

Reinventing Cities

Guidance to design a low carbon, sustainable and resilient project in Bilbao

This document provides guidance on key design approaches to consider when designing a low carbon, sustainable and resilient project in Bilbao and outlines the main strategies to reduce the carbon footprint of spaces.

10 design approaches

Through Reinventing Cities, teams should strive to achieve a low carbon and sustainable design and develop resilient and people-centered spaces. The pathway to achieving such urban projects requires a combination of solutions. To support teams, the competition defines 10 design approaches that participating teams are invited to consider.

1. Energy efficiency
2. Sustainable food
3. Adaptable spaces
4. Low-carbon materials
5. Circular resources
6. Climate resilience and adaptation
7. Biodiversity and green spaces
8. Sustainable lifestyle and green jobs
9. Social inclusion and community engagement
10. High-quality urban design

Teams are not required to respond to all 10 design approaches. The information provided is intended to guide teams in developing their project and identifying concrete solutions to propose for the site. Whilst all design approaches are relevant to the competition, teams should focus on those that are most appropriate for the area.

Furthermore, the examples listed for each design approach in this document are not exhaustive nor mandatory. Teams are not required to include all the examples set out in this document; instead, they are encouraged to use them as an inspiration for their proposal.

Please note the approaches are not in any specific order of importance.

1 - Energy efficiency

Overview: This is a mandatory challenge. Teams should consider providing opportunities to harvest energy using green technologies. Switching to renewables and implementing smart lighting solutions is key to developing safe and energy-efficient spaces. A well-connected space can help communities thrive as well as enhancing social inclusion.

In Phase 2, finalists are encouraged to provide the following KPIs for this challenge:

- Energy consumption of the project in kWh/m²/year broken down by energy source (e.g. electricity, gas, etc.) and by usage (e.g. heat, hot water, ventilation, etc).
- Carbon footprint of the energy consumption in kgCO₂e/m²/year (with a clear distinction made between energy consumption from activities and from normal building use).

Key concepts and examples

Green energy and smart lighting: Reducing energy demand through renewable technologies is a key element towards a low-carbon environment.

Examples of solutions you may consider in your response

- *Install renewable technologies such as solar panels and heat pumps to generate energy and minimize energy demand.*
- *Implement intelligent lighting such as LEDs, solar features and bioluminescence lighting.*

Smart technology: Digitalisation can transform spaces by building resilience and improving the quality of life.

Examples of solutions you may consider in your response

- *Install advanced building controls and management systems that include sensors and controls to monitor usage and performance, including air quality meters or temperature devices.*
- *Install monitoring devices for future appliances such as centralized systems for power outlets.*

2 - Sustainable food

Overview: This is a mandatory challenge. Food systems account for over one-third of global greenhouse gas emissions, yet a third of all produced food is wasted. Without substantial changes to the food system, greenhouse gas emissions from the food sector will increase by 38% by 2050. Teams should develop strategies to promote sustainable food and promote sustainable habits and lifestyle.

In Phase 2, finalists are encouraged to provide the following KPIs for this challenge:

- Food waste treatment capacity as % of estimated on-site food waste generation.
- % of menu derived from healthy plant-based products.
- Surface area dedicated to regenerative urban agriculture (if relevant) in m².

Key concepts and examples

Shifting consumption: Shifting consumption towards more sustainable and health-conscious diets is crucial for fostering a low-carbon, resilient food system. Projects should aim to promote the Planetary Health Diet, emphasizing delicious, culturally relevant, plant-rich meals with optional small amounts of animal-based proteins.

Examples of solutions you may consider in your response

- *Prioritize delicious and culturally relevant plant-rich menu options to encourage and celebrate healthy and sustainable food choices.*
- *Connect to local food assistance programs such as food banks or community kitchens to improve access to healthy, plant-rich foods, particularly in underserved neighborhoods.*
- *Establish a platform for collaboration to bring together residents, businesses, governments, and NGOs to advocate for a sustainable food system.*
- *Support awareness campaigns that promote dietary shifts towards more sustainable choices and reduce food waste.*

Sourcing and growing sustainable food: Promoting regenerative food production practices is essential for creating sustainable and resilient food systems that support healthy and prosperous urban, peri-urban and rural communities. Teams should prioritize procurement of fruit, vegetables and plant proteins cultivated using regenerative practices in order to minimize environmental impact and support long-term food security at the local and regional level. Urban agriculture, while unlikely to produce enough food to meet local demand, can help to raise community awareness of sustainable food

production and consumption and encourage participation in food systems transformation.

Examples of solutions you may consider in your response

- *Establish policies for procuring locally sourced food for the site from producers practicing regenerative agriculture, supporting an inclusive and equitable local and regional food economy.*
- *Support inclusive and equitable access to urban markets for local producers and access to healthy and sustainable food for urban residents by hosting or supporting local food co-ops and farmers markets.*
- *Implement rooftop gardens or vertical farming to build awareness of regenerative agriculture practices and sustainable food systems.*
- *Dedicate land or space for food production through community gardens or allotments, supplying produce directly on-site or distributing to local communities.*

Reducing food waste: Reducing food waste is vital for building a sustainable and resilient food system. Teams should implement strategies that prevent, recover, and recycle food waste, minimizing environmental harm and optimizing resource use.

Examples of solutions you may consider in your response

- *Conduct waste audits to track and monitor food waste levels.*
- *Design low-waste or adaptive menus and portions to minimize surplus food.*
- *Establish systems for redistributing edible surplus food to people in need.*
- *Include activities on site that reprocess surplus food into new products, such as turning overripe fruit into jam or bread scraps into beer.*
- *Install biodigesters, composting systems, or dehydrators to process food waste.*
- *Work with local greenspace stewards and food producers to create closed-loop systems that return organic material to soils.*
- *Consider 'eco-feed' programs that repurpose food waste for animal feed.*

3 - Adaptable spaces

Overview: Teams should consider initiatives to accommodate several uses as well as anticipating the changing needs of future users. By incorporating adaptability, this can reduce the need for future construction and eliminate unnecessary single-use facilities. One way to achieve this is through tactical urbanism and meanwhile uses, which comprises changes and adaptations to existing spaces to meet the needs of the community. Such temporary interventions can also be used to engage the community and create an enjoyable, safe space through participatory approaches.

Key concepts and examples

Multifunctional design: Participants should focus on the concept of adaptable, multi-functional spaces that can be used for multiple purposes and can remain active throughout the day. For instance, future interventions such as tactical urbanism and temporary uses, developing low-cost and scalable solutions that can help foster long term changes.

Examples of solutions you may consider in your response

- *Design adaptable spaces that will allow flexibility in its use and support a range of community activities such as holding public events.*
- *Propose a range of diverse activities for different times of the day including nocturnal periods.*
- *Introduce transitory occupation such as project phasing and scalable activities with short term interventions.*
- *Transform vacant plots to host “meanwhile uses” such as pocket gardens.*

4 - Low-carbon materials

Overview: To minimize embodied carbon emissions, materials should be carefully selected. Teams should seek to use materials efficiently and consider construction materials with lower emissions from the extraction, manufacturing, transportation and end-of-life phase should be preferred as well as bio-based materials. Using modularity/flexible design to enable future adaptation of the building and expand its lifespan, as well as reusing and recycling materials are also of great importance.

Key concepts and examples

Build for the future and optimize existing assets: Teams should seek to reduce embodied emissions by considering the re-use and recycling of materials as well as integrating modular and flexible design. Where possible, existing assets should be optimized and reused to avoid underutilisation and improve asset function and efficiency.

Examples of solutions you may consider in your response

- *Reduce materials used by prioritizing existing material through repurposing and repair.*
- *Foster material efficiency and reuse existing materials.*
- *Repurpose existing structures to provide a safe and comfortable public space.*
- *Plan and design products that are built to last to avoid the need for future replacement.*
- *Plan and design products that are modular, adaptable and have flexible uses.*
- *Use materials with the potential to be dismantled, reused, and recovered at the end of their lifecycle.*

Low-carbon materials: Ensure materials are used efficiently and that low-carbon options such as recycled and bio-based materials are considered.

Examples of solutions you may consider in your response

- *Use low-carbon materials for all street infrastructure and urban furniture (wood and other bio-based materials, low-carbon concrete etc.).*
- *Choose materials with lower emissions from the extraction, manufacturing, transportation and end-of-life phase.*
- *Use materials with the potential to be dismantled, reused, and recovered at the end of their lifecycle.*

5 - Circular resources

Overview: Planning for a sustainable and long term resource usage is key. Teams should provide opportunities, services and tools to instil circular economy principles by conserving, managing and creating a long-term value chain for all materials and resources used, accelerating the transition towards zero-waste and a more sustainable resource management.

In Phase 2, finalists are encouraged to provide the following KPI for this challenge:

- If water-saving measures have been implemented: quantity of water saved per year in m³ or m³/per occupant or m³/m².
- % of estimated recycled waste out of the total waste produced.
- Quantity of expected waste per year and quantity of saved waste compared to a similar project.

Key concepts and examples

Sustainable water management: To address the impacts of water shortage or droughts, teams should seek to lower water demand and manage water usage sustainably.

Examples of solutions you may consider in your response

- *Introduce rainwater harvesting solutions.*
- *Design water efficient landscaping and low-flow fixtures and appliances for public facilities in order to limit water usage.*
- *Implement sustainable drainage systems (SuDS) such as the presence of green space, blue roofs or permeable surfaces to manage water runoff on site and reduce risk of flooding.*
- *Install a purple pipe system to store recycled water for irrigation.*
- *Explore greywater treatment and reuse of wastewater for non-potable usage.*
- *Implement smart water management systems such as smart-metering and irrigation systems to monitor moisture and reduce water consumption.*

Sustainable waste management: To build a circular economy approach, effective methods of waste collection and materials diversion are essential.

Examples of solutions you may consider in your response

- *Support a circular economy approach, for instance, through the provision of Fab Labs, repair services and education programs.*
- *Foster the use of reusable, compostable or recycled materials.*
- *Eliminate single-use plastics and provide drinkable water refill points.*
- *Provide spaces for waste segregation and composting of organic waste.*
- *Deliver community engagement programmes to promote circularity.*
- *Encourage the use of refillable containers to reduce packaging waste.*

6 - Climate resilience and adaptation

Overview: Resilience and adaptation to current and future climate hazards specific to the city and location are extremely crucial. Climate resilience measures should be integrated into the design.

Key concepts and examples

Risk assessment: Teams should assess climate hazards specific to the location, taking into account climate change scenarios and time horizon, and developing climate adaptation and mitigation measures.

Examples of solutions you may consider in your response

- *Assess the site specific climate shocks and stresses i.e. temperature rise, increase in intensity and frequency of winds and storms, flooding, sea level rise and droughts.*
- *Adopt risk management measures shaped to the area.*

Nature-based solutions and resilient design: Nature-based solutions play an important role in protecting and restoring ecosystems as well as building adaptation and resilience to climate impacts.

Examples of solutions you may consider in your response

- *Integrate urban greening and removable or fixed shading strategies to help mitigate the risk of overheating to protect from the heat island effect.*
- *Integrate xeriscape landscapes to reduce the need for irrigation.*
- *Minimize hardscaping and introduce vegetated façades and surfaces, green or blue roofs where possible.*
- *Integrate rainwater harvesting systems and sustainable drainage systems, such as permeable surfaces.*
- *Consider water evacuation mechanisms in flood-prone areas with water retention basins for instance.*
- *Introduce passive cooling strategies and cool zones to reduce the need for air-conditioning.*
- *Include UV coatings, seals, internal glare provision for occupants.*

7 - Biodiversity and green spaces

Overview: Urban nature plays an essential role in restoring ecosystems and increasing climate resilience. It also acts as an effective carbon sink, providing carbon storage and sequestration as well as improving air quality. In turn, green infrastructure can help improve mental and physical well-being by providing space for social and community activities.

In Phase 2, finalists are encouraged to provide the following KPIs for this challenge:

- Surface area dedicated to planted area in m²
- Surface area dedicated to permeable surface in m²
- Surface area dedicated to urban agriculture (if relevant) in m²

Key concepts and examples

Urban nature and biodiversity: Teams should increase the amount of green spaces to promote wellbeing and build resilience. Furthermore, teams should prioritize native and adaptable species over exotic or invasive species in order to enhance biodiversity and pollination.

Examples of solutions you may consider in your response

- *Integrate green surfaces where infrastructure allows it i.e. biodiverse/green/brown roofs, walls.*
- *Introduce, where possible, wildlife habitats and biodiverse planting including pollinator-friendly planting and native and indigenous species as well as heat and drought resilient planting species.*
- *Consider carbon sequestration and air quality potential in species selection.*

Accessible and multifunctional green spaces: Teams should assess opportunities to create green spaces that can be used by the local community.

Examples of solutions you may consider in your response

- *Design pocket parks/green spaces which reactivate small or underutilized spaces and bring nature back into the community.*
- *Dedicate where possible space for food production and urban agriculture.*
- *Provide community gardens to foster opportunities for communal activities as well as physical activity.*
- *Provide flat and accessible green spaces within areas with elderly communities and children.*

8 - Sustainable lifestyle and green jobs

Overview: Teams should implement initiatives to promote a greener, sustainable lifestyle to help equip and empower individuals to make conscious choices on the way they live and consume goods and services. Providing sustainable services and promoting a greener lifestyle is a key element to consider when designing urban spaces. This will support long-term behavioral change through effective and sustained awareness, education and appropriate incentives.

Key concepts and examples

Making sustainable choices easy: Teams should design spaces that make sustainable behavior attractive, affordable and easy to achieve.

Examples of solutions you may consider in your response

- *Design spaces to facilitate the provision of green transport options such as installing storage spaces for bikes and scooters, changing facilities, showers and lockers.*
- *Provide infrastructure to support sustainable waste management.*
- *Design spaces that promote sustainable food consumption such as community food gardens and services that provide sustainable food options.*
- *Design spaces for education on food waste reduction, sustainable consumption, and urban agriculture.*

Green growth: Teams should consider using the site as a catalyst to leverage existing green services or to develop new urban services for the neighborhood that help to reduce the city's environmental impact.

Examples of solutions you may consider in your response

- *Develop flexible spaces for coworking / start-ups / incubator programs that prioritize sustainable businesses.*
- *Design centers that offer educational workshops and training in sustainability, entrepreneurship, and green technologies.*
- *Provide dedicated areas for research and experimentation, supporting innovation in green technology.*

9 - Social inclusion and community engagement

Overview: Teams should consider designing for inclusivity to benefit local people of all backgrounds, ages, genders and abilities. Well-designed spaces create cohesive communities which contribute towards resilience, health and wellbeing while building a strong identity and sense of collective ownership. In this sense, engagement with the local community and stakeholders is key in order to consider local history and support the transition towards behavioral change.

Key concepts and examples

Social inclusion: Building inclusion is important for communities to thrive. Teams should consider all community groups in their design.

Examples of solutions you may consider in your response

- *Design spaces that are safe and comfortable for people of all race, ethnicity, gender, class, ability and sexual orientation.*
- *Design spaces dedicated to collective use and needs such as communal places dedicated to community use and shared services.*
- *Provide low cost initiatives and services that are accessible for low income groups such as water refill stations, community gardens and recreational spaces.*
- *Create inclusive play spaces or playable streets for children.*

Community engagement: Teams are encouraged to take into account the needs of the local community in their design and focus on the specific needs of different individuals and groups.

Examples of solutions you may consider in your response

- *Identify community spaces for street-art and murals via workshops, forums and exploratory walks to foster creativity, community awareness and citizen engagement.*
- *Engage and involve the local community via stakeholder mapping, participatory budgeting or roundtables and public meetings.*
- *Undertake initiatives while designing the project to identify the needs of the local community via participatory processes.*

10 - High-quality urban design

Overview: The project should combine environmental performance with high-quality design and architecture and promote a 'complete neighborhood' model that is compact and mixed-use, where people can access everything they need within a short walk or bike ride of their home following the 15-minute city concept. Instead of single-purpose areas and buildings, the project should support a balanced diversity of 'human-scale' activities. It may also propose new types of services for local communities, and design a public realm that will provide a vibrant, safe and friendly environment for all.

Key concepts and examples

Spatial design: Teams should propose high-quality urban design through spatial design, choice of materials and promote the development of a 'complete neighborhood'.

Examples of solutions you may consider in your response

- *Design spaces that integrate into the surrounding area i.e. respect for cultural heritage.*
- *Design adaptable and modular spaces that anticipate new ways of living and working, include spaces for shared use and implement temporary activation to support a dynamic, evolving place with a strong identity.*
- *Design safe and healthy spaces for occupants to live, work and play.*
- *Design spaces that are dedicated to public and collective use, which cater to various groups and accommodate different needs and preferences such as community hubs, shared gardens and other outdoor activities.*
- *Provide social furniture to foster interaction and facilitate activities.*
- *Provide a mix of spaces that offer a variety of services and amenities from play spaces to green spaces.*

Planning for emissions reduction

The projects should aim to minimize GHG emissions in an integrated way. Therefore, teams are expected to propose multiple low-carbon solutions and actions to curb emissions. Teams are encouraged to carry out a detailed emissions reduction strategy of their project which takes into account factors such as energy consumption, construction, transport, logistics etc. The strategy should clearly define the scope and methodology of the analysis and use standard or conventional approaches.

Teams are also expected to demonstrate how the proposed project performs better than a 'Business-As-Usual' (BAU) approach and demonstrate best practices of environmental/ social/ architectural practices. The BAU case refers to a standard project of similar dimensions and uses in the same city; local and national targets and standards that can be used in defining this scenario and the appropriate emissions reduction difference.

Projects are expected to include low carbon solutions and actions that aim to minimize GHG emissions in an integrated way. There are several key aspects to consider when designing low carbon, sustainable and resilient spaces. Among the 10 design approaches described above, the following aspects have the greatest impact on GHG emissions:

- Reduce energy demand consumed.
- Reduce embodied emissions from construction and infrastructure by using low carbon materials and optimizing existing assets.
- Sequester carbon emissions by increasing green spaces.
- Reduce consumption-based emissions by empowering inhabitants to embrace a more sustainable living.