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Sustainable, Resilient, Circular, Degrowth, or Smart? – Green Building Scripts in the Ruhr and Atlanta Metropolitan Region

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For my father

A passionate former landscape architect, who taught me to see the world as something that can be shaped with care, patience, and imagination. He passed away during the course of this project, but his spirit, curiosity, and encouragement remain present beyond this work.

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Table of Abbreviations

AHA	Atlanta Housing Authority
AMI	Area Median Income
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
BAG	Bundesarbeitsgemeinschaft Wohnungslosenhilfe
BNB	Bewertungssystem Nachhaltiges Bauen
BREEAM	Building Research Establishment Environmental Assessment Method
DGNB	Deutsche Gesellschaft Nachhaltiges Bauen
CASBEE	Comprehensive Assessment System for Built Environment Efficiency
C2C	Cradle-to-Cradle
DIN	Deutsches Institut für Normung
DIY	Do-It-Yourself
EA	Energy and Atmosphere
ECO	Economic Qualities
EEA	European Environment Agency
EFA	Ecological Footprint Analysis
ENV	Environmental Qualities
EoL	End-of-Life
EPA	Environmental Protection Agency
EPAct	Energy Policy Act
EPD	Environmental Product Declaration
ESG	Environment, Social, and Governance
EQ	Indoor Environmental Quality
FARA	Food Access Research Atlas
FDD	Fault Detection Diagnostics
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GPI	The Genuine Progress Indicator
GWP	Global Warming Potential
gif	Gesellschaft für Immobilienwirtschaftliche Forschung
HOLC	Homeowners Loan Corporation
HUD	Department of Housing and Urban Development
HVAC	Heating, Ventilation, and Air Conditioning
IAIA	International Association for Impact Assessment
IBHS	Insurance Institute for Business & Home Safety
ICLEI	International Council for Local Environmental Initiatives
ICT	Information and Communications Technology
IEA	International Energy Agency
ILFI	International Living Future Institute
IN	Project Priorities and Innovation
LA21	Local Agenda 21
LBC	Living Building Challenge
LCA	Life-Cycle Analysis
LCC	Life Cycle Cost
LECHCC	Low Economic Capital High Cultural Capital
LEED	Leadership in Energy and Environmental Design
LIHTC	Low Income Housing Tax Credits
LT	Location and Transportation
LTG	Limits to Growth
MARTA	Metropolitan Atlanta Rapid Transit Authority
MBS	Mercedes Benz Stadium
MR	Materials and Resources
NIMBY	Not-In-My-Backyard
PRO	Process Quality
PV	Photovoltaics
RP	Regional Priority
SC	Smart City
SDG	Sustainable Development Goal

SEEA	Southeast Energy Efficiency Alliance
SEED	Social Economic Environmental Design
SITE	Site Qualities
SOC	Sociocultural and Functional Qualities
SS	Sustainable Sites
TEC	Technical Qualities
USDA	United States Department of Agriculture
USGBC	United States Green Building Council
VRF	Variable Refrigerant Flow
WAWA	West Atlanta Watershed Alliance
WBLCA	Whole Building Life-Cycle Assessment
WE	Water Efficiency
ZWIA	The Zero Waste International Alliance

Table of Artificial Intelligence Aids

DeepL	All original German-language citations were translated into English using DeepL Translator (www.deepl.com). While efforts were made to ensure accuracy as well as the original meaning, minor variations may occur due to the nature of automated translation. The German original citations are provided in the footnotes.

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1 INTRODUCTION: GREEN METROPOLES AND POST-INDUSTRIAL CITIES

This book focuses on the infrastructurally relevant material and tangible dimension of green transformations[1] – **the built environment** – namely the way buildings and neighborhoods are conceptualized to be 'green' by architects, builders, and urban planners, and how these buildings in turn (re)shape human cultures and societies. Apart from their technical construction, buildings as cultural artifacts (Lounsbury 485) form "an integral part of our common human experience" (Lounsbury 493). As Lounsbury writes,

> [b]uildings tell many stories. They are complex material objects wherein we live, work, worship, socialize, and play. They serve basic functions but also embody culture and express the dynamics of its social, economic, and political fortunes. Good stories always have meanings that aim to tell us something about ourselves, our society, or our place in the universe. Buildings achieve meaning in context. New ones speak of our aspirations and old ones remind us of our past. Although mute, they communicate in different ways. (Lounsbury 484)

Buildings as cultural artifacts further manifest and symbolize social relationships and power dynamics. These social relations are manifested through the location, size or furnishings of apartments and houses, which convey messages about the "self-image" and "economic performance" of their owners and occupants (Lueger and Froschauer 31). In their work on the analysis of artifacts, sociologists Lueger and Froschauer refer to this as *verdinglichte Sozialverhältnisse* ('materialized social conditions'). Green buildings[2] in particular have not been extensively studied in terms of what forms of 'materialized social conditions' they produce. Nor have green building standards been examined from this point of view – dissecting how different understandings of 'greenness' produce a variety of social outcomes.

When I first started my research on green buildings, I freely associated green buildings with social and environmental justice, imagining eco-friendly architecture in organic forms built mainly by small cooperatives. However, the physical and social reality of green building is much more complex and nuanced than this conceptual one-way street. From green office towers resembling the impressive skylines of Atlanta or Frankfurt am Main (Germany), to small,

[1] Green transformations are defined here as projects with the goal of decarbonizing human activities in the economic, social, and ecological realm. The plural form 'green transformations' is used, because a variety of global and local actors like the UNEP or activist groups such as Greenpeace, corporate companies like Patagonia, or civilians are involved in these green transformations to varying degrees and involvements through profit-driven or not-for-profit approaches like urban gardens, urban agriculture, or repair cafés.

[2] Green buildings are defined here as buildings that are conceptualized to 'do less harm' to the environment and contribute to the goal of decarbonization. These buildings take on various shapes, forms, and materials – but generally, the goal of their constructors is that these buildings emit less carbon during their production and use phase than conventional buildings. Well known examples are 'passive houses,' 'clay houses' or 'plus-energy houses' that produce more energy through solar or geothermal energy than they consume in a year.

environment-friendly community centers in Indonesia – these buildings are all referred to as 'green building.' Therefore, a more differentiated perspective for understanding what is meant by the term 'green' in building and the materialized social conditions these understandings produce is what I am offering in this book. This necessitates working through the aforementioned complexity and diversity of buildings. Accordingly, the buildings selected as case studies reflect this diversity – from office spaces, to community centers, or green neighborhoods, small and large – and the intricacies of green building are evaluated.

STRUCTURE OF THE BOOK

In order to address the aforementioned complexity and the question of what is meant by the term 'green' in building, the second chapter digests different interpretations of 'greenness' in the city by taking apart and contextualizing the following varieties of greenness: (1) three-pillar sustainability, (2) resilience, (3) circularity, (4) degrowth, and (5) smart city. These varieties were chosen based on a literature review with the goal of identifying prominent and widely used concepts that are associated with the term 'green' (see Jong et al.; Ripoll Gonzalez and Gale; Garcia-Lamarca et al.). I understand these concepts as sub-categories of the umbrella term 'green.'

This nuanced understanding provides the backdrop for the case studies, where buildings in the Ruhr and Atlanta metropolitan region in the planning and use phase are examined through the lens of these concepts. The case studies (chapter 4) exemplify the application of these concepts, which I refer to as 'scripts' (chapter 2), in practice. Scripts are inscriptive, prescriptive, and descriptive formulas and forces that effect and prescribe certain path-dependencies in green building (Buchenau and Gurr, "City Scripts"). The varieties of green scripts explored in this book range from 'resilience,' 'sustainability,' 'circularity,' and 'degrowth,' to more technologically-driven varieties such as 'smart cities' and trace how these formulas have shaped the buildings in their physicality, perception and neighborhood involvement.

By considering different green scripts and including transdisciplinary perspectives, the analysis of the case studies brings forth which scripts are circulating faster than others and which ones are the most promising in affecting specific green transformations. To this end, green building standards are included in the case studies in order to situate the green scripts within the path dependencies imposed by these existing green building standards such as Leadership in Energy and Environmental Design (LEED), Living Building Challenge (LBC), or *Deutsche*

Gesellschaft für Nachhaltiges Bauen (DGNB).[3] Green building standards do not exist in a vacuum, but are conceptualized through the values and understandings of their creators. Accordingly, different standards have different focal areas, point systems, credits, and pursue different versions of 'greenness.'

The case study buildings and neighborhoods (1) "Kreislaufhaus" in Essen (Germany); (2) "Tiny Houses Dortmund-Sölde" in Dortmund (Germany); (3) "Essen 51" in Essen (Germany); (4) "Mercedes Benz Stadium" in Atlanta (USA); (5) "Kendeda Building" in Atlanta (USA); and (6) "Roosevelt Hall" in Atlanta (USA) are at the heart of this study that uncovers the scripts through which they are constructed and created.

After an initial approach toward green building, I quickly realized that most (at least) corporate projects prioritize certain green scripts over others by choosing specific points and paths in the available certification systems such as LEED or DGNB. Accordingly, the main thesis guiding this book is that the social dimensions of green scripts in green building are deprioritized in favor of strictly environmental features such as energy efficiency or resilience. This thesis will be evaluated in the analysis of the diverse range of case study buildings.

In order to achieve green transformations, transdisciplinary answers and perspectives are required. This book aspires to contribute to this transdisciplinary branch of research drawing from the fields of urban literary and cultural studies, sustainability science, and the environmental humanities.

URBAN STUDIES AND RAPID ETHNOGRAPHIES

Correspondingly, this study is engaged in a transdisciplinary field: urban studies. It is not an interdisciplinary study, but raises questions that ought to be researched from a transdisciplinary standpoint. From my perspective, that is engaged in a back and forth with my discipline of origin which is North-American Literary and Cultural Studies, the 'larger socio-political context' of buildings and neighborhoods opens up questions that are asked at the boundaries of disciplines. By researching green building standards and buildings as cultural artifacts, I wish to make a case for the further inclusion of literary and cultural studies into questions of sustainability and climate adaptation. In this regard, urban planners Shi et al. (2016) raise important questions

[3] These standards are introduced in more detail in chapter 3.

> [t]o what extent are urban and infrastructural design decisions for climate adaptation creating new waves of displacement or other forms of maladaptation? Conversely, under what conditions do infrastructure projects for climate adaptation prioritize or complement efforts to address the needs of the disadvantaged? […] What criteria for social justice would be appropriate in ecosystems and urban services valuation, given the growing push to monetize and commercialize these services? (Shi et al. 136)

Asking about disadvantaged populations is not usually at the forefront of current perspectives in the field of engineering, or the natural sciences, but is discussed more and more in the transdisciplinary fields of sustainability science or resilience studies, urban geography, sociology, and urban literary and cultural studies (L. M. Harris et al.; Meerow et al.; Renn and Schweizer). Combining practical knowledge about building standards and engineering practices with humanities and sociological perspectives proposes possibilities to combine these worlds at the scale of building projects.

In *Global Sustainability: Cultural Perspectives for Transdisciplinary and Integrated Research*, urban geographer Werlen constates four major weaknesses of sustainability science and the way the climate crisis is tackled academically. Two of these are the lack of an "appropriate understanding of the social world by natural scientists and engineers" and a missing "understanding and integration of biophysical elements by social sciences and humanities" (Werlen 8). This study of course cannot bridge this gap, as I am grounded in my discipline of origin within the humanities, but it contributes to possible areas of collaboration and exchange through my fieldwork done with engineers, architects, environmental scientists, urban planners, and sociologists in Atlanta and the Ruhr region.

Methodologically, the study at hand draws heavily on Hammersly and Atkinson's *Ethnography: Principles and Practice* and presents as an "integration of first-hand empirical investigation with the comparative or theoretical interpretation of social organization and culture" (Hammersley and Atkinson 1). Similar to ethnographic studies, the 'research design' employs a relatively "open-ended approach, as do qualitative researchers generally" (Hammersley and Atkinson 4). My data derives from green building standard scorecards (LEED, DGNB, LBC), expert interviews, websites, and planning documents related to the case study buildings, movies and other academic documents about the case study buildings, and participant observation during two field-related internships. Partly, this study employs techniques from the field of 'rapid ethnography.' Baines and Cunningham explain that

> [r]apid ethnography (RE) is a form of multi-method ethnography involving data collection from numerous sources over a relatively short period of time including interviews, participant observations, document review and sometimes surveys and focus groups. The goal of this method is to produce a multi-layered, textured analysis of a

> slice of life in an organization, environment or some part of society, intertwining the structure and consciousness with the larger socio-political context shaping social relations. (Baines and Cunningham 74)

Hammersley and Atkinson further expand that "where participant observation is involved, the researcher must find some role in the field being studied, and this will usually have to be done through negotiation with people in that field explicitly or implicitly" (Hammersley and Atkinson 4). I am therefore grateful to have had the opportunity to intern with Öko-Zentrum NRW (Hamm, NRW, Germany) and Epsten Group (Atlanta, GA, USA) for my field research and interviews. For transparency, my role in the companies was a mix between participant observation, conducting interviews, and providing smaller tasks necessary for the daily business of the companies involving research, translation, and understanding and learning the methods of green building certification reviews.

As my discipline of origin is closely connected to literary studies, the narrative construction of green scripts – the way buildings and urban planning are shaped through stories and in turn attempt to shape through stories – are, where suitable, included into the case study analysis. In this context, Goldstein et al. exclaim: "Change the story, and you change the city" (Goldstein et al. 1289). Goldstein et al. work with Finnegan's analysis in their work on "narrating resilience" which will be referenced again in chapter 2.3. In *Tales of the City: A Study of Narrative and Urban Life*, Ruth Finnegan "provides compelling evidence that people act out the stories they tell about the city and, indeed, fashion the city upon these stories" (Goldstein et al. 1290). This is a powerful way of mapping the magic of stories in the urban fabric and works especially for bottom-up story-telling by residents.

In contrast to the thesis of "change the story, and you change the city," in their research of sustainable city branding narratives, social scientists Ripoll Gonzalez and Gale explore

> whether adopting a sustainability narrative in city branding and urban development strategies results in more inclusive governance arrangements (process) and a more pluralistic approach to generating sustainability value (outcome), in line with the triple bottom line approach advocated by the United Nations' Sustainable Development Goals (SDGs). (Ripoll Gonzalez and Gale 20)

Their findings suggest that employing top-down narratives in urban planning does not immediately have tangible effects on citizens' experiences and stories within the city. Furthermore, the determination of what exactly is envisioned by the terms 'value creation' is decisive – and marks the difference between focusing majorly on economic growth or including redistribution and opportunities for less affluent groups. Top-down narratives are not immediately given space in residents' urban imaginaries.

Regarding urban imaginaries, social scientists Ripoll Gonzalez and Gale express that city administrations are moving toward the use of buzzwords in their public city branding such as "sustainability," "triple-bottom-line," "circular economy," "smart city," "just transition" or "SDGs" (Ripoll Gonzalez and Gale 20). More or less surprisingly though, Ripoll Gonzalez and Gale conclude that "we do not know if these claims to urban sustainability exert any real effects, as both underlying theory and practical impacts remain under-researched" (Ripoll Gonzalez and Gale 21). The following chapters and case studies will provide insights into these shortcomings.

WHAT IS GREEN?

The term green and associated terms will be contextualized to address these shortcomings. As the title suggests, this book raises the question of what is actually meant by the term 'green.'

> The Green City is a concept that should not remain just a vision, but can have realistic features of a programme. What the contents of the concept are, however, is determined very differently. The keyword is 'green.' Its use in public debate is normatively mostly positive and multi-layered. Political groups and parties use it to describe their policy offer, energy producers their product, transport companies their service, food producers their products, universities their campus […]. 'Green' has become a catch-all term of positively apostrophized behavior in the public debate. This can range from saving resources to renouncing individual auto-mobility, the consumption of certain foods (e.g., renouncing meat, consuming fair trade products, etc.), health, the achievement of climate and CO_2 targets, and social goals (e.g., social balance, gender conformity). 'Green' then often stands for general sustainability and environmentally friendly action. (Breuste 2)

Through the use of the term 'green' for a variety of concepts and contexts, green is at risk of diluting into an 'empty signifier' and requires an increased need of understanding through conceptual clarity what is meant by green. The term 'empty signifier' was introduced by Ernesto Laclau (although the similar concept of floating signifier was coined by Claude Lévi-Strauss) and has been applied to discourses on sustainability by Brown. I argue that the term 'green' has undergone a similar process of being "emptied of meaning to represent an infinite number of demands" (MacKillop 187) and therefore more nuanced discourses of 'greenness' must be established. Instead of calling everything 'green' in discourses about environmentally-friendliness, more precise terminology such as 'circular,' 'resilient,' 'smart,' 'energy-efficient,' or 'socially sustainable' should be used. Societies in the era of climate change need a new and more nuanced vocabulary for 'green' in order to make specific claims. This is exactly what patients learn in psychotherapy when regulating emotions – the more precisely the emotion can

be named, the closer one gets to the root cause of it (Barrett). The 'catch-all' term green is the nodal point that ties the case studies of this book together. Whilst this book will not give a definitive answer to the question of "what is green?" in the form of a definition, it explores different shades and variations of 'greenness' in detail.

THE REGIONS IN FOCUS: RUHR REGION AND ATLANTA METROPOLITAN REGION

The study at hand works with a "relational comparative approach" (Ward 480) to urban comparisons following Ward (2010) who argues for the necessity of including socio-spatial and historic perspectives in comparative work. The buildings or green neighborhoods selected are situated in two metropolitan regions: Atlanta (USA) and the Ruhr region in Germany. This introduction guides the reader in navigating these two regions' green aspirations and why they form interesting comparative figures. Cities around the globe are striving to become 'green' metropoles in the wake of the global climate crisis. The Ruhr region is part of this global trend, trying to secure its place in the global economic and cultural sphere as an *Innovationsstandort* (innovation hub). For the Ruhr metropolitan area, this creates an interesting dynamic between an identity of the past as a working class, industrial region, invested in the heavy industries of coal mining or steel production and the creation of new pathways forging new identities as a digital, eco-friendly, business hub. This new image for the region is created through financial investments but also storytelling and narrative framing processes. The website of the Ruhr Regional Association (*Regionalverband Ruhr*), an important stakeholder in the region, highlights this development:

> The Metropole Ruhr has developed into an economic center in the heart of Europe. Companies have become highly specialized in diverse, interdisciplinary networked ecosystems. We show, which industries dominate the Ruhr region today.[4] ("Branchen der Zukunft im Ruhrgebiet | Metropole Ruhr")

According to the website, the fields of science and research, hydrogen, cybersecurity, and start-ups will connect and shape the Ruhr region throughout the next decade. Especially, the green transformation has caught the attention of political and economic leadership in the Ruhr area. NRW minister of economics Mona Neubaur asserts that "here, after all, change is part of our

[4] Orig.: "Die Metropole Ruhr hat sich zu einem Wirtschaftszentrum im Herzen von Europa entwickelt. Unternehmen haben sich in vielfältigen, interdisziplinär vernetzten Ökosystemen hoch spezialisiert. Wir zeigen, welche Branchen heute im Ruhrgebiet dominieren."

identity"[5] in support of the goal for the Ruhr region to become Europe's first climate-neutral industrial region ("Metropole Ruhr - PM 27.09.2022").

Representing this transformation and ambition visually through two sculptures, Reinhard Dachlauer's installation of the famous 'bull and bear' in front of Frankfurt's stock exchange was recreated in 'green' by sculpting a hedge into the figures of bull and bear on the premises of the Halde Hoheward in Herten. Frank Dudda, president of the Ruhr Regional Association, comments on the sculptures:

> Hardly any other region in Germany has written such an impressive transformation story over the past 60 years as the Metropole Ruhr. But this development is not yet complete: as a major industrial region, tried and tested in change and still 'unfinished,' the Ruhr region now has the potential to assert itself in Europe as a frontrunner in the green transformation. We are confident that we will succeed in this. This confidence and the self-confidence of the region are also expressed by the hedge sculptures. ("Metropole Ruhr - PM 27.09.2022")

Local political, economic, and cultural leadership, also partly represented through the Ruhr Regional Association, is working to achieve this transformation on multiple levels in the economy, cultural sphere, and through policies. In line with this vision, a report by the Wuppertal Institute (2017) attests large-scale transformative potentials for the Ruhr region's future, claiming

> if the Metropole Ruhr implements the transformation process in an ambitious and goal-oriented manner, it can become an exemplary model region for many industrialized regions worldwide - with a climate-neutral steel industry, extensively renaturalized water bodies, and a strong environmental economy.[6] (Wuppertal Institut)

In contrast to the Ruhr region's ambitions in reclaiming its economically relevant role, the Atlanta metropolitan region has for a long time been regarded as a beacon of economic development and an innovation hub in the American South. Often referred to as 'the city too busy to hate' – it is a hustling and bustling environment that has attracted several fortune-500 companies such as Coca-Cola, Microsoft, Google or Home Depot that now entertain large offices in the metropolis. Economic as well as urban growth haven been identity-forming for the region for decades (Bullard et al. 17). Currently, the metropolis is aspiring to move toward a more ecologically resilient and equitable future and in turn has created an Office of Sustainability and Resilience currently spearheaded by Chandra Farley (as of 2025). Atlanta's

[5] Orig.: "[…] hier ist Wandel schließlich Teil der Identität."

[6] Orig.: "Diesen Pfad jetzt konsequent und beschleunigt aufzugreifen, bietet eine große Chance. Wenn die Metropole Ruhr den Transformationsprozess ambitioniert und zielorientiert umsetzt, kann sie für viele industriell geprägte Ballungsräume weltweit zu einer beispielgebenden Modellregion werden – mit einer klimaneutralen Stahlindustrie, umfangreich renaturierten Gewässern sowie einer starken Umweltwirtschaft."

history as a "growth machine" (Bullard et al. 17) makes the metropolis a productive comparative figure to contrast it with the Ruhr region's aspirations to become "the place that will own the coming decade"[7] as the "greenest industrial region of the world"[8] ("Wenn, dann hier | Metropole Ruhr").

How does an American city that has been growing for decades navigate green challenges in comparison to a German region aspiring to emulate and regain its economic position and trying to shed an industrial past? The comparison between these regions highlights transatlantic differences and congruencies in the circulation of green scripts in settings where economic growth is seen as imperative by the region's economic stakeholders. The comparative study showcases how green scripts flourish under different conditions: Atlanta as an established growth machine vs. the Ruhr region that is on its way to reigniting the latter. In consequence, the questions remain open if established growth patterns inhibit or reinforce incremental change toward a green transformation and if growth is even a suitable measurement for a green transformation. One of my theses is that the Ruhr region has more potential in its ambition toward a green transformation by enhancing and building the necessary infrastructure through processes of restructuring and remodeling, whilst Atlanta's growth so far remains relatively independent and unimpressed by the potential of green growth due to rather stable growth patterns that are not linked to a green economy in this U.S.-specific context.

The case studies from the built environment in the Ruhr region and in the Atlanta metropolitan region illustrate in an exemplary fashion which green scripts the cities, architects, builders, and other actors are following in their pursuit of a green transformation in the wake of interdependent 21st-century challenges such as economic and racial inequality, climate change, global pandemics, or globalization.

In order to evaluate in which direction, the regions green building transformations are headed, I contextualize and analyze the presence of the five identified green scripts [three-pillar sustainability, resilience, circularity, degrowth, and smart city] with regard to the case study buildings. The results highlight which scripts are shaping and have shaped these buildings and their contexts. How do the scripts interact with each other in green building practice and under which circumstances?

[7] Orig.: "Die Metropole Ruhr ist der Ort, dem das kommende Jahrzehnt gehören wird."

[8] Orig.: "[…] grünsten Industrieregion der Welt."

In order to contextualize the scripts employed in green building projects, the socio-economic and cultural sphere of the city is included in the analysis of the case studies. Green buildings as artifacts are part of larger city-wide urban planning paradigms. Ripoll Gonzalez and Gale articulate that "[c]ities are being recast […] as 'ecocities,' 'digital cities,' 'green cities,' 'information cities,' 'intelligent cities,' 'knowledge cities,' 'liveable cities,' 'low carbon cities,' 'resilient cities,' 'smart cities' and 'sustainable cities'" (Ripoll Gonzalez and Gale 22). Cities are embracing these framings, but studies as the one presented here must verify these claims from a perspective that raises transdisciplinary questions and points to inherent challenges and opportunities in the pursuit of these greening processes. Furthermore, in this study cities are viewed as sites with a "growing role in responding to climate change" (Webber et al. 343). Urban geographer Rice articulates there has been a "*climatization* of the urban environment" as well as a "*carbonization* of urban governance" (Rice 930). As the population living in cities is expected to grow, cities can serve as living labs testing green infrastructure, green building practices, green economies, green spaces and more.

2 IN THEORY: GREEN SCRIPTS - SUSTAINABLE, RESILIENT, CIRCULAR, DEGROWTH, AND SMART SCRIPTS

2.1 CITY SCRIPTS

'Atlanta as the beloved community,' 'the city as a growth machine,' 'the green city,' 'the smart city,' 'the creative city' – all these are urban scripts applied in urban plans and practices to shape, remodel, and 'script' cities and their pasts, presents, and futures. Scripts provide a lens through which to analyze urban environments and developments and focalize certain models, methods, and blueprints and their medial representations. The research group "Scripts for Postindustrial Urban Futures: American Models, Transatlantic Interventions" works with the terminology of the 'script' and applies it to urban planning contexts. In the scope of our research group, we differentiate three different branches of scripts for the city: inclusive scripts, green/sustainable scripts, and creative scripts. Notwithstanding, scripts can and do transgress these categories.

A script in this study is a model that is simultaneously descriptive, prescriptive, and inscriptive relying on specific narrative, social, spatial, and technical patterns. Scripts are multi-dimensional and multi-directional. The term script has been established especially with regard to the discourse on creative cities (Peck; McLean; Keidar; Zimmerman; Kong and O'Connor; Luckman et al.; Krueger and Buckingham). Thinking of the creative city script, Rob Krueger and Susan Buckingham contend that "[e]conomists and policymakers, economic geographers, and urban theorists have taken up creative-city scripts in a variety of ways" (Krueger and Buckingham iii) trying to shape the futures of cities through attracting 'creatives' in a Floridian sense (Florida, *Cities and the creative class*). The scholars criticize "the failure of these scripts to engage with social inclusion and environmental sustainability, other than as strategies to fulfill economic objectives" (Krueger and Buckingham iv). The analysis of green city scripts will demonstrate to which extent the focus on economic objectives holds true for sustainable city endeavors.

The way the city is scripted through texts, artifacts, and cultural or spatial practices has garnered interest from the fields of literary and cultural studies (Buchenau and Gurr, "City Scripts"; Mahler), political theory and architecture (Bell), geography and sociology (W. F. Chan; L. L. Newman and K. A. Newman), and architecture and computer science (Cooper and Matson; Carboni et al.). Drawing on French novelist Balzac, anglicist Mahler derives "a palimpsest-like view of (urban) civilization: in order to discover the 'truth' of a city, we might need to 'dis-

cover' layer after layer, script after script, of its intertextual disposition" [9] (Mahler 32). Rather than identifying the 'truth' of a city, I am interested in uncovering the layers of scripts applied in the city's (re-)creation through the construction of artifacts. Mahler further writes "[f]or a city to become a city scape thus presupposes some kind of city script" (Mahler 26). But what are the characteristics of city scripts?

The term 'script' has a long history in various disciplines such as psychology, artificial intelligence, or theater studies (Buchenau and Gurr, "'Scripts' in Urban Development" 146). Thinking of the term in computer sciences, the 'script' represents "[a] sequence of instructions or commands (typically stored in a text file) that are to be executed by a computer program, esp. in order to automate particular processes or tasks" (Oxford English Dictionary). Green scripts on the conceptual and practical level contain 'instructions' of how to establish, narrate, and build green cities – in the case of smart green cities often with digitalization and automation of services, data collection, and technical features in mind. These instructions are carried out on several levels which for conceptual conciseness I reduce to the four aforementioned areas: the narrative, social, spatial, and technical level. Other areas of course are affected by scripts, but the interplay between space, narrative, society, and technology is where scripts exert their most profound impacts on the city.

In psychology, a script refers to "[a] socially expected or accepted pattern of behaviour, one that is culturally prescribed as appropriate to a person's gender or social group" (Oxford English Dictionary) or "[a] person's mental representation of the typical sequence of events (and the people and things involved) in a frequently experienced situation, serving as a guide to dealing with and knowing how to behave in that situation" (Oxford English Dictionary). Green scripts come with conceptual path dependencies similar to "sequences(s) of events" even though the script is always applied in a local context and can therefore be rescripted and configured. Green building standards function in a similar way through customizing and standardizing certain building patterns.

Scripts, according to literary and cultural studies scholar Gurr, "blur the descriptive and normative characteristics of models" (Gurr 7). The term script in this study is chosen conceptually and semantically over 'model' as it highlights the descriptive, prescriptive, and inscriptive nature of the urban phenomena under scrutiny. Nevertheless, there is a conceptual relatedness to the term 'model.' Gurr iterates that

[9] Mahler uses as wide approach to the term text: "the word 'text' being used here in a wide sense of comprising all material artifacts in some way or other, conventionally and arbitrarily, transmitting meaning)" (Mahler 26–27.

> [t]he notion of 'scripts' proposed here draws on uses and implications of the term in a wide variety of disciplines and fields, which each contribute vital components to an understanding of how scripts function as a particularly powerful type of model: They often deliberately blur the descriptive and the normative characteristics of models and thus simultaneously function as models of and models for urban developments. We then draw on an ongoing collaborative research project on the transatlantic comparison of scripts in post-industrial urban transformations to (a) illustrate the implications of this type of research for the theory and practice of literary urban studies and (b) to point out how a surprisingly limited number of such scripts permute, intersect and reinforce each other in global urban developments. (Gurr 7)

Buchenau and Gurr have made the term 'script' operable for the field of literary urban studies. In their article "'Scripts' in Urban Development: Procedural Knowledge, Self-Description and Persuasive Blueprint for the Future" Buchenau and Gurr define scripts as

> artful combinations of narrative, medial as well as figural acts of framing, inscription, description and prescription. In their combination of stories, tropes and media, scripts serve three contending functions simultaneously: they activate procedural knowledge, they serve as self- description, and they provide blueprints for the future. Thus, scripts establish contingent connective tissues between the past, the present and the future. (Buchenau and Gurr, "'Scripts' in Urban Development" 142)

Thinking of the context of the city, a script has different effects of either prescribing, inscribing, or describing the city, its past or future, or any mixture of these processes. As mentioned in Buchenau and Gurr's definition, scripts serve three functions simultaneously: (1) they activate procedural knowledge, (2) serve as self-description, and (3) provide blueprints for the future. An important term for this study is that of 'contingent connective tissues' as this describes my multi-modal approach to the term not only connecting temporal axes but also narrative, social, spatial, and technical axes. Scripts can be similarly complex as models but their semantic and conceptual closeness to the processes of 'describing,' 'inscribing' and 'prescribing' situates them apart.

In a conversation with literature and cultural studies scholar Julia Sattler she commented that scripts "function at the intersection of the state-of-the-art and innovation," further arguing that their prescriptive nature conflicts with their conceptual openness. Thinking for instance of a text or theatre script – the script prescribes what should be said and deviations are usually not allowed – albeit minor changes. A script in media studies can therefore refer to "[t]he written text of a play, film, television or radio program, etc., typically including acting instructions, scene directions, and the like" (Oxford English Dictionary). A green script imposes and inscribes certain values into buildings – creating weak or strong sustainabilities, social spaces, smart features, or certain aesthetics. A script is always put into practice in a local context and

despite its possible global circulation, it is adapted and partially rescripted, creating local varieties.

Julia Sattler further argued that urban planners and policy decision makers often deploy certain scripts such as 'the green economy as growth machine' that do not meet the needs of the populations they are trying to address due to a lack of communication between stakeholders. Vulnerable populations are at best seen as minor stakeholders – as the case study of the Mercedes Benz Stadium will demonstrate (chapter 4.1.4). Scripts, on this note, always entail political dimensions. Their medial and figural representations often contain political messages and aspirations through the function of providing a blueprint for the future.

The Berlin-based Cluster of Excellence research group: SCRIPTS [10] also works with the terminology of the (political) script, which serves as a lens through which to gain knowledge about major societal and political developments and paradigmatic shifts. The research program analyzes contestations of the 'liberal script.' In their research, a script is defined as follows:

> Accordingly, we define a script as descriptive and prescriptive knowledge about the organization of society. This concept allows us to analyze liberal ideas about the organization of societies and changes therein, on the one hand, and alternative concepts of social and political order, on the other. We understand it to be an empirical question of where the liberal script is dominant, whether contestants challenge parts of the liberal script or advance truly alternative scripts that do not just deviate or dissent from the liberal script but reject its fundamental principles. Moreover, we do not confine the 'authorship' of the liberal script geographically or culturally to the 'West.' Societies do not portray themselves in terms of scripts. Rather, they use scripts to describe and compare ideas about the organization of societies across time, regions, and cultures. Scripts manifest themselves in political theories, public discourses, constitutions, party manifestos, and justifications of policies and political positions. Scripts do not only describe; they also prescribe and affect the organization of societies. They are therefore also reflected in societal practices. Conjointly, they influence analytical categories in the social sciences and humanities. (Börzel and Zürn 9–10).

In this conceptualization the "descriptive and prescriptive knowledge" is similarly stressed but applied to the "organization of society." As described in the case of the liberal script, scripts manifest in different local and global contexts. Urban green scripts for example manifest in the urban planning of waste and water management, park spaces, building projects or green infrastructure locally and transnationally.

[10] The cluster of excellence 'Contestation of the Liberal Script' is a collaboration between Freie Universität Berlin, Humboldt-Universität zu Berlin, the Berlin Social Science Center and five other Berlin-based research institutions. The project is funded by the German Research Foundation (DFG) for seven years.

In Buchenau and Gurr's conceptualization of the 'script,' they embrace and shape the perspective of literary urban studies arguing that

> [scripts] are assemblages of figural expression (poetic language, tropes, but also numericals and charts), of narrative exposition (story, voice, focalisation, character constellation, emplotment) and of media presentation (frames, schemes, tracks and shots established by images and sound tracks, analogue and digital maps, audio-visual material, diverse forms of writing and printed matter). (Buchenau and Gurr, "'Scripts' in Urban Development" 146)

I choose to base my research in this understanding but widening the scope in order to make the script operable for urban green cultural studies as a descriptive, inscriptive, prescriptive model that employs narrative, social, spatial, and technical strategies. This study focuses on the construction of green scripts in green building projects. The term 'green script' has not been thoroughly conceptually and academically established – to this end, this study makes it operable for the field of urban literary and green cultural studies.

Especially green scripts in the sense of 'green city,' 'eco-city,' 'low-carbon city' have been heavily inscribed into the make-up and urban planning processes of cities in recent years (see Jong et al.).[11] When focusing on buildings and the way they are conceptualized and prescribed as 'green' – the technical norms and standards to which they are built are imperatively scripting them. At the same time, these buildings then prescribe certain behaviors onto users through signs, walls, or walkways. Questions of who changes and administers certain scripts or who receives agency within and through specific scripts are raised similar to the conceptual focus of the 'liberal script' by the SCRIPTS cluster of excellence. This of course also relates to cultural studies' focus on power relations and dynamics. And this again is relevant to the perspective of the political content and dimension of scripts. The study at hand reveals how certain scripts are materialized and prioritized in the built environment. I thereby focus especially on the construction and materiality of 'green' scripts – how do these forms of procedural knowledge shape artifacts such as buildings and inscribe themselves in these or prescribe certain features? On a descriptive level: How are buildings as artifacts described through the use of certain green scripts in the stories that are told about them in planning documents, on websites, or by citizens?

[11] Joss (2010) explains that the eco-city idea is not new but that attempts to render cities more ecologically-friendly and equitable have historic traditions and thought leaders. Joss elaborates that "[u]rban planning and regeneration over the last one hundred years or so have been significantly influenced by attempts to redress the perceived detrimental effects of large-scale urbanisation, such as environmental degradation, social inequalities and urban sprawl. The Garden City, the New Town and the Techno-City are nineteenth and twentieth century exemplars of such attempts to reinvent the city in the (post)industrial era" (Joss 1).

In my research on ‘greenness’ in the city, I distill five major green scripts basing my research in observations by De Jong et al. (2015) and Breuste et al. (2018). These five city scripts reflect different interpretations and varieties of greenness in the city: three-pillar sustainable scripts, resilient scripts, circular scripts, degrowth scripts, and smart scripts. They perform as different variations of green scripts (own diagram):

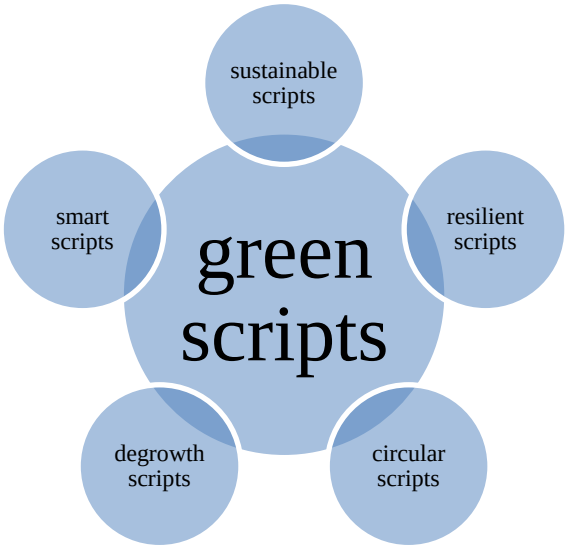

Figure 1: Scripts (diagram by the author)

De Jong et al. constate that

> […] many new categories of ‘cities’ have entered the policy discourse: ‘sustainable cities’; ‘green cities’; ‘digital cities’; ‘smart cities’; intelligent cities'; ‘information cities’; ‘knowledge cities’; ‘resilient cities’; ‘eco cities’; ‘low carbon cities’; ‘liveable cities’; and even combinations, such as ‘low carbon eco cities’ and ‘ubiquitous eco cities’. In practice, these terms often appear to be used interchangeably by policy makers, planners and developers. However, the question arises whether these categories nevertheless each embody distinct conceptual perspectives, which would have implications for how they are understood theoretically and applied in policy. (Jong et al. 25)

Breuste et al. and De Jong et al. come to the conclusion that all terms have “conceptual cores and perspectives which make them distinguishable though partly overlapping” (Breuste et al. 26). Researchers Breuste et al. further argue that the “most widespread (and by now mainstream) concept is the ‘sustainable city’” (Breuste et al. 26). The terminology of the sustainable city or eco-city does not suffice to describe current urban phenomena that rely on different strategies and conceptual green frameworks.

In contrast to the script, Breuste et al. use the idea of "urban concepts" and "Leitbilder" (engl. guiding principles) which they distinguish into three main types: "urban utopias," "structural models," and "slogans" (Breuste et al. 24). Relating their theory of "urban concepts" to scripts, "urban utopias" refer to the normative aspects of scripts, "structural models" to their spatial, social, and technical make-up and "slogans" to their narrative construction. A script is a multi-level approach to understanding the ways in which cities, and in this study specifically the built environment, is inscribed with, described and prescribed by different variations of 'greenness.'

In order to excavate different meanings of 'greenness,' this study analyzes the green scripts present in six case studies of which three are located in Germany and three in the U.S.: Kreislaufhaus RAG-Stiftung (Essen, Ruhrgebiet), Tiny House Neighborhood (Dortmund-Sölde, Ruhrgebiet), Essen 51 (Essen, Ruhrgebiet), the Mercedes Benz Stadium (Atlanta, GA), the Kendeda Building (Atlanta, GA), and Roosevelt Hall (Atlanta, GA).

In order to tackle questions of climate change, we as humans, cannot afford only to 'greenwash' with a broad brush – but in practical consequence must clearly define conceptual terminology and tangible effects of green practices. In this regard, Pow points to the necessity of "excavating behind their [eco-cities] greenwashed image:

> In recent years, the latter [eco-city] has been held up as the answer to the looming urban environmental crisis that confronts cities and countries around the world. Yet to what extent are ecological cities the solution (or are they part of the problem) when we start to excavate behind their 'green-washed image'? (Pow 20)

The process of "excavating" (Pow) – the analysis of underlying scripts – shines a light on the directionality of 'greenness' pursued in green building projects. Green building can have a multitude of meanings from energy efficiency to circularity, social spaces, bio-mimicry, or degrowth-based criticism of capitalist consumption and production patterns, reflected in the ways specific scripts have been inscribed into the projects by builders, architects, owners, and residents.

As explained in the introduction, this is a qualitative study. Goldstein et al. construe that "[u]rban scholars have clearly experienced their 'cultural turn' and have long since unsettled the presumption of incontrovertibly measuring, mapping and otherwise representing the city as a singular object of positivist social scientific study" (Goldstein et al. 1287). In this context, Anguelovski et al. add that

> [s]cholars in urban political ecology, urban geography, and urban planning have demonstrated that many green interventions create enclaves of environmental privilege when low-income and minority residents are excluded from the neighborhoods where

> new green space is created. While some create such privileged enclaves unintentionally, others are accompanied by a clearly articulated strategy for attracting commercial and residential investments and bringing in more socially- and ethnically privileged residents. (Anguelovski et al. 1065)

Scripts can bring light into these questions of privilege through their multilayered natures and the qualitative approach through which they are extracted and excavated through the traces left by their inscriptions, descriptions, and prescriptions.

In the following subchapters, the five basic conceptual scripts used in this study are described (sustainability, resilience, circularity, degrowth, smart city). In order to structure the analysis of the scripts, and underpin their orientation toward shaping future(s), they are introduced through an image generated by the artificial intelligence tool 'Craiyon' accompanied by a brief future story and scenario that sets the scene for thinking about green futures. Afterwards, each script is contextualized regarding its conceptual roots and then the application in green building is described. The images presented are not fixed depictions but visual interpretations of possible futures generated by artificial intelligence. They are intended to inspire, rather than constrain, the reader's imagination and discussion of these concepts. The prompt used for the image is always disclosed to the reader.

In chapter 3, the case studies focalize the six buildings and neighborhoods in terms of the scripts inscribed in them, used to describe them, and how certain scripts were used to prescribe certain elements in the construction process. As the 'sustainable city' is often considered to be a supra-concept related to all different iterations of 'greenness' – it is given the most emphasis in the theory chapter.

2.1.1 SUSTAINABLE SCRIPTS – THE THREE-PILLAR APPROACH TO URBAN SUSTAINABILITY

Future Stories: Sustainable Scripts

When sustainability is read as an unfolding narrative, it tells the story of how human societies evolve from resource-depleting practices to a more balanced coexistence with the natural world. The theme of interconnectedness underpins sustainability, acknowledging that all systems – social, economic, and ecological – are intertwined. Actions in one domain impact others, and sustainable solutions require integrated approaches. Sustainability encompasses not only environmental conservation but also social equity and economic resilience, forming the foundation of the 'triple bottom line' – people, planet, and profit. It emphasizes the need for responsible consumption and production, advocating for more circular and resource-conscious economies that minimize waste by reusing, recycling, and regenerating materials. Solar panels, wind turbines, and hydroelectric systems become motifs of sustainability, representing efforts to shift away from fossil fuels and toward cleaner energy sources. Similarly, urban planning that prioritizes green spaces, public transportation, and low-carbon infrastructure fosters more livable and resilient communities.

CONTEXTUALIZING THE TERM SUSTAINABILITY

Sustainability has become an influential concept, applied in policies and policy propositions, business models, NGO initiatives, individual lifestyle choices, and urban planning documents from the local to the global level. In order to trace sustainability as a concept and to acquire a working definition of the sustainable script for my dissertation, I will mention important steps in the development of understandings of sustainability on different scales ranging from local to global perspectives. After a brief excursion into questions of etymology and historical roots, this subchapter focuses mainly on developments regarding sustainability and its conceptualization since the 1970s.

A possible start to tracing the term sustainability is to take a look at its etymology. Historian Jeremy Caradonna tracks the Latin term "sustinere"[12] as it moves from Latin to Old French "sostenir" to modern French "soutenir" and finally into English as the verb "to sustain" which found wide-spread usage in the Early Modern period (Caradonna, *Sustainability* 7). Caradonna explains further that the term 'sustainable' entered the English language in the 1960s through its use in an economics dictionary through the wording 'sustainable growth' (Caradonna, *Sustainability* 7). In German, the equivalent term 'nachhaltig' (engl. sustainable) spread through its use in Carl von Carlowitz' *Sylvicultura Oeconomica* (1713) which laid the foundation for sustainable principles in forestry that are based upon the preservation of forests (Caradonna, *Sustainability* 65). In a German context, Carl von Carlowitz is often credited to be one of the creators of the concept of sustainability (dt. nachhaltig) in forestry.[13] The economist Wiltrud Terlau describes the development of the concept of sustainability by Carl von Carlowitz (1645-1714) during his appointment as *Oberberghauptmann* (engl. Royal Chief Mining Official) and head of the *Oberbergamt* (engl. Mining Authority) in Saxony in the anthology *Nachhaltiges Wirtschaften im digitalen Zeitalter* (Terlau 64). In Carlowitz' lifetime, wood was one of the most sought-after resources. Since trees grew slowly in comparison to the large demand by a growing population, the result was an overuse of forests. Terlau explains that only the aristocracy could afford to think in longer terms due to their status, assets, self-image and their idea of inheritance to future generations (Terlau 65). Significantly, in this first credited

[12] "Sustinere," derived from "sub" (up from below) and "tenere" (to hold) can be translated into English as "maintain," "support," "sustain," or "endure" (Caradonna 7).

[13] Whereas Carl von Carlowitz' *Sylvicultura Economica* is often credited as one of the foundational texts on sustainability in forestry, the principles of sustainability in forestry reach farther back than 1713. In the late medieval period there were already forestry regulations (dt. *Forstordnungen*) in place that controlled how much wood from which tree could be extracted by whom. These forestry regulations were installed to sustain the forests but also to secure privileges for the aristocracy in regard to access to wood and hunting (Blickle 37–47).

understanding of sustainability the idea of the preservation of ecology was less predominant, it was developed more deliberately around basic economic needs and requirements (Terlau 65). The economic aspect of sustainability has kept its relevancy in contemporary understandings of sustainability and its common definition through the triple bottom line with its three dimensions encompassing ecology, economy, and society. This brief historic excursion[14] elicits that in concepts of sustainability there has for a long time been a contemplation of the relationship between economic and ecological considerations. The confluence of economic interests with ecological criteria plays a decisive role in later international accords and the emergence of the concept of 'sustainable development.'

Around 250 years after Carlowitz' *Sylvicultura Oeconomica*, the term and concept of sustainability gained more prominence outside of forestry and was featured in several relevant international reports and conferences. On a global scale, historian Jeremy Caradonna describes the Club of Rome's publication of the *Limits to Growth* (1972) as "the watershed moment" of sustainability and calls it a "paradigm-shifting book" (Caradonna, *Sustainability* 138). The debate around growth incited by the *Limits to Growth* (LTG) supported the institutionalization of sustainability in the United Nations, Worldwatch Institute and Rocky Mountain Institute. The system theorists that wrote the *LTG* admonished the ecological costs of unlimited economic and population growth that would lead to the collapse of entire eco-systems. The leaders of the industrialized world did not however change their approach to economics in reaction to *LTG*, the 1970s and 80s were on the contrary characterized by neoliberal deregulations of the financial markets and social systems under Margaret Thatcher and Ronald Reagan (Caradonna, *Sustainability* 139). Quite emblematically, in 1981, Ronald Reagan removed the solar panels President Jimmy Carter had installed on the roof of the White House (Caradonna, *Sustainability* 139).

On the other side, stood a growing environmental movement that opposed the massive use of fossil fuels and materialism, advocating for a more eco-conscious, fair, and equal society (Du Pisani; Rome; Tulloch). The environmental movement was fueled by publications such as Rachel Carson's *Silent Spring* (1962) or The Ecologist's *A Blueprint for Survival* (1972). Media coverage of ecological disasters such as the Santa Barbara oil spill (1969) and the oil crises of the 1970s further strengthened the environmental movement.

[14] For a history of the concept of sustainability see Caradonna (*Routledge Handbook of the History of Sustainability*). The handbook traces different historical roots of sustainability from the Highlands of Papua New Guinea to the ancient Maya as well a s during industrialization and later historical periods.

In 1972, the UN Conference on the Human Environment in Stockholm marked the first global summit "to consider human impacts on the environment, and the first major attempt to reconcile economic development with environmental integrity which were commonly regarded as incompatible" (Purvis et al. 683). The conference brought forth the idea of 'environmentally sound' development, which was later coined as 'eco-development' (Purvis et al. 684). Ecological economists such as Ignacy Sachs attempted to reconcile economic growth with environmental responsibilities arguing for "a different, environmentally prudent, sustainable, and socially responsible growth" (Purvis et al. 684). Sachs already mentions the relevance of society and 'socially responsible growth,' which is later institutionalized through the Brundtland Report in 1987.

In the 1980s, the environmental movements of the 1960s and 1970s diminished "as the wave of radical social movements broke and rolled back" (Purvis et al. 684). Scholars Purvis, Mao, and Robinson indicate that throughout the 1980s the ecological and social criticisms of economic growth became interweaved with the latter, leading to the idea of 'sustainable development' which was coined by the Brundtland Commission (Purvis et al. 684). In 1987, the Brundtland Commission published the so-called Brundtland Report titled *Our Common Future* which coined and popularized the phrasing that sustainable development is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Comission on Environment and Development 1). In her foreword, Gro Harlem Brundtland, former Prime Minister of Norway, admonished the "marked retreat" from social and environmental concerns in the 1980s (Caradonna, *Sustainability* 140). The report constituted the first attempt at a well-developed definition of "sustainable development."[15] The concept of 'sustainable development' hence became the new paradigm of the environmental movement and the literature concerning it grew extensively (Purvis et al. 684). The Brundtland Report is often credited with laying the conceptual framework for the three-pillar model of sustainability based on the economic, ecological, and social dimensions (Purvis et al. 681).

In *Sustainability: A History*, Jeremy Caradonna delineates that there are basically no books that use the term sustainability in their title prior to the 1970s. The real surge in publications on sustainability and sustainable development unfolds in the early 1980s. And this is also the time

[15] Whilst a semantic difference exists between 'sustainability' and 'sustainable development', this distinction is not always reflected in the literature, especially when sustainability is conceptualized through the three-pillar model of social, economic, and ecological dimensions (Purvis et al.; Pope et al.; Waas et al.; Carter and Moir).

period when appointed officials in the United Nations began to foreground the issue of sustainability and press for its integration in international accords. Caradonna considers this to be one of the great successes for the concept of sustainability during the 1980s on a global scale.

Another important event for the institutionalization of sustainability on a global scale took place in 1992 when the UN Conference on Environment and Development was held in Rio de Janeiro. The local variants of these policies were called "Local Agenda 21" (LA21) and proposed a "holistic" sustainable development strategy for the 21st century (B. Miller 107). Its implementation was monitored by the International Council for Local Environmental Initiatives (ICLEI). In Europe, the LA21 was largely received in a positive manner, especially in the countries with a social-democratic tradition, whereas in the United States it "fell largely on deaf ears" as geographer Byron Miller analyzes (B. Miller 108). There it was perceived as an unwanted intervention into American politics and threatening American autonomy. This view was especially expressed by members of the U.S. 'Tea Party.' [16] Deriving from the developments around the LA21, discussions about "light" vs. "deep green" transformations and debates about ecological modernization[17] vs. fundamental transformation became prevalent (B. Miller 109). One major criticism of international accords focusing on the concept of sustainable development voiced by sociologist Lynley Tulloch is that the achievement of sustainability was always tied to the concept of economic growth. Tulloch together with David Neilson examines this idea further in the article "The Neoliberalization of Sustainability" (Tulloch and Neilson). Political scientist John Dryzek therefore categorizes the discourse on 'sustainability' as "reformist," contrasting it with more radical environmental discourses such as the 'limits discourse' (Dryzek 13–16; Purvis et al. 686).

Professor of Global Change and Energy Bert De Vries explains that after the fall of the Iron Curtain in the 1990s, and in the spirit of Francis Fukuyama's proclamation of 'The End of History' "optimism set in and worries about environment and poverty became less fashionable in the postmodern world of riches and fun that had emerged" (Vries 128). Certainly, this

[16] For a depiction of the Tea Party's constitution and its values see Skocpol and Williamson's *The Tea Party: The Remaking of Republican Conservatism*.

[17] Ecological modernization is a discourse that revolves around the resolving of ecological problems through economic growth. The first basic eco-modern assumption is the idea of being able to consider and solve ecological problems in isolation. While in the 1970s the interpretation of the ecological crisis was still frequently linked to a fundamental critique of society (Görg 134), this is largely absent from the eco-modern discourse. Sociopolitical goals that are to be achieved in addition to the elimination of ecological problems are not formulated. Thus, a technocratic conception of politics dominates, which questions neither hegemonic structures nor the social power relations that accompany them. This is accompanied by a change from revolutionary to reformist approaches (Krüger 98). Solutions are sought which can be implemented as simply as possible within the given framework conditions (Jänicke).

experience of postmodern riches and fun was the privileged experience of certain socio-economic classes. After the 9/11 terrorist attacks and the burst of the 'dotcom' bubble, many governments in the Western world were concerned with financial crisis management and anti-terrorism. As a consequence, De Vries writes that "in the first decade of the 21st century, the quest for sustainable development lost the momentum and coherence needed to make a sustainability transition happen" (Vries 128).

From certain perspectives De Vries's assessment is true, but since the 2000s there have been major developments in the area of sustainability especially concerning the establishment and further development of metrics, tools, and calculations to measure certain parts of sustainability. The Ecological Footprint Analysis (EFA), the Genuine Progress Indicator (GPI), Life-Cycle Analysis (LCA), Leadership in Energy and Environmental Design (LEED), or the Certification Systems by the German Sustainable Building Council (DGNB)[18] provide only a few examples. The shares of renewable energies in primary energy consumption have increased in Germany and the U.S. from the 2000s until today and is continuously increasing. Green building and sustainable architecture are successively expanding and 'green urbanism' is on the rise (Caradonna, *Sustainability* 180–83). Many American cities now have 'offices of sustainability' and are implementing new modes of transportation such as increasing public transport, car sharing or bike lanes and pedestrian traffic. The sector for sustainable business is expanding and the green economy firmly establishing itself.

Regarding more recent developments, in 2015 the UN developed the "Agenda 2030" coining the 17 Sustainable Development goals (SDGs) with 169 targets. In the same year, the UN Climate Conference in Paris determined to limit global warming to 1.5 degrees Celsius in comparison to pre-industrial times (Terlau 64). These goals are "integrated and indivisible and balance the three dimensions of sustainable development: the economic, social and environmental" (Purvis et al. 687). The three pillars of sustainability are foundational elements for the framework of the SDGs, they are not however explicitly mentioned in the framework for the 17 goals (Purvis et al. 687).

Since 2018, the environmental movement has gained new momentum through the Fridays for Future (or School Strike for Climate) protests and activists. Fridays for Future activists admonish the political inaction against global warming by countries that are the highest emitters of CO_2. The most prominent figure of the protests Greta Thunberg famously exclaimed as the

[18] For brief explanations of these sustainability tools see Caradonna (*Sustainability* 180–85).

closing line of her speech given at the Economic Forum in Davos 2019: "I want you to act as if the house is on fire, because it is." And especially among younger generations ecological issues are regarded through an urgency that requires political and economic action.

De Vries writes pointedly that:

> Thus, sustainable development has evolved into an ethical guiding principle and leading aspiration of humankind in the 21st century, not unlike the idea of socialism in the late 19th and early 20th centuries and the 1948 Declaration of Human Rights in the late 20th century. Such principles and aspirations do not necessarily have to be defined very precisely to be effective. (Vries 133)

Caradonna writes on similar note that "sustainability has become an all-encompassing worldview that has supplanted and displaced democracy as the central preoccupation of the age" (Caradonna, *Sustainability* 178). This argument is supported by youths' preoccupation with climate change and the Fridays for Future Movement. Albeit institutionally, Germany and the U.S. are only slowly implementing sustainable measures on a large scale. Former American President Donald Trump has even denied the existence of climate change, called it a "hoax," and massively cut funding for the environmental protection agency (EPA). Nonetheless, sustainability will remain an influential concept in the 21st century as the world deals with anthropogenic climate change.

DEFINING SUSTAINABILITY: THREE-PILLAR SUSTAINABILITY

The perspective on sustainability I will work with in my dissertation is the idea of sustainability through the triple bottom line, encompassing the ecological, social and economic dimension. The phrasing of the triple bottom line (TBL) was coined by John Elkington in his monograph *Cannibals with Forks: The Triple Bottom Line of 21st Century Business* in 1994 (Caradonna, *Sustainability* 171). John Elkington was a corporate responsibility expert who came forth with this framing. According to the triple bottom line, sustainability can be achieved at the "sweet spot" that equally considers all three dimensions of sustainability. Elkington also introduced the phrasing of 'the three P's' (people, planet, profit). This view is often depicted in Venn diagrams, where sustainability is achieved in the middle, where all three circles overlap. Elkington's framing did not appear in a vacuum but is informed by previous publications and conceptualizations of sustainability such as the Brundtland Report and other sustainability scholars of the 1980s and 1990s. The conceptualization of sustainability encompassing 'three pillars,' 'components,' 'perspectives,' 'dimensions' has been brought forth by several scholars from different scientific disciplines and is traced in the article "Three Pillars of Sustainability:

in Search of Conceptual Origins" by scholars Ben Purvis, Yong Mao, and Darren Robinson (Purvis et al.). The 'triple bottom line' or 'three pillar' definition[19] of sustainability as Purvis, Mao and Robinson name it, had come to be "common view" in the early 2000s through its consistent use by scholars of different disciplines and its representation in local and global policy agendas (Purvis et al. 685).[20]

Nevertheless, the different dimensions of the triple bottom line stand in a certain tension to each other. The pursuit of neoclassical economics generally contradicts the equal pursuit of social and ecological concerns. In environmental policy and governance analyst Sharachchandram Lélé's review and critique of the concept of sustainable development, he explicitly foregrounds the possible contradictions between focusing on economic growth and eco-conscious growth that considers social objectives (Lélé 618; Purvis et al. 687). The analysis of these trade-offs will guide the analysis of the case studies presented in later chapters.

In his seminal article "Green Cities, Growing Cities, Just Cities? Urban Planning and the Contradictions of Sustainable Development" (1996), Associate Professor of Urban Planning Scott Campbell translates the triple bottom line into "the planner's triangle: three priorities, three conflicts" (Campbell 297) and discusses the relevance of the triple bottom line for urban planning. Campbell identifies three major conflicts that may arise between the different goals: the property conflict (economic vs. social dimension), the resource conflict (economic vs. ecological dimension) and the development conflict (social vs. ecological dimension). He also emphasizes that the social dimension is often overlooked in urban planning perspectives that often regard planning through a "man versus environment" lens (Campbell 298). Campbell suggests that interdisciplinary approaches are needed to resolve the conflicts and the necessity of collaboration to do so. In his view only the balancing of the different dimensions will lead to sustainable urban planning.

The German Sustainable Building Council (DGNB) and the Assessment System for Sustainable Building (BNB) bases their entire manuals for sustainable construction on the idea of the three-pillar model. Further categories such as process quality and technical qualities were also added to suit building purposes. The manuals will be explained in further detail in chapter 3. My perspective on urban developments and adhering sustainable building projects will work with

[19] I use the phrasing 'triple bottom line' and 'three-pillar model' of sustainability interchangeably as they refer to a similar understanding of sustainability (Purvis et al.).

[20] Some scholars have added and analyzed additional pillars such as cultural (Soini and Birkeland), technical (Hill and Bowen) or institutional sustainability (Turcu; Spangenberg).

the triple bottom line and its lens of ecological, social, and economic dimensions. The TBL will be used synonymously with the concept of sustainability.

The conceptualization of sustainability through the TBL is of course also viewed critically in debates around 'degrowth'[21] due to sustainability's central integration of economic interests. These critical perspectives will also be reflected in the analysis of the case studies of green building projects in the German and U.S.-American context. Some of the criticism regarding the concept of sustainability in the context of the city is established in the subsequent subchapter on urban sustainability.

THE INTRICACIES OF URBAN SUSTAINABILITY

What does sustainability mean in an urban context? More than 50 % of the world's population lives in cities, in some regions the level of urbanization reaches 80 % (Jonas 117). This means that cities can and will be at the forefront of sustainability efforts. But which effect does the implementation of sustainability measures have on urban environments?

In the context of the city, the term 'green city' is used more frequently than 'sustainable city,' although the terms are often used to refer to the same concept (Karlenzig 346–347), when 'green' also encompasses social and environmental considerations. This is not always the case. Sometimes 'green city' and 'green urbanism' refer mostly to the ecological dimension of sustainability. This difference will be kept in mind when looking at 'green' and/or 'sustainable' measures and their applications in cities. Warren Karlenzig defines a 'green city' through the following terms:

> Today's green city now evokes not only a city that is physically greening its streets and its public and private spaces and byways, but also one that strategically embraces development of renewable energy, less-polluting fuels, widely available local food, efficient public transit, innovative treatment of wastes, polluted land and water, walkability, sufficient affordable housing, and green buildings. (Karlenzig 346)

This conceptualization shows the several different levels at which green policies can be addressed combining and developing new solutions at the social, ecological, and economic level. The definition shows that conceptualizations of the green city in its perfect form are

[21] The anthology *Postwachstumsstadt* (2020) conceptualizes and contrasts the terms 'sustainability' and 'degrowth' in the article "Postwachstums- versus nachhaltige Stadt? Gemeinsamkeiten, Spannungsfelder und Auswirkungen auf Städte und Stadtforschung" by Julia Gamberini. It traces the terms' conceptual origins and delineates commonalities and discrepancies. Degrowth scholars generally reproach the idea of sustainability for not having been separated from the paradigm of economic growth.

defined as "carbon neutral and fully sustainable" (Birch and Wachter 3). Historian Simone Müller and Annika Mattissek extrapolate how cities have adopted and developed sustainable policies on the city level since the 1970s often responding to UN premises such as the 'local agenda 21' or the 17 SDGs. Global developments at the level of the United Nations are taken up by cities and used as blueprints that are adapted to regional needs. Müller and Mattissek write that after the Rio Summit in 1992, large and small cities became actively involved in establishing more sustainable urban measures (S. Müller and Mattissek 5).

In 2005, a global network of megacities constituted itself to fight climate change, forming the group of the C40 cities network. But also more locally, in the U.S. and in Germany several local initiatives have set out to shape cities in more sustainable ways such as the Green City campaign in Munich in 1990 which campaigned to make Munich "people-friendly and green" (S. Müller and Mattissek 5). Or in the 1970s, a group of activists around Richard Register advocated for the planting of trees, building of solar greenhouses, and public transportation and later argued for the application of the ideas formulated in *Eco-City Berkeley* (1987) to various urban settings. Sustainable city initiatives happen on different levels from the global to the local and are sometimes incited by transnational, national, regional or municipal institutions, or the citizen level. It is important to distinguish between top-down and bottom-up urbanism[22] for analytical precision and to keep power dynamics in mind.

But the aspirations of the sustainable city do not come without certain pitfalls. Geographer Andrew Jonas writes critically that "like globalization, sustainability is a discourse to be mobilized selectively in the service of neoliberal urban development" (Jonas 118). And this is partially true, in an urban context, there is often a trade-off for the economic and/or ecological side of sustainability in contrast to the social dimension of sustainability (Wachsmuth et al., "Expand the frontiers of urban sustainability"). Professor of Public Administration Kent Portney describes that cities that focus on sustainability often report higher than average rates of economic growth (Portney). And this correlation is by no means coincidental, but fully intended. The 'sustainability fix' for cities that Jonas describes consists of a set of "discourses, practices and policies on sustainability [that] are selectively mobilized […] to render the concept non-threatening to urban redevelopment, inward investment and growth promotion" (Jonas 118). In his analysis, Jonas always reads the ecological, social and economic effects of sustainability policies through their interweavements and intricacies. He also differentiates

[22] For a discussion of the term bottom-up urbanism see Arefi and Kickert and the *Palgrave Handbook of Bottom-Up Urbanism* (2019).

between "different shades of green" alluding to separations between light and strong sustainability discourses.[23] In Jonas words, sustainability serves as a "master narrative" that is used "in the service of neo-liberal urban agendas" (Jonas 120). In the terminology of our research group, sustainability would be viewed as a 'script,' not through the narrower framing of a narrative, because it also contains a spatial, social and technical logic. Jonas voices that it is hardly possible to argue against the "master narrative"/ script of sustainability. Who after all would argue for an unsustainable urban development (Jonas 120)?

The policies undertaken to make cities more sustainable consist mostly of light green policy packages that are in support of economic growth. More radical approaches that challenge modes of economic distribution or social hierarchies are very seldomly applied and mostly come in the form of bottom-up urbanism rather than from the municipal level. Jonas writes further that "[a]side from reproducing the interest of urban elites, sustainability has also helped to script a language of urban development from which the voices and everyday struggles for survival on the part of poorer and minority communities are excluded" (Jonas 121). The current practice of implementing sustainability in cities does not necessarily challenge existing power structures and dynamics. It is often found to serve "privileged interests" and "reinforcing class divisions and distinctions" (Jonas 121). This does not make sustainability a faulty goal, but it demonstrates the possibility of its appropriation by neoliberal[24] interests.

Sustainability is at the heart of many urban planners' visions that aim at "re-densification, urban compactness, smart growth, green suburbs, healthy communities, and the new urbanism" (Jonas 121). Oftentimes sustainable urban policies seek to attract what Richard Florida has coined as *the creative class* (Florida, *The rise of the creative class*). The creative class encompasses various professions from engineers to artists to doctors and lawyers. It encompasses people that solve problems creatively and that share certain values like diversity, meritocracy, and

[23] Strong sustainability as understood by Jonas emphasizes the integration of social, ecological and economic principles (Jonas 123). In his review of urban sustainability discourses, Jonas argues that these discourses represent different shades of green measures. His figure situates 'low carbon,' 'smart growth,' and 'green economy' and 'green infrastructure' together at the top, whereas 'environmental justice' and 'social equity' are placed at the other corners of the triangle (Jonas 124). When analyzing urban sustainability measures it is important to discuss to which sustainability discourses they pertain to and are situated in and who has access to forming these discourses. This especially regards questions of agency and power.

[24] Scholarly analysis of neoliberalism is characterized by several distinct conceptual approaches. Peck, Brenner, and Theodore stress that there is not one neoliberalism, but is takes specific local and temporal forms and varieties. They describe neoliberalism as "an historically ascendant pattern and hegemonic ideology of capitalist development, organically linked to a host of post-1970s tendencies towards global economic integration, financialization, and normalized practices of 'market-rule' and a political-economic philosophy with a predisposition for liberal economics" (Peck et al. 6).

individuality. According to Florida, cities are in competition with each other in attracting this class. Gentrification is often a result of creatives (in a Floridian sense) moving into neighborhoods, driving out former residents from lower social classes to the margins of the city. This effect is not directly intentional but comes through specific investments and the attraction of business and urban development to the area which increases property values that lead to higher rents. Of course, the creative class also harbors a lot of economic potential for cities to thrive on. Nonetheless, the social effects cannot be neglected as well as the considerations of economic distribution. Otherwise, cities run the risk of fighting "physical environmental issues seemingly devoid of any social meaning and political content" (Jonas 126).

Jonas suggests a combination of environmental measures with economic development and social justice. According to his analysis, only this threefold lens can significantly challenge neoliberal policies (Jonas 129). His understanding is informed by research from Krueger and Savage (2007) on sustainable development in the city. In Associate Professor of Urban Planning Scott Campbell's article "Green Cities, Growing Cities, Just Cities? Urban Planning and the Contradictions of Sustainable Development" he writes that "the idea [of sustainability] will be particularly effective if, instead of merely evoking a misty-eyed vision of a peaceful ecotopia, it acts as a lightning rod to focus conflicting economic, environmental, and social interests" (Campbell 297). According to Miller's reading of Campbell, "sustainable development places the power relations of a capitalist society front and center, with conflict as the seemingly inevitable consequence" (B. Miller 109). For this reason, my analysis of the case studies will scrutinize these conflicts.

Campbell further articulates something that is voiced quite often with regard to conceptualizations of sustainability:

> Sustainable development has been stripped of its transformative power and reduced to its lowest common denominator. After all, if both the World Bank and radical ecologists now believe in sustainability, the concept can have no teeth: it is so malleable as to mean many things to many people without requiring commitment to any specific policies. (Campbell 301)[25]

On a more positive note, he claims that sustainability has become a hegemonic concept, an "accepted meta-narrative" similar to Jonas's framing (Campbell 300). Campbell argues that sustainability nevertheless remains a relevant concept, even if no specific definition has been

[25] Professor of Geography Swyngedouw has written numerous papers on sustainability as an 'empty signifier' – meaning that from Swyngedouw's perspective the term lacks inherent meaning and can be used to serve various political agendas (Swyngedouw 41). For this reason, the emphasis of this chapter lies on determining how green terms are used and in which contexts with which path-dependencies.

agreed upon and there is a significant gap between theory and practice (Campbell 301). He further writes that sustainability might be too holistic to make it operable and not easy to break down into "concrete, short-term steps" (Campbell 301). Campbell views it as the planner's task to resolve and manage these conflicts and to "promote creative technical, architectural and institutional solutions" (Campbell 305).

SUSTAINABLE SCRIPTS IN GREEN BUILDING

Regarding urban housing, sustainable building projects often address middle to high income persons (Daniel). Well-designed residential developments that consider sustainability are often not affordable for low-income households. Miller in this context introduces the term "just sustainabilities" (B. Miller 114). to allude to an understanding of sustainability that integrates social questions. Sustainable script(s) thus, ideally balance economic with social and ecological challenges and demands on a prescriptive, inscriptive, and descriptive level. The differentiation between prescriptive, inscriptive, and descriptive becomes ever more relevant with regard to 'greenwashing' – where on a descriptive level a project sounds holistically sustainable but the 'excavation' of its contexts reveals the inherent trade-offs and true inscriptions. Prescriptive green building standards can on the other hand implement and prescribe energy efficiency or other social features through the allocation of points. Standards are not value-neutral, but prescribe and prioritize values and certain green scripts over others.

Green buildings integrate economic, social, and ecological perspectives by balancing cost-effectiveness, human well-being, and environmental sustainability. These three dimensions can work together to create structures that are efficient, comfortable, and environmentally responsible. From an economic perspective, green buildings reduce operational costs through energy efficiency, water conservation, and smart technology. Although initial investments in sustainable materials and advanced systems may be higher, they can lead to long-term savings through lower utility bills, reduced maintenance costs, and increased property value. Additionally, green-certified buildings often benefit from tax incentives, subsidies, and higher occupancy rates, making them financially attractive for investors and developers.

From a social standpoint, green buildings enhance occupant well-being and productivity. Improved indoor air quality, natural lighting, and thermal comfort contribute to healthier living and working environments, reducing illness and increasing employee efficiency. Green buildings can also promote social equity by fostering inclusive and accessible spaces,

supporting local economies through sustainable sourcing, and creating job opportunities in green construction and maintenance.

Environmentally, green buildings minimize resource consumption and reduce carbon emissions. They use energy-efficient systems, renewable energy sources, and eco-friendly materials to lower their environmental footprint. Water-saving technologies, waste reduction strategies, and biodiversity-friendly designs further contribute to ecological sustainability. By integrating nature through green roofs, urban farming, and sustainable landscaping, these buildings help mitigate climate change and protect ecosystems. A truly sustainable green building balances these three perspectives, ensuring financial viability, social benefits, and environmental responsibility.

2.1.2 RESILIENT SCRIPTS – ENGINEERING RESILIENCE OR NEGOTIATED RESILIENCE?

Future Stories: Resilient Scripts

Regarding resilience, the narrative is about a community, system, or individual's ability to adapt, recover, and thrive in the face of adversity or change. Resilience emphasizes the capacity to endure challenges and emerge stronger, regardless of setbacks or disturbances. Resilience is not just about surviving a crisis, but adapting to new conditions. This theme emphasizes the ability to evolve in response to changing circumstances, learning from past experiences. In ecological systems, resilience ensures the regeneration of habitats after disruption, while in communities, it fosters social cohesion and the development of innovative solutions in times of crisis. From rainwater reservoirs, stormwater retention or heat island reduction, resilient cities can adapt to changing climates through adapting vegetation and building conditions.

CONTEXTUALIZING THE TERM RESILIENCE[26]

Resilience as a concept is used in a multitude of disciplines such as systems thinking, psychology, ecology, geography, or sociology. Conceptualizations of 'resilient cities' have evolved as "normative, desired goals in both academic and policy arenas" (Meerow and J. P. Newell 311) and Béné et al. describe resilience as a relevant "policy narrative" (Béné et al. 116). The Rockefeller Foundation's 100 Resilient Cities (100RC) program has also popularized the idea of urban resilience manifesting specific "urban resilience imaginaries and practices" (Webber et al. 344). Urban planner Rega and engineer Bonifazi claim that "not only resilience has gained prominence in science and policy, but it has also emerged first as a complement to, then increasingly as a substitute for, sustainability" (Rega and Bonifazi 2). They call this the 'resilience turn' in spatial planning (Rega and Bonifazi 2). They further argue that "that the promise held by sustainability that better living conditions for all were within reach (no matter how slow the progress) has been losing grip in the past decades of economic and social turbulences, and growing awareness of global environmental uncertainties" (Rega and Bonifazi 2).

Urban planner Rega and engineer Bonifazi distill three major conceptual approaches to resilience. "Engineering resilience" stemming from the discipline of engineering and theorized by Holling in the 1970s focuses on the ability of systems to bounce back to their state-of-origin when confronted with major shocks (Rega and Bonifazi 4). "Ecological resilience" refers to the "the magnitude of the disturbance that can be absorbed before the system changes its structure" (Holling 33). "Socio-ecological resilience," transformational or adaptive resilience can be defined as a "dynamic non-equilibrium, it signals that systems undergo constant changes and have no stable state. Here, resilience is the ability of the system not only to bounce back but also to adapt and transform" (Rega and Bonifazi 4). [27]

Urban geographers Meerow and Newell critically constate that systems thinking has prevailed in definitions of resilience focusing on "quantitative modeling rather than the interactions

[26] Passages from this chapter have been published in Springer Nature under the Creative Commons Attribution 4.0 International License. Source: Wood, Katharina. "'Becoming Green:' Resilient and Green Building as Risk Mitigation in Atlanta, Georgia." *Natural Disasters in the United States: Making Sense of Risks and Vulnerability*, edited by Natalie Rauscher and Welf Werner, Springer Nature, 2025, pp. 167–190. https://doi.org/10.1007/978-3-031-96436-7_9. Canonical URL to the CC-BY 4.0 License: https://creativecommons.org/licenses/by/4.0/.

[27] These different schools of thought and conceptualizations have received major criticisms. In their article "negotiated resilience," Harris et al. provide an extensive overview of critiques regarding the term 'resilience' (L. M. Harris et al. 7–9).

between individual components and dynamics within the boundaries of a system" (Meerow and J. P. Newell 310). Exactly these interactions and dynamics are where transdisciplinary research is beneficial. In an often-cited report for the Environmental Advisory Council to the Swedish Government, scientists Folke et al. circumscribe resilience for socio-ecological systems as "(i) the magnitude of shock that the system can absorb and remain within a given state; (ii) the degree to which the system is capable of self-organization; and (iii) the degree to which the system can build capacity for learning and adaptation" (Folke et al. 438). Their approach combines different branches of resilience thinking focusing on bouncing back but also processes of self-organization and learning.

With regard to 'urban resilience' Meerow and Newell argue for the implementation and inclusion of the "five Ws of urban resilience": Resilience for whom, what, when, where, and why (Meerow and J. P. Newell 310). This includes perspectives of the humanities and sociology into the concept of resilience asking about beneficiaries and affected groups. According to the authors, "this approach engenders a politics of resilience that includes grappling with trade-offs and scalar complexities and delineating how political context and power dynamics shape resilience policies, with inevitable winners and losers" (Meerow and J. P. Newell 311). The losers are often forgotten, whilst the winners celebrate their successes. This critique is also evident in Brad Evans and Julian Reid's critique of the use of resilience in policy discourses. They argue in *Resilient Life: The Art of Living Dangerously* (2014) that adopting the discourse of resilience is a neoliberal practice of putting responsibility on the individual to adapt in the face of dangers rather than on policy makers to take decisions that protect and secure healthy living conditions for humans and other species. According to their analysis, adopting a resilience-mindset places the "burden of the crises directly on the shoulders of the globally impoverished" (B. Evans and J. Reid 47). They warn that resilience can be practiced as "neoliberal interventionism" (B. Evans and J. Reid 47).

On another note, contrasting this critique of resilience-thinking from a post-colonial perspective sociologist Dieunedort Wandij claims that "[c]ritical resilience thinking is excessively fixated on resilience as participating in a neoliberal rationality of governance, while being itself shackled to the restrictive assumptions of crisis-oriented and disaster-based understandings of resilient systems" (Wandji 288). Further arguing that "[t]he focus on disruptions rather than resilient practices weakens the theoretical foundations of the plurality claim advanced within critical resilience scholarship" (Wandji 288). In his analysis of disruptions at the post-colonial border between Cameroon and Gabon, Wandji frames practices of disruption as acts of

resilience. From a post-colonial perspective, human Geographer Kevin Grove speaks of "subversive resilience" that contests the practice of "neoliberal disaster-resilience" in Jamaican responses to natural disasters (Grove 193). This again is seen by Bracke as a romanticized version of resilience. She contends that "resilience as ways to 'make do' with the conditions one finds oneself in, ways to survive, is something the subaltern does – until she does not, and ceases to survive" (Bracke 852).

In order to synthesize critiques but also opportunities of thinking in terms of resilience, Geerlin et al. propose the term 'adaptation urbanism:'

> [C]urrent forms of resilience planning often operate in operational silos and can result in a type of market-oriented resilience […] that improves safety for some but perpetuates many negative status quo trends. Adaptation urbanism in practice is designed to create a more holistic process of engaging residents in a long-term method of rebuilding cities to make them safer for a changing climate, more energy efficient through better urbanism, and more livable and equitable for all residents. This is the adaptation urbanism resilience process […] that is designed to focus policymakers and the public on a process for creating safer, desirable, more equitable, and sustainable places. (Geerlin et al. 62).

Adaptation urbanism is a powerful tool to tackle issues of resilience in a more equitable fashion. Introducing the concept of 'negotiated resilience' Harris et al. argue that "[r]esilience thinking often overlooks issues of differentiated power attributed to political ideology, finance, class, race, or knowledge" (L. M. Harris et al. 2). Therefore, they conceptualize the idea of 'negotiated resilience' as a process with a focus on inclusivity and participation that always entails a contested and political character (L. M. Harris et al. 10–12). Drawing on research from social scientists Renn and Schweizer (2010), Harris et al. proclaim "engagement will necessarily be uneven, political, and contested, and will point to complex trade-offs rather than win-win-win scenarios as often uncritically implied by the term" (L. M. Harris et al. 2). In practice, this can be exemplified by the city of Ghent's (Belgium) move towards resilience through removing pavement, greening, and installing bike lanes (Stad Gent). Belgian politican Filip Watteuw explains in several interviews that the plans for creating a car-free center city were met with resistance and that there were necessary trade-offs (Faltermann).

Renn and Schweizer base their research in the "normative belief that the integration of knowledge and values can best be accomplished by involving those actors in the decision-making process that are able to contribute all the respective knowledge as well as the variability of values necessary to make effective, efficient, fair and morally acceptable decisions about risk" (Renn and Schweizer 174). Renn and Schweizer situate their argument in the context of

‘inclusive governance.’ In their perspective “[i]nclusive governance is based on the assumption that all stakeholders have something to contribute to the process of risk governance and that mutual communication and exchange of ideas, assessments and evaluations improve the final decisions rather than impeding the decision-making process or compromising the quality of scientific input and the legitimacy of legal requirements” (Renn and Schweizer 175). According to Renn and Schweizer, effective participatory decision-making processes should ensure the inclusion of representatives from all relevant stakeholder groups, where appropriate. Participants must be empowered to engage actively and constructively in discussions. The framing of the risk or issue at hand should be collaboratively developed through dialogue with these diverse groups. This process should foster a shared understanding of the problem, explore potential solutions, and assess their likely consequences by drawing on the expertise of all involved. Additionally, decision-making forums should provide fair and equal opportunities for all stakeholders to express their views and preferences. Finally, a clear linkage must be established between these participatory bodies and the political implementation process to facilitate effective policy integration (Renn and Schweizer 175). The idea of hosting a forum of course requires resources such as time, space, money – and of course interest in and the will to pursue deliberative formats. Harris et al. write that

> [s]ince resilience thinking cannot avoid difficult choices, the focus on negotiation also serves to underscore that it must be pursued in a discursive, deliberative, and negotiated manner that is tailored to on-the-ground realities – including the role of local culture, norms, values and interests – all of which affect the differentiated exposure and subsequent responses to ongoing socio-environmental changes. (L. M. Harris et al. 4)

Harris et al. refer to Imamura’s research on water governance in the Mekong region:

> As research and negotiation is conducted behind closed doors, the general public’s confidence in scientific, technical and administrative expertise is destined to be low. Without more inclusive processes and lasting mechanisms of social learning and public involvement, even scientific findings, however accurate, fail to gain social legitimacy. (Imamura 6)

Imamura makes important points about the legitimacy of decision-making processes and the social acceptability and possible impact of academic knowledge. In this regard, Goldstein et al. argue in their article “narrating resilience” that “resilience analysis does not engage with the material, social and symbolic landscape that constitutes the lived experience of the communities whose resilience is being sought” (Goldstein et al. 1288). They, therefore, focus on “experiential, contemplative and artistic knowledge” the inhabitants of multicultural spaces incorporate and exhibit in addition to approaches stemming from the natural sciences to map the city and measure and calculate resilience (Goldstein et al. 1289). Goldstein et al. envision

resilience as a practice which "is not simply the capacity for change, but an ability to adapt without losing the culture, community ties and local traditions that make a place home" (Goldstein et al. 1289). In their approach to 'narrating resilience,' they argue for plurivocity in the stories that are told. An analysis of the Santa Ana neighborhood in California shows how top-down resilience narratives do not meet residents' needs (Goldstein et al. 1291–93). The 'Renaissance Plan' envisioned for the city as "a utopian ideal of walkable streets, mixed uses, higher-end establishments and a picturesque New Urbanist architectural template. This is a visionary counterpoint to what Santa Ana has been, an older neighborhood of Orange County, California, home to a traditionally majority-Latino community" (Goldstein et al. 1290–91). "[N]ature, look, and culture" of the plan did not emulate what had previously been seen as the neighborhood's identity. The aspect of having a 'home' which is locally-embedded seems to be important to residents – not only in Santa Ana. Harris et al. see the "need to work towards decision making frameworks and policy processes that foreground and invite negotiation, rather than viewing these engagements or institutions as obstacles to the building and achievement of resilience" (L. M. Harris et al. 18). Renn and Schweizer provide useful insights for the decision-making process for resilience.

In 2011, geographer and social historian Derek Antrobus argued that "[i]t is possible to detect a shift in the way we think about environmental issues, in particular climate change, from what academics call 'ecological modernization' to what can be termed 'resilient cities'" (Antrobus 207):

> Like ecological modernization, resilience underpins economic performance. Like ecological modernization, resilience generates skills and wealth. […] A key difference is that it is long term. It is easy to persuade developers to be 'green' where the aesthetics of the landscape adds to land values. It is easy to persuade finance directors to invest in energy saving which reduces costs in the medium term. But the savings from investment in resilience are much less clear cut. They can be long term, affecting cities 40–70 years hence. The benefits are not always returned to investors – for example, flood protection is rarely cost-beneficial to individual economic agents: it requires public schemes. Most of all, there is the issue of social inequality. It is generally the poorest in society and those without a voice who will suffer most from climate change. (Antrobus 214)

Antrobus points to the neglect of social inequality within efforts aimed at a green transformation that predominantly "underpins economic performance" and the chances of resilience to include long term social perspectives (Antrobus 214). According to Coaffee and Lee, resilience is a tool for "governing complexity in an uncertain world, while on the other hand an inherently localist and contextual approach to planning multiple future visions with multiple publics" (Coaffee and Lee 261).

The resilient script is multi-directional – each discipline has varying resilient scripts that inscribe, prescribe and describe different scenarios and path dependencies. In the case studies, these different variations of resilience scripts are kept in mind and conceptually separated. Resilience scripts can be differentiated into separate branches: an engineering resilience script, a neoliberal resilient policy script, and an adaptive and negotiated resilience script. The engineering resilience script generally follows the theoretical branch of resilience engineering focusing on building structures that can withstand severe shocks in the case of earthquakes, severe winds or heavy rain and floods. Engineering resilience focuses on bouncing back to a specific state of origin and thus from a materials' perspective protecting the status quo. The neoliberal resilient policy script is inherently focused on individual responsibility to grapple with resilience. Joseph claims that "[t]he Anglo-Saxon understanding of resilience, in particular, is best understood as a neoliberal form of governmentality that places emphasis on individual adaptability" (Joseph 38). The adaptive and negotiated resilience script focuses on the inclusion of multiple stakeholders in finding solutions and requirements needed with regard to establishing resilience.

RESILIENCE SCRIPTS IN GREEN BUILDING

Resilience is a key principle in green building, ensuring that structures remain adaptable, durable, and sustainable in the face of environmental, social, and economic challenges. By incorporating resilient design strategies, green buildings can maintain functionality during disruptions while supporting long-term efficiency and well-being. A resilient green building is designed to withstand climate-related events such as extreme temperatures, storms, and flooding. Features like renewable energy systems, water conservation technologies, and natural ventilation enhance self-sufficiency, reducing reliance on external resources. Durable materials and energy-efficient systems not only improve performance but also extend the building's lifespan, lowering maintenance and repair costs over time.

Beyond physical durability, resilient green buildings prioritize occupant health and comfort. Natural lighting, improved indoor air quality, and adaptable spaces create a safe and flexible environment that can accommodate changing needs, whether for daily use or emergency situations. Smart technology and energy storage systems further enhance efficiency and reliability, ensuring that buildings continue to operate even in the face of power outages or resource shortages. By integrating resilience into sustainable architecture, buildings are not only energy-efficient but also capable of withstanding challenges while providing long-term benefits for both occupants and the environment.

2.1.3 CIRCULAR SCRIPTS – CREATING CLOSED LOOPS

Future Stories: Circular Scripts

The script of circularity tells the story of moving from a linear economy – where resources are extracted, used, and discarded – to a circular economy, where resources are reused, repaired, and recycled in a closed loop. This narrative is expansive, connecting societal, environmental, and economic dimensions to convey the possibility of a regenerative system that eliminates waste and minimizes environmental impact.

For example, in the narrative of circularity, buildings are no longer constructed as end-products with finite lifespans; instead, they are viewed as dynamic, evolving entities whose components can be continuously reused or repurposed. The narrative situates human activity as compatible with ecological systems rather than in opposition to them.

American economist Kenneth Boulding first pointedly introduced the idea of a circular economy[28] in 1966 in his essay "The Economics of the Coming Spaceship Earth" (Orji and Ojadi 8). Boulding used the metaphor of the spaceship in order to reflect "earth's smallness, crowdedness, and limited resources; the need for avoiding destructive conflict; and the necessity for a sense of world community with a very heterogeneous crew" (Boulding 311). The semantic context of Boulding's metaphor reflects on an imaginary 'spaceship earth' and promotes the necessity of reusing resources on the spaceship and creating closed loops with minimal waste. This constitutes the main idea of the circular economy on which the idea of a circular city is based. A circular city is defined by the architects Bucci Ancapi et al. as:

> Circular city is a concept inspired by biological metabolic systems that seeks to apply the principles and strategies of the circular economy at the different scales of urban functioning. By doing so, a circular city is meant to reduce the intake of primary resources and energy and resulting environmental impacts, such as waste and emissions. Its functioning is (re)defined by efforts aiming to close, narrow, and/or slow material and energy flows. A circular city is a normative concept, implying thus there is an ambition to switch the current – linear – consumption-production system into one that works and develops circularly, in closed loops. (Bucci Ancapi et al. 1)

The idea of a circular city is normative in the sense that it criticizes the status quo of depleting resources. Every day tons of toxic waste are generated in cities around the globe and piling up in landfills polluting the earth and water reservoirs. Economists Orji and Ojadi explain that "the circular economy narrative proposes a future in which the concept of waste is phased out, aiming at a model of economy that overcomes the actual effects of human activities that exceed the resilience of ecosystems on a global scale" (Orji and Ojadi 9). In a circular city, the word 'waste' slowly exits existing imaginaries and vocabularies, because resources are treated in line with the 9R's strategy (reduce, reuse, recycle, recover, reject, repair, refurbish, remanufacture, and reuse) (Paoli et al. 1). Engineers Paoli et al. articulate that "[t]he topic of the circular city is currently much debated in the literature and is seen as one of the possible solutions for achieving sustainability in urban areas" (Paoli et al. 1). The scripts of circularity are sustainability are not mutually exclusive but can support each other depending on their implementation. Urban planner Jo Williams frames circularity through the following process:

> Circularity derives from an ecological conceptualisation of the world. The focus shifts from linear systems, which consume an infinite supply of new resources (inputs) and

[28] Cardoso traces the idea of the circular economy to other economic traditions in the eighteenth century and their criticisms of economic growth by John Stuart Mill or John Law (Cardoso 121; vol. III). The ideas brought forth by Boulding of course are based on decades of economic and philosophical thought that have pondered and discussed the use and trade of resources and the loops created through this trade.

> produce ‘waste’ (outputs), towards circular systems, in which resources are reused, recycled or recovered. The principle of circularity has been applied to industrial systems (industrial symbiosis), production processes (cradle-to-cradle) and economic systems (circular economy). (J. Williams 8)

Jo Williams creates a “socio-ecological conceptualization of a circular city and circular development” (J. Williams 14). In her definition “[a] circular city is a socio-ecological system, consisting of a bio-geo-physical unit and its associated social actors and institutions. It is a complex, regenerative and adaptive system, delimited by spatial and functional boundaries, surrounding an ecosystem” (J. Williams 14–15). Zwiers et al. describe a necessity for the competence of ‘circular literacy’ in transitioning to a circular city. Aspiring and experimenting with a ‘zero-waste’ lifestyle is part of this transition process toward circular literacy, because it creates an awareness for the 9R strategy. The idea of living zero-waste is proliferated through an entire movement with prominent advocates, corresponding blogs, and YouTube channels.

The Zero Waste International Alliance (ZWIA) defines zero-waste as: “The conservation of all resources by means of responsible production, consumption, reuse, and recovery of products, packaging, and materials without burning and with no discharges to land, water, or air that threaten the environment or human health” (Sparnicht). Zero waste advocates propagate that every individual can make a difference by reducing resources such as plastic in everyday consumption patterns (R. Müller and Schönbauer 417). On an individual level, this can be achieved by buying clothes second hand or saving food from being thrown away, bringing containers to zero-waste supermarkets, or the refusal of buying things with excessive plastic packaging.

From the standpoint of resilience, circularity and sustainability, engineer Zaman and architect Lehmann declare that “waste management is one of the most important challenges for sustainable city design” (Zaman and S. Lehmann 74). They suggest the following five principles in order to achieve a ‘zero waste city:’ (1) Behaviour change and sustainable consumption, (2) Extended producer and consumer responsibility, (3) 100% recycling of municipal solid waste, (4) Legislated zero landfill and incineration, and (5) 100% resource recovery from waste (Zaman and S. Lehmann 82–83).

From a standpoint of cultural criticism, scientists Müller and Schönbauer argue that on the level of individual efforts, the zero-waste movement so far remains a rather privileged practice of “White, middle-class, and female” North American or European individuals (R. Müller and Schönbauer 417). Müller and Schönbauer articulate that “[a]ccording to the tenor of many books, TED talks, and articles, a fulfilled life rich in experiences and self-realization awaits

you, if you embark on the path of zero waste living" (R. Müller and Schönbauer 417). The new shopping practices employed by these activist women include going to the farmers market, trying out organic shops, and a lot of DIY (do-it-yourself) research. Reaping the benefits allows them and their families to experience high-quality vacations from the money they have saved (R. Müller and Schönbauer 417). Müller and Schönbauer elaborate that

> [w]hile the reduction of plastic waste and of overall consumption is an absolutely important cause, there are substantial problems with the social politics these narratives perform. […] Such narratives of affluence ignore the reality of a growing number of people in Western societies and beyond who live in and with poverty – people who are disproportionately people of color. Secondly, most narratives of transitioning to zero waste ignore the fact that the resources needed to develop new consumption habits are unequally distributed across society. (R. Müller and Schönbauer 417–18)

Considering economically-disadvantaged populations, "their realities, priorities, and communities are often not included in the membership, narratives, and action plans of popular environmental movements" (R. Müller and Schönbauer 419). Müller and Schönbauer quote marine biologist Ayana Johnson on this note, who exclaims: "To the white people who care about maintaining a habitable planet: I need you to be actively anti-racist. I need you to understand that our inequality crisis is intertwined with the climate crisis. If we don't work on both, we will succeed at neither" (R. Müller and Schönbauer 419). The environmental justice movement has long connected environmentalism with anti-racism and made their interweavement apparent.

CIRCULAR SCRIPTS IN GREEN BUILDING

Designing for circularity in green building focuses on minimizing waste, maximizing resource efficiency, and creating buildings that support a closed-loop system. This approach ensures that materials, energy, and resources are continuously reused, repurposed, or regenerated, reducing environmental impact and promoting long-term sustainability. A key principle of circular design is material selection and reuse. Circular buildings prioritize renewable, non-toxic, and recyclable materials that can be easily disassembled and repurposed at the end of their life cycle. Modular construction techniques, for example, allow buildings to be adapted, expanded, or deconstructed without generating excessive waste.

Energy efficiency and renewable systems also play a critical role. By integrating on-site energy generation, energy recovery systems, and smart grids, buildings can reduce dependency on external resources and operate in a self-sustaining manner. Similarly, circular water

management – such as rainwater harvesting, greywater recycling, and water-efficient fixtures – minimizes waste and optimizes resource use. Another essential aspect is designing for longevity and adaptability. Buildings designed for circularity use durable materials and flexible layouts that accommodate future changes without requiring demolition or excessive modifications. This reduces material turnover and supports a long-term, low-impact life cycle.

In building, circularity includes the life cycle analysis of materials and assessing the carbon emissions ‘cradle to cradle.’ Specific companies have created their unique selling point around circularity and the reuse of EoL (End-of-Life)-building components such as the company ‘Concular.’ Ultimately, integrating circularity into green buildings transforms them from linear resource consumers into self-sustaining ecosystems. By prioritizing reusable materials, energy efficiency, and adaptable design, circular green buildings contribute to a regenerative built environment.

2.1.4 DEGROWTH SCRIPTS – QUESTIONING THE GROWTH PARADIGM

Future Stories: Degrowth Scripts

On the one hand, the narrative of degrowth can be understood as a counter-narrative to the dominant story of everlasting economic growth, casting itself as a tale of transformation, resistance, and renewal. By applying literary terminology, we can unpack its structure, themes, and motifs, framing it as a coherent and purposeful story that critiques the status quo and proposes an alternative vision for society. At its core, degrowth's narrative arc follows a trajectory of disillusionment with current systems, a moment of recognition, and a call to action for systemic change. It positions itself as a narrative of both critique and possibility, challenging the plotline of growth-based economics while offering a new pathway grounded in equity and ecological balance. The theme of sufficiency is central to the degrowth narrative. It advocates for living within planetary boundaries and reevaluating consumption patterns. This theme is intertwined with ideas of resilience and community well-being emphasizing the need for a restructured relationship between humans, the economy, and nature. Another prominent theme is the critique of progress – a questioning of the dominant cultural story that equates economic growth with social advancement. Instead, degrowth promotes a narrative of deceleration, where quality of life is decoupled from GDP and reimagined in terms of well-being, creativity, and shared resources.

On the other hand, the narrative of degrowth is understood by others not as a restorative but a destructive force, that will destroy economic achievements in almost every domain of society through disincentivizing economic excellence.

Political ecologists Demaria et al. elaborate that the term degrowth[29] "signifies a process of political and social transformation that reduces a society's material and energy use while improving the quality of life" (Demaria et al. 431). Critics like economist van den Bergh argue that 'degrowth' puts the improvement of life conditions (in a medical or technical sense) at risk by disincentivizing innovation (van den Bergh 881). Proponents of a degrowth society argue on the other hand that the economy must stay within the limits of earth's "biocapacity" (Xue 411) and therefore challenge neoliberal growth imperatives. In regard to social relations, degrowth thinking proposes "working fewer hours, repairing items rather than replacing them, increased home provisioning, participating in low-energy activities" (Stuart et al. 37). The idea of a degrowth society proposes to increase democratic participation and implement a sharing economy (Stuart et al. 37). Demaria et al. call these forms of living 'nowtopias' highlighting their utopian potential (Demaria et al. 431). Environmental sociologists Stuart et al. emphasize in this respect that "[c]ollective ownership and management of land, energy systems, and housing can increase shared use and democratic participation" (Stuart et al. 37). Visions for degrowth-based economic and societal models often entail ideas of systems change and moving away from neoliberal accumulation regimes toward what Latouche calls "frugal abundance" (Latouche). Critics like economist van den Bergh, on the other hand, question the origins of this "abundance" in a degrowth economy (van den Bergh 881). Van den Bergh argues with regard to GDP-degrowth:

> […] that the long-term effect is uncertain, as GDP degrowth may depress investments in cleaner technologies, renewable energy and related research, which can lead to an increase in future CO_2 emissions. Even the short-term effect is uncertain, as production during a period of crisis may well shift to cheaper, dirtier techniques. Moreover, as is illustrated by recent events, both governments and firms are likely to pay less attention to environmental considerations and policies during a period of crisis. (van den Bergh 882)

Western capitalist economies so far have come with perks such as advanced medicine and technologies, whilst at the same time they have exploited humans, animals, resources and polluted the planet with toxins in their quest for better living conditions. In Germany and the U.S.A. vigorous wealth inequalities continue to exist. The degrowth approach is actively

[29] Degrowth is a translation of the French term 'décroissance.'André Gorz, a French intellectual, used the term first to point to the conflict between on-going growth imperatives and ecological limits with regard to material production (Demaria et al. 432). Since then, 'degrowth' has turned into a social movement with self-organized conferences and visions ranging from "ecofeminist sufficiency" (Salleh) to "conviviality" or "simplicity" (Demaria et al. 432).

seeking transformational approaches to end exploitative economic and ecological relationships, whilst it is uncertain which effects this will have on Western societies that have been socialized with strong individual and capitalist values (Göll and Clausen 129). A degrowth society requires a shift of values from individualism to a focus on the commons. Nonetheless, individualism has a liberating progressive dimension, allowing people to freely choose their sexual orientations, profession, or place of residence (depending on economic means and citizenship), whilst on the other hand individualism places high burdens on individuals and misrecognizes structural dimensions of oppression.

The degrowth perspectives nevertheless raise important questions about planetary boundaries in economies relying on growth. Böcker et al. write:

> Even today, growth is still seen as a guarantor of social balance. This dependence on growth in modern societies is fatal from an ecological point of view. The ever-increasing turnover of services and products is causing the consumption of nature to rise. Politicians do not address the need to keep within planetary boundaries by asking for a sensible limit to growth and accepting the challenge of redistributing wealth under conditions of stagnating or shrinking growth. Rather, it is pinning its hopes on technical solutions that will continue to enable sustainable but 'green' growth. (Böcker et al. 21)[30]

In differentiating branches of degrowth thought, van den Bergh generally rates 'physical degrowth' (limiting the use of physical resources) as the most certainly environmentally positive endeavour (van den Bergh 887) in contrast to more radical approaches of the degrowth movement that seek systems change.

In regard to cities, urban planner Xue therefore argues for "spatializing degrowth" (Xue 413) and to view planning as an inherently ideological practice. The degrowth city is also often combined with approaches to environmental justice. The environmental justice movement has long connected environmentalism with anti-racism and made their interweavement apparent. Atlanta as a historically Black city of the American South, could have presented as a beacon of hope for environmental justice but fails to do so. White and Black elites in the Atlanta metropolitan region continue to follow privileged environmentalisms instead of structurally enmeshing social sustainability with the pursuit of ecological sustainability, resilience, and

[30] Orig.: "Auch aktuell gilt Wachstum nach wie vor als Garant für sozialen Ausgleich. Diese Wachstumsabhängigkeit moderner Gesellschaften ist aus ökologischer Hinsicht fatal. Die immer größeren Umsätze an Dienstleistungen und Produkten lassen den Naturverbrauch steigen. Der Notwendigkeit, die planetaren Grenzen einzuhalten, begegnet die Politik nicht mit der Frage nach einer sinnvollen Grenze für Wachstum und der Annahme der Herausforderung, Wohlstand unter den Bedingungen stagnierenden oder schrumpfenden Wachstums umzuverteilen. Sie setzt ihre Hoffnung vielmehr auf technische Lösungen, die ein dauerhaftes, jedoch ‚grünes' Wachstum weiter ermöglichen sollen."

circularity. Partly Atlanta-based scholars and activists Milligan et al. content that "activism pushes against the enduring whiteness underpinning mainstream environmentalism and how it impairs engagement with the violent realities of our highly racialized socio-ecological relation" (Milligan et al. 1588). The scholars rely on Lee's notion of "ingenious" political activism (Milligan et al. 1588) as an analytical tool claiming that "the ingenious agency of subaltern subjects enables them to rupture the disseminated script" (Milligan et al. 1589). By script they mean conventional mostly affluent practices of environmental stewardship in Atlanta.

While et al. argue that "superficially the neoliberal project of 'growth first' seems to conflict ideologically and materially with the principles and practices of urban sustainability; that is, notions of ecological limits, intra- and intergenerational equity, the integration of economic, social and environmental priorities, and widening involvement in decision-making" (While et al. 550).

DEGROWTH SCRIPTS IN GREEN BUILDING

Questions of degrowth are also connected to sufficiency debates. Living on smaller spatial footprints with less physical objects. The average space per capita has increased from 34,9m² in 1991 to 47,5m² in 2023 in Germany (Statista) and a similar increase can be seen in the U.S.A. In green building this would mean a conscious selection of materials and awareness for sufficiency. Degrowth scripts follow the logics of sufficiency opting for small ecological footprints and favoring sustenance over growth. I argue that degrowth debates have an important corrective function through their criticism of overconsumption and the destruction of human and ecological resources, but that they conflict structurally with deeply Western beliefs in individualism and freedoms. In building, degrowth scripts materialize mostly where there is sufficient use of space whilst considering ecological and social boundaries (e.g. materials selection, fair wages and working conditions).

Urban ecologists De Castro Mazzaro et al. analyze different building strategies and their potential to align with degrowth principles versus growth principles (Castro Mazarro et al. 1307). In their analysis, 'building retrofitting' and 'innovative technologies' have degrowth potential depending on their implementation. Building retrofitting is aligned with degrowth, if it improves "living conditions" and focuses on "communal and ecological uses" and not only considers "economic profitability" (Castro Mazarro et al. 1307). Considering innovative technologies, "low-tech and convivial technologies" are considered to work well with degrowth principles as well as "materials that can be readily composted, reused, upcycled" (Castro

Mazarro et al. 1307). On the other hand, 'smart' technologies that "depend on grey energy and resource extraction" are viewed as part of a growth and resource depleting paradigm (Castro Mazarro et al. 1307). Especially renovation projects can save resources due to the consideration of the embodied energy in the existing structure and through a life-cycle analysis of the materials used in the renovation process. De Castro Mazarro et al.'s analysis of green spatial interventions "indicates that the majority of interventions representative of dominant sustainable urban design and architecture cultures are either ambivalent to degrowth or support the ecomodernist hypothesis premised on technological growth" (Castro Mazarro et al. 1313). The critique of growth-based and selective greening imperatives is also voiced by urban planners Anguelovski et al. by raising the question: "Who is the green city for?" (Anguelovski et al. 418). Angelouvski et al. critically admonish the 'urban greening orthodoxy'[31] that fails to create green corridors in underserved communities. Renown projects like the New York 'High Line' park or the 'Atlanta Beltline' have contributed to green gentrification in the surrounding neighborhoods displacing legacy residents.[32] The High Line founder Robert Hammond therefore constated: "We wanted to do it for the neighborhood…Ultimately we failed" (Anguelovski et al. 418).

The degrowth script challenges conventional growth-driven economic models by advocating for a reduction in material and energy consumption. It promotes a shift away from resource-intensive construction practices and encourages ecological balance, resilience, and equity in the built environment. Rather than focusing solely on efficiency within existing frameworks, it calls for a fundamental rethinking of how buildings are designed, constructed, and maintained to align with ecological limits and community needs. In the context of green building, degrowth supports several key practices that reduce long-term environmental impact. These include the use of locally sourced, renewable, and low-impact materials that minimize embodied carbon and resource depletion. Passive design strategies, such as maximizing natural lighting,

[31] By 'urban greening orthodoxy' Angelouvski et al. mean the inclusive narratives circulated around the creation of greenspaces or ecological corridors in "academic and political discourses" creating glossy images of the positive outcomes of these green spaces, whilst understating "the highly inequitable socio-spatial outcomes they intensify" (Angelouvski et al. 418). The 'inequitable socio-spatial outcomes' are those of green gentrification, in the case of which urban greening raises surrounding property values and in consequence can displace residents because they can no longer afford rents.

[32] The term legacy resident refers to long-term inhabitants of a particular geographic area, often within urban or gentrifying neighborhoods, who have established historical, social, or cultural ties to the community. These residents typically precede significant socioeconomic changes, such as urban renewal, redevelopment, or gentrification. Their presence is often contrasted with newer, more transient populations, particularly those associated with economic shifts that may alter the neighborhood's demographic composition. Legacy residents may experience challenges related to displacement, affordability, and cultural erasure.

ventilation, and thermal regulation, are encouraged to reduce dependency on mechanical energy systems. Water conservation techniques, including rainwater harvesting and greywater recycling, further align with degrowth principles by promoting resource efficiency. Additionally, the adaptive reuse of existing structures and the implementation of circular economy principles help extend the lifespan of materials, reduce waste, and lower overall environmental footprints.

Beyond environmental considerations, degrowth also emphasizes socially inclusive and participatory design processes. It promotes affordable, community-driven housing models, such as co-housing and cooperative living, that prioritize collective well-being over profit-driven development. By integrating these principles, green building within a degrowth framework moves beyond technological fixes, embedding green building within broader ecological and social systems.

2.1.5 SMART SCRIPTS – ENTERING THE DIGITAL REALM

Future Stories: Smart Scripts

On the one hand, the narrative of smart cities presents itself as a futuristic and optimistic story of urban transformation through technology, efficiency, and connectivity. Smart cities emerge as a story of adaptation and innovation, with technology playing the role of the protagonist in addressing the complexities of modern urban life. The smart city narrative is an overarching narrative arc of progress and problem-solving, portraying cities as dynamic systems that can be optimized through data-driven solutions. It reflects a forward-looking story where urban challenge – such as congestion, pollution, and inefficiency – are resolved through digital tools, sensors, and artificial intelligence. The theme of connectivity dominates the smart city narrative, emphasizing the integration of systems to create a cohesive urban experience. It intertwines with themes of efficiency (reducing waste, optimizing resources), sustainability (promoting renewable energy, minimizing environmental impact), and resilience (adapting to climate change and other stressors).

On the other hand, the narrative of the smart city is sometimes told and imagined as a dystopian place of real-time control, political persecution, and conflict. As technological innovation is always used to pursue certain goals, certainly the digitalization through sensors, cameras, and artificial intelligence could be used toward enhancing inequalities and control.

> Following the celebration of the 'creative city' (as described by Richard Florida), the 'smart city' has become the new flavor of the month – and a brand. It makes clever use of resources, and it attracts money, corporate power, and private industries. Offering us cheap, effective solutions to social and political problems, the smart city is functional, optimized, and safe rather than participatory, sustainable, and fair. (Mozorov and Bria 1)

As the introductory quote indicates, the smart city evokes controversial responses and perspectives. On the one hand, engineers Gracias et al. proclaim that the "concept of a smart city is gaining popularity globally as a way to address urbanization, environmental concerns, and economic growth" (Gracias et al. 1719). On the other hand, especially sociological and critical innovation economist perspectives fear a loss of 'data sovereignty'[33] for cities (Mozorov and Bria 10). Undoubtedly, the smart city gives hope to city administrations under pressure striving to create more efficient services for their citizens in the areas of waste, water, or digital bureaucratic services. In search for a comprehensive smart city definition that is aware of adjacent concepts such as the digital city, virtual city, sustainable city, or well-being city, economist Dameri defines a smart city as:

> [a] smart city is a well-defined geographical area, in which high technologies such as ICT,[34] logistic, energy production, and so on, cooperate to create benefits for citizens in terms of well-being, inclusion and participation, environmental quality, intelligent development; it is governed by a well-defined pool of subjects, able to state the rules and policy for the city government and development. (Dameri 2549)

Definitions of smart cities tend to focus on tackling environmental issues concerning traffic, pollution or waste through smart technologies whilst also including aspects like life quality or participation in the implementation of these ICT processes (Dameri 2549). Economists and geographers Echebarria et al. further differentiate three different branches of thinking with regard to the conceptualization of smart cities in their systematic literature review: the techno-centric, humanist, and collaborative approach (Echebarria et al. 161). A techno-centric perspective on the smart city (SC) focalizes the "'hard infrastructure or hard domains' of the city (transport, mobility, communication, energy, building, waste, water, air, security, etc.) through ICTs and underlines the need for planning and control" (Echebarria et al. 161). A significant techno-centric goal is to enhance the city's "operational efficiency" through

[33] Data sovereignty refers to the power and ability to protect, be in control of, and share data without being forced to share sensitive information. Data sovereignty gives individuals or cities power to collect their own data and use it for their own purposes instead of depending on third-party services to collect data and analyze it (Mozorov and Bria 10).

[34] ICT (= Information and Communications Technology).

connecting the city as an intelligent network. This approach is usually planned and implemented from a top-down perspective led by technology companies (Echebarria et al. 162). The humanist approach on the other hand is tied more to concepts such as the creative city, learning city or knowledge city. Its goals are oriented toward creating smart people, smart living, and smart governance (Echebarria et al. 163). Lastly, the collaborative approach combines these perspectives through the inclusion of diverse bottom-up and top-down networks in the implementation of ICTs focusing on interaction for the creation of digital networks through multiple stakeholders (Echebarria et al. 164). These three approaches each translate into different smart city scripts following the aforementioned logics: a techno-centric smart script, a humanist smart script, and a collaborative smart script.

From an engineering perspective, Gracias et al. claim that the techno-centric SC can be very efficient due to the possibilities of sensors, computing, and digital process monitoring. Whilst degrowth scripts oftentimes envision low tech solutions, the techno-centric smart city often entails high-tech and resource intensive solutions for infrastructural problems. In this context, engineers Apanavičienė and Shahrabani write about the potential synergies of smart buildings with intelligent city infrastructures:

> Potential strategies may involve the integration of intelligent infrastructure within urban areas, such as the convergence of smart buildings with the city's smart grid to optimize energy consumption, establishing connections between smart buildings and public transportation to mitigate environmental impact, or implementing intelligent waste management systems that align with the city's existing waste management infrastructure. (Apanavičienė and Shahrabani 1833)

Apanavičienė and Shahrabani argue that smart building strategies "enable resource optimization, enhanced sustainability, and improved quality of life for urban residents" (Apanavičienė and Shahrabani 1833). On the one hand, this is true for vulnerable groups of society such as the elderly. In smart homes, specific software in wrist bands can detect sudden falls and automatically call an ambulance or alert relatives. These features save lives and provide methods of health monitoring. On the other hand, the improvement of quality of life for urban residents is questioned by journalist Morozov and innovation economist Bria in their reflection on "smart austerity"[35] politics. Mozorov and Bria constate that the implementation

[35] By 'smart austerity' Mozorov and Bria mean the difficult dependence cities and their administrations engage in when using technological software and infrastructure from corporations like IBM, Google, or SAP to deploy their services. This dependence creates costly lock-in effects, where it becomes hard to transfer to more democratic open-source software. Cities become 'locked' into specific technological path dependencies and sharing specific data sets with these companies in contrast to creating and securing their own 'data sovereignty' (Mozorov and Bria 18). On the one hand, the solutions are seemingly easily accessible and ready to use, on the other hand they do not necessarily support the establishment of sovereign data by the city and for the city.

of smart cities enables and strengthens the importance of rankings, competition, and scores between cities fighting for a highly-qualified and 'creative' workforce (Mozorov and Bria 9) and in the process reinforces privatization in the city. Mozorov and Bria refer to this process through the concept of the "audit-society"[36] (Mozorov and Bria 10). The dependence of cities on external IT-infrastructure systems and services provides large data sets for these companies with which they can train artificial intelligence and in turn create even more efficient products and services. The provision of free Wi-Fi in cities by telecommunications companies is often tied to the collection of the data of its users. In this regard, Mozorov and Bria articulate the necessity for data sovereignty and the independent collection of data by the city for the amelioration of services for citizens. The use of open-source software and data sharing between cities will be important strategies to secure a certain data sovereignty in the city (Mozorov and Bria 21). Media and Communications Professor Halegoua argues that

> [p]roponents of smart city development emphasize the role of technology in 'smart growth,' improved public services, efficient infrastructures, and entrepreneurial competitiveness. However, critics voice suspicion about the datafication of urban processes, surveillance of urban populations, and the eagerness of public officials to regard information and communication technologies (ICTs) as 'solutions' for perceived urban problems. (Halegoua xi)

Urban bureaucracy is oftentimes perceived to be very inefficient. In 2023, many entrepreneurs and politicians in Germany highlighted this inefficiency as it continues to cause problems in the transition to clean energy systems due to long approval procedures for the construction of new wind power plants or energy storage facilities (Franke). The assistance of digital systems can facilitate decision-making in bureaucratic processes, nevertheless the conceptual programming of these services must be inspected and scrutinized. The programming of software is not a value-neutral undertaking. This becomes obvious in the example of autonomous driving. In case of an inevitable accident with an autonomously-driving car, the digital system has the power to decide in life-threatening situations of moral dilemmas: to run over an elderly person or rather a child that is unexpectedly crossing the street. In the development of autonomous driving ethics play a large role, because the decision is made by the IT-system in the car based on the way it was programmed.

[36] Michael Power describes in *Audit Society: Rituals of Verification* (1997) the implementation of audits, processes of quality control, and standardization as a remedy for solving problems in city's administrations in the 1990s in Great Britain and the U.S. On the one hand, audits standardize and facilitate procedures, on the other hand audits exert systems of control that create dysfunctional behaviors and are biased toward easily quantifiable technical data in contrast to implementing more socially sustainable (less technically quantifiable) city agendas.

Economists Wataya and Shaw write about possible synergies between smart and resilient cities through the economic vocabulary of 'soft assets' and 'human capital:'[37]

> For a smart city, soft or non-physical assets share an important capital component with many impacts in different contexts. They enable a city to deliver and mainstream people-centered policy in addition to the benefits provided by traditional, hard infrastructure. Soft assets can involve social and human capital, knowledge, participation, and innovative approaches that drive value in the city. However, it is always a challenge for city policy makers to identify and strengthen these soft assets using a systemic approach due to their inherent characteristics. (Wataya and Shaw 108)

Humans in Wataya and Shaw's framing 'create value' in the city. The value of these 'soft assets' is often hard to quantify and therefore does not drive policy decisions where politicians want to defend and propagate clean-cut economic benefits (Wataya and Shaw 109). They conclude in their study that: "In short, smart and resilient city approaches are mutually complementary models with two different focuses: reducing environmental load (in the case of a smart city) and strengthening adaptation and transformation (for a resilient city)" (Wataya and Shaw 109). This seems to describe one of the most difficult parameters of the techno-centric smart city, namely its sole dependence on metrics and quantifiable data. Whereas energy efficiency is rather easily quantifiable, such metrics are lacking for the social sustainability of green building projects. This also holds true for the current green building standards DGNB or LEED that focus rather narrowly on the metrics of health-related criteria such as indoor-environmental air quality in their social sustainability criteria. Indoor environmental quality is measured through the use of non-toxic materials and the use of environmental product declarations (EPDs) to ensure low-emitting products as well as air quality testing.

Grießler and Littig, in their work for the Austrian Federal Chamber for Workers and Employees, propose indicators for the measurement of social sustainability and audit procedures such as measuring and quantifying "the satisfaction of basic needs and quality of life" in regard to livelihood protection evaluated through salary structure surveys (Grießler and Littig 83). Also, the EU-Taxonomy is increasing the implementation of quantifiable data with regard to social

[37] The term human capital has entered various disciplines from neoclassical economics where it was coined in the 1950s by economists of the Chicago School of Economics (Tan 412). Human capital "refers to any stock of knowledge or the innate/acquired characteristics a person has that contributes to his or her economic productivity" (Tan 412). Philosophers, sociologists, and educational scholars have criticized the term for limiting human value to economic benefit and productivity. For a profound review of criticisms concerning the term 'human capital' see Tan (2014).

sustainability in their ESG[38] regulations reflecting workers' rights along the supply chain. Nevertheless, well-being and social criteria are often argued to be difficult to measure in quantifiable data (Schreck 678). Smart cities could implement measures to rate social sustainability in a more quantifiable manner in order for these 'soft' metrics to be recognized by professions that typically work with data sets (engineers, IT-professionals, politicians, etc.). Anonymized surveillance data with face recognition could recognize emotions or analyze walking patterns and speed correlating this with stress levels. Health data collected through smart watches can already analyze sleep patterns, and data from hospitals could reveal how many patients suffer from psychological illnesses and therefore implement measures for psychological health and well-being in cities. Surveys can help collect data about well-being in the city and health-related aspects to well-being could be monitored such as heat exposure. Extreme heat causes many physical and psychologically-related health risks. The usage and non-traceability of personalized and sensitive data remains a normative priority for the protection of individual's digital and personal rights. In this context, thinking a step further, the practice of AI-based social scoring[39] must be scrutinized very critically. From Western and human rights-oriented perspectives, the trials of Chinese Social Credit Systems[40] has distinctly dystopian features in regard to discipline and control of social behavior and adherent benefits

[38] ESG refers to "Environment, Social, and Governance" and is further defined in the EU-Taxonomy. Environmental, Social, and Governance (ESG) refers to a framework used to evaluate an organization's performance in three key areas: environmental sustainability, social responsibility, and corporate governance. First of all, the environmental dimension assesses factors such as carbon emissions, resource efficiency, and climate impact. The social component examines labor practices, diversity, human rights, and community engagement. And lastly, the governance aspect focuses on corporate ethics, transparency, regulatory compliance, and executive accountability. ESG criteria are increasingly employed in investment decisions, corporate strategies, and policy frameworks to promote sustainable and ethical business practices.

[39] Ai or user-based scoring systems contribute to the development of a 'reputation economy' in which platform users gain or lose digital social capital (Mac Síthigh and Siems 1044). Platforms like Ebay, Uber, or AirBnB use feedback and scores on their apps to create digital trustworthiness. In the past, scoring systems were more widely applied in credit lending practices based on economic factors in the U.S. and Germany. Some start-ups like Singaporian "LenddoEFL" include social media sources into their credit lending practice arguing this to be fairer to applicants with less economic capital (Mac Síthigh and Siems 1044). Proponents argue that "social scores" support pro-social behavior through positive reinforcement. Critics highlight the possibilities of misuse in authoritarian regimes that base their social scores on normative approval of the regime. From a human rights' perspective, social scores are highly problematic if they do not respect certain rights and freedoms. Otherwise, they solely exert a role of discipline and social control and not of protection.

[40] The Chinese Social Credit System currently is most widely used for businesses and in pilot experiments in 'model cities' applied to individuals and in the latter cases rates "sincerity, honesty and integrity" besides financial parameters (Mac Síthigh and Siems 1049). In some pilot experiments, credits could be gained by individuals through positively-rated behaviors such as caring for the elderly, whilst violating traffic rules deducted points from the score (Mac Síthigh and Siems 1051). Mac Síthigh and Siems argue that despite harsh Western criticism, framing the social credit system as state surveillance and totalitarianism, it serves more diverse purposes in social management in systems with other cultural values (Mac Síthigh and Siems 1056). In current conceptualizations of the Social Credit System, divides between law and politics are non-existent. Western societies base their societies on the separation between legislative, judiciary, and executive branches in order to limit totalitarian practices.

or punishments (Mac Síthigh and Siems). Quantifying social sustainability through metrics could benefit its implementation because the respective data can be visualized and communicated in new ways in which it can 'compete' with other quantitative data sets in the distribution of resources. Developing more quantifiable measurements for social sustainability, could on the one hand, reduce the bias that it is less reliable and subjective – and therefore cannot be included more stringently into green building rating systems. On the other hand, the entire quantification and algorithmicizing of society bares the risk of erasing non-quantifiable, subjective human experiences that defy order. Kette further describes the 'bias problem' of algorithms. Algorithms are sometimes believed to be "a purely factual decision-making orientation with neutralization of all other value references and particularisms"[41] (Kette 166). The human enactment of organizational or bureaucratic rules, on the other hand demonstrates that organizational rules and actual work processes are only loosely coupled and "formal rules are merely abstract 'blueprints' that always require situational updating - and are sometimes ignored"[42] (Kette 167). The algorithmicization of decision-making thus leads to a loss of variance in decision making processes. Kette argues that "for organizations this decision variance is quite functional because it endows the organizations with context sensitivity and flexibility, thus enabling them to decide appropriately even in those situations that are not sufficiently reflected in the program and are surprising in this sense"[43] (Kette 173). In their "reduced depth of intervention, algorithms have more of a decision-preparing character" (Kette 173).

SMART SCRIPTS IN GREEN BUILDING

In Building, smart scripts are used to monitor performance such as the evaluation of water usage, electricity, or to control. Digitalization in buildings enhances efficiency, sustainability, safety, and occupant comfort through various smart technologies. One of its key applications is energy management, where intelligent systems monitor and optimize energy usage to reduce costs and carbon footprint. Building automation further improves operational efficiency by

[41] Orig.: "Eine rein sachliche Entscheidungsorientierung unter Neutralisierung aller sonstigen Wertbezüge und Partikularismen."

[42] Orig.: "Formale Regeln sind lediglich abstrakte ‚blueprints,' die stets einer situativen Aktualisierung bedürfen – bisweilen aber auch ignoriert werden."

[43] Orig.: "Für Organisationen ist diese Entscheidungsvarianz durchaus funktional, weil sie die Organisationen mit einer Kontextsensitivität und Flexibilität ausstattet und es ihr dadurch ermöglicht, auch in solchen Situationen angemessen zu entscheiden, die im Programm nicht hinreichend reflektiert werden und in diesem Sinne überraschend sind."

automating HVAC, lighting, and security systems. Another aspect is smart maintenance, where IoT sensors detect issues, such as leaks or equipment failures, enabling predictive maintenance and reducing downtime. Space utilization is also optimized through digital tools that analyze occupancy patterns, ensuring better use of office layouts and meeting rooms. In terms of security, digital access control systems, smart locks, and AI-powered surveillance enhance safety. Additionally, indoor air quality monitoring ensures a healthier environment by tracking temperature, humidity, and air quality in real time.

Digital twins, virtual models of buildings, allow for advanced simulation, monitoring, and optimization of operations. Moreover, buildings can integrate with smart grids, enabling energy-efficient load balancing and renewable energy integration. With remote monitoring and control, facility managers can oversee operations from digital dashboards, improving response times and efficiency. Finally, digitalization supports sustainability and compliance efforts by tracking and reporting environmental metrics, helping buildings achieve green certifications.

2.2 SYNERGIES BETWEEN GREEN SCRIPTS

The five scripts described in this chapter have undoubtedly not been formed in isolation but have influenced each other and are often intertwined. In this context, Webber et al. constate that "[b]y 2000, urban sustainability was a major focus of urban governance, which now is circulating in tandem with two sister concepts: urban resilience and smart cities" (Webber et al. 343). As a third major script, 'circular cities' have joined the debate. Urban Planner Jo Williams writes in *Circular Cities: A Revolution in Urban Sustainability* (2021),

> [t]o begin to address the challenges facing cities in the twenty-first century we need to ensure they are resource-efficient, ecologically regenerative and resilient. This will enable cities to address directly three key sustainability challenges often overlooked: futurity, inter-generational equity and environmental protection. Indirectly adopting such an approach should also help to address the health and well-being of those living in cities and the creation of sustainable urban economies. In theory, taking a circular approach to development will enable the resource-efficient, waste-free, ecologically regenerative and continual renewal of the city. (J. Williams 7)

Her writing illustrates how different scripts and concepts of greenness are intertwined, can be beneficial in combination and serve each other. Williams further emphasizes the potential of the circular city as a supra-script to include the other approaches. This depends on how far-reaching the circular city is defined and conceptualized. The smart city concept has its origins in the relationship to its sister concepts of the green city or the zero-carbon city, as the smart city was first conceptualized to solve climate problems through increased efficiency and cutting emissions (Mozorov and Bria 6). Degrowth scripts are also interwoven with the circular city and its closed loops and retention of resources. Generally, these previous chapters have concentrated on the 'core areas' and central positions of these respective scripts. But what needs to be emphasized is, that there is a tendency for these scripts and their inherent ideas and proponents to claim and consume previous green ideas and present themselves as the 'new and all encompassing' solution. One example is the *European Circular Cities Declaration* (2020) which includes discourses on sustainability, degrowth, smart, and resilient cities (ICLEI Europe 3–6). The declaration includes aspects of decarbonization, livable cities, closed loops, biodiversity, or LCA that can also be connected to other green concepts such as sustainability, resilience, or degrowth. I believe there should be more transparency about conceptual origins that explicitly give credit to previous traditions. In my opinion, this would support newer concepts' credibility. One of the core motivations to differentiate between the scripts is to show their seminal conceptual origins and create a better understanding of how these ideas were merged into the creation of green building standards. When humans standardize, we should be

very aware of the conceptual origins of the methods and scripts we are standardizing by, relying on clear-cut analysis and transparency.

GREEN SCRIPTS SHAPING GREEN BUILDING STANDARDS

The following chapter 3 evaluates the applicability of the green scripts previously outlined in chapter 2 – sustainable, resilient, circular, degrowth, and smart scripts – and examines how these models are articulated through the criteria embedded within green building certification systems. While chapter 3 has a technical focus, contextualization is provided to ensure accessibility for readers from non-technical disciplines. The analysis is integral to understanding the selected case studies (chapter 4), particularly in light of the green building scripts and standards that shaped their conceptualization.

Further, we can explore how these scripts function not only as technical requirements but also as cultural narratives embedded in the built environment. Building conceptual bridges between and pointing toward limitations of the disciplinary perspectives of looking at green building mainly from a humanities or engineering perspective is the main concern of this book. This endeavor, of course, brings with it many limitations. Whereas the evaluation of the green building criteria in chapter 3 could follow a quantitative approach, I choose a qualitative approach, where the criteria belonging to each standard are not evaluated by the percentage of weight they are given and summed up, but the underlying essential scripts are identified and the conceptual developments of the respective standards clarified. This is essential because standards like green building certification are oftentimes perceived as given, value-free frameworks. From the experience in my internships, I gained the impression that engineers working with the certification systems do not question these, unless they are in a position to do so (for example in a commission to develop a certification system further). To illustrate this: In my interviews at the Epsten Group in 2022, I was met with rather baffled expressions, when I asked how ‘social sustainability’ as part of the three-pillars of sustainability could be enhanced in LEED. I often received the answers “I would say this is done to a sufficient degree,” “I don’t know,” or “this is a really interesting question.” By taking a step back and looking at the standards from a critical and curious perspective, I would like to show that the certification systems should additionally be shaped and evaluated from ‘untypical’ disciplines like the humanities besides architecture or engineering. Material Cultural Studies have long looked at spaces, landscapes, and material expressions in clothing or everyday-objects in households (Hebel 23–24). I believe this work should be intensified with a focus on largely impactful

codified works like certification systems and regulatory frameworks that shape physical objects and entities for example through *Normungsverfahren* (engl. standardization procedures). My impression is that these high-impact frameworks like *DIN* (Deutsches Institut für Normung), are on the sidelines of cultural studies' focus areas. Even though if these frameworks are challenged from a cultural studies perspective, this could make an impactful difference toward the inclusion of non-technical values such as social equity, circularity, or sustainability.

3 IN PREPARATION OF PRACTICE: GREEN BUILDING STANDARDS AND PATH-DEPENDENCIES

3.1 GREEN BUILDING STANDARDS

In the previous chapter, I explored the value of categorizing ‘green’ scripts into more specific concepts, such as resilient or circular scripts. This chapter applies these insights to the most widely used green building standards in Germany and the U.S.: DGNB (Germany) and LEED (U.S.). Additionally, and with regard to the question of innovative perspectives, I will include one visionary standard developed in the USA: Living Building Challenge (LBC).

The chapter begins with a brief introduction to the emergence of green building standards, before turning to an examination of three prominent examples: DGNB, LEED and LBC. In order to ensure consistency between both chapters, the green building standards will be evaluated to determine how the scripts are integrated into each standard. Through showing how each of the previously identified scripts are included in the standards, I aim to show the different focalizations of the respective standards.

The standards emerged through various technical, ecological, but also cultural influences: Visions of architects, engineers, and planners. Green building standards can be understood as aspirations to shape the built environment in an eco-friendlier manner. The novel approach in this chapter is the dissection of the standards into their underlying scripts and as a result understanding the standards and their conceptual origins with more clarity. As standards set regulations and benchmarks for the built environment, their influence on future buildings cannot be underestimated. I seek to understand which direction of ‘greenness’ and inherent values the standards are pursuing: Are they proclaiming circular ways of building, propagating less use of resources, or the inclusion of social sustainability scripts into the built environment? A consistent analysis through this script-oriented perspective has not been undertaken before.

As a quick preview to the subsequent chapter: This analysis will then be applied to building projects (existing or in the planning phase) to detect which aspects of the standards are neglected on the one side, and which ones prominently included in the real built environment on the other side. Standards can prepare the practice of building and set up a framework, but planners, architects and engineers still choose from the possible portfolio of available credits. And in the end, I wish to understand why certain credits in the standards are prioritized over others in practice and what this implies for the built environment. But as of now, let us start with the emergence of green building standards.

GREEN BUILDING STANDARDS OVER TIME[44]

As far back as the nineteenth century structures like London's Crystal Palace and Milan's Galleria Vittorio Emanuele II used passive systems,[45] such as roof ventilators and underground air-cooling chambers to moderate indoor temperature (Cassidy 4). In the early twentieth century, skyscrapers like New York's Flatiron Building and the New York Times Building employed deep-set windows to shade the sun. Also, the first photovoltaics were developed in the 1800s. It is also worth noting that the green building movement did not (re-)gain traction until the 1970s.[46] Around the time the 'glass box' style high rise had become the icon of the American city, a forward-thinking group of architects, environmentalists, and ecologists were inspired by the growing environmental movement and the high fuel costs that were prevalent during the 1970s (Cassidy 4). The genesis of these two scenarios ultimately resulted in the modern green building movement. The first Earth Day, celebrated in 1970, granted even more credibility to this new building concept. Additionally, with the Clean Air (1970) and Clean Water Acts (1972), the U.S. began to regulate air and water pollutants.

The first explicit American green building program was launched in Austin, Texas under the title Austin Energy Green Building in 1991. The first green building rating system in the world was BREEAM (Building Research Establishment Environmental Assessment Method), which was introduced in 1990 by the Building Research Establishment (BRE) in the United Kingdom. BREEAM set the foundation for sustainable building certification and influenced the

[44] Passages from this chapter have been published in Springer Nature under the Creative Commons Attribution 4.0 International License. Source: Wood, Katharina. "'Becoming Green:' Resilient and Green Building as Risk Mitigation in Atlanta, Georgia." *Natural Disasters in the United States: Making Sense of Risks and Vulnerability*, edited by Natalie Rauscher and Welf Werner, Springer Nature, 2025, pp. 167–190. https://doi.org/10.1007/978-3-031-96436-7_9. Canonical URL to the CC-BY 4.0 License: https://creativecommons.org/licenses/by/4.0/.

[45] Passive cooling systems require little to no external energy or movement to operate.

[46] Certainly, traditions of building inspired by nature are much older than the green building movement that established itself in the 1970s in Europe and North America. Nature-inspired building techniques for example used on Nouméa by Kanak people developed in a process of trial and error over centuries in an evolutionary process (Nachtigall 170). These architectures, from a Western and discriminating perspective historically referred to as primitive architectures, are influential in contemporary green building discourses especially in the field of building biology and bionics (German: Baubiologie, Baubionik).

The green building movement that started in the 1970s was inspired by the European and North American environmental movement as a reaction to the environmental burden brought forth by the on-going industrialization processes and environmental pollution. At this time, certain building materials like asbestos were widely used and perceived as ingenious materials by construction professionals. A broad awareness for the health risks of building materials was developed over many years as a result of the mix between a re-gained environmental consciousness and building expertise. Finally in 1993, the material of Asbestos was forbidden in Germany. Warnings had existed since 1898 in Great Britain (Gersmann). Until 2023, half of the building stock in Germany, that was constructed between 1960-1990, is at risk of containing Asbestos. Professionals therefore argue for the introduction of a "pollutant identification card" (German: Schadstoffausweis) (Gersmann). France has already introduced a pollutant identification card in order to assess health related risks for craftsmen and builders in renovation projects.

development of other systems like LEED (USA). Designing and implementing green building designs is arguably one of the most crucial steps to greatly reducing greenhouse gas emissions. According to the US Green Building Council, buildings are responsible for 39% of the United States yearly carbon emissions (USGBC, "Building Decarbonization"). With the increasing recognition of human's influence on global climate change and the necessity to reduce reliance on oil and other non-renewable energy sources, combined with the fact that buildings account for a large portion of carbon dioxide emissions, it may seem logical that the green building movement and green cities have become more prominent over the past five decades.

The green building industry measures sustainability through the use of rating tools in green building standards. Guy and Simon argue that the rating tools, if used in isolation, "tend to narrowly frame the environmental debate to a conceptualization of sustainable buildings as merely differently configured technical structures that can be judged through exchange and comparison of technical data" (Guy and Moore 23). In their argument, this evaluation completely ignores the social context in which these buildings are placed. According to Guy and Moore, environmental assessment methods have tended to be portrayed as "objective, value-free tools whose aim it is to address those universally agreed and 'real' issues such as climate change. As a result, the role of ideology, values, or ethics has tended to be downplayed in the pursuit of such a consensus" (Guy and Moore 24). However, it is now becoming more widely acknowledged that sustainability is a contested concept open to diverse interpretations and that the use of value-referring models could play an important role in understanding sustainable buildings by emphasizing the motivations for addressing particular issues or for utilizing particular technologies. Henn and Hoffmann (2013) further identify five organizational narratives explaining the implementation of green building practices in the U.S.: "profit-driven green", "practical green," "deep green," "green innovators," and "hidden green." According to their analysis, the profit-driven narrative is the most common, asserting that "building green is profitable and that the organization will receive a higher return on their investment by constructing a sustainable building" (Henn et al. 268). Economic savings surely constitute one main driver for the implementation of green building practices, nonetheless, there are several other culturally rooted narrative frameworks at work.

It is often the case that certifications can be of significant benefit in relation to the planning, use and reuse phases. They help to ensure that a wide range of criteria is taken into account from the outset. The majority of projects included in the case study section are built in alignment with one or more green building certification systems. In Germany, the DGNB certificate is the

most widely spread system, while in the United States, LEED is a popular choice. Another American case study in this book employs LBC (case study 4.5). It is worth noting that the tiny houses in case study 4.2 do not currently utilize certification, as they are not standardized for use in this context. The following sections aim to provide a brief overview of DGNB, LEED and LBC. But first, I would like to briefly mention some critical perspectives on green building standards.

CRITICISM OF GREEN BUILDING STANDARDS

Generally, green building standards are criticized for their narrow framing of social sustainability (Atanda and Öztürk 84), their focus on high-tech solutions or lack of local vernacular architecture (Willenbrock, "Die Materialfrage" 43). Architect Auer articulates: "Looking at it soberly, we have made a lot of structural nonsense possible over the past decades with a great deal of technical expenditure, only to then put a green veneer on these buildings. We imagined that we could cheat physics in construction. But of course, that was a mistake"[47] (Willenbrock, "Die Materialfrage" 43).

Further, the 'performance gap' which refers to actual, not the 'predicted' and pre-calculated performance is also often criticized. When performance is not measured post-occupancy, but calculated pre-occupancy, the result is oftentimes a performance gap of 20-70% for example with regard to energy usage (Willenbrock, "Die Materialfrage" 43). The performance gap occurs due to heating and cooling systems latency that is meant to save energy. The real effect is that these systems react too slowly for the comfort or habit of the building's users, so the building users begin to open windows or change the heating settings. This, in turn, causes buildings to underperform their predicted energy consumption.

Criticisms with regard to social sustainability revolve around the narrow scope that is included into the conceptualization of most green building standards. In their analysis of different standards such as LEED, BREEAM (standard from the UK), and CASBEE (Japan), architects Atanda and Öztürk claim that social sustainability is under-conceptualized (Atanda and Öztürk

[47] Orig.: "Nüchtern betrachtet haben wir in den vergangenen Jahrzehnten mit hohem Technikaufwand viel baulichen Schwachsinn ermöglicht und diesen Bauten nachher noch ein grünes Mäntelchen umgehängt. Wir bildeten uns ein, der Physik beim Bauen ein Schnippchen schlagen zu können. Aber das war natürlich ein Irrtum."

84). The architects therefore propose this model and structure to encompass more variety with regard to social sustainability in green building.

Atanda and Öztürk conceptualize 7 categories (equity, education, participation & control, social cohesion, health & safety, accessibility & satisfaction, and cultural values) for establishing criteria that focalize the social script of three-pillar sustainability. Green building standards often focus on only few of these categories, especially in the category 'health & safety' as I will show in the subsequent analysis especially of DGNB and LEED.

The topic of 'social value' in the real estate industry is gaining more traction in recent years (Salzberger et al. 49). Consequently, a wider understanding of the social script of three-pillar sustainability that encompasses a community level in addition to the focus on 'individuals as building occupants' is gaining awareness. This awareness was evaluated in research by *gif Gesellschaft für immobilienwirtschaftliche Forschung* (Society for Real Estate Research), whose researchers and real estate specialists Salzberger, Müller-Judex, and Just argue for this differentiation into individual and community-oriented dimensions of the 'social' realm. Salzberger et al. combine (1) working conditions, (2) health & comfort, (3) security, and (4) adequate supplies of goods and services under the 'individual-oriented dimension' of defining what 'social' means for building. In the community dimension, they conceptualize (1) equity & equal opportunities, (2) cohesion, stability & trust, and (3) participation & inclusion as relevant factors in defining the term 'social' with regard to the real estate industry.

For my research I will not provide another framework for defining the social script for buildings, but work with an understanding that uses the widened scope proposed by Salzberger et al. that considers both dimensions: individual occupants & community/collective perspectives.

3.1.1 DGNB – DEUTSCHE GESELLSCHAFT FÜR NACHHALTIGES BAUEN

The German Sustainable Building Council / *Deutsche Gesellschaft für nachhaltiges Bauen* (DGNB) is an association that was founded in 2007. It is an independent non-profit organization with 2,300 member organizations from the construction and real estate sector. Until 2024, the green building standard has been applied to more than 10,000 projects in over 30 countries (DGNB, "About DGNB"). The first international version was released in 2014. The DGNB understands itself as "Europe's largest network for sustainable building" (DGNB, "About DGNB"). On their website, the DGNB describes their ambition to evoke change in the wake of global warming and commitment to sustainability (DGNB, "About DGNB"):

> But DGNB is more than just four letters. It is the promise to change the status quo in the construction and real estate industry - and to do so in many ways. We take responsibility and make our contribution to making sustainability and climate action the new normal. As a content-driven solution provider, we show paths to all those who are willing to move with us in this direction. We support all those who have understood that 'business as usual' has no future. For them, we create platforms for exchange, for seeking and finding like-minded people, for achieving more together.

Since 2019, the DGNB has deepened its focus on circularity and introduced its award for 'climate positive' buildings. The new system variant for 2023 introduces a materials passport for newly constructed buildings. Version 2023 focuses more on climate adaptation and resilience and reduces the criteria list to 29 eligible criteria. Buildings are certified to the following thresholds and standards - the lowest certification is the DGNB Bronze seal, whilst, Silver is the next highest, followed by Gold and Platinum (DGNB, "About DGNB").

The basic structure of the rating system is divided into six areas, of which three are focalized with a higher weighting. Environmental quality, economic quality, and socio-cultural and functional quality are given a weighting of 25% in the newest version (2023). The decision to divide the areas along these lines was based in a more integral attempt toward sustainability and its widely acclaimed three-dimensional composure. Additionally, technical quality, process quality, and site quality are taken into consideration to add an even broader perspective and highlight aspects from the planning and design phase or waste management on the construction site.

The criteria of these categories have evolved over time, focusing more on circularity, or equity and resilience, which will be evaluated in more detail in this chapter. The criteria are divided into ENV 1 (effects on global and local environment), ENV 2 (resource consumption and waste generation) in the environmental quality. The economic quality focuses on ECO 1 (life cycle

costs) and ECO 2 (performance). In the sociocultural and functional quality, SOC 1 (health, comfort, user satisfaction) and SOC 2 (functionality) are included into the system. TEC gives an overview over the technical qualities. Process quality is divided into PRO 1 (planning quality) and PRO 2 (quality of construction) and site quality is represented in the SITE 1 criteria. For a full list of the criteria, visit the DGNB website, where you can find the most recent manuals (DGNB, *DGNB System* 14–15).

Overview of the DGNB criteria, version 2023:

Topic	Criteria Group	Criteria Label
ENVIRONMENTAL QUALITY (ENV)	EFFECTS ON GLOBAL AND LOCAL ENVIRONMENT (ENV1)	**ENV1.1** Climate Action and Energy **ENV1.2** Local environmental impact **ENV1.3** Responsible resource extraction
	RESOURCE CONSUMPTION AND WASTE GENERATION (ENV2)	**ENV2.2** Potable water demand and waste water volume **ENV2.3** Land use **ENV2.4** Biodiversity at the site
ECONOMIC QUALITY (ECO)	LIFE CYCLE COSTS (ECO1)	**ECO1.1** Life cycle costs
	PERFORMANCE (ECO2)	**ECO2.4** Value stability and adaptability **ECO2.6** Climate resilience **ECO2.7** Documentation
SOCIOCULTURAL AND FUNCTIONAL QUALITY (SOC)	HEALTH, COMFORT AND USER SATISFACTION (SOC1)	**SOC1.1** Thermal comfort **SOC1.2** Indoor air quality **SOC1.3** Sound insulation and acoustic comfort **SOC1.4** Visual comfort **SOC1.6** Quality of indoor and outdoor spaces
	FUNCTIONALITY (SOC2)	**SOC2.1** Barrier-free design
TECHNICAL QUALITY (TEC)	TECHNICAL QUALITY (TEC1)	**TEC1.3** Quality of the building envelope **TEC1.4** Use and integration of building technology **TEC1.6** Circular construction **TEC3.1** Mobility infrastructure
PROCESS QUALITY (PRO)	PLANNING QUALITY (PRO1)	**PRO1.1** Comprehensive project brief **PRO1.4** Sustainability aspects in tender phase **PRO1.6** Procedure for urban and design planning
	QUALITY OF CONSTRUCTION (PRO2)	**PRO2.1** Construction site/construction process **PRO2.3** Orderly commissioning **PRO2.5** Preparation for sustainable use
SITE QUALITY (SITE)	SITE QUALITY (SITE1)	**SITE1.1** Local environment **SITE1.3** Transport access **SITE1.4** Access to amenities

Figure 2: Overview of Criteria DGNB System Version 2023 (table by the author)

The German Sustainable Building Council prides itself in having the most "holistically-oriented system" that is circulated globally (DGNB, *DGNB & Co.* 1–8). This claim will be evaluated in the following sections.

DGNB AND SUSTAINABLE SCRIPTS

The DGNB's Environmental qualities (ENV), Economic Qualities (ENV) and Sociocultural and Functional Qualities (SOC) all center sustainability scripts. Each of these overarching categories is assigned a weight of 25%, reflecting a 'three-pillar' approach that emphasizes balance across environmental, economic, and social considerations and sub-scripts. The environmental qualities focus on the conservation of resources, the reduction of harmful and hazardous substances, promotion of biodiversity, and a low carbon footprint of the building throughout the entire life cycle. Economic factors consider whether a building is economically viable for long-term use throughout its life cycle. This includes a financial perspective, but also a flexible approach to convertibility and reuse. The socio-cultural and functional criteria focus on the users of the built environment and their needs for health, comfort and well-being (DGNB, "Nachhaltigkeitsansatz der DGNB").

The Sociocultural and Functional Qualities (SOC) are especially noteworthy for their emphasis on the concept of "centering people," which DGNB promotes as a fundamental tenet of social sustainability (DGNB, *Lebenswert und Zukunftsfähig* 1–9). In a model based on work by the TU Munich's chair for energy efficient and sustainable building, categories were deducted that influence human well-being in buildings (DGNB, *Lebenswert und Zukunftsfähig* 9). On a physical level, these factors can be classified into four categories: acoustics, visual comfort, olfactory comfort and thermal comfort. From a physiological perspective, age, health, constitution, nutrition, and sex are all factors that play a role. As intermediary factors occupancy, clothing, psychosocial factors, and activity were identified. (DGNB, *Lebenswert und Zukunftsfähig* 9). Two guiding principles were followed: 1. 'positive stimulation' and 2. 'avoidance of disruptive factors.'

The most highly ranked criteria subsumed under the SOC qualities in DGNB are 'health-related' criteria focusing on the individual level. All SOC qualities benefit the health and well-being of the occupants. For example, SOC 1.3 ("Acoustic Comfort") includes an Agenda 2030 bonus for stress reduction, health and well-being, as acoustic comfort is essential for a good working environment and a comfortable living situation. SOC 1.4 ("Visual Comfort") promotes the use of daylight over artificial light in order to save energy and promote mental well-being.

Contributing to the community-oriented dimension of the social sustainability script, SOC 1.6 ("Quality of Indoor and Outdoor Spaces") assesses the provision of recreational spaces that encourage interaction and support quality of the location. This is measured, among other

indicators, by the provision of communication zones or innovation areas with innovative spatial concepts. A major difference between the German green building standard DGNB and the American LEED standard is that DGNB has included the aspect of accessibility for people with disabilities as a mandatory requirement in SOC 2.1 (“Barrier-free Design”) since its inception. In LEED accessibility was only introduced as a mandatory requirement in version 5. Nonetheless, these two criteria are the only ones that predominantly focus on community aspects.

Regarding the environmentally-oriented criteria, the reformulated criterion ENV 1.3 (“Responsible Resource Extraction”) now focuses on the responsible sourcing of raw materials along the supply chain. The indicators require companies with more than 100 employees to have supply chain controls that include monitoring, observation and implementation of fundamental human rights. Documentation of compliance and a catalog of components are required to meet this criterion. This criterion balances ecological, with economic and social sustainability. By establishing this criterion, DGNB is able to position itself as a regulatory authority that not only enforces compliance but also shapes broader narratives surrounding corporate ethics, the development of integrity, and ecological stewardship.

Criterion PRO 1.6 (“Procedures for Urban and Design Planning”) focuses on aspects of building culture to enhance the cultural value and long-term appreciation of the building with the goal of promoting sustainability along the three dimensions. SITE 1.4 (“Access to Amenities”) awards points for proximity to social infrastructure (education, recreation, playgrounds...), commercial infrastructure (retail, medical care, bank, hairdresser, gym…), and building-related infrastructure that is serviced directly in the building. This serves to integrate the building into the community as well as to provide services that address human needs for health, sports, food, etc.

These are just some of the criteria that focus on the symbiosis of all three dimensions of sustainability. As mentioned at the beginning, the DGNB has centered the entire certification system around the implementation of a balanced, three-pillar, approach to sustainability as its core concept. However, certain criteria also cater to other green scripts.

The focus of ENV 2.2 (“Potable Water Demand and Waste Water Volume”) is to ensure the supply of potable water through the conservation and reuse of rainwater and to minimize the demand for potable water. The increasing severity of global warming will increase heavy rainfall events on the one hand and water shortages on the other. Harvesting rainwater on site and limiting the building’s need for fresh water will reduce pressure on potable water supplies. ENV 2.4 (“Biodiversity”) promotes the diversity of species on the site and supports their genetic diversity. Biodiversity is central to the resilience of ecosystems and the maintenance of ecosystem services (Vasiliev 1). ECO 1.1 (“Life Cycle Cost”) ensures the conscious use of economic resources over the life cycle of a building, making the building economically resilient taking into account potentially rising carbon prices and considering the possible reuse of valuable building materials. ECO 2.6 (“Climate Resilience”) accounts for 5% share of the total score. The criterion reflects whether there is a plan in place to assess how the building will respond to climate risks. This assessment includes reviewing forecasts of local precipitation and heavy rainfall events, as well as flooding, and the number of hot days and tropical nights or drought risk. A more detailed description and evaluation scheme can be found in the DGNB manual version 2023, pp. 235-249.

SOC 1.1 (“Thermal Comfort”) awards an Agenda 2030 bonus for climate adaptation, including future climate projections and how the building provides thermal comfort even in extreme heat or during drought conditions. SOC 1.4 (“Visual Comfort”) focuses on the provision of daylight as opposed to artificial lighting, thereby saving energy and increasing independence from artificial lighting. The criterion TEC 1.3 (“Quality of Building Envelope”) aims to minimize the energy demand of the building envelope. This in turn strongly supports the energy efficiency of the building. TEC 1.4 (“Use and Integration of Building Technology”) rewards low-tech passive systems and the technical integration of heating and cooling systems into the neighborhood. This approach, and passive systems in particular, promotes energy independence.

PRO 1.1 (“Quality of Project Preparation”) includes an AGENDA 2030 bonus for participation, including a consultation and co-determination phase in the design and implementation phases. This reflects aspects of negotiated resilience and sustainability, involving a wide range of stakeholders. Criterion SITE 1.1 (“Local Environment”) is given based on three main indicators: 1) performance of a climate risk analysis (10-25 years or 26-50 years into the future),

2) assessment of climate risks at the site (now and in the future for building users), 3) assessment of other external impacts (such as outdoor noise or air quality).

The resilience scripts followed in DGNB pertain mostly to an understanding of engineering resilience and providing adaptable and resilient structures when faced with changing climatic conditions. Negotiated resilience is not part of the criteria's conceptual core.

DGNB AND CIRCULAR SCRIPTS

The DGNB was one of the first green building standards to focus on aspects that promote circular building (DGNB, *DGNB & Co.* 7). The following criteria are taken from the DGNB manual version 2020, which lists criteria with circular economy bonuses. A maximum of 10 additional points can be awarded for each of the following criteria. The environmental quality ENV 2.3 ("Land Use") takes into account the remediation of brownfields and the proper disposal of contaminated soil. The German federal Environmental Agency (Umweltbundesamt) writes that there is no precise definition of brownfields, but they usually refer to formerly developed and now underused sites, such as abandoned factory sites. Unlike greenfields, brownfields are often contaminated by old utility lines, foundations, or chemicals (Umweltbundesamt, "Brownfield redevelopment and inner urban development"). Reuse of these sites supports circularity by bringing these sites back into the building cycle.

The economic quality ECO 1.1 ("Life Cycle Cost") considers whether building components are reused. The circular economy bonus is awarded if more than 80% of the components are reused or implemented through "business models that conform to the circular / sharing economy concept and ensure recyclability" (DGNB, *DGNB System - new buildings criteria set* 239). ECO 2.1 ("Flexibility and Adaptability") promotes higher occupancy rates of spaces that ensure that resources are used efficiently. ECO 2.2 ("Commercial Viability") considers if tenants or companies in the building actively contribute to a circular economy. In the Technical Quality TEC 1.4 ("Use and Integration of Building Technology") measures if 10% of the building's energy load can be stored within the building's realms for grid compatibility. This supports a well-functioning electrical grid, and takes burden off it. TEC 1.6 ("Circular Construction") refers to the reuse and material recycling of components and requires evidence that products are recyclable into similar components. TEC 3.1 ("Mobility Infrastructure") requires designated mobility sharing parking spaces or proximity to car-sharing services. The Process Quality PRO 1.4 ("Sustainability Aspects in Tender Phase") recommends the reuse of secondary materials

in the invitations to tender. PRO 2.1 (“Construction Site/ Construction Process”) requires waste reduction measures during the construction process. Site Quality SITE 1.4 (“Access to Amenities”) rewards allotment gardens, beehives or urban farming and facilities that promote sharing economies and trading like pop-up shops or repair cafés.

DGNB AND DEGROWTH SCRIPTS

ENV 1.1 (“Climate Action + Energy”) requires a life cycle analysis with the goal of reducing greenhouse gas emissions throughout the building’s entire life cycle. This criterion comes with a weight of 10,4% and is mandatory in the 2023 version of DGNB. Degrowth marks connections between GDP growth and the offset of carbon emissions (Domazet 10). Philosopher-physicist Domazet therefore advocates capp8ing and phasing out fossil pollution (Domazet 19). ENV 2.3 (“Land Use”) has the goal of limiting the sealing of soil as well was the use of land for building purposes and therefore centers the redevelopment of brownfields. Sufficiency is a central aspect of degrowth. TEC 1.6 (“Circular Construction”) also encourages using less materials and measures the total mass of raw materials avoided. TEC 3.1 (“Mobility Infrastructure”) promotes alternative mobilities that prioritize cycling, renting, or walking. SITE1.3 (“Transport Access”) rates the connection with existing alternative modes of transport. Degrowth advocates often argue in favor of shared mobilities and against the monopoly of cars (Cattaneo et al. 459).

DGNB AND SMART SCRIPTS

ECO 2.7 (“Documentation”) documents digital construction planning and prepares for the data collection in the building operation phase introducing the concept of the digital twin – a virtual counterpart to physical buildings. The digital twin collects relevant data, and supports the creation of the building components catalogue, LCA, and building resource passport. The criterion establishes “a new normal for new construction” as “BIM-ready” and “cycle-ready” (DGNB, *DGNB System* 250). Building information modeling (BIM) is the basis for smart construction establishing a new normative narrative of intelligent design that extends beyond construction to lifecycle analysis (LCA) and resource passports, embedding smart cities within the plotline of efficient systems. SOC 1.1 (“Thermal Comfort”) is usually measured through sensors and smart technologies to see if the thresholds are met. These technologies interpret environmental data into actionable insights, aligning user comfort with the pursuit of energy

efficiency and technological precision. Finally, the criterion PRO 2.3 ("Systematic Commissioning") involves technical testing and data collection in the building's operation. This entails for example the installment of smart meters for energy monitoring. It foregrounds the importance of operational testing and data feedback. The installation of smart meters for energy monitoring provides accountability, where systems are continuously evaluated and optimized.

CRITICISM OF DGNB

There is little information available about criticism regarding the DGNB system, as it is considered as a rather balanced system from a German perspective, and is not of similar international interest compared to LEED. The DGNB (Deutsche Gesellschaft für Nachhaltiges Bauen) certification system, therefore, is widely regarded as a comprehensive approach to green building. However, it has faced several criticisms related to cost, complexity, and international recognition. One common critique is that certification can be perceived as an expensive image-building exercise rather than a necessity. Critics argue that sustainable building principles are well understood and can be implemented without formal certification. Some suggest that the money spent on certification could be better invested directly into ecological and energy-efficient features (Kreißig). Another concern is the complexity and rigor of the DGNB system. The certification evaluates up to 37 criteria across six categories, requiring extensive documentation and life-cycle analysis. While this ensures a thorough assessment, it can also be seen as a burden, particularly for smaller projects or those with limited resources.

Furthermore, DGNB has limited international recognition compared to other certification systems like LEED. While it is well-established in Germany and parts of Europe, its global reach is relatively smaller, making it less appealing for projects seeking worldwide acknowledgment. Finally, there is a perception that DGNB-certified buildings lead to higher costs. While many assume that sustainable construction is more expensive, research suggests that this is not necessarily the case. Proper planning and long-term efficiency gains can offset initial costs, making sustainable buildings financially viable (Kehl).

In regard to negotiated resilience, Atanda and Öztürk argue that "the majority of the assessment tools are expert-driven and do not sufficiently involve a comprehensive assessment of stakeholders" (Atanda and Öztürk 81). The DGNB certainly also belongs to the category of expert standards. This can lead to a negative effect, because the standard is perceived as imposed upon communities rather than discussed and developed under the inclusion of diverse

perspectives and opinions. Also, the variety of criteria in the SOC (socio-cultural and functional category) are related to improving the health of the occupants, rather than including a broader scope of social criteria as proposed by Atanda and Öztürk.

Despite these criticisms, DGNB remains one of the most detailed and holistic sustainability certification systems available. Its emphasis on life-cycle assessment, economic viability, and long-term sustainability ensures that buildings are not only environmentally friendly but also financially and socially sustainable.

3.1.2 LEED – LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN[48]

The certification system 'Leadership in Energy and Environmental Design' (LEED) was developed as a pilot rating system by the Green Building Council (USGBC) in 1998. Since 2022, version 5 was being drafted, targeting especially carbon emissions, equity, health, and resilience (USGBC, "What's new in LEED v5"). The LEED-standard is a widely recognized internationally acclaimed green building standard. In 2024, it is the world's most widely applied green building standard, applied in 186 countries with 197,000 LEED projects worldwide (USGBC, "LEED rating system"). One of the benefits of LEED certification is that it has developed an international reputation in the construction industry. This is especially interesting for firms that sell their products globally or want to establish a global reputation.

The LEED standard is divided into the following categories: Integrative Process, Planning, and Assessments, Location and Transportation (LT), Sustainable Sites (SS), Water Efficiency (WE), Energy and Atmosphere (EA), Materials and Resources (MR), Indoor Environmental Quality (EQ), Project Priorities and Innovation (IN). Version 4 incentivized resilience criteria in the aspects of "sustainable sites," "water efficiency," "energy and atmosphere," "materials and resources" and "regional priority credits." Version 5 presents a large-scale update to all previous versions, focusing more deliberately on decarbonization, people (quality of life) and ecological conversation and restoration. During my research, I worked mostly with the draft of LEED 5, before it was published in its final version in April 2025. The respective draft was used for the analysis, because congruency with previous versions still remains, but future development becomes more apparent, when including the newly proposed criteria. LEED is now planning for a five-year development cycle to provide some market predictability. The newly merged category "Project Priorities and Innovation" reacts to criticism, that LEED provides "cookie-cutter" standardized solutions and does not customize the buildings to their surroundings (Orr 3).

[48] Passages from this chapter have been published in Springer Nature under the Creative Commons Attribution 4.0 International License. Source: Wood, Katharina. "'Becoming Green:' Resilient and Green Building as Risk Mitigation in Atlanta, Georgia." *Natural Disasters in the United States: Making Sense of Risks and Vulnerability*, edited by Natalie Rauscher and Welf Werner, Springer Nature, 2025, pp. 167–190. https://doi.org/10.1007/978-3-031-96436-7_9. Canonical URL to the CC-BY 4.0 License: https://creativecommons.org/licenses/by/4.0/.

Overview LEED Scorecard version 5:

Category	Criterion	Type	Points
Integrative Process, Planning & Assessments	Climate Resilience Assessment	Prerequisite	Required
	Social Equity Assessment	Prerequisite	Required
	Carbon Assessment	Prerequisite	Required
	Integrative Design Process	Credit	1
Location & Transportation	Sensitive Land Protection	Credit	1
	Equitable Development	Credit	2
	Compact and Connected Development	Credit	6
	Active Travel Facilities	Credit	2
	Transportation Demand Management	Credit	2
	Electric Vehicles	Credit	2
Sustainable Sites	Minimized Site Disturbance	Prerequisite	Required
	Resilient Site Design	Prerequisite	Required
	Protect and Restore Biodiverse Habitat	Credit	2
	Accessible Open Space	Credit	1
	Rainwater Management	Credit	3
	Enhanced Resilient Site Design	Credit	2
	Heat Island Reduction	Credit	2
	Light Pollution and Bird Collision Reduction	Credit	1
Water Efficiency	Water Metering and Reporting	Prerequisite	Required
	Minimum Water Efficiency	Prerequisite	Required
	Enhanced Water Efficiency	Credit	6
	Water Reuse	Credit	2
	Water Metering and Leak Detection	Credit	1
Energy & Atmosphere	Operational Carbon Projection and Decarbonization Plan	Prerequisite	Required
	Minimum Energy Efficiency	Prerequisite	Required
	Fundamental Commissioning	Prerequisite	Required
	Energy Metering and Reporting	Prerequisite	Required
	Fundamental Refrigerant Management	Prerequisite	Required
	Electrification	Credit	5
	Reduce Peak Thermal Loads	Credit	5

	Enhanced Energy Efficiency	Credit	10
	Renewable Energy	Credit	5
	Enhanced and Ongoing Commissioning	Credit	4
	Grid Interactive	Credit	2
	Enhanced Refrigerant Management	Credit	2
Materials & Resources	Planning for Zero Waste Operations	Prerequisite	Required
	Assess Embodied Carbon	Prerequisite	Required
	Building and Materials Reuse	Credit	3
	Reduce Embodied Carbon	Credit	6
	Low Emitting Materials	Credit	2
	Optimized Building Products	Credit	5
	Construction and Demolition Waste Diversion	Credit	2
Indoor Environmental Quality	Fundamental Air Quality	Prerequisite	Required
	No Smoking or Vehicle Idling	Prerequisite	Required
	Building Accessibility	Prerequisite	Required
	Enhanced Air Quality	Credit	1
	Occupant Experience	Credit	6
	Connecting with Nature	Credit	1
	Enhanced Building Accessibility	Credit	1
	Resilient Spaces	Credit	2
	Air Quality Testing and Monitoring	Credit	2
Project Priorities & Innovation	Project Priorities	Credit	9
	LEED Accredited Professional	Credit	1

Figure 3: LEED Scorecard Version 5 (table by the author)

LEED AND SUSTAINABLE SCRIPTS

Before version 5, LEED used to have a clear focus on environmentally-focused scripts of sustainability, with few categories incentivizing social scripts as part of three-pillar sustainability (Atanda and Öztürk 84). LEED was a standard which mostly rated physical ecological and energy efficiency performance above all which relate mostly to resilience and environmental sustainability scripts. Due to the change to version 5, presenting a major shift in

focus, the target areas of version 4 are briefly included. The following illustration depicts the distribution and weighting of impact categories in LEED version 4 (USGBC, *LEED v4* 6):

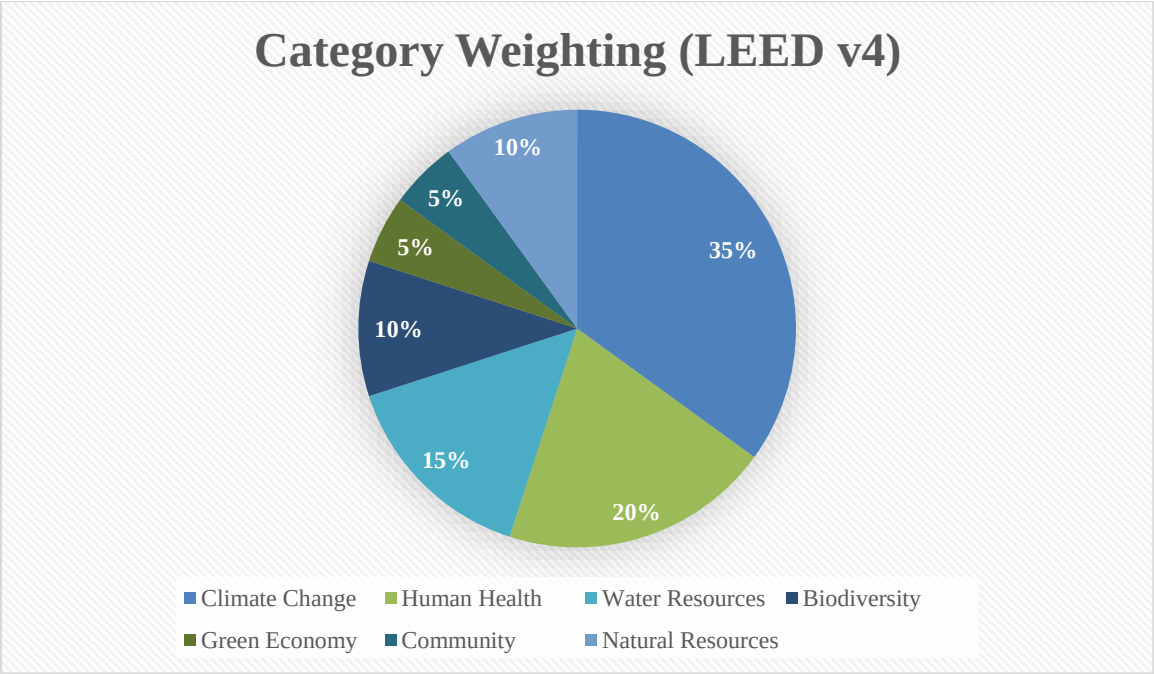

Figure 4: Weighting LEED Impact Categories Version 4 (diagram by the author)

As can be seen in figure 12, criteria related to GHG-emissions and climate change made up around 35 % of the possible portfolio in version 4, another 15% reflected water resources criteria, 10% biodiversity, and 10% resources. In sum, 70% of the criteria reflected environmental qualities. Community, on the other hand, was only factored in with around 5%. Nevertheless, human health was considered in around 20% of the rating criteria. For social sustainability scripts this adds up to 25%, with a clear prioritization of health aspects in the social categories. The economic aspect is rated with 5%, awarded to the support of a green economy and therefore neglects the economic branch of sustainable scripts.

LEED version 5 reacted to different criticisms regarding the system's lack of social sustainability scripts as well as the lack of including embodied carbon more rigorously. In the Integrative Process, Planning, and Assessments' prerequisites Carbon Assessment is included in version 5 in order to reduce long term carbon emissions including onsite combustion, grid-supplied electricity, refrigerants and embodied carbon. As part of the rating, a 25-year projection must be completed through the data from other prerequisites such as MR prerequisite ("Assess Embodied Carbon").

With regard to social sustainability scripts, a new requirement was created in the Integrative Process, Planning, and Assessments' prerequisites. This prerequisite now requires a social equity assessment. This prerequisite has been added in version 5, after LEED was criticized for not including social sustainability scripts to a meaningful degree. The prerequisite asks the team to complete the checklist for Social Impact, which addresses affordability, accessibility, inclusivity, health and wellness, community engagement, workforce impacts, and diversity and representation.

The LT credit, entitled "Equitable Development," includes a path designated "community benefits" in option 1. This path offers rewards to projects situated in disadvantaged community areas, as determined by census and household income data. To qualify for this designation, the income levels in the project's location must fall below 80% of the area median income (AMI) or exhibit a 150% unemployment rate in comparison to state levels. Option 2 offers incentives for the proximity of housing and employment opportunities. Within this option, the first path rewards the hiring of local workers on the LEED project, while the second path provides employment opportunities through proximity to transit hubs. Path 3 offers incentives for the creation of affordable housing or mixed-use projects. The creation of affordable housing is given a total of two points out of a possible score of 110 points. Affordable housing is therefore included in the system, but with very few points.

In order to address greenhouse gas emission further, the LT credit ("Electric Vehicles") are encouraged by providing charging capacities for electric vehicles or incentivizing projects with no parking. SS Credit ("Accessible Open Space") invites the builder to create outside open spaces that encourage interaction, thus promoting accessibility and inclusivity. The EA prerequisite ("Operational Carbon Projection and Decarbonization Plan") relates to environmental sustainability as one pillar of sustainable scripts. It requires an analysis of efficiency, peak load reduction and the creation of a decarbonization plan. The decarbonization plan includes the option of running the building on electricity only above -6.5°C, except for emergency power. Another EA prerequisite ("Fundamental Refrigerant Management") demands refrigerant inventory and assessing the global warming potential of the refrigerant with the goal of reducing it. The congruent EA credit, entitled "Enhanced Refrigerant Management," encourages the utilization of either an entirely refrigerant-free system or low-GWP refrigerants, the latter of which is rewarded with a single point.

In practice, a significant proportion of buildings in the United States utilize HVAC systems. The necessity of their use in regions experiencing extreme temperatures is evident; however, the potential for the construction of buildings aligned with local climates or the implementation of passive systems is not fully realized. The EA credit "Electrification" encourages the diversion from the combustion of fossil fuels on-site, with an exception for extremely low temperatures. By promoting the use of electricity and discouraging the use of fossil fuels on-site, these criteria construct scripts for future building practices that are carbon-lite.

The MR credit ("Low-Emitting Materials") contributes to a healthy environment, due the improvement of air quality for the inhabitants. All the credits for Environmental Quality (EQ) reflect healthy conditions in buildings or options for user controllability that provide enhanced comfort. These include the EQ prerequisite ("Fundamental Air Quality"), EQ prerequisite ("No Smoking or Vehicle Idling"), or the prerequisite ("Building Accessibility"),[49] the EQ credit ("Enhanced Air Quality"), EQ credit ("Occupant Experience"), and the EQ Credit ("Connecting with Nature") that encourages biophilic design. By engaging in these ecological and health-related discourses, LEED credits situate themselves within a narrative of global sustainability, thereby positioning the text as both an active participant in and a response to current cultural dialogues surrounding environmental and social justice. LEED standards are intertextually connected to broader social and environmental discourses, with references to housing equity, biophilia, and emissions reduction also reflecting wider narratives from sources such as the United Nations' Sustainable Development Goals (SDGs) and Agenda 2030.

LEED AND RESILIENT SCRIPTS

According to an analysis by Sánchez Cordero et al. around 30 % of the criteria in LEED refer to the categories "resilience and adaptation" (Sánchez Cordero et al. 15). Taking a closer look at these criteria, they mostly rely on engineering resilience or ecological resilience scripts. The Integrative Process, Planning, and Assessment's prerequisite "Climate Resilience Assessment" requires identifying projected current and future natural hazards such as droughts, earthquakes, extreme heat and cold, flooding, hurricane and high winds, sea level rise etc. The presence of

[49] This prerequisite was only added in version 5. The prerequisite requires compliance with ADA (Americans with Disabilities Act) ramps or wheelchair lifts in order to provide access to people with physical disabilities.

imminent climate risks positions resilience scripts as necessary components of buildings, allowing them to anticipate and adapt to environmental changes.

The LT credit ("Sensitive Land Protection") requires projects to either be built on previously developed sites or for new sites excludes these high-risk/vulnerable areas: Prime farmland, floodplains, habitat for endangered species or wetlands. This enhances resilience from an 'ecological resilience' script that upholds ecosystem functionalities. It also contributes to socio-ecological or adaptive resilience scripts to prevent further settlements in floodplains. The Sustainable Sites prerequisite ("Minimized Site Disturbance") preserves native vegetation, implements an erosion and sedimentation control plan as well as a requirement of preserving healthy habitats for plants and species on site. Another Sustainable Sites prerequisite ("Resilient Site Design") demands that the site is designed for baseline flood protection. Sustainable Sites credit ("Protect and Restore Biodiverse Habitat") additionally supports ecological resilience through soil restoration and pollinator-friendly habitats with biodiverse landscapes. The Sustainable Sites credit ("Rainwater Management") reduces water runoff and helps inhibit downstream flooding toward vulnerable communities. Sustainable Sites credit ("Enhanced Resilient Design") requires addressing two of the highest priority hazards identified in the Prerequisite: Climate Resilience Assessment. This can refer to extreme heat, flooding, hurricanes, or other. The Sustainable Sites credit ("Heat Island Reduction") helps restore human-friendly temperature conditions through demanding a tree equity score for the site (measuring the existing canopy and how it can be increased) as well as nonroof or roof heat island reduction measures through vegetated roofs or the provision of shade through plants or architectural devices. The Sustainable Sites Credit ("Light Pollution and Bird Collision Reduction") improves nighttime visibility through reducing glares and uplights.

The WE Credit ("Enhanced Water Efficiency") reduces the necessity for potable water through the reduction of indoor water use, the reduction of necessary irrigation in the landscape. In order to promote resilience, the EA prerequisite ("Minimum Energy Efficiency") demands compliance with ASHRAE[50] Standard 90.1 to achieve a minimum of energy efficiency. Energy efficiency contributes to reduced demands from the energy infrastructure and augments energy independence when combined with the production of renewable energy on-site (Ribeiro et al. 4; Koutra et al. 1). To certify the energy performance measures in place, EA prerequisite

[50] ASHRAE = American Society of Heating, Refrigerating and Air-Conditioning Engineers. ASHRAE was founded in 1894 and publishes standards and guidelines for energy efficiency.

("Fundamental Commissioning") commands the commissioning of the energy performance. In EA credit ("Reduce Peak Thermal Loads") has the goal of reducing the load on the grid and increasing resilience of buildings when losing power. Options include balances ventilation, or ventilation heat recovery. This criterion assumes mechanic ventilation systems, which are almost standard in new buildings in the U.S. To design for minimal energy usage, the criterion Enhanced Energy Efficiency demands regulated loads with compliance to ASHRAE standards. The EA credit ("Grid-Interactive") supports power resiliency in order to contribute to grid decarbonization and power affordability. One option to apply for this credit is thermal or electric energy storage on-site. In order to help occupants adapt to climate change, EQ Credit ("Resilient Spaces") mandates the buildings operation in cases of episodic, dangerous outdoor conditions such as wildfires through the provision of filter systems, an operation mode for respiratory diseases, or a management mode for power outages. The project priorities and innovation credit ("Project Priorities") allows a focus on geographically sensitive or adaptation-specific environmental, social equity, and public health priorities. This credit encourages the testing of new sustainable building practices and strategies and is awarded with 1-9 points through the implementation of pilot credits or innovative strategies. IN Credit ("LEED Accredited Professional") requires one principal person in the project team to be a LEED AP (Accredited Professional). This ensures project streamlining, and prevents documentation and planning mistakes, which can be very costly in light of the high documentation demands in LEED.

LEED AND CIRCULAR SCRIPTS

The LT credit ("Sensitive Land Protection") promotes development of a previously developed site contributing to the reuse and circularity of sites. The WE credit ("Water Reuse") assists the installment of reuse-ready systems to provide reclaimed water for urinals or water closets, cooling towers or boilers.

EA credit ("Renewable Energy") awards the generation of renewable energy on, or off-site. 5 points are awarded, if 100 % of the project's annual energy demand is sourced from renewable sources. In order to reach the Platinum certification, the completion of this credit is mandatory. The MR prerequisite ("Planning for Zero Waste Operations") includes the consideration of reusable infrastructure in contrast to disposables, the diversion of waste, separate storage for recyclables, methods for sharing, repairing or reuse, with the goal of attempting to reduce waste

in the building's operation. MR credit ("Building and Materials Reuse") considers circularity through maintaining the existing building structure, or using salvaged materials. Through the mandate of using low-emitting materials in MR credit ("Low-Emitting Materials") these materials are better prepared for reuse and recycling, due to less toxicity. In order to promote climate, human, and ecosystem health and social equity as well as a circular economy, MR credit ("Optimized Building Products") rewards the selection of optimized products for example through cradle-to-cradle certification and respective impact scores.

MR credit ("Construction and Demolition Waste") supports diversion of demolition waste from the landfill. This applies when more than 35 % or 50 % of all construction and demolition waste materials are diverted and source-separated and recycled. This is especially relevant for stepping toward a circular system. In 2018, 600 million tons of debris were created, which was twice the size of the entire municipal waste (US EPA, "Sustainable Management of Construction and Demolition Materials").

LEED AND DEGROWTH SCRIPTS

The prerequisite Carbon Assessment in the Integrative Process, Planning, and Assessments is a non-negotiable requirement in version 5. This focus was included after many architects and engineers voiced their criticism (Fairs). Architect Andre Waugh even called the certifications LEED and BREEAM "meaningless" in regard to embodied carbon, due to few incentives to address this important topic outside of carbon emissions and energy savings during the operation of the building (Fairs). Waugh also criticizes that green building standards have allowed architects to focus on operational carbon for too long through expensive high-tech solutions with heavy embodied carbon counts that do not justify their implementation despite the energy savings. As an example, Waugh cites a BREEAM-certified and highly acclaimed building in London (Foster + Partner's Bloomberg headquarters). The building was criticized "for its extravagance and its reliance on complex systems which include hundreds of moveable bronze fins to regulate solar gain and ceilings covered in 2.5 million bespoke aluminum petals that reflect light and help regulate acoustics and temperature" (Fairs). Generally, there is a small movement toward more sufficiency and low-tech approaches in the green building industries, because more and more architects are coming to the realization that high-tech solutions are vulnerable to technological shifts and prone to errors and require a lot of maintenance

(Willenbrock, "Die Materialfrage"; Fairs; TU Braunschweig). Prof. Endres, professor for building- and solar technologies at the TU Braunschweig, articulates:

> In construction, we have pushed the superlatives Higher, Faster, Better, incredibly. We have an infinite number of products and therefore a solution for every problem. I notice this very often in the planning process. But is the solution always to react with a product straight away or could it not be solved more simply - namely through building design or materials and not always just through technical vehicles, such as a faster ventilation system, a larger chiller or an additional system to solve the peak load case according to the standard? The question is: do we need a ventilation system or a cooling system at all? And if so, what does the architecture achieve and what gaps in performance need to be solved technically?[51] (TU Braunschweig)

On the other hand, there are the opportunities offered by smart solutions, such as monitoring irrigation and water availability in urban environments through a widespread use of sensors (Snep et al. 7–8).

The LT credit ("Compact and Connected Development") advocates dense building and incentivizes walkability, livability, and transportation efficiency. This reflects urban concepts such as the '15-Minuten Stadt (engl.: '15-minute city'), 'Stadt der kurzen Wege' (engl.: 'walkable city') and is tied to the movement of New Urbanism, a movement for compact and dense city development against urban sprawl.[52] Urban density is often propagated by degrowth advocates due to intelligent possibilities of sharing and saving resources such as land or services (Kronenberg et al. 238). LT Credit ("Active Travel Facilities") contributes to multi-modal transportation services through requiring bicycle storage, changing facilities and showers, or supporting micromobility through infrastructure for charging e-bikes.

The MR Prerequisite ("Assess Embodied Carbon") demands the upfront assessment of embodied carbon from the extraction and manufacturing phases of major materials. The prerequisite does not demand reductions but primarily an assessment to create an awareness. The accompanying credit ("Reduce Embodied Carbon") then asks for a reduction of embodied

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[51] Orig.: "Im Bauen haben wir die Superlativen Höher, Schneller, Weiter unglaublich vorangetrieben. Wir haben unendlich viele Produkte und damit für jedes Problem eine Lösung. Mir fällt dies sehr oft im Planungsprozess auf. Aber ist es denn die Lösung, immer gleich mit einem Produkt zu reagieren oder könnte man es nicht auch wieder einfacher lösen – nämlich baukonstruktiv oder über Materialien und nicht immer nur über technische Vehikel, wie eine schnellere Lüftungsanlage, eine größere Kältemaschine oder das zusätzliche System, um den Spitzenlastfall nach Norm zu lösen? Die Frage ist doch: Brauchen wir überhaupt eine Lüftungsanlage, oder eine Kühlung? Und wenn ja, was leistet die Architektur und welche Lücken in der Performance müssen technisch gelöst werden?"

[52] New Urbanism is a planning and design movement that promotes walkable, mixed-use neighborhoods, compact urban form, and sustainable transportation to counter urban sprawl and car-dependent development. It emphasizes human-scale design, diverse housing options, and public spaces that foster social interaction and environmental sustainability (Duany et al.). The movement is guided by principles outlined in the Charter of the New Urbanism (CNU, 1996) and has influenced urban planning policies worldwide.

carbon, through a whole building life-cycle assessment (WBLCA), or the procurement of low-embodied carbon construction materials, or EPD[53] analysis.

LEED AND SMART SCRIPTS

Smart features are included in in many criteria where sensors are applied, for example to measure water flows, thermal qualities, or ventilation. WE Prerequisite ("Water Metering and Reporting") requires the installment of permanent water meters to monitor water consumption. The whole-project water usage must be reported to USGBC annually (this is also a new requirement). The meters also support the WE prerequisite ("Minimum Water Efficiency") that prescribe maximum flush and flow rates. The WE Credit ("Water Metering and Leak Detection") rewards the installment of submeters serving at least 80% of indoor fixtures. EA prerequisite ("Energy Metering and Reporting") requires tracking building energy use and demand. The installation of measurement devices is mandatory and data must be shared with the USGBC annually in a report. To monitor energy efficiency, EA credit ("Enhanced Energy Efficiency") advises plug and load management through smart meters with dashboards. To ensure and monitor that the building maintains its energy performance over time, the EA Credit ("Enhanced Commissioning"), requires enhanced commissioning through testing or building monitoring. The credit requires monitoring energy and HVAC systems through an analytic platform to perform smart analytics and Fault Detection Diagnostics (FDD). In the EA credit ("Grid-Interactive") one option includes Automated Demand Side Management including demand-response system-level controls. In order to manage and control indoor air quality, EQ credit "Air Quality Testing and Monitoring") includes pre-occupancy testing and continuous indoor air monitoring and / or continuous outdoor air monitoring.

[53] EPD = Environmental Product Declaration. EPDs are standardized documents that provide transparent and verified information about the environmental impact of a product throughout its lifecycle.

CRITICISM OF LEED[54]

The following criticism all refers to LEED version 4, and evaluates the current status of buildings built until 2024 that follow version 4. LEED-Gold certification in version 4 is often criticized for not being ambitious enough in regard to carbon neutrality. Additionally, some practitioners criticize that LEED creates "cut and paste rules for how to be green," standardized solutions that prohibit creative low-tech approaches to building (Orr 3). Architect Robert Orr argues that LEED "creates cookie-cutter green projects that can be placed in any climate, instead of creating a green project that reflects the neighborhood and region in which it is built" (Orr 3). Orr emphasizes that more points should be awarded for considering low-tech solutions like cross-ventilation or fans in order to create more creative solutions adapted to the location's climate (Orr 5). The architect proposes the use of "original green" solutions that are centuries old (Orr 6). In his view, LEED should award higher points for tougher options – not just 1 point per option and LEED should give more points for the production of renewable energy (Orr 7).

In the interview "To LEED or not to Lead," New York-based architect and designer Wendy Meguro expresses "in order to have longevity, a green building rating system like LEED must avoid being condemned as prescriptive or constraining and instead must exploit its creative opportunities…ideas behind sustainable design should motivate one to creative, adaptive, and environmentally responsible action" (Kauffman 20). Meguro further expresses her appreciation that LEED has changed the market and is creating an awareness for certain features of environmental building such as storm water management to prevent sewage overflow. On the other hand, Meguro describes that many builders implement LEED at the last stage of the planning phase to profit from tax incentives (Kauffman 18). A building need not be LEED-certified to be green and buildings can be LEED-certified and be mostly "greenwashed," she says (Kauffman 18).

For Meguro, this stands in contrast to sustainable design, for which Meguro envisions a holistic approach from the beginning of the project's conceptualization. If buildings are planned in an environmentally-sound way from the beginning, "the environmental cues can be used as a set of creative parameters to shape the visual language of the building" (Kauffman 18). Roosevelt Hall does not implement environmental cues in the way the Kendeda building does for example.

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From the outside, Roosevelt Hall can be read as a classic administrative LEED building. The buildings environmental features relate mostly to the building's core and shell energy and water efficiency. Neither energy-independence nor net water positivity is achieved to make the building more resilient or self-sufficient. Generally, gold-certified buildings achieve energy-savings compared with conventional buildings in the same location – but these savings oftentimes cannot be upheld in performance statistics over several years (Scofield et al.).

Renovation projects like Roosevelt Hall, which pays tribute to considerations revolving around embodied carbon. Preserving existing structures saves materials, because the foundation is maintained and less new materials are used (EEA). For LEED, performance is estimated by the design team, and the actual measurement is not a mandatory requirement for certification. This criticism has been voiced by many professionals in the industry (Scofield et al.; Amiri et al.; USA Today). The living building challenge, therefore has put a focus on actual performance from the beginning. Many studies (Scofield et al.; Amiri et al.; Greer et al.), doubt the actual performance of LEED buildings. A study on federal building's energy performance after the introduction of LEED concludes that "LEED-certified retrofits of federal buildings did not have statistically significant energy savings on average. This is despite energy savings being an explicit federal goal. Second, LEED buildings with higher energy scores had greater energy efficiency post-certification, and the improvements were economically meaningful" (Clay et al. 19).

Even though, I would argue that LEED has raised an awareness for energy efficiency and water efficiency. In favor of LEED and rewarding its achievements Benfield writes "it's not much of a stretch to say that, more than any other single force, LEED has put green buildings on the map and institutionalized building performance measures shown to reduce resource consumption and pollution" (Benfield). It is not the most ambitious green building standard, but has introduced certain standards in commercial building (Presas 5). This from my perspectives can be seen as one of its greatest successes. I argue that LEED has led to a paradigm shift in green building toward energy efficiency, which has been adopted by standard builders – for mostly economic reasons – and to be at the front of state-of-the-art building. This could be one explanation, as to why LEED buildings don't outperform their peers in a more substantial way. The switch to clean electric energy will certainly make LEED buildings outperform their peers as they rely more on PV, geo-thermal energy mixes, and district heating – instead of gas or oil. In 2023 in the U.S., natural gas is still considered 'cheap' – even though it should be more expensive factoring in the true environmental costs of fracking for example.

And this transition will be even more economically-sound when clean energy technologies develop to be more cost-effective and can be stored more easily.

I would therefore phrase the conclusion Scoville et al. proclaim in a different manner and eliminate the constraint of "on the one hand" by simply stating: "This positions LEED buildings to achieve maximum benefit from future reduction in the carbon content of the U.S. electric grid."

A bit cynically, practitioners stated in the magazine Arch2O, a magazine for urbanism, art and design:

> LEED certification can easily be attained even if the building is not truly sustainable. This can be done by taking advantage of the various loopholes in the point system. If a building scores a '40' on the points system, it is eligible for LEED certification. Now, about 22 simple things can be done (like maintaining a small form factor, orienting the building near transit hubs, using less wood, etc.) to get about 70 points in the LEED criteria. This means that the designer doesn't really have to plan out real sustainable designs for the building (like passive cooling techniques, natural ventilation, dynamic daylighting. etc.) in order to get his building LEED certified. (Arch2O.com)

There has been a lot of discussion over the weighting of points in LEED. One point that is often voiced and also purported by the practitioners in Arch2O is that "LEED provides only 4 bonus points in the category of Innovative Design, which doesn't really do justice to some revolutionary sustainable designs which truly deserve the 'green building' title and certification, but won't get the recognition if it doesn't fit into all the categories the LEED criteria states" (Arch2O.com). The U.S. Green Building Council tries to counter negative images through 'myth-busting' – especially the myth that the system is not 'innovative' (U.S. Green Building Council, "LEED works: Myth-busting | U.S. Green Building Council"). The USGBC argues that it has an innovation category – nonetheless, this category solely awards 4 / 100 points and therefore gives very little incentive. U.S. Green Building Council, "LEED works: Myth-busting | U.S. Green Building Council" further argues that it is not "easy to game the system" due to the prerequisites – and these prerequisites have significantly improved over several versions (U.S. Green Building Council, "LEED works: Myth-busting | U.S. Green Building Council").

In his article "LEED after Ten Years," architect Michael Zaretsky evaluates: "If triple bottom line sustainability requires social and economic equity, as well as environmental equity, is it acceptable to suggest that achieving LEED certification somehow equates with sustainable design? By ignoring the social issues of sustainable design, LEED purports a message that a

"green building is not required to address social and economic issues" (Michael Zaretsky 197). Networks like SEED: Social Economic Environmental Design have developed tools that promote social equity in the design process – these tools exist but are not very widely adopted. SEED evaluates how "the design team engages stakeholders in the total project process" and "how the design product answers the short and long term needs of a community while validating ethical and sustainable approaches to design" (SEED). LEED has a social equity pilot credit in the innovation category (IPpc89) – which will be given 1 point if applied. One path to receive the credit is by completing two steps (of three – the last step is evaluated post-occupancy) of the SEED Evaluator. This is a small recognition for the work done at SEED. The completion of the credit will still only be given one point out of 100 possible points – this deprioritizes social sustainability within LEED.

A USA Today research of 7,100 LEED-certified commercial buildings demonstrates "that designers target the easiest and cheapest green points by trying to create pleasant and healthful office spaces; using common building materials; or taking steps with an unknown effect, such as providing preferred parking for fuel-efficient cars, bike racks and showers, and posting educational displays about the building." (USA Today). The results of this study are backed by Abe Kruger's experience especially with regard to affordable or mixed-income residential projects:

> On the affordable housing side, while many of our clients believe in green building, they're typically doing it because they have to. And so, it's the low-income housing tax credits either require it, which is the case in Georgia, or it's incentivized and they are taking those optional points to be more competitive in getting those tax credits. So, there's kind of like that bucket where it's, it's basically compliance like they have to do it or they want to do it. And in some ways, it's a checking the box exercise and so they don't really care how they get to the certification, they just need to get it. They just want that plaque. They need that plaque. (Kruger)

In a similar fashion, Benfield critically recognizes "but, man, there are a lot of warts in this system. For starters, LEED has been criticized for being insufficiently demanding of its applicants. I believe that, to the extent this criticism is well-placed, it stems from a belief held by many involved with the Green Building Council, some of them representatives of the building industry, that the standards should be set only a little bit above what industry is likely to do anyway" (Benfield). Another critique of LEED is operation and maintenance teams are not trained to uphold the performance of the building. This is crucial to a resource-sensitive maintenance phase.

Nevertheless, LEED has pushed awareness in building especially toward resilience and ecological sustainability scripts and the value of energy efficiency. As the most widely used green building rating system, LEED provides a framework for healthy, efficient, and cost-saving green buildings.

3.1.3 LBC – LIVING BUILDING CHALLENGE[55]

Living Building Challenge LBC is a building standard administered and created by the Living Future Institute (ILFI) in 2006. LBC can be applied world-wide. Until 2024, around 800 projects have been certified or registered to complete the challenge. This is far less than DGNB or LEED, and arguably based in the rigorous parameters, that were created not to suit the market, but to be an innovative, "socially just, culturally rich, and ecologically restorative" challenge (International Living Future Institute, "About"). LBC intends to not do "less harm" but to be a "steward and co-creator of a true Living Future" (ILFI 13). A Living Future is understood as "regenerative", in the sense that buildings give back and contribute to an ecosystem which supports a healthy planet through decarbonization and nature-based solutions. ILFI pointedly articulates: "The program has always been a bit of a Trojan horse – a philosophical worldview cloaked within the frame of a certification program" (ILFI 13). Therefore, ILFI describes the program as "philosophy first, an advocacy tool second, and a certification program third" (ILFI 13). LBC provides a framework for a "symbiotic relationship between people, our community, and nature" which is designed through cultural and ecological values that are represented through the "petals" (ILFI 13). The Living Building Challenge groups its aspirations and focus areas into different petals of a flower. The petals are "place," "water," "energy," "health & happiness," "materials," "equity," and "beauty":

[55] Passages from this chapter have been published in Springer Nature under the Creative Commons Attribution 4.0 International License. Source: Wood, Katharina. "'Becoming Green:' Resilient and Green Building as Risk Mitigation in Atlanta, Georgia." *Natural Disasters in the United States: Making Sense of Risks and Vulnerability*, edited by Natalie Rauscher and Welf Werner, Springer Nature, 2025, pp. 167–190. https://doi.org/10.1007/978-3-031-96436-7_9. Canonical URL to the CC-BY 4.0 License: https://creativecommons.org/licenses/by/4.0/.

Figure 5: Living Building Certification Petals (diagram by the author)

According to the International Living Future Institute, the metaphor of the flower is used because "the ideal built environment should function as cleanly and efficiently as a flower" (International Living Future Institute, "What Is The Living Building Challenge?"). According to the co-founder of the standard, Jason McLennan, "flowers are an accurate representation of a truly regenerative building which receives all of its energy from the sun, nutrients from the soil, and water from the sky. Similar to a flower, they simultaneously shelter other organisms and support the surrounding ecosystem. They also serve as beauty and inspiration and adapt to their surroundings" (Thomas).

The system contains 20 imperatives (criteria). 10 imperatives form "core imperatives" which are mandatory for certification, whilst the other 10 "push performance" (ILFI 19–20). Very importantly, the certification is awarded not based on predicted performance but measured performance. Compliance must be demonstrated for twelve consecutive months in order to be verified. The following illustration shows the different petals with their imperatives (ILFI 21).

Explanation of symbols used in the following table (Petals & Imperatives in LBC v4.1):

X	**Imperative required for Typology**
(X)	**Requirement dependent on Scope**
–	**Not Required for Typology**

Petals & Imperatives in LBC v4.1:

Nr.	Petal	Imperative	New Building	Building Renovation	Interior	Landscape + Infrastructure
01	Place	Ecology of Place	X	(X)	–	X
02	Place	Urban Agriculture	X	X	–	–
03	Place	Habitat Exchange	X	X	X	X
04	Place	Human Scaled Living	X	(X)	X	–
05	Water	Responsible Water Use	X	X	(X)	X
06	Water	Net Positive Water	X	X	(X)	X
07	Energy	Energy + Carbon Reduction	X	X	(X)	X
08	Energy	Net Positive Carbon	X	X	–	X
09	Health + Happiness	Healthy Interior Environment	X	X	X	–
10	Health + Happiness	Healthy Interior Performance	X	X	X	–
11	Health + Happiness	Access to Nature	X	X	X	–
12	Materials	Responsible Materials	X	X	X	X
13	Materials	Red List	X	X	X	X
14	Materials	Responsible Sourcing	X	X	X	X
15	Materials	Living Economy Sourcing	X	X	X	X
16	Materials	Net Positive Waste	X	X	X	X
17	Equity	Universal Access	X	(X)	(X)	(X)
18	Equity	Inclusion	X	X	X	–
19	Beauty	Beauty + Biophilia	X	X	X	–
20	Beauty	Education + Inspiration	X	X	X	–

Figure 6: LBC Petals and Imperatives Version 4.1 (table by the author)

The subsequent analysis focuses on the typology for new buildings. New buildings are required to fulfill all twenty imperatives. Regional solutions are central to achieving the LBC. ILFI writes: “becoming water-independent in the desert demands the evolution of a project’s design to emulate a cactus instead of a tree” (ILFI 21). Feedback from different regions is continuously included into the standard through regional equivalencies in order to be suitable for different climates and creative solutions. Certification involves the Ready Audit and the Final Audit. The Final Audit is performed twelve months after the building’s completion.

LBC is committed to Within the place petal ("Ecology of Place") an assessment of cultural and social equity factors is mandatory. This requires the project team to reflect the impact on the human environment on site and create positive impact, respecting the local neighborhood and culture. The health and happiness core imperative ("Healthy Interior Environment") mandates the provision of indoor air quality and compliance with ASHRAE 62.1 or 62.2, prohibits smoking, and demands daylight and views outside for 75 % of regularly occupied spaces. Imperative 10 ("Healthy Interior Performance") measures ongoing high indoor air quality through Indoor Air Quality Testing. Imperative 11 ("Access to Nature") showcases the importance of human interaction with nature. Several studies have shown that patients heal faster in hospitals with plants in their rooms or nature views, even digital representations of nature (Rainey 5). Related architecture is often referred to as 'healing architecture.'

The Materials imperative sets a "baseline for transparency, sustainable extraction, support of local industry, and waste diversion for all projects" (ILFI 320). The imperative 14 ("Responsible Sourcing"), included the application of third-party verified standards and fair labor practices for the extraction of rock, metal and minerals. This entails ecological requirements such as 50 % of wood products being FSC-certified, salvaged or harvested on-site for clearing it. Further, every 100qm² of the floor area must contain at least one Declare labeled product. The Declare label provide insights into building materials ingredients lists especially with regard to toxins and information on material sourcing location. In addition, the materials petal ("Living Economy Sourcing") promotes local communities, businesses and the reduction of transportation impacts. 20 % of materials must be sourced locally (within 500 kilometers from the project site) in support of the local economy. The equity petal imperative ("Universal Access") commands that externally focused plazas, seating, or park space be accessible for the public, including the homeless. Exceptions for daycares, preschools, and commercial projects exist, even though commercial projects must guarantee some learning experience about the building. Further the project may not block sunlight, natural waterways or access to quality of fresh air for adjacent projects. Accordingly, the 7 Principles of Universal Design should be respected. These principles include equitable use, flexibility in use, simple and intuitive use, perceptible information, tolerance for error, low physical effort and size and space for approach and use (ILFI 432). Core Imperative 18 ("Inclusion") fosters the creation of "stable, safe, and high-paying job opportunities for people in the local community" (ILFI 443). Following this mandate, all projects must demonstrate that at least two project team

organizations that are involved in the design and construction process have a JUST Label[56] credential. Further, five organizations involved must perform a JUST Self-Assessment. In addition, 20 % of design contracts and 10 % of maintenance contracts must partner with Just organizations that meet the Diversity category or donate 0.1 % of the total project cost must be donated to a regional nonprofit focusing on equity and inclusion.

LBC AND RESILIENT SCRIPTS

The Place Petal core imperative ("Ecology of Place") commands that buildings are not built on pristine greenfields, wilderness, prime farmland or floodplains. The site and community conditions prior to building must be documented. In a first step, the reference habitat must be identified. The reference habitat refers to the state of the site prior to fundamental alteration by humans. In a second step, the baseline ecological condition is assessed, referencing the current ecological health of the site. Step three requires the generation of an adaptive plan with the aim of improving the site's ecological health. A vision for the highest possible ecological potential of the site must also be provided. And in a fourth step, 12-month progress must be reported for the final audit on these criteria: species composition, community structure, ecosystem function, external exchanges, absence of threats, and physical conditions. The Imperative ("Urban Agriculture") mandates that fresh food be grown on-site promoting human health and biodiversity. A resilience strategy is included, which requires there to be enough "access to food for 75 % of full-time equivalent for a minimum of three days during an emergency" (ILFI 81). The following quote demonstrates the novelty of supermarkets and previous distribution and decentrality of food sources:

> The first supermarket supposedly appeared on the American landscape in 1946. That is not very long ago. Until then, where was all the food? Dear folks, the food was in homes, gardens, local fields, and forests. It was near kitchens, near tables, near bedsides. It was in the pantry, the cellar, the backyard. (Joel Salatin, *Folks, This Ain't Normal: A Farmer's Advice for Happier Hens, Healthier People, and a Better World* qtd in ILFI 82)

Certainly, the current food system is highly designed for efficiency, but creates firm environmental problems through monocultures, pesticides, livestock, among others. Additionally, the U.S. suffers from 'food deserts,' where there is no fresh, healthy or nutritious

[56] JUST is a tool that provides information on an organization's commitment to social equity, employee health and well-being as well as the positive impact on communities in which the work is operated.

food available. In the 2000s, there were more than 6500 identified food deserts in the U.S. (Dutko et al. 1). FARA (Food Access Research Atlas), a tool provided by the USDA Economic Research Service visualizes that that the problem is on-going with data from 2019. Especially low-income areas are at risk of being food deserts, with the only availabilities for food being from gas stations or sometimes fast food. The imperative defines agriculture broadly as "crops, apiaries, orchards, livestock, and other cultivation strategies that contribute to human health and/or food consumption" (ILFI 82). Place Petal imperative ("Habitat Exchange") preserves land for biodiversity and non-human use. It is required for projects to set aside land equal to the project boundary, with the minimum being 1 acre in a different location through a land trust organization. For affordable housing projects, the Habitat Exchange site requirement is reduced to 0.5 acres. The Water Petal intends to "realign how people value water, address the energy and chemicals involved in transporting, purifying and pumping water, and to redefine 'wastewater' as a precious nutrient and resource" (ILFI 145). The core imperative ("Responsible Water Use") addresses the scarcity of water as a resource and its inherent value. This is measured by demanding the reduction of water usage from interior fixtures in comparison to the EPAct 2005 baseline best-in-class equipment. LBC further requires all stormwater to be treated on-site without chemicals and prohibits the use of potable water for irrigation.

LBC AND CIRCULAR SCRIPTS

Water Petal imperative ("Net Positive Water") requires the provision of "one hundred percent of the project's water needs through captured precipitation or other natural closed-loop water systems, and/or through recycling used project water, and all water must be purified as needed without the use of chemicals. No potable water may be used for non-potable uses" (ILFI 174). All grey and black water must be treated on-site. The ILFI handbook especially emphasizes the importance of closed-loop systems and the project is required to emulate the "natural hydrologic state of the site prior to human development" (ILFI 175). Groundwater may not be depleted, but must be restored annually to levels prior to development. Within the energy imperative ("Net Positive Carbon"), all projects are required to provide 105% of the project's energy needs through renewable energy every year. The use of fossil-fuels is prohibited. The Materials imperative ("Responsible Materials") requires the project to divert 80% of the construction waste material from the landfill and provide dedicated infrastructure for the collection of recyclables. In the Materials imperative ("Red List"), pushes for the elimination of certain

toxins that are listed on the “red list” of chemical classes in order to promote a “transparent materials economy free of toxins and harmful chemicals” (ILFI 349). To achieve circularity, the imperative 16 (“Net Positive Waste”) encourages waste reduction as well as imaginative reuses of ‘waste’ materials. During construction, 99 % of all metals must be diverted, soil + biomass 100 % diversion rate, and paper + cardboard 99 % diversion expectancy (ILFI 414). Core imperative 19 in the beauty petal (“Beauty + Biophilia”) encourages the connection between buildings and nature contributing to ecosystems and circular thinking. Therefore, a plan for a biophilic framework must be established that includes how the project will involve nature through light, space, and natural shapes and forms. The inclusion of natural shapes is fostered through the placement of public art that celebrates culture, spirit, and place. A biophilic design guidebook is provided for more information on the guiding principles of biophilic design that enmesh evolved human-nature relationships with natural shapes, forms, and place-based relationships (ILFI 466). The last core imperative 20 (“Education + Inspiration”) has the intent to “catalyze broader change” (ILFI 478). To this end, each project must provide an LBC Case Study, an annual open day for the public or regular public tours, and a copy of the operations and maintenance manual. The manual enables to sustainably uphold the performance criteria even with new owners and users.

LBC AND DEGROWTH SCRIPTS

The Place Petal (“Human-Scaled Living”) focuses on walkable, pedestrian-oriented communities with a goal of reducing fossil-fuel driven vehicles. The imperative therefore promotes, electric vehicle charging stations and spaces for communities to connect. The Energy Petal (“Energy + Carbon Reduction”) promotes the reduction of energy-related carbon emissions. Therefore, embodied carbon as well as operational carbon must be reduced to significant degrees. LCA is used to calculate upfront carbon.

LBC AND SMART SCRIPTS

Water metering is required in the imperative (“Responsible Water Use”). These meters are not mandated to be digital, but they often include digital features of data collection. Generally, LBC does not focus on digital features in their philosophy but cultivate low-tech approaches to building such as passive heating and cooling mechanisms that do not rely on sensors.

CRITICISM OF LBC

The Living Building Challenge is mostly criticized for being too rigorous, too demanding, and too far removed from market standards in the sense of a ‘utopian’ standard. And in practice, the implementation rate of the standard is far lower than LEED or DGNB. Critics argue that the LBC’s stringent criteria can be overreaching, making it challenging for many projects to achieve certification. The program mandates net-positive energy and water usage, which can be difficult to attain, especially in urban settings with existing infrastructure constraints. This level of rigor may deter potential participants who find the standard unattainable. The LBC is not a points-based system but rather a collection of very specific, challenging requirements. This complexity can make the certification process daunting for project teams, requiring extensive planning, resources, and commitment to meet all the criteria.

These criticisms always arise with more innovative or revolutionary approaches. The question is if the standard will have an impact not through the sheer number of realized projects but through their impact strength. In the sense of setting an example that sets new standards and redefines what is possible in the long-term. Researching the impact of LBC would present an interesting point of further research.

3.2 SUMMARY OF FINDINGS

LEED (Leadership in Energy and Environmental Design), DGNB (Deutsche Gesellschaft für Nachhaltiges Bauen), and LBC (Living Building Challenge) are three widely recognized green building certification systems, each with distinct focal points and evaluation criteria. While they all promote green building, their approaches vary in terms of scope, methodology, and ambition.

LEED, developed by the U.S. Green Building Council (USGBC), is one of the most globally recognized sustainability certifications. It focuses primarily on energy efficiency, water conservation, materials, and indoor environmental quality. The system follows a point-based structure, where buildings earn credits across different categories to achieve one of four certification levels: Certified, Silver, Gold, or Platinum. LEED is designed to be flexible and applicable to various building types and locations, making it a widely adopted standard for improving a building's environmental performance.

DGNB, created by the German Sustainable Building Council, takes a three-pillar and life-cycle-oriented approach. Unlike LEED, which emphasizes operational efficiency, DGNB evaluates sustainability through environmental, economic, sociocultural, and technical criteria. A strong focus is placed on life-cycle assessment (LCA), ensuring that a building has a comparably small carbon and environmental footprint (water usage, resource depletion, energy consumption, waste generation) over its entire lifespan, from construction to de- or reconstruction. The certification system is percentage-based, awarding Bronze, Silver, Gold, or Platinum based on overall sustainability performance.

LBC (Living Building Challenge), developed by the International Living Future Institute (ILFI), is the most ambitious and rigorous of the three. It goes beyond conventional green building standards by requiring projects to achieve a net-positive impact on the environment. Instead of a point-based system, LBC follows seven performance categories called 'Petals:' Place, Water, Energy, Health & Happiness, Materials, Equity, and Beauty. To achieve certification, buildings must produce more energy than they consume, collect and treat all water on-site, and use non-toxic, sustainable materials. LBC is performance-based, meaning that certification is granted only after a building demonstrates real-world compliance for at least 12 months. Due to its high demands, LBC is best suited for projects aiming for regenerative design – buildings that actively improve their surroundings rather than just minimizing harm.

The standards follow different scripts. The standard DGNB strongly follows the three-pillar model, also strongly including circular and resilience-oriented scripts. One difference the German Sustainable Building Council emphasizes is the difference between 'green' and 'sustainable building,' the latter embraced by the DGNB due to the argument that 'green' building such as in LEED focuses to narrowly on the environmental aspects of building's performance (DGNB, *DGNB & Co.* 2). And this is true to a certain extent, as LEED focuses more operational energy efficiency. The DGNB system further reflects that all categories must be highly met in order to achieve a Platinum certification, whereas in LEED points can be allocated freely across the 100 points (if minimal requirements are met throughout the categories).

LCA and LCC also work differently in DGNB and LEED. Whereas in LEED, the assemblage of EPDs is rewarded, DGNB focuses on how and where these materials are used in the building. The LCA also allocates more points in DGNB than in LEED, which gives it more emphasis (DGNB, *DGNB & Co.* 3). DGNB further adapts the system to the international contexts and climates rather than providing a 'one system fits all' approach. LEED also encompasses a larger set of possible criteria (110 options) in contrast to 29 criteria in DGNB. The more options, the more difficult the documentation becomes. DGNB also transparently lists which criterion supports which Sustainable Development Goal (SDG). LEED nevertheless has made a significant jump from version 4 to 5 in its focal areas. Before the standard centered energy efficiency and ecological sustainability as well as resilience criteria. In version 5, equity and social sustainability are included more strongly into the system. LBC considers a broad variety of green measures and what situates the standard apart is that it not only measures actual performance of net positive energy and water over the course of an entire year but also an O+M (operation + maintenance) manual is mandatory that instructs new users on how to maintain the buildings systems and technical features.

In contrast to LBC, LEED is more easily adaptable to current market standards. The difference between LEED and LBC can be reframed through the idea of "evolution" versus "revolution." The Conference of IAIA[57] in Brisbane, Australia, in 2019 discussed if "impact assessment (IA) evolution or revolution" would be necessary in the wake of climate change (Fischer 369). Banhalmi-Zakar et al. discuss this notion of "incremental change (evolution)" or "complete

[57] IAIA = International Association for Impact Assessment is a leading global network dedicated to advancing best practices in environmental, social, and economic impact assessment.

overhaul (revolution)" for IA further declaring that these seemingly opposing views lead to different paths forward (Banhalmi-Zakar et al. 506). In the wake of this heated debate, Banhalmi-Zakar et al. introduce the idea of "revolutionary evolution" to synthesize these two paths (Banhalmi-Zakar et al. 512). They do not explain this term further in their paper, but I assume it goes beyond evolution through upholding some traditions, whilst, being revolutionary enough to create fundamental and meaningful change. Whilst LEED is more of an evolution of making market-oriented state-of-the-art solutions more resilient, ecologically sustainable and partly socially equitable, LBC rethinks the entire process of building through an entire philosophy that innovates what building can be in a revolutionary and restorative way.

In summary, LEED focuses on practical and flexible environmental improvements, DGNB takes a comprehensive life-cycle perspective, and LBC sets the highest standard by requiring buildings to be self-sufficient and regenerative. The choice between these systems depends on the project's goals, location, and level of ambition in green design.

The case studies will demonstrate how these focal points are applied in practice. However, it is important to note that the final, detailed certification scorecards for the evaluated buildings are not publicly available and were not provided for this research. As a result, the analysis is based on the information shared by the builders and building owners, limiting the level of detail that can be assessed. Greater transparency could be achieved by publishing the complete scorecards, as currently, only the category scores are available. Due to this lack of transparency, precise ratings cannot be fully evaluated. Nevertheless, understanding the category scores, along with the contextual information provided in this chapter, offers valuable insights into the evaluation process.

4 IN PRACTICE: CASE STUDIES IN THE RUHR REGION AND ATLANTA METROPOLITAN REGION

RUHR AREA, GERMANY

CASE STUDY 1 Kreislaufhaus, Essen

CASE STUDY 2 Tiny Houses, Dortmund-Sölde

CASE STUDY 3 Essen 51, Essen

ATLANTA, GEORGIA, USA

CASE STUDY 4 Mercedes Benz Stadium

CASE STUDY 5 Kendeda Living Building

CASE STUDY 6 Roosevelt Hall

4.1 CASE STUDIES

"The best way to predict the future is to DESIGN it." – Buckminster Fuller

Buckminster Fuller was an American architect, philosopher, and futurist. Engineer Ananthasuresh writes about Fuller expressing that "he [Fuller] thought beyond the design of artefacts." Ananthasuresh continues, "Fuller strived for sustainable living in the global world long before these concepts became important for the world to deal with" (Ananthasuresh 98). Fuller's designs have been inspirational in form, function, and popularized the geodesic dome as well as the term and concept of 'ephemeralization' which describes the idea of 'doing more with less' – a philosophy quite aware of the finiteness and preciousness of resources.

Green buildings include diverse practices and they have been built in manifold cultural, local, economic, and ecological contexts. Innumerable building traditions have influenced construction and building culture from North American indigenous traditions to European post-modern architecture. In the sector of building more sustainably in Germany and the U.S., some green scripts are more present than others – whilst the same holds true for material selections. Building traditions are continuously changing and new ones emerging such as the North American version of the tiny house that emerged in the early 2000s and is experiencing on-going cultural popularity in TV Shows, on Instagram channels, and blogs. What is noticeable in larger metropolitan areas around the world, is that a certain 'global architecture' is unfolding and influencing aesthetics on a large scale (Faulconbridge 2537). This trend is also present in some of the case studies involving large glass facades and concrete elements

Construction and architecture are embedded in local and global cultural contexts and these contexts are part of the analysis in the case studies presented throughout the following chapters. Atlanta has a rich history as one of the origins of the Civil Rights Movement, birthplace of Martin Luther King, Jr., and economic hub of the South-East. The German Ruhr region on the other hand, is a region that is shedding an industrial past and finding pathways to interact with a globalized and decarbonized future.

On another note, over the last years, we are seeing many green building innovations in the global South, for example in Pakistan, which is one of the countries currently hit hardest by climate change through floods, earthquakes, and storms. Renowned and first female Pakistani architect Yasmeen Lari, who studied in Oxford, was recently honored with a Royal Medal by King Charles III. for her efforts in building with bamboo and clay for those suffering from climate impacts (Petter). In an interview for the German magazine SPIEGEL with journalist

Jan Petter, Lari exclaims "there is concrete everywhere"[58] in London, continuing to say "I have the feeling that it's something psychological. As an architect, you always want to be the greatest. That's what you learn"[59] (Petter).

In her 60s, shocked by earthquakes in Kashmir in 2005, she decided to travel to Pakistan and offer her help. During her studies in Oxford, she had mainly learned about famous architects like Le Corbusier. In contrast, while traveling through Pakistan, she learned a lot about local materials and building traditions with bamboo. Lari now supports locals, and especially women, in construction processes and calls this approach 'Barefoot Social Architecture,' where she combines traditional elements with modern methods (Petter). In the historic town of Makli, Lari even erected a Zero Carbon Cultural Centre mainly constructed with Bamboo.

Laris's goal is to build with three zeroes: zero cost,[60] zero carbon, zero waste (Petter). In the regions, where she builds, bamboo fields are entertained as useful resources for construction. As a star-architect, Lari used to build on a large footprint with glass and concrete. She critically expresses that her ego played a large role in erecting these (in her opinion back then) immaculate and impressive buildings (Petter).

One of the case studies certainly falls into this category of iconic architecture – the Mercedes Benz Stadium in Atlanta Georgia. Can such iconic buildings be created in a sustainable way? Or at least a more sustainable way? As the case study will show, the LEED-Platinum and TRUE certified building certainly attempts this for a large sports and event location. Other case studies such as the tiny house settlement in Dortmund-Sölde (Ruhr area) seek to achieve the exact opposite – building tiny and setting an example against the consumption of space and resources. The Kendeda building rethinks and renegotiates concepts like resilience or circularity and sets a powerful example through following one of the most ambitious green building standards: living building challenge (LBC). The circular house (*Kreislaufhaus*, Ruhr area) is one of the first German buildings to use a materials passport that meticulously records the number and type of materials used in order to reuse them in the extension phase. Essen 51 (Ruhr area) is planned as a diverse neighborhood with plus-energy houses. Will it be able to live up to this

[58] Orig.: "Ihr habt alles zubetoniert."

[59] Orig.: "Ich habe das Gefühl, es ist etwas Psychologisches. Man will als Architekt immer der Größte sein. So lernt man das."

[60] Lari teaches her building philosophy to local craftsmen and artisans, which can then spread their knowledge in the communities.

diverse idea? And last but not least, Roosevelt Hall, is a LEED-certified renovation project of a space of cultural heritage and significance.

Nonetheless, some of these buildings represent very commercialized spaces of green building such as the Mercedes Benz Stadium (MBS). My interest lies in focalizing and discussing power dynamics that materialize in this kind of iconic, powerful architecture. The MBS for example has been met with lots of resistance from Atlanta Westside residents criticizing the historic neglect and oppression of these neighborhoods. On the other hand, the Kendeda building (Atlanta) is celebrated for its innovative approaches toward green building, but it equally remains a privileged university space.

Further, many of the buildings under study in the U.S. and Germany still heavily rely on the carbon-intensive resource of concrete. New approaches to building with less carbon-intensive materials are being found, but will need to be disseminated especially in Western building cultures where ‘concrete aesthetics’ continue to dominate.

4.1.1 KREISLAUFHAUS, ZECHE ZOLLVEREIN – CIRCULARITY AND CULTURAL HERITAGE

Das Kreislaufhaus (engl.: circular house) in Essen is the administrative building and headquarter of RAG AG and the RAG Foundation. The building is located on the UNESCO world heritage site *Zeche Zollverein* (engl.: "Zollverein Industrial and Cultural Landscape") which has become "one of the most attractive cultural locations in the Ruhr area"[61] after the transition and structural transformation to an era of post-mining ("Ein Kreislaufhaus"). The former coal mine has been transformed into a museum, event and cultural space, and also accommodates the *Kreislaufhaus*.

Before getting into the details of the circular house, some context regarding the site and RAG AG and Foundation are necessary for this case study. The Ruhr area was the "industrial heart" of Germany from the 1800s to 1980s (Kretschmann 152) and *Zeche Zollverein* constituted the largest coal mine in the area employing around 6900 workers at its peak in 1937. Economist Kretschmann describes that the postwar German *Wirtschaftswunder* (engl.: "German economic miracle")[62] relied heavily on the rapid expansion of hard coal production (Kretschmann 152). Nevertheless, German coal mining soon ceased to be profitable on its own and was subsidized by the German government from the 1960s onward (Kretschmann 152). In an effort of consolidation in 1968, several coal mines and enterprises were subsumed under the *Ruhrkohle AG*, which later was restructured into RAG in 1997 (Kretschmann 153).

In 2007, the phase of post-mining in Germany was initiated by the German government, as the hard coal subsidies were no longer tolerated by the European Union (Kretschmann 153). Renaturalization costs were often not factored into economic plans by the respective coal mining companies, but German laws require mining companies to install measures to deal with the *Altlasten* (engl.: legacy costs) and *Ewigkeitsaufgaben* (engl.: eternity costs) (Kretschmann 152). This includes pumping up the mine drainage water and organizing its treatment in order for it not to contaminate the ground water. Kretschmann writes that

> the three-dimensional approach to sustainability – interpreted in the context of post-mining – includes minimizing mining damage and interventions in nature (ecological sustainability), efficiently managing the post-mining burdens and structural change in

[61] Orig.: "einem der attraktivsten Kulturorte des Ruhrgebiets."

[62] The *Wirtschaftswunder* refers to the rapid economic recovery and sustained growth of West Germany after World War II, particularly during the 1950s and early 1960s. The period was marked by high industrial output, rising living standards, and low-unemployment, establishing West Germany as a leading economic power in Europe.

> the mining regions (economic sustainability), and improving the living conditions of the population in the coalfields (social sustainability). (Kretschmann 154)[63]

In this regard, the RAG Foundation was bestowed with the monitoring, financing, and organization of the eternity costs. In 2007, the "white industries"[64] belonging to RAG were split off into Evonik Industries which today is the second largest chemical enterprise in Germany and the RAG Foundation was founded. Nowadays, the RAG Foundation is also invested in culturally and economically shaping the region. The foundation explains on their website:

> Our roots lie in the coal industry. With this in mind, we bear responsibility for financing the eternity costs left behind by the German coal industry and generate the funds required for this purpose. We also support projects in the fields of education, science and culture. In this way, we support the transformation of the former mining regions. ("RAG Stiftung")[65]

In this context, the foundation published a *Zukunftsstudie* (engl.: study of the future) analyzing stakeholders and possible profitable future developments for the Ruhr region. The study portrays the post-mining transformation as a socially successful endeavor, stating:

> The promise that 'No one will be left behind' has been kept and fulfilled hundreds of thousands of times. We have shown that it is possible to steadily reduce the number of employees in the coal industry without causing severe social disruptions. That is a great success. (RAG Stiftung 7)[66]

Without diminishing the successes, and acknowledging that the Ruhr region has become a more economically diversified region, critical voices emphasize that the post-mining transformation has indeed left many people behind especially from less affluent economic classes. From the 1990s onwards until today, some of the poorest German cities are located in the Ruhr region (Leue). Social scientist Franz Lehner relying on Bogumil et al.'s (2012) thesis "viel erreicht –

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[63] Orig.: "Der dreidimensionale Ansatz der Nachhaltigkeit – interpretiert im Kontext des Nachbergbaus – beinhaltet eine Minimierung der Bergbauschäden sowie der Eingriffe in die Natur (ökologische Nachhaltigkeit), das effiziente Management der Bewältigung der Bergbaufolgelasten und des Strukturwandels in den Bergbauregionen (ökonomische Nachhaltigkeit) sowie die Verbesserung der Lebenssituation der Bevölkerung in den Revieren (soziale Nachhaltigkeit)."

[64] White industries refer to sectors of economic activity that are not reliant on coal mining or heavy industry. They include sectors such as electronics, pharmaceuticals, finance, or information technology.

[65] Orig.: "Unsere Wurzeln liegen im Steinkohlenbergbau. In diesem Bewusstsein tragen wir Verantwortung für die Finanzierung der Ewigkeitsaufgaben, die der deutsche Steinkohlenbergbau hinterlassen hat und erwirtschaften die dazu notwendigen Mittel. Darüber hinaus fördern wir Projekte aus den Bereichen Bildung, Wissenschaft und Kultur. So unterstützen wir die Transformation der ehemaligen Bergbauregionen."

[66] Orig.: "Das Versprechen 'Niemand fällt ins Bergfreie' wurde hunderttausendfach eingelöst. Wir haben gezeigt, dass es möglich ist, die Zahl der Mitarbeiter des Steinkohlenbergbaus stetig abzubauen, ohne soziale Dammbrüche herbeizuführen. Das ist ein großer Erfolg."

wenig gewonnen" (engl.: "major achievements – few gains") argues with regard to the Ruhr region's *Strukturwandel*[67] (engl.: "structural transformation"):

> 'Major achievements' refers to the fact that there have been and still are many interesting and successful activities in the Ruhr region to cope with structural change – from major decade projects to many new start-ups and business models of established companies to many projects in business and civil society. In the process, the Ruhr region has demonstrated a high level of competence in change. However, all of this has not been enough to make the breakthrough into an internationally competitive region that can offer its population a level of prosperity and quality of life that other large cities and agglomerations can provide. This, in turn, is what the 'few gains' refers to. (Lehner 591)[68]

In *Zukunft Denken und Verantworten*, Jörg Bogumil writes that he would reformulate his thesis today in a more hopeful way (Bogumil 547). In contrast to former long-term unemployment, and cities in decline, he positively frames measures of ecological projects like the international building exhibition IBA Emscher[69] and a growing cultural scene or projects like innovation city Bottrop[70] (Bogumil 547). Bogumil believes a "change story" to be helpful in managing and supporting the Ruhr areas further development (Bogumil 549), also stating that the renaturalization of the Emscher represents a "paradigmatic demonstration of an ecological conversion of a traditional industrial landscape" (Bogumil 550). Bogumil envisions the Ruhr area as a "competitive and ecological knowledge region"[71] (Bogumil 550). Lehner further

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[67] *Strukturwandel* in the Ruhr are refers to the profound economic and social transformation of Germany's Ruhr region, historically dominated by coal mining and heavy industry. Beginning in the mid-20th century, deindustrialization led to economic decline, necessitating structural changes through diversification into technology, logistics, and service sectors. Key policy initiatives, such as the Emscher Park International Building Exhibition (IBA Emscher Park, 1989–1999) and investments in research institutions, have played a central role in the region's transition toward a knowledge-based economy (Bogumil and Hein 39–41).

[68] Orig.: "'Viel erreicht' bezieht sich dabei auf die Tatsache, dass es im Ruhrgebiet ganz viele interessante und erfolgreiche Aktivitäten zur Bewältigung des Strukturwandels gab und gibt – von großen Dekadenprojekten über viele neue Unternehmensgründungen und Geschäftsmodelle etablierte Unternehmen bis hin zu vielen Projekten in Wirtschaft und Zivilgesellschaft. Dabei hat das Ruhrgebiet eine hohe Wandlungskompetenz bewiesen. Das alles hat jedoch nicht gereicht, um den Durchbruch zu einer international wettbewerbsstarken Region zu schaffen, die ihrer Bevölkerung einen Wohlstand und eine Lebensqualität bieten kann, wie es andere große Städte und Agglomerationen bieten können. Darauf bezieht sich wiederum das 'wenig gewonnen.'"

[69] The IBA Emscher was a large-scale regional development initiative in the Ruhr area aimed at transforming the former coal and steel industrial landscape into a greener and modern economic and cultural region. Key outcomes included the revitalization of the Emscher river, repurposing industrial sites into cultural landmarks, and the promotion of green infrastructure (Roters 188).

[70] InnovationCity Bottrop is a flagship urban transformation project in Germany, launched in 2010 as part of a broader effort to promote climate-friendly urban redevelopment in former industrial regions. The initiative reached the goal of reducing CO_2 emissions by 50 % within a decade through energy-efficient building renovations, renewable energy integration, and sustainable mobility solutions. Bottrop was selected as the model city due to its strong commitment to structural change following the decline of coal mining in the Ruhr area (Innovation City Management GmbH).

[71] Orig.: "wettbewerbsfähigen und ökologischen Wissensregion."

argues with regard to the Ruhr region's future that "the metropolis of the 21st century must be one thing above all else: just as ecologically sustainable as it is economically and socially sustainable"[72] (Lehner 593).

Historians Eiringhaus and Kellershohn view these efforts as attempts to "homogenize" and "romanticize" the Ruhr area's working-class history (Eiringhaus and Kellershohn). They give the example of the fashion label 'Grubenhelden' that sells fashion memorabilia inspired by the materials of coal miner's working gear. Eiringhaus and Kellershohn write:

> The Bottrop-based fashion label 'Grubenhelden' sells clothing named after mining terms, which certainly produce certain stylistic blossoms, such as the tank top 'Germania' for sixty euros. According to the advertising, pieces of fabric from former miners' clothing are woven into it, and the symbolism of solidarity and hard work is used in the advertising. Mining becomes a label, reduced to a charming backdrop in which those who can afford and want a t-shirt for fifty euros fit in. For this price, one can place oneself in the tradition of the workers - completely without danger - silicosis and industrial accidents are of course not included. The homogeneous historical image of the culture of remembrance capitalizes on the subtle differences.[73] (Eiringhaus and Kellershohn)

These subtle differences can be quite consequential when related to ethnic, class, or gender-based privileges. Einrighaus and Kellershohn also critically reflect branding attempts by regional associations, claiming that the Ruhr area will be the new Silicon Valley etc. ("Silicon Valley meets Ruhrgebiet: echte Macher*innen am Werk | Metropole Ruhr"). Eiringhaus and Kellershohn argue that

> [d]istinctions that are unquestioningly accepted are also becoming established where the relationship between knowledge and the working world of the future are concerned. The Ruhr region as the new Silicon Valley, North Rhine-Westphalia as the capital of the global creative industry? Here, too, memory serves to segregate through distinctions: The dirtier, the more physical, the more strenuous the heavy industrial work of the past appears, the brighter the future of creative workspaces of fully glazed offices shines – naturally, in former industrial facilities. And the evocation of solidarity and comradeship in mining work is wonderfully suited as an ornament that distracts from the precarious conditions of the cultural and creative industries. (Eiringhaus and Kellershohn)[74]

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[72] Orig.: "Die Metropole des 21. Jahrhunderts muss dagegen vor allem eines sein: ökologisch ebenso nachhaltig wie wirtschaftlich und sozial."

[73] Orig.: "Das Bottroper Modelabel 'Grubenhelden' verkauft Kleidungsstücke unter bergbaueigenen Namen, die durchaus gewisse Stilblüten produzieren, so das Tanktop 'Germania' für sechzig Euro. Eingewoben sind – so die Werbung – Stoffteile ehemaliger Bergmannskleidung, geworben wird mit der Symbolik von Solidarität und Schwerstarbeit. Der Bergbau wird zum Label, reduziert auf eine charmante Kulisse, in die sich diejenigen einfügen, die sich ein T-Shirt für fünfzig Euro leisten können und wollen. Für diesen Preis kann man sich in die Tradition der Arbeiter stellen – völlig gefahrlos, Silikose und Arbeitsunfälle sind im Lieferumfang natürlich nicht enthalten. Das homogene Geschichtsbild der Erinnerungskultur kapitalisiert die feinen Unterschiede."

[74] Orig.: "Fraglos hingenommene Distinktionen etablieren sich auch dort, wo es um das Verhältnis von Wissen und Arbeit und die Arbeitswelt der Zukunft geht. Das Ruhrgebiet als neues Silicon Valley, Nordrhein-Westfalen

Put in a rather simplistic way, from an architectural point of view, Eiringhaus's and Kellershohn's perspective highlights that not all problems are solved by shiny fully glazed facades – but the context and insides of these buildings remain extremely relevant to their evaluation from a cultural perspective. As will be shown in the following paragraphs, the *Kreislaufhaus* is a very iconic, resilient, and circular building – but does it achieve to be part of a larger transformation, especially from a social sustainability standpoint?

From the perspective of green scripts, the circular house is a prime example of the use of circular scripts with cradle-to-cradle certified materials and surface recycling. It was also part of the EU-funded research project "Buildings as Material Banks," a pilot project documenting the materials used in materials passports. DGNB auditor Ursula Feld claims that "the building therefore retains a certain quality of resources and functions as a material bank even after its use phase"[75] (kadawittfeldarchitektur). Materials passports for buildings are also widely being discussed in Germany (van Uffelen, "Gebäuderessourcenpass: 'Ziel ist 100 % Zirkularität'"). The "Recyclinghaus" (engl. recycling house) in Hannover was constructed based on a call for tender by Grundlach GmbH & co. KG with the goal of building a 100 % recyclable house built with materials that were locally sourced. Urban Mining pioneer Nils Nolting was hired as the architect for the project. In the end, the house was constructed with many different and mixed materials such as sauna benches from an old fitness club, old jute bags, and old concrete slabs. The recycling house constitutes the first experimental residential building constructed in this manner from entirely recycled materials (Gyger and van Uffelen 71).

In contrast to current discourses in Germany in favor of the retention of the building stock, chemist Braungart, co-developer of the cradle-to-cradle principle, argues in favor of the "obligation to demolition" in order to preserve inhabitant's health (Pfitzenmeier, "3 Fragen an Michael Braungart" 18). Braungart laments the use of toxins in buildings constructed in the 1960s and 1970s that continue to have severely negative health effects especially with regard to air quality. Further, Braungart argues that current buildings do not reflect society's changed need for smaller single households or communal living. In 2050, Braungart is convinced, the

als Hauptstadt der globalen Kreativindustrie? Auch hier dient die Erinnerung der Absonderung durch Unterscheidungen: Je schmutziger, je körperlicher, je anstrengender die schwerindustrielle Arbeit der Vergangenheit erscheint, desto heller glänzt die Zukunft der kreativen Arbeitsräume vollverglaster Büros – selbstredend in ehemaligen Industrieanlagen. Und die Beschwörung von Solidarität und Kameradschaft in der Bergarbeit eignet sich wunderbar als Ornament, das von den prekären Verhältnissen der Kultur- und Kreativwirtschaft ablenkt."

[75] Orig.: "[…] sodass das Gebäude nach seiner Lebensdauer seine Rohstoffqualitäten bewahrt und als Ressourcendepot dient."

world's economies will work according to cradle-to-cradle principles providing services and lending goods produced with monomaterials that are reusable (Pfitzenmeier, "3 Fragen an Michael Braungart" 19).

Das Kreislaufhaus has received several recognitions and nominations for instance for the polis award in 2019:

> Under the maxim '...every square meter of world heritage is valuable space,' the accessible green roofscape compensates for the ground area sealed by the construction measures and offers an identity-building space adding value at the interface of industrial culture and natural landscape. The new building is based on innovative sustainability standards according to the 'Cradle to Cradle' school of thought and also received a DGNB certification with the highest rating level in platinum. ("Ein Kreislaufhaus")[76]

It is one of the first buildings in the region using 'Cradle to Cradle' (C2C) materials in a large scope and therefore strongly applies circular scripts. It is a newly constructed office building for the purpose of creating a representational workspace for the RAG Foundation and RAG AG. As the discourse of remodeling and reusing pre-existing buildings is gaining strength in Germany, the new construction can of course also be seen in a critical light. Daniel Fuhrhop is a prominent German advocate of this movement with his seminal and provocative book *Verbietet das Bauen* (2015) (engl.: *Prohibit further Construction*). The embodied carbon in new materials often does not justify the construction of new buildings despite their high energy efficiency. For this reason, Urban Mining[77] projects are gaining more awareness in Europe and the U.S. On the one hand, building for future urban mining with deconstructable and single-variety materials is highly necessary, on the other hand, the priority should be to upcycle and reuse the resources that have already been put into use in construction projects. This is difficult, due to the proliferation of adhesives used in previous construction, composite thermal insulation systems, and the manual labor necessary to sort the materials.

Kreislaufhaus uses a C2C-certified circular facade, glass system partitions, and carpet tiles which means that they can easily be disassembled and reused in another building. The Material Passport provides information on the recyclability, raw material values, and building biology parameters of the materials in use. The material register records and documents the place and

[76] Orig: "Unter der Maxime '…jeder Quadratmeter Welterbe ist wertvolle Fläche,' kompensiert die begehbare begrünte Dachlandschaft die durch die Baumaßnahme versiegelte Grundfläche und bietet einen identitätsstiftenden Mehrwert-Raum an der Schnittstelle von Industriekultur und Naturlandschaft. Der Neubau orientiert sich an innovativen Nachhaltigkeitsstandards nach der 'Cradle-to-Cradle'-Denkschule und erhielt außerdem eine DGNB-Zertifizierung mit höchster Bewertungsstufe in Platin."

[77] Urban mining conceptualizes the city as a resource warehouse. When buildings or products are disassembled, urban mining advocates for the reuse and upcycling of materials diverting materials from the landfill.

time of installation as well as the quantity and quality. In the building, the materials used should not only be downcyclable, but also recyclable to a high degree (Umweltbundesamt). Kadawittfeld architect Jasna Moritz, who also advised the circular house, argues that "what is attractive about the C2C idea from a financial point of view is that buildings can be understood like raw material storage facilities, so that the investment is not 'lost' but merely 'parked', which also opens up completely different financing options and loans"[78] (Läge).

The project further demonstrates a high potential for adaptation and reuse further promoting circular scripts. The interior walls are easy to relocate, allowing the creation of cellular offices, as well as open space uses. Generous room heights and the developed connection nodes for the technical media also support the high flexibility of the floor plans (Umweltbundesamt). Architect Moritz further explains that

> The C2C-inspired projects are so exciting because they combine many things. Specifically, four C2C-goals were formulated for the RAG *Kreislaufhaus*: It should be positive for people and nature, provide a healthy, flexible working environment, act as an energy supplier, and a raw material depot. (Läge)[79]

Kreislaufhaus receives most of its energy from renewable resources such as photovoltaic elements near the ground floor and a PV-Pergola as well as eighteen geothermal probes (Umweltbundesamt 85). From the viewpoint of engineering resilience scripts, the energy-mix between PV, geothermal energy, and district heating guarantees relative energy-independence and the opportunity to rely on different sources of energy. The independence from gas and fossil fuels has proven to be necessary not only from the perspective of climate change but also for geostrategic considerations. The rainwater is also used on site and stored in cisterns. It is then used for watering green areas and flushing toilets (Umweltbundesamt 87).

Another feature strengthening the resilience of the building is the focus on green spaces. At first, the idea was to create a prefabricated traditional parking space in front of the building, but following the principle that "each square meter of world heritage is precious" the parking space was dug into the ground preserving the iconic views and creating a "polygonal path structure" that is accessible to the public (kadawittfeldarchitektur).

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[78] Orig.: "Attraktiv am C2C-Gedanken ist in finanzieller Hinsicht vor allem, dass Gebäude wie Rohstofflager verstanden werden können, so dass die Investition nicht 'verloren', sondern lediglich 'geparkt' werden, wodurch sich auch ganz andere Finanzierungsmöglichkeiten und Kredite ergeben."

[79] Orig.: "Die C2C-inspirierten Projekte sind so spannend, weil sie vieles verbinden. Konkret wurden für das RAG-Kreislaufhaus vier C2C-Ziele formuliert: Es sollte positiv für Mensch und Natur sein, eine gesunde, flexible Arbeitsumgebung bieten, als Energielieferant und als Rohstoffdepot wirken."

There will additionally be a heightened necessity for solutions dealing with storm water events through the provision of green spaces, because sewers in Germany and the U.S. currently cannot manage these water masses in the short amount of time. Urban greening, as practiced in Singapore, could be one possible solution to this problem. The architects of the 'Bosco Verticale' in Mailand are currently developing more intelligent watering systems that thrive with less water and human maintenance in hotter climates. Unsealed soil can absorb up to 85 % of rainwater. In the case of sealed surfaces, on the other hand, 90 % of the rainwater must be drained into the sewage system. Greened facades and roofs have several benefits. On the one hand, they enable the use of absorbed rainwater in the house for flushing toilets and use in wash machines, on the other hand, they can reduce temperature of the façade by 8-12 °C (van Uffelen, "Hydroskins" 79). Generally green roofs and green facades might play a much larger role in the future also in their ability to contribute to and protect biodiversity. The institute of building biology at the technical University of Munich is experimenting with bio mimicry-architecture due to the fact that many cities currently have few green spaces. Hybrid structures that mix organic materials like trees with other materials could effectively help buildings cool down. Certainly, the combination of green facades or tree structures with other materials will bring biodiversity into the cities. It will require a different approach to living with other organisms transforming the current viewpoint of living 'inside' with nature 'outside.' Biologists have already analyzed which sizes and shapes of green spaces in buildings benefit biodiversity most effectively (Banerd).

Another solution to storm water management and urban heat island effect, is being developed by architect Eisenbarth, who researches the potential of hydroskins[80] for rainwater harvesting at the University of Stuttgart. The hydroskins conceptualized by Eisenbarth consist of different layers of fabric that absorb water in order to cool the building and use the retained water for flushing toilets or irrigation. It will probably be possible to use hydroskins even on the older building stock as hydroskins have fewer static requirements due to minimal added weight on the facade (van Uffelen, "Hydroskins" 76). Rainwater harvesting is extremely relevant in dealing with storm water management, because it retains water in the building and prevents sewage overflow.

[80] In comparison to greening a façade, hydroskins only add between one to five kilos of extra weight to the façade. In contrast, plants and soil tend to add much more. Some plants can add up to 24 kg of weight to the façade per m²

The circular house received the highest certification of the German DGNB Certification System: The Platinum plaque. The building reached an overall performance rate of 82,6 % (DGNB, “Neubau Verwaltungsgebäude Zollverein”):

Ecological Quality	91,4 %
Economic Quality	86,2 %
Socio-Cultural Functional Quality	85,1 %
Technical Quality	67,0 %
Process Quality	85,0 %
Location	44,7 %

The location credits were not awarded with a high fulfillment rate, because DGNB values dense building and proximity to other building and use types such as supermarkets, leisure activities, living and mobility options. Zeche Zollverein is not situated in a dense and diverse-use location.

From the perspective of the social dimension in sustainability scripts, the interior of the building offers several communication spaces. The rooftop garden, is a high-quality space providing recreational spaces and walking paths (kadawittfeldarchitektur). The architecture demonstrates a sensitivity toward its embeddedness in the world heritage site “at the interface between industrial heritage and natural landscape” (kadawittfeldarchitektur). The biodiversity is supported by the walkable urban rooftop garden that is also used as an urban farming space. Native plant species were planted here providing food for insects such as bees and butterflies, and nesting boxes secure year-round protection for bats, which are found on the colliery site. The photovoltaic pergola further provides shaded spaces for recreational purposes (Umweltbundesamt 85). The walkability and interior air quality enhance the overall comfort for the building’s users. Generally, sustainable buildings focus on the construction of healthy indoor conditions to ensure that the people that work and live in them actually enjoy the space and feel comfortable. The idea is that the efforts in creating a comfortable and human-friendly space with a low use of toxins strengthens user satisfaction and appreciation of the building stock. In return, these high-quality spaces are valued more and maintenance is kept up. This then leads to a prolonged use phase of the building which is more ecologically sustainable and fair to new generations. The thermal comfort and the indoor air quality are also improved by the possibility of window ventilation and vertical gardens in the interior spaces. Regarding social sustainability, spatial planner Matthias Drilling argues that

> [s]ocial qualities can be described at three levels: (1) the level of the things that bind people together (the 'putty' of social cohesion, like joint participation, solidarity, civic engagement), (2) the level of equipping a city with infrastructure that fosters and stimulates these social interactions (e.g., meeting places for old and young people, people with disabilities, people needing care, etc.; neighborhood coordination and associations), and (3) the level of geographically fair distribution of opportunities and burdens (e.g., through distribution of public space, support of local small businesses). Social qualities become related to ecological urban development based on the thesis that achieving environmental objectives is possible not through technical innovations alone and that the social area in a city can be steered through social policy. (Drilling 117)

This gives social sustainability a completely different framing than what is understood under 'socio-cultural and functional qualities' in the DGNB system. The protection and advancement of human health within the DGNB system is mainly warranted through the criteria of thermal, acoustic, and visual comfort, as well as indoor air quality. These technical aspects are mostly beneficial to physical health, leaving mental health and community more or less on the sidelines.

In order to evaluate the social dimension of sustainable scripts in green building further, I will consider a study by Rainer Greiff from the *Institut Wohnen und Umwelt* (engl.: Institute for Housing and Environment) who wrote an assessment of the social indicators of sustainable building on behalf of the German Federal Office for Building and Regional Planning as well as the former Federal Ministry of Transport, Construction, and Housing to re-evaluate the criteria for the social dimension of green building used in green building rating systems. The Institut Wohnen und Umwelt (IWU) is a non-profit research institution of the shareholders of the State of Hesse and the City of Darmstadt. The three research fields: housing, energy, and integrated sustainable development characterize the interdisciplinary work of their application-oriented research.

According to Greiff's study, the fundamental prerequisite of social sustainability is the long-term viability and survival of societies. Its foundation rests upon the ability of physical reproduction of societal conditions that enable the functional capability and development of social systems and the fulfillment of basic needs (Greiff 18). In this regard, the material basis for the existence of societies as well as the sustainable usage of resources in the sense of the ecological dimension of sustainability is also to be secured for future generations. The Brundtland Report of 1987 explicitly highlighted the protection of future generations' rights to the usage of natural resources as one of the main criteria of sustainable development. This has consequences for the structure and behavior of societies: "A society is sustainable if it is structured and behaves to the extent that it remains viable over every generation. In other words,

it is as far-sighted, adaptable, and wise not to undermine its own material and social livelihoods" (Donella Meadows et al.).

Generally, it is a complicated matter how far reaching the influence of buildings on society is. Greiff stresses that social inclusion is a complex phenomenon not only influenced by buildings' architectures, but by many other social factors that promote or hinder the inclusion of marginalized groups (Greiff 34). The construction of a building only has limited opportunities to actually further inclusion and these are mostly the provision of space for community/sports/festive gatherings as well as the public use of cafeterias/libraries and open spaces surrounding the building.

This is equally true for the aspect of reconciling family and work life. Despite the growing cultural demand for this reconciliation, construction measures alone will not be able to tackle this societal demand. Nevertheless, they can contribute to its realization by providing children's corners in waiting areas, diaper-changing rooms, as well as workspaces where employees can bring children if their personal and professional lives collide time-wise. But of course, flexible working time arrangements or high-paying part-time or near full-time jobs are equally important political measures to further this cause. But the built environment is also symbolic and can denote: "children are welcome!"

In general, there is still space for improvement within the DGNB rating system with regard to the social aspects of sustainable building. It would for instance be possible to include the socio-cultural and functional qualities related to health into the technical quality in order to give other social aspects like inclusion or communication more relevance. Currently, socio-technical qualities such as indoor air quality, thermal, acoustic and visual comfort have a total weight of 14,6 % in the rating, whereas community-oriented social aspects like 'accessibility' are only given 3,1 %, or 'quality of indoor and outdoor spaces' are awarded 2 % (DGNB, *DGNB System* 28). 'Quality of indoor and outdoor spaces' represent the only category related to furthering communication between the users of the building. This category could be enhanced by including aspects from Greiff's analysis such as open office forms and social rooms. In Greiff's portfolio, the aspect of communication is listed with four subcategories, giving much more emphasis to this aspect (Greiff 42).

In accordance with Greiff, it would therefore be beneficial to the social qualities to include more community-oriented goals rather than only prioritizing the more technical qualities regarding physical health. Especially with regard to the fact that the aim of the system is to create a

"holistic" approach to sustainable building according to the mission statement on the DGNB's website (DGNB, "Das Zertifizierungssystem").

Correspondingly, a sustainable society is not static. Rather, it manages to master dynamic processes of change to secure its continued existence in the long run. Greiff, therefore, accentuates the following prerequisites to social sustainability to be able to gain an independent livelihood: to secure one's basic needs, to maintain and develop social resources, to have equal opportunities in the accessibility to resources, and to participate in societal decision-making processes and culture. Based on the material evaluated, the following social aspects relevant for sustainable building and housing were analyzed by Greiff: "acceptance, accessibility, building culture, reachability, inclusion, communication, participation, safety, reconciliation of family and work life, satisfaction with the physical conditions of the workplace" (Greiff 14). Altogether, 39 single objectives were assigned to these ten aspects of the social dimension of sustainable buildings and were compiled in a list. To rate the social aspects of sustainable building, a total of 100 points were allocated to the ten aspects mentioned above. In order to achieve a due weighting of the aspects, the relevance both for sustainable and social development as well as for the conditions for their implementation in building projects were taken into account by Greiff. On this note, urban planners Weiss and Blumer argue:

> Social sustainability - one of the three proclaimed dimensions of sustainability – still plays a subordinate role in the implementation of construction projects in settlement and urban development. Even though indicators for social sustainability have been tested and elaborated in the multitude of new evaluation systems, sustainable construction is still primarily associated with an ecological (energy-efficient) and an economic (cost-efficient, real estate value-adding) sustainability. Not least due to the technological self-image of the dominant actors, a planning culture has not yet been established that does justice to the equal value of all dimensions of sustainability in practice. (Weiss and Blumer 141)

Other cities in Europe, on the other hand, are experimenting more with social sustainability. In Rotterdam, the design of the museum 'The Depot' is "utterly democratic, since 99 percent of the building can be visited by the public, and the collection, which contains 151,000 artefacts, will be fully disclosed" (MVRDV). With regard to resilience, the building achieves to be 'energy neutral' through the use of efficient LED-lighting, geo-thermal energy exchange, solar panels, and efficient insulation. The green roof minimizes water run-off, and the water caught is captured and used to flush toilets as well as for irrigation. From a cultural perspective, architectural sociologist Schäfers articulates that "architecture is an expression of social hierarchies, of power and domination. The planning of accessibility and inaccessibility of

spaces is also one of the early and variously used patterns of creating distance and difference"[81] (Schäfers 366). The lacking relevance of social sustainability manifests this difference even further. 'The Depot' is an approach toward democratization of access to art, but such approaches that increase open accessibility are very few and far between. More so, there is a tendency that green building either constitutes a private endeavor by individuals with high economic capital, corporations that have the ability to assess future risks and have understood the economic benefits, or public lighthouse projects.

In conclusion, the circular house is a flagship project, that demonstrates what is possible with enough financial resources. The potential of flagship projects is to be inspirational and contribute to city branding which can further shape a regional identity and attract tourism. The circular house definitely contributes to the regional association Ruhr's (RVR) ambition to become the 'greenest industrial region in the world' through strongly following visionary circular scripts. But as Lehner argues, what is missing is a broad application of sustainable measures and a fair redistribution and access to these projects. Flagship projects alone will not be sufficient to achieve a green transformation. The question remains as to whether these practices are transferable to other building types and financial situations. The circular house cost 25 million Euros in total (Winternitz). Many challenges will arise when the existing private building stock will have to be renovated – financial, ecological, and social challenges. In *IBA Von Unten*, activists documented their criticism in regard to the International Building Exhibition IBA Emscher, writing:

> The region has nothing to gain from international showcase projects that are marketed with publicity appeal and where many citizens are only allowed to watch on the sidelines. What is needed are approaches that open up real opportunities for participation, with which identification is possible. However, citizen participation presupposes conditions that are not subordinated to the presentability and rapid completion of projects, but leave time and space for a process and development possibilities. The IBA, which is under pressure to quickly present results, is thus opposed to such approaches.[82] (Heck and Karhoff 10)

[81] Orig.: "Architektur ist Ausdruck sozialer Hierarchien, von Macht und Herrschaft. Auch die Planung von Zugänglichkeit und Unzugänglichkeit der Räume gehört zu den früh und vielfältig eingesetzten Mustern der Herstellung von Distanz und Differenz."

[82] Orig.: "Die Region hat nichts von internationalen Vorzeigeprojekten, die öffentlichkeitswirksam vermarktet werden und bei denen viele BürgerInnen nur als Zaungäste zusehen dürfen. Notwendig sind Ansätze, mit denen wirkliche Beteiligungsmöglichkeiten eröffnet werden, mit denen Identifikation möglich ist. BürgerInnenbeteiligung setzt jedoch Bedingungen voraus, die sich nicht der Vorzeigbarkeit und schnellen Fertigstellung Von Objekten unterwirft, sondern Zeit und Raum für einen Prozess und Entwicklungsmöglichkeiten lässt. Die IBA, die unter dem Druck steht schnell vorzeigbare Ergebnisse präsentieren zu müssen, steht damit solchen Ansätzen entgegen."

In this regard, professor Klaus Schmals articulated that there is a necessity to measure the "IBA goals" with the "IBA reality" (Schmals 15) admonishing that "the IBA lacks societal analyses and social development concepts"[83] as well as "their action strategies [being] embedded in technocratic notions of feasibility"[84] (Schmals 15). The same can be argued is true for the ambitions and perspectives of the RAG Foundation on the Ruhr area's future which are based in technocratic visions of innovation. It is further possible to view similar flagship projects as eco-cathedrals in the sense of Hans Schulte:

> Until now, the cultural aspect has been largely absent from the sustainability discussion. We need an expansion of the discussion: to culture. In architecture, there is the experience that what is beautiful lasts longer. Beauty is not thrown away so quickly. Culture includes thinking about values and their exchange - only this brings about the change of goals. It leads to the fact that ecology is not only seen as a question of survival, but as a fascination. Hans Schulte developed the idea of the 'Eco-Cathedral.' (Günter)[85]

In this Schultean sense, the circular house can serve as an inspirational 'eco-cathedral.' But cathedrals come with other inherent problems such as high construction costs and that they often promise more than they can keep. They serve a more representational function and not always the idea of community first, which is an entirely different approach to urban planning.

In an interview for *BrandEins*, famous Danish urban planner Jan Gehl is asked about "spectacular iconic architecture" for instance by Rem Koolhaas or Norman Foster. Gehl provocatively calls this "Vogelkot-Architektur" (engl.: "bird droppings architecture") (Willenbrock, "Die Menschen in Bewegung setzen" 13). Gehl argues:

> Because what star architects drop on cities often looks pretty crappy on the ground. Many planners believe that architecture is primarily about form. But in reality, it's about the interaction of form and life, the things that happen between houses. This life between houses is admittedly more complicated to plan than any supposedly grand piece of architecture. Which is why it is so rarely attempted.[86] (Willenbrock, "Die Menschen in Bewegung setzen" 13)

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[83] Orig.: "Der IBA fehlen gesellschaftliche Analysen und Entwicklungskonzepte."

[84] Orig.: "Ihre Handlungsstrategien sind eingebettet in technokratische Machbarkeitsvorstellungen."

[85] Orig.: "Bislang fehlte weitgehend der Kultur-Aspekt in der Nachhaltigkeitsdiskussion. Wir brauchen eine Erweiterung der Diskussion: zur Kultur. In der Architektur gibt es die Erfahrung: Was schön ist, hat länger Bestand. Schönheit wird nicht so rasch weggeworfen. Zur Kultur gehört das Nachdenken über Werte und ihren Austausch - erst dies bringt die Veränderung der Ziele zustande. Es führt dazu, dass Ökologie nicht nur als Überlebens-Frage angesehen wird, sondern als Faszination. Hans Schulte entwickelte die Idee 'Öko-Kathedrale.'"

[86] Orig.: "Weil das, was Star-Architekten über Städten abwerfen, am Boden oft ziemlich beschissen aussieht. Viele Planer glauben, bei Architektur gehe es vor allem um die Form. In Wirklichkeit aber geht es um die Interaktion von Form und Leben, also um die Dinge, die sich zwischen Häusern abspielen. Dieses Leben zwischen den Häusern ist zugegebenermaßen komplizierter zu planen als irgendein vermeintlich großartiges Stück Architektur. Was auch der Grund ist, weshalb es so selten versucht wird."

In this regard, the circular house attempts to reconcile the tension between representational architecture and social interaction spaces through the walkable roof or the walkable parking space. Nevertheless, it still remains a private company headquarters for the most part. RAG Foundation's *Zukunftsstudie* presents itself as a rather technocratic and economic approach to the future – and the same is true for the building. From a technical standpoint, it is well-rounded and follows resilient, circular, and ecologically-sustainable scripts. From the standpoint of social scripts, there is room for more investment. Imagine spaces for citizen engagement, playgrounds, a café that is open for visitors, bike lanes or a public library with events. This would signal through the building composition that RAG Foundation is actually trying out formats of civic engagement. The lack thereof reduces the engagement to a rather technical realm brought forth through an ecological show-room. This signaling effect should not be underestimated for the region, but feeds into the narrative that sustainability isn't easily accessible for all.

4.1.2 TINY HOUSES IN DORTMUND-SÖLDE – IS TINY LIVING THE SOLUTION TO TACKLING CLIMATE ISSUES?

The paratext of Llyod Kahn's *Simple Shelter* (2012) around 40 years after the original publication of the iconic volume *Shelter* in 1973 with 1000 photos of buildings around the world reads:

> Come take a trip with us through the world of tiny houses. See firsthand the current trend in scaling back, reducing living expenses, and escaping bank mortgages or high rents. There's a grassroots movement in building smaller homes these days. The real estate collapse, the economic downturn, and the growing scarcity of resources, have caused a sea change in thinking about shelter. (Kahn 6)

Constating a 'sea change' in the sense of a paradigm shift can of course be challenged as the space per capita so far is not significantly reducing in Western countries. Nonetheless, the tiny house movement is growing in the U.S. but also in Germany with an increasing number of tiny villages being conceptualized by cities and built with interested parties across the country.

In *The Growing Trend of Living Small: A Critical Approach to Shrinking Domesticities* (2022), editors and urban geographers Harris et al. write that "particularly over the past decade or so the shrinking of domestic space has been increasingly tied to the housing crisis conditions emerging under neoliberalism" (E. Harris et al. 2). In 2008, the mortgage and financial crisis abruptly ended the dream of home ownership for many buyers in the U.S. causing eight million foreclosures (Goodman and Mayer 31). This experience, politically and culturally, propelled the search for more affordable forms of homeownership. The tiny house, and other concepts of small living, as a consequence were (re)-imagined as possible solutions to an ever-growing housing crisis. In a growing number of cities, "new forms of small housing are positioned as a solution to, rather than symbol of, urban inequalities" (E. Harris et al. 3). In housing markets 'under pressure' these solutions often seem promising, whilst critics like BAG[87] warn against the implementation of cramped and subpar living space in contrast to housing associations that provide subsidized and affordable apartments for renters (BAG Wohnungslosenhilfe).

Harris et al. constate that "shrinking domesticities can, however, represent genuinely progressive, emancipatory and even subversive modes of dwelling" (E. Harris et al. 3). In synthesis, the cultural analysis of tiny houses resides within this sphere of tension: between giving in to neoliberal modes of dwelling and creating sustainable cultures of sufficiency. The

[87] The *Bundesarbeitsgemeinschaft Wohnungslosenhilfe* (BAG) is a working group of social organizations in the private and public sector as well as private and public providers of social services and facilities for homeless people in Germany.

following case study, will first introduce current discourses on tiny living in the U.S. and then reflect the ways these discourses are present in the cultural and material construction of the tiny village in Dortmund-Sölde, which is currently being planned in a co-creative planning effort by the city of Dortmund and interested parties.

THE TINY HOUSE MOVEMENT: ORIGINS AND CHALLENGES IN THE U.S.[88]

The tiny house movement emerged in the early 2000s in the U.S. and is characterized through anti-consumerist values that propagate the reduction of material possessions simultaneously with the reduction of space. It is inspired by the transcendentalist 19th century works of Henry David Thoreau and Ralph Waldo Emerson (Anson 14). Thoreau's retreat to Walden Pond and his criticism of affluence and luxury as well as his immersion into living simply in nature forecast many desires of tiny house occupants. Also, the voluntary simplicity movement has been inspirational to tiny house lifestyles looking to the Quakers and other historic forms of simple living (Owen 75). More recently, the movement has been influenced by minimalist lifestyles and the credo that "less is more" (Ford and Gomez-Lanier 394). The current version of the tiny house movement originated in the United States, which will serve as a backdrop to analyze the traveling concept of the tiny house. This perspective is not meant to erase other forms of small or tiny living in other cultures throughout history. Tiny houses, in my argument, are set apart by a specific middle to upper class U.S.-American aesthetic. The small houses are very popular on blogs, Instagram, magazines as well as in TV shows such as "Tiny House Nation" or films such as "TINY: A Story about Living Small." Their medial representation has contributed to their popularity and made tiny houses travel globally.

Individuals with constrained economic resources regard micro-housing as a viable pathway to attaining residential homeownership (A. Wilson and Wadham 332). The possession of a personal home continues to constitute a central element of the broader ideal commonly referred to as the American Dream. In the U.S., this derives at least in part from history; owning land used to be directly connected to citizenship (K. Evans, "Integrating tiny and small homes into the urban landscape: History, land use barriers and potential solutions" 37). Today's shortage of affordable urban housing has increased the interest in small houses. Small housing, of course,

[88] For more information on the history of tiny dwellings see Wood, Katharina, and Randi Gunzenhäuser. "Tiny Architecture and Narrative: Scripting Minimal Urban Living Spaces." *City Scripts: Narratives of Postindustrial Urban Futures*, edited by Barbara Buchenau, Jens Martin Gurr, and Maria Sulimma, Ohio State University Press, 2023, pp. 69-86. doi: 10.26818/9780814215524.

is not always sustainably-built, although it generally has a smaller carbon footprint than its larger counterparts. Yet, the free-standing tiny house has many of the disadvantages all free-standing buildings share such as inefficient use of land and heat loss.

In a more structural sense, writer Adele Peters constates: “Small backyard houses get a lot of attention as a solution to the housing crisis,” “I wonder if they can sometimes distract from other, more systemic solutions that are necessary” (Peters). Peters continues: “We need more solutions, including different housing tech that can lower construction costs, new housing policies, including policies designed to spur more construction, and salaries that are in line with the cost of living; tiny houses, while cute, can’t fix those issues alone” (Peters). In the end, Peters argues: “Being able to pay for an adequate amount of housing – not huge, but larger than a tiny house or apartment – shouldn’t be so far out of reach” (Peters). The solution to the housing crisis, I agree with Peters, should not be for economically disadvantaged people to have to live in tiny houses, because this is everything they can afford in Germany or the U.S. This again would contribute to severe class distinctions and inequalities. Although this of course is already a reality: The more affluent consume much more space than less affluent groups. The negotiation of who can consume which amount of space will probably be negotiated politically and societally with more prominence due to the lack of housing in Germany and the problems in the building sector due to rising construction costs which lead to less contracts. The German government has set goals for constructing new houses and apartments: 400.000 in 2023. This goal has consecutively been missed (ZDF heute) leading to a competition of the poor and working class around rental apartments especially in in-demand metropolitan areas.

What are central motivations of tiny house occupants? Mari Fitch, an African American tiny house occupant, formulates her motivation for moving into a tiny house: “I’m interested in living sustainably. On top of that, having a kid really opens your eyes to the sneaky ways capitalism gets you to buy a bunch of shit, and I wasn’t down with it. And I don’t want my daughter to feel like she needs all this stuff to live a happy life. I want her to use her body, mind and creativity to blossom into her best self” (qtd. in Plaid). Her reasons again highlight anti-consumerism, minimalism and sustainability. Tiny house owner Jewel Pearson founded the ‘Tiny House Trailblazers’ a community for Black individuals and families within the tiny house movement in the U.S. On the community’s website Pearson states that “representation matters” and that in the past Black women were often not seen or heard in the tiny house movement (Pearson). Pearson continues: “We stopped expecting invitations to other tables and focused on building our own tables. We started gathering the people who were omitted from those other

conversations, the people who weren't represented in the tiny house movement and we continued conversations with the people who respect and value inclusion" (Pearson). Pearson has since become a tiny house advocate, speaker, and consultant also addressing safety concerns and the racism that Black tiny house dwellers are confronted with when searching for a location of residence. Jewel Pearson further addresses the racial gap in landownership in the United States. She insists that for Black women it is important not only to become homeowners but also landowners. The Tiny House Trailblazer Facebook page argues that tiny houses can be opportunities for communities of color to "build community" and achieve "financial freedom."

Nonetheless until today, there is a lack of representation of Black tiny house owners in the movement. The YouTube channel "Living Tiny with the Bushes" documents the life of two Black tiny house dwellers, whose names are Marek and Khotney-Issa. It shows their life in their tiny home which they have inhabited for two years. They also address police violence against African-Americans and the murder of George Floyd on their channel articulating their frustration and anger. Marek describes the murder as "disgusting" while Khotney-Issa expresses feeling "numb" and "hopeless" (The Bush Family). Generally, racism is not a frequent topic on tiny house blogs or channels. Marek and Khotney-Issa's larger aim is to build an entire Black tiny house community for which they have just purchased land close to Kansas City, Missouri.

According to the cultural studies and sociological perspectives of Tracey Harris and Daniel Ingram there is a "class and race privilege inherent in the movement – how tiny house inhabitants are celebrated for their lifestyle choice, but people living in trailers or other low-income spaces of comparable size are often treated disparagingly" (Ingram 640). This perspective is also voiced by Black writer and actor Shantira Jackson who stated on Twitter (@tira_tira_tira): "During quarantine I've been watching a lot of tiny house videos and it's so wild that people living in trailer parks are treated like shit and white people living in literal shipping trailers are seen as brilliant. You live in a trailer Diane. I wish we didn't hate poor people." There are tiny house owners who choose a tiny house from their privileged social position whilst for others a small abode is a pure necessity.

In an American context, the tiny house movement is sometimes blamed for 'poverty appropriation,' or 'poverty porn,' especially when prosperous individuals or families adapt a tiny lifestyle (Westhale). July Westhale, author of *Trailer Trash,* expresses that "it's not just the Tiny House Movement that incites my discontent. From dumpster diving to trailer-themed bars to haute cuisine in the form of poor-household staples, it's become trendy for those with

money to appropriate the poverty lifestyle – and it troubles me for one simple reason. Choice" (Westhale). Nevertheless, Westhale also acknowledges that tiny houses in the United States have especially boomed since the financial crisis of 2008, providing solutions to ever increasing housing prices. But Westhale continues: "This idea of 'returning' to a 'simple life' is one I struggle with. After all, there aren't any glossy photos of the Palo Verde Mobile Home Park where I grew up, enticing people to live more simply and own less furniture as a means to becoming happier" (Westhale). Living tiny, whilst a choice for some, is confining for others. In comparison to tiny houses, especially trailer parks are often viewed condescendingly by the economically prosperous.

From the perspective of social sustainability scripts, and contradicting the idea of class privilege, sometimes tiny house communities are decidedly built to tackle homelessness, like a project by 'Youth Spirit Artworks' does in the Bay Area, California. There are also existing tiny house projects for homeless veterans in Kansas City, Missouri organized by the NGO "Veterans Community Project." In an effort to build a database to monitor and track tiny house villages for the homeless, human geographer Krista Evans found 115 tiny house villages for the homeless in the United States as of July 2019 (K. Evans, "Tackling Homelessness with Tiny Houses" 360–63). In Germany, Little Home e.V., established in Cologne, is an association that builds 'little homes' with 3,2 m² and gifts them to homeless people. These projects do not offer solutions to effectively combat homelessness, but they can bring local improvements and play a role in creating new approaches to old problems.

Under the title, "tiny house, big drama" journalist Katie Herzog writes for the *Grist* magazine about a tiny house project in a Pittsburgh neighborhood that was built to attract and host artists. Herzog writes:

> There's a tiny house storm brewing in Pittsburgh.
>
> The story starts several years ago, when local urban planner and developer Eve Picker sought to revitalize Garfield, a low-income, predominately African-American neighborhood in the rapidly changing East End of the city. Picker, founder and CEO of non-profit think tank cityLAB, wanted to bring artists into the neighborhood in the hopes of attracting economic development. She called the project 6 % Place.
>
> Why? "Six percent is the number, the tipping point," reads cityLAB's website. "If a neighborhood can get that many creative workers, it becomes an attraction in its own right, according to a study by CEOs for Cities. cityLAB has been testing out this hypothesis in Garfield, an overlooked neighborhood in Pittsburgh's East End, since 2011. Our goal is to fill in the neighborhood's vacancies with creative workers who will

> be good neighbors, invest in the community, and help the neighborhood grow sustainably."
>
> One of the 6 % Place initiatives was to build a prototype tiny house in Garfield. Tiny homes, cityLAB hoped, would allow local residents to enter the housing market even as the price of real estate in the city increases. (Herzog)

Despite presumably well-meaning intentions, some neighborhood residents were bothered by the tiny house (Herzog). Resident Matthew Buchholz explains: "It doesn't send a great message to a neighborhood struggling with gentrification to have public funds spent on this project" (qtd. in Herzog). There is an every so often voiced perspective that tiny houses are just "gentrified trailers" (Kimble). More luxurious tiny houses are oftentimes double the price than comparable mobile homes or trailers (Kimble). Vox author Dylan Matthews writes that tiny house YouTube channels are comparable to lifestyle porn (Matthews). Further, tiny houses can represent a sort of poverty appropriation which Emily Chan explains in her article "Hypocrisy, Gentrification, and the Tiny House Craze" (E. Chan). One of the real problems with gentrification is displacement. Emily Chan writes on *The Current MSU*: "The fact of the matter is, along with most other trends, the tiny house movement is reserved for the privileged. It wasn't until the white, middle-class appropriated tiny homes that the lifestyle was embraced and deemed minimalistic rather than impoverished." She further argues: "With shows like 'Tiny House Hunters' and 'Tiny House, Big Living,' the kind of people who are featured on the series, most always white and wealthy, only further uphold the belief that tiny home owners consist of just the free spirits, adventurous folks and nature lovers" (E. Chan). Chan pointedly describes that: "In reality, tiny housing has existed long before the movement itself became popular. For decades, lower-income people have lived in vehicles, RV's, one-room apartments or mobile homes. These people have been looked down upon for the way they live and what few possessions they have. For some people, mobile living isn't a freedom-granting choice, but an inescapable reality" (E. Chan).

From a social education standpoint, Finzi and Kuhnt constate that the tiny house movement in Germany has garnered a lot of attention but little research so far outside of the disciplines of geography or urban planning (Finzi and Kuhnt 335). Urban Researcher Vollmer and geographer Michel critically write that

> in architecture and planning, discussions about the steadily increasing consumption of living space are often reduced to a debate about tiny houses, which ignores the connection between social class and the consumption of living space. From a social point of view, the debate about downsized housing carries the danger of introducing

> substandard housing, and from a political point of view, the danger of individualizing the problem.[89] (Vollmer and Michel 164)

Tiny house occupants are trying to find solutions to the housing crisis in Germany and the U.S., but questions of class privilege remain strong.

4.3.2 TINY LIVING IN DORTMUND-SÖLDE

It all started with an unconventional idea. In his role as an urban planner employed by the city of Dortmund, Gerald Kampert has always sought out ways to promote more green building in the city. For this reason, he was also in support of the '100 Plus-Energy Houses' initiative in Dortmund. But in the end, the plus-energy houses built with help of the support funds were mostly large single-family homes. This got Gerald Kampert thinking about future cities and how much space is necessary to live comfortably. When he saw subsidies by the German *Rat für nachhaltige Entwicklung* (engl. "Council for Sustainable Development"), he decided to hand in a proposal for tiny living in Dortmund. The proposal was accepted and a year-long campaign to promote tiny living in Dortmund was planned with several events, fairs, and meetings. The city council then became more interested in the idea of tiny living, and, when deciding about a plot in Dortmund-Sölde, which usually would have been large single-family homes, decided to go tiny and propose the implementation of a tiny village.

Since then, the city of Dortmund has been planning to establish a 'tiny village' through cooperation between urban planners and interested parties. Start of construction is planned for 2025. Currently, workshops for interested parties are organized by Dortmund's city planning and building regulations office.[90] 'Co-Creation' as a planning practice is analyzed by Puerari et al. in their study on urban living labs.[91] The only project in the case studies with a co-creative approach is the tiny house project initiated and organized by Gerald Kampert and his team in Dortmund. Puerari et al. point to the barriers of co-creation processes:

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[89] Orig.: "Diskussionen um den stetig steigenden Wohnflächenverbrauch werden in Architektur und Planungswissenschaften oftmals auf eine Tiny-House-Debatte reduziert, die den Zusammenhang von sozialer Schicht und Wohnflächenverbrauch außer Acht lässt. Aus sozialer Sicht birgt die Debatte um verkleinerte Wohnformen die Gefahr der Einführung eines Substandards im Wohnungsbau sowie aus politischer die Gefahr der Individualisierung des Problems."

[90] Orig.: *Stadtplanungs- und Bauordnungsamt*.

[91] Urban living labs are based on the concept of the 'living lab' which originated in the 1990s at the Massachusetts Institute of Technology in order to test human-machine interactions and was developed by computer science scholars (Puerari et al. 3). Puerari et al. understand living labs as a process "using several methodologies and tools aimed at the co-creation of innovative solutions (i.e., products and services) in real world environments with users, who meet in real life contexts and share experiences, while envisioning their own future (Puerari et al. 3). In living labs, participants are not only regarded as consumers but act as 'co-creators' (Puerari et al.).

> However, urban actors from different societal domains and sectors still do not necessarily meet, understand each other, or cooperate immediately. They often engage only with those actors from their own social networks, professional backgrounds, institutional settings, or spatial contexts. These social and spatial disconnections have been identified as a key barrier to new collaborative forms of developing urban futures. Some scholars state that suitable spaces and transition arenas for collaborative forms of urban governance are required, where the connections among actors can be established and the boundaries between sectors, interests, and contexts are subject to further exploration. (Puerari et al. 2)

This difficulty in finding pathways and formats that lead to collaboration between diverse actors, has been voiced to me by urban planners in the Ruhr region and Atlanta several times. Nevertheless, there are several projects in Europe that implement a co-creative planning approach. Puerari et al. analyze several urban living labs in Rotterdam. One of them is BlueCity Lab, an old swimming pool transformed into a circular economy lab where new building materials including fungi and bacteria are tested and experimented with (BlueCity).

Urban planners Franta and Haufe discuss the potential of co-creation processes in the realm of the EU-funded 'HORIZON 2020-Project SUNRISE'[92] and synthesize that co-creative planning has the ability to include even 'hard to reach' groups through the diversification of formats. In the realm of the project these traditionally 'hard to reach' groups were encouraged to participate through easily accessible formats in a variety of places and neighborhoods such as playgrounds, homes for the elderly, or schools. In their analysis, Franta and Haufe emphasize that co-creative planning encourages solidarity between different actor groups even without including all the groups in every format. The diversity of participation formats and the enhanced visibility of the project enhance the ability of diverse actors to see the city through the eyes of other social/economic/political groups. This effect, in return, creates an openness for innovative solutions that can benefit these diverse groups in Franta and Haufe's results. My impression is that urban planners often do not have the time to create urban living labs and depend on funds and other actors to allocate the money and design the project. Urban living labs are also oftentimes not part of the mandatory curriculum in urban planning despite their positive effects. In the case of the tiny house project in Dortmund, I witnessed that co-creative processes require perseverance and frustration tolerance, because such projects require more time than top-down planning.

[92] HORIZON 2020-Project SUNRISE was a co-creative EU-funded project in six different cities to evaluate and analyze the potential of collaborative city planning through the inclusion of diverse actor networks. The project was realized between 2017-2021. The focus of the project was to enhance and promote inclusive mobility and knowledge transfer in the city. One of the main objectives was to include groups that are traditionally "hard to reach" such as the elderly, school children, or migrants (Franta and Haufe).

In Sölde, the project will redevelop a brownfield, a former sports field that has not been in use since the 1980s. The concern about gentrification in this case is neglectable I believe,[93] even though co-housing projects are often perceived as gentrification by neighbors (Droste 85). It will be interesting to witness how the tiny house inhabitants interact with their surrounding neighbors in Dortmund-Sölde. Dortmund-Sölde is situated on the outskirts of the city with a more rural atmosphere. The demography shows that the population in Dortmund-Sölde is older than average, and there are less migrants than in the rest of the city. This could potentially lead to problems of inclusion regarding the tiny house community. The more rural areas even when they are still parts of cities tend to be more skeptical toward newcomers. In this context, landscape architect Peter Dehne writes about *Raumpioniere*[94]: "It is the old theme in rural settlements: The newcomers with their urban character and their alternative projects meet the traditional life experiences and the skeptical, wait-and-see attitude of the locals"[95] (Dehne 179). *Raumpioniere* are characterized through alternative living and working models that tend to align with degrowth scripts. Additionally, Dehne describes that "they [Raumpioniere] define their quality of life less by material things and consumption, but by soft factors such as time, peace, community, nature, self-work"[96] (Dehne 172). From what I have witnessed at the planning meetings for the tiny village, this also holds true for Sölde's future tiny village inhabitants.

The central minimal narrative formulated for the tiny village in Dortmund-Sölde is "small house. large life."[97] This aligns with sociologist Tracey Harris's assertion that individuals residing in tiny homes generally report reduced consumption habits and a heightened sense of purpose and satisfaction in their everyday lives (Ingram 640). Motivations for adopting this lifestyle are highly diverse, encompassing ideals such as personal autonomy, minimalist living,

[93] My argument in this regard is that the economic structure of the new inhabitants of the small houses will be average or below average of the existing neighborhood.

[94] *Raumpioniere* are 'spatial pioneers.' The term was introduced by urban sociologist Ulf Matthiesen (2011) to explain the phenomenon of city dwellers moving to mostly Eastern German regions in order to try alternative modes of living in experimental communities or agricultural projects (Matthiesen). The term's use is ambivalent. Whilst Matthiesen associates positive qualities with the phenomenon such as regional economic and creative development, Dehne critically writes that the initial inhabitants of these places are sometimes displaced by the inflow of creatives or at least their form of living severely altered (which does not need to have only negative results) (Dehne 169). In her dissertation project, Hanna Rodewald (part of our urban scripts research group) further analyzes the concept of *Raumpioniere* in Dortmund in negotiation with its American conceptual origins in settler colonialism (Rodewald).

[95] Orig.: "Die Neuen mit ihrer städtischen Prägung und ihren alternativen Projekten treffen auf die tradierten Lebenserfahrungen und die skeptische, abwartende Haltung der Einheimischen."

[96] Orig.: "Sie definieren ihre Lebensqualität weniger durch materielle Dinge und Konsum, sondern durch weiche Faktoren wie Zeit, Ruhe, Gemeinschaft, Natur, Eigenarbeit."

[97] Orig.: "Kleines Haus. Großes Leben."

a desire for ecological integration and sustainability, financial accessibility, and the avoidance of housing insecurity. Certainly, tiny house living can be a potent degrowth script for sustainable living in the degrowth city.

The city campaign for tiny living in Dortmund states that one aim is to create more "sustainable"[98] living space. The campaign actively tries to script an approach to sustainable living that works through the tripartite understanding of sustainability.

From the perspective of economically oriented sustainability scripts, tiny houses are generally characterized by their relative affordability in comparison to larger housing. This aspect is also stressed by Dortmund's model project that argues that the "need for action on the housing market is immense" and that "new ideas for living are necessary that are quick and affordable."[99] Whereas prices on the housing market have strongly increased especially in urban regions, a tiny house of 15-35 m² in Germany generally costs between 25.000-175.000 Euros (depending on if it is self-built), which is still quite expensive in regard to its small size. The Dortmund tiny village project conceptualizes houses with a size less than 100 m² as tiny houses. This is still smaller than the average single-family house that includes 150 m². The model project is attached to the idea of the *Einfamilienhaus* (single-family house) in contrast to more modular approaches to tiny living. Initially, there were ideas to include a modular tiny living building as a *Wohnprojekt* (communal living project). But no interested parties could be found that actively wanted to pursue this idea. The interested parties are more interested in pursuing the idea of their 'own four walls' on their property. Whereas the interested parties actively seek out communal living in building groups with shared spaces in their negotiations, there is a clear adherence to also limit the sharing aspect and preserve individual properties. This aspect is very interesting with regard to negotiating social scripts in urban planning for green futures. Sharing specific spaces is viewed positively by some societal groups, whilst there is a limit on the willingness to share and need for privacy at the same time.

The tiny houses in Sölde will entail ecological aspects of sustainable and resilience scripts. The Sölde website by the city of Dortmund and other collaborators argues that tiny houses use less construction materials and have less space to heat and therefore present an "environment-friendly alternative"[100] to regular houses. Many tiny house builders use environment-friendly

[98] Orig.: "nachhaltig."

[99] Orig.: "Der Handlungsbedarf auf dem Wohnungsmarkt ist groß." "Neue Wohnideen müssen also her – und das schnell und bezahlbar."

[100] Orig. "klimafreundliche Alternative."

and non-toxic, low-emission materials in the construction process. From a critical perspective, tiny houses' energy savings are relativized by their relatively large exterior surface which lets heat escape easily. Despite these considerations, tiny houses require fewer resources, particularly in terms of concrete usage, whose manufacturing process is notably carbon intensive and reliant on the increasingly limited supply of sand. The embodied energy (*graue Energie*) is a relevant denominator to calculate a building's carbon footprint. With regard to resilience scripts, tiny houses in Germany and the U.S. have to adhere to local building codes and therefore usually fare just as well as larger structures in regard to engineering resilience. On the one hand, tiny houses usually do not have basements, which are prone to flooding, on the other hand, they are often single-story buildings which do not provide safety in case of extreme flooding. In flood-prone areas they would have to be built on stilts or other structures. Looking at cooling in periods of heat, tiny houses have to keep ventilation in mind and shadowing mechanisms through trees, vertical or rooftop greening, or window shading. The city of Dortmund so far does not prescribe measures for cooling houses. Ordinances are prescribing the use of photovoltaics, building according to the *Effizienzhausstandard 40*[101] and the use of district heating (where applicable) (Stadt Dortmund). Plans for the tiny house settlement include building with wood, green roofs, service water utilization, and photovoltaics. As typical for some tiny houses, the tiny village will not be entirely energy-independent.

Circular scripts are also popular discourses within the tiny house movement. Within the circular economy, not only the production costs, but the entire life cycle of a product is evaluated and the products used in the building are supposed to be reusable or recyclable. This mode of ecological and economic circulation is often termed 'cradle-to-cradle' principle as explained in chapter 2.1.3. Nonetheless, following circular scripts and reuse of materials or use of C2C-certified materials is not prescribed by the city for the site. At this point building with circular scripts is still very challenging, due to high prices for C2C-certified materials and difficult sourcing and certification processes for reuse of materials in construction.

Kampert's idea is to question if "bigger is always better" and start a conversation about the appreciation and use of space and resources. This resonates with degrowth scripts and questions of sufficiency. Tiny houses, when used as primary space of residence, strongly promote degrowth scripts through advocating for simpler, less consumption-oriented lifestyles and

[101] All newly constructed buildings in Dortmund must be compliant with the funding guidelines of the federal funding for efficient buildings (German: Förderrichtlinien der Bundesförderung für Effiziente Gebäude BEG). An efficiency house 40 (Effizienhaus 40) only requires 40 per cent of the primary energy of a reference building that meets the requirements of the Buildings Energy Act (German Gebäudeenergiegesetz GEG).

foregrounding other cultural values than those present in consumer societies. As I will argue later, I believe that these values for some are intentional and for others serve a different means to an end: maintaining a middle-class status. Nevertheless, most tiny villagers, significantly reduce their belongings to accommodate only the things they really value in their tiny homes. Some tiny houses of course will still be cluttered and not adhere to the minimalistic Instagram-aesthetic. Especially, when normal people inhabit the tiny houses for their own purposes without presenting them on social media on a daily basis. The "always tidy" tiny house is also to some extent a cliché, although it represents an ideal-typical middle to upper class tiny house aesthetic.

The project organizer Gerald Kampert states in an interview that the project attracts many people from LECHCC (low economic capital high cultural capital) backgrounds. Gerald Kampert points out, that this form of living does not attract every social group, but is more tangible for people with certain cultural values such as minimalism and environmental orientations. When speaking at the Forschungskolloquium "Raumplanung" in Winter 2022 in Dortmund, I was asked by students: "What happens to this vision if not everyone wishes to live in such a small space?" and more bluntly "What if this is not what I want?" And I clearly constated that this is a complex question. On the one hand, there is the value of individual freedom – everyone should be able to choose their form of living according to their needs and wishes. The second part of my answer stems from the understanding that "my freedom ends, where another's begins" – so to say if my extensive use of resources impacts others' lives through climate change, the questions arises whether my use of resources should be limited to guarantee future generations' rights to resources. These are fundamental questions of environmental ethics. The answer is not simply yes or no – but depends on the inclusion of diverse perspectives. No one should be forced to live under cramped conditions – and people experience tiny living in different ways. To share an anecdote: My own experience of living in a small apartment (30 qm2) with my partner during a heat wave in 2023 was very humbling. My partner at the time was living in a larger apartment complex, renting out one room where I moved in together with him. As there was only one window door, during periods of heat, we felt like we were using up the oxygen in the room rather quickly as we did not want to open the window frequently to keep the heat out. That was a very practical problem and constantly sharing the same space with no opportunity to have some alone time was very straining for both of us. During the winter time, we found the small living situation to be much more comfortable and enjoyable. In the end, we would prefer to have at least two rooms and a bit more space to make co-working and living easier.

In this context, *BAG Wohnungslosenhilfe* formulated a strong statement against the further inclusion of tiny houses in cities' combat against the shortage of affordable homes. In their argument, tiny houses are 'sub-standard' forms of housing because they depreciate in value rather quickly and force people to live under 'cramped' conditions. On the other hand, proponents of tiny living want to deregulate tiny houses and decouple them from specific building norms, to make them more easily applicable in different urban contexts. This form of deregulation is viewed critically by BAG. BAG further critically contextualizes that mobile homes and other forms of small living have developed in situations and times of crisis by the poor and working class to find shelter in the U.S. (BAG Wohnungslosenhilfe 1). Recreating these dynamics in Germany is viewed very critically and they argue in favor of the 'compact city'[102] with apartments that are affordable. Germany used to have a stronger tradition of building affordable housing after WWII, which has stagnated significantly over the last ten years, leaving many renters helpless and unable to find suitable apartments. This is also discouraging the possible effects of Daniel Fuhrhop's concept of using 'invisible living space'[103] (Fuhrhop). Fuhrhop elaborates different strategies for creating 100.000 additional apartments or comfortable living situations without further construction just by reusing and redistributing existing space. One of the concepts he promotes is *Wohnen für Hilfe* (housing in exchange for assistance) where young students live with an elderly person or couple for an affordable rent, whilst offering to help out with difficult chores. In Belgium, this system is very popular and safe due to agencies taking care of any up-coming difficulties in the shared apartments / houses. In Germany, there are more reservations to sharing living space in this manner. Late-modern German and North American cultures have become more individualistic, less communitarian, as sociologist Andreas Reckwitz pointedly describes in *Gesellschaft der Singularitäten* (society of singularities). Reckwitz describes living conditions in the industrial age as *social engineering*[104] in standardized apartments, whereas in late-modernity living has been singularized – portraying a version of "curated living" in contrast to industrially mass-

[102] The compact or dense city is a concept for dense and mixed-use urban living. It typically includes multi-family residential and mixed-use commercial buildings where inhabitants can reach many amenities in walking distance.

[103] Invisible living space is conceptualized by Fuhrhop as unused space situated for example in large single-family homes. Fuhrhop exemplifies this through the concept of homes built for families, where the children have moved out and parents or grandparents remain in the large house without using large parts of their house. Maintenance is also often difficult for the owners. Nonetheless, there are few incentives for these occupants to move into a smaller apartment as renters, as these apartments are often more expensive and unaffordable for less space. The security of having a home is important for many elderly people that have paid off these homes their entire lives.

[104] Reckwitz here refers to the functionality of industrial living spaces also in regard to Le Corbusier's visions of functional cities.

produced goods and living arrangements (Reckwitz 314). The new academic and creative middle class, who profits from post-industrial developments, is oftentimes still inclined in more separate and at least not entirely communal living arrangements. Sharing spaces is becoming more and more *en vogue*, but living in *Wohngemeinschaften* (shared flats) in Germany remains more of a student phenomenon. This may change in the future either for economic reasons or cultural developments in societies looking to become more resilient through sharing burdens of child care or other responsibilities. On the other side of the spectrum, the service classes[105] of the post-industrial economy are devalued in a double sense: their jobs neither provide material nor ideational satisfaction (Reckwitz 353). From a cultural standpoint, also, more traditional values reign in these latter groups that adhere even more to concepts of the nuclear family which make co-living culturally unattractive even though it could be an economic benefit.

Social scripts as part of three-pillar sustainability in tiny house projects are dichotomous. On the one hand, some tiny house dwellers seek isolation in nature away from other dwellings whilst tiny villages or communities are also very common. The model project in Sölde is conceptualized as a tiny village with several building groups. The project encourages communal living and the establishment of shared spaces. Possibilities of communal living are discussed in workshops and informational meetings. This may include shared kitchen spaces, guest rooms, repair workshops, or sports rooms. The majority of tiny house owners are often very community-oriented relying on others to help with construction or whilst searching for places of residence. Even though Gerald Kampert is actively trying to promote the idea of tiny living to families, most interested parties are older than 50 or in their late 20s to 30s, mostly singles or couples without children.

Although not all tiny houses contribute to social sustainability scripts, the project in Dortmund-Sölde strongly supports them. The implementation of cooperative building groups establishes community throughout the planning phase and beyond. These groups discuss questions of architecture, community spaces, and lot distributions. This fosters cooperation and can build community. Certainly, these kinds of processes are very straining due to different interests and social conditioning toward individualism (s. Reckwitz, *Gesellschaft der Singulariäten*). Droste writes:

> […] self-organised and community-oriented housing has often gained importance in times of social change and, like recently, economic crisis […]. The recent unexpected increase in demand for lower-priced quality housing in growth areas across Germany

[105] Reckwitz refers to service workers in contrast to knowledge workers and the pay gap between well-earning knowledge workers and underpayed service workers.

> has forced municipalities, public and non-speculative housing providers to re-consider the best use of new and existing stock. (Droste 81)
>
> It is evident that co-housing, while remaining in a quantitative niche, is increasingly politically attractive and is seen to contribute to the renaissance and resilience of city living. In those municipalities where it has become a part of strategic housing policies, it contributes to relieving some of the burdens of social-welfare provision. If intelligent partnerships develop between project groups and municipalities, win–win situations can evolve over social land use and enhancing neighbourhood quality. (Droste 80)

Tiny House occupants as part of a study "emphasised the importance of respectable aesthetics in marking out their tiny homes as 'real' and socially accepted" (Owen 81). These middle-class aesthetics have also been prescribed by the city of Dortmund with a clear rejection of trailer park-aesthetics. In one of the signature project presentations for advertising the tiny house campaign, the city planning department visualized acceptable and non-acceptable aesthetics for the future tiny houses. Tiny houses on wheels and mobile homes are depicted – but crossed out – clearly signaling that this aesthetic is not welcome. Tiny houses, therefore gain an ambivalent spot between belonging to the middle class aesthetically but not financially. To a certain extent, this position disguises the conflicts that manifest itself within the discussion around the reduction of living space. On the one hand, the reduction is voluntary – driven by ecological considerations and desires for a simpler life. On the other hand, the decision is amplified and reinforced through economic constraints. A larger house would not be affordable for most tiny house candidates in Dortmund.

Katra Byram, associate professor of German language and literature, further analyzes several tiny house blogs and memoirs and argues that they work according to the Bildungsroman plot with some variations. The theme of "self-formation" is ever present in the experience of moving out of societal norms and building the tiny house (Byram). These norms are also present in future inhabitant's perspectives in Dortmund. I was able to participate in planning meetings and these desires of self-formation were presented in different varieties by the participants. Participants uttered the desire to live more independently, framing the tiny house transition as a 'journey' into a different life stage or situation. Whilst some, would have been more interested in also constructing their house independently – materially experiencing this journey – for others, the transition was more of a spiritual nature. As mentioned before, the tiny house applicants and interested parties mostly belonged to White LECHCC backgrounds. The concept of the tiny house in a way helps them maintain their middle-class status despite not always financially still belonging to it. Tiny houses, in this regard have the potential to, on the one hand, be a creative strategy to maintain a middle-class position, whilst, on the other hand,

disguise this economic slippage. Culturally, tiny houses are disassociated from less economically privileged forms of small living through the emphasis on them being a 'noble' choice in times of ecological crisis. Nonetheless, this image is also partly based on an economically-driven pseudo voluntary decision. The lack of affordable high quality living choices drives these social groups into other ways of maintaining their status: the tiny house.

This perspective of course frames the tiny house as an economically-driven choice, which I believe it is in part, but omits other groups and motivations for living on a smaller footprint. These other considerations are of course extremely relevant. Other more affluent social groups also switch to tiny lifestyles, but oftentimes for vacation homes. Gerald Kampert pointedly articulates that:

> We will not solve the housing problem with the small houses - neither here in Dortmund nor in Cologne. But if we encourage people to think about it, that would be nice. For everyone to think about the question: How much space do I actually need to live? I can only sit once on each chair. Maybe I don't need three sitting areas, a kitchen with 60 or 70 square meters and a huge dining table with 15 chairs. We need a paradigm shift. In 1990, we had 34.8 square meters of living space per person: Now it's 47 square meters per person. We build a new city in Germany every year - not because there are more people, but because each individual takes up more space.[106] (Kölner Stadtanzeiger)

And this culture of cultivating sufficiency will prove beneficial for carbon-neutral societies in the future. Nevertheless, the more affluent classes continue to consume disproportionately large amounts of resources (Heeg 98). Carbon prices could be an option, to make the true costs of products and services visible and would present an opportunity for redistribution. The Fraunhofer ISI together with adelphi and RWTH Aachen analyzed the potential for social redistributions ("Klimageld") and its social acceptance in German society. In Germany, the "Klimageld" was announced and re-announced – but never implemented. And there is a growing resistance among the lower classes against creating carbon-neutral futures, but mostly for economic reasons. The individuals and families from these social groups are often desperately clinging to the financial resources they own and when they see these depreciating in value, resistance erupts. This was the case in 2023, when minister of ecological affairs, Robert Habeck, announced far-reaching measures to renovate the existing building stock. Many

[106] Orig.: "Wir werden mit den kleinen Häusern nicht das Wohnungsproblem lösen – weder hier in Dortmund noch in Köln. Aber wenn wir zum Nachdenken anregen, wäre das schon schön. Dass sich jeder mal mit der Frage beschäftigt: Wie viel Platz brauche ich eigentlich zum Leben? Ich kann ja auf jedem Sessel nur einmal sitzen. Ich brauche vielleicht keine drei Sitzecken, keine Küche mit 60, 70 Quadratmetern und keinen riesigen Esstisch mit 15 Stühlen. Wir brauchen da einen Paradigmenwechsel. 1990 haben wir 34,8 Quadratmeter Wohnfläche pro Person gehabt, jetzt sind es 47 Quadratmeter pro Person. Wir bauen jedes Jahr eine neue Stadt in Deutschland – nicht, weil wir mehr Menschen werden, sondern weil jeder Einzelne mehr Platz beansprucht."

homeowners felt like someone was taking their belongings away – and more existentially that they would not be able to afford their own home anymore. The *Gebäudeenergiegesetz* (GEG) (Building Energy Act) was then renegotiated and deadlines for replacing gas and oil furnaces in Germany extended. This resistance is not only culturally-rooted, but economically. In a study by the UBA in 2022, 91% of Germans were in favor of an environment-friendly transformation of the German economy (Umweltbundesamt, *Umweltbewusstsein in Deutschland 2022* 66). In climate debates, questions of class and privilege are extremely relevant. The very affluent classes consume large amounts of resources, and it has to be debated how carbon emissions should be priced.

Tiny house architect Anne Kozlowski nonetheless argues in favor of tiny living that in order to reach the goal of delimiting global warming, flexible living arrangements are necessary especially in the wake of a growing number of single households and an ageing society (Kozlowski 38). A forsa[107]-trend-indicator revealed what German builders value in sustainable building. First of all, low running costs and healthy living are prioritized by 94%. Adaptability is rated with 86% and ecological protection with 84% (Kozlowski 39). This underlines the priority of economic arguments in relation to ecological considerations. Certainly, they go hand in hand – but there is always an awareness for the economic component and materiality of the buildings.

In sum, the tiny village is set apart from other case studies through its strong focus on degrowth and social sustainability scripts. The co-creative approach to planning with interested parties includes their needs from the very beginning making the planning process into a bottom-up planning effort. Gerald Kampert argues in an interview that this approach to planning is challenging but hopefully worthwhile from a community standpoint (Rudnick).

[107] Forsa is an institute for social research and statistical analysis in Germany. Their current headquarters is in Berlin. Forsa undertakes market research and opinion polling.

4.1.3 ESSEN 51 – TRANSFORMING THE POST-INDUSTRIAL CITY INTO A TRENDY LIFESTYLE PROJECT?

"Essen 51" is a development project for the construction of a new city quarter in the North of Essen by the investor "Thelen Group." The new quarter will encompass an area of 520.000 m² and offer approximately 1.800 new apartments. Thelen Group's vision is to create a green, smart, and diverse city quarter. The name is derived from Essen's 50 districts, of which "Essen 51" will demarcate the 51st.

"Car-sharing," "micro-breweries," "co-working spaces," "yoga," "modular units," "sustainability," "new work," "international kindergarten and school," "smart home" – are only some of the buzzwords employed in the advertising and promotion of the new city quarter "Essen 51." The settlement will serve diverse purposes from living to working, shopping and leisure. It is an ambitious project with an investment of more than 1 billion. The groundbreaking ceremony was held in 2018, but it is often framed as a project that will take a decade to be completed. The project combines sustainable architecture through "Plusenergiehäuser" (plus energy houses) with contemporary trends for modular building, and smart cities. In the settlement, robots will deliver parcels, energy management is monitored by smart grid technologies, and vital signs of the inhabitants are evaluated to give health recommendations. The project follows many smart scripts: "Lighting, temperature, sun protection, monitoring systems: everything is centrally managed and automated" (Thelen Gruppe, *Fact Cards Essen 51* 24). Besides the technology which includes many state-of-the-art sustainable design features, cultural terms used in the project's description are "new work," "globalization," "smart living," "mobility," "agility" among others. The Thelen Group actively tries to script "Essen 51" as a creative, eco-friendly, globalized hub that combines leisure with business and innovation.

But what stands behind these buzzwords and how will this project shape new forms of living in the post-industrial city? For whom and by whom is this project conceptualized? There seems to be a clear focus on hip, international, and contemporary trends like new work, sustainability, and flexibility. The settlement will be for the new middle-classes and their acquired tastes which the German sociologist Andreas Reckwitz describes in *Die Gesellschaft der Singularitäten*. According to Reckwitz, this new middle-class is extremely qualified, creative, communicative, international, and academic and establishes and promotes different values than the old, more traditional German middle-class. Reckwitz further describes this as a 'polarized post-industrialism' and discerns between a professional and a service class on an economic and social level. The old middle class in Reckwitz's terminology, which encompassed large parts

of German society in the 1950s-1970s and in German is generally referred to as "nivellierte Mittelklasse" (levelled-out middle class) is slowly decreasing in the post-industrial society and being replaced by the new middle class and a less qualified service class. Especially sociologists like Ralph Dahrendorf have criticized the theory of the 'levelled middle class' society and emphasized historically existing and consciously maintained economic differences and social injustices within the different classes (Dahrendorf).

The members of Reckwitz' new middle class are the winners of globalization and flexibilization. "Essen 51," I argue, caters to the needs of this new middle class and their taste of singularities. Reckwitz further writes that the polarization of the classes affects how and where people live: "Particularly in the cities, the mixed residential neighborhoods of the middle class are being replaced by spatial segregation between the attractive neighborhoods of the academics and the more difficult neighborhoods of the underclass."[108]

I argue that "Essen 51" has the potential to become a secluded trendy neighborhood with little connection to the rest of the city. Some apartments will be publicly-supported subsidized housing – a lot less than the quota of one third of all apartments proposed for instance by the city of Hamburg in their "contract for Hamburg." It is therefore in question in how far "Essen 51" will contribute to social desegregation. This is one of the main concerns voiced by citizens of Essen about the settlement under construction (Schymiczek; Heiße). How costly and luxurious will the apartments be and affordable for which societal groups? The Westdeutsche Allgemeine Zeitung, the largest regional newspaper in Germany with their headquarters in Essen, writes about the project: "A hypermodern quarter will be created here. One in which the young, up-and-coming business elite will feel just as much at home as the older generation, the latter in multigenerational houses with integrated communal areas and barrier-free apartments" (Schymiczek).[109] The phrasing "business elite" clearly denotes the ties to the new middle and upper class described by Reckwitz. The international school and kindergarden planned in "Essen 51" also cater to an international economic elite. Cucca and Friesenecker describe the tendencies of "self-segregation processes in eco districts" (Cucca and Friesenecker 505):

> However, 'eco' has been defined as the discursive construction of environmentally friendly cities, districts or buildings for their inhabitants, filtering and protecting them

[108] Orig.: "Besonders deutlich in den Städten werde die gemischten Wohnviertel der Mittelstandsgesellschaft von der räumlichen Segregation zwischen den attraktiven Vierteln der Akademiker und den schwierigen Vierteln der Unterklasse abgelöst."

[109] Orig.: "Ein hypermodernes Quartier soll hier entstehen. Eines, indem sich die junge, aufstrebende Wirtschaftselite ebenso zuhause fühlt wie die ältere Generation, letztere in Mehrgenerationenhäusern mit integrierter Gemeinschaftsfläche und barrierefreien Wohnungen."

> through highly technological envelopes, being places within which urban life can be made clean, healthy and comfortable, but also potentially becoming areas of self-segregation for a green elite. (Cucca and Friesenecker 505)

Even though Essen 51 is not officially marketed as "eco-city," the planned neighborhood engages with some of the ambivalent practices shared with eco-cities. Caprotti admonishes, "eco-cities will not benefit those who will be most impacted by climate change" (Caprotti 1286). Caprotti bases his argument in the analysis of Chinese eco-city developments that he calls "technological fixes." Caprotti continues, "thus, the eco-city becomes the node around which a new economy based on 'green' industries and unrestricted flows of capital can be built" (Caprotti 1291). Essen 51 will be built in the North of the city between *Nordviertel* and *Bochold* two neighborhoods characterized through working class environments. The Ruhr area is characterized through factual social 'segregation' along the A40 which is also referred to as *Sozialäquator*.[110] Essen 51 will be north of this equator. This could have different consequences of either mixing the economically affluent with the less economic affluent quarters, or just creating an affluent 'island' in Essen's North. Frank also describes the phenomenon of cities trying to attract these middle classes through secluded neighborhood settlements which offer the cultural attractiveness of proximity to the city whilst also including leisure opportunities and public transport (Frank 159). A new transportation city line is under construction to connect Essen 51 with the inner city of Essen (Makowka).

Attracting the new middle classes is often tied to hopes for economic affluence, cultural tolerance, and revitalization of the existing building stock (Frank 161). Nevertheless, Frank describes that on the contrary, the tendencies for polarization and social segregation are deepened through the middle classes moving into the inner cities or its proximity (Frank 161). The new middle class is attracted by "middle class 'suburban' islands in the city" - the idea of a culturally homogenous living situation where they can pursue acquired tastes and leisure activities. Frank therefore raises the question as to why middle-class families choose spatial seclusion in these "new family enclaves" (Frank 162). Frank's study shows that in addition to structural reasons like the provision of high-quality services in one location, cultural homogeneity with neighbors is perceived to provide a secure harbor for a safe socialization of their children. In situations where both parents are working close to full-time and share responsibilities, they want everything around them to "function" adequately and not disturb

[110] The 'social equator' refers to the factual unequal distribution of economic income, migration backgrounds, and education. The Southern parts of the cities in the Ruhr region tend to be wealthier, have a better education, and less diverse backgrounds.

their lifestyle (Frank 163). Frank further writes: “Against this background, the authors interpret the current inner-city transformation processes as a spatial coping strategy of the urban middle classes, who are successful in the global economy but still tend to be overwhelmed by it” (Frank 167). These middle-class parents are looking for a “safe harbor” in the midst of global uncertainties and flexible economies. These “middle-class islands” help them secure their status through the transmission of cultural and economic values and passing on a certain habitus (Bourdieu). Frank therefore argues that the trend of reurbanization is mixed with trends associated with suburbanization. She claims that these are not opposed trends but for the middle-classes go hand in hand. And against Florida’s argumentation of increased tolerance, urbanization and integrative qualities, the empirical evidence suggests that especially for middle class parents seclusion and status demarcation are the result (Frank 169). Middle-class solidarities with more marginalized communities are characterized by NIMBY phenomena – solidarity practiced at a distance (Frank 169).

These tendencies can be witnessed in societies where lower incomes and higher incomes separate more and more. In cities of the global South, there is very strong spatial segregation. And these tendencies are fortifying in Germany and around the globe since the 1980s (van Ham et al. 4). The OECD speaks of “divided cities” in this context. Many belonging to the middle class feel like the social contracts are eroding and trying to secure their own status. The same happened in the process of American suburbanization, segregation processes of the middle classes. Möller describes this development as destabilizing for democratic societies and economic stability (Möller 274). The unequal distribution of wealth is mostly based in the beneficial development of stock investments and not in personal work performance, the former being much more profitable than earnings through work alone (Möller 284). Van Ham et al. explain that since the 1980s, “globalization, restructuring of labour markets, and liberalization of the economy, have led to rising income and wealth inequality” and spatially have led to the formation of “a spatial footprint in the form of socio-economic segregation” (van Ham et al. 4). From van Ham et al.’s study of 24 major cities, they conclude that “the higher the level of inequality, the higher the level of segregation” (van Ham et al. 7). In their study, they are able to show that over time the higher-income countries have assimilated to the inequality and segregation degrees of the lower income-countries (van Ham et al. 7).

Essen 51 will be part of the Krupp-Gürtel and Krupp-Park (Naturschutzbund Deutschland e.V.). "Krupp-Gürtel Nord" (Sammet). Shared spaces are supposed to reduce the space used per capita (Sammet).

Additionally, "Essen 51" adopts a certain approach to building culture. "Essen 51" is built on the former coal mining area "Zeche Amalie" and demonstrates the ways in which former industrial spaces can be reused and repurposed. Some elements of the old "Zeche" (colliery) will be integrated into the building concept for "Essen 51" possibly as a market hall. Students from the International School of Management (ISM) pitched different ideas ranging from student housing to a biking hotel or a sustainable hotel and a market place, the latter of which was regarded as the most favorable option (Thelen Gruppe, "Nutzungsperspektiven für die Zeche Amalie auf ESSEN 51."). The iconic pithead tower will also remain part of the future design.

Thinking in scripts and terms of the green city, "Essen 51" combines aspects of smart, resilient, sustainable and social scripts. The script of the degrowth city is not very dominant, although the adaptable housing units and prospective urban gardening projects promote consumer conscious lifestyles and the option of downsizing through their modular approach. Essen 51 is built in a modular structure with the idea that families can upgrade or downsize within the complex. Engineering resilience scripts are mostly present through the efforts in pursuing the plus energy houses, the greening of roofs and facades, and the green spaces and water areas that support cooling. With global warming it will be more important in the future to prevent urban heat islands. Resilience is not addressed as a specifically named topic in the fact cards of the project "Essen 51," but resilience against extreme weather and a hotter climate belong to a future-oriented form of planning. In regard to the ecological dimension of sustainability scripts and promoting engineering resilience, the project will design all apartment buildings as net positive energy houses (dt. *Plusenergiehäuser*) that produce more energy than they consume. The additional energy will feed into the city's power grid. It will be the first settlement in Essen to be comprised fully of plus energy houses. In the Ruhr metropolitan area, the city of Dortmund also ran a campaign to support the building of one hundred plus energy houses in different districts. The roofs and facades of "Essen 51"'s buildings will be greened, supporting biodiversity and insect habitats. Twenty per cent of the total area will consist of green spaces with open water areas contributing to Essen's urban development qualities and cooling this urban area. In the brochure, the Thelen Group writes: "Green buildings not only minimize

ambient noise and particulate matter, but also help to reduce urban stress and enable people to relate to nature. Vertical farming and urban gardening will be part of the "ESSEN 51" habitat."[111] As geographer Joachim Rathmann demonstrates in his book *Therapeutische Landschaften* (2020), natural environments have positive psychological effects on humans. In 1983, Roger Ulrich had already established his theory of stress reduction in natural environments from the perspective of environmental psychology arguing on the basis of studies from hospitals, where patients needed less pain medication and regenerated faster when looking at green spaces (Rathmann 28).

Urban gardening projects can further contribute to social interaction, cohesion and social sustainability scripts. Elisabeth Haefs analyzes urban gardening practices in her dissertation, especially focusing on the types of communities created in urban gardening projects and potential mechanisms of exclusion and narrow social stratification in Essen's urban gardens (Haefs).

The Thelen Group promotes its project as fully sustainable throughout the three dimensions of social, economic, and ecological sustainability (Thelen Gruppe, *Fact Cards Essen 51* 6). The project is advertised to look socially inclusive – even though that might be more of a marketing strategy due to relatively limited efforts of social housing. The green city scripts at work, are diverse, but in order to follow for example a fully sustainable script, there should be more efforts in regard to social sustainability scripts. The efforts in international diversity and inclusion are one step, but the diversity of social stratification should be considered further. The script most closely followed is that of the smart city and engineering resilience with smart monitoring of energy consumption and smart home assistants, delivery robots, and automotive electric shuttles. "Essen 51" in some aspects certainly is a lifestyle project for the new middle-class, but it would be too narrow to frame it entirely through this lens because it also paves the way for other resilient, eco-conscious smart city development projects.

[111] Orig.: "Begrünte Gebäude minimieren nicht nur den Umgebungslärm und die Feinstaubentwicklung, sondern tragen auch dazu bei, den urbanen Stress zu reduzieren und den Menschen den Bezug zur Natur zu ermöglichen. Vertical Farming und Urban Gardening werden Bestandteil des ESSEN 51. Lebensraumes sein."

4.1.4 MERCEDES BENZ STADIUM – MEGA SPORTS FACILITIES AND NEIGHBORHOOD CONFLICTS[112]

Figure 7: Mercedes Benz Stadium (photograph taken by the author)

Sociologist and historian Mary McDonald describes the Mercedes Benz Stadium in Atlanta, which houses the NFL-team Atlanta Falcons and soccer team Atlanta United, through the term "spectacular architecture" (McDonald 219). The stadium comes with a unique and celebrated architecture including an eight-panel extendable roof that is shaped like the petals of a flower. Viewed through the iconography of photography, it opens like a camera aperture. According to the designers and architects at HOK, the roof was inspired by the oculus in ancient Rome's Pantheon (HOK). Business owner and philanthropist Arthur Blank intended to create an "architectural icon" with a "unique fan experience" (HOK). The façade imitates and continues the roof's angular form (HOK). The project was finalized in 2017 with a cost of more than 1.5

[112] Passages from this chapter have been published in Springer Nature under the Creative Commons Attribution 4.0 International License. Source: Wood, Katharina. "'Becoming Green:' Resilient and Green Building as Risk Mitigation in Atlanta, Georgia." *Natural Disasters in the United States: Making Sense of Risks and Vulnerability*, edited by Natalie Rauscher and Welf Werner, Springer Nature, 2025, pp. 167–190. https://doi.org/10.1007/978-3-031-96436-7_9. Canonical URL to the CC-BY 4.0 License: https://creativecommons.org/licenses/by/4.0/.

billion dollars (McDonald 220). It is the result of a public-private partnership between Arthur Blank and the city of Atlanta.

Figure 8: Mercedes Benz Stadium Interior (photograph taken by the author)

Viewed through the perspective of ecological sustainability scripts, the stadium far exceeds state-of-the-art practices in stadium building and organization with its LEED Platinum certification – the highest achievable award in LEED. It is the second sports stadium in the world to receive the platinum plaque. The first was the Minerão stadium in Brazil by BCMF Arquitetos. Especially the water management in the Mercedes Benz stadium is highly innovative and sensitive to storm water management as this area was affected by severe flooding that occurred in Atlanta in 2009. The stadium receives all available points in the LEED category for "water efficiency" (WEc). According to the website, a "680,000-gallon cistern harvests rainwater that is used for irrigating the exterior landscape and for make-up water for the stadium's cooling towers. The stadium is also equipped with a 1.1-million-gallon underground stormwater vault designed to capture and slowly release stormwater to help prevent flooding in the neighboring communities" (Mercedes Benz Stadium, "Water"). The sports stadium is designed to reduce water consumption by 47% in comparison to an average

stadium (Mercedes Benz Stadium, "Water"). The stadium also receives points for installing waterless urinals.

From an ecological perspective, many of the stadium's construction features are tied to engineering resilience scripts such as 'heat island reduction' and 'storm water management.' For the respective credits the stadium receives all available points. The stadium further uses a lot of recycling measures through compostable cups and a recycling sensitive waste infrastructure and was therefore recently awarded with a TRUE Platinum certification (Total Resource Use and Efficiency) for its efforts in zero waste.

The Mercedes Benz Stadium is strongly tied to the ideas of the circular scripts with special emphasis on the concept of zero waste and recycling in regard to consumable goods. On their website, the GBCI clarifies that "A TRUE project's goal is to divert all solid waste from the landfill, incineration (waste-to-energy), and the environment" (TRUE). The MBS (Mercedes Benz Stadium) has adopted a range of strategies to achieve this certification and is able to divert 90% of waste from the landfill through the following measures (Wang):

- "Using supply chain items made from recyclable and compostable materials"
- "Leveraging a 6,000-square-foot resource recovery room (R3) to reclaim, sort and divert materials from landfill"
- "Sustainability education and engagement programs for fans, associates and the stadium's food and beverage partners"
- "Recycling and compost bins added to every stadium suite by August 2022"

Following a zero-waste philosophy as indicated by Müller and Schönbauer in chapter 2 can individualize environmental responsibilities without acknowledging structural and systemic changes that have to be made in the global economic and political systems. This process of individualization is strengthened by the practice of handing out freebies/gifts (often jerseys signed by players) to individuals that correctly recycle or compost their waste at a trash bin inside the MBS. These individuals are then shown on the large screen within the stadium and celebrated as zero-waste advocates. The MBS administration is invested in educating the public on environment-friendly behavior – creating "happy sustainability stories" – that do not or only to a very limited extent question the foundations of economic and ecological inequalities.

On the podcast "The Sustainability Report," creator of the podcast on sustainability in sports Matthew Campelli interviews Scott Jenkins, who at the time served as general manager at MBS (Campelli). With regard to the sustainability achievements at MBS Campelli expresses: "We're talking about the environmentally sustainable side of it – but we're talking about it with a social face – with a human story" (Campelli). Jenkins then adds:

> I think it's the storytelling – as I mentioned LEED Platinum is awesome – but most people walk by the plaque and they might have heard it and then that's the end of the story. But if you can get people to buy into the storytelling – if you can make impacts into your local community and tie that into the small individual choices we make each day – we are hoping that that moves the needle. (Campelli)

And this claim certainly makes a difference on the psychological level – whereas narratives of doom and despair can lead to fatalism, encouraging individuals to assume responsibility is part of the process toward a more sustainable society. Despite the necessity to treat climate change on a structural policy and economic level, individual efforts should not be dismissed as irrelevant. Philosophers Johnson and Sinnott-Armstrong argue in contrast that climate change-related issues "are collective action problems, in which individual actions are inconsequential" (Edelglass 215). Philosopher Edelglass contradicts their positions by arguing for an ethics in times of climate change:

> In the context of climate change, this means that even while justice dictates that I meet my own needs, I am also obligated to work for the alleviation of others' suffering, regardless of whether they are far away or may live in a future generation beyond the horizons of my own life. And the more finely attuned my moral consciousness, the more I recognize both my own responsibility and the resources I possess to work for a more sustainable world. (Edelglass 228)

Sustainability-sensitive ethical frameworks certainly can provide a meaningful lens to think about responsibilities in the age of climate change. Moving away from ethics, but still looking at the question of responsibility, researchers P. Newell et al. propagate in their analysis of climate politics "a focus on identifying agency, whether the capacity of institutions to act or the behavior of individuals" (P. Newell et al. 535). Newell et al. describe the problem of (non-)assuming responsibility through the concept of "governance traps:"

> In seeking to avoid the political risks of taking long-term action, governments' actions on climate change have frequently placed responsibility back onto individuals, communities, and firms through proposals for carbon foot-printing, carbon disclosure for firms and personal carbon allowances. However, our research suggests that people tend to believe that climate change is too big a problem for individuals to tackle alone and that primary responsibility lies with national governments, resulting in a 'governance trap' in which both the governing and the governed seek action from the other but where none is forthcoming. (P. Newell et al. 536)

According to the scholars, these "governance traps" can be circumvented through "reducing the emissions intensity of both production and consumption decisions" and on the policy level "rather than seeking to dismiss public concerns about the scale of the challenge and their efficacy in addressing it, they [policy makers] need to address such concerns by showing strong leadership and a willingness to take responsibility for radical and politically challenging action

to address climate change" (P. Newell et al. 539). The MBS's educational attempt at reducing, reusing, repurposing, donating, recycling, or composting (Mercedes Benz Stadium, "Zero Waste") therefore is one way to address the climate crisis on an individual level, 'one cup at a time' – but most certainly only half the story. The stadium currently misses out on chances to advocate for change on a more structural level that holds business owners, supply chains, and policy decision makers more accountable. In consideration of average ticket prices for MBS events, attending any kind of event is hardly affordable for low-income families. In consequence, these families do not profit from the cultural or educational sustainability experience offered at the MBS.

Considering materials and resources used in the stadium, the issue of circular scripts is being woven more strongly into LEED especially in the materials and resources category (MRc) (Hughes). Nevertheless, the MBS does not receive points for reusing indoor non-structural materials in credit MRc 1.2. This credit refers to the reuse of pre-existing materials in the construction of the indoor spaces. The MBS receives points for recycled content (2/2), regional materials (2/2), and rapidly renewable materials (1/1) in the MR category. Points for certified wood are not awarded. Changes in LEED that factor in embodied carbon, the entire life-cycle of products, and EPDs (environmental product declarations) are laying an emphasis on circularity in version 5 (Hughes).

Regarding resilience scripts in the sense of food security as well as providing green spaces to reduce heat island effect – the stadium includes edible landscaping with on-site blueberry bushes and apple trees as well as an urban garden that is used as an educational resource to showcase healthy produce (AMB Sports Entertainment 15–16). The MBS website explains the different functions of the on-site urban garden:

> Using the garden as a place to share the importance of our food system's ecological footprint, we connect these lessons to the overall sustainability effort at Mercedes-Benz Stadium. For example, soil regeneration as a best practice in the urban garden, is a key element to fighting climate change, and also improves our personal nutrient intake from the meals we eat. By growing our own food and utilizing compost in the Mercedes-Benz Stadium urban garden, we allow a full circle food system to thrive! (Mercedes Benz Stadium, "Urban Garden and STEAM")

The urban garden is again also connected to the ideas inherent in circular scripts. On this note, MBS also has a contract with "Gainsville Waste and Recycling" that converts stadium waste into compost. In March 2022, the MBS "received its first bags of soil made from those composted material generated from trash at the stadium. A portion of that composted soil has

been transported back to MBS and planted in our urban garden on property" (Mercedes Benz Stadium, "Zero Waste").

As landscape architect Richard Stiles indicates in the foreword to *Resilient City*, the idea of the necessity of green spaces is not historically new, but has been promoted by many planners and landscape architects drawing on different cultural traditions and practices (Stiles 7–8). Berlin city planner Martin Wagner advocated for "sanitary greenspaces for cities" in his 1915 dissertation similarly to writer and horticulturalist John Claudius Loudon in his monograph *Hints for Breathing Places for the Metropolis* (1829) (Stiles 7). Stiles emphasizes that authors, gardeners, urban planners, and landscape architects have shared this vision for an extended amount of time (Stiles 7–8). As landscape architect Mertens writes, "[g]reen open spaces such as parks and gardens not only provide recreational opportunities for city dwellers but also serve other functions, such as ecological compensation areas for sealed surfaces, fresh air corridors for ventilating the city, and retention, infiltration, and evaporation surfaces for maintaining the water balance" (Mertens 9). The Stadium offers green spaces to the public on site in order to reduce heat island effect. Mertens explicates that "[m]any cities are already experiencing the urban heat island effect and accompanying heat stress for its citizens" (Mertens 10). Atlantan's especially on the Westside are at severe risk for heat island effects due to lack of park spaces and energy-efficient and well-insulated buildings. "Urban warming" already is and is expected to be a significant health risk in the future (Stone and Rodgers 186–87).

In Antrobus's framing of the resilient city as depicted in the chapter 2, resilience scripts open up spaces to discuss long-term strategies that do not achieve an immediate return on investment. The flood protection generated by MBS strongly benefits the local communities and protects them from storm-water run-off as the latter is kept and treated on-site. From the standpoint of resilience, circularity and sustainability, engineer Zaman and architect Lehmann declare that "waste management is one of the most important challenges for sustainable city design" (Zaman and S. Lehmann 74). As mentioned in the chapter 2, they suggest five principles in order to achieve a "zero waste city": (1) Behavior change and sustainable consumption, (2) Extended producer and consumer responsibility, (3) 100% recycling of municipal solid waste, (4) Legislated zero landfill and incineration, and (5) 100% resource recovery from waste (Zaman and S. Lehmann 82–83). The MBS' efforts are mainly in the areas of (1), (2), and (5). The stadium is understood by its management not only as an opportunity for a sports venue, but the educational value is also stressed through informational and educational signs throughout the

stadium and the stadium tours that inform about sustainability measures and continued efforts in achieving new green benchmarks.

In the LEED credit scorecard, and supporting the engineering resilience and circular script on site, the MBS receives all available points for sustainable sites (SSc) which focuses on brownfield redevelopment, alternative transportation as well as heat island reduction and storm water control. The MBS is in close proximity to two MARTA stations and provides electric vehicle charging capacities for up to 48 cars simultaneously as well as 250 bike racks (Mercedes Benz Stadium, "Alternate Transportation"). The Mercedes Benz stadium receives half of the available points for energy optimization, but focuses on the use of renewable energy through the use of 4000 photovoltaic solar panels that are able to provide enough power for nine Atlanta Falcons games. In the regional priorities score, the focal areas of the MBS are reflected. Here the MBS receives additional points for EQc7.1 Thermal comfort-design; SSc4.1 Alternative transportation - public transportation access; SSc6.1 Stormwater design - quantity control and WEc3 Water use reduction. These priorities in LEED strongly reflect a focus on the ecological dimension of sustainable and resilience scripts – a bias stemming from the rating systems' path dependencies that for instance only minorly focus on social sustainability by design.

Regarding three-pillar sustainable scripts – especially the notion of social sustainability – the project must be contextualized in a much more complex way. McDonald writes about the "contested character of sustainability" (McDonald 221) often tying in with neoliberal practices that benefit the wealthy rather than the less-economically affluent. The stadium has faced counter-protests arguing that the city's tax money should be used for education, infrastructure or to weaken socio-economic inequalities (Dierick and Le Dantec). Community organizer Kate Dierick and communications scholar Christopher LeDantec analyze these community protests in their research on the Mercedes Benz stadium and depict how "Westside residents challenge the rules of sport mega development" (Dierick and Le Dantec 1). In their five-year participatory action research, they conducted interviews and interacted with predominantly African American communities next to the stadium through participant observation. Their research finds that the protests were mostly led by African American women trying to educate their peers about histories of oppression and resistance.

The Mercedes-Benz Stadium certainly presents and establishes many innovative eco-friendly standards. In the wake of the global climate crisis this sets an important example. Where it falls short is especially the realm of social sustainability scripts – despite efforts by the Arthur M. Blank Family Foundation. The concerns of the Westside residents in Vine City and English

Avenue about displacement, rising property prices or economic redistribution were never taken very seriously in the construction and design process – only recently, these efforts are intensifying (Mercedes Benz Stadium, "Community Impact"). The stadium is multi-purpose in the sense that it hosts large pop cultural events and two major sports teams. Nevertheless, in the design process, it failed to interact with local disenfranchised populations providing more diverse use cases or inclusion opportunities.

Figure 9: Atlanta Is Beautiful (photograph taken by the author)

The entanglement of major building projects with larger social and ecological questions could not be more conspicuous as suggested by the analysis of the following art work. In the interior of the stadium, the art work "Atlanta is Beautiful" reminisces about and depicts Civil Rights leaders Dr. Martin Luther King Jr. and Coretta Scott King, John Lewis, together with former President Jimmy and Rosalynn Carter, former Atlanta mayor Andrew Young, and business men and philanthropists Arthur Blank, Bernie Marcus, and baseball player Hank Aaron. Martin Luther King and Andrew Young had even lived in the neighborhoods of Vine City and English Avenue. The wording of the art work and the way it is compiled creates the illusion that all leaders and prominent figures depicted here have shared similar visions for "a beautiful Atlanta" – which is a very sanitized version. Despite it being a collage, the street arty elements

share aesthetic connections and features creating a 'collective graphic memoir.'[113] This notion is especially evoked through the slogans spread on the art work reading "follow your dreams," "love is the answer," or "it's a wonderful world." In reality, major corporate interests have historically often conflicted with workers' rights and ambitions for economic redistribution. Arthur Blank and Bernie Marcus – founders of the home improvement retailer 'home depot' – have long resisted the creation of unions within the home depot enterprise (Jamieson). And in contrast to a community effort, this piece of art was created by a single white French artist named Thierry Guetta. This minor detail tells a story about the stadium's construction – creating the imagery of community orientation whilst only involving very few stakeholders in the design process.

The construction of sports stadia often promises development that will positively affect the local communities through new jobs, economic investments, infrastructure etc. Research by Jones, Swindell and Rosentraub shows that these goals are often empty promises and that sports facilities cater mostly to their primary function as an event space and are not conceptualized to benefit the local communities in the long term. Arthur Blank promised broad economic benefits, but there has been little real effect of this promise. Blank announced: "When we decided to build Mercedes-Benz Stadium, it was imperative that the stadium catalyzes revitalization in the Westside" (Bahr). Further arguing: "We view the stadium as an anchor institution and a citizen of the neighborhood with an opportunity and a responsibility to contribute to meaningful, positive change" (Bahr). For a fact, the Blank Foundation is providing grants to support further implementation of affordable housing, reducing illegal evictions and supporting home ownership. In 2022, the available funding sum was 5 million dollars. The total sum invested so far exceeds 57 million (The Arthur M. Blank Family Foundation). This money has been invested in very specific projects, sometimes benefitting very small groups such as building homes for external police officers in order to reduce crime rates: critically stated to police the neighborhood.[114] Other investments such as the @Promise Youth Center, in Chambers's and Green's analysis, mainly contribute to the gentrification of the area – beautifying minor parts top-down whilst not contributing to bottom-up initiatives.

The city of Atlanta will invest around 700 million dollars in stadium construction and maintenance, which in total cost 1.5 billion dollars. Remarkably, Atlanta has one of the highest

[113] Thank you to Dr. Sandra Danneil for bringing up this term in the research colloquium.

[114] The officers chosen to live in the neighborhood for instance have to park their police vehicle in front of the house to show presence. They are further awarded 500$ each month to participate in community events (Green).

rates of economic inequality in the U.S. (McDonald 221). And this inequality is strongly divided along racial lines. The Mercedes Benz Stadium is not the first case of mega sports development in Atlanta. It was preceded by the development of the Georgia Dome and further preparations for the 1996 Olympics. Against this backdrop, author Tom Wolfe in his 1998 novel *A Man in Full* wrote the following passages:

> Did you happen to see any of those 'guides to Atlanta' they published for the Olympics? Big, thick things, some of them, regular books, and I couldn't believe it at first. It was as if nothing existed below Ponce de Leon other than City Hall and CNN and Martin Luther King memorabilia. The maps—the maps! —were all bobtailed—cut off at the bottom—so no white tourist would even think about wandering down into South Atlanta. They didn't even mention Niskey Lake or Cascade Heights."
>
> ''I'm not too sorry about that,'' said Roger.
>
> ''I'm not either,'' said Wes, ''But you get the picture, don't you? How do you segregate white tourists from black people in a city that's 70 percent black? You render the black folks invisible!' (Tom Wolfe, *A Man in Full*, 1998, p. 185, qtd. in Gustafson 198-99)

Geographer Seth Gustafson argues that the city of Atlanta strategically not only tried to render Black spaces invisible but also displaced homeless and lower-income populations in preparation for the 1996 Olympic Games so that "Atlanta could create an image of itself as a prosperous, authentically global city" (Gustafson 199). In this course of action, the city intended to "demographically actualize the narratives of prosperity, cosmopolitanism, and multiculturalism that accompany global city formation" (Gustafson 201). In this glossy imagery, homelessness and poverty are not welcome – but must be hidden out of sight. The largest homeless shelter in downtown "Peachtree-Pine" was closed in 2017. "After years of controversy around its future, the former Peachtree-Pine Homeless Shelter has a new owner – a deal that could help revitalize an area long seen as a gap between downtown and Midtown" (Wenk). Recreation and leisure studies scholars Burns and Berbary describe that "revitalization and renewal suggest a progressive upscaling and improvement that conceals legacies of displacement. Revitalization is, in many instances, a friendlier way of describing gentrification in progress" (Burns and Berbary 645). These processes of gentrification displace populations without offering solutions – the homeless shelter will be redeveloped into a university building without offering an adequate replacement or contributing to solutions to solve Atlanta's homelessness crisis (Atlanta Mission). Atlanta-based journalist heather Buckner writes "[w]hat scholars refer to as the modern era of homelessness emerged in the 1970s and '80s, propelled by urban renewal, the closing of public mental institutions, the millions of jobs lost to deindustrialization, the early-'80s economic recession, and the austerity budgets embraced by the Carter and Reagan administrations" (Buckner). These developments are clearly discernable

in Atlanta, and for the Super Bowl LIII in 2019 that was hosted at the MBS, homeless people were put into temporary shelters yet again (K. Williams).

The documentary film *The Home Team* (2019) directed by Camille Pendley and Laura Asherman shines a light on the residents "in the shadow of the Mercedes Benz Stadium" (Pendley and Asherman, "The Home Team"). The following sections quote people that were interviewed for the documentary or sequences included from other news outlets. A prominent sequence shown is from the CBS show "This Saturday Morning" where a journalistic voice-over shows the MBS while stating that "it may look like a sporting cathedral, but according to the Falcons president and CEO Richard McKay it was built to be more like community center." McKay is then interviewed by CBS and states: "This stadium can be a catalyst for change, we can bring everybody to the table, we can make an impact on the Westside – but it won't just be because we built the building."

In a later sequence Franz Fernandez, VP of Community Development at the Arthur M. Blank Foundation, is interviewed for the documentary and proclaims:

> So, as part of the whole stadium project, we committed to working with the city and others to see what we can do to bring about revitalization and transformation. For us, it really is this idea, this North star, of we all rise together. Arthur has publicly said 'We can't have this great iconic sports stadium – which is one of the finest sports stadiums in the world next to some of the most marginalized, disinvested, and distressed communities.' That cannot coexist – we have to do what we can from our perspectives and the resources we have to change that – to change the path of concentrated poverty you have here in these Westside neighborhoods.

The terms "revitalization" and "transformation" are reiterated as they are used in many planning documents without questioning these terms' problematic intricacies and histories in urban planning. When the residents voice their opinions, Rosario Hernandez exclaims: "This might not look cute – but we are a community […] once gentrification happens it's gonna be very very different. That's the difference I don't want. I do want things to look nice, to feel safe, but I don't want to lose this whole – you know – we are a community." Another resident interviewed for the documentary expresses: "With the stadium thing, I don't think they are trying to help the kids in the hood. What I really see is that they are trying to push us out the hood. They got programs, you know, to try to help em. But they probably ain't gonna reach all of them, because some folk be like: 'Hey man, them folks taken over our hood.' You know, where you've been all your life." The residents' perspectives react very differently to the proposed "transformation" envisioned by the Arthur Blank Foundation. And 'perspective' is exactly the keyword. In his statement Frank Fernandez articulated that "we have to do what we

can from our perspectives." As stated in chapter 2 involving research by Renn and Schweizer on 'inclusive risk governance' stakeholder involvement is crucial (Renn and Schweizer). This also becomes apparent in another statement by resident Rosario Hernandez, where she comments on the Westside Future Fund meetings that were launched by the Atlanta Center for Progress (ACP) and supported also by the Blank Foundation:

> The Westside Future Fund meetings, were geared more towards investors and people that are decision makers and not really geared towards the regular folks that live here. And all these meetings month after month, I'm wondering how much money it costs, to hold all these meetings, to investigate us, to do surveys, to treat us like we are lab rats. If I could see some change. […] Meet us where we are at.

Taking the Westside residents into account certainly presents a step toward social sustainability scripts but is far away from the concepts of "negotiated resilience" and "adaptation urbanism" discussed in the chapter 2. What residents in the documentary are asking for is to "meet us where we are at" and to "come on in – and we can show you what we need some improvement on" (Pendley and Asherman, *The Home Team*).

Urban planners and architects Wiedmann and Salama identify "[t]hree main conflicts endangering any sustainable development" that "are rooted in the divide between top-down decision-making and the values of communities, the divide between masses of labourers and few consumers and finally the divide between widespread speculative tendencies of investments and the implementation of long-term solutions." (Wiedmann and Salama 353). In the case of the MBS, these conflicts become apparent, especially the first conflict. The social production of spaces and buildings relies heavily on power structures. The MBS is an iconic example of this. The monumental architecture creates a space of excellence that is socially exclusive. It further showcases the problematic nature of philanthropic engagement which generally solves problems on a surface level without addressing the root cause. Maclean et al. constate that "[c]ritics argue that philanthropy is a profoundly undemocratic institution that places yet more power in the hands of elites by handing them control of cultural, social and political priorities" (Maclean et al. 331). "Recycle for Good" – an initiative where from three million recycled aluminum cans at the stadium, a house is built on the Westside falls into the same trap of philanthropic engagement.

What further calls into question the responsibilities the MBS' owners are willing to share and assume is that the stadium is exempt from property taxes that would also benefit the school system on the Westside (Pendley and Asherman, *The Home Team*). This circumstance was challenged in a lawsuit but overruled (D. Williams). In sustainability efforts, social

sustainability scripts are frequently given the least priority – a back-seat – only a witness to ecological sustainability being prioritized through efforts in resilience and climate adaptation. This negligence has very immediate consequences and risks leaving the poor and working class on the sidelines. This technocratic approach to sustainability is often pursued through the idea of creating a 'green economy' mostly by pursuing energy efficiency in the sense of 'ecological modernization.'

Professor of International Relations Peter Dauvergne argues in *Environmentalism for the Rich* that the environmental movement has mainly been concerned with topics pertaining to the interest areas of the affluent – "diverted into eco-business, eco-consumption, wilderness preservation, energy efficiency, and recycling" (blurb text). How communities are affected and how they can participate and include their perspectives is seldomly the focal area of corporate environmentalism.

The green building rating system LEED, which is mainly adopted by businesses and large stakeholders, reflects the lack of social sustainability scripts quite transparently in their priorities list for version 4:

> Of all LEED credits, 35% of the credits in LEED are related to climate change, 20% of the credits directly impact human health, 15% of the credits impact water resources, 10% of the credits affect biodiversity, 10% of the credits relate to the green economy, **5% of the credits impact community** and 5% of the credits impact natural resources. (USGBC, "LEED rating system")

Only 5% of credits are planned to affect 'community.' There are several pilot credits in progress to change this, but so far there is no incentive to incorporate these with more weight in the rating system. The way the green building rating system LEED is built in version 4 illustrates the concepts of 'greenness' it is conceptualized through which is a mix of ecological sustainability scripts (mostly energy efficiency) and engineering resilience scripts. The question of: "sustainability for whom?" plays a very minor role. But this is not entirely true: The health of the building's inhabitants plays a relatively large role as it is included with 20% of the rating's criteria. Green buildings are conceptualized to be healthy buildings for those that use them through the use of low-emitting materials, daylight views, and human-friendly air, acoustic, and thermal qualities – again reflecting an individualistic view of social sustainability scripts. In addition, the question remains: "Who inhabits these buildings?" The vast amount of LEED certification in Atlanta happens in the affluent corporate sector whilst the rest of South-West Atlanta, where the Mercedes Benz Stadium is situated, suffers from energy insecurity and energy burdens through poorly insulated buildings. There is a history of disinvestment in the

Western and Southern areas of the Atlanta metropolitan area. Racial segregation is the most relevant historic influence on this disparity. West Atlanta has fewer greenspaces and main waterways are polluted. Researchers and partly Atlanta-based activists Milligan, McCreary, and Jelks further conclude that "Atlanta's urban hydrology presents a landscape of racial disparity" (Milligan et al. 1600). Proctor creek, which runs through West Atlanta, is at high risk of storm water flooding and sewage overflows polluting the waterway in the majority Black and economically depressed neighborhood. High-levels of bacteria regularly cause problems for the local residents (US EPA, "Urban Waters and the Proctor Creek Watershed/Atlanta (Georgia)"). The West Atlanta Watershed Alliance (WAWA) is a Black-led educational and scientific institution condemning and problematizing these hazards and engaged in the environmental justice movement. Darryl Haddock, Education Director at WAWA, says the following about challenges facing Atlanta-based communities:

> That influx of gentrification in town and the downtown neighborhoods of Atlanta have created new communication and outreach challenges because we've been so used to speaking to communities that look like us. We've got these new populations, some transplants from other cities, who are majority educated and wealthy white residents, and they're communicating differently. For example, they use social media more than the legacy residents. It means that we have to be nimble and learn these new communication strategies. This creates a lot of stress and anxiety on legacy residents because there's a difference in the financial and economic pressures on these two populations. (River Network)

Gentrification has become a more pressing issue and challenge in recent years in the Atlanta metropolitan area. Especially 'green gentrification' surrounding the 'Atlanta Beltline'[115] has fallen short of providing affordable housing projects that had originally been promised. The Beltline has made the city more attractive to what Richard Florida coins as the 'creative classes' and also increased the property values of adjacent spaces, adding to the pressures on legacy residents.

Atlanta-based researcher Martínez situates the placement of Black residents in flood-prone lower areas of the city and the development of sewer systems accordingly in their historic context of racial segregation and settler colonialism (Martínez 8). Martinez describes how in Atlanta narratives "of racial progress [have] obscured ongoing anti-Black violence, such as redlining" (Martínez 8). Martinez further explains that "[r]edlining's economic rationality relied on anti-Blackness but disguised its dependence on constructed racial hierarchies with

[115] The Beltline is a multi-use trail in Atlanta on former railroad tracks with adjacent greenspaces, culture and event spaces that connects multiple neighborhoods and is used for leisure activities. The idea for the project was developed in a master's thesis by Georgia Tech student Ryan Gravel and its development is on-going.

purported neutral language of ‘the market,’ which laid the groundwork for continued housing insecurity” (Martínez 8). These narratives of “racial progress” have been proliferated through the so-called “Atlanta way” that consisted of economic coalition-building between white and Black elites and oftentimes repressed Black resistance. This effect of the “Atlanta way” has been traced from 1906 race riot in Atlanta to the George Floyd uprisings by reseachers Edgett and Abdelaziz.

The question of accessibility and equal distribution of green and quality housing remains urgent. From a normative standpoint, green building should be available and accessible not only to affluent groups. Abe Kruger, founder of SkCollaborative, and other advocates in Atlanta promote the inclusion of sustainability criteria especially for affordable housing and mixed-income housing. Fortunately, the LIHTC credits (Low Income Housing Tax Credits) in Georgia legislate that new affordable housing projects must adhere to one of several green building standards such as LEED. This promises to alleviate some of the energy-burden for the most vulnerable populations. Nevertheless, Atlanta has a history of reducing affordable housing while not remodeling or replacing it adequately. This for example happened in the case of the demolition of Techwood Homes prior to the 1996 Olympics, one of the first public housing projects in the U.S.

Frameworks such as LEED provide templates and criteria that follow ecological sustainability and resilience scripts but continue to hold a very narrow focus on ‘greenness’ which often is separated from social questions and responsibilities. LEED makes this clear and is quite transparent in this regard, awarding only 5% of the rating’s criteria to benefitting the ‘community’ in version 4. In order to achieve a green transformation which is also inherently social, technical standards should be inclusive of other research questions. Complex problems need transdisciplinary answers. From the interviews I have conducted, I learned that LEED building projects generally do not even try to achieve the criteria related to social sustainability but focus on energy efficiency – which achieve the highest monetary return on their investment. Social sustainability is considered nice to have – but not essential, as stated in my interview with Abe Kruger.

The green scripts followed most prominently in this case study are the resilient and circular script also adhering to principles of ecological sustainability. The MBS is framed as “trailblazer for the green sports industry” (AMB Sports Entertainment) but falls short in the realm of social sustainability scripts. The concept of inclusive governance (Renn and Schweizer 175) introduced in the resilient city chapter fails to be implemented in the case of MBS for political

and economic reasons. The approach to resilience brought forth in the concept of the MBS does not include the notion of Harris et al.'s "negotiated resilience" including multi-perspectival approaches and stakeholders into resilience frameworks. Out of the five W's of resilience (Resilience for whom, what, when, where, and why) in Meerow and Newell (2019) – the answers are not directed at transforming social and ecological relations in the sense of redistributions but rather engage with a neoliberal 'sustainability fix.'[116]

Failed opportunities in the case of MBS are the cooperation with smaller, more locally grown NGOs such as WAWA and more citizen participation in the decision-process for philanthropic projects instead of top-down approaches. In cooperation with residents new questions such as: "What do residents need despite more police presence or the building of single homes?" could be raised. The inclusion of neighborhood-oriented resilience in the project through the storm water management vault is an important starting point for community-oriented resilience scripts which does not end at property lines and concludes the aspect where the stadium supports its neighborhood most. In line with Soja's Thirdspace, marginalized perspectives have been left out in the planning process. The editors of *The Social (Re)Production of Architecture* (2017) architects Petrescu and Trogal argue that

> a 'right to architecture' [that] not only concerns 'having a say' in development, but rather concerns real material rights (such as the right to housing, to public space, the rights to space) as well as the more elusive, psychological rights that Lefebvre evoked, such as the rights of imagination, or the right to play. These rights are seen 'more as an emancipatory project, emphasizing the need to freely project alternative possibilities.' (Petrescu and Trogal 3–4)

Green building standards so far provide rather limited 'alternative possibilities' for the social realm. Green building standards have in the past mostly been established by engineers with a focus on ecological sustainability, resilience and circular scripts and have been less frequently informed by the humanities or social sciences. Arthur Blank makes a very bold statement in the MBS's website "community impact section" stating "If we are not successful in transforming the Westside communities around the stadium, this project will be a failure" (Mercedes Benz Stadium, "Community Impact") – the future beholds what will come of these ambitions.

[116] While et al. explain that urban sustainability is often deployed in the context of the entrepreneurial city in such a manner as to use green growth to extend the neoliberalization of the urban sphere. In this usage, the 'sustainability fix' does not appear as a transformative script, but one that secures, extends, and manifests existing power relations.

4.1.5 THE KENDEDA LIVING BUILDING – ECO-CATHEDRALS AS BEACONS OF HOPE?[117]

"A nation that destroys its soils destroys itself."

— Franklin D. Roosevelt qtd. in Ratcliffe

Every year, Georgia is affected by several forms of natural disasters such as an average of 30 tornadoes, wildfires, floods, extreme heat and droughts, or tropical storms, and hurricanes. Due to climate change and global warming these disasters occur more often and have stronger impacts (Stott; McBean). The city of Atlanta, GA, is especially at risk for flooding and severe storms (Wright et al.). Atlanta has therefore installed an "Office of Resilience" coordinating efforts on several levels: food and agriculture, clean energy, parks and greenspaces, and neighborhood livability. The case-study at hand investigates one building confronting these risks: The Georgia Tech "Kendeda" living building.

The Georgia Institute of Technology frames the building through the following statement: "Rather than being less bad for the environment, The Kendeda Building fosters regenerative and restorative relationships amongst humans and nature where people give back more to the environment than they take" (Georgia Tech, "The Kendeda Building"). The building accordingly strongly follows regenerative principles. In this context, the current director of the Kendeda building Shan Arora articulated:

> Let's talk about the mind shift of seeing buildings as giving back more to nature than they take – what we call regenerative buildings. I would add that buildings should also be restorative in how they shape human relationships. We are creatures who live in buildings, and I believe buildings can help people become happier, healthier, more connected. (Arora)

The statement evokes another green script: circularity. The idea of closed loops, where materials and resources are reused and repurposed. In consequence, the Kendeda building has not only adopted one, but two, green building certification standards: LEED (Leadership in Energy and Environmental Design) version 4 and LBC (living building challenge) version 3.1. Resilient, green, and healthy buildings are necessary prerequisites for the mitigation of climate change and natural catastrophes. This chapter analyzes how green building standards can help mitigate the effects of natural disasters due to climate change from the perspectives of resilience, social and ecological sustainability, and cultural responsibility.

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[117] This chapter is based on and has been published in Springer Nature under the Creative Commons Attribution 4.0 International License. Source: Wood, Katharina. "'Becoming Green:' Resilient and Green Building as Risk Mitigation in Atlanta, Georgia." *Natural Disasters in the United States: Making Sense of Risks and Vulnerability*, edited by Natalie Rauscher and Welf Werner, Springer Nature, 2025, pp. 167–190. https://doi.org/10.1007/978-3-031-96436-7_9. Canonical URL to the CC-BY 4.0 License: https://creativecommons.org/licenses/by/4.0/.

Figure 10: Kendeda Living Building (photograph taken by the author)

Atlanta is a pioneer for green building in the United States, ranking 3rd in LEED-certified office space, and 10th in LEED-certified residential buildings (CBRE). The different standardization systems such as LEED or living building ensure standardization and accountability, and many of them pursue the goal of resilience. Within LEED certification, it is encouraged through pilot credits and rewarded through points to establish and conduct 'climate related risk management planning' or 'emergency preparedness planning.' Especially in green building, there is an awareness for resilience on an environmental, economic, and social level. Green and resilient buildings therefore provide future-oriented solutions to limit global warming and contribute to eco-conscious lifestyles. In this regard, the Kendeda building is also used for educational and

showcasing purposes to propagate environment-friendly building techniques and blueprints (Georgia Tech, “The Kendeda Building”).

Green buildings, resilient infrastructure, and green spaces can inhibit damage through flooding and severe winds. It is necessary to take these measures into account as historic natural catastrophes in the U.S. have shown how easily buildings can be damaged and collapse, when confronted with natural disasters. The building stock and future building projects must therefore be scrutinized from the perspective of risk mitigation and resilience. Building with resilience also raises social questions: Who profits from current green and resilient building efforts? Only those who can afford to? Are affordable housing projects included in the efforts? Statistically measured, economically-disadvantaged communities often have fewer green spaces where water can be absorbed and are at higher risk of flooding (Wachsmuth et al., “Expand the frontiers of urban sustainability”).

Certification systems provide several benefits, such as risk management, optimization, and quality control. Nevertheless, there is always the potential of commodification and green washing. Certification is easily used for marketing or “green signaling” (Truong and Pinkse). Generally, certifications have important benefits with regard to the planning, use, and reuse phase. They secure that a wide arrangement of criteria is included from day one. One of the benefits of LEED certification is that it is internationally renowned and has an international reputation. This is especially interesting for firms that sell their products globally or want to establish such a global reputation. The living building challenge (LBC) is one of the most ambitious green building standards in the U.S. and is gaining more and more recognition – although it is used far less than LEED due to its strong requirements.

BUILDINGS CODES AND STANDARDS IN THE U.S. AND THE CULTURE OF INDIVIDUALISM

As research concerned with insurance data has shown, stronger building codes can limit the effects of natural disasters regarding windstorm losses by 40-60% (Czaijkowski 311). Economist Jeffrey Czajkowski further illustrates how “the most vivid images presented in the wake of natural disasters involve buildings” (Czaijkowski 303). Losing a home can become an existential crisis for the former inhabitants, not simply monetarily but also with regard to identity, memory, and attachment to possessions and place. In his analysis of building code implementation in the U.S., Czajkowski finds that adaptation and code prescriptions vary strongly by state and region (Czaijkowski 307). He also finds that “36% of states do not adhere

to uniform statewide residential building code standards" (Czaijkowski 307). Research suggests that stricter codes have economic benefits as buildings built under them sell for 10% higher prices (Czaijkowski 306).

Specific opposition to more regulation through stricter building codes or certification systems culturally comes from U.S.-American affections for cultural concepts such as self-reliance and individualism. As social scientist Toby Miller describes, "American individualism is a bad source of ideas for addressing global warming and environmental degradation, both because it misreads the real role of government in our lives and because it nourishes ongoing white supremacy" (T. Miller and Maxwell). Global warming is perceived differently by humans with more individualistic cultural values in contrast to more egalitarian views (Smith and Leiserowitz 1029). Environment and forestry scholars Smith and Leiserowitz describe that individualism and egalitarianism are strong predictors with regard to the incline toward pro-environmental behaviors (Smith and Leiserowitz 1030). On this note, environmental philosopher Baird Callicott emphasizes that "the hyper-individualistic and rationalistic paradigms – originating in the late eighteenth century and dominating moral philosophy – cannot capture the moral concerns evoked by the prospect of global climate change" (Callicott 101). Some solutions can certainly be found at the individual level, but these solutions are insufficient and demand laws, policies, and regulations at higher regional, national, or international levels (Callicott 115–116). One possible measure for climate change mitigation would be the implementation of green building certification systems at these levels. These certification systems contribute to resilience on the economic, social, but most strongly on the ecological level.

How can these standards contribute to disaster mitigation? First of all, certifications encourage a structured and well-organized planning phase that considers a manifold catalogue of criteria related to ecological resilience. And secondly, sustainable building certification systems tackle the problem from two directions: prevention and adaptation. Environmental law scholar Shari Shapiro, considering research by Hassler and Kohler, further defines resilience for the built environment through the following two concepts (Shapiro 491):

> Resilience is a term that can 'collapse into meaninglessness […] from having too many meanings' (Hassler and Kohler 119). Here, resilience incorporates two concepts: built-in resilience and disaster risk reduction. Lee Bosher defines 'built-in resilience' as 'a quality of a built environment's capability (in physical, institutional, economic and social terms) to keep adapting to existing and emergent threats' (Hassler and Kohler 123). By contrast, 'disaster risk reduction' is preventing threats from happening in the first place. (Hassler and Kohler)

Green building certifications, as I will argue in the following, contribute to built-in resilience as well as disaster risk reduction. Green building certifications further provide concrete criteria to measure engineering resilience and circumvent and confront the problem of elusiveness – but they oftentimes fail at negotiated resilience scripts and adaptation urbanism.

"KENDEDA" LIVING BUILDING IN ATLANTA, GEORGIA

> Campus landscapes can serve as living laboratories for reducing carbon footprints, conserving water and aquatic resources, supporting biodiversity, and building active, equitable social communities. Moreover, as learning landscapes, such campuses actively promote sustainable design by engaging faculty, staff, and students in the design and implementation process as a part of the pedagogy of place. This progressive focus positions universities as leaders educationally and environmentally. (Way et al. 25)

Most greening initiatives on U.S.-American campuses focalize green buildings by implementing LEED certification or waste/facility management procedures (Way et al. 25). The number of 'greening campuses' initiatives has steadily increased over the last decade (Steele). Geographers Finlay and Massey argue that "[u]niversities and colleges are important sites of transformation as centres of discourse and vehicles of social change" (Finlay and Massey 150). With this in mind, one of the core goals of the Kendeda building partners was to "demonstrate that a regenerative building can be built in a hot and humid climate" (Georgia Tech, "Key Living Building Details").

The Kendeda Living Building is an experimental and educational structure built for the Georgia Institute of Technology by means of the Kendeda Fund, which is a private family foundation based in Atlanta, Georgia. It combines many innovative and state of the art efforts in green building. The Living Building Certification groups its aspirations and focus areas into different petals of a flower. The petals are: "place," "water," "energy," "materials," "health & happiness," "equity," and "beauty."

According to the International Living Future Institute, the metaphor of the flower is used because "the ideal built environment should function as cleanly and efficiently as a flower" (International Living Future Institute, "What Is The Living Building Challenge?"). According to the co-founder of the standard, Jason McLennan, **"**flowers are an accurate representation of a truly regenerative building which receives all of its energy from the sun, nutrients from the soil, and water from the sky. Similar to a flower, they simultaneously shelter

other organisms and support the surrounding ecosystem. They also serve as beauty and inspiration and adapt to their surroundings" (Thomas).

Introducing the building, here are some central facts taken from the website (Georgia Tech, "Key Living Building Details"):

- "The Kendeda Building site, which was formerly a parking lot, acts like a forest with 90% of an average rainfall managed on site."
- "Renewable Energy: Photovoltaic system supplied 225% of building's energy needs, far exceeding the 105% LBC requirement."
- "Project kept economic benefits close to home by sourcing at least 50% of products and services from within 621 miles (i.e., 1,000 km)."
- "Construction of the building diverted more waste from the landfill than sent to the landfill through the use of salvaged materials."

Especially the place, energy, water, and materials petals incentivize engineering resilience scripts through focusing on biodiversity, urban agriculture, net positive water, or non-toxic, low-emitting, and repurposed materials. The requirements for LBC require buildings to be built on greyfields or brownfields and "projects may not be built in ecologically-sensitive habitats, including wetlands, primary dunes, old-growth forest, virgin prairie, prime farmland, or within the 100-year floodplain" (Georgia Tech, "Place Petal"). This sensitivity to floodplains increases socio-ecological resilience scripts as well as the imperative of net positive water. Net positive water "requires one hundred percent of occupant water to come from captured precipitation or closed loop water systems" (Georgia Tech, "Water Petal"). Rainwater is turned into drinking water on-site without the use of chemicals. Water is a "regionally critical issue" in Atlanta due to droughts and limited available ground water (Georgia Tech, "Water Petal"). In the design process, the data suggested that a "50,000-gallon cistern would provide ample capacity to overcome drought and provide water resiliency after studying 31 years of drought and precipitation data and stress testing the model for varying occupancy and water use patterns (high, moderate, low)" (Georgia Tech, "Water Petal").

LEED-standard is a widely recognized internationally acclaimed green building standard. Version 4 incentivizes engineering resilience scripts in the aspects of "sustainable sites," "water efficiency," "energy and atmosphere," "materials and resources" and "regional priority credits." In the criteria of "sustainable sites," the Kendeda buildings receives all points with regard to "heat island reduction," "open space," "site development (protect or restore habitat)," and "rainwater management" (USGBC, "Kendeda Building"). In the criteria of "energy & atmosphere" the building receives all points for optimizing energy performance and renewable energy production (USGBC, "Kendeda Building"). LEED currently is testing pilot credits that

are directly related to natural disaster mitigation. The credits (IPpc98**)** include hazard assessments for flooding, hurricane, tornado/high wind, earthquake, tsunami, wildfire, drought, landslide/unstable soils (USGBC, "Resilience Workbook IPpc98 and IPpc99"). The goal is to identify the top three hazards for a site and ways they can be addressed. In addition to this prerequisite, one of two options has to be chosen which is "climate resilience planning" or "emergency preparedness planning." Credit IPpc99 – Design for Enhanced Resilience – then evaluates if the hazards detected in IPpc98 are tackled via appropriate mitigation strategies (Alex Wilson).

In an interview with Shan Arora, current director of the Kendeda building, Shan spoke about how the building could be used as a space of refuge in case of disaster due to its relative energy- and water independence. The foam-flush toilets consume very little water, rainwater can be treated on-site and turned into drinking water, and the building is net energy- and water positive. In 2021, the building provided 201% of its energy demand on-site (Georgia Tech, "2021 Annual Report"). In the interview, Shan Arora articulated:

> We also have to think about resiliency in our communities and about creating places of refuge when infrastructure fails. Certain buildings naturally lend themselves to that role, especially schools and houses of worship. They already have what's needed for people to gather, and they are known and trusted within the community. Whether or not you attend a school or a church, you likely know where they are.
>
> So, we should design public buildings as multi-use infrastructure. A school can be much more than a school. A town hall can be much more than a government building. Infrastructure should function more like Living Buildings and serve multiple purposes at once. Every component should meet two, three, maybe even ten needs simultaneously. The Kendeda Building is an example of that kind of resiliency. Now the work is to scale it. (Arora)

In Shan Arora's vision, the Kendeda building could serve as such a site of refuge in times of crisis. Arora emphasizes that the resilience of the building would have to be increased for it to become such a place. Environmental engineers Dargin and Mostafavi articulate:

> Considering the complexity of modern critical infrastructure systems in terms of its inter-dependencies and external pressures, including increasing demand, aging, and climate change, the risk and severity of disruptions are becoming more likely. Community resilience planning is tasked with ensuring the equitable access and delivery of critical infrastructure system services in cities by reducing the disproportionate risks of service disruptions to the most vulnerable members in a community. (Dargin and Mostafavi 2)

Resilient buildings can crucially contribute to this infrastructure. Especially vulnerable populations must be kept in mind when dealing with natural catastrophes or extreme heat. In

this case, the Kendeda building is not located in a residential area but on the Georgia Tech campus, where it will most likely mostly serve Georgia tech staff and students.

The Place Petal planning description for the Kendeda building describes the land it is built on as "rich and storied:"

> The natural and cultural history of the land on which The Kendeda Building is built is rich and storied. While the Beauty Petal and its Inspiration + Education Imperative asks teams to look at the site and its surrounding region's cultural heritage, the Place Petal focuses first and foremost on the environmental heritage. The Piedmont region, of which our site is a part, naturally features a variety of plants and soils – not an expanse of concrete. (Georgia Tech, "Place Petal")

Respecting the environmental heritage is a relevant aspect of the resilient city – especially preserving natural soils for rainwater run-off and plants. The return to native plants and local climates further adds to the achievement of resilience. The Place Petal in the Living Building Certification System nevertheless contradicts the OECD's vision of growth in the resilient city through the four imperatives: limits to growth, urban agriculture, habitat exchange, and human-powered living (Georgia Tech, "Place Petal").

The Water Petal focuses on achieving Net Positive Water. This means that the water used on site must be collected on site. This also resonates with aspects of resilience that consider local rain water supply as well as future predictions based on changes through global warming processes (Georgia Tech, "Water Petal"). Atlanta has very little available groundwater and relies on streams, rivers, and reservoirs for the city's supply (Georgia Tech, "Water Petal"). The Kendeda building can convert rainwater into drinking water. The greywater is used to "recharge" the landscape (Georgia Tech, "Water Petal"). The wording "recharge" is a very positively connoted word with synonyms like refresh, regenerate, rejuvenate, energize. The story told about water is that of 'recharging the soil,' 'managing water,' and in the end 'achieving net positive water.' This sequence of events relates stories about the resilient city.

With regard to the energy petal, concepts and phrases like "passive design," "efficient," "natural climate," "optimization," "operable," "comfort," "conservation," "needs," "generate" are utilized with clear references to the resilient city script ("Energy Petal"). The engineering resilience script works according to specific concepts that evoke certain vocabularies such as "modeling," "mitigation," solutions," "extremes," "bouncing back," "health," "infrastructure." The idea is that systems exist in a constant state of flux and should be able to adjust to different extremes (Meerow and J. P. Newell 314). The production of energy which relies on several

renewable resources appears to be rather resilient as it spreads risks through photovoltaics, passive design, shading, and efficient energy conservation.

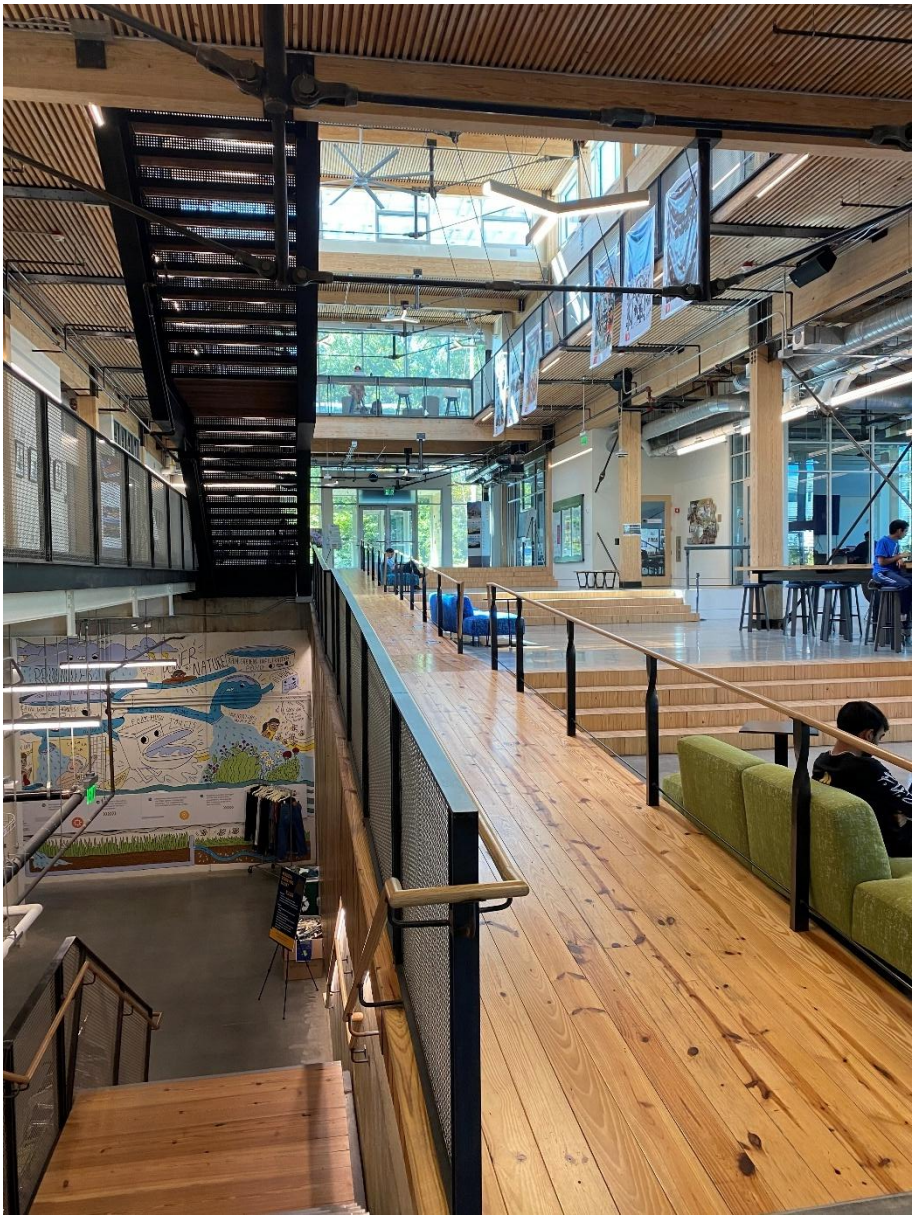

Figure 11: Kendeda Building Interior (photograph taken by the author)

The stair treads in the picture consist of heart pine joists dating back to the 1880s that were repurposed for the Kendeda building during the 2016 renovation of the iconic Tech Tower (Georgia Tech, "Materials Petal"). In the construction process emphasis was laid on reusing and repurposing materials and sourcing them locally – contributing to the idea of circularity and regeneration.

Both rating systems could be more equipped to deal with social and negotiated resilience. LEED has a strong focus on health-related indoor environmental qualities that enhance user satisfaction such as thermal, visual and acoustic comfort (USGBC, "LEED rating system").

LBS, on the other hand goes a lot further with more community-oriented resilience criteria such as “Human Scale and Humane Places”, “Universal Access to Nature and Place,” “Equitable Investment,” and “JUST Organizations.” For LBS, all buildings must ensure access for people with disabilities, and permit access to fresh air, light, and water. The criterion of JUST organizations evaluates the equity of business practices in the project under the criteria of diversity, equity, safety, worker benefit, and stewardship (Georgia Tech, “Equity Petal”). Geographers Keck and Sakdapolrak synthesize findings in regard to social resilience through these three dimensions: “coping capacities,” “adaptive capacities,” and “transformative capacities” (Keck and Sakdapolrak 10–11). Keck and Sakdapolrak argue that “the search for new approaches to resilience-building – especially with regard to the livelihoods of the poor and marginalized – is revealed to be not merely a technical question, but also a contested political one” (Keck and Sakdapolrak 14). Green buildings are healthier through the use of non-toxic materials, provision of daylight, energy-bills are much lower and they provide more user satisfaction. Especially planning affordable housing with green certification standards would have manifold benefits for the environment, for users, and even for investors. Nevertheless, the focus on health-related criteria such as “indoor environmental quality” in LEED and the lack of more community-oriented criteria compared to LBC is one of its strongest deficits from the viewpoint of social sustainability and resilience.

Inside of the Kendeda building, spaces for trading clothes (indirectly) point to the necessities and opportunities of ‘degrowth’ in the sense of reducing consumption. Nevertheless, degrowth scripts and the propagation of “consuming less” seems to be inherently un-American for the most part. Environmental economist Sam Bliss argues that “[t]he concept remains relatively unknown in the United States, a country whose oversized production and consumption have ample room to degrow” (Bliss 2). Bliss further states that “[a]n informal survey suggests that American degrowth advocates tend to frame degrowth as necessary more than as desirable” (Bliss 2). In order “[t]o build a political movement, degrowth discourse must illustrate the desirability of its vision to potential allies” (Bliss 2).

In the Kendeda building, circular scripts are strongly promoted through the focus on recycling and related educational efforts promoting the reuse of materials. The term degrowth is used at best very carefully despite the strong necessity for degrowth on a materials and resources scale. Bliss continues to portray that “degrowth has not entered the American vernacular. All major environmental non-profits – The Nature Conservancy, Sierra Club, Environmental Defense Fund, Natural Resources Defense Council, and more – remain firmly pro-growth. No political

figures have publicly questioned the pursuit of growth" (Bliss 6). In the living building challenge rating's "Materials Petal," one goal is to pursue "local economic growth" through sourcing materials within a certain distance (Georgia Tech, "Materials Petal"). The emphasis on local economies is attached to various narrative packagings. On the one hand, it emphasizes pro-environmental positions on local food and resource consumption. On the other hand, it fits into the narrative of 'deglobalization' and is therefore also compatible with more conservative positions. This also amplifies communication opportunities with non-environmentally educated publics and interest groups.

BEYOND MATERIALITY: NARRATIVES ABOUT THE KENDEDA BUILDING

During my stay in Atlanta and tour of the Kendeda building, I was able to collect student's reactions to the building:

> First, I like the outdoor space next to it, and I like how open it is. Having all the open windows is really, really nice. And even having the patios where the door is open and so you sort of have like an indoor-outdoor patio. And it's just nice to be out there. Even when you're inside, you're still kind of outside and with nature and then again, having the rooftop is super wonderful. It's also a great way to build community. I guess that'll be my second reason I really like it. And that a lot of the involvement in the building is a collaboration and so students are always working with each other. (Georgia Tech Student)

Staff and students recite stories about the building when speaking to each other but also through commentaries on platforms such as reddit.com. Some responses to the Kendeda building on the web forum "reddit.com" under the sub-reddit "r/gatech" explain that "the wood environment feels like a huge treehouse" (NotCreative11) but "that the compost toilets were weird to get used to but pretty interesting." Another user states:

> The design of the building is really cool and it has that freshly cut wood smell, which is awesome. Nice place to get some work done or hangout. Some of the "Living Building" requirements make it inconvenient to work in. There are like 3 outlets in an entire lab, so we had to bring laptops fully charged and hope they lasted the whole lab. There are no printers in the building. I understand saving electricity [...] but you kinda need it in most lab settings. (jaketuber)

The main complaints were about the lack of electric outlets but the main positive story mentioned by the reddit users was about the comfort of the fresh cut wooden smell and the profitable learning environment. And undoubtedly there are trade-offs between saving electricity and practicability in a laboratory setting. Some commentaries also valued the efforts

in sustainability as “very cool” (sereca). From the perspectives voiced on reddit, the stories told about the building are very mixed. They could be read like this account by one reddit user:

> The lecture hall is horribly distracting. My instructor was often distracted by the giant windowed garage door at the back of the classroom and would stop teaching. The students are often distracted by the giant picture windows that are behind the projector screens. Outlets are few and far between as well. All in all it’s a pretty building and it’s new, but there’s definitely a lot of oversights to making it a practical learning environment for a classroom. (geoffbezo)

The adjectives used range from ‘horrible’ to ‘pretty;’ the situations explicated range from distraction to fruitful learning environments. The building seems to generate quite mixed narrative responses. For one user, the Kendeda building is the “favorite building on campus” (sereca). Generally, the building evokes strong reactions due to its experimental character. Many practical features are unusual like the compost toilets and therefore elicit mixed responses.

The Kendeda building contributes to imaginations of green future cities through its architecture, materials, and narrativity. Students and staff working on site experience one materialization of the possibilities of the resilient city first hand – its advantages and disadvantages in comparison with conventional buildings. These narratives and stories told can contribute to larger discourses in the achievement of climate neutrality or its inhibition. The experimental structure and character of the Kendeda building is a living lab as well as a ‘space of possibility.’

Critics of the engineering resilience script voice that its application has to centrally include questions of politics, power, and equity (Meerow and J. P. Newell 311). Carbon emissions are not divided equally between different social groups. In the U.S., the less wealthy fifty per cent of the population emit ten tons CO_2 per person per year, compared to the richest ten per cent that emit seventy-five tons each (Chancel). Normatively speaking, solutions to carbon neutral futures must consider these discrepancies, when inventing approaches to combat carbon emissions. Kuhlicke, Kabisch, and Rink write in *The Routledge Handbook on Urban Resilience*: “The question about how to organize a resilient city or how resilient an urban area should be is intimately connected with normative questions, which can be answered very differently by different groups” (Kuhlicke et al. 21). The Kendeda building demonstrates what is possible through private donations with science-based know-how and planning. Unfortunately, in the U.S. and Germany green building solutions for the masses, especially lower-income people are not prioritized.

In 2018, 600 million tons of construction and demolition waste were generated in the U.S. (US EPA, "Sustainable Management of Construction and Demolition Materials") and 27 percent of carbon emissions were generated by the building industry (Logan). The building sector has great potential to adopt principles of circularity, repurpose resources, and implement urban mining. The Kendeda building sets an important example in this regard.

Put in a very generalized way, building certification systems say 'what needs to be done' and building code regulates 'how it is done.' LEED could be implemented nationally for corporate buildings of a certain size, government buildings, and simplified for the use in homes. Incentivizing the use of the living building standard for government buildings, to set a visionary example, could move engagement even further. Building green and resilient also has geopolitical relevance. It strongly reduces energy consumption and incentivizes on-site energy production and heating for instance through passive-house or plus-energy house structures with solar energy or heat pumps.

The Kendeda building is a relevant flagship project which has the ability to inspire beyond the realms of Atlanta, GA, and promote LEED and the living building challenge as an ambitious and holistic endeavor. Especially the educational efforts through the manifold tours through the building, its use as a classroom, and its student ambassadors showcase this. Similar spaces are much needed in times of climate crisis. Nevertheless, Georgia Tech remains a relatively privileged space due to tuition costs that are unaffordable for many U.S.-Americans with less economic means. Phrased in a critical manner, the appraisal of the Kendeda building culturally relates to U.S.-American individual heroism – the idea that one 'heroic' building will save the world. But in contrast to fictional hero accounts like *Superman,* individuals rarely have the power to evoke systemic change on their own. This is certainly not entirely true as certain figures have proven to be very influential and inspirational such as Martin Luther King for desegregation, Mahatma Gandhi for non-violence and Indian independence, or Greta Thunberg for the climate movement. But scattered eco-cathedrals will not suffice to deal with the climate crisis in a scalable manner. Buildings like Kendeda are representational structures for their owners, but they inspire nevertheless through their incredible ecological achievements.

In the end, green building certifications tackle the problem of increasing natural disasters and extreme weather from two sides: cause and effect. These standards must be further developed from the perspectives of diverse disciplines including the humanities in order to prevent a narrow focus on resilience from an engineering point of view. Including concepts such as

adaptation urbanism or negotiated resilience will prove to be crucial for achieving more social sustainability.

4.1.6 ROOSEVELT HALL – PRESERVING AND REVITALIZING HISTORIC ARCHITECTURE

In 1937, Roosevelt Hall,[118] was built as a part of the first federally-funded public housing project for African Americans in the U.S. (Yann). Roosevelt Hall served as the recreation hall and auditorium of the University Homes affordable housing compound in Atlanta. At the time, Roosevelt Hall attracted "business and civic activity," and included "amenities such as a laundromat, library, beauty salon and barbershop" (Yann) in the historically Black neighborhood of Vine City.[119] The neighborhood was also home to the historically Black colleges Spelman and Morehouse.

Roosevelt Hall was recently renovated to LEED-Gold standard and reopened in 2023. After the reopening, Atlanta Housing[120] will be using Roosevelt Hall in partnership with Choice Neighborhoods Atlanta[121] as a community and administrative center. At the (re)opening ceremony, many memories of the historic building were shared. Commissioner Elliott remembers: "It was a special place for all of us who lived in University and John Hope Homes." Elliott recalls, "Yates and Milton Drugstore was downstairs in the corner. That's where we got prescriptions filled and my momma bought ribbons for my hair. I also had my birthday parties

[118] Roosevelt Hall was possibly named in honor of former First lady Eleanor Roosevelt, who took a special interest in the construction of Roosevelt Hall in Atlanta for the benefit of supporting an inclusive community in the University Homes compound (Atlanta Housing ("Archives Virtual Exhibit - Roosevelt Hall stage")).

[119] The Vine City district is part of Atlanta's inclusionary zoning efforts. Inclusionary zoning in Atlanta requires multi-family project developers to provide 15 % of units built at a rate for households earning 80 % or less of the area median-income (AMI). The other option is to rent 10 % of units for a rate of 60 % or less below AMI. Vine City, due to its central proximity to the Beltline, is viewed as a 'hot market' site, which means it is at a high risk for gentrification and investor-financed large development projects. Critics argue that the inclusionary zoning efforts are not strict enough, because, most urgently, housing is needed at 50 % AMI or less (Keenan ("Can Bowen Homes overhaul keep gentrification at bay?")).

[120] Atlanta Housing (AH) is a housing authority that provides and facilitates affordable housing. Formerly, the Atlanta Housing Authority (AHA) was created in 1938. Next to the task of providing affordable housing, since the 1950s, the AHA was involved in major "urban renewal" projects to "help eliminate slums and blight" (Atlanta Housing ("AH History")). To this end, "AHA acquired and cleared the blighted areas, and then sold the land to private enterprises for new development," Atlanta Housing writes about its history (Atlanta Housing ("AH History")). AHA was also involved in the construction of the University Homes compound "replacing the slum of wooden shanties with poor ventilation, outhouses, lack of sanitation or utilities" the Archive Virtual Exhibit of Atlanta Housing states (Atlanta Housing ("Archives Virtual Exhibit - Slum Clearance"). On the one hand, this significantly improved living conditions through the provision of hot and cold running water, electricity, and modern kitchen appliances. On the other hand, the rents charged were "too high for many poor people displaced by public housing" (Ruechel 932). Of the current AH properties most are senior high-rises.

[121] Choice Atlanta is a local model of the Choice Neighborhoods program by HUD. The motto of Choice Atlanta is "Revitalize. Empower. Transform. Atlanta" (Choice Atlanta ("Choice Atlanta: Creating Housing, People, & Neighborhood Prosperity")). Choice Atlanta is mostly active in the Westside neighborhoods former University Homes and Ashview Heights, Atlanta University Center and Vine City. Choice Atlanta refers to these neighborhoods as 'University Choice Neighborhoods' (UCN). The organization "Choice Atlanta leverages public and private dollars from Atlanta Housing, the City of Atlanta, Invest Atlanta and other public, private and philanthropic organizations to address under-resourced neighborhoods with distressed public or HUD-assisted housing" (Choice Atlanta ("About Us - Atlanta Housing Resources")).

upstairs in the community room" (Yann). Sharing the fond memories highlights important moments from personal histories. In contrast, on a societal level, racial segregation and discrimination was deeply ingrained in institutions and further cemented through formal and informal segregation policies in the South. In 1939, just two years after the historic opening of University Homes, the film *Gone with the Wind* premiered in Atlanta attracting an enormous crowd of 300.000 people. The event was strongly racially segregated and African American actors did not attend, because producer Selznick was scared for their safety. Black audiences were excluded from the premiere (Emory University News Center). Nonetheless, for Black citizens, in the 1940s, Roosevelt Hall functioned to a certain degree as what DuBois envisioned as a "Black enclave" for tenant-run activities, social work and community building (Crawford 230). Architectural Historian Crawford therefore argues that Roosevelt Hall "matters because it is a symbol of social activism in Atlanta" and because "demolition is the cultural norm in the city" (Crawford 213).

Even though the University Homes compound was renovated in the 1980s, most of it was demolished in 2009 due to poor conditions (Crawford 213). In the 2000s,[122] Roosevelt Hall suffered from "vandalism and poor conditions on the inside" (U.S. Department of Energy). The decision to renovate the building was based on the solid structure it had retained throughout the years and the opportunity to "pay homage to its important place in the history of this Westside community" (U.S. Department of Energy).

Under HOPE VI,[123] Atlanta was the first city to entirely remove all of its public housing (Hankins et al. 2932). In their analysis of forced relocations due to demolished public housing

[122] The Decline of University Homes began in the 1980s with "growing crime and concentrated poverty" (Choice Atlanta ("Choice Atlanta: Creating Housing, People, & Neighborhood Prosperity")). Techwood Homes – University Homes' sister project, which was originally for Whites only in 1938 – "became a focal point among city leadership" prior to the 1996 Olympics in Atlanta (Choice Atlanta ("Choice Atlanta: Creating Housing, People, & Neighborhood Prosperity")). Techwood Homes was redeveloped under HOPE VI and became known as the "Atlanta Model" through its approach as a mixed-income development. Eventually, in 2009, University Homes was torn down "to make way for its revitalization" (Choice Atlanta ("Choice Atlanta: Creating Housing, People, & Neighborhood Prosperity")), whilst Roosevelt Hall was maintained.

[123] HOPE VI was a government program that granted a variety of "revitalization grants" for the "demolition of severely distressed public housing" and "major rehabilitation, new construction and other physical improvements" (HUD). One of the core ideas was to replace public housing with mixed-income facilities in order to improve neighborhoods and living conditions for the residents. Goetz ("Better Neighborhoods, Better Outcomes?") finds in his evaluation of studies on the displacement of public housing residents through HOPE VI's revitalization that there were few significant positive effects and depended mostly on "families' networks of support" (Goetz ("Better Neighborhoods, Better Outcomes?" 25)). In Goetz's study the simple relocation of residents did not lead to major changes because factors like "employment, income, health, and social interaction involve systems that are complex" (Goetz ("Better Neighborhoods, Better Outcomes?" 24)). Goetz attributes the failure of HOPE VI to achieve significantly better prospects for former residents to an "oversimplified view of poverty," which does not acknowledge the interlinkages of different systems such as health conditions and (un)employment with poverty (Goetz ("Better Neighborhoods, Better Outcomes?" 5)).

in Atlanta, sociologists Ruel et al. found that elderly populations in senior homes generally viewed moving out of public housing negatively, whilst families saw it more as an opportunity to ameliorate their living conditions (Ruel et al. 349). Ruel et al. therefore advised policy makers to reconsider the relocation of elderly populations especially due to the fact that the senior facilities in Atlanta were in better condition and better neighborhoods than the family housing. In this regard, geoscientists and sociologists Hankins et al. pointedly phrase that "residential movement is imbued with power relations" (Hankins et al. 2946). The geographic and sociological study by Hankins et al. suggests that "the patterns and processes of forced mobility can have devastating consequences for the residents themselves, many of whom suffered from the speed, rhythm, route, and friction of their exit from Atlanta's public housing. At the same time, the experiences the residents have are significantly shaped by their own resourcefulness, which involves access to social networks, computer skills, and faith dispositions" (Hankins et al. 2947). In contrast, economist Boston's analysis of the forced relocations shows that "households who moved out of conventional housing projects (whether voluntarily or involuntarily) experienced significant improvements in socioeconomic status and neighborhood quality" (Boston 403). In response to Boston's analysis, Goetz emphasizes that for a few, moving to a different neighborhood did have positive and poverty-decreasing effects on their mental and physical health – but not on an economic level. Goetz explains:

> The research tells us that these households typically move to neighborhoods that are less distressed than the ones from which they came, but more distressed than average. This is the real weakness of the deconcentration of poverty paradigm exemplified by HOPE VI. The neighborhoods that can provide the most benefits to poor households are off-limits to them, either because these communities will not accept replacement affordable units, or because the market will not allow for the use of housing vouchers. (Goetz, "Comment" 409)

The former residents of the affordable housing projects such as Techwood[124] or University Homes were either given an apartment in the new mixed-income residencies or housing vouchers. Residents were told that they would be able to settle in more affluent neighborhoods with the housing vouchers. But Atlanta-based law professor Jones critically says, "So what we see is that there is no real choice, that the only landlords who are willing to accept these certificates are landlords that own homes in areas that are concentrated by race and poverty"

[124] Techwood Homes was the sister project of Roosevelt Hall, and due to segregation policies in the American South, originally for Whites only. Techwood Homes was demolished in 1996 prior to the Olympic Games after long debates between city councils and other public and private stakeholders.

(Lohr). In my interview with SK Collaborative Founder Abe Kruger he comments on the demolition of public housing in Atlanta:

> My understanding is most of the new projects using tax credits are mixed income to some degree, because of the history of concentrated poverty. We've kind of learned that's not such a good idea. But you know, even there, the flip side is that it makes it very cost effective to provide support services. When you've got a lot of people in one place, you can place social services and social workers and things so that they can impact a lot of people. But when you have a more distributed population then it makes it a little harder providing those services. But I do think that we don't want 100% low-income housing like those big towers anymore. (Kruger)

Kruger's company SK Collaborative is invested in many mixed-income residential projects with the ambition of creating affordable units that are built to green standards such as LEED, Green Globes, or others. These projects are often given tax credits by the state of Georgia or city of Atlanta that are tied to the application of a green building standard with the idea of creating energy end water efficient buildings to decrease Southern energy insecurity especially for low-income families. Abe Kruger critically admonishes with regard to the energy burden on lower-income families:

> In Atlanta, we're, I think it's #3 in the nation for energy burden – the percent of your income that's going to energy bills. And so, in Atlanta, we need more green affordable housing now more than ever before. Because when you look at low-income, folks are just paying so much of their income towards utilities, let alone the housing, the rent. (Kruger)

In my interview with Will Bryan who works at Southeast Energy Efficiency Alliance (SEEA) we further discussed this problem and he suggested a wider implementation of "on bill tariff models of financing energy efficiency retrofits." Bryan explains what these models could look like:

> One is called 'Pay as you Save,' which is like a proprietary version of this type of framework. But essentially, the way it runs, is the utility upfronts the money. So, you know, I could be renting a home. I could qualify for the program because of income or whatever and utility would pay $7000 or whatever to upgrade and retrofit my home to make it more efficient. The utility would do it in an assessment to determine what the energy and cost savings from that upgrade would be. And so, that assessment comes back and says, if you make these changes, the home is going to have bills that are $100 less a month or something like that. So, then you know out of the savings the utility takes a proportion of it to pay back the capital that they invested and then the homeowner or renter gets a portion of the savings too. So, if the savings are $100: Maybe the utility takes $80 to pay down the investment every month, but that still means your bill is $20 a month less with no capital investment on your part. It's kind of a win-win and default rates are basically 0 for programs where this is in effect. The other nice thing about it is that because it's a tariff on the meter, it's not debt, so it does not follow you. If you move, it does not come with you. (Bryan)

Similar models could effectively help many Westside residents, who are renters, and also homeowners reduce the money they spend on utilities. Bryan argues that the utility company benefits through the possibility of installing smart meters and demand-response systems which help manage the energy loads at peak times.

A comparison of historic maps of segregated lending practices and current distribution of energy burden demonstrates the necessity for investment especially in the South- and Westside communities (see fig. 29). Political Scientist and Energy Analyst Bhedwar at SEEA explains, "housing segregation, or redlining, which led to disinvestment in communities of color, still shapes access to affordable energy in the South. Neighborhoods that were historically segregated often experience high levels of energy burden today" (Bhedwar).

Homeowners Loan Corporation (HOLC)[125] of Atlanta's lending employed grades that ranged from desirable to uninsurable, whereas uninsurable was given to many Westside and Southside areas as the figure shows (Bhedwar). The discriminatory practice of redlining in Atlanta prevented many potential home-buyers, based on the racial characteristics of the neighborhood, from receiving a loan to build or buy a home (Encyclopedia Britannica). The restriction in affordable and available loans inhibited the potential to buy a more qualitative and oftentimes more energy-efficient home with better insulation and ventilation. Redlining effects still persist in current Atlanta through higher rates of unemployment, renting (not owning of a home), and lower median income in former redlined districts (Bellows).

ROOSEVELT HALL RETROFIT

In the introduction for the Choice Neighborhoods Initiative Transformation Plan for the University Area,[126] Atlanta Housing writes: "More than 5.3 million people and nearly 150,000 businesses call Atlanta, Georgia, home – with a world-class airport, abundant green space, and numerous entertainment and sports venues. Today Atlanta is a vibrant metropolis with a reputation for diversity and opportunity that is in stark contrast to the racially segregated and divided city of the past" (U.S. Department of Housing and Urban Development 2). This heavily

[125] The HOLC was created in 1933 to "encourage widespread home ownership and suburban development by making home loans and mortgages affordable" (Encyclopedia Britannica). The rating system was applied in an extremely discriminatory way, deeming predominantly non-White neighborhoods as 'high risk' and therefore not offering loans in these areas. This practice has become known as 'redlining' – as these neighborhoods were marked with the color red as high risk (Encyclopedia Britannica).

[126] Roosevelt Hall is situated in the University Area and formerly constituted a part of University Homes.

contrasts Atlanta-based urban planner Dan Immergluck's assessment of an increasingly gentrifying city under stress especially for low-income residents. In 2022, Immergluck published *Red Hot Atlanta: Housing, Race, and Exclusion in Twenty-First Century Atlanta*, an analysis of rapid gentrification in Atlanta. Immergluck writes about Atlanta's "urban regime"[127] that "continues to work for the benefit of investors, real estate interests, and affluent homeowners, rather than for the benefit of the working-class" (Immergluck 106). Invest Atlanta has continuously given million-dollar tax breaks to companies like BlackRock, Google, or Coca-Cola in "hot-market neighborhoods where subsidies are not needed" (Immergluck 105). Invest Atlanta is the City of Atlanta's Development Authority, which was rebranded as 'Invest Atlanta' in 2012. Invest Atlanta writes in their mission statement about their goals: "To advance Atlanta's global competitiveness by growing a strong economy, building vibrant communities, and increasing economic prosperity for all Atlantans" whilst also "to increase sustainable living-wage jobs and affordable housing, reduce income and wealth gaps across racial and social-economic lines" (Invest Atlanta). In practice, the pursuit of making the city attractive to large companies and real estate investors through tax breaks is prioritized over the creation of affordable apartments (Immergluck 98). The result is rapid gentrification in the city, which intensifies the pressures on long-term, lower-income residents. Immergluck reasons that Invest Atlanta remains "stuck in the mindset of a shrinking city, as if it were still 1980" and therefore fails to transform some of the revenue generated from the settlement of large firms and higher-wage workers in the city to "subsidize the housing needs of lower-income Atlantans" (Immergluck 98). Between 1970 to 1990 Atlanta lost around 100.000 residents to the suburbs (Room for Debate). Since the 2000s, Atlanta has been a booming economy with an influx of high-paid jobs and urban planner Immergluck therefore suggests a shifting mind-set with less tax breaks for large corporations and more redistributive measures including the creation of mixed-income and affordable housing. In the interview with Abe Kruger about affordable housing in Atlanta, he further acknowledged:

> So yes, I would say there is Nimbyism for sure, "not in my backyard," and especially when the city talks about inclusionary zoning, so requiring a certain percent of units be affordable. You know, like Buckhead, wealthy, predominantly white. They will say how Atlanta has a housing problem, but then when you say, "hey, can we build an affordable housing development in Buckhead?" And they're like, "no." So, there is a lot of that, you know and when you talk to affordable housing developers, I've heard from multiple

[127] By 'urban regime' Immergluck refers to the mix of strong public-private partnerships between large corporations, philanthropic organizations, and city-led organizations in Atlanta. The effect of these partnerships is often a deprioritization of social equity and focus on economic gains for private investors whilst 'social washing' the outcomes of these alliances through marketing tools that frame them as equitable, transformative, and

> people that trying to build an affordable family community, so a community for just like families, right? So, anyone with kids or anyone can live there. It's much harder to do that in many communities than to do senior housing. (Kruger)

The NIMBY[128] phenomenon Abe Kruger describes remains strong especially in the Northern parts of Atlanta, who have also refused the expansion of MARTA[129] (light-rail public transport system in Atlanta) in these areas for fear of "crime." This is a highly racialized and classist fear, as economically less affluent minorities most frequently use the MARTA.

On their website, Atlanta Housing writes about the renovation project Roosevelt Hall for their new administrative office:

> The renovation boasts an array of modern amenities and community-centric spaces. Residents and visitors will have access to a state-of-the-art library, cutting-edge technology center, two captivating history walls, an enchanting urban garden, versatile community spaces, special events venues, including a scenic rooftop, and a retail area. This comprehensive redesign ensures that Roosevelt becomes a versatile and dynamic centerpiece for the community, fostering educational opportunities, cultural enrichment and social engagement. (Yann)

Atlanta Housing participates in the Better Buildings Challenge[130] and has been compliant with the city of Atlanta's clean building ordinance since 2015. The Department of Housing and Urban Development gave 30$ million as a Choice Neighborhoods Implementation Grant for the funding of Roosevelt Hall (U.S. Department of Energy).

From an engineering resilience and water efficiency standpoint, Roosevelt Hall features key water and energy-efficiency measures and is expected to reduce potable water usage by 83%. The project collects rain water through permeable pavers, in a 15,000-gallon cistern for non-potable reuse. Native plant species support local biodiversity and no amount of potable water is used for irrigation. The roof was transformed into a space with plant covered facades and screen. The use of high-efficiency plumbing fixtures reduces the necessary amount of water for

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[128] NIMBY = 'not in my backyard.' This phenomenon often appears when goods, products, companies, or subjects perceived as 'undesirable' are planned to be placed in a person's neighborhood.

[129] MARTA is the Metropolitan Atlanta Rapid Transit Authority. MARTA is underfunded in comparison to highway expansions, The highways are generally used more by White, more affluent Atlantans, whilst public transport is used more by financially less affluent minority groups. Henderson employs the terminology of the "secessionist automobile" explaining that "race has been a factor limiting the geography of transit, forcing automobile dependency by design" (Henderson 300). Secessionist automobiles are in conglomeration with anti-urban sentiments based on family and religious values according to Henderson.

[130] The Better Buildings Challenge was initiated by President Obama in 2011 in order to support commercial buildings to become 20% more energy and water efficient. It emerged out of the American Recovery and Reinvestment Act and is organized by the U.S. Department of Energy (DOE). Since 2013, the scope of the challenge has been widened to include the Multifamily Sector, partnering with HUD.

sinks and toilets. And rainwater is used to flush the latter. Water submeters further help manage opportunities for water savings (U.S. Department of Energy). These water-efficiency measures reflect engineering resilience scripts due to the to their focus on rainwater control, which supports the site's and neighborhood's resilience through preventing sewage overflow through water run-off.

Roosevelt Hall uses a high-efficiency variable refrigerant flow (VRF) HVAC-system. Further, LED-lighting throughout the building is used and energy sub-meters are employed. The sub-meters track energy use and support energy management with the goal of saving resources and reducing energy consumption by 30%. In support of electric vehicles, charging stations have been installed. Through a custom rebate program by Georgia Power, the energy-efficient lighting was approved for a rebate due to being 20% more efficient than code requirements. (U.S. Department of Energy). The building follows the engineering-resilience script through the reduction of the building's energy consumption. Nonetheless, no points were awarded with regard to the use and implementation of renewable energy sources such as PV or geo-thermal heat, which would secure the building's energy independence in case of a power outage. Energy independence is relevant, when buildings are conceptualized as places of refuge in the case of severe weather events or other forms of crisis.

Social sustainability scripts are followed in part, as there will be accessible computers, a library and green roof open to the public. However, Roosevelt will not enable the same kind of community use it served in the past. Further, no measures contributing to negotiated or community resilience scripts were employed. This reflects current planning paradigms which mostly involves stakeholders at the company and urban planning office levels rather than conventional citizens.

Circular scripts are reflected through the reuse of the main structure, although no further materials were recycled in the project. Embodied carbon is maintained in the structure and new carbon emissions lowered through the structural adaptation. Nevertheless, more buildings that reuse materials would significantly lower the carbon emissions used in construction as a study by the European Environment Agency (EEA) demonstrates (EEA). From the possible measures used in renovation processes, materials reuse and enhancing the life-span of existing buildings has the potential to reduce the carbon footprint most effectively (EEA).

A problem with current LEED certification is that post-occupancy energy and water use are not evaluated. Architect Hu analyzed buildings energy-performance for LEED-certified versus not

certified buildings and concludes for a study in Washington, DC, that "LEED office buildings do not perform better at any of the certified levels. On the contrary, those reported LEED buildings collectively use 17% more source energy and 13% more site energy than non-LEED buildings" contrary to the projections (Hu). Physicists Scofield et al. find in their comparative study that "in aggregate, we found that these office buildings save 11% in site energy and 7% in both source energy and GHG emissions, as compared with non-LEED office buildings in their same cities" (Scofield et al. 16). Scofield et al. conclude:

> Finally, we showed that LEED offices rely more heavily on electric energy than do other offices. On the one hand, this positions LEED buildings to achieve maximum benefit from future reduction in the carbon content of the U.S. electric grid. On the other hand, as the U.S. electric grid is presently heavily dependent on fossil fuels, LEED offices demonstrate little GHG savings today relative to other offices. Only time will tell whether future savings in GHG emission will justify the choice to rely heavily on electric energy. (Scofield et al. 17)

In a carbon-neutral economy, clean electricity in current projections should replace fossil fuel energies. Therefore, LEED-buildings will probably outperform their peer non-certified buildings in the future. Nonetheless, the U.S. is under less pressure to change their energy-mix (at this point) in comparison to Germany that is under pressure due to previous dependence on Russian gas and the diversion from these contracts due to Russia's war on Ukraine.

About builder's motivation to build green and main incentives, Kruger articulates:

> I guess of pretty much all the green building programs the foundation is energy efficiency. That's going to be like the area where you have the most points and the most requirements are related to energy efficiency. And I think that makes sense because to make a building energy efficient you tend to also improve the health and comfort of the building. I think every green building program is slightly different as well as their approach to the other stuff like water efficiency, indoor air quality, resource efficiency. But there tends to be minimums in all the categories. You have to do a little bit of everything for our clients. Honestly, they usually don't care like they're not like, they don't have a preference for one category over the other. It's more of how do I as cheaply or as most cost effectively as possible achieve the certification. Now, we do have some clients who are like, health and wellness are very important to them. And so, they're the folks that are like: "we definitely want the community garden," "we want a walking trail on site," "we want better filtration in the units." Low VOC paints like those things resonate with them because they want to have healthy residents. But I would say our typical client, they don't really care one category over the other. It's just dollars. (Kruger)

The emphasis on the "dollars" and energy efficiency quite strikingly frames current 'green' building aspirations as more financially driven than by idealistic values. In my opinion, Roosevelt Hall is a typical example of the mixture of these focalizations. The building is a

conventional LEED-Gold building in almost every aspect – energy- and water efficient to a decent degree. Roosevelt Hall uses a more energy-efficient HVAC-system, but no innovative approaches through employing natural ventilation, cooling, or renewable energies. Conventional HVAC-systems consume high amounts of energy and refrigerants that emit green-house gasses (Leffer). In the future, natural cooling and ventilation will be necessary in building and urban planning. Iranian Yach-tschals deliver important inspiration. The structures stored ice inside for uses in summer time or throughout the whole year. Whilst the structures are very impressive, they work mostly in dry climates, as the water evaporates and humidifies the air (Leffer). In more humid climates, this process would not be applicable, as the increased humidity works against the cooling effect. Different companies such as cSNAP, Transaera, or BlueFrontier are working on more energy-efficient cooling systems that partly work without refrigerants.

The International Energy Agency (IEA), claims that cooling is necessary to save thousands of lives each year that are at risk due to severe heat. IEA also states that: "However, the rapid growth of AC is putting stress on the power grid, whilst exacerbating the adverse impact of space cooling on GHG emissions, local air pollution, power outages, urban heat island effects, energy poverty, and physiological acclimatization (International Energy Agency 1). Passive solutions would be preferrable, as they do not contribute to a vicious cycle of heating and cooling but more high-tech solutions are currently being implemented (International Energy Agency 3; Leffer).

The traditional LEED-certified office building, from what I have witnessed in Atlanta, employs similar strategies in strengthening energy- and water efficiency but fails to include renewable resources in a meaningful way or implement synergies between low-tech and high-tech measures. For the last decade, it has been assumed, that high-tech solutions are most valuable and will be the best options for the future by many builders in contrast to more simple ways of building. In Germany, a trend away from high-tech or at least combining no-tech with digital methods is possibly under way with the creation of *Gebäudetyp E – einfach und experimentell* (building type E – easy and experimental). Klara Geywitz, minister for building in Germany, spoke at the Impact Festival in 2023, and argued to learn from constructions that have sustained hundreds of years such as *Fachwerkhäuser*.[131] To me, what is missing in many LEED-

[131] *Fachwerkhaus* is an old building technique with wood and clay, used in parts of Germany and Switzerland mainly until the 19th century. Many of these structures are still standing today in historic parts of cities.

buildings, including Roosevelt Hall, is to take up old or new building traditions that are truly long-term sustainable and do not rely on reinforced concrete. Switzerland is experimenting with new ways of recycling concrete or carbon-concrete (Beton 2030). Especially the use of renewable energies and clean energies will support climate neutrality. The *ARTE* Documentation Series *Wunderstoffe* (miracle materials) chronicles current developments in building technologies especially with regard to innovative building materials (ARTE). Conventional reinforced concrete for example is extremely resource intensive, but researchers are developing methods for self-healing concrete through bacteria that creates limestone as a result of its living organism. This method could significantly increase the usability of concrete and its life-span. Even in ancient Rome, durable concrete was built into structures that are still standing today (ARTE).

In Germany, conventional reinforced concrete is still being used in many building projects despite its problematic carbon footprint. The "Kö Bogen," a building situated in Düsseldorf, which is celebrated for its green façade, has been criticized for mostly using conventional reinforced concrete for its basic structure (Matzig). The persistence on the use of concrete and the lack of material-openness presents a relevant problem with regard to building cultures in Germany and the U.S. Many innovative climate-friendly projects are happening in other countries such as the Netherlands, Singapore, or Pakistan. Experimenting with new materials such as fungi and their micelle networks for example could revolutionize insulations. Some innovative developments are also happening in Germany and North America. Architects, engineers, and biologists at the Karlsruhe Institute of Technology are working on insulation materials from micelle structures. First, the fungi grow their micelle structures in the space of a preformed brick. After substantial growth by feeding the fungi with sugar and other agricultural waste, this micelle bricks are then heated up to extract water and end the organism's growth (C. Lehmann). In the future, these resulting bricks could be used in circular, bio-based construction processes instead of conventional bricks, insulation or sheetrock.

Biophilic design can enhance durability and minimize carbon emissions, and even positively create more oxygen through plants and trees. In Singapore, the city's green plan 2030 envisions the creation of a 'jungle in the city' through innovative greening of the built environment's facades and roofs (van Uffelen and Gyger 115). The Singapore-based architectural firm WOHA is implementing a growing number of projects in Singapore with 'skyrise-greenery,' a special form of horizontal and vertical building greening in sky-rises.

WOHA's vision is to create "integrated architectural and urban solutions to tackle the problems of the 21st century such as climate change, population growth and rapidly increasing urbanization" (WOHA). In creating buildings as biodiverse ecosystems, these structures contribute to the cooling of the area, support positive psychological effects, and also social benefits through mixed uses (Joson). More than 50 plant species were included in the construction of the "Osia Hotel Downtown." As a result, the building is composed of 1.100% more greenspace, than the original capacity of the lot (van Uffelen and Gyger 117). WOHA explicitly seeks to enable intergenerational exchange and limit the loneliness experienced by elderly citizens through their projects. This goal is pursued through the creation of community parks in their buildings. The 'buddy benches' constitute a special feature in this regard – created to foster new friendships. Singapore has implemented a green plot ratio and further prescribed green building rules such as the implementation of the Singaporean rating system Green Marks Scheme which was developed for the Singaporean climate in 2005. Singapore has relatively few natural resources and depends on the import of water and fuels. Political leaders have therefore emphasized the importance of retaining water through greenspaces and becoming more energy-independent (Senthilingam).

As another current and on-going trend, using renewable resources such as wood has witnessed a breakthrough in Germany and the U.S. in recent years. This recourse of combining century-old building practices and materials with new technologies has contributed to this breakthrough as well as the construction of wooden high-rises. In Atlanta, the T3N building is a mass timber structure. Researchers in Denmark are even experimenting with translucent wood fibers to diversify the uses for wood as a material in building (ARTE). In this context, former Director of the Potsdam Institute physicist Schellnhuber propagates planting five billion trees and building two billion homes from harvested biomass in order to provide shelter and quality housing especially in the Global South whilst using these houses as carbon sinks (Hans Joachim Schellnhuber). Beef production would have to be phased out in order to have enough land capacity for the trees, but according to Schellnhuber's calculations there would be no other large obstacles concerning the necessitated space. Schellnhuber advocates for the cultivation of a "smart circular bio-economy." Schellnhuber is also part of the collective organization *Bauhaus Erde*[132] that wants to contribute to discourses around sustainable building in a

[132] *Bauhaus der Erde* is an interdisciplinary initiative focused on sustainable design and architecture. It emphasizes the importance of blending modern technology with traditional craftsmanship to address contemporary environmental challenges while fostering social equity.

transformative way. On this note, Annette Hillebrandt has claimed that "waste is an error by design" (Pfitzenmeier, "Bauhaus der Erde"). Schellnhuber further expressed in an interview for *Cradle* magazine:

> From a climate perspective, the rapid transition to organic building and insulation materials - wood, bamboo, hemp, reeds, etc. - is the most important solution option. This would not only replace materials associated with high greenhouse gas emissions - concrete, steel or glass - but could even partially offset historical emissions: When a tree, shrub or grass grows, the plant absorbs carbon from the air through photosynthesis. When the corresponding biomass is converted into long-lasting value products - houses, furniture, bridges, etc. - the emissions are reduced. - When the corresponding biomass is converted into long-lasting value products - houses, furniture, bridges, etc. - the net effect is that CO_2 is removed from the atmosphere. In this way, cities can become carbon sinks.[133] (Pfitzenmeier, "Bauhaus der Erde")

Will bamboo be one of the wonder materials of the future? Currently, bamboo mostly has to be imported to Europe and North America. In countries where bamboo traditionally grows, it retains the image of "poor quality housing." Similar to wood though, bamboo has positive qualities for building and also functions as a carbon sink.

Nature will continue to serve as inspiration especially for biophilic architecture. The "Start-Up Lions Campus" in Kenia was constructed imitating a termite mount – the best ventilated structure on earth – and designed by holistic architect Diébédo Kéré. Despite being in a hot climatic region, the building does not require artificial ventilation, but provides natural ventilation through its low-tech structure. In 2022, Kéré was awarded with the renowned Pritzker-Prize for Architecture. Possibly and probably, biophilic design will be conceptualized together with smart city scripts, sensors, IT-systems, and data analysis. According to Schellnhuber, "this is what the future of the built environment will look like, it will combine natural elements, it will have advanced solar technology, it will have sensors, it will have computer power in order to organize… in the end, we will have something like a cyborganic age" (Hans Joachim Schellnhuber). This 'cyborganic age' might have the potential to limit the effects of global warming, but comes with new digital challenges regarding cities' and citizen's data sovereignty. Streich sees potential here for 'subversive urban planning' where citizens and

[133] German orig.: "Aus Klimasicht ist der rasche Übergang zu organischen Bau- und Dämmstoffen – Holz, Bambus, Hanf, Schilf usw. – die wichtigste Lösungsoption. Dadurch würden nicht nur Materialien ersetzt werden, die mit hohen Treibhausgasemissionen verbunden sind – Beton, Stahl oder Glas –, sondern man könnte sogar historische Emissionen teilweise wieder gutmachen: Wenn ein Baum, ein Strauch oder Gras wächst, nimmt die Pflanze mittels Photosynthese Kohlenstoff aus der Luft auf. Wenn die entsprechende Biomasse in langlebige Wertprodukte – Häuser, Möbel, Brücken usw. – verwandelt wird, hat man netto der Atmosphäre CO_2 entzogen. So können Städte zu Kohlenstoffsenken werden."

cities participate in self-organized data exchanges enhancing the ability of participatory planning.

Roosevelt Hall follows ecologically-oriented circular and resilience scripts in the sense that the project is a renovation project, which pays tribute to considerations revolving around embodied carbon. Preserving existing structures saves materials, because the foundation is maintained and less new materials are used (EEA). For LEED, performance is estimated by the design team. Criticism of this certification practice has been voiced by many professionals in the industry (Scofield et al.; Amiri et al.; USA Today). The living building challenge, therefore has put a focus on actual performance in the use phase from the beginning. Many studies (Scofield et al.; Amiri et al.; Greer et al.), doubt the actual performance of LEED-buildings.

Nonetheless, I would argue that LEED has raised an awareness for energy efficiency and water efficiency. In favor of LEED and rewarding its achievements Benfield writes "it's not much of a stretch to say that, more than any other single force, LEED has put green buildings on the map and institutionalized building performance measures shown to reduce resource consumption and pollution" (Benfield). It is not the most ambitious green building standard, but has introduced certain standards in commercial building (Presas 5). This, from my perspective, can be seen as one of its greatest successes. I argue that LEED has led to a paradigm shift in green building toward energy efficiency, which has been adopted by standard builders – for mostly economic reasons – and to be at the front of state-of-the-art building. This could be one explanation, as to why LEED-buildings don't outperform their peers in a more substantial way. The switch to clean electric energy will certainly make LEED-buildings outperform their peers as they rely more on PV, geo-thermal energy mixes, and district heating – instead of gas or oil. In 2025 in the U.S., natural gas is still considered "cheap" – even though it should be more expensive factoring in the true environmental costs of fracking for example. And this transition will be even more economically-sound when clean energy technologies develop to be more cost-effective and can be stored more easily.

CONCLUSION ROOSEVELT HALL

Benfield's criticism of LEED 'not going beyond' what the industry is likely to do anyway is also my critique of Roosevelt Hall's refurbishment. Atlanta Housing CEO Eugene Jones articulated that "this visionary project embodies the spirit of progress, inclusivity, and preservation of heritage" (Yann). From my point of view, Roosevelt Hall preserves heritage

and to a certain extent inclusivity through the shared community spaces. But from an ecological, carbon neutrality point of view, the project could embody the notion of "progress" more substantially for example through a reliance on renewable energy mixes. Roosevelt Hall's efforts relate mostly to energy-efficiency and water-efficiency in the realm of engineering resilience scripts. No points are achieved for renewable energies.

As USGBC program manager Suzanne Haerther states: "I think that the biggest part is looking at the financial aspect of the project and going beyond the fact that saving energy saves money but digging deeper" (Haerther). And in my opinion, this is what the project could have focalized more. In an interview with LEED manager Dustin Mason (USGBC Georgia), he stated:

> And what LEED has done (among other initiatives and programs that are out there) is that the market has transformed. So therefore, things that we were doing 30 years ago are now just automatically built in or designed into a building. So, there's green qualities that are kind of no-brainers these days. And part of that no-brainer is energy efficiency and saving money. I personally think the tipping point of the market revolves around the financial implications of designing and building and operating green buildings. So, when that becomes the most economical route, you're gonna get, a lot of these folks that aren't really into green buildings or don't wanna spend that extra money, they're gonna basically have to do it because it saves them money. So, the economic value is key to the market. To get to that point though, there also have to be some other incentives: carrots and sticks. That's how we say it here. Carrots are incentives from the government. Sticks are perhaps ordinance or codes or standards and other sort of top-down initiative. So, those two – carrots and sticks – ultimately lead to that market transformation where it's economical. So, it's not always easy to get to where it's cheaper to build a green building. (Mason)

And this "carrots and sticks" tactic could be encouraged further in Atlanta. Mason emphasizes:

> I believe our biggest challenge is just the assumption that it's more expensive. And while it is more expensive, it's only one, two percent. And oftentimes you can recoup those costs. I think, personally, the challenge for my organization is pushing the envelope. So, while we've played a big role in that market transformation, I described earlier, what's next? You know, we – our team of experts, our volunteers that help contribute to new LEED versions – have to continue to push it further, more progressive, more aggressive, and that's the challenge. The market (I'll call it the market, but really the industry), the world, globally… to me kind of feels like: where are we going? And right now, it seems to be decarbonization. So, LEED; in my opinion, a challenge for them is to kind of design their LEED program around decarbonization when in the past maybe it's been more like energy efficiency or things of that nature years ago. So, the challenge is more progressive LEED certifications and programs to continue to push it forward. Particularly with all of these climate goals, net zero goals that everybody has now, you know, zero by 2050 and all that. It's gonna take aggressive programs to get to that. (Mason)

These aggressive paths will have to include focusing on decarbonization, alternative cooling strategies, and new (or well-known) low-carbon materials and building traditions.

4.2 SUMMARY – CASE STUDY FINDINGS

Tackling carbon emissions is a complex and multifaceted challenge. All of the green building standards contribute to the promotion of what a green future will look like and set different examples. The case studies in chapter 4 provide insights into European and North American green building culture from a qualitative analytical approach. Rapid ethnographies have the ability to analyze few examples in depth, instead of providing more quantitative results. Combining a quantitative approach where the weight of the green building criteria is compared to which criteria were actually chosen in green building projects would complement this research. This book has in turn focused more on how green buildings interact with their neighborhoods and which scripts of green futures are prioritized in the respective projects.

REGIONAL DIFFERENCES IN GREEN BUILDING AND THE PURSUIT OF GREEN SCRIPTS

In regard to the regional particularities, the conflicts surrounding the Mercedes Benz Stadium, Kendeda's status as a privately-owned eco-cathedral, and Roosevelt Hall's relatively unambitious renovation to LEED-Gold standard with a focus on energy-efficiency – the American case studies paint a picture of investing in resilience through storm water management or energy-independence in order to mitigate climate disasters, whilst neglecting more social approaches to sustainability. Whereas the Atlanta metropolitan area is extremely divided along racial and economic lines (Immergluck), citizen's resistance to historic and current processes of privileged urban planning along the Atlanta beltline or in suburban mixed-income developments is expressed among other formats in the essay series "How I'd fix Atlanta." Activist Stacey Hopkins writes in one of the essays that "ATL has consistently ranked in the top spot for income inequality for well over a decade despite our robust economic growth" (Hopkins). Other essays criticize the lack of urban quality through Atlanta's sprawl and the necessity to depend on cars as central means of transport (Lawrence). Apart from the Beltline, large parts of Atlanta are not easily walkable. I experienced this myself while interning with the Epsten Group. My rental was in Kirkwood and the streets rarely had sidewalks. In consequence, walking through the neighborhood was of course possible, but much less pedestrian-friendly.

Despite the infrastructural difficulties in creating greener and healthier futures, many metro Atlanta residents imagine futures for the area. Sarah Lawrence writes on "How I'd fix Atlanta" about the idea of shading parking lots with solar panels (Lawrence):

> The sad fact is that surface parking lots are simply too damn hot and unbearable to be in for any longer than a moment. There are lots of ways we could fix Atlanta. As much as it would improve our city, we're not realistically going to get people out of their cars any time soon. And as great as it would be to live in a public-transit-powered utopia where we could tear up all the parking lots and turn them into wildflower jungles, that also isn't going to happen in the near future.
>
> A hot parking lot full of electric vehicles is still, well…a hot parking lot. But you know what we can do fairly quickly? Require developers to build solar panels on top of all of them.

And Lawrence's perspective pointedly addresses the problem spot on: Atlanta's car-centricity most probably will not change quickly, therefore solutions must be embraced that ingeniously work with existing cultures or nudge for change like the "love our places" initiative by the Atlanta Department of City Planning which is "aimed at reimagining Atlanta's public realm through placemaking" (Atlanta Department of City Planning). On their website the Department of City Planning writes: "Tactical urbanism is one of the tools of placemaking that uses low-cost, high-impact interventions as an instrument for residents and community organizations to create public spaces in their communities" (Atlanta Department of City Planning). Past projects have included redesigned parking spaces, artistic crosswalks or on-street dining. Atlanta has a vibrant artistic and cultural scene with many activists and artists that are invested in Atlanta's future. Aligning with this spirit, the Department of City Planning has written *The Atlanta City Design: Aspiring to the Beloved Community* as a guiding document for the future. On the final page, the document reads "Atlanta is 'rising again' – this time from the ashes of the twentieth century. After generations of economic decline, disinvestment and environmental degradation, our city is resurging with new life and prosperity" (City of Atlanta 378). Nonetheless, this dynamic is opposed to Immergluck's analysis in *Red Hot City: Housing, Race and Exclusion in the Twenty-First Century, Atlanta* (2022), that emphasizes that "many decisions since the 1990s could have been made differently, in ways that would have led to less gentrification and displacement, more housing stability and affordability for lower-income families, and less reshuffling for poor families" (Immergluck 234). This disinvestment and higher-income neighborhoods' disdain for affordable housing looms large as an on-going crisis in Atlanta. The building projects described in the case studies highlight the gap between green ambition and a multi-modal reality, where green buildings are mostly resilient and energy-efficient infrastructures with little impact on social inequalities. An exception is the Living Building Standard and Kendeda building case study, that works with the JUST label and other means to foster diversity in the workforce and the inclusion of buildings into their communities through visitor-friendliness and openness.

Ways of including social sustainability more strongly would be to simply give the respective credits more weight. For example, IPpc89 "Social Equity within the Community" is a pilot credit in LEED version 4.1 that is given 1 point if achieved in the final score. The credit responds to the needs of the adjacent neighborhoods through understanding the communities and supporting vulnerable groups. Nonetheless, it is a rather complex credit and other credits are much easier to achieve because they require less time and award financial benefits to the owners. Generally green building in the U.S. is driven mostly by financial motivations as also expressed in the interview with building specialist Abe Kruger (Kruger).

While resilience measures like the large cistern in the Mercedes Benz Stadium also benefit adjacent communities through preventing flooding, they mostly follow engineering resilience scripts rather than negotiated resilience through community inclusion. I can imagine many builders fear co-creative approaches, because they take time and include strong conflicting interests between creating a higher return on investment and serving the communities. IPpc89 is a good starting point, as it requires either an assessment based on Social Economic Environmental Design (SEED) or to "partner with local organizations that already have existing relationships with the community and can participate as partners to represent community needs and concerns" (U.S. Green Building Council, "Social equity within the community"). LEED version 5 (v5) which will launch in 2025, includes a social equity assessment as a prerequisite. This prerequisite so far is mostly a checklist to identify issues related to affordability, workforce impacts, or community engagement, in order to raise awareness in the integrative team. LEED v5 will make major changes in regard to resilience and social equity. Circular building is not comparably prioritized in LEED as it is in DGNB. In LEED it relies mostly on waste diversion and requirements on materials reuse in the MR category. The Living Building Challenge has stricter requirements for waste diversion in their imperative 16 in version 4 ("net positive waste"), but mainly focuses on responsible sourcing (as in imperative 14 "responsible sourcing" version 4) rather than on the reuse of materials.

In Germany, the DGNB is focusing strongly on circularity in the version of 2023 for new buildings with a focus on retaining existing building stock or using buildings as urban mines for resources (DGNB, "Zirkuläres Bauen"). This endeavor is promoted in their publication "Im Fokus: Zirkuläres Bauen" and the creation of the Materials Passport (DGNB, *Im Fokus: Zirkuläres Bauen* 4). The Materials Passport ("Gebäuderessourcenpass") that was also applied in the Kreislaufhaus in Essen supports disassembly and reuse. The time during which this book was written (2019-2025), circularity in building remained a fairly new topic. None of the case

studies used large amounts of repurposed materials but mainly relied on low-emitting, low-carbon, sometimes C2C-certified, new materials. This is in part due to complex and strict building regulations, where old building materials must meet certain criteria and be reassessed in Germany. This is relevant for safety and standardizing guidelines, but many experts argue for regulation changes to make reuse mandatory or at least to facilitate the reuse of materials (Ehlerding). Nonetheless, the script of circularity is gaining more traction also through new business models such as the firm "Concular" in Germany. Concular employees scan buildings that will be demolished and the company then resells and repurposes old materials to new projects. The company was founded in 2020 and is often mentioned as a poster child for circularity. In their efforts, they currently focus mainly on large corporate buildings. In the future, artificially intelligent visual technologies could be used to scan materials on site and classify which materials can and should be repurposed. This would be possible through cameras or drones and an automated analysis trained by artificial intelligence algorithms. Currently, human assessment of the materials remains necessary. The inclusion of new technologies could open many new possibilities of collaboration and create recycling infrastructures and pathways.

Additionally, I would like to share an observation with regard to regional differences I have witnessed during my stays in both the Ruhr region and Metro Atlanta. For the most part, the Ruhr region is trying to tackle green projects from a larger infrastructural perspective, whilst Atlanta fosters innovation more through local government programs at the municipal level. Urban farming and green space preservation are promoted through the "Green Communities Program" or small initiatives like "Hands on Atlanta" or "Community Engagement Chore" that mobilize volunteers to protect and preserve the city's numerous parks and green spaces. The major infrastructural project in Atlanta is the Atlanta BeltLine, which converts former railway corridors into a multi-use trail encircling the city. This project supports green mobility in a city where cars remain extremely dominant. Many local organizations and artists participate in activities along the BeltLine through urban gardens among others. Nonetheless, there is a lack of affordable housing developed along the BeltLine due to opt-out options for developers in Atlanta's inclusionary zoning regulations (Keenan, "Could Atlanta make affordable housing mandatory in hot markets?"). These regulations allow to bypass lower-income housing through paying a fee, which developers regard as more profitable.

In the Ruhr area, large infrastructural projects like the international building exhibition Emscher Park and reconstruction of the Emscher to a sewage-free river (the largest infrastructure project in Europe (Bogumil and Heinze 41)) have been pursued since the 1980s. This renaturation

project has enhanced the quality of life in many areas of the Ruhr region, making it more attractive as a knowledge region ('Wissensregion') that attracts a skilled workforce (Bogumil and Heinze 45). Bogumil and Heinze therefore proclaim the future vision of the Ruhr region as a 'competitive ecological knowledge region' (Bogumil and Heinze 46). Nonetheless, also in the Ruhr region, there is significant economic and ethnic segregation. For this reason, the autobahn A40 is often referred to as a "social equator" ("Sozialäquator") with more joblessness in the Northern parts of the Ruhr region (Bogumil and Heinze 40). The transformation to a knowledge region with many universities has certainly helped the Ruhr area's economic and ecological transformation and brought economic success. Regardless, not the entire workforce is qualified for these emerging fields in intelligent mobilities or green energy transitions (Bösch 23). Whilst the Ruhr area is investing in many economic cooperations with start-ups and investors in these emerging fields, it will be essential to include the non-academic workforce into regional value creation.

In the course of these developments, innovation city Bottrop highlights the efforts in decarbonization from a traditional mining town to an eco-friendly innovation hub. With the new regional, infrastructural development project IGA 2027 ("international garden exhibition"), the Ruhr region is again bracing itself for the future through creating "Zukunftsgärten" ("gardens for the future") that are creating or recreating new green spaces and parks in five places within the Ruhr region. IGA 2027 is under the motto of "How do we want to live in the future?" (German orig.: "Wie wollen wir morgen leben?"). To this end, 30 projects will be highlighted that are in different phases of development (finalized projects or even renderings) to demonstrate the on-going transformation to a carbon-neutral and green future. In order to attract business and achieve carbon-neutrality, clean energy remains an urgent issue to be solved. Many industries in the Ruhr region rely on energy-intensive production such as the steel or chemical industries. Objective 26 in the GI (green infrastructure) plan by the Ruhr Regional Association advocates for the acceleration of renewable energies from wind or hydropower (Regionalverband Ruhr 80). Nonetheless, some of these technologies or the storage of energy produced through renewables is not market-ready to the necessary extent. Therefore, energy will remain one of the most pressing challenges for the Ruhr's green transformation.

Whereas Atlanta is one of the leading cities in LEED-certified residential and office space in the U.S., from my point of view, the city and developers pursue certification mostly to strengthen Atlanta's position as an economic hub – as green corporate buildings have higher

returns on their investment than their counterparts (Copiello and Coletto). Economic leadership in Atlanta has traditionally focused on attracting major corporations and large-scale investments. While these efforts enhance the city's overall economic profile, they may not directly address or benefit the specific needs of individual neighborhoods. This approach can inadvertently sideline community-driven initiatives.

Generally, greening efforts in Atlanta are majorly driven by resilience due to frequent extreme weather events. Atlanta additionally has a resilience strategy in place as part of the Rockefeller Resilient Cities Network. Still, not all case study projects are limited to focusing on heat island reduction or storm-water management. Especially the Kendeda Living Building addresses resilience in a multi-faceted way. On the other side of the Atlantic, German traditions as applied in the Ruhr region, focus more on coherent green infrastructures, circularity and co-creation. As the tiny house case study in Dortmund demonstrates, some city officials experiment with co-creative approaches, despite resource-intensive planning and communication challenges. Furthermore, the Kreislaufhaus, as one of the first buildings in Germany to use DGNB's materials passport sets an example for the ability to reuse building components in the future.

ENGINEERING RESILIENCE SCRIPTS AS PRIORITY IN GREEN BUILDING EFFORTS

The hypothesis that social sustainability is deprioritized in green building standards is mostly true according to my qualitative analysis. All case studies (MBS, Kendeda, Kreislaufhaus, Tiny Houses, Essen 51, Roosevelt Hall) centrally include engineering resilience through features like storm water management, cisterns, water management, on-site and energy-independence measures like geo-thermal probes or solar energy. Further, resilience is mainly inscribed in the projects through the script of engineering resilience, not through the idea of negotiated resilience. The green building standards LEED and DGNB prescribe this path-dependency on engineering resilience through the way points are awarded in the systems.

A singular focus on engineering resilience scripts can result in a technical and infrastructure-heavy approach to greening the city, potentially overlooking the importance of community engagement, social equity, and cultural preservation. For example, resilient buildings may be designed to withstand extreme weather conditions, but if they are unaffordable or inaccessible to marginalized populations, they fail to contribute to a wider understanding of urban resilience (Meerow and J. P. Newell). Ensuring equitable access to resilient buildings is crucial for achieving broader sustainability goals. Resilience primarily focuses on enhancing a building's ability to withstand shocks and stresses, whereas other sustainability frameworks – such as

regenerative design – emphasize restoring ecosystems and promoting biodiversity (Lyle). An overemphasis on resilience may lead to rigid structures that, while durable, do not integrate nature-based solutions such as green roofs, permeable landscapes, and passive design strategies. This could limit the potential of buildings to contribute positively to urban ecological networks.

Including negotiated resilience would require more participatory and inclusive forms of citizen dialogue. As described in chapter 2, introducing the concept of negotiated resilience, this process is challenging and requires time, money, and moderation skills. Some cities are experimenting with creative ways to include and activate citizen's imaginaries about the city. Dortmund for example provided a digital tool to reimagine the city's central train station as part of a smart eco-city. To further facilitate citizen involvement, the Department of City Planning in Atlanta maintains the "Atlanta for All" platform, which provides up-to-date information on urban planning initiatives and details about upcoming engagement opportunities. The platform serves as a centralized hub where residents can access resources, review planning documents, and submit feedback.

Three-pillar sustainable scripts, therefore are rarely followed in the case studies due to the shortcomings in regard to social sustainability. The EU-Taxonomy through its implementation of ESG-Standards (environment – social – governance) could possibly further the inclusion of social sustainability – even though the social pillar is already under-conceptualized and underrated. Nonetheless, bridging the divide between the natural sciences and humanities will be necessary to tackle the climate crisis in a way that is reconcilable with more social justice. Therefore, I find that the practical implementation of green scripts in green building practices deprioritizes social sustainability in favor of engineering resilience scripts.

4.3 CONSTRAINTS TO THE FUTURE – TRANSITION TO CLEAN ENERGY

In order to make these future visions attainable, decarbonization is without alternative. The transition to clean energies presents an elementary cornerstone in the process of decarbonization for the U.S. economy. Nonetheless, the Republican Party heavily opposes the reduction of oil and coal as energy sources. On the contrary, Miniard et al.'s survey "highlights that there are surprisingly minor differences across ideological groups in their future preferences for energy sources for the United States, and in general, our participants want a heavily decarbonized energy system in 2050" (Miniard et al. 7111). According to Miniard et al. the differences in opinion are inflated in the media by Republican politicians that like to portray the conservative electorate as being against decarbonization. What is more accurate according to the study is that there is disagreement over which policies should be implemented in order to reach decarbonization goals. Whilst liberals in the study are more in favor of restrictive measures such as halting the construction of new oil pipelines, the conservative electorate is generally opposed to restrictive policies perceived as 'government interventions.' On the other side, there is bipartisan agreement to fund renewable resources and fund battery storage research (Miniard et al. 7110). These results are backed by surveys conducted by the PEW Research Center in 2023 that show that more than two thirds of Americans are in favor of prioritizing alternative energies such as wind and solar and support the goal of American decarbonization by 2050 (Tyson). Simultaneously, there are strong bipartisan differences in regard to how the threat of climate change is perceived. Whilst 78 % of liberals view climate change as a major threat, only 23 % of conservatives do. Among conservatives, especially younger conservative voters (under 30) favor eco-friendly policies in contrast to conservative voters older than 65 (Tyson). The Republican narrative that "environmental policies hurt the economy" remains virulent and has gained strength since the financial crisis of 2008 (Krugman).

In their introduction to *The Power of Narrative* Lejano and Nero write "this book is about how words become edifices; how they come together like brick and stone, and people set them down, layer upon layer, building structures and neighborhoods and cities. And the villages that people settle into are the stories that these words build up into alleys that connect and walls that set apart" (Lejano and Nero 1). The narratives around climate skepticism have become immensely powerful. Lejano and Nero analyze climate skepticism as a powerful in that sense 'good' narrative from the point of view that it succeeds in persuading 28 % of the American public – not from a normative standpoint of moral or scientific judgement (Lejano and Nero 4).

> The climate skeptical narrative has steadily developed and spread over more than two decades with all of the normal elements of a good story – plot, actors, time, place, breach, conflict, moral, etc. – but it has evolved into something more profound and compelling – an ideological narrative, which can be defined as a system representational narrative that strongly exhibits four properties – autopoiesis, decontextuality, invariance, and univocity (or the absence of their opposites: intertextuality, contextuality, contingency, and plurivocity). (Lejano and Nero 42)

Especially, the four properties explicated here are extremely persuasive. 'Easy' solutions often serve as connective tissues for a wider public by decreasing cognitive dissonance concerning upheld beliefs that the status quo can be maintained without changes in routine. The mechanisms by which this powerful narrative has been built, constructed, and disseminated are described by Lejano and Nero as:

> Skeptics have effectively unsettled climate science and linked it to politics and fundamental U.S. values such as freedom and choice in order to de-naturalize it and build a compelling alternative ideological narrative. They have succeeded in doing this over time with the help of language, as can be seen from the textual analysis and summary accounts, by using invariance, repetition, alternative data repetition, alternative data, the creation of binary frames, and the attribution of sinister motives and demonization of the other as well as reinforcing these positions by sharing the narrative with mostly like-minded or like-historical people. (Lejano and Nero 80)

Repetition is a powerful tool in political campaigns. President Trump excessively used the linguistic strategy of repetition in his campaigns and during his presidency, relying on simple binary frames, and immense reductions of complexity such as "crooked Hillary" or "failing New York Times" (Schneider and Eitelmann 1–13). The repetitions of such frames create false simplicities.[134]

Choi and N. Miller explain in their analysis that the EPAct 2005 (implemented by George Bush) significantly helped implement more green buildings due to financial incentives and tax rebates (Choi and N. Miller 105). Further, the efficacy of renewable energies has increased severely during the last ten years, making renewables more economically sound. Many private sector companies have therefore endorsed the Inflation Reduction Act such as BP or Shell (Krugman). The adoption of 'green capitalism' can also be witnessed by the adoption of green building certification by major corporations. These companies benefit from the reputation gained by LEED certification which is internationally acclaimed. Fuerst et al. constate that "ecolabeled commercial buildings as luxury goods are more likely to be purchased by more affluent

[134] Humans often demonstrate what has become known as 'simplicity bias.' Simple solutions are preferred in contrast to more complex explanations for phenomena (Feldman 337).

consumers. The penetration of LEED-certified buildings tends to be higher in large, economically dynamic, affluent cities with highly educated populations" (Fuerst et al. 567). Texas has attracted large companies from California and other states, that choose it over crowded and high-priced living conditions in the Bay Area and for the low taxes Texas offers. The area of Austin, Texas, has even been called "Silicon Hills" due to the large number of tech companies and start-ups that have settled there (Benveniste). Dustin Mason at USGBC also stresses that LEED is market-driven even in more conservative states.

> However, states like Florida for example, our neighbor to the South, are leading the way. They're at the forefront of climate issues. And while it is kind of a purple state, I would say more conservative in general, just like Georgia, they recognize that and they are building LEED communities, LEED cities. And Texas and Florida and Georgia to some degree have higher percentages of LEED buildings than other states across the country. So, it's an odd dynamic. (Mason)

Some especially conservative-led states, however, are trying to pushback more energy-efficient building codes through legislation. This is the case in North Carolina, where the Republican controlled house of representatives passed House Bill 488 that bans all updates to building codes until 2031 (St. John).

GERMAN PERSPECTIVE ON TRANSITION TO CLEAN ENERGY

The German government, particularly under the influence of the Green Party, has implemented ambitious plans to transition to renewable energy sources. A noteworthy policy includes the proposed ban on new fossil-fuel heating systems, aiming to reduce emissions and promote cleaner heating alternatives. This initiative reflects Germany's broader commitment to achieving its climate targets and reducing reliance on fossil fuels.

However, these climate policies have economic ramifications. The transition to renewable energy and the associated regulations have led to increased energy costs, impacting both industries and consumers. The industrial sector, in particular, has expressed concerns over competitiveness and the financial burden of adapting to new regulations. This economic strain has contributed to public discontent, especially in regions heavily reliant on traditional industries. Capitalizing on this discontent, the AfD has positioned itself as a vocal critic of the government's climate policies. The party argues that these measures are economically detrimental and questions the scientific consensus on human-induced climate change (Otteni and Weisskircher 317). By framing climate initiatives as elitist projects that overlook the

average citizen's concerns, the AfD has gained traction among voters frustrated with the current government's approach (Marsh and Sychev). The AfD's growing popularity presents a significant challenge to Germany's climate agenda. While the party remains excluded from coalition governments upheld by major parties, its influence is evident in public discourse and regional politics. The AfD's success in local elections, particularly in eastern Germany, indicates a shifting political landscape that could impede the implementation of comprehensive climate policies.

In response, the German government faces the complex task of balancing the urgency of climate action with economic considerations and public sentiment. Ensuring that climate policies are both effective and equitable is crucial to maintaining public support and countering the AfD's narrative. As Germany navigates this intersection of environmental responsibility and political dynamics, the outcomes will have profound implications for its commitment to combating climate change.

OPINION: CLIMATE PORN AND RISK AS FEELINGS

Despite the green building movement institutionalizing itself further in Germany and the U.S. through the expansions of networks, building exhibitions, and political support for example from the European Union, and other legislative bodies – resistance to pro-climate measures is on the rise since the Trump administration has taken up governance in 2025 and populist perspectives from the AfD are circulating in Germany. What would support the discussion about low-carbon building in Germany in my opinion, would be to focus on affordable measures of refurbishing houses – because many homeowners fear they will not be able to pay for a climate-friendly renovation.

What can be done then in order to reach climate goals and contribute to decarbonizing the building sector? Exaggerating the disaster is certainly a bad idea. "Climate porn" which refers to sensationalist media coverage, can evoke feelings of "despair and helplessness," and contribute to the rise of "alarmist images" (Smith and Leiserowitz 1029). Psychologist Kyle Killian describes how the perspective of 'disaster porn' encourages "audiences [to] sit back and watch it all happen, consuming apocalyptic 'entertainment'" (Killian). The 'risk-as-feelings hypothesis' was articulated by Loewenstein et al. in 2001, and describes that "feelings play a much more prominent role than they are given credit for" (Loewenstein et al. 274). Loewenstein et al. argue that

> [e]motional reactions guide responses not only at their first occurrence, but also through conditioning and memory at later points in time, serving as somatic markers" (Loewenstein et al. 274). […] "In contrast to cognitive evaluations, emotional reactions are sensitive to the vividness of associated imagery, proximity in time, and a variety of other variables that play a minimal role in cognitive evaluations. (Loewenstein et al. 280)

Smith and Leiserowitz describe that "[m]ost Americans have learned about global warming from the mass media, which has a particularly important agenda-setting effect for this complex issue. Climate change seems distant and abstract to most Americans, while carbon dioxide, other greenhouse gases, and the impacts that have already been observed around the world are largely invisible and outside of most people's direct experience" (Smith and Leiserowitz 1028). This invisibility is slowly changing as droughts, wildfires, storms, and floods occur more frequently and hit closer to home. Unfortunately, in the U.S. and partly in Germany, pro-environmental attitudes have become a partisan subject, declared as 'liberal views' standing in opposition to 'conservative values' (Callicott 115).

Enforcing stricter and more resilient and sustainable building codes, standards, and certification systems might have to be framed differently in order to be appealing to more conservative audiences by arguing through the lens of individual profits, protection, and engineering resilience. Home-owners from any political spectrum quite directly understand the benefits of securing their homes against possible disasters and weather extremes such as heat. In the U.S., insurance companies are increasing their involvement in risk reduction, offering premiums and discounts for example for participation in IBHS's Fortified Home program (Czaijkowski 315). Nonetheless, the underlying cultural issues must be dealt with – refraining from the partisan narrative and emphasizing the benefits of living in clean and healthy environments. This is a lesson the USGBC has learned in more conservative states, because from their experience, humans generally agree on the desire to live in healthy and clean environments. And if this in turn is paired with an affordability-sensitive discussion, there is a possibility that green building will be less attackable by populist debates.

5 CONCLUSION

This book set out to analyze the presence of five green scripts (three-pillar sustainability, resilience, circularity, degrowth, and smart city) in building projects in the Ruhr and Atlanta metropolitan region in order to assess which scripts are circulating faster than others and how they are manifested in the materialities of the respective buildings. My thesis that the social script in three-pillar sustainability is underrepresented in green building standards and their practical application was confirmed by the case studies and the study of green building standards.

However, the green building standards under scrutiny are adapting to societal pressures, as evidenced by LEED version 5, which includes social equity more prominently than before. In spite of that, the number of credits centralizing equity are still very few in LEED v5. Whereas, LBC has included the social script of three-pillar sustainability very prominently – the other two standards with more reach, LEED and DGNB, still focus their socially-oriented credits mainly around occupant health through the measurement of acoustic, olfactory, or visual comfort. While the German standard DGNB is developing its system to focus more on circular scripts, the most prominent script in the case studies was the engineering resilience script, which prioritizes measures like heat island reduction or storm water management in order to support the building through challenging climatic conditions. The focus on the engineering resilience script stems from the perspectives through which the standards are constructed, which mainly belong to engineers and architects and their educational curricula, which prioritize the durability of structures rather than the social implications of buildings. And certainly, there are economic, and ecological reasons to do so as the durability of a building in the face of climate-related stress events enhances the longevity of the structure.

Nonetheless, young architects and urban planners are criticizing the separation of disciplines when trying to find solutions to urban planning in the age of global warming in German *Baumeister* magazine B3/23 with the title “Junge Architekten” (Baumeister). The young architects claim that sociologists, educators and other humanities’ perspectives should be included and receive a seat at the table in discussing and shaping green cities. This book accordingly emphasizes the necessity of transdisciplinarity for green futures that are ecologically, economically, and socially viable. As mentioned in the introduction, the synthesis of the natural sciences with the humanities can highlight shortcomings and opportunities in regard to green transformations.

From my analysis, the specification of what is meant with the term ‘green’ is crucial. A ‘green’ project is not similar to another so-called ‘green’ project as the analysis of the case studies demonstrates. From creating ‘living buildings’ that are restorative like the Kendeda building, to buildings that are constructed to be material depots like the *Kreislaufhaus,* to small settlements like the tiny houses in Dortmund-Sölde that promote sufficiency, or relatively conventional renovations like Roosevelt Hall that focus mainly on energy-efficiency through modern HVAC-systems – green buildings could not be more diverse in impact and their conceptual origins – the scripts through which they were imagined.

Certainly, my perspective on the shortcomings and possible future developments of green building standards is limited in its own way and should be renegotiated further, especially with engineers and architects that have predominantly shaped these standards in the past. I have accordingly not attempted to blend all possible perspectives, but to add complexity to the way humans create and codify standards into our everyday materialities and lives. I believe cultural studies should engage with great rigor in debates on standardization processes and the respective academics should involve themselves in such committees, since the built environment shapes human’s social and economic lives in such profound ways.

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SUMMARY (ENGLISH)

This dissertation focuses on the infrastructurally relevant material and tangible dimension of green transformations – the built environment – namely the way buildings and neighborhoods are conceptualized to be 'green' by architects, builders, and urban planners, and how these buildings in turn (re)shape human cultures and societies. In order to address the complexity of what is actually meant by the term 'green' in building, this study digests different interpretations of 'greenness' in the city by taking apart and contextualizing the following scripts of greenness: (1) three-pillar sustainability, (2) resilience, (3) circularity, (4) degrowth, and (5) smart city. A script, as used in literary and cultural studies, is a model that relies on specific narrative, social, spatial, and technical patterns. Green buildings in particular have not been extensively studied in terms of what forms of materialized social conditions they produce. Nor have green building standards been examined from this point of view – dissecting how different understandings of 'greenness' produce a variety of social outcomes. My main thesis is that green building standards tend to deprioritize social scripts of sustainability in favor of other varieties of greenness.

At the heart of this study lie the case study buildings and neighborhoods (1) "Kreislaufhaus" in Essen (Germany); (2) "Tiny Houses Dortmund-Sölde" in Dortmund (Germany); (3) "Essen 51" in Essen (Germany); (4) "Mercedes Benz Stadium" in Atlanta (USA); (5) "Kendeda Building" in Atlanta (USA); and (6) "Roosevelt Hall" in Atlanta (USA). My data is derived from green building scorecards (LEED, DGNB, LBC),[135] expert interviews, planning documents, and the representations of the case study buildings in digital spaces. In addition, data was collected through participant observation during two field-related internships with Öko-Zentrum NRW (Hamm, NRW, Germany) and Epsten Group (Atlanta, GA, USA). Correspondingly, this study is situated within the transdisciplinary field of urban studies, wherein the 'larger socio-political context' of buildings and neighborhoods raises questions that emerge at the intersections of disciplines. By researching green building standards and buildings as cultural artifacts, I wish to make a case for the further inclusion of literary and cultural studies into questions of sustainability and climate adaptation.

[135] The Leadership in Energy and Environmental Design (LEED) system, developed by the U.S. Green Building Council, is a globally recognized green building standard focusing on energy efficiency and environmental performance. Deutsche Gesellschaft für Nachhaltiges Bauen (DGNB) emphasizes an approach incorporating ecological, economic, and sociocultural criteria. The Living Building Challenge (LBC), by the International Living Future Institute, sets very ambitious benchmarks, requiring regenerative and self-sufficient building practices.

Accordingly, this book investigates the presence of the aforementioned five green scripts in building projects in the Ruhr and Atlanta metropolitan regions in order to assess which scripts are circulating faster than others and how they are manifested in the materialities of the respective buildings and the standards that have shaped them. My thesis that the social script in three-pillar sustainability is underrepresented in green building standards and their practical application was confirmed by the case studies and the study of the green building standards. All case studies centrally include 'engineering resilience' through features like storm water management, cisterns, heat island reduction, and energy-independence measures like geo-thermal probes or solar energy. My dissertation warns that a singular focus on engineering resilience scripts can result in a technical and infrastructure-heavy approach to greening the built environment, potentially overlooking the importance of community engagement, social equity, and cultural preservation. For example, resilient buildings may be designed to withstand extreme weather conditions, but if they are unaffordable or inaccessible to marginalized populations, they fail to contribute to a more just understanding of urban resilience (Meerow and J. P. Newell). Ensuring equitable access to resilient buildings is crucial for achieving broader sustainability goals. Engineering resilience primarily focuses on enhancing a building's ability to withstand shocks and stresses, whereas other green frameworks – such as circular or regenerative design – emphasize restoring ecosystems and promoting biodiversity (Lyle). This narrow focus could limit the potential of buildings to contribute positively to urban ecological and social networks. However, the green building standards under scrutiny are adapting to societal pressures step by step, as evidenced by LEED version 5, which includes social equity more prominently than before. Whereas LBC includes the social script of three-pillar sustainability very prominently – the other two standards with more reach, LEED and DGNB, still focus their socially-oriented credits mainly around occupant health through the measurement of acoustic, olfactory, or visual comfort. The focus on the engineering resilience script stems from the perspectives through which the standards are constructed, which mainly belong to engineers and architects and their educational curricula oftentimes prioritizing the durability of structures rather than the social impacts of buildings. Certainly, there are additional economic, and ecological reasons to do so as the durability of a building in the face of climate-related stress events enhances the longevity of the structure.

I demonstrate that cultural studies and urban literary scholars should engage rigorously in debates on standardization processes and the relevant committees, since the built environment shapes human social and economic lives in such profound ways.

ZUSAMMENFASSUNG (DEUTSCH)

Diese Dissertation konzentriert sich auf eine infrastrukturell relevante materielle und greifbare Dimension grüner Transformationen: die gebaute Umwelt. Dabei wird beleuchtet wie Gebäude und Stadtviertel von Architekt*innen, Bauherr*innen und Stadtplaner*innen als ‚grün' konzeptualisiert werden, und wie diese Gebäude wiederum menschliche Kulturen und Gesellschaften (neu) gestalten. Um die Komplexität der Begrifflichkeit ‚grün' im Bauwesen zu klären, werden in dieser Studie die folgenden Skripte kontextualisiert: (1) Drei-Säulen-Nachhaltigkeit, (2) Resilienz, (3) Kreislaufwirtschaft, (4) Postwachstum und (5) die smarte Stadt. Als Skript wird in den Literatur- und Kulturwissenschaften ein Modell bezeichnet, das auf bestimmten narrativen, sozialen, räumlichen und technischen Mustern basiert. Insbesondere nachhaltige Gebäude wurden bisher nicht umfassend im Hinblick darauf untersucht, welche Formen von verdinglichten sozialen Verhältnissen sie hervorbringen. Auch die Normen und Standards für nachhaltiges Bauen wurden bisher nicht daraufhin analysiert, inwiefern unterschiedliche Priorisierungen dieser grünen Skripte zu heterogenen sozialen Konsequenzen führen. Meine Hauptthese ist, dass die Normen für grünes Bauen dazu neigen, die sozialen Skripte der Nachhaltigkeit zu vernachlässigen.

Im Mittelpunkt dieser Studie stehen die Fallstudiengebäude und -quartiere: (1) Kreislaufhaus in Essen (Deutschland); (2) Tiny Houses Dortmund-Sölde in Dortmund (Deutschland); (3) Essen 51 in Essen (Deutschland); (4) Mercedes Benz Stadium in Atlanta (USA); (5) Kendeda Building in Atlanta (USA); und (6) Roosevelt Hall in Atlanta (USA). Meine Daten stammen aus Bewertungsbögen zu den nachhaltigen Baustandards LEED, DGNB und LBC[136] sowie aus Experteninterviews, Websites und Planungsdokumenten, Filmen und weiterführender akademischer Literatur zu den Fallstudiengebäuden sowie aus teilnehmender Beobachtung während zweier feldbezogener Praktika. Dementsprechend ist diese Studie in einem transdisziplinären Bereich angesiedelt: den ‚Urban Studies.' Der größere sozio-politische Kontext von Gebäuden und Stadtvierteln wirft Fragen auf, die in den Zwischenräumen von Disziplinen verortet sind. Durch die Erforschung von nachhaltigen Baustandards und Gebäuden

[136] Das **Leadership in Energy and Environmental Design (LEED)**-System, entwickelt vom U.S. Green Building Council, ist ein weltweit anerkannter Standard, der sich auf Energieeffizienz und ökologische Kriterien konzentriert. Die **Deutsche Gesellschaft für Nachhaltiges Bauen (DGNB)** betont einen Ansatz, der ökologische, ökonomische und soziokulturelle Kriterien inkludiert. Die **Living Building Challenge (LBC)** des International Living Future Institute setzt sehr ambitionierte Maßstäbe und erfordert regenerative und autarke Baupraktiken.

als kulturellen Artefakten möchte ich ein Plädoyer für die weitere Einbeziehung der Literatur- und Kulturwissenschaften in Fragen der Nachhaltigkeit und Klimaanpassung halten.

In dieser Dissertation wurde das Vorhandensein der erwähnten fünf grünen Skripten in Bauprojekten im Ruhrgebiet und in der Metropolregion Atlanta analysiert, um zu beurteilen, welche Skripte schneller zirkulieren als andere und wie sie sich in der Materialität der jeweiligen Gebäude manifestieren. Meine These, dass das soziale Skript der Drei-Säulen-Nachhaltigkeit in den nachhaltigen Baustandards und ihrer praktischen Anwendung unterrepräsentiert ist, wurde durch die Fallstudien bestätigt. Alle Fallstudien beinhalten in hohem Maße technische Resilienz durch Merkmale wie Regenwassermanagement, Zisternen, Maßnahmen zur Hitzereduktion oder zur Energieunabhängigkeit wie geothermische Sonden oder Solarenergie. Ein vorrangiger Fokus auf technische Resilienz-Skripte kann jedoch zu einem technischen und infrastrukturlastigen Ansatz in Bezug auf die Nachhaltigkeit von Gebäuden führen, bei dem die Bedeutung von gesellschaftlichem Engagement, sozialer Gerechtigkeit und kulturellem Erhalt vernachlässigt wird. Beispielsweise können resiliente Gebäude so konzipiert sein, dass sie extremen Wetterbedingungen standhalten, aber wenn sie für marginalisierte Bevölkerungsgruppen unerschwinglich oder unzugänglich sind, tragen sie nicht zu einem gerechteren Verständnis von urbaner Resilienz bei (vgl. Meerow und J. P. Newell). Dies kann das Potenzial von Gebäuden einschränken, einen positiven Beitrag zu sozial-ökologischen Netzwerken zu leisten. Die Gewährleistung eines gerechteren Zugangs zu resilienten Gebäuden ist entscheidend für das Erreichen umfassender Nachhaltigkeitsziele. Die untersuchten Standards für grünes Bauen passen sich jedoch fortlaufend an den gesellschaftlichen Druck an, wie die LEED-Version 5 zeigt, die soziale Gerechtigkeit stärker als bisher berücksichtigt. Die Fokussierung auf das Skript zur technischen Resilienz ergibt sich aus der Perspektive, aus der die Standards erstellt werden, die vor allem von Ingenieur*innen und Architekt*innen und ihren universitären Lehrplänen geprägt ist, welche in der Vergangenheit oftmals der Dauerhaftigkeit von Strukturen gegenüber den sozialen Auswirkungen von Gebäuden den Vorrang geben haben. Dafür lassen sich sowohl ökonomische als auch ökologische Argumente anführen, da die Widerstandsfähigkeit eines Gebäudes gegenüber klimabedingten Extremereignissen maßgeblich zur Erhöhung seiner Lebensdauer beiträgt.

Abschließend zeige ich, dass sich Wissenschaftler*innen aus den Kulturwissenschaften und urbanen Literaturwissenschaften in die Debatten über Standardisierungsprozesse einbringen

und in den entsprechenden Gremien engagieren sollten, da die gebaute Umwelt das soziale und wirtschaftliche Leben von Menschen auf so tiefgreifende Weise prägt.

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