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Mapping Frontier Research on the New European Bauhaus

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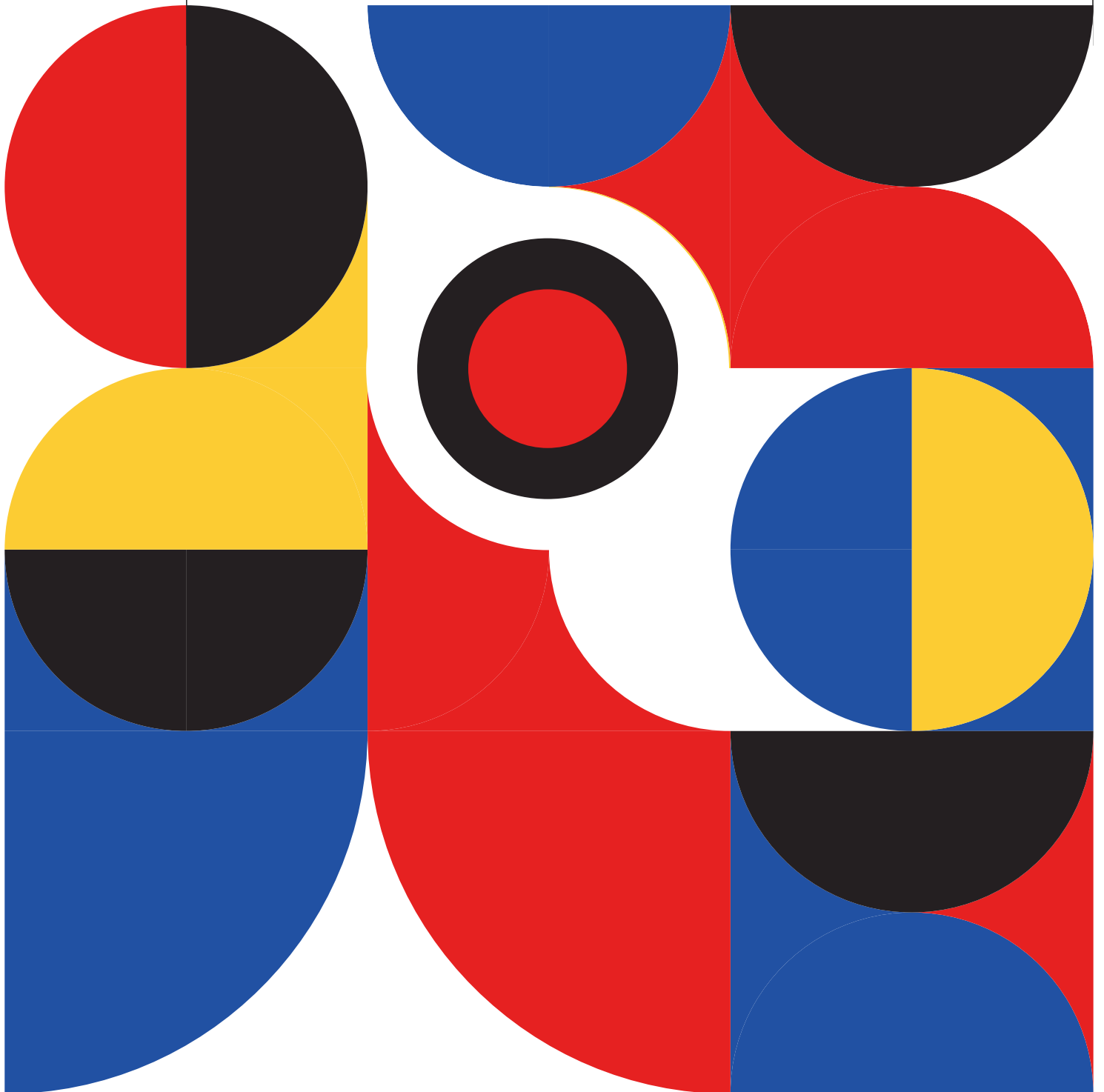


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1. Foreword

Launched by the European Commission in 2021, the New European Bauhaus is more than an initiative — it's a movement. It fuses creativity and design with sustainability, accessibility and affordability to bring the goals of the European Green Deal to life. At its heart is collaboration: citizens, experts, businesses and institutions working together to reimagine the spaces we live in and to shape urban environments that are beautiful, sustainable and inclusive.

The Mapping Frontier Research initiative of the ERC Scientific Council shows how curiosity-driven research feeds directly into solutions for society's biggest challenges. This report — Mapping Frontier Research on the New European Bauhaus — presents a portfolio of 87 ERC funded projects that push the boundaries of knowledge, while offering concrete ideas to support the Bauhaus vision of thriving, inclusive communities.

From nature-based building materials to solar-powered architecture, from affordable housing to urban greening, these projects showcase innovative ways to design the cities of tomorrow. They explore how art and culture foster belonging, how neuroscience connects wellbeing to the spaces around us, and how circular economies, sustainable mobility and pollution reduction can make urban life more resilient.

Together, these discoveries provide a glimpse of what's possible when frontier science meets societal ambition: places that are not only sustainable and inclusive but also inspiring — for today and for generations to come.



[Harriet Bulkeley](#)
Member of the
ERC Scientific Council



2. Introduction

2.1. Policy context

The [New European Bauhaus](#) is a flagship initiative of the European Union that drives the green transition in our built environments. Rooted in the spirit of the original Bauhaus movement — founded in 1919 by Walter Gropius to unite art, design and function — the New European Bauhaus reimagines this vision for today's challenges of climate change, social inclusion and cultural diversity.

At its core, the New European Bauhaus promotes solutions that are **sustainable, inclusive and beautiful**, while recognising and valuing Europe's diverse places, traditions, and identities. It empowers communities by working at the grassroots level, providing tools, guidance, and tailored approaches, while ensuring that citizens, practitioners, and stakeholders are engaged throughout the design and implementation process.

By bridging **science and technology with art and culture**, the New European Bauhaus turns creativity and innovation into practical transformation. It advances Europe's commitment to a just and green transition by promoting three inseparable values:

- > **Aesthetics:** quality of experience and style beyond functionality
- > **Inclusion:** from valuing diversity to securing accessibility and affordability
- > **Sustainability:** from climate goals to circularity, zero pollution, and biodiversity

2.2. ERC-funded research on inclusion, aesthetics and sustainability in the built environment

The European Research Council (ERC), established by the EU in 2007, is the premier European funding organisation for excellent frontier research. By giving researchers, the freedom to pursue ambitious ideas without predetermined priorities, the ERC enables groundbreaking research with impact beyond science.

This publication presents a portfolio of **87 ERC research projects**, supported by **€158 million in funding**, which contribute to the generation of knowledge, technical advancements and innovative solutions that can inform and contribute to the New European Bauhaus ideals and objectives. These projects were identified using a set of targeted keywords and were subsequently individually assessed for their alignment with at least one of the three values of the New European Bauhaus presented above. As shown in Figure 1, half of the projects focus on sustainability-related matters, while 18% address inclusion, and 5% focus on aesthetics. Nearly a third of the projects cover more than one of the three aspects.



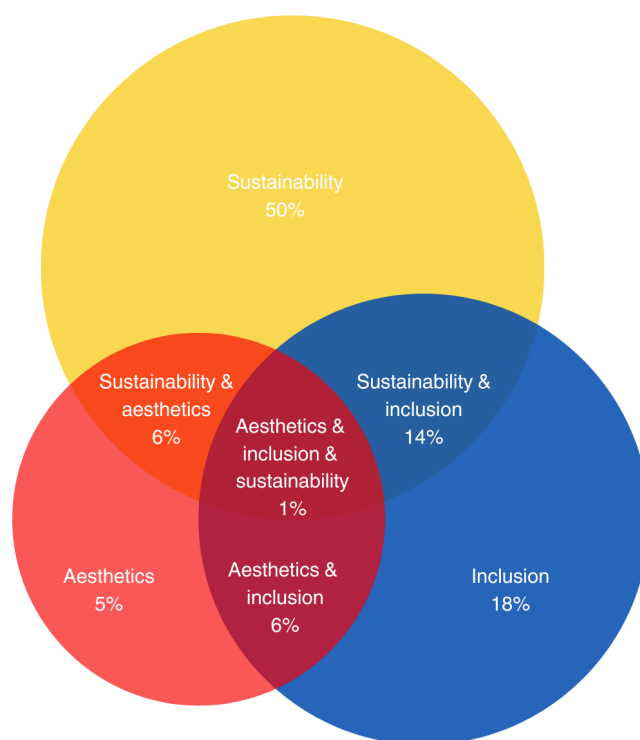


Figure 1: ERC project distribution along the three values (aesthetics, inclusion, sustainability) of the New European Bauhaus.

Most of the projects are funded under the Social Sciences and Humanities (SH) and the Physical Sciences and Engineering (PE), with a smaller number in the Life Sciences (LS) domains. Their distribution across the ERC scientific panels (excluding Synergy and Proof of Concept grants) is shown in Figure 2.

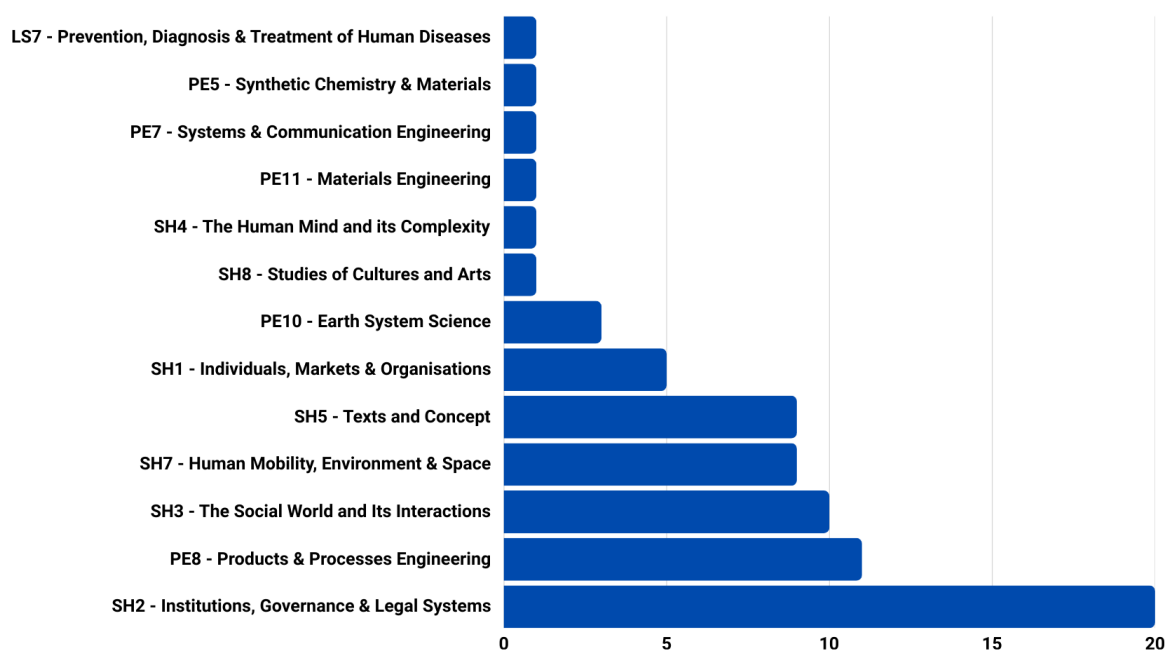


Figure 2: Panel distribution of projects addressing the New European Bauhaus values

From 2014 to 2020, geography, urban studies and planning were included in panel SH2. Since 2021, they have formed part of panel SH7. From 2014 to 2023, culture, architecture, and the arts were included in panel SH5. Since 2024, they have formed part of panel SH8.

The scientific disciplines covered and the issues addressed by the portfolio of projects are shown in Figure 3.

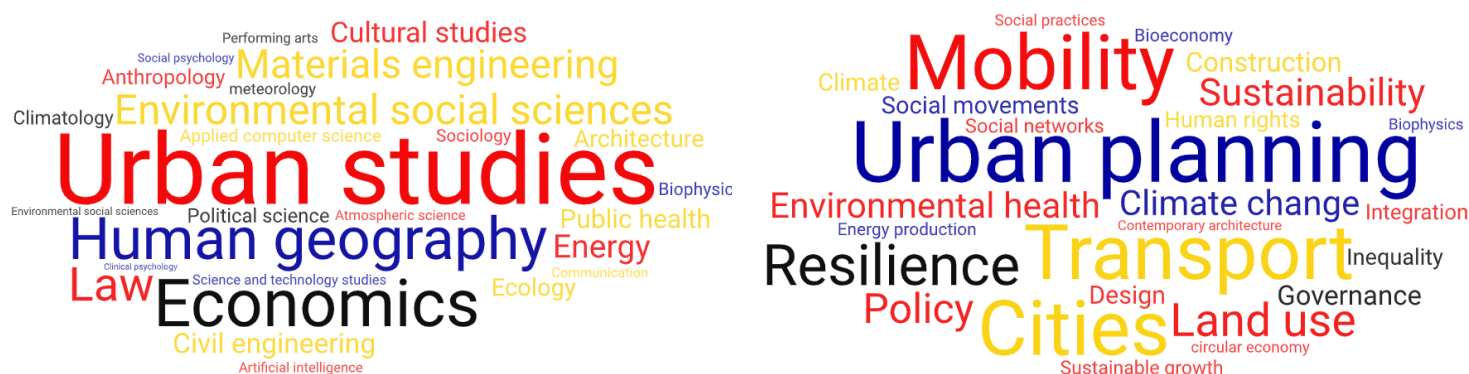


Figure 3: Scientific disciplines (left) and topics (right) of ERC projects addressing the New European Bauhaus.

The following three sections present a selection of the 87 projects. When choosing the projects to highlight, the primary selection criteria were the maturity of the projects and the availability of notable research outputs. Projects were also selected to showcase the wide scope of the portfolio. Each project is presented under one of the three core values of the New European Bauhaus — aesthetics, inclusion, sustainability — while many of them are relevant to more than one of these values.

3. Aesthetics: Quality of experience and style beyond functionality

Aesthetics has a profound impact on our sensory and emotional experiences. It enriches our lives with beauty and meaning and contributes to our physical and mental well-being.

This dimension of the New European Bauhaus is centred on supporting a sustainable and inclusive aesthetic that combines functionality with beauty. Core principles are the integration of circularity, sustainability, and regenerativity into design along with the promotion of diversity, inclusivity and accessibility. This dimension emphasises the importance of co-creation, participatory design and community engagement in shaping the built environment, with a focus on sensory experience, well-being and the emotional connection between people and spaces.

3.1. Architecture and building materials

This section presents projects that develop innovative solutions for a more sustainable and comfortable built environment. Through frontier research into new materials, advanced modelling tools for design and fabrication, and novel perspectives on architecture, the projects tackle key challenges such as environmental responsibility and the mitigation of climate change impacts on urban areas. The overarching goal is to shape built environments that not only uphold environmental sustainability but also enhance the comfort, well-being and quality of life of their inhabitants.

The use of coatings and surface treatments to protect materials from environmental conditions is ubiquitous in engineering. Many of these treatments involve harsh chemicals or energy-intensive processes, while consuming large volumes of increasingly precious water. The [ARCHI-SKIN](#) project, led by Anna Sandak at the University of Primorska in Slovenia, pioneers the development of Engineered Living Materials (ELMs) to extend the lifespans of materials in the building sector. Inspired by nature, Sandak and her team envision building surfaces as ‘living skins’, using fungal biofilms to create protective layers, which can grow, adapt to environmental changes and self-heal. Replacing chemical coatings with biofilms to extend the lifespan of materials reduces pollution and contributes to sustainable, environmentally responsive architecture in the built environment.

“ Our technology has strong potential to transform surface protection in architecture, offering coatings that are self-regenerating, non-toxic, and environmentally responsive. These properties can dramatically reduce maintenance, extend material lifespans, and support carbon neutrality goals. ARCHI-SKIN targets the building sector, which requires large quantities of coatings, especially in light of the EU’s need to build or renovate over 9 billion m² of walls and roofs by 2050 to meet climate targets.

Anna Sandak, ARCHI-SKIN

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The biofilm protective technology developed by ARCHI-SKIN uses low-cost and widely available biomaterials and production methods. This makes it economically viable for large-scale applications with the potential for wider adoption. The team collaborates with the [New European Bauhaus Academy](#) to train architects and engineers in using nature-based materials, contributing to broader efforts to upskill and reskill the building sector for sustainable construction.

“ ARCHI-SKIN positions ELMs as a breakthrough for sustainable architecture. ELMs offer self-healing, adaptive and low-impact solutions far beyond current smart materials. They have cross-sector potential, from synthetic biology and health applications to AI-driven material monitoring. Their application can reduce maintenance, extend material life and enable structures that actively contribute to environmental health. By merging biology with design, ARCHI-SKIN opens the door to a radically more resilient, aesthetic and inclusive built environment.

Anna Sandak, ARCHI-SKIN

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Read more about ARCHI-SKIN on their [website](#) and in this [article](#).

Reducing the large carbon footprint of the construction sector and its reliance on dwindling resources such as metal and fossil fuels is central to the [ECO-METABOLISITIC-ARC](#) project, led by Mette Ramsgaard Thomsen at the Royal Danish Academy. Thomsen and her team examine a range of biomaterials, such as bioplastic and bioluminescent bacteria, to explore their potential for application in architecture. One of the project’s strands focuses on developing advanced modelling tools to optimise the design and fabrication of architectural elements, particularly those made from timber. These tools aim to minimise waste and reduce material intensity by assessing each piece of timber in relation to its specific use, ensuring it is utilised as efficiently as possible.





Biomaterials have different properties to finite materials, which architecture has so far largely relied on, and these biomaterials pose various challenges, for example in terms of durability or resistance. ECO-METABOLISTIC-ARC advances a holistic approach that redefines architecture, moving away from traditional notions of permanence and durability. It envisions buildings as living and changeable entities that, much like plants or living materials such as bacteria, require maintenance and care. [Read more](#) about the project and [follow their work](#).

A crucial aspect of designing sustainable architecture is considering energy consumption related to cooling and heating. Rising temperatures make this issue particularly pressing in cities, which often experience higher average temperatures than surrounding rural areas — a phenomenon known as the urban heat island effect.

The [HELIOS](#) project, led by Anna Laura Pisello at the University of Perugia in Italy, develops innovative solutions for mitigating excessive temperature in urban areas to improve the well-being and quality of life for residents, while reducing the energy consumption associated with traditional cooling systems. Pisello and her team have developed and tested a range of technologies absorbing and reflecting energy including photoluminescent skins and high reflectivity and emissivity materials, to advance smart systems that passively cool buildings without the use of energy.¹

“By integrating self-regulating longwave infrared emitters, photoluminescent coatings and scalable radiative cooling systems, HELIOS aims to actively mitigate the urban heat island effect at the building and neighbourhood scale. It combines experimental validation and physical modelling to ensure reliable performance in real-world conditions. Ultimately, HELIOS envisions a new class of climate-responsive architecture, enhancing human comfort, reducing cooling energy demand, and enabling cities to become more resilient, liveable and environmentally sustainable.”

Anna Laura Pisello, HELIOS

The team is advancing mathematical models to predict how the materials will perform in different climates and seasons and is developing tools to measure their ability to selectively emit, reflect, or absorb specific wavelengths of radiation. One of the project's key achievements is the publication of a new performance index, which will serve as a crucial reference for future standardisation and regulation of the materials, enabling their wider adoption by the construction industry.

“

The HELIOS project is designed with scalability and real-world impact at its core. Our research goes beyond material innovation — we are actively developing scalable prototypes, performance metrics, and modelling tools that can be integrated into design workflows, construction practices, and urban planning policies.

Anna Laura Pisello, HELIOS

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[Read more](#) about the project, its societal outreach and how it contributes to the sustainable development goals.

Improving buildings' energy efficiency was also the focus of the [IntelGlazing](#) project, led by Ioannis Papakonstantinou at University College London in the UK. As windows are a significant weak point in building energy efficiency, allowing heat to escape in the winter and enter in the summer due to their limited insulation properties, the researchers developed two innovative solutions. An innovative glazing system (using nanostructured glass) was designed for new window installations, while a specialised polymer film was created to retrofit existing windows. Both solutions enable window surfaces to dynamically adapt to changing temperatures, permitting solar radiation to enter during winter months and reflecting it during summer months, thus optimising energy efficiency and reducing heat transfer. The research on nanostructured glass, conducted as part of the project, explored innovative properties beyond thermal modulation, including its potential for self-cleaning, antimicrobial, and anti-condensation effects. Read more about the project's innovations in this [article](#).

Thermo-modular properties are also being explored — in this case in textiles — by the research team behind the [ModelCom](#) project, led by Jaana Vapaavuori at Aalto University in Finland. The team investigates the potential of smart fabrics to adapt their properties in response to environmental changes. By integrating specifically-designed textiles with thermo- and photo-actuators, these fabrics can dynamically alter their colour, breathability and permeability. These innovative materials can be applied in various products, including clothing and window shades, which can then adjust their warming and cooling capacity depending on temperature and sun exposure, providing enhanced warming or cooling capabilities as needed. Follow the project [here](#).





3.2. Urban greening

Urban greening refers to integrating green spaces and elements into city environments to improve environmental quality, enhance well-being and counter the negative effects of urbanisation, such as air pollution, heat islands and loss of biodiversity. This section presents projects that explore the impact of greening, urban agriculture and novel ecosystems, as well as unintended negative consequences of greening initiatives, such as the displacement of vulnerable communities.

While urban greening initiatives aim to improve the overall quality of life in cities, they may also produce adverse side effects. The [GreenLULUs](#) project, led by Isabelle Anguelovski at Universitat Autònoma de Barcelona in Spain, examined how urban greening initiatives, such as parks, greenways, waterfronts or climate-adaptive infrastructure, can unintentionally contribute to gentrification and the displacement of people.

Anguelovski and her team's research found that while greening initiatives provide environmental benefits, they can also increase property values and attract wealthier residents, pricing out long-standing, often racialised and lower-income communities. Through comparative research across multiple cities in Europe, North America and South America, the team mapped the green gentrification dynamics that emerge when nature-based interventions are implemented without adequate social safeguards (such as the provision of new affordable or public housing, community land trusts or taxation of large-scale development projects) or inclusive planning. For example, the team found that in 18 of the 27 middle-sized cities studied in Europe and North America, greening was the most important driver of gentrification in the majority of these cities during the 2000s and 2010s. The solution proposed by the team is not to halt urban greening projects but to carefully consider how green infrastructure is planned, governed and financed to ensure that it supports housing affordability, recognises cultural identities and reinforces residents' rights to remain in their neighbourhood.

The research in GreenLULUs contributed to more inclusive and greener built environments by:

- > Providing evidence-based tools to monitor displacement risks around green amenities.
- > Recommending equity-centred design and policy strategies, such as community land trusts or rent control zones near green developments.
- > Building community knowledge and participatory practices to empower residents in decision-making.

***“One of the biggest barriers to building racially and socially equitable green cities in Europe is the dominant urban planning model, which still tends to prioritise real estate value, aesthetic transformation, and international competitiveness over long-term affordability and community needs. In many cities, green infrastructure is deployed as a tool of place-branding or “eco-prestige,” rather than as a vehicle for restorative environmental and social justice.*”**

Isabelle Anguelovski, GREENLULUS

[Read more](#) about GREENLULUS and its outreach to communities, academic institutions and municipalities.

Digital technologies, such as ‘smart forests’, are developing as an important strategy for addressing environmental change, including in urban environments. At the same time, these new technologies may also have unanticipated impacts. The [SmartForests](#) project, led by Jennifer Gabrys at the University of Cambridge in the UK, explores how digital technologies in smart forests reshape environmental management and examines their broader socio-political impact.

Green cities help cool urban heat, improve air quality, store carbon, support biodiversity, manage storm-water and create more liveable, inspiring environments. Smart forest technologies can further facilitate this through multiple technologies, including remote sensing techniques to identify areas with low tree cover and potentially high heat inequality, sensor technologies to aid with planting design and ongoing maintenance by ensuring regular watering of often drought-stressed trees, and participatory technologies to enable urban residents to contribute to the enhancement of urban vegetation and forests. While smart forest technologies are developing at a rapid pace, they also have profound effects on environmental governance.

***“As our research has shown, decisions about what to value, measure and implement can be significantly influenced by digital technologies that, by design, enable some environments over others.*”**

Jennifer Gabrys, SmartForests

Gabrys and her team have analysed a wide range of design projects for smart forest cities to study the advantages and disadvantages of smart-forest urbanism, from foregrounding the importance of nature to urban infrastructures, but also to generating potential exclusions in terms of who has access to green spaces or who can afford to live in well-designed, green and sustainable environments.² Environmental justice scholarship reveals that not only do less economically advantaged urban neighbourhoods tend to have fewer green and well-designed spaces, but also that once vegetation and design are enhanced in these areas, gentrification processes can displace the very people whom the interventions were meant to support.

“The introduction of digital technologies to facilitate sustainable urbanism can also potentially displace environmental governance from local councils to big tech infrastructures. For these reasons and more, efforts to address environmental change through urban design and digitalisation must engage with citizens and put justice and fairness at the centre of these initiatives.”

Jennifer Gabrys, SmartForests

As part of the project, the team developed the [Smart Forests Atlas](#) in collaboration with [Common Knowledge Coop](#) as a living archive, digital garden and tool for building networks of communities, researchers and practitioners engaged with smart forest topics.⁴

***“The Smart Forests Atlas is a generative space for enabling pluralistic knowledge practices while also going beyond the screen and into environments, where further interactions can take place.*”**

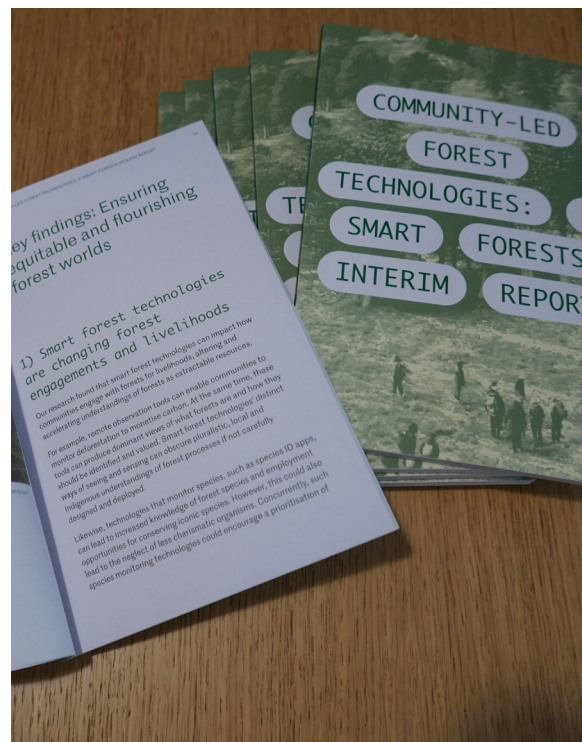
Jennifer Gabrys, SmartForests

The Smart Forest Atlas showcases a variety of interesting projects working at the intersection of urban forests and digital technology — from an ‘[Urban Data Lab](#)’ testing 5G technologies to aid urban forestry to an ‘[Internet of Nature](#)’ vision for how to connect multiple urban data streams to realise more sustainable cities. More playful projects engage with urban forests through ‘[Tweeting Trees](#)’. Mapping can be an important way that tree management techniques develop, often including individual tree IDs to facilitate urban forest management and maintenance.





Arbotag QR code for identifying and maintaining trees in Chile.



Community-led Forest Technologies: A Smart Forests Interim Report, 2025.

The Smart Forests Atlas provides scope to consider how to support civic engagement with forests through participatory technologies building on citizen science and identification apps, such as [iNaturalist](#) and [Plant Net](#), and for considering how to work towards more community-oriented initiatives that can contribute to urban planting, ongoing forest care and maintenance, and biodiversity restoration and regeneration.

“A challenge is that many apps and platforms are vying for people’s attention, and they often have questionable data practices and unequal distribution of benefits. It would be interesting to see community-led forest technologies develop to support urban environments and design, where technologies, communities and environments are in mutual and beneficial relation.”

Jennifer Gabrys, SmartForests

Follow the Smart Forests project [here](#).

With a focus on Barcelona and Oslo, the [URBAG](#) project, led by Gara Villalba at Universitat Autònoma de Barcelona in Spain, examined to what degree green infrastructure can be a source of sustainable food, reduce environmental impacts and promote a more efficient use of resources in urban regions. Various types of green infrastructures have different levels of effectiveness in facilitating the sustainability goals of cities, such as reducing greenhouse gas emissions, improving local air quality, and optimising use of resources. URBAG carried out a novel, comprehensive analysis integrating the life cycle impacts of resources required for green infrastructures with their effects on the urban atmosphere to identify which precise combinations of urban/peri-urban agriculture and green spaces deliver the best local and global environmental performance.

Villalba also received an ERC Proof of Concept grant [NUTRISOIL](#), that paved the way for sustainable peri-urban agriculture and fostered a circular approach to resource management within cities by facilitating knowledge exchange among farmers, operators of composting facilities and waste water treatment plants and policymakers. Read more about the results [here](#) and in the ERC [report](#) on Transformative change for a sustainable future.

Novel ecosystems are, either intentionally or unintentionally, unmanaged wild urban areas that are anthropogenic in composition and that can never be restored to their original ecological status. The implications for biodiversity conservation and societal progress of these urban wild spaces in urban communities are largely unknown, as are citizens' perception of them.

The [NovelEco](#) project, led by Marcus Collier at Trinity College Dublin in Ireland, studies the values and perceptions that people have of informal wild spaces or novel ecosystems in cities. It is a participatory science project, which takes citizen science a step further by engaging with communities of interest and communities of practice in their work. Citizens have helped generate the project's research questions, and many of the engaged communities have collected the project's primary data using a project-developed app to gather information on the social values of wild spaces.

Collier and his team have found that citizens engaging with wild spaces in cities and neighbourhoods can play a vital role in building a more sustainable society. Many humans have been disconnected from nature for centuries, and this disconnection is a root cause of environmental neglect — from over-extraction of resources and pollution to biodiversity loss and climate change. Reconnecting people with nature offers a chance to shift behaviours towards more sustainable choices. An emotional bond with wild spaces can be a catalyst for transformation, helping to shape a more sustainable urban future.

“ *In almost every engagement with communities in informal wild spaces, we can see that they have transformative capabilities. Our capacity for engagement and collaboration, along with healing and building resilience, are all enhanced within urban novel ecosystems.* ”

Marcus Collier, NovelEco

Cities are as diverse as the people within them, and promoting management and policy recommendations, based on research carried out in a limited set of cities is challenging. However, Collier and his team visited many cities and found many commonalities. One of them is that in society, we tend to follow traditional viewpoints handed down over generations, and these viewpoints are difficult to change. For example, informal wild spaces are frequently considered to be 'unkempt' or 'messy' and of low priority. However, when they asked citizens in different urban settings to observe and record data in these sites, it did not take long for such long-held opinions to be challenged or even changed.



Manoel Island in Valetta, Malta

© Marcus Collier



NovelEco therapeutic landscape outdoor workshop in New York

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The strongest policy recommendation is to protect wild spaces while ensuring they are accessible. In line with the growing calls to safeguard green areas and recognise them as nature-based solutions, policymakers and planners should make wild spaces a priority.

Marcus Collier, NovelEco

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Follow the NovelEco project [here](#).

3.3. Well-being in built environments

The wellbeing of urban residents depends on the surroundings in which they live and work. The built environment is not just a backdrop to daily life but a determining factor for mental health, stress and overall quality of life. This section highlights frontier research examining the links between environmental surroundings and mental health, and presents innovative approaches for creating healthier, more equitable and restorative urban environments.

Green and blue spaces

How do the physical and biological environments affect our brain, health and mental well-being? The emerging field of environmental neuroscience addresses this question by investigating the relationships between brain activity and the social and physical surroundings. The [BrainScape](#) project, led by Simone Kühn at the Max Planck Institute for Human Development in Germany, places particular emphasis on studying healthy living environments, evidence-based urban planning and the impacts of climate change with the aim to uncover the pathways and mechanisms that directly influence brain function and mental well-being. The project aims to build a knowledge base for evidence-based urban planning to promote healthy living environments.

“

This is becoming increasingly urgent: over half the global population now lives in cities, and in countries like Germany, people spend 80-90% of their time indoors. As urbanisation and climate change increase, so too does the need to understand how factors such as air quality, proximity to green and blue space, and interior architecture influence brain function and health.

Simone Kühn, BRAINSCAPE

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Neuroscientific research on brain plasticity has convincingly demonstrated that our activities and experiences shape the function as well as the structure of the adult human brain.⁶ Studies in environmental psychology have found that time spent in nature has restorative effects, improving mood and performance in cognitive tasks. However, it is still unclear which specific features of the environment (natural or urban) drive these effects, and via which neural mechanisms. At the Centre for Environmental Neuroscience, Kühn and her team address this gap through diverse methodologies: studying participants in their daily lives, working with twin samples to control for genetic differences and using geographic information systems to map environmental features.

“By treating the environment as a complex, multi-layered phenomenon, we hope to unravel the specific neural pathways through which it shapes the human brain and mental health.”
Simone Kühn, BRAINSCAPE

Their early findings suggest that even short-term variations in environmental exposure can be linked to rapid changes in the brain. In the Day2Day study⁷, they repeatedly scanned the brains of a small number of young adults over six months.

“We found that more time spent outdoors in the 24 hours prior to a scan was associated with increased volume in the prefrontal cortex and higher levels of positive mood – quite a striking result.”
Simone Kühn, BRAINSCAPE

BRAINSCAPE's findings so far support the positive impacts of ensuring that as many people as possible can access and enjoy the restorative effects of natural environments. Meanwhile, Kühn and her team continue to test the impact of environmental exposure to create a more detailed picture of how peoples' everyday surroundings affect their brain structure and function. This is done through integrating MRI imaging with real-time data collection via mobile devices and apps, tracking environmental and physiological variables such as light exposure, air quality, tree density and heart rate and investing in mobile MRI to reach rural populations that are typically underrepresented in research and to access different physical environments (e.g. the ocean).

The [NEEDS](#) project, led by Marco Helbich at Utrecht University in the Netherlands, examined the correlations between environmental exposures, depression and suicide. It went beyond limited focus of previous studies on the impacts of citizens' residential surroundings and examined how factors across people's daily travel routes, such as urban design, green and blue spaces as well as social interactions, influence their mental health.



Helbich and his team found that the social and socio-economic contexts to which people are exposed have stronger effects on both depression severity and suicide risk. For example, how isolated you are from other people or how safe you feel in a neighbourhood have a bigger impact than passing a green space on your way to work. Suicide risks are significantly lower for people experiencing improvements in social fragmentation and deprivation compared to those remaining in poor conditions.

While the researchers could not establish protective effects as concerns suicide risks of being exposed to green or blue spaces, they found that that being in nature, even for less than one hour, is associated with reduced depressive mood, regardless of whether these spaces can be accessed at home or during daily travels.

The results of the NEEDS project show that to improve citizens' wellbeing in built environments, policymakers should explore opportunities for increasing a sense of social cohesion and safety within neighbourhoods as well as ensuring access to green and blue spaces. Read more in this [article](#).

Studies on the benefits of urban greenery tend to focus on residential contexts, while the impact of exposure to greenery during people's everyday urban travel has, as mentioned, been less examined. To help fill this gap, the [GREENTRAVEL](#) project, led by Tuuli Toivonen at the University of Helsinki in Finland, explores the impact, quality and availability of green urban travel environments. Furthermore, the project examines to what extent citizens have equal access to green and blue spaces, and develops methods for better identifying where to add urban greenery to promote equity.

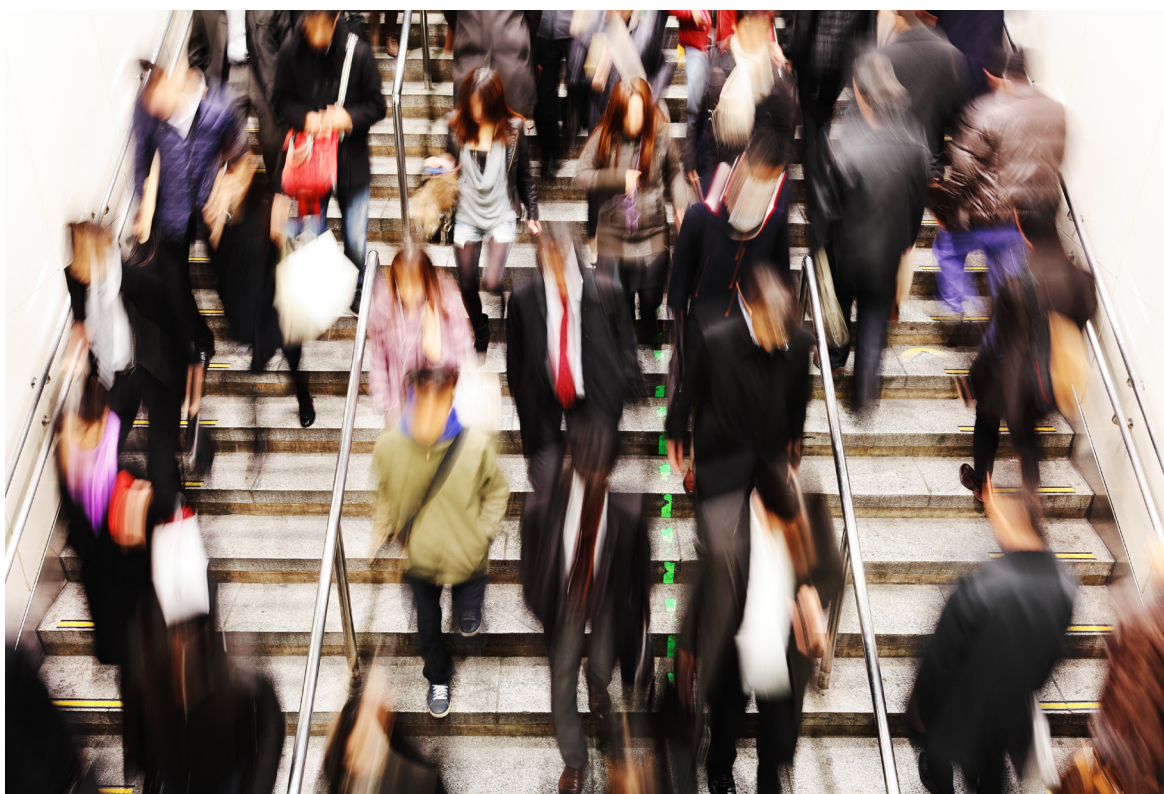
Recent studies⁹ show that greenery along travel routes not only reduces exposure to air pollution, noise, and heat, but also supports psychological restoration, especially for those who walk or cycle. It can also encourage more frequent and longer active travel, helping to reduce transport emissions. However, a comparative study by Toivonen and her team of 86 European cities reveals that travel environments generally contain less greenery than residential ones.¹⁰

More specifically, their study found that while travel greenery is higher in northern European cities, most southern European cities are characterised by low travel greenery. At the same time, these patterns are mediated when adjusting greenery measures for temporal variations, which are biggest in northeastern Europe. Their study shows that incorporating temporal variation into assessments of access to greenery (both residential and during daily travel) gives a more comprehensive



understanding of citizens' exposure to greenery and is something urban planners could incorporate into their greening efforts to provide health-promoting travel environments throughout the year.¹¹

Another study by the GREENTRAVEL project involving 43 large European cities, which examined greenery along daily school trips, showed persistent inequalities in access: some people live in areas with both good school access and green surroundings, while many lack greenery during their daily mobility. These insights can help urban planners make availability of green environments more accessible and equitable for all citizens, including during their daily mobility.¹² [Read more](#) about the GREENTRAVEL project.



Stress is ubiquitous in our daily lives and is a risk factor for 90% of diseases. Whether it is our neighbourhood of residence or the places we visit regularly, our daily environments contribute to fuelling stress or, on the contrary, to producing a restorative effect. The project [FragMent](#), led by Camille Perchoux at the Luxembourg Institute of Socio-Economic Research, explores how the places we visit and the time we spend in them influence short- and long-term stress, and how these patterns differ across social groups. FragMent helps policymakers, local organisations and citizens to equitably reduce exposure to factors determining stress in the public space.

[Watch](#) the video explaining the project in more detail.





Sound

While access to green and blue spaces is important for urban well-being, the acoustic environment also plays a crucial role in our health and quality of life. Noise is a health problem for at least 1 in 5 EU citizens. The latest [report](#) from the European Environmental Agency (EEA) shows that progress in decreasing the number of people exposed to harmful levels of noise has been slow. Furthermore, research suggests that the conventional approach, i.e. reduction of 'sound level', simply does not deliver the required improvements to quality of life.

The [Sound Indices](#) project, led by Jian Kang at University College London in the UK, significantly improved our understanding of the impact of sound in densely populated areas by moving beyond simple noise level measurements such as decibels, recognising that human perceptions, not just volume, play a critical role in how sound affects human well-being.

Bringing together 24 universities across 18 countries, Kang and his team developed new soundscape indices that reflect human comfort in acoustic environments. They created a global soundscape database from 5000+ survey responses and tested indices using tools such as Likert scales, skin response monitoring and brain imaging.

These indices, based on international standards and validated through psychological and physiological data, could eventually replace the decibel scale as a measure of sound quality. Sound Indices' work has influenced [ISO standard 12913](#) and supports more effective, people-centred approaches to urban planning, health and environmental policy. Read more about the results of the project in this [article](#).

Improving sound insulation in buildings is a key step to reducing noise pollution. However, achieving sufficient sound insulation of buildings is a complex problem and acoustic performance requirements often conflict with structural and thermal requirements. Unlike thermal insulation, sound travels through entire building systems, including walls, floors, ceilings and their connections, making noise control a complex challenge. The [VirBAcous](#) project, led by Edwin Reynders at KU Leuven in Belgium, developed computational tools that can help engineers and architects design quieter buildings and indoor environments.

The project developed numerical modelling tools that can simulate and optimise the acoustic properties of building components virtually. These tools were successfully used to enhance the design of building elements, improving sound insulation without increasing material use. The project not only provided a strong foundation for next-generation sound prediction software, but also paved the way for faster, cheaper and more accurate acoustic design, supporting the shift to sustainable materials.

The economic and societal potential of the results of VirBAcous are being explored in the ERC Proof of Concept project [SOPRANO](#), which aims to bridge the gap between the fundamental numerical methods from VirBAcous and the construction sector, facilitating their practical application.

4. Inclusion, from valuing diversity to securing accessibility and affordability

A core objective of the New European Bauhaus is to create a built environment that is accessible, equitable, and empowering for all individuals, regardless of age, ability or socio-economic background.

By focusing on inclusion, the New European Bauhaus seeks to bridge gaps between diverse communities, fostering a sense of belonging and social cohesion. By engaging citizens, stakeholders and marginalised groups in co-creation processes, it strives to address the needs and aspirations of all people, promoting participatory and human-centred design. Ultimately, the New European Bauhaus' vision is to create vibrant, resilient and sustainable communities that value diversity, promote social justice and provide equal opportunities for all.

Cities are spaces of diversity, where multiple voices and experiences shape their identity. They are hubs of culture, innovation and economic opportunity, but these benefits depend on effective urban management. Inclusive cities ensure all residents, including marginalised groups, can fully participate in the social, cultural and economic life.¹³ This section presents research examining the impact on cities of economic inequality, access to housing and the accessibility of public spaces, as well as on how diversity is managed and experienced in cities, including through art and culture.

4.1. Affordable housing, socio-economic inequality and social cohesion

Although Europe remains the least unequal region in the world, the richest 10% earns twice as much as the poorest 50% and holds 67% of total wealth, while the bottom half owns just 1.2%.¹⁴ Affordable housing is increasingly out of reach for many across the continent. A safe and stable home is a basic need, yet in numerous countries a growing housing crisis threatens this fundamental right.¹⁵ This section presents research projects that investigate the links between access to housing, economic inequality and social cohesion.

The unequal distribution of economic resources in cities limits opportunities for poorer residents and poses a risk to social cohesion. The [SEGUE](#) project, led by Clémentine Cottineau at Delft University of Technology in the Netherlands, investigates the key economic, geographic, sociological, and demographic factors driving urban economic segregation to better understand its dynamics and to evaluate potential policy solutions.

As a first step, Cottineau and her team carried out an extensive literature review on the theoretical interactions between the processes generating urban economic segregation. They found that in the short term, economic segregation usually reflects existing levels of economic inequality. The housing market is most often identified as the main link between inequality and segregation, though many other theories and mechanisms are also involved to explain how the two are connected.¹⁶

By successfully linking datasets covering the entire Dutch population from 2011 – 2021, including income, wealth, residential location, and household composition, the project has produced detailed annual indicators of income inequality and segregation across all urban areas in the Netherlands. These indicators, disaggregated by income percentile, allow for analysis of both affluence and poverty. The findings show that inequality and segregation remained stable or declined in most cities, though significant differences exist between them. Generally, more unequal cities tend to



be more segregated, but the relationship is not uniform — similar levels of segregation can occur alongside varying markers of inequality.¹⁷ [Read more](#) about the findings of the SEGUE project.

Over the past decades, scholars have grappled with the causes and consequences of economic inequality and social mobility. While income inequality rose in the 2000s, in particular after the 2008 crisis, economies in Europe and beyond saw an even larger concentration in wealth, along with unprecedented volatility in asset markets such as housing and equities. The [WEALTHPOL](#) project, led by Ben Ansell at University of Oxford in the UK, examined how the stock of wealth, not just income, but including assets such as property, savings and investments is distributed, inherited and taxed across societies, and how this impacts public opinion and politics.

One might expect that economic inequality would create deep grievances among the public and that this, in turn, would lead to support among people for redistribution of the resources of the well-off through taxation, particularly as concerns wealth, which is much more unequally distributed than income. However, studies carried out by Ansell and collaborators, drawing on several surveys of people in the United Kingdom (UK) and across seven European countries, showed that overall support for raising inheritance taxes or even net wealth taxes is not especially high. However, they also revealed that there is a fundamental asymmetry with respect to how people think about wealth taxation. People with expensive property, or those who think they might inherit it are, perhaps not surprisingly, strongly opposed to inheritance and wealth taxation. Those without such assets, who might benefit from the revenues associated with wealth taxation, tend not to have a strong opinion about it. At the same time, Ansell and his team found that, while providing statistical information does not change this pattern, changing the framing of questions — for example to include information on what inheritance taxes might be spent on — does appear to alter people's views, pointing to an informational divide between the opponents and supporters of wealth taxation.

Furthermore, they found that in places in Europe with higher levels of unaffordable housing, people's views about both redistribution and building more housing become more polarised, with renters becoming more supportive and homeowners less so.¹⁸

“ *The problem for people who would like more houses to be built or money to be redistributed is that in almost every location in Europe, homeowners are a majority of the electorate. So rising unaffordability makes these homeowners even less likely to support mitigating policies.* ”
Ben Ansell, WEALTHPOL



Another interesting finding of the project is that there is a strong negative correlation between house prices and support for populist political parties and movements from Brexit, to Marine Le Pen's National Rally party in France and the Danish People's Party.¹⁹ This relationship is not simply cross-sectional (i.e. that people who live in more expensive places vote less for populists) but is also dynamic, namely that increases in house prices locally push people away from populist political parties, stagnation in prices towards them.

“ *These findings help explain the connection between the great housing boom of the past quarter-century across Europe and the rise of both populists and their cosmopolitan political opponents. As house prices have polarised, so too has politics.* ”

Ben Ansell, WEALTHPOL

Property rights are a foundational element of democracy, but the right to private property exists in tension with values of equality and the right to shelter, with existing economic models resulting in millions of people being evicted from their homes every year. Through ethnographic studies of conflicts over housing, the [PaDC](#) project, led by Marianne Maeckelbergh at the University of Gent in Belgium, explored the impact of property regimes on the experience of citizenship across five countries: Greece, the Netherlands, Spain, the United Kingdom and the United States of America.

As Maeckelbergh points out, the main barrier to affordable housing is the growing chasm between the cost of housing and income levels. Housing prices increase rapidly as the result of three interconnected factors. The first one is economic: with the creation and massive expansion of mortgage issuance, housing prices have been able to significantly increase, as capital in the form of debt became widely available. The transformation of this debt into financial products, such as collateralised debt obligations, have created a 'risk-free' financial context for the expansion of the mortgage market and the corresponding increase in housing prices, which are no longer dependent on people's ability to pay with their salary, but solely dependent on their ability to get a mortgage. Secondly, the lack of policy measures to protect renters have led to rent levels that are disproportionate to income levels, which undermines the financial sustainability of life-long renting households and prevents future homeowners from saving enough to pay the highly inflated home prices. Finally, there is a prevailing moral discourse in which private property is valued more than housing/shelter as a human right, and which skews both public opinion and people's own sense of their rights in favour of the rights of landowners.



Access to affordable housing is also a matter of intergenerational justice as intergenerational wealth is increasingly dependent on property ownership. As income levels stagnate all over the EU (or increase at a much slower rate than property prices), those who inherit property or who receive sufficient savings/contributions from their families are the only individuals who can afford to purchase property (in competition with corporations, international investors and property developers).

“Our project confirms how intergenerational wealth, and inequality continues to be constructed across race and gender lines, further disadvantaging groups who are already struggling to participate in society as full citizens. On the other hand, it can also become a site for struggle and activation of citizens who feel collectively abandoned by their representatives and by society at large. But in the absence of collective bargaining tools, these struggles are often unsuccessful as, by definition, they go up against powerful resource-rich individuals at the local level and challenge a key foundation of the global economy at the ideological level.”

Marianne Maeckelbergh, PaDC

One of the key takeaways from PaDC's analysis of the impact of property regimes on the experience of citizenship is that people cannot function as full members of society when they live in unstable housing. When people are threatened with eviction, are exposed to unpredictable rent increases or face uninhabitable conditions (rats, cockroaches, mould, asbestos etc.) with no power to change these circumstances (because they do not own the property or do not have the means to afford improvements or to make monthly mortgage payments), they experience existential distress that impacts all aspects of their lives. If and when people are finally forced to move, they lose not only their home, but also their community — schools, doctors, neighbours, support networks, access to their work and volunteering activities.

“Policy and market approaches to housing as ‘units’ misses this obvious social fact and as a result Europe’s approach to housing policy allows for the destruction of communities, even when more ‘affordable’ housing is being created, exacerbating instead of alleviating hardship. Understanding housing as a collective matter, as being about communities, would allow for a foundational transformation in housing policy but this is unlikely to happen as it does not fit within developers’ economic profit-loss models.”

Marianne Maeckelbergh, PaDC

[Read more](#) about the project PaDC.





UN Habitat estimates that 2.8 billion people globally live without adequate housing.²⁰ Around the world, grass root housing movements are pushing back, not only demanding secure homes but also challenging wider social inequalities. The [RadicalHOUSING](#) project, led by Michele Lancione at the Polytechnic University of Turin in Italy, studied these movements across the continents, exploring their history, strategies and their impact through research in eight cities, including Rome and Bucharest. The project also hosted a Global Forum of Radical Housing — a space for sharing ideas and findings with other experts and participants. The goal was to better understand and strengthen the worldwide fight for the right to housing. Read more about the project and its findings [here](#).

Forced evictions constitute a violation of human rights and are recognised under both international and European laws and regulations. However, eviction cases typically fall under the prerogative of national laws, which often do not offer adequate protection. The [EVICT](#) project, led by Michel Vols at the University of Groningen in the Netherlands, studies around a thousand cases of eviction during the financial crisis in the EU to understand the interaction between international and national laws. Vols and his team have established the Scientific Network on Eviction and Housing Research that aims to create a worldwide community of scholars from legal and other disciplines who work on the legal, social and humanitarian aspects of evictions, housing law, housing rights and homelessness. Follow the blog on their [website](#) to explore their work.

The [HABITAT](#) project, led by Alessio Sardo at the University of Genoa in Italy, is rethinking the legal foundations of urban inequality by investigating a groundbreaking hypothesis, namely that the persistent socio-economic inequalities in major European cities stem largely from the historical regulatory failures of urban legal systems. By examining Berlin, London, Milan and Paris through a legal and economics lens, the project analyses how laws and judicial decisions have accelerated wealth concentration and disadvantaged vulnerable groups. Combining evolutionary legal analysis, comparative legal studies, econometric assessment and scenario-based modelling, HABITAT seeks to provide evidence-based pathways for designing more just and equitable cities. [Follow](#) the project.

4.2. Diversity and inclusion

Managing diversity and ensuring inclusion are central to creating cities where all residents can thrive, regardless of their background or circumstances. This section presents research on the impacts of the homogenisation of cities due to globalisation and rapid urbanisation, how citizens react to diversity in urban environments and what cities can do to ensure inclusion and accessibility for all citizens.



Increased globalisation and urbanisation tend to result in the homogenisation of urban areas — a homogeneity that researchers find has a direct impact on people’s ability to engage with the places they live in. The [GLOBESCAPE](#) project, led by Adrienne Grêt-Regamey at ETH Zurich in Switzerland, explored how globalisation and rapid urbanisation are making urban environments increasingly uniform, threatening local culture, social cohesion and people’s sense of place. The project demonstrated that homogenisation, in particular in peri-urban areas, lowers people’s affective bonds to places and, eventually, their willingness to engage with their neighbourhoods. The project team engaged communities in Switzerland and Finland to explore how people’s values, beliefs, and participation could be activated to help drive positive urban transformation and create a sense of belonging. By focusing on emotional connections to place and participatory processes, GLOBESCAPE developed new methods to reshape planning practices and create more inclusive, resilient urban landscapes. Read more in this [article](#) and on the project [website](#).

Polarisation, growing diversity, and inequalities present significant challenges for many European societies, putting pressure on peaceful coexistence and social cohesion. With a focus on nine urban neighbourhoods in Finland, France and Sweden, the [EmergentCommunity](#) project, led by Eeva Puumala at Tampere University in Finland, explores daily practices of coexistence and patterns of conflict, and how they influence these societies. The aim is to enhance our understanding of how community dynamics develops in contemporary societies and to provide policymakers and politicians with knowledge of how social sustainability and inclusion can be promoted. Watch Eeva Puumala’s presentation of the project at the ERC’s 2023 annual conference on diversity [here](#).

Millions of people with disabilities have difficulties using public spaces, including streets, public transport, accessing buildings and enjoying shared spaces such as beaches and sports centres. This hinders their freedom to make their own choices and take control of their lives.²¹ The [InclusivePublicSpace](#) project, led by Anna Lawson at the University of Leeds in the UK, investigated the legal and social justice problems which arise when city streets are designed, operated or managed in ways that exclude or marginalise pedestrians whose bodies, minds or life circumstances diverge from narrow assumptions about who streets are designed for and used by. The project focused on two cities in five countries: Delhi and Pune (India), Nairobi and Mombasa (Kenya), Utrecht and Almere (the Netherlands), Leeds and Glasgow (UK), and Syracuse and Atlanta, (USA).

The first step to making streets more accessible and inclusive, the project highlights, is to increase the overall understanding and awareness of the barriers faced by disabled people, older pedestrians and those navigating streets with young children. Based on their findings, Lawson and her team

offer a range of resources, including guidelines that provide suggestions for how to make public space more inclusive, documentary films covering a variety of barriers and 360° Virtual Reality films offering a glimpse into the routine journeys of people who participated in the project. These resources are available on the project [website](#). The project also demonstrated that law and policy can play an important role in making streets more accessible: well-designed laws and policies can ensure that accessibility is prioritised from the start and that existing barriers are actively removed. More examples and the project's policy briefs are available [here](#).

4.3. Art, culture and belonging in diverse cities

Art and culture have been inextricably linked to cities, co-shaping their identity and the urban fabric. They have also been central to community building as spaces of expression, negotiation and empowerment. This chapter presents a selection of research projects that zoom in on a range of creative and cultural practices including arts, theatre, design and participatory knowledge building, and examine their role in creating inclusive and sustainable cities and communities.

The [ARTIVISM](#) project, led by Monika Salzbrunn at University of Lausanne in Switzerland, explored the potential of art and creative practices as forms of activism and triggers of social, economic, and political change in multicultural cities. The research focused on strategies such as the *detournement* of signs and symbols, the use of humour and satire and other indirect forms of powerful political critique. It showcased carnival parades in Italy and France, comic and street art in Cameroon, and mural paintings by Latino artists in California. Through long-term fieldwork, visual ethnography, and collaborations with artists and activists, Salzbrunn and her team studied the challenges faced by communities and how art has been used to voice their concerns, assert agency and instigate change.



'La rue de l'art', Yaoundé 2019. Created by the artists MOC, Kayaman, ChristoBeks, Jaab, Haziz Driller, and the activist/mediator Oasis/Papy in 2019

“ In Genoa, Italy, and in Marseille and Nice, France, self-handled art spaces and social centres include people of various origins and social class, who organise neighbourhood feasts, create performances, street art, carnivals and festive parades or fashion shows. In Los Angeles, murals created by Chicana artists contribute to valorising the Mexican-American history of California. In Cameroon, namely in Yaoundé, the Rue des Arts is a central space of visual and performative expressions through murals, street art and comic art by visual and graphic artists of various origins. ”

Monika Salzbrunn, ARTIVISM



'La rue de l'art', Yaoundé 2017, created in 2013. Created by the collectif A3 and friends in 2013.

The chosen case studies, although different in terms of socio-political contexts and forms of artistic expression, share many common preoccupations: struggle for recognition freedom of expressions, and empowerment; growing inequalities, discrimination and gentrification; feminist, anti-fascist, anti-authoritarian and environmental struggles.

The researchers observed that in all field sites under study, art has become more politically engaged and activist-oriented in response to increasingly repressive political contexts, becoming an even more crucial part of political processes. Creative practices are also key to fostering a sense of community and belonging, especially in the context of large superdiverse cities.

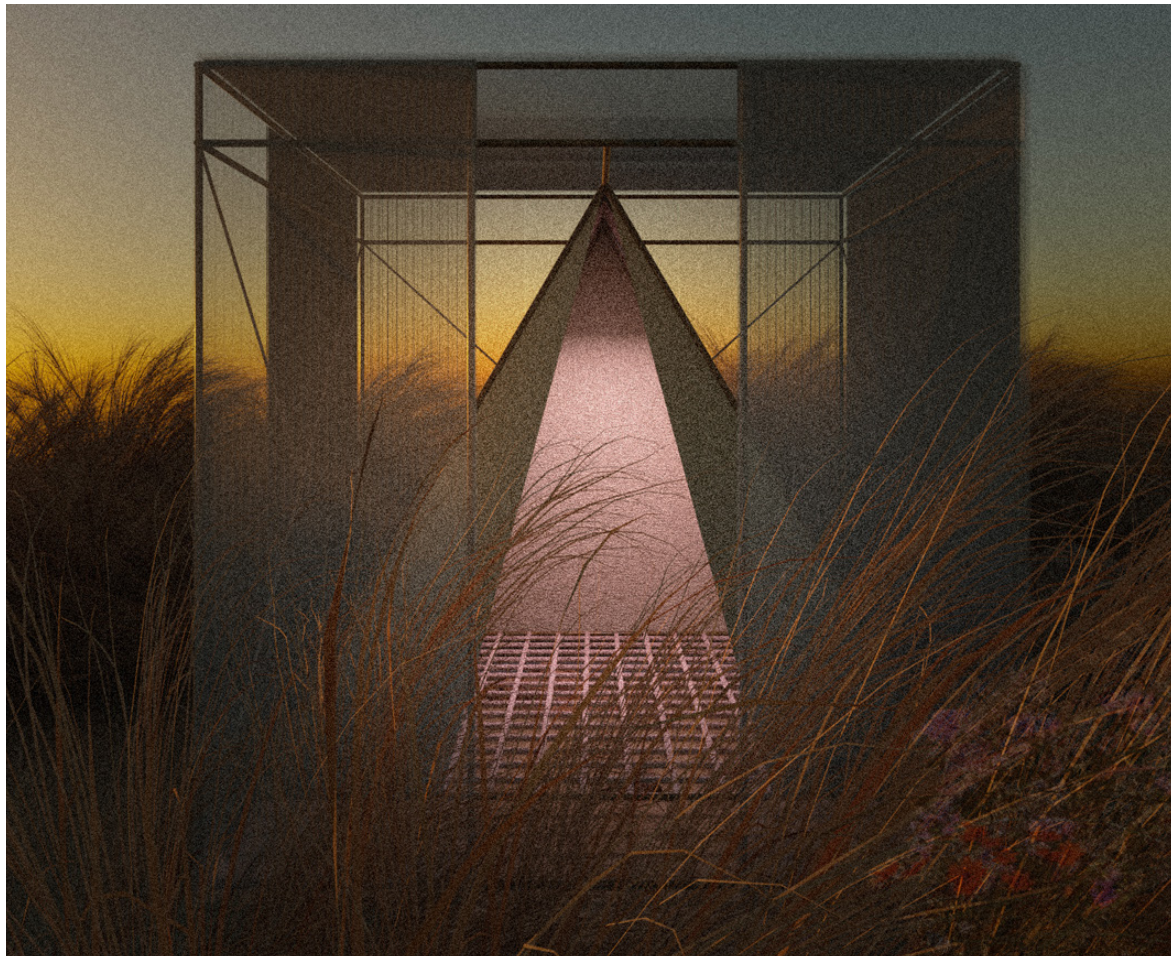
“The common creation of activist events or works efficiently contributes to community building since it reaches a broad range of citizens across ages, origin and class. These are important spaces of civil resistance and a critique of top-down urban planning, social, cultural and environmental politics. It is important to protect self-organised, creative spaces to guarantee freedom of expression, especially for residents excluded from voting rights and therefore not represented on a formalised political level.”

Monika Salzbrunn, ARTIVISM

[Discover more](#) about ARTIVISM.

The [ARTIVES](#) project, led by Kamila Krakowska Rodrigues at Leiden University in the Netherlands, studies artistic and cultural narratives related to superdiverse cities, with a particular focus on how diversity and urban intercultural dynamics are reflected and imagined. The project explores how Afro-European artists based in Lisbon and Rotterdam portray diversity and belonging in their creative work – through films, performances and their stories, which are often overlooked in mainstream discourses. The aim is to create an archive of situated artistic stories (referred to as *urban artives*), which will serve as a repository of competing narratives and imaginaries that challenge essentialising perspectives on diversity and migration. Created in participation with artists and communities, the *urban artives* will offer a space of representation where communities can tell their stories, negotiate their sense of belonging and claim agency. The project will also develop policy recommendations on how to foster more inclusive and diverse urban cultural scenes. Follow the project [here](#).

The [THEAGENT](#) project, led by Emine Fişek at the Austrian Academy of Sciences, examines the relationship between cities and theatre, analysing the role it has played in urban transformation across Europe in the twenty-first century. Focusing on London, Paris, Berlin, Warsaw and Istanbul, Fişek and her team study theatre and performance practices as sites where the changes in urban life, including the notions of belonging, exclusion, displacement, are reflected and critically articulated. At the same time, the project investigates theatre institutions as players in ongoing urban transformations, such as gentrification, and their often paradoxical and contradictory roles as both drivers of gentrification and spaces of resistance.²² By studying the urban transformation through the lens of theatre as a creative practice and institution, the project highlights the significance of art and culture as commentaries on contemporary issues as well as drivers of urban transformations, with both positive and negative consequences. [Read more](#) about the project.



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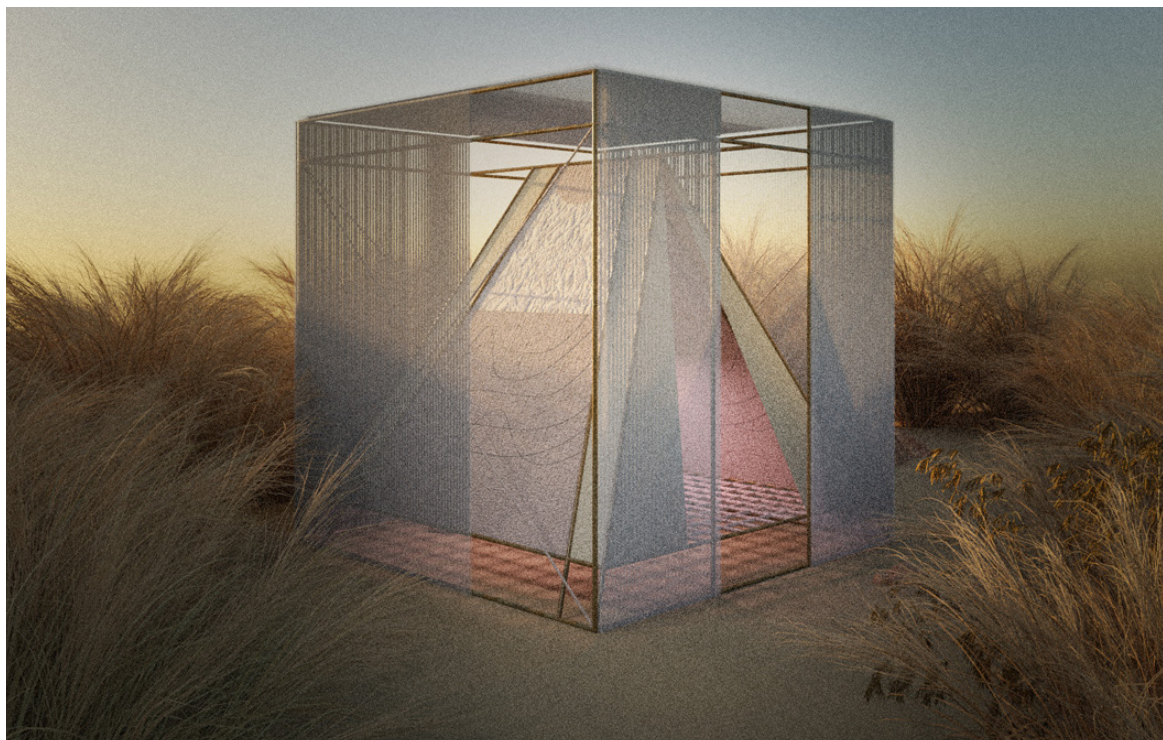
Illustration of Silent Room V.04 (2024)

Thinking about cities and urban design has traditionally focused on the physical fabric of the built environment, with less attention given to other important aspects of the lived experience in urban spaces, such as sound. The [SONCITIES](#) project, led by Gascia Ouzounian at Oxford University in the UK, investigates the significance of sound in architecture and urban life, its impact on residents and the environment as well as its socio-economic dimensions, such as how the exposure to noise is a reflection of existing inequalities.

“ Our research asks, for example: how is gentrification in a London neighbourhood manifest sonically, and how is that sonic gentrification experienced differently by residents based on socioeconomic factors such as class and ethnicity? Or, to give a contrasting example, how do those living in conflict cities experience the violent soundscapes of war? ”

Gascia Ouzounian, SONCITIES





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Illustration of Silent Room V.04 (2024)

The research goes well beyond the urban planning concerns for noise control, exploring the potential of sound as a critical medium for building more just and inclusive cities. The point of departure is in-depth ethnographic research with urban residents and communities to better understand the everyday experience of sound environments. The team collaborates with architects and designers, as well as artists, who use sound as a tool for critical reflection and for reimagining more inclusive and welcoming sonic environments. One example is a sonic architecture by Nathalie Harb with Gerard Gormley, *Silent Room V.04*, commissioned as part of the project, which offered a silent space of respite amongst the city's noise.

“ **Nathalie Harb’s ‘Silent Room’ series is significant in how it reframes the right to listen as a shared public good: something that should be equitably accessible, not reserved for the privileged. In contexts marked by conflict, displacement and gentrification or overdevelopment, this work reimagines acoustic space as a site of care, dignity and attention. Harb’s work shows us how creative sound practice can reshape our understanding of justice, access and public space, not only by designing soundscapes, but by proposing new forms of sonic urban infrastructure.** ”

Gascia Ouzounian, SONCITIES

Building on their findings, SONCITIES team aims to develop ‘a new acoustic paradigm for cities’ — a novel framework for designing healthy, liveable and inclusive cities, which prioritises sound as a key component.

“ **Firstly, policy frameworks must move beyond the narrow aims of noise mitigation and instead embrace the concept of sonic equity, recognising that sound carries profound social and cultural significance, and is experienced differently across communities. Secondly, encouraging interdisciplinary collaboration is crucial: partnerships between urban planners, architects, sound artists and local communities should be actively supported and funded. Together, such approaches help reposition sound not as a nuisance or a problem to be controlled, but as a critical medium for building more just and inclusive urban futures.** ”

Gascia Ouzounian, SONCITIES

[Read more](#) about the SONCITIES project.



Designing inclusive and sustainable built environments for vibrant communities requires innovative approaches to architecture and urban design. This includes a thoughtful reuse and repurposing of existing structures, recognising that some buildings are more than physical spaces — they are centres of community life and repositories of collective memory. The [ReARQ.IB](#) project, led by Ricardo Costa Agarez at the University of Lisbon in Portugal, focuses on residential and public use buildings in Spain and Portugal, which have been essential to community life but have largely been omitted in architectural and urban history. The project's goal is to develop a comprehensive knowledge base, by drawing on archives and the memories of local communities that documents the material, cultural and historical significance of these buildings.

The knowledge base provides a crucial resource for communities to make decisions about the future use, maintenance and preservation of their built environment. This is based on the notion that understanding the architecture shaping our everyday lives empowers communities to make informed decisions about what to preserve, reuse, replace and how to update and improve buildings. The project not only supports the preservation of crucial community sites and their history but also promotes sustainable reuse of existing buildings over new constructions. [Read more](#) about the project.

4.4. Sharing and circular urban economy

Cities are arenas where the challenges of sustainability, food and resource use intersect. The way people consume and the way resources — from food to waste — are managed reflect both the challenges and the opportunities that exist for building more sustainable, inclusive and circular systems. This section presents projects exploring how urban communities are rethinking food sharing, collective food practices and waste management, offering solutions for more sustainable cities.

As cities grow, the scale of food consumption and disposal makes urban areas key sites where the challenges, but also opportunities, of reducing food waste are most acute. Food sharing is increasingly recognised as a transformative practice for reducing food waste, conserving resources and, not least, fostering new forms of social connections.

The [SHARECITY](#) project, led by Anna Davies at Trinity College Dublin in Ireland, set out to identify and analyse urban food-sharing practices worldwide, exploring their forms, governance and potential for shaping more sustainable and inclusive urban food habits and cultures. Having mapped more than 4000 food-sharing initiatives in 100 cities around the world, Davies and her team created the first international [database](#) of urban food sharing. This database has enabled comparative analysis of patterns and practices across continents, allowing for unprecedented insights into how communities experiment with new ways of sourcing, distributing and consuming food.

Building on this, the team's in-depth ethnographic research in nine cities (Athens, Barcelona, Berlin, Dublin, London, Melbourne, New York, San Francisco and Singapore) revealed the ways in which food sharing fosters social cohesion, reduces waste and supports circular economies. These city analyses identified both challenges and opportunities for embedding food sharing within urban life and governance, demonstrating its potential to reshape everyday eating practices in ways that are environmentally sound, socially inclusive and culturally meaningful. Read more about the findings from the city case studies [here](#) as well as in this [briefing note](#).

A key innovation of the project was the co-designed, online sustainability toolkit, [SHARE IT](#). This platform empowers food-sharing initiatives to assess and communicate their impacts, exchange knowledge, and connect with peers. By enabling grass root actors to demonstrate their value in tangible terms, SHARE IT strengthens the visibility and legitimacy of food sharing practices, helping them to influence policy and contribute to systemic change.

Finally, the project pioneered new approaches to imagining sustainable urban futures through scenarios and a [Food Sharing Manifesto](#). The project engaged policymakers, practitioners, and young people in co-creating visions of inclusive, circular food systems. In doing so, SHARECITY not only generated conceptual and empirical breakthroughs but also offered practical pathways for rethinking urban food cultures.

Davies received the first ERC Public Engagement with Research [Award](#) in 2020 in the area of online and social media. The prize recognises ERC grantees who make the effort to engage with audiences beyond the scientific community and do so in effective and original ways.



SHARECITY MANIFESTO

SUSTAINABLE FOOD SHARING INITIATIVES ARE:



SHARECITY MANIFESTO

Sustainable food sharing initiatives are:

Accessible

Easy to access, understand and engage with



Accountable

Open and transparent, fostering trusting relationships



Careful

Attentive to the impacts they create, valuing positive caring relationships



Connected

Deeply connected, virtually or physically, to their communities



Creative

Imaginative and innovative, able to adapt to dynamic conditions



Democratising

Increasing participation in the food system, enhancing food democracy



Embedded

Strongly rooted in the needs of individuals, communities and environments



Fair

Making food justice a cornerstone of their activities



Regenerative

Taking a holistic approach to restore, renew and revitalize the earth, themselves and others



Supported

Working with governments that respect and support the values sharing creates



Transformative

Acting as agents of change for sustainability, transforming practices with and around food



Visible

Communicating the positive activities they conduct to citizens and stakeholders



Valuable

Leading activities that are worthwhile, useful, and important for sustainability



Once considered an emergency response to temporary crises, charitable food provision has evolved into a structural component of poverty alleviation, operating alongside and, in some cases, substituting formal welfare systems. The proliferation of food banks, pantries and community meal programmes has been driven by rising food insecurity, policy shifts towards welfare retrenchment and the increasing reliance on surplus food redistribution as a sustainability strategy. Understanding how charitable food systems emerge, evolve and function within different institutional settings is therefore key to understanding and addressing both the opportunities and challenges presented by this expanding sector. While these initiatives play a crucial role in mitigating hunger, their growth raises fundamental questions about the organisation of food support, its governance and its impact on those who rely on it. The [Food Charities](#) project, led by Filippo Oncini at Maastricht University in the Netherlands, investigates these systems in urban contexts across Italy, the Netherlands and Japan with the aim to advance both a theoretical and empirical understanding of charitable food provision and to contribute to policy discussions on poverty, food insecurity and sustainability transitions. Follow the project as it advances [here](#).

Sharing of assets has emerged as a prospective solution to sustainability challenges faced by cities. Yet, its potential and institutionalisation pathways have not been systematically examined. The [Urban Sharing](#) project, led by Oksana Mont at Lund University in Sweden, examined, tested and advanced our knowledge about the design, sustainability of practices and institutionalisation pathways of urban sharing organisations across five cities: Amsterdam, Melbourne, Seoul, Shanghai and Toronto. The project team conducted more than 250 interviews, collected data through observations and mobile research labs and organised nine workshops with academics and practitioners in the cities. Based on their findings, the project team developed governance frameworks that have been used to shape more sustainable and equitable sharing economy policies. For example, the City of Kalmar in Sweden has used the municipal governance framework of the sharing economy to develop a 'Handbook for the Sharing Economy' for municipalities in Sweden. The project team also produced a series of six films that discuss the five municipal governance mechanisms of the sharing economy, which constitute the core of the [Massive Open Online Course on Sharing Cities](#). [Read more](#) about the results of the project and follow them on their [website](#).



While a great deal of attention is given to ‘smart’ urban food procurement, less is paid to the fact that food is not only a commodity or nutrient but also a social practice, with eating choices being shaped by culture, faith, gender, age, income and other factors. For food-related policies to be effective, these factors must be taken into account. The [FOOD CITIZENS](#) project, led by Cristina Grasseni at Leiden University in the Netherlands, studied nine cases of collective food procurement networks, focusing on urban foraging, short food chains and local food governance, in Gdańsk, Poland, Rotterdam, the Netherlands and Turin, Italy. Combining ethnographic fieldwork with digital visual methods, the project explored whether and how these networks indicate emerging forms of ‘food citizenship’, with a specific focus on how they interpret and articulate solidarity, how they build skills and how they operate across diverse communities. The team also analysed whether these initiatives risk reproducing exclusionary processes such as gentrification or instead open up genuinely transformative pathways. The results of FOOD CITIZENS’ work can be explored in the projects unique ‘[i-doc](#)’, an interactive platform, which innovatively showcases the varied ways in which citizens engage and work with food across diverse European contexts.

A shift towards a degrowth economy is increasingly seen as essential for tackling the challenges of resource scarcity and waste accumulation. Degrowth pursues socio-economic wealth while reducing material flows and reusing waste in socially responsible and ecologically regenerative ways. In this context, the circular economy has gathered political momentum as a way to reach these goals. However, the circular economy will not have a significant impact on cities and regions’ ecological footprint unless it challenges the regulations that dismiss certain materials as waste in the first place. The [DECYCLE](#) project, led by Federico Savini at the University of Amsterdam in the Netherlands, examines the regulatory frameworks that make it possible to revalue waste materials as a resource for city-regional development.

The project introduces new ways of understanding how laws, policies and economies shape what happens to waste by comparing how construction, food and heat waste are managed in Amsterdam, Barcelona, Hamburg, Milan and Vienna, showing how local and international regulations influence waste reduction. Ultimately, the project aims to lay the foundations for reducing cities’ dependence on waste production and raw material extraction by providing new concepts, methods and comparative insights that can inform future research, policymaking and sustainable urban development. For more insights, read Savini’s [article](#) on degrowth, circular economy and the value of waste.

5. Sustainability, from climate goals to circularity, zero pollution and biodiversity

The New European Bauhaus places sustainability at its core, recognising the urgent need to transform the built environment into a regenerative and circular system that prioritises the well-being of both people and the planet.

The New European Bauhaus focuses on reducing environmental impact, promoting climate resilience and conserving natural resources through innovative design, materials and technologies. This includes embracing principles such as reuse, recycling and upcycling as well as integrating renewable energy sources, green infrastructure and eco-friendly transport systems. By adopting a holistic and systemic perspective, it aims to minimise waste, pollution and carbon emissions, while maximising the positive impact of the built environment on biodiversity, ecosystems and human health.

5.1. Solar energy in the built environment

This section presents frontier research and innovations in solar technologies and their applications within the built environment. From integrating photovoltaic (PV) materials directly into building facades to developing flexible and stretchable solar cells that adapt to diverse surfaces, these technical advances open new possibilities for sustainable energy generation. By merging functionality with design, these innovations are redefining how buildings can contribute to a cleaner, more resilient energy future.

Since the beginning of civilisation, humans have built homes to maintain comfort across seasons. Today, around 50% of total energy use goes to heating and cooling, and rising demand for thermal regulation continues to drive energy consumption. Most heat is still produced by burning fossil fuels, biofuels or waste-based fuels, all of which generate emissions. The [PHOTHERM](#) project, led by Kasper Moth-Poulsen at Chalmers University of Technology in Sweden, is fundamentally changing how heating and cooling are generated by developing a new class of materials that capture, store and release both solar and ambient heat. The solar thermal management materials are a unique combination of molecular photo-switches that capture and store sunlight, so-called MOST systems, together with phase change materials (PCM) that can contribute to thermal management.

The MOST-PCM combination has the potential to disrupt how we control the temperature in a broad range of applications, from local power production to heating and cooling in electronics systems, to temperature control in automotive vehicles and housing. The materials developed can potentially radically change thermal comfort and energy consumption and provide new design opportunities for thermal management. Read more about Moth-Poulsen's [work](#).

Building on the results of the [Uniting PV](#) project, the ERC Proof of Concept project [StreP](#), led by Bart Vermang at Hasselt University in Belgium, developed a stretchable PV foil for use in applications where conventional solar panels are unsuitable, such as architectural textiles, agricultural PVs, tents, and domes. This innovative technology has the potential to revolutionise the way we think about energy harvesting in the built environment.

The core innovation is a thin, ultra-lightweight copper-indium-gallium based PV foil that can conform to virtually any surface: flat, curved, or even inflatable. By integrating PVs directly into building envelopes (facades, roofs, canopies, shading devices, even window frames), Vermang and his team turned passive surfaces into active energy generators without needing bulky panels or major structural retrofits. This seamless integration reduces installation complexity and material waste, supports local micro-generation to offset grid demand peaks, and accelerates renovation of existing buildings toward near-zero energy standards. Furthermore, because their foils can be applied 'like wallpaper', they enable targeted shading solutions that harvest solar energy and reduce cooling loads, simultaneously cutting embodied and operational carbon.



“ To date, we have demonstrated lab-scale modules with power conversion efficiencies of around 13% on areas up to 100 cm², and mechanical endurance over 1,000 bending cycles. This positions us at Technology Readiness Level (TRL) 6. Over the next 18–24 months, we aim to advance to TRL 7-8 by transferring our roll-to-roll coating processes to a pilot coating line in partnership with a coatings manufacturer. ”

Bart Vermang, StreP

The inherent compatibility of their foil with existing roll-to-roll fabrication technology means that, once optimised, large-area (metre-scale) production can be achieved without major equipment overhaul.

“ We are already in discussions with two European PV fabrication plants interested in licensing our encapsulation approach, and we foresee full commercial deployment within three to five years, pending further durability testing and standard certification. ”

Bart Vermang, StreP

Widespread adoption of stretchable PV foils could unleash a fundamental shift from ‘add-on’ solar panels to truly ‘built-in’ PVs. Architects and urban designers could incorporate energy generation into every membrane, overhang and facade detail, turning bus shelters, street furniture, noise barriers, even public art installations into micro-power stations. Building renovation projects could achieve net-zero targets more affordably by simply ‘re-skinning’ surfaces rather than mounting heavy panels. In dense urban contexts, facades that harvest solar radiation at multiple angles would smooth out daily and seasonal generation profiles.



© Hasselt University

“ The aesthetic flexibility of our foils, available in customisable textures, colours and translucencies, also opens creative possibilities where form and function co-evolve: a vibrant, light-diffusing façade that doubles as an energy harvester or dynamic shading elements that adjust opacity while powering interior lighting. Ultimately, the built environment would become an active participant in the energy cycle rather than a passive consumer, bringing us closer to circular, carbon-neutral cities. ”

Bart Vermang, StreP



The [PEDAL](#) project, led by Sarah McCormack at Trinity College Dublin in Ireland, focused on developing novel technology to enhance the efficiency of luminescent solar concentrators and luminescent solar devices. One of the main focus areas was developing special coatings that can be applied to solar panels to make them more efficient. McCormack and her team tested such enhanced panels in real-world weather conditions and showed a 12-fold efficiency improvement. This innovative approach has the potential to significantly increase the adoption of building-integrated PVs, reducing greenhouse gas emissions and promoting sustainable energy production. The colourful solar power facades developed by PEDAL can also inspire new design principles and materials for the built environment, contributing to the New European Bauhaus vision of blurring the lines between architecture, art and technology. Read more about the project and its results in this [article](#).

The [PISCO](#) project, led by Renaud Demadrille at the French Alternative Energies and Atomic Energy Commission, paved the way for a new generation of solar cells that not only generate electricity but also adapt to changing light conditions, like smart windows. Focusing on dye-sensitised solar cells, the project introduced innovative photochromic dyes that change colour and transparency when exposed to sunlight. This allows the solar cells to adjust how much light they let through, while also increasing their energy output as sunlight intensifies.

Unlike earlier approaches that combine separate technologies or use unstable materials, PISCO successfully created fully reversible, self-adjusting solar cells. These devices can shift from light yellow to deep green and back again, offering both energy generation and dynamic shading in one simple, efficient system.

The project has produced semi-transparent solar modules that perform reliably in real-world conditions, with efficiencies up to 4.2% and visible light transmission ranging from 60% to 30%. These smart solar cells could one day turn windows, vehicles or public transport into energy-producing surfaces.

The Proof of Concept project [PRINTSOLAR](#), led by Michael Grätzel at the Swiss Federal Institute of Technology Lausanne in Switzerland, aimed to bring high-efficiency perovskite solar cells (PSCs) from the lab to real-world application. Building on the [MESOLIGHT](#) project, which helped drive PSC performance to record-breaking levels, PRINTSOLAR focused on solving two key challenges: scaling up these highly efficient cells to industrial-sized modules and ensuring their long-term stability.



© Michael Grätzel

PSCs are lightweight, low-cost, and can be produced using printing techniques, offering an attractive alternative to traditional silicon-based PVs. While small lab cells have already reached over 20% efficiency, PRINTSOLAR demonstrated industrially relevant 100 cm² modules achieving 10% efficiency with promising durability, withstanding 1,000 hours of heat and humidity stress testing.

In collaboration with industry partner Greatcell Solar, scalable manufacturing techniques were developed, while Spinverse provided market research and identified pathways to commercialisation. The project supports the EU's clean energy transition by aiming to reduce the cost of solar electricity below that from current technologies, potentially achieving grid parity and broad market uptake by 2030. PRINTSOLAR thus illustrates how cutting-edge research can accelerate the green transition, offering printable solar solutions that are efficient, cost-effective, and scalable for global impact. Read more about Grätzel's work in this [article](#).

5.2. Urban mobility

Urban mobility is central to European citizens' daily lives but remains a major source of greenhouse gas emissions. Road transport makes up nearly three quarters of EU transport emissions, with cars being the largest contributor. Congestion, car dependence, and weak integration of inclusive public transport, along with active mobility options, remain a challenge.²³ This section presents research projects that deliver innovative solutions for improving urban mobility, making it greener, smarter, healthier and more inclusive.

The number of cyclists and pedestrians in cities is increasing. However, we still do not fully understand how they interact with each other, which makes it difficult to effectively guide traffic rules and regulations. Most policy decisions related to pedestrian and bicycle infrastructure are based on rules of thumb. To improve our understanding of pedestrian and cyclist traffic, the [ALLEGRO](#) project, led by Serge Hoogendoorn at Delft University of Technology in the Netherlands, used big data and experimentation, augmented reality, and remote and crowd sensing to develop a comprehensive theory of slow mode traffic behaviour. Hoogendoorn and his team developed highly innovative models that can be used to test new policies and design when these are proposed by policymakers. The project also provided crowd managers with better insights into where crowds occur, the impact of specific measures (against congestion for example) and more. Moreover,



ALLEGRO developed traffic control strategies for smart bicycles that can be used to improve urban flow and ultimately make the bicycle a more attractive transport option for citizens. Read more about the results of ALLEGRO in this [article](#).

Transport policy is a contentious issue. Ambitious policy initiatives aiming at reducing car use and creating a more sustainable, equitable and healthy transport system have been met with strong opposition, despite obvious health and environmental benefits. Meanwhile, the [ATRAPA](#) project, led by Oriol Marquet at Universitat Autònoma de Barcelona in Spain, explores the ‘active travel backlash paradox’, where vocal opposition to sustainable travel interventions may conceal substantial silent support. The project analyses the determining factors of the dissonance between public opinion creators and the perception of lay citizens, thereby enabling policymakers to implement progressive environmental traffic policies. Follow the project [here](#) as it investigates the determining factors of opposition and acceptability towards built environment-based sustainable travel interventions across seven European cities.

Urban mobility concerns the movements of people within cities for their daily activities. It is closely related to every individual’s lifestyle as well as the functioning of urban spaces, making it one of the critical issues addressed in the Sustainable Development Goals. The [realTRIPS](#) project, led by Chen Zhong at University College London in the UK, advances urban mobility analysis by using emerging automatic data and developing a modelling framework that captures variability across time, space and population groups. Combining novel insights from geographic information system engineering, urban analytics, AI, urban planning, transport and geography, the project aims to significantly contribute to the development of more inclusive and sustainable cities. One of the project’s [articles](#) shows that larger cities in England create more opportunities for social interaction, particularly for socio-economically advantaged residents, but also deepen patterns of segregation that tend to disadvantage less privileged groups. By analysing mobility data, the article reveals that inequality is shaped not only by income but also by people’s ability to move and connect in urban spaces. The findings highlight the importance of urban planning strategies — such as shared public amenities — to counteract segregation and support more inclusive city growth. Follow the project [here](#).

5.3. Pollution

Pollution is one of the most pervasive health threats to people living in urban environments. The [EU Zero Pollution Action Plan](#) is central to the New European Bauhaus’ aim to contribute to sustainable urban development. This section presents projects that contribute innovative solutions and also explores citizen driven actions to deal with pollution.



Synthetic chemicals are used widely worldwide. Per- and polyfluoroalkyl substances are the most widely used human-made chemicals that accumulate over time in people and in the environment. Because of their widespread use and persistent properties, they can be found in the environment, humans, animals, food and feed.²⁴ Combining anthropology of the body, urban political ecology, and experimental governance, the [Embodied Ecologies](#) project, led by Anita Hardon at Wageningen University in the Netherlands, investigates what citizens and city planners do in response to the growing use of synthetic chemicals that accumulate in the human body, leading to serious health problems. With a focus on Amsterdam and Paris as well as Baguio and Marikina, the Philippines, the project examines how urban residents in both the Global North and South experience and respond to the pollution and chemical exposures that infiltrate their daily routines, paying close attention to how factors such as race, class, and location shape the experience of pollution. The project provides insights into the structural factors that enable and/or constrain citizens' ability to protect themselves — insights that will inform new harm reduction strategies. Follow the project [here](#) and watch the documentary on how neighbours and organisations in the French suburbs work together to turn a brownfield back into fertile land.



Rising extremes in temperature driven by climate change are costing millions of lives each year. Early warning systems of air quality play a crucial role in alerting about upcoming heat waves and temperature shifts that may affect our health. Through the [EARLY-ADAPT](#) project and two related Proof of Concept projects, [HHS-EWS](#) and [FORECAST-AIR](#), Joan Ballester at Barcelona Institute for Global Health in Spain, and his team have developed an open-access platform called [Forecaster.Health](#).

Available early warning systems of air quality are generally based on location-specific thresholds of air pollutant concentrations and on forecasts representing the physical processes of atmospheric chemistry. What they do not capture are the inequalities in vulnerability of the exposed population. While traditional systems focus on extreme pollution events and rely solely on atmospheric forecasts, the Forecaster.Health platform integrates air quality forecasting with environmental epidemiology and socio-economic factors (such as age, income, and health status) to issue alerts that better reflect actual health risks. The platform thus provides inclusive health warnings, protecting socio-demographically vulnerable groups, as well as more accurate and impactful public health warnings.

“As a result, public health agencies can implement targeted emergency plans focused on the most at-risk groups, improving effectiveness while minimising the impact on the daily activities of the general, less vulnerable, population. Moreover, Forecaster.Health empowers public health authorities to define vulnerable groups according to their own priorities and policies, placing them at the centre of the decision-making process.”

Joan Ballester, EARLY ADAPT, HHS-EWS, FORECAST-AIR



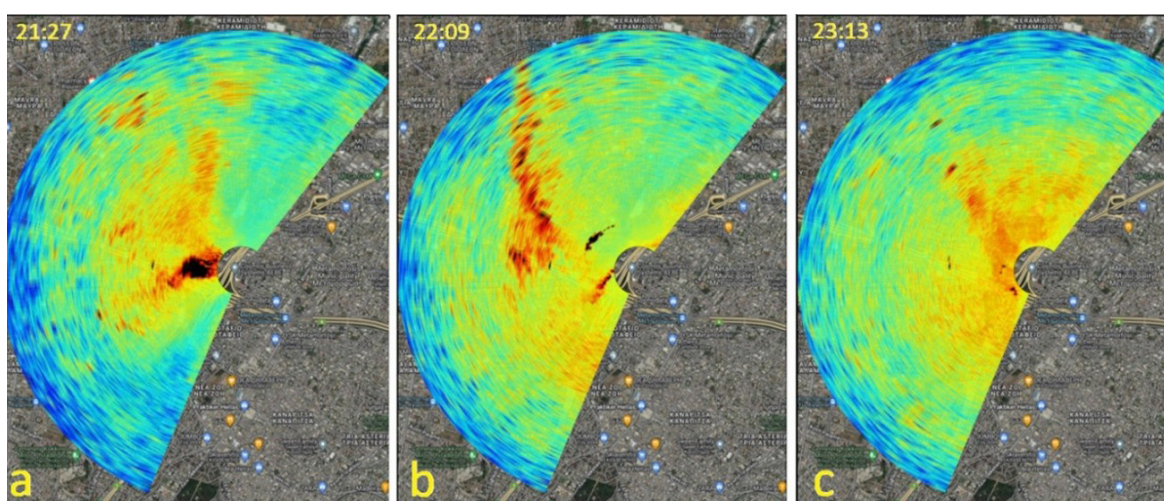
A public online platform will allow access to a broader range of end users, including the general public, private hospitals, insurance companies, residential homes, schools and other sectors. These various users can contribute to the platform through co-designed solutions. In this way, Forecaster.Health can also serve as a model for a public database ready for marked adoption beyond the health domain.

Ballester and his team expect Forecaster.Health to make a significant contribution to reducing the health burden of air pollution in Europe, directly supporting the objectives of the EU Zero Pollution Action Plan and other relevant public health and environmental policies. Atmospheric pollution remains one of the major environmental risks to human health, particularly in urban and industrialised areas where the majority of the population resides. In Europe alone, the European Environmental Agency [estimates](#) that over 400,000 premature deaths annually are attributed to exposure to air pollutants. Despite efforts to improve air quality, the health sector has yet to fully benefit from the potential of environmental forecasting tools. Read more about Ballester's ERC projects in this [article](#).

Poor air quality in cities causes premature deaths and major economic losses, making detailed monitoring of harmful pollutants and their sources essential. Yet current methods often lack the resolution and accuracy needed. The Proof of Concept project [PM-scanner](#), led by Vassilis Amiridis, at the National Observatory of Athens in Greece, used cutting-edge laser technology and artificial intelligence (AI) to deliver reference aerosol measurements. It provided critical high-resolution data in space and time, enabling the detection of uncharted emission sources at city scale and in near real time. To develop the PM (particulate matter) scanner lidar, the National Observatory of Athens collaborated with Raymetrics S.A. and the ACTRIS Pan-European Research Infrastructure. The system offers air quality authorities and other stakeholders (e.g. researchers, non-governmental organisations, providers of care to vulnerable groups) a more effective and affordable way to detect, monitor and assess air pollution, its sources and its impacts

“ These enhanced, cost-effective and rapidly accessible air quality data and information, directly support science-based decision-making and policy development at local and national levels, ultimately leading to more effective air quality measures aligned with the revised EU air policy for the improvement of urban wellbeing in Europe. ”
Vassilis Amiridis, PM-scanner

The PM-scanner has a manifold impact: It contributes to public health, by informing citizens about their outdoor activities to minimise exposure to harmful pollutants, it assists authorities (or industries) to enforce regulatory compliance and it allows decision-makers to make informed decisions on future pollution mitigation strategies through air quality impact assessments.



Example of the PM-scanner lidar technology application for particulate matter mapping in Athens, Greece. The new technology has the potential to deliver particulate pollution concentration fields of 30m resolution at a circle of 10 km diameter.

Secondary organic aerosols (SOAs) formed from emitted trace gases have a significant impact on human health in urban areas. Studies have shown that volatile chemical products (VCPs) from household products are one of the major sources of organic vapours in cities. However, the potential for VCPs to form SOAs is still unknown. To fill this knowledge gap, the [CHANEL](#) project, led by Georgios Gkatzelis at the Jülich Research Centre in Germany, investigates the role of VCPs as pollutants in European urban areas. As the landscape of urban pollution is shifting in Europe through the decreased use of fossil fuel, CHANEL paves the way to important research on urban air quality, measuring the contribution of household chemicals to secondary pollution. Follow the project [here](#).

Transport is a major determinant of population health, especially in lower- and middle-income cities. The way people and goods move through a city shapes how active residents are, how much air pollution they are exposed to and their risk of traffic collisions. To address this, policymakers need models that can predict how changes in travel patterns affect health outcomes. The [GLASST](#) project, led by James Woodcock at the University of Cambridge in the UK, integrated health impact assessment and transport research into an innovative model for assessing the health effects of mobility and transport choices. It brought together transport demand, air emissions and quality, crash and physiological models to evaluate how different patterns of travel affect health. As transport systems shift from cars to more sustainable modes such as walking and cycling, these impacts need to be captured through realistic modelling to inform future urban policies. Positioned at the intersection of health and sustainability, GLASST developed tools that extend conventional transport models to include health outcomes, supporting urban policy and decision-making. Read more about the project [here](#).

5.4. Smart cities and urban planning

This section presents projects that reimagine urban planning and propose innovative visions for smart cities. The projects advance complex models and novel technologies to make cities more resilient and sustainable in the face of climate change and increased urban development, actively engaging citizens through digital participation.

The [CoCi](#) project, led by Dirk Helbing at the Federal Institute of Technology in Switzerland, is testing and demonstrating how decentralised and democratic approaches to urban planning can reshape cities with the active participation of citizens using smart technologies. CoCi combines two research directions: the automation of mobility solutions based on the Internet of Things and machine learning approaches with novel collaborative approaches, such as participatory resilience or digital democracy. City Olympics, open-source urbanism, and a socio-ecological finance system are further participatory approaches and opportunities that Helbing's team has explored.²⁵ Specifically, the CoCi project has demonstrated through various case studies that decentralised and participatory urban planning can lead to more efficient, sustainable and resilient cities, which integrate values such as freedom, solidarity and equality in their decentralised digital models. Rather than focusing on a restrictive control approach, the project has worked out alternative ways of managing cities that use urban complexity to our benefit, unleashing changes for the better through small interventions, e.g. catalysing coordination and cooperation.²⁶

“Our work builds on the concept of participatory resilience, which recognises that the involvement of diverse stakeholders — citizens, communities, and decision-makers — is crucial not just for generating data, but for enabling cities and for citizens to survive, recover and improve together in the face of social and environmental challenges. Participatory resilience is about leveraging the collective intelligence and adaptive capacities of communities to co-create solutions, enhance preparedness, and build social ties, ultimately making urban systems more adaptive and sustainable.”

Dirk Helbing, CoCi

The work of Helbing and his team has shown the great potential of participatory approaches for co-creating smart cities, for example through crowd sensing²⁸ and citizen science²⁹. Based on these participatory approaches, the team has developed and deployed sensors to measure air quality and has also developed an App called [Routify](#), which helps people select good travel routes through the city, whether on foot, by bike or by car.



“Imagine you want to avoid cycling on polluted roads with heavy traffic, and instead go along green routes with clean air, without too many slopes and detours, and you want to avoid times of rainfall, too. By combining data on roads, weather, noise, and nature, users can find a route that matches their own criteria — and by sharing this knowledge, we build a collective benefit for all.”

Dirk Helbing, CoCi

The team has impressively demonstrated that participatory approaches in urban planning can be used to strengthen democratic engagement in novel ways by scaling up citizen participation. For example, one promising approach called ‘re-mixing’³⁰ works more efficiently if more people participate, which is in stark contrast to the notion of classical deliberation. Basically, people work out (partial) solutions online, and their proposed solutions can then be modified by others. In this way, an increasing number of better solutions result from an online-based co-creation process. These many solutions must then be evaluated by a decentralised assessment, such as peer review. A shortlist of the best projects will be finally voted on.

Interestingly, even though everyone assesses only a few proposals, and nobody sees all of them, one can be confident that the outcome will have very high quality. This is because the method is based on collective intelligence. Of course, the approach can be further improved by simplifying co-creation and evaluation, using suitable generative AI tools.

Dirk Helbing, CoCi



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Digital Twin of Barcelona, Spain - for illustration. The Digital Twin we used for our traffic and environmental simulations was not as detailed, but still a powerful tool that combined a number of different datasets and spanned across different urban scales. (Picture created by Javier Argota Sánchez-Vaquerizo using Google Whisk, Adobe Photoshop and Adobe Firefly).



© Javier Argota Sánchez-Vaquerizo

Digital Twins allow one to explore different possible futures. Here, different kinds of future cities are illustrated as if they were continents of a planet. (Image created by Javier Argota Sánchez-Vaquerizo using Google Whisk, Adobe Photoshop and Adobe Firefly).

The team has worked with large datasets and machine learning for smart city planning for a long time, critically examining both their potential and their unintended consequences. While these tools are undeniably powerful, they also imply risks, such as reproducing bias, making measurement errors, or inviting wrong interpretations. They can also lead to opaque decisions when replacing human judgment. Furthermore, beyond technical limits, widespread reliance on algorithms reshapes power relations and influences trust. Therefore, responsible innovation must balance performance with ethical scrutiny, open standards, and human values, aiming for social benefit rather than efficiency alone.³¹

Helbing also points out that more data or stronger machine learning is not automatically better. Complex societal problems often require model-based approaches combined with data-driven methods. An example is the digital twin model the team built for Greater Barcelona's traffic system. The model made it possible to test scenarios realistically and showed that traffic efficiency and environmental impact can be improved simultaneously.

One of the scenarios tested by the team is adaptive traffic light control to better handle traffic disruptions or topological variability (irregular road networks).³² Combining the principles of minimising travel time and giving priority to clearing long queues result in self-organised green waves that reduce waiting time and outperform brute-force machine learning. This system qualifies as a green IT solution, as it combines computational efficiency with lower emissions from fewer stops and shorter travel times.³³

For the city of Barcelona, Helbing and his team also studied scenarios of strategic road closures, which is a concern for those who are afraid that it could lead to a dysfunctional traffic system. Their findings showed that it is possible to reduce carbon emissions by strategically closing some roads, while improving travel times at the same time. In essence, they found that less (fewer roads) can be more (quality of life), when a few roads are closed down in a smart and minimally invasive way.³⁴ The team also examined the transformation of office space into housing and found that, even if more people would then live in the centre, commuting would decrease, thereby leading to improved traffic conditions overall. Read more about the project and its findings [here](#).

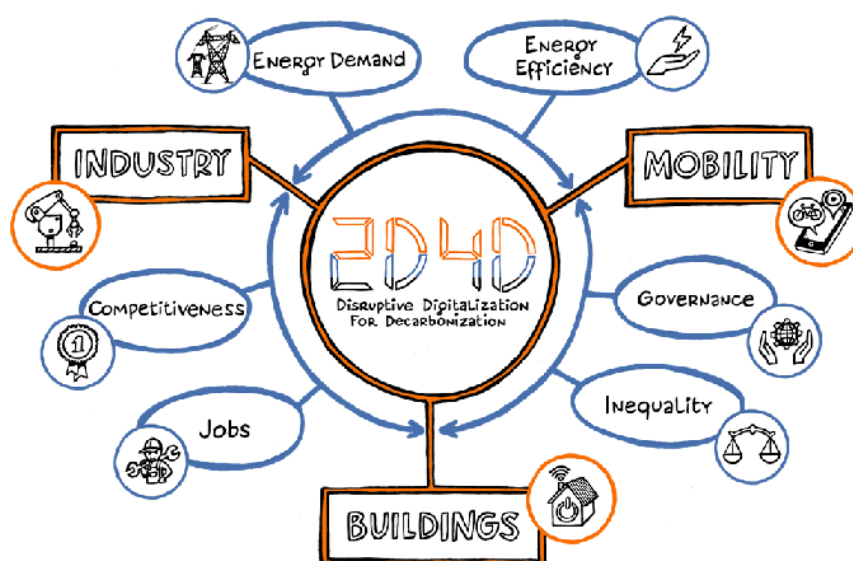
According to the UN, the world population living in urban settlements is expected to increase to 70% of 9.7 billion by 2050.³⁵ As urban populations continue to expand, so too does the imperative to secure sustainable access to water and to rethink how cities manage this vital resource. Historically, as cities grew, new water infrastructures followed as needed. However, these developments had less to do with real planning than with reacting to crisis situations and urgent needs. Owing to increasingly uncertain climate conditions, there is the need for a more holistic and intelligent decision-making framework for managing water infrastructures in the cities of the future.



In this context, the [Water-Futures](#) project, led by Barbara Hammer at Bielefeld University in Germany, Phoebe Koundouri at Athens University of Economics and Business in Greece and the Technical University of Denmark, Marios Polycarpou at the University of Cyprus, and Dragan Savić at the University of Exeter in the UK, is developing a new framework for the allocation and development of decisions on drinking water infrastructure systems that ensure that these decisions are socially equitable, economically efficient and environmentally resilient. Follow the project as it advances on their [website](#) and read the interview with Koundouri in the Transformative change for a sustainable future [report](#).

Growing cities also face problems relating to climatic conditions and congestion. To help tackle these problems, the [Urbisphere](#) project, led by Sue Grimmond at the University of Reading in the UK, Jörn Birkmann at the University of Stuttgart in Germany, Andreas Christen at the University of Freiburg in Germany; and Nektarios Chrysoulakis at the Foundation of Research and Technology Hellas in Greece, adopts a novel approach in forecasting and projecting urban futures and climates, by using a dynamic framework that incorporates weather, air quality, differential exposure and the vulnerability of people.

The project has developed a Smart Urban Observation System (SmUrObs) that has so far been deployed in Berlin (2021–22) and Paris (2023–24) to gather data on the interaction between cities and weather. The data gathered through SmUrObs in different urban regions allows the team to build new urban models that enhance the dynamic representation of cities in global models that inform about urban risks and resilience. The observations and modelling systems are used to create simplified urban dynamic archetypes that can provide cities with new strategies in a changing climate. To read more about the project, see also the ERC [report](#) on Transformative change for a sustainable future and the project [website](#).



Digitalisation is fundamentally changing all sectors of the European economy. At the same time, the EU is committed to reaching net-zero carbon emissions by 2050.³⁶ These two transformations will undoubtedly affect each other, but the extent to which they will be mutually supporting is unknown. Most importantly, there is a danger of the digital transformation delaying progress towards a net-zero carbon economy because of its impact on energy demand. As the International Energy Agency states in a recent [report](#), artificial intelligence has the potential to transform the energy sector in the coming decade, driving a surge in electricity demand from data centres around the world while also unlocking significant opportunities to cut costs, enhance competitiveness and reduce emissions. The [2D4D](#) project, led by Elena Verdolini at the University of Brescia in Italy, investigates how the digital transformation can be an enabler of decarbonisation by identifying and measuring the decarbonisation consequences of disruptive digitalisation technologies in three challenging sectors: additive manufacturing in industry, mobility-as-a-service in transport and AI in buildings. Read more about the 2D4D project in this [article](#) and on their [website](#).

In the same vein, the [scAlnce](#) project, led by Eva Kassens-Noor at the Technical University of Darmstadt in Germany, critically examines how AI and related technologies impact urban systems and whether they lead to more sustainable cities. Combining information technology, civil engineering, and urban planning, Kassens-Noor and her team analyse AI-driven urban transformations through a groundbreaking, systematic, and comprehensive study across 400 cities worldwide assessing both governmentally and privately funded AI solutions on their merit to create sustainable urban environments. Follow the project [here](#).

5.5. Extreme conditions in cities

Urban areas face growing threats from flooding and landslides as climate change drives more extreme rainfall, rising sea levels and unstable ground conditions.

The [ANGRYWATERS](#) project, led by Nils Goseberg at Braunschweig University of Technology in Germany, investigates how extreme flow events, such as flash floods and tsunamis, can cause buildings to collapse and generate dangerous debris flows. By combining large-scale experiments, advanced 3D-printed building models and state-of-the-art simulations, Goseberg seeks to develop new methods for predicting how water and debris move through urban areas. The goal is to improve risk assessment and help communities better prepare for the growing impacts of climate change. Read more about the project in this [article](#).

In addition to flooding, landslides triggered by heavy rainfall and unstable terrain represent a safety hazard in cities, particularly in rapidly growing or topographically complex cities. The [UrbanSlide](#) project, led by Ugur Öztürk at University of Vienna in Austria, explores how landslide risks in urban areas arise from interactions between societal, environmental and urbanisation factors. Rapid urban growth, unplanned development and climate change-driven rainfall extremes are increasing exposure, with at-risk populations projected to rise from 65 million today to 90 million by 2050. The project develops a hybrid model combining process-based and statistical approaches, informed by social-environmental interactions, to anticipate future landslide hazards and support proactive, equitable risk reduction in rapidly expanding cities.

6. Conclusion

The projects presented in this report demonstrate how frontier research can meaningfully contribute to the ambitions of the New European Bauhaus and to wider EU policy priorities, from the [Green Deal](#) to the [Zero Pollution Action Plan](#) and the [Urban Agenda](#).

Several key insights emerge:

- > **Science as an enabler of systemic change:** The projects emphasise that transformative urban futures cannot be achieved through technological solutions alone. Policy frameworks must promote the integration of advanced science and technology with co-creation, participatory design and community engagement. Embedding democratic, citizen-based approaches to science ensures that research agendas, technological development and innovation are informed by local knowledge, public priorities and collective decision-making, making systemic change more inclusive, responsive and resilient.
- > **Interdisciplinarity as a driver of innovation:** The evidence shows that transformative breakthroughs are more likely to emerge when natural sciences, engineering, social sciences and the arts interact. Policymakers should therefore continue to support and incentivise cross-disciplinary research and innovation in the built environment.
- > **Sustainable and inclusive resilience:** Climate adaptation, energy transition and digital innovation must be pursued in ways that safeguard inclusion, fairness and accessibility. Equal access to spaces and resources, reducing inequalities and protecting local ecosystems are essential to making urban development sustainable, inclusive and just. The projects in this report demonstrate practical pathways for policymakers to ensure that urban development strategies are not only technically robust but also socially equitable and ethically grounded.
- > **Frontier research as a foresight tool:** By exploring disruptive ideas well before they reach markets or policy agendas, ERC-funded projects offer early signals of opportunities and risks. Tapping into this knowledge base can strengthen EU policy foresight and anticipatory governance.

Together, the projects presented in this report propose more than isolated solutions: they articulate **integrated visions for sustainable, inclusive, and aesthetically enriching cities**. For policymakers, this underscores the importance of maintaining strong bridges between frontier research and policy design. Leveraging the insights from ERC-funded science can accelerate Europe's capacity to lead globally in shaping urban transitions that are environmentally regenerative, socially cohesive and culturally vibrant.



Under the Horizon Europe programme, the European Commission has delegated a new task to the ERC Executive Agency (ERCEA) to identify, analyse and communicate policy-relevant research results to Commission services. The ERCEA has developed a Feedback to Policy (F2P) framework for ERCEA to guide these activities, adapted to the specifics of the ERC as a bottom-up funding programme. This report is part of a series aiming to highlight the relevance of ERC-funded frontier research, for addressing societal, economic and environmental challenges, and thus its contributions towards key EU policy goals. This F2P series does not offer any policy recommendations.

More information: <https://erc.europa.eu/projects-statistics/mapping-erc-frontier-research>

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