

Drawdown: Play to Enter - Representing Climate Activism Through Gameplay

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AGENCY AND INTERPLAY

“Drawdown: Play to Enter” is a cooperative game designed to simulate the joys of negotiation and collective action required to work through climate strategy and resource management in the built environment. Disciplinary approaches to representing climate activism often focus on a fixed condition of intervention (before vs. after), whereas game design embodies the active qualities of negotiation, compromise, balance, and incremental progress that occur in the in-between. By introducing the concept of interplay¹ to architectural frameworks on the climate, game design expands the territory of architectural agency to model complex mechanisms of environmental stewardship that engage in scientific processes and stakeholder ecologies.

The project leverages the fundamental principles of games as a medium of agency.² Using the large table game board as a representational tool for our shared domain, players in DRAWDOWN are tasked with the shared responsibility of mitigating carbon outputs through the introduction of drawdown technologies while maintaining critical public programs.

RESEARCH STRATEGY

According to Architecture 2030, the built environment is responsible for nearly 50% of annual global carbon emissions.³ It is important for architects to understand that these emissions are entangled upstream and downstream in other sectors that engage the discipline in various ways. Addressing emissions reduction cannot be contained to solutions at the building level – rather, architects should engage with other sectors to envision how decarbonization manifests in our cities through unconsidered built forms. The spectrum of drawdown practices range in technology, scale, and timeframe.

Research for the game’s decarbonization database comes from Paul Hawken and Project Drawdown⁴ who have catalogued the most effective strategies to lowering GHG emissions, the majority of which are rooted outside of architecture. These processes encourage architects to look beyond the discipline to unlock the design potentials of industrial, agricultural,

energy, and carbon capture operations. DRAWDOWN also embraces the speculative, scenario-based thinking embodied in Holly Jean Buck’s *After Geoengineering*⁵ which asks players to earnestly take on the ethos of climate maintenance in our near-future world.

GAME DESIGN

The central theme of DRAWDOWN is understanding carbon as a shared neutral resource which requires delicate balance and maintenance. Within the shared domain of the game table, there are two categories of agents (Operations vs. Programs), each with their own affordances. Players strategize how to introduce emissions-reducing processes (Operations) by allocating resources while maintaining existing infrastructure (Programs) that unavoidably releases GHG into the atmosphere.

Operations + Drawdown Rate:

The game highlights four categories of Operations (see Figure 2): Industry, Agriculture, Energy, and Carbon Capture. The initial research phase of the game features thirty-six unique operations (see Figure 4) across these four sectors. Some operations are considered hybrid in nature, such as Agrivoltaics and Solar Grazing (see Figure 9). Each Operation type is assigned multiple characteristics: 1) Drawdown Rate, 2) Resources Required to Build, and 3) Resource Gains, all which are described on their Operation Card (see Figure 4). In summary, these Operations absorb GHG emissions at a specific rate per turn but also require certain resources to be implemented. They might also generate other types of resources in return.

Programs + Emissions Rate:

While Operations reduce carbon emissions, Programs emit GHG equivalents into the atmosphere. These programs, however, are considered vital public infrastructure which cannot be immediately decommissioned but should rather be incrementally offset and balanced through strategic thinking. The game focuses on four categories of Programs: Hospitals, Government Buildings, Schools, and Housing. Each type of Program emits carbon at a specific rate (see Figure 3).

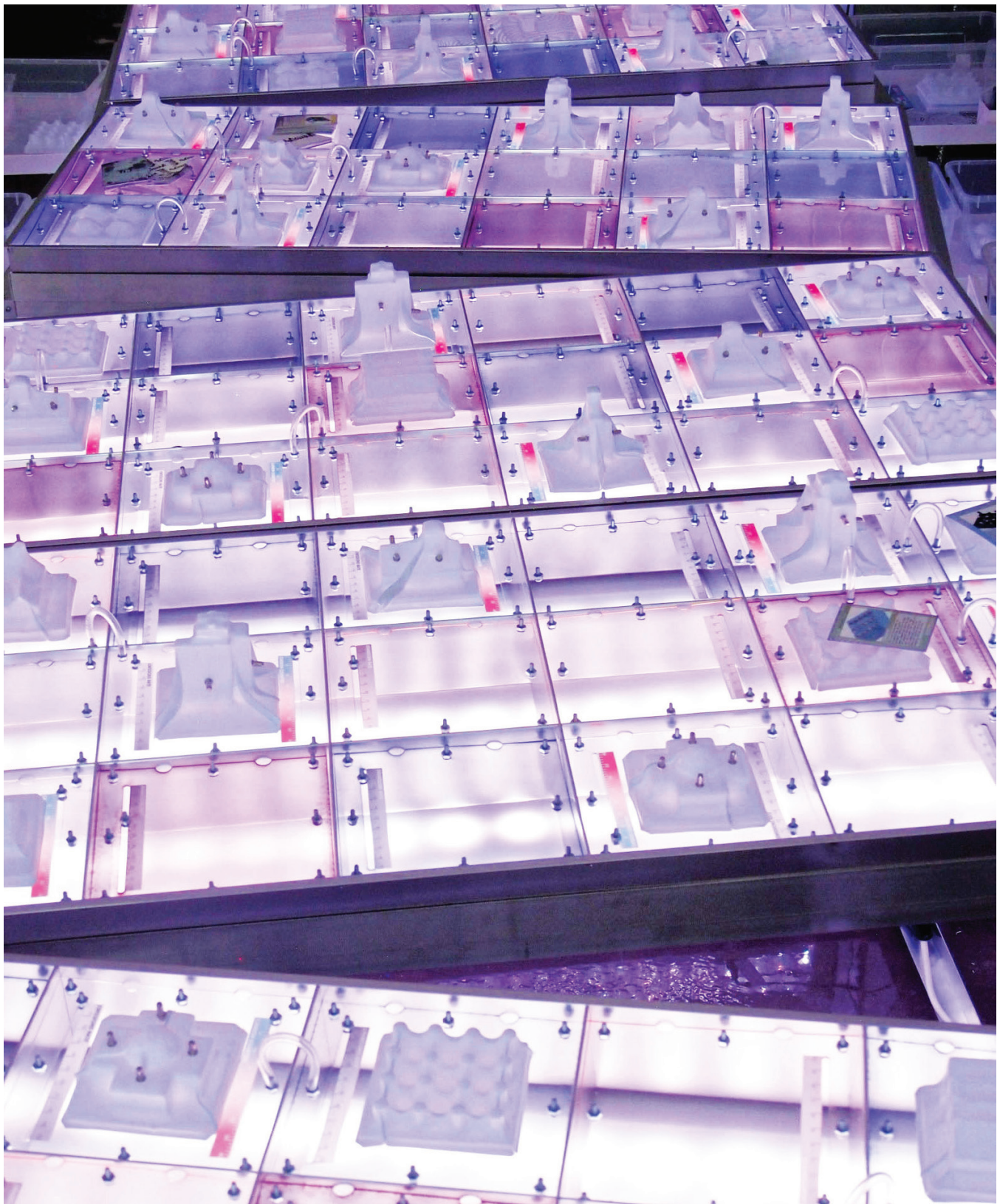


Figure 1. Operation and Program pieces populate the game table. On each tile, sliders account for drawdown and emissions rates. All photos by author.

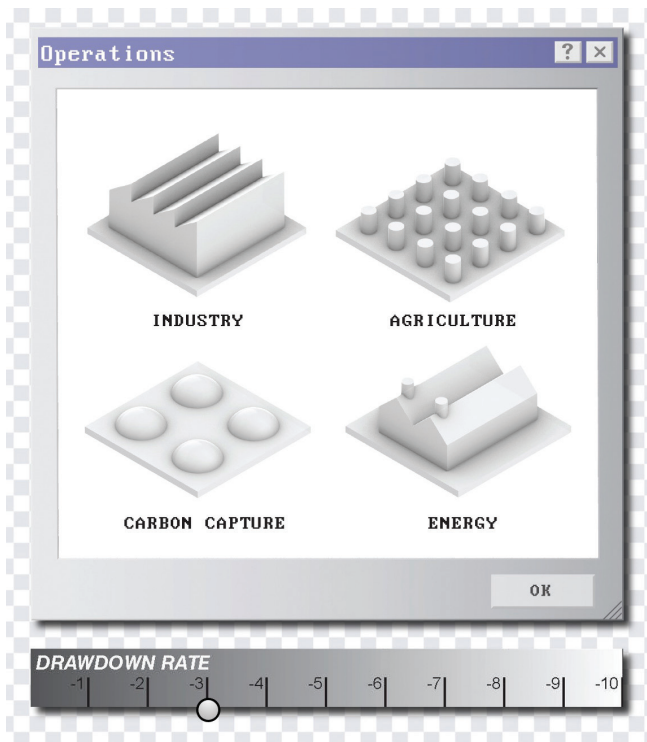


Figure 2. Operations are categorized under four distinct sectors.

Resources:

While Operations and Programs negotiate through a net balancing of Drawdown and Emissions rates, all actions are fundamentally mediated and made possible through a suite of Resource Cards. The four types of resources include: CO₂, H₂O, Food, and Energy (see Figure 4).

GAME MECHANICS

On the game table, there are two types of terrain tiles (see Figure 8). Operation Tiles are ready to receive Operations once players collect the necessary resources to build them. Operation Tiles also feature a Drawdown Rate Counter which indicates the units of carbon absorbed per turn. Program Tiles feature a Carbon Counter which increases with each turn, cumulatively collecting the emitted carbon from the Program. The game has a maximum Carbon Counter of 40 units (see Figure 7). Players must work together to avoid reaching 40 units on any Program Tile or otherwise face climate disaster and game termination.

At the beginning of the game, each player is dealt several Operations Cards. With each turn of the game, players draw Resource Cards with the objective of introducing Operations to the table, thereby reducing the Emissions Rate of the Program

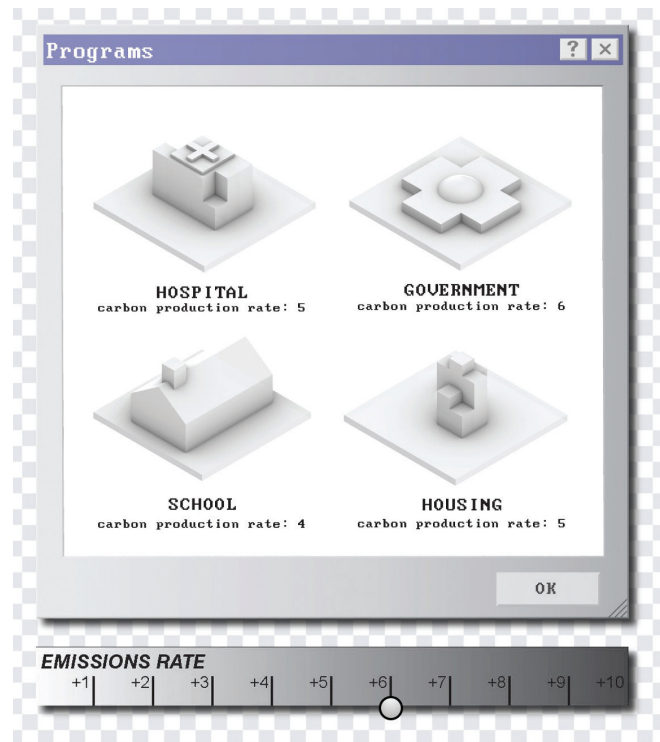


Figure 3. Four Program types follow varying emissions rates.

pieces. Once an Operation is tied to a Program, a link is made between the two tiles (see Figure 5).

As players take turns accruing Resources, building Operations, and lowering Emissions Rates, they become aware that improving climate conditions is a continuous juggling of rates and exchanges, not achieved through one-time transactions or quick fixes. Players collaboratively introduce solutions to offset the carbon emissions of critical public infrastructure, all the while being cautious of the holistic resource cost required for such strategies to take place.

GAMES AS ACTIVE FORMS

The DRAWDOWN game is an active form⁶ that represents the constant flux and continual work involved in moving towards decarbonization in our building stock. It addresses the equation that solutions require resources, and that environmental stewardship relies on considering solutions at multiple scales, even when they come into direct conflict with one another. The game also acknowledges that climate activism from an architectural perspective requires deep engagement with science, technology, and extra-disciplinary research. Modeling the entanglement between public stewardship and infrastructural strategy, the game prioritizes banal and non-canonical architectural typologies as complicated pieces to solving the climate puzzle. Nonetheless, envisioning a sustainable world requires bold, joyful imagination that exceeds the pragmatism of science and policy. By working through games, architects can explore both the object and process aesthetics⁷ of designing

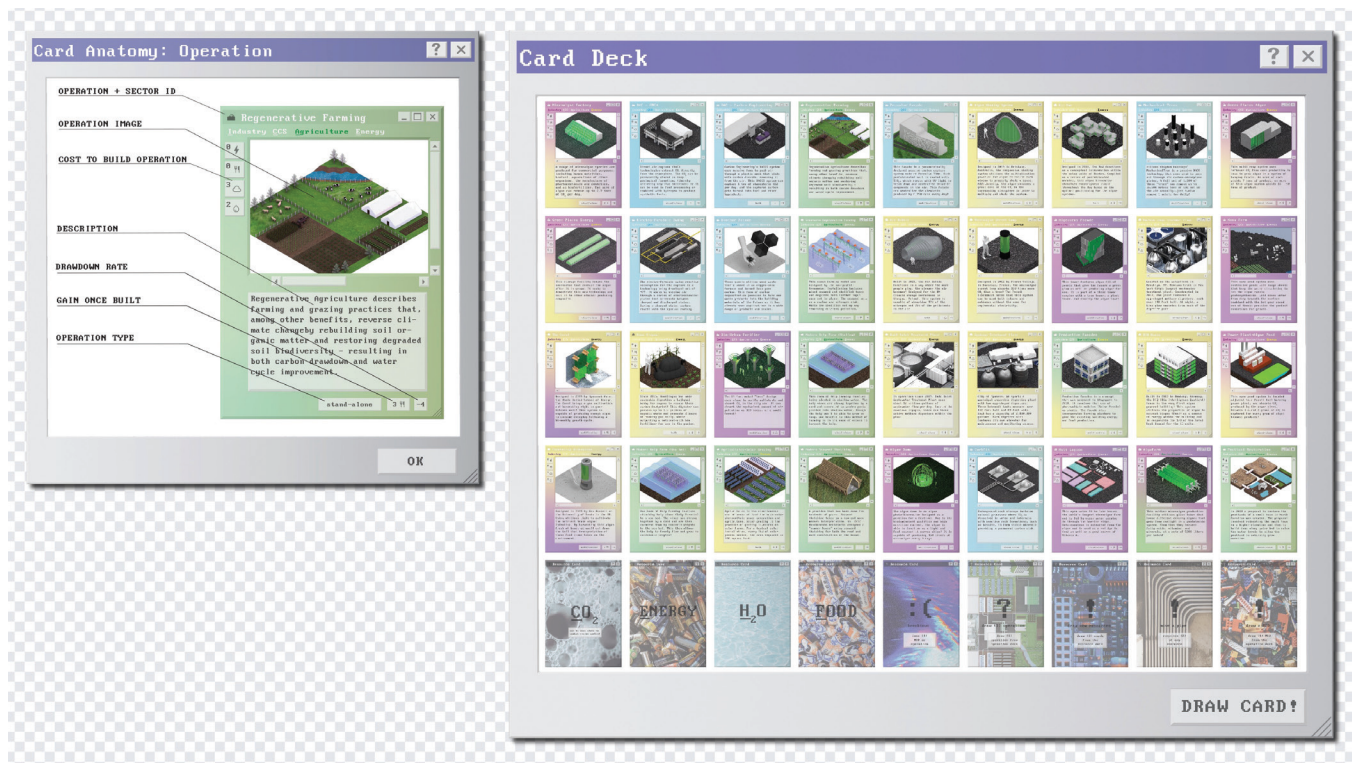


Figure 4. Operation card design (left) and complete card deck (right).

for climate change. Players are encouraged to embrace a simultaneous sense of urgency and euphoria as they play together to cool the planet.

LIST OF OPERATIONS:

Energy

- Budd Inlet Wastewater Treatment Plant, WA
- City of Spokane Wastewater Treatment Plant, WA
- Newtown Creek Wastewater Treatment Plant, NY
- Eco Pod, Squared Design Lab, MA
- Air Bubble, EcoLogic Studio
- Microalgae Street Lamp, Pierre Calleja
- Countertop Bioreactor, University of Leeds
- Algae Shading System, Polytechnic College of Turin
- BIQ House, ARUP, Germany
- HomeBiogas

Carbon Capture

- Orca, Climeworks (Direct Air Capture)
- Carbfix, Iceland
- Carbon Engineering (Direct Air Capture)
- Mechanical Trees (Passive DAC)

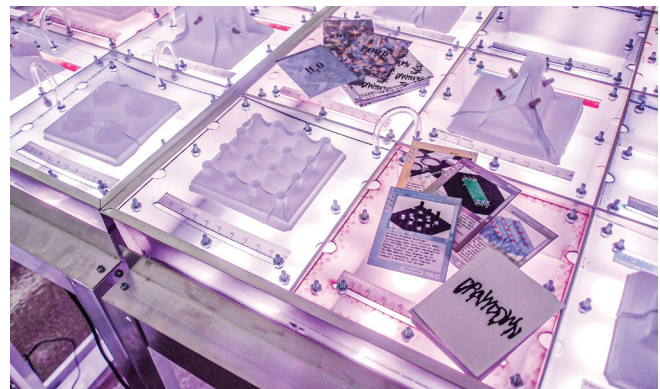


Figure 5. Operations are linked to Programs through carbon rates.

- Prosolve370e Façade Tiles
- Biochar Façade Tiles, Made of Air
- Fardaic Electro-Swing

Agriculture

- Peatland Restoration
- Regenerative Ocean Farming
- Productive Facades
- Regenerative Agriculture
- Agrivoltaics & Solar Grazing
- Modern Seaweed Thatching

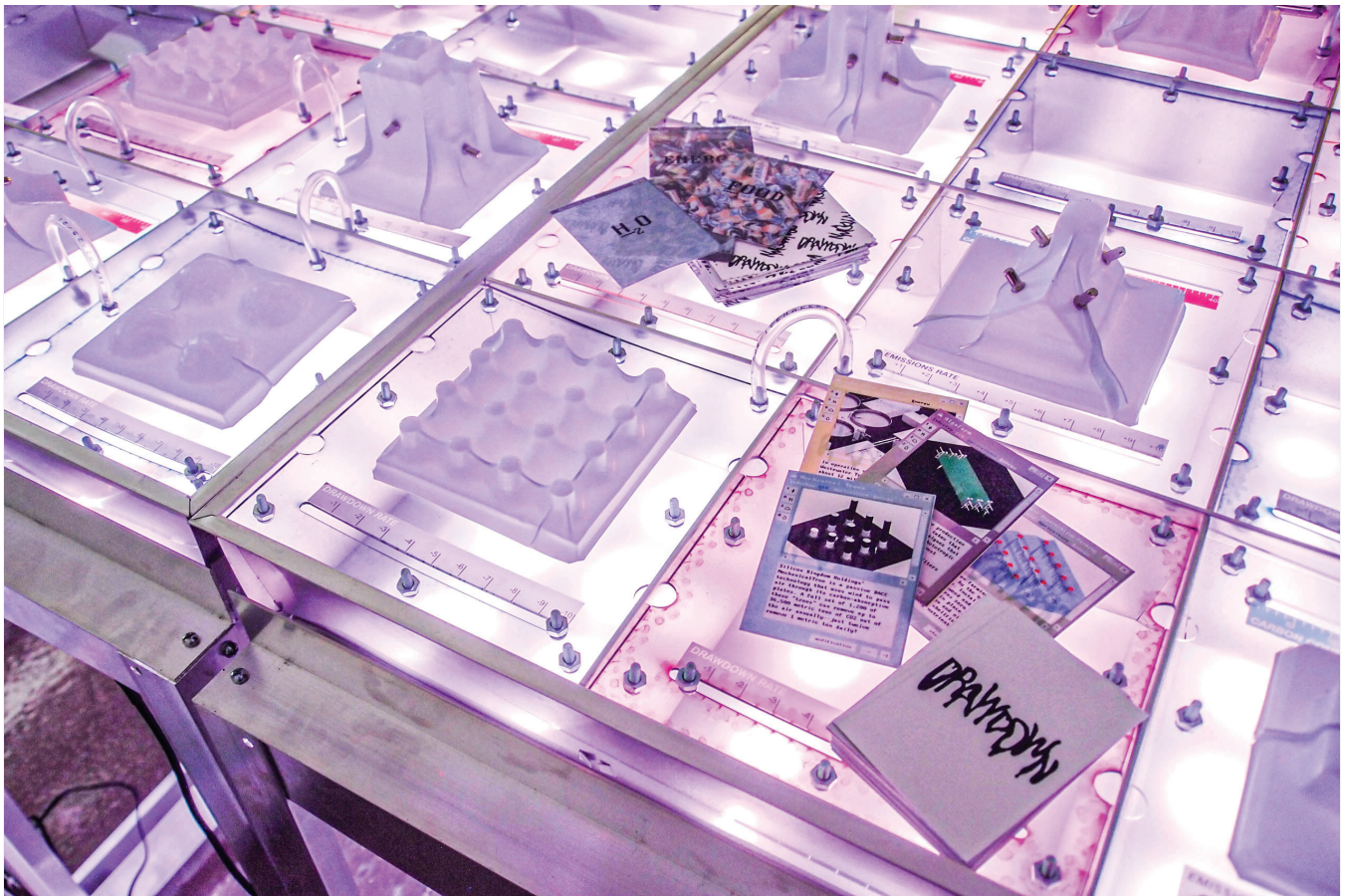


Figure 6. Players manage their hand of Operation and Resource cards, attempting to lower emissions rates and maintain critical infrastructure.

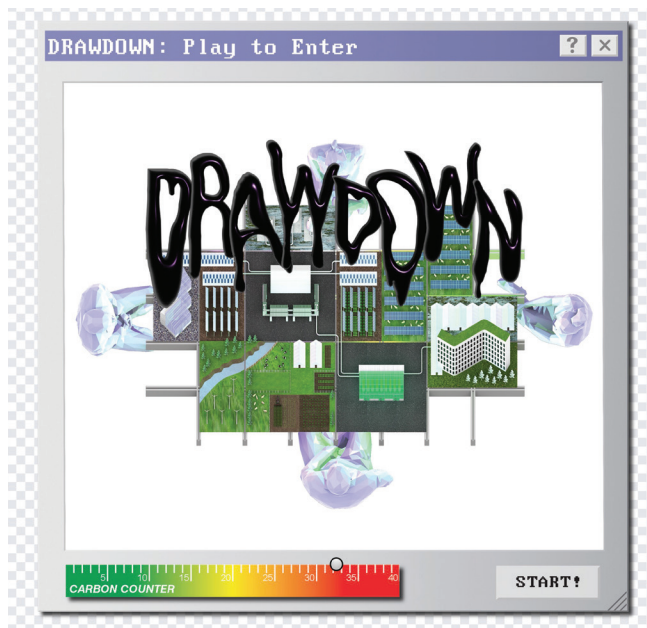


Figure 7. The Carbon Counter marks the urgency of climate collapse.

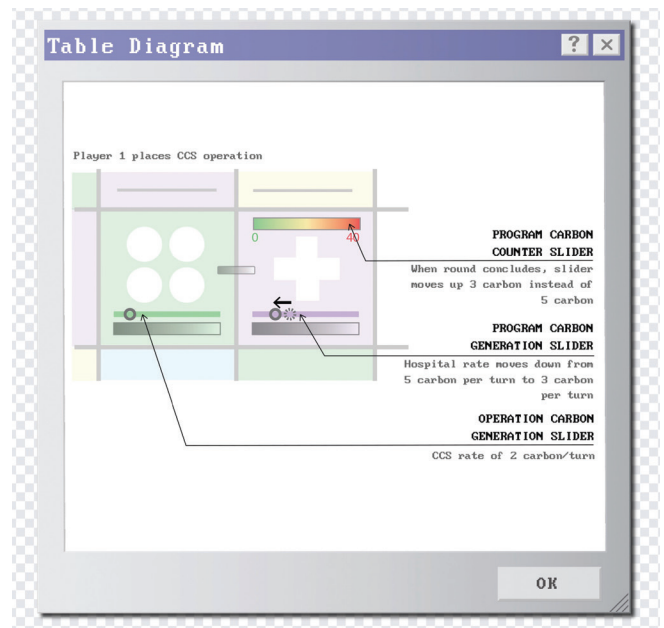


Figure 8. Sliders and links allow the game to work through active forms.

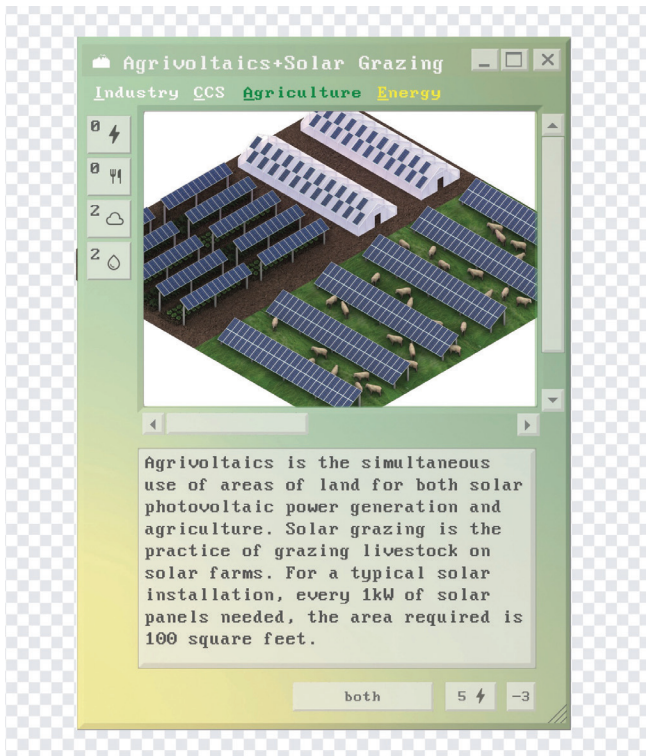


Figure 9. Card design for *Agrivoltaics + Solar Grazing*.



Figure 10. Card design for *Direct Air Capture - Orca Model*.

- Seabed Kelp Farming
- Shallow Water Kelp Farming
- The Coral, Hyunseok An, RISD

Industry

- Hutt Lagoon Algae Farm, Australia
- Algae Dome, Space10
- Algafarm, Portugal
- Green Plains Energy and Storage, IA
- Kona Algae Farm, HI
- BioUrban Purifier
- Microalgae Factory, Germany
- Power Plant x Algae Pond
- In Vivo Algae Façade, XTU Architects

ENDNOTES

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