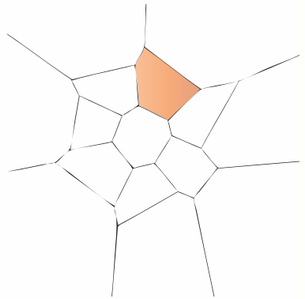
PLENITUDE



SITE PETAL

Plenitude's site is one of Morocco's many phosphate surface mines needing remediation. The particular mining area is in the middle of three ancient towns and functions to absorb future growth while being a model for mine restoration and regeneration. The mined brownfield acts as our 'limits to growth' boundary with only heliostat mirror support columns; wind turbine windbreaks around the periphery assist farmers. Shade is partially provided by flipping over the mirror surfaces upon which two processes occur: 1) retaining daytime temperatures beneath the mirrors during the night; and 2) the reverse side enabling colored light to penetrate the ground and increase growth. Both conditions occur when the sun is sub-optimal for heliostat performance. The remaining agriculture occurs on the city's rooftops and under the large thermal chimney greenhouse. The thermal chimney is a regional hub for public transportation (see Energy Petal). The quadrant communities of the city's north, south, east, west use the country's ecozones as their vegetative themes, visibly listing native plant species. Plenitude thrives on a fundamental respect and support of indigenous habitats and a commitment to regenerate to whatever extent a bio-mimicking of these habitats. Finally, Plenitude is tessellated using voronoi algorithms to optimize distances for pedestrian and other transportation modes such as our RRpods throughout the city/region.

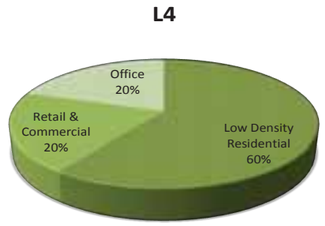
LIVING BUILDING CHALLENGE

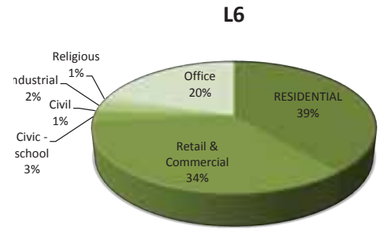
Requirement Index

	Neighbourhood	Building	Landscape + Infrastructure	Renovation
1. Limits to Growth	●	●		
2. Urban Agriculture	●	●	●	●
3. Habitat Exchange	●	●		
4. Car Free Living	●	●	●	●

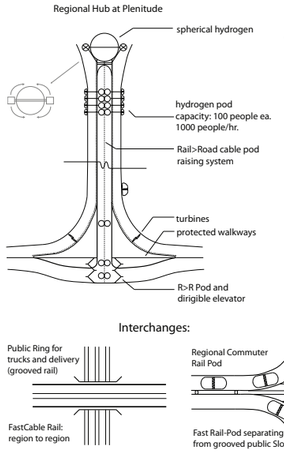
EXISTING SITE PHOTOS

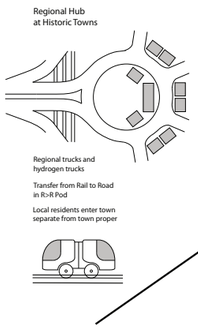
RESIDENTIAL DENSITIES

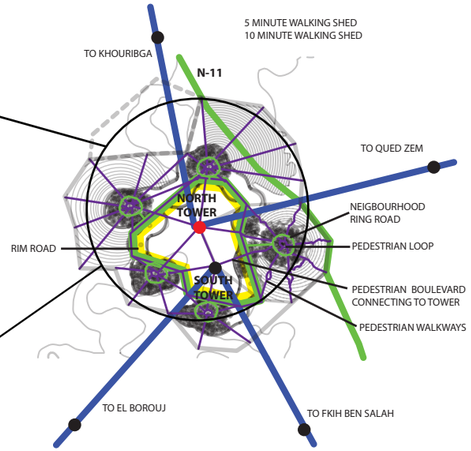


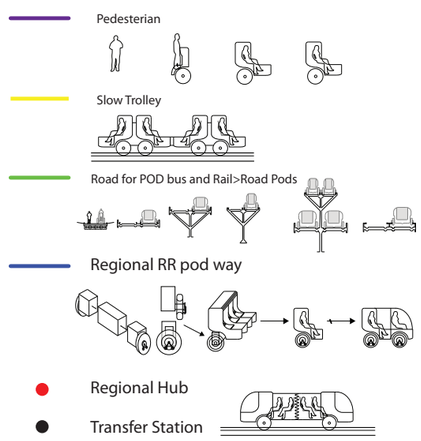


TRANSPORTATION PLAN FOR THE PROJECT

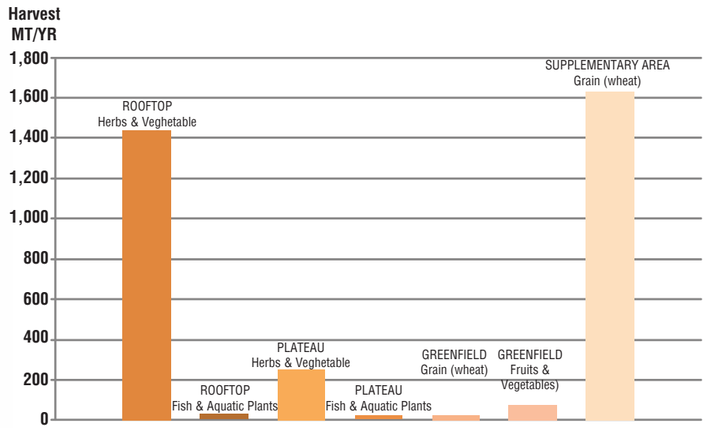




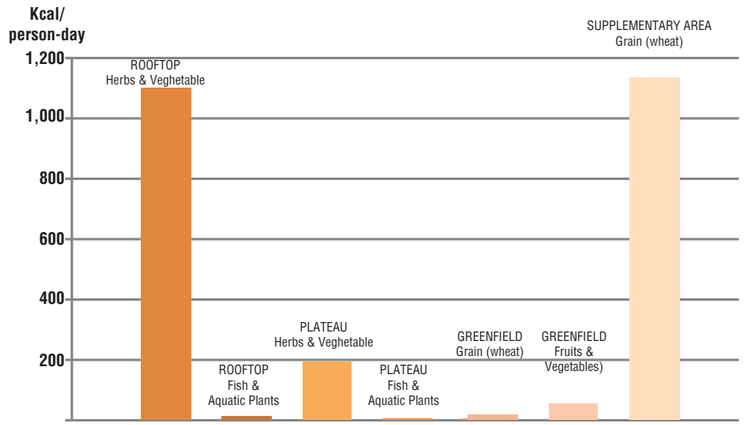




FOOD HARVEST



TOTAL FOOD ENERGY



NATIVE SPECIES OF MOROCCO BIOREGIONS

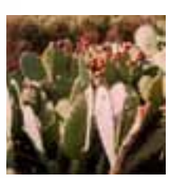


Fig 1.1 Opuntia Ficus-Indica


Fig 1.2 Panicum Turgidum


Fig 1.3 Argania Spinosa


Fig 1.4 Quercus Suber


Fig 1.5 Pinus Pinea

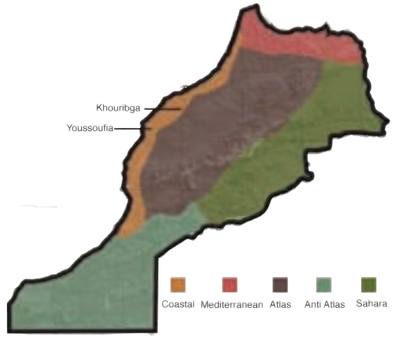

Fig 1.6 Phoenix Dactylifera


Fig 1.7 Arbutus Unedo

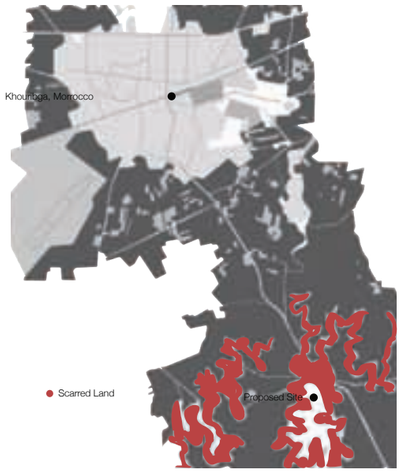

Fig 1.8 Osteospermums


Fig 1.9 Maerua Crassifolia

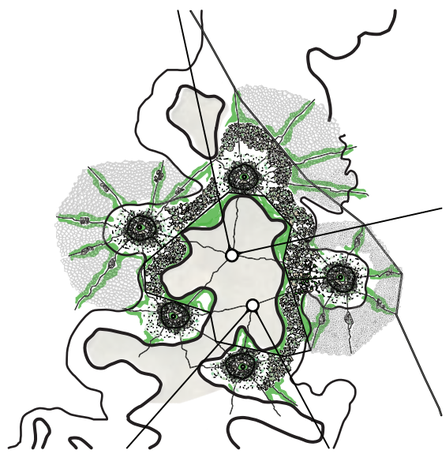
SURFACE MINING



5 Bioregions of Morocco

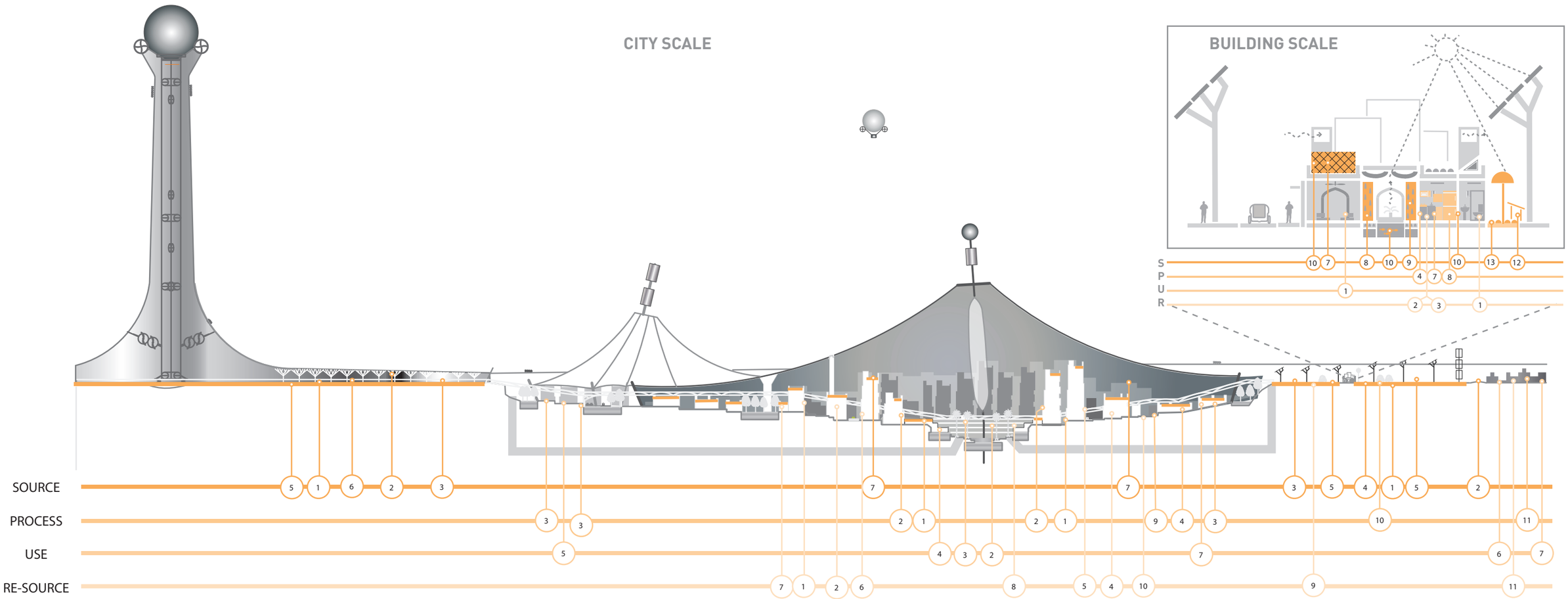


Scarred Mining Site



Proposed Site Plan

ANNOTATED SYSTEM DIAGRAM SHOWING FOOD FLOW



SOURCE

1 Dye-sensitized greenhouse vegetables
2 Greenhouse aquaculture
3 Greenhouse orchards
4 Brine water salicornia (cattle feed)
5 Brine water shrimp
6 Brine fish species

7 Roof top container garden
8 Integration kitchen gardens
9 Courtyard herb vegetables
10 Home chicken, pigeons, and fish farms
11 Pulse fed animal husbandry

12 Adaptive traditional animal husbandry
13 Enhanced traditional gardening methods

PROCESS

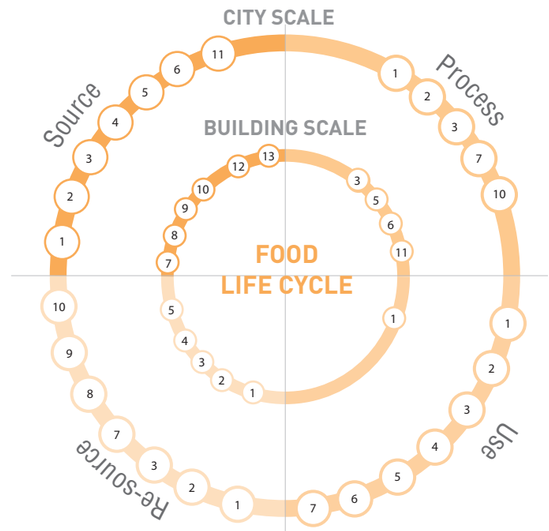
1 Vegetable preparation for markets
2 Food preparation for markets
3 Meat butcher
4 Medicinal plant preparation
5 Home meat/fish preparation
6 Poultry preparation - pigeon/chicken
7 Animal slaughtering
8 Large-scale solar dryers
9 Adaptive reuse of traditional cooking methods

USE

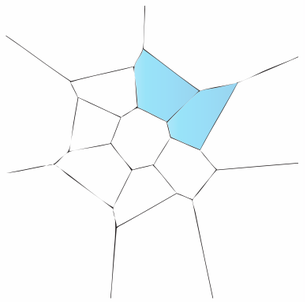
1 Personal nutrition: fiber, protein, carbohydrates, vitamins & minerals
2 Restaurants
3 Store front sales
4 Street vendors
5 Open air market vendors
6 Bulk sales outside communities
7 Traditional market sales
8 Oasis Market stalls

RE-SOURCE

1 Toilet waste separation
2 Kitchen compost
3 Kitchen recycling center for organic separation
4 Biopod organic treatment- protein concentration for fish and small animals
5 Vermiculture
6 Street recycling system
7 High yield in-vessel composters
8 High yield vertical composters
9 Integrated landscape-window composting
10 Whole tent neighborhood vermiculture farm system
11 Lifecycle design organic food restaurants (keyed food sources in Plenitude)



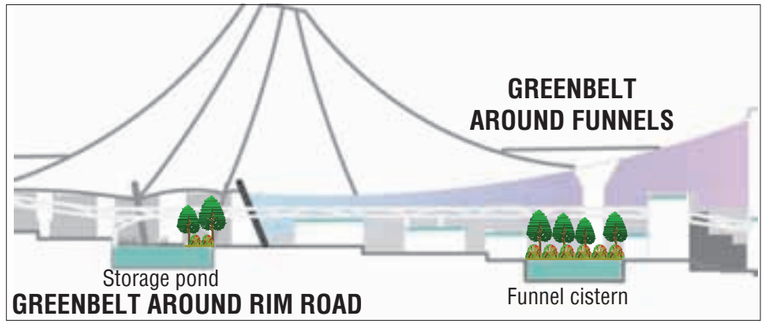
PLENITUDE

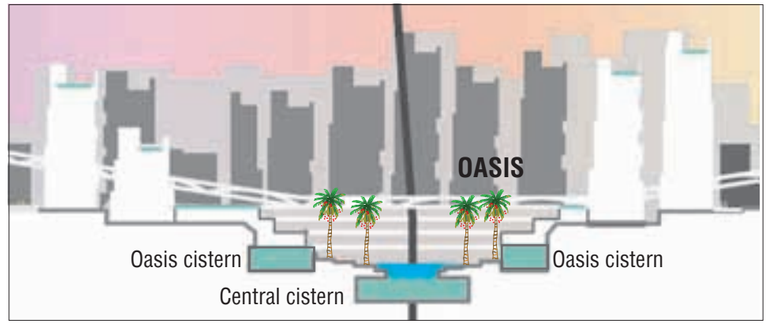


WATER PETAL

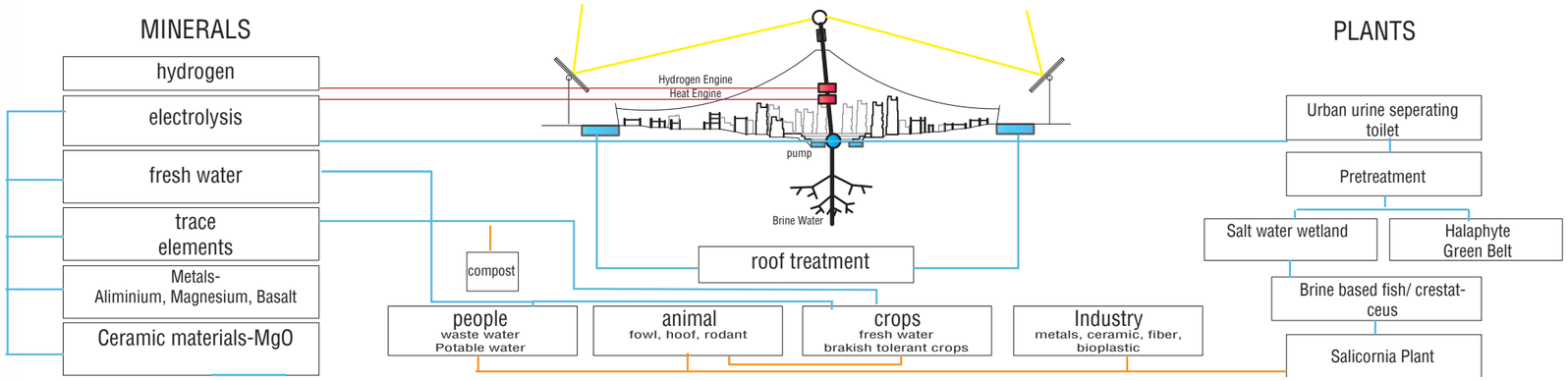
Water balance in arid and semi-arid conditions requires traditional methods and an advanced understanding of ecotechnologies and landscape approaches. As with Plenitude's approaches to energy and materials, the key is the multi-faceted use of saline ground water e.g., hydrogen salt water electrolyte, construction material cement and reinforcing, agriculture trace elements. The compelling economics of this approach is that each feedstock for one process is the by-product of another. As our sections attest, integrated urban planning creates a context for how these water resources are used. In a desert setting, fresh water is first used for potable purposes for humans and animals, then for crops, and finally for manufacturing. Plenitude's unique contribution to understanding water in the broadest sense is that the globally abundant condition of salt water is used for multiple purposes: halophyte crops; greenbelts; fish species; animal feed derived from saline species. As coastal regions become more threatened, this approach will be an essential model.

WATER COLLECTION AND STORAGE SYSTEMS

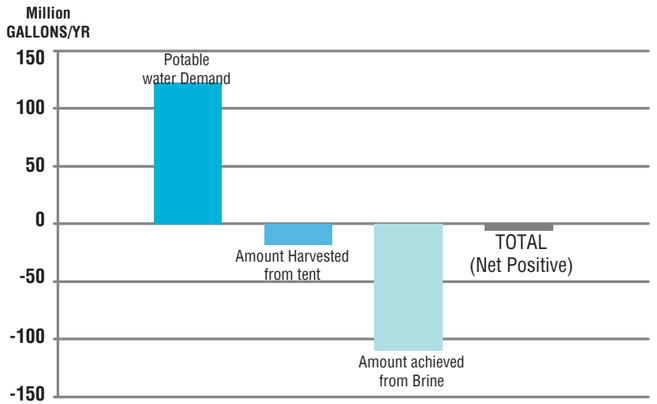




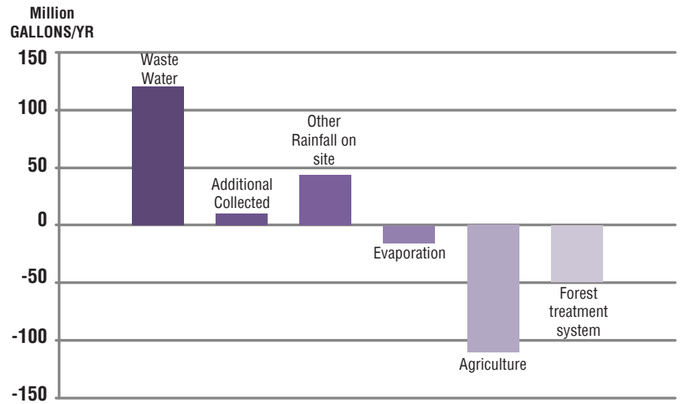
WATER COLLECTION AND STORAGE SYSTEMS



WATER BALANCE



ECOLOGICAL WATER FLOW



KEY WATER SYSTEMS FOR COLLECTING, STORING AND REUSING

Fig 2.1 Constructed Wetland System

Fig 2.2 Curbless Streets

Fig 2.3 Detention System

Fig 2.4 Garden Bed Reed System

Fig 2.5 Horizontal + Vertical

Fig 2.6 Infiltration System

Fig 2.7 Pervious Pavers

Fig 2.8 Retention System

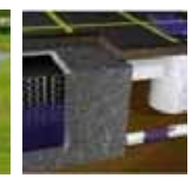


Fig 2.9 Underground Cistern

WATER AVAILABILITY

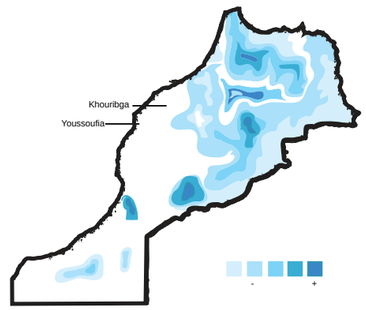


Fig 2.10 Morocco Precipitation Map

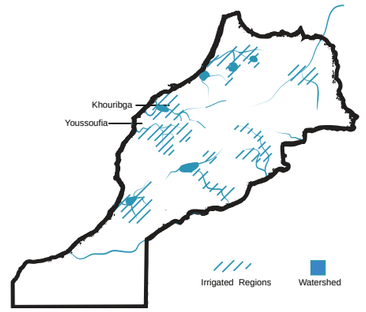


Fig 2.11 Morocco Brine Water Map

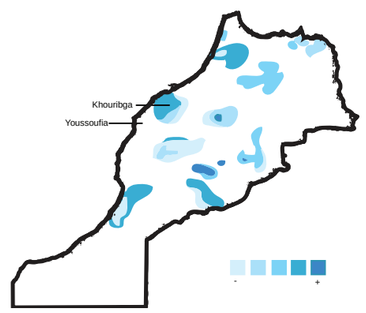
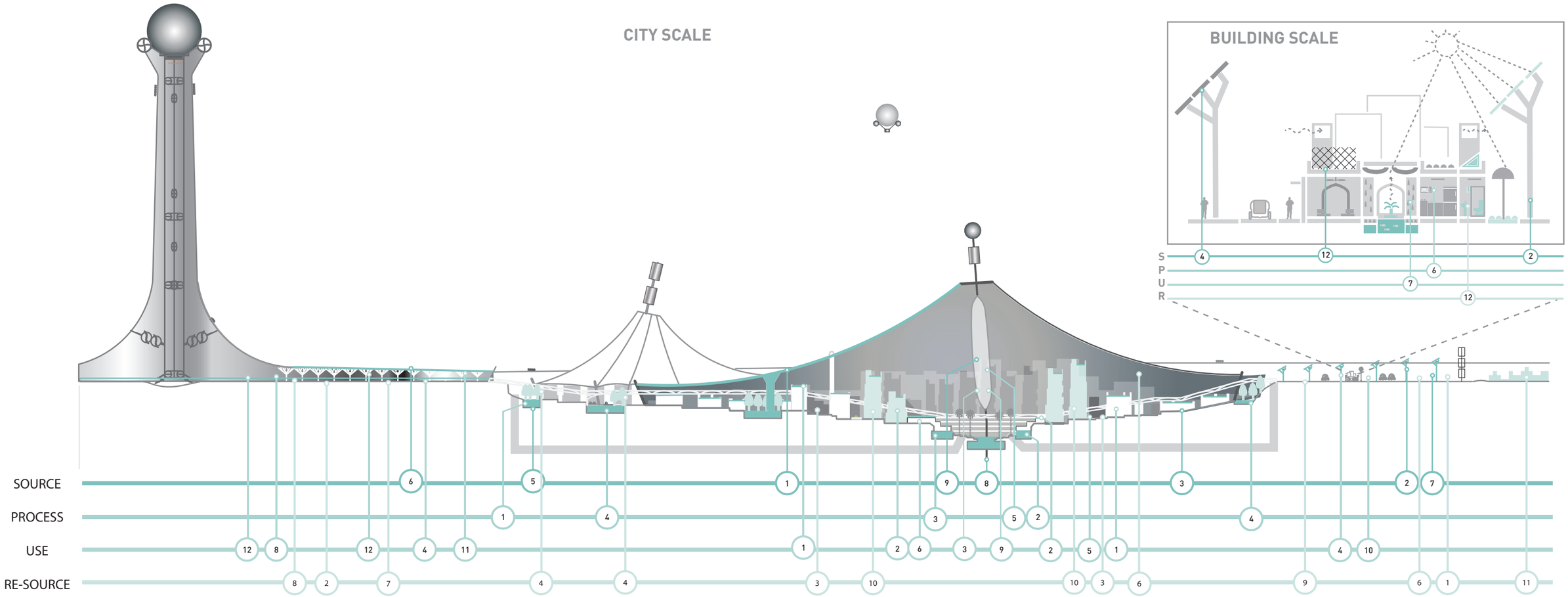


Fig 2.12 Morocco Irrigation Map

ANNOTATED SYSTEM DIAGRAM OF WATER FLOW



SOURCE

1 Precipitation, Tent Roofs
2 Precipitation Mirrors
3 Precipitation Mirror Reradiation Moisture and Greenhouse Condensation
4 Path and Street Water
5 Major Thoroughfare Water Collection
6 Large Thermal Chimney Greenhouse Water
7 Greenhouse Surface Roofs
8 Underground Brine
9 Brine water from Mineral processing
10 Brine water from Urine processing
11 Green roof Collection on Farm Buildings

PROCESS

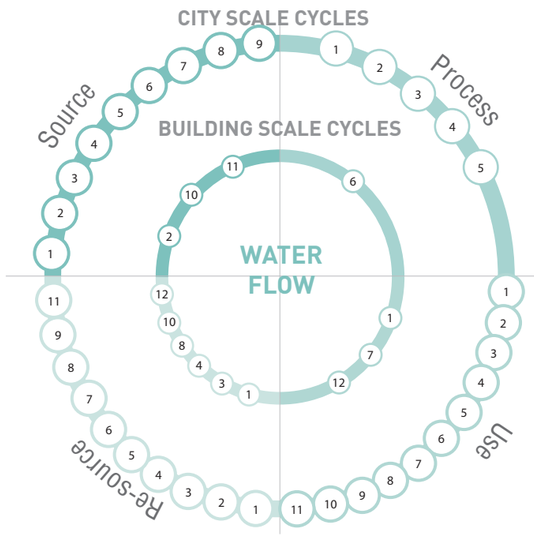
1 Processing/Storage under Greenway
2 Oasis Direct Storage
3 Cisterns around Oasis-indirect storage
4 Greenway aroound Large tents at ground connection
5 Electrolyis, RO Brine processing
6 Water Harvesting Treatment at Home Scale

USE

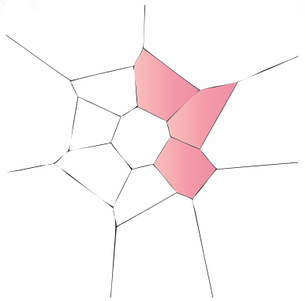
1 Residential
2 Commercial
3 Industry
4 Fresh water irrigation (drip irrigation)
5 Bioremediation enzyme bacteria and fungi phase
6 District Chiller and Evaporative Cooling
7 Vertical Vegetable and Herb Garden Community and Home Scale
8 Halophyte Agriculture
9 Brine water for MgO Phosphate Cement
10 Washing of Heliostat Mirrrors
11 Washing Greenhouse/tent dye-sentisized PV
12 Salt water irrigation

RE-SOURCE

1 Flipped Mirror Reradiation Evaporative Retention
2 Fresh water Food Aquaponics, Fish Waste Water used by plants
3 Wetlands using Reed plant species for treatment
4 Tree Species for human Waste treatment (grey and black water)
5 Green roofs for Human Waste Treatment
6 Waste Water Greenhouse condensate
7 Brine Waste Water from Halophyte plants into Brine Shrimp Farm
8 Food Aquaponics-grey water for Tilapia
9 Select animals use non-fresh Water Sources
10 Urine resourced as Fertilizer
11 Ground Water Saved for Historic Towns
12 Toilet/Urine Separation



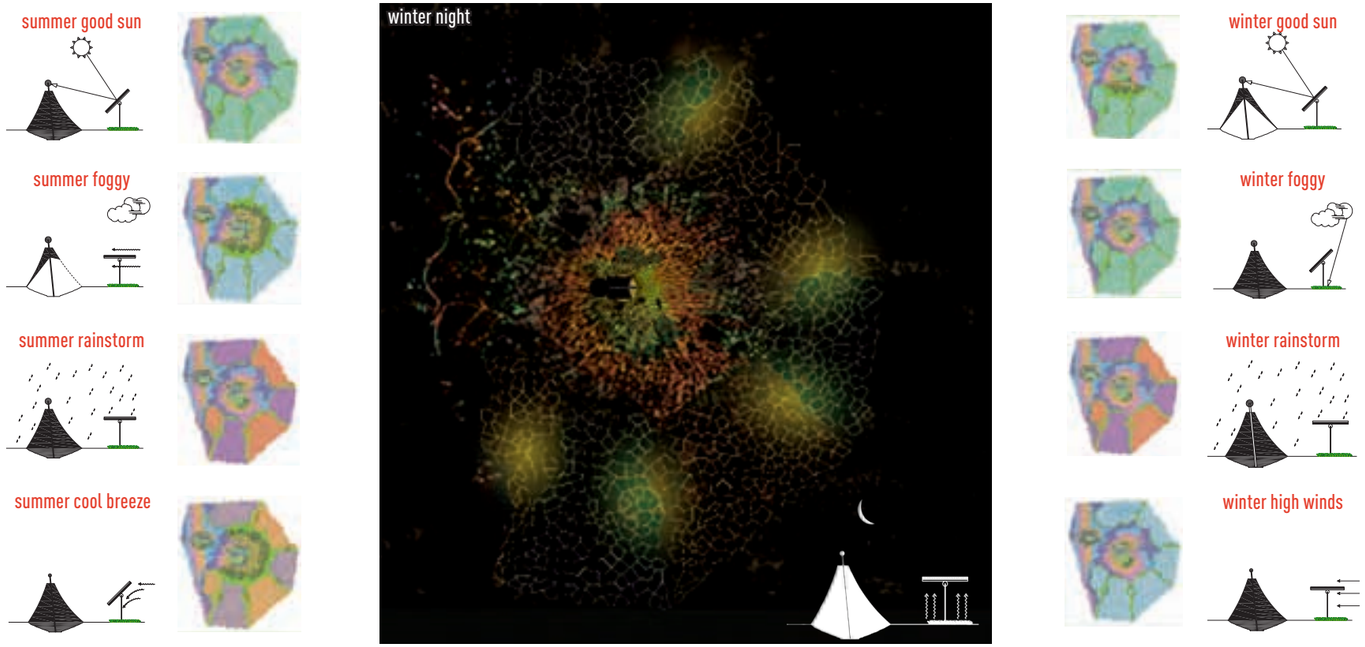
PLENITUDE



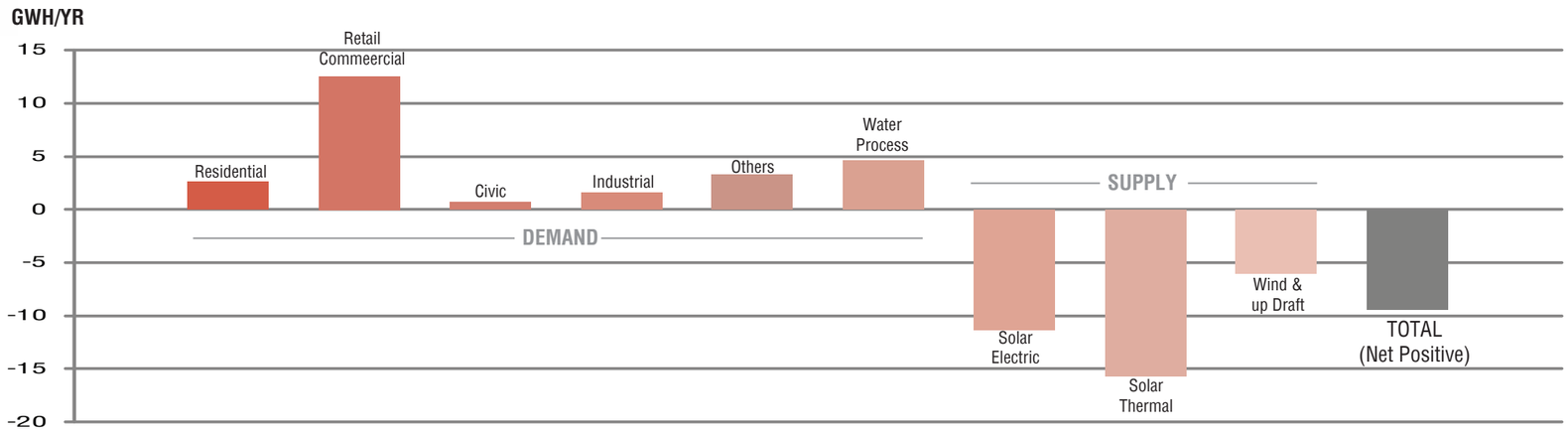
ENERGY PETAL

Plenitude has a diverse renewable energy mix that emanates from the essential desert climatic principles: shade, breeze (nocturnal flushing), night-time re-radiation, phase change, mass. Once these strategies are fully employed, we add more active approaches: solar concentrating heliostats, wind generated electricity, dye sensitized photovoltaics imbedded into the tent fabric, thermal chimney-based wind, on-demand hydrogen for backup. Unlike most solar zero energy efforts we factor the transportation system into the system energy equation, beginning with the essentials: human power whenever possible, walkable distances, and pedestrian friendly conveyance such as slow trolleys circuiting the city's entire circumference. The energy/transport approach is grounded in time honored approaches such as the gravity-powered pump storage to power the gravity driven Rail to Road Pods (RRpod™). This capitalizes on the need to cost justify the tower with multiple uses: a hydrogen elevator takes users to the gravity anchored RRpods that, when released, travel up to 3 ½ miles. If needed to go further distances, a small hydrogen engine takes over. The RRpods are lifted using electrical generation provided by the thermal chimney wind systems.

CLIMATIC RESPONSE OF KEY ENERGY SYSTEMS



DATA SHOWING ENERGY BALANCE



KEY SYSTEMS PRODUCING AND CONSERVING ENERGY

Fig 3.1 Heliostat Mirrors

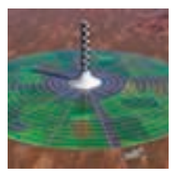


Fig 3.2 Solar Chimney

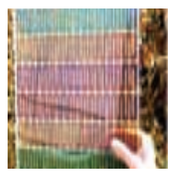


Fig 3.3 Dye-sentisized PV

Fig 3.4 Solar tracking optic system

Fig 3.5 Human Power

Fig 3.6 Wind turbines

Fig 3.7 Hydrogen

Fig 3.8 Earth building

RENEWABLE ENERGY SOURCE

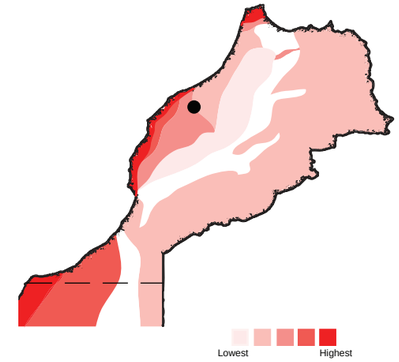


Fig 3.10 Morocco Wind Energy Map

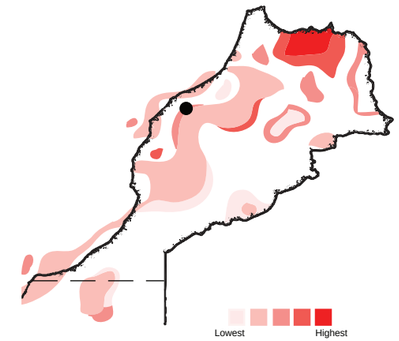


Fig 3.11 Morocco Geothermal Energy Map

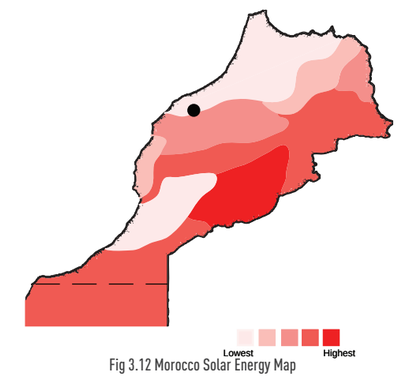


Fig 3.12 Morocco Solar Energy Map

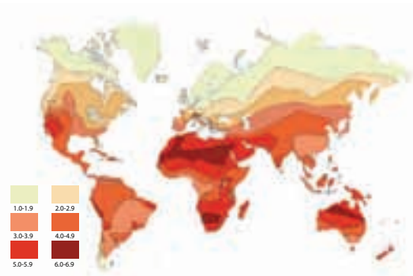
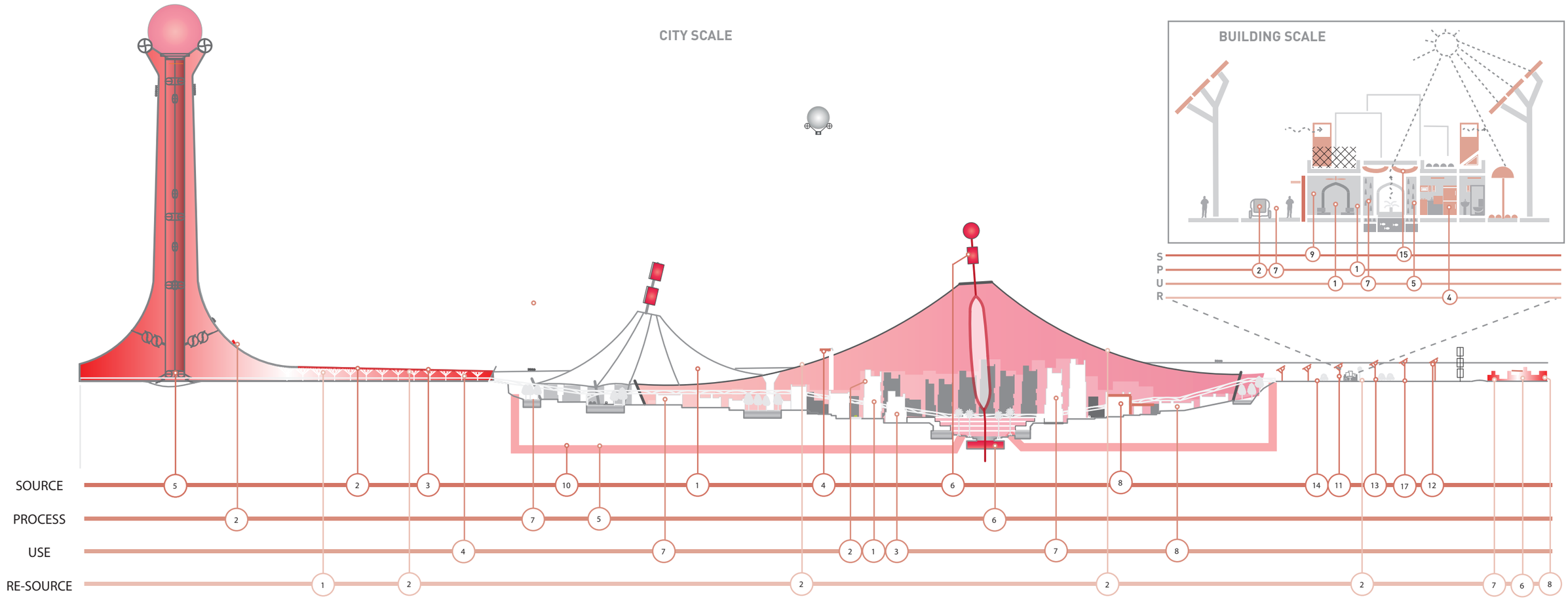


Fig 3.13 World Solar Energy Map

ANNOTATED SYSTEM DIAGRAM OF ENERGY FLOW



SOURCE

1 Community shade vent system
2 Integrated dye-sensitized solar PV
3 Greenhouse tent dye-sensitized solar PV
4 Fiber optic daylight tracker
5 Multifunctional updraft thermal chimney raises hydrogen pods for gravity release
6 Combined solar high temperature absorber with vertical axis wind system
8 Green roofs for constant temperature
8 Thermally designed caliche/hemp walls
9 Ground based cooling tunnels for core neighborhoods
10 Night time flattening of mirrors to hold ground temperature
11 Heliostat mirrors tilt on poor direct solar days for heating community buildings and agriculture
12 Solar greenhouse drying for earthern construction
13 Solar greenhouse drying for crops
14 Long lasting shade system made from basalt for courtyards
15 Multifunctional multiangular solar heliostats

PROCESS

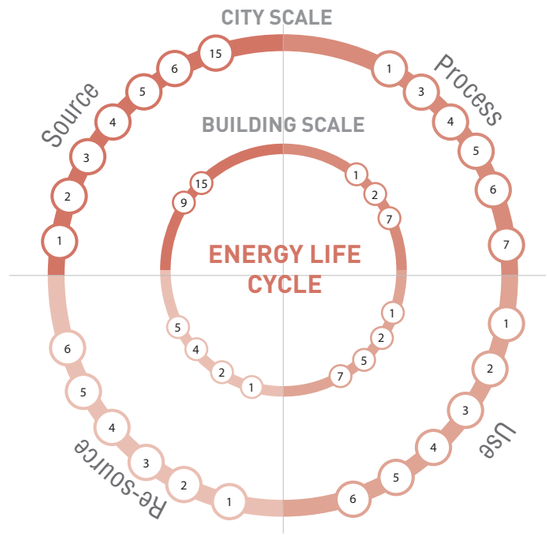
1 Phase change magnesium oxide (MgO) plaster
2 On demand aluminium-magnesium battery
3 Greenway cooling for tent and thermal chimney
4 Oasis heat sink
5 Wet sand heat sink
6 Cistern heat sink
7 Auto / truck hydrogen conversion

USE

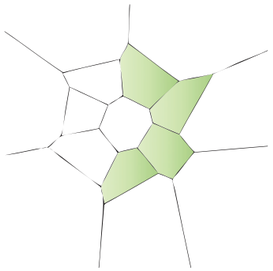
1 Passive heating / cooling of buildings
2 Passive lighting
3 Fiber optic full spectrum task lighting
4 Colored light for plant growth
5 Courtyard cooling using shade
6 Courtyard cooling using mist
7 LED lighting
8 Microwave

RE-SOURCE

1 Waste CO2 for greenhouses
2 Light from dye-sensitized PV increases plant growth
3 Water from hydrogen battery
4 Wall/floor release/absorb constant temperature
5 Ground cooling aided by waste moisture from hydrogen absorption chillers
6 Exported energy from Plenitude used by historic desert towns
7 Improved living standards for permanent renovation
8 Non-polluting firing methods for traditional brick firing



PLENITUDE



HEALTH PETAL

Plenitude's health performance reflects three foundations of healthy building: 1) a healthy bio-remediated environment; 2) a healthy home; and 3) the delight of experiencing nature and integrating nature's beauty in everyday life. The first is addressed through our multi-step bioremediation plan which contains eleven phases and specific steps to get to complete each phase before going to the next. These are outlined as process, product, and the bio-remediated conclusion. Healthy home environments capitalize on a spectrum of nature-inspired health approaches from the use of solar energy to heat, cool, and treat, water to visibility of nature's processes that support a civic environment including a plant intensive atrium, roof gardens and green walls with water in the desert always a cooling reminder of how precious and important that resource is.

COURTYARD HOUSE

BIOREMEDIATION PHASES FOR PROJECT

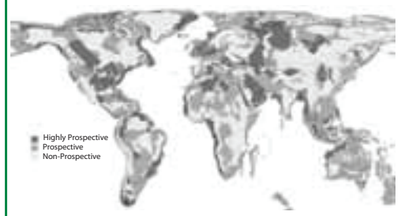
PHASE	1	2	3	4	5	6	7	8	9	10	11
PROCESS	Surface mines near historic towns	Drill well for water	Set up water processing and enzymes	Seep water into ground & grow: - reed species - hemp - fungi - bacteria	Harvest biobase	Manufactured MgO and phosphate	Chelate mineral with compost	High - temperature basalt manufacturing	Hemp pyrolysis processing into oil and hemp-based plastics for greenhouses and tents	Extract aluminum & magnesium from brine water	Install dye-sensititized photovoltaics on greenhouses and tents
PRODUCT	- Acquired brownfields - Caliche - Brine water	Brine water	- Minerals and fresh water - Basalt - Aluminum - Magnesium - Caliche	- Hemp grass fibers - Sequestered heavy metals	- Hemp fiber - fungi building materials	- MgO/phosphate cement - Trace element for agriculture	High mineral content compost used as organic fertilizer	Support for tents, towers, and greenhouses	- Bio-based plastics reinforced with basalt fiber. - Manufacturing of monocoque Road>Rail Pods	Aluminum and magnesium plates for saltwater hydrogen electrolysis	Full spectrum and select spectrum output for humans and plants
BIOREMEDIATION	High value remediation point	Brine waters processed	Enzymatic soil building	Harvest sequestered heavy metals	Solar UV radiation cleans soil	MgO/phosphate cement encapsulation of heavy metals	- Compost with trace elements to build desert soils	Basalt permanently replaces iron	Bio-based plastics replace petroleum	Hydrogen fuel replaces fossil fuel pollution	Colored greenhouses improve plant growth

KEY SYSTEMS FOR BIOREMEDIATION

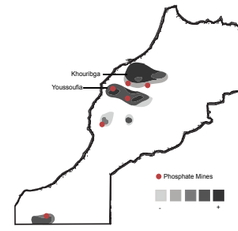
1 Enzyme | 2 Bacteria | 3 Fungus | 4 Mushroom | 5 Reeds | 6 Poplar tree | 7 Phytoremediation | 8 Mercury | 9 Cadmium

Fig 3.1 Heliostat

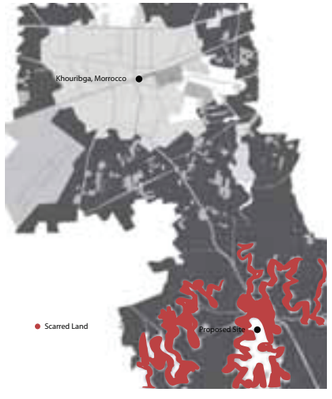
SURFACE MINING MAPS



Surface Mining Prospectivity

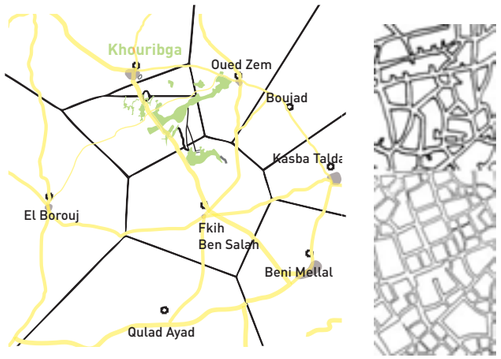


Phosphate Deposits

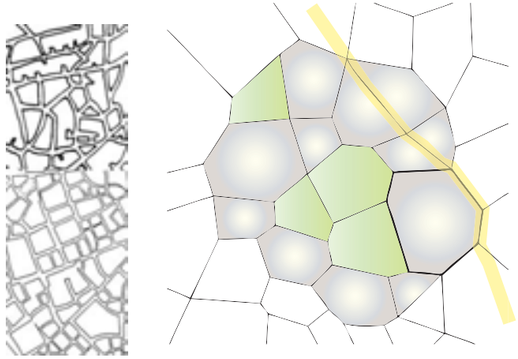


Scarred Mining Sites

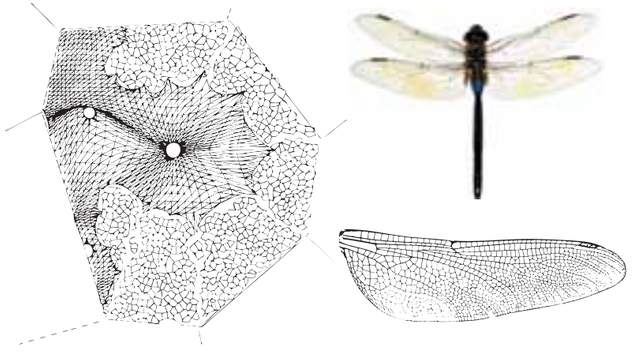
BIOMIMICRY- TESSELATION



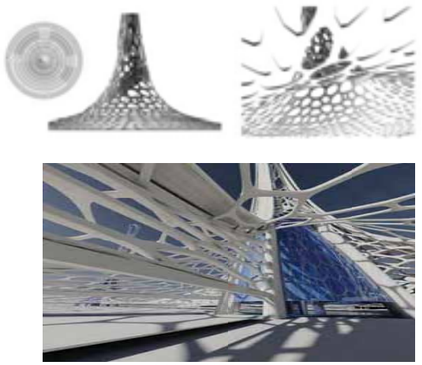
STREET/ ROAD NETWORK SYSTEM



SOAP BUBBLES

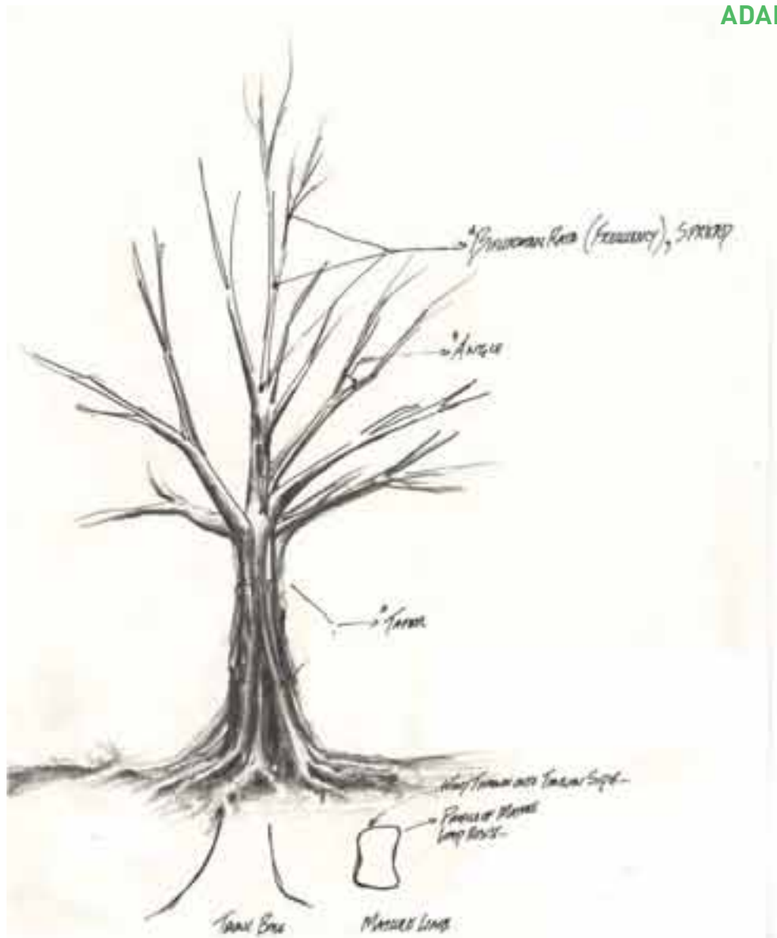


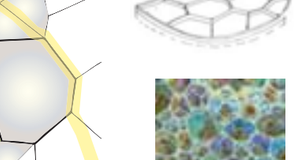
DRAGONFLY WINGS

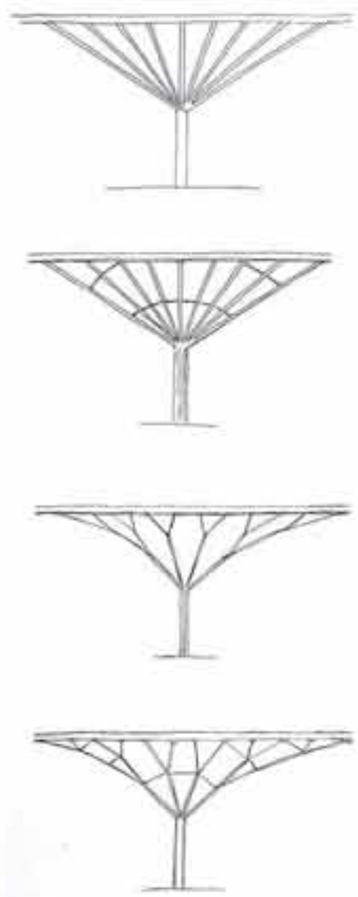


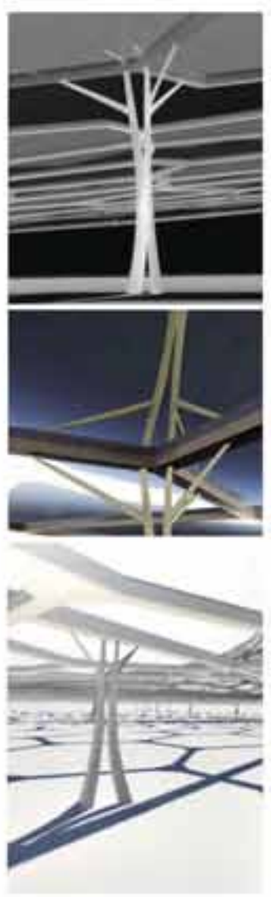
TASSELATED WEBBING

ADAPTIVE GEOMETRY/ BRANCHING/ MINIMUM PATH SYSTEMS

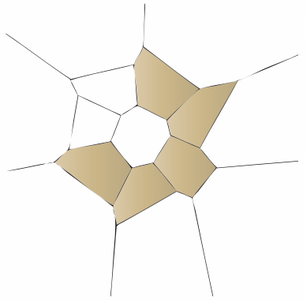






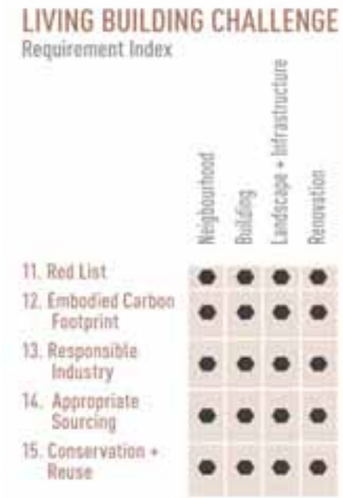


PLENITUDE

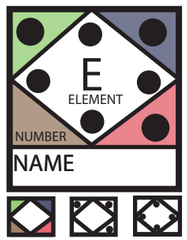


MATERIALS
PETAL

A principal trigger Plenitude's material base is brine resulting from treating saline ground water. The "mast" well also serves as a vertical industry within a center pivot distribution system. This creates a low energy, fast-setting salt water mix concrete in a large, 3D-type printer. All material sources are first analyzed using the Plenitude Periodic Table that screens for toxicity. The chosen materials are non-toxic and exhibit a means of by-product utilization based on local and regional eco-industrial practices. Many become infill for the structural skeleton mentioned above. All materials have a low carbon footprint with the exception of the basalt fiber used for advanced magnesium oxide (MgO) cement reinforcing. The basalt's carbon intensity is compensated by its ability to replace steel as a permanent reinforcement (not subject to deterioration and far stronger). The carbon balancing is calculated using the Carbon Dioxide Intensity Ratio. Due to its performance attributes of ultraviolet and weather resistance, basalt is also incorporated into all tent and shade surfaces. Finally, Plenitude's materials pallete is regional, reflecting where it is derived from and how it supports an eco-industrial effort.



RED LIST FOR PLENITUDE



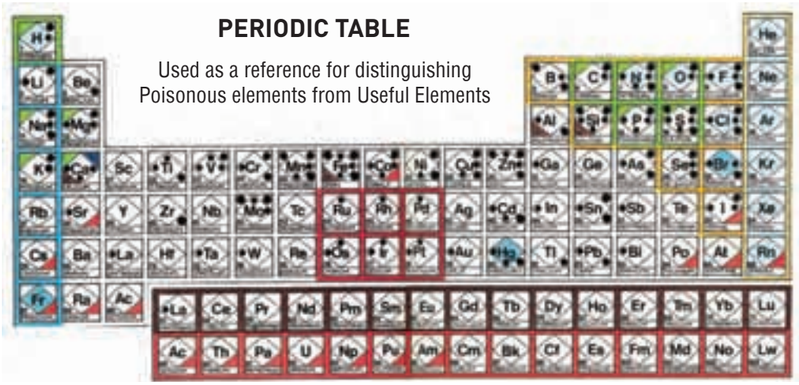
- HYDROCARBONS
- NON-METALS
- ALKALI METALS
- INERT GASES
- MAJOR CATALYSTS
- RARE EARTHS
- RADIOACTIVE

POISONS

Cs, Fr, Sr, Ra, Ac, Th, Pa, U, Np, Pu, Am, Co, Po, I, At, Rn, Na, Be, Ti, Zr, Cr, Mn, Fe, Ni, Cu, Zn, Cd, Hg, B, Al, Sn, Pb, N, As, S, Se, F, Cl, Br

PERIODIC TABLE

Used as a reference for distinguishing Poisonous elements from Useful Elements



ELEMENTS IMPORTANT FOR :

PLANTS/SOIL
Ca, Fe, Al, Si, H, Na, Mg, K, Ca, C, N, O, P, S, Mo, Mn, Zn, B, Ti, V, Ru, Rh, Os, Ir, Pd, Pt, Co, Ni, Cu, Cd, Hg

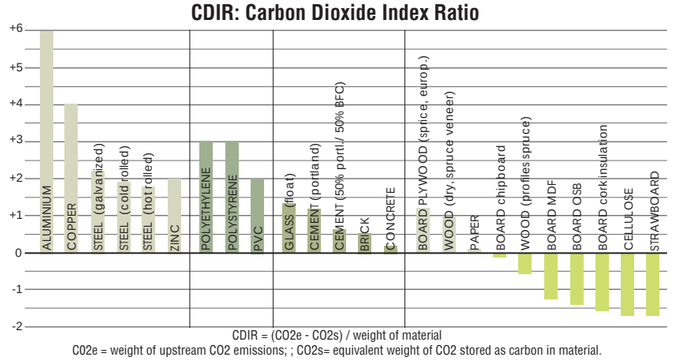
HUMANS/ ANIMALS
Ca, H, Li, Na, K, Mg, V, Cr, Mo, Mn, Fe, Co, Ni, Cu, Zn, C, Si, Sn, N, P, As, O, S, Se, F, Cl, I

AQUATIC LIFE
Li, Mg, Ca, Sr, La, Ti, V, Ta, Cr, W, Os, Co, Ir, Pt, Au, Cd, Hg, Al, Ga, In, Si, Sn, Pb, N, P, As, Sb, Bi, S, F, Cl, Br, I, H, Na, K, Mo, Mn, Fe, Cu, Zn, B, C, O, Se

MICRO ORGANISMS
H, Na, K, Mg, Ca, V, Mo, Mn, Fe, Co, Cu, Zn, B, C, Si, N, P, O, S, Se, F, Cl, Br, I, Mn, Ni, Cd, Hg

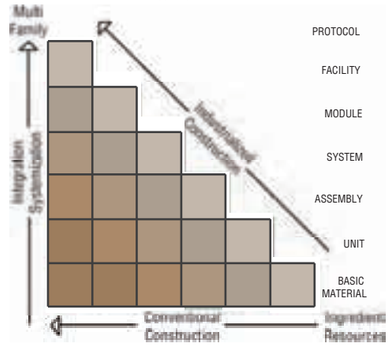
CONCEPTS USED BY PLENITUDE

CDIR: Carbon Dioxide Index Ratio

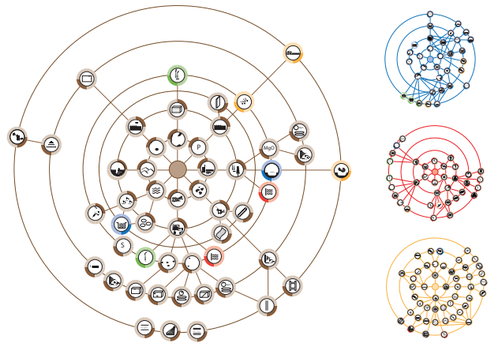


CDIR = (CO2e - CO2s) / weight of material
C02e = weight of upstream CO2 emissions; ; CO2s= equivalent weight of CO2 stored as carbon in material.
Positive ratios indecate net carbin dioxide sources; negative ratios indicate net carbon dioxide sinks

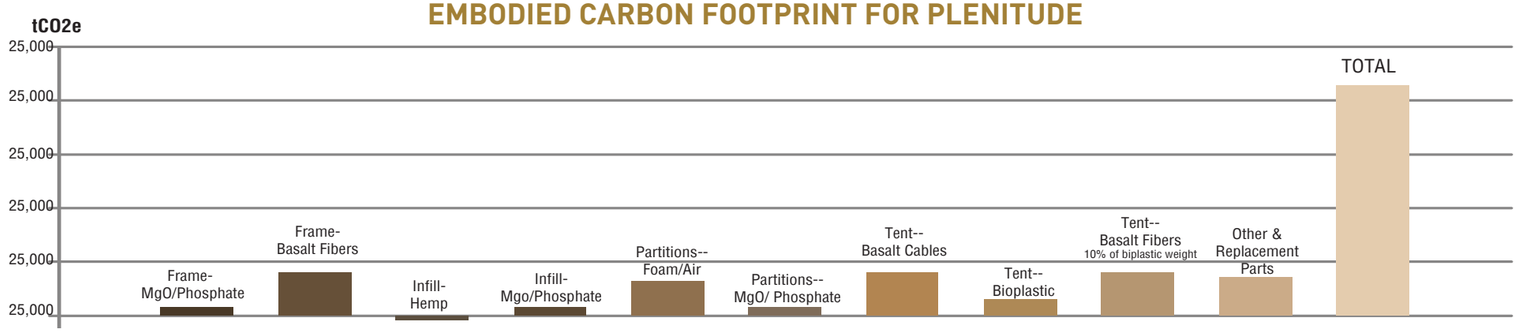
Open building system protocol



Industrial Ecology network diagrams for Morocco



EMBODIED CARBON FOOTPRINT FOR PLENITUDE



EMBODIED CARBON FOOTPRINT FOR PLENITUDE

Fig 5.1 Bio based Materials - Heavy Metal Sequestering

Fig 5.2 Basalt-brine reinforcing fiber, cloth, rebar

Fig 5.3 Quick connects for water, waste water in open building system

Fig 5.4 Open building system components floor wall plaza

Fig 5.5 Caliche Block materials for Historic Repair

Fig 5.6 MgO cement used for monoque construction (non freshwater concrete)

Fig 5.7 Inter-locking light weight flexible partition system

LOCALLY AVAILABLE MATERIALS

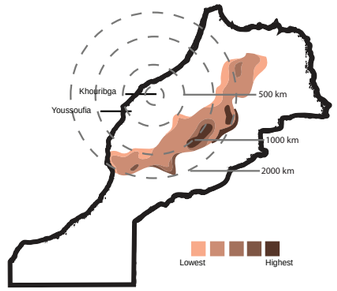


Fig 5.8 Morocco Basalt Deposits

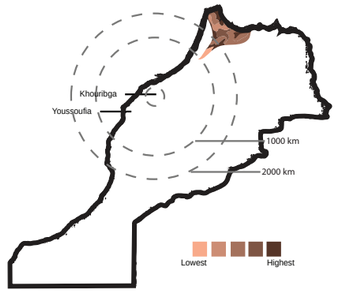


Fig 5.9 Morocco Hemp Cultivation

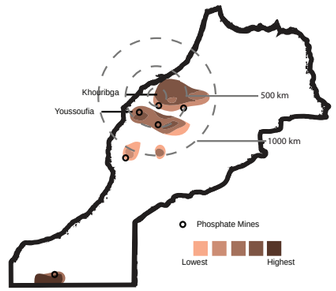


Fig 5.10 Morocco Phosphate Deposits

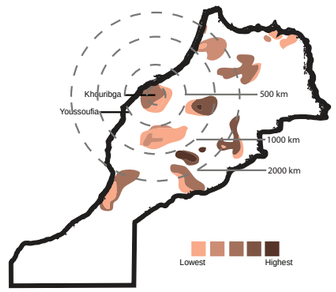
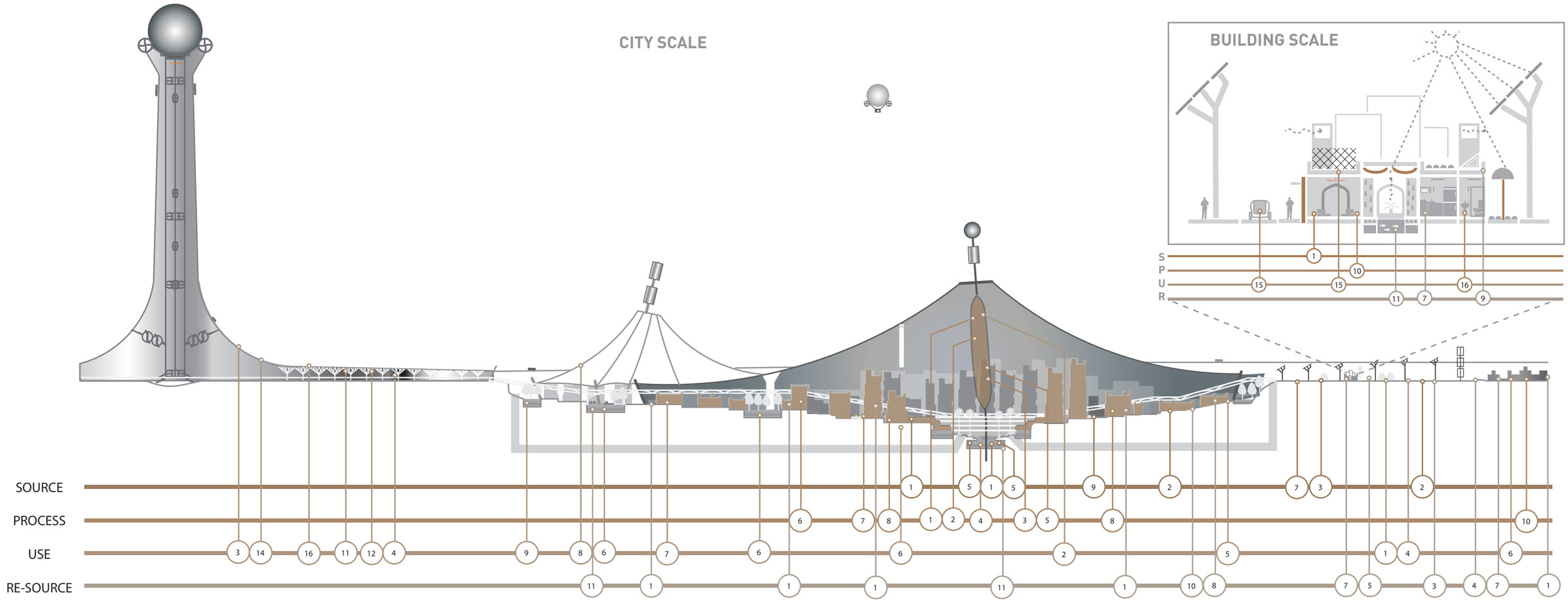


Fig 5.11 Morocco Saline Soils

ANNOTATED SYSTEM DIAGRAM OF MATERIALS FLOW



SOURCE

1 Waste phosphate & MgO carbon-balanced cement
2 Caliche from high calcium carbonate soils
3 Silicone sand
4 Brine minerals for ceramic cements
5 Brine metals (iron/aluminium/magnesium)
6 Basalt from mineral extraction
7 Hemp (fibers and oils)
8 Oily plants-cactus, Yuahubi, Salicornia, Creosole Bush
9 Bioremediated land to build on

PROCESS

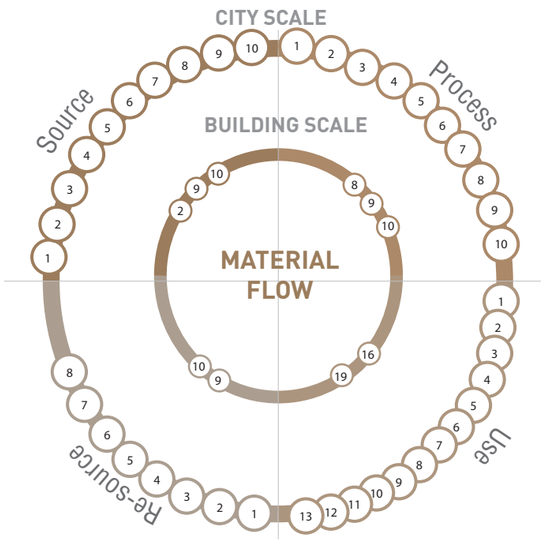
1 High temperature kiln, basalt fiber
2 Medium temperature kiln, MgO cement
3 Low temperature kiln - bio-based material drying
4 Electrolysis
5 Plant oil extraction
6 Monomer spin weaving
7 High temperature fusing (basalt) using solar
8 Foamed MgO/phosphate cement
9 Hemp fiber/MgO block
10 Hydrogen firing for traditional clay crafts

USE

1 Structural monocoque support mirrors
2 Vertical industry support tower
3 Thermal chimney tower
4 Greenhouse support systems
5 Control walls and pond bottoms for enzyme and bacterial processes
6 Pond and cistern linings
7 Encapsulation of heavy metals using MgO/phosphate concrete
8 Cables for tents and thermal chimney
9 Greenway ring road
10 Fine and coarse aggregate for all cementatious processes
11 Cable rails for transportation
12 Bio-based plastics for greenhouses and tent membranes
13 Hemp bio-based resins for monocoque R-R pods
14 Electrolysis plates/aluminium and magnesium
15 Water harvesting
16 Caliche block replacement of adobe

RE-SOURCE

1 Open building systems/reuse of elements
2 MgO is nutrient fertilizer
3 Hemp as renewable resource
4 Oily plants as renewable resource
5 Rehabilitation of land using waste organics
6 Improved earth technologies like caliche
7 Improved reinforcing of old structures using fast setting cements
8 Iron replacement for reinforcing old structures with basalt rebar
9 Repair of old roofs with more permanent materials
10 Reusable carbon-balanced cement using MgO phosphate
11 Reduced use of fresh water with brine based cements



PLENITUDE

EQUITY
PETAL

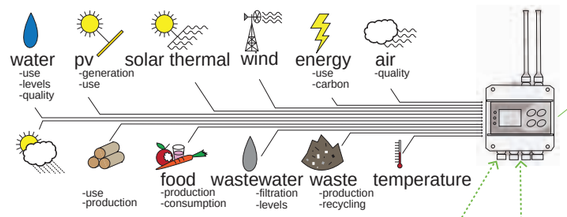
LIVING BUILDING CHALLENGE
Requirement Index

	Neighbourhood	Building	Landscape + Infrastructure	Renovation
16. Human Scale + Human Places	●	●	●	
17. Democracy + Social Justice	●	●	●	
18. Rights to Nature	●	●	●	

SHEET 12

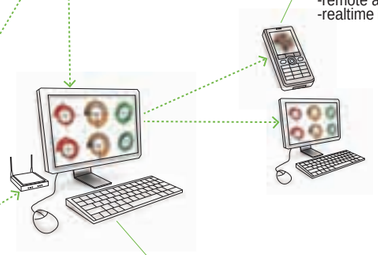
SUSTAIN-A-BILLS (a wearable currency)

Lifecycle Monitoring System



sensors (hobo) send data to computer
-tags indvidual usage _rfid
-meters specific flows and usage and conditions
-sends personal usage info for specific utility
-realtime sensing

internet and cell phones
-text message info and alerts
-check status online
-track info online
-remote access
-realtime feedback

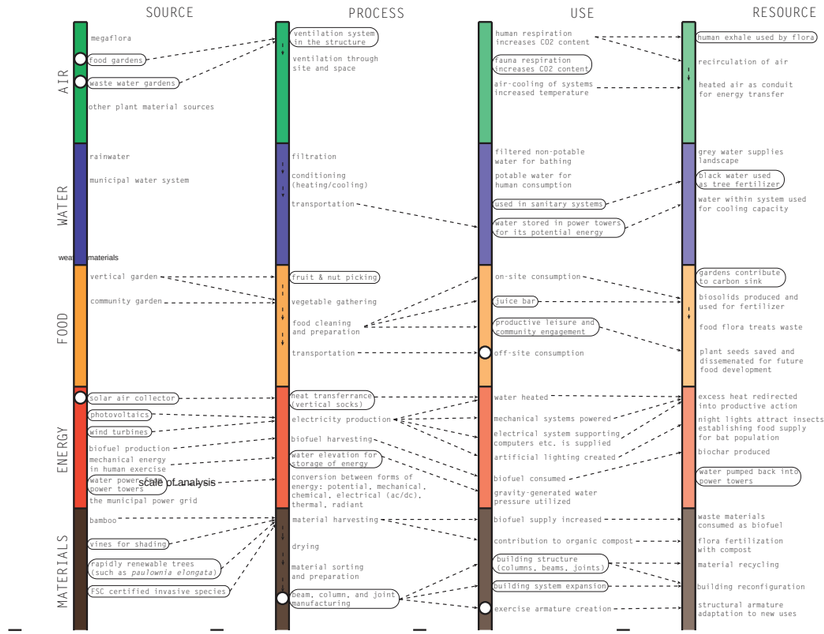


camera phone:
reads QR codes

central computer
linked to sensors and smart watch
-combines data for building and individual
-creates graphic interface/display
-calculates usage, analyzes ecobalance
-realtime monitoring and feedback

smart watch:
linked to sensors and central computer
-sends individual's information:
- life cycle topic
- life cycle phone use history
- peer comparison
- community credit analyzed
- reinvestment options

Typical Life Event Sequence



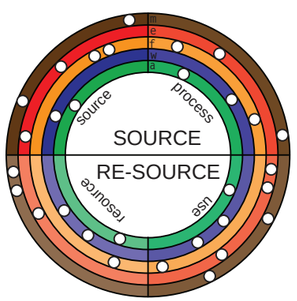
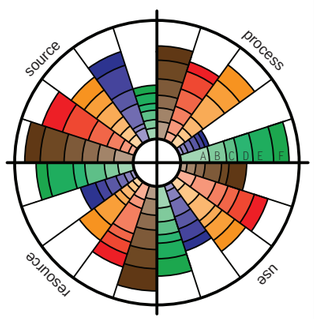
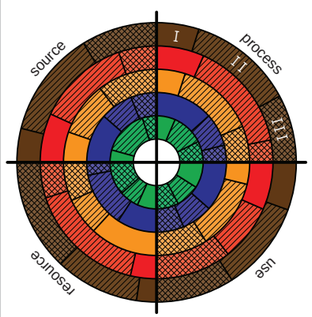
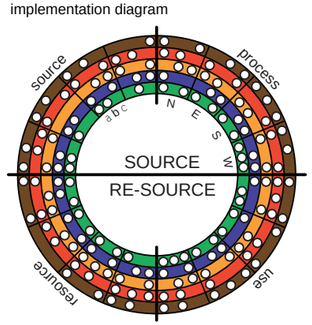
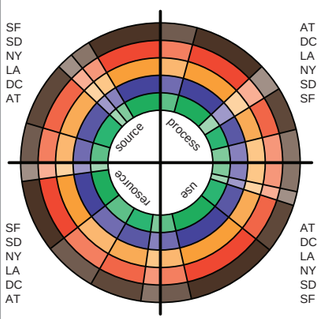
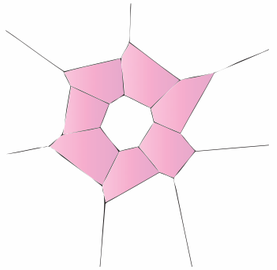
	person	group	facility	city	world
whole cycle	individual EcoBalance master chart	group EcoBalance member comparison	facility EcoBalance competing group analysis	multi-facility city EcoBalance selective implementation diagram	world EcoBalance by proportional achievement
					
	persons A, B, C, D, E, and F with respective role in group efficiencies	air, water, food, energy, and materials with respective implementations	groups I, II, and III with respective engagement in resource balancing efforts	facilities N, E, S, and W with respective employment of general EcoBalance strategies	air, water, food, energy, and materials with respective implementations

Fig 3.1 Heliostat Mirrors

PLENITUDE



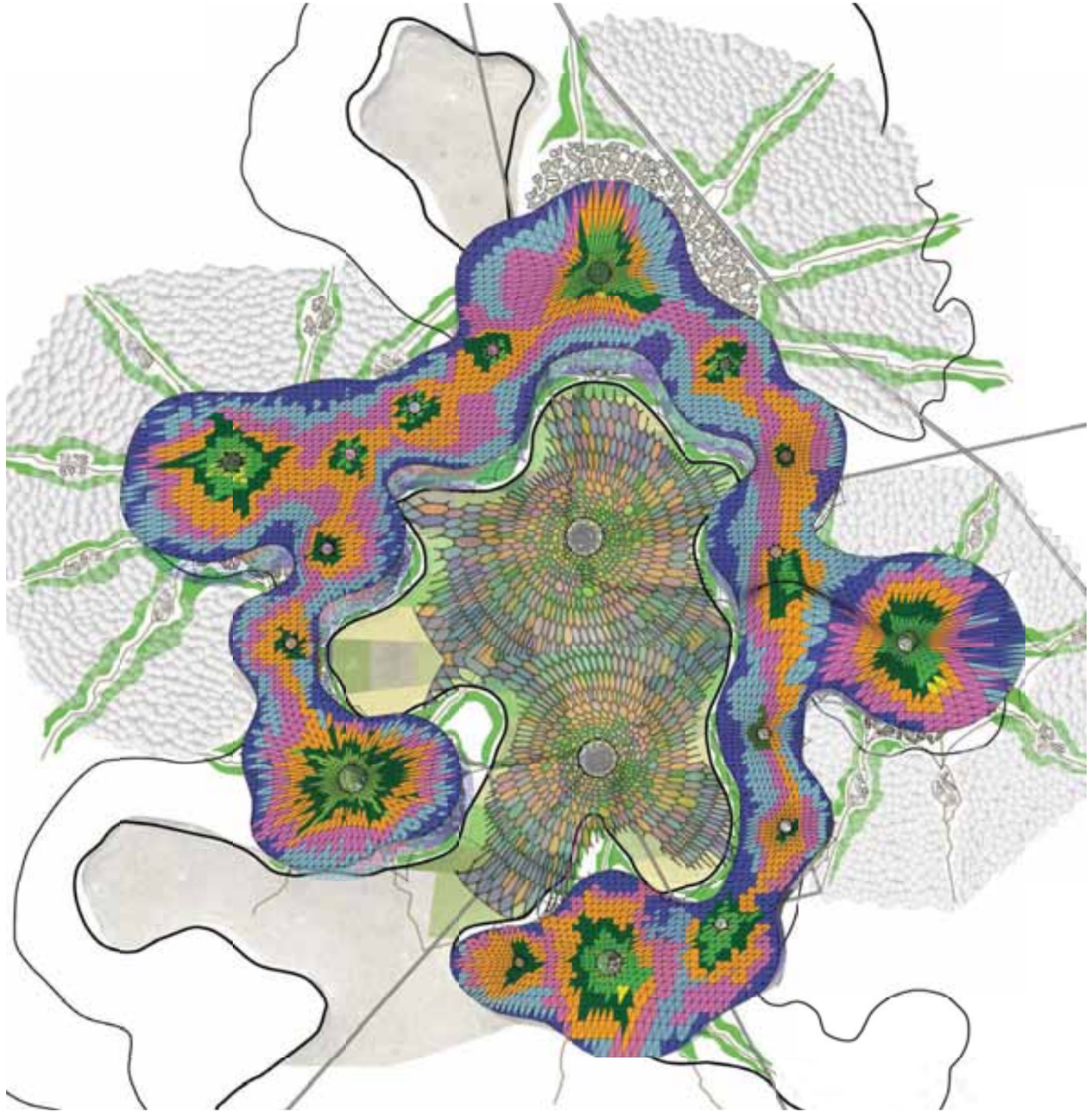
BEAUTY PETAL

Beauty+Spirit+Education are combined as a single petal: beauty inspires; the inspired mind is more receptive to education, yielding superior pedagogy. In Plenitude, we inspire by transforming a devastated site into an exceptional one through awe-inspiring manifestations of a community of the future. The inspired mind wants to learn more; its momentum is viral, and becomes a model to share with the world.,

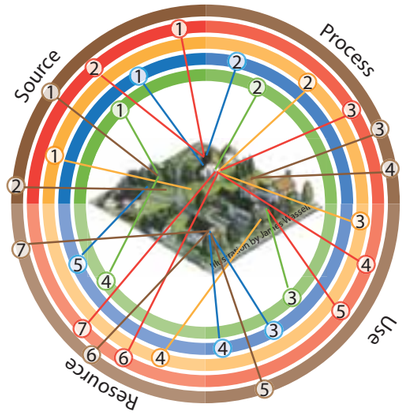
LIVING BUILDING CHALLENGE
Requirement Index

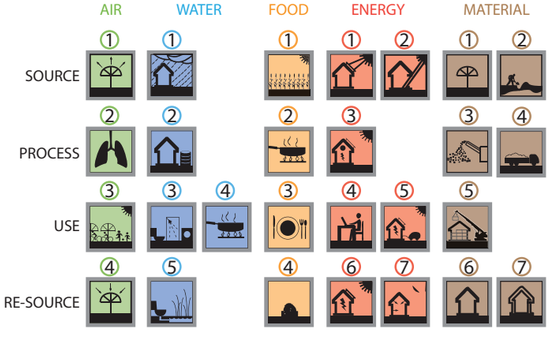
	Neighbourhood	Building	Landscape + Infrastructure	Renovation
19. Beauty + Spirit	●	●	●	●
20. Inspiration + Education	●	●	●	●

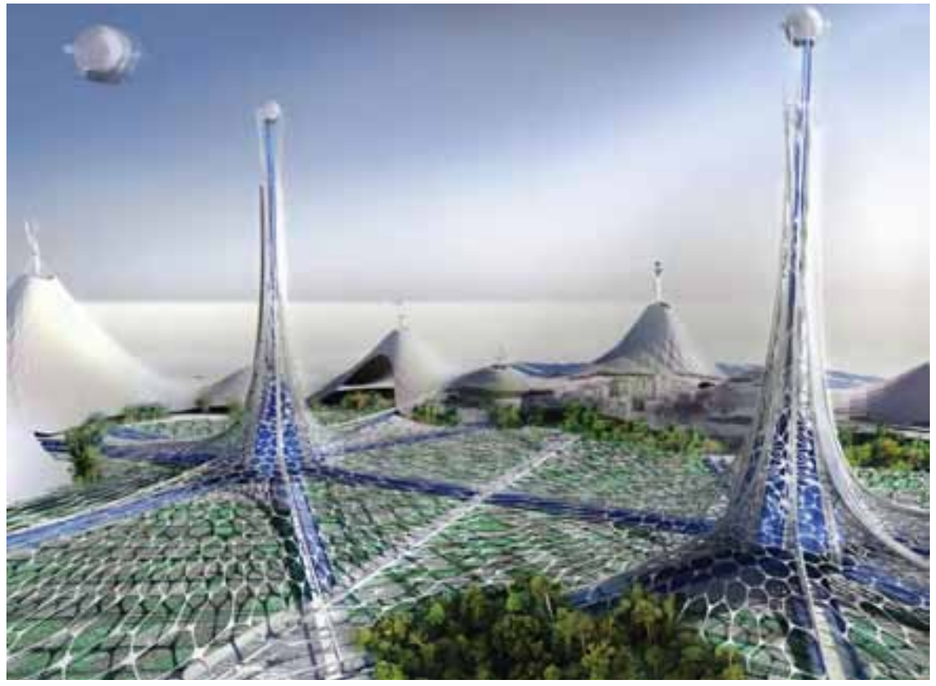
LIVING UNDER A COLORFUL SKY

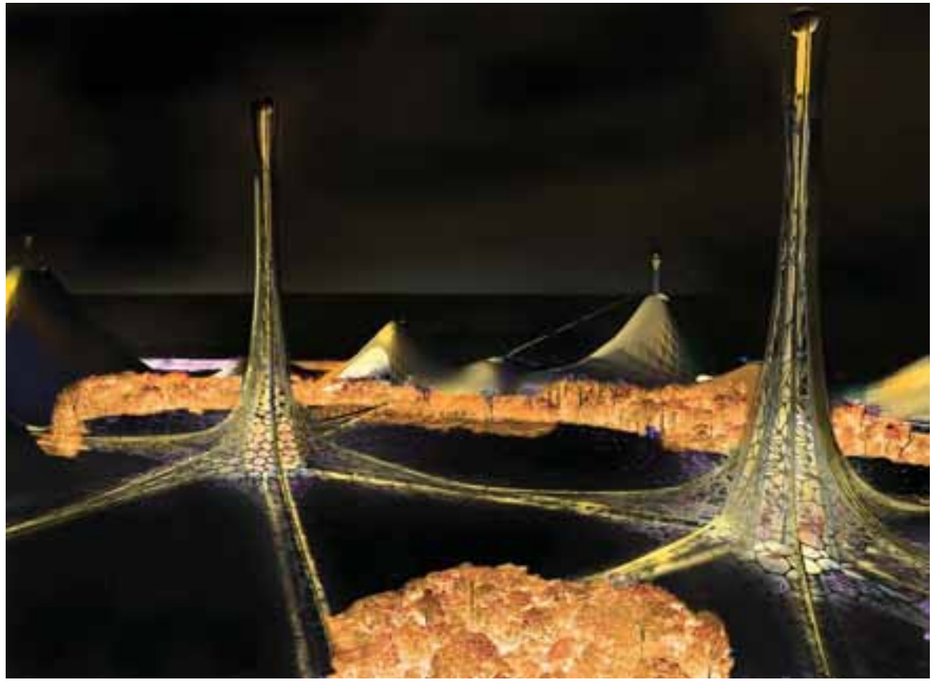


LIFECYCLE BALANCING









ARE WE IN A WORLD THAT MAY NEVER WAKE UP?

Once there was a world of great promise,
a shining blue-green jewel-like planet
that bedazzled the heavens
when seen from a hundred thousand miles in space.
This verdant world, inhabited by a remarkable variety
of plants and animals, had become
a sort of miracles of miracles in the cosmos,
for most planets are forbidding and sterile
or a flaming molten mass.

But this one had seemed just right
for an unprecedented undertaking.
The Deity had chosen it for a great experiment,
to be a prototype for future worlds.
It was the start of a celestial redevelopment plan
for all of space,
and everything in creation seemed to hold its breath
awaiting the outcome of this incredible venture.

A steward had to be provided to give direction,
to husband the resources, and so
the Deity provided a new species he called a human being.
He gave him a good brain with foresight and a conscience,
a set of values and a desire for fine things.

This human was given domination over the animals and the plants,
over the rivers and the lakes and the oceans and the good earth beneath his feet.
He was given clean fresh air with just the right ingredients to breathe
and beauty every place he looked.
He was given a whole world full of microbes and bacteria,
invisible to him, but working for him day and night
to maintain the soil that fed him,
to keep his waterways clean and to remove the surface debris,
keeping the ground he walked on sweet and clean.

Everything the Deity could contrive for his needs and aspirations was given him.
This the richest experiment the celestial power could bestow
held all the promise for the rest of space in times to come.

The word was sent out that Earth was to be observed
by all monitors of space
to note her progress.

Toward the end of the first celestial day of almost five billion years,
an official report was sent to the Heavenly Halls,
a progress report on the state of the world.
The report is now under study

PHASE I Setup Parallel Programs
Pavilion / Exhibit / Model

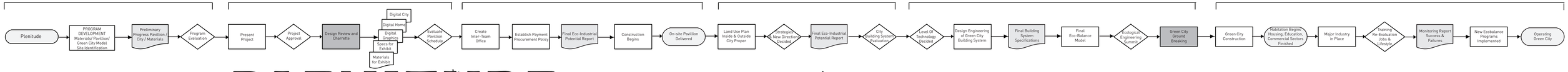
PHASE II
Design / Build Exhibit / Pavillion / City Model

PHASE III
Build Pavillion / Model / Exhibit

PHASE IV
Eco Industrial Development & Manufacturing

PHASE V
Green City Building System Components - Architecture & Engineering

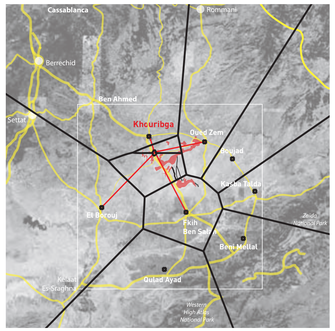
PHASE VI
Lifestyle Training / Education - Feedback Monitoring of Green City



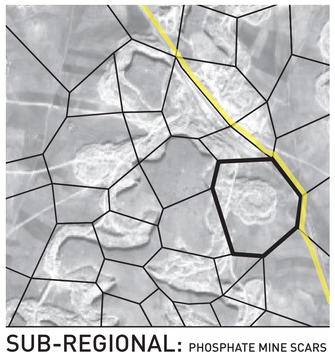
PLENITUDE

LIVING CITY COMPETITION:

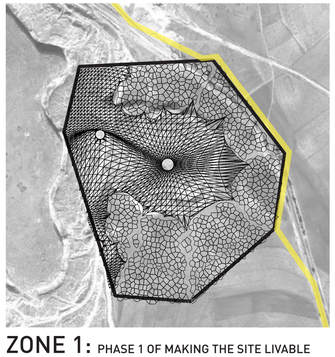
CITY PLANNING PROCESS:



REGIONAL: NEAR KHOURIBGA, MOROCCO

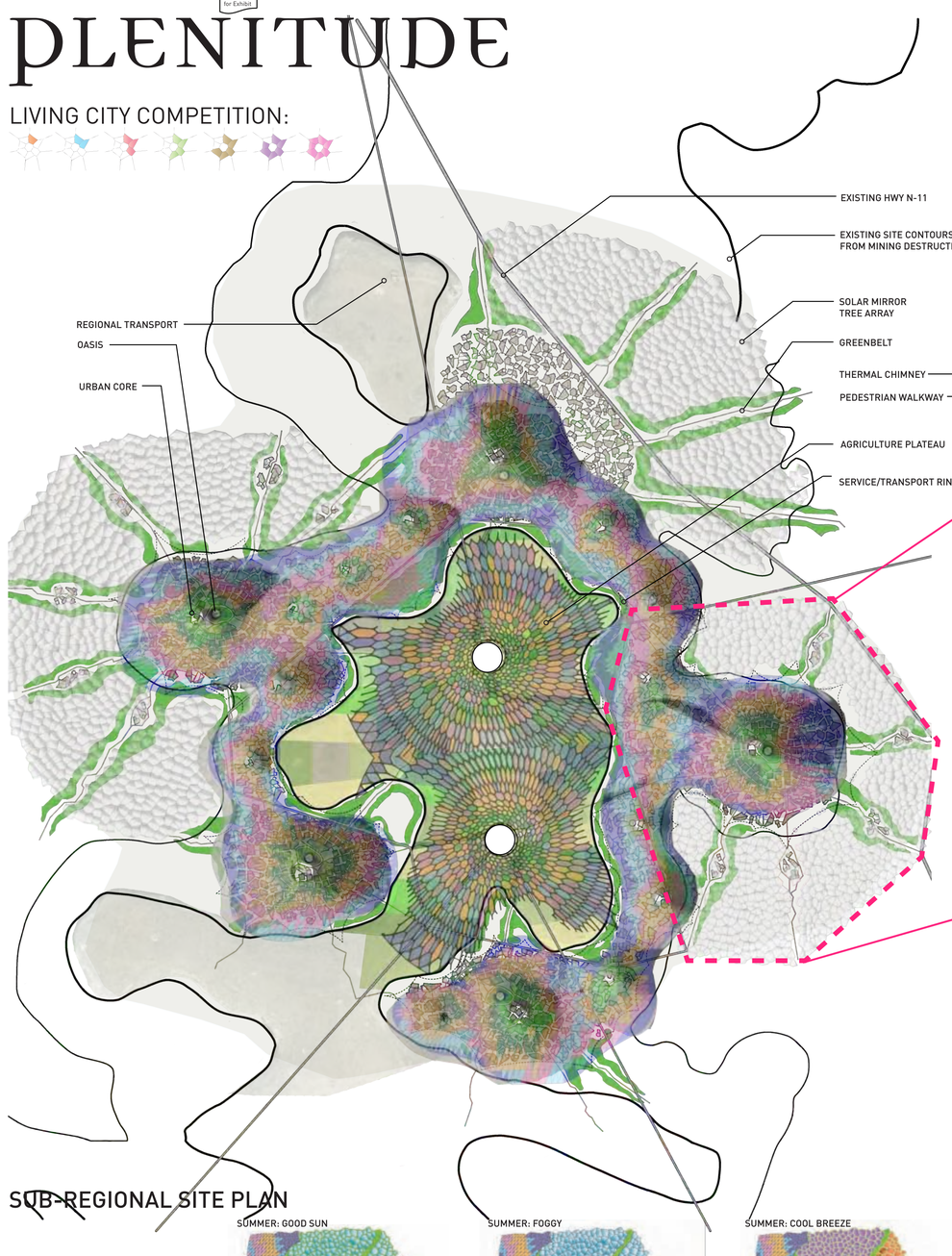


SUB-REGIONAL: PHOSPHATE MINE SCARS



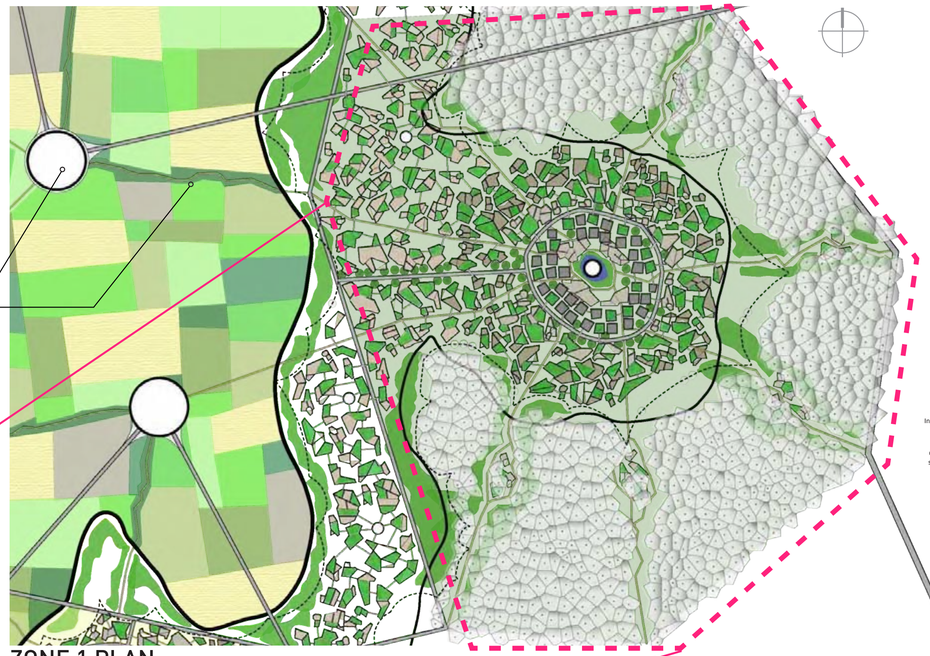
ZONE 1: PHASE 1 OF MAKING THE SITE LIVABLE

EXISTING CONDITIONS



SUB-REGIONAL SITE PLAN

A GREEN CITY INITIATIVE FOR NORTH AFRICA:



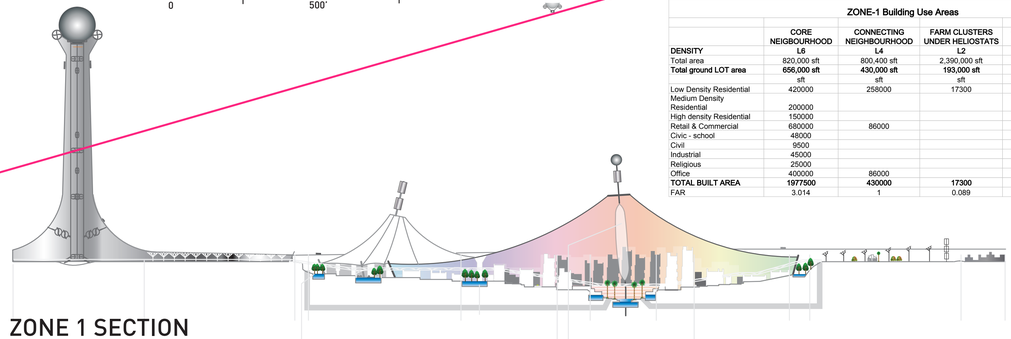
ZONE 1 PLAN

0 500' 1000'

BRANCHING/BIOPHILIA

ZONE-1 Building Use Areas

	CORE NEIGBOURHOOD	CONNECTING NEIGHBOURHOOD	FARM CLUSTERS UNDER HELIOSTATS	GREEN BELT AREA	TOTAL
DENSITY	L6	L4	L2	L1	
Total area	820,000 sft	800,400 sft	2,390,000 sft	1,763,000 sft	5,773,400 sft
Total ground LOT area	656,000 sft	430,000 sft	193,000 sft		1103300 sft
	sft	sft	sft		
Low Density Residential	420000	258000	17300		
Medium Density Residential	200000				
High density Residential	150000				
Retail & Commercial	680000	86000			
Civic - school	48000				
Civil	9500				
Industrial	45000				
Religious	25000				
Office	400000	86000			
TOTAL BUILT AREA	1977500	430000	17300		
FAR	3.014	1	0.089		



ZONE 1 SECTION

THERMAL CHIMNEY TOWER
Multifunctional Updraft thermal engine lifts "Rail-Road" pods for gravity release Transportation Hub Regional dirigible and rail road gravity transportation

LARGE DESERT LIVING MACHINES
Dye sensitized solar PV greenhouses for controlled heat gain and wavelength change

CONTINUOUS SHADED NEIGHBORHOOD
Connecting neighborhood centers with dye-sensitized colored PV and wind generators

TENT VALLEY
Funnel/cistern water storage

OASIS
Community underground cisterns

INTEGRATED VERTICAL INDUSTRY SUPPORT TOWER

DENSE MIXED USE COMMUNITY
Civic, Commercial, and Housing

MULTIPURPOSE GREENWAY
Vegetative cooling, cistern water storage, bird sanctuary, living machine fertilizer-pigeon & bats

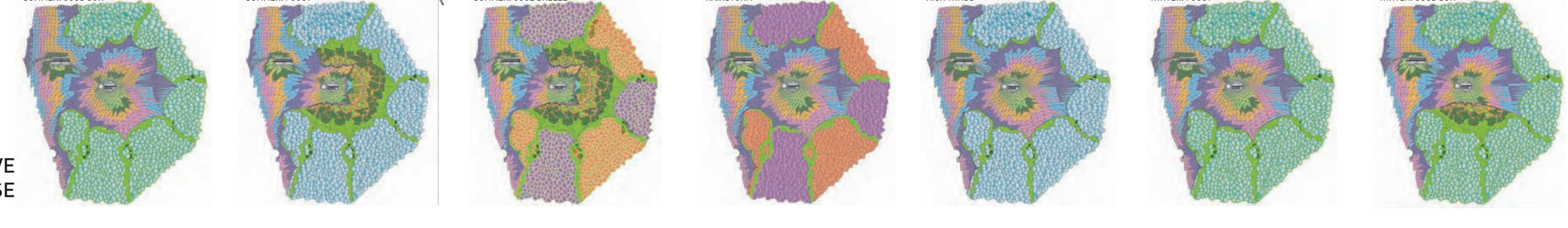
GREENWAY

FARM RESIDENTIAL CLUSTER

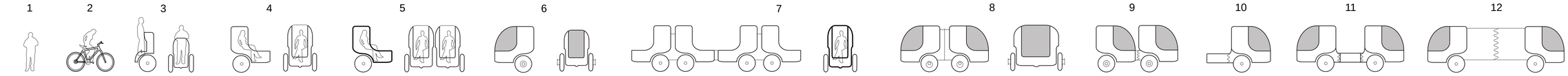
HISTORIC DESERT TOWNS
Preserved as museums

UPGRADED EXISTING FARMLAND WITH MULTIFUNCTIONAL MIRROR TREES

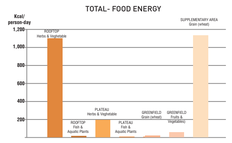
URBAN ADAPTIVE SYSTEMS RESPONSE

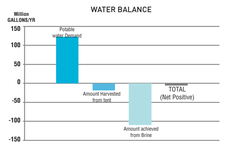


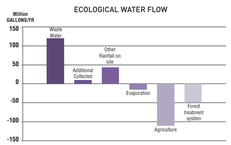
TRANSPORTATION

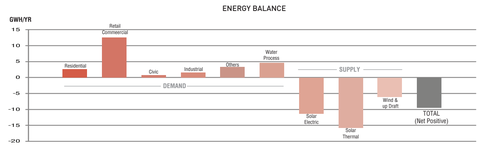


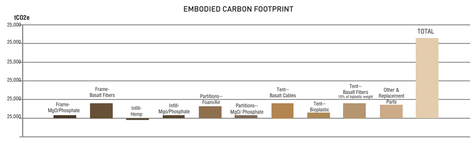
BALANCE:



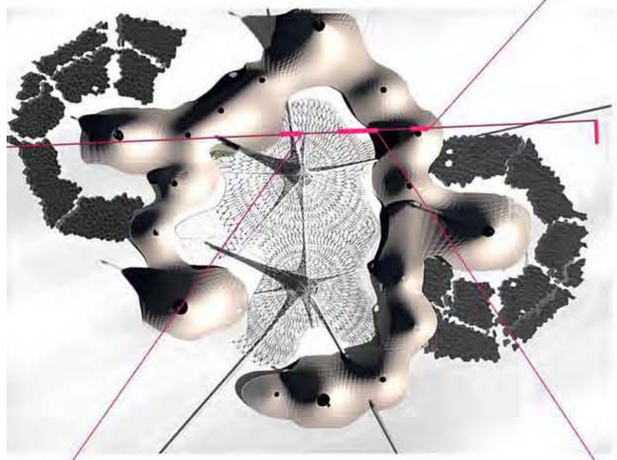


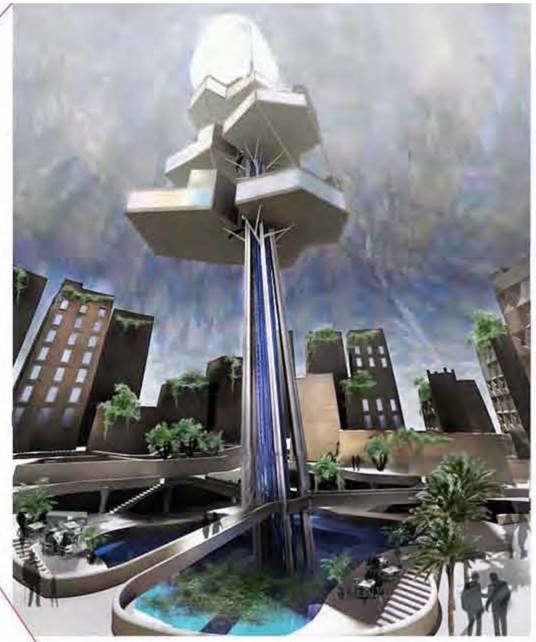


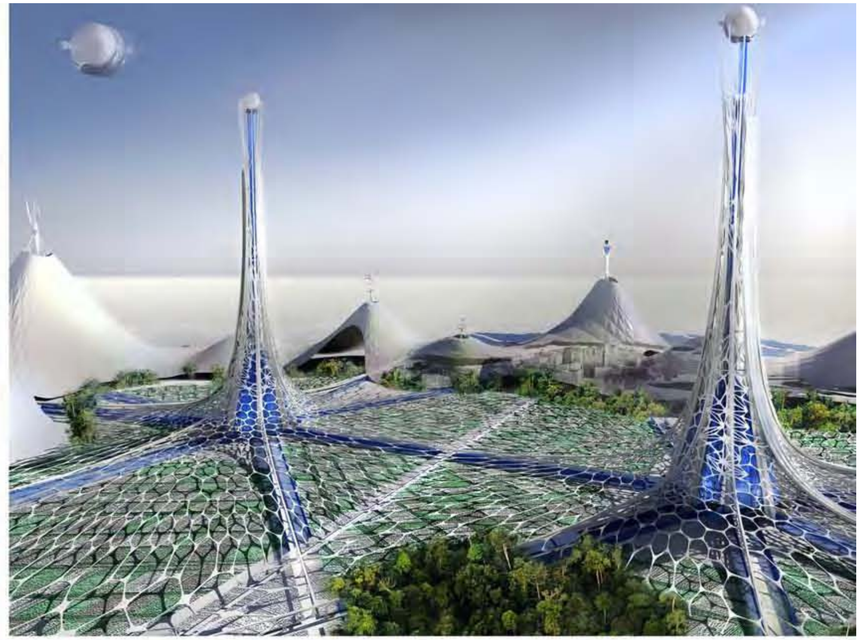




PLENITUDE







URBAN CHARACTER:

Plen-i-tude n., an abundance, is a proactive compact urbanism response to a global pattern of environmental and social travesty. A human/nature-driven ecology of commerce emerges, using the reparative powers of a solar community to bio-remediate the toxicity and social inequity tolls of surface mining, while financially rewarding those who preserve ancient desert settlements. The approach introduces established game changing technologies and societal constructs of resource consciousness Technologically we incorporate: 1) high strength carbon balanced, non-fresh water-based brine derived concretes reinforced with abundant, regionally derived fibrous minerals; 2) on demand hydrogen energy system with no storage requirement; 3) an efficient, pedestrian-friendly Rail to Road transportation pod using both gravity and hydrogen propulsion, and 4) efficient solar heliostat and hybrid wind system for electrical energy export to create a fiscally responsible settlement. Finally, a regional currency, Sustain-A-Bills(TM), integrates a monetary system as a fundamental underpinning of a life cycle-based green economy.

KEY SYSTEMS FOR BIOREMEDIATION

ENZYME

BACTERIA

FUNGUS

MUSHROOM

REEDS

POPLAR TREE

PHYTOREMEDIATION

MERCURY SEQUESTERING

CADMIUM SEQUESTERING