



**BIOTONOMY**  
THE DESIGN LANGUAGE OF NATURE

# NATURE-BASED SOLUTIONS FOR ARCHITECTURE & CONSTRUCTION



**RECOGNIZED BY UN-HABITAT AS  
"TOP 20 INNOVATIVE SOLUTIONS"**



**1ST PRICE  
LATINAMERICA  
GREEN AWARD**



# WHO WE ARE



BIOTONOMY

THE DESIGN LANGUAGE OF NATURE



**MOEIN NODEHI**

FOUNDER & CEO OF BIOTONOMY



**RAFAEL RABASSA III**

HEAD OF BUSINESS DEVELOPMENT

BIOTONOMY CARIBBEAN





# AGENDA

1 - BACKGROUND

2 - INTRO BIOTONOMY

3 - PROJECTS

4 - BIOTONOMY CARIBBEAN

5 - QUESTIONS





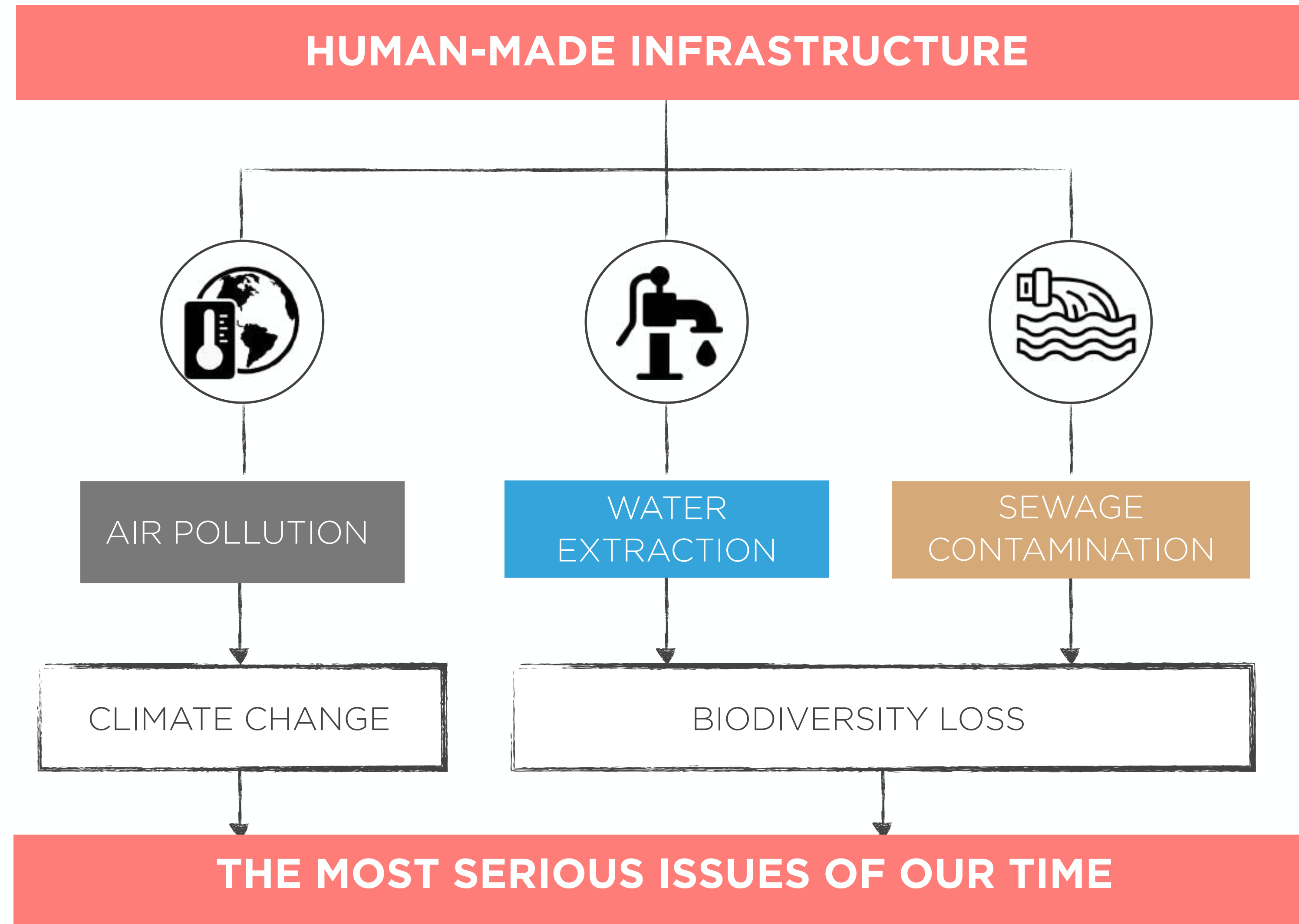
# BACKGROUND

ENVIRONMENT - INFRASTRUCTURE - ANCIENT KNOWLEDGE



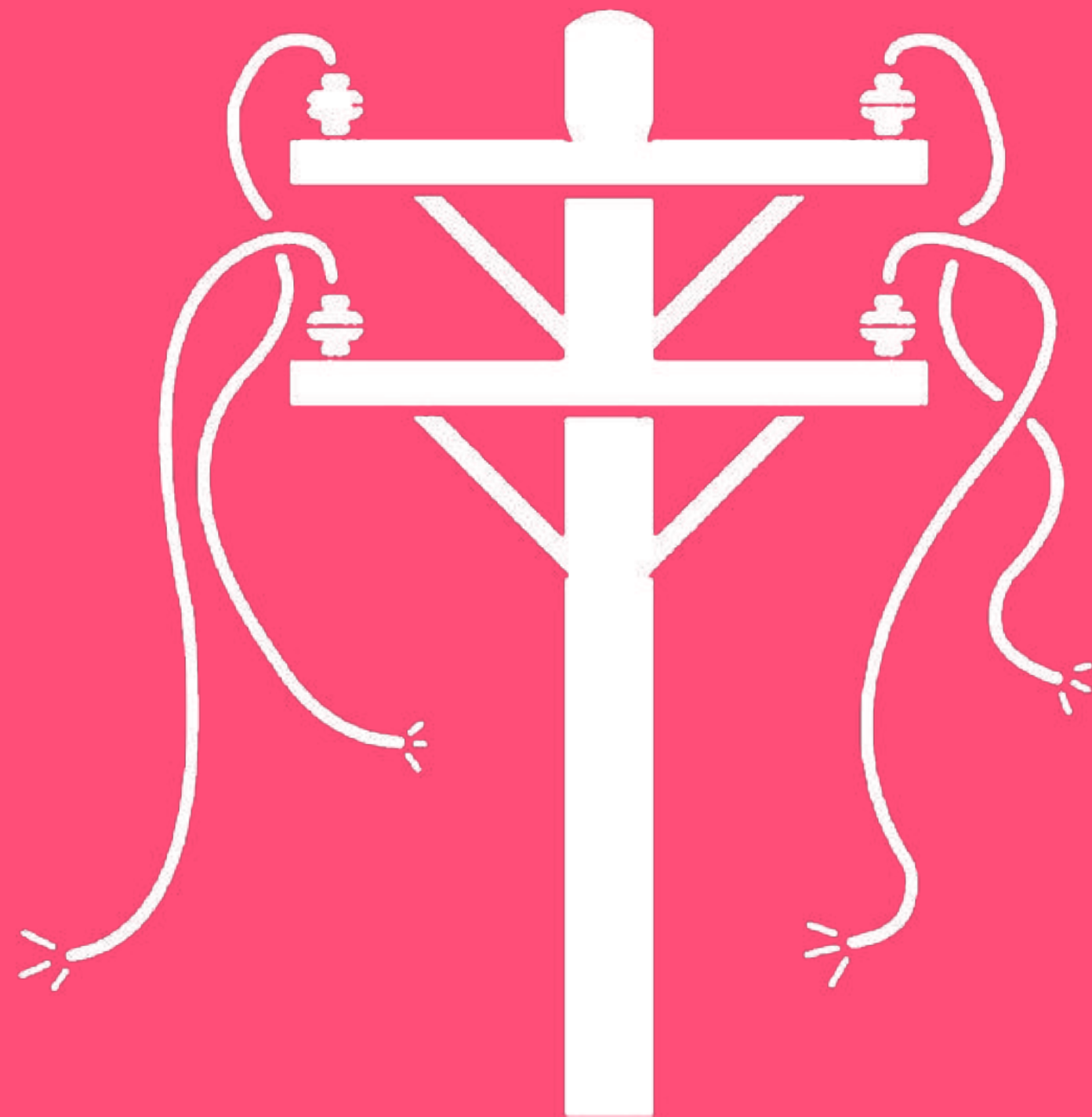


# MAIN ENVIRONMENTAL IMPACTS - CAUSED BY BUILDINGS & CITIES





# INFRASTRUCTURE & CLIMATE CHANGE



- + MODERN SOCIETY
  - +FASTER ECONOMIC GROWTH
  - + COMFORTS
- 

## THE WORLD IS AT A TURNING POINT

- NOT DESIGNED FOR CLIMATE CHANGE
- EXTREMELY VULNERABLE & UNRELIABLE
- MORE SEVERE AND FREQUENT EXTREME WEATHER EVENTS
- OUTDATED & UNSUSTAINABLE





# \$360 BILLION

THE ANNUAL COST OF EXTREME WEATHER EVENTS IN THE USA







JAPAN



SOMALIA



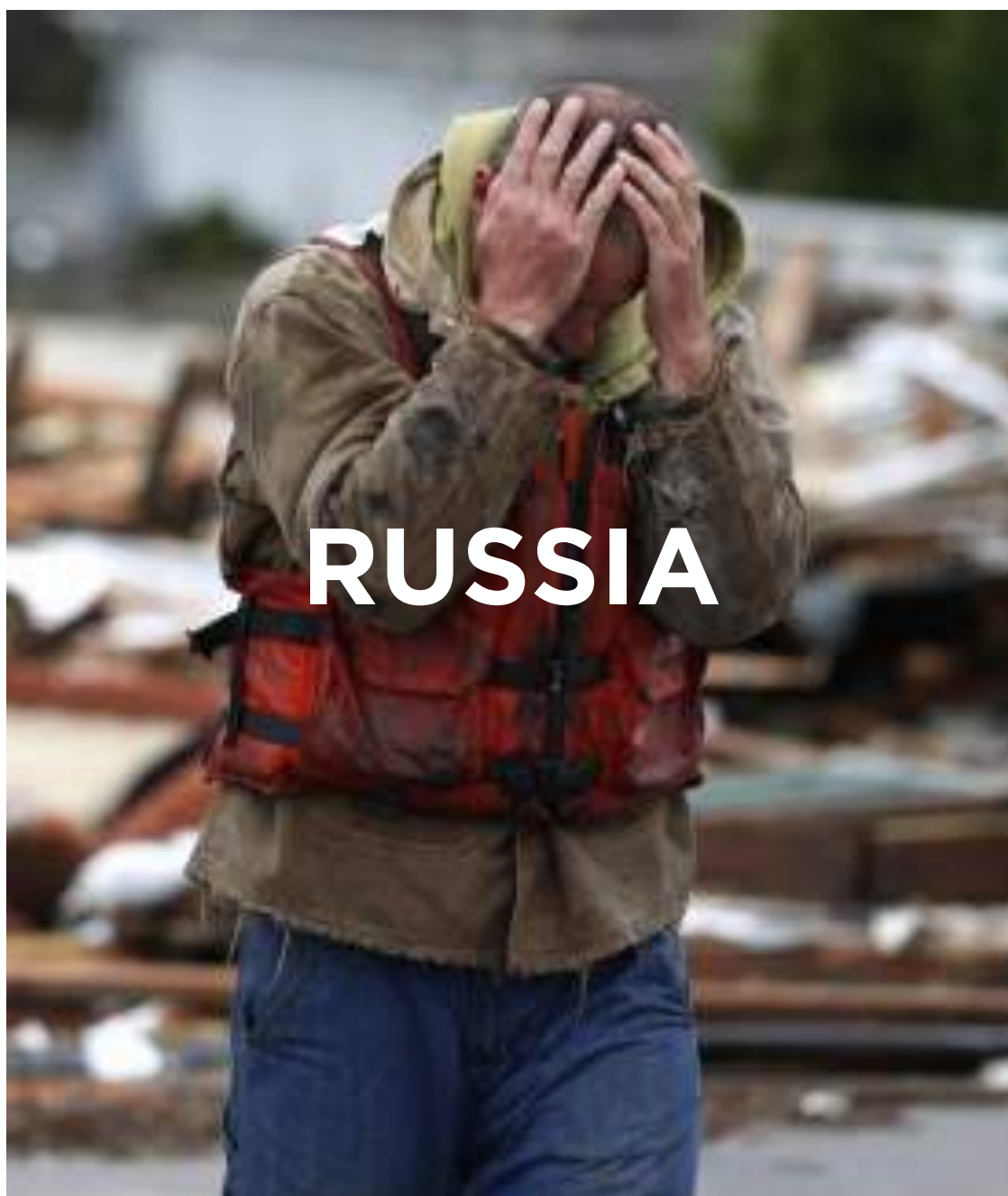
MALAWI



FRANCE



GREECE



RUSSIA



ITALY



USA



SPAIN



FRANCE



CYPRUS



FINLAND



LEBANON



CANADA



GREECE



ITALY



BRAZIL



ITALY



HOLLAND



CHINA



BELGIUM



GERMANY



HAITI



MEXICO



PHILIPPINE



IRAN



AUSTRALIA



SUDAN



# THE 2 MAIN DESIGN CONCEPTS - ON THE MARKET

## GREEN BUILDINGS



50 YEARS

## PASSIVE HOUSE



40 YEARS

- **Depends on human-made infrastructure to operate**
- Vulnerable to extreme weather events
- Relies on resources that are not available around the world
- Outdated 40-50 years old



# HUMAN-BASED ARCHITECTURE

## TECHNICAL & MECHANICAL

RELIES ON HUMAN MADE INFRASTRUCTURE



**200.000 YEARS**  
OF EVOLUTION

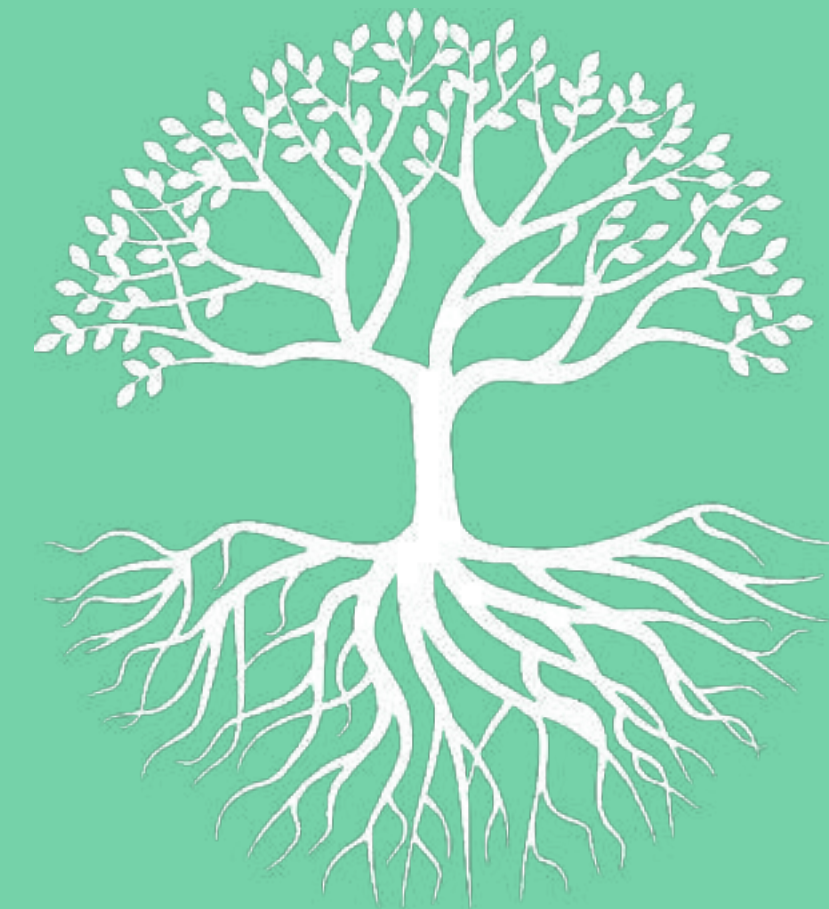
**GREEN BUILDINGS &  
PASSIVE HOUSE**



# NATURE-BASED ARCHITECTURE

## BIOLOGY & PHYSICS

RELIES ON NATURES INFRASTRUCTURE

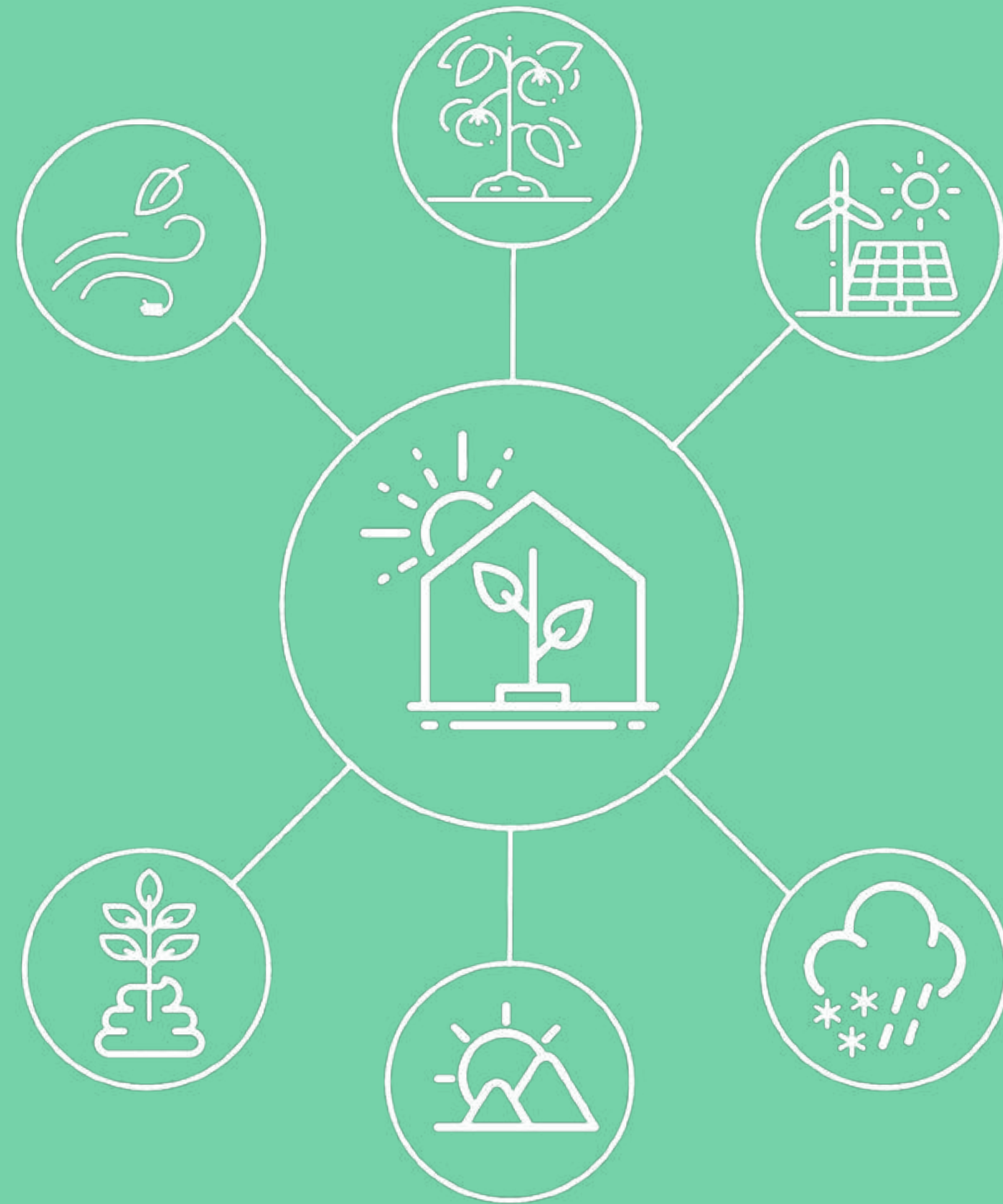


**3.8 BILLION YEARS**  
OF EVOLUTION

**BIOTONOMY**



# HOW WOULD NATURE DESIGN A BUILDING?



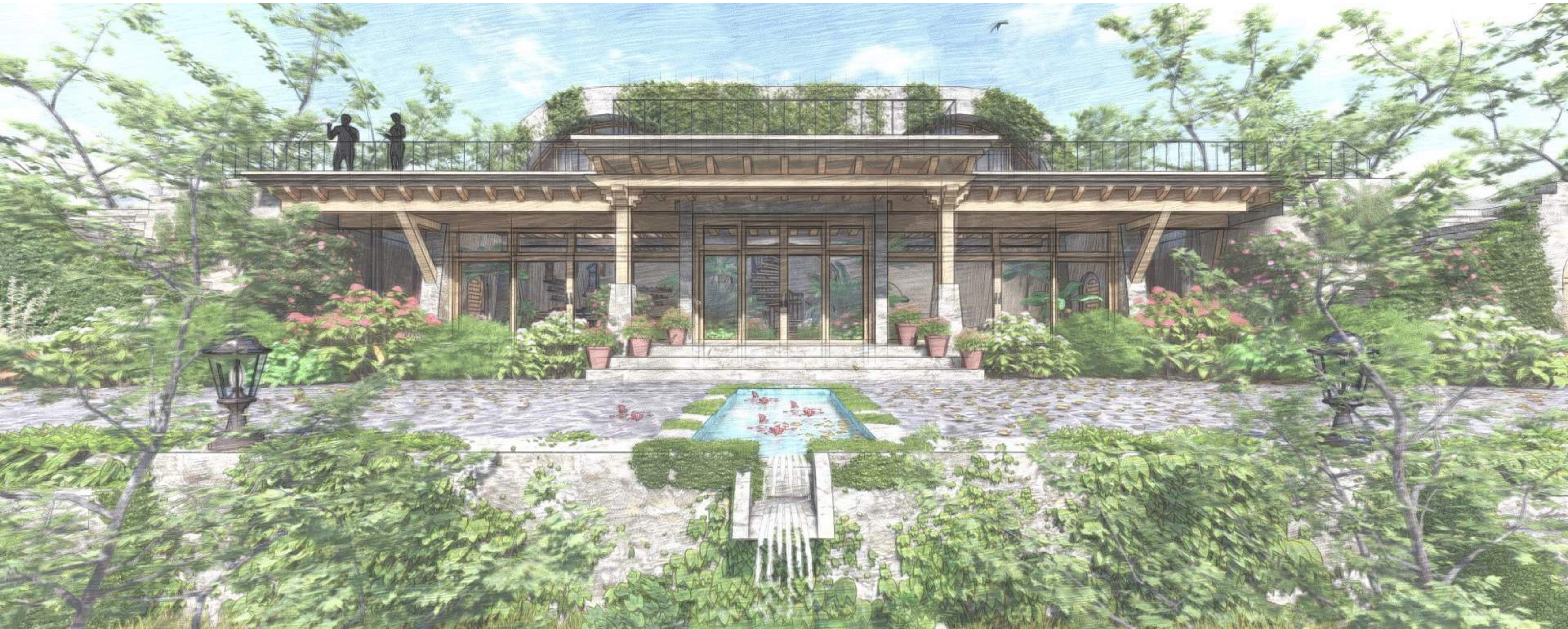
*“WE DON’T NEED TO REINVENT THE STRATEGIES THAT ARE ALREADY HERE. WE JUST NEED TO LEARN HOW TO ADAPT THEM”*

- MIMICS THE STRATEGIES FOUND IN NATURE
- SOLVES CHALLENGES SUSTAINABLY AND IN SOLIDARITY WITH ALL LIFE ON EARTH
- RESTORING ECOSYSTEMS.
- COST EFFECTIVE, ENVIRONMENTAL & SOCIAL BENEFITS



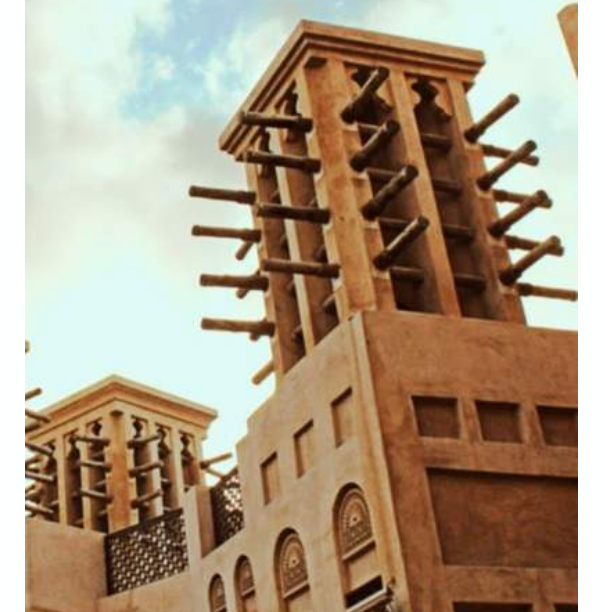
# NATURE-BASED SOLUTIONS

HAS PROVEN TO BE **MORE EFFECTIVE & COST-EFFICIENT** IN THE LONG TERM THAN PURELY  
TECHNICAL & MECHANICAL APPROACHES.





# NATURE-BASED SOLUTIONS - ANCIENT TECHNOLOGY







# BIOTONY

THE DESIGN LANGUAGE OF NATURE





# SERVICES WE PROVIDE



## Architecture

Bi-tonomy Studio develops holistic designs with nature-based solutions for small and large scale projects.



## Construction

Bi-tonomy Construction offers construction services for new and reforming projects with nature-based solutions.



## Education

Bi-tonomy Academy offers onsite workshops & online courses about how to design & build with nature-based solutions.



## Vertical Ecosystems

Bi-tonomy Garden develops vertical ecosystems for climate adapting and renaturing urban areas.





# VERTICAL GARDENS

TRANSFORMING WALLS TO LIVING ECOSYSTEMS



- 1 - Reduces Urban Heat
- 2- Insulates & cools buildings
- 3 - Increases real-estate value
- 4 - Improves air quality
- 5 - Food growing in Urban Ares
- 6 - Effective noise reduction
- 7 - Absorbs carbon emission









# **NATURE-BASED SOLUTIONS**

FOR ARCHITECTURE & CONSTRUCTION

1. NATURAL HEATING & COOLING

2. NATURAL VENTILATION

3. WATER PRODUCTION

4. BIOLOGICAL SEWAGE TREATMENT

5. NATURAL SOURCED ELECTRICITY

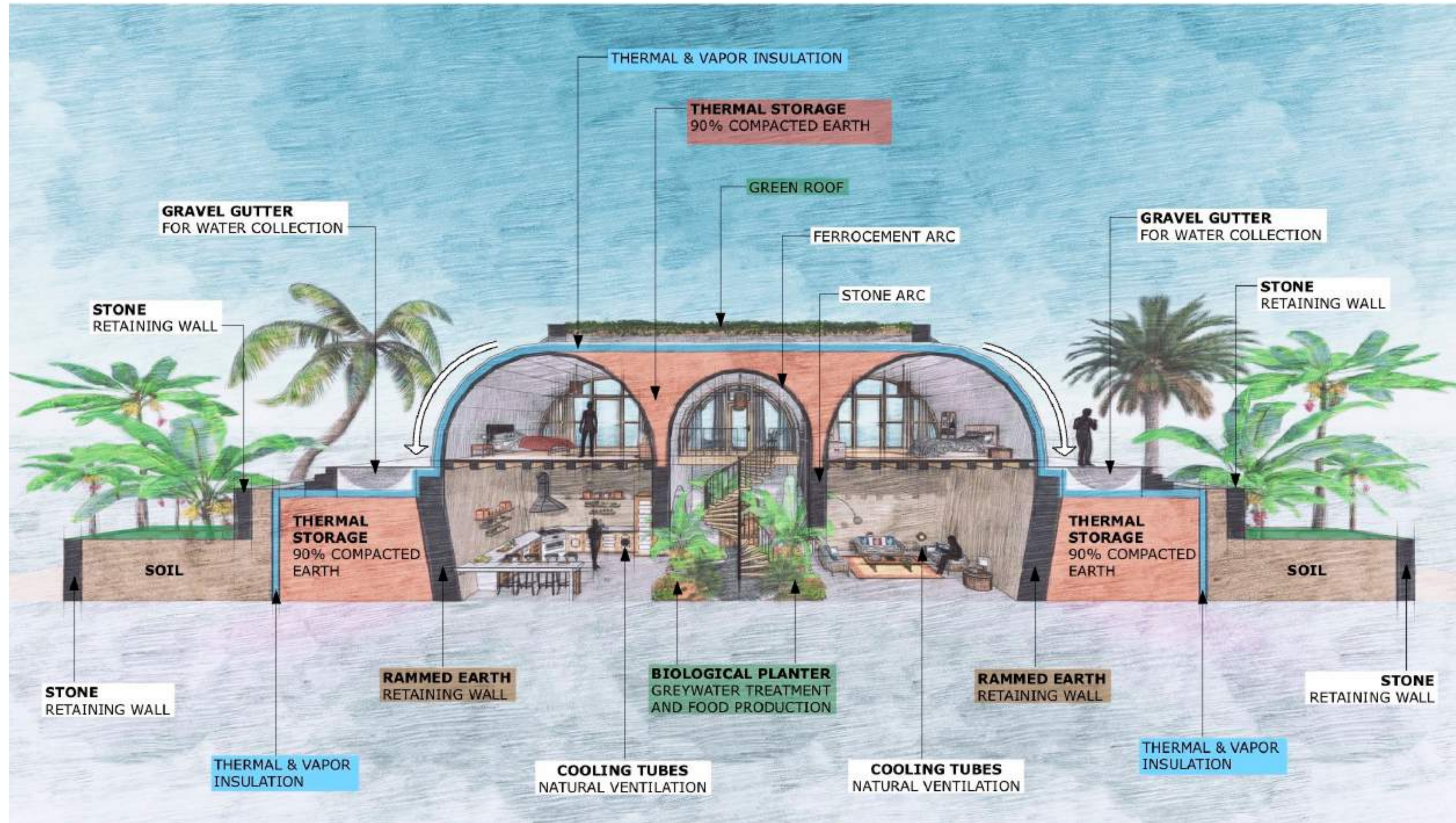
6. FOOD PRODUCTION



# 1

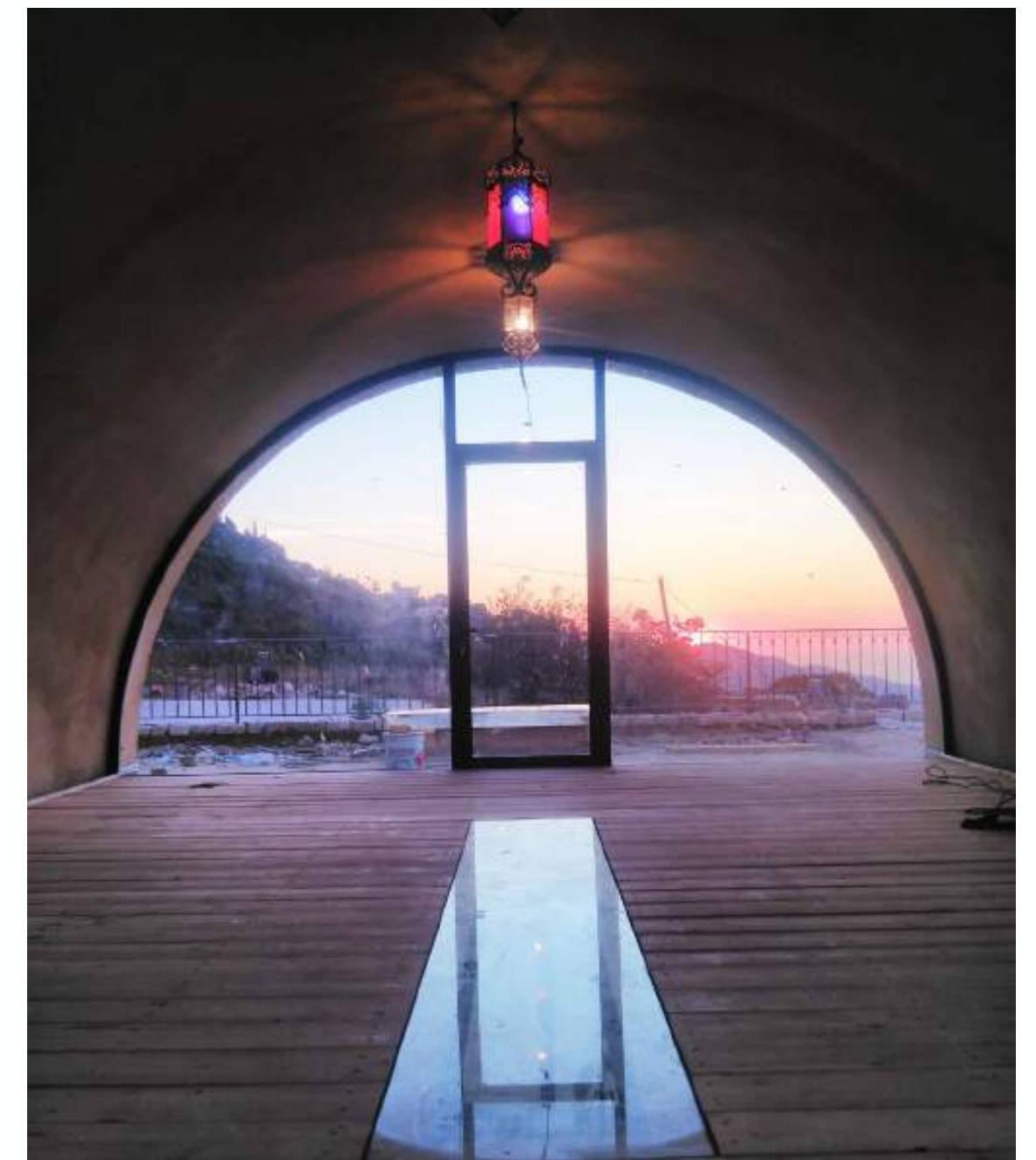
## NATURAL HEATING & COOLING

### PASSIVE SOLAR - THERMAL STORAGE - MICROCLIMATES





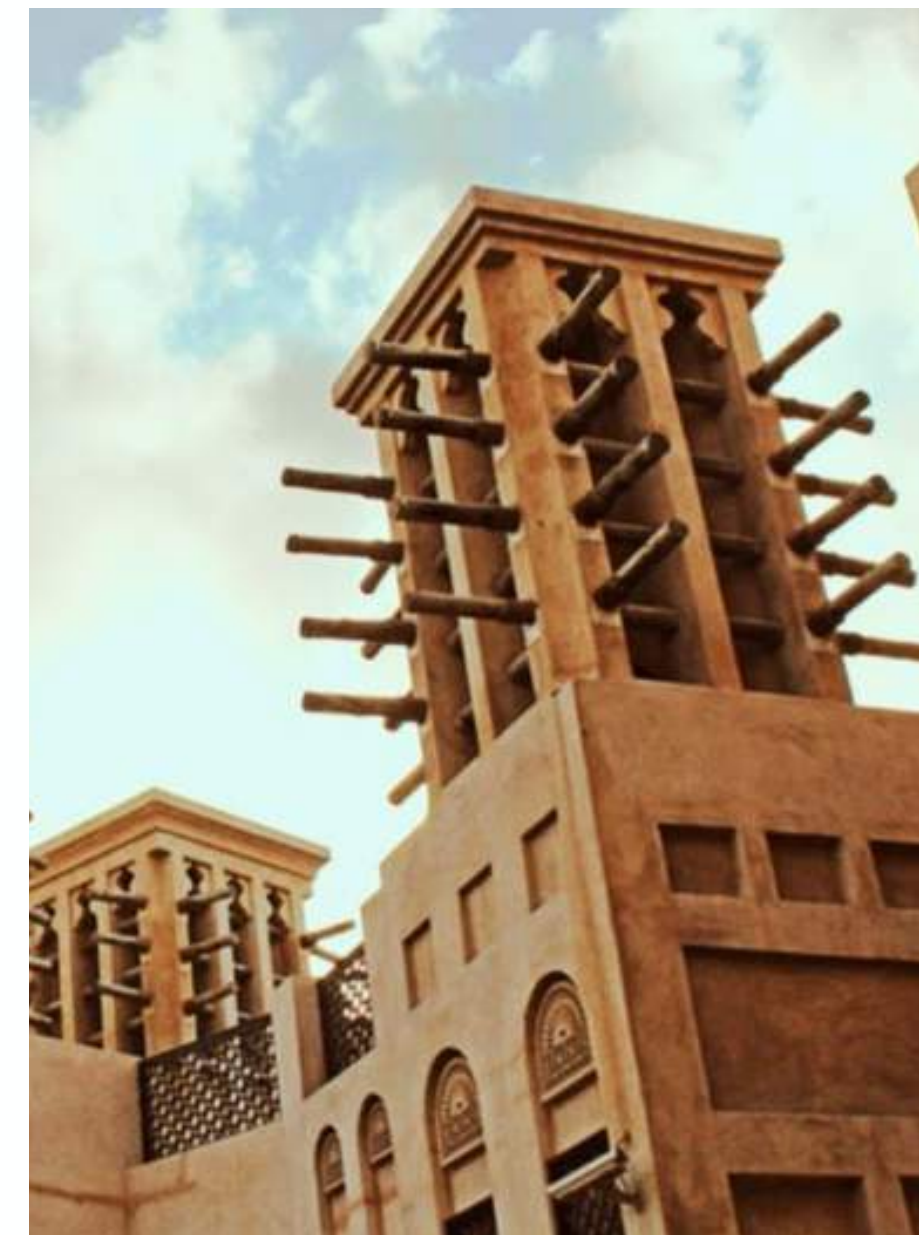
# ZERO ENERGY FOR HEATING & COOLING





# 2 NATURAL VENTILATION

## ANCIENT METHODS - NATURAL CONVECTION





# 3 WATER PRODUCTION

## ON SITE HARVESTING - FILTRATION SYSTEM





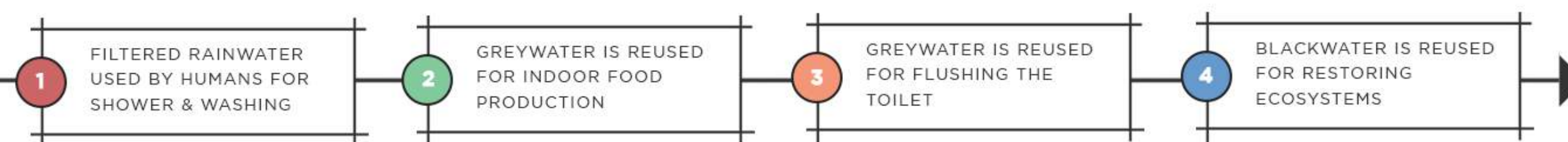
# 4

## BIOLOGICAL SEWAGE TREATMENT

CONTAINED - INDOOR FOOD PRODUCTION - RESTORING ECOSYSTEMS



### BIOLOGICAL SEWAGE TREATMENT

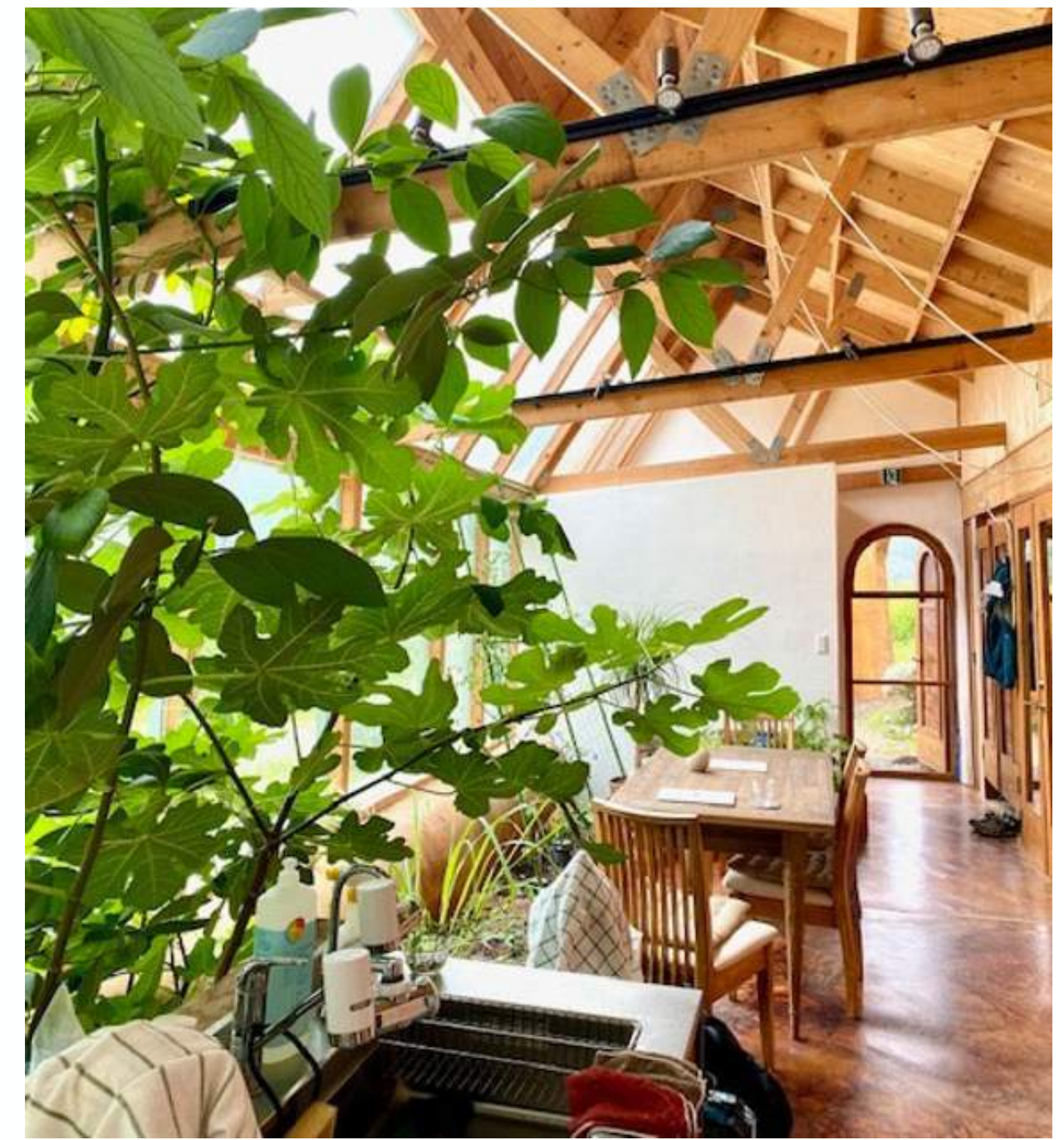




# 5

## FOOD PRODUCTION

**FOOD SECURITY - CLEANS INSIDE AIR - BOOST IMMUNESYSTEM**





# 6 NATURAL SOURCED ELECTRICITY

## MORE AFFORDABLE - SOLAR PANELS - WIND TURBINES





# THE BENEFITS OF **NATURE-BASED SOLUTIONS**

1. ELIMINATE CARBON EMISSIONS DURING OPERATION PHASE.
2. REDUCE OPERATING COST WITH UP TO 95%
3. MINIMIZE/ELIMINATE THE ENERGY CONSUMPTION FOR HEATING & COOLING UP TO 100%.
4. DECREASE WATER CONSUMPTION UP TO 75 %
5. REUSE WASTEWATER FOR FOOD PRODUCTION & RESTORING ECOSYSTEMS
6. PROVIDE FOOD & WATER SECURITY
7. BUILDING RESILIENCE FOR OUR SOCIETIES AND ECOSYSTEMS.
8. RECONNECTING PEOPLE WITH NATURE & ENHANCING HUMAN WELLBEING





# BIOTONOMY - STANDARD MODELS

**MODEL 808** - COLD CLIMATE



**MODEL 909** - MILD & TROPICAL CLIMATE



**MODEL 929** - MILD & TROPICAL CLIMATE



**MODEL 919** - MILD & TROPICAL CLIMATE









# PROJECTS

LEBANON - ARGENTINA - HAITI - ICELAND - SPAIN





# LEBANON - TOP 20 INNOVATIVE SOLUTIONS BY UN-HABITAT



## RECOGNIZED BY UN-HABITAT

"TOP 20 INNOVATIVE SOLUTIONS THAT TRANSFORM WASTE TO WEALTH AND CONTRIBUTES TO THE SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND THE NEW URBAN AGENDA."



UN HABITAT  
FOR A BETTER URBAN FUTURE



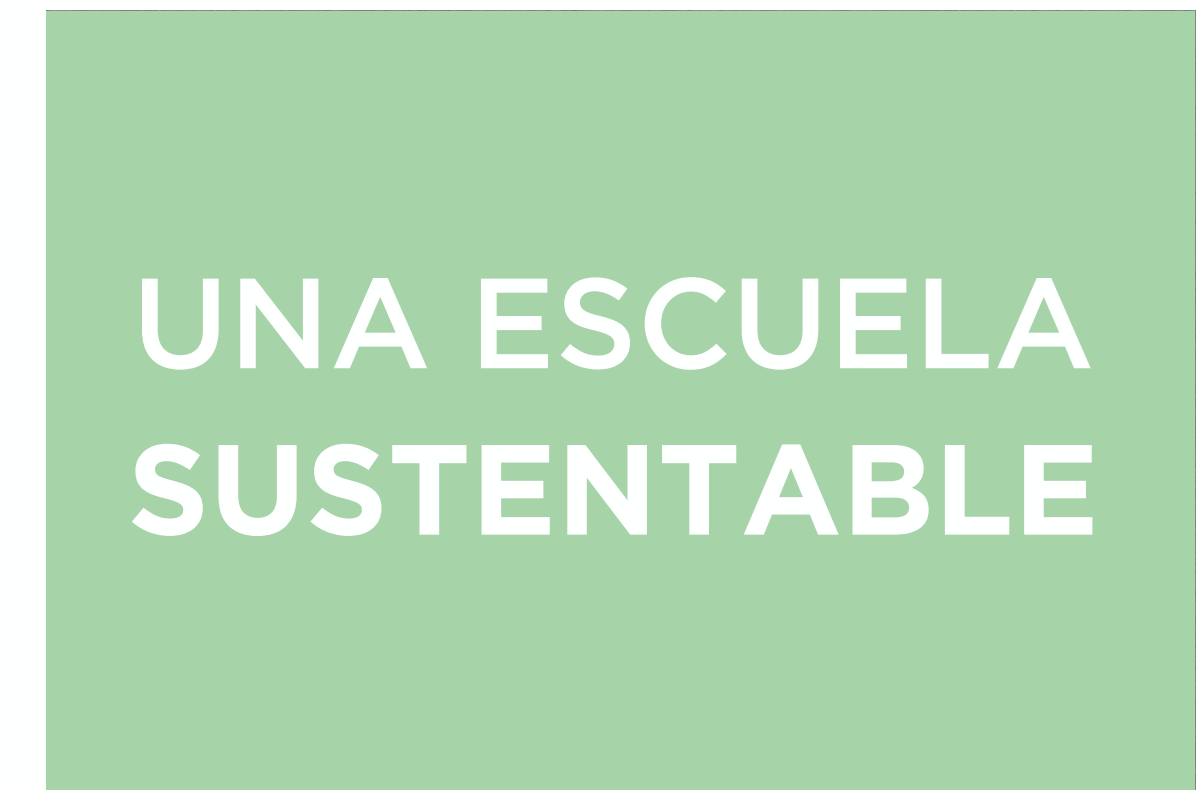
SUSTAINABLE  
DEVELOPMENT  
GOALS



# 1ST PRICE OF LATIN AMERICAS GREEN AWARDS



The first Autonomous School built with Nature-based solutions in Latin America. This school was built with voluntary hands and with support from the private, public and academic sectors. The school was built mostly with natural & recycled materials, and it produces renewable energy, collects rainwater and reuses its waste water and does not need energy for heating & cooling. The school also has an integrated greenhouse, where the children take care of the plants.





# HAITI - PRIMARY SCHOOL

THE FIRST AUTONOMOUS SCHOOL IN HAITI BUILT OUT OF NATURAL & RECYCLED MATERIALS





# ICELAND - AUTONOMOUS HOME

- Inspired by traditional Turf-houses





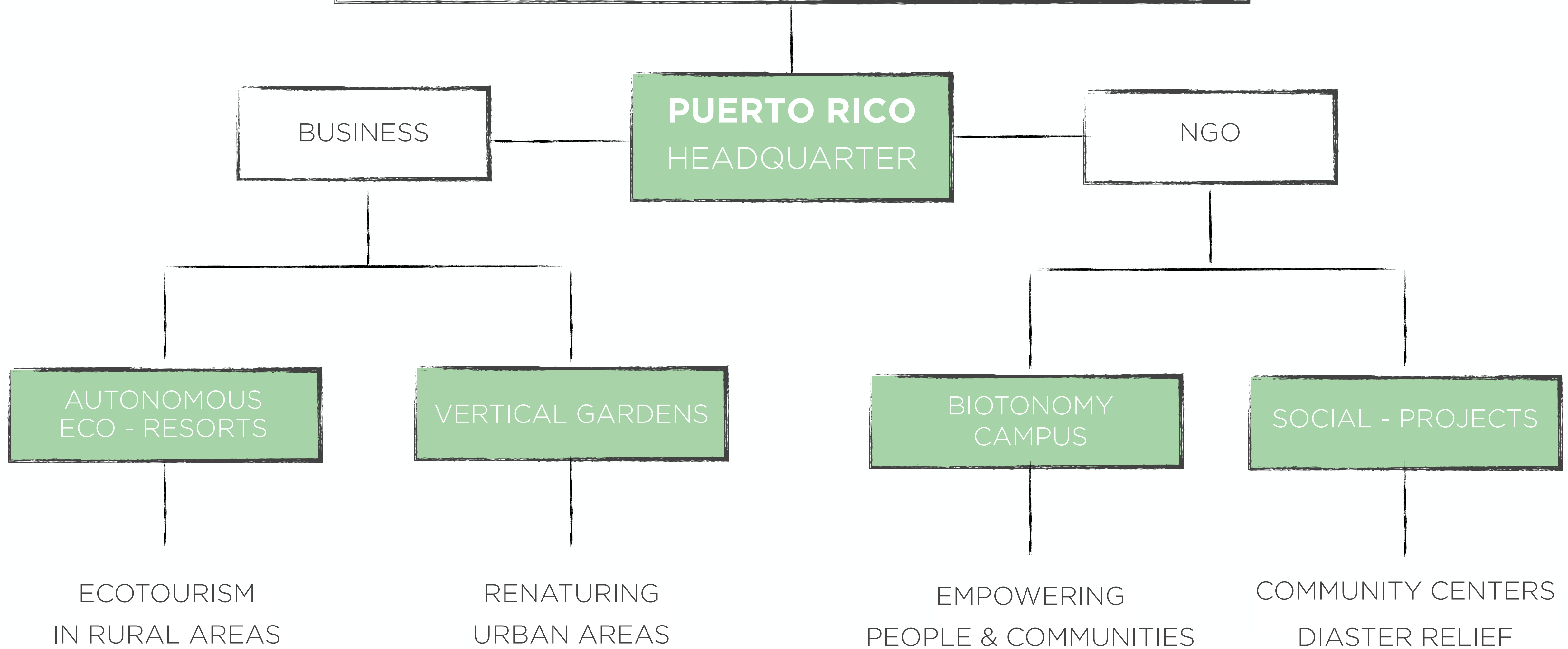


# BIOTONOMY CARIBBEAN





# BIOTONOMY - CARIBBEAN





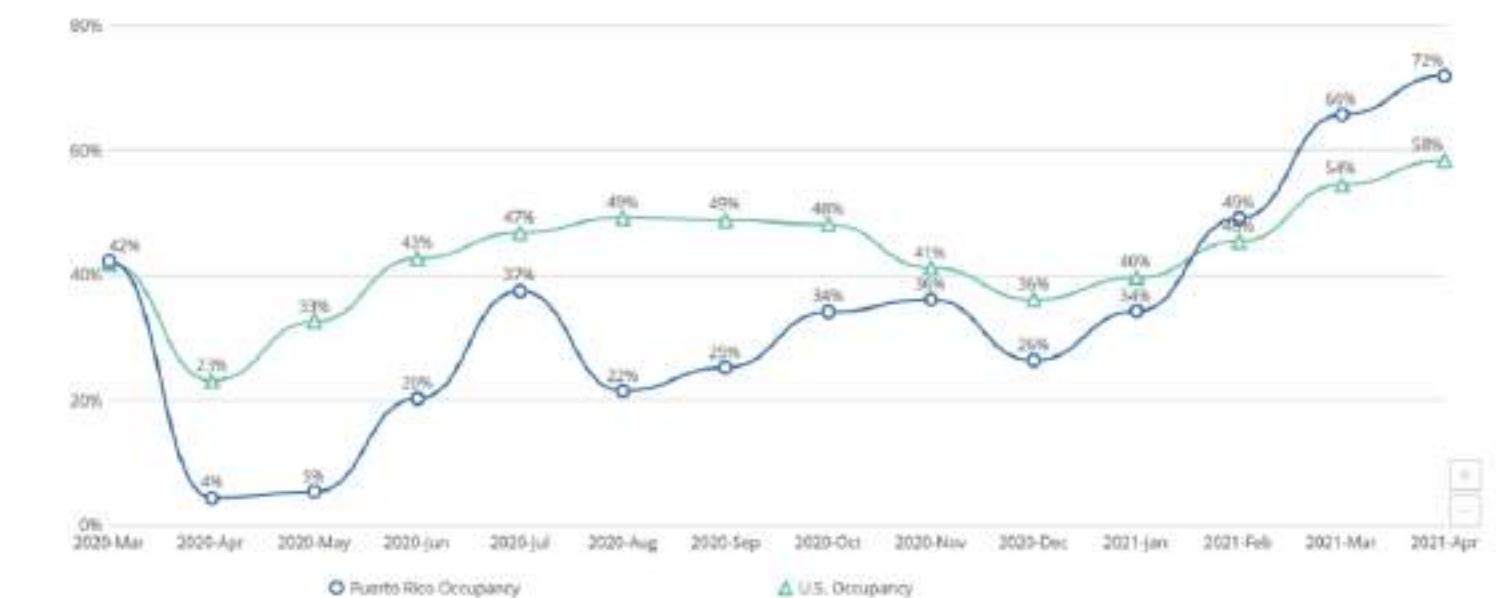
# AUTONOMOUS ECOLOGICAL RESORTS - PUERTO RICO

Puerto Rico's tourism recovery is exceeding that of other U.S. states and territories.

**Hotel occupancy rates are 15% higher than 2019**

Since April 2021 Occupancy Rate in Puerto Rico is over 70%

**CONTINUE TO OUTPACE U.S. AVERAGE**  
Dramatic rebound in the last eight weeks



## ECO TOURISM

**54 % MARKET GROWTH IN 8 YEARS**

The ecotourism market size was valued at \$181.1 billion in 2019, and is expected to reach **\$333.8 billion by 2027.**



# THE FIRST FULLY AUTONOMOUS ECO-VILLAGE

**DESIGN:** 12 x Model 919 - Caribbean

**SIZE:** 860 square feet Interior space (80m<sup>2</sup>)

**1ST FLOOR:** Kitchen, Living-room, WC, Shower, Porch

**2ND STORY:** Master-bedroom, Roof Terrace

**MATERIALS:** Natural, Local, Traditional, Recycled



## AUTONOMOUS SYSTEMS

1. NATURAL COOLING SYSTEM
2. WATER PRODUCTION
3. BIOLOGICAL SEWAGE TREATMENT
4. FOOD PRODUCTION
5. SOLAR POWER
6. BIOGAS





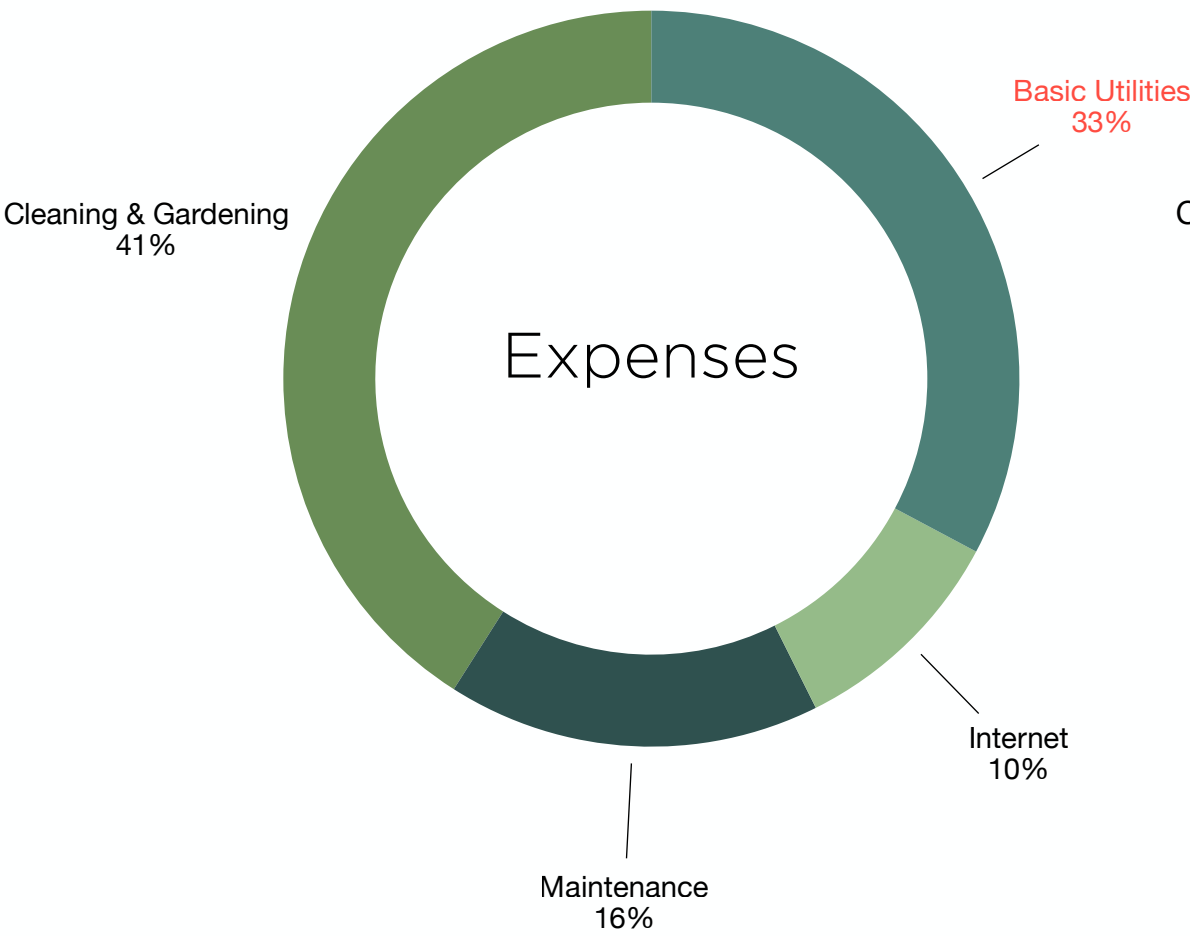


# INVESTMENT - MODEL 919 - ONE UNIT

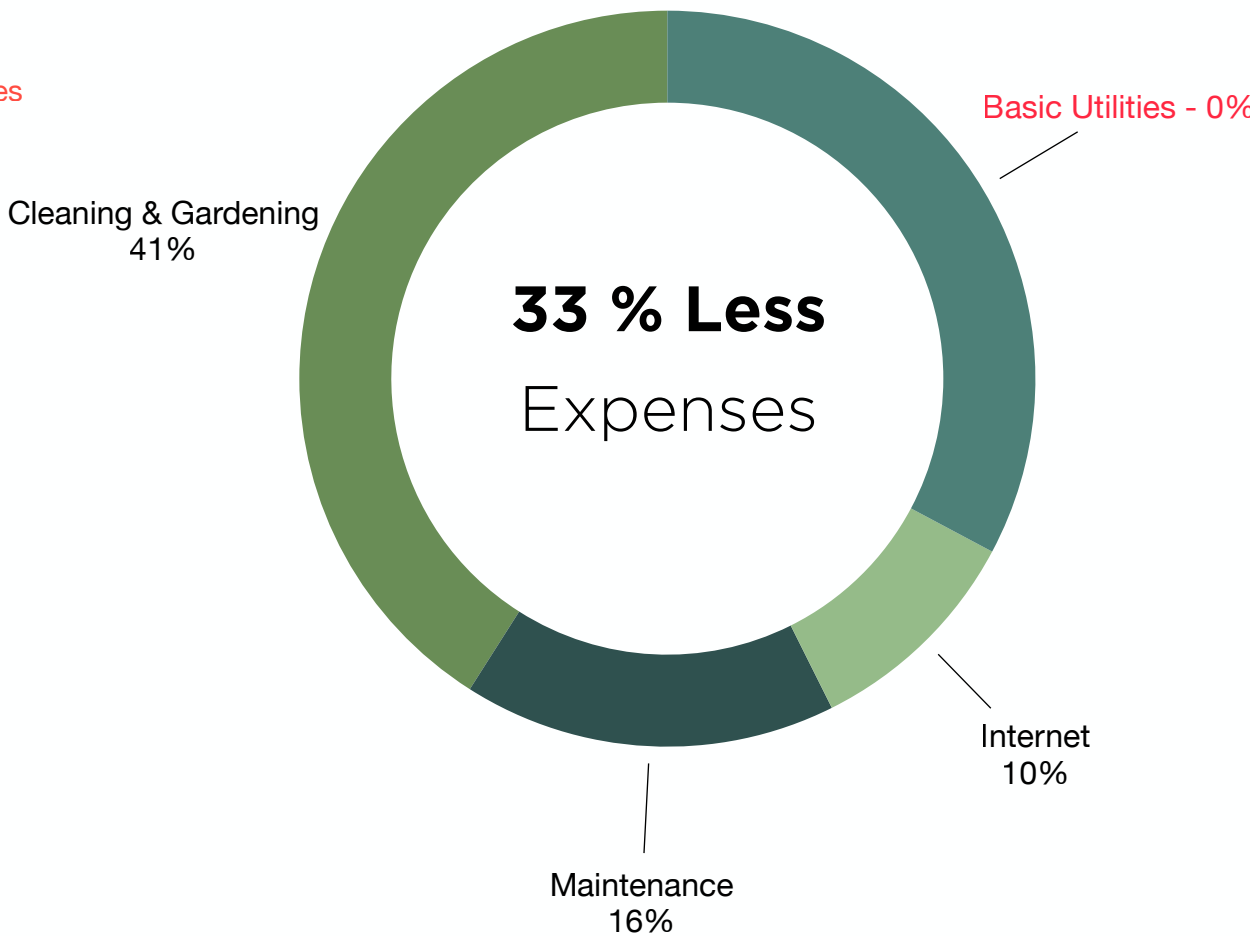
<b>BUILDING COST</b> (BT INV 50.000 USD)	150.000 USD
<b>TOTAL NIGHTS</b> (70% Occupancy rate)	252 Nights/Year
<b>ANNUAL REVENUE</b>	50.400 USD/Year
<b>ANNUAL EXPENSES</b> (One unit)	4.900 USD/Year
<b>ANNUAL PROFIT</b> (200/night)	<b>45.500 USD/Year</b>
<b>ANNUAL PROFIT</b> (300/night)	<b>70.700 USD/Year</b>



CONVENTIONAL - RENTAL



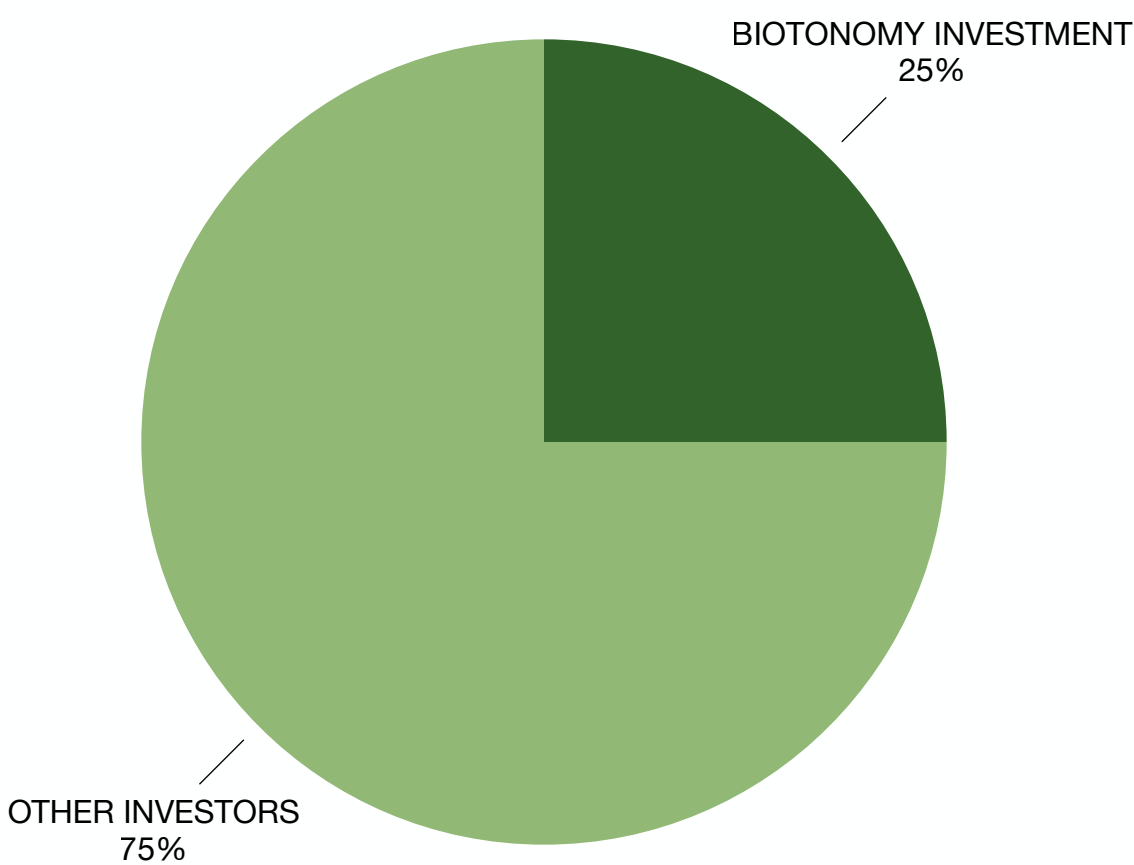
AUTONOMOUS - RENTAL





# INVESTMENT - AUTONOMOUS ECO RESORT, 12 MODEL 919

<b>BUILDING COST</b> (BT INV 600.000 USD)	1.800.000 USD
<b>TOTAL NIGHTS</b> (70% Occupancy rate)	252 Nights/Year
<b>ANNUAL REVENUE</b>	604.800 USD/Year
<b>ANNUAL EXPENSES</b>	58.800 USD/Year
<b>ANNUAL PROFIT</b> (200/night)	<b>546.500 USD/Year</b>
<b>ANNUAL PROFIT</b> (300/night)	<b>848.400 USD/Year</b>



**TOTAL INVESTMENT**  
2.400.000 USD

**BIOTONOMY INVESTMENT 25 %**  
600.000 USD

**REMAINING INVESTMENT 75%**  
1.800.000 USD





# BIOTONOMY CAMPUS - PUERTO RICO, CARIBBEAN

The worlds first educational and research center for nature-based solutions



A physical learning and research center for accelerating the uptake and implementation of nature-based solutions for development projects









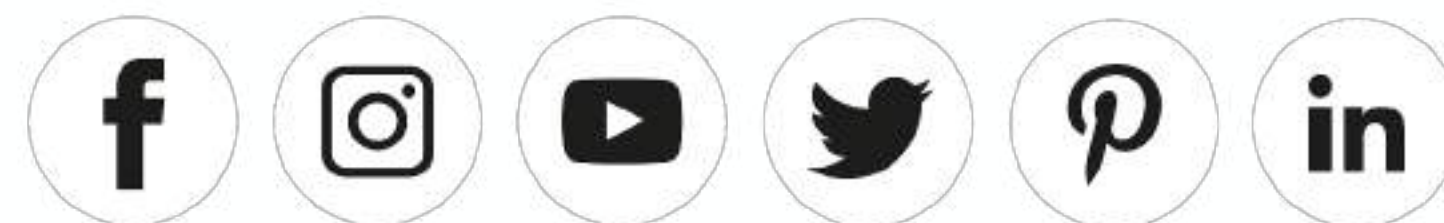


“The environmental crisis we are facing on this planet is in many ways a big **design crisis**”

/ Moein Nodehi, founder of Biotonomy

# THANK YOU

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