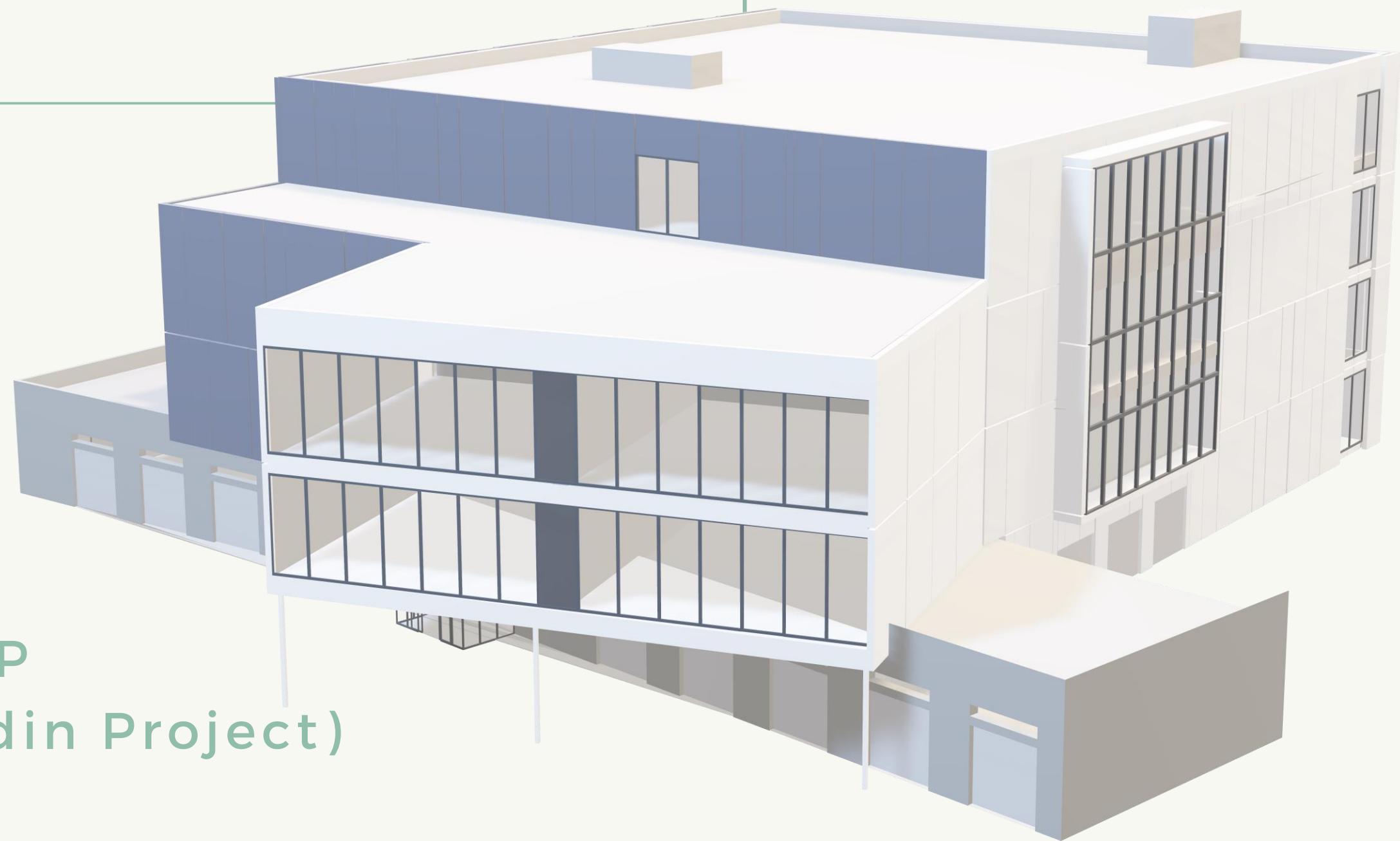


SEEDONE

VERTICAL FARMING IN SHANGHAI



Group 6 - Team XJP
(eXperimental Jardin Project)

JULY 2023

The Problem: Food Insecurity in Shanghai



29.21M People Expected in 2023



32% Farmlands



68% Urbanization

The rising concern about ensuring food security in developed cities like Shanghai stems from the challenge of meeting increased food demand driven by population density while facing limitations in arable land availability due to pollution and expanding urban development.



180K ACRES

Total Arable Land Lost per Year

**EXPONENTIAL
FARMLAND LOSS**

Due to Fertilization & Urbanization

64.7%

Urbanization Rate in 2022

EXPECTING 80%

Urbanization Rate By 2035

An architectural rendering of a modern, multi-story building with a large glass facade. The building is situated behind a courtyard area where several people are walking and sitting. There are trees and outdoor seating areas with umbrellas in the courtyard. The sky is blue with some clouds. The overall scene is bright and sunny.

OUR MISSION

We strive to create a space for **sustainable** indoor farming for fresh vegetation. We aim to be **energy-efficient** to minimize environmental impact while supporting local **communities** through a vibrant outdoor market space. Through **innovation** and **collaboration**, we aspire for positive change to achieve a healthier future

OUR TEAM



Mathew Song

- Energy Analysis Lead
- Horticulture Researcher



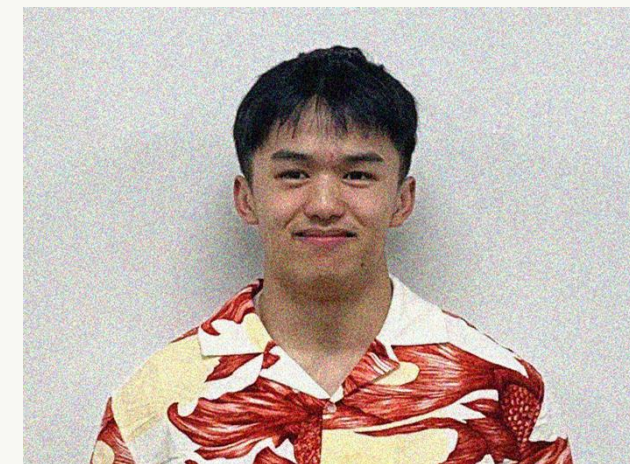
Jessie Zhuang

- Architectural Design Lead
- Urban Designer



Jeffery Li

- Project Manager
- Mechanical Design Lead



Justin Quong

- BIM Lead
- Enclosure Design Lead



PROJECT SITE

China, Shanghai, Jiading
District, 汇龙潭 邮政编码:
201800

31°22'05.9"N 121°14'55.9"E

COMMERCIAL OFFICES

FIREFIGHTING STATION

JUNKYARD

CORPORATE HQ

RESIDENTIAL ZONE

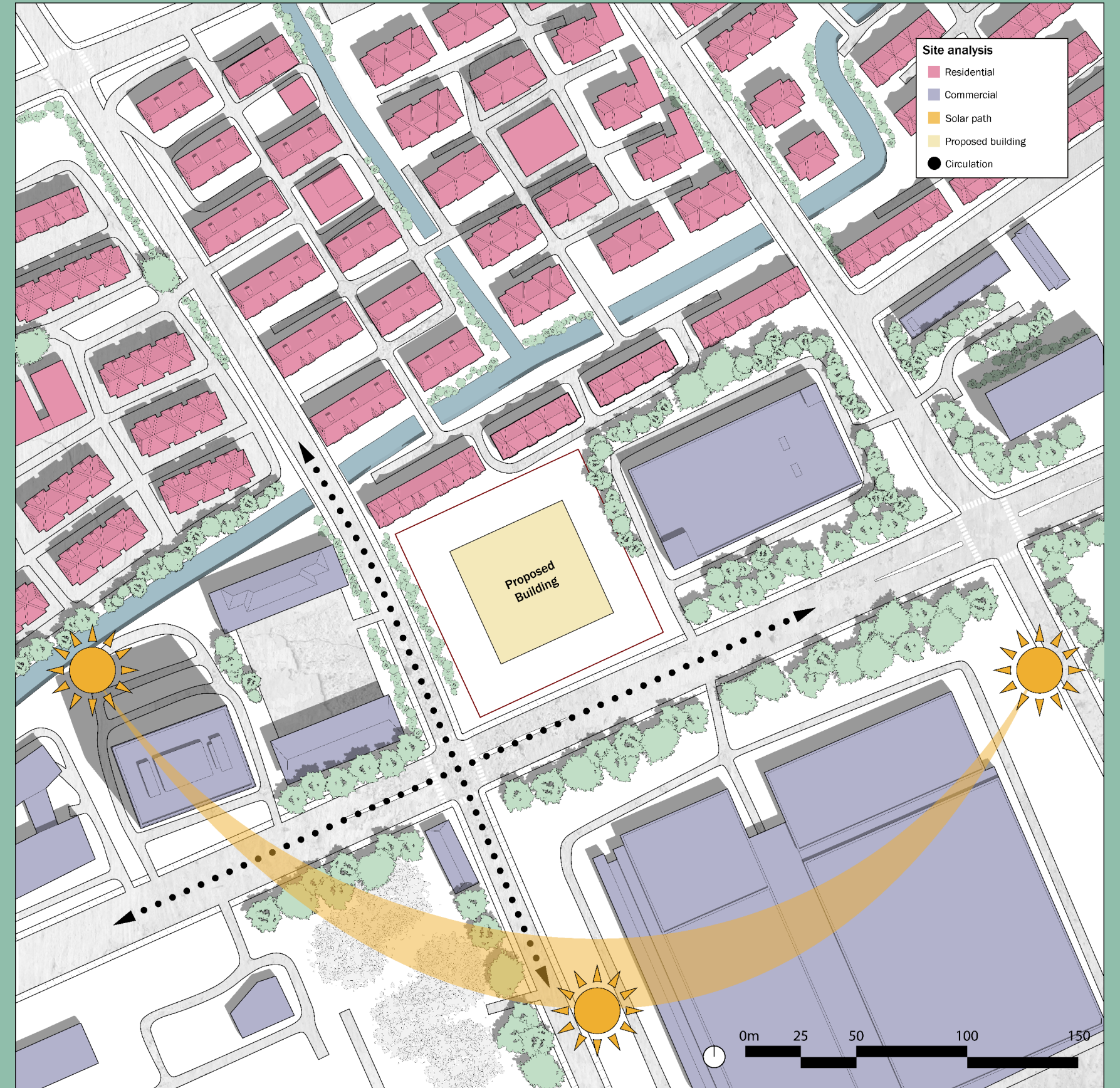
TECHNOLOGICAL
CENTRE



DESIGN CONSTRAINTS

Constraints:

- Limited Agricultural Space
- Sub-tropical Climate
- Solar Patterns
- Indoor Environmental Control
- Nearby Building Considerations



DESIGN OBJECTIVES



Architectural and
Enclosure Design



Passive Design
Strategies



Detailed Building Energy
Performance



Farming System
Mechanical Design

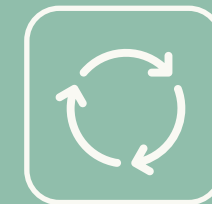
SUCCESS CRITERIA:



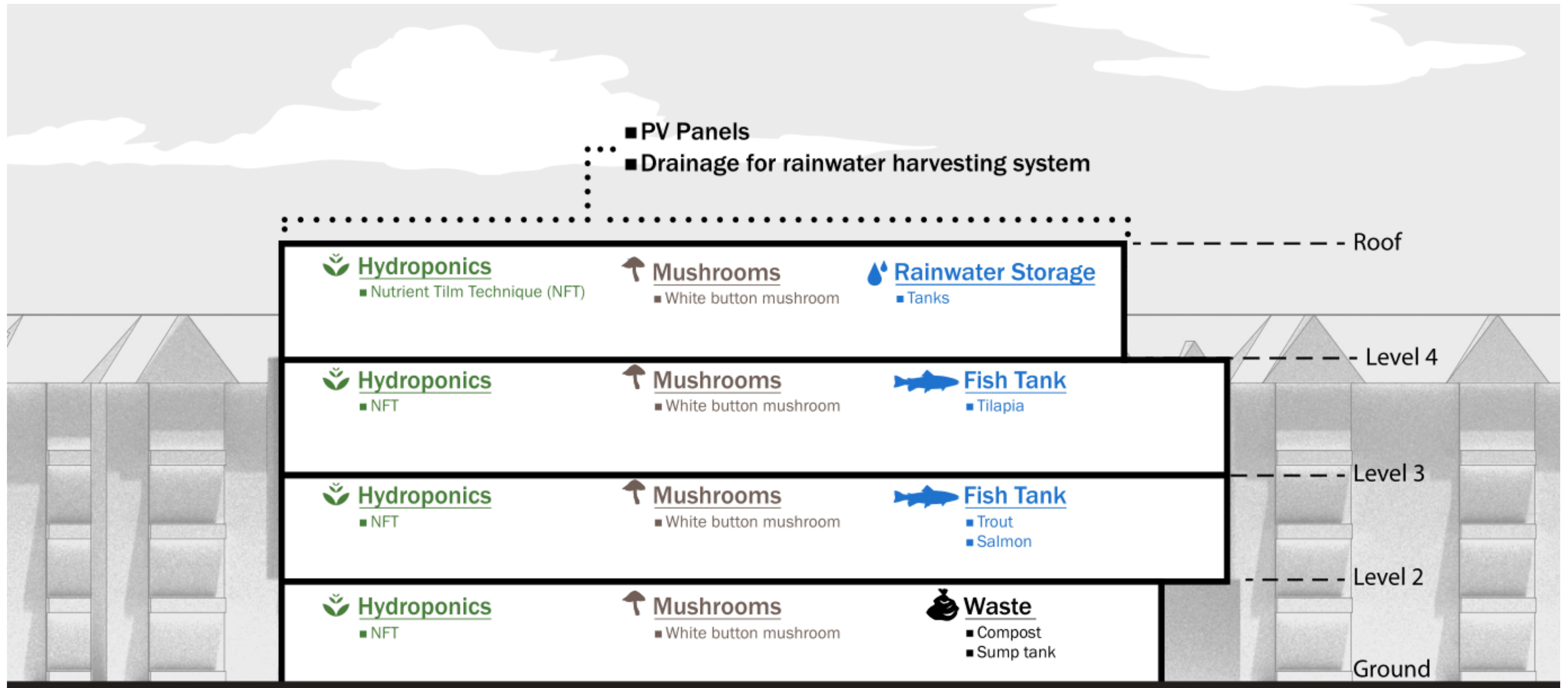
400G/DAY
VEGETATION INTAKE



6000
NEARBY RESIDENTS TO
FEED

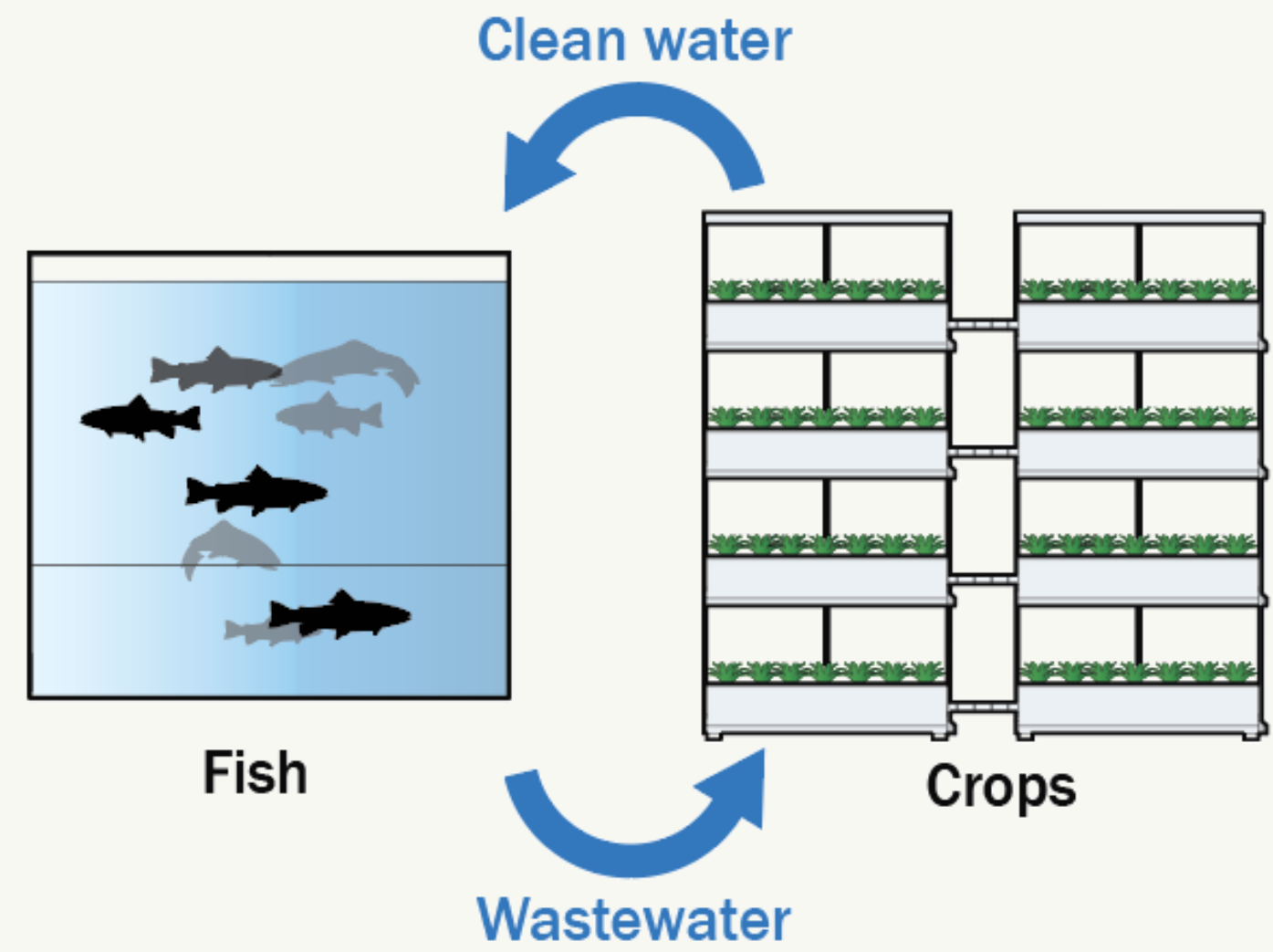
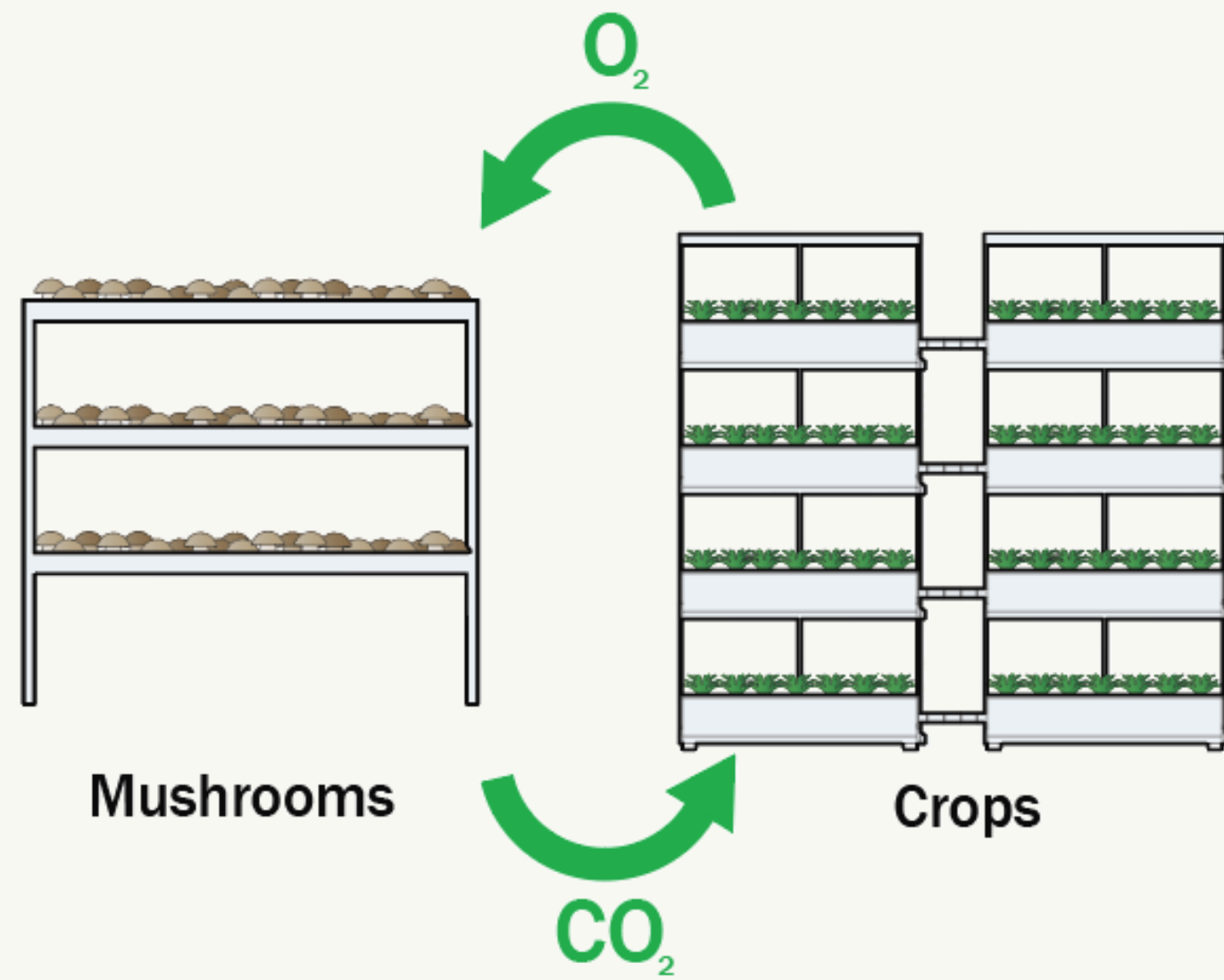


CIRCULAR
ECONOMY

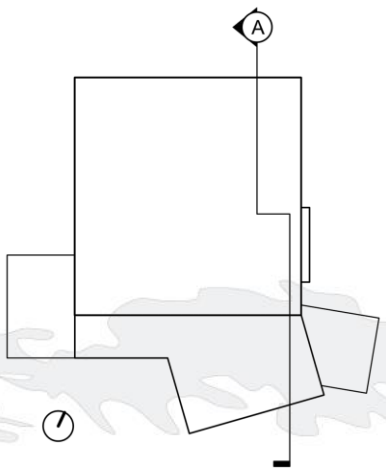


BUILDING SECTION SCHEMATIC

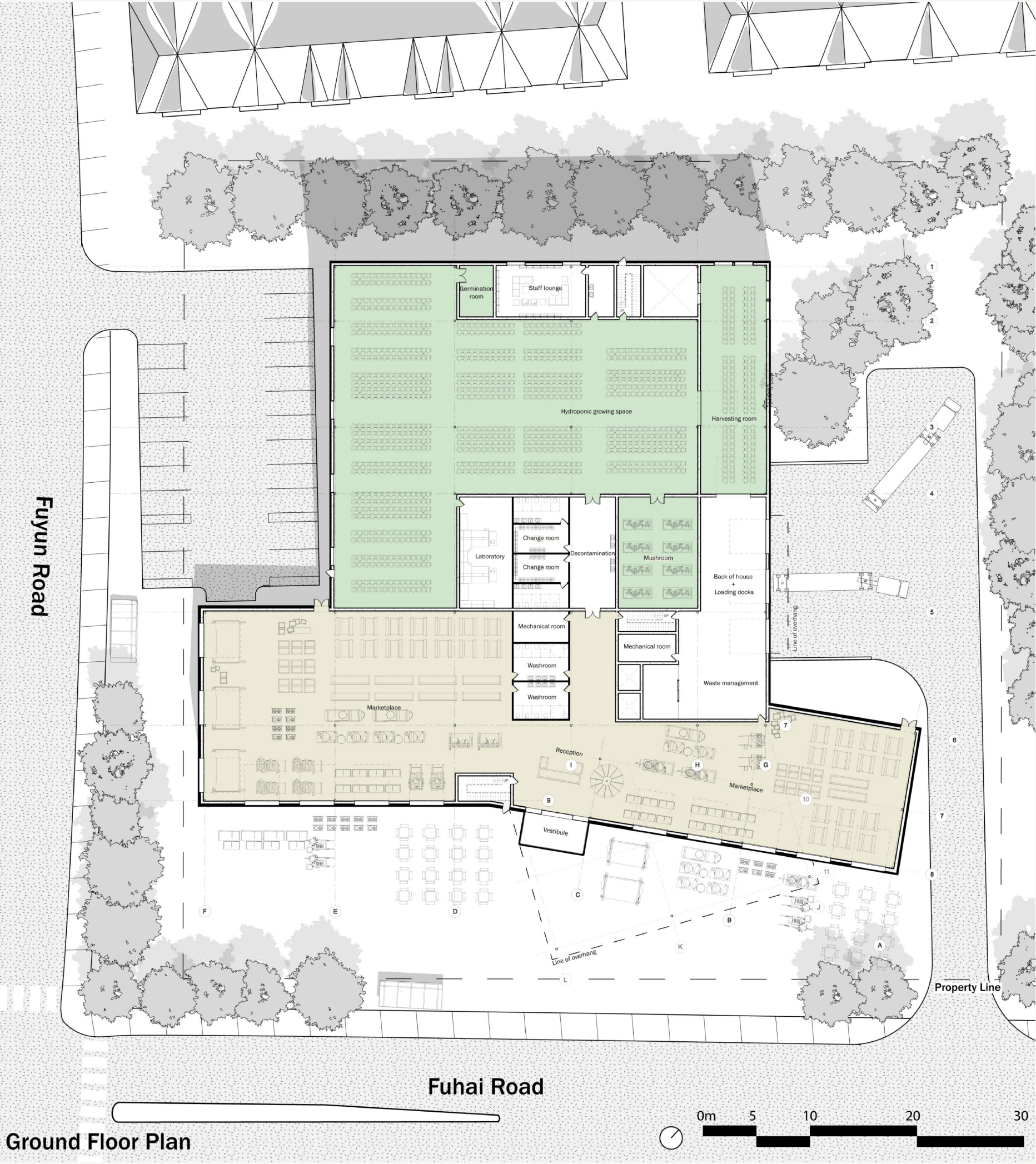




SECTION



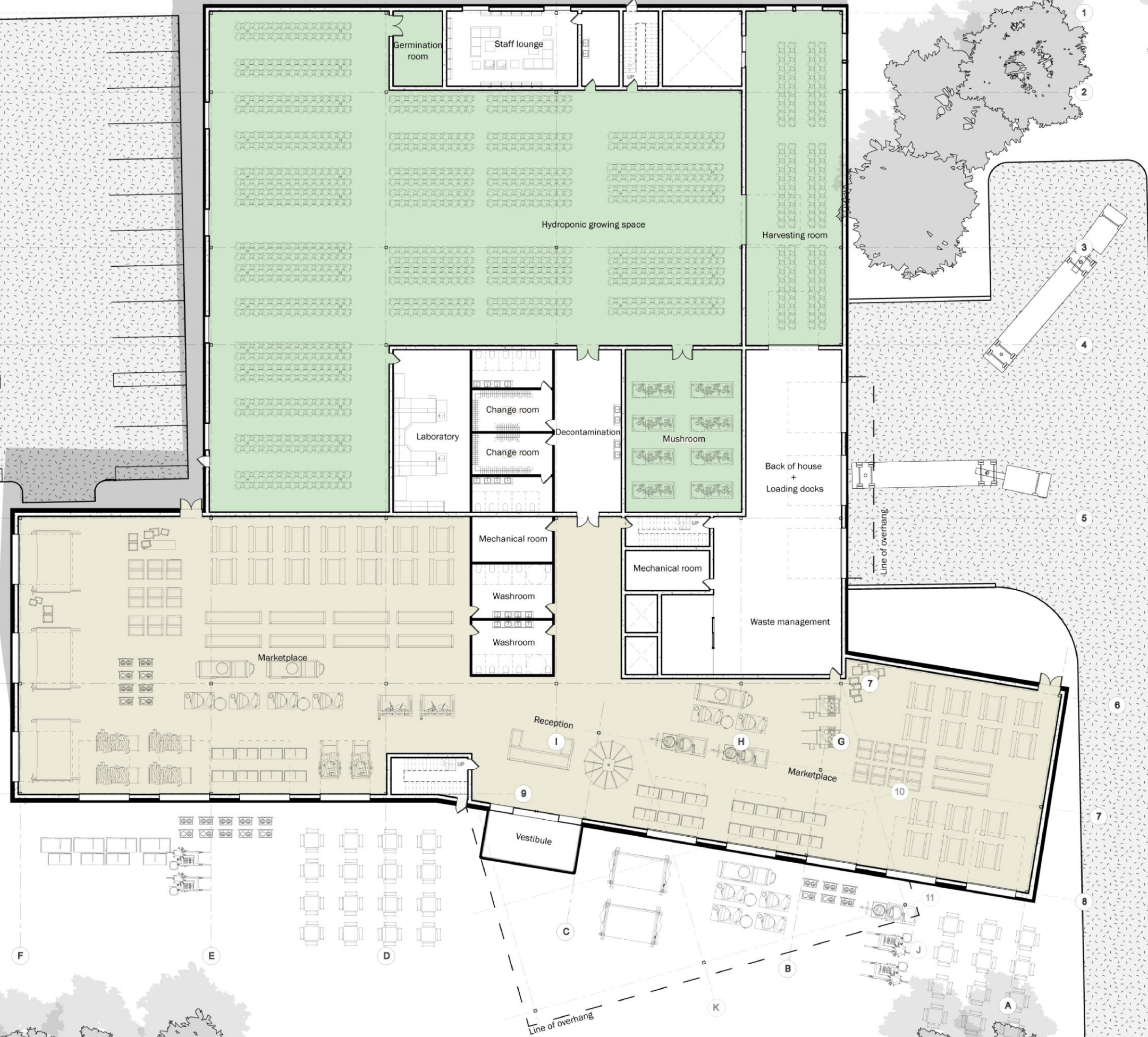
LEVEL 1



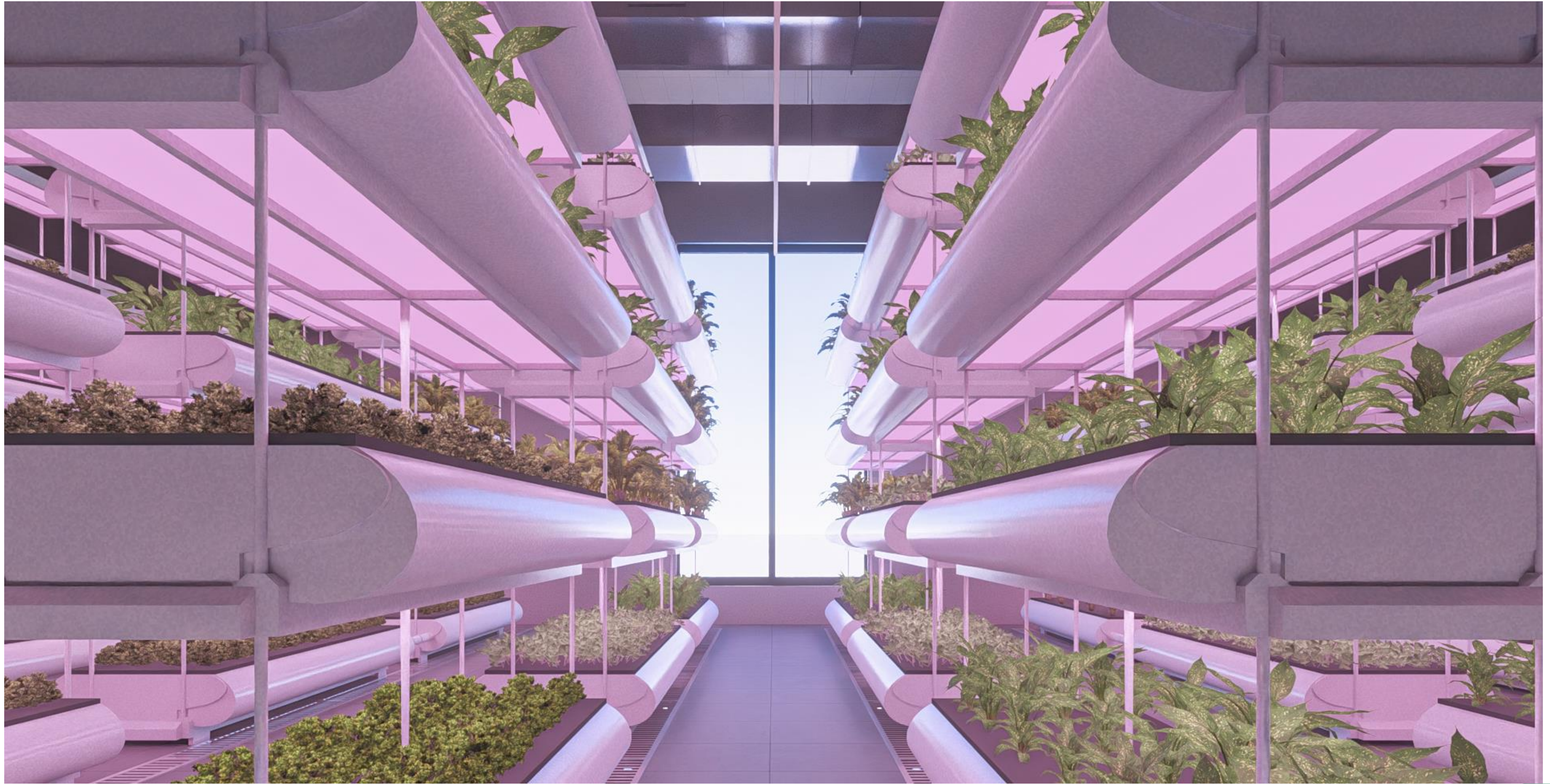
- INDOOR FARMING PROGRAMS
- MARKET PROGRAMMING



Fuyun Road





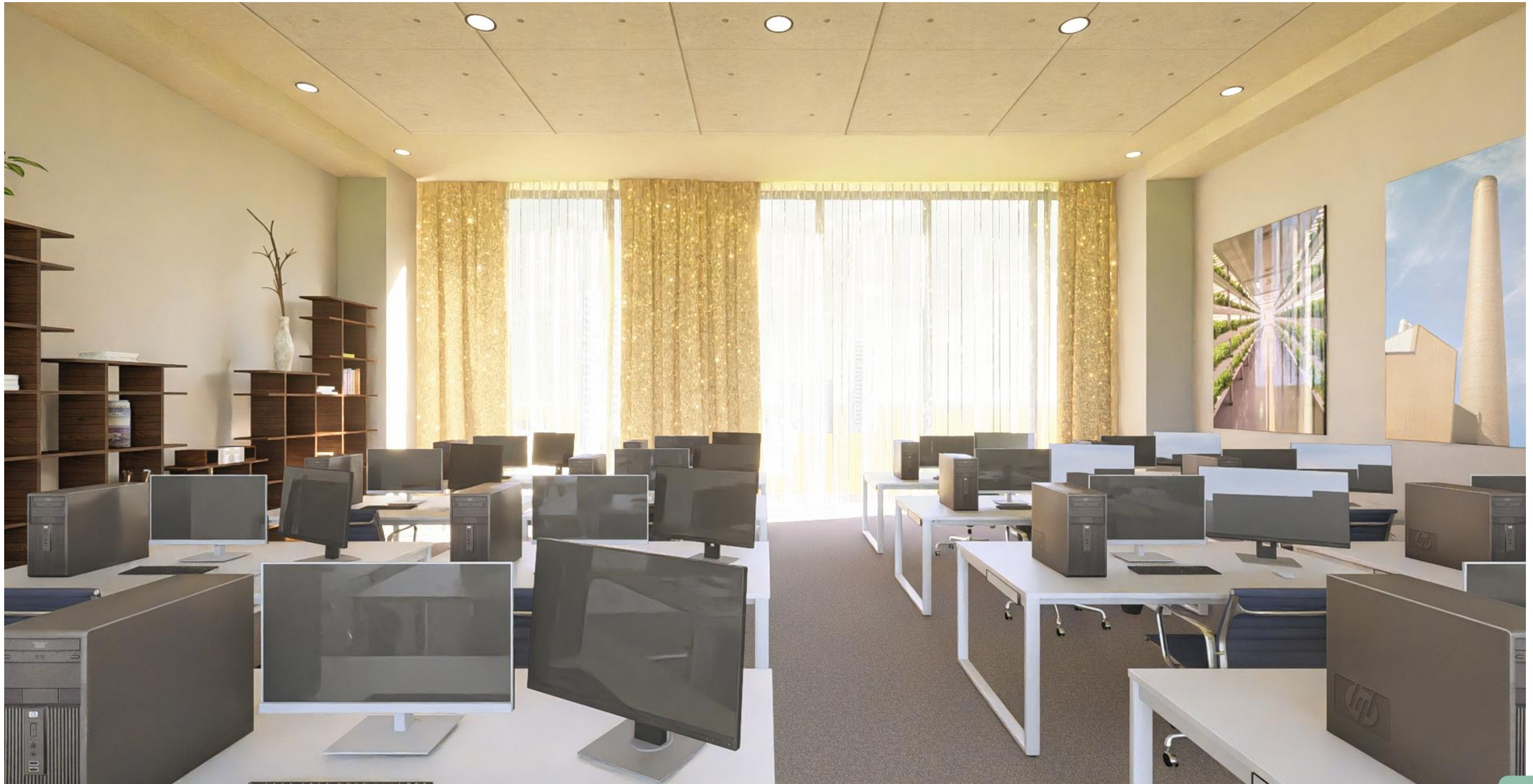




- INDOOR FARMING PROGRAMS
- COMMERCIAL PROGRAMMING
- AQUAPONIC PROGRAMMING

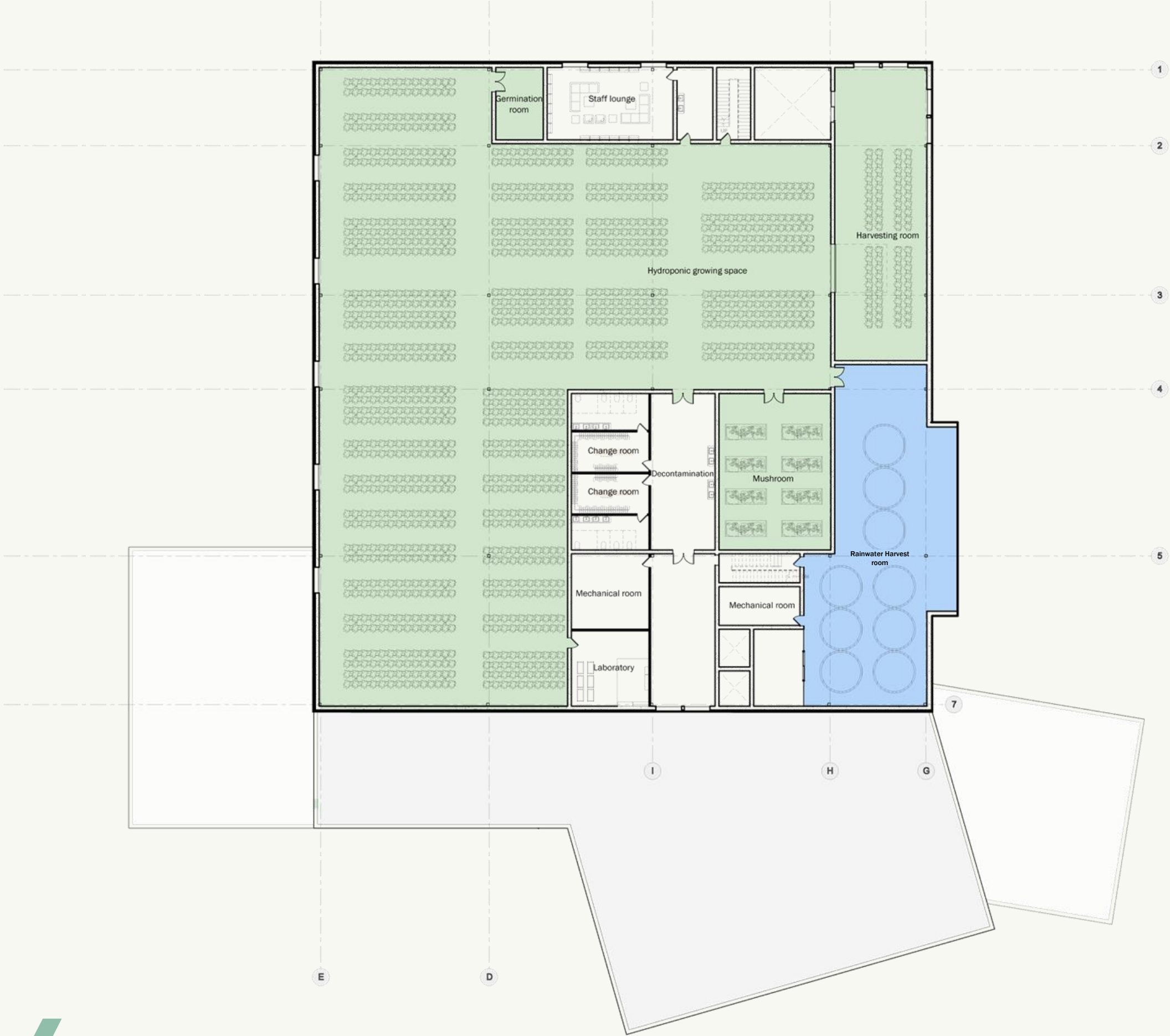
LEVEL 2/3

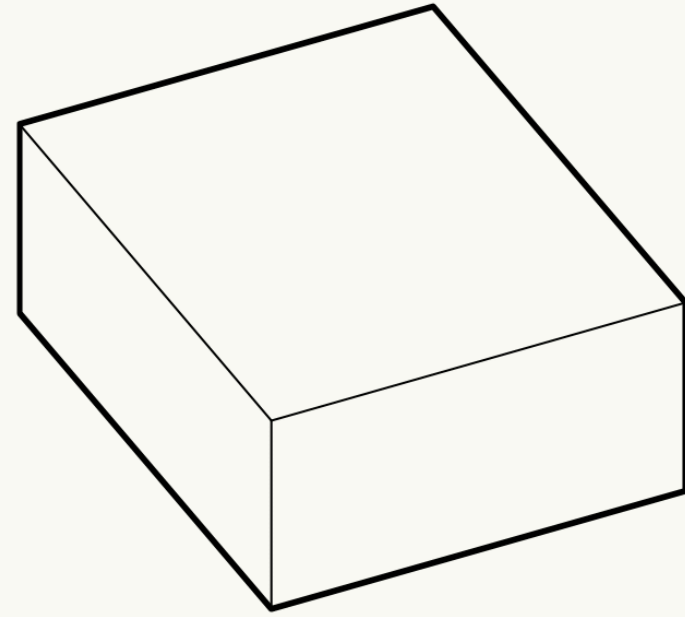






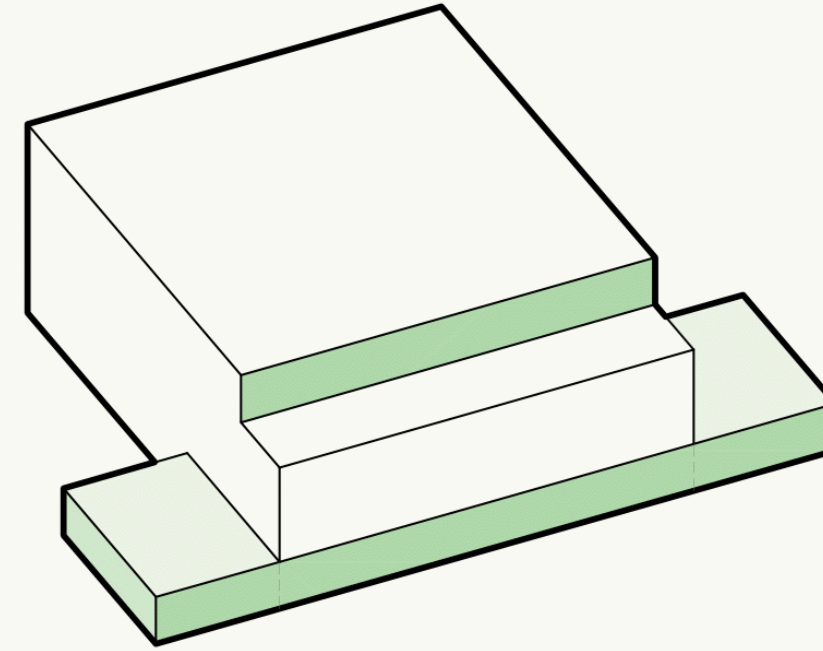
LEVEL 4





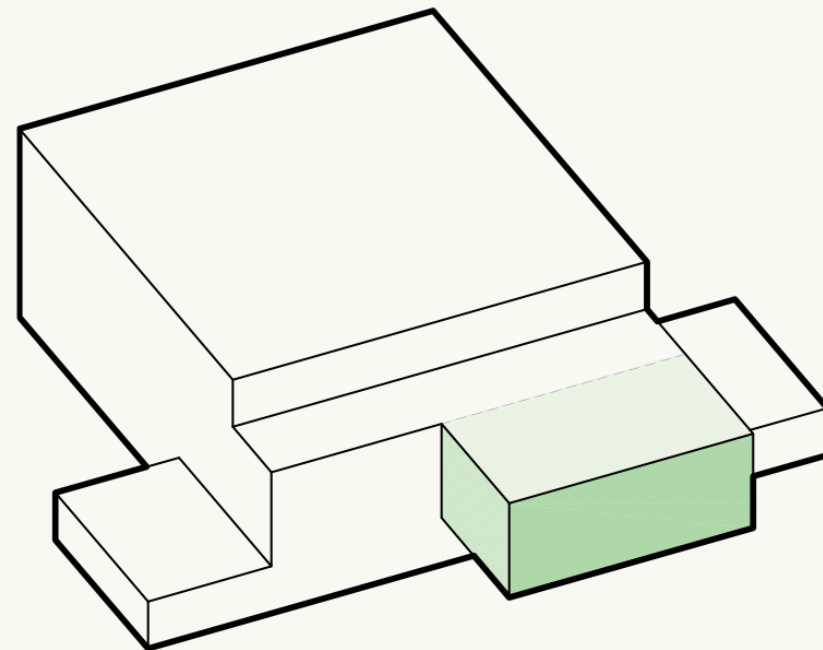
1 - BASIC MASSING BLOCK

RECTANGULAR SHAPE BEST FOR URBAN FARMING



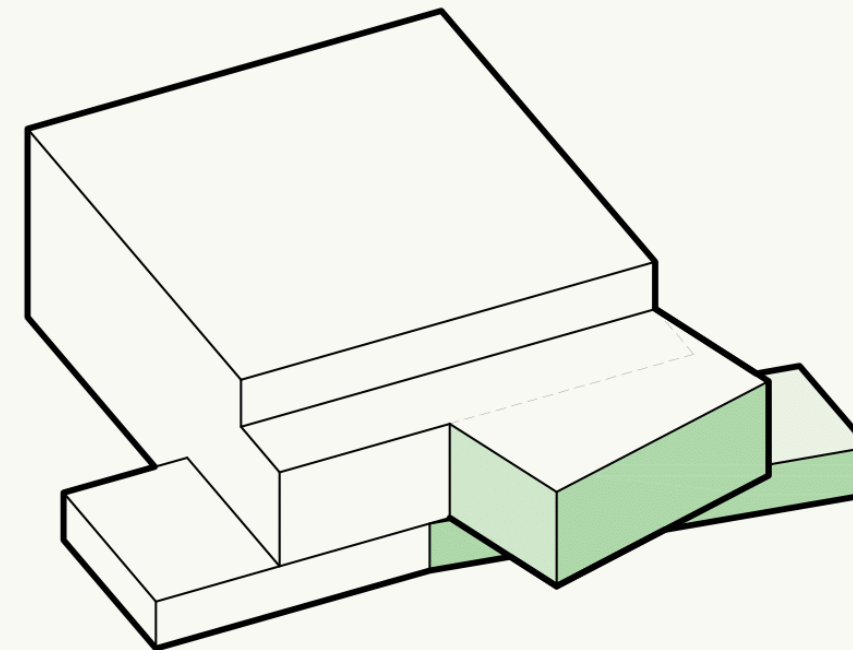
2- EXTRUDE + PUSH

EXTRUDE FORM TO DEFINE MARKET SPACE &
PUSH TOP FLOOR TO MAXIMIZE PROGRAM NEEDS



3 - EXTRUDE

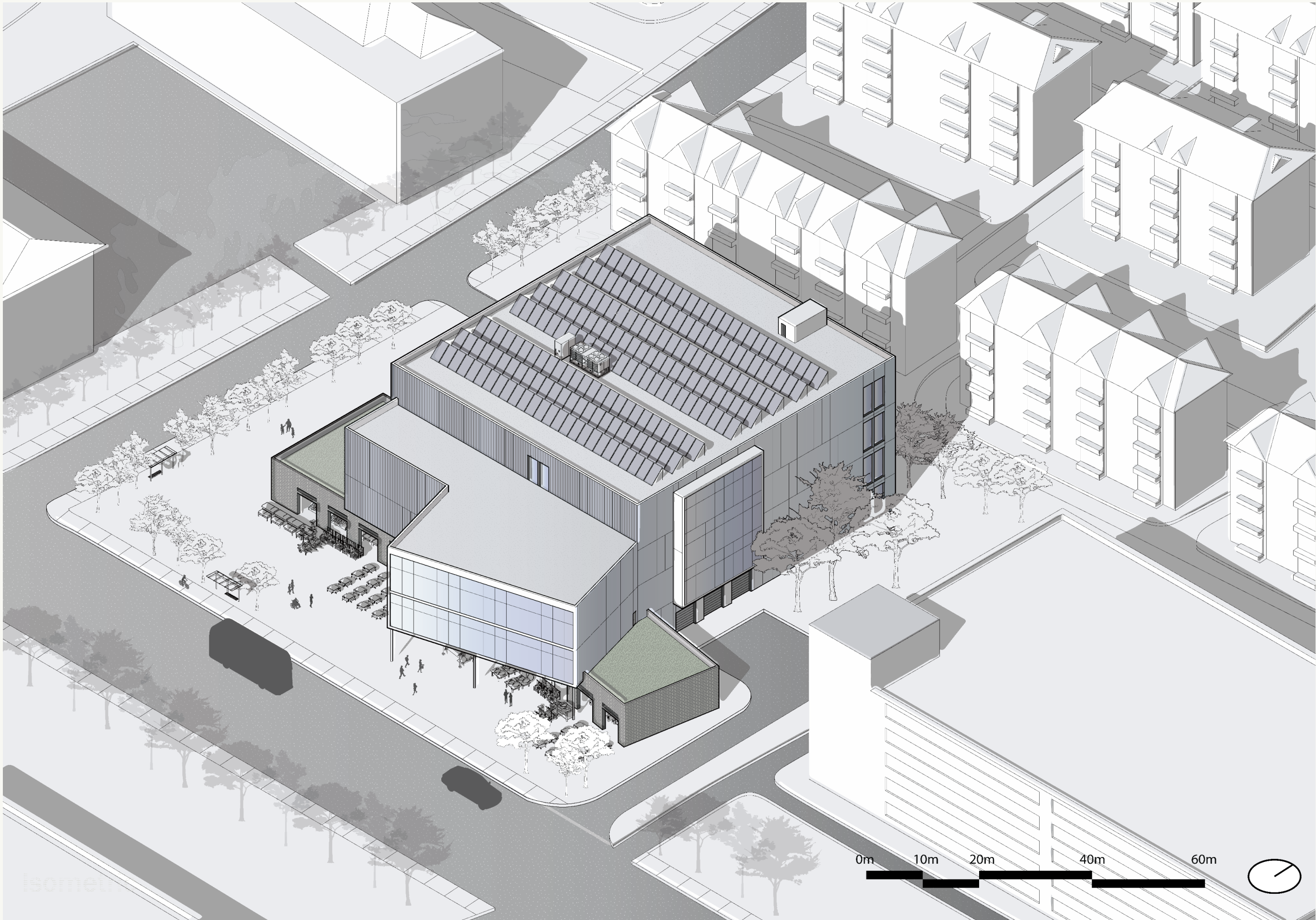
EXTRUDE COMMERICAL OFFICE SPACES TO CREATE
UNIQUE CANOPY FOR MARKET BELOW



4 - ROTATE

ROTATE OFFICE AND MARKET FORMS TO HIGHLIGHT
ENTRANCE & DIRECT PEDESTRIAN FLOW





ISOMETRIC VIEW

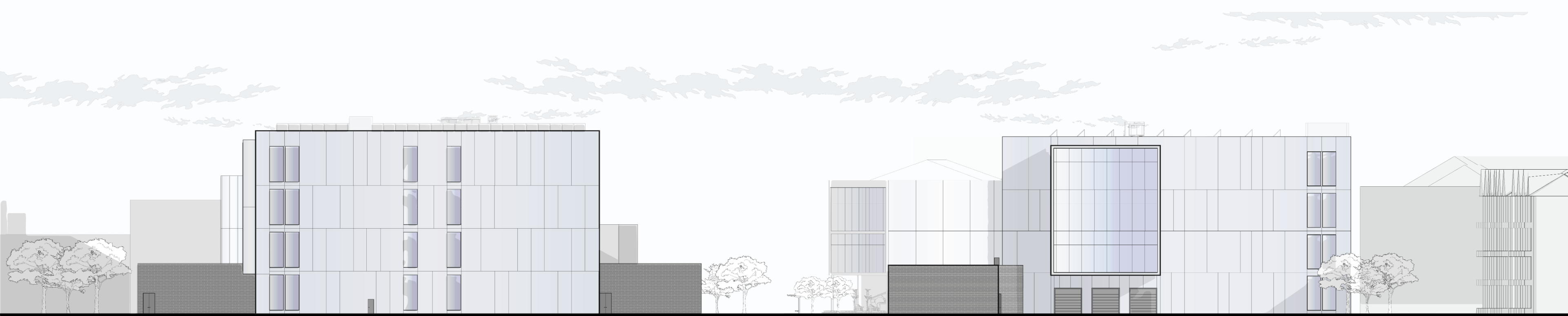






SOUTH

WEST

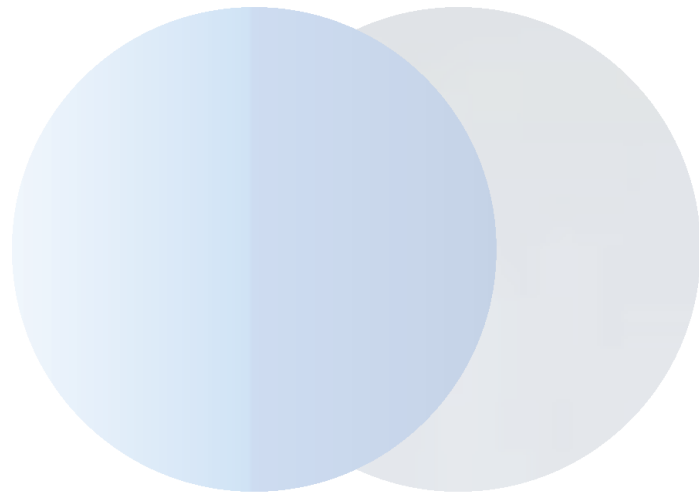


NORTH

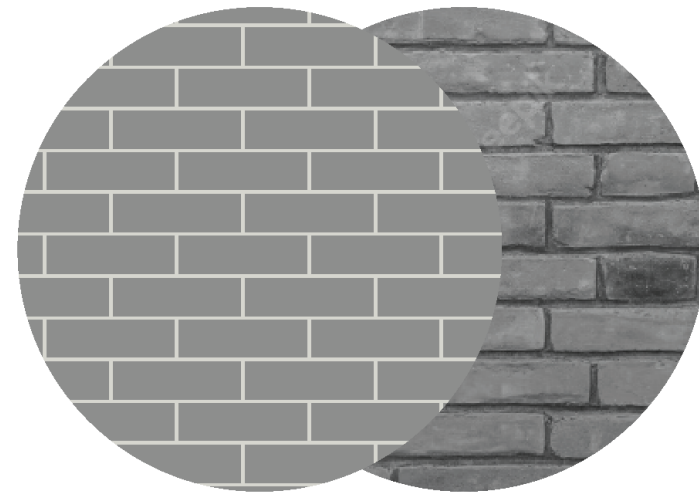
EAST



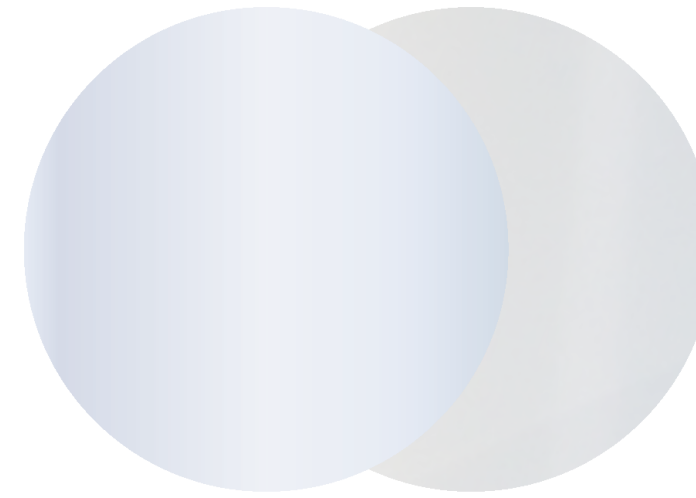
MATERIAL SELECTION



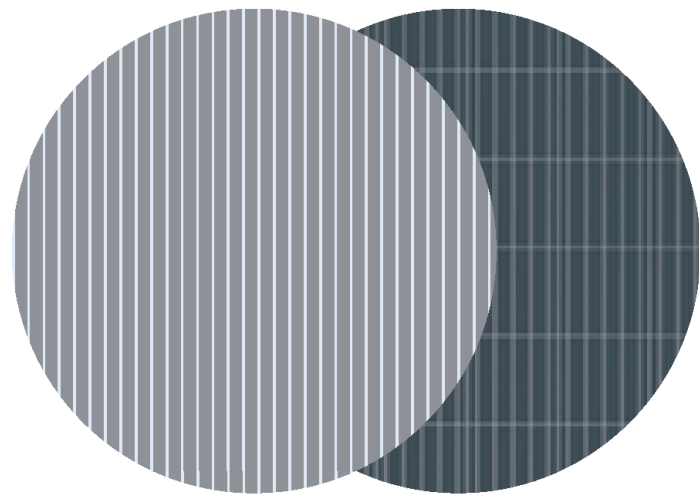
Glass



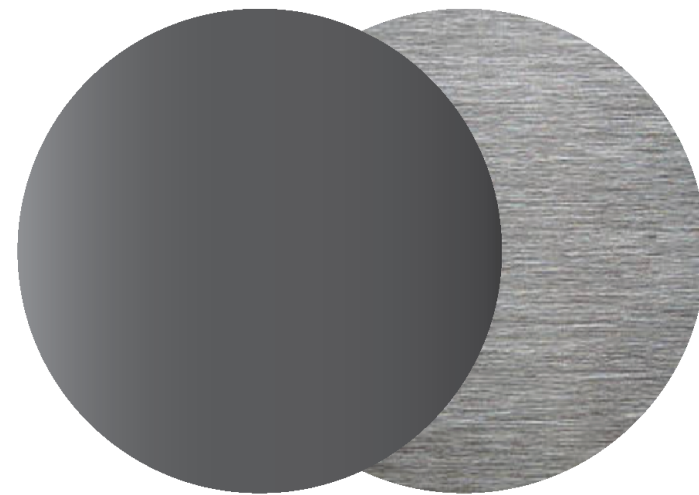
Brick Veneer



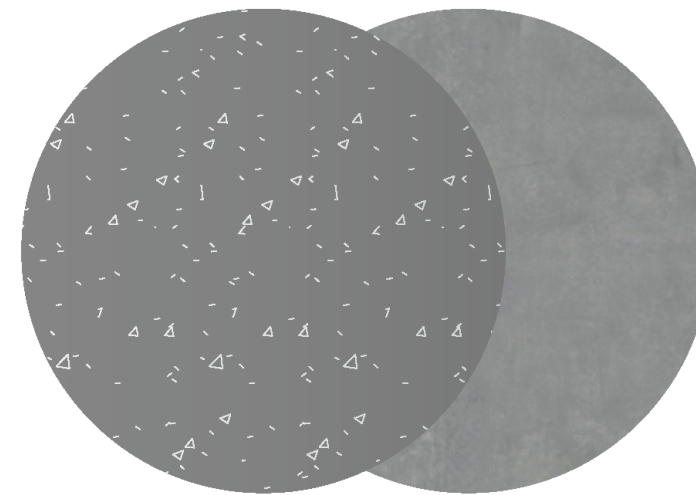
**Aluminum composite
material (ACM)**



**Building-integrated
photovoltaics (BIPV)**



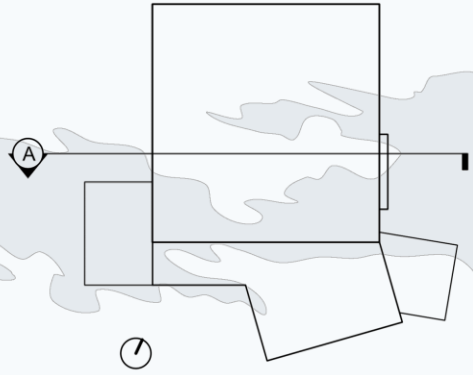
Structural steel



**Structural precast
concrete**



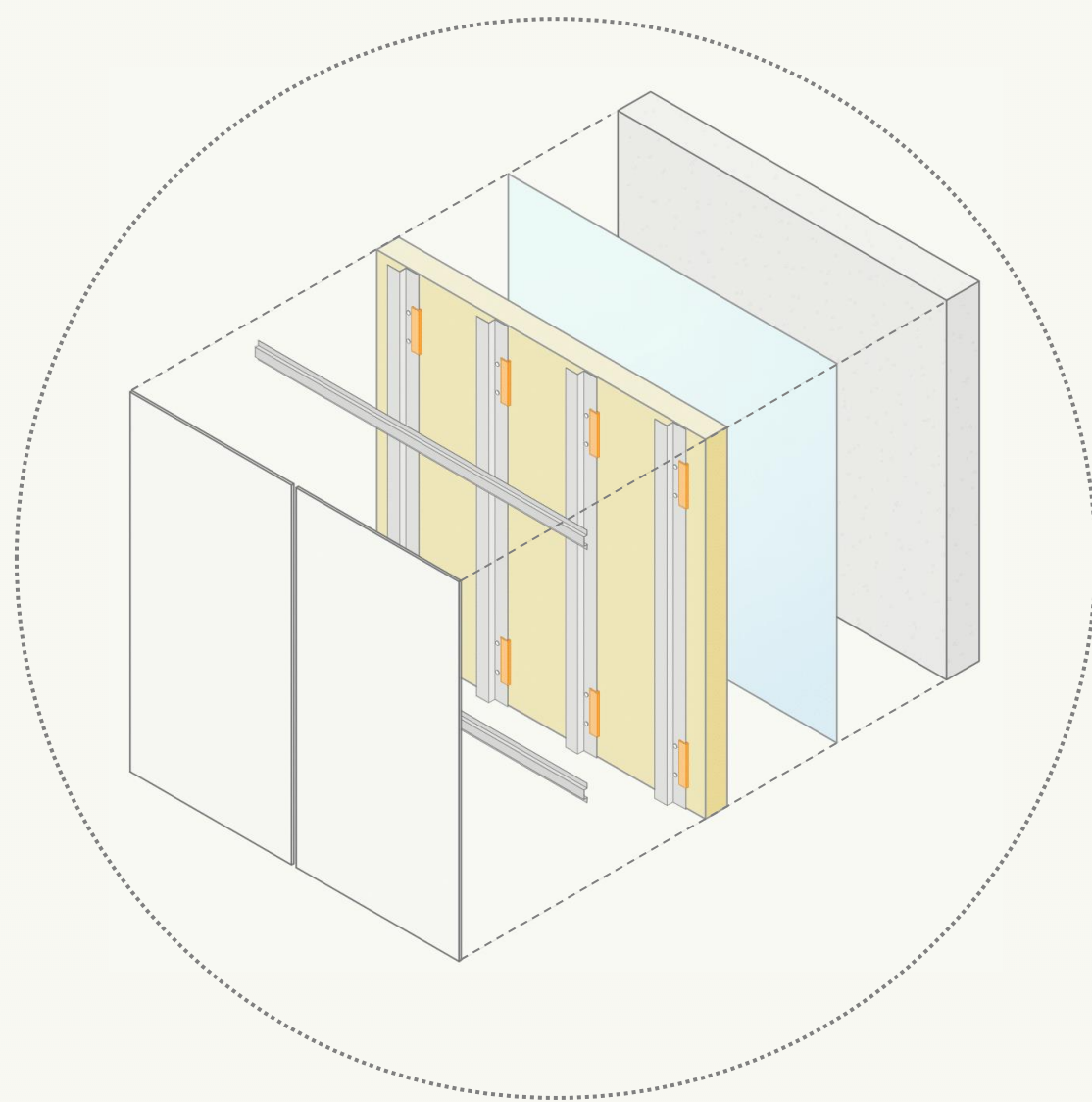
SECTION





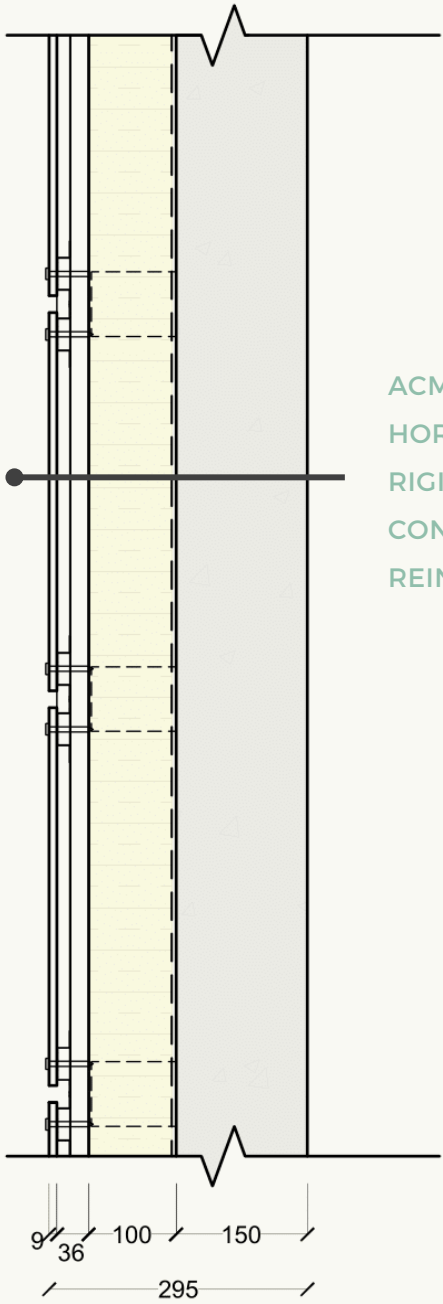
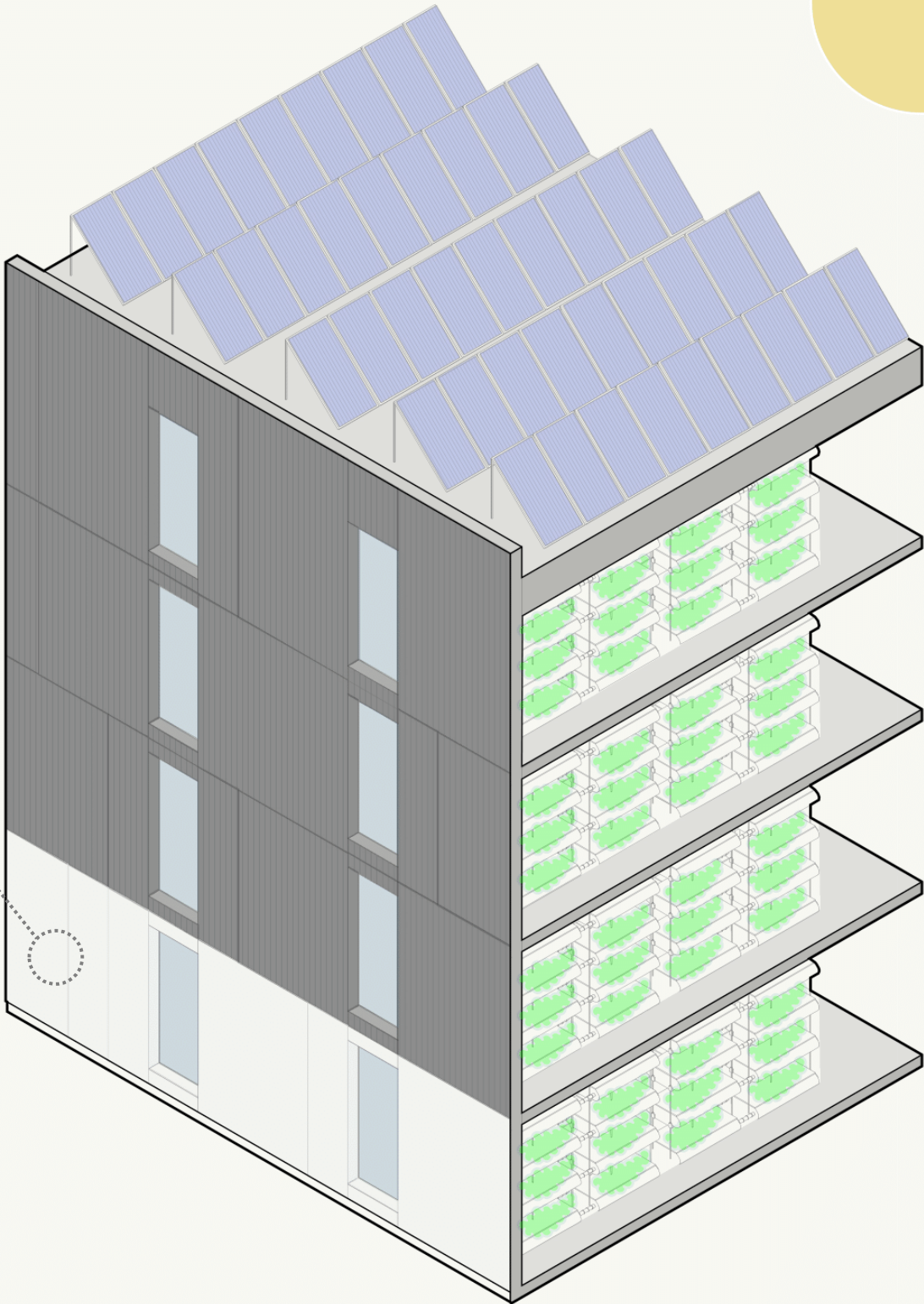


ENCLOSURE



KEY DECISIONS:

- Concrete walls act as a vapor and air barrier, perfect for high humidity conditions

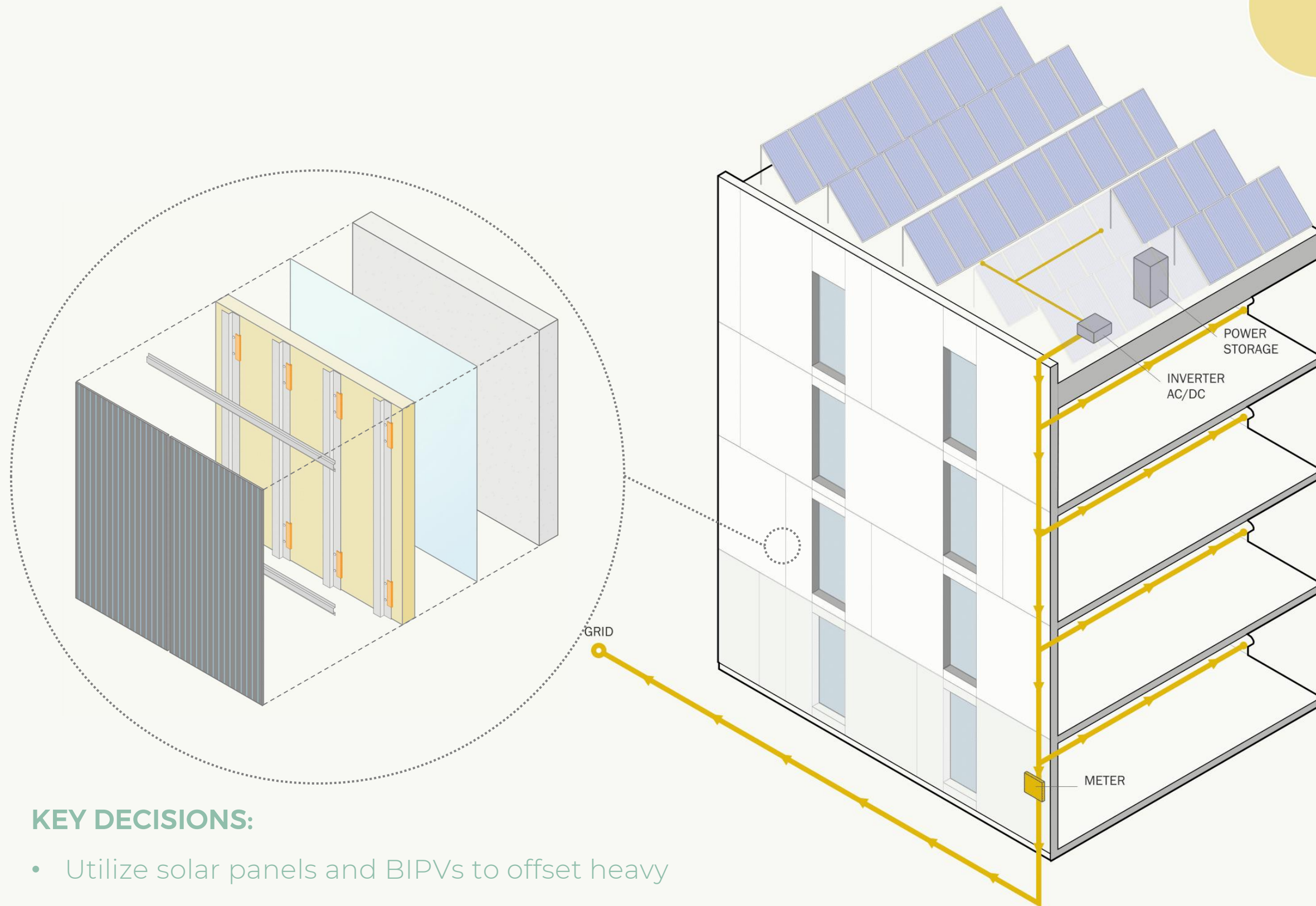


ACM WALL PANEL
HORZ. & VERT. METAL GIRT SYSTEM
RIGID INSULATION W/ FIBREGLASS CLIPS
CONTINUOUS WATER BARRIER
REINFORCED CONCRETE

EXTERIOR WALL ASSEMBLY
(R26)



PHOTOVOLTAICS



KEY DECISIONS:

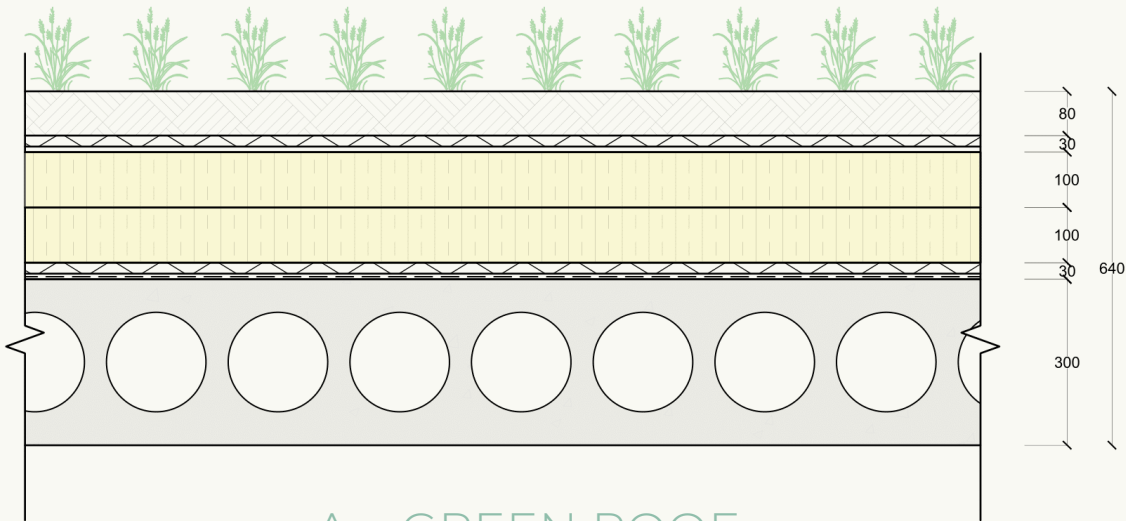
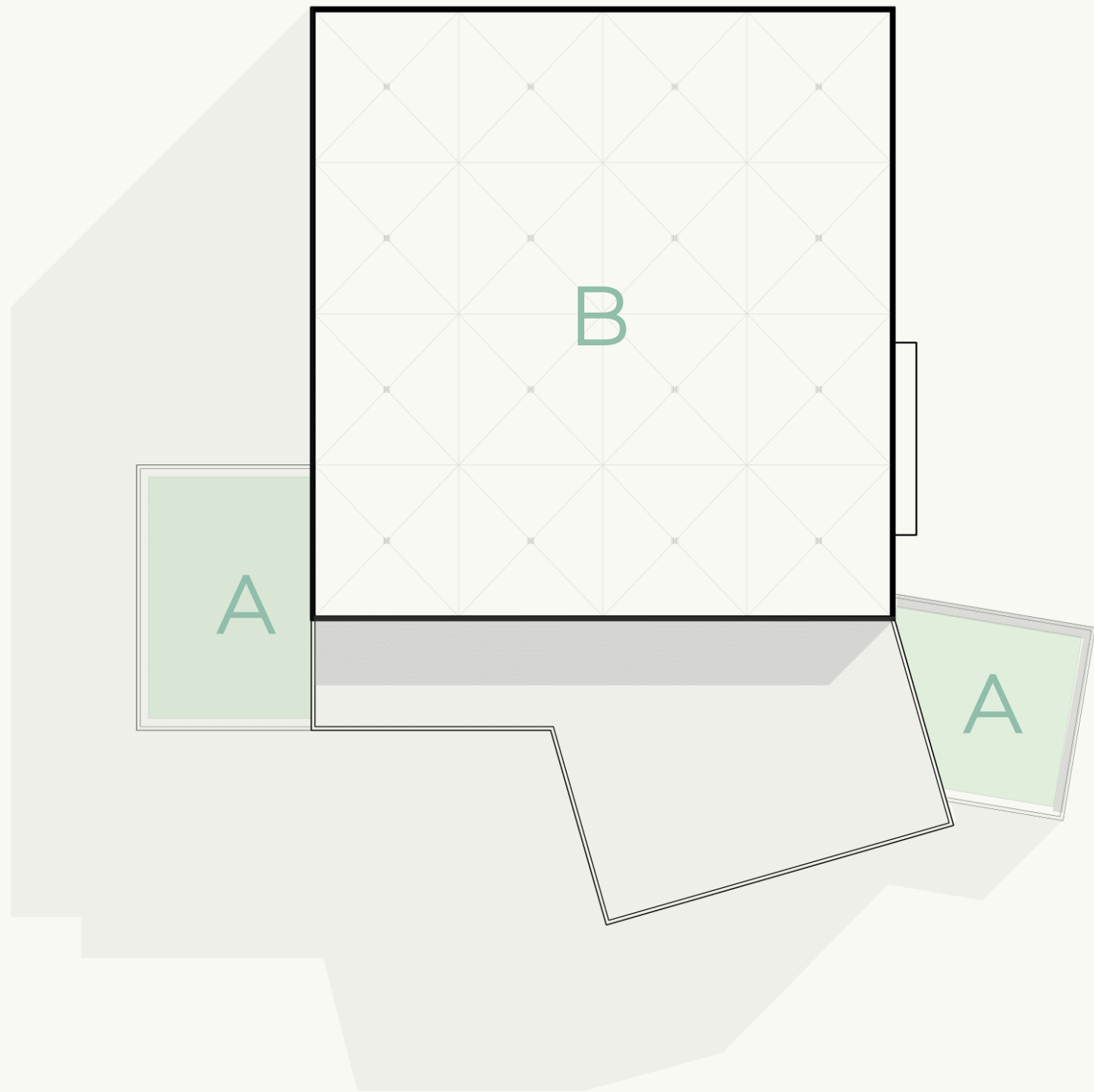
- Utilize solar panels and BIPVs to offset heavy electricity usage

ENERGY

ROOFTOP SOLAR PANELS
AND THE BIPV'S WILL
PRODUCE **44 EUI**

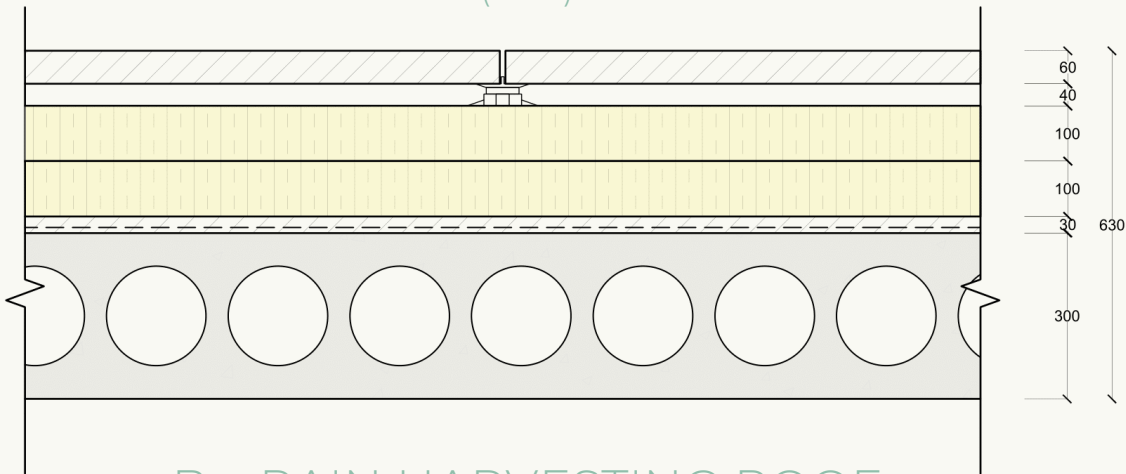


ROOF



A – GREEN ROOF

(R52)



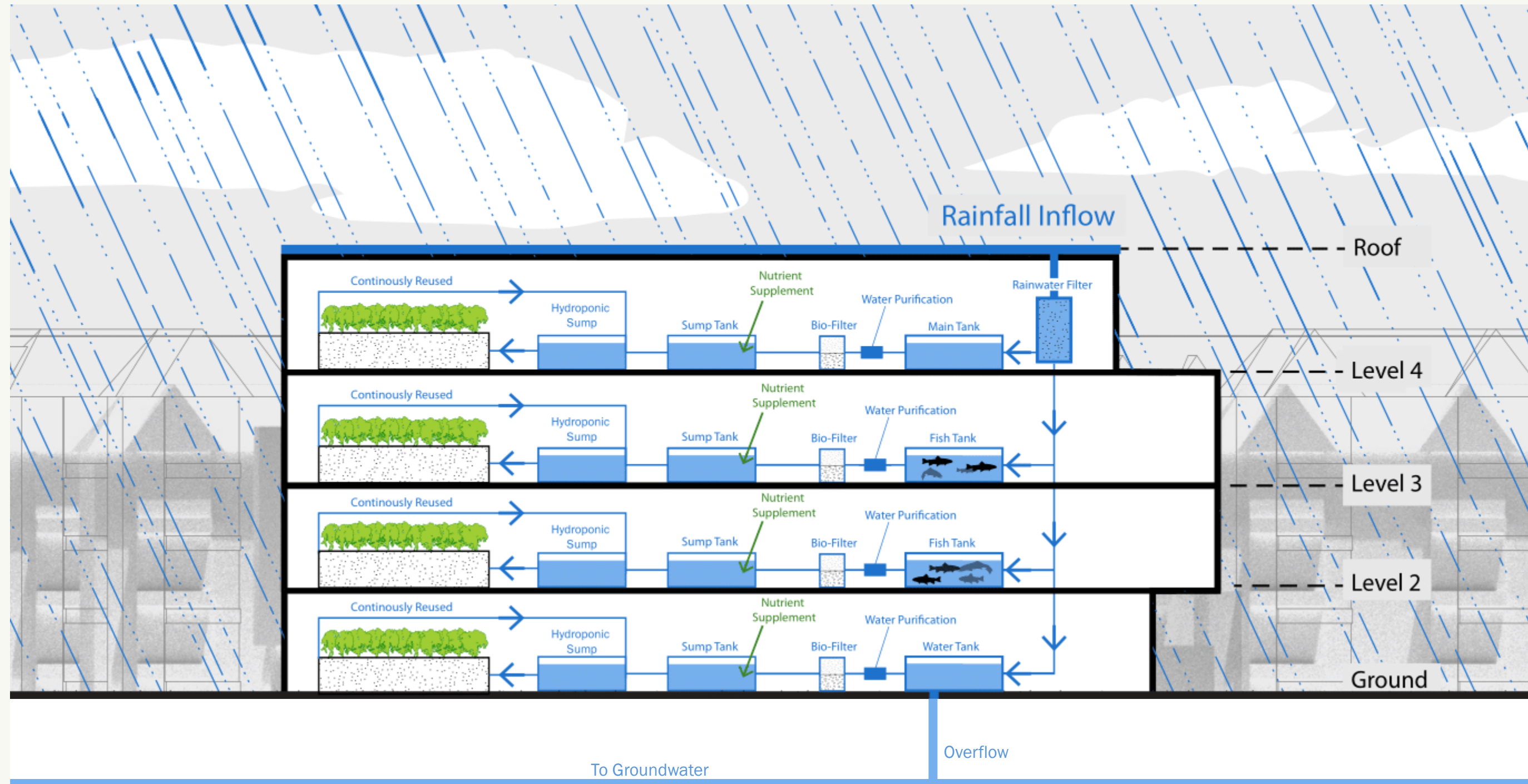
B – RAIN HARVESTING ROOF

(R49)

- VEGETATION
- ENGINEERING SOIL
- DRAINAGE SPACE
- ROOT BARRIER
- RIGID INSULATION
- DRAINAGE SPACE
- CONTINUOUS ROOF BARRIER
- CONCRETE TOPPING
- PRECAST HOLLOW CORE CONCRETE SLAB

- PRECAST CONCRETE PAVERS
- DECK PEDESTAL SYSTEM
- RIGID INSULATION
- PROTECTIVE ROOF BARRIER
- WATERPROOFING MEMBRANE
- SLOPED TOPPING SLAB (0-3" VARIATION)
- PRECAST HOLLOW CORE CONCRETE SLAB





MECHANICAL OVERVIEW

Heating

Primarily
Provided by Air
Source Heat
Pumps on
Rooftop

Cooling

Partially
Provided by Air
Source Heat
Pump, with the
Remaining
Supplied by the
Chiller

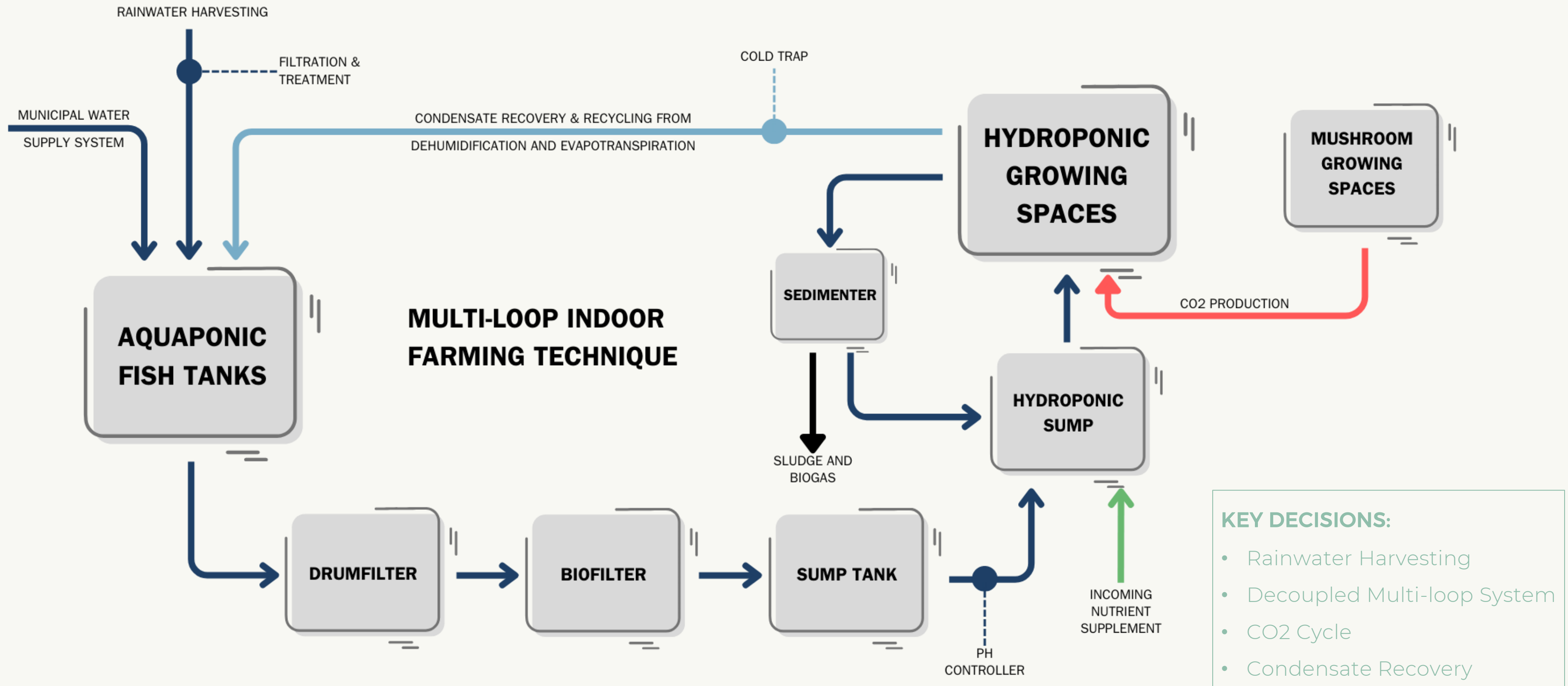
Ventilation

Provided by 7
Indoor Air
Handling Units
in Mechanical
Rooms

Recovery

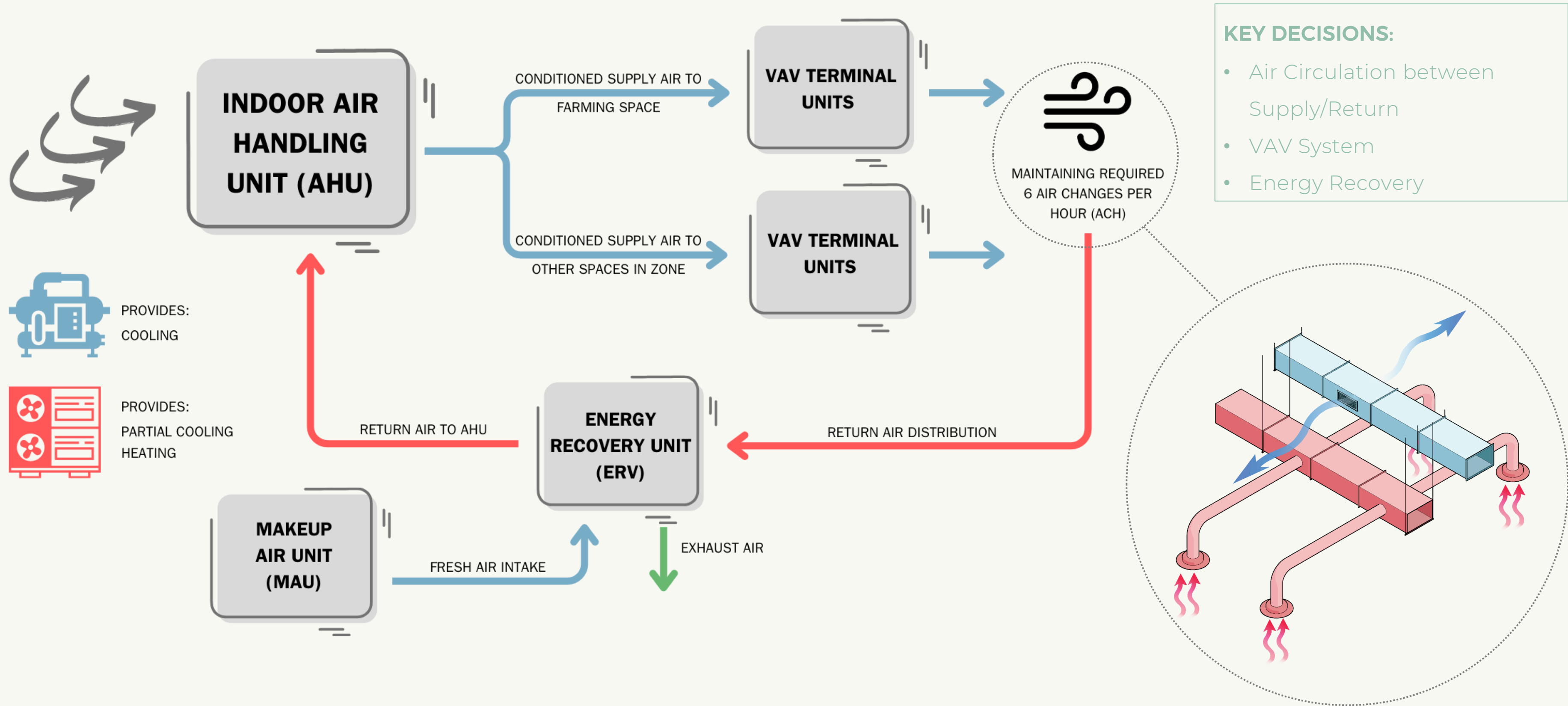
Heat and
Condensate
Recovery by ERV
System





FARMING TECHNIQUE SCHEMATIC DIAGRAM





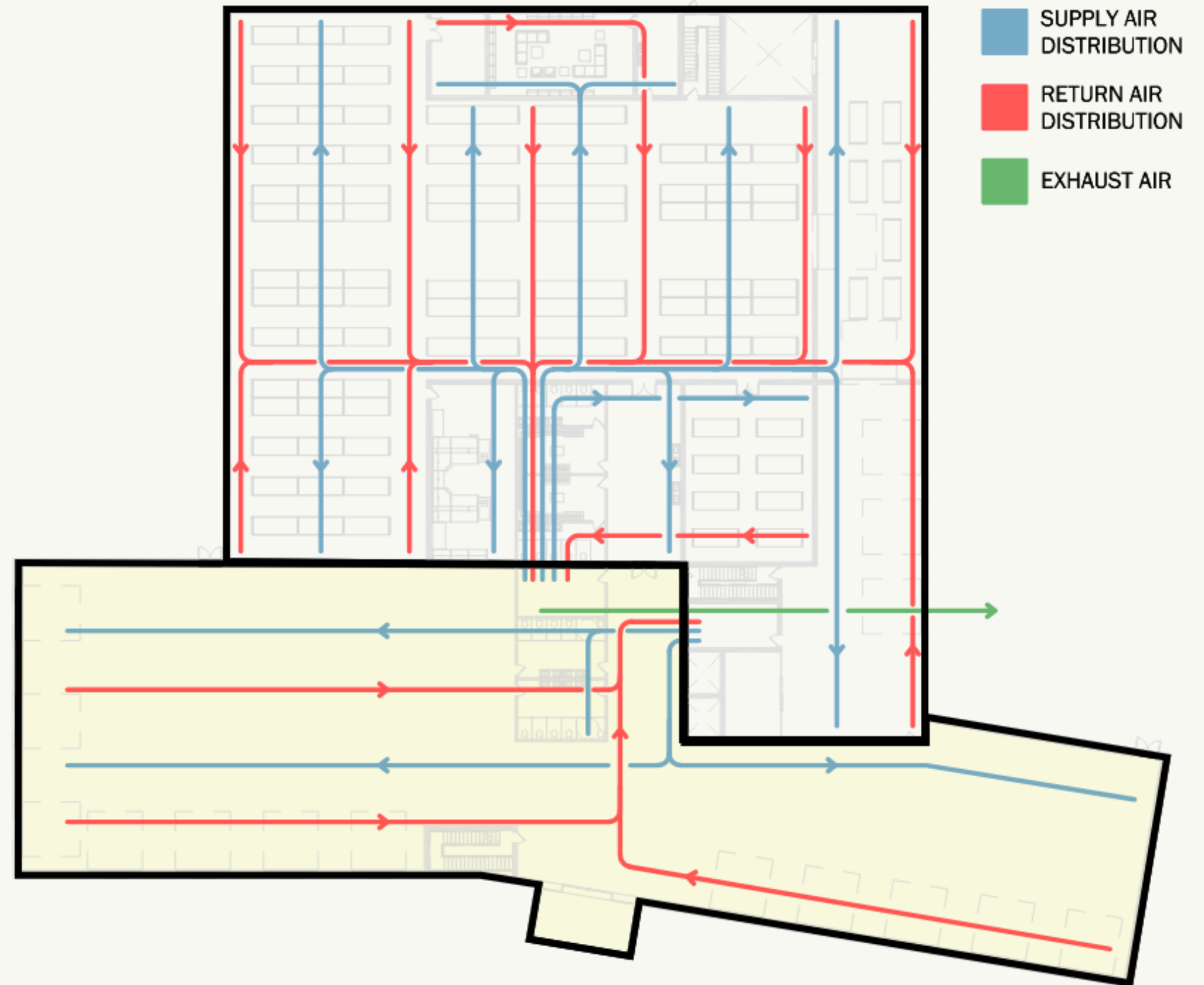
VENTILATION SCHEMATIC DIAGRAM



GROUND FLOOR VENTILATION PLAN

KEY DECISIONS:

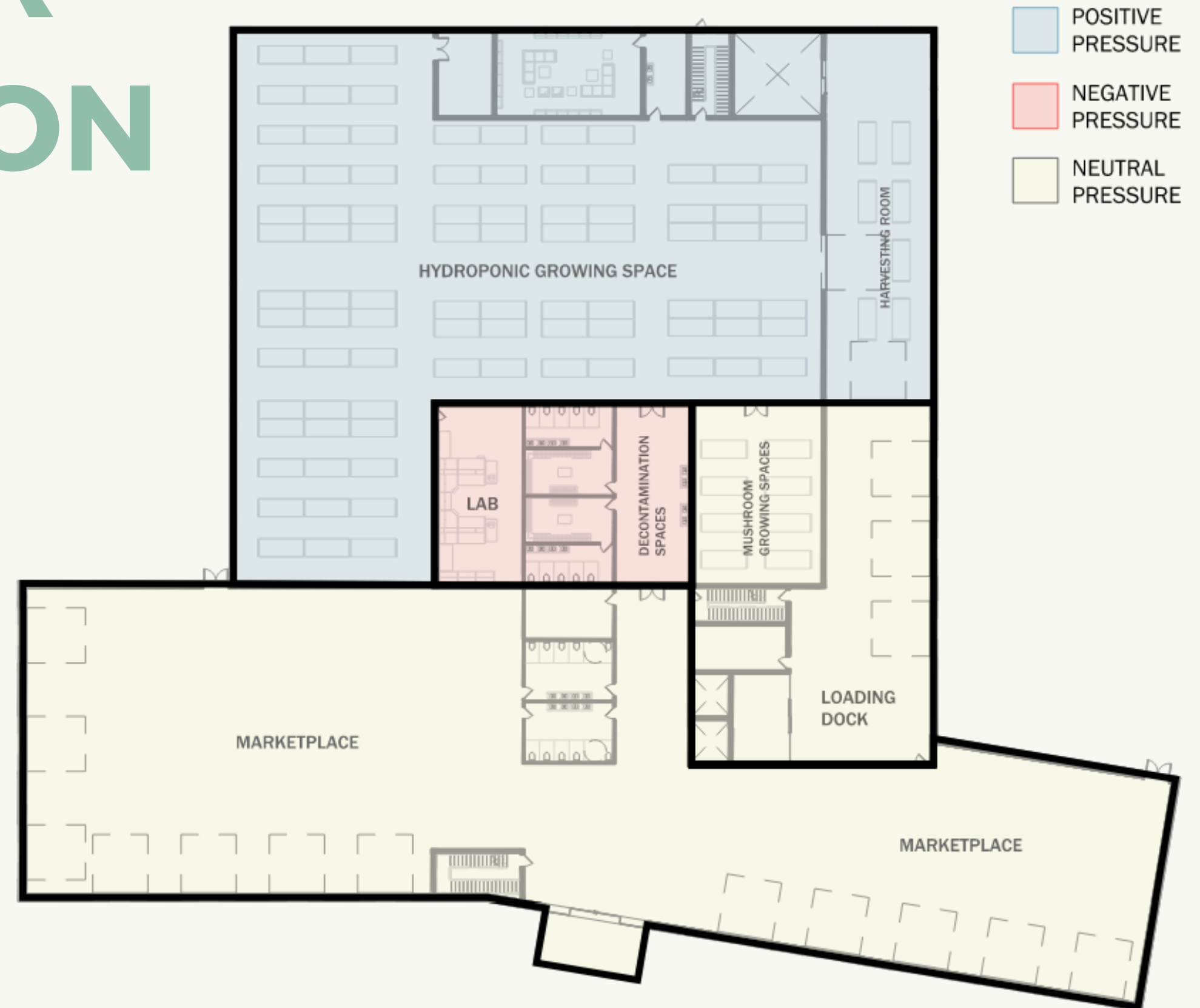
- Dedicated Supply/Return Ducting for Mushroom Space for CO₂ Contamination
- Distinct Zoning between Farming and Public Spaces
- Vertical Overlap in Mechanical Rooms for Exhaust Air Ducting Continuity

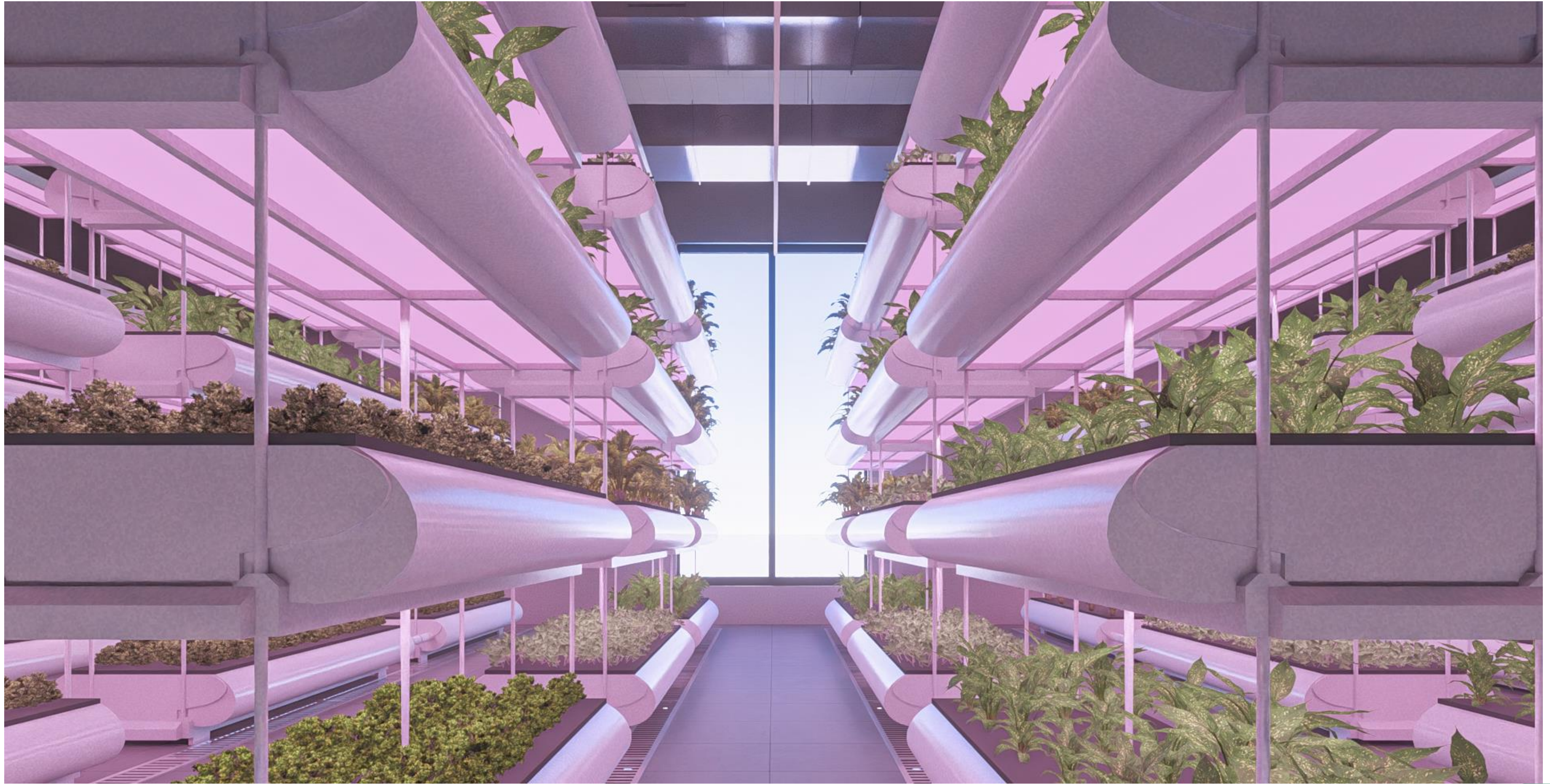


GROUND FLOOR PRESSURIZATION PLAN

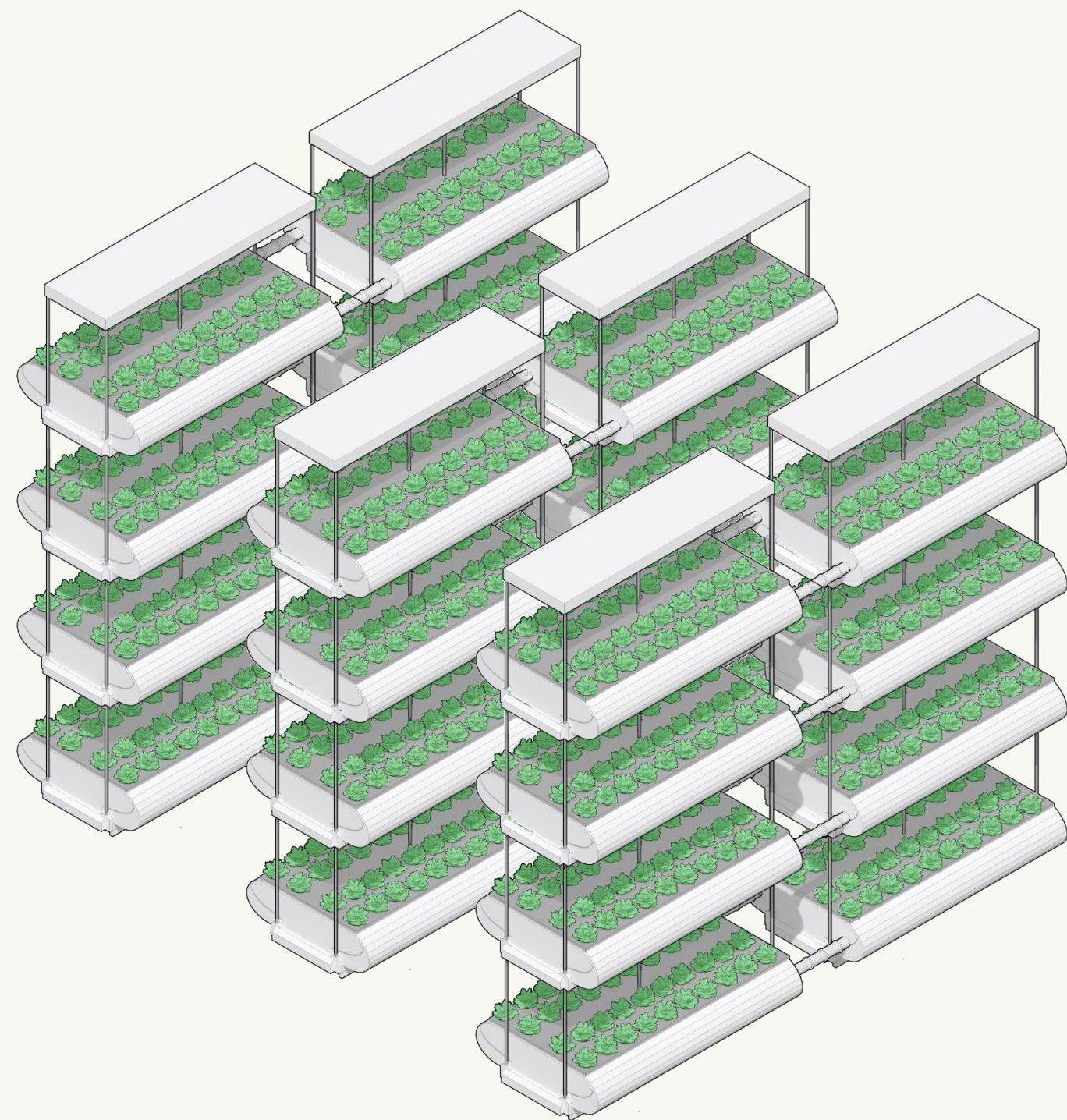
KEY DECISIONS:

- Contaminants controlled through varying pressurization
- Pressurization regulated by exhaust fans & VAV dampers
- Minimal pressurization control in public spaces such as the marketplace

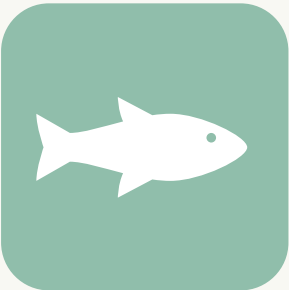




FARMING PRODUCTION



2900 KG/DAY
LEAFY GREEN PRODUCTION



440 M²
DESIGNATED SPACE FOR FISH TANKS
24.2 KG/DAY
PROVIDES FERTILIZER TO 900 LBS OF LETTUCE/DAY



400 M²
DESIGNATED SPACE FOR MUSHROOM GROWTH
0.7 KG OF CO₂
PRODUCED FOR EVERY KG OG MUSHROOMS





24%

OF BUILDING ANNUAL
ENERGY SAVING THROUGH
PV ENERGY

~2196 M³

OF ANNUAL HARVESTED
RAINWATER



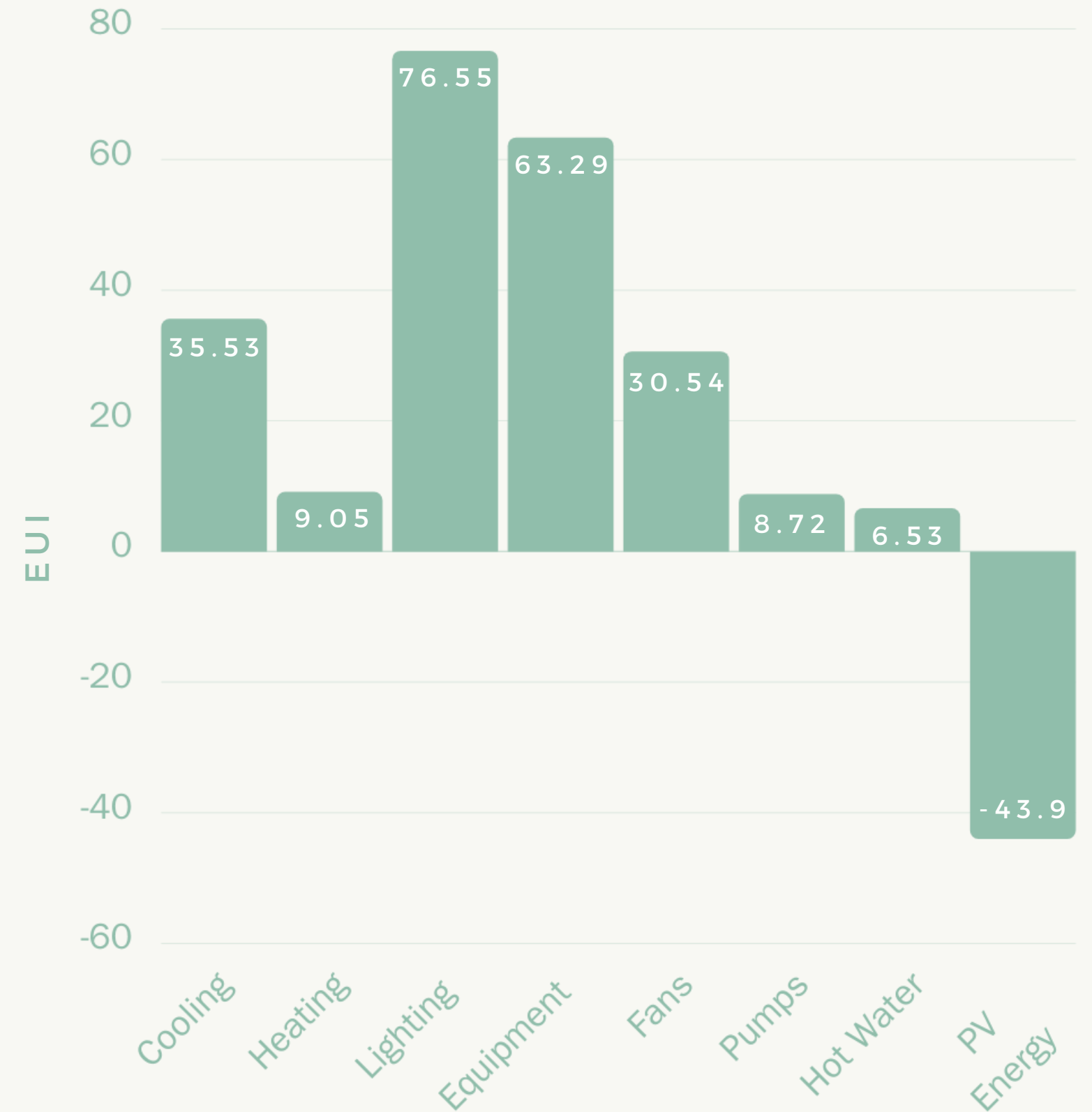
ENERGY CONSUMPTION

186

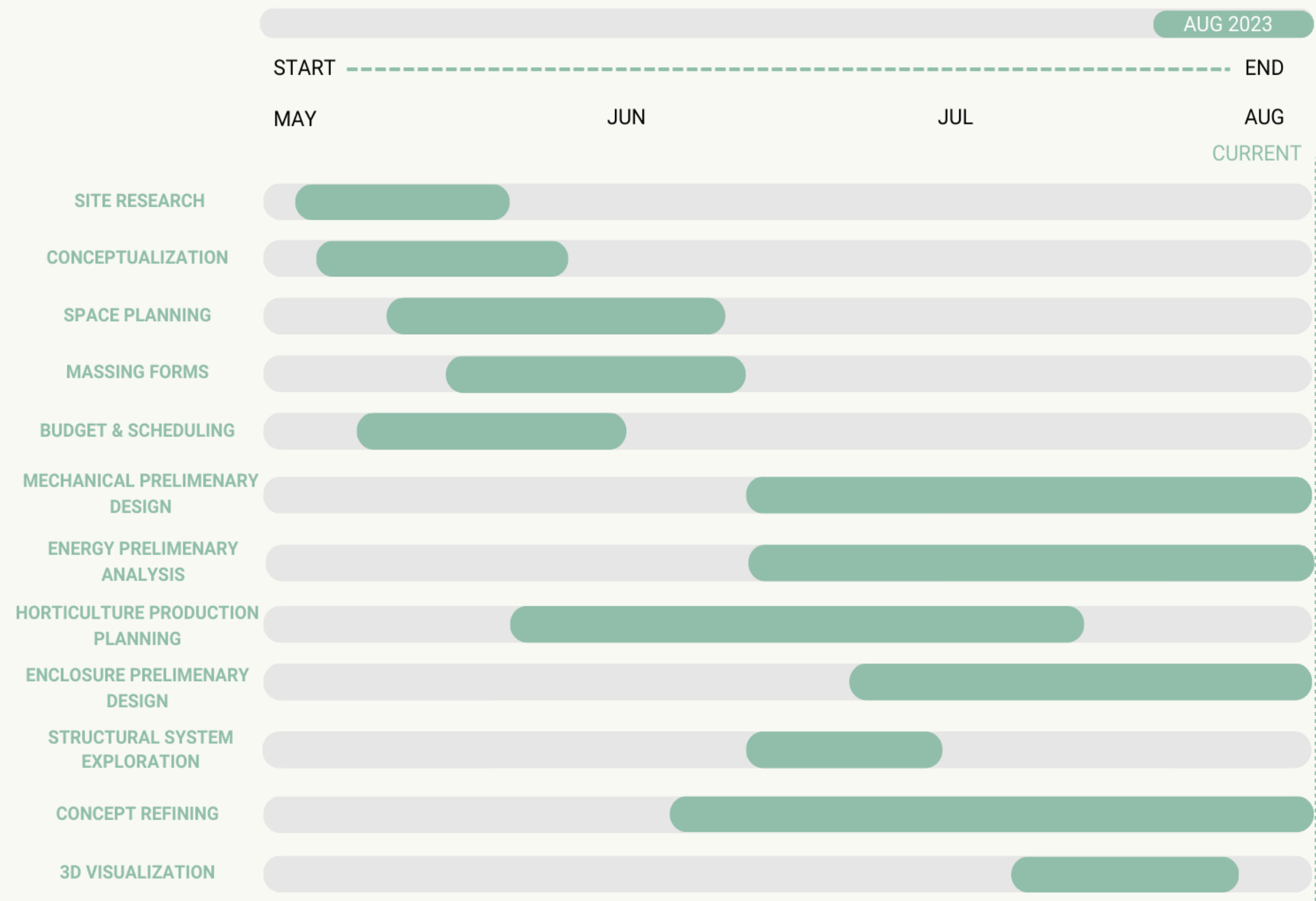
KWH/M²/YR ENERGY USE INTENSITY

64%

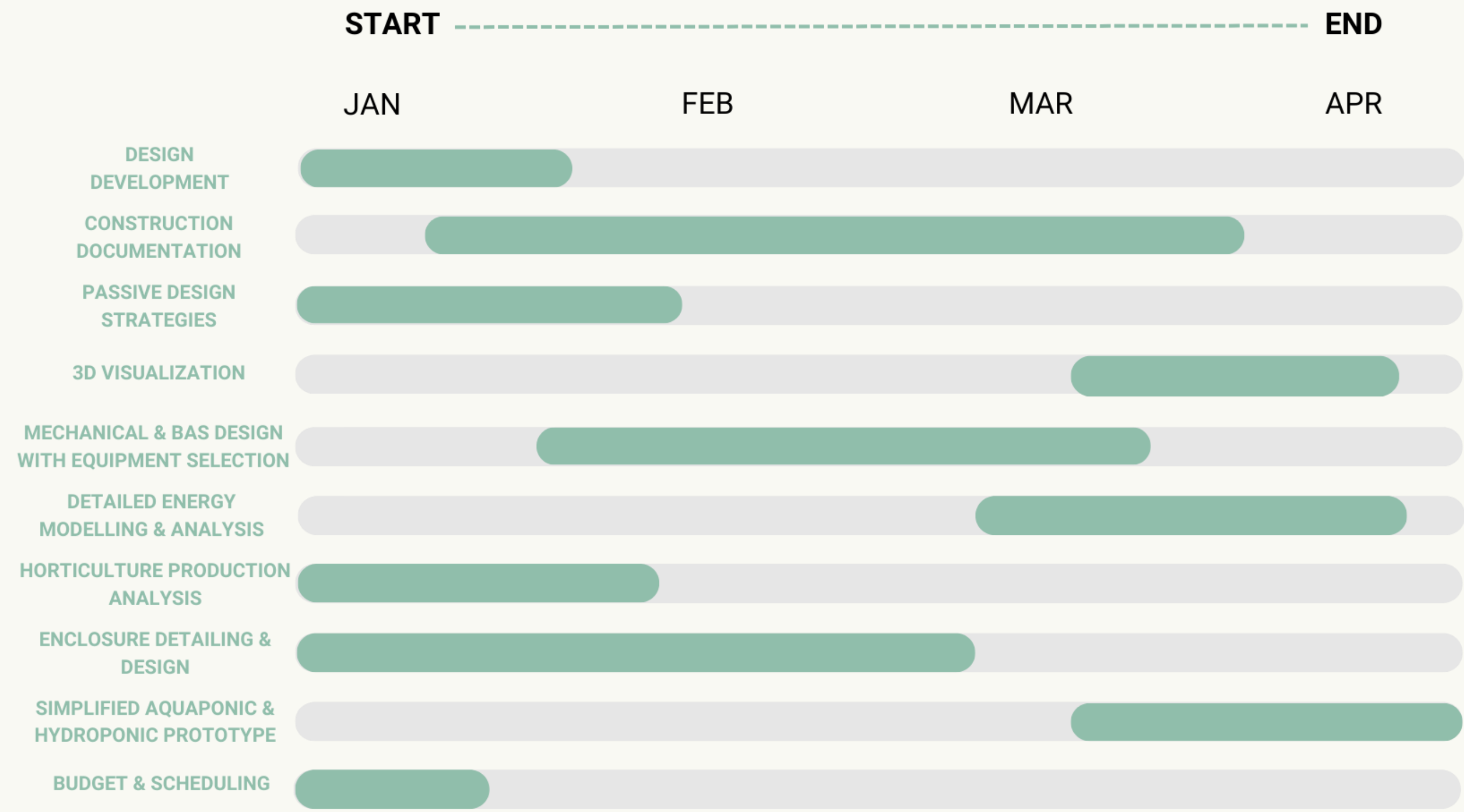
BETTER THAN 2030 BASELINE



PHASE 1 MAJOR COMPLETIONS



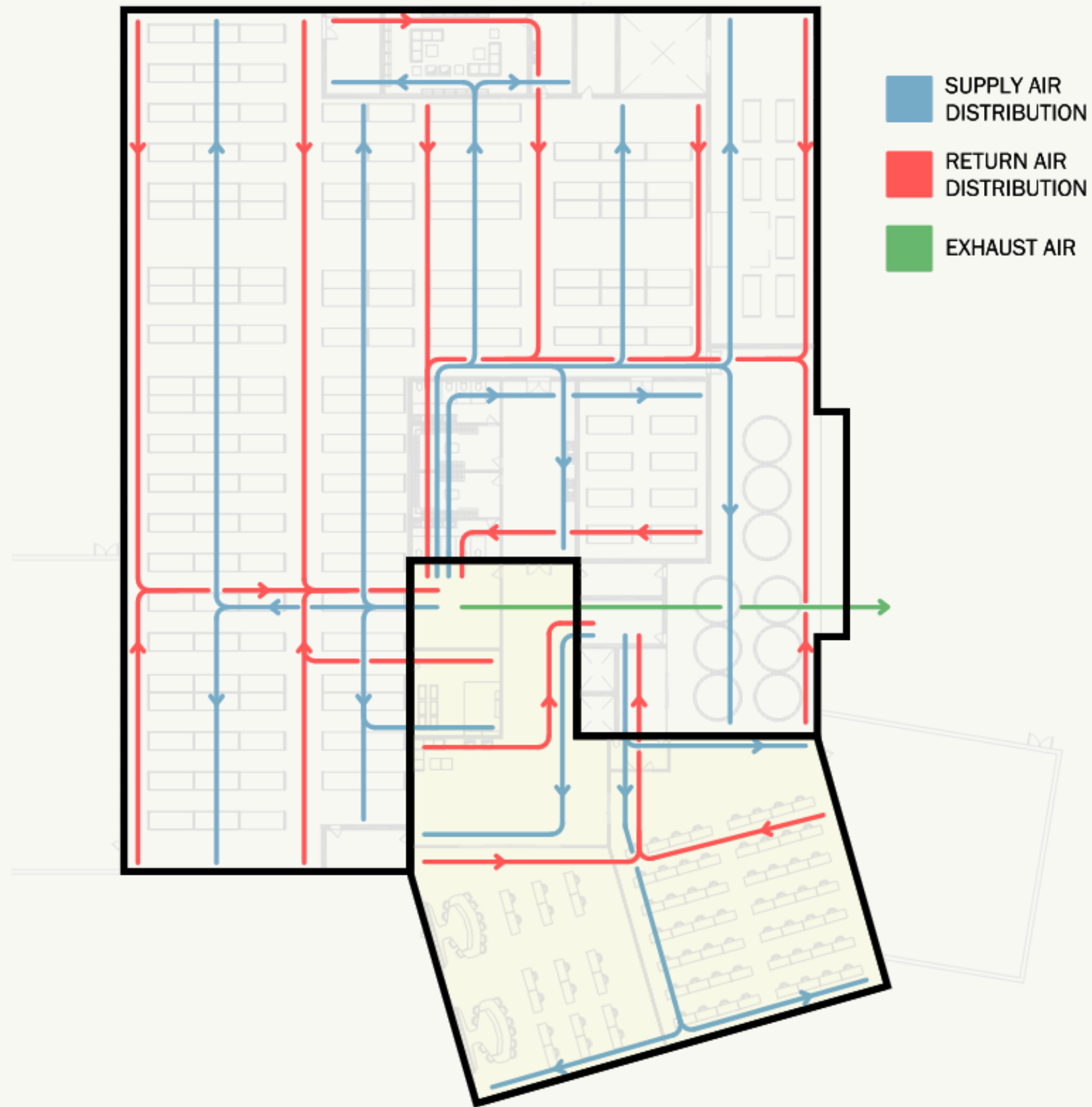
PHASE 2 MAJOR DELIVERABLES



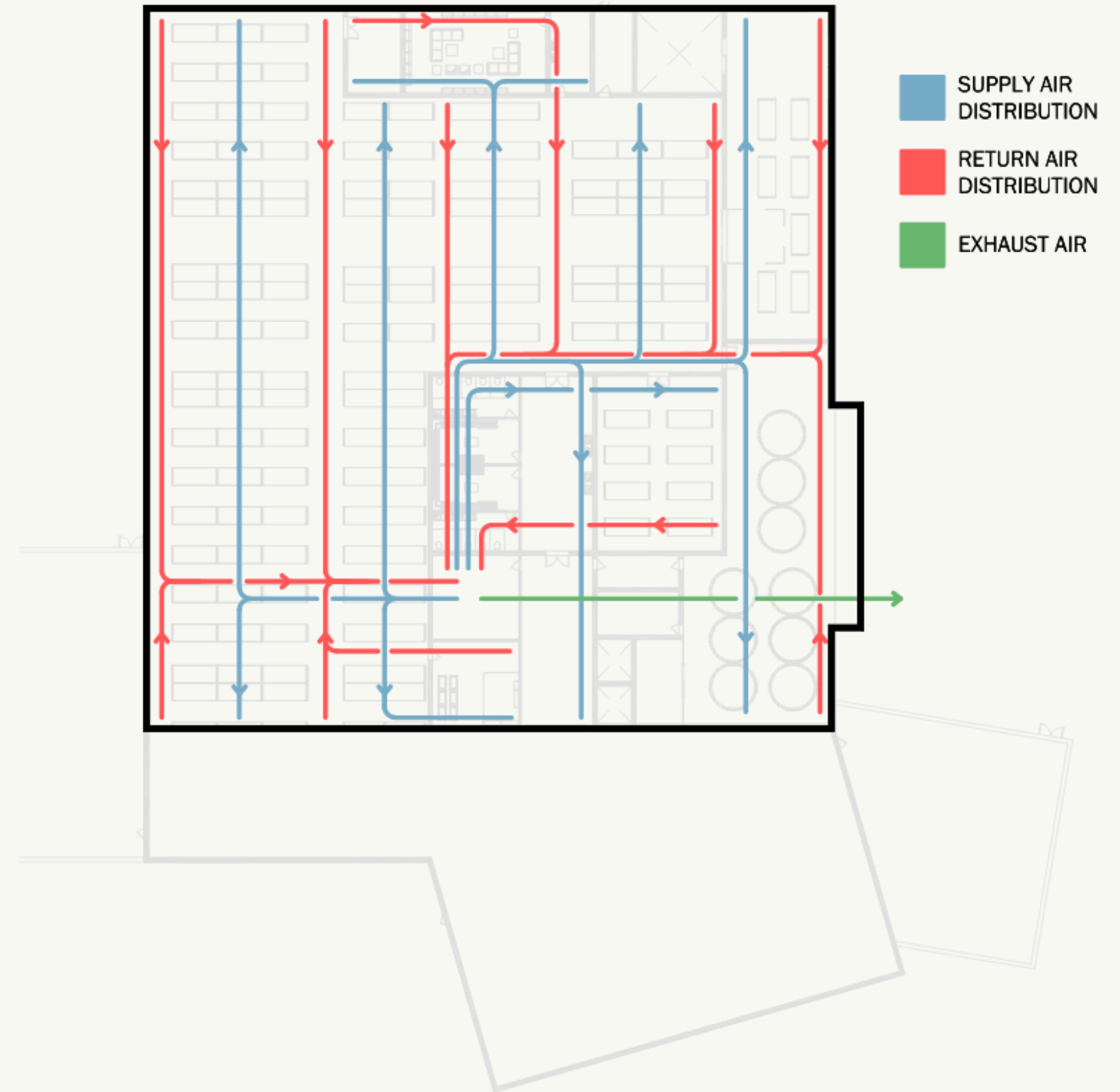
EMPOWERING SUSTAINABLE
GROWTH, ONE SEED AT A TIME

Thank you!





LEVEL 2/3



LEVEL 4

