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“Sustainability is the capacity to cross time, to resist to changes and, indeed, to know how to easily adapt to them. The projects collected in the volume highlights, right from the start, the ability to the design to transform itself, adapting, thanks to recycling and reuse processes of elements that are becoming, luckily, increasingly widespread.”

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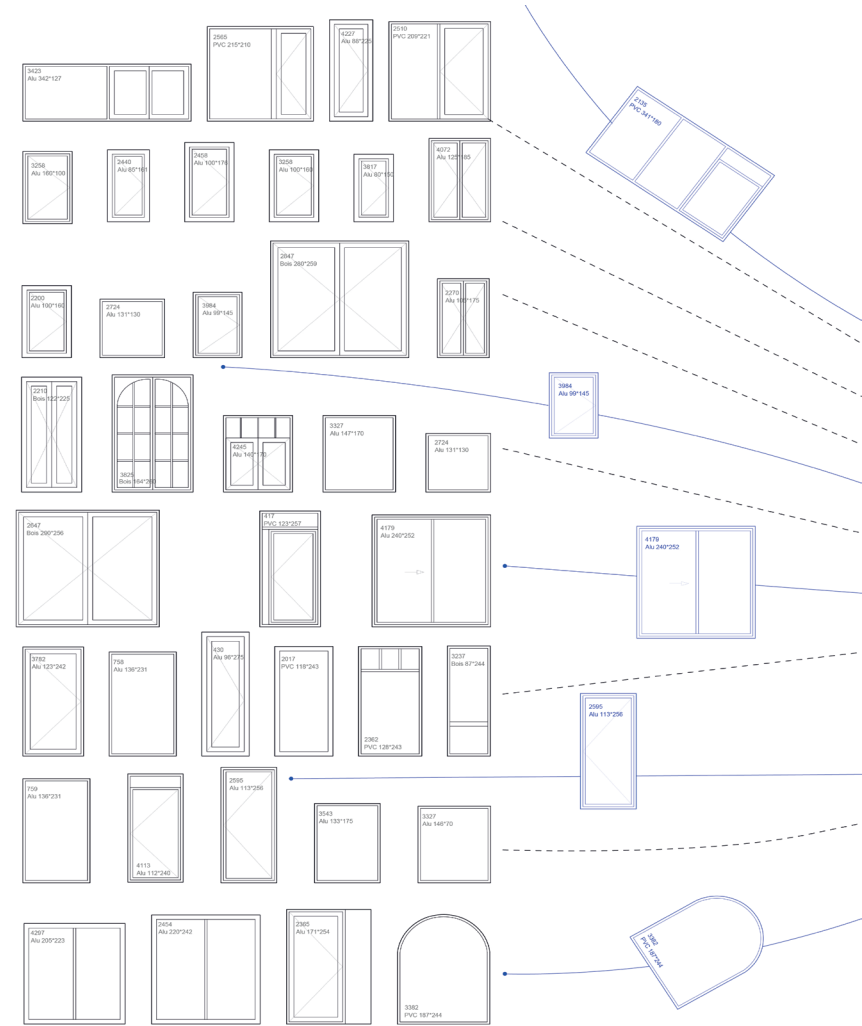
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GIULIA SETTI (EDITED BY) ARCHITECTURE AND SUSTAINABILITY: MATTER, QUALITY, FORM

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ARCHITECTURE AND SUSTAINABILITY: MATTER, QUALITY, FORM

EDITED BY GIULIA SETTI



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Architecture and Sustainability: Matter, Quality, Form explores the relationship between architecture and sustainability and identifies 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. The collected essays, authorial drawings and diagrams interpret some significant contemporary projects, defining a comprehensive perspective of environmental issues in architectural design, looking for new solutions which limit and optimize the resources' consumption. The book is organized in four sections: *Circularity and Reuse; Appropriate Technology; Materials, Techniques, Local Care* and *Alpine Ways* which address the central topic putting in evidence four major challenges: economy, performance, construction, culture.



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ARCHITECTURE AND SUSTAINABILITY: MATTER, QUALITY, FORM

Edited by Giulia Setti

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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 Albori¹. The projects, the techniques and the typological 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

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 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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ARCHITECTURAL FIRMS

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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 KUNDHOO 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 DGNB, 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 ETSAB (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 Bial Iberoamericana XIII (2016).

STUDIO SER 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, Studio Ser 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.

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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.

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