

CLIMATE DESIGN CORPS | Reinventing Architecture, Labor, and Environment

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OVERVIEW

In the fall of 2018, the United Nations Intergovernmental Panel on Climate Change (IPCC) released a report that was both familiar and unfamiliar. It built on facts we already knew about the climate crisis: carbon emissions cause warming, which causes sea level rise and extreme weather and loss of biodiversity, which in turn causes disease and hunger and migration and death. But it also reached a new conclusion: the world has only 12 years to halt carbon emissions and avoid the most catastrophic global effects. The warming target of 1.5 degrees Celsius (rather than 2.0 degrees) is required, not optional. The difference of half a degree dramatically improves our odds of preserving any coral reefs, avoiding the collapse of insect life, escaping the trigger of irreversible planetary transformation, and minimizing drought, floods, extreme heat, migration, and poverty for hundreds of millions of people. Urgent and unprecedented action is required. Not eventually. Now.

Architecture makes up 30-40% of global carbon emissions. So addressing warming requires reducing the flow of carbon from our buildings. At the same time, due to the expected population growth of three billion people by 2050, there will be 13,000 buildings constructed every day for the next 30 years. And 15 of the 20 largest cities in 2050 have yet to be built. If architecture is a significant component of the climate crisis now, it will only be more so in the near future.

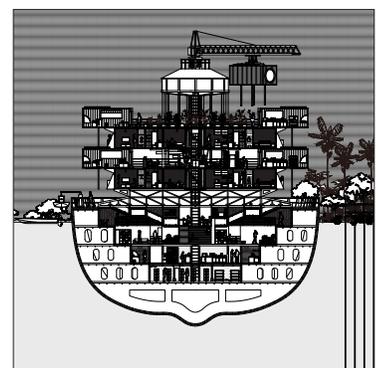
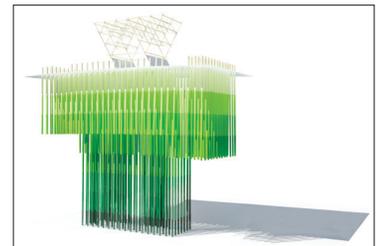
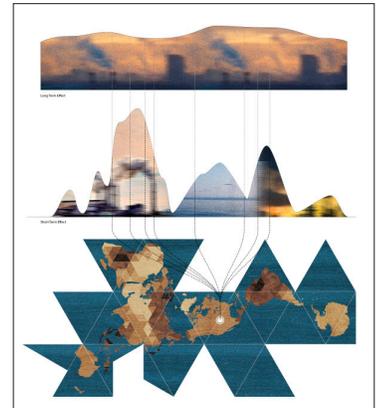
While some people claim that we already have all of the solutions and technology we need to halt carbon emissions, others believe that we need new strategies for agriculture, transportation, carbon capture, land use, and the built environment. And in any serious analysis, we need a radical transformation not only of energy and buildings, but also of jobs and ways of living. This is the most urgent challenge of our times, and this is the setting for our studio at the critical intersection of climate, labor, and design.

1. CLIMATE DESIGN CORPS

In 1802, the United States Army Corps of Engineers was formed with a mission of delivering vital public engineering services, strengthening security, energizing the economy, and reducing the risks from disasters. The organization now represents the country's investment in infrastructure and mitigating the damage of the climate crisis.

One hundred and twenty-nine years later, as part of the New Deal during the Great Depression, the Civilian Conservation Corps was created to train unmarried and unemployed young men for construction and related trades through work such as building roads, dams, and bridges. This was about more than constructing physical objects. It was also about creating immediate jobs, as well as training people for future employment.

The Peace Corps was established in 1961 with the aim of supporting development in other countries through voluntary service. At the same time, the program aimed



Images (top to bottom): Hoover Dam, an inspiration for the Civilian Conservation Corps; Global production diagram (Benjamin Studio 4, Ruomeng Wang); Factory design and visualization (Benjamin Studio 4, Abraham Murrell and Edward Palka); Physical model of architecture and carbon footprint (Benjamin and Wikstrom Studio 6, Wo Wu and Kyungmin Cho); Floating production facility in repurposed ship (Benjamin and Wikstrom Studio 6, Yining Lu and Mengxuan Liu); Greenhouses designed to use captured carbon.

to promote mutual understanding between the citizens of the United States and of other countries. The goal was social and cultural, as well as technical and economic. And the Peach Corps now supports hands-on, grass roots-driven, and lasting impact.

Americorps was launched as a domestic version of the Peace Corps in 1993. The idea was for young members to serve in a network of nonprofit community organizations and public agencies. They perform work addressing education, public safety, health care, and environmental protection.

In the spirit of these organizations, this studio will explore a new “Climate Design Corps.” Like its predecessors, our corps will call upon young people to commit to a year of service, to work together in teams, to receive training for future meaningful jobs, and to work for the public good. Similar to many of the individual Americorps programs, our corps will emphasize diversity of participants and promote social equality through collaboration. But our corps will be more environment-focused than Americorps, and more design-focused than any of the precedent corps.

Instead of going abroad, young people will work in the United States. Instead of teaching, young people will design and build. Instead of moving on to jobs in the industries of service or finance, young people will move on to jobs in the industries of the built environment.

We will imagine that our corps is one of the primary elements of the Green New Deal, addressing the climate crisis with urgency, and committing to leave no one behind during the radical transformation required. We will also suppose that the key to successful transformation is design and the built environment. Our approach to the Green New Deal will be creative, critical, practical, and urgent.

2. LOW-CARBON MATERIALS

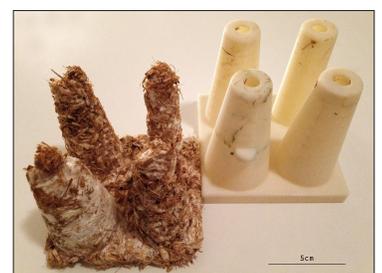
In 2010, in Sharjah, United Arab Emirates, a North-Carolina-born architect named Ginger Dosier was working out of a small lab at the American University, conducting tests on a new kind of architectural material: a brick grown from bacteria and sand.

Her idea was that the natural process of microbes secreting calcium could be tuned and accelerated. Microbes could become a living glue to bind sand together into a solid object.

Dosier purchased various bacteria cultures from India and other countries. She tried dozens of species and all kinds of growing conditions. After 111 failed experiments, Dosier identified a specific strain of *Bacillus* and the precise proportion of aggregate to create a robust structural brick.

This brick involved almost no embodied energy and no carbon emissions. In fact, if this new brick were to replace all of the kiln-fired bricks produced in the world each year, it could eliminate 800 million tons of carbon—or over 2% of global emissions. More broadly, this new kind of material could reframe our approach to architecture and the built environment—to what is designed and how we build it.

In addition to inventing a new Climate Corps, this studio will focus on low-carbon materials. We will study bio-materials like Dosier’s bricks, as well as carbon-



Images (top to bottom): Low-carbon bricks grown from bacteria (Ginger Dosier, BioMason); Cross-laminated timber; Low-carbon sand-blasted wood (Embodied Computation Lab, The Living); Low-carbon material prototypes (Benjamin Studio 5, Shuya Tang); Low-carbon material prototype (Benjamin Studio 5, Pablo Taberna); Physical model of materials designed to change over time (Benjamin Studio 4, Tonia Chi); Mycelium and 3D printed model (Benjamin Studio 5, Thomas Wegner).

sequestering wood, repurposed materials, prefabrication, and buildings as material depots. We will spend time making physical prototypes for low-emission materials and retrofit systems. Operating at multiple scales, we will create materials, design new buildings and infrastructure, and develop new systems for material flows and lifecycle impact.

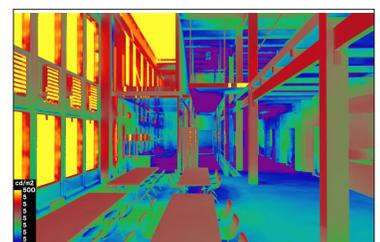
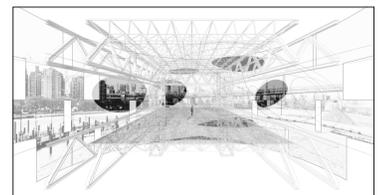
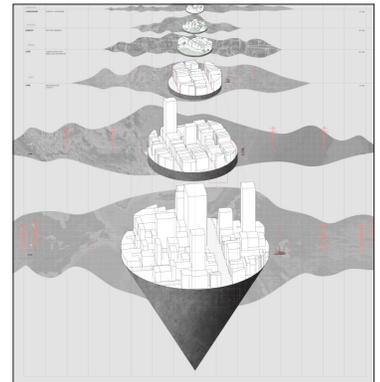
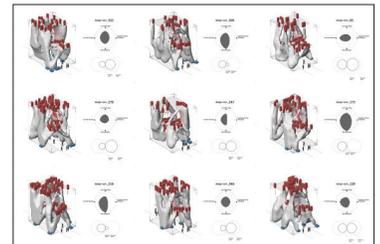
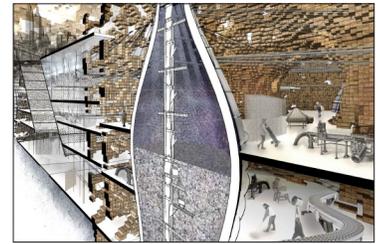
We will also explore the interconnections of low-carbon materials with some of the Green New Deal's most radical and challenging aims, such as upgrading every building in the U.S.; reviving domestic manufacturing; designing and constructing ten million no-carbon public homes; prolonging the useful life of objects and buildings through work in design and repair; promoting community-defined projects and strategies; inventing new ways of living; and creating meaningful jobs from design through construction.

3. BUILDINGS AS OPEN SOURCE SYSTEMS

In 1973, a young Swiss architect named Walter Stahel was looking for ways to save large amounts of energy (and by extension to reduce carbon emissions) in the construction industry. Instead of looking at technologies such as more efficient lighting or cooling, Stahel turned to behavior patterns and socioeconomic issues. Stahel and his collaborator, Genevieve Reday-Mulvey, eventually reached the conclusion that these problems could be best addressed by substituting manpower for energy. In a report called *Jobs for Tomorrow*, they wrote, "The creation of new skilled jobs can be achieved in parallel with a considerable reduction of the energy consumption through a prolongation of the useful life of materials and products." Stahel and Reday-Mulvey's line of thinking itself was not new. All accounts of industrialization involve the increase in productivity due to machines taking over the labor of humans, which translates to machines consuming energy (usually fossil fuel) to do work instead of humans consuming food to do work. But it was refreshing for Stahel and Reday-Mulvey to suggest that this trend could be selectively reversed through having humans take back some work from machines.

Of course much has changed since 1973, but Stahel and Reday-Mulvey's original argument about the need to look simultaneously at fossil fuel consumption and fulfilling employment is as relevant as ever—especially in light of the current wave of antiglobalization populism in Europe and the United States. Labor and environment should not be considered separate agendas. This studio will consider how architects might design jobs and materials as well as buildings and environmental impact. It will explore how labor and equality are necessary factors when considering urgent environmental issues. And it will address design in the context of time and change.

The Green New Deal Resolution calls for "upgrading all existing buildings in the United States and building new buildings to achieve maximum energy efficiency, water efficiency, safety, affordability, comfort, and durability." As the Architecture Lobby notes in their annotated version of the resolution, perhaps the most enlightened item in this list is "durability." Designing for durability is a radical



Images (top to bottom): Factory for production from waste (Benjamin Studio 4, Troy Lacombe); Community-built grown structure (Benjamin Studio 5, Lorenzo Villaggi); Direct air carbon capture technology (Climeworks); Environmental education center designed to change over time (Benjamin Studio 5, Carolina Almeida and Ricardo Souto); Production facility (Benjamin Studio 4, Yanling Deng); Recycling center (Benjamin Studio 4, Michael Hoehn); Environmental research station (Benjamin Studio 5, Lincoln Antonio).

notion in the contemporary culture of the built environment. In this studio we will explore architecture designed for a long duration, as well as buildings designed to be changed and upgraded over time. This may involve conceiving of buildings as open source systems rather than static objects.

In addition, we will explore prolonging the useful life of buildings through repair, renovation, and adaptive reuse. But we will go further and define buildings as living organisms to be nurtured rather than inert structures to be utilized.

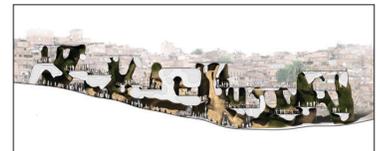
4. A NEW DISCIPLINE

In late September 2019, this studio will travel to Washington, D.C. by train for meetings with government agencies including the Corporation for National and Community Service (AmeriCorps) and the Army Corps of Engineers. We will then travel to Durham, North Carolina for a workshop with BioMason, Ginger Dosier's low-carbon materials company. These dual stops to investigate policy and architecture will help guide our design over the rest of the semester.

This studio will be structured as a mini-thesis project. Drawing on the topics, content, and research of the class, each student will design their own site, program, position, and 11-year impact in terms of both carbon emissions and equality. Each student will also explore new modes of practicing architecture.

In addition to reimagining our approach to the climate crisis, we will reimagine the discipline. We will challenge the hierarchies in the field. We will consider models of distributed leadership and authorship. As the Architecture Lobby suggests, "The form the AEC industry took during the mobilization of the New Deal, with many buildings not being attributed to a single architect and emphasis being places on buildings that served their purpose rather than buildings as marketing tools, sets a precedent for how we can move forward beyond the limitations of conventional development."

Building off of the urgent need to reduce greenhouse gas emissions, we will also address jobs and way architectural work is structured and carried out. We will reinvent materials, architecture, labor, and ways of life. And over the course of the semester, we will apply all of our theories, experiments, and imagination to the design of innovative and viable building proposals.



Images (top to bottom): Factory for low-carbon materials, made of low-carbon materials (Benjamin Studio 5, Chris Gardner); Same; Same; Great Mosque of Dejenne, renovated every year through a cultural event; Community center and participatory construction (Benjamin Studio 5, Lorenzo Villaggi); Cooperative worker-owned carbon negative tower (Benjamin and Wikstrom Studio 6, Russell Einbinder and Samuel Guenin).