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Holistic portfolio planning tool and rapid zero-emission renovations to advance the energy transition of buildings and achieve urban climate goal targets



Co-funded by
the European Union

The innovative solution in a nutshell

Main Urban Authority (MUA):
City of Nuremberg

Project ZEROit aims to solve the City of Nuremberg's energy transition challenges using holistic, highly replicable solutions. Meeting climate targets requires a rapid and substantial reduction in emissions from the building sector – but this involves overcoming significant economic and decision-making barriers. Traditional retrofitting strategies tend to focus on large-scale buildings, overlooking the fact that the majority of urban building stock consists of small to medium-sized structures with only moderate energy performance.

In Nuremberg, which manages a portfolio of about 1.900 buildings, the scale and complexity of planning individual renovations make the city's 2035 climate goals seem increasingly unattainable.

This project proposes a smarter, more holistic approach to decarbonising municipal buildings. By developing tailored pathways for each building, cities can maximise the impact of every investment. Core strategies include transitioning to high-efficiency active systems, with actions such as using heat pumps, reducing energy demand, integrating renewable energy sources, and enhancing grid flexibility. Together, these measures can enable cities to accelerate renovation efforts, overcome systemic barriers, and reduce emissions substantially.





Welcome to
Nuremberg

Nuremberg is one of Germany's major urban centres and the largest city in Franconia. It lies on the Pegnitz River and the Rhine–Main–Danube Canal, with the Nürnberger Reichswald forest shaping much of its wider setting. **Its climate is classified as oceanic with some humid continental influence**, with changeable winters and generally warm summers shaped by its inland position and elevation. **Economically, Nuremberg remains an important industrial centre**, with strong positions in automation, energy and medical technology, while manufacturing and technical innovation continue to play a major role in the wider urban economy. At the same time, Nuremberg is a city with a rich historic identity and **a very practical transition challenge: “How to decarbonise a large and highly diverse municipal building stock and meet ambitious climate targets?”**

The City of Nuremberg manages around 1.900 buildings, ranging from schools and offices to many other public facilities. This stock reflects the city's layered urban history: around half of the buildings were originally constructed before the Second World War and later rebuilt, while roughly 40% are listed buildings. As in many European cities, the majority are small to medium-sized buildings, which makes standard renovation approaches slower, more complex and often less effective at scale.

Nuremberg therefore offers exactly the kind of real urban testing ground that ZEROit needs: a city combining strong political commitment to climate neutrality with the practical constraints of limited budgets, heritage requirements, technical complexity and the urgent need to act fast. In this sense, Nuremberg is not only the place where ZEROit is being implemented, but also a highly relevant urban laboratory for solutions with wider European value.



MUA's vision of the innovative solution and underlying motivation

Moving from conventional *"house by house"* to portfolio driven renovation logic

Nuremberg's vision for ZEROit is rooted in a simple but demanding ambition: to make the transition of its municipal building stock toward climate neutrality faster, smarter and more achievable under real-world urban constraints.

The City recognises that conventional renovation logic is no longer sufficient. In a portfolio of around 1.900 buildings, dominated by small and medium-sized assets, planning one renovation at a time and relying mainly on slow, resource-intensive envelope measures would not allow the municipality to meet its 2035 climate objectives. Instead, **Nuremberg's vision is to create a more strategic and operational model that helps the city decide where to invest, what to prioritise, and how to reduce emissions with maximum effect for every euro spent.**

At the core of this vision lies the idea that decarbonisation must be approached as a portfolio challenge, not only as a building-by-building technical exercise. **ZEROit therefore combines three connected solutions:**

- **a Holistic Portfolio Planning Tool** to support data-based and city-wide decisions;
- **a Rapid Zero-Emission Renovation Approach** focused on practical, low-disruption measures for smaller buildings;
- and **Capacity Building and Engagement Measures** to ensure that municipal staff, stakeholders, citizens and future users can understand, adopt and multiply the project's results.

The motivation behind this approach is both environmental and institutional: Nuremberg needs to reduce emissions urgently, but it also needs tools and capabilities that allow the city itself to plan, steer and scale the transition more effectively. In this sense, ZEROit is designed not only to deliver project results, but to change how the city manages decarbonisation in the long term.



ZEROit project is built around 5 project pillars.

ZEROit project design & pillars

Holistic Portfolio Planning – Digital Tool

Will bring fragmented building and energy data into one planning environment that helps the city prioritise investments, compare renovation pathways and make better portfolio-level decisions.

Zero Emission Renovations

Will demonstrate how small and medium -sized buildings can be decarbonised faster through practical, low-disruption renovation packages based on off-the-shelf technologies and future-proof planning.

Municipal and Decision Maker Upskilling

Will strengthen the skills of municipal staff and decision-makers so they can use new data, tools and renovation knowledge more confidently and effectively in everyday investment planning.

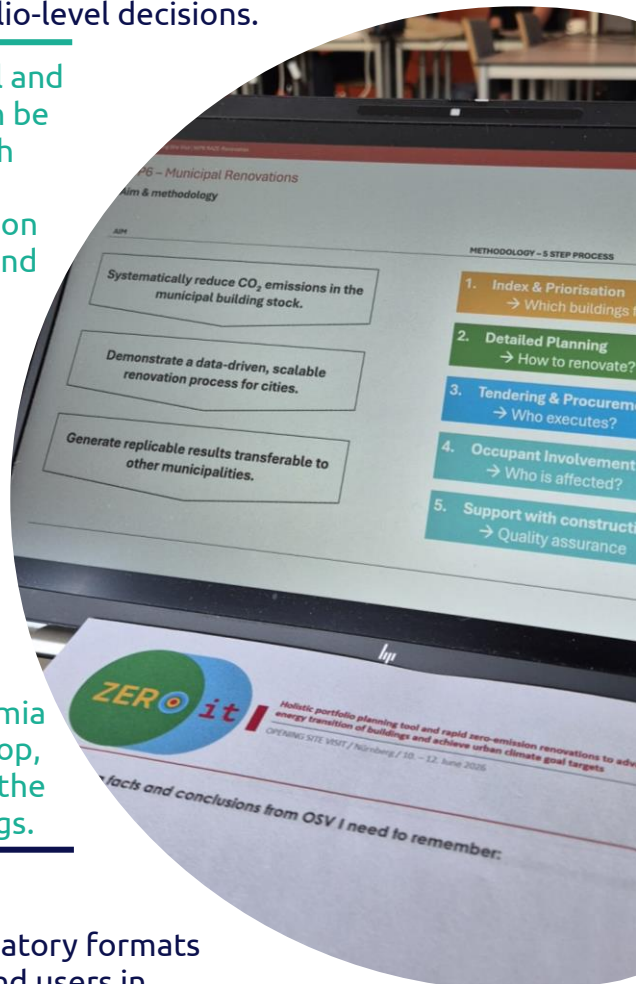
Capacity Building Across the Quadruple Helix

Will build a collaborative ecosystem across public authorities, industry, academia and civil society to co-develop, test and scale solutions for the energy transition of buildings.

Embedding Collaboration in Renovation Planning

Will introduce participatory formats that involve citizens and users in shaping future-oriented renovation planning, helping the city connect technical solutions with real needs, expectations and social acceptance.

The five project pillars should also be understood as transferable innovation blocks through which ZEROit's three core solutions can be interpreted, tested and adapted by other cities, helping Transfer Partners identify what they may realistically learn from, apply and further explore in their own local contexts.





Political Leadership at the MUA

On the Path to Climate Neutrality: ZEROit Accelerates Nuremberg's Building Strategy

With the ZEROit project, the City of Nuremberg is taking an important step toward a climate-neutral municipal building stock. Funded by the European Union, the project combines digital innovation, climate-neutral heat generation, and active citizen participation in a novel, comprehensive concept. The goal is to make the energy-efficient modernization of municipal buildings significantly faster, more cost-effective, and more impactful.

At the heart of the project is the development of a smart planning tool that can be used to analyse and strategically assess a large building portfolio. **This allows investments to be targeted precisely where they will have the greatest impact on climate protection and energy savings.** At the same time, innovative renovation approaches will be tested to enable smaller and medium-sized buildings to transition to an emission-free heat supply more quickly. The City of Nuremberg is providing the pilot buildings.



Mayor for construction Dr. Nasser Ahmed explains:

"With ZEROit, we are laying a new foundation for data-driven decision-making in building management. This will allow us to use our resources more efficiently and significantly accelerate the modernization of our building stock."



Mayor Marcus König emphasizes:

"ZEROit demonstrates how European funding can have a tangible impact at the local level. The project strengthens Nuremberg as an innovative city and helps us achieve our climate goals with modern and cost-effective solutions."



Dr. Andrea Heilmaier, the Economic and

Scientific Affairs Officer responsible for European topics and EU funding, also points out:

"ZEROit combines sustainability, digitalization, and municipal practice in an exemplary way. The European Union recognizes this through its funding. At the same time, the project sends a strong signal for cooperation with other cities to jointly drive innovation forward in Europe."

Together with experienced partners from research, technology, and urban development, **Nuremberg is using ZEROit to develop a model that could serve as a guide for other European cities in the future.** This tool is intended to facilitate the rapid implementation of ambitious climate protection goals in the building sector.

Addressing the
Mismatch between
Climate Ambition
and Delivery Capacity

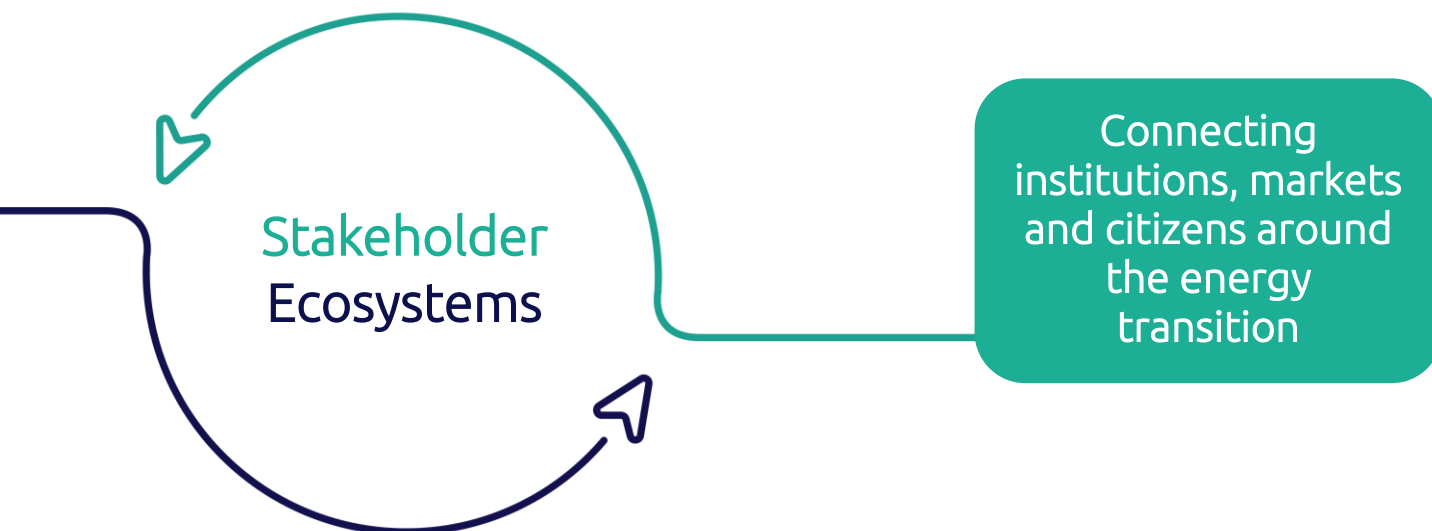
Local
Context

Nuremberg's local context is shaped by a clear mismatch between climate ambition and delivery capacity. **The city administration has committed itself to becoming climate neutral by 2035**, in line with the wider city's 2040 climate-neutrality pathway. **Yet this ambition must be pursued in a financially constrained municipal environment**, where the decarbonisation of a large, operationally diverse and historically complex public building portfolio places major pressure on budgets, staff time and implementation capacity. **An estimated €1,1 billion would be needed to fully refurbish the portfolio, while current resources would push full climate-neutral transformation far beyond the target year.**



The challenge is therefore not only technical, but structural. Nuremberg must deal with slow planning and renovation processes, rising costs, limited internal capacity, and the need to coordinate decisions across many buildings rather than a few flagship projects. **Conventional retrofit approaches are often too resource-intensive and too slow to match the pace required.** What is needed is a way to act more strategically: to identify where limited investments can achieve the greatest emissions impact, to accelerate decision-making, and to reduce the friction between planning, procurement and implementation. **This is precisely the local problem ZEROit is designed to address.**

In this sense, ZEROit is not a stand-alone innovation project, but a practical municipal response to a systemic urban challenge. It gives Nuremberg a pathway to move from fragmented, building-by-building action toward a more strategic, data-driven and scalable model of decarbonisation.



ZEROit is built on the understanding that the energy transition of buildings is not only a technical task, but a multi-actor urban transformation process. Its stakeholder ecosystem therefore reaches well beyond the municipal administration and deliberately connects public authorities, the construction sector, portfolio owners, research organisations and civil society. This reflects two of the project's core innovation blocks: building capacity across the quadruple helix and embedding collaborative approaches into renovation planning.



At the centre of this ecosystem are the **City of Nuremberg's departments and energy-management units**, which act as both operational actors and future users of the project's outputs. They are supported by **regional and city-wide bodies** such as the Klimabeirat, the Metropolitan Region of Nuremberg, the Chamber of Commerce and Industry and the local energy network operator N-ERGIE Netz. The **construction sector and related trades** are also essential stakeholders, as ZEROit seeks not only to test integrated zero-emission renovations, but also to strengthen the local capacity needed for future large-scale implementation.

Beyond the municipality, the project engages **portfolio-holding stakeholders and multipliers**, including the Energy Agency North Bavaria, **social housing organisations, private real-estate actors, banks and universities** such as FAU and the University of Technology Nuremberg. **Citizens, building occupants and local NGOs** are involved to ensure that the solutions developed are practical, user-oriented and socially inclusive.

Through focus groups, co-creation workshops, testing activities and dedicated engagement events linked to the HPP-Tool, the RAZE-Renovation approach and the One-Stop-Shop concept, **ZEROit creates a stakeholder ecosystem that strengthens local ownership while also supporting future replication.**

Where
decarbonisation,
data and inclusion
come together

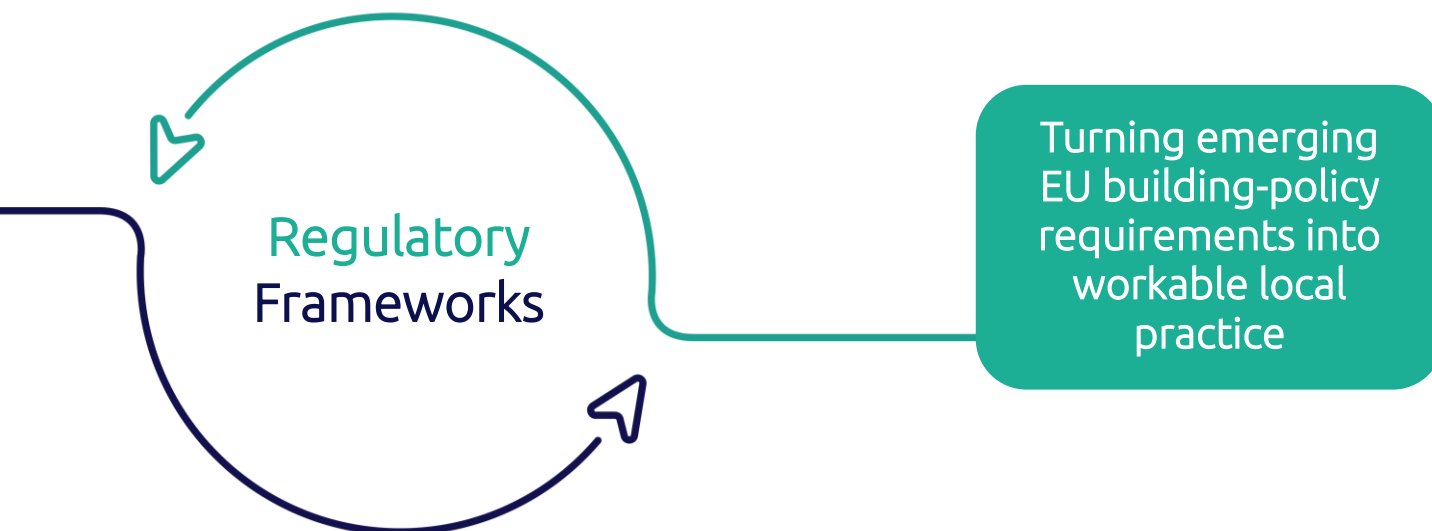
Digital,
green and
just aspects
of the IA

ZEROit brings together the digital, green and just dimensions of the urban transition in one integrated approach to decarbonising buildings. **Its green ambition is clear: to accelerate emission reductions from the municipal building stock by enabling faster, more effective and more scalable renovation pathways.** Through the HPP-Tool and the RAZE-Renovation approach, the project supports de-fossilisation, energy-efficiency gains, the use of on-site renewable energy and improved grid flexibility, particularly in the many smaller and medium-sized buildings that are often hardest to renovate through conventional approaches.

The digital dimension is not an add-on, but the backbone of the solution. ZEROit develops a city-wide planning environment that brings together fragmented building and energy data through GIS, APIs and advanced modelling tools. This makes it possible to compare renovation scenarios, assess costs and impacts, and support faster, more informed decision-making across the whole portfolio rather than building by building. In this way, digitalisation directly increases the city's ability to plan strategically under limited budgets and staff capacity.

The just dimension lies in who benefits and who gains capacity through the project. ZEROit strengthens the skills of municipal staff, the local construction sector and portfolio owners, while also improving access to renovation planning through the One-Stop-Shop concept. Citizens and occupants are involved in shaping and testing solutions, and the project specifically seeks to support more inclusive future uptake, including for vulnerable groups and stakeholders linked to social housing. **ZEROit therefore treats the energy transition not only as a technical challenge, but as a question of access, capability and shared benefit.**



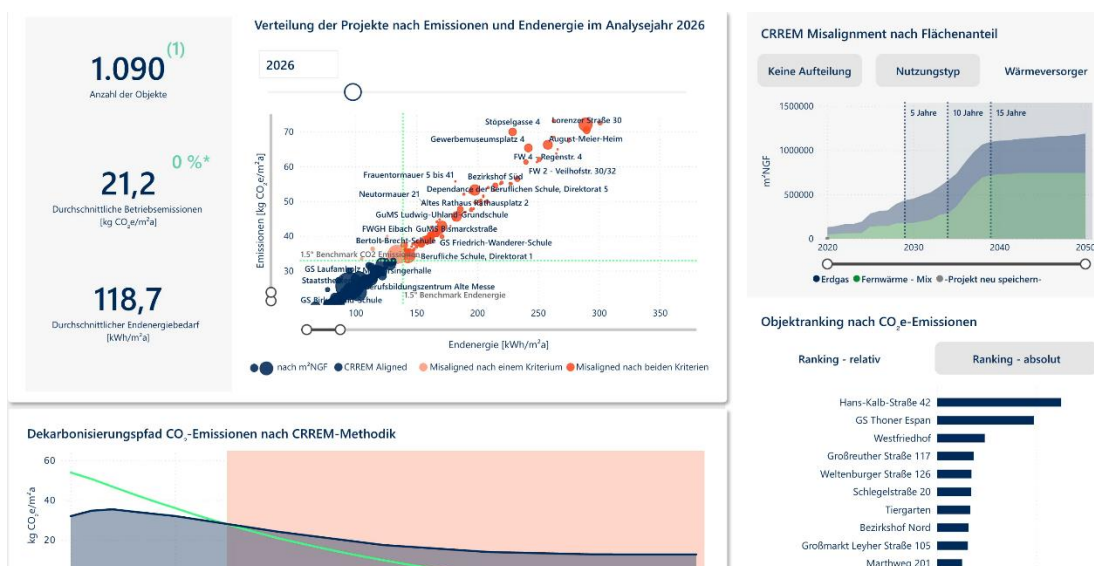


Turning emerging EU building-policy requirements into workable local practice

ZEROit sits at the intersection of municipal practice and evolving European building policy. In particular, the project supports the implementation logic of the recast Energy Performance of Buildings Directive (EPBD), especially the growing importance of One-Stop-Shops and Renovation Passports as enabling mechanisms for faster and more informed renovation. Rather than treating these as abstract regulatory requirements, **ZEROit translates them into practical tools, workflows and advisory capacities that can be tested in a real urban setting.**

A central contribution in this regard is the **development of a dedicated OSS-Tool linked to the project's wider planning environment**. This tool is intended to support future One-Stop-Shop services by giving experts integrated access to building, energy and city-planning data, making renovation advice faster, more coherent and more useful for building owners and portfolio managers. By combining automated analysis, modelling functions and local planning information, the approach can generate outputs resembling first-stage Renovation Passports and help structure more realistic renovation pathways.

The regulatory relevance of ZEROit also lies in its social and market dimension. The project strengthens understanding of the actual needs and barriers faced by stakeholders, including vulnerable groups, while improving access to guidance, training and trial use of digital tools. In this way, **ZEROit does not simply respond to regulatory change — it helps prepare the institutional, advisory and implementation conditions needed to make that change work in practice.**



Combining strong city leadership with collaborative project governance

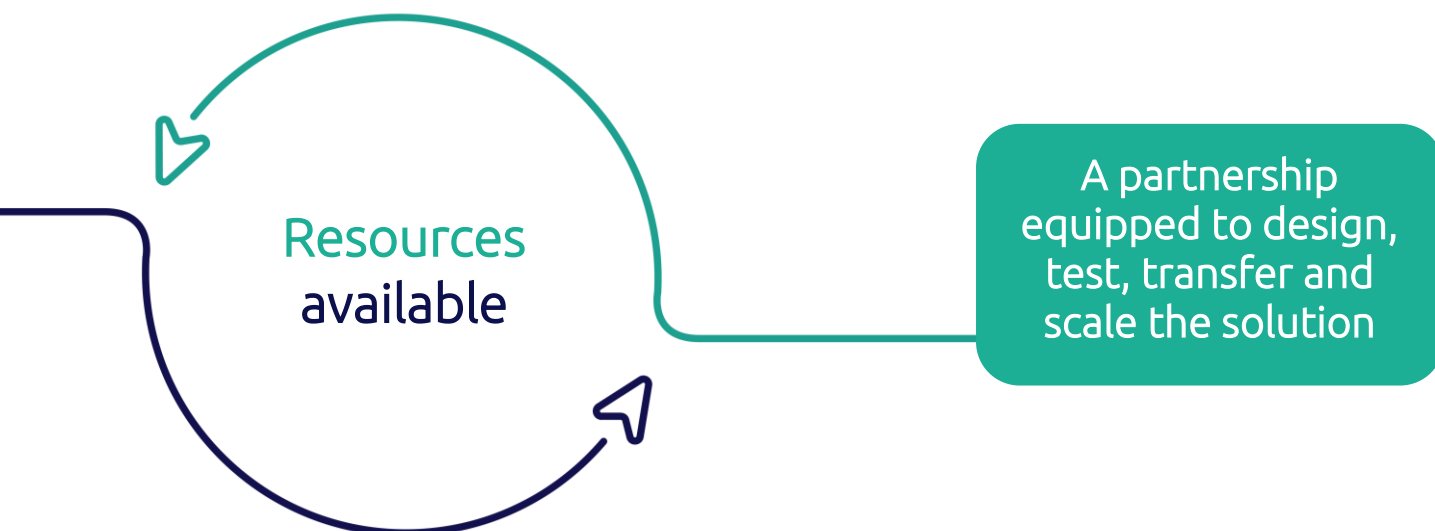
Management and governance of the innovative solution

ZEROit's governance model is designed to ensure that the innovative solution remains firmly anchored in municipal reality while benefiting from strong operational support and specialist expertise. **The City of Nuremberg is not only the Managing Urban Authority, but also the visionary initiator, main client, test user and future owner of the project results.** This gives the city a central role in steering the development of the solution so that it responds directly to the practical and strategic needs of its building portfolio, rather than becoming a stand-alone technical product.

A distinctive feature of ZEROit is the way governance responsibilities are shared. Nuremberg retains full official, administrative and technical responsibility for the project, while **EMPIRICA provides operational project management as a neutral facilitator across the partnership.** This arrangement allows the city to focus on its role as client, validator and future user of the HPP-Tool and the renovation approach, while benefiting from continuous coordination, progress monitoring and structured support across the work plan. In this way, governance combines municipal ownership with collaborative delivery.

The innovative solution itself is designed for long-term integration into the city's planning and decision-making structures. The HPP-Tool is expected to become Nuremberg's central platform for portfolio and refurbishment planning, supporting future investment decisions and renovation pathways across the municipal stock. At the same time, the project's collaborative formats bring municipal departments, construction stakeholders, portfolio owners and citizens into the process, creating a governance model that strengthens institutional capacity while supporting Nuremberg's pathway towards climate neutrality.





ZEROit is supported by a strong combination of municipal ownership, specialist expertise and financial resources. At its centre stands **the City of Nuremberg**, which provides the building portfolio, institutional leadership and the practical testing ground for the innovative solution. The city's municipal energy-management expertise is complemented by a carefully structured delivery partnership: **EMPIRICA** contributes research, design methods, evaluation, facilitation and operational project management; **CAALA GmbH** provides the software base and modelling expertise needed to develop the Holistic Portfolio Planning Tool; **LIST Eco GmbH & Co. KG** adds market-relevant data, sustainability analysis and planning services for large-scale renovation; and **Urban Lab gUG** brings expertise in citizen engagement, communication and co-creation. Together, these partners provide the technical, organisational and societal capacities needed to develop, test and validate ZEROit in real conditions.

The project's resources are further strengthened by its transfer dimension. **Braşov Municipality, the Municipality of Waalwijk and Gabrovo Municipality** contribute external perspectives, local testing capacity and future replication potential, helping ensure that the solution is not only effective in Nuremberg, but also relevant to other European urban contexts. **This broad partnership reflects the project's quadruple-helix approach and gives ZEROit a strong foundation for both delivery and transfer.**

Financially, ZEROit is backed by a total budget of €6,248,080, with 80% ERDF co-financing. This gives the partnership the capacity to invest in tool development, pilot renovations, stakeholder engagement, capacity building and transfer activities, while ensuring that each project partner has a defined role and resource base within the overall implementation structure.

KEY FACTS

- ▶ Time frame: 42 Months, October '25 – March '29
- ▶ Total (€): 6,248,080
- ▶ Funding: European Urban Initiative



PARTNERS



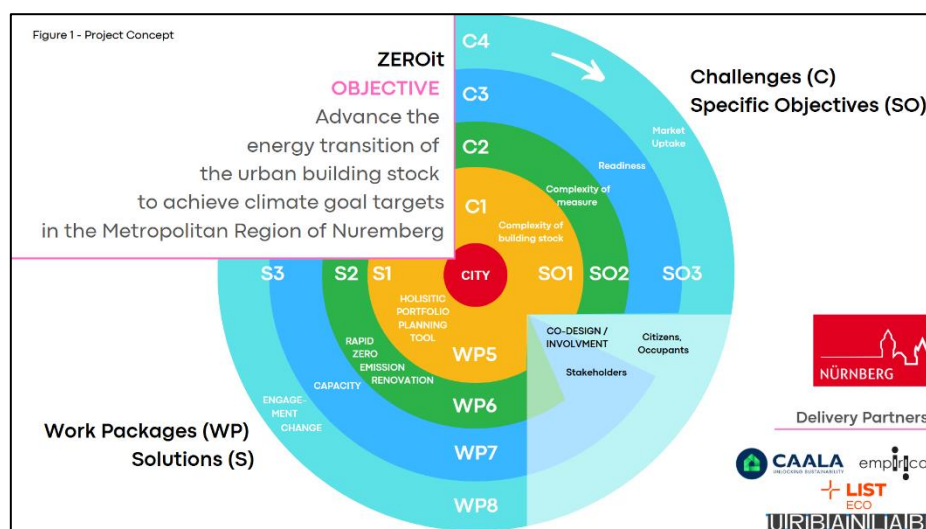
Embedding the solution in the city's long-term planning and delivery model

Sustainability of the innovative solution at the MUA

ZEROit is designed as a long-term strategic solution for the City of Nuremberg, not as a stand-alone pilot. **Its sustainability at the MUA rests on a clear principle: the project's core outputs are meant to remain useful, operational and institutionally embedded after the funded period ends.** Most importantly, the HPP-Tool is intended to become Nuremberg's central platform for planning, prioritising and managing renovations across the municipal building stock, supporting future investment decisions and helping the city continue its shift toward portfolio-based decarbonisation. Nuremberg intends to continue using the tool after the project, building on the database, workflows and experience created during implementation.

Sustainability is further strengthened through institutional integration, market uptake and capacity building. Municipal staff, local stakeholders and the construction sector will gain practical skills and routines that remain valuable beyond the project itself. The renovation concepts tested through ZEROit are explicitly designed to avoid stranded investments and to prepare for future upgrades across the building lifecycle. The project also leaves behind guidance, templates and practical experience for engagement, framework contracts and future advisory use, helping the city move from one-off experimentation to repeatable practice.

Finally, sustainability at the MUA is linked to scale. **Nuremberg sees ZEROit as a basis for extending the approach far beyond the pilot phase, including future uptake of RAZE-Renovations and wider use of the One-Stop-Shop logic.** In this sense, the project's long-term value lies not only in what it delivers during implementation, but in how it reshapes the city's future capacity to act.





As with any ambitious innovation project, ZEROit involves a set of risks closely linked to the complexity of the challenge it is trying to solve. **The most immediate risks concern data integration, renovation delivery capacity and stakeholder uptake.** The HPP-Tool depends on the availability, quality and interoperability of building and energy data from multiple municipal and external sources. At the same time, the project operates in a context of limited local delivery capacity, where construction-sector readiness, procurement timelines and the coordination of integrated renovation measures across different buildings and actors may all affect progress. These are not side issues, but structural realities of the transition context in which ZEROit is being implemented.

A second set of risks concerns acceptance, usability and long-term adoption. For ZEROit to create lasting value, its tools and approaches must be understood, trusted and used not only by municipal staff, but also by portfolio owners, construction stakeholders and citizens. There is also a risk that the HPP-Tool could become too shaped by one local context if it is not tested against wider needs and expectations. Here, the Transfer Cities play an important role: by providing external feedback, testing relevance in their own contexts and helping assess how practical and adaptable the tool really is, they strengthen its future usability and transfer potential. In the longer term, they may also become future users of parts of the solution.

ZEROit addresses all stated risks through an iterative and collaborative implementation model. Continuous stakeholder engagement, agile testing, regular evaluation, capacity-building activities, co-creation workshops and pilot applications are all built into the project in order to improve local skills, strengthen user acceptance and reduce implementation barriers over time. In this sense, risk is treated not as a side issue, but as an integral part of the innovation process.



Klemen Strmšnik with support of the ZEROit team
May 2026

