Bilbao City Council

Maria Díaz de Haro, Bilbao (Bizkaia)

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Mikel González Vara
mgvara@bilbao.eus

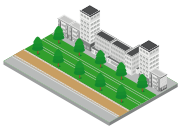
Conversion of an urban traffic artery into a green corridor to improve thermal comfort along Maria Diaz de Haro street in Bilbao

The Bilbao City Council proposed to fully transform María Diaz de Haro Street, converting two of its three traffic lanes into a green corridor connecting two existing urban green areas - Doña Casilda Park and Ametzola Park. The entire road design has been completed, and at the date this document is published the first phase of the work, the section from Simón Bolívar to Autonomía Street, has also been finished.

The intervention aims to renaturalise a road that is almost 1 km long and 25 metres wide. The first phase of the project covers an area of around 9,000 m^2, a large part of which will be used for new pedestrian and green areas. Motorised traffic lanes are therefore removed, widening the pavements and creating a large central space in the form of a green corridor where a children's play area is also installed. The project has been able to completely revitalise this important urban artery of the city from the pedestrian, recreational, and commercial point of view.

María Díaz de Haro green corridor after the intervention was completed.

Type of NBS implemented in the intervention



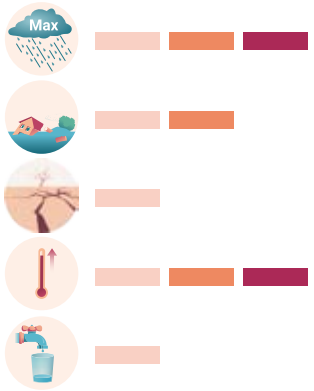
Renaturalisation of linear infrastructure for soft traffic

The first phase of the project covers a surface area of nearly 9,000 m², of which more than **6,000 m² are destined for new pedestrian and green areas.** To this end, two of the three motorised traffic lanes are removed, widening the **pavements to 4.5 metres** and creating a large central space as a green corridor.

Approximately **50 trees** of four different medium-large size species, as well as shrubs and grass (approximately 10 different species) are planted to create the linear space along the green corridor, forming different plant strata.

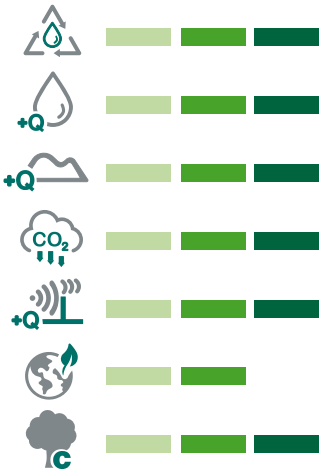
Photographs with the interventions described (in the middle and at the bottom).

CLIMATE THREATS



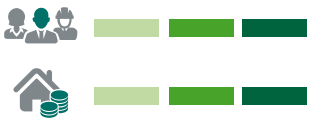
CO-BENEFITS

Environmental



Social

Economic



SDG

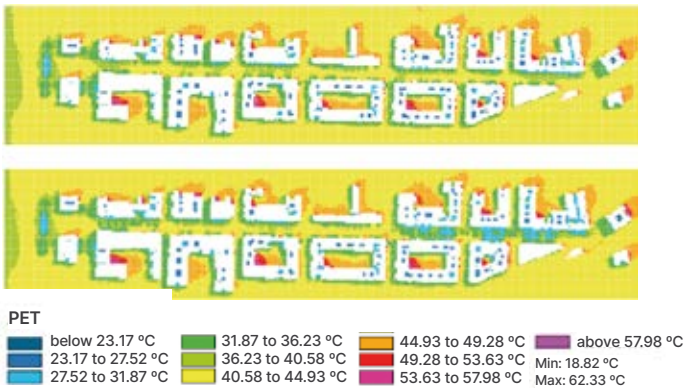
Urban Sustainable Drainage System (SUDS)

Storage cells are arranged at the lowest points of each street section to allow water to infiltrate into the ground and reduce the risk of rainwater flooding. This system also helps to reduce the impact of heavy rainfall events on the stormwater network, as only the excess water overflowing from the cells is discharged into the network.

Structural soil has been incorporated in the tree surrounds, based on granular material specially treated with gels and other materials. The soil favours the optimal development of the tree roots, helping to ensure the availability of water, air, organic matter and nutrients. This avoids damage to street furniture and paving when the root system of the planted specimens grows. At the same time, the designed structure can temporarily store surface runoff.

Micro-scale thermal modelling

Thermal modelling at micro-scale level has been used to analyse the effectiveness of the solutions adopted. The improvement in thermal comfort experienced in the street is analysed by comparing the situation before and after the works were carried out and all the elements of shading, green areas, etc. were incorporated. The study also took into account the climatic variable, analysing the results under different climate scenarios.



Effect of vegetation and materials used in the intervention on the thermal comfort indicator PET (Physiological Equivalent Temperature).

> *"The street will become a green corridor and a natural extension of the Doña Casilda Park up to where it meets the Ametzola Park. It will be an entirely harmonious, sustainable place, with wide spaces to take a walk, well-looked after vegetation, and children's playgrounds."*
>
> **Juan Mari Aburto, Mayor of the City of Bilbao.**

Agents involved

Bilbao City Council:

- Mobility and Sustainability Department
- Works, Urban Planning and Strategic Projects Department
- Services and Quality of Life Department

Economic data

Approximate cost of the intervention:
€ 3 M

Funding: € 16,200
(Local Climate Eco-innovation, 2021) for micro-scale thermal modelling.

Lessons learnt

- The ability of NBS to provide shade is one of the elements that determines their potential to provide thermal comfort. How the shade behaves on the street must be considered when designing NBS, trying to ensure that the shadow is cast on the areas intended to be used and walked through.
- Wind is another key element in thermal comfort. The prevailing wind channels should be identified and NBS should not be placed in areas that would obstruct the wind flow and prevent aeration.
- The following should be taken into account when selecting tree and shrub species: their potential to provide thermal comfort, their native character, their contribution to urban biodiversity, and their maintenance requirements (pruning, water consumption, etc.).

Success factors

Collaborative and interdisciplinary work flow between the different **city council departments and the agents involved.**

Consultation and assessment of available information on the vulnerability and risk of Basque municipalities to climate change, and **thermal analysis of the city** to address the challenge of thermal adaptation on a city scale from a general urban planning point of view.

Increase in green areas

- Increase in estimated CO_2 **absorption capacity by 39%.**
- **80% of the surface** of the action area **improves the adaptability to heat stress:** following the intervention, more than 40% of the surface is in a low range of moderate heat stress for the hours of the day most exposed to discomfort (from 9h to 14h) in typical summer days with hot weather.
- Thermal improvement ranging between **0 and 2 ºC,** with 13% of the area improving by more than 2 ºC.