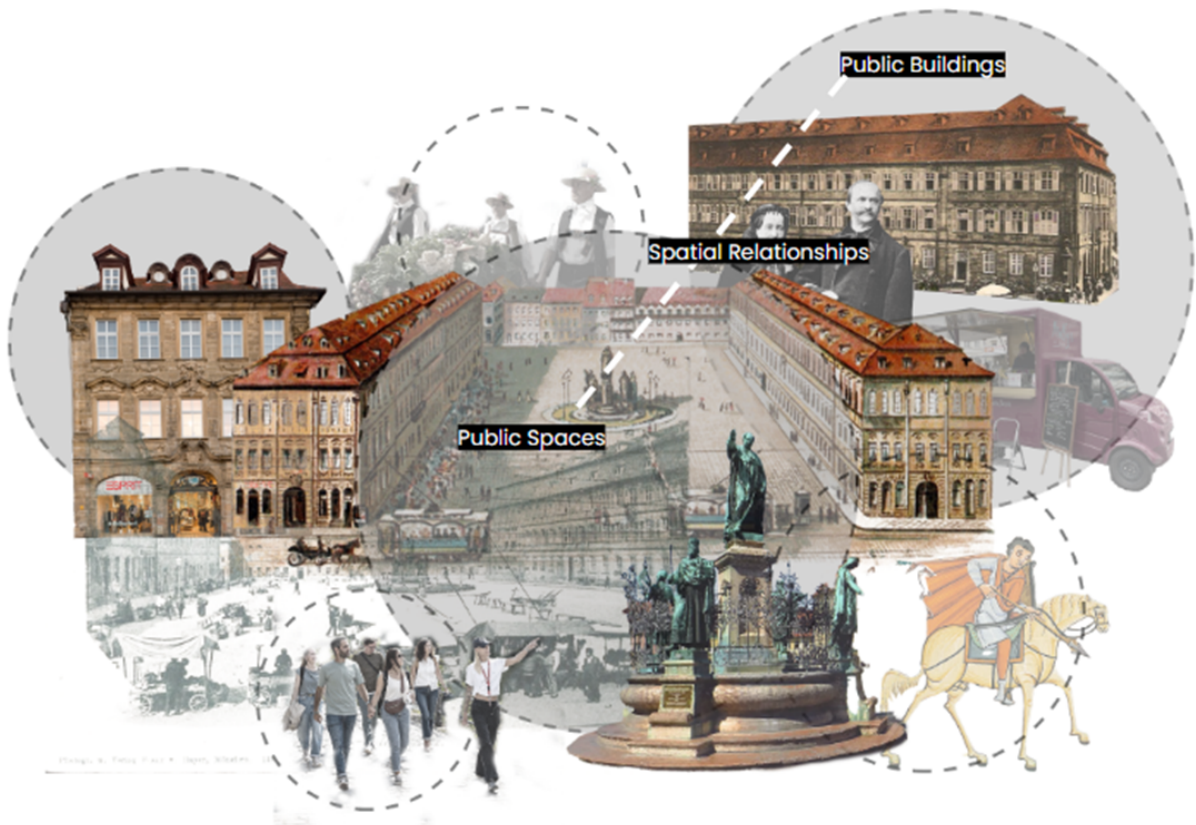




Final Report

THE ISLAND DISTRICT

Go2Change Annual Training School 2026

Project Team:

Arezu Feizolahbeigi: Postdoc, Italian Institute of Technology, Italy

Bhuvana Nanaiah: PhD Candidate at the Department of Architecture and Planning, Norwegian University of Science and Technology, Norway

İrem Baz Sözüer: PhD Candidate and Research Assistant at AGU Faculty of Architecture, Turkey

Niloofar Tabebordbar: Master's Student in Architecture for Sustainability, Politecnico di Torino, Italy

Rana Tootoonchi: PhD Candidate, Digital Technologies in Heritage Conservation, University of Bamberg, Germany

Rachel Smith, PhD: Archeologist and Technology Service Line Lead at Chronicle Heritage, USA

Sevim Sezi Karayazi, PhD: Asst Prof in Architecture, specializing in Historical Urban Planning and Visitor Behavior at Çanakkale Onsekiz Mart University, Turkey

Table of Contents

1. Introduction.....	4
2. Introduction to the Case Area.....	5
3. Methodology.....	8
4. Climate Risk Statement.....	10
5. Solutions to Climate Change Impacts on the Case Area.....	15
6. Pathway to Operationalisation of the Solutions.....	19
7. Conclusion and Summary.....	26
8. Reference.....	27

1. Introduction

As per the CORDEX projection model, the maximum of maximum temperature for the RCP 8.5 scenario is predicted to be 31.5, 32.4, and 35.3 degrees in short, mid-term, and long-term, respectively, in Bamberg (Copernicus Climate Change Service, 2024). This trend is already becoming visible in key urban spaces such as the New City Hall and Maximiliansplatz, which bring together a wide range of stakeholders, from decision-makers like politicians and municipal leaders to local shopkeepers, workers, and residents. Furthermore, these spaces play a central role in the island district's administrative, civic, and commercial life. However, their current design makes them particularly vulnerable to rising temperatures. Large open surfaces, heat-retaining materials like paving, and a lack of blue-green infrastructure contribute to the formation of urban heat zones, especially around the New City Hall.

These conditions have both physical and social consequences. On one hand, increased heat can lead to material stress, affecting building façades and structural elements. On the other, it discourages people from spending time in the area, reinforcing an already limited use of the space. As heat stress intensifies during the summer months, people's emotional connection to the place weakens, along with their sense of care and responsibility toward it.

In response, our proposal focuses on targeted retrofitting and maintenance strategies for both the building façade and the surrounding public space. These are further distinguished into two categories: material-based and nature-based. One key intervention, the Urban Mistifier, has been developed in detail to demonstrate how such solutions can be tested and scaled across other heat-affected areas within the island district.

The New City Hall serves as an ideal test site due to its unique combination of functions, spatial conditions, and diverse user groups. This makes it well-suited for evaluating both the technical performance of microclimate interventions and their acceptance among users. Insights gained here can inform the adaptation and expansion of similar strategies across the district.

2. Introduction to the Case Area

The island area of Bamberg is located between the garden district and the hills district, making it a central location in the city. Therefore, it is one of the most visited areas. In the context of the increasing heat, the urban fabric plays a crucial role in the perceived risk based on its morphological aspects (like built mass and the distribution of open space), material, as well as the presence/absence of shading elements.

As shown in Figure 1, the urban fabric in the protected part of the Island district is dense, limiting the availability of public open space. Given that most of the open spaces in the district are privately used and located within building areas, little space remains for public use. As shown in Figure 4, we can identify four publicly accessible open spaces, and each of them serves a different purpose depending on the nearby building functions. From a historical point of view, Maximilianplatz, which is located in this district, plays a significant role since it acts as a node and important spot alongside the main path that connects 3 different zones of Bamberg. It was the site of the St. Martin church and its cemetery, dating back to at least the 8th century. In the early 19th century (1802–1805), the church was demolished, and the area was transformed into an open square. In the second half of the 20th century, an underground parking garage was constructed beneath the square, leading to its redesign; during excavations in 1969, the remains of the former church were uncovered and subsequently removed¹. Today, the potential of this plaza is ignored in the current situation.



Figure 1:

Island area urban fabric
areas and Hills



Figure 2:

Free Spaces within urban fabric



Figure 3:

Location between Garden

¹ City of Bamberg, Urban Planning Office. (1999). *Gestaltung des Maximiliansplatzes: Machbarkeitsstudie*. Bamberg.

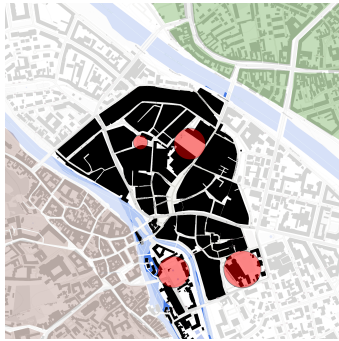


Figure 3:

Public open spaces

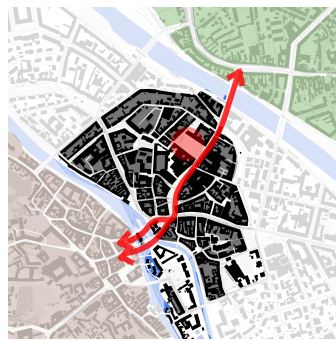


Figure 4:

Maximiliansplatz, as a node

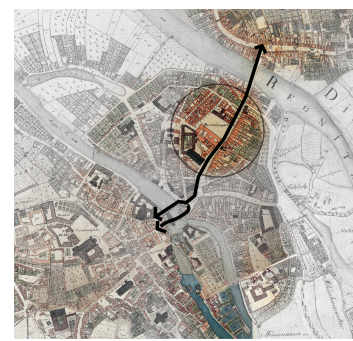


Figure 5:

Historic importance of area

The urban heat island effect is particularly evident around the New City Hall and Maximiliansplatz, which serve as an important space for stakeholders in Bamberg with strong influence, such as the mayor and politicians, as well as those with high interest, including local shopkeepers, citizens, and people employed in the area. Moreover, the landscape serves multiple attributes and is situated in a key administrative, civic, and commercial function within the island district.

The main attributes selected for this analysis are the public buildings, public spaces, and the relationship between them as they shape access, visibility, and economic activity. The public spaces act as the main area of movement and social activities. The public buildings that surround the public space define the edges of the square by their functions, façades, and physical forms. The relationship of these two elements defines the overall performance, user experience, spatial qualities, and climate responsiveness.

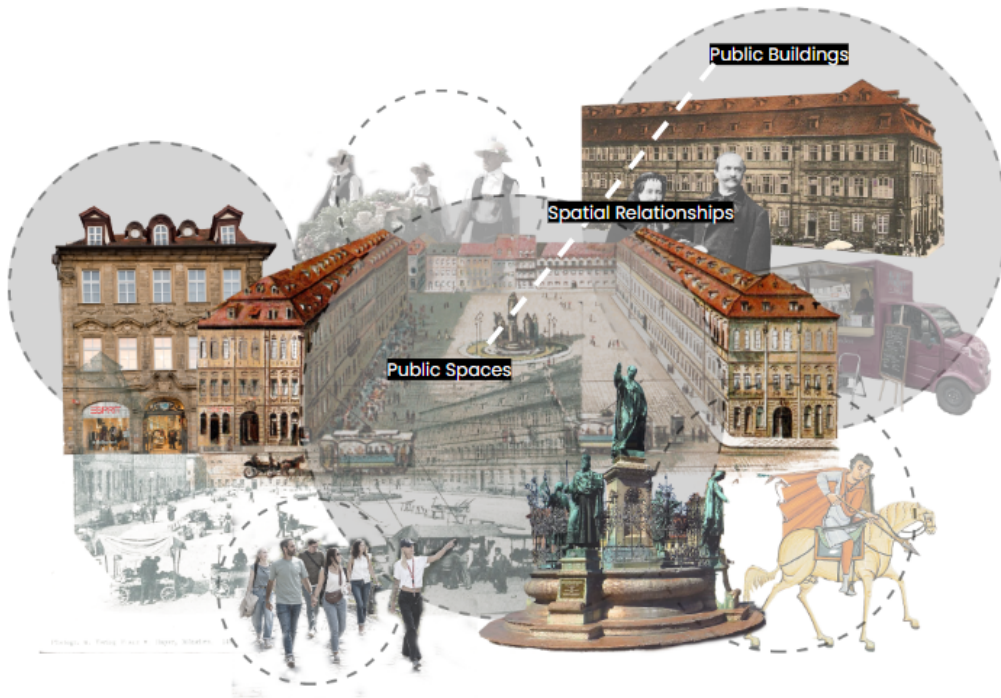


Figure 6: Attributes of Bamberg.

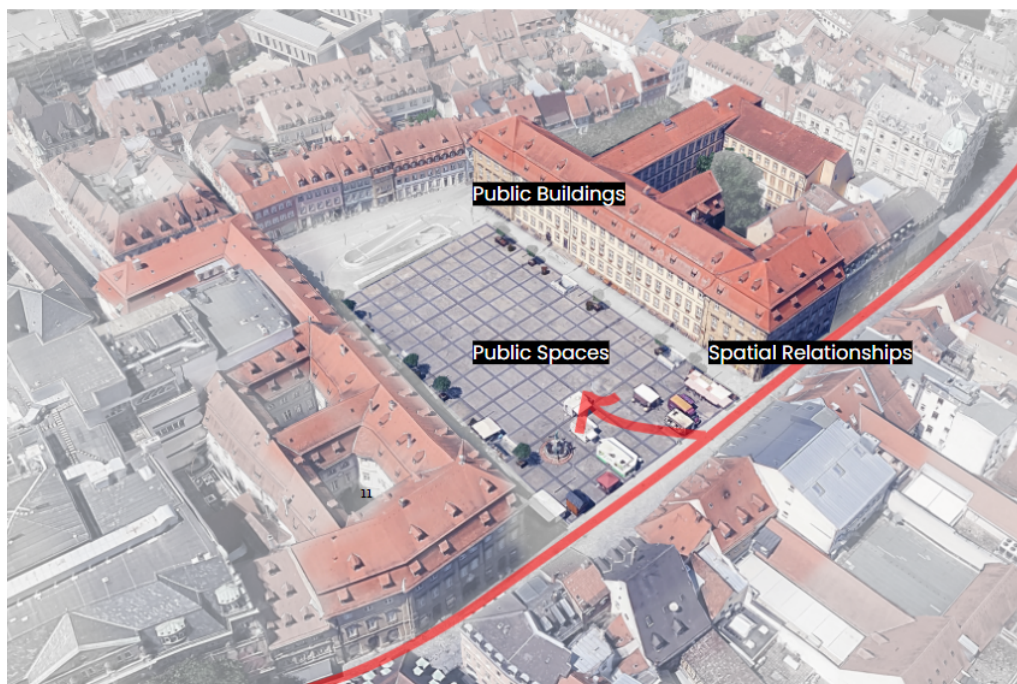


Figure 7: Attributes of Bamberg.

3. Methodology

The development of this proposal follows a multi-scale and interdisciplinary methodology, combining climate analysis, heritage conservation principles, and sustainability strategies. It focuses on the interaction between the public urban space of Maximiliansplatz and the New City Hall Bamberg. The approach is structured to ensure that mitigation/adaptation measures are technically effective, suitable for the context, and compatible with the historic urban landscape of Bamberg. These methods were chosen based on the previous experiences of the project team, as well as the possibility of incorporating the methods introduced in the lectures during the training school.

Historic urban landscape analysis: This included a focused analysis that considers key attributes and values linked to the Island District, to identify the key areas with maximum impact. This was further delimited to the urban landscape surrounding the New City Hall, particularly, which includes:

- **Maxplatz** as a large plaza, paved with stone, with limited vegetation, which is exposed to the sun
- **The new City Hall** as a historic administrative building with heritage values

Local Climate Risk and Sensitivity Assessment: A targeted assessment was conducted based on:

- Hazard: increasing temperatures and heat stress
- Exposure: high pedestrian density, especially during peak tourist hours, south-west direction of the surfaces
- Sensitivity, such as stone pavements (heat storage and radiation), stone facades of the New City Hall, lack of airflow.

Multi-Scale Strategy: Building + Plaza: The proposal combines building and urban level strategies. On a building scale, **Building Scale (New City Hall)**, the team discussed the **possibility of incorporating** Minimal and reversible interventions, for example, Hidden PV on non-visible roof areas, Envelope improvements (internal, non-invasive). However, due to the lack of data and time constraints to propose well-founded technical interventions, it was decided that the team would focus on the **Urban Scale (Maxplatz+New City Hall) in the assignment.**

Synergistic Integration of PV and Nbs1: In accordance with the lectures from trainers, the team also discussed the integration of PV and Nbs based on the lectures provided. The focus was to ensure maximum performance without compromising heritage value.

- Energy generation → building level (low visibility)
- Cooling and climate adaptation → plaza level (high impact)

Application of Conservation and Energy Framework: All interventions are evaluated according to EN 16883:2017. Each measure is assessed based on:

- Visual impact on the historic square
- National and regional rules for conservation and intervention in world heritage sites
- Material compatibility with the New City Hall and the urban landscape of Maxplatz

Feasibility and Governance Approach: The proposal assumes the Municipality (City of Bamberg) as the main actor. Moreover, it prescribes public funding for implementation and maintenance. The solutions are also scalable and modular, reducing long-term costs.

Monitoring and Adaptive Management: If implemented, we also recommend monitoring the effectiveness of the solutions to mitigate risk via sensors installed in the plaza and building, and adjustment of systems (e.g., shading, misting intensity)

4. Climate Risk Statement

Statement:

The Island District is experiencing increasing exposure to climate-related risks, driven by rising temperatures and growing atmospheric instability across Central Europe. Regional climate projections from CORDEX (Figure 8) under the high-emission scenario RCP 8.5 indicate a marked escalation in maximum temperatures for Bamberg, reaching approximately 31.5°C in the short term, 32.4°C in the mid-term, and up to 35.3°C in the long term (Gutiérrez, 2024). Importantly, these projections reflect not only gradual warming but also increasing variability and extremity in temperature patterns, which are more consequential for urban environments than changes in mean temperature alone. One specific area impacted by the climate risk is the historic urban landscape of the New City Hall, which represents attributes related to “Public Buildings”, “Urban Space”, and “Spatial relationships”. This project, therefore, aims to mitigate the risks related to increasing heat in the world heritage site by proposing solutions that can be tested around the New City Hall. This in turn, would support engagement with key stakeholders to further inform its scalability across the Island district.

Supporting Evidence:

Evidence was collected via remote sensing as well as onsite observations.

Multi-criteria analysis using Remote Sensing:

To assess localized thermal dynamics, a Land Surface Temperature (LST) model was developed (Figure 9) using Landsat 8 OLI data spanning 2014–2025 (EROS, 2020). Although the 30-metre spatial resolution limits fine-scale analysis, the dataset enables identification of broader spatial trends and emerging hotspots of thermal stress across the urban landscape.

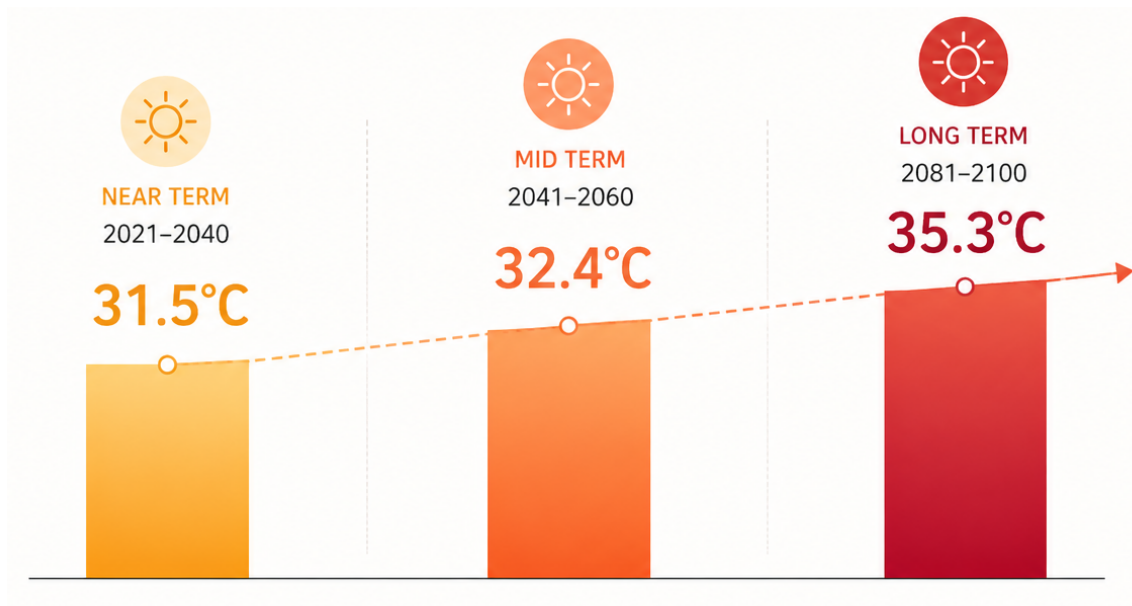


Figure 8: Regional climate projections from CORDEX under the high-emission scenario RCP 8.5

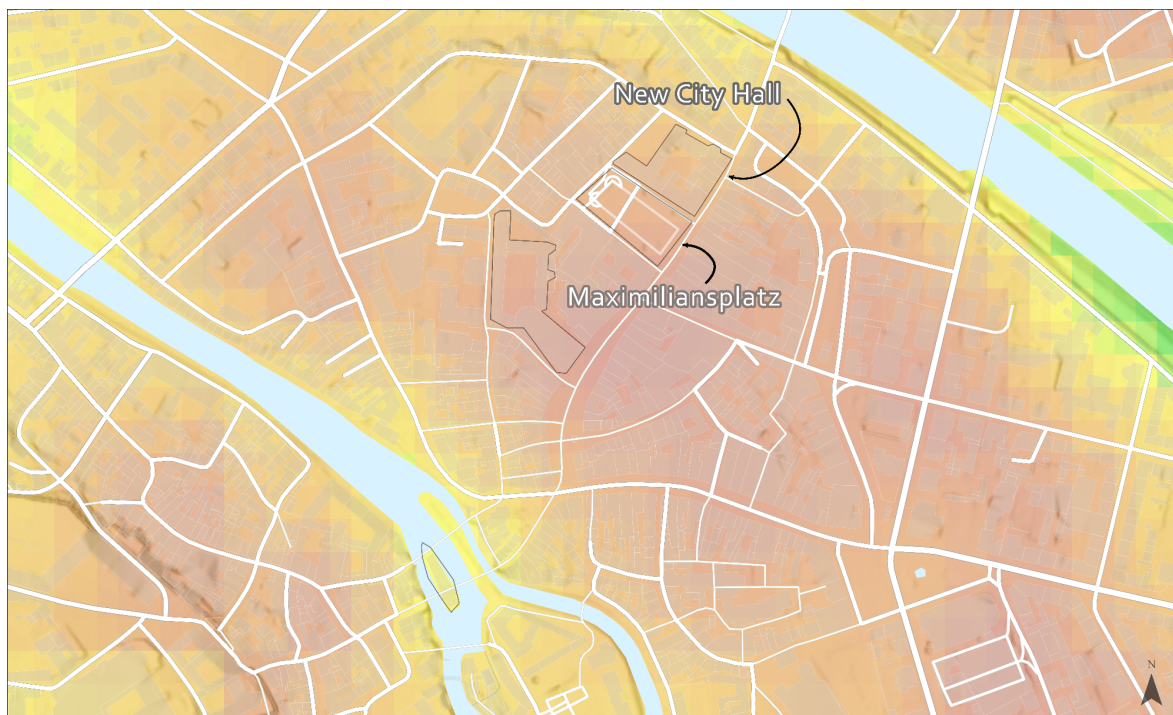


Figure 9: The Land Surface Temperature (LST) model was developed using Landsat 8 OLI data spanning 2014–2025.

Comparative summer analyses reveal a clear intensification and spatial expansion of surface temperatures across the Inselstadt between 2014 and 2025. In 2014, relatively cooler zones persisted, particularly in southern and river-adjacent areas, producing a discernible thermal

gradient. By 2025, this gradient had largely dissipated, replaced by a more continuous distribution of elevated temperatures throughout the urban core. Notably, the area surrounding Maxplatz and the New City Hall has transitioned from being adjacent to warmer zones to becoming fully embedded within a contiguous field of high surface temperatures. This shift indicates a weakening of localized cooling effects and an increasing dominance of heat accumulation processes.

Recognizing that LST alone cannot fully capture urban climate dynamics, a multi-criteria analysis (MCA) was conducted to integrate additional environmental indicators derived from Landsat data (Figure 10). This approach incorporates Land Surface Temperature (LST), the Normalized Difference Vegetation Index (NDVI), the Normalized Difference Water Index (NDWI), and surface albedo. Together, these variables provide a more comprehensive representation of surface stress by accounting for thermal exposure, vegetation-mediated cooling, moisture availability, and radiative properties.

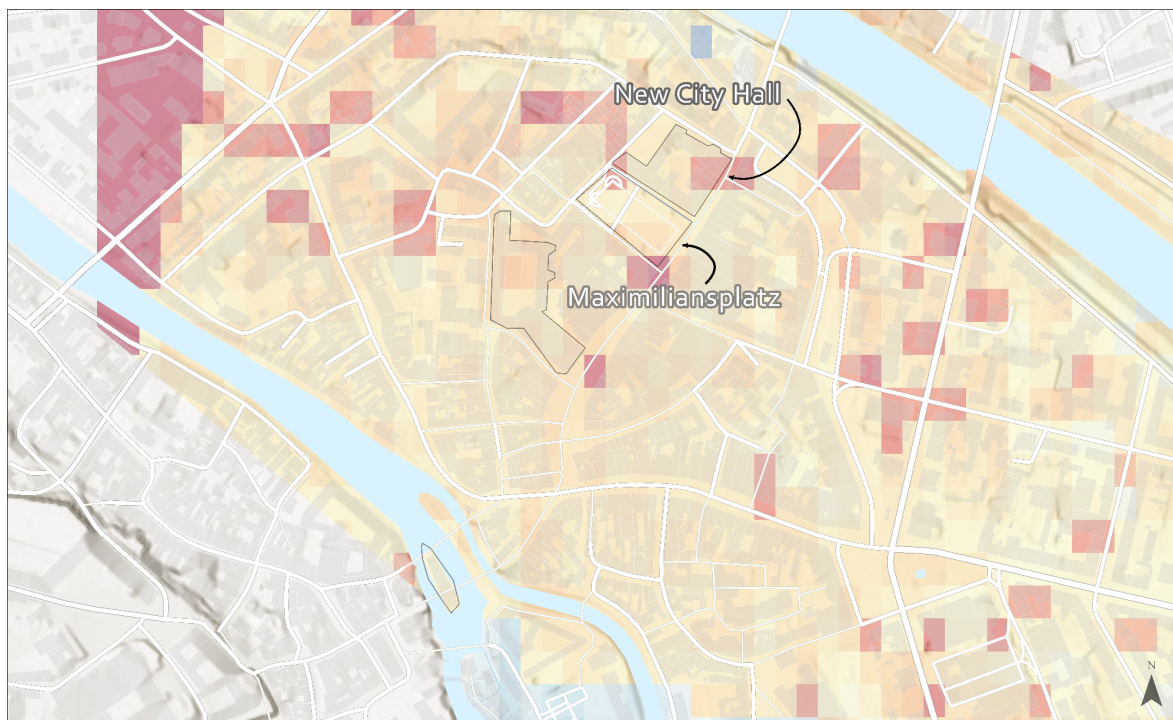


Figure 10: Additional environmental indicators derived from Landsat data.

The MCA results identify a pronounced concentration of summer surface stress immediately south of Maxplatz, likely associated with extensive paving and high pedestrian activity. Maxplatz itself lies directly adjacent to this hotspot, underscoring its strategic importance as a site for targeted mitigation interventions. In contrast, winter analysis indicates relatively stable

thermal conditions within the historic core, with greater variability observed toward the urban periphery. This seasonal divergence suggests that, although the area does not constitute a winter stress hotspot, it remains a critical location for addressing summer-specific thermal exposure, particularly given its role as a highly frequented public space.

Temperature variability also generates a suite of secondary, interrelated hazards. These include intensified heat stress and urban heat island effects (Kabisch et al., 2023), increased humidity and moisture retention (Coffel et al., 2018), more frequent drought–flood alternation events (Tabari, 2020), and amplified freeze–thaw cycles during transitional seasons (Leduc & Logan, 2025). Collectively, these processes reflect a compound risk regime driven by climatic instability rather than isolated environmental stressors.

The Island District is particularly sensitive to these dynamics due to its location between branches of the Regnitz River, which enhances localized microclimatic effects, including elevated humidity and thermal retention (Xu et al., 2022). This geographic configuration intensifies the interaction between atmospheric processes and the built environment, amplifying exposure to climate-related stressors.

These climatic pressures have direct and cumulative implications for historic materials and structures. Repeated thermal cycling induces expansion and contraction, resulting in micro-cracking and progressive surface degradation, particularly in porous materials such as stone, plaster, and timber. Concurrently, fluctuations in moisture promote biological growth, efflorescence, and material decay (Gillich, A). In dense urban areas surrounding key landmarks such as the New City Hall and Maxplatz, the combination of limited vegetation and extensive impervious surfaces exacerbates heat accumulation, thereby intensifying thermal stress on both buildings and public space.

Taken together, these processes constitute a cumulative and escalating risk trajectory. The combined LST and MCA results demonstrate a transition from a spatially differentiated thermal landscape in 2014 to a more homogenized and elevated heat regime by 2025. As a result, the New City Hall and Maxplatz are increasingly situated within a continuous zone of summer heat exposure. This convergence of interacting climate pressures progressively undermines material integrity, increases maintenance demands, and ultimately threatens the long-term Outstanding Universal Value (OUV) of the Island District and Bamberg as a whole.

On-site observations:

With proper maintenance, the square and the surrounding buildings currently don't pose serious impacts related to climate change conditions. The present damages (as identified by the project group) can be listed as follows:

- Minor superficial degradation and peeling of the coating material: Due to the humidity, extreme heat, and freeze-thaw cycles.
- Cracks and degradation of the stone material of the pool: due to the freeze-thaw cycles.
- Black crust on stone materials on facade and statues: due to the combined effect of humidity and CO₂ arising from the presence of the underground parking.
- Degradation of the historic wooden materials: due to the passage of time and environmental conditions.

5. Solutions to Climate Change Impacts on the Case Area

Temperature fluctuations mainly damage plaster and stone through thermal expansion and contraction, the freeze-thaw cycle, and moisture movement. Therefore, effective adaptation should focus on risk mitigation.

Risk Mitigation:

Considering the on-site observation of the impact of the temperature increase on the site and the site specifications, a three-step risk mitigation strategy is suggested, including:

5.1 Material-Based

5.1.1 Reduce temperature stresses

In this method, layers of Bio-based limewash coatings are applied on the masonry facades to reduce heat stress by absorption and increase solar radiation reflection. This method can reduce thermal fluxes in summer by up to 134 times (Barrera et al., 2014). Additionally, this method is quite beneficial to mitigate freeze-thaw risks in cold seasons.



Figures: Sample images of bio-based lime wash (Source: <https://tinyurl.com/3s7hmj4t>)

5.1.2 Controlling moisture:

Use of breathable plaster (e.g. lime-based) to allow evaporation (Bowler et.al.2010).

5.1.3 Continuous monitoring and maintenance

Early repair of cracks and improvement of details around joints, windows, and ledges using compatible mortars to prevent water ingress.

This mitigation strategy is highly compatible with masonry materials; it is more flexible under heat, has high solar reflectivity, acts as a breathable, renewable protective layer against humidity, heat, and UV, and is easy to reapply without damaging the original material. It is reversible and demands minimal intervention. Moreover, it helps to save the heritage values and authenticity of the square and the surrounding historic buildings.

5.2. Nature-Based

Large mobile canopy trees, which combine shade-providing trees, climate-resilient species compatible with the European climatic conditions, with low-impact planting systems, are suggested to be introduced to the square (Figure 11).

This mitigation method enhances cooling surfaces on the facades, buffers temperature swings, regulates moisture, and reduces reflected heat onto façades. Moreover, the solution demands minimal interventions to the historic buildings and the square fabric and respects the square's heritage values and character.



Figure 11: Large mobile canopy trees proposal, AI-generated image.

5.3 Nature+ Well-being-Based Island Mistifier

The Island Mistifier is a misting and cooling station that will be placed in Maxmillianplatz. It helps reduce heat stress on users, as well as improves the microclimate, through evaporative cooling. This, in turn, would reduce the need for maintenance issues arising from high heat in surrounding public buildings. Misting stations have already been incorporated in other heritage cities that face similar heat stress, such as Rome and Ancona in Italy (Black-Ingersoll *et al.*, 2022).

The mistifier is designed as a cylindrical seating space with a concave roof for collecting rainwater and harvesting solar energy. The seating space doubles as a water storage. The roof of the mistifier is designed at an angle of 30 degrees to collect rainwater that would be fed into the storage tank. In case of long dry spells, the water can also be collected via a reservoir along the River Regnitz, which is located close to our site. The misting is activated by sensors, which would be triggered based on temperature, relative humidity, and the presence of users in the seating area. The more efficient scenario to trigger the misting must be modelled in the future, along with the duration, in order to balance between water consumption and benefits. Moreover, we currently propose 1 unit for testing purposes, but recommend multiple units in the future for maximum benefits. The cost-benefit analysis, the optimal placement of heritage buildings, and the optimization of the number of units must be performed in the future. To avoid potential consequences of increased humidity on the building facade, we further propose a dry pressure system, which has fewer consequences on humidity (Figure 12).

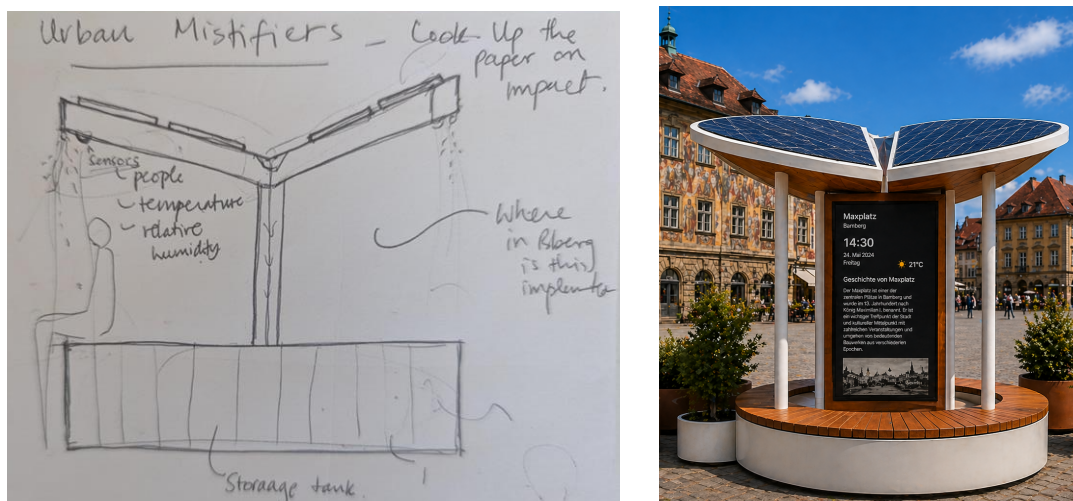


Figure 12: Initial Sketch by the group (left) and AI-generated image of the concept (right).

Analysis of the mistifier:

1. Protection of Heritage Attributes by reducing maintenance frequency: The improvement of microclimatic conditions would reduce the material degradation of the facade around Maximilianplatz, thus reducing the need for structural maintenance. In addition to heat mitigation, it also contributes to the following social wellbeing uses all year round, by serving as a place of rest, relaxation, and communication due to the shade.
2. Reduce maximum urban canyon air temperature (up to 17.5 °C): When implemented on an urban or district scale, the mistifier, along with other solutions (such as vegetation), can also reduce urban canyon air temperature by up to 17.5 degrees (Huang *et al.*, 2025). The benefits, therefore, would not be limited to Maximilianplatz but would extend to the whole district. An optimization of location and design type needs to be performed in the next step.
3. Social Well-being Benefits: The mistifier can reduce skin temperature by up to 0.53 degrees, thus reducing the possibility of severe health impacts on users during high heat stress (Huang *et al.*, 2025). Additionally, the mistifier also comes with seating, which can be used all year round. This could also benefit local vendors and existing food trucks in the landscape, as there is currently a lack of seating space.

6. Pathway to Operationalisation of the Solutions

In this section, the operationalization and expansion of one solution, the Island Mistifier, are examined. The solution is initially proposed to be tested in the plaza in order to assess user feedback and identify potential local improvements. This is followed by district-level computer simulations to evaluate its potential impact on urban canopy air temperature. Through this process, the optimal number and placement of the units can be determined. This process consists of three phases: Phase 1 “Feasibility, Study and Design”, Phase 2 “Implementation”, and Phase 3 “Maintain and Monitor”.

6.1. Stakeholder mapping and identification of key roles in implementation

In Phase 1, a diverse set of stakeholders collaboratively shapes the project from the outset. Municipal and administrative groups play a central role in coordination and approval processes, while architects and urban planners contribute to design development. Infrastructure service providers ensure technical feasibility. At the same time, residents and broader urban communities contribute local knowledge and user perspectives. Event organizers and local market actors provide insights into spatial use and economic activities. Academic actors, including students and funded researchers, support the process through research, data collection, and analytical input. This multi-actor structure ensures that the project is grounded in both technical feasibility and social relevance.

Phase 2 focuses on implementation, where roles become more operational. Contractors are responsible for construction and installation, while infrastructure providers coordinate technical systems such as water and energy. Municipal staff oversee implementation and ensure alignment with regulations. Local stakeholders, including residents, market actors, and event organizers, remain involved as users and observers of the intervention. Academic contributors continue to support monitoring and documentation processes.

In Phase 3, responsibilities shift toward long-term operation and governance. Urban services manage maintenance, cleanliness, and event organization. Regional and governmental bodies support regulatory processes and funding mechanisms, ensuring continuity and scalability. Advocates represent community interests and contribute to conflict resolution and inclusive decision-making. Emergency services and volunteer groups play a key role in safety and preparedness, thereby strengthening the intervention's long-term resilience. (Table 1)

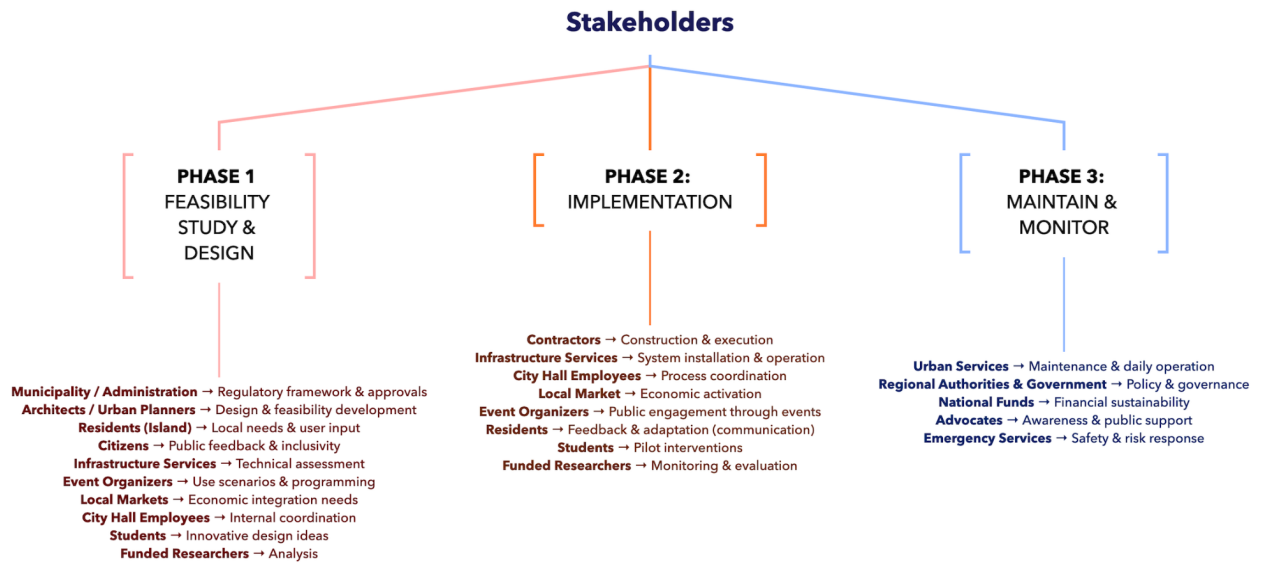


Table 1: Stakeholders required at each phase of the Island Mistifier project.

6.2. Analysis of the Bamberg governance system and the World Heritage management framework

In order to implement the proposed urban climate intervention, the Island Mistifier, within a World Heritage context, it is essential to distinguish between governance and management. Governance refers to the multi-layered system of regulations, processes, and institutional relationships through which decisions are shaped, whereas management concerns the practical execution of these decisions. Given that Bamberg is a protected historic environment, the governance structure influencing the design and implementation of the Mistifier operates across four interconnected regulatory levels.

At the international level, UNESCO frameworks apply, as Bamberg has been inscribed as a World Heritage Site since 1993. The primary requirement at this level is the protection of the site's OUV. This imposes strict design and material constraints: the intervention must preserve key visual elements such as skylines and historic sightlines, while all materials must be compatible with the existing urban fabric in terms of texture, color, and form. Additionally, integrated systems such as solar PV panels must be designed to minimize visual impact, and both core and buffer zones must be respected.

At the national level, the project must comply with the German legal framework, particularly the Baugesetzbuch (BauGB), which regulates planning procedures, aesthetic integration, safety standards, and permitting processes.

At the regional level, the intervention is subject to the Bavarian Monument Protection Act and oversight by institutions such as the Bavarian Ministry of the Interior for Building and Transport. Approval processes require coordination with regional authorities, including the State Building Office (Staatliches Bauamt) and the District Government (Bezirksregierung) of Upper Franconia.

At the local level, governance is managed by the City of Bamberg, where the World Heritage Office plays a central coordinating role in balancing conservation priorities with urban development needs. The intervention must align with local land-use plans and site-specific conditions. These local conditions introduce additional constraints. The proposed plaza is located above an underground parking structure and is actively used for public events, such as seasonal markets. As a result, the Mistifier must be fully mobile and adaptable. It must also comply with local regulations regarding structural safety, fire safety, transport logistics, and emergency accessibility. Overall, the governance framework demonstrates how multi-scalar regulatory systems directly shape the design, feasibility, and implementation of climate-responsive interventions in heritage contexts.

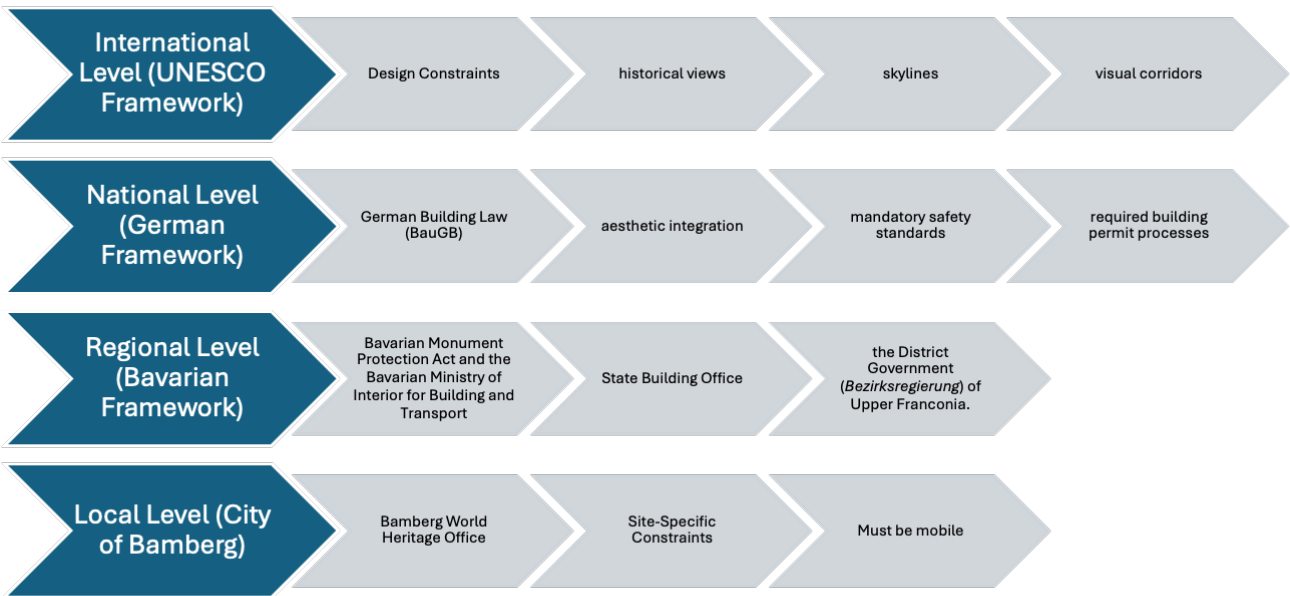


Table 2: Bamberg governance system and the World Heritage management framework.

6.3 Institutional responsibilities and stakeholder roles and Potential funding sources

Securing funding is identified as one of the key challenges of the project; however, several complementary financial sources have been identified within a blended finance framework. At

the regional level, the Bavarian State Government represents the most significant contributor, particularly through the Bavarian Ministry of Interior for Building and Transport, which has historically supported large-scale urban modernization initiatives. This level of funding is expected to cover approximately 30–50% of the total project costs and is accessed through official procurement and funding platforms. At the municipal level, the city administration is envisioned as a key co-investor, contributing direct capital, co-financing, and in-kind support, typically accounting for 10–25% of the overall budget.

At the national scale, complementary funding mechanisms linked to climate action, cultural heritage protection, and energy transition programs can provide an additional 5–15%, particularly targeting energy efficiency measures and nature-based solutions. On the European level, significant opportunities arise through research- and innovation-driven programs such as Horizon Europe and the New European Bauhaus (NEB), which support experimental, demonstrative projects. Depending on the project component, EU funding can range from 20% to 40%, with certain research-oriented activities potentially reaching up to 70% or even full coverage.

Alongside public funding, local and private stakeholders constitute a flexible but strategically important layer of financing. Private donations, tourism-related revenue generation, and visibility-driven investment strategies, such as leveraging the Mistifier intervention to increase attention toward the New City Hall, are expected to contribute approximately 5–15% of the budget, while also enhancing long-term reinvestment potential. In addition, knowledge-based contributions from academic and research institutions, including design, data collection, and analytical work, are considered in-kind inputs valued at 5–15% of the total project scope. Finally, infrastructure and utility providers, particularly in the fields of energy and water, may act as co-investors in smart infrastructure components, contributing an additional 5–20% for targeted system upgrades.

Overall, this blended finance structure combines public, European, municipal, private, and knowledge-based resources to ensure both financial feasibility and long-term sustainability. According to blended finance frameworks, such as those outlined by UNESCO and the World Bank, this approach strategically mobilizes different types of capital to reduce risk, enhance impact, and enable sustainable development outcomes through coordinated investment structures.

6.4 Project procedures and implementation timeline

The project implementation process is structured within this framework to ensure that the proposed funding and governance structure can be effectively translated into practice through a clear and adaptive workflow. It is organized into three continuous phases, each defined by specific procedures, monitoring approaches, and associated risks.

The first phase focuses on feasibility and design, where data is collected through user studies such as questionnaires and on-site interviews in the plaza area. Based on these inputs, design proposals are developed and submitted to the municipality for review and approval. This stage carries risks related to slow administrative procedures, possible disagreements among stakeholders, conflicts between institutions, and the potential loss of key actors during decision-making processes.

The second phase concerns implementation, where the physical construction of the mobile unit is carried out. This requires close coordination with infrastructure providers and contractors, while also addressing site-specific constraints such as the underground parking structure and the coexistence of ongoing urban activities. Key risks at this stage include construction delays, adverse weather conditions, funding shortages, technical problems during execution, unexpected regulatory changes, and possible negative public reactions.

The final phase involves maintenance and monitoring. In this phase, project success is evaluated through both process- and outcome-based criteria. Process monitoring includes tracking progress, organizing intersectoral coordination meetings, and ensuring adherence to timelines. Outcome evaluation relies on sensor-based measurements that assess microclimatic effects such as cooling and shading performance, as well as surveys and observational studies that capture user experience and feedback. Long-term risks in this phase include physical deterioration of the Mistifier system, loss of funding for continued monitoring, regulatory changes, potential conflicts with future urban interventions, and the emergence of new stakeholder groups who may oppose the project.

6.5 Monitoring and evaluation mechanisms

The implementation of the Island Mistifier follows a structured, phased timeline that translates the overall governance, stakeholder, and funding framework into an operational process. The

project is organized into three consecutive phases, each defined by specific procedures, evaluation criteria, and risk conditions (Table 3).

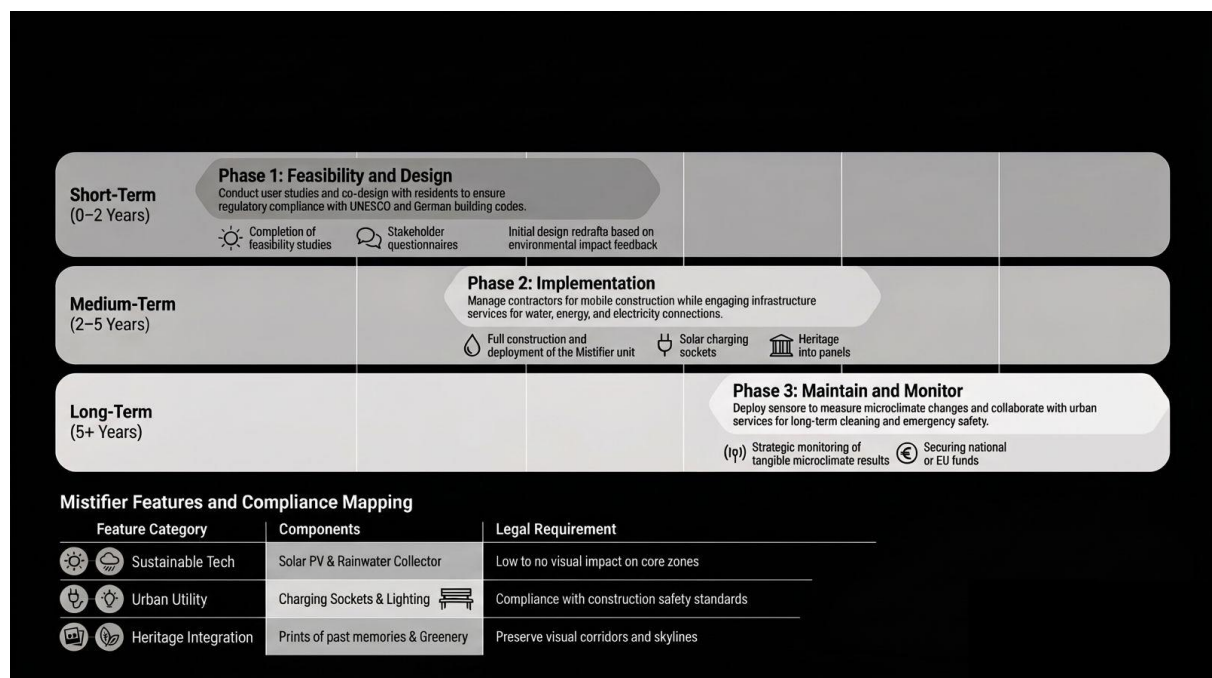


Table 3: Monitoring and evaluation process of the Island Mistifier.

Phase 1 focuses on validating the intervention through empirical input and formal approval processes. User-oriented data collection methods, such as on-site questionnaires and interviews in the plaza, are used to inform early-stage design decisions. The collected findings are translated into design proposals, which are then submitted to municipal authorities for assessment and approval. Key uncertainties at this stage relate to procedural delays within administrative review systems, misalignment between institutional expectations, and potential discontinuity in stakeholder engagement.

Phase 2 concerns the physical realization of the mobile system. Construction activities are carried out in coordination with technical service providers and contractors, while ensuring compatibility with spatial constraints and ongoing urban activities in the intervention area. This includes logistical adaptation to temporary uses of the plaza and integration with surrounding infrastructure systems. Critical risks in this phase include disruptions to the construction schedule, technical execution failures, funding instability, and regulatory adjustments that may affect on-site operations.

The final phase focuses on the long-term performance and adaptability of the system. Monitoring is conducted through a dual framework combining operational tracking and

environmental performance assessment. Process-oriented evaluation includes coordination meetings, progress tracking, and deadline control, while outcome-oriented evaluation is based on sensor-derived environmental data and user response collected through surveys and field observations. Long-term uncertainties include material degradation, continuity of monitoring resources, regulatory changes affecting operation, and shifting stakeholder dynamics within the urban context.

7. Conclusion and Summary

Temperature increase is one of the most impactful climatic factors that is affecting the heritage value, integrity, and authenticity of the Maximilian Square and its surrounding buildings. This work studied the history of the temperature increase in the region and, based on the historical data and some predictions on the future temperature increase in the region, proposed a three-step mitigation strategy to reduce the impacts of this climatic phenomenon on the case study. However, it should be noted that a comprehensive mitigation strategy needs a comprehensive assessment of the cumulative impacts of all climatic hazards. To this aim, a well-equipped monitoring system must be employed in the area, and any mitigation action must be based on the monitoring data.

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