

Achieving climate neutrality involves reducing greenhouse gas emissions from all energy, material, and water streams in various projects. This process, complex due to the need to consider direct and indirect impacts, is guided by four main strategies: **Energy Efficiency**: Reducing energy usage to optimal environmental levels while maintaining economic viability. **Renewable Energy**: Transitioning entirely to renewable and sustainable energy sources. **Cascade Use**: Utilizing waste energy from one process as input for another, optimizing overall energy quality and reducing primary energy demand. **Flexibility**: Implementing energy storage, exchanging energy streams, and managing demand to optimize energy use on larger scales, like in cities or regions. These strategies are integral to Europe's Positive Energy Districts concept, focusing on energy efficiency, renewables, and flexibility. A comprehensive emission assessment in city-wide projects accounts for all greenhouse gases, adhering to standards like NetZeroCities and the Greenhouse Gas Protocol. This holistic approach offers a more effective strategy than focusing solely on carbon intensity.



## ENVIRONMENTAL PERFORMANCE

# *Climate Neutrality & Energy*

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Energy Efficiency, Share of Renewables,  
Energy Flexibility, CO-2 Emissions.

Creating healthy, secure, and sustainable water cycles involves two key aspects: **Responsible Water Management**: This includes the efficient use of drinking water, rainwater, and greywater. For drinking water, the goal is to minimize consumption per person without compromising service levels. Maximizing rainwater use is encouraged, especially where it can replace drinking water, but without harming natural supplies and underground aquifers. Disconnecting rainwater from sewage systems is advised to enhance direct use or replenishment of natural sources. Greywater, from residential or industrial sources, can be recycled or upcycled, with any residual heat extracted for reuse. **Climate Change Adaptation**: This involves implementing green-blue networks and enhancing absorption and buffering capacities to mitigate the impacts of extreme rainfall and drought. Improving the quality of surface water and replenishing groundwater tables is also crucial. An optimization process, involving life cycle analysis and life cycle cost assessments, can determine whether it's more environmentally and economically beneficial to purify water at a community level or at individual buildings.



## ENVIRONMENTAL PERFORMANCE

# *Healthy Secured Water Cycles*

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Drinking water, Wastewater, Climate Adaptation,  
Nature Restoration, Buffering and Infiltration,  
Flood Risk Control, Nature-based Solutions.

Achieving full circularity is complex, involving the careful management of materials, energy, and water use, with a focus on both direct and indirect aspects. Circularity aims to minimize environmental impact and maximize sustainability within the urban metabolism, adhering to the global ecological and spatial carrying capacity. The key strategies include reducing, reusing, and recycling materials, along with urban mining to extract raw materials from used products and infrastructures. Circularity is not just an end in itself but also addresses broader issues like resource scarcity, conservation, and materials independence. To effectively assess the environmental impact of material streams, life cycle analysis and material flow accounting are employed. However, circularity extends beyond environmental impact, targeting other goals like resource conservation and materials independence. Doughnut economics, adopted by cities like Sydney, Berlin, Melbourne, Brussels, and Amsterdam, merges ecological carrying capacity with social responsibility, ensuring a basic level of service and social justice. These combined methods provide an integrated, holistic approach to assessing sustainability, balancing ecological limits with social needs.



## ENVIRONMENTAL PERFORMANCE

# *Circularity & Materials*

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Life Cycle Analysis, Urban Mining,  
Urban Metabolism, Doughnut Economics.

Land use in sustainable development projects focuses on three main aspects: **Location:** This refers to selecting the right site for a project, considering its sustainability. Key factors include the appropriateness of the project for the location, its centrality, and accessibility, especially by sustainable transport modes. **Space Use:** This involves preferring redevelopment of previously used (brown-field) sites over new (greenfield) sites and optimizing urban density. Urban density should be balanced, not maximized, to fit the project's function in its broader urban context. **Quality of Local Ecosystems:** This aspect focuses on conserving, restoring, creating, and compensating for local ecosystems and biodiversity. It also includes minimizing the project's disruption to the underground environment, like hydrology and geology. An effective method for achieving these goals is the development of green-blue networks. These networks offer multiple benefits, such as enhancing the water cycle, increasing biodiversity, reducing urban heat island effects, and improving well-being. They provide recreational green spaces for residents of densely populated areas and create safe, comfortable infrastructure for active transportation like walking and biking.



## ENVIRONMENTAL PERFORMANCE

# *Sustainable Land Use*

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Green-Blue Network Functions,  
Biodiversity & Ecosystem Value,  
Location and Space Use.

Mobility significantly impacts the environment and urban landscapes, presenting a major societal challenge to transition towards sustainable modes. This transition can be assessed through various criteria: **Proximity and Accessibility:** Evaluating the distance to urban centers or services. This includes concepts like the '15-minute city', where basic services are accessible within a 15-minute walk or bike ride. **Public and Active Transport:** Differentiating between primary, efficient public transport connections and secondary ones is crucial. The quality of walking and biking infrastructure, considering convenience, safety, health, and comfort, is essential for encouraging people to shift away from individual motorized transport. **Parking Norms:** Implementing parking norms in urban design influences car usage. For cars, maximum parking limits should be set, while for sustainable modes like bikes, minimum parking requirements are suggested. **Mobility as a Service and E-mobility:** Assessing the level of shared, multi-modal mobility solutions is important. An appropriate and context-specific balance of these elements is crucial for facilitating a shift to more sustainable transport modes. The modal split, or the proportion of different types of transport used, is a key indicator in steering these efforts.



## ENVIRONMENTAL PERFORMANCE

# *Sustainable Mobility*

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Modal Split, Active & Public Transport,  
Physical Activity, Congestion, Air Quality,  
Spatial Organisation.

Cultural sustainability encompasses a wide range of aspects, including cultural value and diversity, identity, belonging, history, heritage, and the quality of spatial and aesthetic environments. It assesses how well the built environment reflects cultural and historical significance, creating a sense of identity and belonging. Key elements of spatial quality include: The balance between public and private spaces, and transitions between them. Integration of green structures and green-blue networks into the urban landscape. Visual landscape quality and scenic beauty. Legibility and permeability of urban areas. Harmonious integration of various architectural styles and preservation of existing heritage. Cultural sustainability also emphasizes the role of the arts in enhancing beauty, inclusiveness, diversity, and community engagement. Artistic approaches like relational, participatory, or community art can significantly contribute to social and cultural sustainability. Moreover, cultural sustainability is closely linked to economic and social factors. The arts, culture, and creative sectors can revitalize abandoned urban areas, fostering new social and economic dynamics.



## SOCIAL - CULTURAL PERFORMANCE

# *Cultural Sustainability*

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Arts Mobilisation,  
Spatial-Architectural & Artistic Quality,  
Cultural Value & Diversity, History & Heritage,  
Identity & Belonging.

Sociability in urban development refers to how well a place supports and encourages healthy, vibrant social interactions. Urban regeneration projects should aim to minimally disrupt valuable existing social structures and, ideally, enhance them during the transformation process. Key strategies include: **Stakeholder Engagement and Co-creation:** Project initiators should engage in processes with local actors, building on existing social capital. This involves active participation from community members in shaping their environment. **Inclusivity:** Assessing whether an urban environment is friendly to all groups, like children and the elderly, and ensuring universal access through design is vital. **Dynamic Sociability and Future-proofing:** In our rapidly changing world, the ability of a place to adapt to future social conditions sustainably is essential. This includes resilience to social changes, quality of housing, evolving demographics, and the redesign of car-oriented spaces. **Social Innovation:** Building strong local social capital is important for both social well-being and education. This aspect forms a connection to broader urban indicators, including those related to education and public health.



## SOCIAL - CULTURAL PERFORMANCE

# *Sociability*

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Social Innovation, Resilience, Social  
Networks, Social Capital.

Apart from the physical accessibility of services and amenities, their level of inclusion, affordability and social fairness (the EU Green Deal pillar 'Leaving no place and no one behind') is a primary social quality. Affordability implies, for example, that a proper share of social and/or affordable housing is available, while variety in the offer of housing types must also be seen as a factor that increases the level of integration and inclusivity. Inclusivity assures that all social or age groups, people with reduced mobility or vulnerable groups have good access to all needed services, and are properly being represented and effectively involved as users or stakeholders in related institutions and processes.



SOCIAL - CULTURAL PERFORMANCE

## *Affordability and Inclusivity*

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Social Equity, Social Justice.



This topic focuses on the effectiveness of core social services in urban areas, emphasizing the functional mix, diversity, and accessibility of various services and amenities. It aligns with the concept of the "15-minute city," where essential functions like housing, work, commerce, health and child-care, education, and cultural and leisure activities are accessible within a 15-minute walk or bike ride. This model also stresses the importance of easy access to green and open spaces for urban dwellers' well-being. A sustainable urban setting provides a balanced mix of these services, offering easy, low-threshold, and universal access, contrasting with monofunctional zoning. Setting maximum distances to these services ensures their accessibility and promotes inclusivity. With the increasing significance of digitalization, the accessibility and quality of digital services are equally important. This includes catering to social groups with limited capacity to use digital tools, encompassing a broad range of services from targeted communication strategies to the use of digital twins for city management.



## SOCIAL - CULTURAL PERFORMANCE

# *Effectiveness of Services*

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Digitalization,  
Diversity & Accessibility of Services.

Physical safety in urban environments encompasses several factors, including risks to physical integrity, crime, and specific concerns for children and the elderly. Social control, fostered through good urban design, plays a vital role in enhancing physical safety. Key aspects of physical safety also include: **Local Air Quality:** Assessing local air quality, particularly NO<sub>2</sub> concentrations, against established norms or standards helps monitor and improve air quality. **Noise Levels:** Managing noise levels using standards like the WHO's L-levels, with a distinction between day and night noise levels. **Traffic Safety:** Addressing traffic safety separately due to its significance in creating sustainable and livable environments. **Urban Heat Island Effect:** Strategies to reduce it include more greenery and water bodies in cities, using building and road materials with higher albedo (lighter colors), and reducing waste heat from buildings and vehicles. Passive measures like building insulation and sun-shading, or providing shaded car parks, are effective. Other nuisances like excessive wind, traffic congestion, vibrations from construction or transport, visual pollution, stench, and emissions to water and soil also impact physical safety and should be considered in urban planning.



## HEALTHY LIVING

# *Outdoor Environmental Quality*

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Safety, Air Pollution,  
Urban Heat Island, Noise Levels.

The main suggested indicators are temperature and humidity levels, indoor CO<sub>2</sub> - concentrations and noise levels. Indoor air quality can also be jeopardised by the presence of hazardous elements like volatile organic compounds (VOCs) emitted by interior finishing materials and furniture. Outside air pollution , e.g. from urban highways, may enter indoor spaces and cause similar detrimental conditions for the working and living conditions inside buildings.



HEALTHY LIVING

## *Indoor Environmental Quality*

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Temperature, CO<sub>2</sub>-Levels, Humidity.

Sustainable local embeddedness evaluates how well a project integrates into and supports the local economy, particularly in terms of sustainable economic activities. Key aspects include: **Local Employment:** The project should generate both temporary and permanent quality jobs, deeply anchored in the local labor market. This is enhanced by linking projects to educational and capacity-building initiatives that increase local human capital. **Support to Local Green Economy:** Projects should contribute to circular and climate-neutral operations while promoting local activities. This includes creating locally closed material and energy loops, local food production, nature-based solutions, and biodiversity preservation. **Community-Supportive Business Models:** Shifting from individual, short-term services to collective, long-term solutions, such as micro district heating and cooling networks, shared renewable energy installations managed by local communities, sustainable co-housing, and collective mobility solutions. Cooperative company models, in particular, can enhance community building, strengthen local economies, and maintain a for-profit approach while reinvesting profits back into the community.



## ECONOMIC PERFORMANCE

# *Sustainable Local Embeddedness*

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Local Green Economy, Local Employment,  
Human Capital, Sustainable Tourism.

Sustainable investments, particularly in renewable energy, often face challenges due to outdated legislation and shifting regulatory frameworks. Stable, predictable policies with fair transition periods are essential to support the sustainability transition and provide legal certainty for investors. Innovation support, not just financial but also through legal sandboxes, can mitigate risks associated with highly innovative projects. This approach spreads the innovation risk across a broader range of societal stakeholders who will benefit from the innovation. The adaptability and functional flexibility of long-lifespan products, like buildings and infrastructures, are crucial. These should be designed to adapt smoothly to changing functional requirements over time, increasing their sustainability and avoiding wasted resources. The governance models managing these assets also need to be scrutinized for their adaptability. This future-proofing approach ensures economic viability while supporting a sustainable and adaptable society.



ECONOMIC PERFORMANCE

*Legal Certainty  
and Future Economic Value*

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Innovation Support,  
Regulatory Stability & Foreseeability,  
Futureproofedness & Adaptability.

Valuing investments through a Life Cycle Cost or Total Cost of Ownership approach can favor sustainable alternatives over short-term, profit-driven projects. This method becomes even more effective when accounting for social and environmental externalities—hidden costs related to environmental and social impacts. Key economic benefits of this approach include: Higher energy and materials independence, leading to reduced energy poverty and waste volumes. Decreased social security expenses due to improved well-being and health. Reduced pollution and safer living environments, enhancing the quality of life. Increased employee productivity, less absenteeism, and improved recovery in hospitals, attributed to healthy and comfortable buildings. Growth in local and stable jobs in green sectors, like energy-efficient building renovation and renewable energy production. Reduced traffic congestion and its associated costs. Enhanced real estate value of energy-efficient buildings, which are future-proof against upcoming energy requirements. These factors extend beyond financial gains, offering broader benefits such as better living conditions, healthier environments, and sustainable employment opportunities.



## ECONOMIC PERFORMANCE

# *Total Societal Cost of Ownership*

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Equitable Funding

Especially in a context of societal transitions, good governance processes make the difference. Good governance is needed both in the development phase of a solution, as well as in its operational phase. Process quality measures the quality of the integrated process and project management. Because the process quality in the development phase has a permanent effect on the performance of the realised project, this temporary aspect should be included in the assessment of the permanent quality of the project. Sustainable projects will often make use of alternative management concepts, for example for collective energy, mobility, water, green and waste handling infrastructures. Suitable business models, communication structures and related agreements are the basic components for successful exploitation. When dedicated urban governance processes become well-anchored in the local transition landscape, they gain legitimacy and create institutional capital . This may further contribute to realising stable, long-term strategies beyond the short-term political cycles.



## GOVERNANCE

# *Process Quality*

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Governance Setup, Institutional Capital.

Integrity checks in how far the project or development realises true sustainability, and in how far the share- or stakeholders' agendas, investments and actions support this. Greenwashing is a typical example where integrity is particularly low – sustainability is being claimed but other (unsustainable) goals are being served primarily. Burden shifting (to the environment, to certain social groups, to other locations) is another example where project integrity can be seriously jeopardised. An integrity check is thus instrumental in unearthing hidden agendas, project setup flaws, but also unwanted side effects. This requires, amongst others, the use of well-thought indicator sets for project monitoring. An integrity check can be (periodically) performed through a process of reflexive governance . All stakeholders' interests (including vulnerable groups and even 'nature' or the environment as silent stakeholders) must hereby be considered. An integrity check is also instrumental for identifying clear conditions that must be met at all stages of the process, as well as for building and managing indicator sets for the Impact Model, to ensure aspectual completeness.



## GOVERNANCE

# *Integrity*

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Reflexive Governance, Ethics, Burden shifting,  
Greenwashing, Reflexive Governance.



Participation and co-creation examine the extent to which the various stakeholders participate in the decision-making process, in which form (e.g. up to co-creation or citizen control) and how this leads to solid support for the project or the development. The participation format must be fit for purpose and can therefore take various forms. As with process quality, participation is partly a 'temporary' indicator, although the participation process will preferably also find an extension in the use phase of the development. The score will therefore be best if the participation functions optimally in both the project and the use phase. Well-designed participation also supports social fairness, as all involved actors can have their concerns expressed and taken into account. Duly covering the stakeholder field is an important aspect, in particular with regard to onboarding 'silent majorities', marginalised groups and other potentially underrepresented stakeholder groups.



## GOVERNANCE

# *Participation and Co-creation*

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Stewardship, Agency.