**Norman Foster Foundation**

Norman Foster Foundation's Contribution to Redeia's 'Sustainability Days 2024'

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**The Norman Foster Foundation promotes the debate around sustainability and proposes architectural and material solutions to offer housing that is sustainable, affordable and safe. In all projects, internationally recognised and awarded, you try to combine sustainability, new technologies, efficiency, modularity, creativity and innovation; as seen in ongoing projects like the Essential Homes Research Project, Cosmos' modular construction, the Autonomous House or Green School Ibiza.**

**Based on your experience at the Foundation, how is the use of architectural technologies evolving towards a more sustainable and efficient construction? Could you share examples of innovative projects where sustainability acts as an essential pillar of architectural design?**

I would like to begin reflecting on the concept of sustainability, which aims to manage resources to satisfy current needs without putting future needs at risk. As we all know, we haven't achieved this goal. We have all seen the diagrams showing that, at a global scale, we would need 1.7 Earths to sustain our current way of life. Extremes like Qatar would need 9.2 Earths, or Eritrea, at the other end of the spectrum, would need only 0.3 Earths. Spain would be somewhere in the middle with 2.5 Earths. The direct implication of this is that our management of resources as a society is not sustainable. To reverse the situation, meeting the usual sustainability parameters won't be enough; we need to go beyond them and talk about Regenerative Architecture and Design.

The question is not a mere figure of speech nor a replacement of words, it entails direct implications in design. It is about our buildings and communities aiming to be more than neutral and have a positive impact. That way, at some point in the future, we will be able to talk about sustainability again. However, right now the mission is regeneration.

The good news is that we have the ability to do it. New design and construction technologies allow for high degrees of optimisation in the use of resources, buildings, public spaces and infrastructures. We are able to simulate and quantify the impact of each of them in our environment. This concept is not new; in the twentieth century, Buckminster Fuller talked

about doing more with less and led by example with his designs of highly efficient structures.

Parametric design, in combination with genetic algorithms of optimisation and neuronal networks, have been applied for decades in architecture studies to look for optimal solutions that will help in solving structural, climatic, spatial or any sort of problems.

In the case of the Norman Foster Foundation, this regenerative concept of architecture is inherently present in all projects and activities. It's part of the Foundation's philosophy. The concept of regeneration is not only applied in its most simplistic version—measuring the carbon footprint—but also in its deeper implications, with a social, economic and environmental regenerative character. For example, you previously mentioned the case of the Essential Homes Research Project, presented at the 2023 Venice Biennale and recipient of the Architectural Innovation of the Year Prize in the Global Architecture Design Awards 2023. In this research project, which due to its success has become a real project with concrete applications, a great effort was made to optimise resources to consolidate in the least amount of space the necessary conditions to give a family a dignified house. Consequently, we are talking about the ability of projects to transcend the concept of sustainability towards a social and environmental regenerative objective through architecture and design.

This project originated during a Workshop held at the Norman Foster Foundation in which there were discussions with a group of students and experts on the topic of shelters where refugees are forced to live after fleeing their countries and homes. Nowadays, there are more than 103 million refugees, of which 1 in 3 are children, with the unpromising foresight of that number increasing in coming years. When they arrive at those refugee camps, families are assigned, in a best-case scenario, eighteen-square-metre tents—the best in the market—designed to last for thirteen months before starting to decompose. The reality is that the average stay of a refugee spans between years and decades, not months. With those numbers on the table, the Norman Foster Foundation considered that there was room to come up with a proposal.

The idea is to leave the notion of shelters behind and talk about housing instead. Again, a change of words brings with it a series of design implications. Everyone has the right to a dignified house, and the Essential Homes Research Project proposes an edification that can improve refugee's living conditions while fulfilling parameters of ease, speed, durability, environmental respect and low construction costs. It's a 100% recyclable modular project that can be built in four days, with a minimum durability of twenty-five years and a 70% reduction of the carbon footprint, compared to a similarly sized house built using the usual means.

The focus is not exclusively on the building, but also on the design of the camps. It is about planning communities, not refugee camps. We applied the most basic laws of urbanism,

which are not usually used in the design of this type of settlement (street layout, squares, public spaces, private patios, green zones, et cetera).

This proposal has gathered great interest from both the private and public sectors. Currently, we are in the final stage of exporting the concept of affordable terraced housing for social housing programmes in Latin America. With this solution, we could have a positive impact on the environment and the living conditions of the families.

**The Norman Foster Foundation has led several initiatives to promote urban sustainability, including the development of the Master's Programme on Sustainable Cities which engages directly with chosen Pilot Cities. This programme unites an international team of experts with the objective of promoting a holistic approach in the design and management of the cities of the future.**

**In your opinion, what should the role of architecture be in the development of intelligent cities that promote sustainability in addition to well-being in Spain? Could you share any innovative project in which you are currently working that integrates urban sustainability and citizen wellbeing?**

Under the premise of the world turning into a network of cities, the Norman Foster Institute offers a comprehensive educational programme that combines theoretical learning with applied practice to pilot cities chosen each year. The students closely collaborate with local authorities to identify and solve each city's specific problems.

As part of the programme, the Norman Foster Institute has a state-of-the-art technological laboratory that allows for the use of design methods based on data and evidence to explore and evaluate the proposed interventions.

The same tool that the Norman Foster Foundation is developing to use in Kharkiv's Masterplan (the second largest city in Ukraine with 1.5 million inhabitants, only thirty kilometres away from the Russian border), is used at the Norman Foster Institute to propose pilot projects in concrete places, resulting in a general improvement of the city they are applied on by accumulation. These pilot projects are carefully identified and developed for specific areas of each city. Later on, they turn into catalysers for urban regeneration when they are reapplied and adapted for other areas of the city.

In the case of Kharkiv, the pilot project deals with various issues. Regarding housing, the objective is to provide housing with the best habitability conditions and energetic efficiency. When it comes to industry, there is an emphasis on enabling the transition from a heavy and polluting industry into a more innovative and sustainable one. Additionally, there is an interest in integrating rivers as green corridors in the city while restoring the city's heritage in iconic places in the urban centre. Finally, it has been proposed to include a new Science Quarter that combines the benefits of a scientific park with those of a dense urban quarter.

In the case of the Norman Foster Institute, this year they collaborated with Athens, Bilbao and San Marino. The students have worked in close collaboration with the Municipality of Athens to transform the city's ambitious sustainability objectives into concrete and viable interventions, with the objective of creating more habitable, safe and healthy urban spaces. Some of the strategies proposed by the Norman Foster Institute include turning road intersections into public spaces and reorganising parking areas in the streets to generate space to plant trees. These actions are a contribution to the redefinition of Athens' future urban landscape. The plan's draft includes several mentions of the Norman Foster Institute's work, recognising the positive impact of their urban proposals.

Working alongside Bilbao's City Council, the students from the Norman Foster Institute have designed a methodology based on socio-demographic and spatial analysis to identify areas of low urban activity. The programme 'Bilbao Social Boosters' is presented as a new urban planning model that deals with social aspects, usually hard to measure, through the planning of the space in partnership with the citizens. The proposal aims to decentralise the city, focusing on neglected communities and improving their interactions on different scales. These specific temporary interventions, designed to complement the existing public environment, will contribute to strengthening social cohesion.

Finally, the Norman Foster Institute has collaborated with the Republic of San Marino on the development of strategies to preserve and improve the vitality of its historic centres, whilst promoting sustainable development in the entire region. The students evaluated the performance of each urban area using key sustainability indicators, such as access to green spaces, accessibility in the streets, cultural activities and public transport's connectivity to neighbouring localities. This methodology has been integrated into a digital tool that will allow those responsible for decision-making to compare and evaluate projects and interventions, with the objective of improving citizen quality of life.

**The Norman Foster Foundation has pioneered projects that explore the future of sustainable building, both on Earth and in potential spatial colonies. The Programme on Sustainable Cities aims to train urban leaders, integrating indicators like the Sustainable Development Goals (SDGs). In this context, Redeia had the opportunity to participate in a class given by its president, Beatriz Corredor, where she shared her vision on initiatives that aim to improve the quality of life and lessen the carbon footprint. Diego, from your experience, where is the future of sustainable construction headed? What challenges is Spain facing to create sustainable urban environments? And what measures can drive this change?**

We have to take into account all architectural scales. On one hand, it's very good that architects achieve neutral buildings with a positive impact. However, that is but a small part of the whole. The future of the world is linked to the future of cities, where 90% of the world's wealth is generated. From here until 2050, we will have to build the equivalent of

eighteen Madrids each year to accommodate the 1,400 million urban residents that will emerge during that period.

As we know, construction is linked to greenhouse gas emissions. Nowadays, the building sector is responsible for 33% of global emissions. This percentage could be reduced by 80% by employing materials more efficiently, whether it's through the use of local, recycled or reused materials. Consequently, it's fundamental to apply regenerative criteria beyond building design; we have to reflect on the model of the city that we need to build. According to the data, the winning model socio-environmentally is that of the dense compact city, with high-rise buildings, good public transport and green spaces. Rankings of cities with the best liveability are a testament to this, as are carbon footprint studies that compare this compact type of city with other models that propose suburban development and private car dependency. Cities like Vienna, Copenhagen and Zürich, which represent the first model, have consistently topped the liveability rankings.

It's the moment to take action and prepare our cities to face challenges. Gases with a great impact on global warming, such as $CH_4$, degrade in twelve years; meanwhile, $CO_2$ can stay in the atmosphere for decades or centuries. In other words, we still coexist with $CO_2$ molecules emitted during the First Industrial Revolution. Therefore, even if all global $CO_2$ emissions were eliminated today—which would pose the moral dilemma of demanding reductions in societies that have access to energy in their homes for the first time, while the northern hemisphere has had it for centuries—we would still coexist with the current high concentration for decades.

For that reason, it is imperative to prepare our cities for a short and medium-term future with rising temperatures. We must rethink how we build our houses and revise the legislation that regulates them. We also need to redesign our public spaces so they can provide greater comfort to the population, because the solution isn't to create big green belts around cities, arguing that some have more green zones than others; the importance is on the location of those areas. Additionally, we have to intervene in the interior of cities, especially the centres. Some of the key weapons to fight a warmer future include having trees, vegetation and big bodies of water generated through reutilisation and depuration, as well as access to urban equipment dotted with new technologies to quantify and predict future conditions.

We talk about using design not only as a reactive tool that attempts to solve problems once they have happened but also as a preventive tool that avoids those situations altogether. To achieve that goal, we have to keep an open mind, and propose and consider solutions based on facts, beyond ideologies and trends.