2026 FIRST PRIZE

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HARVARD UNIVERSITY GRADUATE SCHOOL OF DESIGN

FACULTY ADVISOR — JONATHAN GRINHAM

LYCEUM

A traveling fellowship in Architecture

Good Shit: From Waste to Commons

LF-12321
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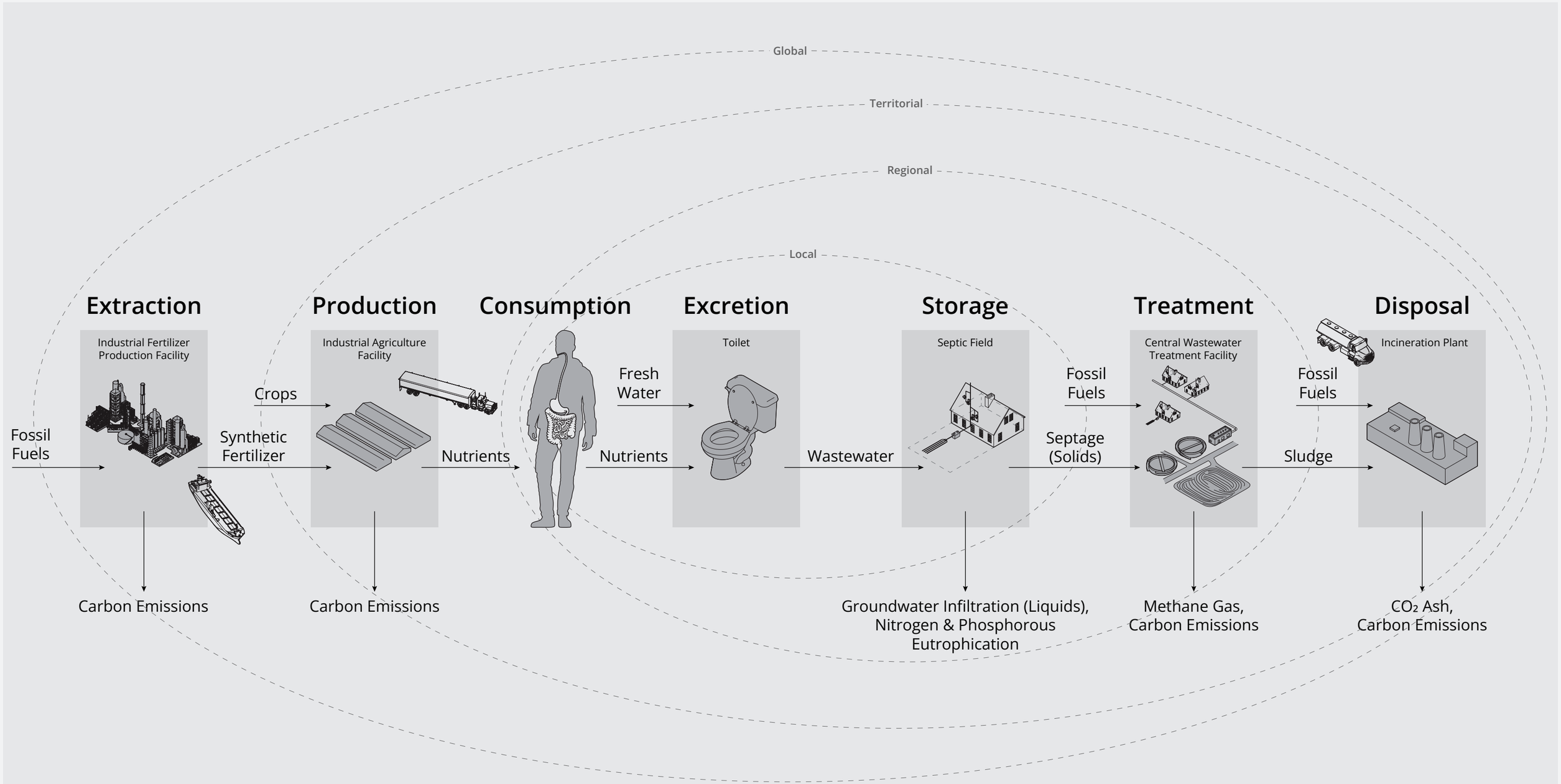


Dead End Nutrient Flow

Cape Cod's wastewater infrastructure embodies a vast, broken nutrient cycle entangled with global petro-systems. Nutrients are brought in at great expense, and nutrient-rich excrement is brought back out to be incinerated, with large carbon emissions at each step – hard-fought nutrients quite literally going up in smoke.

Geopolitical Uncertainty

Food sources on the Cape depend on global fertilizer supply chains tied to fossil fuels and foreign production. The majority of the US's fertilizer comes from Russia and China via the Strait of Hormuz. Geopolitical disruptions reveal the vulnerability of relying on distant industrial infrastructures for essential nutrient resources.

Economic and Ecological Fragility

Runoff from domestic septic systems concentrate nutrients, primarily nitrogen and phosphorous, in fragile coastal ecosystems. This over-fertilizes ponds and coastlines, fueling toxic algae blooms that destroy aquatic life, cause disease, and threaten Cape Cod's water-dependent tourism economy.

Restrictions to Equitable Development

In unsewered parts of Massachusetts, like most of Cape Cod, Sanitary Code Title 5 mandates setbacks and other capacity-based spatial restrictions on septic systems, leachfields, and reserve fields, which prevent housing affordability and density by constricting the viability of building anything other than single family homes.

Cape Cod Community Composting Cooperative

Founding Manifesto

Modern sanitation is a planetary design problem, linking architecture, ecology, and the politics of human metabolism. Freshwater-based plumbing hidden in the walls of our homes and beneath the streets of our cities forms the digestive tract of the built environment, connecting domestic interiors to distant landscapes. This infrastructural apparatus transforms excreta – with nutrients vital to soil fertility – into "waste," rupturing the reciprocal cycle between humans and the environment. Nutrients lost as effluent leachate are synthetically replenished with fossil-fuel-derived fertilizers, sustaining a globalized, extractive petrochemical industry. In Cape Cod, the consequences of this broken system are acute: septic effluent seeps into fragile coastal ecosystems, fueling toxic algae blooms and endangering human, ecological, and economic health.

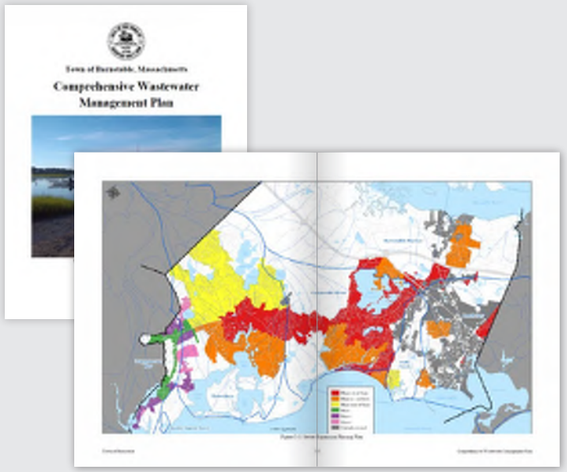
Historically, societies worldwide maintained circular human-nutrient systems through the collection and reuse of "night soil," transforming excreta into valuable fertilizer used as an agricultural resource. In pre-modern Asian societies, notably, this practice was central to thriving regional economies; yet, this cultural attitude and social-infrastructural systems were displaced as a result of colonial modernity, which prioritized the appearance of purity and cleanliness even if it meant producing unsustainable externalities. On Cape Cod, the New Alchemy Institute's 1970s experiments in closed-loop living sought to give architectural form to metabolic balance. Positioned within this lineage, we ask: by revaluing excrement not as waste but as nutrient-rich resource, what hybrid spatial forms, community-empowering local economies, and modes of public life might emerge?

With this founding manifesto, we are establishing the Cape Cod Community Composting Cooperative and asserting the following principles to be vital to the creation and maintenance of a regenerative resource ecosystem:

1. Waste is food
2. Water is sacred
3. Keep metabolism local
4. Touch the ground lightly
5. Resilience through disaggregation
6. Power in collectivity
7. Infrastructure belongs to us

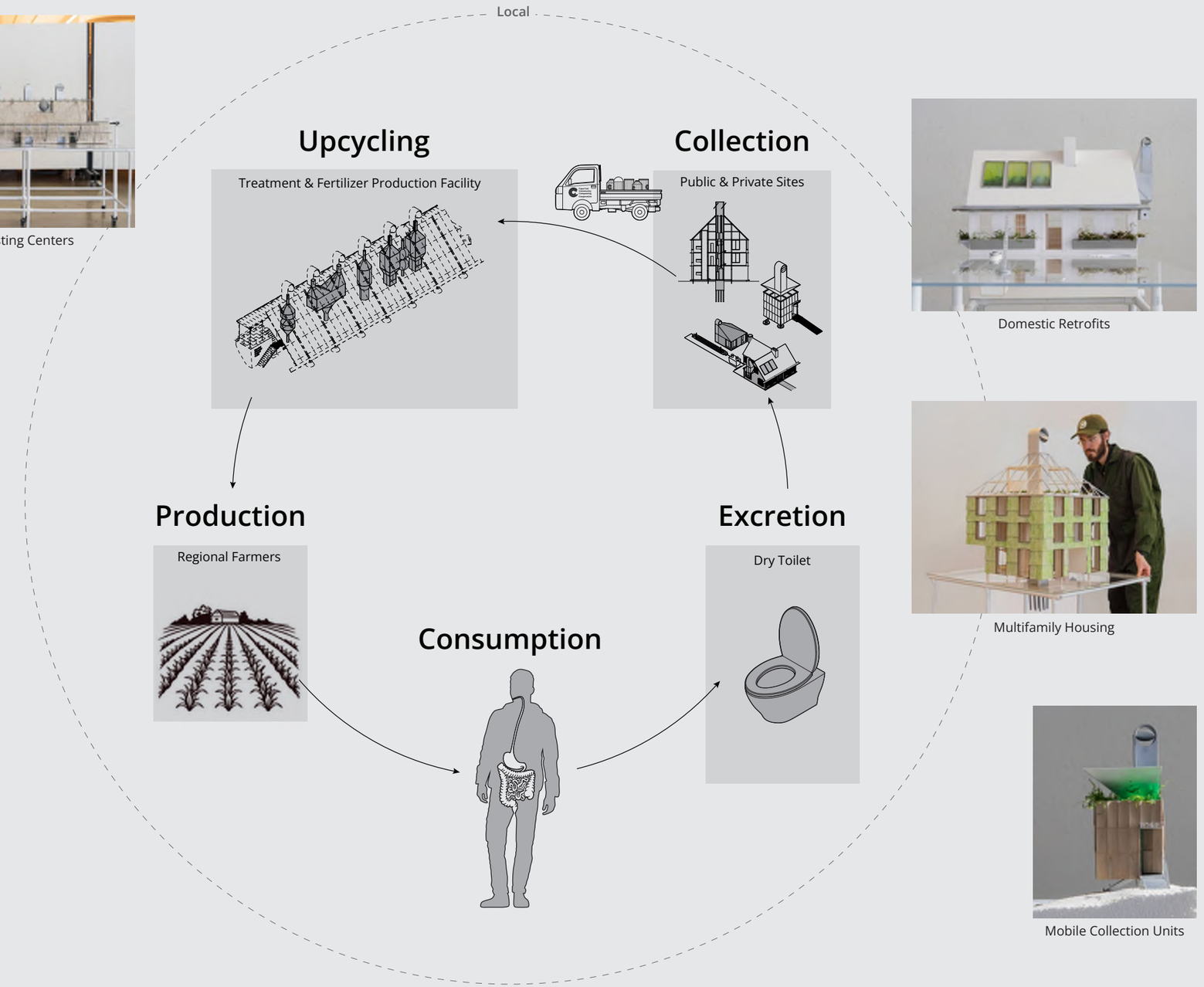
Our community-owned and operated network for human excreta composting and upcycling in largely unsewered Barnstable, Massachusetts is articulated across four interconnected scales – public space, domestic, civic, and regional. Through cooperative governance and public participation, we seek to reimagine sanitation as visible, social, and regenerative infrastructure, connecting bodies, buildings, and landscapes within a renewed cycle of ecological reciprocity.

Massachusetts Title 5
Sanitation Code



Barnstable Wastewater
Management Plan, 2020

Community Composting Centers



Domestic Retrofits

Multifamily Housing

Mobile Collection Units

Counter-Proposal

Fed up Barnstable residents banded together to found the Cape Cod Community Composting Cooperative (CCCCC). Taking matters into their own hands, they fight back against the Town's $2 billion proposal to enlarge the existing small Wastewater Treatment Facility, which would further centralize wasteful nutrient imbalance.

Local Networks of Nutrient Recycling

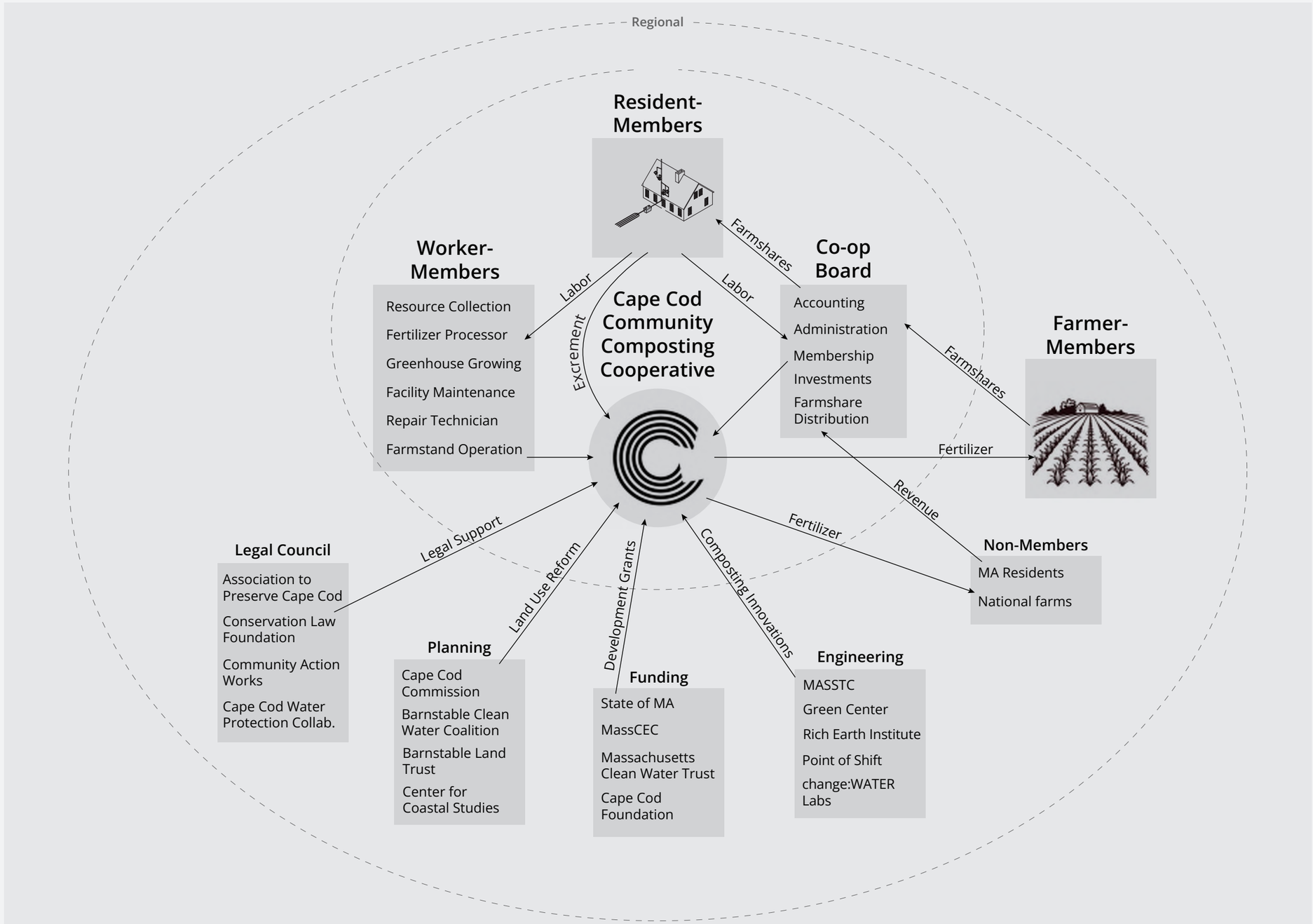
The CCCCC is a localized, community-owned nutrient micro-economy. Through the deployment of low-tech excrement collection and composting systems across numerous scales in both domestic and civic life, nutrients are upcycled and remain in the region, and do not rely on polluting fuel sources.

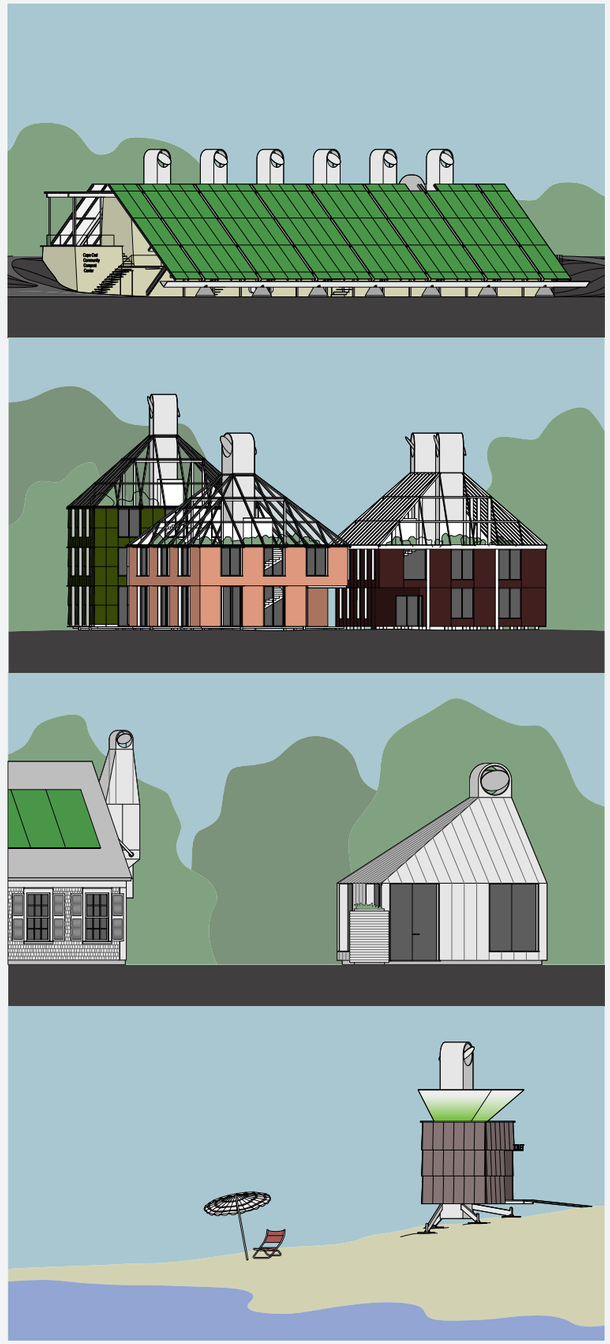
Regional Agricultural Empowerment

After natural composting processes treat the excrement, the output fertilizer is delivered at no cost to local farms. Farmers, whose fertilizer costs had previously been at the whim of economic fallout from wars with global petro-states, now have a reliable, affordable way to provide organic nutrients back to their local economy.

Liberated Housing Policies

Without costly and land-intensive subterranean septic systems to temporarily store excrement, strict land restrictions are removed allowing for more permitted housing types – ADUs and multifamily buildings designed around excrement collection – which increase density and help resolve the Cape's affordable housing crisis.





Cape Cod Community Composting Cooperative

At the core of this nutrient recycling social-infrastructure is the Cape Cod Community Composting Cooperative, a 501c(3) entity owned by resident-members, worker-members, and farmer-members. The Co-op manages the safe and efficient exchange of excrement, fertilizer, and farmshares.

Planning and Regulatory Agencies

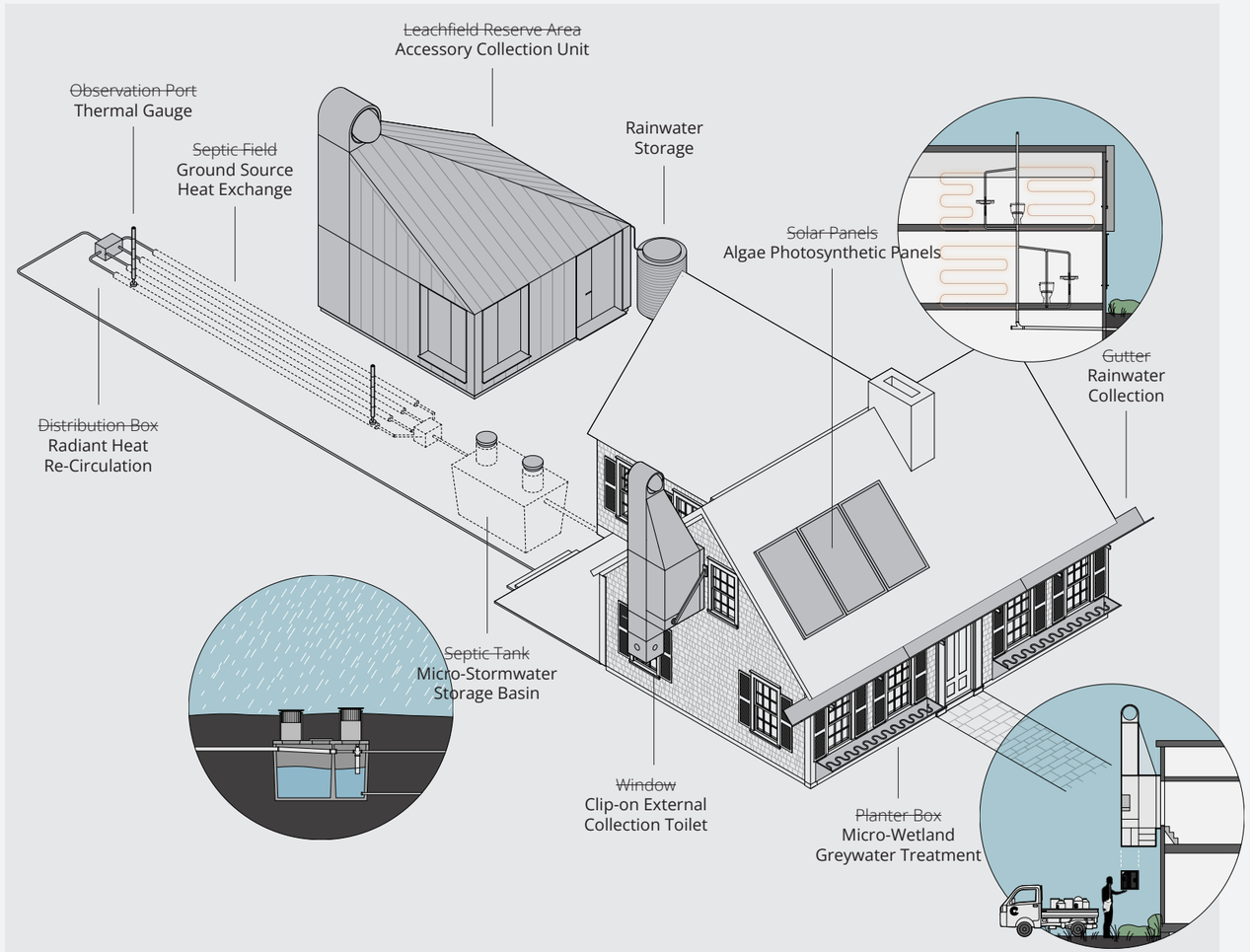
Numerous environmental protection and organizing agencies like the Cape Cod Coalition and Barnstable Clean Water Coalition contribute regulatory, planning, and legal expertise; the State of Massachusetts and local organizations like the Cape Cod Foundation provide initial seed funding.

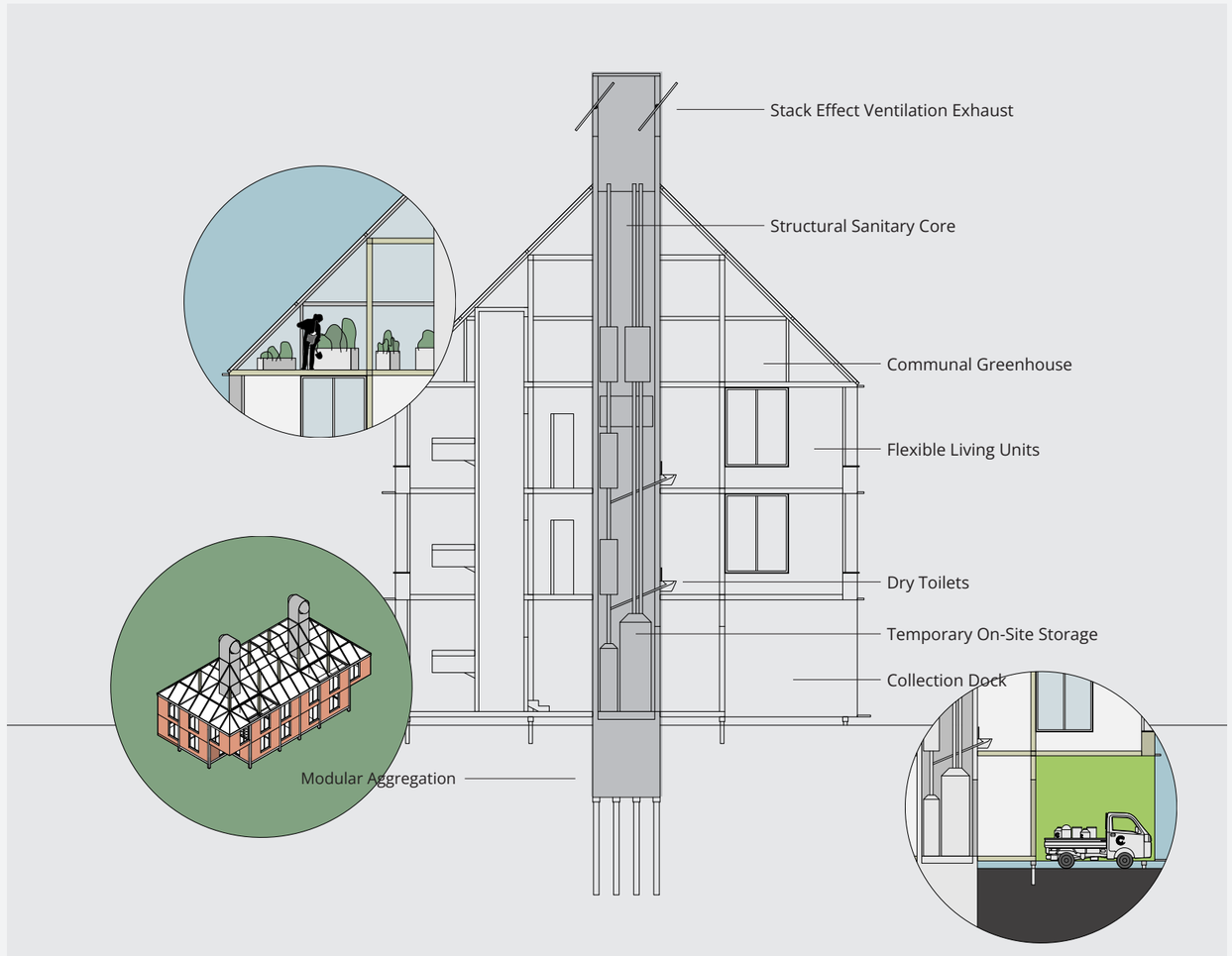
Self-Sustaining System

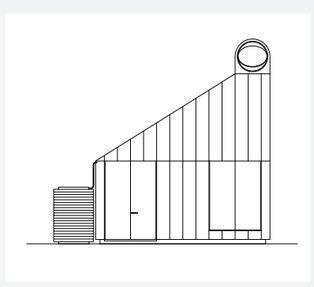
Surplus fertilizer and farmshares are sold regionally to non-members. This revenue allows the Co-op to sustain itself without federal or state support, pay worker-members well, and invest in infrastructural improvements over time, like a fleet of electric excrement-collection vehicles or new forms of composting technologies.

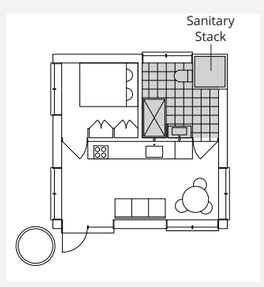
Bottom-Up Advocacy

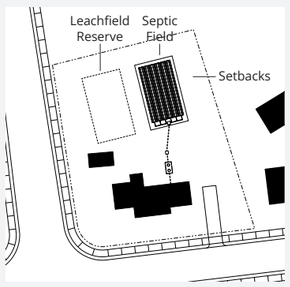
Rather than an infrastructural paradigm being imposed top-down by the Town of Barnstable, the CCCCC is a community-driven organization instigated, organized, and operated by the community members themselves. This radical formation allows for more direct representation, benefit, and flexibility.

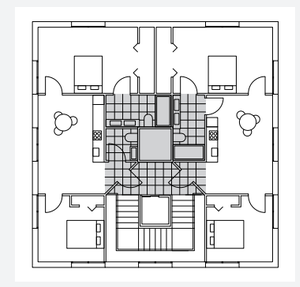












Repurposing Vestigial Sanitary Waste Infrastructure

Clip-on interventions from the CCCCC disconnect houses from their septic systems. The vestigial waste infrastructure is cleaned and re-purposed as tools for environmental resiliency, such as septic tanks as micro-stormwater basins for floods, plumbing lines as radiant heating, and leachfields as ground-source heat exchangers.

Expanded Use of Domestic Plots

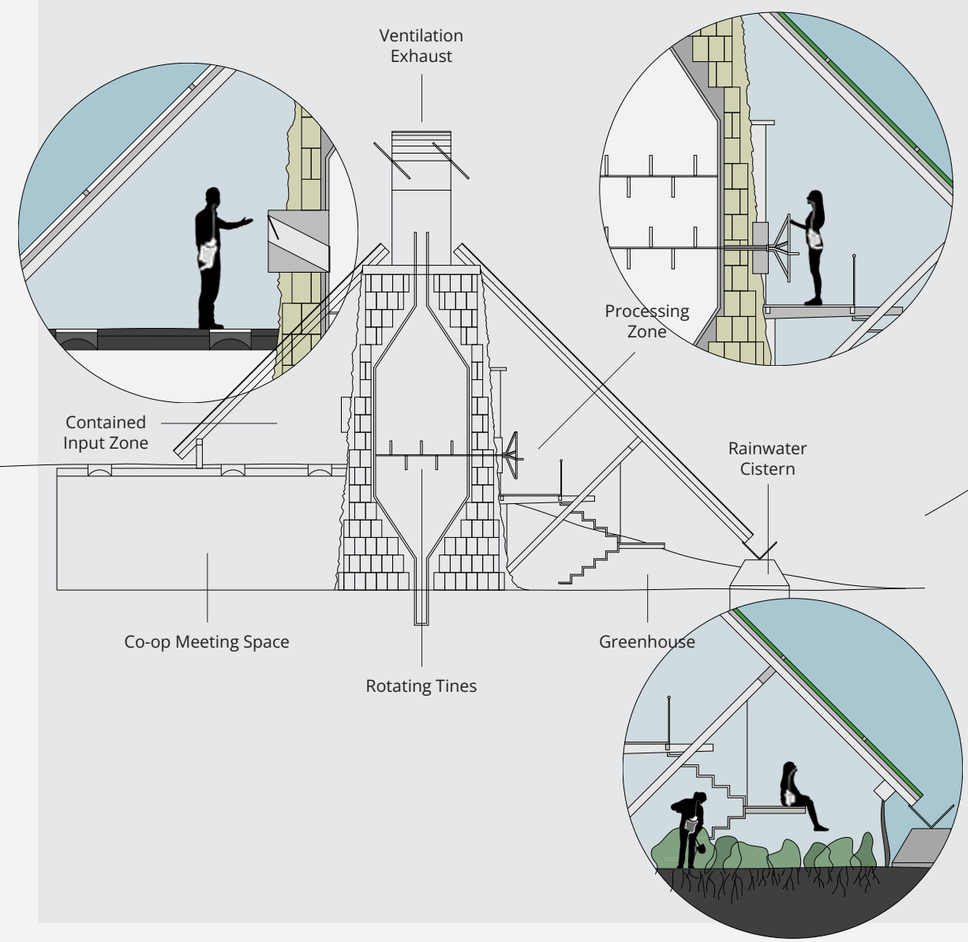
Previously, Title 5 mandated an un-buildable leachfield reserve slated for a future drainfield when the existing system inevitably fails. Now obsolete, this reserve area can host a backyard cottage designed around efficient excrement collection, helping to alleviate the affordable housing crisis in the region.

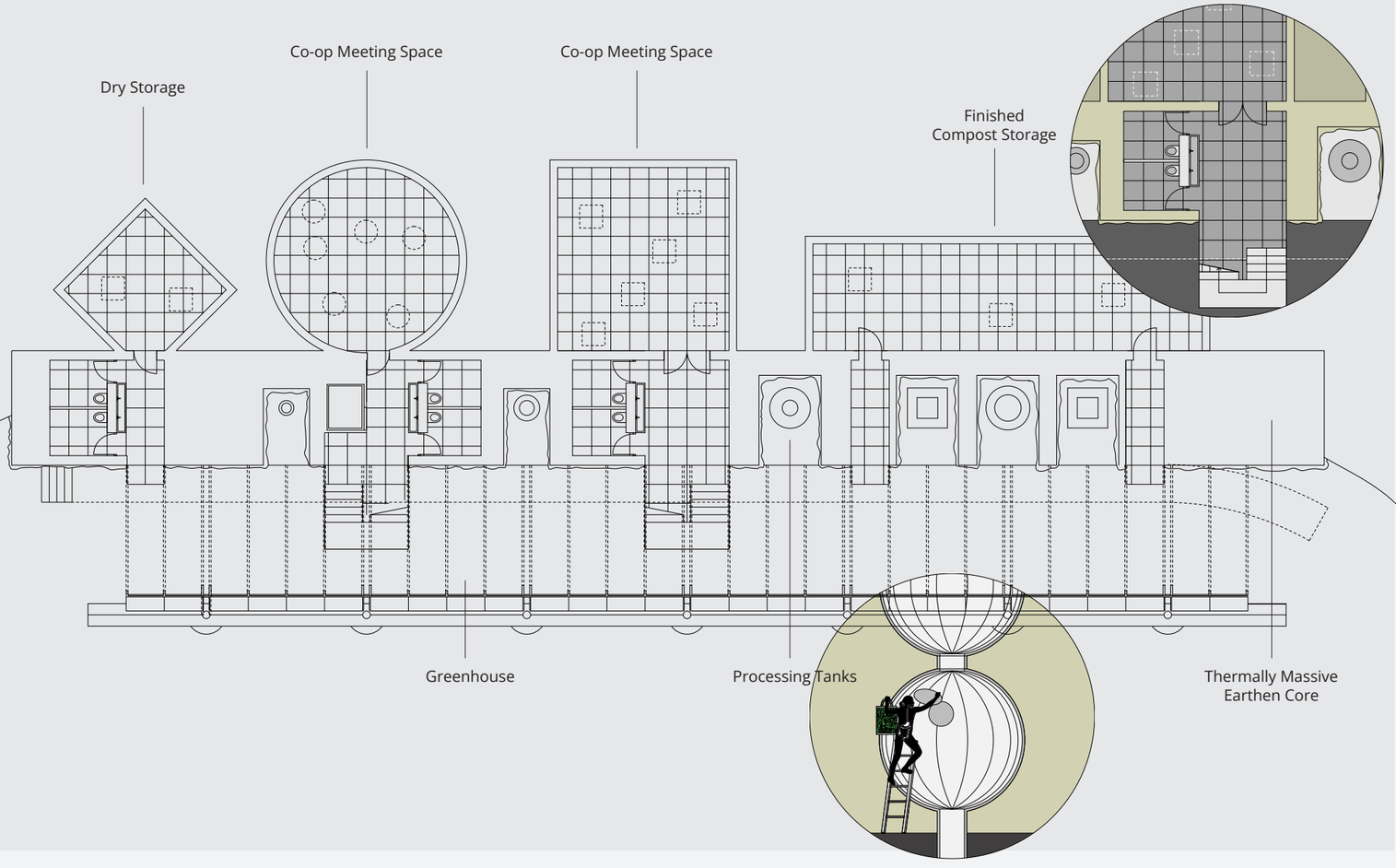
Design for Collection

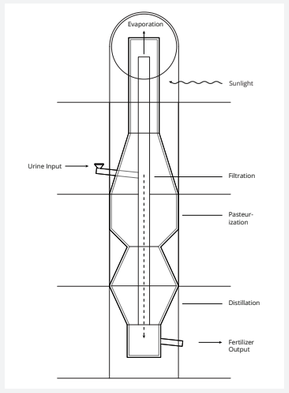
This multifamily building is designed around a central sanitary core. A rooftop greenhouse allows residents to grow their own food with fertilizer from the Co-op. Facade cladding uses low-carbon lime-stone from algae biomineralization, reframing algae away from a toxic entity in ponds, toward an expressive, celebratory material.

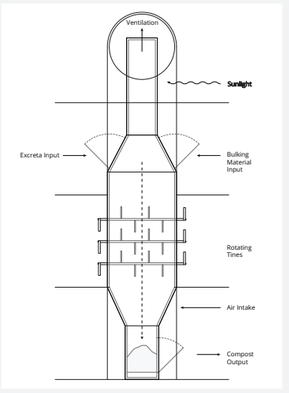
Denser Development Patterns

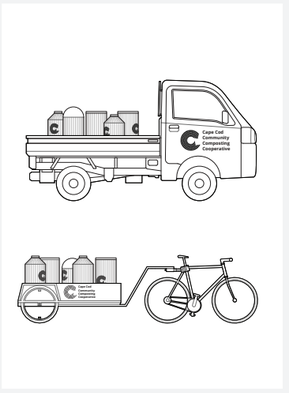
The Title 5 reform allows for denser development if buildings do not rely on a septic system. The units are flexible in size, allowing for intergenerational living. All bathrooms are organized around the central sanitary core, allowing for optimal collection.











Community Composting Center

Community Composting Centers are equal parts fertilizer factory, greenhouse, and Co-op Chapter Town Hall. They are sited to serve residents within a mile radius, and the number of modular processing cores varies depending on the size and load needs of their community.

Expressive and Engaged Processes

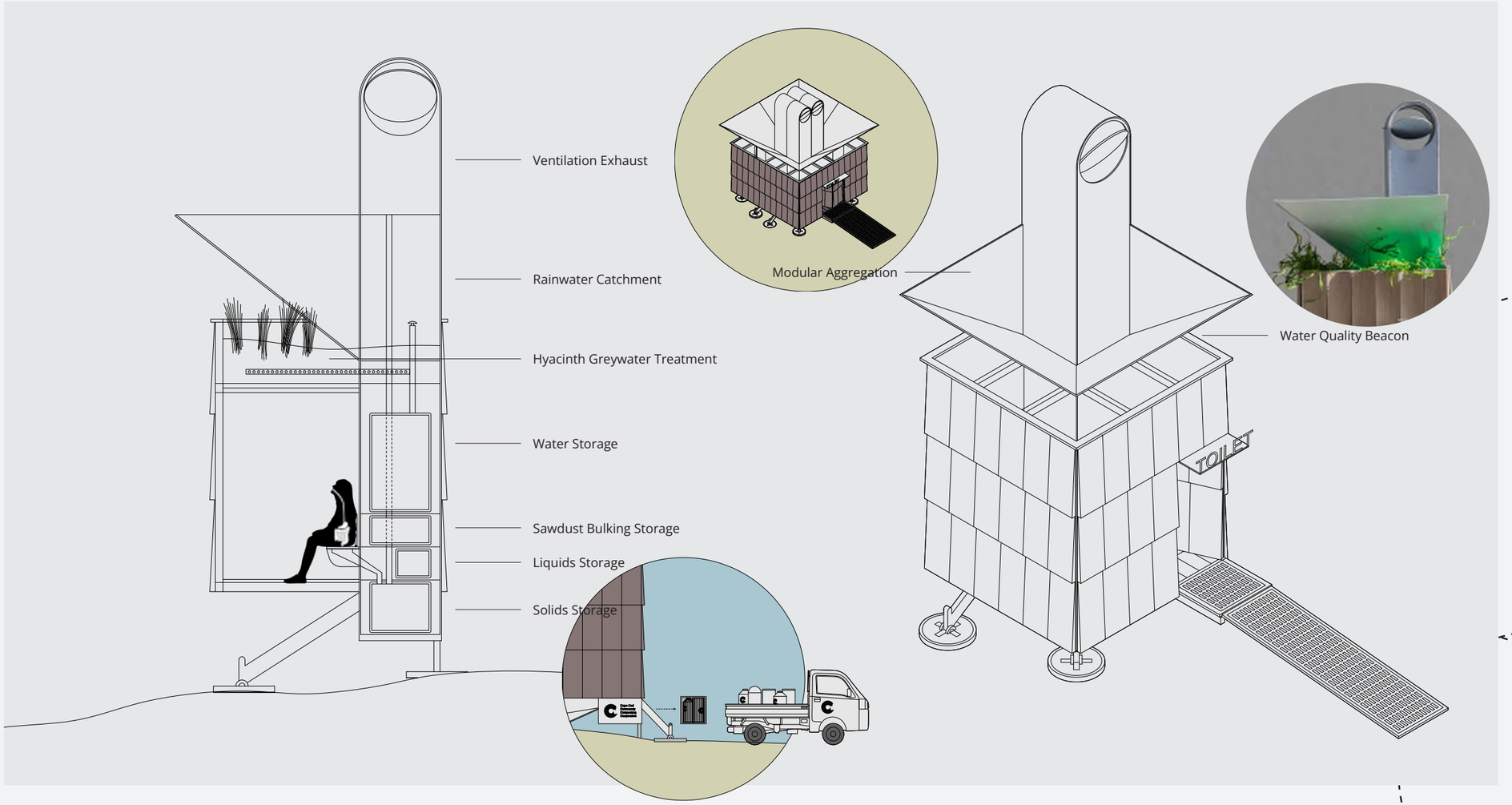
The building acts as an extension of the human body – the numerous processing tanks act like organs, metabolizing nutrients and energy. The structural earthen wall around the tanks absorb heat from the composting process and releases it into the greenhouse, maintaining optimal temperatures year-round.

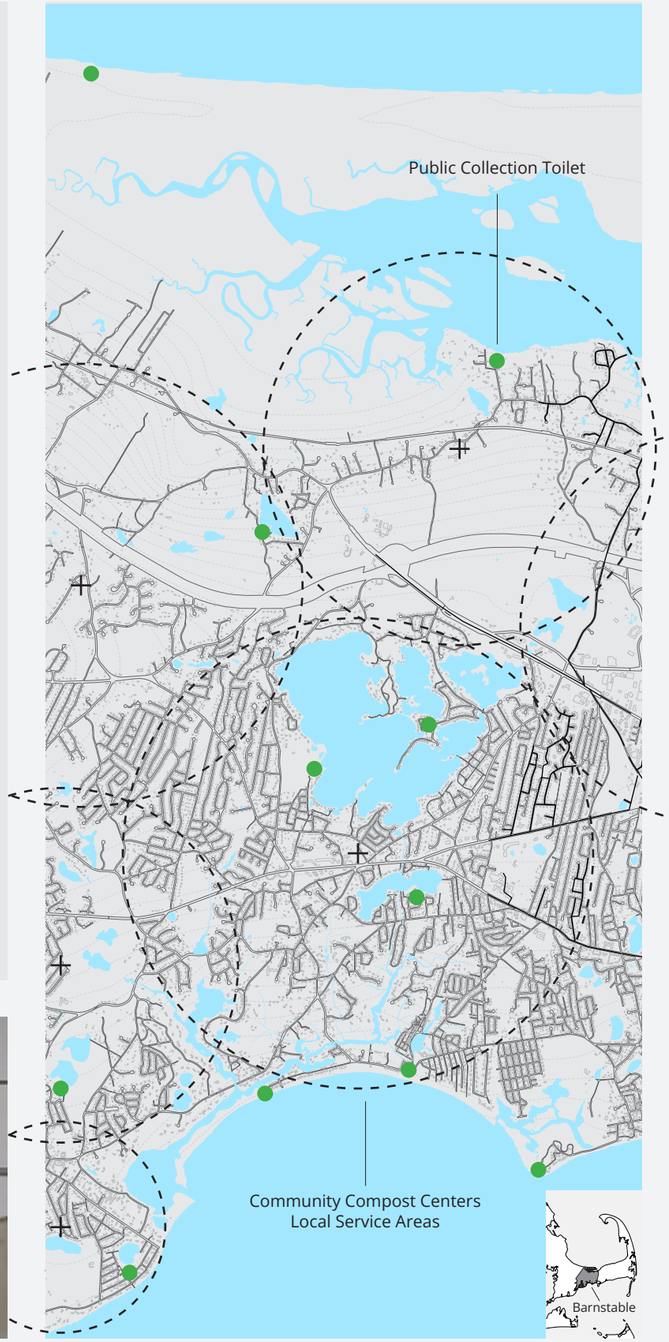
Excremental Upcycling

The composting tanks are simple and low-tech. Solids and liquids are input into separate cores on the second level. Over several months as the excrement makes its way toward the lower level, aerobic microbes break it down into stabilized, safe-to handle compost, fit for applying on food-grade crops.

Cultural Shift

The beneficial outputs of this infrastructure are experienced legibly throughout residents' daily life. As such, the cultural perception toward human excrement slowly changes – from something dangerous and disgusting meant to be invisibly flushed away, to a high-value resource worth taking care of.





Public Toilet Unit

This modular Public Toilet, distributed by the CCCCC in popular Cape Cod destinations like ponds and beaches, provides an elevated and expressive alternative to the porta-potty experience while integrating into the collection network. Rainwater is captured and greywater treated with water hyacinth.

Water Quality Beacon

A water quality beacon illuminates green if the water is safe for swimming, or red to signal dangerous algae blooms. This beacon acts akin to the old lighthouses so prevalent on the Cape, but communicating a different, more contemporary waterborne hazard.

Light Touch

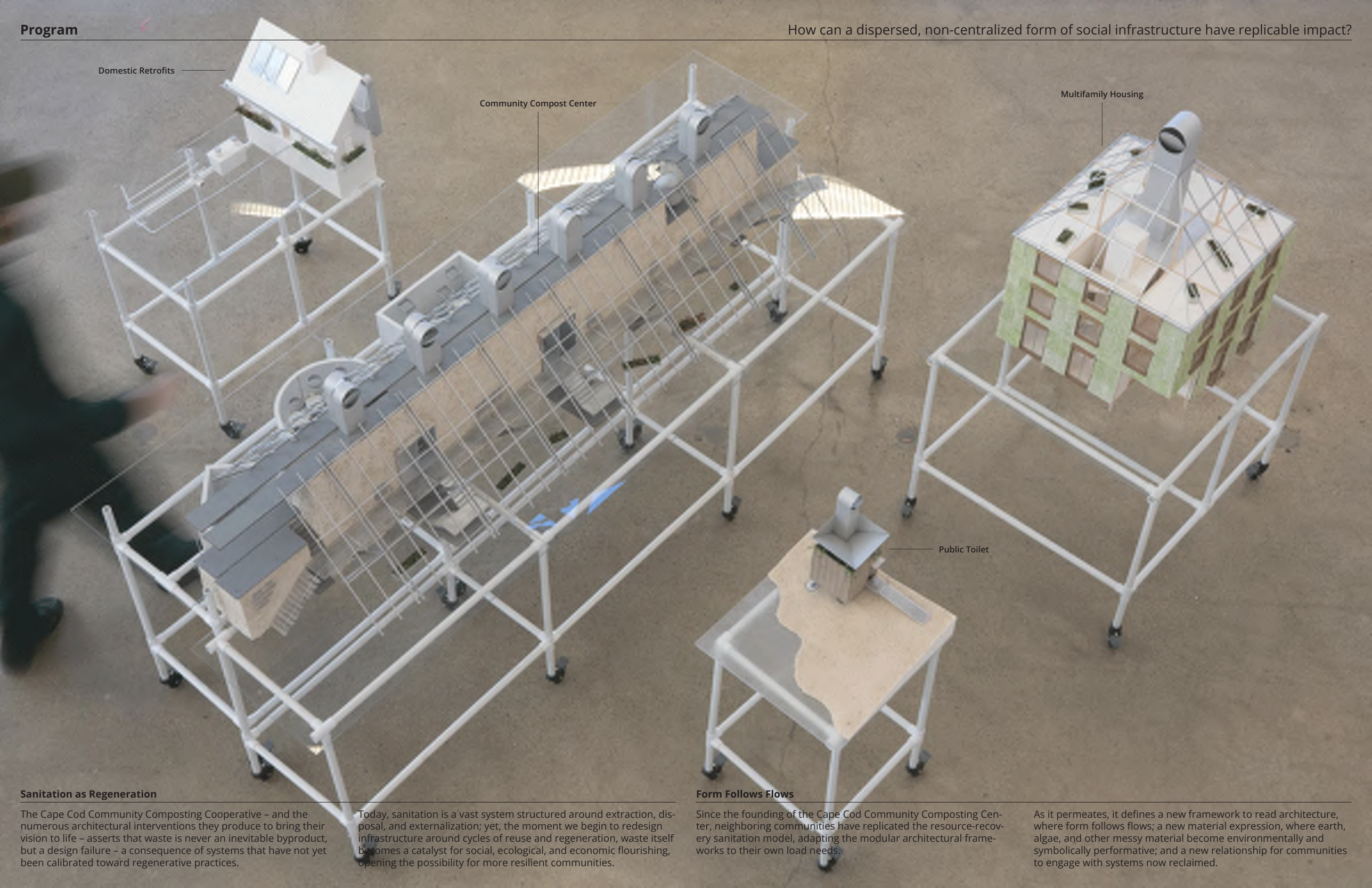
Like other structures on the beach, the Public Toilet has a light touch on the ever-changing ground. No longer is sanitation a purely subterranean endeavor; it is now lightweight and low-impact.

Dispersed Network for Community Resiliency

Many Public Toilets and Composting Centers are distributed across the Cape in a networked, rather than centralized, framework. This builds resiliency – if a certain Composting Center is taken offline temporarily for repairs, a neighboring facility can provide service to the community.

Program

How can a dispersed, non-centralized form of social infrastructure have replicable impact?



Sanitation as Regeneration

The Cape Cod Community Composting Cooperative – and the numerous architectural interventions they produce to bring their vision to life – asserts that waste is never an inevitable byproduct, but a design failure – a consequence of systems that have not yet been calibrated toward regenerative practices.

Today, sanitation is a vast system structured around extraction, disposal, and externalization; yet, the moment we begin to redesign infrastructure around cycles of reuse and regeneration, waste itself becomes a catalyst for social, ecological, and economic flourishing, opening the possibility for more resilient communities.

Form Follows Flows

Since the founding of the Cape Cod Community Composting Center, neighboring communities have replicated the resource-recovery sanitation model, adapting the modular architectural frameworks to their own load needs.

As it permeates, it defines a new framework to read architecture, where form follows flows; a new material expression, where earth, algae, and other messy material become environmentally and symbolically performative; and a new relationship for communities to engage with systems now reclaimed.