

# A FRAMEWORK FOR REGENERATIVE DESIGN

According to the August 2021 report from Working Group 1 of the Intergovernmental Panel on Climate Change (WPG-1), 'it is only possible to avoid warming of 1.5 °C or 2.0 °C with associated catastrophic impacts, if massive and immediate cuts in greenhouse gas (GHG) emissions are made' before 2030. In short, we have less than eight years to drastically reduce global carbon emissions and avoid the direst impacts of climate change.

By Colin Rohlfling

As we know, the built environment plays a significant role in climate change — from how projects are constructed, to how they're used, to how they are disassembled at end of life. For some time now, the design and construction field has implemented increasingly stringent "high performance" design practices to minimize those impacts and there have been progress. Since the implementation of the AIA 2030 Challenge in 2005, the building sector has reduced GHG emissions by 30% even with a nearly 20% increase in floor area. The industry is on target to achieve a 72% reduction by the year 2030. However, these reductions alone are not enough and we must keep pushing towards faster, net positive benefits for a variety of focus areas such as water, ecology, human health and equity.

As a design industry, we must radically transform the way we approach design; to think beyond the immediate boundaries of our projects to EMBRACE broader interconnected social and ecological systems. We must move beyond the equilibrium of sustainability towards design that has net positive benefits. We need to think about our developments not in the context of doing less harm, but actually doing good. In other words, our projects need to actively regenerate or contribute positive impacts to the people who use them and the local ecology that surrounds them.

## REGENERATIVE DESIGN

The term "Regenerative Design" describes a process that mimics nature itself by restoring or renewing its own sources of energy and materials. At HDR, we view regenerative design as design that reconnects humans and nature through the continuous renewal of evolving socio-ecological systems. It emulates natural systems for the continuous renewal of societal and ecological functions. A Regenerative Design approach embodies six core principles:

### 1. Regenerative design achieves net-positive impacts for ecology, health and society.

A regenerative project establishes performance metrics in these three areas to remediate the harm that has resulted from decades of conventional development. Because it emulates natural ecological systems, regenerative design incorporates leading edge design for wellness and actively participates in unique, place-driven solutions that address issues of social equity.

### 2. Regenerative design is flexible, and can be applied to all project types and sizes.

Regenerative design does not discriminate, nor does it apply only to certain types of project. HDR has developed a regenerative design framework that has the ability to accommodate design projects of all sizes, typologies and levels of performance.

The framework moves beyond conventional high performance design; to pursue "net positive" impacts for carbon, water, nutrients, air, biodiversity, social and health categories.

### 3. Regenerative design is evidence based, data driven and measured against multiple metrics.

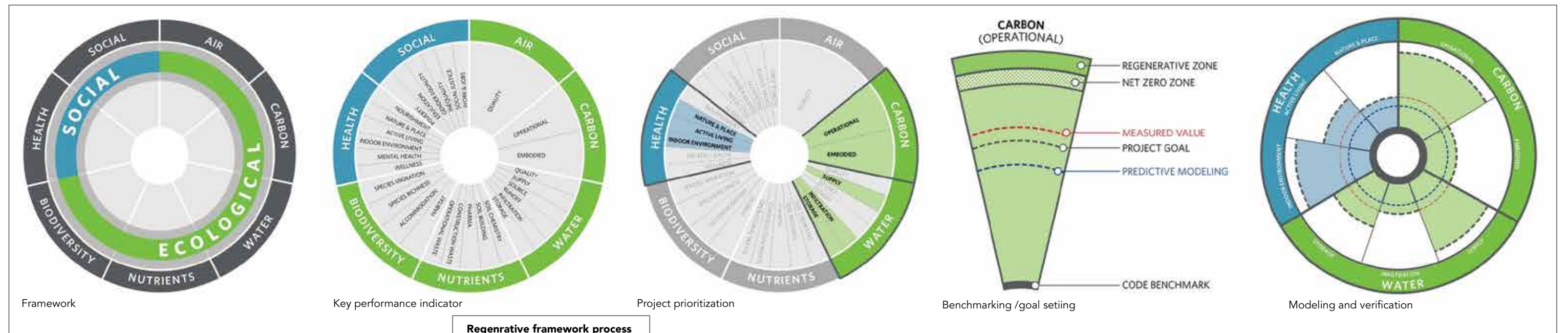
Regenerative project goals are established using a pristine reference site as a baseline. Its associated natural performance metrics exceed code and regulatory standards. These metrics are scientifically defensible and are established using Geographical Information System (GIS) maps; together with data from federal and provincial governments; and research conducted by universities and other recognized social and ecological enterprises.

### 4. Regenerative design continuously evolves and renews.

Regenerative design includes projection modelling of place-appropriate performance indicators in the following categories:

- air
- carbon
- water
- nutrients
- biodiversity
- health and
- social equity and community wellbeing

These indicators will fluctuate and are influenced by short- and long-term disturbances of socio-ecological systems.







**5. Regenerative design incorporates and builds upon existing paradigms:**

Everything we have been doing as a firm and an industry has been building to true regenerative design performance levels and this type of design thinking should be considered an "umbrella" over everything that we have been working towards in the past few decades. The following paradigms are included in our regenerative design framework:

- Triple Net-Zero (energy, water and waste)
- Carbon Balancing (embodied and operational carbon)
- Health and Wellness Design
- Materials Transparency
- Resiliency
- Social Equity

**6. Regenerative design continuously engages and involves the community.**

A project should maintain and inspire continual stakeholder engagement to harmonize community values with project goals and to plan for future co-evolution of socio-ecological systems.

HDR has applied these principles to numerous projects including:

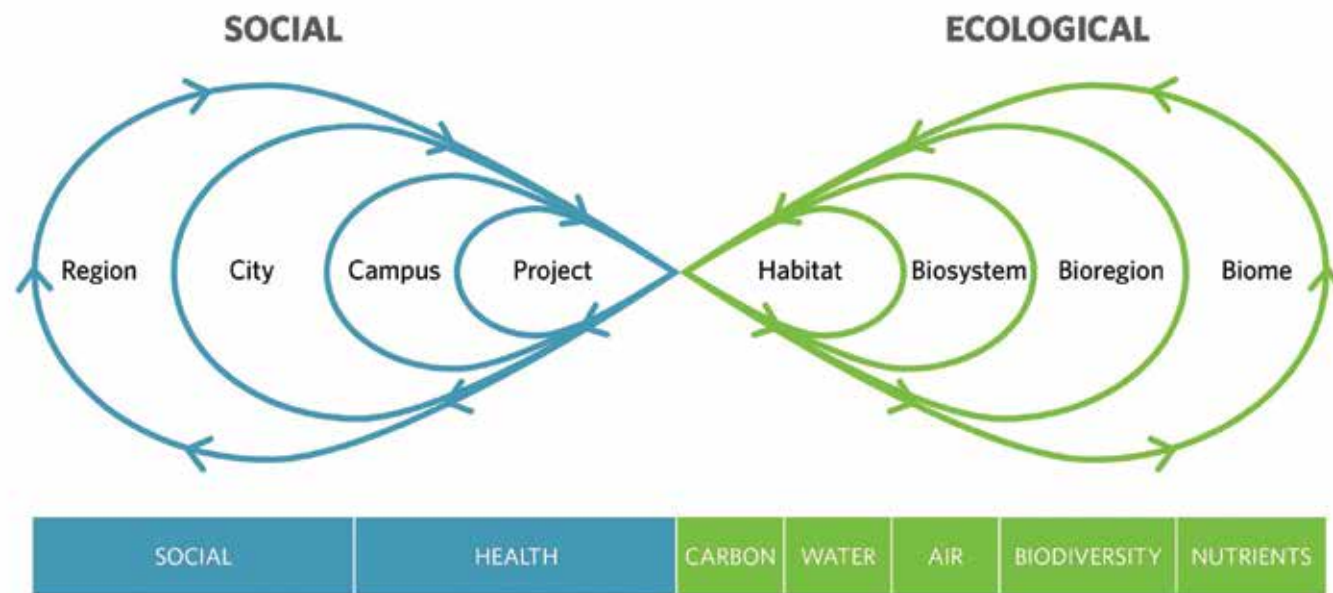
**HAMILTON COMMUNITY PLAN WA**

On average Hamilton Washington has faced flooding events every 3 1/2 years and the severity of these events is increasing due to climate change. Using a triple net zero approach for energy water and waste to address this challenge, HDR designed a community that works in concert with nature and is situated above the 500-year flood plain. The design is highly resilient and reconnects humans with natural systems.

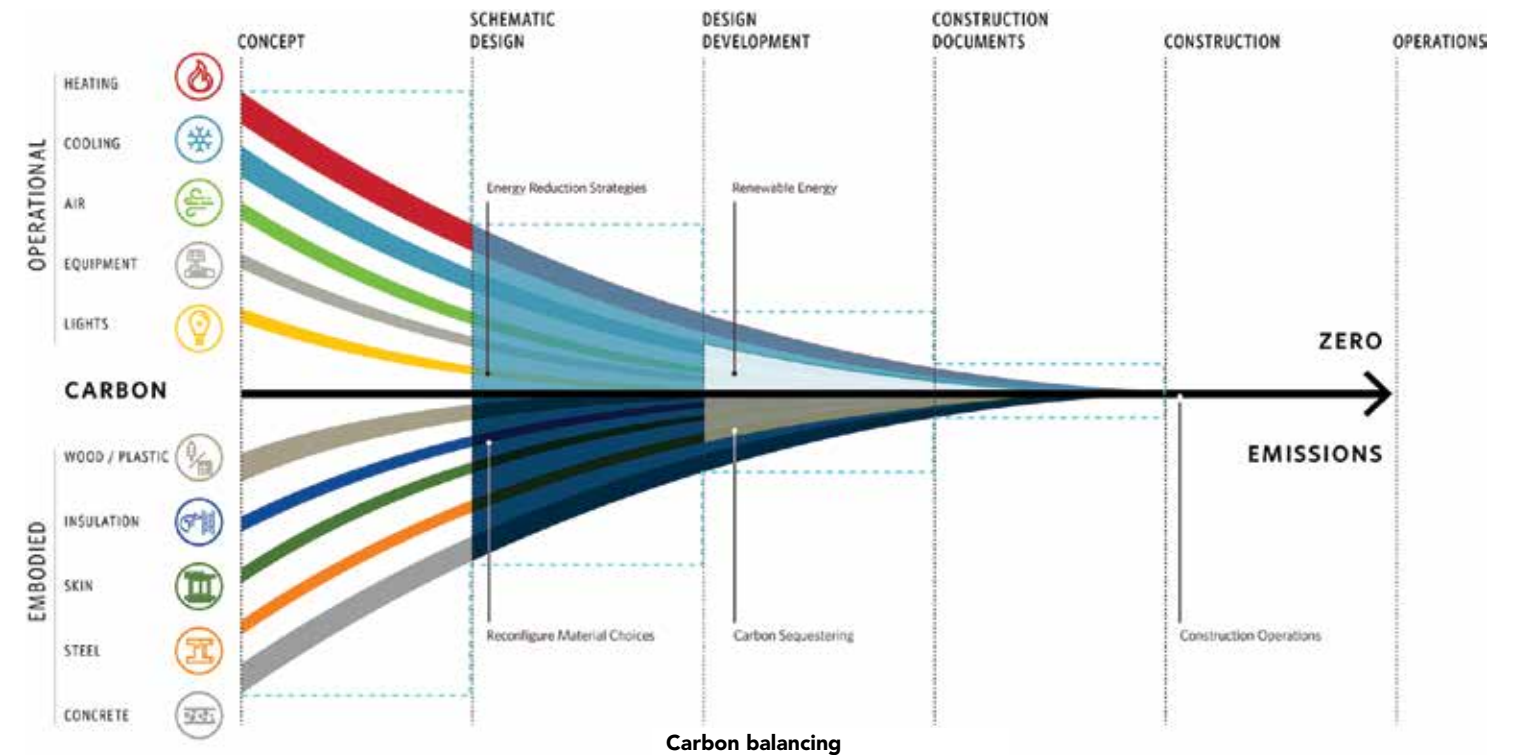
**ORANGE COUNTY SANITATION DISTRICT HEADQUARTERS CA**

The Orange County sanitation district has administrative headquarters in California; a 100,000 square foot net positive energy office complex, which also achieves a 180% reduction in embodied carbon for construction, through the use of mass timber, the reduction of interior finishes and a prevalence of renewable materials. Over its lifetime, the project is estimated to sequester over 360 metric tons of carbon to help balance the operational and embodied carbon equation.

projects like these have allowed us to imagine a world where buildings actually give more than they take -so much so that we've developed an online interactive tool that helps design teams capture and think through these strategies as part of the design process from day one



Regenerative design scales



**THE ONLINE TOOL**

With more than 125 data sets and 40 calculators that are unique to a given site and location, this tool places the project in the appropriate context, by establishing an ecological baseline. Location-specific data sets inform design metrics and enable design teams to quickly assess specific climate change scenarios for temperature and precipitation that may impact building systems; 100 and 500 year flood maps that should be considered for detailed resiliency planning; water use impacts for both potable and process water; regional air quality index statistics for each day of the year to help drive health and passive design decisions; community social vulnerability indicators that identify sectors of the community that are at risk; census level data that digs deeper into air quality concerns that affect human health issues; and the realities of social inequality. The data enables us to design our projects to acknowledge and address negative impacts that the built environment is having on disadvantaged or vulnerable communities.

This new data driven design approach changes our fundamental thinking about long-term building operations and their impacts on the local community and ecology.

It changes our approach on how a project should perform through its entire lifecycle (cradle to cradle). Regenerative design creates an opportunity for new supply chains and increased availability of resources for future projects of all types, both vertical buildings and horizontal infrastructure such as roads, bridges and water systems.

It also changes our approach to community development issues, given the need to plan in a way that supports at risk or disenfranchised populations, promotes attainably-priced housing and brings issues of social equity to the forefront of a design.

In the end, regenerative design is about taking responsibility and action for mitigating the harmful impacts of the carbon emissions caused by the buildings we design. It's about a design lens that is evolving to be more holistic, data-driven and renewal-focused.

The challenges that face us can be daunting, but nothing has more strength than dire necessity. Instead of letting fear overcome us, we have another option - which is to act.

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**FOOTNOTE:**

HDR is hoping to release a simplified version of this tool for public use. Because it currently contains over 125 data sets and 40 calculators, there is inherent risk if the data sets change or the calculations are disputed. The company is exploring the best way to mitigate legal risk while still providing an open tool for industry collaboration