C40 City-Industry Dialogue:
Beyond the Building: Increasing resilience and reducing embodied carbon through nature, urban design and planning

Key Takeaways

- Beyond buildings: streets, infrastructure, open spaces and natural systems all make up our urban environment. They represent more than **50% of cities' space and use around 50% of the materials** in cities' built environments.
- These often **overlooked "in-between"** spaces hold vast opportunities for climate and community resilience, emissions reductions and active biogenic carbon sequestration.
- Urban design and urban planning hold critical levers to increase resilience whilst reducing embodied carbon. **Leveraging the design, planning and materials of these spaces for climate action** can indeed provide:
    - •operational and embodied emission reduction,
    - •carbon sequestration, and
    - •resilience benefits, such as reducing risks like flooding, urban heat, etc.
- Embodied carbon reduction strategies (both in design and in policymaking) typically feature the procurement of low-carbon materials as a seemingly singular solution. However **key decisions early on in the design stages** provide plenty of opportunities well before material procurement or even material selection.
- There is momentum from both the city and the industry side and **post-covid provides a bigger opportunity to accelerate it**. Where landscape architects adopted this a while back, cities have started to incorporate nature and look at both adaptation and mitigation (both implicitly and explicitly) through regulations and codes.

Designing with nature

- Nature-based Solutions (NBS) are not just a nice add-on to have, designing and planning for NBS supports cities and companies' climate targets.
- Mandy from C40 Adaptation resonated that NBS is the single most effective solution to mitigate climate risks, highlighted in the C40 and McKinsey Report where NBS was considered to be a low-hanging fruit to build resilient cities.
- For example, NBS supports better water management, and decreases heat and air pollution, while sequestering carbon and supporting biodiversity.
- Yet landscape architectural elements which include NBS designs are the first to be cut in projects currently. This needs to change and cities such as Toronto and São Paulo are taking different leading approaches to incentivise and regulate this area.
- **According to Chris Hardy, from Sasaki, living systems are the only economically feasible way to extract carbon from the atmosphere.**
- Landscape-level designing with nature has the **potential to tackle landscape-level problems** ranging from flood capacity, urban heat island effect and acting as carbon sinks.

Leading Practices in Industry

- Chris Hardy from Sasaki Designs gave examples from projects where landscapes with living systems / NBS are used to mitigate floods by providing extra storage capacity within the city. They were used to mitigate heat islands by cooling cities with shading and evapotranspiration.
- Sasaki has modelled as much as a 2.5 degree C average temperature drop for campuses increasing their forest coverage by 25%, serving as storm buffers and increasing drought tolerance, whilst providing numerous co-benefits: health, wellbeing, biodiversity, resilience, and reduced embodied carbon.
- **Pamela Conrad from CMG Architecture emphasised that minor changes in infrastructure which include nature and NBS take about 20 years to offset the infrastructure emissions as compared to 200 years from grey infrastructure.** With Climate-positive design provides an opportunity to remove one gigaton of co2 emissions from the atmosphere by 2040.
- However, both have been confronted by a gap in tools and methods.
- To address this challenge, they have **created a number of tools and apps to calculate the impact of the choice of design, materials and location choices** - all are listed below.
- Design strategies and tools such as Climate Positive Design, the Pathfinder tool, Carbon Conscience app are existing solutions that both cities and companies can use now (VIncent Martinez, A2030). Please do look at the slides for self-explanatory visuals and examples.

Leading practices in cities

• Cities play a huge role in making these solutions scalable through policy and standards and inspire change at the highest level of decision-making.

City of Toronto

- The city of Toronto has **introduced new Green Standard version 4 which sets requirements on buildings and infrastructure**, including landscape associated with sites.
- **Emphasis is on stronger performance requirements** to increase resilience and avoid embodied carbon.
- By using database performance (e.g., Pathfinder tool) the city is planning greener streets, measuring carbon sequestration, increasing tree canopy, enhanced stormwater management, biodiverse green roofs, planning for pollinator space, increasing permeability of surfaces and more to have more climate-positive design requirements.

City of São Paulo

- The city of São Paulo has **one of the most advanced zoning codes**. It incorporates nature-based solutions through a regulatory instrument called **Environmental Quota, 2016**.
- Being highly susceptible to climate change, the city is using the code **to mitigate floods on private allotments** (solutions include trees, green roofs, green walls, permeable flooring and draining reservoirs.).
- The application of the instrument **varies according to the type of use of the property (housing, business etc), area and location.**
- Locations are classified according to their needs in terms of drainage, green spaces, and others.

Challenges and Opportunities

Challenges

- **Utilities conflicts, maintenance costs, psychological and cultural barriers, funding sources, and innovative low carbon materials** are some of the challenges to incorporating nature into public spaces and buildings.
- Cities and the construction sector are **lacking alignment, knowledge and tools** on the multiple benefits of designing and planning with nature. For example, one big challenge Sao Paulo is facing is to assure that things that are on paper materialise in action by private owners.

Opportunities

- Crucial to have alignment between green building, stormwater management and green infrastructure standards with climate-positive policies to a detailed level of inspection. **For this, a collaboration between the practitioners and policymakers is essential to bring innovation** (Chris Hardy, Pamela Conrad, Shayna Stott).
- Often it is up to individuals for approvals and here **positioning of narratives** is very important. Some cities might already have an ambitious climate policy whereas others are more interested in heritage and conservation and water quality.
- **Economic incentives** such as a slight increase in the allowed built area per plot of land or tax relief for private enterprises, as implemented by São Paulo.

Resources and Tools

- NCR solutions is a guide for community planners and other practitioners which includes case successful projects from across the US and Europe to help communities learn more and identify which nature-based solutions might work for them.
- Climate.Park.Change. is a web-based platform that compiles data on how change affects park and recreation spaces and suggests physical design solutions.
- Carbon Conscience, a planning scale tool where you can assign attributes to land use and predict a range of potential embodied carbon impacts for new construction, site preservation, as well as predicated carbon sequestered and stored within the next 80 years.
- Climate Positive Design and Pathfinder app are tools to help practitioners to design projects which can sequester more carbon than they emit by measuring and improving the carbon impact.
- An article by Pamela Comrad, highlighting the importance of nature and nature-based solutions in the exterior build environment, an article by Pamela Conrad.

Inspiring quotes

- *"When we sequester more than we emit, our actions can create a myriad of "co-benefits" that support and sustain people, protecting the most vulnerable from heat, flood, pollution, and water scarcity. Making cities wonderful places to live and connect people to nature"* – Pamela Conrad, CMG Landscape Architecture
- *"Landscape should not only be considered as an amenity or aesthetic, but as the place where the ecology, culture, and infrastructure of a city is brought together in the public realm"* - Chris Hardy, Sasaki Designs.
- *"Key decisions, early on, become critical for long-term sustainability goals – such as commitments to accreditation goals, net-zero targets, restoration and tree protection requirements, or fundamental approaches to land use"* - Chris Hardy, Sasaki.
- *" Public spaces are like the living room and garden for the residents living in a city and it is important to rethink and reinvent public spaces"* - Helene Charter, C40.