Madlen Kobi/Adam Przywara

CIRCULAR ECONOMY AS HUMAN-MATERIAL RELATION

Understanding the Reuse of Building Materials through Historical Sources and Ethnographic Data

1. Introduction

The construction industry is responsible for 40 percent of the solid waste produced on Earth today, and the volume of CDW (construction and demolition waste) is predicted to reach 2.2 billion tons a year in 2025.[1] This is a mass three times larger than that of rubble estimated to have covered urban areas of Central and Eastern Europe after six years of World War II.[2] When CDW is deposited on landfills, which is mostly the case today, it contaminates the soils, while the fossil energy contained in the building materials is entirely wasted. How to keep CDW in use, saving resources and energy, has become a major challenge for the contemporary market-driven construction sector.

EU policymakers, industry leaders, architecture professionals, and the construction industry are seeking to change this state of affairs by creating ›circular solutions‹ that divert CDW back into construction.[3] The introduction of Circular Economy (CE)

1 Sadhan Kumar Ghosh et al. (eds), *Circular Economy in the Construction Industry*, Boca Raton 2021; Mark Jarzombek, The Quadrivium Industrial Complex, in: e-flux Architecture, November 2019, URL: <https://www.e-flux.com/architecture/overgrowth/296508/the-quadrivium-industrial-complex/>.

2 The estimates for Germany, Poland, Soviet Ukraine, Belarus, and Russia published in: Kazimierz Tyszka, Problemy odgruzowywania miast [Problems of rubble clearance], in: *Inżynieria i Budownictwo [Engineering and Building]* 5 (1948) issue 1-2, pp. 3-9. The estimates were based on the amounts self-reported by the administration of respective countries, and should be treated as very rough calculations.

3 Nicholas Lynch, Unbuilding the City: Deconstruction and the Circular Economy in Vancouver, in: *Environment and Planning A: Economy and Space* 54 (2022), pp. 1586-1603; Wendy Wuyts/Julie Marin, »Nobody« Matters in Circular Landscapes, in: *Local Environment* 27 (2022), pp. 1254-1271; About BAMB [Buildings as Material Banks], URL: <https://www.bamb2020.eu/about-bamb/>.

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in construction is viewed as a way to close the gap between the principle of growth driving the capitalist economy and the mounting social pressure to protect the environment. CE is an economic paradigm that originated in the 1970s and coincides with a growing awareness of industrial ecology approaches for the damaging effects a take-make-waste economy has on the environment. CE thus proposes to decouple ›wealth (value) creation from resource consumption‹.[4] It aims to do so by implementing practices which maintain and increase the value of existing assets and capital in time, rather than continue with the linear economic pattern.

In architecture and construction, CE is associated with a variety of practices which address each stage of a building's life: from initial design through renovation and adaptive reuse of entire structures to practices of deconstruction, salvaging, and building material reuse and recycling. It is this last set of practices that is currently attracting significant attention, as waves of destruction – due to different reasons and circumstances – sweep through urban environments across the world.

Building material reuse, and to a much smaller extent recycling, allows emissions and waste associated with construction to be reduced significantly. Experts estimate that between 60 to almost 90 percent of carbon emissions can be cut compared to conventional construction.[5] However, such promising numbers have only been achieved thus far in the experimental settings of privately funded single-building projects that used various sustainable construction strategies. Beyond such examples, the effects of the systemic implementation of CE have been obscured by misleading reporting, e.g. by the EU member states.[6]

We believe it is urgent to foster critical reflection on CE in construction by employing qualitative methods to assess the paradigm's implementation. Our research, which relies on historical and ethnographic methods, has led us to question the image of neat material circulation as a solution to the waste problem that is presented by policymakers, industry leaders, architecture professionals, and positivist academic researchers promoting CE. In this article, we provide a critical perspective on CE based on a historical-ethnographic approach while at the same time assessing the potentials of cross-disciplinary collaboration. Moreover, we show how the image of a seamless and endless circulation of materials promoted by the industry obscures the social reality of building material circulation.

This article draws on empirical and qualitative research to bring into view the human-material and socio-material relations that are central to the process of material (re-)circulation, yet often remain obscure in professional, industrial, and academic

4 Walter R. Stahel, History of the Circular Economy: The Historic Development of Circularity and the Circular Economy, in: Sepp Eisenriegler (ed.), *The Circular Economy in the European Union. An Interim Review*, Cham 2020, pp. 7-19, here p. 10.

5 Marc Angst et al., New paths toward net zero? Potentials for climate protection, in: Eva Stricker et al. (eds), *Reuse in Construction. A Compendium of Circular Architecture*, Zurich 2022, pp. 165-177.

6 Julia Moschen-Schimek/Thomas Kasper/Marion Huber-Humer, Critical Review of the Recovery Rates of Construction and Demolition Waste in the European Union – An Analysis of Influencing Factors in Selected EU Countries, in: *Waste Management* 167 (2023), pp. 150-164.

debates on CE. We understand the human-material relationship as a direct encounter between an individual, or a group of people, and materials: raw resources, manufactured materials, or buildings.[7] Such encounters often result in practices set within a specific social, economic, and political reality. When reflecting on this broader reality, be it in the past or today, we use the concept of socio-material practice, or relation.[8] Accordingly, this article explores the possibility of cross-pollination between ethnographic data and historical sources in highlighting the relations that animate the reuse of building materials. Therefore, the article provides qualitative insights into CE, while reflecting on the methodology of tracing and analysing the materiality of architecture.

The next section positions our research focus in the context of the existing literature on construction materials in history (2.). Then we outline our methodological approach (3.). The first empirical section problematizes convergences between historical and contemporary practices of building material reuse in construction (4.). The second empirical part outlines meaningful differences that emerge when juxtaposing historical and ethnographic practices (5.). The concluding section reflects on circular economy as a socio-material practice that unfolds in a particular economic, social, aesthetic, and historical context. We underline the limits of current CE discourses as technological fixes and the insights that historical-ethnographic research generates (6.).

2. Circular Construction as Human-Material Relation

To bring historical and ethnographic perspectives into dialogue, we pursue an analysis that focuses on the human-material relations inherent in keeping building materials in use. The materiality of things, denoting the relationship between humans and their environment, is an established field of historical and anthropological inquiry.[9] As historians Simone Derix et al. have already argued in this journal, engaging with such a conceived history of things is a way of understanding the history of humans.[10] Yet the materiality of architecture, in contrast to that of smaller things, has received little attention, both in anthropological and historical inquiry.

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7 Tim Ingold, Materials Against Materiality, in: *Archaeological Dialogues* 14 (2007), pp. 1-16.

8 Theodore Schatzki, Materiality and Social Life, in: *Nature and Culture* 5 (2010), pp. 123-149.

9 In history, see: Smil Vaclav, *Making the Modern World. Materials and Dematerialization*, Hoboken 2016; Jane Elizabeth Hutton, *Reciprocal Landscapes. Stories of Material Movements*, New York 2019; Alexey Golubev, *The Things of Life. Materiality in Late Soviet Russia*, Ithaca 2020. In anthropology, see: Daniel Miller (ed.), *Materiality*, Durham 2005; Schatzki, Materiality and Social Life (fn 8); Madlen Kobi, Chinesische Wege des Bauschutts – Sozialanthropologische Perspektiven auf das Recycling von Baumaterialien und die Materialität der Stadt, in: Phillip Grimberg/Grete Schönebeck (eds, in cooperation with Rüdiger Breuer), *Vom Wesen der Dinge. Realitäten und Konzeptionen des Materiellen in der chinesischen Kultur*, Wiesbaden 2019, pp. 169-191.

10 Simone Derix et al., Der Wert der Dinge. Zur Wirtschafts- und Sozialgeschichte der Materialitäten, in: *Zeithistorische Forschungen/Studies in Contemporary History* 13 (2016), pp. 387-403, here p. 391.

In his recent book, architecture historian Ákos Moravánszky sketched out a horizon of reflection on architecture which would account for the ›continuum of history which, rather than excluding technology, examines it in synthesis with culture‹.[11] According to Moravánszky, architecture can be understood in this continuum as a type of alchemical process, a ›transformation of a worthless stone into a golden one‹.[12] Moravánszky's theoretical reading of architecture comes close to that of anthropologists who argue that architecture is a process of material transformation involving knowledge, technologies, and labour. Such processes of human-material interaction produce values out of materials in an economic and extra-economic sense.[13]

Historians of architecture have primarily analysed the materiality of buildings in the context of the initial cycle of production. Scholars have traced processes of resource extraction, building materials production, and construction in modernity.[14] In doing so, they have highlighted the ways in which architecture shapes the social, ecological, and economic realities in various geographical and temporal scales. Much less has been published about the afterlives of buildings in history, and human practices associated with them.[15] A notable exception here is the research into *spolia* in the architecture of ancient and mediaeval Rome. Scholars in this field have advanced the understanding of a relation that binds people to their material surroundings.[16] These relations emerged from the appropriation of building elements (›spoliation‹ or plunder), and their subsequent intentional and visible reuse in new construction. Lately, scholars have started to look not only into the aesthetic or symbolic meanings of that practice but have also scrutinised the social and economic dimensions of reuse and recycling in ancient Rome.[17]

Architecture scholars today are calling for further reflection on the broader economic, political, and industrial conditions of building material reuse and CE in modernity and twentieth-century construction. They are focussing on a systemic shift from centuries-old practices of deconstruction, salvaging and reuse towards the industrialisation and mechanisation of demolition – the emergence of recycling – as an outcome of WWII.[18] This article further advances that research trajectory by articulating a transformative relation of material, labour, and technology implied in the practice of building material reuse.

11 Ákos Moravánszky, *Metamorphism. Material Change in Architecture*, Basel 2018, p. 308.
12 Ibid., p. 9.
13 Victor Buchli, *An Anthropology of Architecture*, London 2013.
14 Adrian Forty, *Concrete and Culture. A Material History*, London 2012; Hutton, *Reciprocal Landscapes* (fn 9).
15 Tim Edensor, *Industrial Ruins. Space, Aesthetics and Materiality*, Oxford 2005.
16 Hans-Rudolf Meier, *Spolien. Phänomene der Wiederverwendung in der Architektur*, Berlin 2020.
17 Chloë N. Duckworth/Andrew Wilson (eds), *Recycling and Reuse in the Roman Economy*, Oxford 2020.
18 Arne Vande Capelle et al., *Ad Hoc Baroque. Marcel Raymaekers' Salvage Architecture in Postwar Belgium*, Brussels 2023.

3. A Cross-disciplinary Approach: Juxtaposing Historical and Contemporary Practices of Reuse

While the cognitive skills required to envision a circular economy in building construction are important, it is through the bodies of the experts and workers involved that circularity is carried out. The input of both intellectual and physical labour by architects, demolition workers, engineers, material scientists, carpenters, and digital experts is essential to make materials circulate. Both their minds and bodies are involved in removing nails from wooden planks, sorting salvaged tiles, designing with reused materials, or carrying second-hand windows to the warehouse. This embodied knowledge is frequently neglected in the discussions on how materials circulate, while technical and engineering knowledge is foregrounded but often presented as detached from any human input.

Highlighting the role of the body is relevant for all scholars who work on the built environment. Anthropologists are trained to approach topics from an actor perspective, paying attention to the multiple and often intricate relations between humans and non-humans (including materials, microbes, animals, plants, and other objects). When approaching reuse with a new materialism lens, we see that the ›distributed agency‹[19] within human-material assemblages actually defines the possibilities of reuse at different stages and on different sites. Neither the materials nor the humans fully determine the ways in which materials are repurposed, but circularity emerges in the design, handling and moving of building materials. Not paying attention to the bodily labour and knowledge in these processes would be an analytical omission.

Our cross-disciplinary approach to human-material relations departs from ›thinking through things‹[20] when we approach the materiality of circular construction. The historian of technology David Edgerton argues that by directing our scientific gaze on ›things‹ rather than ›technology‹, we gain a much more heterogeneous impression of what is subsumed under a technological field.[21] This allows us to view material reuse not only in terms of technological innovations, as is often presented in CE policies. Instead, reuse is an anthropological phenomenon based on construction techniques which involve ›the [sociotechnical] system of material resources, tools, operational sequences and skills, verbal and non-verbal knowledge, and specific modes of work coordination‹.[22]

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19 Jane Bennett, The Agency of Assemblages and the North American Blackout, in: *Public Culture* 17 (2005), pp. 445-466, here pp. 451-452.

20 Amiria Henare/Martin Holbraad/Sari Wastell, Introduction: Thinking Through Things, in: Amiria Henare/Martin Holbraad/Sari Wastell (eds), *Thinking Through Things. Theorising Artefacts Ethnographically*, London 2007, pp. 1-31.

21 David Edgerton, *The Shock of the Old. Technology and Global History Since 1900*, Oxford 2007, xvii, p. 212.

22 Bryan Pfaffenberger, Social Anthropology of Technology, in: *Annual Review of Anthropology* 21 (1992), pp. 491-516, here p. 497.

In line with this perspective, we also grasp material reuse as a historical phenomenon contingent on broader economic, social, and political conditions. Written archival sources provide access to material, immaterial and conceptual valuation processes, while ethnographic data covers the practices in human-material relations. Therefore, by engaging both ethnographic data and historical sources, we are offering a nuanced and complex understanding of the valuation of rubble, which is taken for granted by policymakers and industry leaders. Our aim is to articulate a qualitative perspective on CE by looking at the circulation of materials instead of its imaginaries, by looking at practices of reuse rather than (only) the discourses surrounding them. Such a cross-disciplinary perspective is made possible by drawing on the two authors' past and ongoing fieldwork and archival research.

Adam Przywara has employed historical methods, tracing the material transformation of rubble during postwar reconstruction of Warsaw.[23] Through the analysis of archival documents, construction and architecture magazines, and visual sources (maps, drawings, films, photographs), his research covers the multifaceted history of rubble clearance, reuse, and recycling. This research was conducted in the archival collections of major reconstruction institutions such as the Warsaw Reconstruction Office (State Archive in Warsaw) and the Ministry of Reconstruction (The Archives of Modern Records). It brings together sources on smaller institutions that are scattered across different archives, such as the Rubble Commission in the Warsaw Reconstruction Office, the Directorate of Winter Action of Demolition, and the Rubble Commission in the Building Research Institute. The archival investigation was complemented by field visits to trace and document the ways in which rubble exists today as a materiality of the postwar landscape and architecture of Warsaw.

Madlen Kobi collected ethnographic material in 2022 during seven months of fieldwork in and around *materialnomaden* (literally, the name ›material nomads‹ emphasises the movement of materials through human practices). This start-up company in Vienna promotes and practises the reuse of building materials. The long-term participant observation in the company involved the accompaniment of daily activities including meetings, building assessments, public events, and manual work in the workshop and on the deconstruction site. Semi-structured interviews with employees from *materialnomaden* were complemented by interviews with individuals from other companies and city administration. The interviewees were chosen based on their collaboration with *materialnomaden* to get an outside perspective on the company's practices. In addition, published materials from different companies were studied to learn about the ways in which circular practices are communicated to customers. Likewise, policies and publications by government institutions were analysed to understand the role that CE plays for addressing ecological challenges in the city of Vienna.

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23 Adam Przywara, Mining for Embodied Coal: Building Material Reuse in the Postwar Reconstruction of Warsaw, in: *Ardeth* 13 (2023), pp. 141-159; Adam Przywara (ed.), *Zgruzowstanie. Przeszłość i przyszłość ruin w architekturze [Rising from Rubble. Past and Future of Ruins in Architecture]*, Warsaw 2023.

By collaboratively working on the historical and ethnographic material gathered during our individual research, the following sections emphasise the convergences of such a cross-disciplinary perspective on building material reuse. We are convinced that both historical sources and ethnographic data are essential in highlighting the social dimension of the building material reuse in construction. Simultaneously, the juxtaposition of historical and contemporary practices of reuse reveals inevitable challenges that stem from the diverging economic, ecological, and political conditions that the research focused on. Therefore, while we argue that an ethnographic approach to CE is essential for understanding its real-world impact, historical perspectives provide a comparative, intertemporal view on the valuation of materials in other political and economic contexts.

4. Urban Mining of Building Materials in Postwar Warsaw and Contemporary Vienna

The destruction wrought in Europe during WWII resulted in what was at the time a historically unprecedented amount of rubble strewn across the urban areas of the continent. In Germany, postwar estimates ran to approximately 350 million m^3 of rubble, and 450 million m^3 in the Soviet Union. In Poland in the late 1940s, urban areas were choked by around 170 million m^3 of rubble. In the 1940s it was estimated that the amount of rubble in Poland could have allowed for the construction of a wall 10 metres high encircling the postwar borders of the state two times.[24]

Despite the amount of materials that needed to be handled during reconstruction, subsequent historical accounts of this period have failed to provide a sustained engagement with rubble. The architectural history of postwar reconstruction, which privileges urban planners' and architects' perspectives, describes rubble as a mere obstacle in the realisation of reconstruction plans.[25] This lack of engagement with the socio-material practices that rubble has generated can be explained by the choice of archival sources utilised by historians of reconstruction. Many of these documents were prepared by architects and planners engaged in the reconstruction. They often presented the postwar territory of the city as a space devoid of human-material relations.

In 1945 and 1946, employees of the statistical department of the Warsaw Reconstruction Office (*Biuro Odbudowy Stolicy,* BOS) prepared an inventory map of wartime damage in the city of Warsaw. It was a prolonged and laborious process of visiting, assessing, photographing, drawing, and note-making covering almost 20,000 buildings

24 Tyszka, Problemy odgruzowywania miast (fn 2), p. 5.

25 Martin Kohlrausch, *Brokers of Modernity. East Central Europe and the Rise of Modernist Architects, 1910–1950*, Leuven 2019.

Destruction Survey Map, Warsaw Reconstruction Office, 1945–1946. The plots marked in red designate buildings burned to the ground. The captioned area in the centre is the former Warsaw Ghetto, where all the buildings were turned into rubble (one Catholic church remained standing and is marked in black). (Archiwum Państwowe w Warszawie/State Archive in Warsaw, 72/25, 7724, 31)

across the city. Each building was assigned a level of damage and was then plotted onto a map. In left-bank Warsaw, 9,865 buildings (roughly 58 percent of the built-up area) were destroyed completely, 2,873 buildings (roughly 17 percent) were devastated to a very significant extent, and 4,225 (roughly 25 percent) to a moderate extent.[26]

Preparation of the map was possible only following the end of German occupation on 17 January 1945. In other cities across the continent, such as Berlin, Vienna, or London, similar maps were produced almost immediately after the damage had occurred.[27] These maps were vital for the coordination and planning of reconstruction works, which often started with the demolition of ruined buildings and the

26 Krzysztof Dunin-Wąsowicz, *Warszawa w latach 1939–1945 [Warsaw 1939–1945]*, Warsaw 1984, p. 370.

27 Carmen M. Enss/Birgit Knauer (eds), *Atlas Kriegsschadenskarten Deutschland. Stadtkartierung und Heritage Making im Wiederaufbau um 1945*, Basel 2023.

Old Town in Warsaw, 1947. Almost six years of German occupation transformed the city into an alien landscape of ruins and rubble. Such documentary photos, which also serve as icons of indictment of German war guilt, were used in press materials of different kinds. Many of these photos were never published. (Narodowe Archiwum Cyfrowe/National Digital Archives, Socialist Press Agency, 3/3/0/47/1127; Public Domain)

removal of rubble.[28] Such maps were the outcome of translating the materiality of the postwar city into the rational language of categories, numbers, and comprehensible images.

The statistical calculations based on the inventories of wartime destruction allowed the architects to grasp the rubble scattered in Warsaw in numbers. Based on the inventory, employees of BOS assessed in 1946 around 22 million m^3 of rubble strewn throughout the city and an additional 4.5 million m^3 bounded in the ruins and buildings assigned for demolition.[29] The administration of the reconstruction efforts used these numbers to communicate to the public the unprecedented challenge lying ahead. However, if we extend the scope of archival sources even beyond the professional archives, much more complex views of relations between people and rubble emerge.

28 Małgorzata Popiołek-Roßkamp, *Warschau. Ein Wiederaufbau, der vor dem Krieg begann*, Paderborn 2021.

29 Jerzy Nowiński/Stanisław Mazurkiewicz, Gospodarka gruzem na terenie Warszawy [Management of Rubble in Warsaw], Biblioteka Muzeum Warszawy [Museum of Warsaw Library], 1946, p. 2.

Halina Rozmarynowska, a paramedic in the First Polish Army, recalls that, when she entered the city in early 1945, it did not occur to her that it would be rebuilt: ›We never thought that this place would be Warsaw. We thought that it would stay as a memorial, and they would build Warsaw nearby.‹ She continued with a description of the ruins: ›It was like a landscape after an eruption, like after a volcanic eruption: mountains, pits, and graves. It was like mountains. There were these pits after the bombs. And crosses everywhere, crosses everywhere. They made an impression.‹[30] In the oral history archives we can find similar descriptions, which highlight a direct, bodily, and emotional experience of ruined landscape. These sources offer a different view of rubble than that represented on maps and architectural drawings: the postwar city is characterised as an alien type of nature while also being a marker of the lost past. The view of rubble as part of postwar urban nature opens a different horizon of human-material relations rather than simply characterizing them as waste matter or an obstacle.

We learn about a different value of rubble when exploring the ways in which rubble started to change as soon as the matter entered into relations with the labouring bodies of inhabitants and reconstruction workers. At the forefront of this process were those employed in what came to be the new postwar organisation of ›unskilled labourers‹: the Work Brigades established in January 1945 by the newly appointed municipal administration. In the first few months following the war, the brigades were composed mainly of women, since those men who had survived the war returned e.g. from labour camps only later in the year. The brigadiers were directed to do the urgent public works in the city, particularly rubble clearance and the demolition of damaged buildings.

The workers' direct bodily engagement with rubble can be traced through hundreds of receipts found in the BOS archives. The brigade administration recruited workers for a specific job from a larger pool of pre-registered persons. These workers were paid in a piecework system, which makes their movements directly legible in the archival documentation. The receipts sent from Work Brigades to BOS give insight into the choreography of their work: ›Throw away compacted brick rubble, paving slabs and earth to a distance of 4, 20 and 30 metres; Salvage entire bricks, clean them and move them up to 50 metres, set them in a tower; Salvage the iron parts, clean them and gather them in one place, up to 50 metres away.‹[31] During the clearance and sorting of the materials, the heterogeneous composition of rubble became apparent; this realisation expanded the scope of possibilities regarding its handling far beyond

30 Halina Rozmarynowska, Wywiad historii mówionej przeprowadzony przez Grzegorza Kaczorowskiego [Oral history interview conducted by Grzegorz Kaczorowski], Archiwum Historii Mówionej w Domu Spotkań z Historią [Oral History Archive of the History Meeting House], Warszawa 2010. All archival materials and testimonies were translated from Polish to English by Adam Przywara.

31 Aleksander Kulinicz, Rachunek Nr 3 [Receipt No. 3], Archiwum Biura Odbudowy Stolicy w Państwowym Archiwum w Warszawie [Warsaw Reconstruction Office Collection in the State Archive in Warsaw], Warszawa 1945.

Work brigade clearing the rubble at a tenement house at 63 Mokotowska Street in Warsaw, 1945 (photo: Zofia Chomętowska [1902–1991]; Muzeum Warszawy/Museum of Warsaw, AN 51244)

that of waste disposal or clearance. Despite this, in late 1945, after the press reported on hard labour conditions and a notorious inconsistency in paying workers, the municipality decided to close the Work Brigades.[32]

Despite its relatively short institutional life, the labour performed by the brigades had lasting consequences for postwar reconstruction. The encounter between labour and matter manifested in the productive relation between Work Brigades and ruins fostered a new perception of rubble within the reconstruction administration. The magazine *Stolica* [Capital City], published by BOS, announced in late 1946 that rubble was not an obstacle to reconstruction. Quite to the contrary: it was a ›treasure‹ that state reconstruction efforts ›should take firmly into its hands‹.[33] This statement clearly shows a decisive shift in the socio-material relation bounding rubble, and the reconstruction effort. Indeed, the 1940s saw a state-led development of novel construction practices, knowledge, technologies, and industrial organisation. The latter facilitated the salvaging, reusing, and recycling of rubble for postwar reconstruction.

The intensity and scale of this shift in the social relations towards rubble in postwar Europe was driven by postwar scarcity and economic crisis. However, in contemporary times, similar socio-material relations can be observed due to the ongoing accumulation of CDW. In 2016, almost 800 million tonnes of CDW were produced in the countries of the European Union,[34] which is approximately 20 times more than the amount of rubble left in Warsaw following six years of WWII. Some actors have started to sift through European cities, salvaging building components instead of sending them to the landfill. The following paragraphs outline the ways in which building materials are assessed and reused in contemporary building construction in Vienna. Today, architectural obsolescence[35] rather than wartime destruction is leading to the gradual demolition and replacement of buildings. New energy efficiency standards, outdated insulation materials, and the wish for new aesthetics are the main drivers for urban demolitions. By ethnographically accompanying different actors in contemporary Vienna, we have learned about the ways in which human-material relations unfold in the direct contact between material hunters and components such as bricks, parquets, or steel beams.

One of the actors involved in the harvesting of building materials in Vienna is the start-up *materialnomaden*. The company has promoted the reuse of building materials and trained building material scouts on how to assess old buildings to deconstruct valuable components. When a building is about to be demolished, different people invest labour to manually evaluate, salvage and sort components denominated as

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32 Cf. Adam Przywara, R for Rubble, in: Michael Hennessy Picard et al. (eds), *Wastiary. A Bestiary of Waste*, London 2023, pp. 72-74.

33 [Unknown author,] Skarb pod gruzami [Treasure in Rubble], in: *Stolica [Capital City]* 6 (1946), pp. 2-3, here p. 2.

34 European Commission, European Innovation Partnership (EIP) on Raw Materials, 3rd Raw Materials Scoreboard (2021), p. 70, URL: <https://op.europa.eu/en/publication-detail/-/publication/eb052a18-c1f3-11eb-a925-01aa75ed71a1>.

35 Daniel M. Abramson, *Obsolescence. An Architectural History*, Chicago 2016.

›demolition waste‹ to make them again accessible as a building material. Components are carefully assessed to know which materials can possibly be disassembled and reused and which ones might better be discarded, either because they contain toxic components, are damaged, or have little repurposing potential. An old parquet slat can, depending on its valuation, either land in the incinerator or be repurposed for flooring.

Several times, Madlen Kobi accompanied Alex,[36] an urban planner and employee of *materialnomaden*, to do assessments about the reuse potential of housing interiors and exteriors commissioned by landlords, building owners and real estate companies. Alex's equipment included a measuring tape and an iPad on which the digital assessment program rosinA was installed, a programme that *materialnomaden* had developed for that purpose.

After arrival on a site, Alex usually started numbering the rooms of a flat, which helped locate the assessed components in the digital description. Then, he recorded the characteristics of materials and objects. The program allows users to take a photo of the object (or several ones from different angles) and then to enter parameters such as length, width, material quality, colour, condition, year and name of the producing company, type of material, and special characteristics. This systematic assessment and inventory of components in a database differs from the manual practice of sorting rubble in postwar Warsaw. The inventoried materials are then presented online in a publicly accessible digital store for second-hand materials. As it was often not sure whether this work would end in a contract for deconstruction afterwards, the inventory task had to be completed under time pressure. However, assessing the remaining furniture, parquet floors, HVAC (Heating, Ventilation, Air-Conditioning) devices, windows, and shelves in a soon-to-be-renovated five-room office could easily mean one and a half days of labour. The salary for these labour hours usually comes from the sale of the inventoried materials. Because of the difficulty in matching up supply and demand, start-ups like *materialnomaden* still often struggle to cover the working hours of their employees. This is mainly because new materials are often less expensive than second-hand materials, which include the labour costs for assessment and deconstruction.

When accompanying Alex, we see that it is in direct contact with the materials that value is ascribed to some materials rather than others. By touching and assessing a wooden parquet slat, for example, material scouts like Alex determine the wood type and its value in economic and repurposing terms. Knowledge from working with materials and from previous assessments help to list the objects at hand in the best possible way. Even if artificial intelligence tools and digital scanning are used today for some architectural tasks, reuse practitioners have emphasised that the human-material encounter cannot be fully substituted. A curious intern once asked one of the managers of *materialnomaden*: ›Why do you employ the analogous method to assess

36 All used names of interlocutors are anonymized.

building components? Why not use AI and visual analysis?‹ The manager answered that this would certainly be possible, but they would not need as much information about an object as an artificial tool could generate. A photo and basic measurements and descriptions would be enough to know whether it is worth deconstructing the building component or not. And she added that human intelligence is needed to recognise which components and buildings are worth assessing at all. The sensory experience gained through years of working with second-hand materials forms an essential part of that knowledge.[37]

The skills of newly emerging professional fields such as material scouting are often learned on site, by repetitively assessing building materials. In another situation, an employee of *materialnomaden* emphasised that the necessary knowledge to judge second-hand materials accumulates with the years. While new components are certified during their production, he says that it is challenging to know about the quality of old components when encountering them in a building slated for demolition. It takes time to do a proper assessment. According to him, building with reused components shifts a project's costs from raw materials to the required working time for assessment and planning.[38] This emphasises the importance of human actors in judging the second-hand materials at hand through their direct interaction with them.

A stigma for people working in the reuse sector is that their work is often not taken seriously. Many object to the idea that they are working with waste materials, but the valuation process of materials is contingent upon more than just the apparent characteristics inherent in materials; the valuation also largely depends on political and economic circumstances. With the Russian invasion of Ukraine in February 2022, timber prices have suddenly risen in Western Europe because less timber was imported from Eastern Europe. This has temporarily increased the demand for second-hand lumber in Austria. But reused materials can also become valuable again when sorted and presented in a particular way.

A Swiss architect once deconstructed a building together with students to make them aware of the material characteristics of building components. She said that ›once we had ordered the harvested wood along length, it didn't look like waste anymore, but it looked like building materials‹.[39] Another architect recently told a similar story: When his company salvages materials, they sometimes arrange the materials on a pallet, wrap them in plastic foil, and suddenly the client ascribes more value to these materials than if they were not wrapped.[40]

Both the historical and the ethnographic examples outline that building components to be retrieved from cities are evaluated in and through human-material relations. While maps and archival documents can represent at a meta-level the kinds of

37 Field notes, 10 March 2022.
38 Field notes, 17 March 2022.
39 Barbara Buser, public presentation at Architekturforum Bern, 1 November 2022.
40 Pascal Angehrn, Roundtable ›Bauen im Bestand. Verstehen, Erhalten, Umbauen, Umnutzen, Wiederverwenden‹, Quadrat Zollikofen, 18 April 2023.

In the yard of *materialnomaden*, second-hand parquet slats are wrapped in plastic foil to store and resell them. Ordering salvaged building materials helps to get rid of their perception as ›waste materials‹ and raises their resale potential. (photo: Vanessa Feri, 2022)

materials that can possibly be harvested, the full potential for reuse can only be assessed in the direct encounter between humans and components. Or as political geographer Nasser Abourahme framed it for building materials in the formation of a refugee camp: ›These [materials] all retain *properties* of their own, but as *capacities* they only emerge in the interaction of the assemblage.‹[41] The reuse potential is hence not inherent in the material; it depends on the context and the person evaluating and handling the object at hand. Whether a brick is evaluated as reusable is decided when the brigade worker in postwar Warsaw lifts the object, or when a material scout in contemporary Vienna decides to enter it into the database. In the following section, we will further unpack these activities of material valuation in both postwar Warsaw and contemporary Vienna to discuss how different socio-political contexts influence material valuation.

41 Nasser Abourahme, Assembling and Spilling-Over: Towards an ›Ethnography of Cement‹ in a Palestinian Refugee Camp, in: *International Journal of Urban and Regional Research* 39 (2015), pp. 200-217, here p. 212.

5. Material Valuation in Differing Political and Economic Contexts

Materiality is not a given. It manifests itself in the engagement between humans and the world around them. Building materials reach their full potential only through localized practices, because ›materiality is not interwoven with social life, but, stronger, a dimension of it‹.[42] The historical and ethnographic analysis of building material valuation is a good example to show that value is not material-inherent, but depends on the political economy in which it is evaluated. The valuation in a ruined city under socialist reconstruction and in a modern consumerist society today underlay different valuation logics that we outline in the following sections.

In Warsaw of the 1940s, the re-evaluation of rubble was a response to the economic and environmental conditions of the period. Among the results of the German occupation of Poland during WWII was the depletion of resources such as timber, as well as an almost complete halt in the production of some materials, for example in brickworks. Therefore, the materials predominantly used in construction before the war – timber and bricks – remained scarce. However, this scarcity alone cannot explain the fact that in the late 1940s, the construction industry in Warsaw, and across Poland, shifted towards the alternative source of building materials from rubble and ruins.

In the wake of the war, Stalin-backed politicians dominated the Polish government. For them, the postwar reconstruction of Warsaw was a crucial opportunity for legitimation and for gaining popular support for socialist politics and planned economy. In 1945, the representatives of the postwar government of Poland signed two legislative pillars of the planned reconstruction of Warsaw. The first of these was the ›Bierut Decree‹,[43] which effectively expropriated private landowners in Warsaw and had immediate and lasting consequences.[44] The second pillar, much less present in historical literature, was a ›Demolition Decree‹.[45] It regulated the process of demolishing buildings damaged and destroyed by the war. The Demolition Decree allowed a reconsideration of the ways in which building materials could be sourced in the planned economy of urban postwar Poland.

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42 Schatzki, Materiality and Social Life (fn 8), p. 141.

43 Krajowa Rada Narodowa [State National Council], Dekret z dnia 26 października 1945 roku o własności i użytkowaniu gruntów na obszarze m.st. Warszawy [Decree of 26 October 1945 on Ownership and Usufruct of Land in the Area of the Capital of Warsaw], in: Archiwum Polskiego Sejmu [Polish Parliament Archive] (1945), URL: <https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU19450500279>.

44 Joanna Kusiak, Legal Technologies of Primitive Accumulation: Judicial Robbery and Dispossession-by-Restitution in Warsaw, in: *International Journal of Urban and Regional Research* 43 (2019), pp. 649-665.

45 Krajowa Rada Narodowa [State National Council], Dekret z dnia 26 października 1945 r. o rozbiórce i naprawie budynków zniszczonych i uszkodzonych wskutek wojny [Decree of 26 October 1945 on the demolition and repair of buildings destroyed and damaged by war], in: Archiwum Polskiego Sejmu [Polish Parliament Archive] (1945), URL: <https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU19450500281>.

Demolition of a building damaged during the war in Wrocław, 1949. The workers are using the ›rope method‹ (pulling the wall down with a metal rope), which was the most popular way of demolishing ruins in postwar Poland.
(Narodowe Archiwum Cyfrowe/National Digital Archives, Military Photographic Agency, 3/39/0/-/3061-2; Public Domain)

Working out the specifics of such a shift was taken up by architect Roman Piotrowski, Director of BOS, in his report written for the Ministry of Reconstruction in early 1946.[46] The report became an opportunity for Piotrowski to critically rethink the principles which shaped the organisation of demolitions at the time. In 1945–46, ruin demolitions were organised predominantly according to the ›rope method‹: a metal rope would be fixed high on a wall and pulled down by a group of labourers standing on the ground. The method allowed for rapid demolition with a comparatively small investment of labour and technology. Yet, in comparison to time-consuming manual demolition, this technique was much more damaging to any materials stored in ruins. Piotrowski identified the ›rope method‹ with the irrationality of the market economy and argued for its rejection by planned reconstruction administration. Instead, he argued that the state should promote and implement manual demolition, which would take advantage of the large pool of manual workers existing in cities across postwar Poland. In this way, state policy could mitigate the scarcity of resources and construction materials by increasing the amount of materials salvaged from rubble.

Piotrowski proposed reorganising the demolitions around the political and economic imperative to salvage any material from derelict structures, regardless of the involved labour costs.[47] His aim was to break with the cost calculation of the past, which was based on market principles. In practice, this meant a shift from ›rope method‹ demolitions to manual demolition techniques that, although they required much more labour and time, yielded twice as much salvaged material. Piotrowski's thinking about demolitions addressed the immediate concerns during a time of historical upheaval and political change, yet he was also anticipating a broader shift in Poland's political economy. The move away from a capitalist market economy to a planned economy meant focusing on the salvaging of components with a high degree of material value, rather than just high profits for contractors.

This example shows that the human-material relations which lead to the revaluation of building materials are inevitably conditioned by external economic and political forces. In other words, broader market conditions shaped the organisation of labour in each time and place, and by extension affected the way in which rubble or demolition waste was valued. This fact necessarily frames the potential of cross-disciplinary analysis of historical sources *vis-à-vis* ethnographic data. Indeed, while the material flows in postwar Warsaw were shaped by a nascent planned economy, resource scarcity, and industrial ruination, material flows in contemporary Vienna are fuelled by globalised capitalist markets and the idea of unlimited available resources.

Today, as in postwar Warsaw, reusing building materials still demands a considerable input of human labour. During the participation in refurbishing second-hand materials for their new use, we were astonished over and over about how much manual

46 Roman Piotrowski, Roboty Rozbiórkowe i Porządkowe [Demolition and Clearance Works], Archiwum Biura Odbudowy Stolicy w Państwowym Archiwum w Warszawie [Warsaw Reconstruction Office Collection in the State Archive in Warsaw], Warszawa 1946.

47 Ibid., p. 78.

labour is invested in this process. For a hotel project in Vienna, *materialnomaden* collected and refurbished almost 200 glass lamps that were manufactured between the 1950s and the 1970s. The search for and the collection of the lamps from different places was already time-intensive. The company found them in on- and offline second-hand markets, from both private and commercial sellers. Then, it took several days for one of the employees to thoroughly clean off the dirt and dust that had accumulated over the decades. In the next step, they were catalogued by size and sorted into three groups (small, medium, large) which would end up in different parts of the hotel. Finally, another employee added new light bulbs and assembled the lightbulb holders with the lampshade. An external electrician then certified each of the finished products. Once the lamps left the workshop of *materialnomaden*, the electricians on the construction site could treat them as if they were new products. Through the significant input of labour at different stages of refurbishment, the product obtained an update in material terms; also, its economic value had increased alongside its symbolic value related to notions such as ›vintage‹ or ›nostalgic‹.

Reuse practitioners such as *materialnomaden* see reuse as an opportunity to create workplaces and to take care of the existing building stock, rather than merely offering economic gains through the sale of materials. In that sense, they are propagating the same material valuation as proposed by Roman Piotrowski in postwar Warsaw. However, today's reasoning for the reuse of building materials often refers to the immaterial and heritage values, as well as the idea of ›embodied emissions‹ inherent to building components. These emissions – which have emerged in the sourcing, transportation, industrial manufacturing, and implementation of a component into a building – are destroyed when the component is thrown away. Repurposing components therefore reduces the production of emissions for new materials.

Rather than focus on the mere economic costs, reuse practitioners thus incorporate arguments based on the symbolic and ecological values of materials maintained through reuse. We can also read this shift of valuation as an indicator of the importance of sustainable growth and environmental politics in the field of construction. By reusing existing components, *materialnomaden* proposes a practice of care that goes hand in hand with sustainability discourses around resource efficiency and energy saving.[48]

In the project *re:parkett*,[49] which was initiated by *materialnomaden*, the contemporary circulation of oak parquet slats from the demolition to the construction site is tightly intertwined with narratives around the material's history. When tenement buildings in inner-city Vienna from the late 19th century are demolished today, the floors are usually replaced and the old parquet slats land in the municipal incinerator. However, *materialnomaden*, together with a parquet layer and an industrial partner, now deconstructs the old slats and brings them to the factory for refurbishing.

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48 Peter Kneidinger, in: a palaver. Architektur im Radio, 4 October 2021, URL: <https://www.apalaver.com/sendungs-archiv/212/materialnomaden>.

49 *Re:parkett* is a collaboration between three companies: *materialnomaden*, *Wiener Parkett Manufaktur* and *Weitzer Parkett*; see <https://www.weitzer-parkett.com/reparkett/>.

The slats are then reused in new parquet floors. Emanuel, a Viennese parquet layer who has worked in the business for more than 30 years, emphasised that the parquet slat's historical aesthetic allows this product, unlike other reused materials, to be easily marketed. As those slats were laid in the late 19th century, Emanuel said with a smile, maybe Princess Sissi once walked over them.[50] With a twinkle in his eyes he elaborated that the discursive connection to the history of the city helps to sell the slat; it bestows an aura of royalty to the oak slats that goes beyond its material value. The material thus contains ›symbolic resonances‹,[51] which was the main reason for keeping the component intact. In the process of making the slats reusable, the industrial company Weitzer could have decided to slice the salvaged slats into different thinner oak layers, glue them on to HDF (high density fibreboard) plates and thus produce a larger parquet surface from the old material. However, leaving the original slats intact allows the promotion of the slats as containing historical value and distinguishes them from conventional parquet products. In many instances, the reference to the historical, symbolic, and cultural values of building materials is used in close reference to the economic value of a component.

While the reused parquet slats are marketed by linking them to the social and cultural life of fin de siècle Vienna, keeping parquet slats in the loop is related to a lot of labour invested in harvesting, refurbishing, and marketing the product. First, *materialnomaden* have to know when an old flat is being renovated and slats can be extracted, which requires a good network among demolition and construction contractors in Vienna. Manual deconstruction demands a careful harvesting of slats apt for reuse, but usually around 20 percent of all slats are discarded anyway because they either break or do not meet the standard size for refurbishment in the industry. In the factory, the industrial producer provides the necessary machines and knowledge to carefully grind the surfaces of the slats and prepare them for the reinsertion into a new floor. Through marketing and logistical skills, the parquet slats are then reused in renovations or new building projects.

The material analysed in this section shows that in postwar Warsaw, the value of bricks and other building materials increased, and not only because the war brought the construction sector to a halt. Alongside ruination and scarcity, it was the political and economic agenda of the postwar government that raised the scale and intensity of material salvaging and reuse. This is much less the case in contemporary Vienna, where new building materials are abundant and the government offers insufficient incentives and support for reusing building materials. Today, it is the market economy, not the government, that is decisive in determining how materials circulate. In this context, the stakeholders engaged in reuse have to find ways to assign additional, extra-economic values to second-hand materials, for example by emphasising the materials' ecological and symbolic value in times of climate crisis and waste overflows.

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50 Field Interview, 9 June 2022.

51 Penelope Harvey, Cementing Relations: The Materiality of Roads and Public Spaces in Provincial Peru, in: *Social Analysis* 54 (2010) issue 2, pp. 28-46, here p. 31.

Manual salvaging of individual parquet slats from a *Gründerzeithaus* (tenement housing from the 19th century) in Vienna's inner-city district. The slats will be refurbished by the industrial producer before being reintegrated into new buildings.
(photo: Madlen Kobi, 2022)

6. Conclusion

Today's large construction companies have established Circular Economy (CE) departments to make their practices appear environmentally friendly. Instead of diminishing the amount of waste, companies integrate recycling into their production without considering the overall impact of their practices. Sometimes, presenting themselves as ›circular‹ and ›green‹ even increases their revenues as consumers are buying into these ecology-friendly promises.[52] Policymakers and industry leaders tend to present CE as a technological fix: they focus on circulation as a goal, without reflecting on the socio-material contexts.

Responding critically to these developments, contemporary academic discussions are voicing a growing critique of the vast discrepancies between discourses about and the practice of CE.[53] Scholars particularly underline that this economic paradigm

52 Francisco Valenzuela/Steffen Böhm, Against Wasted Politics: A Critique of the Circular Economy, in: *Ephemera. Theory & Politics in Organization* 17 (2017), pp. 23-60.

53 E.g. Martin Calisto Friant et al., Analysing European Union Circular Economy Policies: Words versus Actions, in: *Sustainable Production and Consumption* 27 (2021), pp. 337-353.

promotes a quantitative and depoliticised view of sustainable growth.[54] Others claim further that circularity is a ›theoretically, practically, and ideologically questionable notion‹.[55] However, these current critiques of circularity are primarily based on the analysis of specific types of documents, mainly policies and industrial reports. These official documents are underpinned by codified types of expertise, most importantly waste management.[56] As such, they tend to reproduce the rational view of construction and demolition waste as unprecedented in volume, yet homogeneous and ultimately controllable.

This article has highlighted historical and contemporary realities of material circulation which are absent from the aforementioned discussions of CE. The ethnographic data presented in this article has shown how bottom-up initiatives and smaller entrepreneurs such as *materialnomaden* criticise the corporate CE agenda. Such critics argue that these corporate agendas support the continuing resource-exploiting capitalist model of construction, rather than moving the industry towards self-sufficiency. On the other hand, the historical documents we have reviewed here have shown that external economic and environmental conditions and the will of political actors played a fundamental role in the valuation of postwar rubble. In that context, history of Warsaw can be seen as an essential historical reference for thinking about future ›degrowth‹[57] in construction and urban development.

In order to close the epistemological gap illuminated by such a top-down perspective, we argue that it is essential to focus on investigating human-material relations underpinning the CE *vis-à-vis* its universalising frameworks. It is necessary to extend the existing epistemological frame of CE to include a more nuanced and complex view of the socio-material reality upon which CE is based. Already in the 1980s, the forerunners of CE highlighted labour as central to the paradigm, but this aspect has receded into the background over time.[58] Both ethnographic data and historical sources underline the essential role of labour in practices surrounding the afterlives of buildings and building materials. It is in the specific relations between labour and materials that the city is revealed as an accumulation of materials: an urban mine.

This concern with the value of materials, defined both in economic and extra-economic terms, stands at the core of the historical-ethnographic perspective fostered in this article. We have argued that building materials salvaged from ruins of war or demolition sites are not valuable resources *per se*. The value of a building material is defined not just in relation to the market, but also in relation to other things, people,

54 Andrea Genovese/Mario Pansera, The Circular Economy at a Crossroads: Technocratic Eco-Modernism or Convivial Technology for Social Revolution?, in: *Capitalism Nature Socialism* 32 (2021) issue 2, pp. 95-113.

55 Hervé Corvellec/Alison F. Stowell/Nils Johansson, Critiques of the Circular Economy, in: *Journal of Industrial Ecology* 26 (2022), pp. 421-432.

56 Matthew Gandy, *Recycling and the Politics of Urban Waste*, London 1994, p. 33.

57 Giorgos Kallis, In Defence of Degrowth, in: *Ecological Economics* 70 (2011), pp. 873-880.

58 Walter Stahel/Geneviève Reday-Mulvey, *Jobs for Tomorrow. The Potential for Substituting Manpower for Energy*, New York 1981.

and the political economy.[59] Values are linked to narratives about where the material comes from, who handled it before, and its appearance. Our approach also highlights the fact that economic, social, aesthetic, and historical values ascribed to building materials are often intertwined.[60] This entanglement inevitably creates tensions that emerge around issues of ownership of materials stored in buildings, access to the sites of demolition and salvage, and that of control over the end-of-life trajectories of materials.[61] Therefore, cross-disciplinary approaches to material circulation can bring to the fore the political, economic, legal and socio-cultural contexts of valuation that are often obscured in material flow assessments by economists and CE consultants.

In our cross-disciplinary dialogue, we also came along some terminological differences. For example, historians talk of ›sources‹ when referring to the archival materials and interviewed persons, while anthropologists speak of ›data‹ referring to both, ethnographic and interview-based information. This can be partly related to the fact that anthropologists generate most of the material for their analysis themselves. On the other hand, historians rely on what has been preserved from past discussions and their ›sources‹ describe documents and information evolving from different kinds of authorship. Lately however, through engagement with oral history method, historians have started to use the term ›(research) data‹ themselves. This suggests that a cross-disciplinary encounter can bring new reflections into a discipline's established practices and terminologies. Rather than unravelling these terminological specificities, we have shown that both terms – sources and data – provide insights into the human-material relations and socio-material practices constitutive to circular construction.

While an ethnographic approach to CE is essential for understanding its real-world impact, historical research enables a comparative perspective on valuation of materials in different periods. But historians are not only concerned with the past, and anthropologists are not only focused on the present. Combining the historical and ethnographic approaches allowed us to locate, define and critically reflect on the human-material relations that drive the circulation of building materials, and position them in a broader socio-material reality. Such a cross-disciplinary collaboration is one of the ways in which a more comprehensive view of material circulation, reuse, and valuation can be developed – an essential research agenda at the time when the CE in construction becomes directly intertwined with the debates on postwar rebuilding.

The urban destruction in Syria, Palestine, or Ukraine brings back the challenge of rebuilding from rubble. The aerial bombing conducted daily since the start of the full-scale Russian invasion of Ukraine has, for example, damaged tens of thousands of buildings. The European Union and non-governmental actors like the Heinrich Böll Foundation have called for a ›green reconstruction‹ of Ukraine including circular

59 Arjun Appadurai (ed.), *The Social Life of Things. Commodities in Cultural Perspective*, Cambridge 1986; Michael Thompson, *Rubbish Theory. The Creation and Destruction of Value*, Oxford 1979.

60 Derix et al., Der Wert der Dinge (fn 10), p. 400.

61 Cindy Isenhour/Brieanne Berry/Erin Victor, Circular Economy Disclaimers: Rethinking Property Relations at the End of Cheap Nature, in: *Frontiers in Sustainability*, 5 January 2023, pp. 1-14, here p. 11.

strategies.[62] It remains to be seen in what ways government and private actors will collaborate in tackling the huge task of reconstruction while also engaging with the paradigm of circular economy. However, it is already clear that the climate catastrophe and the topic of energy and resource conservation in construction will permeate these discussions. Therefore, alongside studies focusing on peacetime economy or postwar reconstruction, a collaborative approach as developed here might be crucial for understanding the inherent socio-material realities in these contexts.

Prof. Dr. Madlen Kobi
University of Fribourg | Department of Social Sciences | Social Anthropology Unit
Bd. de Pérolles 90 | CH-1700 Fribourg
E-mail: madlen.kobi@unifr.ch

Adam Przywara, PhD
University of Fribourg | Department of Social Sciences | Social Anthropology Unit
Bd. de Pérolles 90 | CH-1700 Fribourg
E-mail: adam.przywara@unifr.ch

62 Peter Nijkamp/Karima Kourtit/Gabriela Pascariu, Ukraine: A Post-War Phoenix Perspective, in: *Cadmus* 4 (2022) issue 6, pp. 210-216; Heinrich Böll Stiftung Kyiv/Andriy Andrusevych/Zoryana Kozak, Post-War Green Reconstruction of Ukraine: Processes, Stakeholders, Public Participation, Policy Paper, January/February 2024, URL: <https://ua.boell.org/en/2024/05/20/post-war-green-reconstruction-ukraine-processes-stakeholders-public-participation>.