

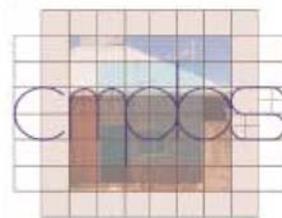
GREEN BUILDING FUTURE OR PAST

PLINY FISK III

CO-DIRECTOR

CENTER FOR MAXIMUM POTENTIAL BUILDING SYSTEMS

AUSTIN TEXAS



DESIGN

Flexible Open Building Systems
Incorporating Life Cycle Design

Internationally recognized green architecture
Greenhouse gas-balanced design
Prototype building systems
Healthy building design and specifications



Blueprint
Demonstration Farm
Laredo, TX



Advanced Green
Builder Demonstration
Austin, TX



2007 Solar Decathlon
Texas A&M University



GroJoint™
CMPBS Farmstand
Austin, TX

MASTER PLANNING

Ecologically-Balanced Land Use
Master Planning

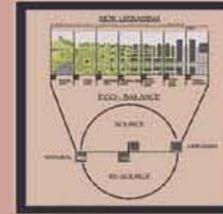
Nature centers & camps
Community-supported architecture
Educational facilities
Integrated landscape/infrastructure systems



School for Field Studies
Baja Del Sur, Mexico



CMPBS 30th Year
Master Plan
Austin, TX



Verano Development
San Antonio, TX



Community Supported
Architecture
Mississippi

POLICY & EDUCATION

Sustainable Guidelines, Training
& Policy Initiatives

Intern program
Green building programs and guidelines
Life cycle planning procedures
Professional development training seminars
Environmentally preferred materials and methods
Green health care initiatives



Green Guide for
Health Care



Green Building Guidelines;
Mueller Green Resources Guide
Austin, TX



Professional Training,
Conference Seminars,
and Workshops
Image copyright: Bill Ravanesi



Guidebooks, Manuals,
Publications

TOOLS

Environmental/Economic Impact
Baselining and Benchmarking
Life Cycle Evaluation

BaselineGreen™
GreenBalance™
Materials library and assessment
LEED® and sustainability consulting



Block 21
Austin, TX



LEED® Consulting
Image: Dell Children's Medical Center of
Central Texas, courtesy of Karlsberger Companies



Materials and Building
Systems Library



EcoBalance™ Game

BUILDING FOR THE FUTURE

(A BEYOND LEED PROPOSITION)

PLINY FISK III
CMPBS AUSTIN TEXAS

- Need to understand the how the future is near
- Need for buildings to become part of owners economic reality
- Need to move from linear checklists to balanced cycles
- Need to retrofit existing cites at a meta level by leveraging possibilities



FEMA

Declared Disasters by Year or State

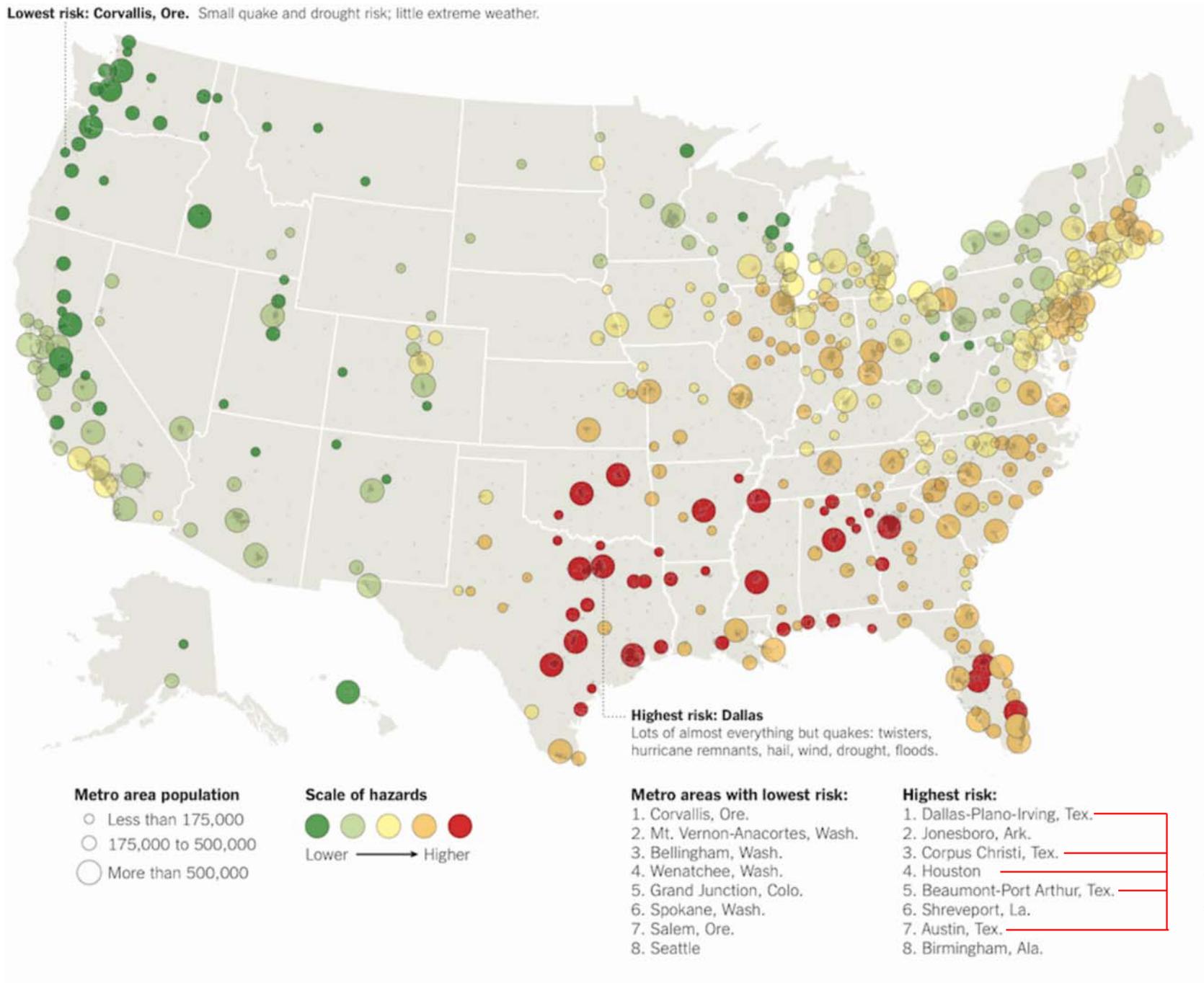
By Year:

YEAR	NUMBER OF DISASTER DECLARATIONS
2011	93
2010	81
2009	59
2008	75
2007	63
2006	52
2005	48
2004	69
2003	56
2002	49

By State:

	STATE	NUMBER OF DISASTER DECLARED
1	Texas	86
2	California	78
3	Oklahoma	70
4	New York	65
5	Florida	63
6	Louisiana	58
7	Kentucky	55
8	Alabama	55
9	Missouri	53
10	Arkansas	53

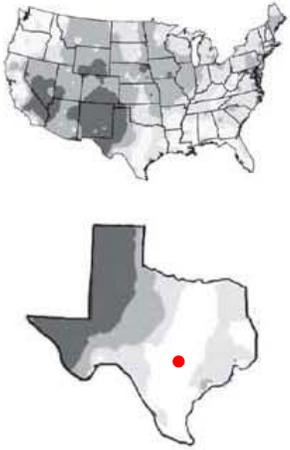
Natural hazards included in this analysis are hurricane, tornado, earthquake, flooding, drought, hail and other extreme weather.



T
E
X
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S

HAZARD MAPS

FIRE RISK



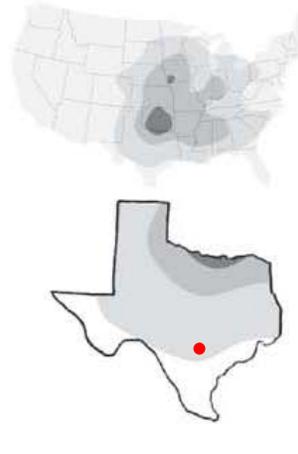
HURRICANE RISK



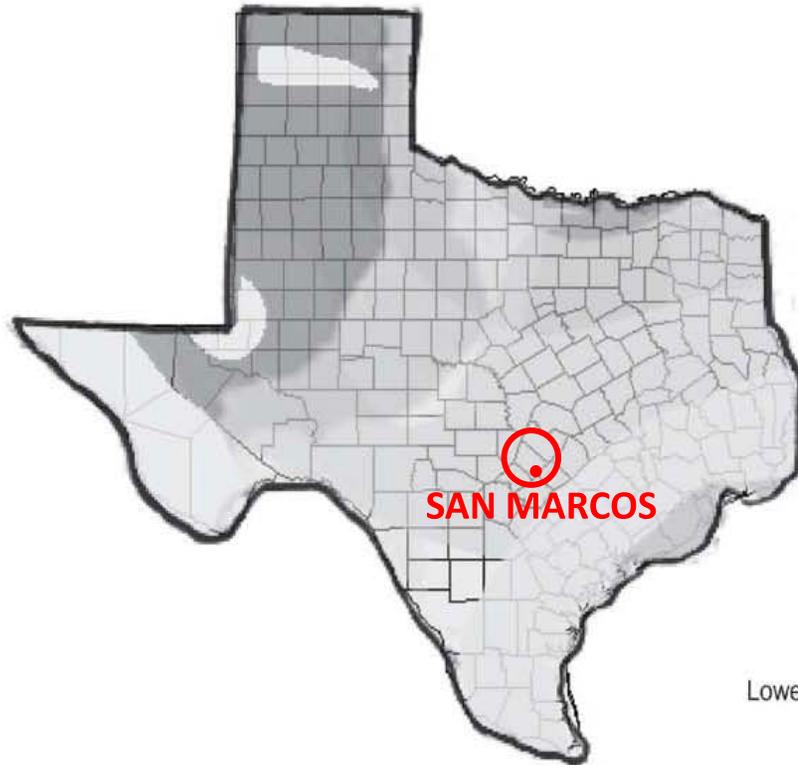
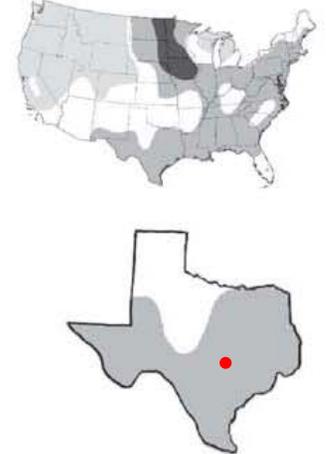
EARTHQUAKE RISK



TORNADO RISK

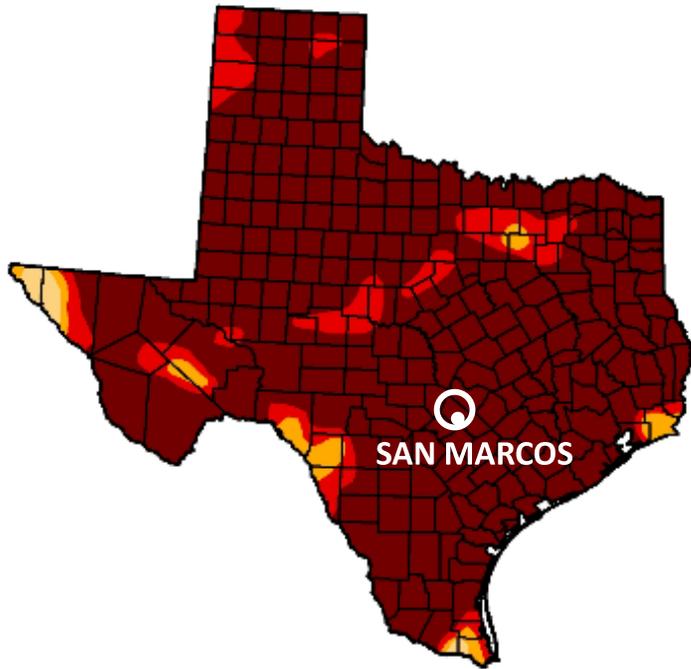
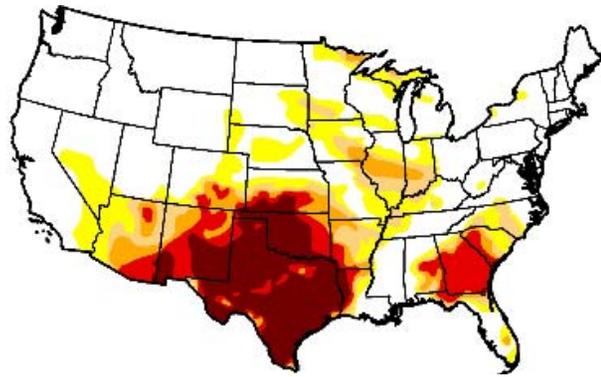


FLOOD RISK

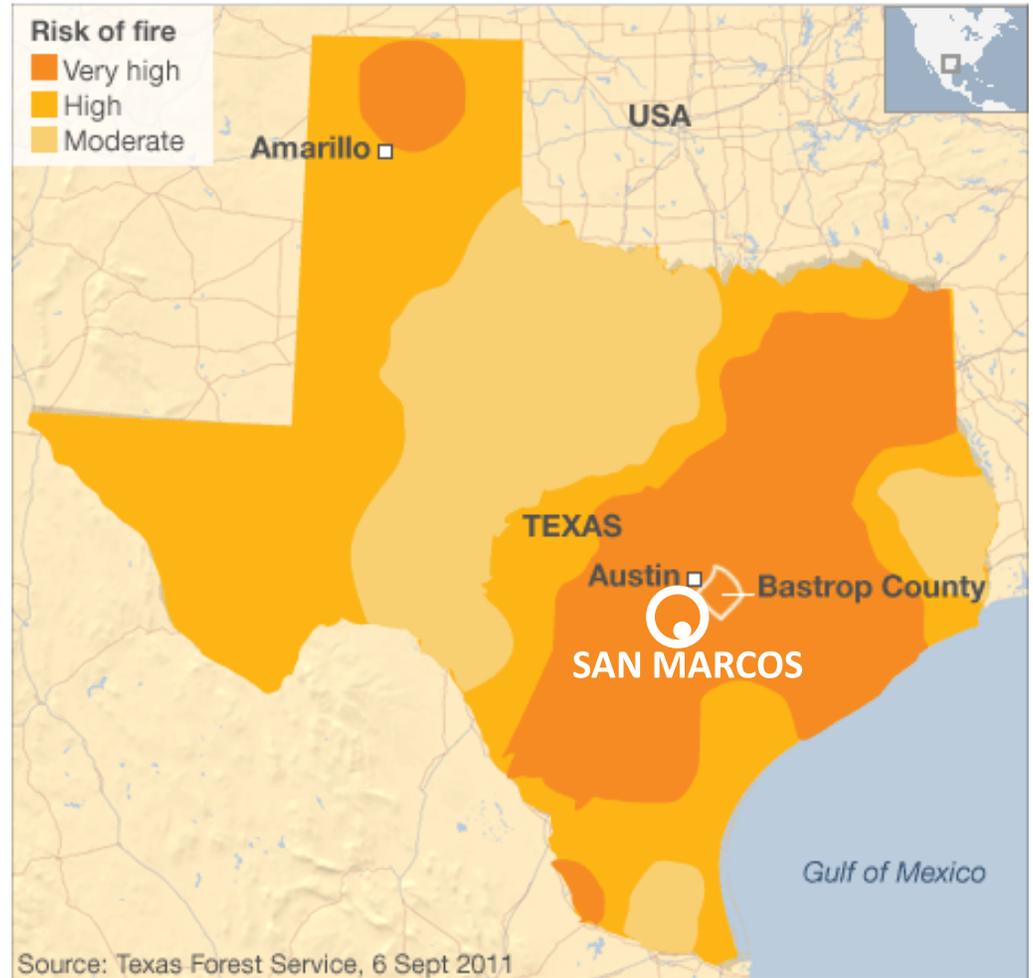


Lower  Higher

Drought Severity and Forecast Fire Danger Map- September 2011



Forecast of areas at risk of fire



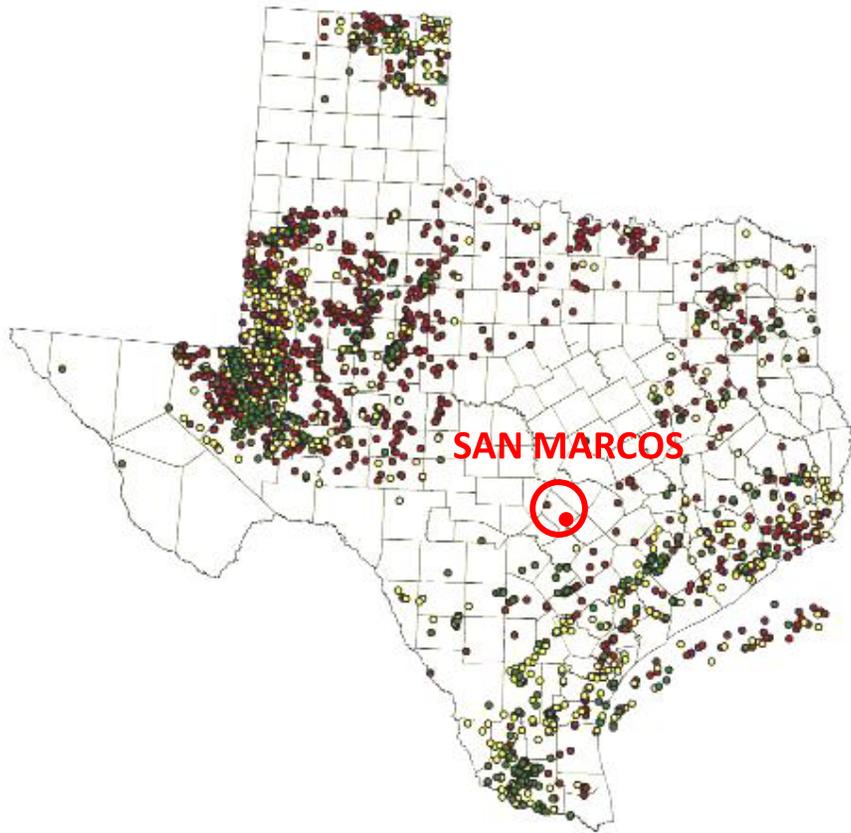
Source: Texas Forest Service, 6 Sept 2011

Drought Severity



ECOLOGICAL RESTORATION MAP

Brine Water

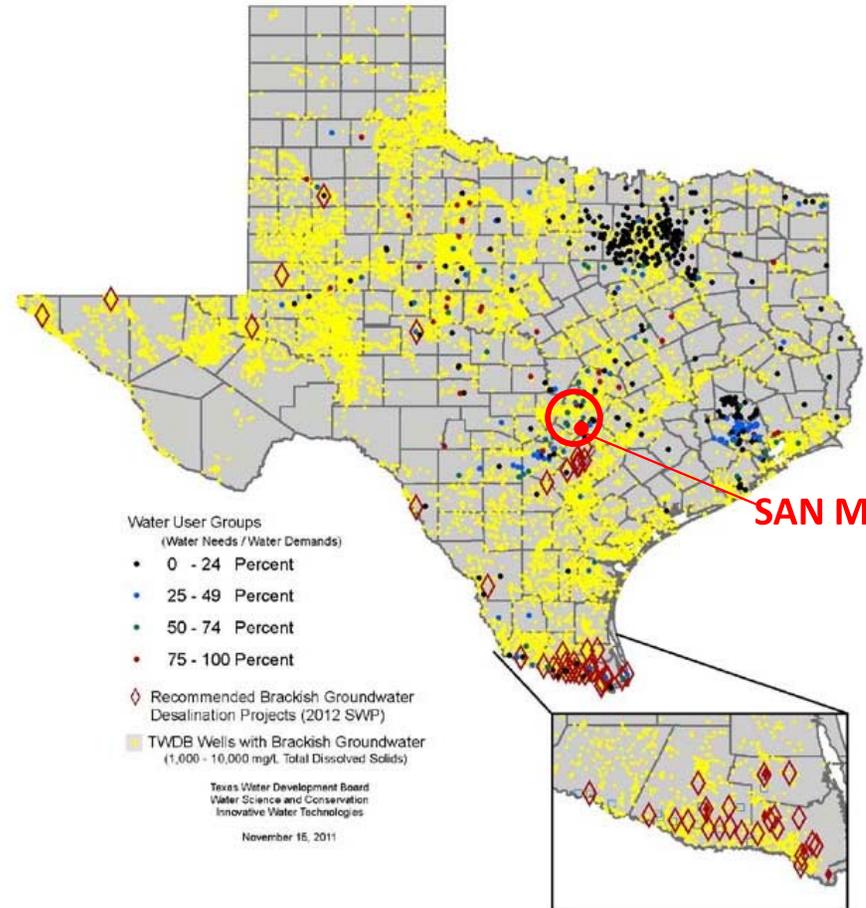


Legend

- Total Dissolved Solids < 10,000 ppm
- Total Dissolved Solids between 10,000 and 50,000 ppm
- Total Dissolved Solids > 50,000 ppm



Brackish Ground Water Sources



Water User Groups

(Water Needs / Water Demands)

- 0 - 24 Percent
- 25 - 49 Percent
- 50 - 74 Percent
- 75 - 100 Percent

- ◇ Recommended Brackish Groundwater Desalination Projects (2012 SWP)
- TWDB Wells with Brackish Groundwater (1,000 - 10,000 mg/L Total Dissolved Solids)

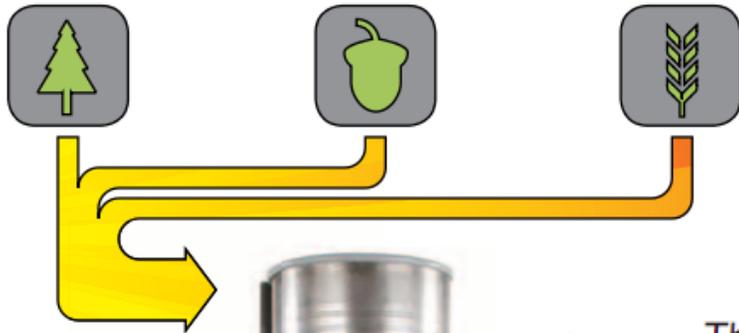
Texas Water Development Board
Water Science and Conservation
Innovative Water Technologies

November 15, 2011

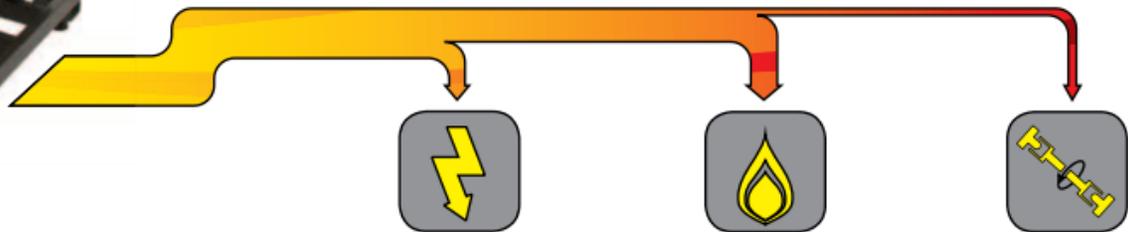
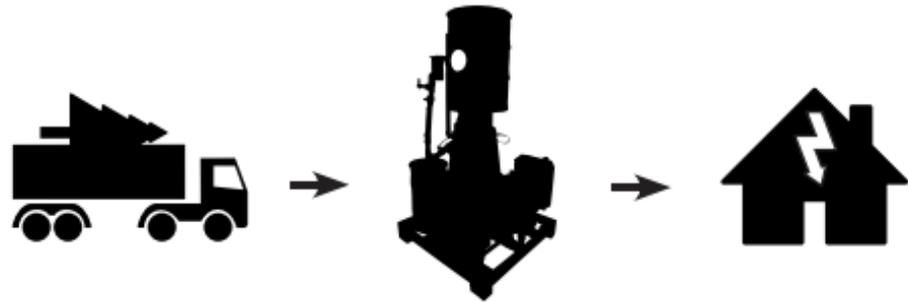


ALL POWER LABS
PERSONAL SCALE POWER

Woody Biomass

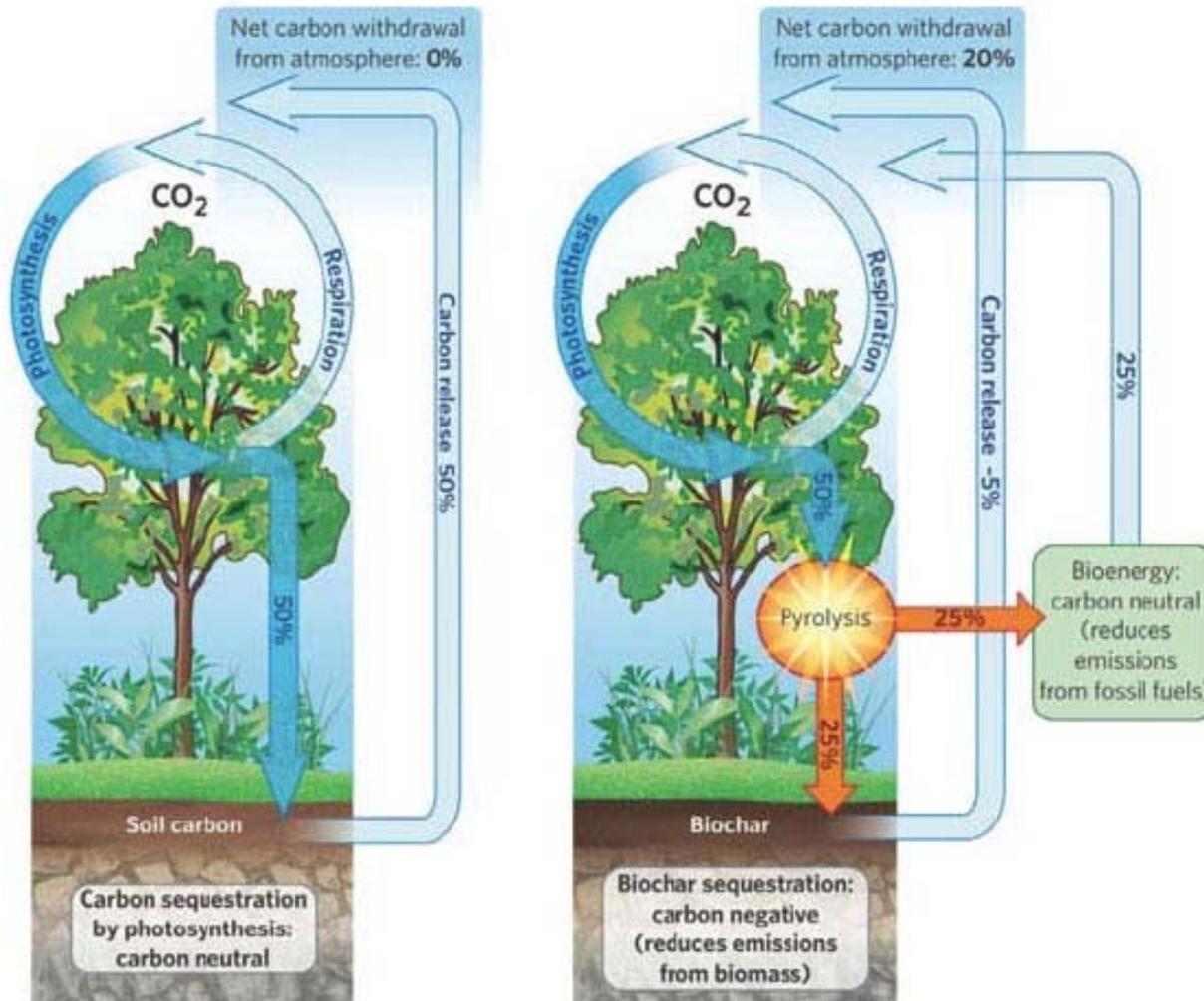


The *GEK Power Pallet* provides reliable, low-cost electricity anywhere biomass is available.

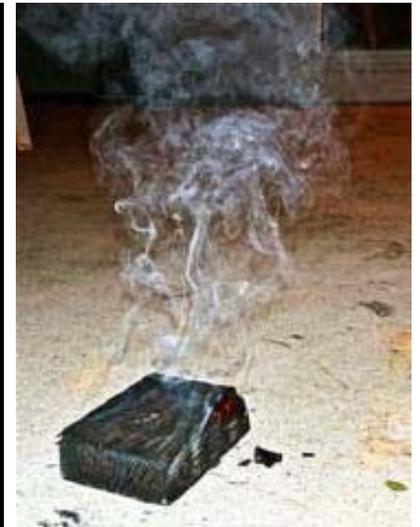
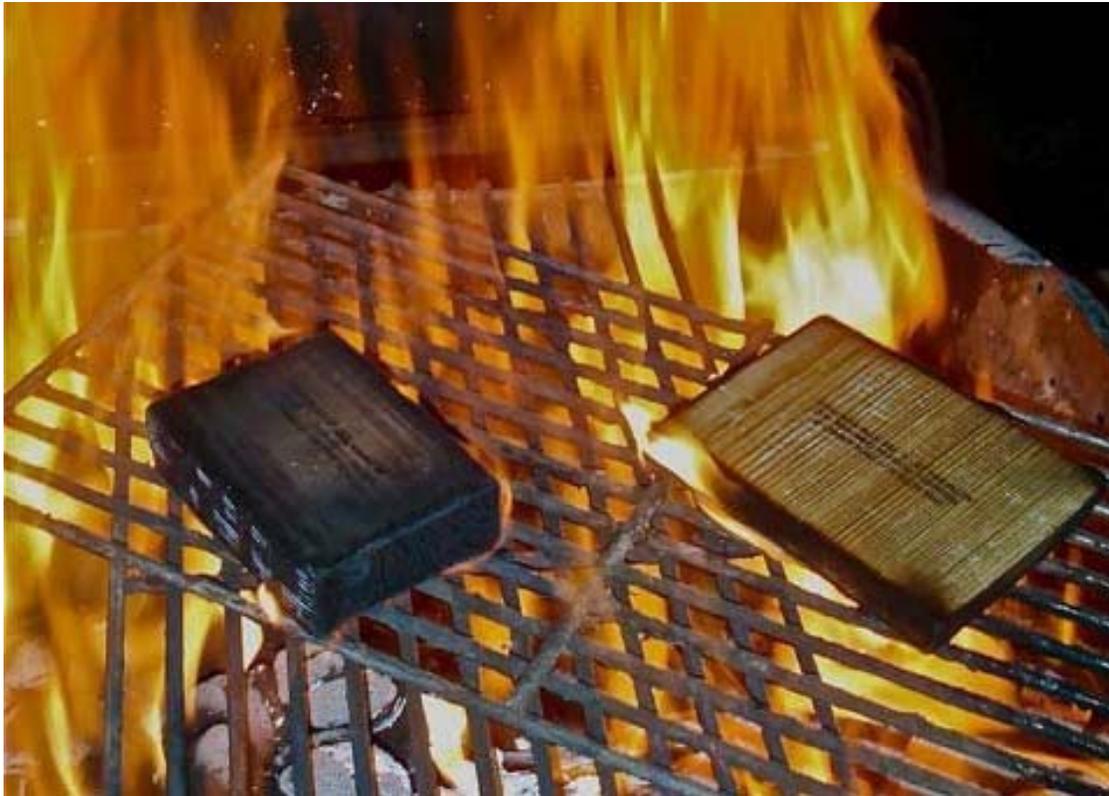


Electricity, Heat and PTO shaft power

Biochar Can Be Carbon-Negative



Fire Resistant “Wood”





How TimberSIL[®] Strength Compares to Selected Wood Species



Properties	TimberSIL [®] Glass Wood Fusion	Beech	Oak	Douglas Fir	Radiata Pine	SPF (stud)
Strength (rupture) MOR (psi)	16,000	14,900	14,300	11,900	11,700	10,200
F _b (psi) (Grade 1, 2x4)	2,700	1,810	1,425	1,600	1480	690
Strength (elasticity) MOE (psi)	1,900,000	1,720,000	1,820,000	1,490,000	1,480,000	1,000,000
Compression parallel to grain (psi)	7,100	7,300	6,090	6,230	6,080	5,600
Compression perpendicular to grain (psi)	2,124	1,000	870	740	610	580
Tension parallel to grain (psi)	15,000	9,529	8,700	11,000	11000	4,600
Shear parallel to grain (psi)	1,600	2,000	1,390	1,510	1,600	1,150
Hardness (lb)	1,012	500	1,060	510	750	510

The Gaia Engineering Process

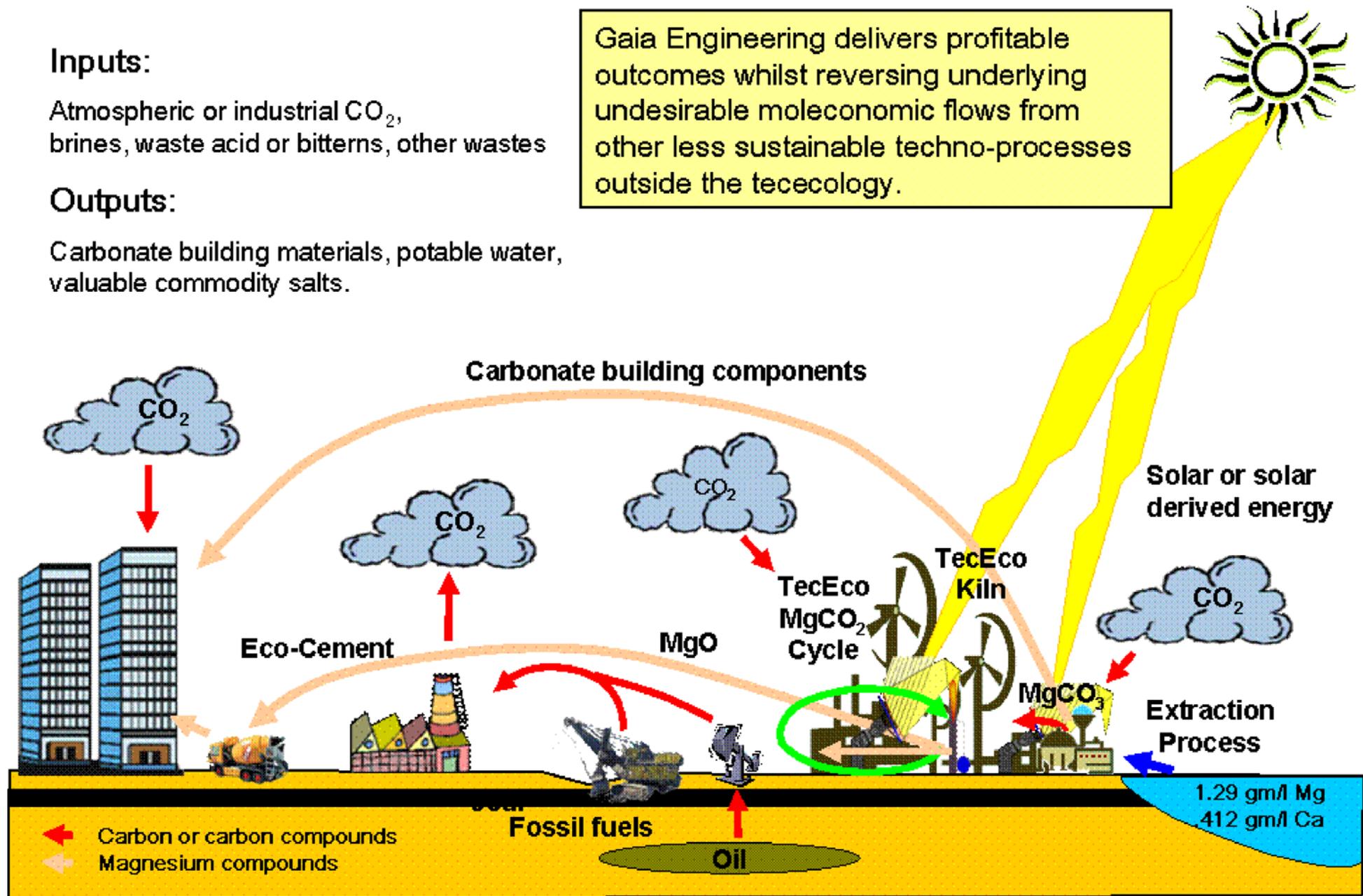
Inputs:

Atmospheric or industrial CO_2 ,
brines, waste acid or biterns, other wastes

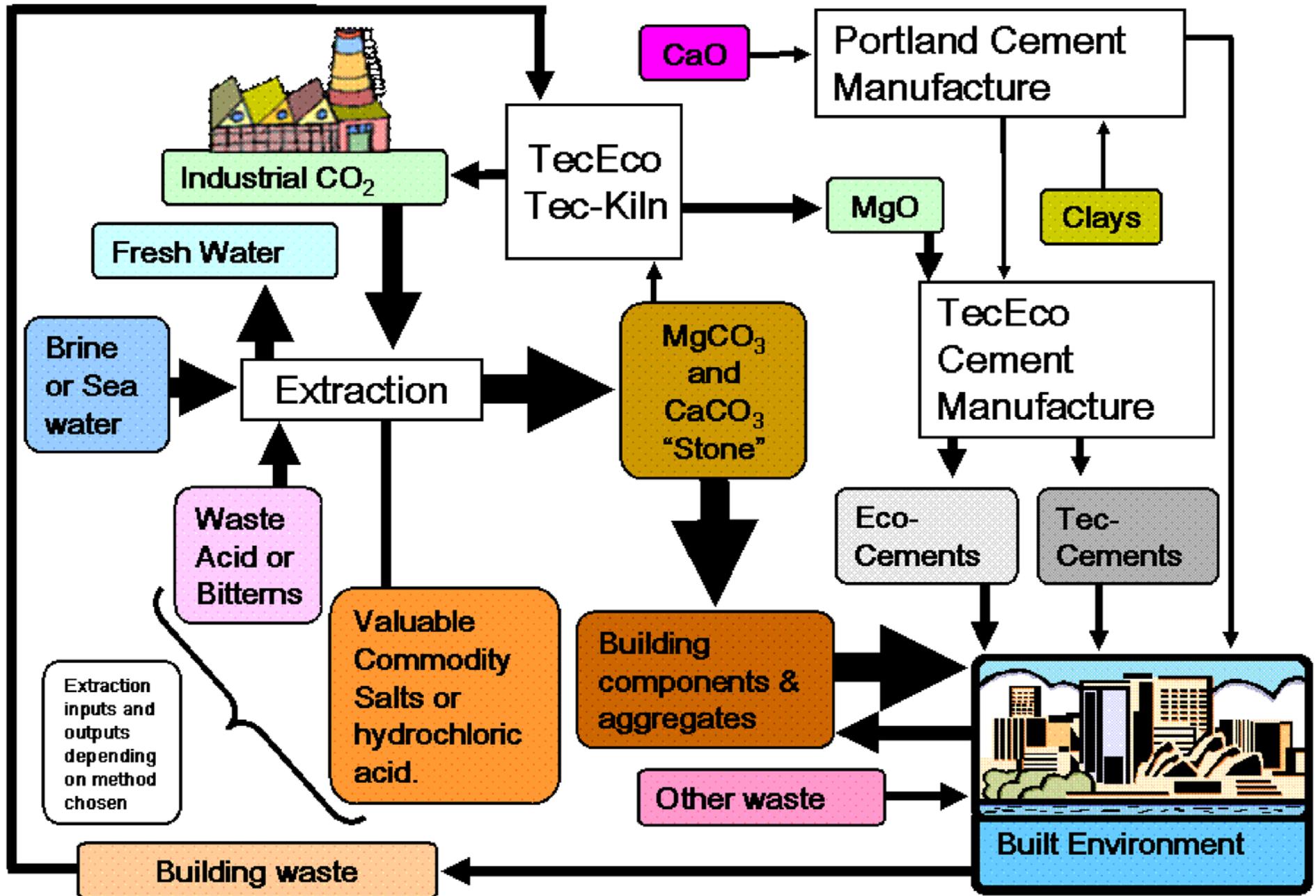
Outputs:

Carbonate building materials, potable water,
valuable commodity salts.

Gaia Engineering delivers profitable outcomes whilst reversing underlying undesirable moleconomic flows from other less sustainable techno-processes outside the tececology.

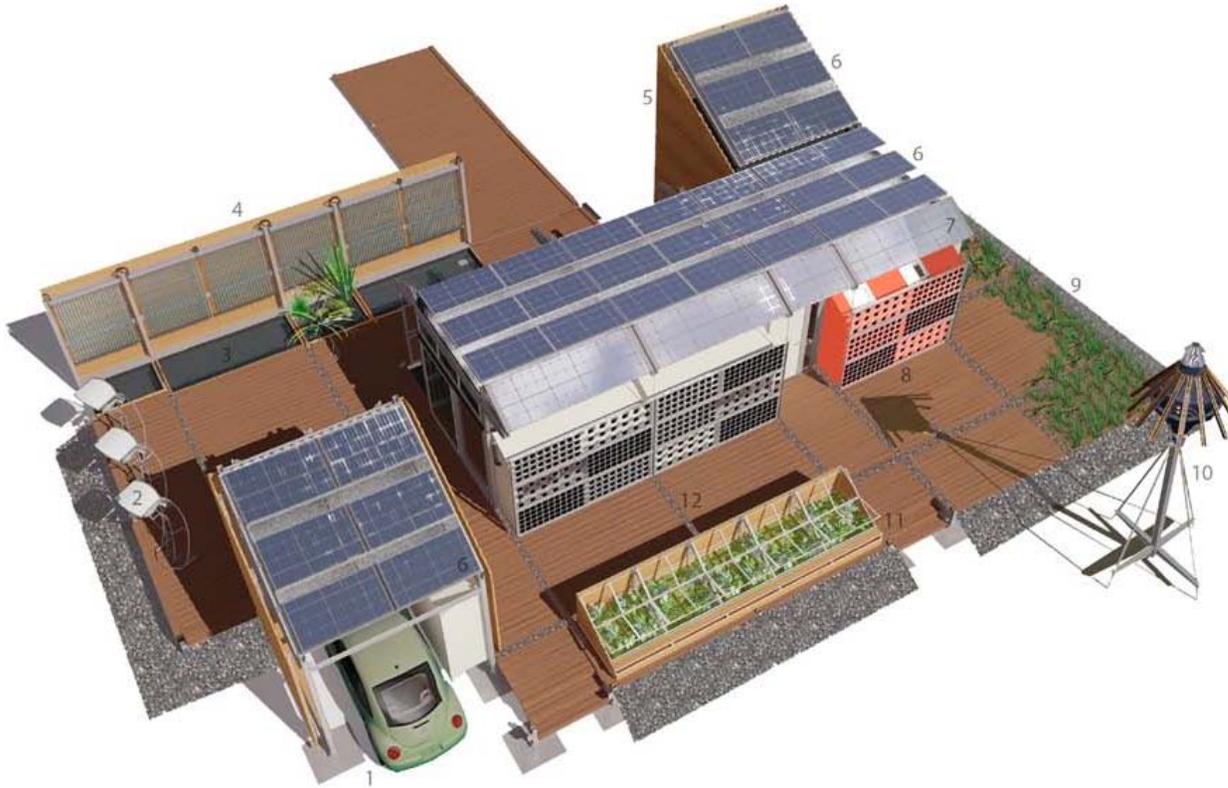


Gaia Engineering Flowchart



Texas A&M Solar Decathlon

■ Shelter ■ Energy ■ Health ■ Visualization ■ Marketing



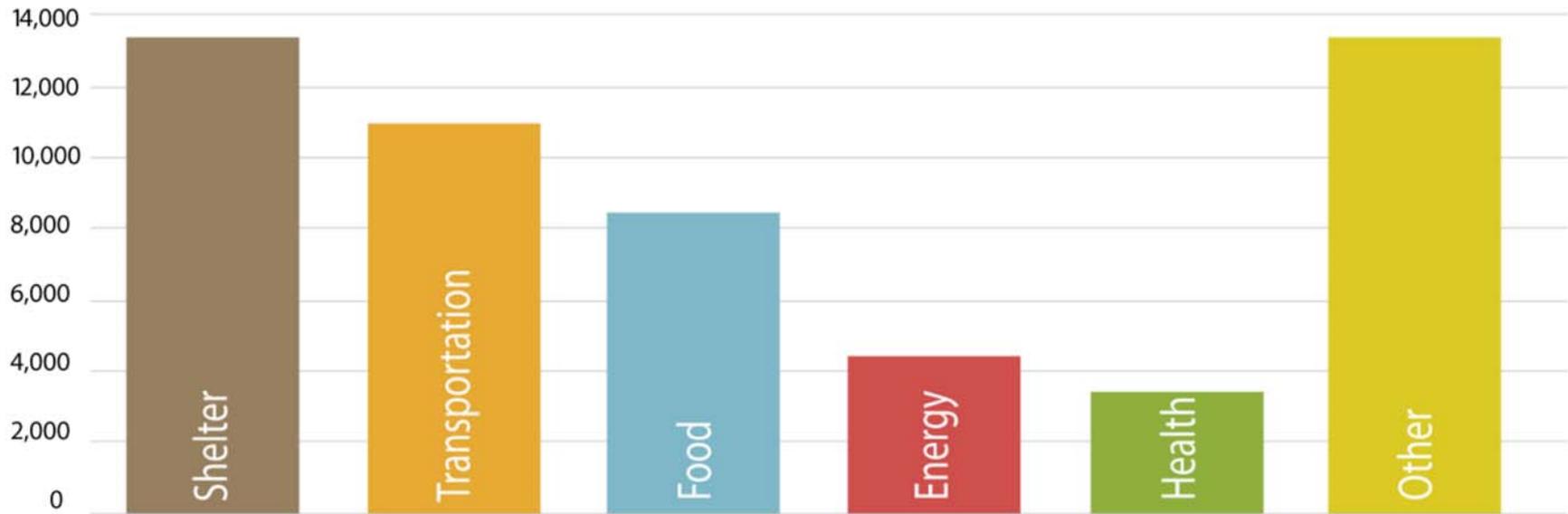
- 1 Solar Carport
- 2 Building Integrated Wind System
- 3 Reflecting Pond
- 4 Solar Thermal Fence
- 5 Studio
- 6 High Efficiency BIPV
- 7 Light Reflecting BIPV
- 8 Light-Thru BIPV
- 9 Grassland Biome Simulation
- 10 Bat Tower
- 11 Food Garden

■ Shelter ■ Energy ■ Health ■ Visualization ■ Marketing

In partnership with the Center for Maximum Potential Building Systems



Yearly Costs to Family



The house is paid off incrementally as you add rooms, which provides considerable savings.

The house provides a full set of electronic controls for a two-way grid connection, or for direct use by the home with ability to attach Energy Ports to any home.

Multi-use beds act as food drier incorporated as part of the design solution, which will also lead to savings, by providing food for inhabitants

The design solution eliminates the incredible toxic yard of the typical family home by using a replacement for insecticides and chemical fertilizers through the use of a bat tower.



- Need for buildings to become part of owners economic reality

Building Costs Compared by Method of Construction

	Manufactured/ Mobile Home	Traditional Site Built	Incremental Site Built	Monthly Savings	Total Term Savings
Structure cost	\$48,000	\$84,000	\$22,000*		
Lot cost	\$16,000	\$16,000	\$16,000		
Total cost	\$64,000	\$100,000	\$38,000		
Mortgaged amount	\$60,800	\$95,000	\$36,100		
15 Year Mortgage monthly payment (6.5%)	\$494	\$880	\$314	\$566	
Out of pocket & mortgage payment	- \$145,812	- \$226,164	- \$104,232		
Out of pocket incremental improvements	\$0	\$0	- \$44,000*		
Appreciation of 5%	\$133,051	\$207,893	\$170,472		
Net gain	- \$12,761	- \$18,271	\$22,240		\$77,090
20 Year Mortgage monthly payment (6.5%)	\$453	\$708	\$269	\$439	
Out of pocket & mortgage payment	- \$172,775	- \$272,752	- \$134,044		
Out of pocket incremental improvements	\$0	\$0	- \$44,000*		
Appreciation of 5%	\$169,811	\$265,330	\$217,570		
Net gain	- \$2,964	- \$7,422	\$39,526		\$106,500
30 Year Mortgage monthly payment (6.5%)	\$384	\$569	\$228	\$341	
Out of pocket & mortgage payment	- \$233,422	- \$380,711	- \$196,589		
Out of pocket incremental improvements	\$0	\$0	- \$44,000*		
Appreciation of 5%	\$276,604	\$432,194	\$354,400		
Net gain	\$43,184	\$51,483	\$113,811		\$188,646

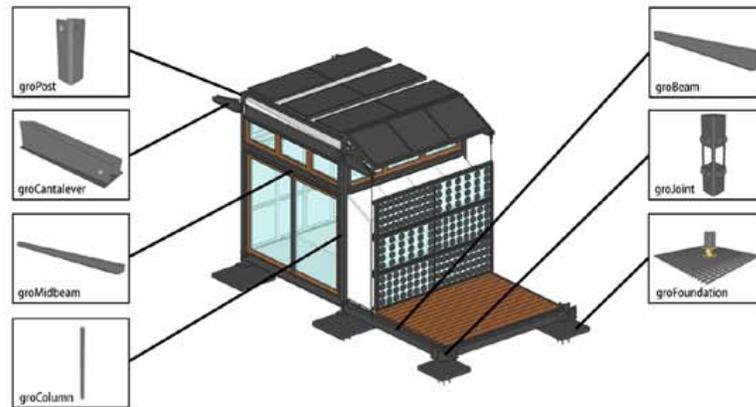
* It is assumed that only the first increment is built and financed initially and the monthly savings will afford the owner to save and pay cash for two (2) future increments each costing \$22,000.

Additional assumptions include: 2.5% property tax; 2.0% closing costs; 5.0% down payment; 1.0% annual maintenance; 5-year mortgage insurance; 6.5% mortgage interest; 5.0% property appreciation. The traditional site built home is used to calculate the monthly and term savings.

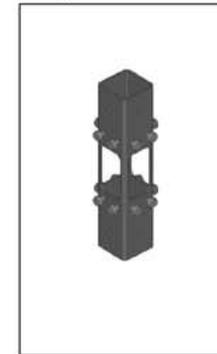
Shelter

the groSystem of Componentets

the groComponents



the groJoint



the groWalls



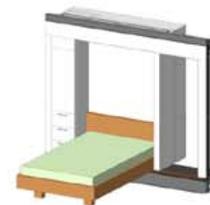
Kitchen groWall



Entertainment groWall



Bathroom groWall



Bedroom groWall



Mechanical groWall



Energy groWall

the groSpaces



Garage



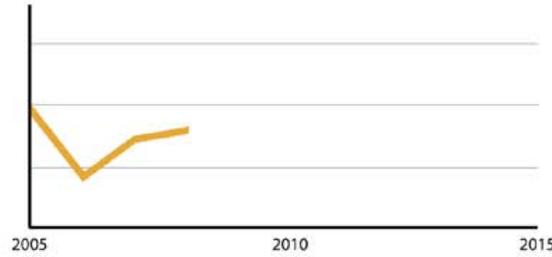
Studio

Marketing

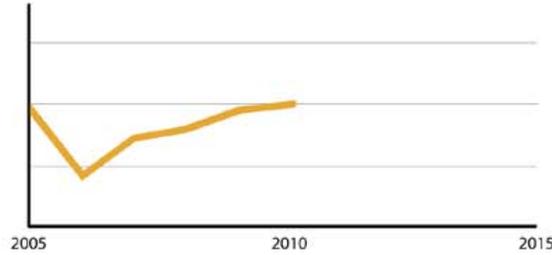
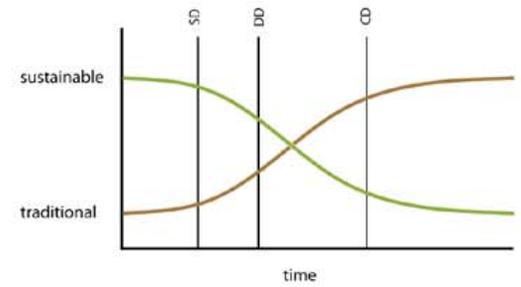
Pay-As-You-Grow



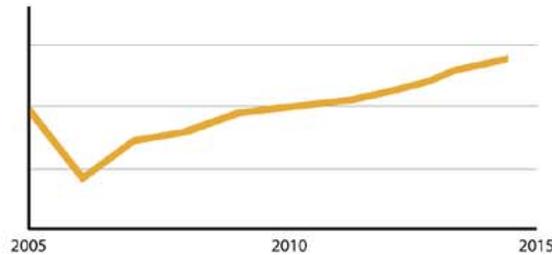
Financial Stability



Design Cost Comparison



Open Source System



Pay-As-You-Grow: Because you only purchase what you can afford, adding more components as you need, there is no need for a large mortgage, reducing the amount of money paid for the groHome. The amount of equity on this example of disaster relief for post-Hurricane Katrina housing in Mississippi only increases after the initial purchase and construction of the groHome. As the number of occupants grows, so does the amount of space in the house.





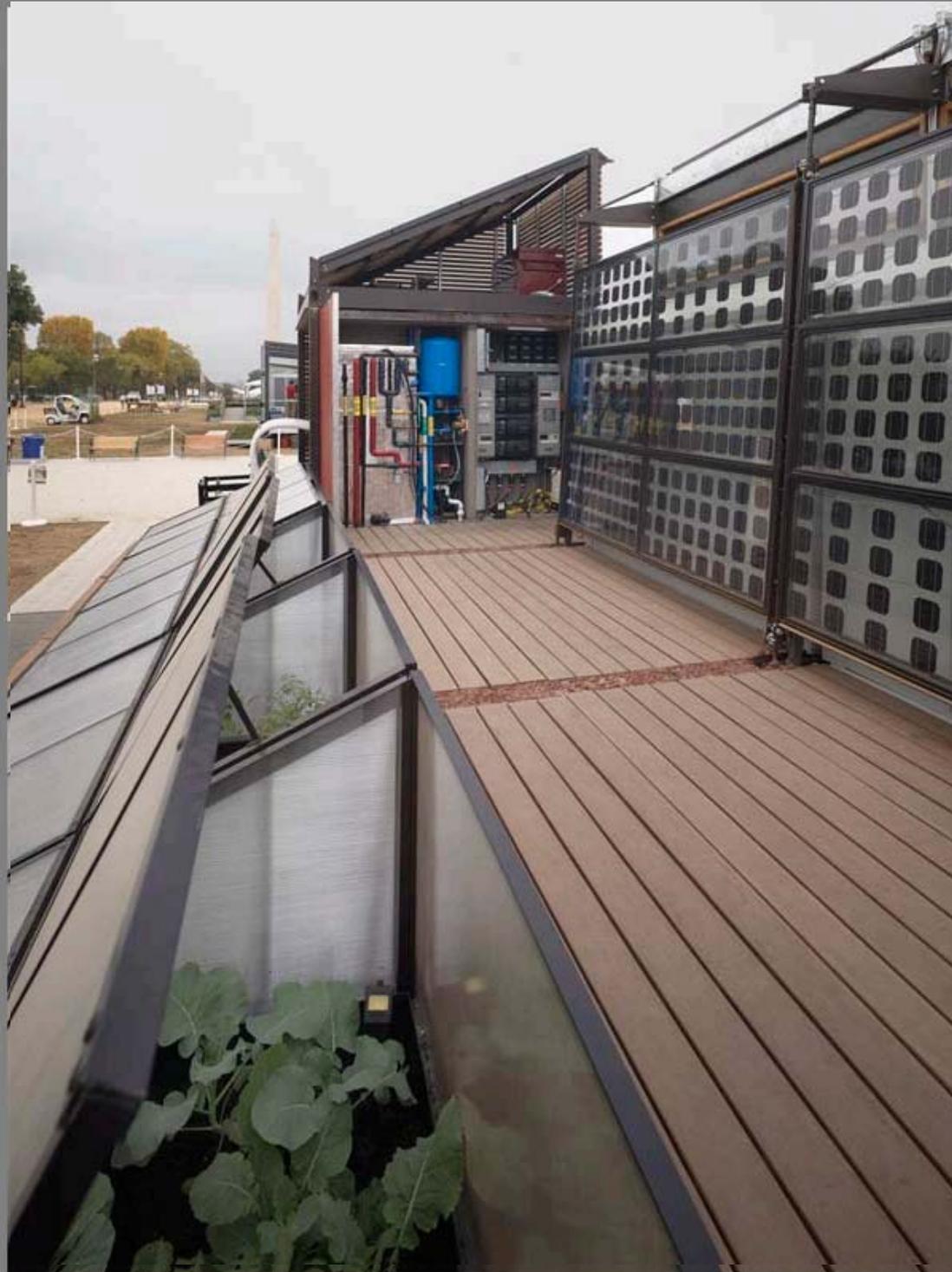
























Texas A&M Solar Decathlon

■ Sustainability ■ Open Source ■ Growth ■ Relief ■ D.I.Y.

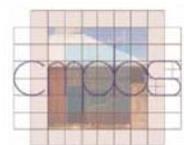


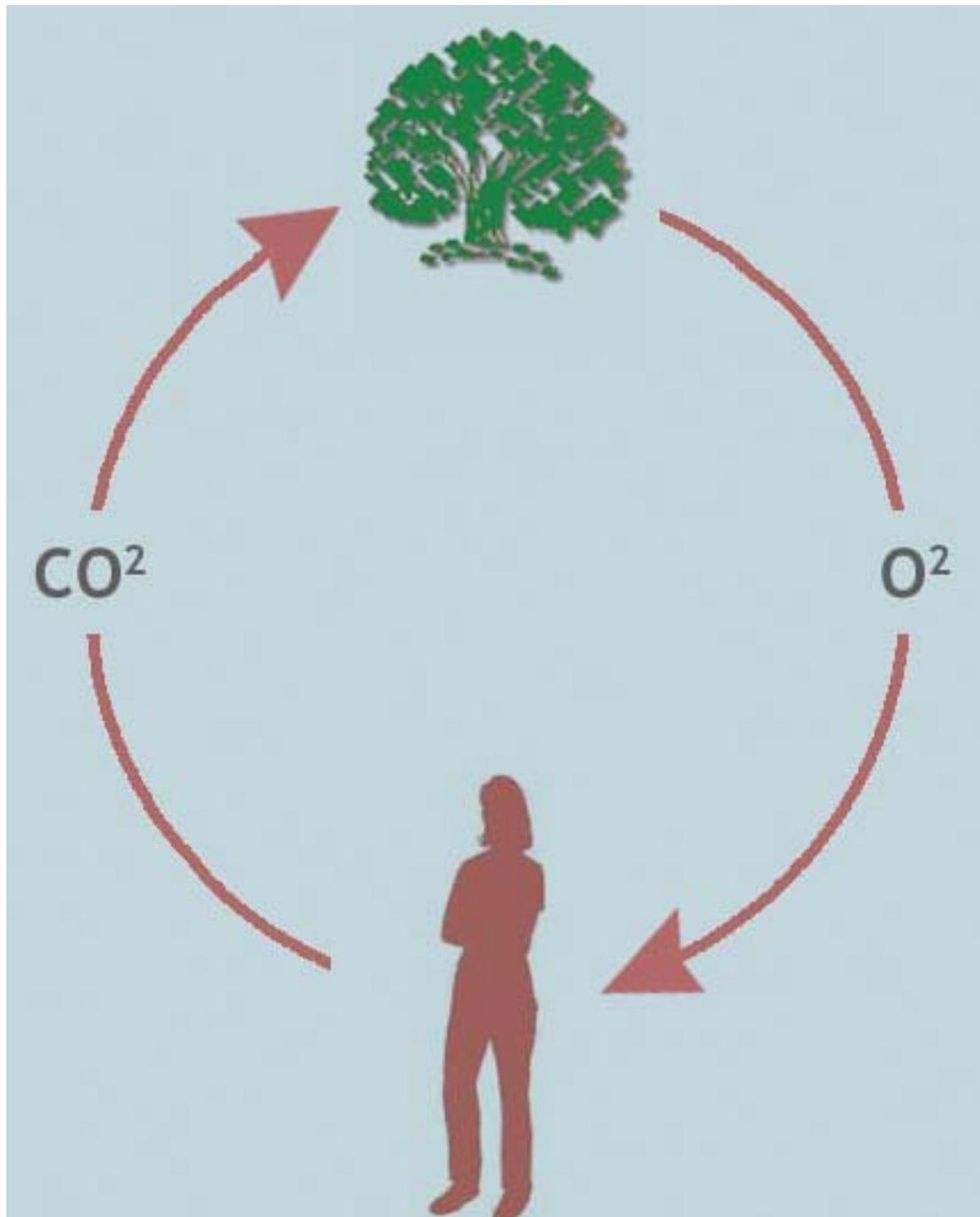
The Texas A & M Solar Decathlon won the following awards:

- 1) AIA Cote/ AIAS 1st place Mall award
- 2) EPA design for disassembly DfD 1st^t Place national award
- 3) Decathlon Appliance award 1st place
- 4) NAHB - 3rd place curb appeal award
- 5) Sundance Documentary chosen out of the 20 entries (shown April 1 2008)

ALLIED PROFESSIONALS	POTENTIAL OR EXISTING BALANCE CONDITIONS
Accountant	Balances Credit and Debit
Mathematician	Balances Algebraic Equations
Chemical Engineer	Balances Chemical Equations
Mechanical Engineer	Balances Heat Gain to Heat Loss
Civil Engineer	Balances Retention to Release of Stormwater
Structural Engineer	Balances Gravitational Force to Structural Capacity
Ecologist	Balances Producers and Consumers
Climatologist	Balances Carbon Release to Carbon Sink
Hydrologist	Balances Water Quality to Water Availability
Life Cycle Analyst	Analyzes Data for Upstream and Downstream
Industrial Ecologist	Balances Inputs & Outputs in Industrial Ecosystems
Urban Planner	Balances Public Sector to Private Sector Needs
Neurobiologist	Balances the Brain to Metabolic Functionality
Psychologist	Balances Society with the Individual

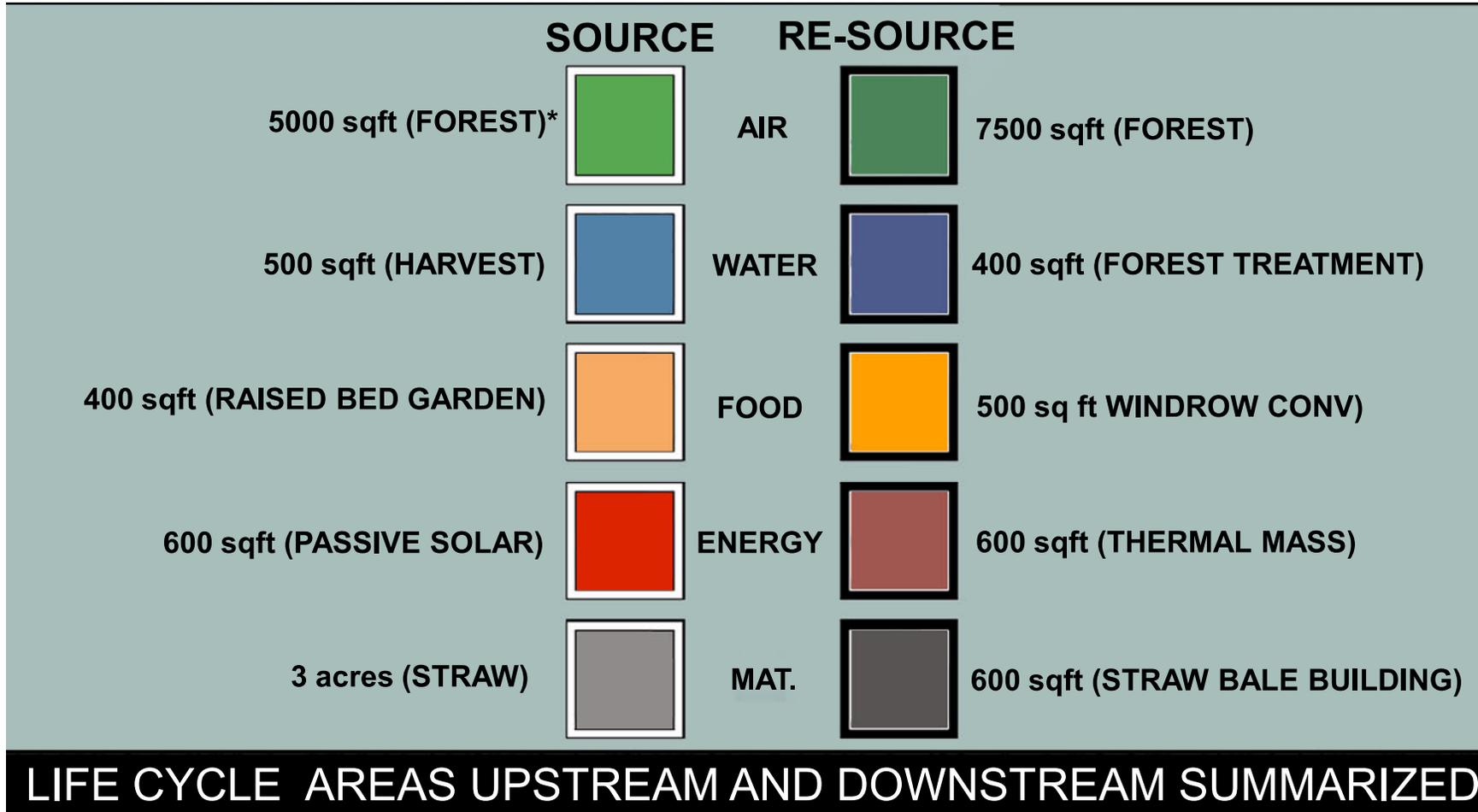
DISCIPLINES OF BALANCE





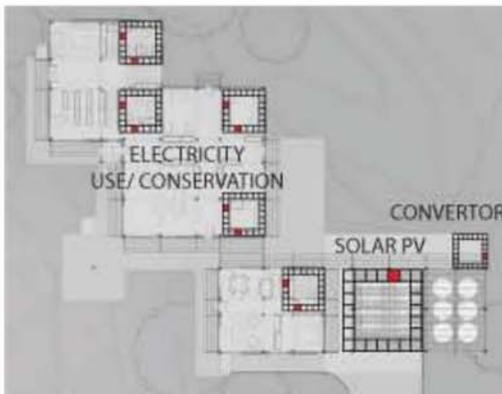
**A SIMPLE AIR LIFE CYCLE FOR BREATHING
BETWEEN HUMANS AND PLANTS**

THE CENTER FOR MAXIMUM POTENTIAL BUILDING SYSTEMS

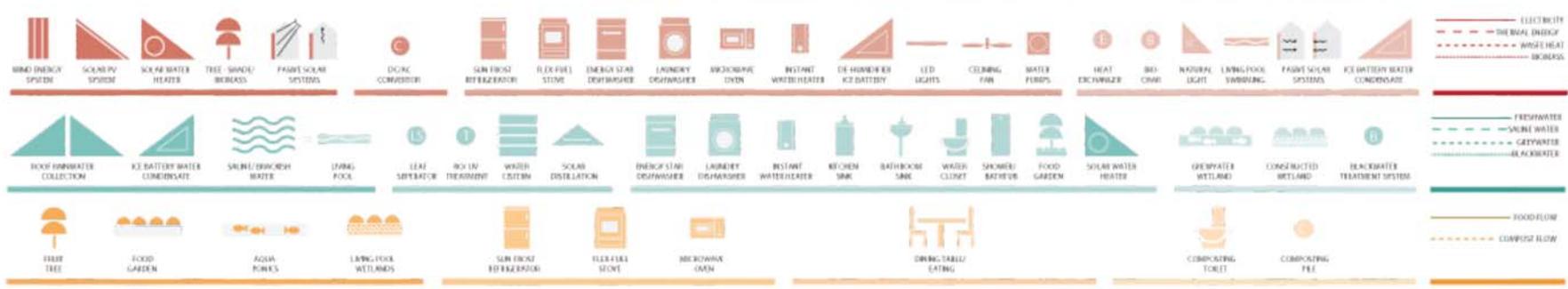
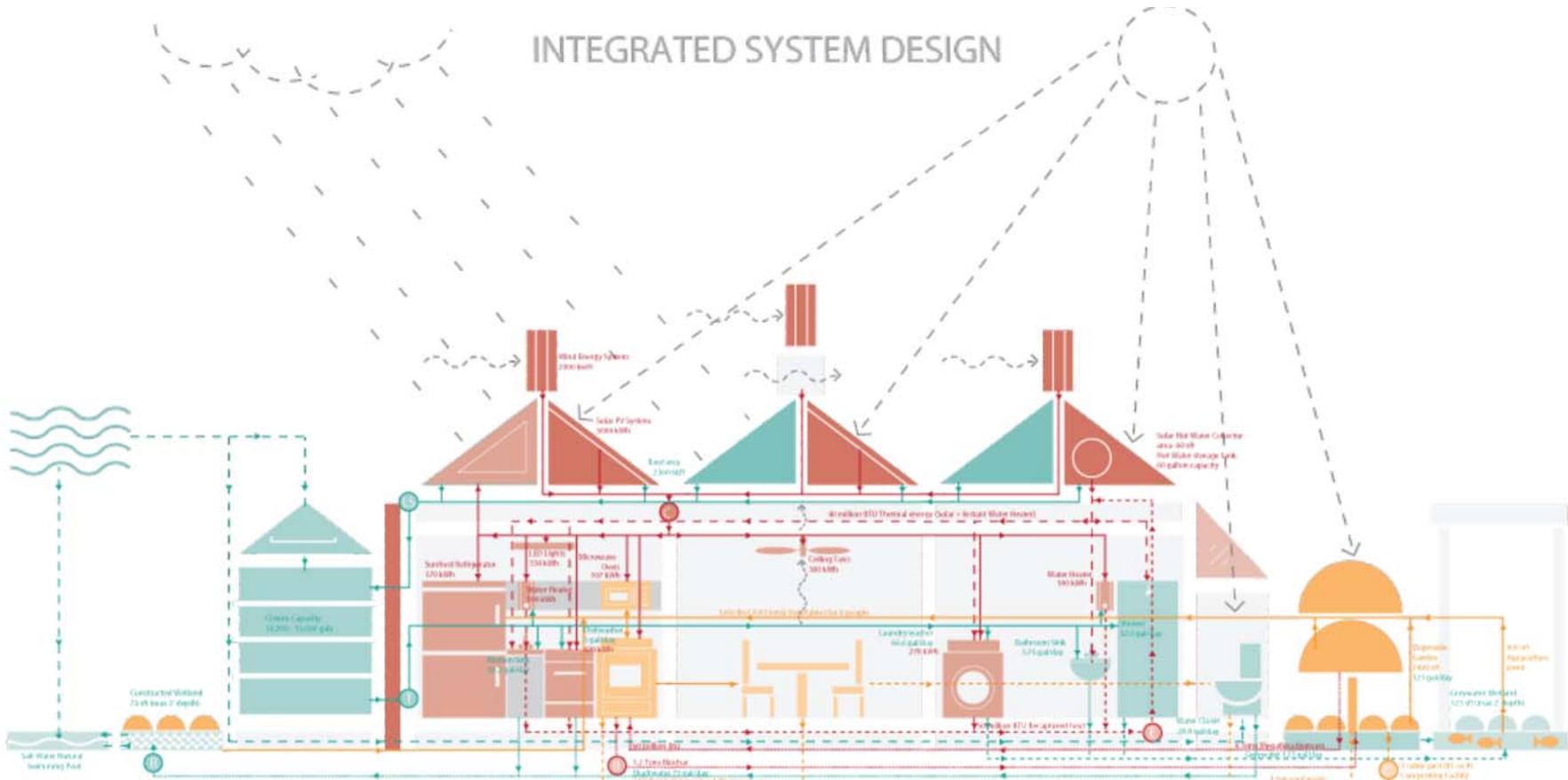


• AREA NEEDED PER PERSON
 SOURCES UPON REQUEST

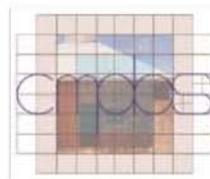




INTEGRATED SYSTEM DESIGN



INTEGRATED HOMME SCENARIO – PEACABLE KINGDOM



BASE/ INVENTORY MAPS



SUITABILITY MAPS



COMPOSITE MAPS

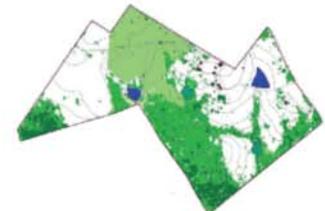


SYNTHESIS MAPS



ECOBALANCED MASTERPLAN

AIR



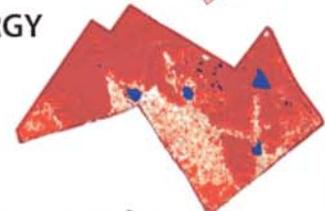
WATER



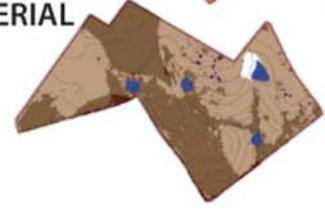
FOOD



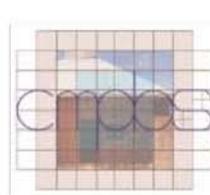
ENERGY

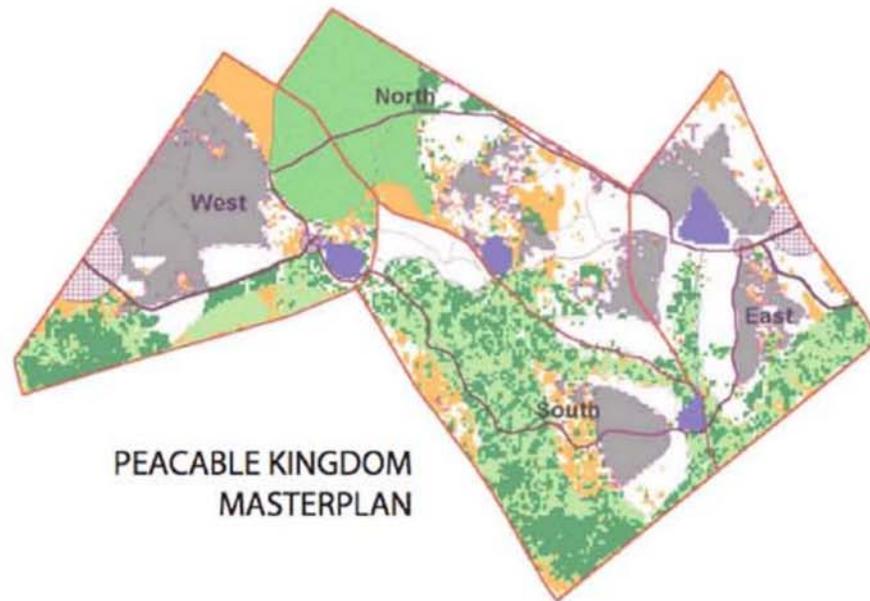
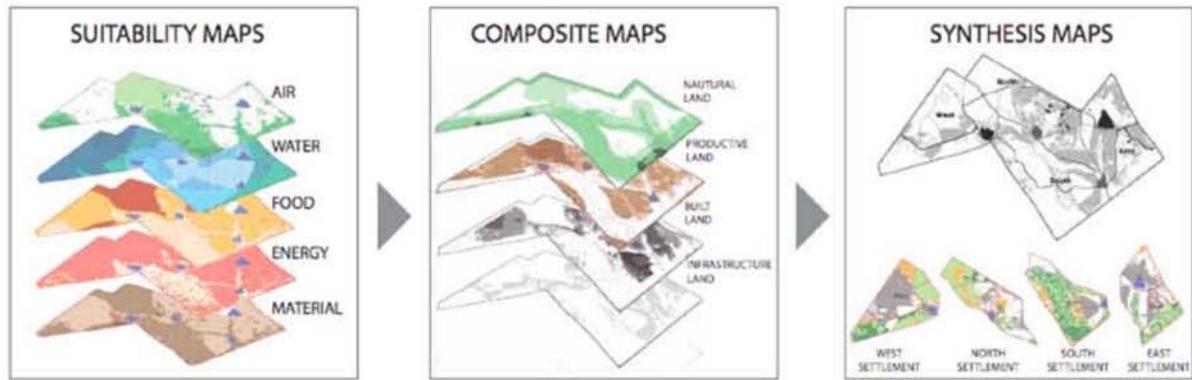


MATERIAL

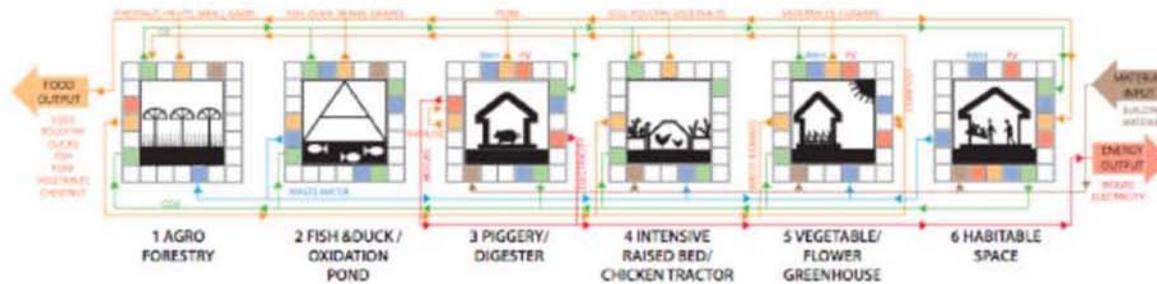
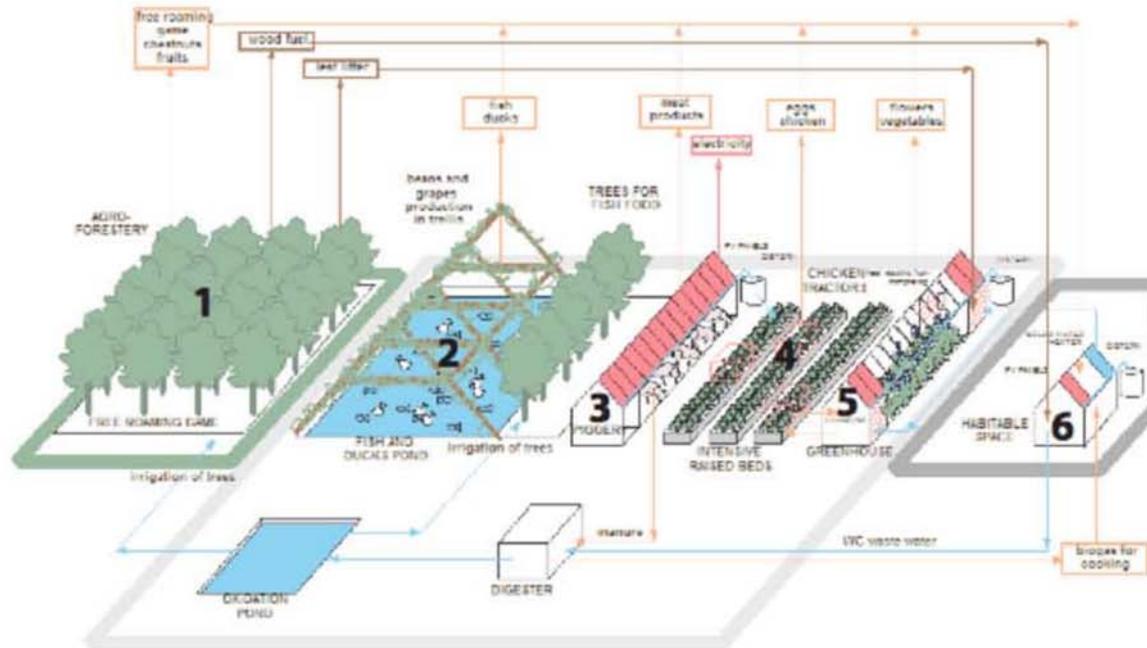


LAND PLANNING PROCESS – EAST TEXAS

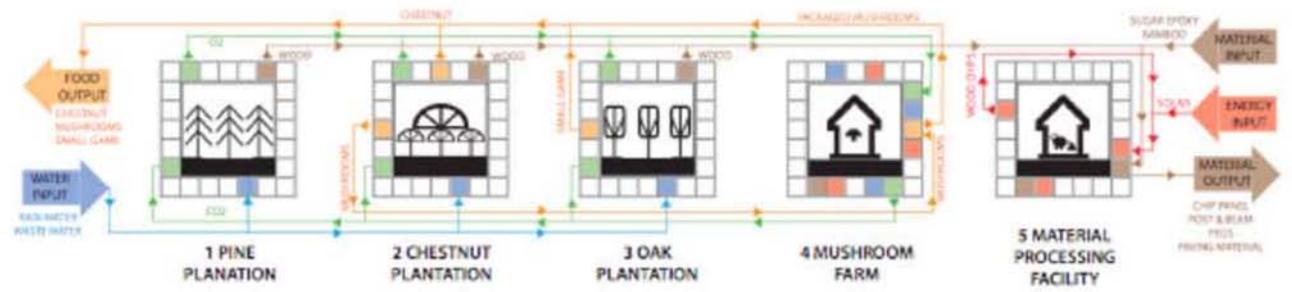
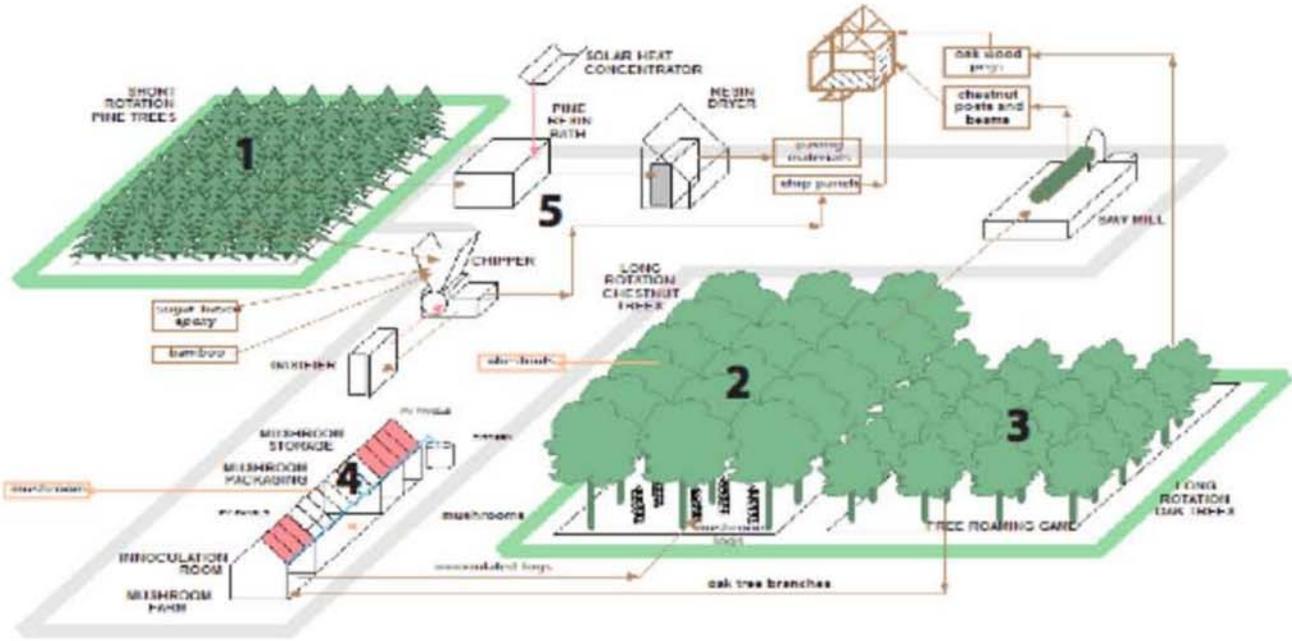




NORTH SETTLEMENT



SOUTH SETTLEMENT





Ecobalance basic home

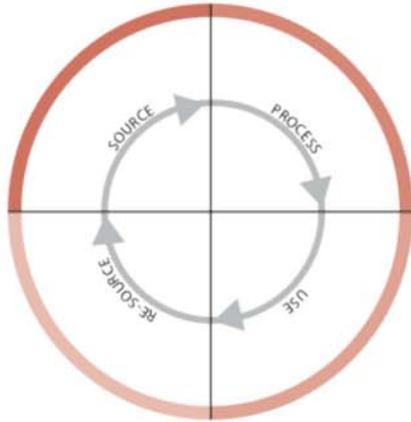
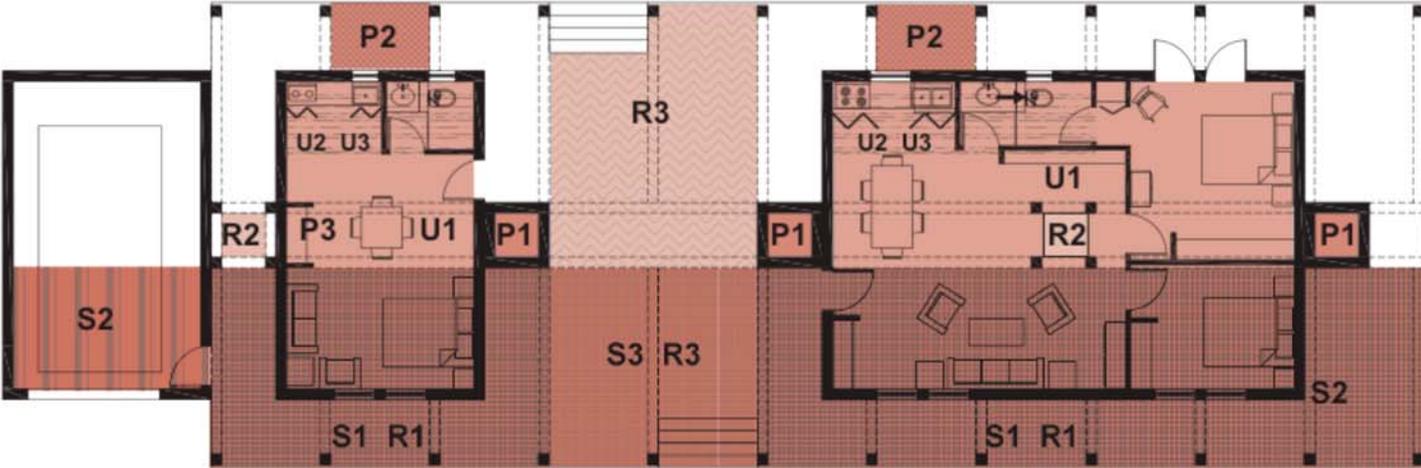


ecoBalanced Fredricksburg Style Home



ecoBalance dog trot as green house home

ENERGY LIFE CYCLE



SOURCE

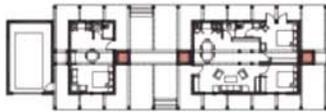
PROCESS

USE

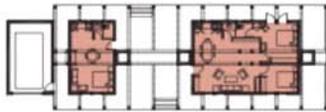
RE-SOURCE



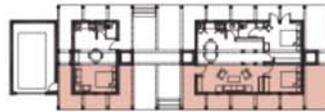
S1 Integrated PV and Solar Thermal



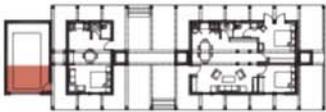
P1 Load Sharing Converters



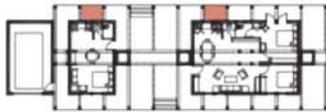
U1 Space Conditioning using PTAC Heating/Cooling



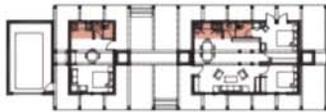
R1- Excess PV Heat used for Thermal



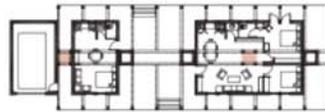
S2 Solar Thermal



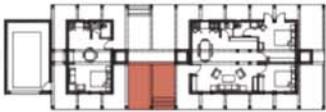
P2 Hot Water Storage



U2 Hot Water



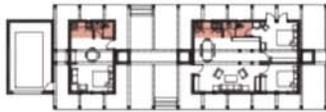
R2- Solar Thermal Chimneys Exhaust Waste Heat and Reduce Electricity Load



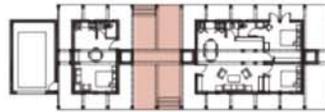
S3 Dye Sensitized colored PV



P3 Wet Sand Heat Sink



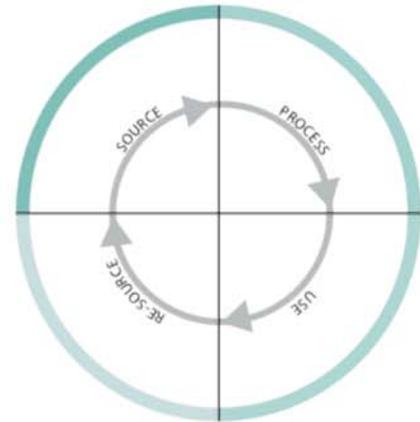
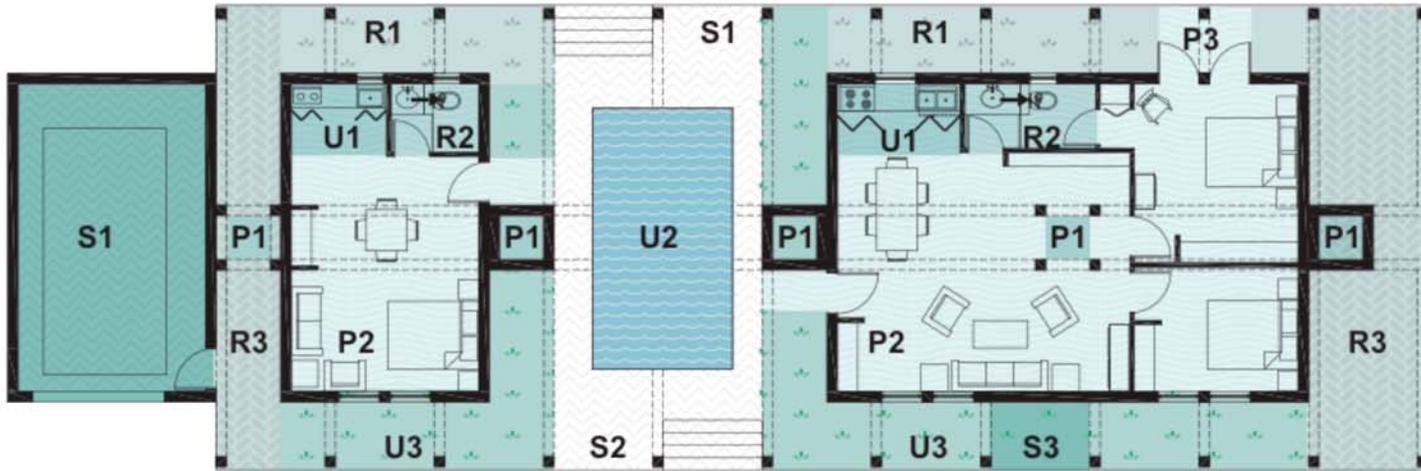
U3- Energy Efficient Appliances



R3- Dye sensitized PV help in plant growth



WATER LIFE CYCLE



SOURCE

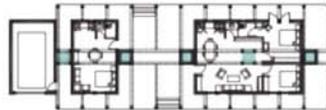
PROCESS

USE

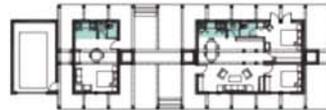
RE- SOURCE



S1 Rainwater Roof Collection



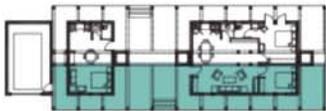
P1 Water Storage in Tower Cisterns



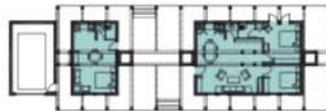
U1 Water conserving Kitchen/.Bathroom Fixtures



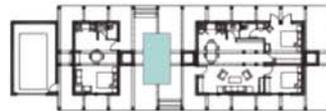
R1- Kitchen Greywater Wetland and Garden



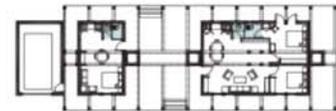
S2 Integrated Rainwater Collection from PV Panels



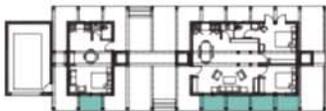
P2 Water Storage in Floor Cisterns



U2- Wading Pool for recreation and passive cooling



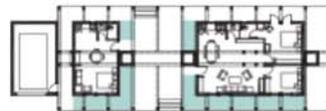
R2- Bathroom Greywater Reused for Flushing



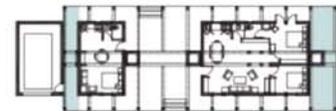
S3 Dew Collection



P3 Water Storage in Pod cisterns



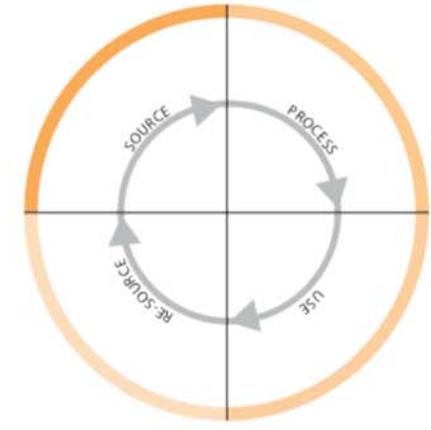
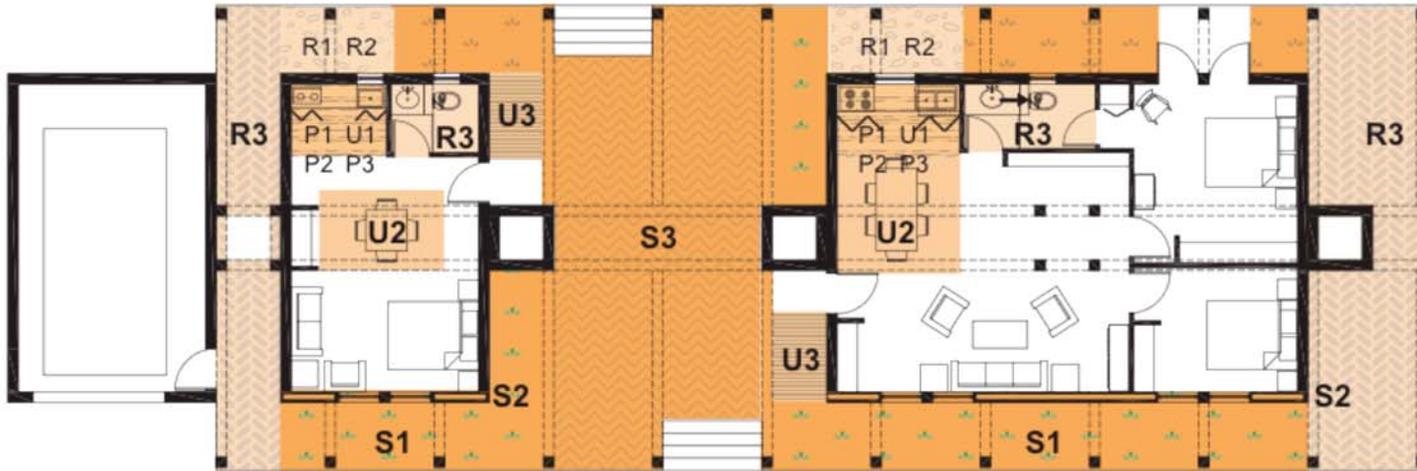
U3- Vegetable/Herb Garden Irrigation



R3- Blackwater Treatment Wetland



FOOD LIFE CYCLE

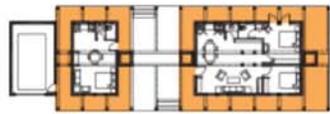


SOURCE

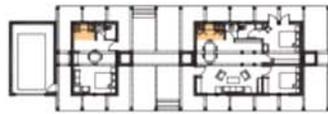
PROCESS

USE

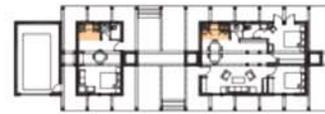
RE- SOURCE



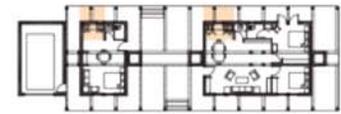
S1 Vegetable/Herb garden in pods



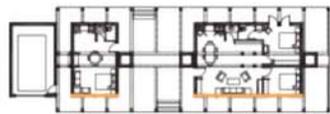
P1 Washing/Preparation



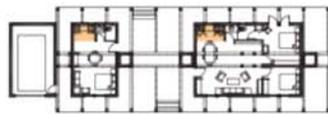
U1 Kitchen



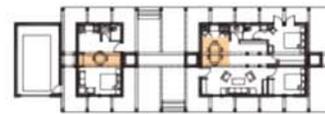
R1- Composting Kitchen waste



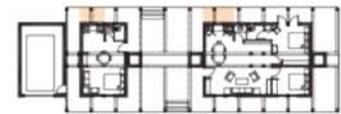
S2 Vegetable/Herb growing Green Walls



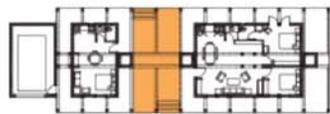
P2 Low Energy Cooking



U2 Dining Area



R2- Vermiculture



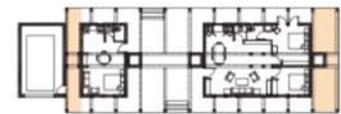
S3 Edible Landscaping in Breezeway



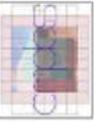
P3 Low Energy Refrigeration



U3- Barbecue Station Outside

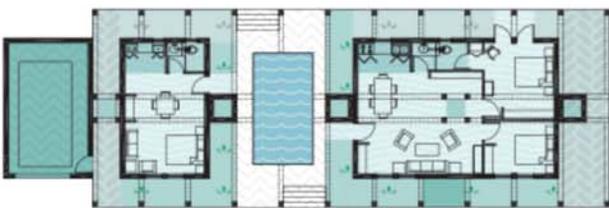
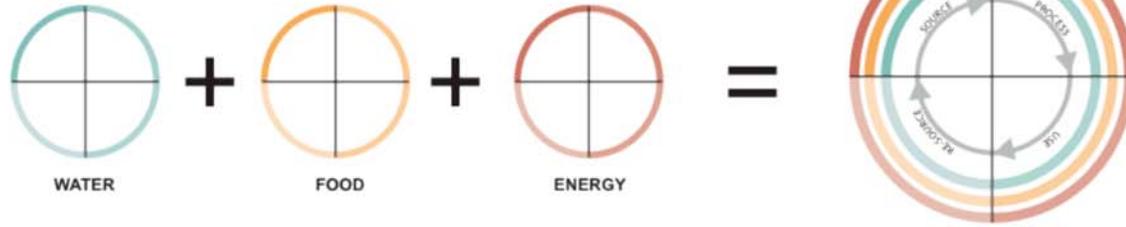


R3- Blackwater Treatment Wetland



INTEGRATED LIFE CYCLE LIVING

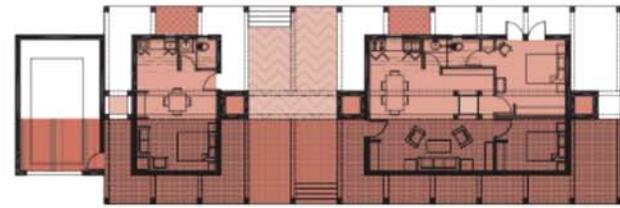
	WATER	FOOD	ENERGY
SOURCE			
PROCESS			
USE			
RE-SOURCE			



WATER



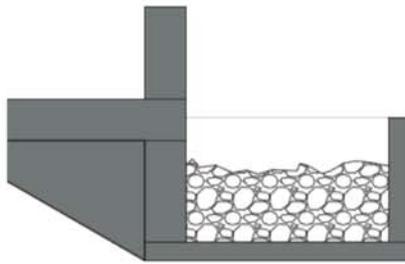
FOOD



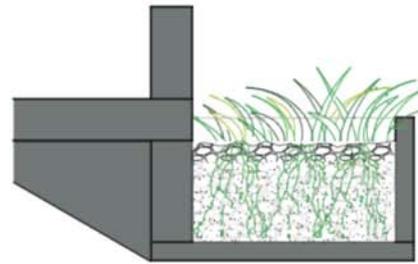
ENERGY



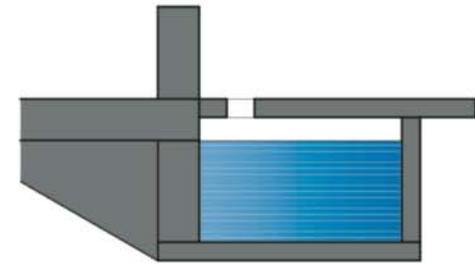
VARIOUS FUNCTIONS OF PORCH CELL COMPONENT



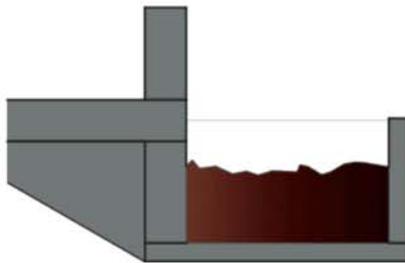
WETLAND



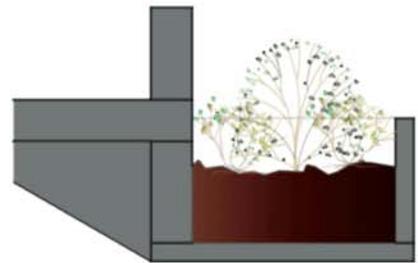
WETLAND WITH PLANTS



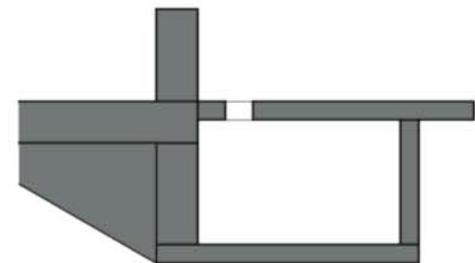
WATER CISTERN



DIRT AS ANCHORING WEIGHT



GARDEN

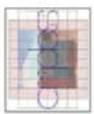


PORCH

Design: PLINY FISK
Drawing: SHRUTI GUPTA

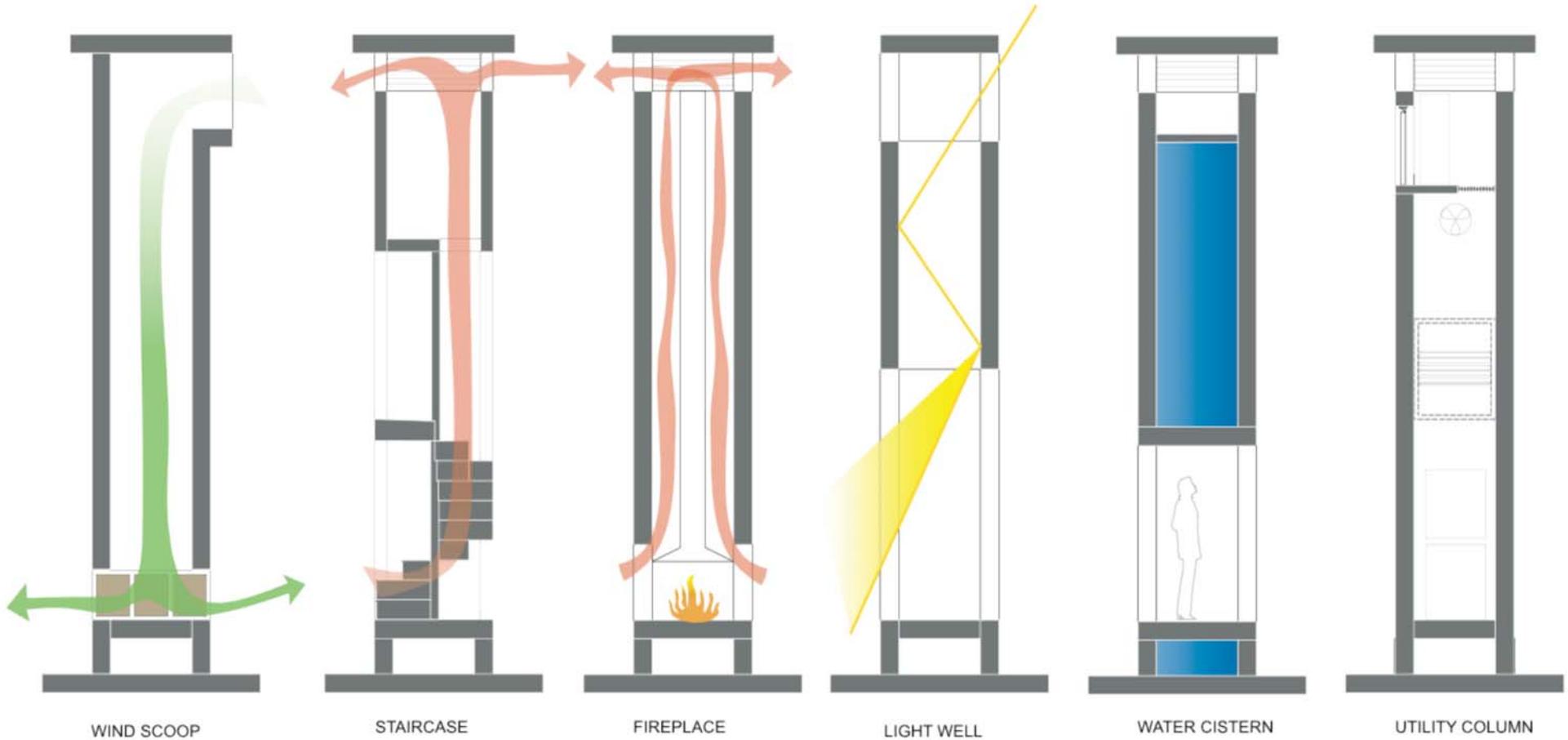
Ecobalance Home for Life Cycle Living
CMPBS-AUSTIN TEXAS - CONFIDENTIAL

Not for regulatory approval, permitting, or construction. ©cmpbs 2011. Date: 04/04/2011



The adaptable porch for varying ecoBalance™ needs

TOWER ALTERNATIVES



The adaptable vertical shaft/ column for varying ecoBalance™ needs



FLOOR ALTERNATIVES



WATER CISTERN

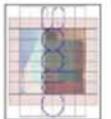


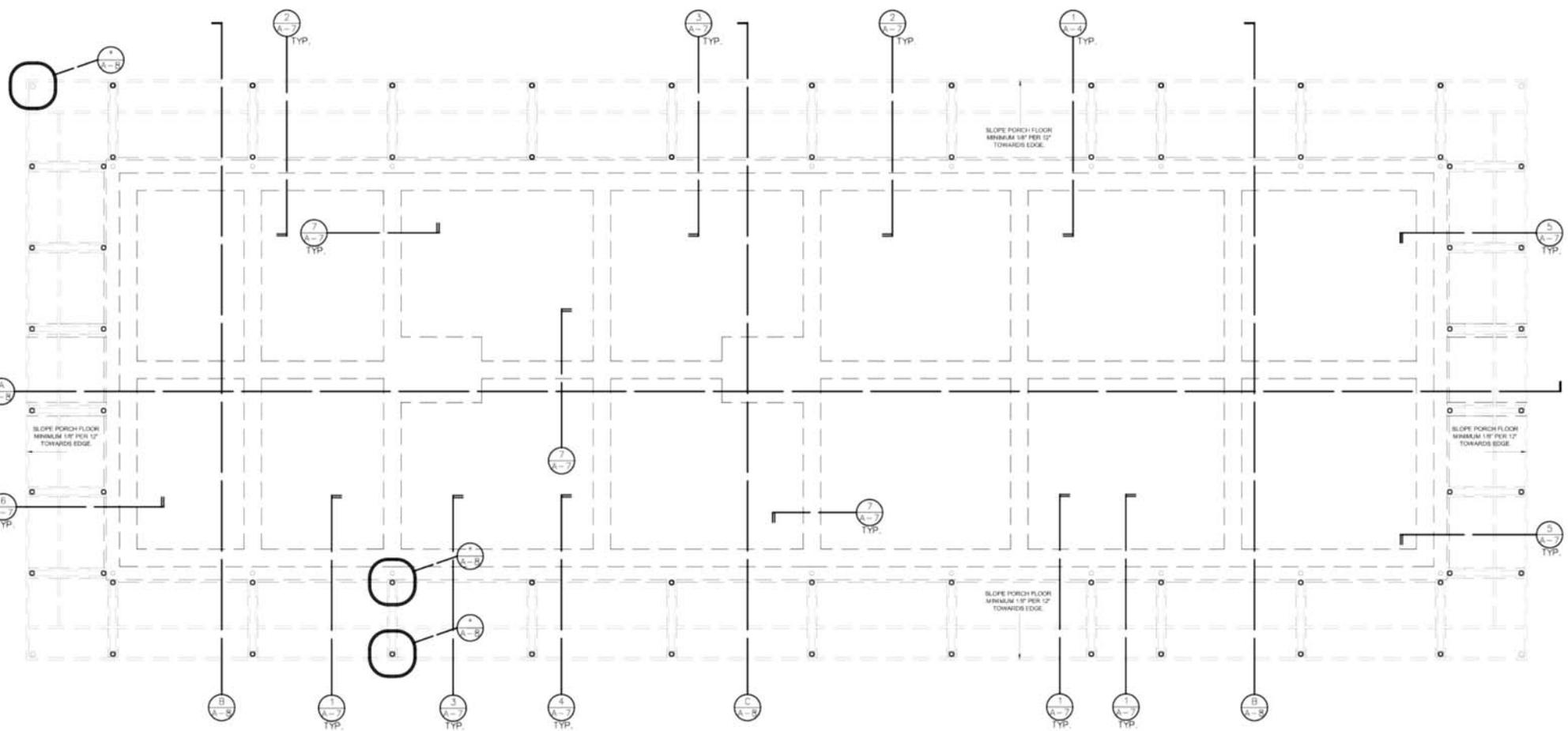
WET SAND HEAT SINK



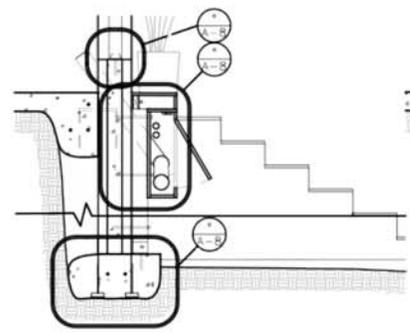
VACANT SPACE

The foundation for varying ecoBalance™ needs

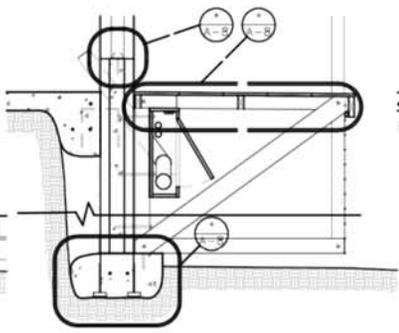




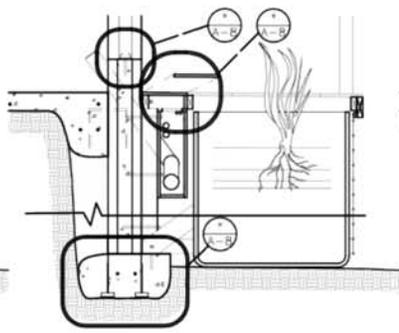
Foundation Plan
SCALE: 1/4" = 1'-0" 



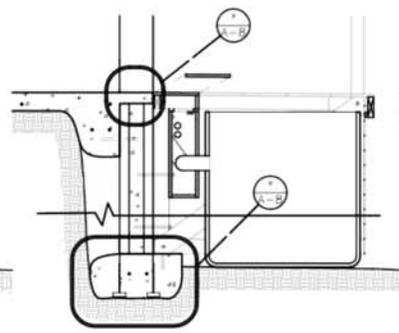
1 Opt. For Stem Wall
A-7 SCALE: 1/2" = 1'-0"



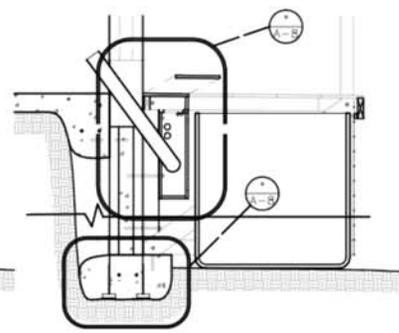
1.2 Opt. For Stem Wall/ Porch
A-7 SCALE: 1/2" = 1'-0"



3 Opt. For Stem Wall/ Wetland
A-7 SCALE: 1/2" = 1'-0"

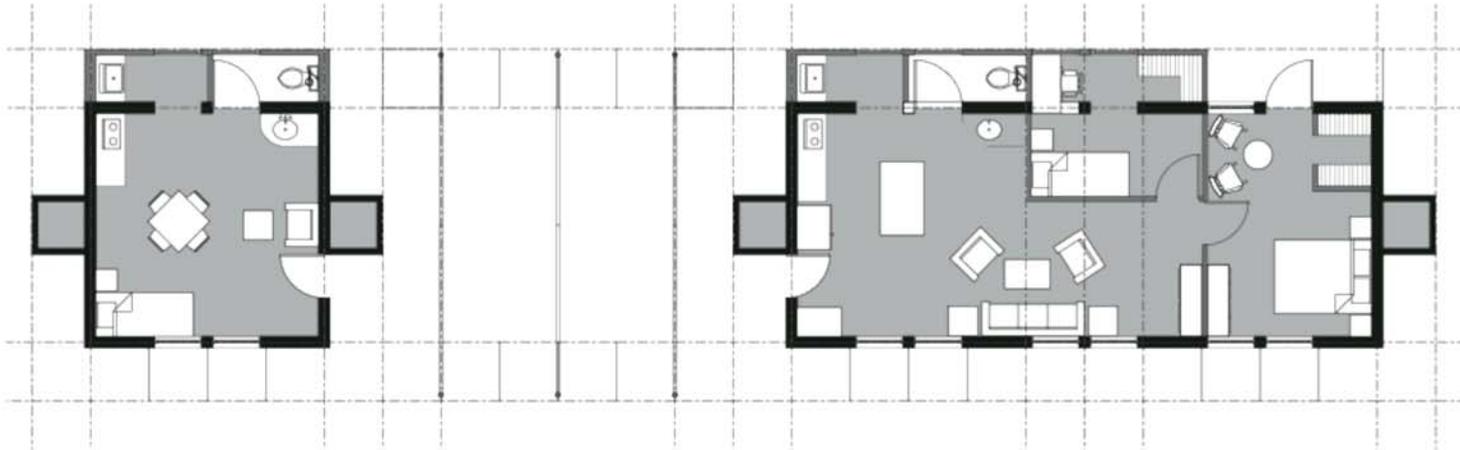


1.2 Opt. Stem Wall at Doors
A-7 SCALE: 1/2" = 1'-0"

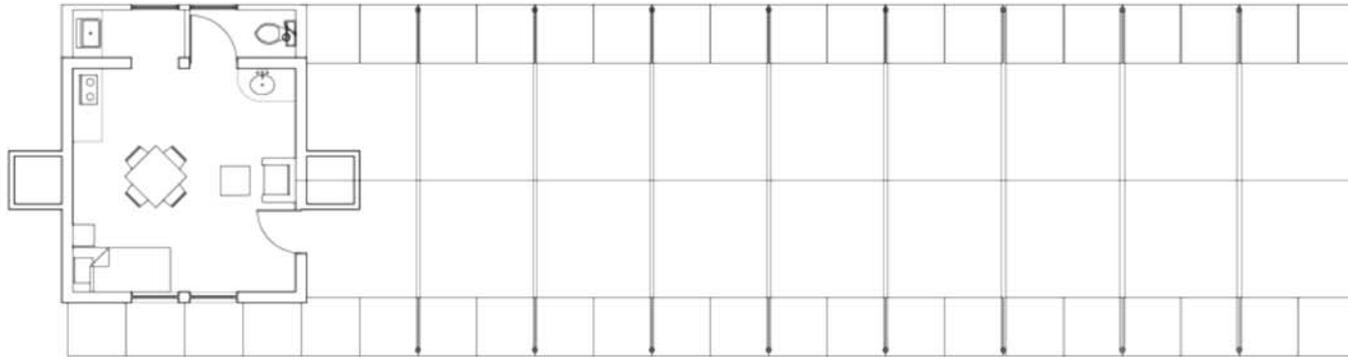


7 Opt. Stem Wall at Wall Opening
A-7 SCALE: 1/2" = 1'-0"

PRELIMINARY
AND SCHEDULES & DIMENSIONS
NOT FOR CONSTRUCTION



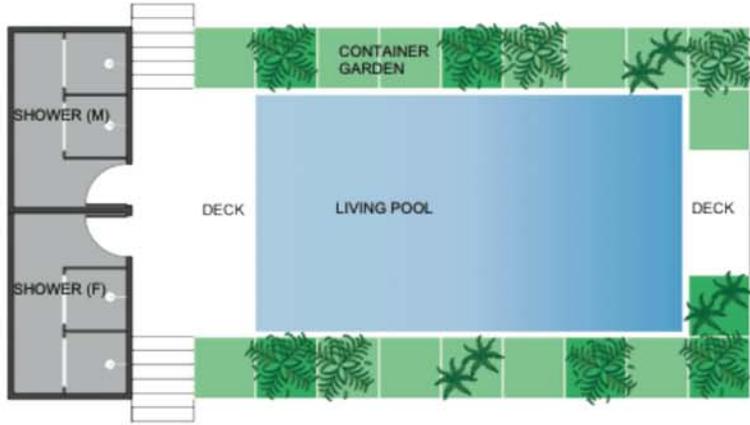
COTTAGE AND HOUSE WITH BREEZEWAY



COTTAGE WITH GREENHOUSE



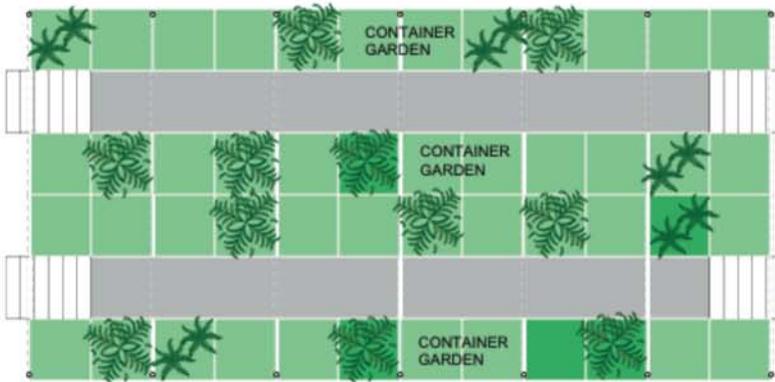
Spatial adaption for varying ecoBalance™ and user needs



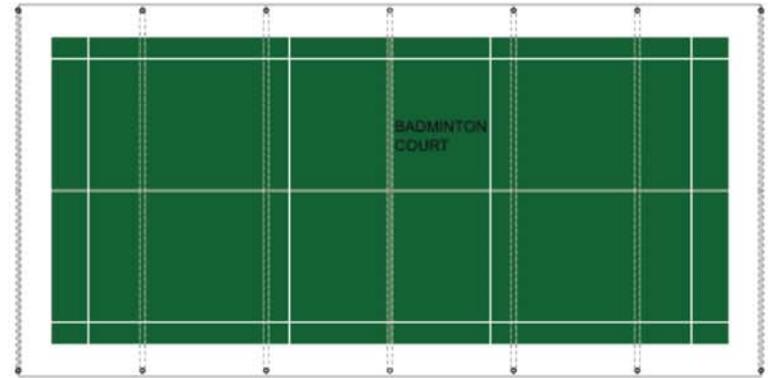
LIVING POOL



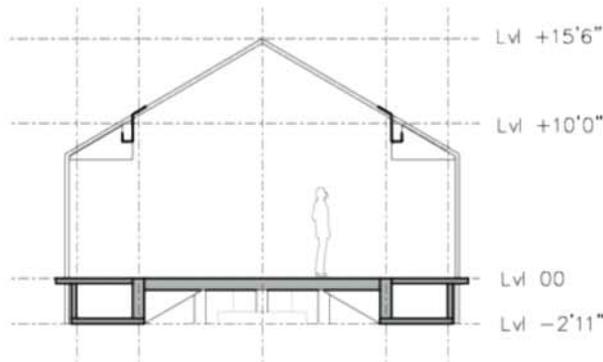
COMMUNITY RESTAURANT



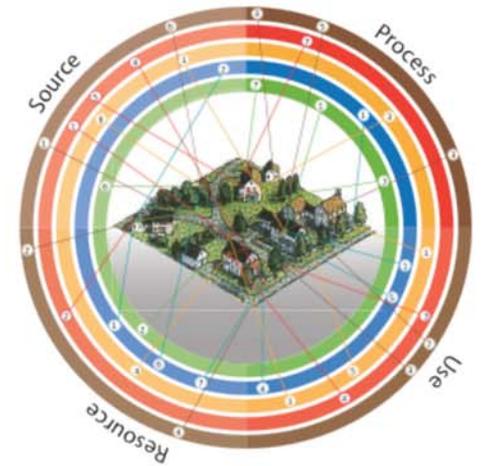
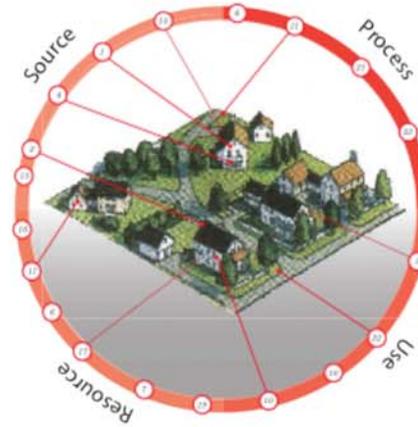
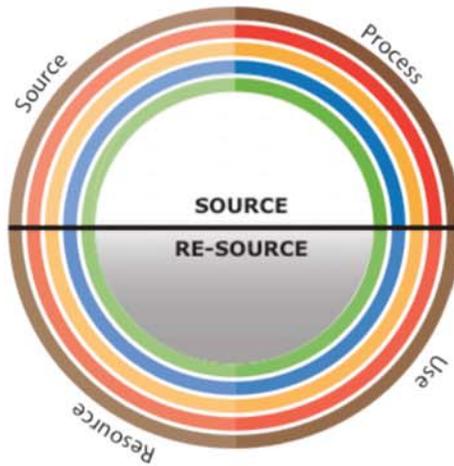
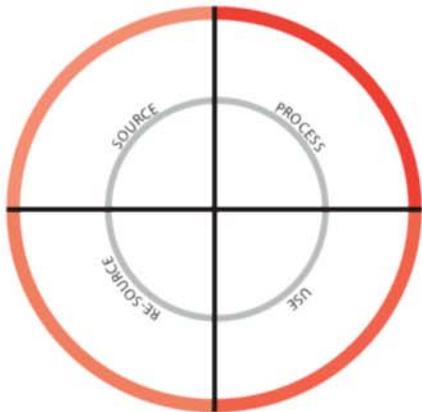
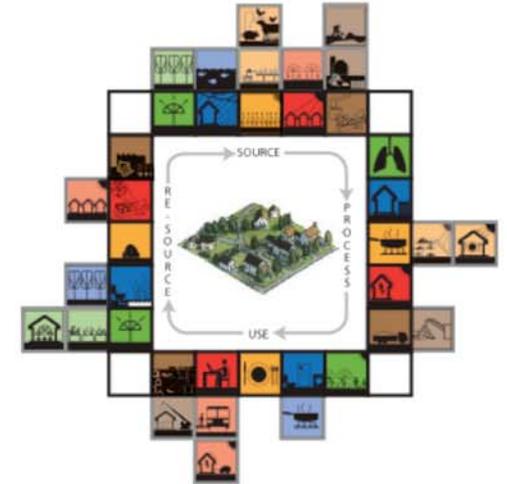
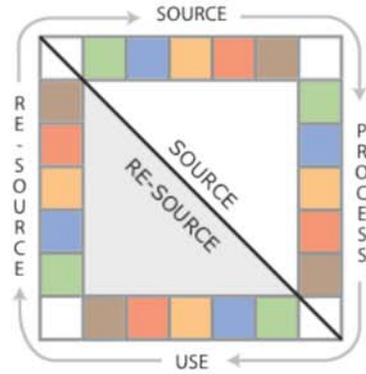
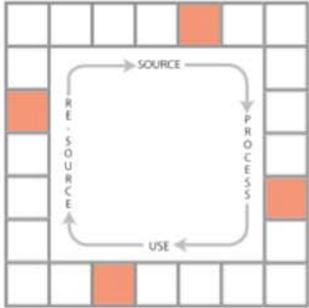
CONTAINER GARDENS UNDER GREENHOUSE



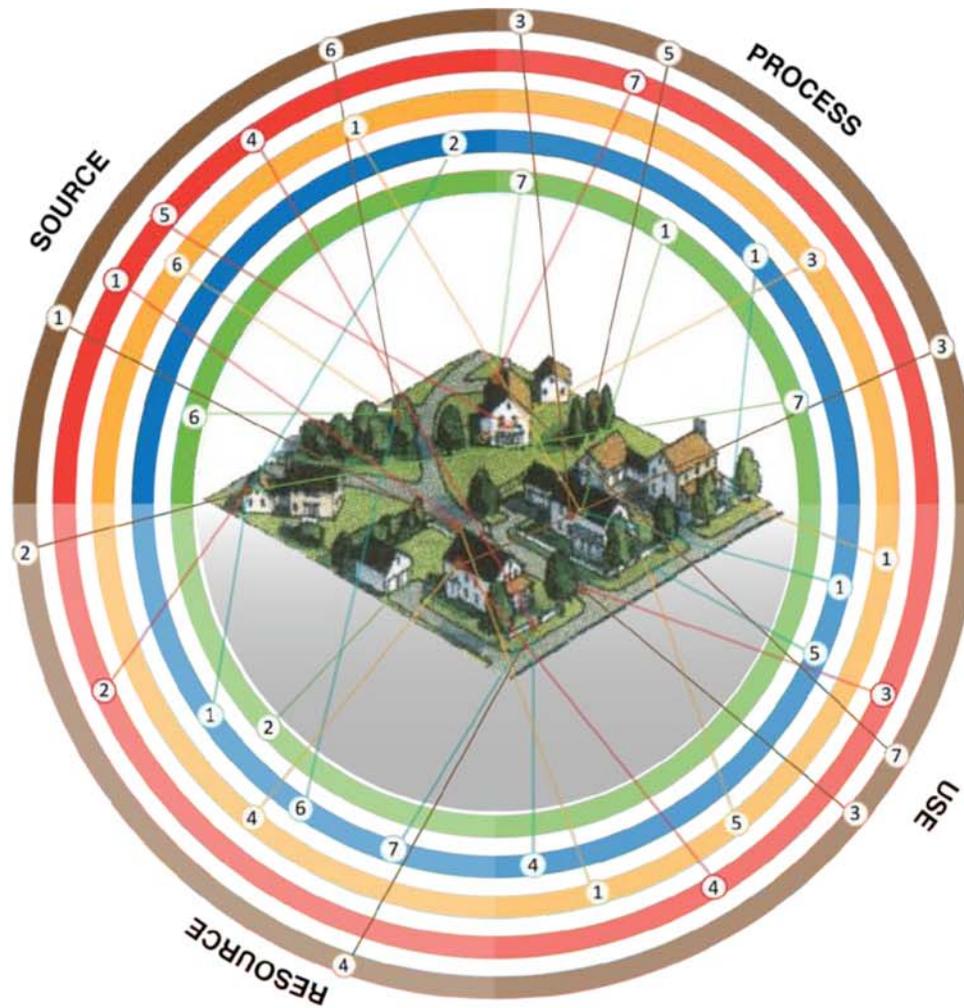
COURT GAMES UNDER TRELLIS



LIFECYCLE ECOBALANCING

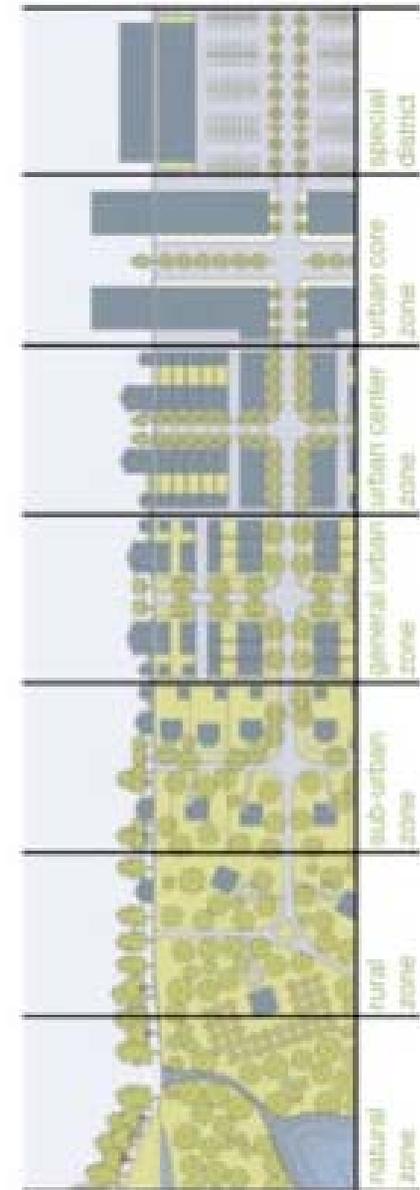


- Need to move from linear checklists to cycles



ECOBALANCE

Verano



- Need to move from a conservation to integration



SOURCE	RE-SOURCE
O2 Footprint For 1 person 5000sft For 3718 ppl 450acre	CO2 Footprint For 1 person 7500sft For 3718 ppl 648 acre
Water Harvest Footprint For 1 person 400sft For 3718 ppl 32acre	Water Treatment Footprint For 1 person 400sft For 3718 ppl 32acre
Food Harvest Footprint For 1 person 4000sft For 3718 ppl 338acre	Food Compost Footprint For 1 person 2000sft For 3718 ppl 162acre
PV Footprint For 1 person 1000sft for 1 vehicle 250sft For 1 Unit 2250sft For 1487 Units 98acre	Solar Thermal Footprint For 1 person 80ft For 3718 ppl 8 acres For 1 Unit surplus



SOURCE

RE-SOURCE

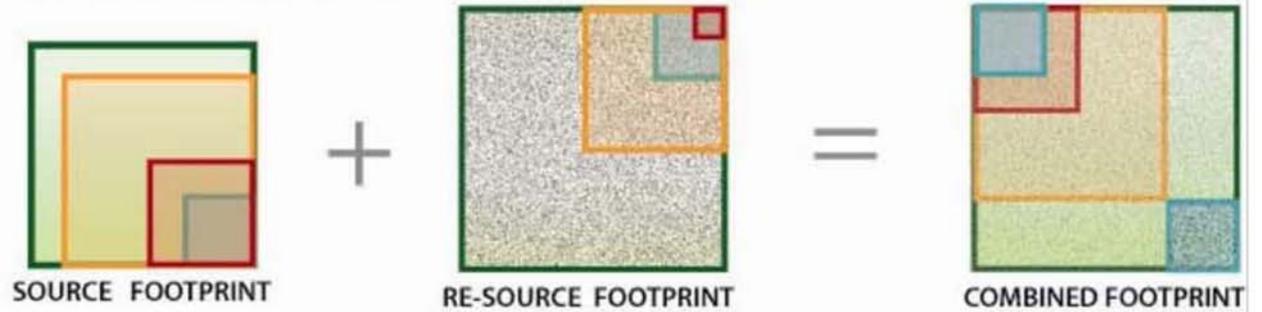
O2 Footprint For 1 person 5000sft For 4230 ppl 512 acres	CO2 Footprint For 1 person 7500sft For 4230 ppl 800 acres
Water Harvest Footprint For 1 person 400sft For 4230 ppl 50 acres	Water Treatment Footprint For 1 person 400sft For 4230 ppl 50 acres
Food Harvest Footprint For 1 person 4000sft For 4230 ppl 392 acres	Food Compost Footprint For 1 person 2000sft For 4230 ppl 200 acres
PV Footprint For 1 person 1000sft for 1 vehicle 250sft For 1 Unit 2875sft For 1692 Units 128 acres	Solar Thermal Footprint For 1 person 80ft For 4230 ppl 8 acres For 1 Unit surplus

AIR+WATER+FOOD+ENERGY

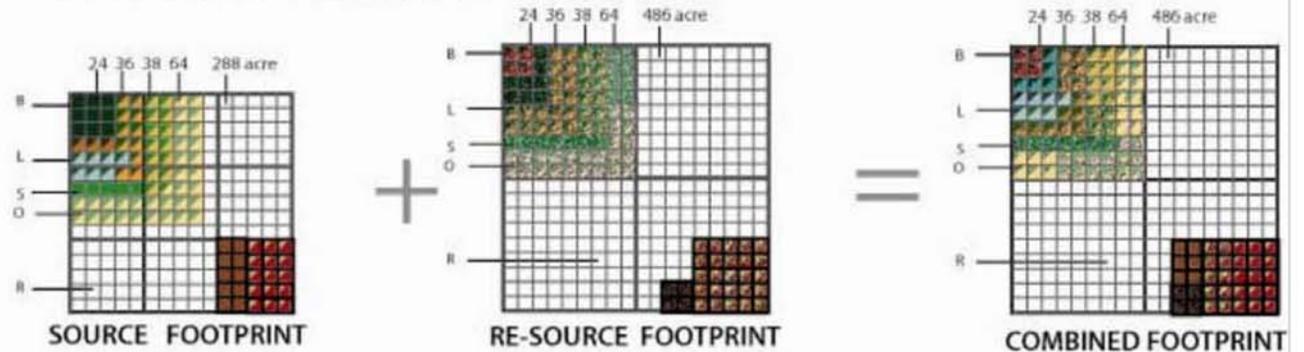
COMBINED FOOTPRINT AREA FOR T-3



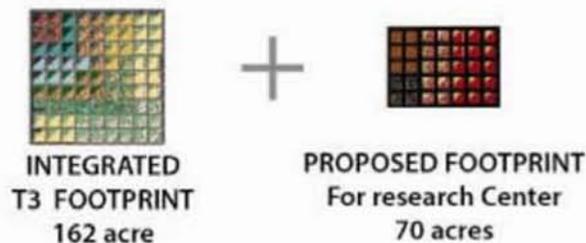
UNTEGRATED FOOTPRINT AREA :



INTEGRATED FOOTPRINT AREA :



ACTUAL FOOTPRINT REQUIRED TO BALANCE T3:

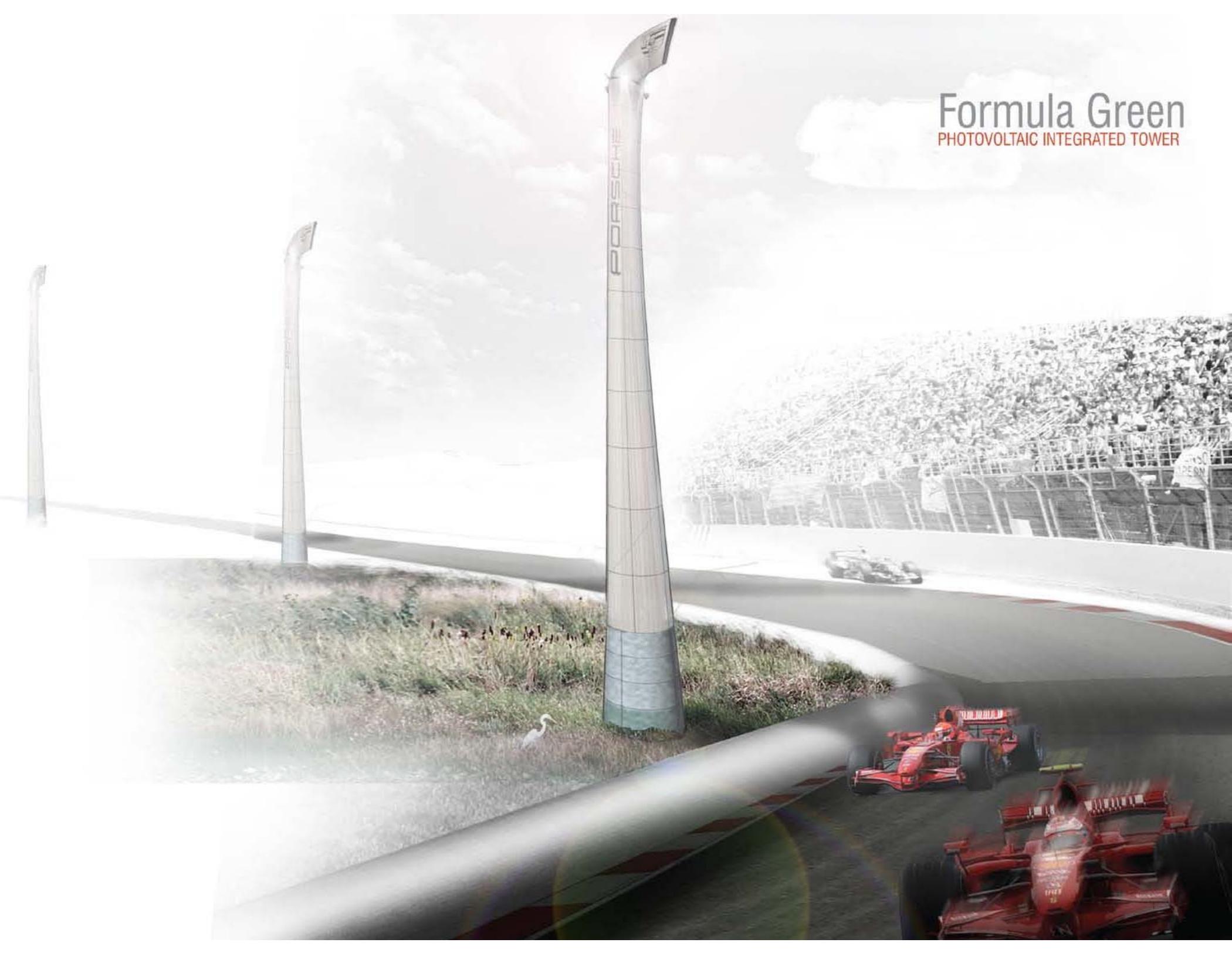


RESEARCH CENTER USAGE

Megaflora plantation	50 acres
-O2 supply/Carbon sink	
-Waste water treatment	
-BiomassFuel / Biochar	
Intensive Farming	20 acres

Formula Green

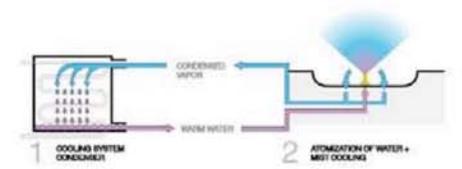
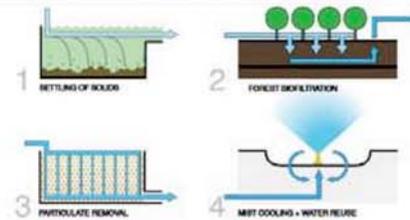
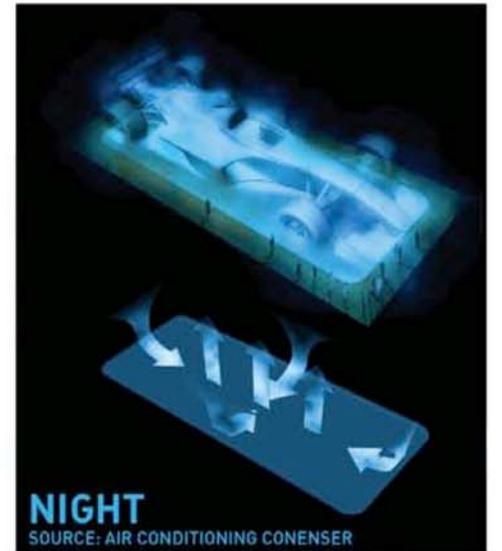
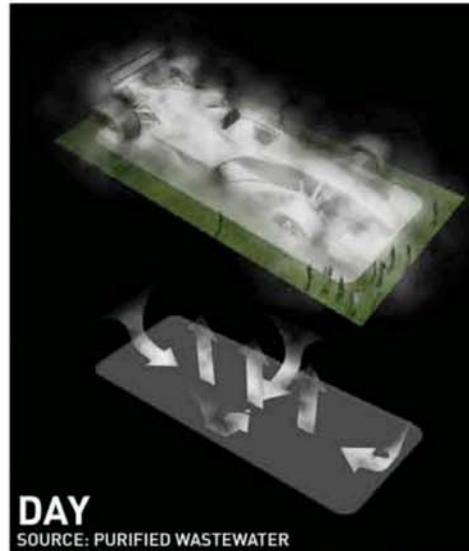
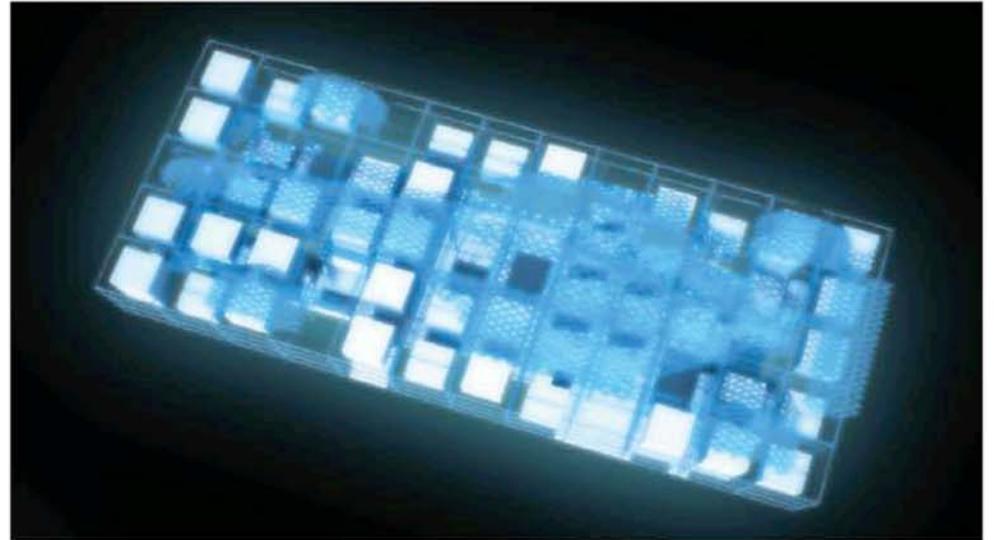
PHOTOVOLTAIC INTEGRATED TOWER



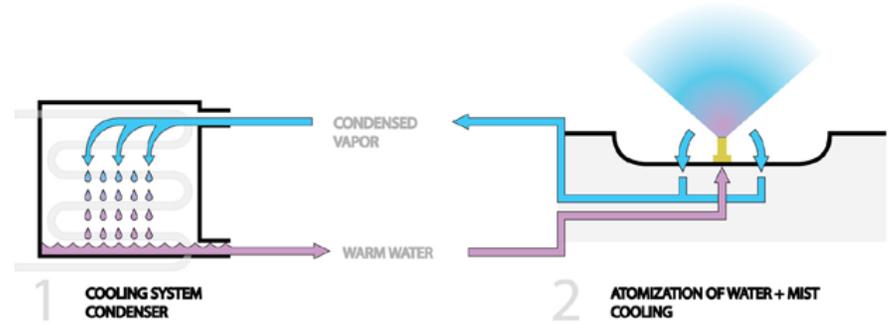
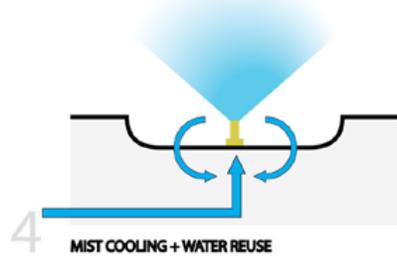
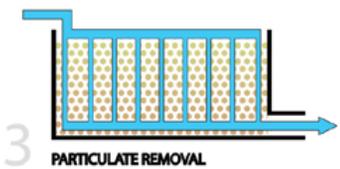
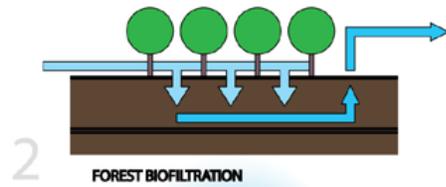
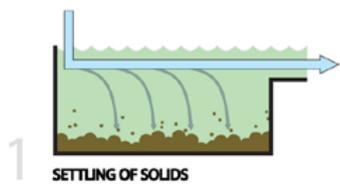
Future Home of
The Formula 1 United States Grand Prix™
formula1unitedstates.com



Conceptual Master Plan

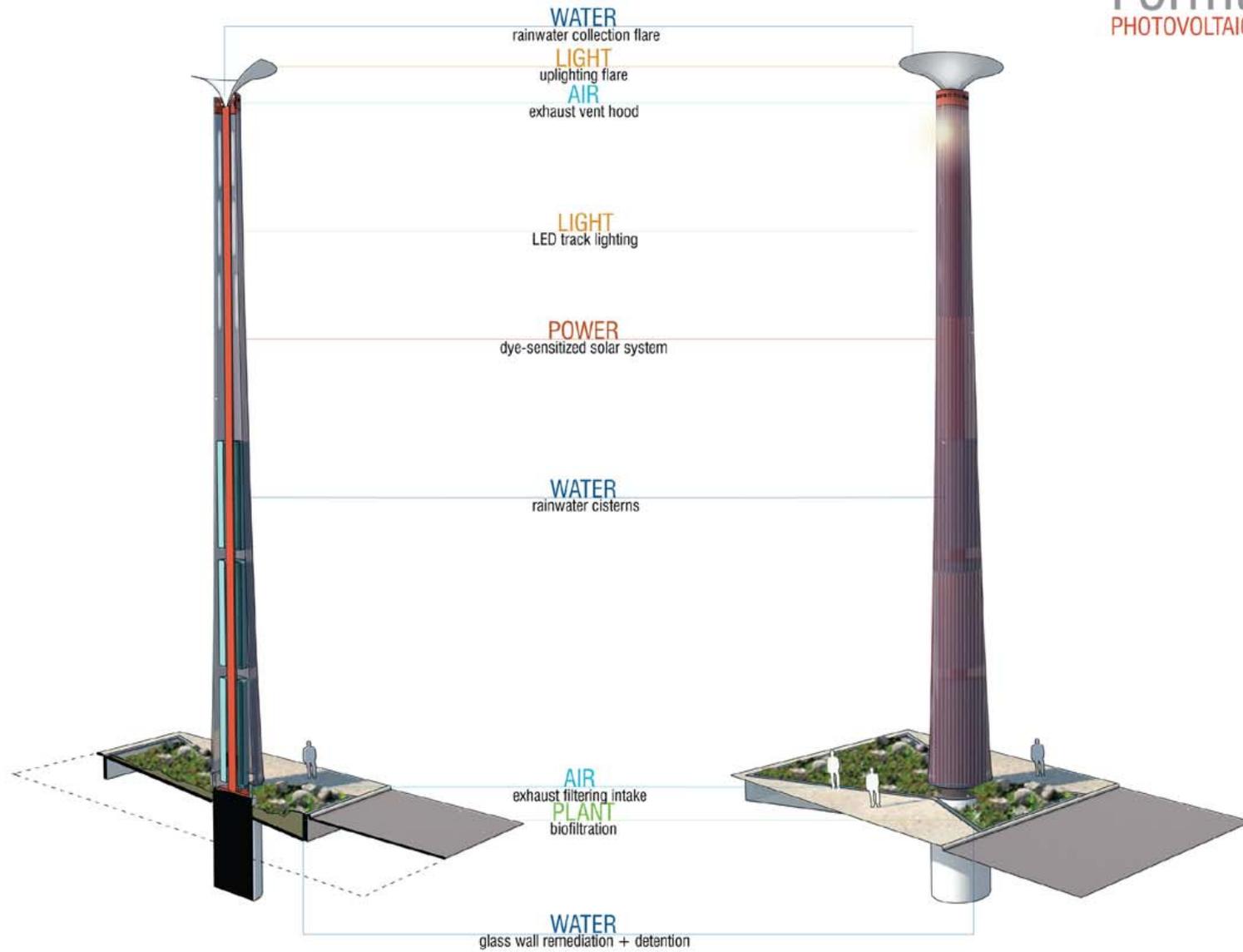


Use of Eco-machines as advertisement



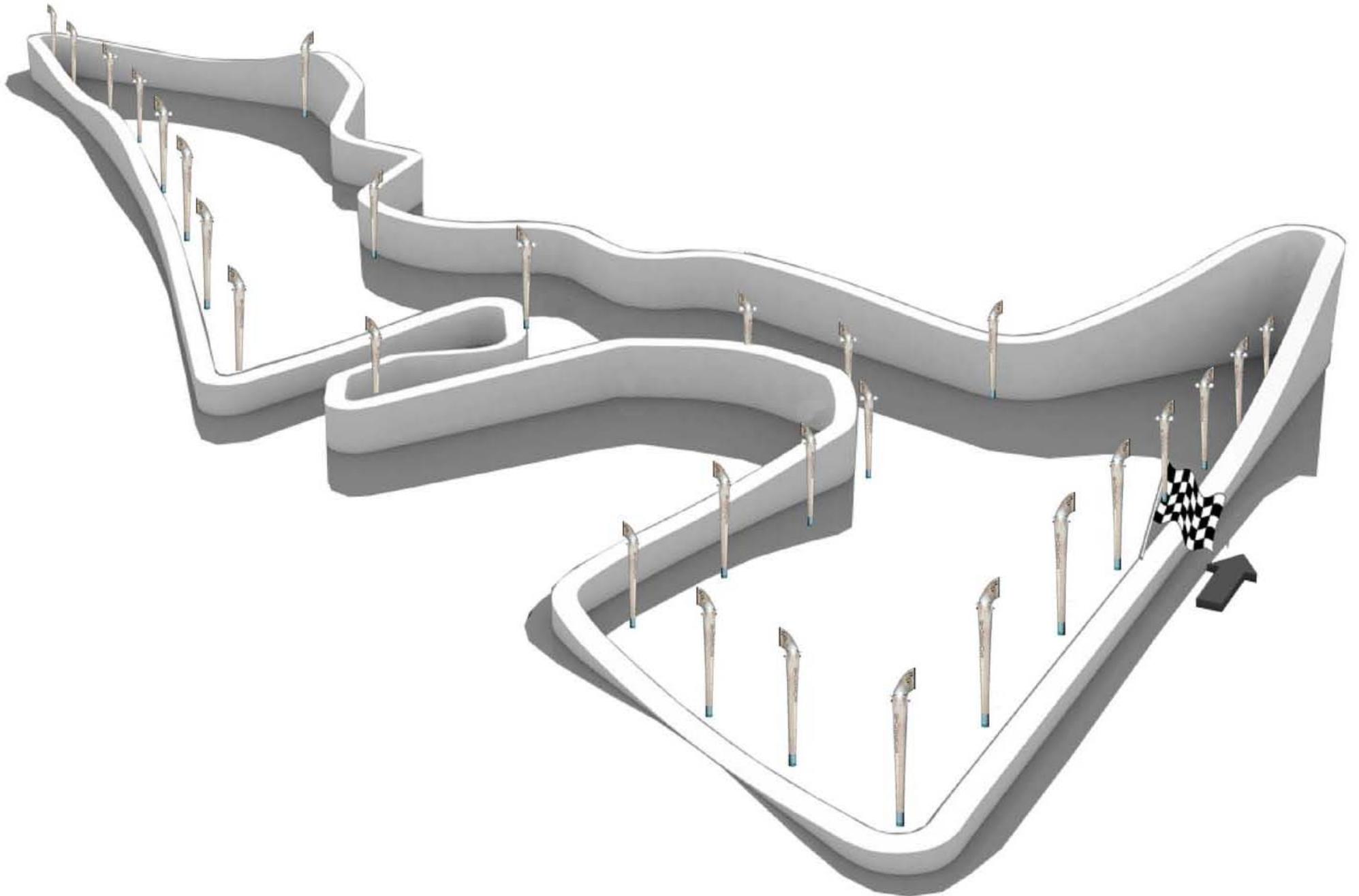
Formula Green

PHOTOVOLTAIC INTEGRATED TOWER



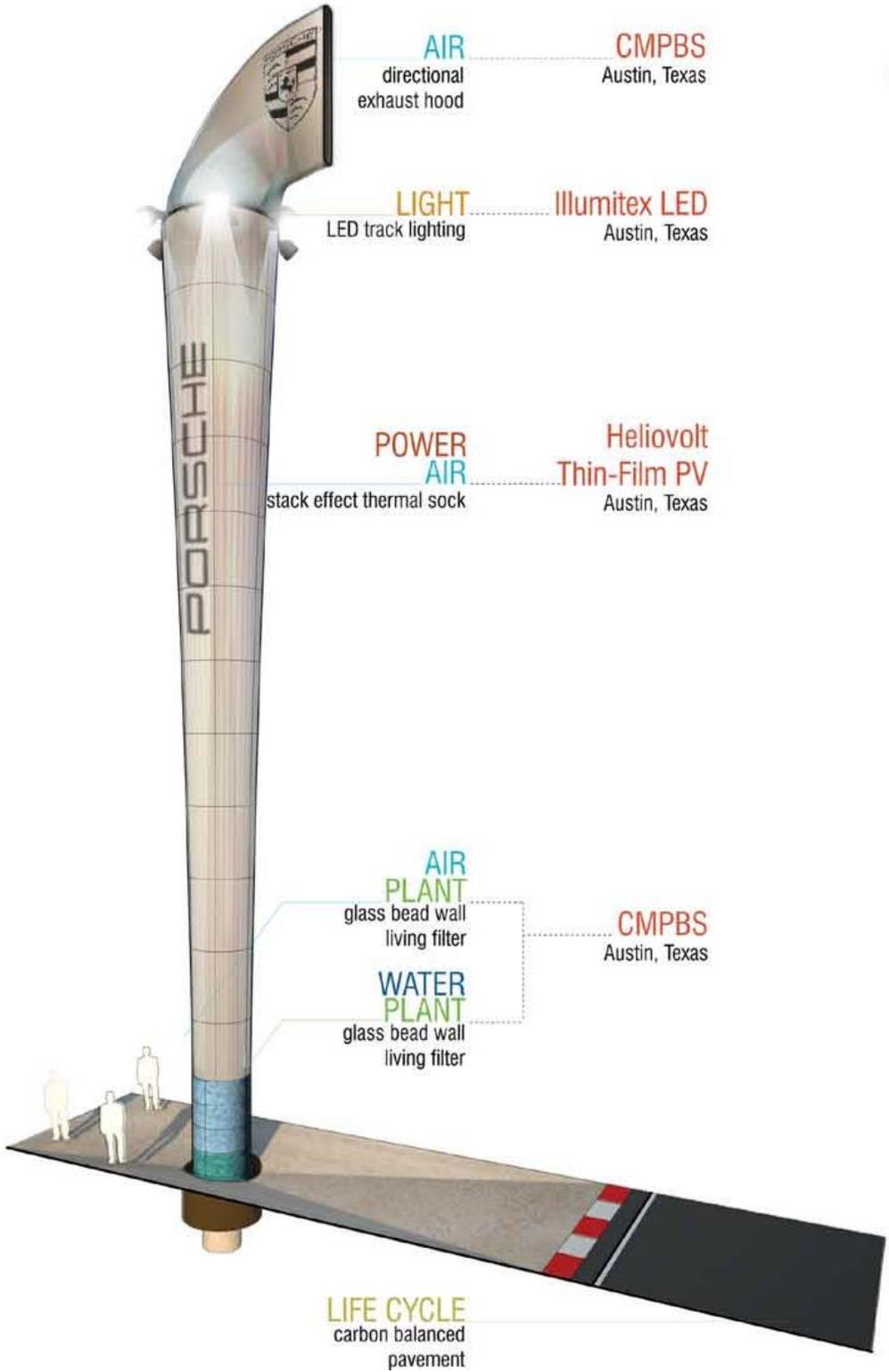
Formula Green

TOWER PLACEMENT DIAGRAM



Formula Green

INTEGRATED LANTERN TOWER



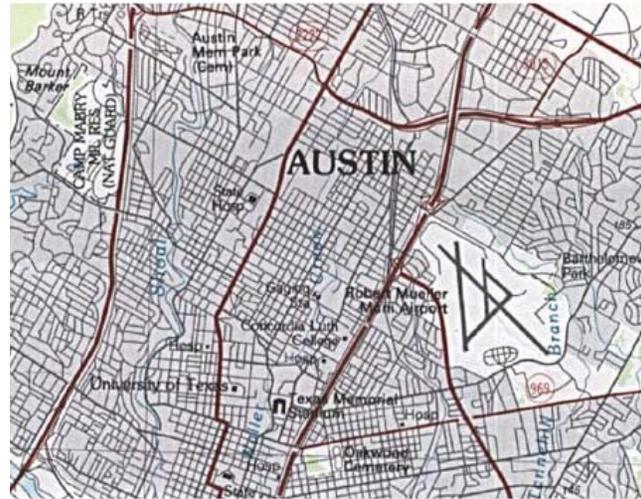
Formula Green

INTEGRATED LANTERN TOWER





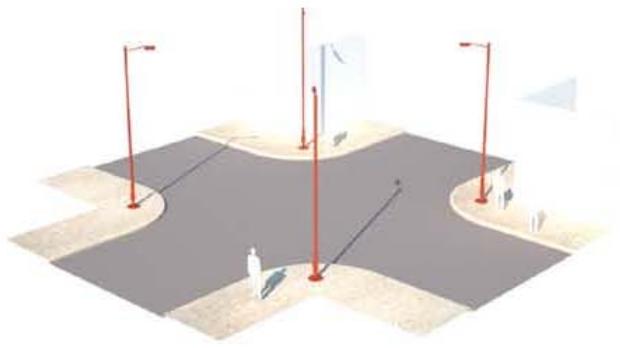
HIGHWAY | RACEWAY
Formula Green



STREET
Austin Great Streets



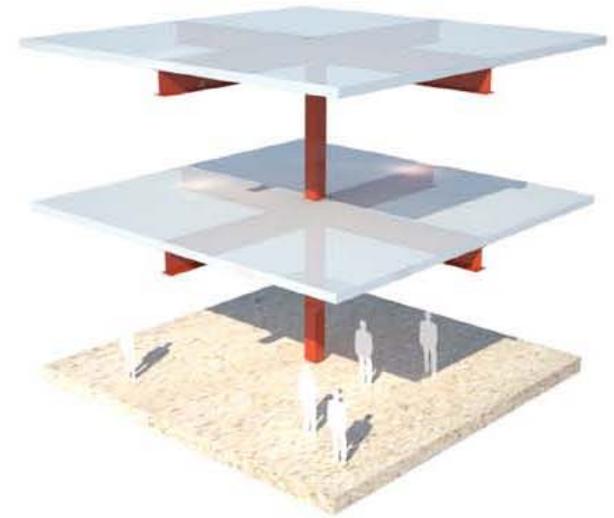
BUILDING
Highland Mall-ACC Masterplan



URBAN INTERSECTION
Typical Condition



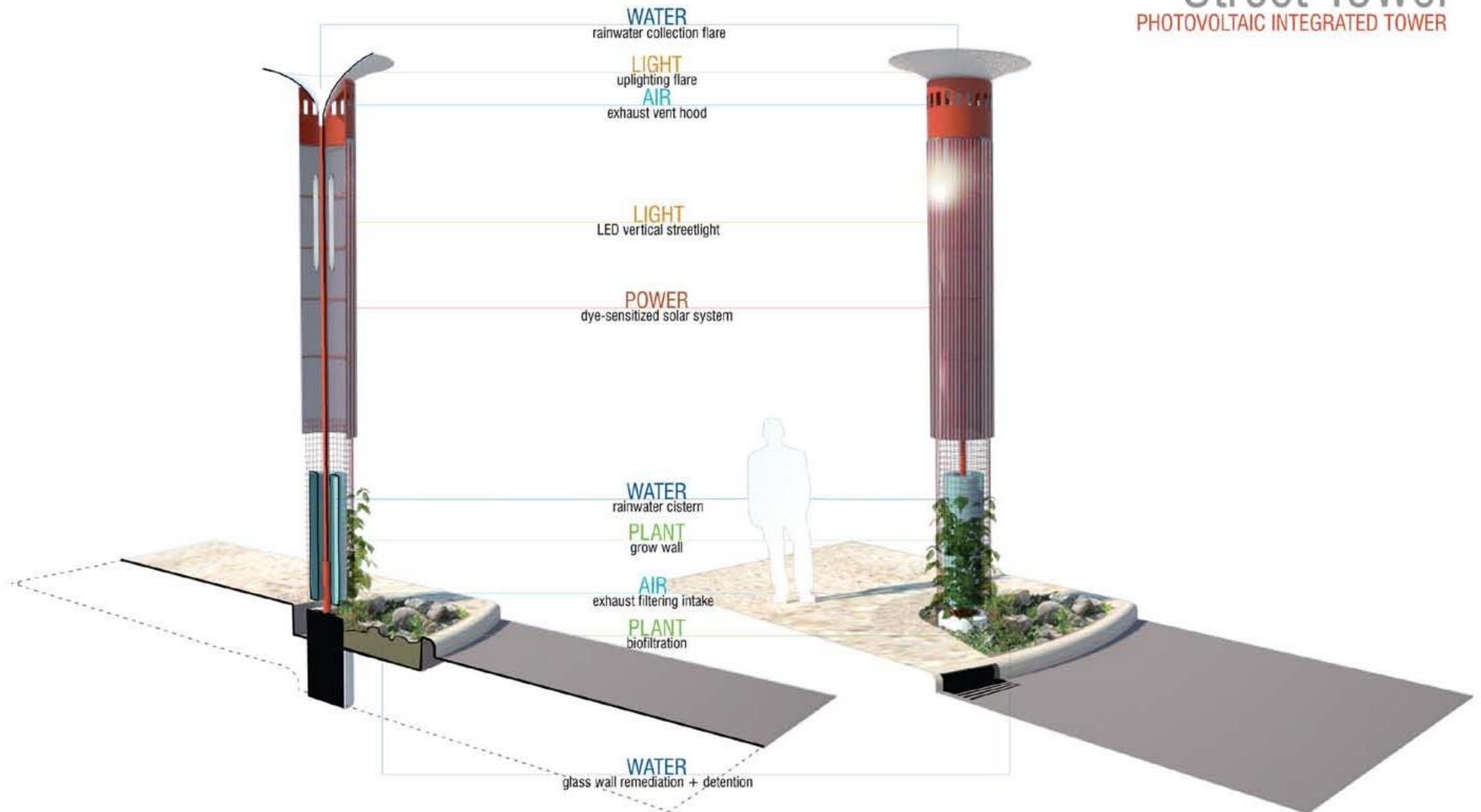
HIGHWAY | RACEWAY
Typical Condition



HEAVY STEEL BUILDING
Typical Condition

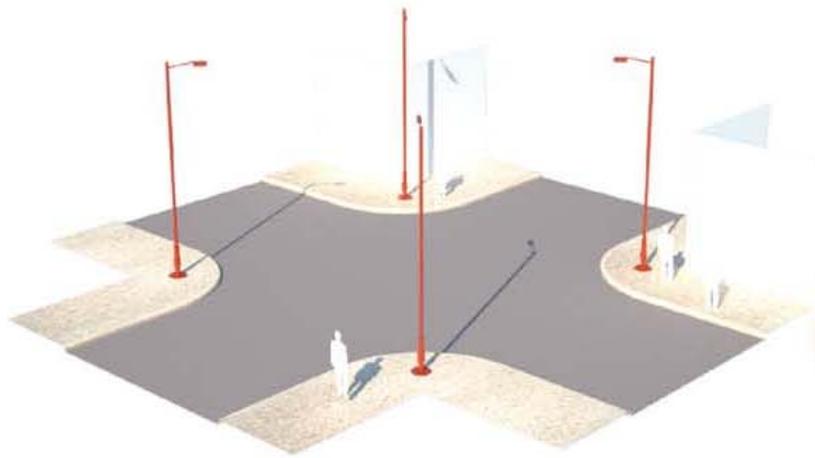
Street Tower

PHOTOVOLTAIC INTEGRATED TOWER

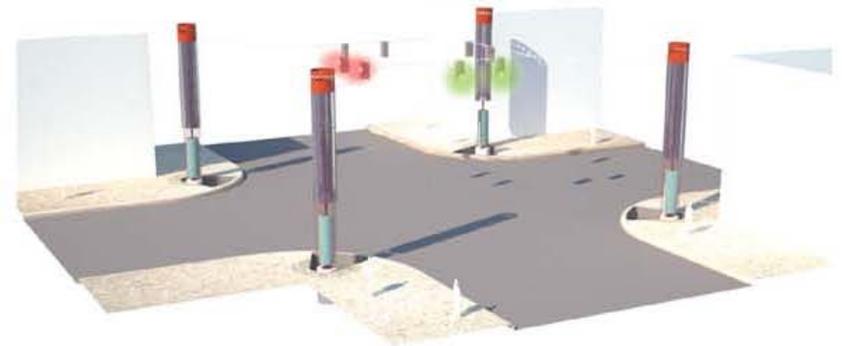


Street Tower

PHOTOVOLTAIC INTEGRATED TOWER



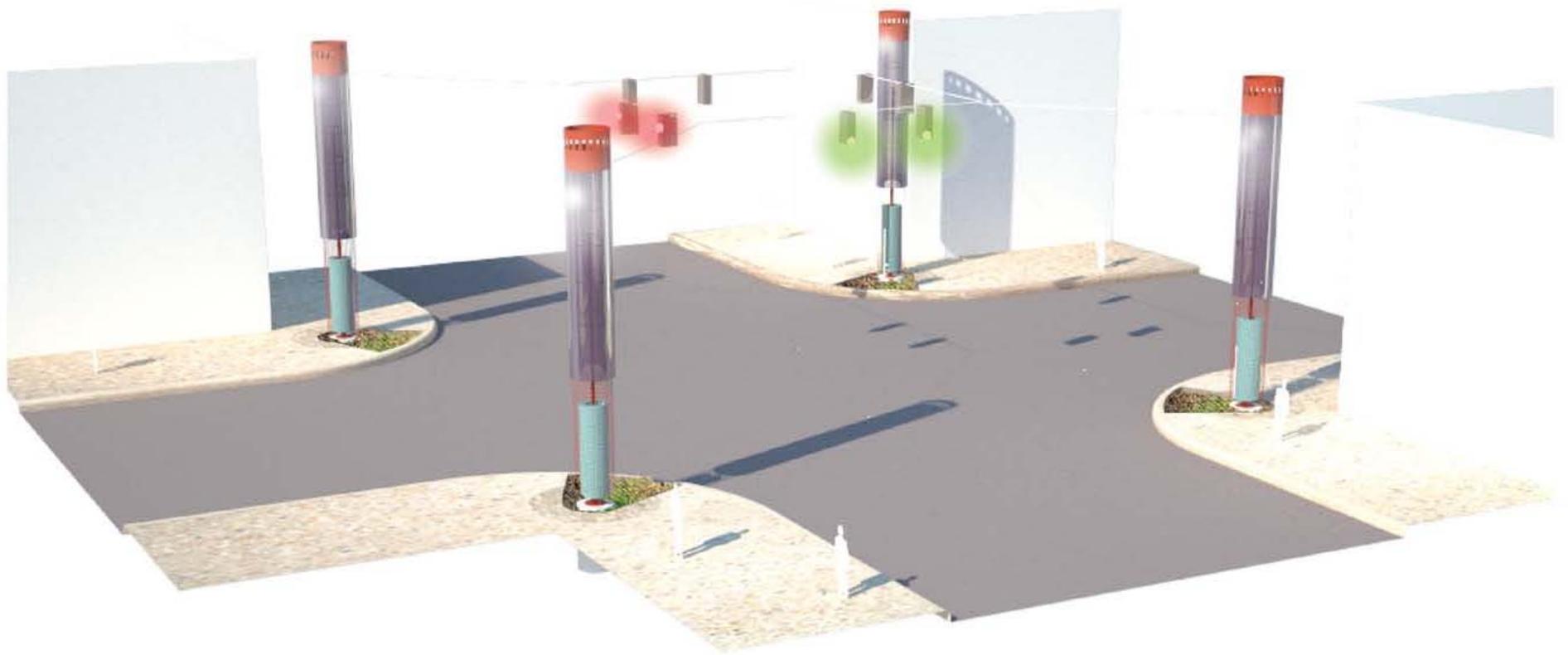
STANDARD INTERSECTION
Existing Condition

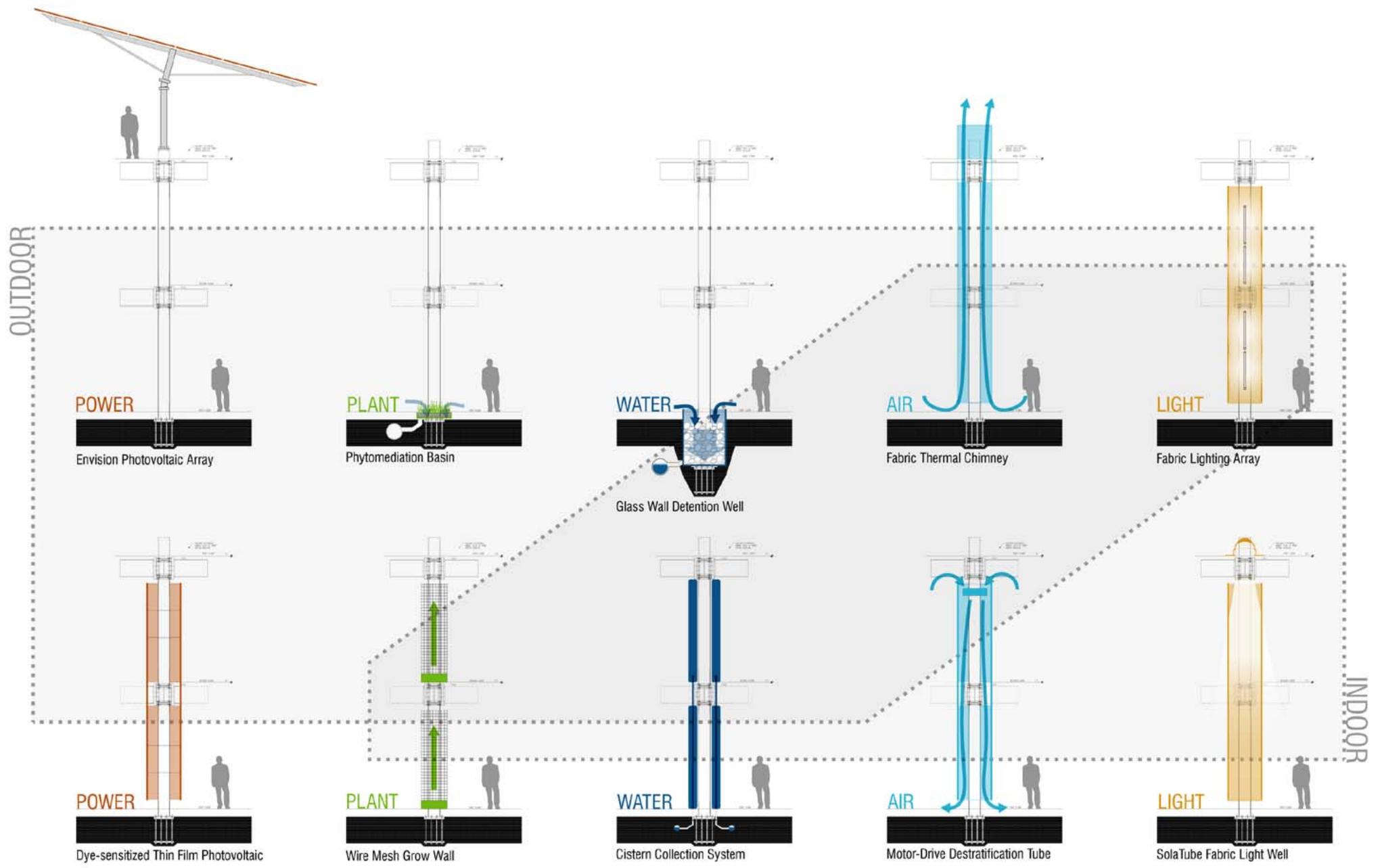


GREEN INTERSECTION
Integrated Condition

Street Tower

IMPLEMENTATION STRATEGY





OUTDOOR

POWER

Envision Photovoltaic Array

PLANT

Phytomeditation Basin

WATER

Glass Wall Detention Well

AIR

Fabric Thermal Chimney

LIGHT

Fabric Lighting Array

POWER

Dye-sensitized Thin Film Photovoltaic

PLANT

Wire Mesh Grow Wall

WATER

Cistern Collection System

AIR

Motor-Drive Destratification Tube

LIGHT

SolaTube Fabric Light Well

INDOOR