the research and activities organized together with Mapei, which has been able to support the ideas and suggestions that emerged during the work. This interview attempts to draw up a balance of the experience conducted so far and to reflect further on the relationship between sustainability, construction processes and design, imagining what could arise, in the future, from the debate already underway. The dialogue is also a possibility to explore the deep interest in Mapei to support design processes, from the initial phases to the construction site, focusing on the quality of materials.

The aim of this publication is to identify some topics of great interest in the contemporary debate in architecture, but it is evidently an open field that could be constantly implemented. In this research we have always tried to put the design at the center of the reflection, choosing architectural practices which are sustainable and capable of producing architecture with quality and where the research between form, materials and space finds highly significant results. It is equally interesting to note that of the eight studios we will discuss in this volume are from very different parts of the world: two are Italian, two Belgian, one Spanish, one Swiss, one Austrian and one Indian. We have traced a partial geography, leaving out contexts where there is certainly great interest in issues related to sustainability, but trying to give a look that could retrace a European approach to the theme,

except for Anupama Kundoo who, although she has worked a lot in India, has been based in Berlin for several years. The variety of perspectives about sustainability has been the most interesting part of the research, capturing the nuances of a topic that has already been widely covered in recent years, but which requires renewed attention.



Owest Architecture, Zinneke and Rotor, *back façade of Zinneke*, Brussels, 2015. Picture by Delphine Mathy, released under creative commons.

PART I:  
CIRCULARITY AND REUSE



FRANCESCA ZANOTTO

## THE COMPOSITE LANGUAGE OF REUSE

Although the reuse and upcycling of building materials and components has been a well-established architectural practice for centuries, it reemerged as a design concern at the turn of the new millennium, as the challenging idea of reusing elements produced abundantly, quickly, and cheaply through industrial methods arose under the pressure of growing environmental concerns about resource exhaustion. The practice found a first, key reference in the publication, in 2002, of *Cradle to Cradle. Remaking the Way We Make Things* by William McDonough and Michael Braungart, highlighting that the world cannot address new issues, such as resource scarcity, by relying on the same systems that caused those problems in the first place. The book also emphasizes the central role of design in the outlining of new models of production and consumption and advocates learning from the cyclical functioning of nature to redesign industrial processes, a principle already introduced by Industrial Ecology studies, emerged in the US in the late 1980s (Frosch 1992, 800-803). The *Cradle to Cradle* framework identifies two metabolisms on the planet: the biological metabolism – referring to the cycles of nature – and the technical metabolism, encompassing the cycles of industry, “including the harvesting of technical materials from natural places” (McDonough and Braungart 2002, 104). Concerning architecture, it envisions buildings designed for easy disassembly, where components can be reused endlessly, and employing materials that can be completely reused or safely returned to the environment. The model also proposes an “upcycling passport”, a document that identifies all the materials used in the construction of a building and indicates “which are viable for future nutrient use and in which cycle” (178).

In relation to the *Cradle to Cradle* framework, many practices have emerged in later years: Thomas Rau and his firm, RAU Architects, put McDonough and Braungart's idea of a material passport into practice through the platform Madaster<sup>1</sup>, and leads his architectural work with the concept of buildings as "depots of materials" (Rau and Oberhuber 2023). The Ellen MacArthur Foundation<sup>2</sup> built on the framework to help define, a few years later, the Circular Economy paradigm, visualizing the two cycles in its "butterfly diagram"<sup>3</sup>, with circular, looping arrows symbolizing the recycling, reuse or revaluation of biological and technical materials. The Foundation also partnered with ARUP to produce the *Circular Buildings Toolkit*<sup>4</sup>, a set of guidelines for architectural design and construction that prioritize resource efficiency.

Despite *Cradle to Cradle*'s stated respect for diversity (118), its focus on contextual relationships and systems, and the condemnation of the "one-size-fits-all" logic (28), architecture based on *Cradle to Cradle* and related frameworks reproduces, with few exceptions, the standardization that led Modernism and International Style to evolve into homogeneous, uninspiring forms of architecture. *Cradle to Cradle*-based buildings are frequently "bland, uniform structure isolated from the particulars of place" (29), shaping a technocratic image of circular architecture (Zanotto 2020), in which recurrent, heartless glass façades

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- 1 Madaster is an online platform that registers and manages materials and products used in the built environment by giving them an identity through a set of data called a "passport", tracking their information, performance, and lifecycle thus enabling their safe and informed reuse, recycling, or repurposing. See Rau, Thomas, and Sabine Oberhuber. 2023. *Material Matters. Developing Business for a Circular Economy*. Routledge.
  - 2 The Ellen MacArthur Foundation is a non-profit organization based in the UK that works to accelerate the transition to a circular economy through research, education, publishing and partnership with international corporations. See <https://www.ellenmacarthurfoundation.org/>.
  - 3 See Ellen MacArthur Foundation. 2015. "Growth within: A circular economy vision for a competitive Europe." Accessed May 2, 2025. <https://www.ellenmacarthurfoundation.org/growth-within-a-circular-economy-vision-for-a-competitive-europe>.
  - 4 See ARUP. n.d. "Circular Buildings Toolkit." Accessed May 2, 2025. <https://ce-toolkit.dhub.arup.com/>.

and curtain walls reflect clients' budgets and market positioning ambitions. In her *The Architecture of Closed Worlds*, Lydia Kallipoliti references the Berlin critic Adolf Behne – quoted in Beatriz Colomina and Mark Wigley's *Are We Human?*, who, in 1926, stated that “those designers who only care about the mechanical logic of function, and aim to make a building a ‘pure tool’, actually end up [...] producing an inhumanly standardized architecture” (82). The inability of “corporate”, technocratic circular architecture to address “the complexities present in both environmental science and creative design” (Kallipoliti 2018, 22), as well as the tensions, contradictions, and human passions is based on the same functional vision of buildings, seen as steps in procedural frameworks, rather than devices able to intertwine cultural and social relationships with their context. Moreover, while emphasizing the future of architecture, whenever its first lifecycle would be completed and the structure would be dismantled and reused, the narrative of these buildings freezes them in a perpetual present, where time and wear do not exist, ambitions do not change, and the post-occupancy of the buildings is channeled into predictable, compliant patterns.

Approaching architecture from a different perspective – and with different capitals at hand, some practitioners have been exploring over the past two decades an alternative approach to circular architecture, based, rather than on dismountability, the measurement of performances and the production of marketable models, on the unique contribution architecture can bring to the social and cultural environment through the reshuffling of tangible, intangible and latent existing resources. These practitioners engage in architectural design and adaptive reuse, as well as in a constellation of related practices such as curatorship, self-building, material scouting, academic involvement and scientific research, dissecting and rethinking design and construction processes and rules, seeking leverage points to challenge and reconfigure in order to make architectural practice truly transformative. Figures that embody, once and for all, the answer to the long-standing debate about the architect's role in the 21st century: professionals shaped by today's global complexity, relational economy, diffused working, and mass entrepreneurship

and well aware of the need for multifaceted answers to contemporary questions. Alejandro Zaera-Polo, in his *2016 Global Architecture Political Compass* mapping the relational ecology of emerging architectural practices' "post-neoliberal" positionings<sup>5</sup>, might have situated them in fluid relationships with the "material fundamentalists", who use the materialization of the project and the reconciliation of the architect's and the builder's practice as arguments "for resistance to neoliberal liquefaction" (277); the "normcore", who view the often restricted economies of the project as the "main driver" (281) of tailor-made, unique and innovative solutions that can nonetheless generate shareable frameworks; the "activists", engaging in direct-action practices aiming to "re-engage the architectural object with community" (257).

Among these practices is Rotor, a cooperative design practice based in Brussels, critically investigating since 2005 the "organization of the material environment" (Rotor n.d.) through design and the study of economic and policy models related to the architectural practice. In 2016 they launched Rotor DC, a spin-off project that manages a physical and virtual marketplace for salvaged building components and materials. Rotor creates new value in the built environment by working "on the existing with the existing", and selecting, among the countless signs and artifacts produced by our era and its markets, those that are open to be reinterpreted and able to take on new roles within new formal and functional compositions, diffusing new meanings.

Another Brussels-based practice, 51N4E, focuses on today's complex reality and aims to leverage the diversity of existing systems and conditions to create integrated social value in the built environment. Their design research focuses on the decision-making and materialization process in architecture, using resilient structures, calibrating old and new materials to form a greater whole, conceiving inherited buildings as landscapes to be explored and seeing each project as a set of specific spaces,

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5 The *Global Architecture Political Compass* diagram has been authored by Alejandro Zaera-Polo and Guillermo Fernández-Abascal and is published in Zaera-Polo, Alejandro. 2016. "Well Into the 21st Century. The Architectures of Post-Capitalism?." *El Croquis* 187: 253-87.

open to multiple interpretations (51N4E n.d.). They often engage in adaptive reuse of “open public structures”, existing and underused landmarks re-imagined to unlock new potential.

The architecture produced by Rotor, 51N4E, and other practices engaged in re-signifying the existing results from navigating norms, building regulations, and market rules shaped by a predominantly extractive building culture. The study of the policy and regulatory landscape within which design and construction operate is the main field of interest and work of these firms, since the possibility to innovate architectural paradigms and regulate the environmental impact of the construction sector depends on a necessary reformulation of procedural and regulatory frameworks. Sectoral policies have the potential to transform exceptions into norms, thus playing a fundamental role in the acceptance of new procedural models and, consequently, of a non-extractive<sup>6</sup> (Space Caviar 2021) architectural and building culture.

Regulations, standards, and taxation are crucial factors shaping reuse practices, interweaving complexly and being managed by public authorities. The measures discussed by recent studies mainly focus on a quantitative approach, which well fits the goal of making reuse practice more attractive by emphasizing their measurability, cost-effectiveness and “marketability”. One widely discussed measure is the possibility of establishing mandatory reuse rates – not without doubts and many issues pending<sup>7</sup> – identifying in a minimum of 15% of reused materials to be incorporated into construction or renovation projects (Ghyoot 2024,

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6 “Non-extractive architecture” is a term popularized in the debate by the homonymous ongoing project initiated by Space Caviar (Joseph Grima, Sofia Pia Belenky and others) aimed at “collectively rethinking the balance between the built and natural landscapes, the role of technology and politics in future material economies, and the responsibility of the architect as an agent of transformation” (Space Caviar n.d.). See Space Caviar, eds. 2021. *Non-Extractive Architecture. On Designing Without Depletion. Volume 1*. Sternberg Press.

7 To explore further see Ghyoot, Michaël. 2024. “Reuse Rates: Should They be Mandatory?” In *The Architecture of Resue in Brussels*, edited by Kristiaan Borret, Lola Durt and Jerome Kockerols. Bouwmeester Maitre Architecte.

108-109). The Interreg NWE project *Facilitating the Circulation of Reclaimed Building Elements* (FCRBE)<sup>8</sup>, led by Rotor, Brussels Environment, TUDelft, LIST, and CSTB, has identified other quantitative measures on the basis of best practices observed around Europe, such as the adaptation of taxation for reused construction products, or the internalization of the environmental costs of new products to make reuse more competitive (Ghyoot and Topalov, Bottani-Dechaud, Rejai 2024, 33). Other possible actions identified within the project include addressing the certification issue on reused materials; the establishment of a list of “protected” items, that should be recovered for reuse during demolitions; the creation of a framework to assess and demonstrate the suitability of reused materials for use; the support of companies that adopt reuse practices; the facilitation of the access to land for storage and conditioning of recovered materials. Further measures include ensuring compliance with construction and demolition waste management protocols and pre-demolition audit guidelines, the creation of resource databases and procedural frameworks that simplify the essential case-by-case negotiation (Condotta and Zatta 2021).

Apart from quantitative measures, construction frameworks need qualitative changes that necessarily intertwine with quantitative aspects, revolving, for example, around a shift in the idea of progress and prosperity, that should derive from the ability to keep things “alive”<sup>9</sup>, avoiding their wasting and the loss of their value. Working with reuse practices requires significant empirical skills and experience; a redesigning of the economic model on which the materialization of architecture is based should be built on the valorization of intellectual and manual labor – the added value necessary to transform existing matter into new

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8 See <https://vb.nweurope.eu/projects/project-search/fcrbe-facilitating-the-circulation-of-reclaimed-building-elements-in-northwestern-europe/#tab-3>.

9 Based on Michaël Ghyoot’s speech held on March 25th, 2024, at AUIC School, Politecnico di Milano, at the *Circularity and Reuse* seminar, part of the *Architecture and Sustainability: Matter, Quality, Form* seminar series, promoted in collaboration between the Department of Architecture and Urban Studies and Mapei.

objects, without causing environmental harm. This shift would be strongly backed by a reasoned renovation of building codes, alongside the integration of reuse into evaluative tools.

Closely tied to the revision of regulatory frameworks and a turn in the market value related to construction, another focus of these practices is the questioning of established, streamlined materialization processes, conceived and fine-tuned to be quick, efficient and profitable. The current system relies on an ideally linear process and immutable environmental conditions, organized around schedules based on *decisions* made in advance, where in-process changes are a variable, not structurally foreseen. Built architecture is the materialization of these choices, leaving little or no space for spontaneous dynamism and adaptation to unforeseen conditions or knowledge gained during the process, which is often lost in the pursuit of realizing a finite building. The making of architecture, however, never follows a “deterministic” linear path but unfolds through a “constant set of negotiations – between internal intents and external forces, between certitude and chance” (Till 2000). Reuse practices flip the script and break open the established design process, making room for intuition, discovery and evolution, not necessarily aiming to completion through materialization but scattering the latter throughout the entire journey. It may occur even before the actual design begins, during material scouting or when the design concept is driven by the understanding of the tangible and intangible resources that can be activated on-site, beyond the specific design brief: the phase of deciding “what to do with the forces at play” (Vandembulecke 2024, 76). In this process, we may loosen control over materialization and lower the expectations of seeing realized precisely what we have designed and know, and overturn the project timeline, “leaving bleed”<sup>10</sup>, gaps, buffers and spaces in both the timeline and the system to enrich the project with the emergence

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10 Based on Michaël Ghyoot’s speech held on March 25<sup>th</sup>, 2024, at AUIC School, Politecnico di Milano, at the *Circularity and Reuse* seminar, part of the *Architecture and Sustainability: Matter, Quality, Form* seminar series, promoted in collaboration between the Department of Architecture and Urban Studies and Mapei.

of unforeseen solutions, the rewrapping of some decisions and the incorporation of insights, innovations and new experiences.

Through policy and procedural frameworks, reuse practices shake rooted cultural assumptions about architecture, such as the idea of each building as an immutable object, exposing its materiality, reminding its technical, economic and social nature before artistic (Rotor 2010, 17-18), unveiling its being inserted in production and disposal cycles (Zanotto 2020, 80) and shifting the focus of architect's role from the composition of a new object to the manipulation of someone else's work, blurring authorial boundaries (Mac Aoidh 2023, 45) and questioning the established notions of authorship and originality. However, unlike *Cradle to Cradle*-based practices', their focus notably remains firmly on architectural composition and language, never sliding away into process-making or policy examination. The resulting expressions are obviously not driven by individual whims, but by the re-composition of an alphabet made of existing structures, forms, materials, colors and textures into a new visual language where the many tight, tangible and intangible entanglements in architecture resonate through past stories turned into new potentials, the creation of shelters for different activities (51N4E n.d.), and functional, captivating spatial experiences. The rehabilitation of a former printing workshop complex in Brussels, led by Ouest Architecture with Rotor, aimed to open the place to the city's many small creative initiatives. The rear façade was completely recomposed, with large openings created toward the garden. Reclaimed window frames, provided by a local supplier, were reemployed in unexpected ways, establishing a strong connection with the surrounding context and embodying the inventive sparks that support and inspire creative practices. 51N4E's Recypark, in Anderlecht, repurposes the wooden structure of an old riding arena into a public canopy open towards the city, which accommodates a skate park and a green space working in synergy with the container park and facilitating the acceptance of the logistics program and facilities in the district. The structure gives a common identity to the different programs, leveling off the different nature of their publicity while fitting the scale of the surrounding industrial buildings. In their *How to Not Demolish*

*a Building*, 51N4E report the complex and layered process of entirely reusing the former World Trade Center in the Northern Quarter in Brussels, describing in detail the procedural framework and, at the same time, defining the architectural characteristics of the new adaptive-reuse project called ZIN: a building embodying “a new type of urbanity, one that is no longer about monolithic buildings standing in isolation but about hybrid urban objects activating their surroundings, functioning as extensions of the public space and having a beneficial urban, social, and ecological impact” (51N4E and l’AUC 2023, 73).

By speaking this visual language, architectural reuse practices have the potential to affect our cultural relationship with the built environment, contributing to a broader understanding of the unsustainability of current models of materialization and challenging architectural aesthetics that perpetuate the success of these models, dismantling the mistrust surrounding reuse and the belief in the necessity of a pristine architecture, perceived as “new” and therefore “safer, sounder, cleaner and generically preferable” (Shotwell 2016), since “purity is a myth” (Till 2009, 18). On one hand, these practices rework existing resources, countering “the long-held assumption that architectural progress is necessarily signposted through the addition of new stuff to the world” (Till 2012); on the other, they challenge Branzi’s prediction for the 21st century of a “non-figurative architecture” (2006, 9), by exploring formal and language possibilities that return surplus value to the environments and communities they engage with, demonstrating a deep trust in architecture.

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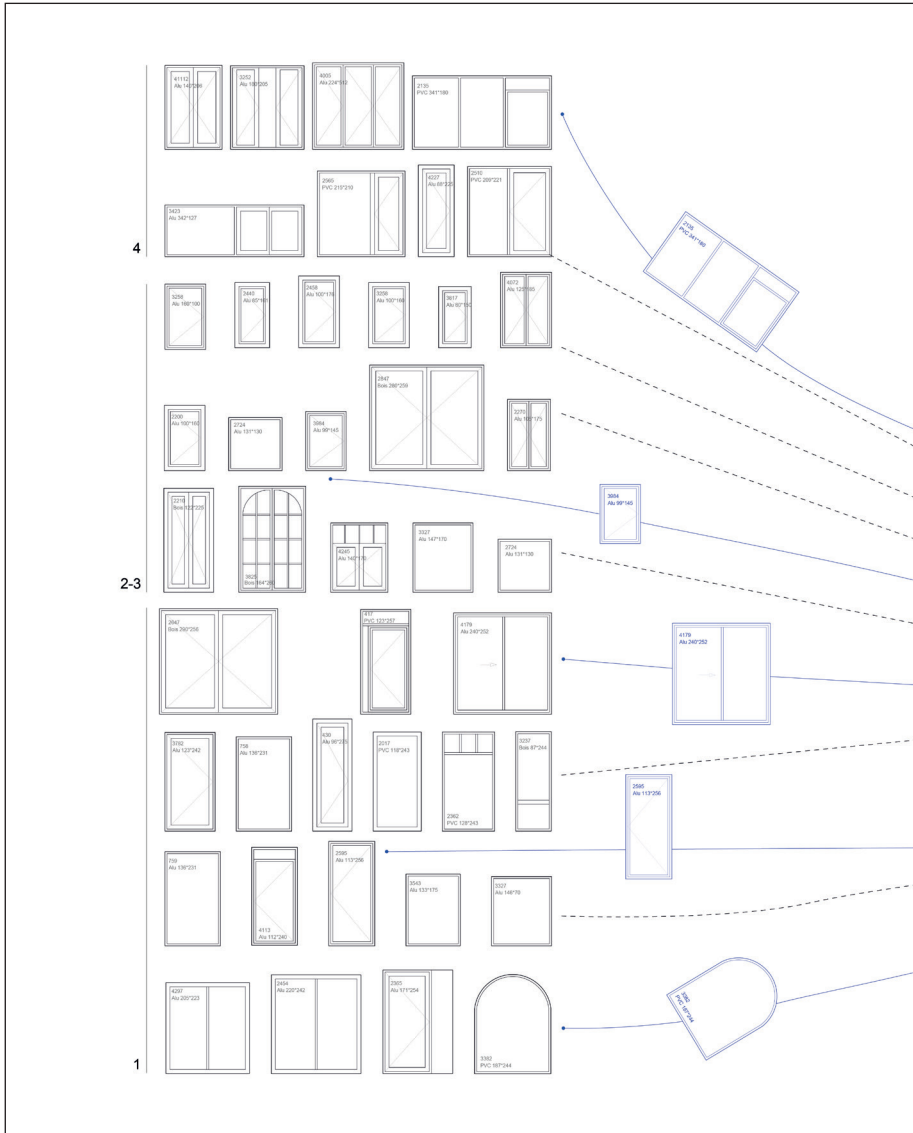
GIULIA SETTI, BEATRICE BALDUCCI

## RECYCLE AND REUSE: NECESSARY DESIGN CONDITIONS

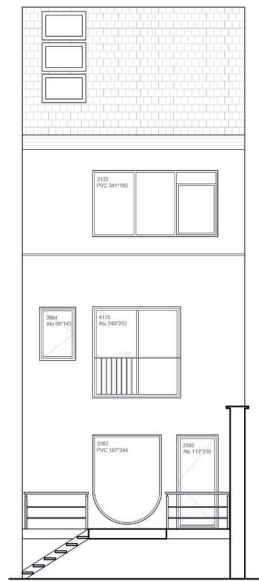
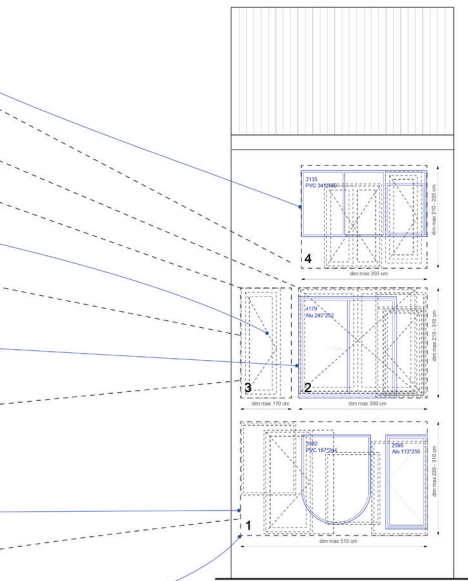
The projects of Rotor and 51N4E, two design offices both based in Brussels, demonstrate ongoing research on the topic of the reuse and recycling of materials or parts of existing buildings, which are no longer in use, and could have a second life. The scarcity of renewable resources produced by the Earth and the high impact that constructions produce highlight the need to transform and convert the enormous stock of existing buildings, avoiding, where possible, demolition and new construction (Ghyoot 2024; 51N4E and l'AUC 2023).

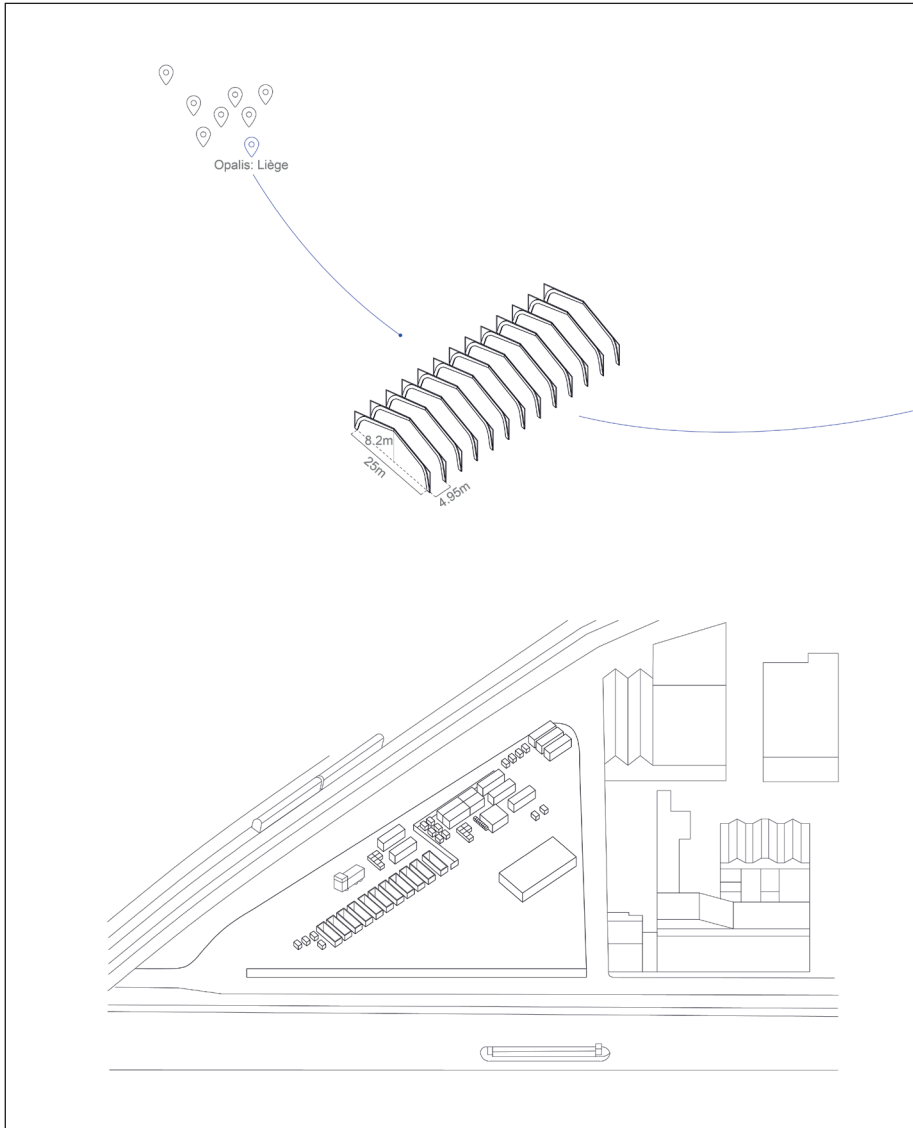
The two projects studied in this section, one by Rotor and one by 51N4E, well describe the complex process behind practices of reuse and recycling of construction elements, it is a very interesting geography that starts from the collection and selection of abandoned materials most suitable for recovery, up to the project site.

The transformation of Zinneke's spaces, a socio-artistic organisation founded in the context of *Brussels 2000 European City of Culture*, is an exemplary case of a renewed focus on waste reduction and the possibility of adapting materials already used in other buildings. In 2015, Zinneke invited Rotor to follow the long-term project for the renovation of their new facilities at Place Masui in Brussels. The location is a former state printing workshop complex. In 2016, the design team expanded with the addition of Ouest architecture and Matriciel. Both the project and the process are very interesting because they allow an understanding of the phases and actions necessary to reuse materials in design interventions. In particular, Rotor supports Zinneke in achieving the objectives related to the reuse of materials that were set at the beginning of the project. It is a co-design process that leads to the recovery of 5 window frames to compose the back façade of one of the street houses, but also 2 elegant steel staircases, 30 steel beams used as lintels for new bays. And again, about 20 radiators, more than 20 doors (including fire-resistant doors), and finally, a complete ventilation group saved from

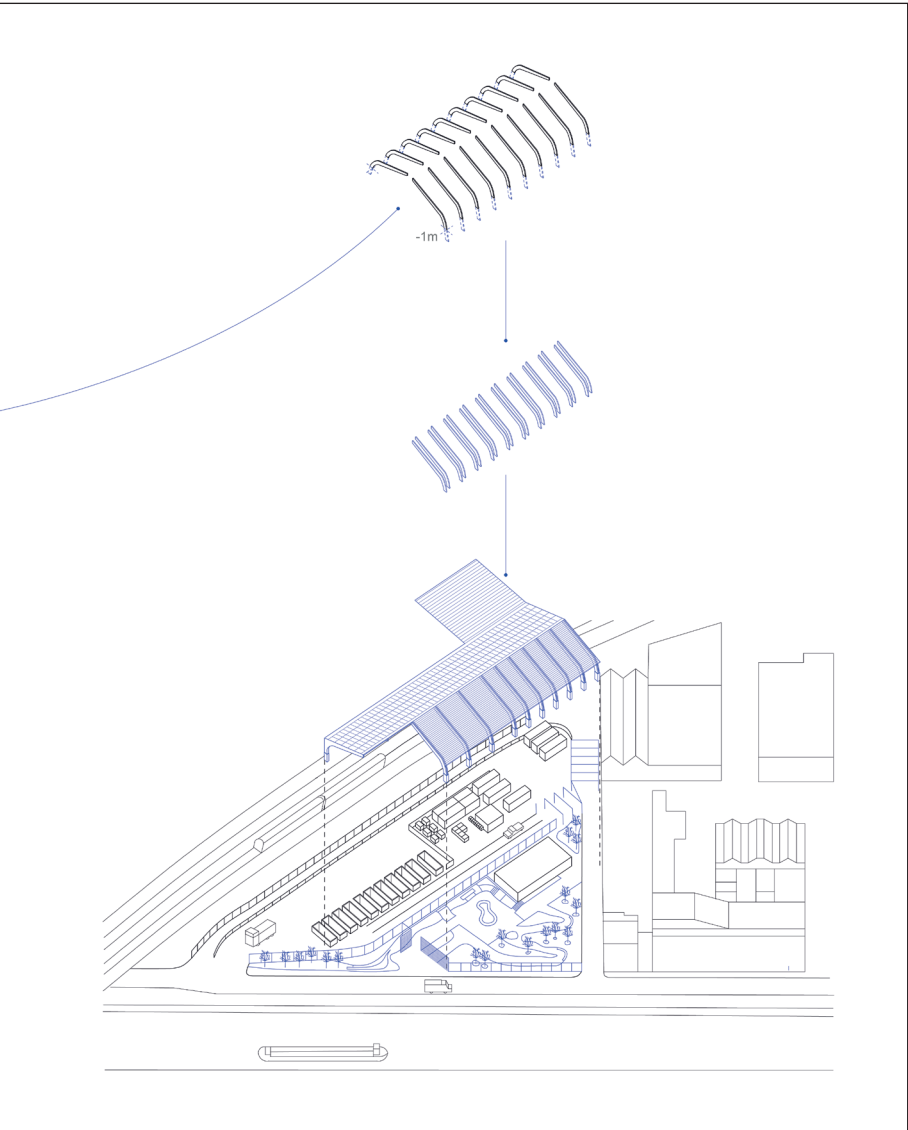


Rotor, *Zinneke façade*, Bruxelles, Belgium, 2019. Drawing by Beatrice Balducci. The drawings show the process of cataloging, selection, and composition of windows.





51N4E, *Recypark*, Anderlecht, Belgium, 2024. Drawing by Beatrice Balducci. A new park is conceived while converting a former industrial site. The design of a common roof takes form by reusing the structure of an old riding arena, reinventing its forms and use.



a downtown office tower. These are just some of the materials and technological systems recovered that have found a new use in Rotor's project; by the end of the design, more than 94% of the existing building has been kept unchanged, this result is significant because it highlights the possibility to work with minimal interventions able to make the most from the existing spaces and, therefore, reducing waste of materials and resources (Rotor n.d.).

The interpretative drawings realized, based on this project, highlight first of all the process of selection and research of materials to be reused, in this case the window frames, which become an emblematic element in the design. Rotor begins a very in-depth research work, where the windows are catalogued by size and materials, it is a sort of archive from which to choose the openings that best adapt to the elevation to be composed. The selection of 5 windows is made respecting the dimensions given by the constraints of the existing building. The new facade welcomes the reused windows and becomes a manifesto of the infinite design possibilities that reuse can provide to architects. Through this project, Rotor shows how it is possible, and much more sustainable, to recover materials, selecting the elements most capable of adapting to new configurations.

51N4E has a design philosophy that is, in some ways, similar to Rotor's; both consider reuse a design practice to be supported, necessary in a historical moment marked by a deep climate and environmental crisis (De Bruyn and Leyssen 2022). *Recypark* is an adaptive infrastructure project developed in an area along the Brussels-Charleroi Canal, a space that is increasingly becoming a leisure refuge for citizens and not just a peripheral space. Recypark is a container park, like many others that are emerging in various cities, a public place in which to rethink the use of waste, giving these processes a positive connotation. In the project description on their website, 51N4E states that one person's waste can become usable resources for others and, in this perspective, Recypark represents a fundamental piece in the circular economy process (51N4E n.d.).

The design proposal divides the area into two parts: one for recycling activities and another for public spaces facing the canal and intended for citizens, a strong choice capable of giving back a part of the land for collective and open activities. The public space is activated by the presence of a skatepark and a green area that facilitates integration with the Recypark's activities. The two

programs are independent of each other, but they are also part of a single idea of public space; for this reason, 51N4E decided to cover, under a single roof, the space to strengthen the common identity of the project. Following a study developed by Rotor itself, 51N4E chooses to reuse the structure of an old riding arena to create the common roof for Recypark. The structure is obtained from an industrial shed and integrates into the semi-industrial environment, reducing its carbon footprint. The existing roof structure was analyzed, disassembled, and stored, awaiting its reassembly on site. The drawings, which critically interpret this project, describe the long process that was necessary to reuse the roof and adapt it to the new site. In particular, they show how the new assembly allowed for the modification of the position of the wooden elements, obtained from the existing roof, thus creating a new, but recovered element.

The exploded axonometry shows the evolution of the design phases, starting from the original site conditions up to the addition of the new roof and the design of public spaces. The wooden roof was recovered and adapted to the specific site conditions, becoming a peculiar element in the design. Recypark has been a design opportunity for 51N4E to increase the social and collective character that logistics-related infrastructures can bring to cities. At the same time, it is a very ambitious small and large-scale project, that can become a prototype for other processes of integration between logistics and public spaces.

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Anupama Kundoo, *Wall House*, Auroville, India, 1997-2000.  
Credits: javiercallejas.com

PART II:  
APPROPRIATED TECHNOLOGY



ALESSIO BATTISTELLA

APPROPRIATE TECHNOLOGY  
IN ARCHITECTURE.  
FROM HUMAN RESOURCEFULNESS  
TO SYSTEMIC RESILIENCE

The notion of *appropriate technology* should not be misunderstood as a static catalogue of tools or construction techniques, nor as an anti-modernist nostalgia for pre-industrial craft. Instead, it constitutes a theoretical framework and evaluative lens that interrogates the ethical, social, and ecological implications of technological choices in architecture. This framework repositions the discourse away from innovation for its own sake, and toward a more context-sensitive, human-scale, and environmentally grounded practice.

*Historical Foundations: Gandhi, Schumacher, and Post-Industrial Critique*

The term's ideological origins lie in the work of Mahatma Gandhi, who challenged the imposition of Western industrial technologies upon Indian society, advocating for *swaraj*, self-rule through local autonomy and resource control. Gandhi's *charkha* (spinning wheel) became both symbol and instrument of an alternative technological order, privileging decentralised production, simplicity, and social cohesion.

It was Ernst Friedrich Schumacher, however, who formalised these ideas in the 1970s into a comprehensive critique of industrial modernity. In *Small is Beautiful* (1973), Schumacher argued that development models imported from the Global North were incompatible with the socio-economic conditions

of the Global South. Observing that such societies were “long in labour and short in capital” (Schumacher 1973), he proposed a small-scale, capital-cheap, labour-intensive, energy-efficient, and non-violent technology, a vision he termed *intermediate* or *appropriate* technology.

This critique laid the foundations for the Intermediate Technology Development Group (later Practical Action). It influenced institutions like the National Centre for Appropriate Technology (NCAT) in the United States, which applied similar principles to rural development and energy systems (Régnier and Wild 2023). It also seeded a broader epistemological critique of techno-determinism in development thinking.

### *From Technological Determinism to Epistemological Pluralism*

Ivan Illich significantly deepened the critique of technology in *Tools for Conviviality* (1973), arguing that modern industrial tools tend to disempower individuals and centralise expertise. Illich distinguished between *convivial* tools that foster autonomy, skill, and social bonds, and *manipulative* tools that require technocratic mediation and produce dependency. For architecture, this distinction foregrounds the role of craft, local knowledge, and participatory building processes in sustaining cultural and material resilience. Illich’s vision is echoed by Wolfgang Sachs, whose anthology *The Development Dictionary* (1992) dismantles key assumptions of post-war development discourse, including the belief in technological *catch-up* as a path to prosperity. Sachs emphasises that true sustainability requires cultural self-determination, degrowth in material throughput, and locally governed technologies rooted in ecosystemic rationality. Building on these critiques, Arturo Escobar, drawing from Latin American decolonial theory and political ecology, proposes a pluriversal approach to technology. In *Designs for the Pluriverse* (2018), he argues that development itself is a colonial construct that imposes Western ontologies of progress and linear time. Instead, he advocates for technologies designed from within local life worlds, technologies that emerge from re-

lational ontologies, privileging care, reciprocity, and ecological embeddedness.

Together, these perspectives reframe appropriate technology as an alternative ontology of making, which goes beyond an interpretation of architecture as the application of neutral techniques and becomes the material expression of cultural, ethical, and ecological relationships.

### *Contemporary Reformulations: Market Strategies and Frugal Innovation*

While early proponents of appropriate technology focused on grassroots empowerment, later iterations, particularly C.K. Prahalad's *Bottom of the Pyramid* (BOP) theory, reframed the concept within the language of inclusive capitalism. Prahalad (2005) argued that the four billion people living on less than \$2 a day represented a vast untapped market. New business models could simultaneously serve their needs and generate profit. This market-oriented shift attracted private-sector investment but also introduced new tensions. Critics argue that commodifying poverty risks reinforcing asymmetrical power structures, where people experiencing poverty are treated as consumers rather than agents of their own development (Régner and Wild 2023). The emphasis on scalability and efficiency may eclipse local knowledge systems, community agency, and environmental limits.

A more recent evolution of this discourse is seen in frugal innovation, which attempts to reconcile affordability, usability, and sustainability. As Albert (2019) notes, frugal innovation emphasises radical simplicity, modularity, reparability, and low embodied energy, aligning with the core values of appropriate technology. It intersects with concepts like the circular economy, design for disassembly, and open-source architecture, and has found expression in both humanitarian and climate-adaptive design.

*Toward a Critical Technological Ethics in Architecture*

Reinterpreted through the lens of Kundoo's and TAM's work, appropriate technology in architecture is a strategy for engaging with the complex material, climatic, and political ecologies of the Anthropocene. Anupama Kundoo's practice focuses on revalorising human resourcefulness, demonstrating how materials like ferrocement, earth, or waste ceramics can generate high-performance, low-impact buildings when embedded in local labour systems and cultural practices. Her work emerges from a deep, lived understanding of context. Kundoo represents an architect born, trained, and who has worked extensively in the South of the world, operating from within the constraints and possibilities of its specific socio-material realities.

Raul Pantaleo's work, through TAMassociati, illustrates a systemic approach in which climate modelling, participatory governance, and material pragmatism coalesce into socially resilient infrastructures. While equally committed to appropriateness and equity, Pantaleo represents a different trajectory, an architect born and trained in Europe, who has chosen to work in the South of the world. His practice brings a politically engaged, activist dimension to design, addressing global asymmetries through collaborative, infrastructural, and deeply contextualised projects.

Together, their paths exemplify two complementary modes of engaging with appropriate technology. Both authors share a post-industrial and post-colonial ethics of design, in line with the critiques advanced by Illich (1973), Sachs (1992), and Escobar (2018). In both cases, technology is not the starting point but the result of a collective inquiry into values, constraints, and potentials. The design process becomes a means of producing knowledge and capacity, not just objects. In this regard, appropriate technology serves as a vector for social transformation, restoring design to its civic and ecological vocation.

*Anupama Kundoo: Human Resourcefulness as a Design Paradigm*

Anupama Kundoo frames technology as an act of human engagement rather than a mere tool. Her critique of post-colonial architectural norms, which often import material logics and construction methods ill-suited to their contexts, is grounded in the belief that sustainability is fundamentally an epistemological issue. Materials are not inherently appropriate or inappropriate; the human relationship to them defines their value. Her architecture begins with the body, with hands-on engagement and embodied knowledge. She reinvigorates earth, brick, and lime not as nostalgic returns to the vernacular, but as living technologies subject to innovation and reinterpretation. Rather than privileging novelty, Kundoo seeks to extract maximum intelligence from ancient construction systems, testing and refining them in dialogue with modern engineering. By foregrounding labour, Kundoo underscores the social dimension of technology. A brick is not only a unit of construction, but the result of a local economy, a chain of human decisions, and a territorial ecology. Her attention to these layers reveals architecture as a platform for community development. She bridges the gap between the informal and the formal, reconfiguring architectural education itself to include craftspeople as teachers and students as hands-on collaborators. Kundoo's architecture is grounded in what she calls the abundance of human resources, rather than the scarcity of natural ones. Her work in Auroville illustrates how material research, construction experimentation, and community labour can generate contextually intelligent and socio-economically inclusive architecture. This attitude exemplifies frugal innovation in practice: low-cost, locally replicable, materially efficient, and culturally resonant (Albert 2019).

Kundoo's ethos resonates strongly with Illich's concept of convivial tools: her architecture does not impose but enables. It is a pedagogy as much as it is a practice. Her emphasis on *thinking with the hands* and full-scale prototyping within academic settings reflects a counter-hegemonic architectural education model that seeks to restore tacit knowledge, community memory, and

embodied intelligence. From this perspective, her architecture becomes an act of reskilling and reterritorialisation, an ethical project of reclaiming spatial production from extractive industrialism and redirecting it toward relational, labour-rich, materially attuned practices.

### *The Home as Laboratory*

The essence of Anupama Kundoo's architectural practice lies in developing adaptive, iterative knowledge systems, an approach most clearly embodied in the construction of her own home in Auroville. More than a residence, the house is a long-term architectural laboratory, a testbed for techniques rooted in appropriateness, frugality, and embodied intelligence. Kundoo has refined multiple construction techniques within this modest domestic scale, advancing material efficiency and labour-based innovation. Central to her experimentation is minimising material use, especially in structural components. To this end, she employs form-optimised geometries, such as catenary curves, which provide maximum strength with minimal mass. Her home's thin-shell vaults and arches are cast in reinforced cement concrete (RCC) using lost formwork systems made from reusable, low-cost materials. These enable significant reductions in steel reinforcement, up to 60%, while integrating thermal, acoustic, and aesthetic functions. This process demonstrates that aspects of economic and architectural quality can coexist. Significant is her commitment to roofing innovation. Across her home, Kundoo has implemented seven distinct roofing systems, each exploring different forms, materials, and thermal behaviour logics. These include inverted terracotta pots as permanent RCC formwork, catenary vaults of terracotta tubes, ferrocement vaults, and jack arches, all tested and inhabited under real climatic conditions.

These prototypes offer insights into rainwater runoff, thermal gain, acoustics, and comfort, collapsing the divide between design, construction, and post-occupancy research. Her use of lime-based plasters and oxide washes instead of industrial finishes furthers her ethos: natural, breathable, locally sourced materi-

als that permit broad participation, including low-skilled labour. The resulting aesthetic, derived from waste ceramics and regional pigments, grounds the house in a vernacular modernism that is neither nostalgic nor imitative. For Kundoo, the appropriate is not a fixed style or toolkit, but an evolving methodology refined through making, dwelling, and learning cycles. Her home embodies this ethos at every scale: from the arc of a ferrocement vault to the shared rituals it shelters, it is an architecture shaped by relationships between people, materials, techniques and place.

### *Raul Pantaleo and TAMassociati: Architecture as Political Infrastructure*

Raul Pantaleo, presenting on behalf of TAMassociati as a founding partner, articulated an interpretation of appropriate technology rooted in systemic activism. This approach sees architecture as infrastructure for health, dignity, and civic empowerment. In collaboration with Emergency NGO, TAM has developed projects in fragile contexts such as Sudan, Uganda, Iraq, and Afghanistan, where architecture becomes a strategic tool for addressing global, structural vulnerabilities, conflict, displacement, inequality, and climate crisis. TAM's methodology prioritises systems thinking. Projects are conceived through scenario planning, climate forecasting, participatory governance, and economic modelling, involving interdisciplinary teams, engineers, health professionals, and sociologists from the outset. The result is a metabolic architecture capable of managing energy, water, material, and social flows while responding to infrastructural gaps. Crucially, TAM challenges the elitism of high-performance architecture. Drawing on C.K. Prahalad's (2005) *Bottom of the Pyramid* concept, they argue that sustainability must begin with economic viability. Unaffordable buildings, difficult to maintain, or reliant on imported technologies exclude the very communities they claim to serve. Climate adaptation must therefore emerge from local means, capacities, and agency. To achieve this, TAM favours passive systems, local materials, and modular construction, aligning with Martin Albert's (2019) idea of frugal

innovation, simplified, resource-efficient, and environmentally compatible designs. Their projects reject performance fetishism in favour of long-term equity and resilience. This economic pragmatism highlights a broader architectural ethic. TAM's architecture is not only responsive to context, but it is also co-produced with it. Confirming Arturo Escobar's (2018) relational design theory, TAM positions communities as co-authors, actively shaping what is built, how, and by whom. In this sense, participation becomes a design tool. Architecture functions as relational infrastructure, enabling people to organise, learn, adapt, and govern. Public spaces and shared facilities strengthen social cohesion, reinforcing resilience from within. As Pantaleo asserts, "the project is the process." Architecture is thus redefined as an evolving system of relationships, situated at the intersection of material practice and social transformation. Their work offers a vision of appropriate technology that is politically engaged, economically grounded, and ecologically attuned.

### *Climate-Responsive Architecture in Darfur*

The Vocational Training Centres in Darfur is an example of TAMassociati's climate-responsive architecture, where projected climate data served as the primary driver of design decisions. Rather than relying on present-day averages, TAM began the design process by analysing 2040 climate scenario projections, including rising temperatures, increased heat stress and a shift toward more intense, short-duration rainfall events. This data-driven approach fundamentally redefined the architectural brief, transforming the school into an instrument of climate adaptation. The design responded to these forecasts through a range of systemic and pragmatic strategies. The site was elevated to mitigate anticipated flooding, and the roofs were equipped with integrated rainwater harvesting systems designed to manage sudden surges in rainfall. Building orientation and spatial organisation were tailored to maximise passive ventilation. At the same time, the materials, such as sun-dried and baked bricks produced using cow dung as biofuel, were selected for their thermal performance and

local availability. Central to the strategy were ventilation towers incorporating rock-bed cooling systems, a reinterpretation of traditional Badgir techniques using volcanic stones to store and release cool night air, thus reducing indoor temperatures without mechanical intervention. TAM's architectural response to climate change is conceived as a holistic, anticipatory system. It begins with empirical data: climate trends, population dynamics, ecological thresholds and uses that information to guide decisions across every scale, from site grading to structural form to material logistics. The outcome is not just architecture that responds to climate, but design that understands, anticipates, and integrates climate knowledge from the outset. In this framework, architecture is a time-responsive medium, capable of anticipating future conditions rather than merely reacting to present ones. In the face of the climate crisis, livability becomes the project's primary measure of success, not comfort as luxury, but as survival. As Pantaleo insists, climate resilience cannot be delivered through imported technologies. It must be embedded in replicable, context-specific systems, rooted in local knowledge and scientific forecasting. By internalising long-term environmental scenarios into the architectural process, TAM exemplifies a shift from reactive adaptation to proactive design thinking, a necessary architectural paradigm in the age of climate uncertainty.

### *Toward Situated and Ethical Design Futures*

Reframing appropriate technology within architectural discourse demands more than a revival of small-scale or low-tech solutions. It requires a fundamental rethinking of what design is for, who it serves and how it operates within planetary limits. As this chapter has shown, appropriate technology is not a fixed toolkit, nor a nostalgic return to vernacular forms, but a critical design framework that interrogates the ethical, ecological, and political implications of architectural production across local and global contexts.

From Gandhi's insistence on technological autonomy and Schumacher's vision of intermediate scale, to the more recent

critiques articulated by Illich, Sachs, and Escobar, the trajectory of appropriate technology reflects an ongoing effort to decentre industrial universalism and revalorise forms of knowledge embedded in place, culture, and care. These thinkers have shifted the discourse from technical determinism to epistemological pluralism, reframing technology not as a neutral force but as a deeply political and relational practice.

Architects such as Anupama Kundoo and the TAMassociati firm have played a decisive role in translating theory into built form in this expanded framework. Though distinct in method and geography, their practices converge in their commitment to technological ethics, human-scaled systems, and collaborative authorship.

Kundoo's focus on human resourcefulness, labour-intensive material experimentation, and making-centred pedagogy directly challenges the extractive use of resources and the formalist aesthetics that dominate global architectural practice. Meanwhile, TAM's systemic, anticipatory, and climate-literate approach operationalises appropriate technology at the scale of civic infrastructure, offering replicable models for health, education, and resilience across some of the world's most vulnerable regions. Together, these practices critique dominant design models and propose new ones, grounded in frugality, participation, and justice. They show that appropriate technology is a radical redefinition of advanced design itself: one that begins with equity, centres on agency, and measures success through adaptability.

As we move deeper into the Anthropocene, where climate volatility, ecological collapse, and social inequality increasingly intersect, the urgency of appropriate technology becomes ever more apparent. Architecture must become a site of ethical negotiation and systemic reparation to remain relevant, not a vehicle for aesthetic spectacle or technocratic control. In this sense, appropriate technology does not mark a constraint; it marks a beginning. It invites us to imagine and construct sufficient futures rather than excessive, shared rather than imposed, and grounded rather than abstract. It asks what we can build and what kinds of worlds our technologies will ultimately sustain.

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GIUSEPPE TAMBORINI

DESIGN THE FUTURE:  
FROM RESEARCH  
TO PRACTICAL EXPERIMENTS

Today architecture faces ever-changing demands that relate to social, technological and climatic challenges. The projects of the *Vocational Training Centres* in Darfur and the *Wall House* in Auroville, respectively designed by TAMassociati and Anupama Kundoo, stand as inspiring projects, able to mediate between complex global conditions and specific local contexts. Both designs generate from a deep and thoughtful analysis of the site, intended not only as the space destined for construction, but as the network of goods, skills, materials, cultural heritage and knowledge present in the area.

The concept behind the *Vocational Training Centres* is structured as a set of elements that can be put together in various configurations, based on different needs. The modules are designed to accommodate a large set of functions, such as workshops, study rooms and communal areas. What brings them together is the principle that guides their design, which is the necessity to face challenges related to the harsh climatic conditions that will further worsen in the next decades. To do so, a thorough research on global trends has anticipated any architectural elaboration, inquiring about various projections of future scenarios, related to temperatures, precipitation and other climate parameters. This approach considers designing not only in response to present-day needs but also adopts a long-term vision aimed at extending the building's functional lifespan. This visionary perspective is coupled with a pragmatic approach to construction. Materials, technologies, techniques and skills needed to complete this building are available on site, with limited need for outsourcing. The structure can be either constituted by load-bearing brick walls or compressed earth

blocks, depending on the availability of materials. The roofs are formed by thin vaults, supported by steel beams, allowing for sizeable spans with limited material. Additionally, elements such as the shaded porches, cooling wind towers and storage rainwater tanks complete the design granting comfortable conditions for the users by managing precious resources and taking advantage of the site's conditions. Simple construction, replicability and energy self-sufficiency are key factors in this project.

Although the construction of the artifact was halted due to unstable conditions in the country, it nonetheless constitutes a significant milestone in the pursuit of contextually appropriate architectural solutions. What remains for the community is the set of design principles, module combinations and climatic strategies, as well as the forward-thinking context analysis. In this project the core stands in the approach that guides the design, rather than in the physical building itself.

In a similar way, the *Wall House* can be understood through the perspective of projection, here related to experimentation and manual research. Once more, the heart of the design does not reside solely in the building itself, but rather in its conception as a testing field for a different, new methodology. Kundoo takes great care in clarifying that, the *new methodology* is based on the revival of the well-established manner of designing that has led to the construction of buildings for thousands of years<sup>1</sup>. It was, and could still be today, based on the availability of crafting skills, materials, labour. Every typical and well-established choice regarding material, technology and composition, is questioned, seeking for a simpler, more tailored design. In this practice, the form generates from what is already present on site, rather than being dictated by standardization and commercial products, that often make architecture a capitalized product (Caruso 2008, 34). Furthermore, the architect's deep knowledge of the specific context allows for the integration of foreign elements

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1 Based on Anupama Kundoo's speech held on April 22<sup>nd</sup>, 2024, at AUIC School, Politecnico di Milano, at the *Appropriated Technology* seminar, part of the *Architecture and Sustainability: Matter, Quality, Form* seminar series, promoted in collaboration between the Department of Architecture and Urban Studies and Mapei.

such as baked clay vases and cups in the building, considered as waste by other processes (Cheshire 2016), reused and dignified in the design by means of circular economy. In Kundoo's design, an ordinary and consolidated element such as the roof, becomes an opportunity for research, leading to the construction of seven prototypes in this building alone (Heathcote and Kundoo 2020). In this way, the scope of the construction goes beyond the need for shelter and accommodation, striving for an empirical proof of concept, using architecture as a laboratory for architecture itself. These intentions are found in the detailed and thoughtful design of each and every element of the house, from the structure to the finishings. The raw and sincere forms of the volumes contribute not only to a sustainable design, but also to the creation of spaces that are rich in atmosphere. Rooms, corridors and terraces surprise and charm the visitor through visual axes, textured surfaces and playful reflections, tied together by a balanced composition.

These projects demonstrate how creative approaches, and alternative research can serve as catalysts for innovation and sustainable change, possibly referring to the concept of *pensée sauvage* (Lévi-Strauss 1962), a form of unconventional and free thought associated to the figure of the tinkerer. This is achieved not through the implementation of complex, industrial technologies, but rather through the thoughtful management of existing resources, whether these comprise materials, skills, tools or labour. Looking at architecture through this perspective means conceiving people as a central figure in the design, not only as final users of architecture, but as autonomous builders, and even before that, as drivers of change in the system that forms the contexts.

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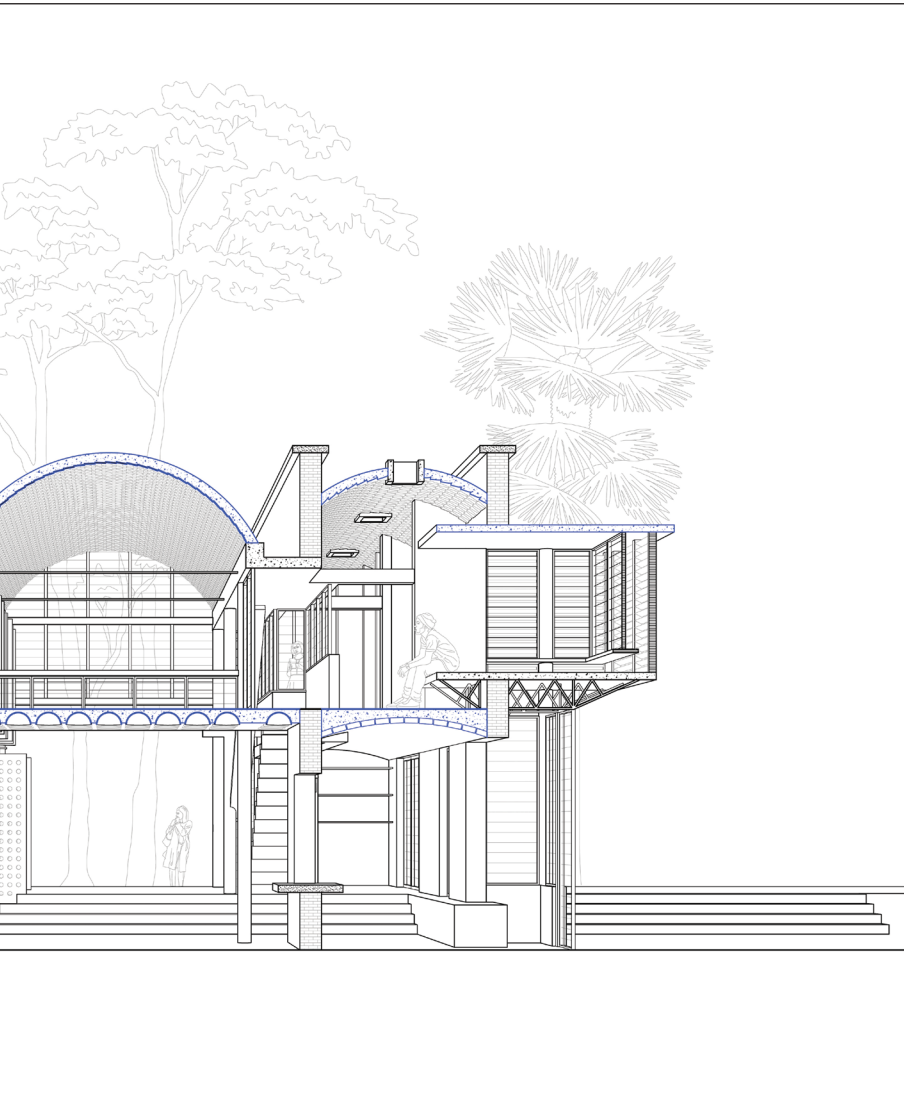
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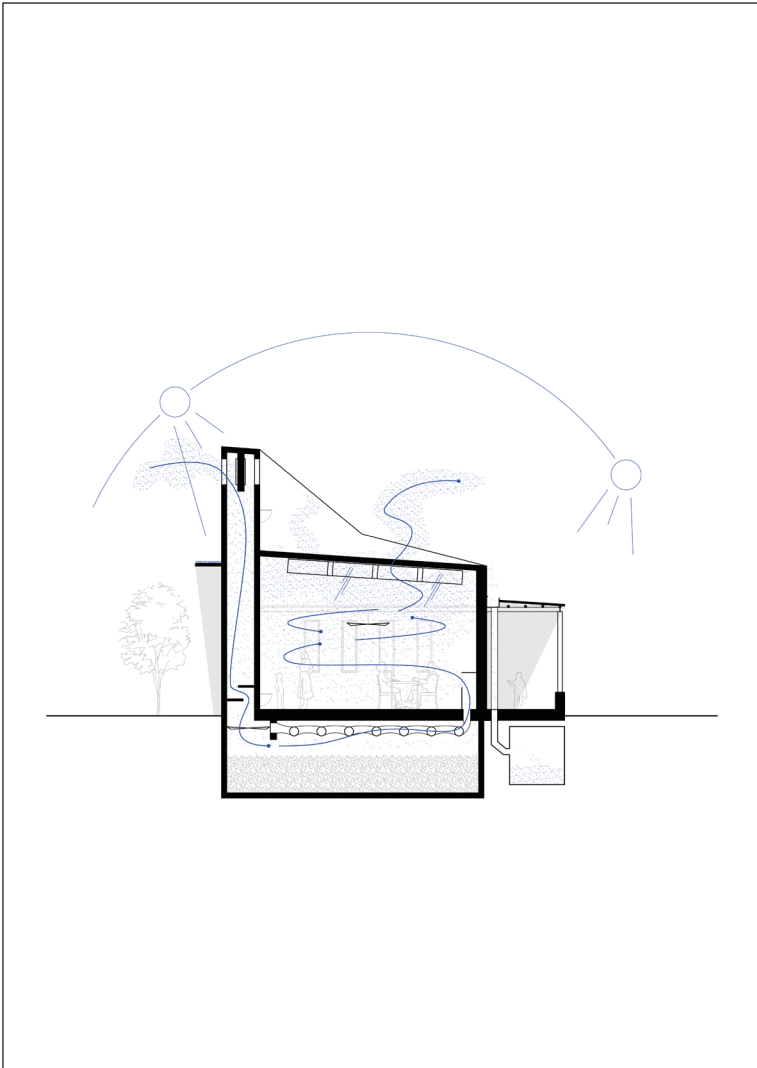


Anupama Kundoo, *Wall House*, Auroville, India, 1997-2000.

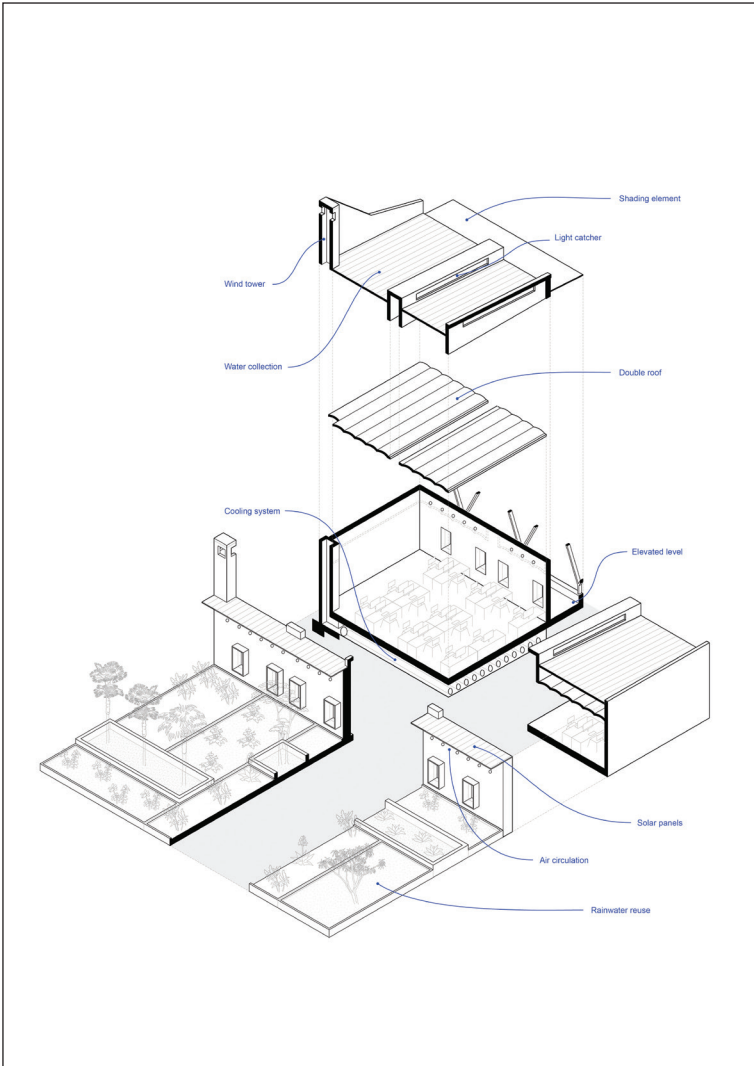
Drawing by Giuseppe Tamborini.

The building as a laboratory: experimentations about roofing solutions.





TAMassociati, *Vocational Training Centres*, Darfur, Sudan.  
Drawing by Giuseppe Tamborini. Energy flows in section: wind, rain and sun.



TAMassociati, *Vocational Training Centres*, Darfur, Sudan.  
Drawing by Giuseppe Tamborini. Composition of technological strategies.



Harquitectes, *Rehabilitation of Vapor Cortès*. 1923 Prodis, Terrassa, Barcelona, 2020-2021.

PART III:  
MATERIALS, TECHNIQUES, LOCAL CARE



GIULIA SETTI

THE POETRY OF MATERIALS.  
EXPLORING TECHNIQUES AND  
ENVIRONMENT IN DESIGN PRACTICE

This essay reflects the relationship between materials, locally rooted technologies, and the industrious spirit of the places of origin, through the observation and analysis of several contemporary projects that are central to today's architectural debate. It seeks, where possible, to move beyond the often overused notion of sustainability in architectural design, aiming to address pressing issues and themes, and provide practical tools for creating buildings capable of safeguarding the planet's limited resources. Starting with these seemingly simple and perhaps obvious considerations, the essay delves into technological aspects and choices regarding materials and construction techniques that significantly influence a project's potential to be regarded as truly sustainable.

Using locally available raw materials, along with construction techniques tied to the traditions of each specific context, are fundamental to developing projects that minimise environmental impact and reduce the depletion of construction-related resources. Resource management, materials procurement, and their application in building are pivotal steps in mitigating the ecological footprint left by new constructions.

The interplay between materials, form and technology is explored through a comparative lens, a methodological choice that underpins the research in this volume. It does so by discussing, analysing and exploring a selection of works by the Barcelona-based studio *Harquitectes* and the Milan-based stu-

dio Albori<sup>1</sup>. The projects, the techniques and the typologica decisions of these two studios bring to light the contradictions and insights necessary to visualise and design an architecture that is more sustainable and attuned to its setting and contemporary cultural conditions. Despite their marked differences, it is interesting to identify similarities and recurring themes that arise from comparing design approaches, each marked by a distinctive attentiveness to the climatic framework and identity of the places destined to host different projects. This essay does not claim to be exhaustive but offers one possible interpretation of the relationship between resource use, materials, and typological decisions. It provides an original perspective on the meaning of sustainability as a practical concept, which it seeks to uncover and examine.

*Resources: what we have and what we will lose*

The climate crisis, along with sudden and often catastrophic natural events, have compelled us to adopt new forms of care and attention towards the Earth's natural resources, and their consumption and depletion. A recent exhibition at MAST in Bologna, held between 2019 and 2020 and titled *Anthropocene*, documented the now irreparable damage that humanity's footprint has left on the planet. Through various media works by Edward Burtynsky, Jennifer Baichwal and Nicholas de Pencier, the exhibition depicted processes such as quarrying and the burning of fossil fuels – operations essential for human activity but devastating in their impact on the planet and its landscapes (Hackett, Kunard and Stahel 2018).

More recently, the exhibition *Everybody Talks About the Weather*, was held from May to November 2023 at Ca' Corner

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1 This essay stems from the conference series *Architecture and Sustainability: Matter, Quality, Form* which was held between March and June 2024 at Politecnico di Milano – DASTU department, with the support of MAPEI S.p.A. It draws on the third event in the *Materials, Techniques, Local Care*, series held on 6 May 2024, featuring speakers Josep Ricart from Harquitectes and Giacomo Borella from studio Albori.

della Regina, the Venetian venue of Fondazione Prada. The exhibition offered a compelling and in-depth exploration of the many meanings attached to the concept of weather and how it has been represented in the visual arts. In this context, the relationship between climate and atmosphere encourages a broader reflection on the effects of ongoing climate change and how these are artistically visualised (Roelstraete 2023). The exhibition started from a simple premise: the near ubiquity of climate discourse in the media and how this might form a foundation for critical awareness of the risks human behaviour poses to the Earth.

Our relationship with nature and the Earth is increasingly becoming the subject of research and criticism, particularly in disciplines questioning the architecture and design role. It seems that our species' survival may depend on forging a new alliance with nature. No longer regarded as a benevolent backdrop, nature is seen as something wounded and in need of repair and rebalancing (Kousidi 2022; Metta 2022; Rocca 2006). We must learn to design differently and discover tools and strategies for mitigating extreme climate events, reducing dependence on non-renewable energy, reusing waste, and reimagining traditional materials.

This means not only consuming less, but more wisely, creating buildings that respond to new climatic conditions and are adapted to their local context and architectural culture. This is a significant shift in how we think about projects – moving beyond compliance with energy certifications to placing the architectural project at the heart of addressing environmental and energy concerns. The work of Harquitectes and studio Albori is meaningful because both interpret sustainability through diverse approaches, using methods and techniques that enhance local materials while creating high-quality, and comfortable environments.

Typological experimentation, material appropriateness, and flexibility are three key themes that run through the work of Harquitectes and studio Albori. We will attempt to identify the relationships between these topics and their expression in individual projects.

*Domestic commons: Harquitectes' design research on collective living spaces*

Harquitectes' architectural research has a clear focus: redefining and exploring contemporary domestic space. As the most fundamental form of shelter and protection from the elements, the home, serves as a place for sharing, movement and encounter (Coccia 2021). Drawing inspiration from primitive forms of shelter, Harquitectes reinterprets and updates the notion of domestic environmental well-being through a contemporary lens that includes a recurring focus on the use of brick, which has become a defining element of its architectural language. Its work is a meticulous investigation into architectural devices capable of delivering improved climatic comfort and innovative spatial configurations, while reworking the home's traditional structure (Harquitectes 2023b). Harquitectes builds mainly in Spain, especially in and around Barcelona – an environment that profoundly shapes its design approach. Its projects are always site-sensitive and deeply rooted in the local environment. Each house designed by Harquitectes becomes a unique prototype, merging environmental awareness, typological exploration, and the ability to evoke sensory and perceptual experiences (Lui 2023, 7).

Harquitectes' dwellings define intermediate spaces, of transition and passage, between the different house environments. These often open yet sheltered hybrid spaces, foster a direct relationship with natural light and air. Particularly noteworthy are the *climate sections* which are real design tools that illustrate the constructive details and life that unfolds within the domestic spaces (Deplazes 2023, 156). These diagrams express the architecture's interaction with environmental phenomena, such as natural ventilation and solar exposure. This approach is exemplified in the design of *House 1721* in Granollers (Barcelona) and *House 1101* in Sant Cugat del Vallès (Barcelona). In the design of *House 1101*, the climate section reveals the architects' principal compositional intentions. It dissects one of the two covered spaces that separate the three parallelepiped volumes housing the home's various functions and illustrates

how the space is designed to remain open, extending the surrounding garden (Narne 2021, 47). This area serves as a special kind of living space – usable as a conservatory in winter, enclosed by large, glazed panels, and as a veranda in summer. From the section, we observe the brickwork's materiality forming the more inward-facing volumes of the house, which frame the open living area. Vegetation climbing across the pergola further enhances the integration between built form and landscape. The seamless continuity between outdoor and indoor space results in a typologically rich environment – a domestic room *en plein air* in which the landscape is incorporated into the life of the home by direct outdoor engagement.

Harquitectes' persistent experimentation with brick is highly innovative. It uses bricks with varying grains, textures and colour tones, making it a signature aesthetic and a high-performance material offering excellent environmental comfort. The same material becomes, an element of technological and compositional variation in each project. In some of Harquitectes' recent projects, material experimentation now embraces the reuse of salvaged masonry, with demolished components recovered and recombined to build new walls. This approach is evident in *House 1413* in Ullastret, where the stone wall originally marking the property boundary had to be replaced to comply with current regulations. The house is built around the footprint of this original wall, exploring a new model for a single storey dwelling in which rooms flow seamlessly into one another and respond sensitively to the terrain's contours. The construction uses stones salvaged from the previous wall, mixed with site-sourced aggregate, limestone, and cement.

A similar method was adopted in the *Social Housing 2104* project, where a disused school was demolished and its rubble almost entirely repurposed. The reclaimed material was used for foundational excavations and creating large cyclopean concrete blocks, in which the rubble is visibly embedded, giving the blocks a distinctive texture. The prefabrication of these concrete units enabled a significant reduction in the construction time of the new residential development (Harquitectes 2023a, 4).

Another project, equally notable is the *Clos Pachem Winery*, completed in 2019. In this case, Harquitectes transposed many of the environmental strategies explored in its residential architecture into a larger-scale, functional building. The winery adopts passive environmental principles to optimise the internal space conditions. The building is located within a pre-existing plot in the historic centre of Gratallops. A perimeter wall of stone, brick and plaster, forming a polygonal boundary, becomes the project's foundational element. The building comprises a tall, rectangular volume dedicated to wine production and a transitional, collective or public open space positioned between the volume and the site's boundary wall. It is an interesting space because it is flexible and public, acting as an entrance to the winery and providing continuity with the outside. The winery functions as a bioclimatic experiment, bringing together many of the devices tested in Harquitectes' residential projects. The winemaking space occupies a structure built to the maximum possible height, encouraging hot air to rise far above the barrels. Meanwhile, the building's interior maintains stable temperature and humidity levels thanks to the high thermal inertia of its construction materials. Designed as an intricate cooling mechanism, the roof protects the central space housing the barrels. Around it, a covered walkway winds through a series of roofs at shifting heights, punctuated by wide stone landings between stairways. The green roofs collect rainwater, which is gradually channelled along the path, contributing to the cooling of the interior space. The intermediate slabs protect this transitional zone from rainfall and direct sunlight, while defining areas that can be used for social activities. The use of brick reappears in this project. The structural brick wall system is constructed in multiple layers, interspersed with pillars, enabling airflow between the walls. Harquitectes deliberately embraces an ambiguity of architectural language – externally, the building feels embedded in the local village; internally, it initially suggests a vernacular style that quickly gives way to the expression of its exposed construction systems that unfold and deconstruct to reveal the project's complexity and technological refinement.

*Designing with waste: studio Albori's research into the poetry of materials*

Studio Albori's architectural research often starts with the details, with the individual components that comprise a building – a window frame, or a seat. From these fragments, Giacomo Borella, along with partners Emanuele Almagioni and Francesca Riva, construct and bring to life many of their architectural projects. Their process reflects a near-obsessive dedication to salvaging and reinterpreting discarded materials, such as offcuts, remnants, or building site refuse that would otherwise be deemed unusable. Instead, these elements are adapted to serve new functions and given renewed life. The concept of materials possessing multiple lives, and their capacity for flexible reinterpretation, is central to many of studio Albori's works.

In 2016, as part of the *Architecture as Art* exhibition at Hangar Bicocca, curated by Nina Bassoli and Pierluigi Nicolin for the XXI Triennale Esposizione Internazionale, studio Albori was invited to create a temporary installation in the outdoor spaces of Hangar Bicocca. The exhibition was an opportunity to explore a project conceived to be disassembled, relocated, and reused – a mobile and adaptable structure. The installation at the Hangar marks only the first step in this ongoing process (Nicolin 2016).

Constructed almost entirely from salvaged materials, the structure was an open archive or catalogue of repurposed components such as, large shipping crates, old chairs, funnels, and fibre cement panels were recombined with new elements to create a sheltered public space or collective hut. Designed as a meeting point and platform for dialogue, the installation hosted numerous seminars and events during the exhibition. The Hangar Bicocca space is conceived as an atlas intended to illustrate the themes and subjects that define the new responsibilities of 21st-century architecture. This is a highly relevant topic that has led several studios, invited to take part in the exhibition, to reflect on the role of architecture and the sustainability of contemporary practice. Studio Albori adopts a radical approach: recover and assemble, aiming to assign new roles and meanings to materials otherwise destined for demolition. This approach

reappears in different forms of design action within the *Timber and Straw House* project in Laveno Mombello, Varese, which began in 2017 and was completed in 2022. The project, for a small house located in the historic fabric of Laveno, closely replicates, except for minor variations, the outline of the previously demolished building. The new project pays homage to the old one – it is its slightly transfigured reincarnation (studio Albori 2023, 4), preserving its eccentric location, almost at the village square's centre.

Studio Albori carefully selects the new building's materials and components. It is a handcrafted work with hand-carved decorations in the house's walls and offers innovative and interesting applications of the balance between new and existing elements. The project integrates various reclaimed materials into the construction of the small house. This includes the creation of a detailed inventory of windows and doors to be recovered, cataloguing their dimensions and features to identify how and where they can be adapted. Tiles, railings, gates, grilles, and stones from the garden have been salvaged. Basically, everything reusable from the existing structure finds a new life in the small domestic space constructed by studio Albori.

The building's external walls are infilled with straw bales and plastered with lime, while the timber frame remains exposed. The straw-bale building method is a living, frugal technique, rooted in everyday craftsmanship, ecological awareness, and popular ingenuity (studio Albori 2023, 4). Straw is inexpensive, made from agricultural waste – the part of the cereal crop that is normally discarded. It can be sourced locally to the building site and evokes traditional building techniques (Borella 2021, 51). In designing the house in Laveno, studio Albori chose to keep the timber structural frame, which houses the straw visible. This pays tribute to the skilled work of carpenters and clearly showcasing the construction method with honesty and simplicity. The lime-plastered walls are flush with the timber frame, thereby defining the rhythm of the façades.

Recycling windows and doors is another environmentally friendly and sustainable practice that significantly reduces building site costs and has been practised since the early days.

Unused windows and doors are often mismatched in size and texture, which is where their charm lies. Using them requires a shift in the design approach. The process begins by creating an inventory that catalogues the available openings, which are then chosen and integrated accordingly. The variety and irregularity of materials represent a rich resource, sadly diminished in the Laveno house, where the windows and doors were painted red before the architects had a chance to intervene. Attention to detail in the small house borders on obsession from the earliest design stages. Some of the tiles that form the unrendered north façade have been hand-engraved in situ with simple tools, depicting abstract graffiti, stars, moons, and other symbolic motifs. This same care is evident in the design of fences and railings – features that are far from secondary in the building’s overall appearance. Studio Albori’s approach to sustainability starts with attention to every detail. Each element is carefully studied and is the result of thoughtful choices in material and colour. Nothing is left to chance. The project becomes an act of reinterpreting discarded objects and unused fragments and transforming them into something new. It is a poetic approach that recognises the inherent value of existing materials.

The work of Harquitectes and studio Albori highlights experiences that place materials at the heart of the design process starting with colour, texture, and meticulous attention to detail and composition. Though different in meaning and method, both studios aim to create an architecture that is honest, seemingly simple, yet capable of revealing distinct typological or material choices with rigour and clarity. In many cases, meaningful omissions become apparent. Adding more often proves worse than subtracting. Selecting a few precise actions underlines the importance of each decision.

Materials and details emerge as central themes in this comparison. Despite their differing styles and languages, there is a shared need – decide what to use, reuse, and why. In an era often marked by excess and redundancy, the essential and coherent choices made by Harquitectes and studio Albori provide a hopeful vision for the future of architecture.

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KEVIN SANTUS

## REVEALING CLIMATE AND RESOURCES THROUGH ARCHITECTURE

Rethinking the relationship between architecture, resources, and climate takes on a deep significance in the works of Harquitectes and studio Albori that merge environmental and ethical demands with design reflection. This section presents a critical reinterpretation of two projects by the respective studios, emphasizing how architectural design emerges as the physical construction of reflections attentive to climatic dynamics and the responsible use of resources. Both projects detach themselves from just formal or stylistic understanding of design, instead asserting themselves as site-specific architectural responses, whether through decisions rooted in local microclimatic conditions, as seen in the work of Harquitectes, or through choices concerning the reuse and reinterpretation of materials and components, as exemplified by studio Albori.

Despite the differences in scale and operational contexts, the selected case studies articulate a design attitude that conceives architecture as a critical practice confronting issues of environmental criticalities and resource depletion. This attitude is emphasized by a search for a poetics that is not incidental, but rather intrinsically situated within the broader dynamics of the climate crisis and the cultural transformations it imposes on contemporary architectural thought and practice.

The first project presented is *Clos Pachem Winery*, located in Gratallops, Catalonia, by Harquitectes. The architects, through this project, demonstrate an approach rooted in bioclimatic processes linked to the usage of natural ventilation, fostering a direct dialogue between interior and exterior spaces. This approach

takes form in the shapes and articulation of the building's architectural elements. Designed to store wine, the building requires precise indoor temperatures and, in certain areas, continuous ventilation. To achieve this, the new brick structure becomes a dynamic organism that integrates with the local microclimate. Through the design of the perimeter walls, it passively regulates temperature and humidity. The architecture does not isolate the interior from the exterior but instead rethinks the wall as a ventilating diaphragm, where bricks are arranged in a measured rhythm that channels airflows within the wall itself. It is not a separating partition but a device that makes the concept of a climatic machine tangible. As Roesler (2022, 226) states, contemporary architecture has the potential to frame the building "as a cultural technique of coping with environmental conditions, its main strength is the ability to connect – and not to separate – inside and outside conditions". This connection, as expressed in the drawings, is mediated by the architecture and revealed through the building's section.

The section becomes the instrument not only to represent the construction, but to properly conceive the architecture in its climatic behavior, expressing the idea of the building as a climate device. The thickness of the walls reveals the layering of the bricks and the methods through which the air can flow through the structure. At the same time, the use of double-height spaces allows for an internal spatial composition that not only establishes a hierarchy and variety of rooms but also emerges as the result of functional and climatic considerations. Indeed, it allows a natural stratification of the temperature in the indoor spaces, with different air pressures that transform the walls into climate chimneys. The breathing of the building is then synthesized in the cross sections, which show how atmosphere, temperature, and ventilation are shaped by the spatial configuration and, vice versa, determine the forms of specific architectural elements. The attitude here represented reflects a broader approach visible in Harquitectes' work, where the section is not a merely technical drawing, but a spatial tool to make physical the climate considerations, tackling the concept of architecture as "the art of building climates. [...] Through its own knowl-

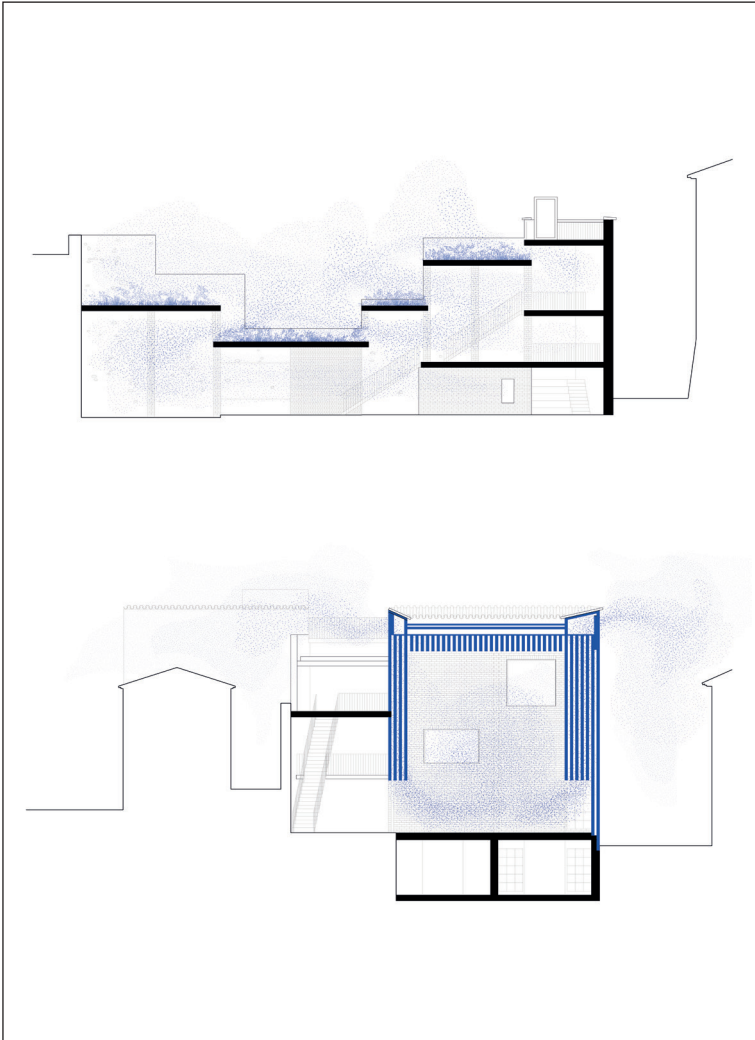
edge, architecture modifies a section of natural climate, sweetens a certain amount of the earth's atmosphere, anthropising a natural space" (Rahm 2020, 25).

This concept of climatic architecture is further enhanced by a sequence of green roofs, which contribute to the hygrothermal regulation of interior spaces, ensuring spatial continuity between the envelope and the interior. These systems, along with the use of massive masonry, help mitigate temperature fluctuations and increase the building's thermal inertia. What stands out in this project is the studio's ability to translate environmental needs and climatic sensitivities into spatial and constructional logic. The result is a structure that is both massive and porous, reinterpreting the bioclimatic relationship between building and context through a poetic act of space that becomes a climatic and cultural extension of its surroundings.

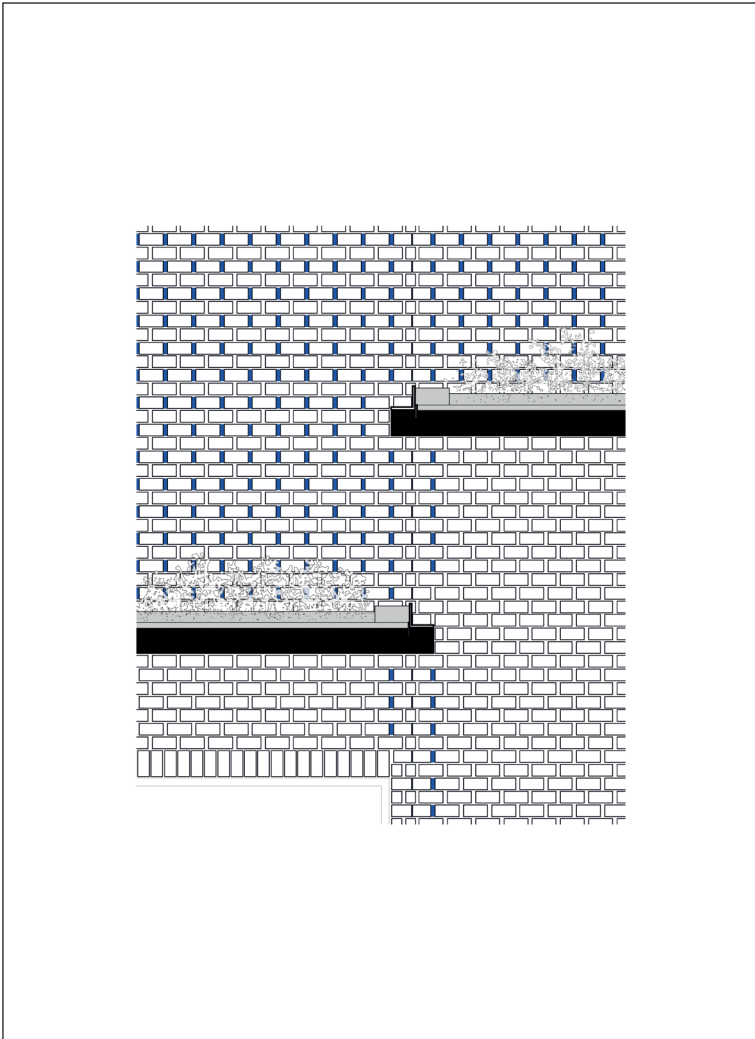
In contrast, the temporary *Pavilion* designed by studio Albori at Hangar Bicocca in Milan, as part of the *Architecture as Art* exhibition curated by Nina Bassoli and Pierluigi Nicolin for the XXI Triennale Esposizione Internazionale, reveals a pronounced sensitivity in imagining a space starting from the reuse of discarded materials. Here, the construction process moves away from standardized logic, returning to a more artisanal realm. The way the pavilion is built becomes central to the narrative and presence of the architecture itself. It is the result of an initial phase of detailed surveying of what already exists, starting with the creation of an abacus of elements, measured and organized, which becomes the raw material for the project.

From this, the assembly of the various elements is not simply a juxtaposition of reused materials, but a compositional and design reflection on space.

The abacus is used as a graphic and conceptual medium through which to represent the story of the construction process, revealing the artisanal logic behind the selection, measurement, reuse, and reinvention of each part. From the abacus, all the materials that seem uncoherent assume an overall idea of space, where the design action is an assemblage of elements whose meaning is transformed: a funnel is reimagined as a downspout,

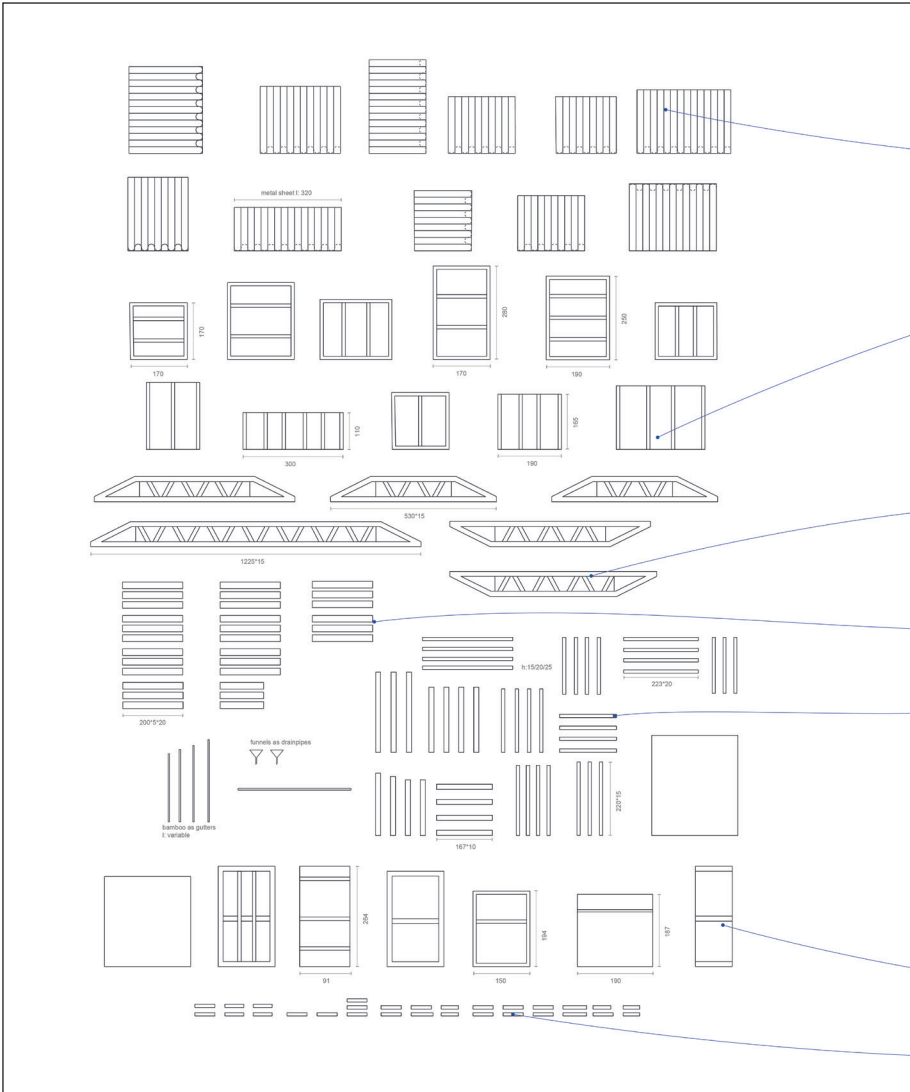


Harquitectes, *Close Pachem Winery*, Gratallops, Spain, 2019. Drawing by Kevin Santus. Project Sections. A sequence of green roofs contributes to air cooling, while the brick walls become diaphragms, ensuring continuous natural ventilation.



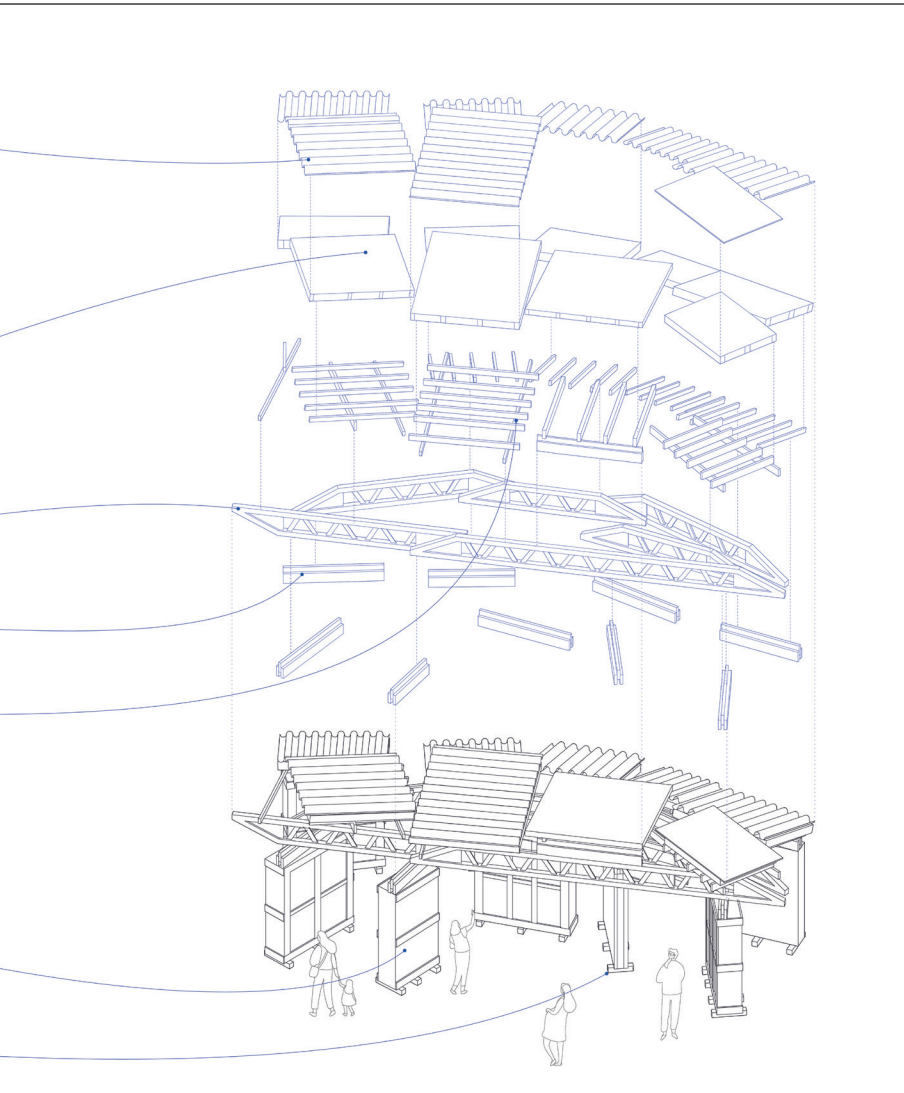
Harquitectes, *Close Pachem Winery*, Gratallops, Spain, 2019. Drawing by Kevin Santus.

Detail of the green roof system, the perimeter wall features a series of gaps between bricks, to allow natural ventilation.



Studio Albori, *Hangar Bicocca Pavillion*, Milan, Italy, 2016. Drawing by Kevin Santus.

The temporary pavilion begins with a study and classification of materials, which are then reassembled to form the architecture.



artistic wooden packaging is transformed into walls and roofing elements, and scattered wooden elements become beams.

This project embodies the idea of architecture's "relative autonomy" (Avermaete et al. 2019), to be understood not as detachment from context, but as an affirmation of the centrality of the act of construction, in which the project reveals the reuse of resources while reaffirming the importance of tectonics as the poetics of architecture. The process that studio Albori presents from the sourcing of materials to their cataloging and subsequent recomposition in design, thus becomes "an outcome from a critical approach to the current state of human society" (De Cooman 2019, 141).

From the pavilion, initially conceived as a temporary structure, the studio has since developed further cycles of reuse for individual components, enabling ongoing repurposing. Therefore, understanding the pavilion project and its potential for continued reuse requires interpreting the reuse process as a return to alternative materialities, slower processes, and artisanal care for things. Similarly, the architectural design can no longer be understood as the outcome of compositional operations detached from place but requires a deeply rooted process; one that is not simply about understanding the site, but also involves a cognitive engagement with its residues and discarded elements, which, through an act of project, can generate new spatial and design value.

The two projects, in their different perspectives, assume construction techniques and processes as tools for reading and interpreting local resources and climatic conditions. If in Harquitectes' sections reveal the climate logic of the architecture, in studio Albori, the flows between the inventory and the pavilion composition unveil the material reinvention of the project. The built space thus becomes a synthesis that discloses how the relationship with climate and resources can offer a poetic dimension to architectural design. The poetics that emerge from the two projects presented are not, in fact, a secondary effect or the incidental outcome of the design process. Rather, they are the direct result of careful construction, material, and climatic choices. In this sense, architecture itself becomes a tool through which the underlying logic and func-

tioning of the building are made legible and so revealed. What ultimately arises is a poetics of necessity, capable of engaging with environmental and contextual constraints, while at the same time reimagining forms and typologies, considering a necessary rethinking of the architectural discipline.

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StudioSer, *seven interventions in Monte*, Castel San Pietro, Ticino, 2022,  
© StudioSer.

PART IV:  
ALPINE WAYS



MAURO MARINELLI  
ALPINE WAYS.  
ALTERNATIVE PATHS TO SUSTAINABILITY  
IN THE ARCHITECTURAL  
EXPERIMENTATIONS OF INNAUER  
MATT AND STUDIO SER

*Alps, a Plural Noun*

The Alps represent a multifaceted and stratified territorial system influenced by partially common geology and geography while expressing a mosaic of cultural and social diversities. Defining them as a singular and homogeneous entity inevitably leads to a tension between a classificatory desire and the essential focus on local specificities, between typological imperatives and the intention to convey the plurality of contexts and experiences. The term *Alps*, in its plural form, invokes a diverse array of settlement conditions, linguistic variations, and production systems. Reducing them to a singular paradigmatic model is problematic, if not entirely misleading or stereotypical. Such simplifications frequently arise from externally imposed perspectives derived from the plains-based cultures encircle the mountainous region. These narratives risk subsuming the inherent complexities of the Alpine world beneath homogenizing viewpoints that obscure the diversity and richness present in its social and architectural landscapes.

In this context, *Alpine architecture*, even for contemporary production, should be viewed as a retrospective concept (Reichlin 1996), a definition created to establish a shared identity. This occurs through the reinterpretation and organization of various design practices and projects, where consistent morphological, typological, and linguistic features are identified to define an *Alpine* architectural approach. While this effort may improve the

overall success of specific architectural projects and architects, it also risks becoming a simplistic approach that promotes clichéd and superficial interpretations, thus sacrificing the complexity of local diversities for simpler communication.

Talking about *Alpine ways* to sustainability is not exempt from this identical risk. Nevertheless, sustainability, a pivotal theme within contemporary architectural discourse in the Alps, derives significant influence from premodern Alpine cultures, which offer a deeply rooted foundation. This legacy is based on resilient practices and settlement strategies that emerged not from abstract theoretical frameworks but in response to concrete environmental adaptation and resource optimization imperatives (Bätzing 2005). The persistent scarcity of physical and spatial resources and the necessity to operate within climatically and geomorphologically challenging environments have generated traditional methodologies characterized by frugality and a deep awareness of energy economies. This awareness is evident not only in building construction but also in traditional territorial management (Bätzing 2005), representing a significant epistemological legacy and providing a strong foundation for contemporary architectural approaches to sustainability. These considerations should prevent nostalgic reinterpretations of an idealized past (Appadurai 2001) and serve as foundations for a conscious contemporary approach to sustainability. Due to its compelling duality of urgency and allure, sustainability in the Alps has occasionally led to a formal and linguistic glorification of the results achieved by sustainable design practices in the early 1990s and 2000s. Sometimes, it has led to an escalating aestheticization of sustainability, transforming it from a fundamental design ethos into a superficial stylistic element. This trend is particularly evident in certain Alpine regions, such as Vorarlberg in Austria and Südtirol-Alto Adige in Italy, where a well-established architectural narrative employs the language of sustainability as a means of territorial branding.

In contrast to these tendencies, several architectural practices have emerged that are marked by their integrity and a deep awareness of how a territory transforms itself sustainably. These practices do not view sustainability as merely a demagogic label; rather, they manifest it in a less overt manner, characterized

by a high degree of awareness and appropriateness, embodying a pragmatic approach that is emblematic of many traditional cultures across the Alpine range. This approach is achieved not through a linguistic showcase of sustainable goals but through a kaleidoscopic design sensibility that produces projects devoid of abstract theoretical proclamations, rich with a pragmatic awareness that regards the territory as a precious resource to be cared for. Some offices deliberately avoid both naïvely reassuring approaches and overt technological displays. Instead, they present themselves as capable of engaging with the contradictions and potentials of their contexts, which are frequently marginalized areas, distanced from significant infrastructure and relatively isolated from the pressures of mass tourism.

Specific projects derive their strength from their peripheral status. By operating outside the dominant paradigms of urbanization and global architectural production, these projects can generate unexpected and surprising responses. These architectural projects, often resulting from a constructive dialogue among architects, artisans, and local communities, are characterized by an approach based on the sites' geographical, climatic, social, and productive conditions. In this regard, they transcend the conventional binary opposition between tradition and innovation, proposing an alternative pathway based on the coherence of material, meaning, and temporality, where language is no longer the central focus of architectural research, and sustainability serves as a necessary background.

### *Everyday Pragmatism*

In the alpine context, it is increasingly evident how the complexity of territories and their fragility necessitates a sensitivity that finds its driving force in the pragmatic relationship with places. This is rooted in the conviction that architecture is potentially a form of care before being a method of literally modifying places.

In some architectural practices, this sensitivity emerges strongly, highlighting the need to avoid repeating established ab-

stract recipes, particularly regarding sustainability. Instead, there should be a reflection on the resources that places and communities provide with freedom and awareness.

Among the works currently found in the Alps, the design experiences of *Innauer Matt Architekten* and *StudioSer* offer a significant opportunity to explore contemporary *alpine ways* of sustainability.

*Innauer Matt Architekten*, founded in 2012 by Markus Innauer and Sven Matt, is located in the Bregenzerwald; *StudioSer*, established by Rina Rolli and Tiziano Schürch in 2019, operates in Zurich and Lugano. They are both situated in Alpine territory but have different relationships with the territories in which they work. In the case of *StudioSer*, they rarely work in the territories to which they exactly belong, while *Innauer Matt Architekten* mainly operates in Bregenzerwald.

The difference in the relationship between practices and territories illustrates alternative approaches that have achieved significant results, particularly in deeply and productively understanding local complexities, and the approaches of the two offices demonstrate that recurring themes are becoming an increasingly important aspect of contemporary architecture in the Alps. Thus, engaging with their work allows us to address emerging themes, highlighting how the project's methodological strength is crucial due to the diversity of their outcomes. Through their projects, these offices demonstrate that architecture in alpine contexts does not have to succumb to formal stereotypes or linguistic trends. Instead, it can arise from carefully reworking specific contextual issues and responding precisely to local challenges.

### *A lot with little*

The works of both studios reveal a deep awareness of architecture's transformative potential, an architecture guided by a principle of economy of effort and maximum transformative output. In an Alpine context where resources are traditionally scarce, the ability to create significant transformations with minimal actions is also a cultural necessity. The goal is to achieve the highest

architectural effectiveness by maximizing output with minimal resources in fragile contexts while addressing many questions with concise, skillful responses.

StudioSer's projects in Monte, a small settlement in Castel San Pietro, Ticino, are emblematic examples of this approach. Micro-interventions are strategically positioned throughout the settlement, demonstrating a keen understanding of individual contexts and a capacity to address essential community needs. Beyond the procedural methods through which individual interventions are envisioned and realized, which will be described later, the small projects can regenerate spaces that once again become hospitable for communities, thanks to a well-conceived general strategy.

In some cases, the interventions are so minimal they may seem paradoxical; nevertheless, they effectively reconstruct relationships involving other buildings and spaces, which are transformed in turn. The excellent capability of these micro-interventions lies in their ability to reverberate individual actions widely, even within the almost microscopic scale of actual physical transformation. In these minimal interventions, small acts of public space enhancement have a significant impact, demonstrating the power of architecture to regenerate not by physically transforming what it touches but by physically and bodily re-inventing material, symbolic, identity-based, and poetic relationships. Achieving such high degrees of regeneration through such minimal transformations is a powerful demonstration of a sustainable approach to architecture deeply rooted in rural and Alpine wisdom.

Innauer Matt, generally working at a larger scale, designs buildings that, in their completeness as objects, still manage to define relationships capable of regenerating broader contexts. In numerous interventions, they succeed in defining artifacts that, in their precision and appropriateness, encompass extensive areas.

For example, the architects intervened in a particularly important building on Dorfstraße in the village of Bezau, Austria. A building that once housed cows in a stable eventually became home to the Hiller family of photographers, who operated their business there for decades. In 2012, the photographic studio de-

signed by Leopold Kaufmann became the chair of the Innauer Matt studio, which planned a significant intervention in 2021. This intervention is particularly interesting because it starts from a preexisting building that combines traditional elements with Kaufmann's intervention. Above all, it recognizes the building's physical and social role as an important inhabited building, even though it is not public. Therefore, the architects maintained the large transparent façade while redefining the more historic part, keeping its forms and materials but modifying its elements and language.

What makes the intervention interesting is the awareness of the public role of the large transparent façade and the concrete basement in front of it, simultaneously becoming a small public and private space.

The intervention at the Lochau bathing pavilion is also very interesting. Architects created a new flat structure positioned strategically between the lake and the landscape near the mouth of the Kugelbeerbach stream. A single artifact, replacing a previous building, again engages the shore of Lake Constance that it overlooks, redefining essential relationships with the adjacent spaces and successfully establishing a sense of protection and privacy towards the railway, which is situated on the opposite side of the artifact from the lake. This capacity to achieve significant results with minimal resources is particularly intriguing. It is addressed not through landscape projects but through the ability to manage relationships from small scales to artifacts that can profoundly transform spaces without requiring extensive physical alterations.

### *Communities and constructions*

Achieving significant impact with minimal interventions involves both spatial and physical considerations and a reflection that engages the community, understood as inhabitants, users, and a productive context. Engaging residents in the area is viewed not as a supplementary activity but as a core principle influencing numerous design phases.

In the case of Monte and StudioSer, collaboration with the community during the project's early stages, when the specific locations and goals of each intervention were established, proved particularly fruitful and rewarding. The process, which is also documented in videos that recount a collaboration with the community (Chiorino 2024, 12) marked by great sensitivity and empathy, demonstrates the awareness that architecture should be conceived not only for end users but also with them, fostering a direct relationship and a sense of responsibility within the community (Carlana, Chiorino, Franzoso, Marinelli, Rolli, Schürch 2024).

Furthermore, the involvement of local communities is not mere consultation but a participatory process that helps create a greater sense of belonging and continuity. This theme reaches an even deeper level in the work for the small mountain chapel of Wirmboden by Innauer Matt Architekten. The structure was commissioned by a small community of farmers who engaged in dialogue – sometimes not without difficulty – with the architects. This dialogue, comprised of changes, persuasion, adjustments, and many meetings around a table, led to a genuinely shared and accepted project. This experience is particularly powerful because the project was conceived from the beginning as something the clients themselves could build as much as possible.

The project is ultimately realized by members of the small community who possess skills in working with concrete and timber carpentry. Thanks to a design rooted in these capabilities, the idea physically took shape through the community's labour, which reinvented local techniques, hybridized ancient methods with contemporary ones, and utilized local materials such as stone (VV.AA. 2017). Besides reducing energy consumption for construction, this process rejuvenated the community and turned the building into a symbol of a unified purpose that derives its meaning from within the community. It is a process that fosters deep sustainability, enabling the structure to endure over time. It activates and enhances local skills, making them better equipped to withstand the pressures of the contemporary market, thereby aiding in countering the depopulation of mountain areas. This approach not only reduced costs but also had a positive impact on the community, which saw

the construction as an opportunity for cultural and identity-based growth. Using artisanal technologies alongside industrial techniques, as seen in the chapel's stone-concrete walls, enables these projects to achieve optimal energy efficiency and sustainability results. This leads to high final quality while transforming the construction process into an opportunity for local communities to gain knowledge and new business opportunities. It also empowers the artisans to not restrict themselves to the *traditional* use of technology but enhances its capacity to respond critically to the specificities of the alpine context, integrating it seamlessly with the landscape and local culture. Moreover, in terms of construction, durability is one of the most significant issues. The topic of the life cycle of transformation, not just of a building, is inherent in the traditional wisdom that, as previously mentioned, has developed in an area where resources are scarce. The awareness leads to the careful evaluation of projects so that they can continue to respond to the territory's needs as long as possible. This prompts reflections on design, construction, and technology, which all tackle this issue with considerable maturity.

Wood, as a building material, proves notably successful in the Alpine context, acknowledging its advantages and disadvantages, perhaps precisely due to its traditional use. Therefore, other materials, which may face ideological criticism, are utilized with great sensitivity, considering the greater durability they can offer.

The use of concrete, for example, in public spaces designed by StudioSer, responds to the need to withstand extreme climates and intense use. This allows interventions to remain viable for a long time, achieving a great deal with little, even over time.

In any case, there is a clear preference for local materials; however, this is never expressed through folkloristic or stereotypical use or the comforting display of traditional building techniques. The use of arzo marble by StudioSer, for example, holds potent meaning in the Monte project, being more poetic than technical. Even though we can affirm that materials are selected based on durability, maintenance, and use are also taken into account, and we can affirm that the often extreme conditions of the alpine environment demand we design and build without hiding behind demagogic proclamations by addressing sustainability challeng-

es with a holistic and informed perspective, to see architecture as an opportunity, not a problem.

For these reasons, along with the considerations mentioned earlier, the Alps represent a promising arena for examining sustainability from an alternative perspective. The showcased design experiences of high architectural quality evidently illustrate this notion.

### *Alpine Ways*

The analyzed design experiences show that sustainability, in complex and fragile contexts such as the Alpine region, cannot be reduced to a set of technical parameters or an aesthetic of the *sustainable*.

On the contrary, it emerges as a cultural practice rooted in a deep understanding of place, awareness of available resources, and the ability to activate local communities, memories, and traditional knowledge. This general approach to sustainability is not a recent invention; it is deeply embedded in traditional Alpine cultures, which have long been based on frugality, environmental respect, and intelligent adaptation to climatic and geographical conditions (Salsa 2007).

Within this framework, the active involvement of local communities and artisans plays a central role. It fosters greater acceptance of projects and thus amplifies the effectiveness of environmental efforts. It also activates virtuous productive circuits capable of countering demographic decline and enhancing skills and knowledge that might otherwise be lost. Architecture, understood in this way, becomes a generative tool: it does not merely produce forms and spaces but also creates economic, social, and cultural opportunities.

Architecture becomes sustainable precisely because it is a form of care, capable of regenerating discarded, forgotten, or marginalized resources. It works on the physical environment and the symbolic and relational fabric of the territories it inhabits, weaving together new meanings, renewed uses, and resilient practices.

By reframing what is often considered waste – material, spatial, or cultural – architecture restores value, purpose, and possibility. This deeper form of sustainability is grounded in relationships, attentiveness, and collaboration. It offers a concrete alternative to folkloristic distortions and technological performance rhetoric. No pre-packaged solutions are applied; each project is approached with specificity and sensitivity, recognizing the irreproducible character of each context as an essential design resource.

In this sense, the most conscious and thoughtful examples of contemporary Alpine architecture do not look to the past with nostalgia nor to the future with naïveté. Instead, they inhabit the present with clarity, confronting today’s environmental, social, and cultural challenges with intelligence and restraint. To look to the Alps today is to observe a fertile and free experimental laboratory where the pursuit of sustainability generates design responses capable of transcending prejudice, fear, and the geographical boundaries of the mountain territory.

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THOMAS CABAI  
GRAMMARS, CONTEXTS, SYNTHESIS

Innauer Matt Architects and StudioSer are both working on sensitive design solutions, taking a careful approach towards the context, the communities engaged and the materials. Innauer-Matt's projects consistently pursue a profound integration with their contexts – whether technical, such as construction practices; socio-economic, like ties to the local economy; or aesthetic, through materials, textures, and ornamental motifs. Their approach to the context identifies synergies and heterogeneous *satellites* that orbit around a potential project and reworks them into a device of synthesis: architecture as a catalyst, absorbing and reorganizing the values of a local system (Pallasmaa 2012).

In the project for the *house of Julia and Bjorn* designed by Innauer Matt, the heterogeneous satellites of the system take shape through a series of precise references: the clients' personal connection to the world of woodworking, which informed the choice of materials and detailing; the presence of two large existing trees, which the client did not wish to cut down and so became both constraints and opportunities for the project; the site's topography, which suggested a configuration with two entrances on different levels – one facing uphill, the other, more intimate and spectacular, facing downhill; and finally, the references to local building practices, understood as a form of synthesis refined over time through technical demands, cultural traits, and the geography and logistics of available resources. Elements such as the pitched roof – necessary to bear the seasonal snow load – and the tradition of stacking firewood along building façades were reinterpreted and adapted with both rigor and sensitivity.

In the project for the decoration store, this search for integration with the context – this time urban – is renewed, though the

architectural motifs here are more heterogeneous than those of the scattered houses in the valley. Once again, the roof plays a decisive role in establishing a sense of continuity with the surrounding environment: the main volume is shaped by a four-pitched roof, crossed by a smaller transept, a configuration that the volume itself faithfully follows (VV.AA. 2017).

Given the overall coherence and the strongly synthetic character of Innauer Matt's buildings, the drawings produced for these two projects aim to highlight the subtle differences in an approach that is never self-referential but always reflective. The two buildings are depicted through converging, almost mirrored axonometric views to enable a direct volumetric comparison. The façades of the axonometries are replaced with elevations, making visible the slight variations in the pitch angles, in the wooden cladding patterns of the envelope, and in the topographic line of the ground, which differs in each site. Starting from this shared base, the drawings are further enriched by two specific focuses: in the case of Julia and Bjorn's house, the existing trees are highlighted as design constraints; for the decoration store, the focus is on the prefabricated glulam roof system, transported and assembled on-site, with the smaller transept instead built directly in situ.

StudioSer's design attitude is grounded in a gaze that seeks wonder within the ordinary, identifying small ruptures that disrupt the predictability of architectural objects that shape our everyday spatial experience (de Certeau, 1984). This perceptual exercise has been refined through *Encounters*, a series of photographic essays in which common objects are made to emerge from an undifferentiated background thanks to small details that pull them out of the standard and invest them with humanity.

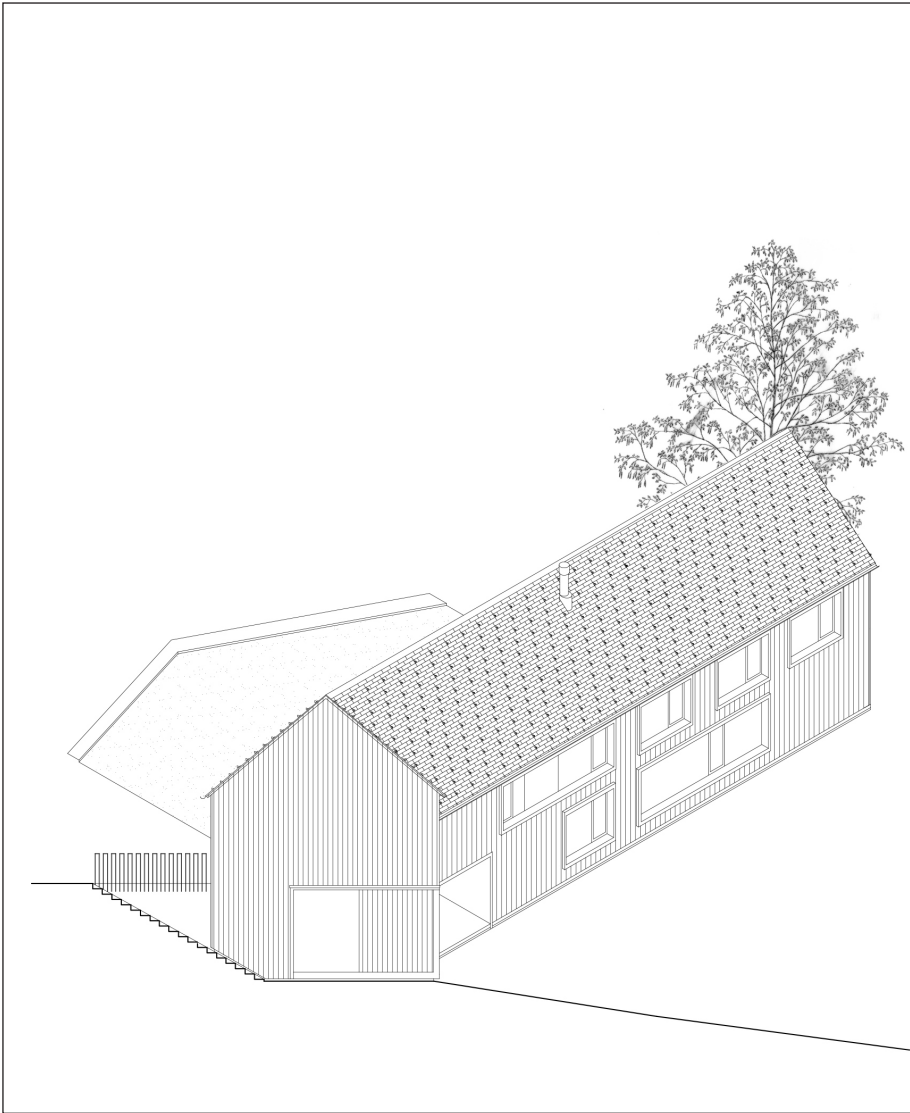
This gaze is evident in the cemetery project in Monte, a portion of the municipality of Castel San Pietro, where the intervention by the Swiss studio takes the form of a collection of small transformative devices. The entrance to the cemetery – central to the project – posed critical issues on several levels. The first was technical: the slope leading to the site was too steep and uneven, making access difficult in a village mostly inhabited by elderly residents. The second issue concerned spatial configura-

tion: likely due to demographic factors, the cemetery had become a major point of circulation and social gathering – an informal public square whose communal vocation had remained unheard, relegated to a mere connective function, and even that in a sub-optimal way. To these challenges were added ritual and practical needs, such as the requirement for a nearby water source to facilitate the tending of flowers by local residents. StudioSer addresses these conditions through a series of minimal gestures: objects, surfaces, and microarchitectures that discreetly but incisively articulate the space, translating the site's identity through a language of attentive, precise fragments (Carlana, Chiorino, Franzoso, Marinelli, Rolli, Schürch 2024; Chiorino 2024, 12).

The drawing of the project is organized into two distinct groups, conceived as complementary reading tools. The first is an overall axonometry representing the project as realized, emphasizing the relationship between the interventions and their context. Here, existing elements – the terrain's slope, material preexistences, the sequence of entrances – are key to understanding the spatial logic and the effectiveness of the transformations. The second group disassembles the intervention into its constituent parts: each object, surface, or device is isolated and drawn at an appropriate scale, with the aim of capturing the specificity of each design gesture.

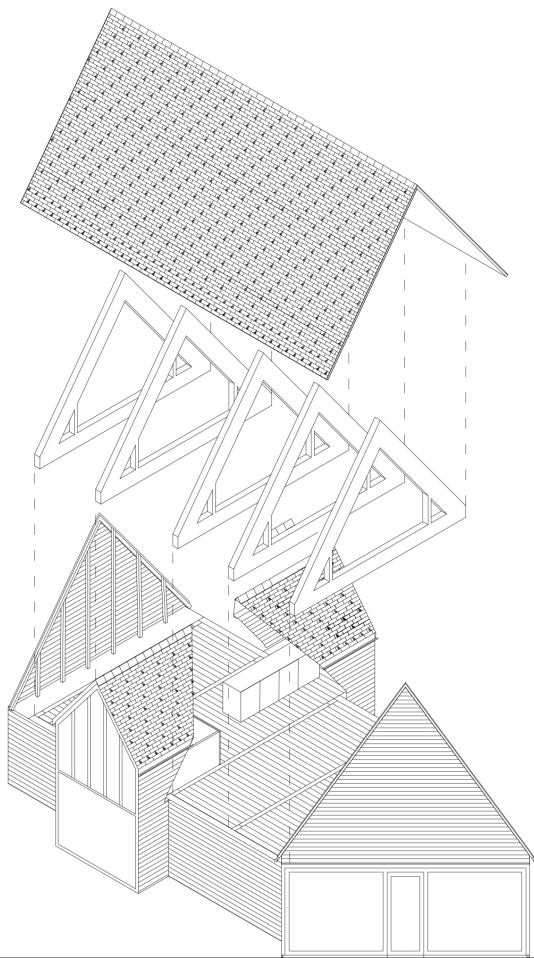
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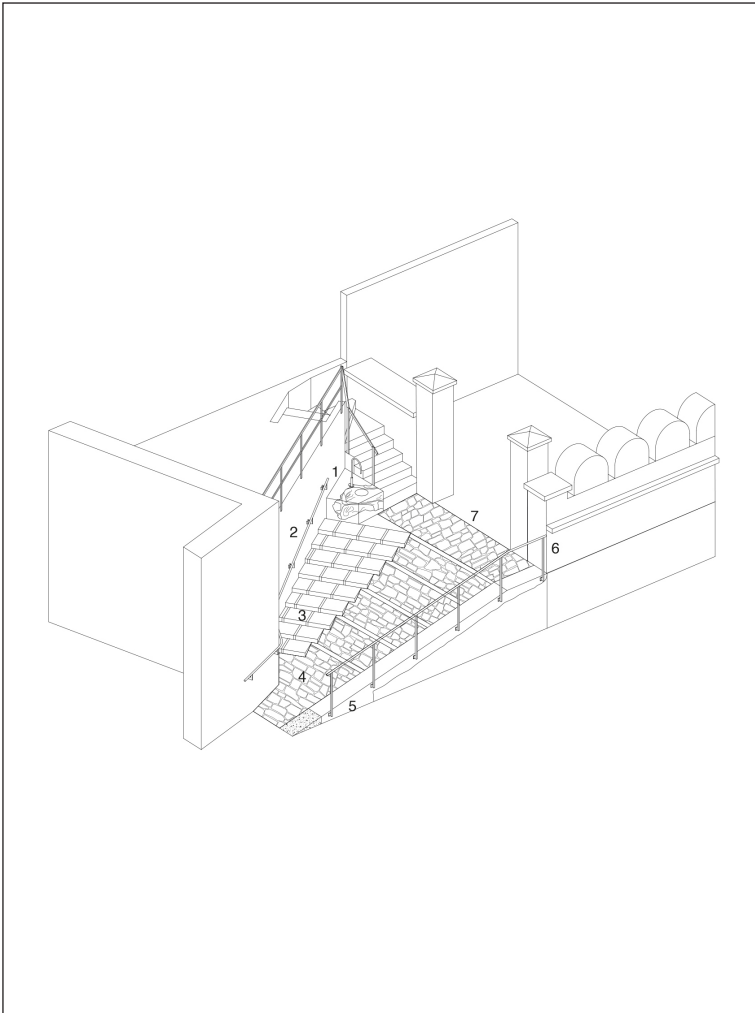
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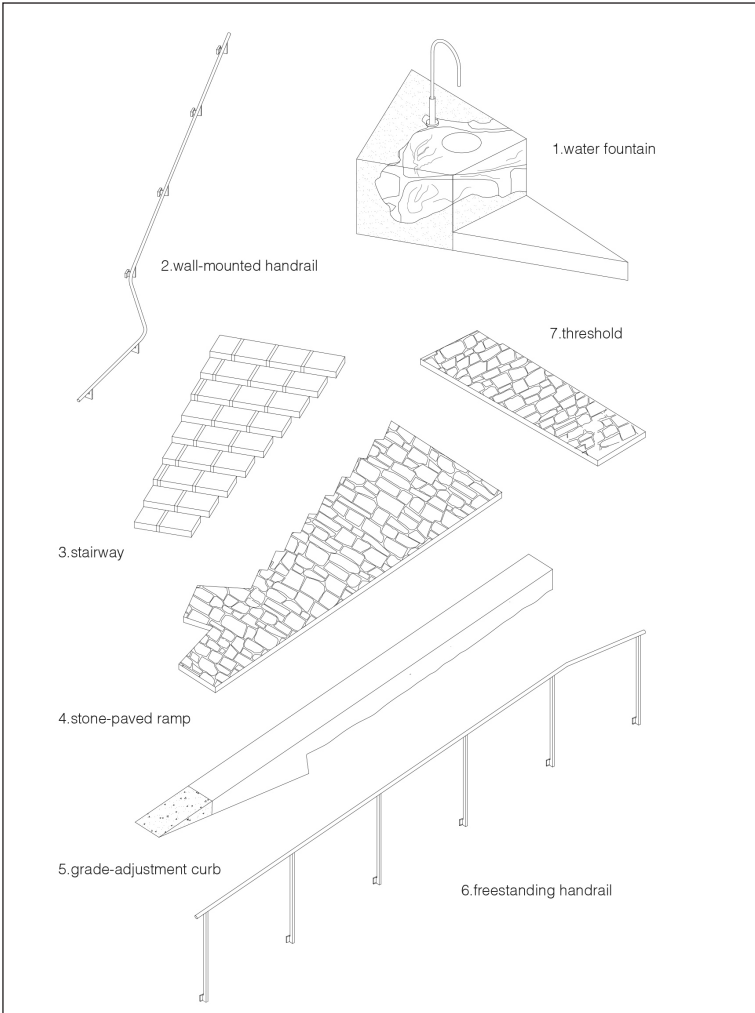
Innauer Matt, *Haus für Julia und Björn*, Egg, Austria, 2014. Drawing by Thomas Cabai.

Axonometry-elevation, highlighting materials and existing natural elements like the tree.





StudioSer, *the Cemetery*, Monte, Castel San Pietro, Ticino, 2022. Drawing by Thomas Cabai.  
Axonometry of the different minimal interventions.



StudioSer, *the Cemetery*, Monte, Castel San Pietro, Ticino, 2022. Drawing by Thomas Cabai. Grammar of elements.



Emergency NGO Onlus, Renzo Piano Building Workshop, TAMassociati,  
*Childrens Surgical Hospital*, Entebbe, Uganda, 2013-2020,  
© Emmanuel Museruka.





## PART V



MASSIMO BRICOCOLI, SIMONA GIORGETTA  
INDUSTRIAL AND ACADEMIC RESEARCH  
IN PARTNERSHIP, FOR A MORE  
SUSTAINABLE ARCHITECTURE\*

*Massimo Bricocoli: In selecting the architects invited to participate in the seminar series Architecture and Sustainability, a deliberately open and diverse approach was adopted, encompassing a wide range of professional profiles. Despite the urgency posed by the environmental crisis and the increasing weight of international regulations, a conscious – and certainly debatable – stance was taken: one that envisions the integration of environmental and social sustainability parameters into architectural design as a gradual, evolutionary process. This approach contrasts with more radical positions that assess sustainability solely through rigorous energy performance metrics, often excluding from consideration projects that do not meet the highest benchmarks. Such a perspective tends to narrow the discourse to technological aspects in a strict sense, primarily informed by engineering logics and corporate strategies. Instead, we sought contributions that could foster a more dialogical engagement with the broader architectural discourse. We explored the possibility of combining clearly articulated sustainability objectives with contemporary architectural projects that prioritize design quality. This allowed us to outline a potential approach while*

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\* The text has been developed from a dialogue between Simona Giorgetta, Massimo Bricocoli and Giulia Setti held in May 2025 in Milan at the Mapei headquarters. Mapei, founded in 1937 by Rodolfo Squinzi, is today a world leader company in chemical products for the construction industry. The historic headquarters in Via Cafiero, which then had 7 employees, today hosts the Corporate Research Center in Milan, dedicated to the research and development of new solutions. Nowadays, Mapei has more than 12,500 employees, is present in 57 countries worldwide with 96 subsidiaries, 93 production plants and 36 research centers.

*also acknowledging the long journey ahead in cultivating a deeper and more widespread awareness of sustainability within architectural practice. The invitation to the contributors had a dual aim: on the one hand, to encourage a wide-ranging reflection on the quality of contemporary architecture; on the other, to underscore how the selection of materials and building components plays a crucial role in achieving a meaningful gradient of sustainability – one that is substantive and not merely defined by certification standards, which increasingly reflect a constructed narrative rather than empirical evidence. The seminar series, and the forthcoming publication it has inspired, offer a valuable opportunity for shared reflection. They also serve as a foundation for identifying future directions and fostering broader dissemination and collaboration in the evolving dialogue between architecture and sustainability.*

Simona Giorgetta: Mapei and the Politecnico di Milano share a longstanding tradition of collaboration, primarily rooted in chemical research on materials and components – fields that represent the core of our experimentation, innovation, and production. Over the years, this partnership has grown particularly strong with the engineering departments engaged in materials science. Recently, we found it particularly stimulating to establish a more direct dialogue with the Department of Architecture and Urban Studies, as it offered an opportunity to expand our perspective and engage more directly with architectural discourse. Mapei is a multinational, family-owned company that manufactures chemical products for the construction industry – essentially producing the raw materials from which architecture is made. We have long been interested in exploring the theoretical and practical connections between materials and their application. The conference series provided an invaluable context for this investigation, exposing us to unfamiliar territories and themes through the diverse focus of each seminar, all of which addressed pressing issues in contemporary architectural debate. To our surprise, we recognized some of the architects and projects featured in the conferences – although our prior knowledge of them had often been shaped by our engagement with construction processes, rather than by

their underlying design principles and conceptual frameworks. This collaboration with an academic institution engaged in independent scientific research has proven especially enriching for our advanced R&D activities. A key factor has been the absence of commercial constraints and the suspension of the technical urgencies typical of construction sites or product development. This was a condition we had sought for some time, one that enabled us to broaden our outlook towards architecture and urban design. The conferences made it clear that rather than a generic, performance-based approach to sustainability, architectural practice often requires context-specific methodologies and tailored solutions. While Mapei's core clients are retailers of adhesives, sealants, and other chemical products who serve construction firms, our role within the construction industry is far more extensive. Mapei offers 26 product lines and provides a range of services designed to support architectural and engineering projects at various stages – from early conceptual development to execution. These services are not limited to builders or installers but are increasingly aimed at architects and design teams during initial project phases, such as design competitions or early conceptual studies, where the feasibility of an idea can depend on the availability of suitable materials. One of our key support mechanisms is the activity of so-called *promoters*, professionals who work closely with architectural firms. Their role extends beyond recommending existing materials: they collaborate with architects to conceive and develop new materials or customized products with specific characteristics suited to a given project. This consultancy aims to respond to the often complex and unexpected demands of the design process – not merely to promote specific products, but to provide informed and responsive support for advanced design ambitions. This assistance continues into the detailed design and contracting phases. During public tenders, for example, companies may propose alternative technical solutions, which must be carefully evaluated to determine whether they enhance or compromise the integrity of the original design. Our technical teams also provide on-site support during construction, and assistance continues even after completion, when issues arise or modifications to the building are needed. In

renovation and adaptive reuse projects, Mapei offers advanced technical solutions and specialized construction techniques tailored to the challenges of the existing built environment. This, in essence, is the method and philosophy that guide our work. What emerged – sometimes unexpectedly – during the conference series was how often our products had been used in the featured projects. The events underscored the deep interconnections between architectural quality, the mindful use of materials and components, environmental awareness, and sustainability. Interestingly, the English term *sustainability* seems to retain a stronger and less diluted meaning than its Italian counterpart, which has suffered from overuse in recent years. In many respects, the phrase *environmental awareness* appears more precise and appropriate in conveying the substance of these discussions.

*MB: In the field of sustainability, certain projects stand out as significant milestones, having achieved notable results in terms of energy efficiency and the reuse of materials within a circular economy framework. These projects are emerging as icons in a broader discourse that is often dominated by metrics, parameterization, and certification procedures. They demonstrate that high-quality architecture can also serve as a model of environmental responsibility.*

*This raises an important question: to what extent can the prominence and visibility of such iconic projects prove valuable from a business perspective? Just as architecture operates under the competitive pressures of design contests and market demands, companies too function within a continuously competitive landscape. It is perhaps no coincidence that some of the ambitious and complex projects mentioned have also involved Mapei, bringing the company into the spotlight and enhancing its visibility in the architectural field.*

SG: Within the seminar series, this thematic direction was particularly appreciated. Starting from the title we had proposed – *Matter, Quality, Form* – several original and thought-provoking projects were presented. These contributions confirmed that the more architecture demonstrates aesthetic and functional quality,

sensitivity to its context, and responsiveness to its environment, the more central the role of materials becomes. This renewed focus on materials emerged as a key insight shared across all the experiences presented by the invited architects. Among the many valuable conferences, one in particular stand out for us – both for its thematic relevance and for its unexpected yet direct link to our company: the social housing projects by IBAVI (*Instituto Balear de la Vivienda*), the public housing agency of the Balearic Islands in Spain. Architect David Mayol, representing IBAVI – the institutional public housing company, not a private practice – presented a series of projects that were remarkable for their ability to convey both simplicity and sophistication through architectural form<sup>1</sup> (Obal 2023). What made the presentation even more striking was discovering that these projects had previously received a sustainability award from our Spanish subsidiary, Mapei Spain. This recognition felt like a meaningful closing of a circle – a moment in which shared values, independent paths, and common goals converged. There are indeed projects in which Mapei has been explicitly involved, and which found renewed visibility and discursive space within the seminar series. One of the most significant among them is the Children’s Surgical Hospital in Entebbe, Uganda, designed by Renzo Piano Building Workshop in collaboration with TAMassociati and Emergency. The project was presented in the series by Raul Pantaleo, co-founder of TAMassociati. It is a particularly meaningful project for several reasons: it acquired strong social relevance through the depth of our partnership, and it represented a true frontier of innovation in terms of both methods and content in our collaboration with Renzo Piano’s practice. Our involvement began at the very inception of the project, when Emergency’s founder and then-president, Gino Strada, posed a radical challenge: he requested a building that would be *scandalously beautiful*. From that initial provocation, Renzo Piano developed the first sketches and conducted an exploratory visit to the site in Entebbe, outlining multiple de-

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1 The speech of David Mayol and IBAVI was the subject of a fifth event of the conference series *Architecture and Sustainability: Matter, Quality, Form* which was held on May 27, 2024, at the Politecnico di Milano.

sign hypotheses. One constant that quickly emerged was the construction technique: *pisé de terre*, or rammed earth. This choice had profound implications in terms of materials and construction methods. *Pisé* involves compacting slightly moistened soil in small, removable wooden formworks to prevent cracking during the drying process. For a hospital of this complexity, built in the specific environmental context of Entebbe, material-related considerations were critical, and our contribution proved to be decisive. The rammed earth envisioned by Renzo Piano needed to deliver high structural and thermal performance and had to be made from local materials – in this case, the site’s highly clay-rich soil, which presented several technical challenges. In response, Mapei’s R&D laboratory developed a custom additive that enhanced the soil’s workability while minimizing the use of vital resources such as water. Moreover, the final material had to achieve high mechanical strength to ensure structural reliability for a large-scale facility. This was a demanding brief – technically and ethically – and the outcome stands as one of our most virtuous collaborations in the creation of new architecture. Another emblematic example in the field of restoration dates back to 2008, when we were called to contribute to the replastering of the Solomon R. Guggenheim Museum in New York. The project involved close coordination between our U.S. research teams and the central laboratories in Milan, in partnership with the conservation experts at Integrated Conservation Resources (ICR). The situation was extremely delicate: Frank Lloyd Wright’s iconic structure had suffered significant deterioration due to air pollution, and there was a need to intervene without compromising the original material qualities – imperfections included – that the restoration aimed to preserve. The risk was to alter the building’s identity and turn it into something Wright never intended. For us, it was a profound responsibility to work on a landmark of modern architecture. Closer to home, the recent restoration of the Torre Velasca in Milan, completed in 2024, represents another milestone. This project was particularly meaningful for Mapei, given the tower’s symbolic importance to the city. For this intervention, we developed a bespoke product: the *Velasca Binder* (Coppa, Iacobone 2025). Our research laboratories studied the

original sands used in the plaster and performed detailed colour analyses using advanced spectrophotometers. These instruments allowed us to precisely match the original tones, accounting for the variation in hue that occurs when different aggregates are used. We collaborated closely with the Superintendency to identify and faithfully recreate the building's original colour palette. The result was met with great appreciation. Despite some initial apprehensions, the public response was overwhelmingly positive. One of the most rewarding compliments came from a Milan resident whose apartment overlooks the tower: she told me that, upon returning to the city after many years, she hadn't even noticed the restoration. When I explained that Mapei had contributed the materials, she expressed deep appreciation – an understated but powerful confirmation of our success. Finally, I would like to mention our recent work on the restoration of the southern ambulatory passages of the Colosseum in Rome. This high-profile intervention was developed in close collaboration with the Archaeological Park. As with other heritage projects, the work demanded extreme precision and thoughtful material selection. It stands as another powerful reminder of how much the materials we choose – and how we apply them – matter, particularly in contexts where history, architecture, and identity converge.

*MB: One of the intentions we set ourselves at the beginning of this seminar and research path was to be able to intercept the design challenges and to open up dialogue with architects, compared to the more usual beneficiaries of Mapei (resellers and installers). Also thinking about the experiences of supporting the design and construction site, what is the level of awareness that architects have with respect to the degree of innovation and the research frontiers on which Mapei works? If you look at the current architectural debate, what do you think are the references, in terms of sustainability or design quality, and where are possible improvements in the ordinary design compared to a more conscious use of the materials that are already available.*

SG: When it comes to design quality, we often move between two extremes: excellence and ordinariness. These can be seen



Emergency NGO Onlus, Renzo Piano Building Workshop, TAMassociati, *Childrens Surgical Hospital*, Entebbe, Uganda, 2013-2020, © Emmanuel Museruka.



as parallel tracks. On the one hand, as demonstrated in our seminar series, we engage with architects who represent the highest standards of architectural practice, and who therefore show a more developed awareness in their use of materials. On the other hand, our day-to-day work at Mapei frequently reveals a very different reality – one in which this level of attention is far less common. In this regard, the role of schools of architecture is fundamental. The university environment offers a unique space of intellectual freedom – for both faculty and students – which is invaluable not only for academic research, but also for market innovation and industrial advancement. It fosters experimentation, accelerates new ideas, and generates vital provocations. Through the seminar series, we encountered outcomes, sometimes unexpected, that confirmed the importance of this academic-industry dialogue and the valuable reflections it can produce. Looking at the contemporary architectural landscape, I am convinced that there is a widespread issue regarding the conscious use of high-quality materials. Consider Milan, the city in which we live and where the Politecnico is located. Much of the city's built-up fabric dates back to the post-war reconstruction period – a time in which many of today's residential buildings were constructed. These structures, once considered utilitarian, are now recognized for their inherent quality and are increasingly appreciated as part of Milan's architectural identity, contributing to its status as a reference point for modern architecture. What is striking about that period is the widespread awareness of material quality, supported by the strong role played by local builders and construction companies. The challenge emerges when urban development ceases to be the result of close collaboration between public authorities and local construction actors, and instead becomes shaped by a far more fragmented and complex array of players. One clear example is the rise of large investment funds, which operate according to financial logics that are often disconnected from architectural or urban concerns. These shifts demand serious reflection on the impact such actors have on the quality of the spaces we inhabit. In this evolving context, there is a pressing need for ongoing dialogue among all stakeholders in the built environment. Describing a building

simply as a *product of the construction industry* is profoundly reductive – buildings are where people live, are born, fall ill, heal, raise children, and experience the fullness of life. They are the physical containers of human experience. At Mapei, our approach to sustainability has always been strongly oriented toward durability. We believe that longevity is one of the most rigorous interpretations of sustainability: a durable material reduces the need for maintenance and renovation, thereby lowering the environmental impact over time. This commitment is not a recent development, nor is it a marketing strategy. In many companies, sustainability falls under the remit of marketing departments. At Mapei, it has always been anchored within our Research & Development division. Our engagement with environmental issues long predates the widespread adoption of the term *sustainability*. For more than twenty years, dedicated teams have worked on these concerns from a scientific perspective, and when we eventually formalized a sustainability department, it was natural for it to remain rooted in R&D. Among our most advanced research efforts is an ongoing project focused on concrete – an essential material in the construction industry and the second most consumed substance on the planet after water. Our R&D laboratories are actively working to reduce the clinker content in cement, a critical factor in lowering CO<sub>2</sub> emissions. Through an integrated programme known as *Cube*, we are developing a new generation of concrete additives that support the use of alternative binders and a broader range of aggregates. This integrated approach enables the production of high-performance, low-carbon concrete, thereby reducing its environmental footprint without compromising technical standards. Mapei's commitment to environmental responsibility is reflected in multiple dimensions of our operations. In the formulation of our products, we prioritize recycled raw materials whenever possible, and we strive to reduce transportation by producing locally – close to where the materials will be used. The same principles guide the construction of our own buildings and production facilities, which now number around one hundred worldwide. These facilities often include offices, showrooms, and training centers for architects and installers alike.

In each of these spaces, we aim to integrate the highest possible environmental standards. We use our own materials – because we believe in their quality – and we incorporate renewable energy sources wherever possible, including solar panels and cogeneration systems. Sustainability, for us, is not a slogan but a design principle that shapes everything we do – from product innovation to the buildings we construct and inhabit.

*MB: With operations in 57 countries worldwide, Mapei – often described as a multinational family-run company – serves as a remarkable observatory of how product and process innovation in the fields of design and construction is developed and implemented across diverse contexts. At the same time, maintaining a presence in such a wide range of locations presents a significant challenge, particularly in navigating the varied conditions and development trajectories that characterize each setting.*

SG: The country with the largest number of Mapei production units is the United States. More recently, we have opened a new facility in Egypt, where we have already reserved space for potential future expansion in the greater Cairo area. The demographic context is particularly noteworthy: in Egypt, the average age of the population is approximately 25, whereas in Italy it is closer to 50. When deciding where to expand our production operations, we consider both current market conditions and future outlooks. It is increasingly clear that countries such as Egypt, Saudi Arabia, and the United Arab Emirates offer highly promising development prospects. In Saudi Arabia, for instance, we are currently involved in the construction of a large artificial lake that will supply the artificial snow for the 2029 Asian Winter Games. This infrastructure will support the development of Trojena, a ski resort planned approximately 50 kilometers from the Gulf of Aqaba on the Red Sea. Such projects highlight how environmental sustainability has become an urgent and highly relevant issue in the Middle East – one that is now firmly embedded in national policy agendas. In response, we have appointed a dedicated sustainability specialist in the region. At the same time, we are witnessing the emergence of a growing middle and upper-middle class of consumers who are

increasingly attuned to environmental concerns and who recognize the value of high-quality products, such as ours, that, despite higher initial costs, offer durability and long-term sustainability.

*MB: The emphasis on durability is particularly significant – yet it is often overlooked. And yet, when we consider existing buildings that have demonstrated remarkable longevity over centuries, this should encourage a more rigorous definition of evaluation parameters and criteria, especially in relation to material and design choices. Another crucial factor to consider is cost. A European research project under Horizon Europe – ReHousing ([www.rehousing.eu](http://www.rehousing.eu)), in which the Department of Architecture and Urban Studies (DASU) is a partner – has been investigating the complex and often unforeseen effects of green policies on housing affordability and social inequality. Within current debates on construction, the issue of cost remains central: the expansion of the building sector is frequently assessed in terms of its potential to lower prices and increase access to affordable housing. In a country like Egypt, it is clear that both awareness of environmental issues and the availability of financial resources are growing. However, in a context marked by limited purchasing power, what are the real possibilities for balancing sustainability goals with cost containment? How can we navigate this tension in a way that supports long-term environmental objectives while also addressing pressing socio-economic needs?*

SG: I believe that, to some extent, this is a misleading issue – or rather, I would encourage a reconsideration of the assumptions typically made when discussing construction costs. At the heart of any investment lies a fundamental question: what are the expected profit margins for developers in the construction sector? If the expectation is for returns comparable to those of financial investments, then disappointment is likely. To remain grounded in the real world, profit expectations in the construction industry must be aligned with the structural and long-term nature of the sector. For substantial investment to occur, I believe it is essential to establish a robust and strategic partnership between the public and private sectors – just as is necessary in other critical domains



Emergency NGO Onlus, Renzo Piano Building Workshop, TAMassociati,  
*Childrens Surgical Hospital*, Entebbe, Uganda, 2013-2020,  
© Emmanuel Museruka. A detail of the walls made in rammed earth.



such as education, healthcare, and youth policy. A country that fails to invest in its own future is, from the outset, a country that risks losing its competitive edge. This lesson is clearly visible elsewhere. Take Egypt, for example, where there is a strong political will to attract investment, combined with a clear awareness that current decisions will shape the country's long-term trajectory. In Italy, I would welcome a similarly proactive stance from public institutions – a capacity to intervene strategically in these matters with the aim of redefining the framework of costs, revenues, and market access. Such an approach could help to establish a more balanced and functional system – one capable of supporting both public interest and sustainable private initiative.

*MB: Looking ahead, and drawing on your vantage point within the world of architectural design, what reflections or proposals would you like to share following the collaboration and the seminar series we conducted together?*

SG: It is essential to invest in and nurture Schools of Architecture and departments like DASTU, which are engaged in both teaching and research. Even when the primary focus is not explicitly on material use, it is crucial to integrate, as fully as possible, the creative aspects of design with the more technical knowledge and application of materials. The real challenge lies in bridging the gap between project and technique, as the integration of these disciplines is fundamental. Today, this interconnection is so vital that no other approach seems viable. In my own experience, after a career as an architect – including practice with a specific focus on landscape – I transitioned into a company producing chemical materials for construction, thus remaining within the same field but from a different perspective. Reflecting back, I recognize that the School of Architecture I attended differs significantly from current programs. My architectural education exposed me to a wide variety of approaches and subjects, with opportunities for in-depth study in key areas. Studying architecture cultivates the ability to design and envision the future by drawing upon diverse disciplines and a broad, dynamic knowledge base. I am particularly grateful that the architecture program I completed was not

strictly specialized; I believe that a less narrowly focused curriculum fosters a broader vision and greater intellectual openness. During the seminar series, I had the opportunity to engage with students and observed their strong curiosity and attentiveness to the future of their profession, as well as to the practical realities they will face after graduation. In conversations with students, I sensed a certain pressure compared to my generation, which perhaps experienced a more carefree approach to these issues, alongside a remarkable awareness of the topics under discussion. I also perceived a heightened sensitivity among students and Ph.D. candidates toward architecture and construction – a significant advance compared to the past, when engagement with developments outside the university, and with the city and its transformations, was much weaker. This shift is undoubtedly positive, as it allows for an early academic exploration of the world, fostering the development of personal methods to approach the complex challenges that lie ahead.

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Innauer Matt Architects, *Alpine Chapel*, Wirmboden, Schnepfau, Austria, 2016,  
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## PART VI



GIULIA SETTI

## SUSTAINABLE ARCHITECTURE. TRACING FUTURE DESIGN PATHS

*Sustainable Architecture* is not only the title of this essay but also the hope to open a direction where the impact of buildings on the environment is less. It is not easy to try to provide a synthesis of the topics and questions that emerge from this volume, but I believe that those who have read until the last pages expect, at least, an attempt to outline some future research perspectives that draw their inspiration from the experience we have conducted.

As a premise to these reflections, I would like to say that talking about *sustainability* in architecture today is increasingly difficult, under this flag we often find projects that reduce the attention to design quality to, instead, embrace compliance with very strict quantitative parameters. It is a narrative that must be overturned, bringing design back to the centre of the discussion, moving back to an architecture that questions today's environmental challenges while trying to work on the quality of the project. The research *Architecture and Sustainability* has tried to break the association between performance and sustainability, illustrating how a good design, that is able to respond to the needs of different users and that knows how to integrate into the context, has a good chance of being sustainable. Reading the stories and projects described in the book an interesting and fertile scenario emerges, which underlines, something not trivial, how architecture can combine an ever-stronger attention to environment, materials, resources with the quality of the spaces that are built. Jacopo Leveratto says it very precisely in his latest book *A Room of No One*, "talking about sustainability in architecture means first of all dealing with its durability, as well as the most suitable ways to prolong it" (Leveratto 2025, 7). The need to build more than what is actually

necessary is a crucial aspect that concerns architecture and sustainability. Burckhardt in his book *The Minimal Intervention* already supported the importance of reducing, in favour of specific and minimal projects (Burckhardt 2022). Reducing the footprint is a fundamental goal and it implies a deep understanding of the scarcity of resources that we are facing.

The idea of sustainability comes from the ability to cross time, to resist to changes and, indeed, to know how to easily adapt to them. The projects we have presented are very different from each other, some highlight, right from the start, the ability to the design to transform itself, adapting, in particular thanks to recycling and reuse processes of elements that are becoming, luckily, increasingly widespread. The circularity of raw materials and resources already used, but not yet exhausted, is a fundamental aspect and at the centre of various design practices (Zanotto 2020). Adaptation is a very effective form of sustainability, the reduction of waste and the possibility of giving a second life to a building, or to some of its components, is a fundamental design practice, as the works of Rotor and 51n4e remind us (Setti 2019, 29-31). But the architecture we have discussed in these pages tells us about very different conditions and equally various typological solutions, however one aspect in common between the selected projects is the care and attention towards the materials or, better said, towards the local resources typical of each context. It is on this point that I would like to focus because it is one of the most innovative aspects of this volume, it seems banal but, instead, the ability to associate appropriate construction techniques with pertinent typological solutions is an essential combination to search quality in architecture that can be defined as sustainable.

The care in the choice of materials is a distinctive element in the projects of StudioSer, studio Albori, Harquitectes, Anupama Kundoo and Innauer Matt, just to name a few of the protagonists of the book, and of the conference series. It is precisely from the choice of materials that, in many cases, a project starts. Through the research, very different approaches emerge that remind us how making architecture is closely linked to techniques, and to a technological know-how that must be appropriate, therefore capable of using local resources and traditional methods to build,

reinterpreting them in a contemporary way. The book explores a new balance between the nature and the Planet, especially focusing on resources that man has often abused, precisely by returning to an architecture that intervenes by limiting sensational gestures in favour of punctual and minimal interventions. Minimal architectures, precise and non-invasive signs are clear evidence of a paradigm shift in the design discipline and practice (Marini and Salvaneschi 2024). An architecture that could be called *silent*, and never invasive, is certainly that presented by StudioSer and *Innauer Matt* who have been working for years in the Alpine context, promoting small interventions able to fit into a delicate and fragile landscape. The use of local materials, such as specific types of wood or stone, are the basis of their design culture that is based on a discreet approach that is attentive to the needs of local communities. This is also a contemporary form of sustainability, which has been presented in the volume because it seemed to us that caring for people, as well as the environment, allows to build buildings of higher quality (De Rossi 2012). Studying projects in uncertain, fragile and delicate places is one of the possible ways of reconciliation with nature and, perhaps, building less, and better, is ultimately the only possible way.

On several occasions, in the public debate, there have been opportunities to discuss about this theme, for example thinking about the 17th Venice Biennale, International Architecture Exhibition in 2021, which was titled *How we will live together?*, or the XXII International Exhibition organized at the Triennale di Milano in 2019 and entitled *Broken Nature: Design Takes on Human Survival*, which have put the relationship – difficult and controversial – with Nature, and with the resources of our Planet in danger of extinction, at the centre of the disciplinary discourse. While the XXIV International Exhibition has just opened, this edition has been dedicated to the topic of *Inequalities*, highlighting the profound disparities that affect both populations and the places we inhabit and, therefore, lead to reflection on the social sustainability of architecture. These exhibitions tell, in different ways, of the need to rethink architecture in light of the current crises; this volume restarts from the Architecture itself, and from a very simple assumption: sustainability is not added at the end of

the process or achieved thanks to performance certificates. On the contrary, it is the care towards certain aspects, which seem different or sometimes marginal, such as materials, typology, communities, and places that contribute to make a project sustainable and able of lasting over time. From a curatorial perspective, I think that all the projects described in this book have this ambition and are bringing back the attention to the discipline and to the operative approach to make architecture. They are interesting experiences because each one is a story in itself: the story of a particular client, or of the development of a construction technique that had to adapt to a specific place and, sometimes, they are also stories of failures that are part of the practice. In this book, there isn't a univocal answer on how to deal with sustainability in architecture, because there is certainly not only one possible way, but there are, on the contrary, different positions, even divergent ones. However, the research and the outcomes could be a good tool for students and Ph.D. candidates interested in exploring these topics in depth.

Defining a cultural position around the relationship between architecture and sustainability seems to me to be an important challenge for the discipline, even more today when we are witnessing a continuous and drastic reduction of available resources and, therefore, we must take care of what we already have and what we decide to build. The idea to take care of architecture, spaces and environment is an aspect that has guided many of the reflections collected in this book, and each architectural office has tried to describe its approach of taking care, but also the time, the dedication and the passion that this job requires. And, above all, the need to invent, each time, new and more innovative design solutions, precisely to respond to particular needs of environmental comfort or of urban, social and economic sustainability that could have an impact on architecture.

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## AUTHORS

BEATRICE BALDUCCI is architect Ph.D. She studied at Politecnico di Milano, where she earned her Ph.D. in Architectural, Urban, and Interior Design in 2023, and where she has been working as a teaching assistant since 2020. In 2021, she co-founded the research project “Assume There’s a Landscape.” In 2022, she was a visiting Ph.D. fellow at the Kuma Lab at the University of Tokyo. In 2023, she collaborated with SANAA Kazuyo Sejima + Ruye Nishizawa. Since 2024 she has been working with Triennale Milano as Assistant Curator for the 24th International Exhibition “Inequalities.”

ALESSIO BATTISTELLA is an Assistant Professor of Technological and Environmental Design of Architecture at the Department of Architecture and Urban Studies, Politecnico di Milano. He is an architect, Ph.D. and scholar. He specializes in sustainable and socially inclusive design. He is Chairperson of ARCò – Architecture and Cooperation, promoting architectural solutions for sustainable development. Battistella is a faculty member and scientific committee member of the Master’s program *Circular Architecture* at the University of Camerino, and of *Design for Development* at Politecnico di Milano, where he focuses on design strategies for the Global South. He also serves on the Scientific Committee of IN/ARCH (National Institute of Architecture), contributing to discourse on innovation and sustainability in architecture. His work, both academic and professional, reflects a strong commitment to circular and cooperative architecture, with a focus on integrating environmental and social equity into the design process.

MASSIMO BRICOCOLI is the Head of the Department of Architecture and Urban Studies at Politecnico di Milano, where he is Full Professor in Urban Planning and Policies. He has taught at IUAV Venice, Ca' Foscari University in Venice, the University of Luxembourg, and HafenCity University in Hamburg where he has been Alexander von Humboldt Research fellow. His research focuses on Housing Policies and Projects, Urban Regeneration, Local Welfare. On these topics he has an extensive experience in coordinating research projects, advising and supporting local governments in Italy and abroad, and extensively publishing. He is the scientific coordinator of OCA, the *Affordable Housing Observatory* of Milan ([www.oca.milano.it](http://www.oca.milano.it)) and Principal Investigator (for Polimi) of the EU Horizon Project REHOUSIN ReHousIn – *Reducing housing inequalities in the green and digital transition* (<https://rehousin.eu/>). He is currently a member of the Board of the Research Center for New Social Housing at the Technical University of Vienna.

THOMAS CABAI is an architect and PhD candidate in Architectural, Urban and Interior Design at Politecnico di Milano. He is affiliated with the National Biodiversity Future Center (NBFC) in Italy, where he collaborates on projects related to restoration ecology, phytoremediation, and mycoremediation. His research interests extend into practice through the restoration of abandoned wetlands and meadows in northern Italy, alongside ongoing architectural work. He has gained professional experience in various architecture offices as well as in an independent video-game startup. He has also undertaken study periods at Tsinghua University in Beijing and Kyoto University in Japan.

SIMONA GIORGETTA is an architect. After graduating in Architecture with honors at the Politecnico di Milano in 2004, she worked as a landscaper until 2018 between Milan and Paris. At the same time, she began her collaboration in Mapei, as Real Estate Coordinator, realizing various strategic projects for the company in Italy and abroad. She has been a member of the Board of Directors of MAPEI since July 2019, assuming, among other tasks, the coordination of the Real Estate area. Since May 2021,

she has been the Sole Director of Mapei Stadium, a company of the Mapei group that has the concession for the Reggio Emilia stadium.

MAURO MARINELLI graduated with honors in Architecture from the Politecnico di Milano in 2011 and earned a Ph.D. in Architectural and Urban Design, also with honors, in 2016. Since then, he has taught as an Adjunct Professor at the Politecnico di Milano and held visiting positions at SEK University in Quito (2018), IUAV in Venice (2024), and the University of Naples Federico II (2025). In 2017, he co-founded *franzosomarinelli* with Mirko Franzoso. The practice has received numerous awards, including the *Rigenera Award* and the *Costruire il Trentino 17–22 Award*. He has lectured internationally in Italy, Switzerland, Germany, Slovenia, Ecuador, and China. Since 2019, he has been a member of the Provincial Planning Commission of the Autonomous Province of Trento (Italy), and since 2025, a member of the scientific committee of STEP-TSM (Italy).

KEVIN SANTUS is a Ph.D. Architect, currently a Research Fellow and Adjunct Professor at the Department of Architecture and Urban Studies at Politecnico di Milano. His academic work focuses on the intersection of architecture, ecology, and urban transformations, with particular attention to climate vulnerabilities. His publications and participation in international seminars are oriented toward studying the impacts of the climate crisis on morphological and typological elements of design, as well as the related methodological and theoretical implications. In addition to his academic activity, he was a research consultant at the Brookfield Sustainability Institute in Toronto (2022-2023) and he co-founded the architectural collective *Fragil Fortuna* (2024).

GIULIA SETTI, architect, is Assistant Professor of Architecture and Urban Design at the Department of Architecture and Urban Studies, Politecnico di Milano. She holds a Ph.D. *cum laude* in Architectural and Urban Design from Politecnico di Milano. Her research focuses on topics related both to the reuse of industrial architecture, as well as the typologies of contemporary public

spaces. Currently, she participates in the CRAFT project – *Competence Center Anti-Fragile Territories* coordinated by DASTU – Department of Excellence (2023-2027), as member of the Scientific Board. In 2014-2015, she conducted teaching and research activities at CEPT University, Ahmedabad (India). In 2018, she published *Oltre la dismissione. Strategie di recupero per tessuti e manufatti industriali*; in 2022, she published *Stepwell. Architetture per l'acqua nel Gujarat. Tra valorizzazione, progetto e recupero*.

GIUSEPPE TAMBORINI graduated in Politecnico di Milano, completing a Bachelor degree of Science in Architectural Design in 2022 and a Master degree of Architecture and Urban Design in 2024, both obtained with honors. He had the opportunity to take part in an Exchange program with the Technical University of Delft, following the Master degree of Architecture and the Built Environment. During his studies, he completed curricular internships at prestigious professional firms such as franzosmarinelli, located in Cles (Trento), and Bricolo Falsarella, in Sommacampagna (Verona). He is now undertaking a professional internship at MB36 architetti associati (Milan), to qualify as a registered Architect in Italy.

FRANCESCA ZANOTTO is an Italian architect and researcher based in Milan, currently serving as a RTDa (fixed-term researcher) and Assistant Professor of Architectural and Urban Design at the Department of Architecture and Urban Studies of Politecnico di Milano, within the National Biodiversity Future Center (NBFC). Since 2013, she has been actively engaged in research, teaching, and design both in Italy and internationally. She holds a Ph.D. *cum laude* in Architectural, Urban, and Interior Design from Politecnico di Milano; she served as visiting researcher at TU Delft and postdoctoral researcher at Università Iuav di Venezia; she is currently a visiting professor at the Xi'an Jiaotong University/PoliMi Joint School of Design and Innovation. Her research focuses on circular architecture and the ecological implications of architectural design, specifically exploring forms of built environment production that contribute to the conservation and enhancement of urban biodiversity.

## ARCHITECTURAL FIRMS

GIACOMO BORELLA (studio Albori) is an architect, he founded studio Albori in Milan with some friends thirty years ago. In these three decades, the work of the studio has increasingly concerned the practical and bodily dimension as an antidote to the abstraction, alienation and counterproductivity of late modern architecture. He has collaborated with various magazines, newspapers and radio stations, and some of his writings have been collected in the booklet *Per un'architettura terrestre* (Letteraventidue, 2016). He has edited and translated into Italian books by Ivan Illich, Petr Kropotkin and Colin Ward. He's currently visiting professor at the Accademia di Architettura of Mendrisio in Switzerland.

MICHAËL GHYOOT (Rotor) is an architect and researcher in the field of reuse, ecology and architecture. He holds a PhD from the Faculty of Architecture of the Université libre de Bruxelles. He is a project manager at Rotor, where he has been involved since 2008 through research, lectures, organization of exhibitions, and assistance with the reuse of materials for building owners in Belgium. He is a shareholder of Rotor DC, a cooperative company active in salvaging and selling reusable building materials.

MARKUS INNAUER (Innauer Matt Architects) founded, together with Sven Matt, Innauer Matt Architects in 2012, and have since come up with atmospherically dense, yet subtle and detailed architectural solutions that always strive to connect the novel with the existing. Innauer Matt Architects, based in the Bregenzerwald, a mountainous valley in Western Austria, stand for architecture with a strong relation to an object's location, its natural surroundings and its inhabitants. Their high standards of

precision combined with a certain laid-back approach leads to surprisingly plain solutions in often complex conditions. Always in the focus of their work is the search for architecture that provides surroundings with a relaxed, familiar feel to them and that will stand the test of time.

ANUPAMA KUNDOO graduated from University of Mumbai in 1989 and received her PhD degree from TU Berlin in 2008. Her research-oriented practice started in 1990 in Auroville has generated people centric architecture based on spatial and material research for low environmental impact while being socioeconomically beneficial. Her body of works was recently exhibited as a solo show *Taking Time* at Louisiana Museum of Modern Art, Denmark. She has taught Architecture and Urban Management at various international universities strengthening her expertise in rapid urbanization and climate change related development issues including at Yale University and Columbia University. She is currently Professor of Architecture at T.U. Berlin. She received the RIBA Charles Jencks Award for her contribution to architectural theory, the 2021 Auguste Perret Prize for architectural technology, the 2021 Building Sense Now global award of the German Sustainable Building Council DGfNB, and the Global Award for Sustainable architecture under UNESCO patronage in 2022. Her studios are based in Berlin in Germany, and Pondicherry in India.

DIETER LEYSSEN (51N4E) is architect and urban sociologist. He holds a Master in Architecture from KULeuven and one in City Design and Social Sciences from London School of Economics. Since 2019 he is partner at Brussels-based international practice 51N4E, where he co-founded the studio Acte and is responsible for projects in civic design and adaptive infrastructure. He teaches at KULeuven and UHasselt. Over the past years, he conducted projects ranging from architecture, masterplanning, socio-economic analysis, and curatorial works. Both in practice and writings, he developed a specific interest in collaborative processes that enable and strengthen durable social and spatial transitions.

RAUL PANTALEO (TAMassociati) is an Italian architect, born in Milano, graduated from IUAV, Faculty of Architecture in Venice. Since 2019, he is Adjunct Professor of Architectural Design at the University of Trieste. In 2016 he has been tutor of the working group of Senator Renzo Piano G124 at the Senate of the Republic. He is one of the co-founders of TAMassociati, a practice specializes in Impact Design. Internationally, TAMassociati works on sustainable and socially equitable architecture. Some of the current and completed projects include: The Salam Centre for Cardiac Surgery for Emergency NGO in Sudan, Banca Popolare Etica in Padova, Children Surgery Centre for Emergency NGO in Uganda with Renzo Piano; healthcare buildings in Italy, Nicaragua, Darfur, Sudan; Central African Republic, Sierra Leone, Afghanistan, Iraq, Kenya, Senegal, Rwanda and Uganda. With TAMassociati in 2013, he won the *Aga Khan Award for Architecture* and the *Curry Stone Design Prize 2013*, in 2014, he won the *Zumtobel Group Award*. In 2014 with TAMassociati he won the prize *Best Italian Architect of the Year*; in 2016, TAMassociati has been the Curatorial Team of the Italian Pavilion at the 15th International Architecture Exhibition Biennale di Venezia. Since 2009 to present he is member of the Emergency NGO Board of Directors, since 2020 he is member of the Michelucci Foundation Scientific Committee.

JOSEP RICART (HARquitectes) is partner at HARquitectes, an architecture studio founded in 2000 together with David Llorente, Xavier Ros and Roger Tudó. All of them licensed between 1998 and 2000 in ETSAV (UPC), where Josep and Roger teach. They combine their professional activity with teaching, in Polytechnic University of Catalonia Faculty of Architecture (ETSAV and ETSAB), Swiss Federal Institute of Technology Zurich, and Harvard University Graduate School of Design. They have been invited to Porto Academy, Architectural Association School of architecture, University of Texas at Austin, Pontifical Catholic University of Chile, École d'Architecture Paris-Villemin, and Umeå School of Architecture, among other institutions. They have received several national and international awards, and their work has been widely published and exhibited. Among their

awards there are the Fritz Höger Preis (2014), the Ugo Rivolta European Prize (2015) and the Premio Bienal Iberoamericana XIII (2016).

STUDIOSER merges the ideas of Rina Rolli and Tiziano Schürch since 2019. Collaborating across the North and South of the Alps, they continuously join forces with others to develop projects rooted in dialogue and exchange. The practice explores architecture as a field of encounter – between materials, time, and people – guided by a persistent effort to reveal the essence and singularity of each place, its community, and its layered histories. Drawing inspiration from the specific context of each site, StudioSer approaches architecture as something that must emerge from, and respond to, its surroundings. By engaging with the social and historical background of a place, they uncover traces of the past that can be reinterpreted and transformed into defining elements of the present. Their work is shaped through precise, context-driven interventions that move fluidly between the urban scale and the intimate detail.

## ACKNOWLEDGMENTS

A heartfelt thanks goes to Massimo Bricocoli for having supported and participated in this research, for having always provided references and original ideas that have enriched the contents and the debate. This volume would not have been possible without the support of *CRAFT – Competence Center for Anti-fragile Territories* and the Department of Architecture and Urban Studies of the Politecnico di Milano, as well as without the support of Simona Giorgetta and Mapei S.p.A., whom I would like to thank for having believed in this project since the beginning. I would like also to thank the colleagues who participated in the conference series *Architecture and Sustainability: Matter, Quality, Form*, bringing ideas and actively contributing to the debate: Fabrizia Berlingieri, Alice Buoli, Pierre-Alain Croset, Josep Maria Garcia Fuentes, Simona Galateo, Chiara Geroldi, Stamatina Kousidi, Fabio Lepratto, Carles Muro, Lorenzo Pagliano and Nicola Russi.

The experience built, within the *Architecture and Sustainability* research, would not have been possible without the continuous dialogue and exchange with the group of colleagues who worked with me for about a year on this project and who, subsequently, contributed to the contents of this volume. A sincere thanks goes to Alessio Battistella, Mauro Marinelli, Francesca Zanotto, Beatrice Balducci, Thomas Cabai, Kevin Santus, Giuseppe Tamborini for having worked with great passion on an idea that, at least at the beginning, we did not know exactly what results it would bring.

Finally, I would like to thank the architecture offices (51n4e, studio Albori, Harquitectes, Anupama Kundoo, Innauer Matt Architects, David Mayol with IBAVI, Rotor, StudioSer, TAMassociati) that we invited because, with great generosity, they agreed

to interpret their projects with respect to the categories that we defined – *Matter, Quality, Form* – it was evidently an open challenge to be able to talk about sustainability in a different way, leaving behind quantitative rhetoric, to instead bring the debate back to the relationship between the design quality and its relationship with the environment. I look forward to discussing the contribution that this book may bring to the academic and public debate, in the perspective of further research developments and engagement on such complex challenges.

To all the students who followed and participated in the conferences and debates, who discussed architecture and new possible forms of sustainability; the book is for them, so it can give some ideas to continue studying architecture and to hope for a better future.

A personal thanks goes to Nicole De Togni and Agim Kërçuku for always being there, for the advice and discussions that have enriched this work, and for the precious time that we share together.

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*Finito di stampare  
nel mese di settembre 2025  
da Digital Team – Fano (PU)*