SUSTAINABLE AND CLIMATE-NEUTRAL CITIES FOR INCLUSIVE AND EQUITABLE URBAN FUTURES

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Sustainable and Climate-Neutral Cities for Inclusive and Equitable Urban Futures

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Finally, we thank the Urban Europe Research Alliance (UERA) network for fostering a collaborative and inspiring research community. The diversity of perspectives represented in this book reflects the strength of this alliance and its shared commitment to advancing climate-neutral, sustainable, and equitable urban futures.

Rome, February 2025

Enza Lissandrello, Aalborg University, Denmark
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FOREWORD

The Urban Europe Research Alliance (UERA) organises its annual conference to address systemic and urgent issues in urban research, bringing together scholars, practitioners, and policymakers to advance knowledge and collaboration. Each year, the conference provides a platform to explore critical questions at the intersection of sustainability, climate action, and social justice, while also contributing to education and capacity-building in these fields.

In 2025, the conference takes place in Rome at the National Research Council, Italy under the theme *Sustainable and Climate-Neutral Cities for Inclusive and Equitable Urban Futures*. It highlights the urgency of addressing today's polycrisis while recognising the planetary dimension of urbanisation.

The 2025 UERA Conference featured **45 abstracts and full paper presentations**, organised across five thematic sections, which structure this *Book of Abstracts*. The complete proceedings are currently under preparation and will be published by Springer in 2026.

WELCOME NOTE

The Urban Europe Research Alliance (UERA) is a European network of research organisations committed to advancing knowledge and collaboration for sustainable urban transformations and transitions. Since its establishment, UERA has brought together scholars and practitioners across disciplines, fostering research alliances that respond to pressing societal challenges and contribute to shaping the European urban research agenda.

Over the past two decades, urban research has increasingly focused on developing and promoting innovative strategies for sustainable and climate-neutral urban development. Important progress has been made in supporting more sustainable economies, strengthening community building, and fostering transformative planning practices. Urban research has also played a key role in analysing exemplary practices, shaping narratives of sustainable and climate-neutral cities, and developing models that inform conceptual and practical approaches to urban transitions.

Despite these advancements, significant challenges remain – particularly concerning fundamental issues of inclusivity, equity, and social justice in shaping future pathways toward sustainable urban environments. Today, these challenges are further compounded by what many describe as a *polycrisis*: the entanglement of climate change, biodiversity loss, energy and resource scarcity, public health risks, growing inequalities, and geopolitical instability. At the same time, urbanisation must be understood in its *planetary dimension*, where local dynamics are deeply intertwined with global processes of transformation. In this context, it becomes increasingly critical to embed justice, inclusivity, and resilience into urban sustainability agendas.

The UERA Conference 2025 brings together contributions that critically examine the complex implications and interdependencies of urban sustainability in light of these global and interlinked crises, while also recognising the planetary dimension of urbanisation processes. The conference fosters essential learning processes that confront the challenges of achieving sustainable and climate-neutral urban futures. Through diverse methodologies and case studies, it emphasizes the integration of inclusivity, equity, and justice into governance and planning mechanisms for sustainable transitions.

Drawing from comparative cases and interdisciplinary perspectives, the conference presentations shed light on key themes. These include the adoption of systemic approaches to urban sustainability, the exploration of socio-spatial dynamics between core and peripheral areas, and the transformative role of technology in advancing sustainability transition processes.

Enza Lissandrello, Aalborg University, Denmark
Chair of the Urban Europe Research Alliance

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SESSION 1

SOCIAL JUSTICE, EQUITY, AND PARTICIPATION

This section addresses the theme of social justice, equity, and participation through diverse theoretical and methodological perspectives, highlighting aspects that have often been underrepresented in research and policy discourses on sustainable and climate-neutral cities.

Urban sustainability agendas have increasingly emphasised active mobility – promoting walking and cycling as alternatives to car-dependent models – yet these strategies are frequently embedded within compact city and densification policies. While such approaches aim to improve environmental performance and quality of life, they may also risk exacerbating inequalities when the distribution of benefits is uneven across urban areas. In some contexts, they can contribute to forms of "green" gentrification, raising concerns about accessibility and mobility justice.

The integration of digital technologies and automated services likewise introduces both opportunities and challenges. While often presented as efficient and environmentally friendly solutions, their social and political implications for inclusion and equity remain insufficiently examined. Questions of digital accessibility, responsiveness to diverse needs, and the potential for uneven impacts demand closer scrutiny.

Climate change further amplifies justice concerns. Urban heat, for instance, is not only an environmental phenomenon but also a socially mediated condition that reflects and reinforces existing inequalities. Unequal access to cooling resources such as green spaces, shaded areas, and public facilities highlights the risk that climate-neutral planning may fall short in delivering distributional justice. Vulnerable groups – including the elderly, children, people with disabilities, and low-income populations – are particularly exposed and often have limited adaptive capacity.

Taken together, these dynamics call into question how current models of sustainable and climate-neutral urban development address both distributive and procedural dimensions of justice. The papers in this section explore these issues by examining the role of active citizenship, inclusive governance, and the development of scalable pathways that can foster socially just and equitable urban transitions.

EQUITY AND ACTIVE TRAVEL: GENDER AND BEYOND

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Keywords: Active travel, equity, gender, intersectionality, accessibility

ABSTRACT

This paper examines inequalities in access to, and experiences of, walking and cycling. Drawing primarily on research and data from the United Kingdom, it also reflects on differences across contexts and between walking and cycling. The analysis highlights gender inequalities while emphasising the importance of addressing additional forms of inequality, including intersectional marginalisation and exclusion, which are less often explored. Particular attention is given to disparities in access – such as whether cycle networks are available to different groups or residents of disadvantaged suburban areas – alongside questions of experiential equity. The paper argues that the marginalisation of active travel is closely entangled with other forms of social marginalisation, and that advancing equity in sustainable mobility requires both distributive and experiential justice.

TECHNOLOGY AND THE CITY: A SOCIAL EQUITY DILEMMA

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Keywords: smart cities, digital equity, social justice, urban technology, inclusion

ABSTRACT

With the increasing adoption of digital technologies and the proliferation of automated public services, smart cities are often presented as efficient mechanisms capable of advancing both environmental and social sustainability. Yet a more ambivalent picture emerges when these solutions are scrutinised through the lens of equity. While many smart city initiatives appear to contribute significantly to climate neutrality and environmental goals, their effectiveness in promoting social justice is far less certain.

This presentation critically examines the relationship between technological innovation and social equity within smart city frameworks. It interrogates the extent to which smart city initiatives uphold principles of equal treatment and shared rights, and whether their implementation adequately incorporates strategies for social inclusion. Without such measures, the transition toward digitally enabled infrastructures risks reinforcing existing inequalities. Disparities in digital literacy, access to digital tools, and infrastructural coverage disproportionately affect vulnerable groups, including the elderly, ethnic minorities, low-income populations, and residents of peripheral or underserved urban areas.

The concept of digital gentrification – compounded by green redevelopment initiatives and concentrated investments in smart grids – highlights how technologically advanced neighbourhoods may thrive while disadvantaged communities face marginalisation or displacement. Moreover, the prevailing emphasis on real-time data and operational efficiency often encourages short-term, visibility-oriented interventions, while structural drivers of inequality and environmental degradation remain unaddressed.

Ultimately, the challenge for smart cities is not simply to increase technological sophistication but to ensure that innovations are equitably distributed and socially embedded. True innovation lies in developing inclusive, accessible systems that enhance the well-being of all urban residents – without exception – thereby realising a genuinely sustainable and just urban future.

THE INSTITUTIONALIZATION OF URBAN CARE CULTURES AND THEIR EFFECTS ON SOCIAL JUSTICE: THE CASE OF PROTECTIVE MEASURES AGAINST CLIMATE-RELATED HEALTH RISKS IN BASEL, SWITZERLAND

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Keywords: care infrastructures, social justice, climate resilience, heat governance, urban vulnerability

ABSTRACT

Since the global financial crisis of 2008, many governments have pursued austerity-oriented policies that reduced public services and delegated care responsibilities to local actors, civil society, and individuals. This restructuring of welfare provision has significantly reshaped urban governance, particularly in health, housing, and social infrastructure. At the same time, climate change has introduced new layers of urban vulnerability. Extreme heat events, in particular, pose substantial health risks for elderly people, the homeless, the chronically ill, and low-income populations, creating an urgent demand for adaptive and inclusive urban care infrastructures.

This paper engages with the concept of *cultures of care* in urban environments, exploring how they are shaped by the intersection of austerity politics and climate change. It focuses on the "Cool Spaces" project in Basel, launched by the author as a Living Lab in collaboration with a local social organisation. The initiative identifies and promotes publicly accessible spaces that provide thermal refuge during heatwaves, particularly for unhoused and socially vulnerable groups. The project responds to public health guidelines and urban planning recommendations that emphasise the need for accessible cooling infrastructure in climate-resilient cities.

Using a multimethod approach that combines GIS-based spatial analysis with qualitative research (interviews and field observations), the study examines the distribution of heat-relief spaces, the differentiated needs of user groups, and the administrative complexities of implementing climate-responsive care measures. It interrogates how care practices are institutionalised across governance levels, highlighting challenges of administrative fragmentation and policy gaps, and the role of public, private, and civil society actors in organising care responsibilities.

A comparison with Vienna's more centralised, government-led model of heat governance further illustrates how different institutional contexts shape the accessibility, sustainability, and equity of climate care services. By examining these dynamics, the paper contributes to broader discussions on how urban planning can more effectively integrate care infrastructures to advance social justice, environmental resilience, and inclusive urban futures.

THERMAL JUSTICE IN THE CITY: ADDRESSING HEAT INEQUITIES THROUGH PARTICIPATORY URBAN PLANNING

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Keywords: thermal justice, participatory planning, environmental justice, heat vulnerability, urban resilience

ABSTRACT

Historical patterns of neglect – such as redlining and industrial zoning – have entrenched socio-spatial inequities, leaving marginalised neighbourhoods disproportionately exposed to urban heat effects. These areas often lack adequate green infrastructure, reflective surfaces, and accessible cooling amenities, which exacerbates vulnerability to extreme temperatures.

Participatory approaches, such as thermal walks, have emerged as valuable tools for identifying and addressing these disparities. By involving residents in mapping thermal comfort and discomfort zones, these methods foster inclusive dialogue around lived experiences of heat and support community-driven identification of neglected hotspots. Such practices not only democratise data collection but also amplify the voices of communities frequently excluded from conventional planning processes.

Thermal walks conducted in the Ivry-Port neighbourhood illustrate the effectiveness of these methods in raising awareness of cooling inequalities and revealing barriers to the effective use of existing cooling spaces. The process highlighted not only physical discomfort but also broader socio-environmental challenges such as safety concerns, spatial exclusion, and underutilisation of available infrastructure.

Addressing urban heat through an equity-based lens requires reimagining cooling as both a public good and a fundamental urban right. This perspective aligns with broader concerns of environmental justice, including equitable access to urban space, the mitigation of insecurity, and the reduction of environmental nuisances. It further calls for the fair distribution of cooling resources – such as shaded public areas, green spaces, and climate-responsive infrastructure – particularly in historically underserved communities.

By embedding these concerns within environmental justice frameworks, urban planning can more effectively contribute to the creation of equitable, inclusive, and climate-resilient cities.

CITIZEN SCIENCE FOR GREEN URBAN TRANSITIONS: STORIES FROM URBAN RELEAF CITIES

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Keywords: citizen science, nature-based solutions, urban resilience, environmental justice, participatory planning

ABSTRACT

Nature-based solutions (NbS) provide critical ecosystem services and health benefits, from urban cooling and reduced air pollution to improved well-being. They have become central to European urban policy initiatives, including the EU pledge to plant three billion trees and the European Green Deal. Yet implementing NbS requires transformative approaches that go beyond conventional urban planning and governance.

The Urban ReLeaf project addresses this challenge by co-developing green infrastructure policies with public authorities and communities. Across six European pilot cities, the project organises citizen science campaigns that involve residents directly in monitoring and planning greenspaces to enhance climate resilience.

Examples include Athens, where a participatory tree registry supports greenspace management; Cascais, where residents report on thermal comfort in parks; Dundee, which co-develops interventions to improve greenspace accessibility; Mannheim, which integrates citizen data on tree health into a heat action plan; Riga, where community groups monitor air pollution; and Utrecht, where residents of green-deprived neighbourhoods collect microclimate data.

Together, these cases show how citizen engagement and data-driven collaboration can make urban NbS more inclusive and effective. By embedding citizen science in planning, Urban ReLeaf demonstrates how green infrastructure can strengthen resilience, equity, and environmental justice in European cities.

ADVANCING INCLUSIVE AND SUSTAINABLE MOBILITY: INSIGHTS FROM THE FAIR MOBILITY PROJECT

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Keywords: mobility justice, peri-urban mobility, intersectionality, feminist planning, governance innovation

ABSTRACT

The Fair Mobility project seeks to redefine mobility planning and governance in peri-urban and rural regions of Europe by advancing equitable, inclusive, and climate-neutral development. Using a feminist and intersectional framework, the project addresses challenges such as inadequate transport connectivity, gendered mobility disparities, and entrenched socio-spatial inequalities.

Focusing on Ebensee (Austria) and Creil (France), Fair Mobility integrates policy analysis with participatory co-design processes to develop context-sensitive mobility strategies. Concepts such as the “30-minute region” are applied to promote equitable access to essential services and inclusive public life. Local stakeholders, including vulnerable groups, are engaged to shape solutions tailored to their mobility needs.

Findings highlight systemic barriers in peripheral regions. In Ebensee, the closure of small railway stations, insufficient last-mile connections, and urban sprawl have restricted access for low-income and car-independent residents. In Creil, socio-economic marginalisation intersects with inefficient transport systems, compounding accessibility deficits.

To address these challenges, the project explores transformative measures including gender-responsive transport budgeting, revitalisation of regional rail and bus networks, and promotion of active and multimodal mobility systems. These interventions not only seek to improve mobility equity locally but also provide scalable models for inclusive mobility transitions in other European contexts.

Aligned with the UERA Conference theme, the project contributes to debates on governance innovation and inclusive sustainability transitions. The presentation will share insights and recommendations to advance socially just, climate-resilient mobility policies across Europe.

ENTROPIC URBANISM: TRANSFORMATIVE STRATEGIES FOR CLIMATE-NEUTRAL AND SUSTAINABLE DEVELOPMENT IN INFORMAL AND POST-SUBURBAN AREAS

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Keywords: peri-urban areas, entropic urbanism, decarbonisation, participatory governance, mobility

ABSTRACT

This research investigates transformative strategies for decarbonising and improving the liveability of informal and post-suburban territories, which face complex socio-spatial and environmental challenges across Europe. Anchored in the conceptual framework of *entropic urbanism* – which examines dynamic flows of energy, materials, and socio-economic interactions – the project reconceptualises traditional planning paradigms by proposing resilient and adaptable frameworks for climate-neutral urban transformation.

The methodology combines contextual analysis, participatory co-design, pilot implementations, and scalability studies. Drawing on participatory governance, digital innovation, and renewable energy technologies, it positions mobility as a key lever for decarbonisation. Shared mobility services, multimodal infrastructures, and intelligent energy systems are explored to enhance connectivity, optimise resource efficiency, and reduce environmental impacts.

Participatory tools such as simulation platforms, photovoice, and Generalised Q Analysis are employed to support inclusive public engagement and evidence-based decision-making. The project addresses research questions related to designing smart public spaces, integrating electrified mobility systems, and dynamically managing urban space. Key outputs include policy frameworks, stakeholder engagement toolkits, training modules, and actionable recommendations for sustainable urban development.

Anticipated outcomes include improved public health, reduced air pollution, strengthened governance in informal areas, and scalable models for peri-urban sustainability transitions. Ultimately, the initiative contributes to advancing European sustainability and equity goals by offering a comprehensive roadmap for resilient and inclusive urban transformation.

CONDOMINIUM HOUSING RENOVATION FOR SUSTAINABLE AND CLIMATE-NEUTRAL CITIES

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Keywords: condominium housing, energy efficiency, positive energy districts, renovation, energy poverty

ABSTRACT

Urban energy consumption is increasingly recognised as a critical challenge in the context of resource scarcity and global warming. Strategies that combine energy efficiency with the integration of renewable energy sources (RES) in the built environment are now seen as essential for mitigating climate impacts. Within this context, the concept of Positive Energy Districts (PEDs) has gained prominence as a holistic approach that integrates technological, spatial, regulatory, financial, and social dimensions of sustainable urbanisation.

A pressing challenge exists in the large-scale, multistorey mass housing estates common across Eastern Europe. These estates face a threefold crisis: deteriorating living standards, poor energy efficiency, and structural decline. Applying the PED framework to these complexes offers significant potential, particularly through the integration of renewable energy technologies into existing housing stock.

However, systemic barriers persist. In many post-Soviet countries, condominium housing suffers from weak maintenance, inadequate management, and the absence of enabling legislation or sustainable financing mechanisms. Since the 1990s, these shortcomings have led to a continuous decline in housing quality, with energy inefficiency aggravating energy poverty among residents.

This paper examines how renewable energy production can be leveraged to address these challenges. Specifically, it explores the feasibility of using revenues generated from RES to finance the renovation and retrofitting of multistorey condominiums. Such an approach supports climate and energy goals while simultaneously improving living conditions and alleviating energy poverty in vulnerable urban areas.

THE TRAVELING URBAN SUSTAINABILITY RESEARCHER: ADDRESSING A CONFLICTUAL TOPIC

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Keywords: academic travel, climate protection, justice, transdisciplinary research, sustainability

ABSTRACT

Research-related business travel occupies a pivotal position in the climate change discourse. While it significantly contributes to universities' greenhouse gas emissions, it also underpins scientific progress, academic identity, and the production of socially relevant knowledge. For instance, ETH Zurich reported in 2019 that around half of its total emissions stemmed from travel-related activities. Yet travel remains central to institutional exchange and to advancing urban sustainability research, generating inherent tensions within climate protection efforts in academia.

This presentation asks: how can scientific exchange and international collaboration be made more climate-friendly without compromising the quality and reach of research on climate and sustainability? Drawing on the Karlsruhe Real-world Lab for Sustainable Climate Protection (KARLA, 2021–2024), the study explores strategies for climate-friendly academic travel through collaborative workshops, emissions calculations, and sustainability assessments.

A key challenge identified concerns implicit justice dimensions of travel reduction policies. Early-career researchers, in particular, worry about career disadvantages, often voicing these concerns through emotional narratives rather than systematic critique. This reluctance can hinder experimentation with socio-technical innovations for reducing emissions.

Findings reveal a gap in the literature: while guidelines for sustainable academic travel exist, structured, justice-oriented approaches are lacking. To address this, the project proposes a multidimensional framework that (a) incorporates intra- and intergenerational justice via a travel reflection tool based on the IKONE sustainability framework; (b) identifies potential lines of conflict; and (c) develops context-specific, equity-informed solutions.

By presenting this framework, the paper advances climate-friendly and conflict-sensitive models for urban research that are both environmentally effective and socially equitable.

SESSION 2

PLANNING AND DESIGN FOR URBAN SUSTAINABILITY AND RESILIENCE FOR CLIMATE NEUTRALITY

This session explores how planning and design practices can contribute to the development of sustainable, climate-neutral, and resilient cities. As urban areas face mounting pressures from climate change, resource scarcity, and social inequalities, the role of spatial planning and design has become increasingly critical in shaping fair and adaptive pathways for transformation.

Contributions in this section highlight approaches that link long-term climate neutrality goals with immediate urban development challenges. They address questions of how mobility systems, governance tools, and participatory planning frameworks can be re-designed to ensure equitable access to services, resilient infrastructures, and improved quality of urban life. The session places particular emphasis on integrating innovative planning instruments – such as doughnut economics, climate contracts, and spatially integrated frameworks – with participatory methodologies that empower diverse stakeholders.

By drawing on case studies from cities and regions across Europe, the papers illustrate both the opportunities and tensions inherent in efforts to align urban design with climate objectives. They also underline the importance of bridging the gap between high-level policy ambitions and local realities, where institutional capacities, resource limitations, and social diversity demand context-sensitive solutions.

Together, these contributions provide insight into how planning and design can function as levers for more sustainable, inclusive, and climate-resilient urban futures.

PLANNING FOR INCLUSIVE AND EQUITABLE CITIES: RETHINKING MOBILITY AND PARTICIPATION

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Keywords: equity, participation, mobility, spatial justice, governance

ABSTRACT

Climate change, urban development, and social disparities represent some of the most pressing challenges for contemporary urban and territorial planning. International frameworks, including those promoted by UN-Habitat, highlight the importance of the "Right to the Plan," which emphasises social justice, spatial equity, and participatory governance. Yet persistent conflicts between social groups and deepening inequalities continue to challenge traditional planning paradigms, calling for more inclusive and adaptive approaches.

This study integrates multiple theoretical perspectives to propose a framework for inclusive and equitable urban planning. It advocates for a transition away from rigid, top-down governance models toward data-informed, participatory, and evidence-based practices that empower communities and foster democratic decision-making.

Within this context, sustainable mobility emerges as a critical field of inquiry for advancing spatial justice. By enhancing accessibility, supporting social integration, and improving environmental sustainability, modes such as walking and cycling offer effective tools for reducing mobility-related inequalities. The research examines cycling infrastructure in Potenza, applying morpho-syntactic spatial analysis to assess how urban configurations shape mobility patterns and social interaction. These findings are complemented by comparative insights from selected European case studies.

In addition, the study considers citizen-centred planning strategies that combine digital and conventional participatory methods, aiming to foster transparent, collaborative, and responsive governance. Results suggest that integrating participatory regeneration, spatial analytics, and active mobility policies can create more equitable, sustainable, and human-centred urban environments.

Ultimately, rethinking planning through the lens of equity and inclusion requires tools that connect theoretical insights with spatial practice. This research offers a framework of recommendations for planners and policymakers seeking to design cities that are not only resilient and efficient but also just, accessible, and participatory.

DOUGHNUT ECONOMICS AS A TOOL FOR PARTICIPATORY GOVERNANCE IN SUSTAINABLE AND CLIMATE-NEUTRAL CITIES: THE CASE OF THE BUDAPEST DEGROWTH DOUGHNUT

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Keywords: doughnut economics, participatory governance, degrowth, climate neutrality, social equity

ABSTRACT

Advancing participatory governance for European cities pursuing sustainability and climate neutrality requires a shared understanding of the *safe and just space*: one that operates within planetary boundaries while ensuring social equity. Ecological economists argue that this necessitates rethinking the growth-centric logic of current economic systems, which undermines both environmental integrity and human well-being.

The Doughnut Economics framework provides a powerful alternative. Its model combines a social foundation, representing the minimum conditions for a dignified life, with an ecological ceiling, the limits that must not be exceeded. The space in between defines the safe and just space where humanity can thrive. While initially developed for assessing national economies, the framework has been increasingly applied to urban systems and municipal policy.

This research builds on the *Degrowth Doughnut*, an adaptation that emphasises flexibility and contextual sensitivity. It enables communities to co-define what a safe and equitable space means in practice by identifying local opportunities and priorities. The presentation introduces the Budapest Degrowth Doughnut, developed through a participatory process involving diverse stakeholders.

Participants co-created a place-based narrative of what constitutes a safe and just space for Budapest, producing insights that informed municipal planning, including the city's climate strategy and roadmap toward climate neutrality. The case highlights how the Degrowth Doughnut can connect ecological sustainability with social justice, and demonstrates how participatory methodologies can enrich urban governance frameworks in times of climate transformation.

PEDALLING TOWARDS SUSTAINABILITY: UNLOCKING THE POTENTIAL OF CYCLING FOR LIVEABLE CITIES

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Keywords: cycling, sustainable mobility, climate neutrality, urban resilience, innovation

ABSTRACT

Innovation in cycling has emerged as a transformative strategy to address pressing urban challenges, including sustainable mobility, social equity, and liveability. This presentation examines how innovative cycling policies and infrastructures can support climate neutrality and advance broader sustainability goals, drawing on theoretical frameworks and empirical insights from the HANDSHAKE project. It shows how strategic investment in cycling can reshape urban landscapes and strengthen environmental, social, and economic resilience.

Key innovations include the development of integrated cycling networks, seamless connections with public transport, and the use of smart technologies to prioritise cycling and optimise multimodal traffic flows. Evaluation tools such as REFEREE are highlighted as essential for assessing the economic, environmental, and social benefits of cycling initiatives, supporting evidence-based investment decisions.

Empirical examples demonstrate the effectiveness of these approaches. Cities like Amsterdam, Copenhagen, and Munich illustrate how separated cycling corridors, multimodal hubs, and adaptive signal systems such as green waves can boost cycling uptake and reduce car dependency. Emerging cities such as Bruges and Bordeaux have advanced by adapting innovative practices through structured mentoring programmes, achieving measurable improvements in cycling use and mobility equity.

The role of the International Cycling Community of Practice (ICCoP) is also underlined as a collaborative platform that builds capacity, shares resources, and provides evaluation frameworks to support knowledge exchange among cities.

By reframing cycling as a central pillar of urban policy rather than a supplementary measure, this research calls for coordinated action to embed cycling into mainstream planning. Cycling is presented not only as a transport mode but as a catalyst for building climate-neutral, inclusive, and future-ready cities.

TOWARDS CLIMATE-NEUTRAL CITIES: INSIGHTS FROM A DECADE OF SUSTAINABLE URBAN MOBILITY PLANNING IN CZECH CITIES

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ABSTRACT

Urban mobility is a critical frontier in achieving climate neutrality and improving quality of life. The European Green Deal calls for a 90% reduction in transport-related greenhouse gas emissions by 2050, underscoring the need for integrated, adaptive, and systemic approaches to mobility planning. Sustainable Urban Mobility Plans (SUMPs) have become a central policy instrument in this endeavour, addressing environmental, spatial, and social dimensions of mobility across the European Union.

Cities in Central and Eastern Europe, however, face specific challenges in adopting and implementing SUMPs, including limited institutional capacity for participatory planning, monitoring, and multi-stakeholder engagement. These constraints are often linked to post-communist governance legacies and structural limitations.

This paper examines the evolution of SUMPs in Czech cities over the past decade, during which institutional learning has gradually fostered the incorporation of sustainability principles into transport planning. Supported by national guidelines and EU frameworks, Czech municipalities have introduced shared mobility initiatives, innovative transport technologies, participatory practices, and mobility management strategies aimed at reducing car dependency.

The study draws on the Delphi method, engaging experts from 35 Czech cities with experience in SUMP development. Results highlight both achievements and persistent gaps, particularly regarding long-term evaluation capacity and the coordination of diverse stakeholders.

Based on these findings, the paper offers strategic recommendations to strengthen institutional structures, enhance national-level support, and address emerging challenges in future SUMP iterations. By providing an evaluative framework grounded in empirical evidence, the study contributes to broader debates on sustainable mobility and offers guidance for advancing SUMPs in both national and international contexts, in pursuit of climate-neutral urban development.

CLIMATE CITY CONTRACTS OF THE EU CITIES MISSION: INVESTIGATING INNOVATIVE URBAN PATHWAYS FOR CARBON NEUTRALITY

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Keywords: Climate City Contracts, EU Cities Mission, governance innovation, carbon neutrality, energy poverty

ABSTRACT

Urban climate mitigation depends heavily on local action, positioning cities at the forefront of efforts to achieve climate neutrality. Within the framework of the European Mission on 100 Climate-Neutral and Smart Cities by 2030, participating cities are developing Climate City Contracts (CCCs). These contracts represent innovative governance instruments designed to co-create urban decarbonisation pathways in collaboration with local stakeholders and citizens.

This study introduces a methodological framework for analysing the strategies embedded in CCCs and for extracting insights that can support knowledge exchange among cities. Adopting a holistic perspective, the framework addresses critical intersections of urban climate action, social equity, and sustainable development. A systematic content analysis of the nine CCCs submitted by Italian Mission cities highlights the role of governance and organisational innovation in embedding social justice and addressing energy poverty within mitigation strategies.

The research also evaluates portfolios of proposed actions across five domains: energy systems; mobility and transport; waste and circular economy; green infrastructure and nature-based solutions; and the built environment. This enables a comparative assessment of city-specific interventions, identifying priority investment areas, key stakeholders, and the most impactful sectors for emissions reduction. The study further explores the replicability of innovative actions in different urban contexts.

By synthesising lessons from these early experiences, the paper contributes to building a collaborative, inclusive, and effective approach to climate neutrality. Future research will examine how CCCs interact with institutional governance mechanisms and voluntary planning tools, with the aim of strengthening integrated approaches to urban climate action.

TESTING PARTICIPATORY METHODOLOGIES FOR INTEGRATING GREEN INVESTMENTS IN SUSTAINABLE URBAN DEVELOPMENT: THE ROLE OF INTERNATIONAL FRAMEWORKS IN ŠABAC, SERBIA

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Keywords: participatory planning, green investments, sustainable urban development, New European Bauhaus, Serbia

ABSTRACT

International frameworks for sustainable urban development, such as the EU Cohesion Policy 2021–2027 and the 2020 Leipzig Charter, advocate for public interest-driven urban policies based on participation, co-creation, multi-level governance, and place-based approaches. The New European Bauhaus (NEB) further reinforces these principles, offering a framework to support and finance climate-conscious initiatives, including in non-EU contexts such as Serbia, where the adoption of sustainable urban development (SUD) instruments and deliberative governance has gained momentum over the past decade.

This paper examines participatory methodologies for integrating green investments into urban regeneration in the city of Šabac through the Interreg project *New Governance of New Spaces – NONA*, developed under the NEB initiative. Based on qualitative research conducted in 2024 with residents and local stakeholders, the study assesses how traditional participatory processes can evolve to more effectively engage both citizens and potential investors in shaping climate-responsive urban development.

Findings suggest that while local public authorities need time and institutional adaptation to shift from established governance routines, participatory approaches play a key role in facilitating knowledge exchange and enhancing cross-sectoral collaboration. These dynamics strengthen inclusive decision-making processes at the local level and contribute to the transition toward sustainable, resilient, and climate-conscious urban futures.

INTEGRATED SPATIAL PLANNING FOR CLIMATE-NEUTRAL, SUSTAINABLE, AND EQUITABLE CITIES: THE LIFE IN-PLAN PROJECT METHODOLOGY

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Keywords: spatial planning, climate neutrality, integrated governance, LIFE IN-PLAN, participatory planning

ABSTRACT

European cities face the dual challenge of improving liveability while achieving carbon neutrality within ambitious EU timelines. Their efforts are often hampered by fragmented institutional frameworks, the lack of legislation mandating climate and energy plans, insufficient data, and weak multilevel governance.

The LIFE IN-PLAN project responds with an innovative methodological framework – referred to as the *Practice* – which provides a checklist to help local and regional authorities integrate climate, energy, and mobility considerations into spatial planning processes. Central to the framework is an evidence-based, data-driven approach. Georeferenced climate, energy, and mobility data are used to identify site-specific challenges and design integrated spatial plans that can demonstrate clear societal benefits. A particular emphasis is placed on addressing the needs of vulnerable groups to ensure inclusive and equitable development.

The framework promotes vertical (multilevel), horizontal, and territorial integration, while embedding participatory processes that involve municipalities, citizens, academia, and the private sector. By fostering shared strategic visions, aligning investments, and demonstrating public value, this approach helps overcome financing barriers and strengthens collective commitment to climate neutrality.

Within the project, three lighthouse municipalities in each of five participating countries (Croatia, Ireland, Italy, Romania, and Sweden) co-created and tested the Practice. The framework is now being disseminated to additional pilot municipalities, where it is adapted to reflect local priorities and conditions, ensuring broad relevance and effectiveness across diverse territorial contexts.

STATE OF LOCAL CLIMATE AND ENERGY PLANNING IN SMALL AND RURAL EUROPEAN TOWNS: PRELIMINARY RESULTS OF THE LIFE LOCAL GOGREEN PROJECT

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Keywords: rural towns, clean energy transition, climate planning, capacity building, LIFE LOCAL GoGREEN

ABSTRACT

Small and rural towns play a crucial role in balanced territorial development and in advancing European sustainability objectives, as recognised by the European Spatial Planning Observation Network (ESPON) in 2024. Yet these communities often face structural and institutional challenges in responding to demographic, social, economic, and environmental change. They require targeted support to strengthen their capacity for pursuing decarbonisation and energy transition goals.

The LIFE22-CET LOCAL GoGREEN project addresses this need by supporting six pilot municipalities in Bulgaria, Croatia, Slovenia, Italy, Germany, and Spain. The project accelerates the clean energy transition through strategic actions across priority areas including sustainable transport and e-mobility, building energy efficiency, renewable energy generation, land use planning for carbon sequestration, and waste-to-energy solutions.

Activities combine stakeholder engagement, capacity-building, analytical tools for energy planning, pre-feasibility studies, and the development of roadmaps and action plans. This presentation reports on the preparatory phase, which laid the foundation for municipal action plans and feasibility studies. Key tasks included a self-assessment of municipalities using a standardised reporting template, the mapping of existing climate and energy plans, and the development of shared indicators to analyse and compare planning instruments.

Preliminary findings highlight both critical gaps and promising opportunities for implementing ambitious, medium-term energy transition strategies. These insights inform the identification of actionable pathways for replication and upscaling through a broader community of practice. The next phase of the project will conduct a gap analysis to pinpoint implementation barriers and formulate tailored policy recommendations across the selected thematic areas.

HOW URBAN PLANNING CAN REDUCE ENERGY CONSUMPTION: A LITERATURE REVIEW

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Keywords: urban planning, energy consumption, positive energy districts, spatial design, sustainable cities

ABSTRACT

As part of the European Union's Green Deal Mission to achieve 100 climate-neutral and smart cities by 2050, renewed attention has been given to the nexus of urban and energy planning. This emphasis is reflected in the Horizon Europe partnership *Driving Urban Transitions* (DUT), particularly through the Positive Energy Districts (PED) transition pathway, which promotes energy flexibility, efficiency, and local renewable energy generation.

To date, however, the PED research agenda has largely remained technical and energy-centric. It has focused on implementing renewable infrastructures and enhancing system flexibility, while paying comparatively little attention to the role of urban planning in reducing energy consumption and shaping future demand through spatial design and urban form.

This paper revisits traditional urban planning principles for sustainable city and district development to assess how planning practices can contribute to reducing energy use and supporting the realisation of PEDs. Using a semi-structured, narrative-based literature review, the study distils insights into ten key "commandments": concise planning guidelines designed to be easily communicated and adopted across disciplines, including energy planning.

The findings argue that, despite fragmentation in the urban–energy nexus literature, urban planning has a significant and underutilised potential to support the transition toward climate-neutral and sustainable urban futures.

PLANNING, URBAN DESIGN AND ARCHITECTURE FOR CLIMATE ACTION: FINDINGS FROM UCCRN'S THIRD ASSESSMENT REPORT ON CLIMATE CHANGE AND CITIES

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Keywords: Climate resilient development; Carbon neutrality; Climate adaptation; Transformative change; Systemic transformation; Built environment transformation

Embedding climate resilient development principles in planning, urban design, and architecture means ensuring that transformation of the built environment helps achieve carbon neutrality, effective adaptation, and well-being for people and nature, simultaneously. Planners, urban designers, and architects are called to bridge the domains of research and practice and evolve their agency and capacity, developing new methods and tools consistent across multiple spatial scales to ensure the convergence of outcomes towards city-, region-, state- and global-level targets. Shaping systemic, transformative change necessitates an innovative action-driven framework with multi-scale analysis of urban climate factors and co-mapping, co-design, and co-evaluation with city stakeholders and communities.

The presentation will anticipate the key messages and findings of the working group "Planning, Urban Design and Architecture for Climate Action" of the Urban Climate Change Research Network (UCCRN, www.uccrn.ei.columbia.edu), as part of the Third Assessment Report on Climate Change and Cities (ARC3.3), which will be published by Cambridge University Press in early 2025.

The work highlights the importance of multi- and trans-disciplinary approaches to planning and design, fostering dialogue between research and professional practice to develop integrated actions for decarbonization and adaptation starting from the socio-economic and environmental priorities expressed by local communities, advancing transformative system change approaches by streamlining socio-economic and environmental co-benefits of climate action, and proposing novel approaches for capacity building in public administrations and the private sector, tested in cities such as Rio de Janeiro, Napoli and Thessaloniki within Horizon Europe projects UP2030 (www.up2030-he.eu) and KNOWING (www.knowing-climate.eu).

SESSION 3

TECHNOLOGY AND INNOVATIONS FOR URBAN TRANSITIONS

This session explores the role of technological innovation in shaping pathways toward climate-neutral, sustainable, and equitable cities. While digitalisation, artificial intelligence, and smart infrastructures are often presented as enablers of efficiency and climate action, their transformative potential depends on how they are embedded within social, institutional, and spatial contexts.

The contributions in this section highlight how new technologies – ranging from community energy systems and urban digital twins to advanced optimisation frameworks – can accelerate sustainability transitions. They emphasise the opportunities that technological solutions offer for reducing emissions, enhancing resilience, and fostering more inclusive urban futures. At the same time, they point to the risks of uneven adoption, digital divides, and governance challenges that may undermine social equity.

By examining concrete applications and experimental approaches in diverse European and global contexts, the papers in this session illustrate both the promise and the dilemmas of technology-driven urban innovation. They provide insights into how data, modelling, and networked systems can be harnessed not only for operational efficiency but also for advancing justice, participation, and long-term sustainability.

Together, these contributions underline the importance of aligning technological progress with inclusive governance, social innovation, and place-based strategies – ensuring that digital and technical transitions support urban futures that are not only smart but also just, resilient, and sustainable.

COMMUNITY ENERGY SOLUTIONS TO ACCELERATE LOCAL CLIMATE ACTION

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Keywords: community energy, renewable energy, local climate action, digital twins, governance

ABSTRACT

National carbon reduction targets and municipal climate action plans often fail to translate into timely local decarbonisation initiatives. In this context, community energy solutions have emerged as a promising mechanism to accelerate the clean energy transition. These initiatives empower citizens, foster stakeholder engagement, and promote decentralised renewable energy generation. While energy communities are rapidly advancing in Europe, the concept of producing and sharing energy – together with the necessary legal and institutional frameworks – remains underdeveloped or poorly understood in many regions.

The Montreal Next Generation Cities Institute is exploring the multidimensional aspects of community energy solutions in collaboration with municipalities and private sector stakeholders. This work involves co-designing, implementing, and operating innovative local energy systems that integrate renewable sources with building efficiency measures. Ensuring success requires context-specific solutions that are both technically robust and economically viable.

This keynote addresses the challenges and opportunities of implementing community energy solutions. It highlights the role of digital twin technologies in modelling, simulating, and comparing alternative scenarios to support data-informed decision-making. It also examines governance frameworks that can accelerate adoption, underscoring the importance of institutional alignment and stakeholder coordination.

ADVANCING URBAN RESILIENCE THROUGH NETWORK SCIENCE AND AI: A SCALABLE FRAMEWORK FOR CLIMATE-NEUTRAL AND EQUITABLE CITIES

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Keywords: urban resilience, network science, artificial intelligence, governance, adaptive planning

ABSTRACT

While physical infrastructure is critical for advancing climate neutrality and sustainability, institutional collaboration and governance are equally essential for enhancing cities' capacity to withstand climatic, economic, and social shocks. The Urban Resilience and Sustainability Alliance (URSA) introduces a network-oriented assessment framework that combines Parenclitic Network Analysis (PNA), artificial intelligence (AI), scenario modelling, and an Enhanced Urban System Abstraction Hierarchy (USAH) to evaluate resilience through systemic, network-based approaches.

The study presents a scalable methodology for assessing and comparing urban resilience. PNA identifies latent deviations in a city's socio-economic structure by referencing an emergent "optimal city" benchmark. This allows policymakers to detect hidden vulnerabilities and weak interdependencies, supporting the design of adaptive and responsive governance strategies. The Enhanced USAH framework integrates institutional, economic, environmental, and social indicators to produce detailed resilience profiles.

Findings from a pilot application in Vancouver show how the framework can (a) identify fragmented governance structures and their impacts on resilience, (b) evaluate the role of digital infrastructure as a foundation for equitable climate adaptation, and (c) enable cross-city benchmarking and policy harmonisation across urban regions.

The research underscores that institutional coordination and governance adaptability are as indispensable as physical infrastructure in achieving climate-neutral urban transitions. By employing the AI-enabled decision-support system embedded in URSA, cities can evaluate policy trade-offs, forecast resilience deficits, and test adaptive governance scenarios. This data-driven benchmarking approach provides a robust foundation for designing governance strategies that support resilient, equitable, and climate-neutral urban futures, while offering scalability across European and international networks.

URBAN DIGITAL TWIN SUPPORTING THE IMPLEMENTATION OF POSITIVE ENERGY DISTRICTS (PED)

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Keywords: digital twin, positive energy districts, CityGML, urban regeneration, geospatial data

ABSTRACT

This paper presents innovative outcomes from the Rome Technopole research project, which supports decision-making for urban regeneration at both building and city scales. The contribution to the SubTask on *Energy Efficiency, Production, and Distribution* focuses on the development of a geospatial database to facilitate the implementation of Positive Energy Districts (PEDs) and large-scale renovation strategies. The approach employs the CityGML standard to ensure interoperability with Geographic Information Systems (GIS), enable 3D visualisation, and leverage open data for the generation of development scenarios.

Building on international initiatives such as *MakingPEDs* and *WEGENERATE*, the study applies a cognitive framework methodology for database design and data integration at the neighbourhood scale. A semi-automated process for open data scraping and semantic conversion to the CityGML standard was used to digitise the entire Valco S. Paolo district in Rome. This resulted in the creation of an extended Digital Twin that can be employed in simulation models for scenario definition and scaled to other areas in Lazio (Pietralata, Testaccio, Civitavecchia) and Emilia-Romagna (Cesena).

The methodology follows a five-stage pathway for the acquisition, modelling, and management of CityGML-based 3D components, incorporating machine learning and automation: (1) acquisition, modelling, and management of the CityGML database; (2) installation of a local 3DCityDB instance; (3) analysis of interoperability requirements; (4) identification and acquisition of spatial data sources; and (5) detailed modelling setup (LOD2). A sixth phase provides visualisation of the 3D CityGML database – including building geometry, usage consistency, and associated energy data – through the CESIUM platform.

This framework demonstrates the potential of Digital Twin technologies to support PED implementation, enabling scalable, interoperable, and data-driven approaches to urban regeneration.

SNIPER-TECH FOR TAILORED URBAN INNOVATION: PITIGLIANO AS AN OPEN BLUE-SKY LAB

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Keywords: rural innovation, smart technologies, resilience, living lab, climate neutrality

ABSTRACT

Achieving climate-neutral, sustainable, and equitable communities requires innovative approaches that are responsive to the challenges of both urban and rural contexts. The *Borgo del Futuro* project – developed by ENEA, Open Fiber, INGV, and the Municipality of Pitigliano – introduces *Sniper-Tech*, a precision-driven framework designed to transform historic villages into sustainable, climate-resilient, and inclusive communities.

At the core of the Sniper-Tech framework is the development of standardised methodologies that enable tailored technological interventions adapted to local needs. By integrating fibre optic infrastructure, IoT sensors, and AI-powered analytics, the framework ensures scalable and replicable deployment of technologies across diverse territorial and socio-economic contexts.

Sniper-Tech is specifically aimed at addressing the needs of vulnerable populations and areas exposed to natural hazards, including those exacerbated by climate change and post-disaster conditions. Through adaptable, data-driven solutions, it enhances resilience, sustainability, and social inclusion in challenging environments.

The Pitigliano *Open Blue-Sky Lab* serves as a proof of concept, demonstrating how targeted technological innovation can support the climate-neutral transformation of rural areas. As a living lab, it enables the testing of key services such as:

- Smart energy monitoring systems supporting Renewable Energy Communities (RECs);
- Real-time environmental risk monitoring to strengthen territorial resilience;
- Telemedicine solutions to improve healthcare accessibility in remote areas.

This project offers a replicable model for integrating equitable, resilient, and sustainable technologies, advancing energy transition, climate adaptation, and social well-being while strengthening community engagement.

EXPLORING THE ROLE OF TECHNOLOGIES IN URBAN SUSTAINABLE TRANSITION PROCESSES

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Keywords: smart mobility, intelligent transportation systems, autonomous vehicles, infrastructure design, urban transitions

ABSTRACT

Smart mobility, a core pillar of smart city development, refers to integrated and intelligent transport systems that employ advanced technologies to meet the evolving demands of urban life and economic activity. In recent years, progress has been driven by Intelligent Transportation Systems (ITS), encompassing a range of automated driving technologies. Looking ahead, automated mobility is expected to become a dominant feature of the urban landscape, with the long-term vision of a fully automated transport ecosystem where autonomous vehicles operate seamlessly within connected, intelligent infrastructures.

Yet the current transitional phase – marked by the gradual introduction of vehicles with varying levels of automation and incremental infrastructure modifications – presents considerable challenges. The coexistence of autonomous and conventional vehicles on shared roads can create complex and potentially unsafe interactions, underscoring the need for proactive strategies to manage risks and harness opportunities.

The *STREET21* research project addresses these challenges by developing strategies to redesign urban at-grade intersections to accommodate both autonomous and conventional vehicles. This study synthesises findings from a comprehensive literature review to identify key knowledge gaps, particularly regarding autonomous vehicle behaviour and its implications for road design and infrastructure planning.

By mapping these gaps and proposing design responses, the project contributes to the development of adaptive, resilient, and sustainable transport systems. Such systems will be better equipped to manage the complexities of mixed-vehicle environments and to support the broader transition toward automated mobility within sustainable urban futures.

A NASH BARGAINING LOCAL-GLOBAL OPTIMISATION FRAMEWORK TO FAIRLY INTEGRATE RENEWABLE ENERGY COMMUNITIES WITHIN A SMART CITY

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Keywords: renewable energy communities, smart cities, optimisation, Nash Bargaining, energy transition

ABSTRACT

Recent European legislation highlights the pivotal role of smart cities in advancing the energy transition, particularly in meeting rising energy demands amid rapid urbanisation. Renewable Energy Communities (RECs) – comprising local actors who produce, consume, and share renewable energy – offer opportunities to enhance local self-consumption and deliver economic benefits to users.

However, integrating RECs into urban environments requires reconciling their individual objectives (such as minimising energy costs) with broader city-level goals (such as achieving net-zero carbon emissions). This creates a need for optimised frameworks that balance local energy generation with diverse urban energy demands while ensuring economic viability, equitable benefit distribution, and environmental sustainability.

This work proposes a novel local-global optimisation framework based on a Nash Bargaining model. The framework is designed to align the interests of both individual RECs and the city as a whole, despite potential conflicts between them. It jointly considers environmental targets at the city scale and system costs for local REC users. Specifically, the model minimises both total REC costs (investment and operational) and the life-cycle carbon emissions of the city.

By promoting cooperative behaviour, this dual-level optimisation supports the fair and efficient integration of multiple RECs within a smart city. It demonstrates how local energy strategies can be aligned with overarching sustainability goals, enabling cities to combine economic efficiency, environmental responsibility, and social equity in the transition toward climate neutrality.

RESEARCH ALLIANCES FOR SUSTAINABLE AND SMART CITIES: UNLOCKING SYNERGIES FOR INNOVATION AND IMPACT

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Keywords: Integrated energy solutions; Climate adaptation strategies; Smart and sustainable cities

The transition towards climate-neutral, sustainable, and equitable urban communities requires coordinated research and innovation efforts across disciplines, sectors, and governance levels. The European Energy Research Alliance Joint Programme on Smart Cities (EERA JP-SC) has the potential to play a crucial role in shaping this transition.

While the EERA JP-SC is in the process of developing a Strategic Research and Innovation Agenda (SRIA), this keynote will provide an overview of its emerging vision, thematic priorities, and proposed research directions. These priorities include a strong emphasis on energy efficiency, digitalization, and resilience, alongside a focus on innovative topics such as: climate and environmental sustainability and resilience of cities; energy resilience through diversified sources, including hydropower; bioenergy and circularity in energy; decentralized energy systems, with cities serving as key nodes in distributed green energy networks; citizen-driven and citizen-centered innovations.

Synergies with other initiatives, such as the Urban Europe Research Alliance (UERA) and the International Energy Agency (IEA) programs, among others, are recognized as critical pathways to enhance knowledge exchange, co-create solutions, and support evidence-based policymaking.

By leveraging cross-alliance cooperation, we can accelerate the implementation of integrated energy solutions, climate adaptation strategies, and citizen-driven innovation to ensure that the cities of tomorrow are not only smart but also sustainable, just, and inclusive for both present and future generations.

This session will conclude with a call for collaborative actions and partnerships, inviting researchers, policymakers, and industry stakeholders to engage in shaping shared research and innovation ecosystem for sustainable smart cities.

SOLARPUNK IS THE POETICS OF THE FUTURE

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Keywords: Anti-capitalist ecological futures; Speculative and utopian literature; Inclusive and post-dystopian imagination; Activism for sustainable social transformation

Solarpunk Italia is a collective of activists and enthusiasts of art and literature. With our actions, we interpret feelings and demands that call for collective, organic, fair, ecological progress. We are part of the international Solarpunk movement that was born spontaneously, from below', as a sustainable alternative to the current capitalist development model, responsible for the climate catastrophe, that threatens the very existence of civilization.

Solarpunk Italia is primarily engaged in solarpunk literature, a new literary genre born as a spin-off of science fiction, in open opposition to the 'dystopisation of the imaginary' which is functional to justify the theory of a lack of alternatives to capitalism.

The overflowing dystopian genre has engulfed science fiction: its reactionary imagery takes for granted the subjugation of the Natural to the Artificial, the degradation of the environment beyond the limit of no return. As Osvaldo Soriano wrote: The ruling classes hate dreams because they are incapable of generating a poetics of the future.'

Solarpunk rebels against this pessimistic narrative; it imagines an anti-capitalist, ecologist, anti-racist, feminist, anti-patriarchal, anti-specist and inclusive future, and acts to make it possible.

Solarpunk is the poetics of the future.

SESSION 4

RESILIENT INFRASTRUCTURES AND NATURE-BASED SOLUTIONS

This session explores how infrastructures and nature-based solutions (NbS) can be designed and implemented to enhance urban resilience, foster climate neutrality, and support more inclusive forms of sustainability. Infrastructural and ecological systems are increasingly recognised as interdependent, requiring integrated approaches that address both technical performance and social equity.

The contributions in this section highlight how NbS – such as urban greening, cooling interventions, and ecosystem service-based planning – can mitigate environmental risks while improving well-being and liveability. They also examine how resilient infrastructures, ranging from building retrofits to multi-level planning for air quality, can be combined with participatory and community-driven approaches to ensure fair distribution of benefits.

Case studies from across Europe illustrate the potential of integrating ecological and cultural dimensions into infrastructure design, as well as the challenges of overcoming fragmented governance, financing gaps, and policy inertia. Particular attention is given to how resilience can be co-produced through collaboration among governments, communities, and knowledge institutions.

Together, these contributions show how resilient infrastructures and NbS can serve not only as technical solutions but also as transformative practices that embed justice, inclusivity, and long-term sustainability into the urban fabric.

EVER NEW BUZZ WORDS OR LEVERAGING TRANSFORMATION? ACTIVATING NATURE-BASED SOLUTIONS FOR ECOLOGICAL JUSTICE IN CITIES

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Keywords: nature-based solutions, ecological justice, just transition, urban living labs, socio-ecological transformation

ABSTRACT

This keynote explores the transformative potential of nature-based solutions (NbS) in urban planning and design as a response to pressing societal challenges. It examines how NbS shape the diverse living conditions of urban residents and their relationships with nature, engaging critically with justice frameworks such as just transition, social justice, and environmental justice.

The presentation argues for embedding normative principles into both research and practice, ensuring that justice becomes a foundational element of planning processes rather than a rhetorical add-on. Drawing on insights from the EU Horizon project *JUSTNature*, it highlights innovative approaches trialled in urban living labs to activate NbS, with particular attention to how power dynamics and political processes influence spatial outcomes.

Through an analysis of practical experiences and emerging strategies, the keynote reflects on both the strengths and limitations of current practices. It concludes with a call for a research agenda that meaningfully integrates justice into NbS initiatives, positioning them as drivers of socio-ecological transformation in urban environments.

NATURE-BASED SOLUTIONS FROM THE PERSPECTIVE OF SUSTAINABILITY

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Keywords: nature-based solutions, urban ecology, sustainability, ecology of cities, resilience

ABSTRACT

Until the 1980s, ecological research was primarily concerned with natural habitats, often neglecting disturbed or human-altered environments. Pioneering studies by researchers such as Gilbert and Sukopp on urban vegetation marked a turning point, sparking wider interest in urban ecosystems and the complex interactions between urbanisation and nature.

Early urban ecology focused on the *ecology in cities*, examining natural systems shaped by urban drivers. While this produced valuable ecological insights, it remained disciplinary in scope and offered limited integration with urban science and planning. The subsequent shift toward the *ecology of cities* broadened the field to include social systems, built environments, and spatial contexts such as blue and grey infrastructure. This evolution reflects a growing recognition that sustainability requires an integrated lens balancing ecological, social, and economic dimensions – an ongoing challenge in both research and practice.

Emerging in the 2000s, the concept of nature-based solutions (NbS) sought to address this challenge. NbS aim to deliver ecological and social benefits simultaneously, harnessing natural processes to tackle urban issues such as climate adaptation, biodiversity loss, and social inequities.

This paper reviews selected applications of NbS through the perspective of sustainability, assessing their potential to support more holistic, equitable, and resilient urban development. By situating NbS within the trajectory from *ecology in cities* to *ecology of cities*, it highlights their role as a key integrative approach for advancing sustainability in urban contexts.

A MODELLING APPROACH TO INVESTIGATE THE IMPACT OF AN URBAN OVERHEATING MITIGATION TECHNIQUE IN THE CONTEXT OF CLIMATE CHANGE IN ROME (ITALY)

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Keywords: urban overheating, climate change, mitigation strategies, building energy performance, modelling

ABSTRACT

Urban overheating is a well-documented phenomenon that significantly affects quality of life in cities and is increasingly exacerbated by climate change. This underscores the need for strategies that not only mitigate urban heat but also address their interactions with building energy performance under current and future climate scenarios.

This study investigates two key aspects: (1) the impact of urban heat mitigation measures on the energy performance of residential buildings, and (2) how these effects may evolve under future climate conditions.

For the first aspect, the research assesses the urban heat island (UHI) reduction potential of high-reflectivity construction materials and increased urban greenery in Rome. Simulations of current urban configurations and alternative "what-if" scenarios were carried out using the Weather Research and Forecasting (WRF) model. The resulting meteorological data – air temperature, wind speed, relative humidity, and solar irradiance – were then used as input for TRNSYS17 to evaluate their effects on the energy performance of typical residential buildings.

For the second aspect, the study applies a similar modelling framework under future climate scenarios. Simulations include past, present, and projected Euro-Mediterranean climate conditions, drawing on pathways from the IPCC Sixth Assessment Report (e.g., SSP1-2.6 and SSP5-8.5). These scenarios integrate socio-economic development and greenhouse gas emission assumptions, providing a comprehensive perspective on long-term impacts.

Overall, the research develops a robust methodological framework for quantifying the effectiveness of urban-scale heat mitigation strategies and for assessing their implications on building energy performance under both current and projected climate conditions.

INTEGRATED PLANNING FOR AIR QUALITY AND CLIMATE: EVIDENCE FROM AN ITALIAN MULTI-LEVEL CASE STUDY

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Keywords: air quality, climate change, integrated planning, multi-level governance, policy learning

ABSTRACT

Scientific literature increasingly emphasises the interconnection between air quality and climate change, and their integration at the policy level has become a priority in the European agenda. While legislation still often treats these domains separately, recent analyses of air and climate action plans suggest that integrated approaches are emerging in practice, creating synergies and amplifying the benefits of coordinated action.

This research pursues two objectives: (1) to develop a methodology for assessing the degree of integration between air quality and climate within multi-level governance frameworks, and (2) to identify enabling factors that support effective integration and facilitate the replication and scaling of successful practices.

The study focuses on a multi-level case encompassing national (Italy), sub-national (Tuscany Region and its provinces), and municipal levels. Findings show that municipalities with clear strategic visions are more likely to adopt integrated planning approaches. Public engagement also emerges as a critical factor in strengthening climate policy instruments at the urban scale.

The research concludes by identifying enabling conditions for scaling up best practices, promoting knowledge exchange among cities, and fostering policy learning across governance levels. These insights provide guidance for advancing integrated approaches that link air quality and climate action, supporting more resilient and sustainable urban futures.

VEG-GAP: ENHANCED KNOWLEDGE OF URBAN ATMOSPHERE IN RELATION TO URBAN VEGETATION

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Keywords: urban vegetation, air quality, climate change, atmospheric modelling, sustainable planning

ABSTRACT

Understanding the interactions between climate change, air quality, and urban vegetation is essential for sustainable development strategies and urban well-being plans. Yet these aspects are often overlooked in urban planning, partly due to the limited availability of robust, science-based evidence.

The LIFE VEG-GAP project (www.lifeveggap.eu) addresses this gap by developing a methodology and integrated platform to help cities assess how vegetation influences atmospheric conditions. Using advanced atmospheric modelling systems, the project evaluated the impacts of vegetation on meteorology and air quality in three cities – Bologna, Milan, and Madrid.

The VEG-GAP platform provides dynamic assessments of vegetation effects on meteorological parameters (e.g., temperature, humidity, wind speed) and chemical indicators (e.g., O_3, NO_2, PM_{10} concentrations and deposition rates, emissions of biogenic volatile organic compounds). Results are generated at hourly, daily, monthly, and annual scales, offering comprehensive insights into vegetation–atmosphere interactions.

Simulations were performed for both current and future vegetation scenarios. In Bologna and Milan, additional analyses disentangled the indirect effects of vegetation on pollutant concentrations through meteorological influences from its direct impact via biogenic emissions. The study also examined how selecting plant species with different emission factors could alter air quality outcomes, providing actionable guidance for species selection in urban greening strategies.

By integrating modelling, data, and scenario analysis, VEG-GAP enhances knowledge of how vegetation can improve – or, in some cases, complicate – urban air quality. The project delivers a practical tool to support evidence-based decision-making for sustainable and climate-responsive urban planning.

FINDING THE RIGHT TREE IN THE MUNICIPALITY OF ROME: AN ECOSYSTEM SERVICE-BASED APPROACH

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ABSTRACT

Nature-based solutions (NbS), particularly the enhancement of urban green infrastructure (UGI), are increasingly recognised as effective strategies to improve air quality, mitigate heatwaves, stabilise water and carbon cycles, and promote social cohesion. These ecosystem services are vital for advancing climate neutrality and public well-being, but require science-based tools for strategic planning.

This study applies the AIRTREE model to simulate soil–plant–atmosphere interactions and assess the capacity of different Mediterranean and allochthonous tree species to sequester CO_2 and remove air pollutants (PM_{10}, $PM_{2.5}$, O_3, NO_2). Evergreen species such as *Pinus pinea*, *Quercus ilex*, and *Quercus suber* generally outperform deciduous species, though tree selection must also consider drought resistance, allergen emissions, and volatile organic compounds (VOCs).

Equally important is site selection. Incorporating data on accessibility, population exposure, income levels, and the distribution of vulnerable groups ensures that urban greening strategies deliver not only environmental benefits but also environmental justice.

A STEP-CHANGE NATIONAL PLAN FOR THE INTEGRATED SEISMIC-ENERGY REHABILITATION OF THE BUILDING STOCK TO ENHANCE COMMUNITY RESILIENCE AND SUSTAINABILITY

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Keywords: seismic resilience, energy efficiency, building stock, rehabilitation, community sustainability

ABSTRACT

The urgency of establishing a comprehensive national plan for the integrated, multi-performance rehabilitation of existing building stock is increasingly evident. Such a plan must address architectural, functional, and energy performance aspects while simultaneously enhancing structural and seismic safety to mitigate the severe socio-economic and environmental consequences of earthquakes.

This presentation provides an overview – grounded in national and international experience – of recent advances and emerging opportunities to enhance community resilience and sustainability. It focuses on two priorities: (a) the development of next-generation technologies for integrated structural and envelope systems, enabling resilient, low-damage, earthquake-proof buildings; and (b) the design of socio-economic and financial policies to sustain long-term national programmes for the seismic and energy-efficiency rehabilitation of the building stock.

Achieving this ambitious objective requires a paradigm shift that draws on the multidisciplinary contributions of diverse stakeholders. Equally critical is the need for improved communication with non-technical audiences, raising awareness of risks, impacts, and available solutions to co-create realistic and inclusive pathways for implementation.

INTEGRATING CULTURAL AND SPATIAL QUALITIES INTO DECISION-MAKING: TOWARDS SUSTAINABLE TRANSFORMATION OF THE SØRSIDA WATERFRONT AREA IN ÅLESUND

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Keywords: cultural values, spatial qualities, urban transformation, participatory governance, climate neutrality

ABSTRACT

How can municipalities integrate cultural and spatial qualities into decision-making processes for sustainable urban transformation? This contribution reflects on the approach adopted by the Municipality of Ålesund, Norway, within the *Re-Value* project, which seeks to leverage cultural and spatial values to guide the transformation of the Sørsida waterfront area.

Following approval of the development plan for Sørsida in 2015, Ålesund initiated a series of artistic, cultural, and creative interventions designed to foster social engagement throughout the transformation process. These initiatives included the installation of temporary and adaptable urban furniture, alongside the creative reuse of buildings slated for demolition.

With the support of *Re-Value*, the municipality is now testing innovative governance strategies for sustainable urban development. A key element was a multidisciplinary workshop that brought together experts to reflect on the cultural and spatial values of Sørsida, identify ways to embed them in future development, and propose concrete actions. The process was monitored and analysed using the *Re-Value Impact Model*, offering insights into methods for embedding cultural and spatial considerations into decision-making, particularly in the context of climate-neutral transitions.

This work-in-progress outlines the workshop's structure and outcomes, and discusses how the reflections generated may inform Ålesund's broader strategy for climate-neutral and sustainable urban transformation.

TRANSFORMATIVE HOSPITALITY FOR SUSTAINABLE AND INCLUSIVE URBAN TOURISM

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Keywords: transformative hospitality, sustainable tourism, gentrification, community engagement, cultural diversity

ABSTRACT

This study investigates *transformative hospitality* as a strategic response to overtourism and gentrification in historic urban tourism destinations. It focuses on community-led and artistic interventions that foreground engagement, cultural diversity, and social resilience as foundations for sustainable urban development.

Through a comparative case study of two initiatives – *AltoFest* in Naples, Italy, and the *Dourgouti Island Hotel* in Athens, Greece – the research explores the potential of local residents as active agents of change. Employing participatory, qualitative methods, including semi-structured interviews and analysis of community interactions, the study examines how cultural interventions can foster urban resilience.

Findings show that transformative hospitality creates meaningful connections between residents and visitors, strengthening social cohesion while mitigating the negative effects of gentrification. By reconfiguring urban spaces into inclusive and equitable environments, such initiatives contribute to the broader goals of sustainable tourism and just urban transitions.

The research proposes a tourism model that prioritises community well-being over purely economic outcomes. While grounded in specific contexts, it offers insights for planners, policymakers, and cultural practitioners seeking to reimagine urban sustainability through empowerment and cultural preservation. Ultimately, it underscores the importance of innovative planning and governance strategies to address the intertwined challenges of sustainability and equity, supporting climate-neutral and socially inclusive urban futures.

ADVANCING CLIMATE-RESILIENT TRANSPORT INFRASTRUCTURES TO FOSTER SUSTAINABLE AND CLIMATE-NEUTRAL URBAN COMMUNITIES: THE CRISTAL PROJECT

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Keywords: Climate-resilient transport infrastructure; Inland waterways decarbonization; Renewable Energy Communities in ports; Digital Twins and IoT for smart navigation

The Horizon Europe-funded CRISTAL Project (Climate Resilient and Environmentally Sustainable Transport Infrastructure) aims to enhance the resilience and sustainability of transport networks and services, with a particular focus on inland waterways. Recognizing their crucial role in fostering low-carbon, climate-neutral urban communities, CRISTAL addresses climate risks, promotes decarbonization, and ensures safer, more efficient transport infrastructure that supports the energy transition.

This presentation highlights four core innovations developed within the project to achieve these goals:

- Renewable Energy Communities (RECs) in Ports: Ports are positioned to act as energy transition hubs. CRISTAL investigates REC models centered on ports to promote local renewable energy production and consumption, enhancing sustainability and energy resilience.

- Feasibility Study of Cold Ironing for Waterway Docks: To reduce emissions from vessels at berth, CRISTAL explores the implementation of cold ironing solutions, allowing ships to connect to shore power instead of running engines. This approach improves air quality and promotes greener ports.

- Synchromodal Corridor Management System (SCMS): CRISTAL is developing an SCMS to optimize the integration of multiple transport modes within a corridor, enhancing operational efficiency and sustainability across the network. The system aims to facilitate seamless, climate-friendly transitions between modes, supporting the resilience of urban logistics.

- IoT Sensors and Digital Twin Technology for Smart Navigability and Predictive Maintenance: The project leverages real-time data from IoT devices and integrates it into Digital Twin models to monitor waterway conditions and infrastructure performance. This enables predictive maintenance, reducing the risk of failures and supporting efficient navigation.

CRISTAL's innovations align with the broader goal of fostering climate-neutral, sustainable urban communities. By addressing infrastructure resilience, reducing emissions, promoting renewable energy, and enhancing multimodal transport integration, the project demonstrates how inland waterways can play a pivotal role in achieving climate neutrality while engaging communities in the transition.

SESSION 5

ENERGY COMMUNITIES AND JUST ENERGY TRANSITIONS

This session examines how energy transitions can be shaped to advance both climate neutrality and social justice. While the rapid expansion of renewable energy and decentralised systems opens opportunities for cleaner and more resilient urban futures, these processes also raise questions of equity, governance, and participation. Energy communities, in particular, have emerged as a key mechanism for enabling local ownership, reducing energy poverty, and fostering inclusive decision-making.

The contributions in this section address diverse dimensions of energy justice – from the spatial implications of energy communities and the participation of vulnerable groups, to the governance of positive energy districts and the transformative potential of living labs. They highlight how new institutional models, financial mechanisms, and participatory approaches can support not only technical innovation but also fair distribution of benefits across social groups and territories.

By drawing on case studies and experimental frameworks from across Europe, the papers illustrate how energy transitions are negotiated at the intersection of technology, policy, and everyday life. They also show how emerging practices of co-creation, capacity-building, and community empowerment can reconfigure energy systems in ways that strengthen resilience, inclusivity, and long-term sustainability.

Together, these contributions underline the importance of embedding justice into the governance of energy transitions – ensuring that the shift toward climate neutrality delivers not only environmental benefits but also equitable, socially responsive, and community-driven outcomes.

PLANNING URBAN ENERGY TRANSITION FUTURES AS 'PATH CONTINGENT'

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Keywords: energy transition, urban governance, path contingency, social justice, planning futures

ABSTRACT

The urban energy transition presents complex research challenges, particularly in relation to the dynamic interplay between the socio-spatial construction of cities and the processes of energy transformation – spanning energy efficiency, system flexibility, and renewable energy production. While progress has been made in understanding how urban practices and transformations can facilitate these transitions, a key question remains: how can we move beyond simplistic binaries such as fossil versus renewable energy, or 'clean' versus 'dirty' systems?

This keynote addresses the need for methodological innovation capable of capturing the multifaceted nature of urban processes and their role in shaping energy transitions. It draws on a conceptual framework inspired by Patsy Healey's notion that futures are *path contingent*, rather than strictly path dependent. This perspective emphasises situated experiences and contextual applicability over universal principles, highlighting the diversity of trajectories that energy transitions can take.

Building on insights from ongoing EU projects on urban energy transitions, the presentation foregrounds the importance of embedding social sustainability and justice within energy transition frameworks. It raises critical questions of inclusion, equity, and agency in shaping low-carbon urban futures.

The keynote concludes by arguing that planning frameworks must be guided by normative objectives of justice and sustainability, while recognising the power relations embedded in governance structures. It advocates for reimagining planning as a democratic and transformative practice, central to steering urban energy transitions toward socially inclusive and climate-neutral outcomes.

EMPOWERING THE MARGINS: INCLUSIVE PARTICIPATION OF VULNERABLE GROUPS IN ENERGY TRANSITIONS

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Keywords: energy transitions, positive energy districts, energy citizenship, vulnerability, participatory methods

ABSTRACT

The transition to climate-neutral cities depends on inclusive urban strategies that integrate sustainability, resilience, and social equity. Within this context, Positive Energy Districts (PEDs) have emerged as central instruments for creating livable, energy-efficient, and socially integrated neighbourhoods. A key component of this transition is the concept of *energy citizenship*, which emphasises the active participation of individuals and communities in shaping energy futures.

This paper critically reflects on inclusive participation with a focus on vulnerable groups within the context of PEDs. Vulnerable populations often face systemic challenges in energy access, affordability, and efficiency – issues deeply embedded in socio-economic and infrastructural conditions. Addressing these requires participatory approaches that respond to the specific needs, capacities, and lived experiences of such groups.

The paper reviews social science methodologies that promote inclusion and empowerment, including photovoice, vignette-based focus groups, participatory mapping, and peer-led interviews. These methods support the co-creation of context-sensitive and adaptive interventions that recognise the relational and multidimensional nature of energy vulnerability.

By examining the intersection of energy citizenship and vulnerability, the paper advances a nuanced understanding of how inclusive frameworks can support shared visions and collective action in energy transitions. The findings underscore the importance of place-based, participatory approaches in ensuring equitable engagement, fostering agency, and strengthening resilience among vulnerable populations.

ENERGY COMMUNITIES: SPATIAL IMPLICATIONS AND TACKLING ENERGY POVERTY

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Keywords: energy communities, energy poverty, just transition, spatial justice, decentralisation

ABSTRACT

Energy systems across Europe are undergoing decentralisation, marked by increasing volumes of locally generated energy. This transformation is reshaping energy geographies and opening new opportunities for participation in the energy system. Energy communities are often identified as key enablers of a just energy transition. This paper examines their spatial implications with a particular focus on their role in alleviating energy poverty—a form of energy injustice that has become an escalating concern across Europe.

Despite the recognised potential of energy communities to mitigate energy poverty, their contribution is often discussed in isolation. Thus, in a recent study with Jordan Young, we explore the specific strategies adopted by energy communities to address energy poverty and the barriers they face. The Netherlands provides the empirical setting, where the number of energy communities has doubled over the past decade.

A survey of 196 energy communities was conducted to evaluate their involvement in tackling energy poverty. Using ordinal logistic regression, the analysis assessed the effectiveness of different strategies. Findings reveal that measures aimed at neighbourhood-level support—such as investments in local public goods—are far less common than financial or technical interventions. This is significant, as energy poverty extends beyond inadequate housing or limited financial resources to encompass issues such as social isolation and institutional trust.

The results have implications for the evolution of the energy community movement, as well as for policymakers and practitioners engaged in energy governance. Unpacking the spatial and social dynamics of energy communities contributes to a deeper understanding of how decentralised energy systems can advance both equity and sustainability in urban and regional contexts.

URBAN TRANSFORMATIVE CAPACITY BUILDING BY USE OF LIVING LABS: A CASE STUDY OF ALYTUS, LITHUANIA

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Keywords: urban living labs, transformative capacity, co-creation, experimentation, governance

ABSTRACT

Since the early 2000s, Urban Living Labs (ULLs) have been studied as experimental environments where diverse stakeholders – citizens, researchers, businesses, and policymakers – co-create and test innovative solutions for urban development. By fostering collaboration, empowerment, and shared learning, ULLs support participatory approaches to urban challenges and cultivate cultures of foresight and experimentation.

In this context, ULLs represent a valuable mechanism for enhancing Urban Transformative Capacities (UTC). They enable local actors to strengthen skills, expand knowledge, and build intersectoral networks, while providing opportunities for experiential learning and adaptive governance.

The municipality of Alytus has embraced this approach by establishing a collaborative platform to foster innovation in urban development, as outlined in its *Strategic Operational Plan 2022–2024*. This platform convenes stakeholders – including citizens, businesses, and public authorities – to co-design and test solutions to pressing urban challenges.

As part of the EU-funded project *TANGO-W* (ERA-Net Urban Transformation Capacities, Project No. 875022), Alytus participated in a series of 'community of practice' meetings that reinforced the role of ULLs in building local capacity. These experiences illustrate how living labs can advance transformative governance and support the transition toward more sustainable, inclusive, and climate-resilient cities.

SOCIAL PARTICIPATION IN INNOVATIVE ENERGY EFFICIENCY RENOVATION TO FOSTER URBAN REGENERATION: A CASE STUDY IN THE SOUTH OF ITALY

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Keywords: energy efficiency, social housing, co-design, urban regeneration, participation

ABSTRACT

Energy-efficient retrofitting of public social housing is a critical challenge for building a sustainable and inclusive society, alleviating energy poverty, and improving living conditions and comfort for vulnerable tenants. Within the EU-funded *REHOUSE* project, ENEA coordinates a pilot case in Margherita di Savoia, Italy, involving the renovation of a social housing building. The intervention integrates advanced technological innovations and structural upgrades – such as a centralised system for hot water and cooling, new wall insulation, and a photovoltaic façade – to reduce energy consumption, cut CO_2 emissions, and enhance indoor air quality.

The pilot adopts a people-centred approach in which each technical phase is preceded and accompanied by co-design and participatory processes. Tenants actively engage with designers and technicians, fostering behavioural change in energy use. Following an analysis of the social context and resident needs, continuous support is provided through targeted information and assistance, enabling informed decision-making and encouraging acceptance of innovative technologies.

Participation methods include community meetings, questionnaires, interviews, workshops, and interactive tools. A notable element is *Enzeb*, a serious game developed by ENEA to engage residents and disseminate knowledge on energy efficiency, renovation outcomes, and sustainable practices.

The results show that social participation is essential for ensuring the successful adoption of technological innovation at the urban scale. It empowers communities to manage shared spaces more inclusively and sustainably, while fostering behavioural change, shared understanding, and strengthened social relationships.

CHALLENGES FOR BULGARIAN CITIES IN ACHIEVING SUSTAINABLE AND POSITIVE ENERGY DISTRICTS

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Keywords: positive energy districts, energy efficiency, Eastern Europe, urban transformation, renewable energy

ABSTRACT

Achieving Positive Energy Districts (PEDs) poses significant challenges for Eastern European countries, where most residential buildings – both single-family and multifamily – were constructed with minimal energy performance requirements. In many high-rise housing estates, the deterioration of insulation materials has further reduced thermal efficiency.

Urban and building transformation processes have been slow, constrained by the relatively high property values compared to average household incomes. Initial progress has been achieved through programmes introducing heating systems based on renewable or low-emission energy sources, aiming to improve environmental quality and expand opportunities for locally produced energy.

In Sofia, the largest city in Bulgaria, municipal policies now prohibit the use of solid fuels, and new buildings must comply with stringent EU energy efficiency standards, including requirements for partial on-site renewable energy generation. While these measures represent important steps, they remain insufficient to achieve the systemic transformation required for PEDs.

Moving forward, technical and policy innovations must be complemented by broader legislative frameworks that support households in transitioning away from polluting fuels. Such initiatives are essential to advance urban transformation in ways that enhance energy security, public health, and socio-economic stability, while enabling sustainable development across settlements ranging from small towns to megacities.

LEVERAGING CAPACITY BUILDING AND AWARENESS TOWARDS PEDS: THE C.LEVER PROJECT EXPERIENCE IN CESENA, ITALY

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Keywords: positive energy districts, capacity building, decision support, urban regeneration, climate neutrality

ABSTRACT

The transition toward Positive Energy Districts (PEDs) is a critical challenge for advancing urban sustainability, requiring collaboration across sectors and a deep understanding of the interdependencies between energy efficiency, environmental sustainability, and social equity. The *C.Lever – Cesena Leveraging Cross Synergies Towards PEDs* project, funded under the Scalable Cities initiative, addresses this challenge by developing a methodological framework and knowledge base using Cesena, Italy, as a pilot case.

The project's main objective is to support the transformation of the existing urban built environment into resilient, efficient PEDs. It does so by consolidating expertise and data from ongoing initiatives (e.g., *POSEIDON, WEGENERATE*) to empower local authorities, planners, and communities in navigating the complexities of climate-neutral urban transitions.

Key outcomes include a capacity-building programme to strengthen interdisciplinary collaboration and a Decision Support System (DSS) comprising a multi-criteria analysis matrix for identifying suitable areas for PED transformation. In addition, a data-characterisation framework supports the creation of a digital urban model capable of simulating PED transition scenarios and informing urban regeneration processes.

Ultimately, the project provides a strategic benchmark for Cesena's climate-neutral development, anchored in energy efficiency, resilience, and social inclusion. By fostering synergies across sectors and equipping stakeholders with actionable insights, *C.Lever* contributes to a new paradigm of sustainable urban living that is adaptive to future challenges and responsive to community well-being.

REAL EXPERIMENTS OF CO-CREATING SUSTAINABLE AND INCLUSIVE SOCIETIES TOWARDS CROSS-SECTORAL TRANSITION TO CLIMATE NEUTRALITY: THE TRANSITION SUPER LAB IN WESTERN MACEDONIA

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Keywords: transition super labs, systemic innovation, cross-sectoral governance, climate neutrality, regional transformation

ABSTRACT

Achieving the European Union's climate neutrality targets, as set out in the Paris Agreement and the European Green Deal, requires profound and rapid systemic transformation. Reaching net-zero cities by 2050 demands more than innovation in niche contexts; it calls for the design of carbon-neutral societal systems supported by strategic investment and cross-sectoral synergies.

The Transition Super Lab (TSL) represents a novel approach that conceptualises entire cities and regions as living laboratories. By fostering collaborative governance structures, TSLs empower stakeholders, public authorities, and policymakers to co-develop and implement policies that accelerate systemic innovation and enable climate-neutral transformation.

This paper highlights the role of TSLs as catalysts for systemic change. It introduces a suite of transition-enabling tools designed to generate added value for cross-sectoral initiatives, facilitate economic transformation, and provide practical responses to complex regional challenges. At the core is a cross-sectoral transition model that guides cities and regions through structured roadmaps for managing transformation processes.

The region of Western Macedonia (Greece) provides a case study of TSL implementation, which has involved coalition-building with stakeholders, co-defining a shared transition vision, and co-developing an action plan anchored in pilot interventions. Alongside Western Macedonia, three additional European regions – Emilia-Romagna (Italy), the Ruhr Area (Germany), and Lower Silesia (Poland) – are adopting the TSL approach. Comparative insights from these cases underscore the adaptability of the model and its potential for replication at larger scales.

CONCLUDING NOTE

The contributions gathered in this Book of Abstracts illustrate the breadth and depth of contemporary urban research in addressing the urgent challenges of climate neutrality, sustainability, and social equity. Across five thematic sessions – ranging from social justice and participatory practices to planning and design for resilience, technological innovation, nature-based solutions, and just energy transitions – the papers highlight how diverse disciplines and perspectives converge to advance more inclusive and sustainable urban futures.

A recurring theme throughout the conference is the recognition that technical innovation alone cannot deliver the profound transformations required. Equally essential are governance frameworks that empower citizens, participatory processes that foreground justice, and cross-sectoral collaborations that bridge knowledge, policy, and practice. By drawing on cases from across Europe and beyond, the conference underscores the importance of context-sensitive approaches while also pointing to the shared systemic challenges faced by cities worldwide.

The Urban Europe Research Alliance (UERA) conference thus serves not only as a forum for sharing research but also as a collective space for shaping new agendas, nurturing alliances, and strengthening capacities for action. Together, the contributions reinforce the message that achieving climate-neutral and equitable urban futures will require innovation that is both technological and societal – anchored in values of inclusivity, justice, and democratic transformation.

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