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The essays and case studies in this volume were originally written in Italian. Artificial intelligence tools were used to assist in their translation into English and in the linguistic revision of the translated text. All translations were subsequently reviewed and edited by the corresponding author/s, with particular attention to scholarly terminology, conceptual accuracy, citations, and the preservation of the meaning and style of the Italian originals. The corresponding author/s exercised editorial control throughout the process and assume full responsibility for the final English text.

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MODERN HERITAGE AS A RESOURCE BEYOND ENERGY RETROFIT

Uta Pottgiesser, Wido Quist

DOCOMOMO International – the International Working Party for Documentation and Conservation of Buildings, Sites and Neighbourhoods of the Modern Movement – was established in 1988, formally consolidated as an organisation in Eindhoven in 1990 and defined its principal objectives in the so-called *Eindhoven Statement*. It emerged at a critical moment when 20th-century architecture was still relatively young and therefore not widely regarded as 'heritage', which in most countries followed the 50- or 100-year rule of age. At the same time, the early buildings of the Modern Movement were increasingly threatened by demolition, disfigurement, technological obsolescence and changes of use. DOCOMOMO International sought to challenge this situation by arguing that modern architecture constituted an important part of cultural heritage that required systematic documentation, research, conservation and public recognition. The research – by DOCOMOMO founders Hubert-Jan





Figure 1
Zonnestraal before and after the intervention; photographs from 1986 (top) and 2007 (bottom).

Henket and Wessel de Jonge – into the possibilities of preservation of the abandoned Zonnestraal Sanatorium in the Netherlands served as a prominent example.[1]

In 1990, representatives of 14 different countries gathered to follow a common goal to contribute to the fundamental characteristic of DOCOMOMO: the deliberate connection between documentation and conservation. The systematic recording of Modern Movement buildings through registers, drawings, photographs, archives and other forms of documentation was intended not only to develop knowledge about the Modern Movement but also to establish methods for the appropriate conservation of its buildings. Documentation was consequently not merely an archival activity but an instrument of heritage protection.

During the 1990s, documentation fiches to create an inventory became one of DOCOMOMO's central practical activities. The objective was to identify significant examples of Modern Movement architecture and create a systematic knowledge base that could support research and conservation. Consequently, DOCOMOMO established its first International Specialist Committee on Registers (ISC/R) at the 1992 International DOCOMOMO Conference in Dessau (Germany) to develop the collective international register. Only two years later in 1994 the second International Specialist Committee on Technology (ISC/T) was founded in which specialists could exchange experience concerning the repair, maintenance and conservation of modern materials and technologies to foster the development and dissemination of appropriate conservation methods, documented in several ISC Preservation Technology Dossiers.[2]

In this way DOCOMOMO was helping to redefine the boundaries of architectural heritage. Instead of concentrating primarily on monuments from earlier historical periods, it demonstrated that 20th-century buildings, including ordinary housing, industrial buildings, schools, offices and infrastructure, could possess heritage value and deserve to be recognised through listing locally, nationally and internationally. ISC Registers' advisory report on *The Modern Movement and the World Heritage List* (DOCOMOMO ISC/Registers, 1997) demonstrates its underrepresentation and underlines DOCOMOMO's recognised advisory role.

With its work in the first decade DOCOMOMO transformed documentation into a conservation strategy by constructing the intellectual, documentary and professional infrastructure through which 20th-century architecture could be read and recognised as heritage. Its founding premise was that buildings, sites and neighbourhoods of the Modern Movement could only be effectively conserved when their cultural, architectural, technological and historical values were first understood and made visible. DOCOMOMO therefore contributed to a fundamental shift in the heritage discourse: the architecture of the Modern Movement was increasingly perceived as cultural heritage requiring active processes of identification, interpretation, conservation and continued use.

Already in the 1990s DOCOMOMO extended its scope beyond buildings, expressed in establishing a further International Specialist Committee Urbanism and Landscape (ISC/U+L) in 1996. After 2000, the ISC on Education and Theory (ISC/E+T), later renamed Education and Training, was established, followed in 2016 by the ISC on Interior Design (ISC/ID). The ISCs contributed to international exchange and collaboration beyond and next to the biennial International DOCOMOMO Conferences (IDC's). Through its international and interdisciplinary network of

1 Knoll Modernism Prize (https://www.wmf.org/knoll-modernism-prize).

2 The ISC/T Dossiers are available via the website of DOCOMOMO International (https://docomomo.com/dossiers-isc-t-2/).

architects, historians, conservation specialists and researchers across all continents, DOCOMOMO's most important conceptual contribution was to understand the Modern Movement as an international cultural phenomenon rather than a collection of nationally isolated architectural achievements.

In 2014 DOCOMOMO added 'adaptive reuse' to its principal objectives and further committed to sustainability and the UN's Sustainable Development Goals (SDGs), manifested in the *Eindhoven-Seoul Statement* (DOCOMOMO International, 2014). In 2022 the Council Meeting in Valencia (Spain) approved a further addition to DOCOMOMO's principles with the *DOCOMOMO Manifesto on Education* (DOCOMOMO International, 2022). Overall a good theoretical basis was created to improve and accelerate the conservation practice by different approaches such as restoration, rehabilitation, reconstruction or renewal, in particular when adaptive reuse comes into play.

From Documentation to Conservation

Since its establishment DOCOMOMO has grown from 14 to 85 national working parties from all five continents. In parallel, the scope of DOCOMOMO's work extended beyond the interwar period (1918–1939) to the post-war period (1945–1975). Through local initiatives, its international conferences and through the *DOCOMOMO Journal* also 'other modernism', 'multiple modernism', 'dissonant modernism' and 'imperfect modernism', were brought to the attention of a global audience, colouring the documentation and conservation of buildings, sites and neighbourhoods of the Modern Movement beyond the Eurocentric and North American perspective. This had several implications for the body of research and documentation, and for conservation challenges.

The conservation of 20th-century architecture increasingly confronts a fundamental tension between the preservation of architectural heritage and the need to meet contemporary or even future standards of environmental performance, safety, and usability. Buildings of the Modern Movement were frequently conceived through principles of technological innovation, lightweight construction, transparency and extensive glazing (Prudon, 2008). Yet the material and technological systems that enabled these architectural qualities are often associated with significant energy losses, material deterioration, corrosion, deferred maintenance and functional obsolescence. Glazed façades and lightweight steel- or aluminium-framed enclosures present complex conservation challenges because their architectural significance is often closely related to their material and technological characteristics. The conservation of such buildings consequently raises a fundamental question: how can their significance be sustained while their environmental and technical performance is adapted to contemporary requirements? It also raises a fundamental theoretical question concerning authenticity: must architectural authenticity reside in the survival of original material, or can it also reside in the continued legibility of architectural or even conceptual principles? The examples studied in this book and documented in earlier book publications suggest the latter possibility. High-performance glazing, enlarged vision areas, solar-control devices and façade redesign may alter material reality while attempting to preserve or reinterpret significant architectural characteristics. Such an approach moves conservation away from the concept of the building as a fixed historical object and towards an understanding of heritage as a continuously reconstructed relationship between material evidence, cultural meaning and contemporary use.

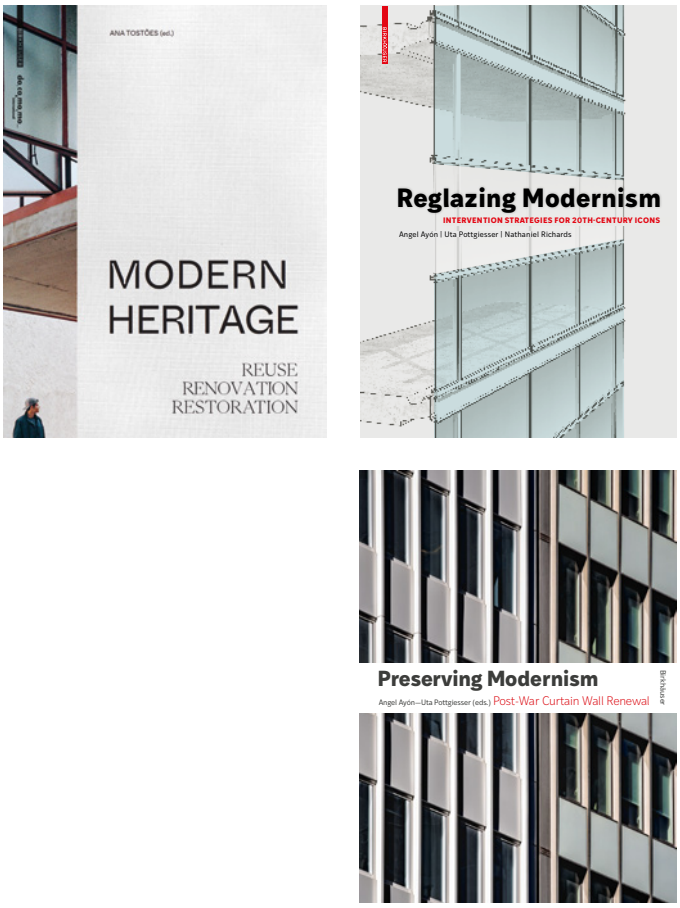

Figure 2
Recent book publications on preservation and rehabilitation of 20th century architecture, edited in collaboration with DOCOMOMO International (2022, 2019, 2026).

The appropriate strategy depends on factors such as the building's cultural significance, physical condition, energy performance, safety and potential future use. Underlying these approaches is the broader philosophy of transformation rather than demolition – principles associated with Anne Lacaton, Jean-Philippe Vassal and Frédéric Druot: 'never demolish, subtract or replace, but always add, transform and reuse.' (Spoormans et al., 2018). These principles position existing buildings as resources and emphasise enhancement, extension, transformation and continued use. Reuse establishes a form of continuity between conservation and sustainability. Rather than treating existing buildings as obsolete objects to be replaced by technically optimised new construction, it recognises their accumulated material, spatial, cultural and urban value. Transformation consequently becomes a means of preserving embodied architectural resources while enabling new forms of occupation.

Also, DOCOMOMO examines how buildings of the Modern Movement can be conserved and adapted without reducing conservation to the simple preservation of existing fabric. Instead, it proposes a differentiated understanding of levels of intervention and a search for the 'tolerance for change' in which restoration, rehabilitation, replacement, reframing and reglazing can contribute to the continued life of buildings, both ordinary and of cultural significance (Van den Heuvel et al., 2008; Kuipers & Quist, 2013).

The first comprehensive overview of good practices was presented in *Modern Heritage: Reuse, Renovation, Restoration,* a publication accompanying the first DOCOMOMO Rehabilitation Award (DRAW), edited by former DOCOMOMO International Chair Ana Tostões (2022). The book presents 24 international projects

clustered in 12 different categories to illustrate the broadness of preservation philosophy and conservation strategies.

Intervention Categories for the Building Envelope

Regarding the building envelope, authenticity and energy efficiency, DOCOMOMO has contributed to several publications to develop an intervention taxonomy for the building envelope conservation. Angel Ayón and Uta Pottgiesser co-authored *Reglazing Modernism: Intervention Strategies for 20th-Century Icons* (2019), and both edited *Preserving Modernism: Post-War Curtain Wall Renewal* (2026). Within this context, several categories of intervention are distinguished:

- Restoration represents the most conservative approach and seeks to retain and repair existing building components wherever possible. Different forms of restoration may involve repairing the original frame while retaining single-pane glass, introducing laminated glass, or applying surface-mounted films. Such interventions prioritise material continuity and the retention of architectural characteristics. However, the environmental performance of the existing envelope may establish limits to what can reasonably be achieved through minimal intervention. This creates the need for performance-oriented conservation, in which the technical upgrading of the building becomes part of the conservation strategy itself.
- Rehabilitation is a more substantial alternative when deterioration or performance requirements exceed the possibilities of minimal intervention. It is characterised as partial replacement where significant material loss has occurred in metal frames or glazing, where in-kind replacement is unfeasible, ineffective or inappropriate, or where upgrading is required to meet contemporary environmental or structural performance requirements and to support continuing or new programmes. Rehabilitation is reconciling conservation with upgrading.
- Overcladding is particularly significant in US/American context because it permits the introduction of a new façade layer without necessarily eliminating the entire existing construction. The publication identifies interventions ranging from complete façade redesign to localised aesthetic modifications, including glass cladding of metal spandrels, metal cladding of mullions and spandrels, and modifications to accommodate mechanical equipment.
- Replacement represents a further stage of intervention. This may include high-performance glazing, enlargement of vision glass, replication of the historic appearance through new façade systems where heritage designation requires it, new exterior solar-control devices and façade redesign. Replacement is therefore not presented as a single technical solution but as a range of possibilities for reconciling improved performance with architectural continuity.

All intervention categories demonstrate how environmental and technical requirements can become agents of architectural transformation.

Reglazing Modernism (2019) focused on steel-framed glazed buildings from the 1920s–1960s. Challenges include, for example, high energy losses, daylight requirements, corrosion, deferred maintenance and changing programmes. Restoration seeks to retain as much of the original fabric as possible. Examples include repairing existing frames while maintaining single-pane glass or combining repaired frames with laminated glass or surface-mounted films. The cases of the Hallidie Building, Villa Tugendhat, Fallingwater, the Glass House, the Farnsworth House and the TWA Flight Center illustrate the possibilities of this approach. These interventions can introduce improved glazing while retaining significant original elements.

Preserving Modernism (2026) focuses on aluminium-frame glazed buildings from the 1950s–1980s. Such buildings – mainly high-rises – present different conservation conditions: they tend to be larger and taller, may have limited formal heritage recognition (yet), and frequently exhibit significant energy losses, deterioration and functional obsolescence. The intervention categories identified include rehabilitation, overcladding, and replacement. Challenges include, for example, high energy losses, daylight requirements, corrosion, deferred maintenance and changing programmes. Case studies such as Bizkaia Tower in Bilbao (Spain), the former Royale Belge building in Brussels (Belgium), Goldman Sachs and 180 Water Street in New York City (USA) demonstrate how façades can be upgraded through new skins, improved glazing, localised interventions or complete replacement. These projects show that adaptation can involve both technical improvements and changes to a building's architectural expression.

Conservation Strategies beyond Energy Efficiency

The shift from preservation to performance-oriented conservation indicates that improving environmental performance does not necessarily require the wholesale replacement of an existing building envelope. This distinction is important because the environmental performance of a heritage building is not reducible to the performance of individual components. The building operates as an interconnected system involving façade, structure, daylight, use and environmental conditions. Consequently, sustainable conservation requires an assessment of how interventions affect the complete building rather than simply maximising the technical performance of individual elements. We suggest that energy efficiency should be understood as a means of enabling continued occupation, rather than as an isolated technical objective. The purpose of upgrading is ultimately to allow significant buildings to remain functional and adaptable under contemporary and potentially future conditions.

Reuse as an environmental and cultural strategy

Within the context of this contribution, this principle has both cultural and environmental implications. Reuse avoids treating existing buildings as disposable objects and instead recognises their potential for adaptation. The existing structure and envelope become resources from which new forms of performance and use can be developed. This approach also changes the meaning of sustainability in architectural conservation. Sustainability is not presented solely as a matter of reducing operational energy consumption. It is connected to the long-term viability of existing buildings sites and neighbourhoods and to the capacity to adapt them to changing requirements. The preservation of architectural heritage and the reduction of environmental impact can therefore become mutually reinforcing when adaptation enables buildings to remain occupied and useful.

Conservation, performance and the environmental dimension of architectural heritage

We suggest that energy efficiency should become an integral consideration within the assessment of 20th-century architectural heritage. Case studies demonstrate a range of possible responses and strategies. These strategies imply that there is no single sustainable conservation solution that is always the preferred option. The appropriate intervention depends on the significance of the building, the condition of its materials, its existing performance, its future programme and the extent to which architectural characteristics can accommodate technical change. Here lies an important role for all stakeholders involved to join forces.



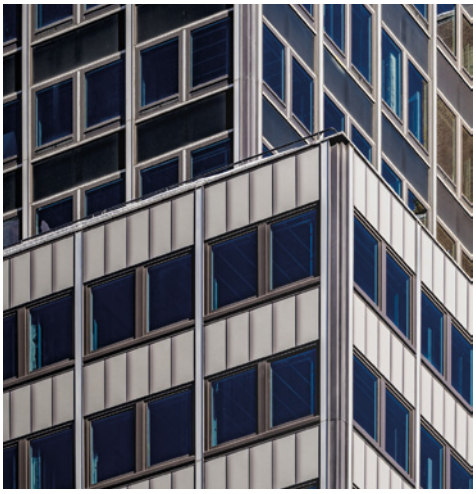

Figure 3
Large steel- and aluminium-framed glazed enclosures characterise many 20th-century buildings from the interwar and post-war periods; photographs from 2014 (top) and 2026 (bottom).

Conservation, performance and the problem of obsolescence

The conservation of modern architecture presents a particular set of difficulties because its architectural significance is frequently embedded in constructional and technological characteristics. A conservation strategy must consequently determine which characteristics of a building are essential to its significance and which can be modified in response to environmental or functional demands. The issue is not simply whether original fabric is retained, but how its retention can be reconciled with the building's continued performance and use. This suggests not only thinking in terms of constraints but focusing primarily on opportunities.

Reglazing as a strategy of sustainable adaptation

The relationship between conservation and energy efficiency is particularly evident in the treatment of glazing. This formulation is important because it situates environmental upgrading within the logic of conservation itself. Improved glazing is not understood simply as an independent energy intervention but as a means of enabling the continued use of a significant building. The environmental performance of the envelope thus becomes directly related to the long-term viability of the heritage asset. This approach suggests a conception of sustainability based on adaptation rather than technological replacement alone. The objective is not necessarily to reproduce the original technical condition, nor to maximise performance irrespective of heritage value, but to identify an appropriate relationship between existing fabric and new technical requirements.

energy efficiency consequently assumes a dual role. On the one hand, it is a performance requirement associated with contemporary environmental expectations. On the other hand, it becomes a condition of continued architectural use. The two dimensions cannot easily be separated: inadequate environmental performance can contribute to functional obsolescence, while appropriate upgrading can support continued occupation and thereby contribute to the preservation of heritage.

Conclusion: Towards a Sustainable Model of Conservation

The case studies presented in this book suggest that sustainable conservation cannot be reduced to a hierarchy in which the least intervention is automatically regarded as the most appropriate. Minimal intervention may be desirable where existing fabric remains viable, but more extensive intervention may be justified where material deterioration or inadequate performance threatens the building's continued use. The concepts of compatibility (to what extent the intervention harms the existing fabric) and retreatability (to what extent an intervention could be repeated in the future) seem to be useful in contributing to the discussion on appropriate interventions.

This leads to a more differentiated understanding of conservation in which intervention intensity is related to both heritage significance and performance requirements. Restoration, rehabilitation, overcladding and replacement are not necessarily competing doctrines; they constitute potential responses to different material and environmental conditions. One could even argue that often 'more extensive interventions' can also be regarded as 'minimal interventions', because doing less would not have sustained the continued use of the building: doing as little as possible but as much as needed.

The environmental dimension therefore expands the conventional understanding of architectural heritage. The value of a building lies not exclusively in the survival of its original form but also in its capacity to remain meaningful and usable under changing conditions. At the same time, the pursuit of energy efficiency cannot automatically justify the removal of significant historic fabric. Sustainable conservation requires a negotiated balance between retention, performance and transformation.

The recurring case studies collectively demonstrate that reconciling conservation values with contemporary energy-efficiency standards is achievable across a range of intervention intensities, reinforcing DOCOMOMO's broader advocacy position: that Modern Movement heritage constitutes a documentable and manageable resource rather than an obstacle to sustainable adaptation. This perspective gives particular importance to (adaptive) reuse. The continued use of existing buildings can be understood as both a cultural and environmental objective: it sustains architectural heritage while creating the conditions for further adaptation. DOCOMOMO International's commitment to the documentation and conservation of the Modern Movement, together with its emphasis on responsibility towards this recent architectural inheritance, provides the broader institutional context for this position.

This perspective supports shifting from preservation as stasis towards conservation as managed continuity. The objective is neither to freeze all 20th-century buildings in their original state nor to subject them indiscriminately to contemporary performance standards. Rather, it is to establish forms of intervention that allow architectural significance and environmental performance to coexist, calling upon all stakeholders, instead of questioning the viability of preservation, to join forces to make it happen. This understanding is consistent with DOCOMOMO International's commitment to

documenting and conserving the buildings, sites and neighbourhoods of the Modern Movement while fostering responsibility towards this recent architectural inheritance. We ultimately suggest that the future of 20th-century architectural heritage depends upon developing conservation practices capable of negotiating technological change rather than resisting it. Preserving, reglazing and reframing can thus be understood as complementary instruments in the broader project of sustainable architectural continuity.

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