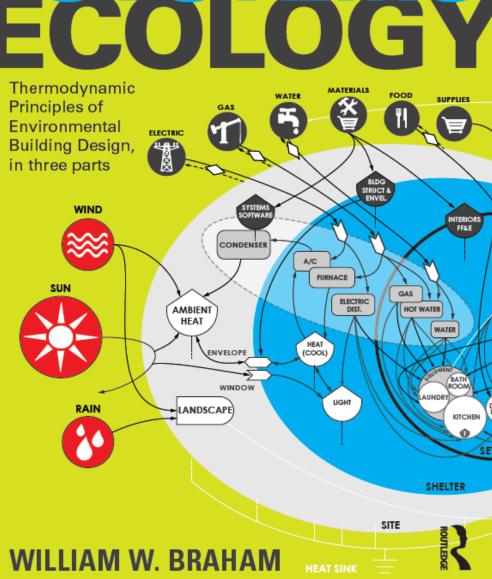
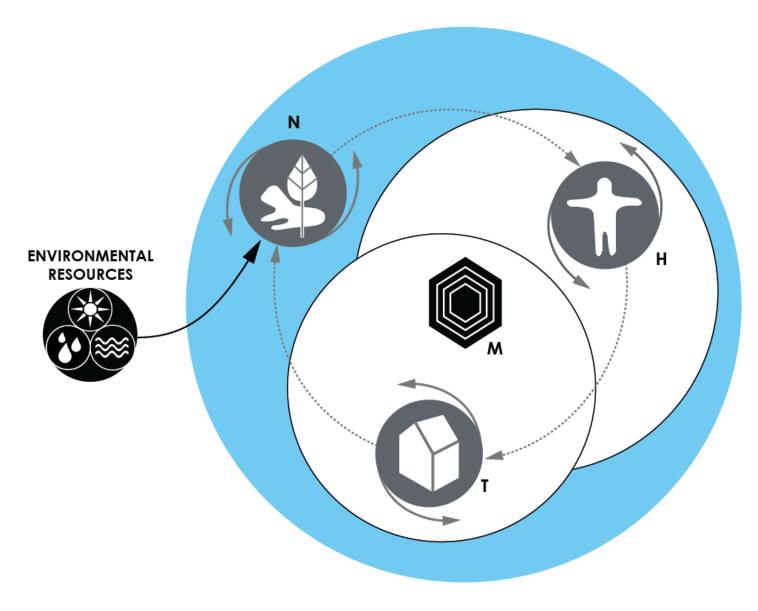


ARCHITECTURE SSECOLOGY







BUILDING LIFE CYCLE



250 YEAR STRUCTURE
HEAVY TIMBER, CONCRETE & STEEL

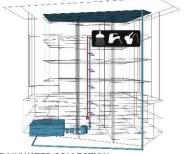


50 YEAR SKIN HIGH PERFORMANCE ENVELOPE

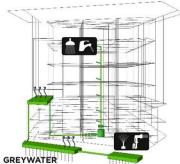


25 YEAR TECHNOLOGY ACTIVE SOLAR CONTROL PHOTOVOLTAICS

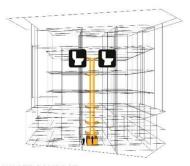
NET ZERO WATER



RAINWATER COLLECTION 100% DEMAND MET ON SITE 50,000 GALLON CISTERN

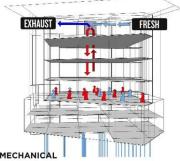


100% TREATMENT ON SITE
EVAPOTRANSPIRATION & INFILTRATION

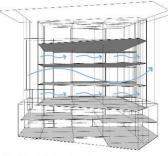


WASTE COMPOST 100% TREATMENT ON SITE

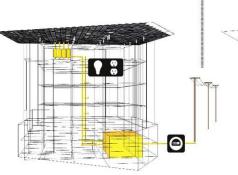
NET ZERO ENERGY



GROUND SOURCE HEAT EXCHANGE RADIANT HEATING/COOLING HEAT RECOVERY AIR SYSTEM

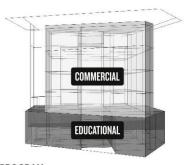


NATURAL VENTILATION
NIGHT FLUSH & OPERABLE WINDOWS

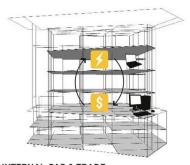


ENERGY 100% RENEWABLE ON SITE GRID USED AS BATTERY

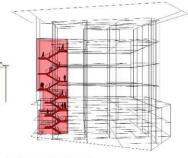
OCCUPANT



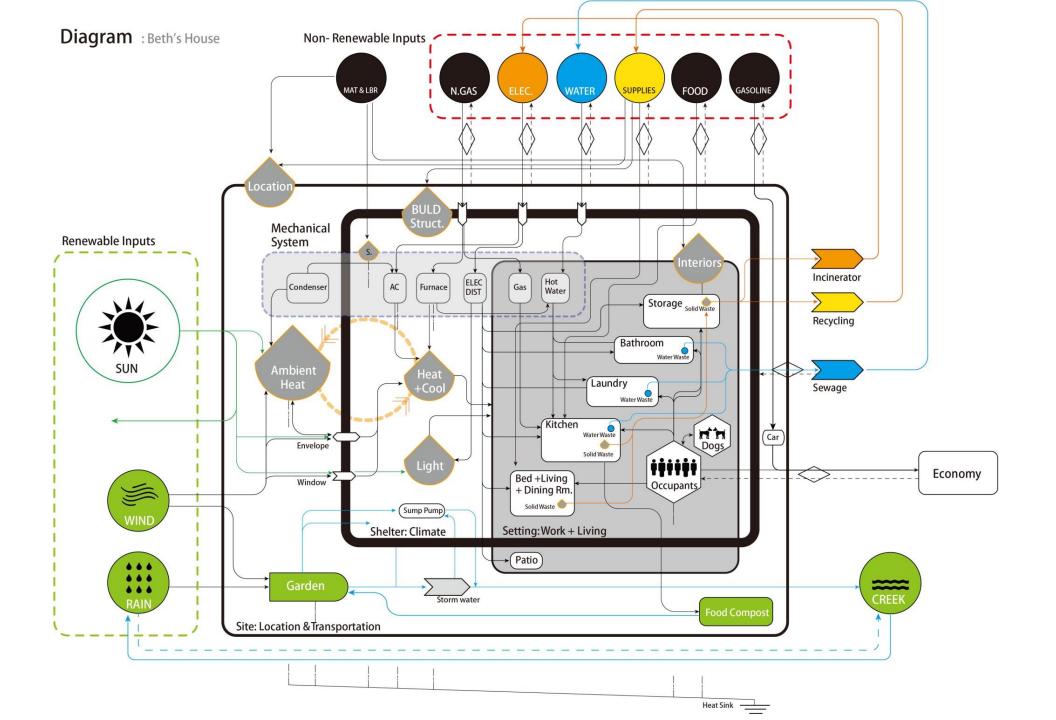
PROGRAM
OCCUPANCY
PRIVATE USERS ABOVE, PUBLIC FOCUS
USERS AT GRADE



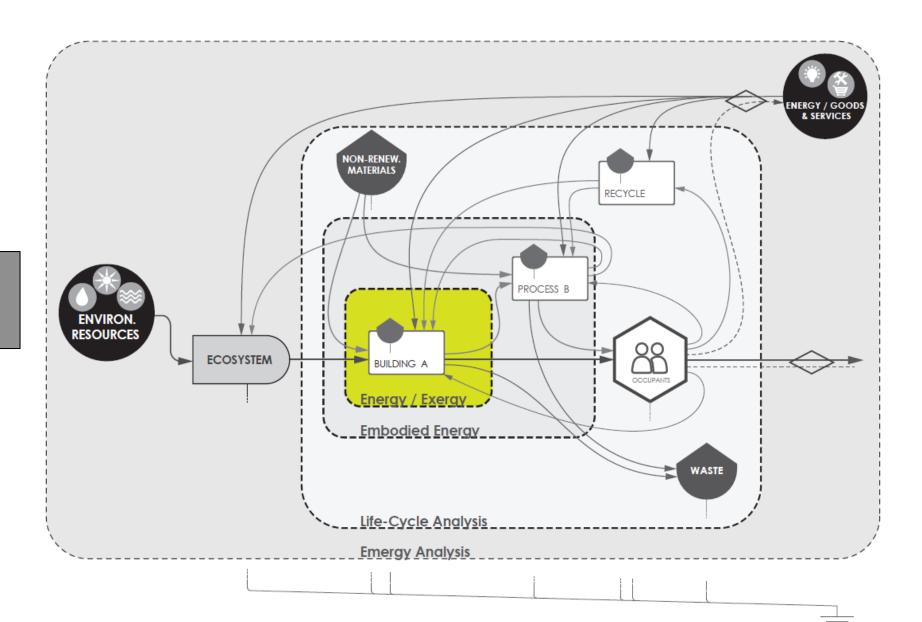
INTERNAL CAP & TRADE EACH TENANT HAS AN ENERGY BUDGET; UNUSED ENERGY CAN BE TRANSFERRED



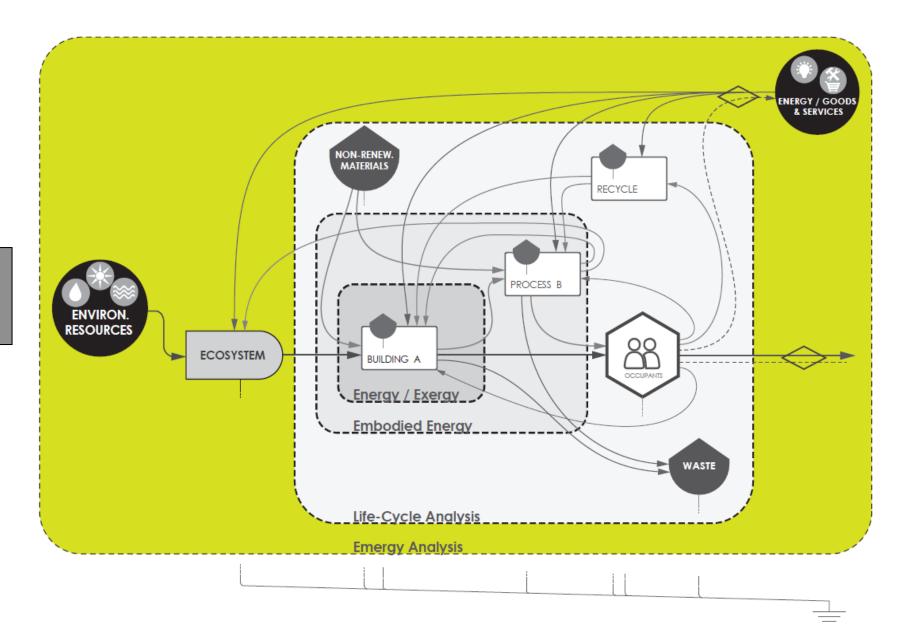
IRRESISTIBLE STAIR
ELEVATOR ALTERNATIVE, HEALTHIER
OCCUPANTS, ENGAGEMENT WITH STREET

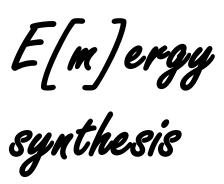


Efficiency 1st & 2nd law

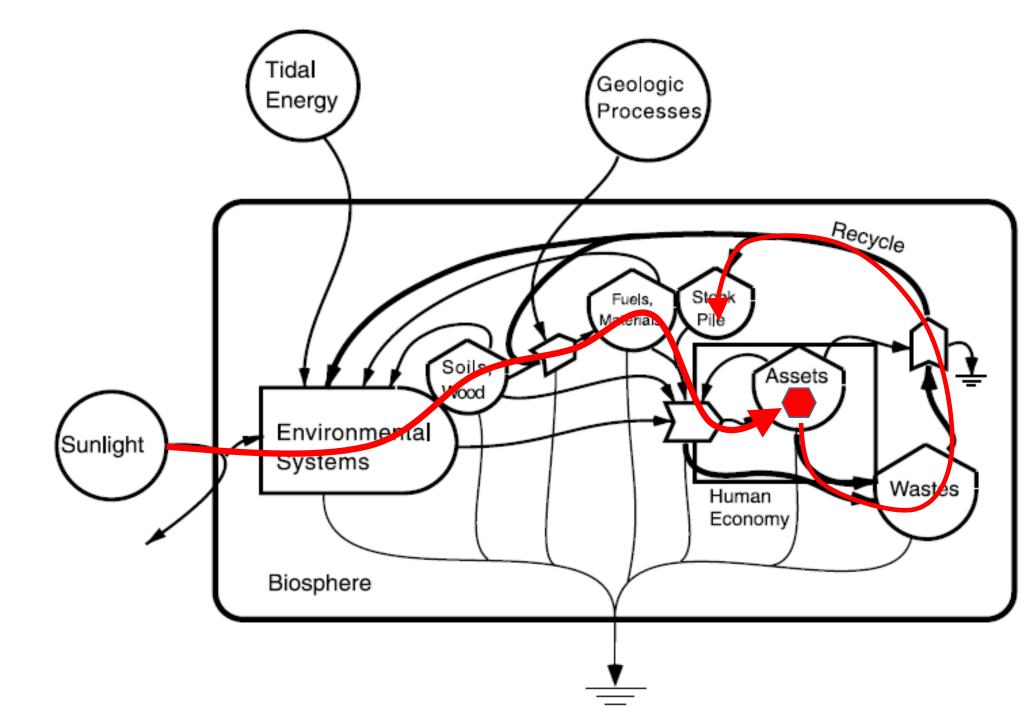


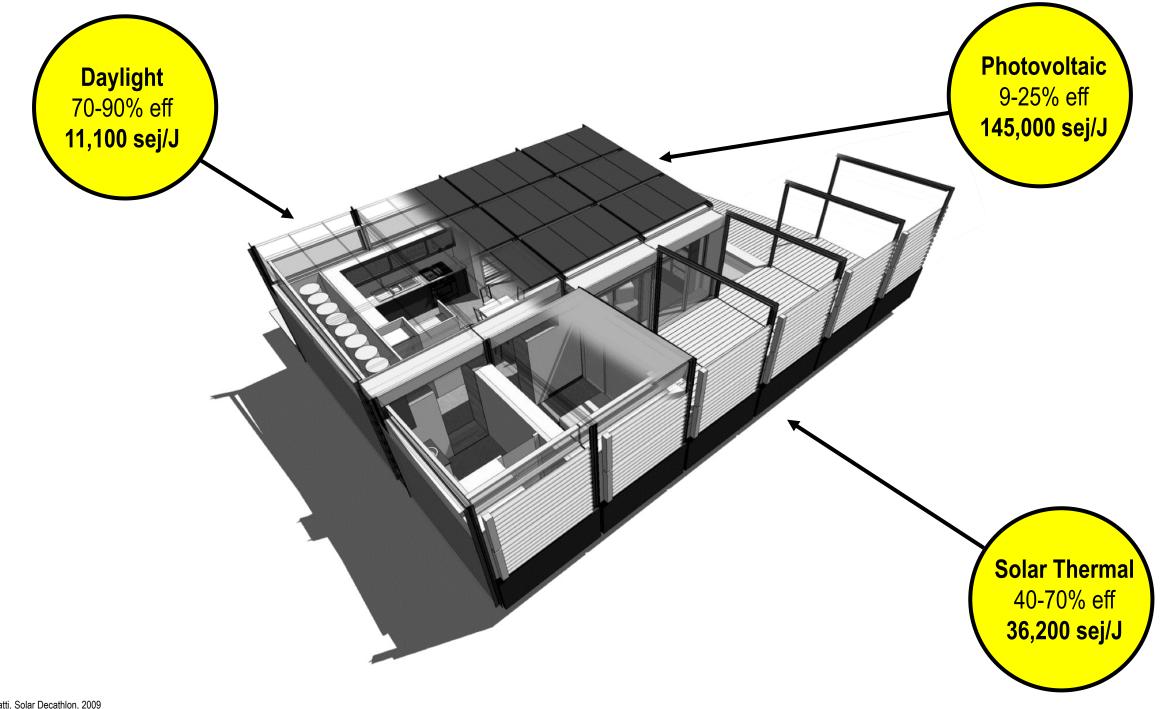
Organization

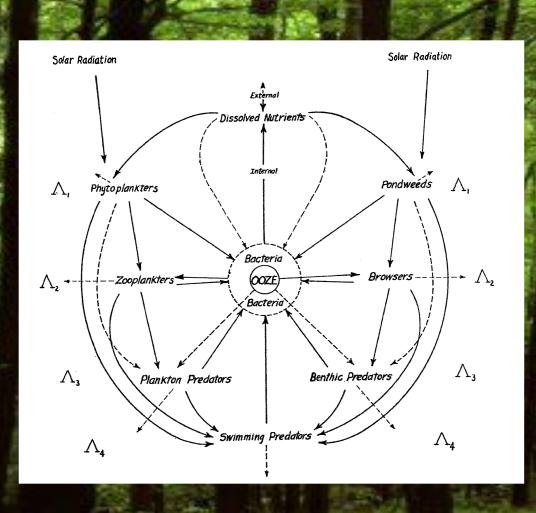




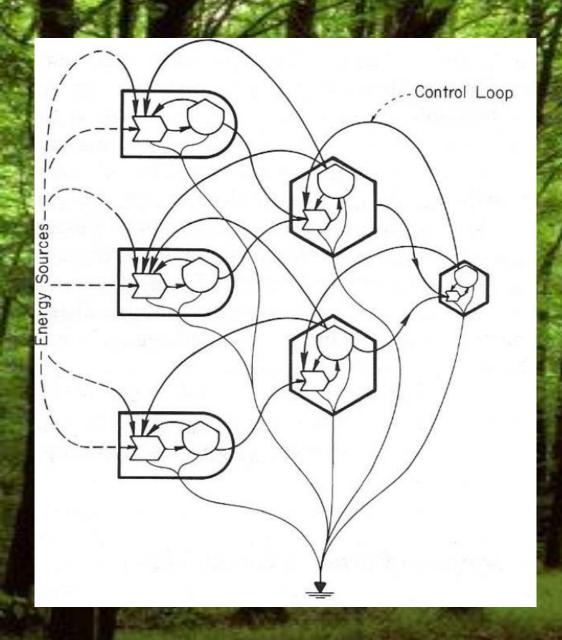
Cumulative energy dissipated in production of resources







Thermodynamic organization of complex, self-organizing ecosystems



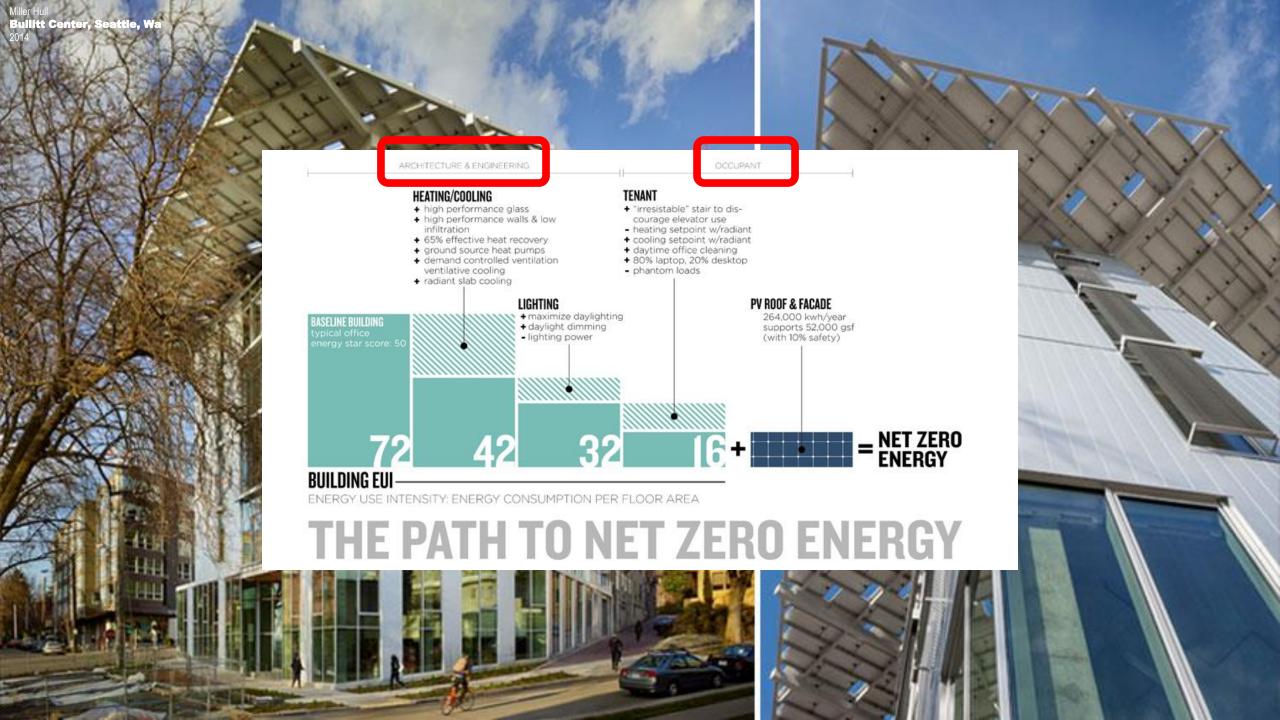
Three system principles:

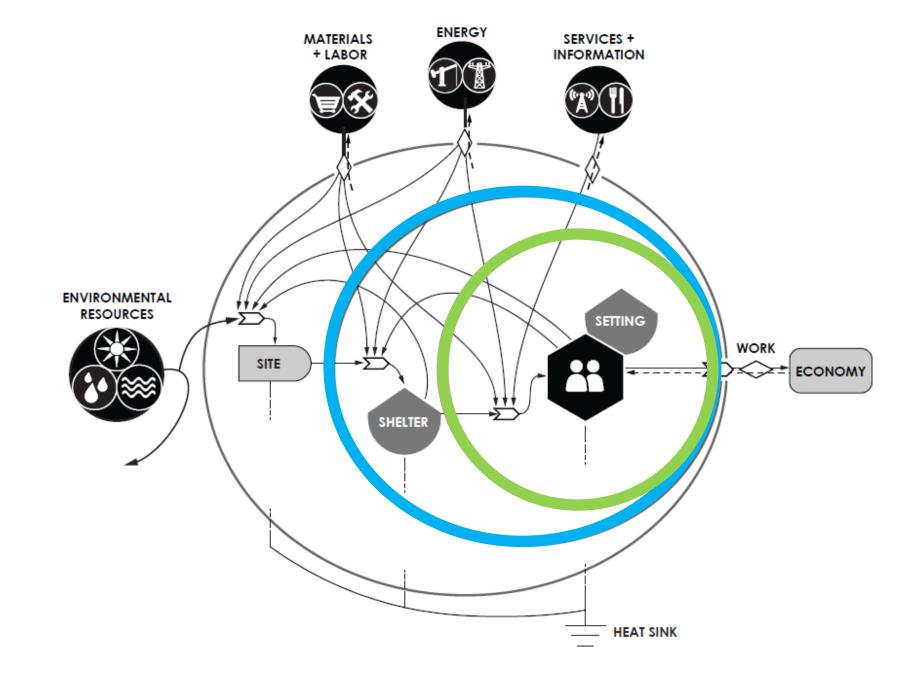
4 The Lotka–Odum principle of **maximum e[m]power** as the selection goal toward which self-organizing systems evolve over time.

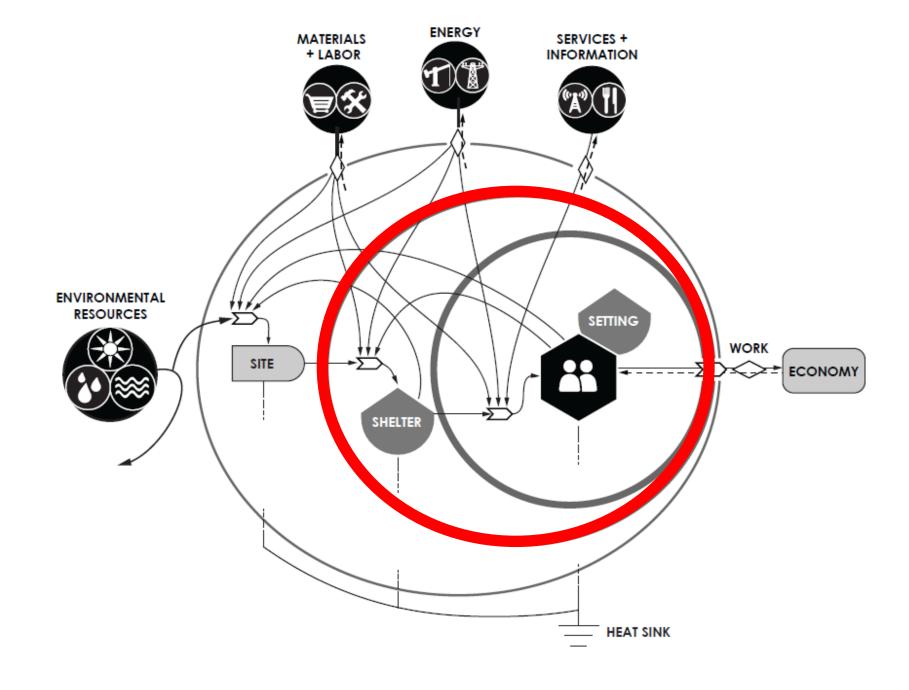
5 The Lindeman-Odum principle of **energy transformation hierarchies**, which emerge over time to achieve maximum e[m]power.

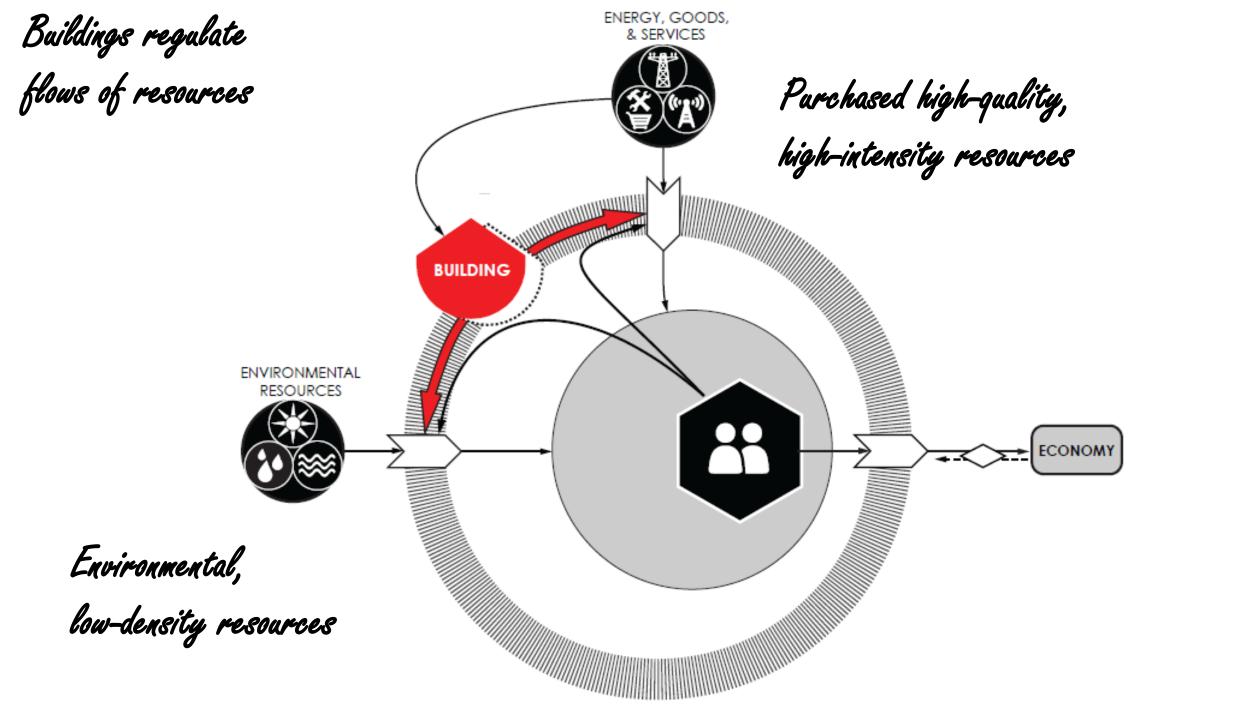
6 The Odum-Holling principle of **material concentration hierarchies**, closely coupled to energy transformation hierarchies, which **cycle or pulse** at different spatial and temporal scales to achieve maximum e[m]power.



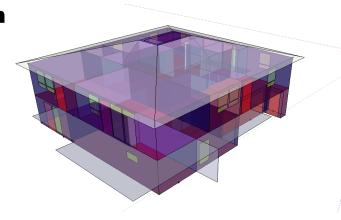






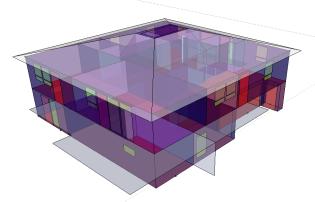


Original version with normative utilities



Improved version

with lower utilities



3.97E+05 3.97E+05 Commuting, Train (electricity) 0.00E+00 3.44E+09 34,015 Labor 8.57E+07 3.92E+07 3,362 1.12E+08 3.92E+07 Labor, Homeowner 3,362 161,540 125,212 Subtotal Purchased Inputs, F

2.50E+12

Ellis House, Base

Solar

Emergy

3.02E+04

4.70E+04

9.83E+02

n/a

1.22E+09

3.54E+09

7.50E+05

2.50E+12

2.97E+11

3.70E+10

4.05E+10

1.78E+05

3.97E+05

2.50E+12

1.87E+05

Data

(units/yr)

6.70E+12

2.55E+09

3.66E+06

3.30E+10

6.83E+17

1.46E+16

5.57E+05

3.83E+05

1.53E+10

1.78E+04

2.93E+03

3.92E+03

1.16E+04

6.81E+10

6.16E+10

3.65E+03

Subtotal Exports

56j 56j

RENEWABLE INPUTS (R)

Rain (chemical potential)

PURCHASED INPUTS (F) Depreciated Assets

Rain (geo potential)

Wind (kinetic energy)

Building Construction

Material Services

Non-durable Supplies

Concentrated Power

Location & Transportation

Location (annual property tax) Commuting, Car (fuel)

Water

Food

Wastewater

Solid Waste

Fertilizer, P

Fertilizer, N

Natural Gas

Solar Thermal

State Tax

Solar

Emergy

(E12

sej/yr)

77

32

116

13,804

1,045

14,850

680

1,356

11,462

44,429

871

145

470

22,855

27,045

49,900

22,500

11,515

0.17

(units/yr

6.70E+12

2.55E+09

3.66E+06

3.30E+10

6.90E+17

1.46E+16

1.53E+05

1.05E+05

1.53E+10

1.78E+04

1.47E+03

0.00E+00

0.00E+00

2.64E+10

3.08E+10

Ellis House, Improved

Emergy

3.02E+04

4.70E+04

9.83E+02

(yrs) n/a.

1.22E+09

3.54E+09

7.50E+05

2.50E+12

2.97E+11

3.70E+10

4.05E+10

1.78E+05

3.97E+05

2.50E+12

1.87E+05

2.50E+12

Solar

Emergy

(E12

sej/yr)

77

0.17

32

116

13,922

1,045

187

373

11,462

44,429

8,855

10,479

19,334

22,500

5,758

29,622

4,403

4,403

9,114

91,431

1364,606

14.967

Data

(units/yr)

6.70E+12 2.55E+09

3.66E+06

3.30E+10

7.01E+17

0.00E+00

1.53E+05

1.05E+05

1.53E+10

8.89E+03

1.47E+03

0.00E+00

0.00E+00

0.00E+00

5.65E+10

1.25E+10

0.00E+00

7.33E+09

1.12E+08

1.18E+05

3.29E+04

3.65E+03

Ellis House, Passivhaus

Solar

Emergy

(sei/unit)

3.02E+04

4.70E+04

9.83E+02

n/a

14

1.22E+09

3.54E+09

1.60E+05

2.50E+12

2.97E+11

3.70E+10

4.05E+10

1.45E+05

3.62E+04

2.50E+12

1.87E+05

3.97E+05

3.92E+07

2.50E+12

2.50E+12

2.50E+12

Subtotal

Exports

Total Emergy, U

sej

Solar

Emergy

(E12

sej/yr)

77

0.17

32 116

14,117

14,117

187

373

436

8,193

451

8,193

22,500

25,408

4,403

4,403 77,776

77,892

293,99

293,99

82,317

9,114

91,431

2,445

22,214

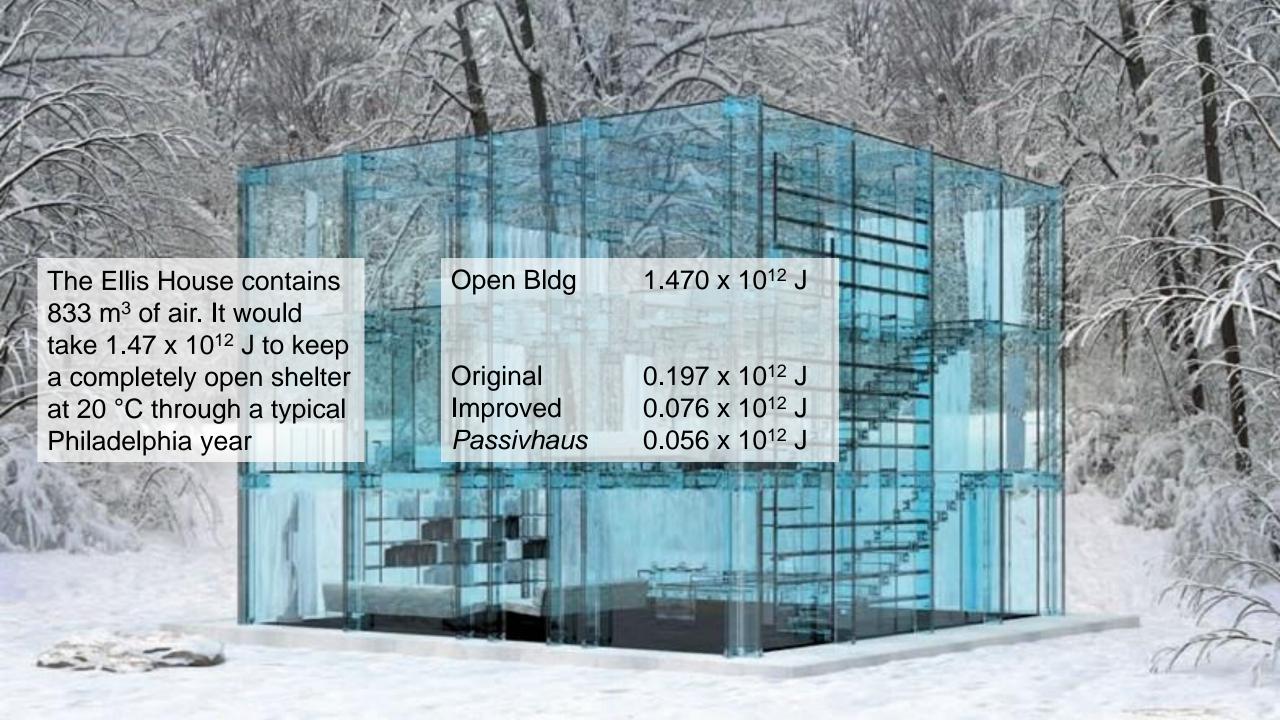
Passivhaus version Total Emergy, U 161,656 Total Emergy, U 125,329 with NZE photovoltaics IMPORTS Household Income 293,990 293,990 2.50E+12 2.50E+12 Subtotal Imports 293,990 293,990 EXPORTS Federal Tax 3.29E+04 2.50E+12 82,317 2.50E+12 82.317 3.29E+04

| NET INCOME | Imports - 202,559 | imports - 202,559 | Imports - 202,55 |
|------------|-------------------|-------------------|------------------|
| | Exports | Exports | Exports 9 |

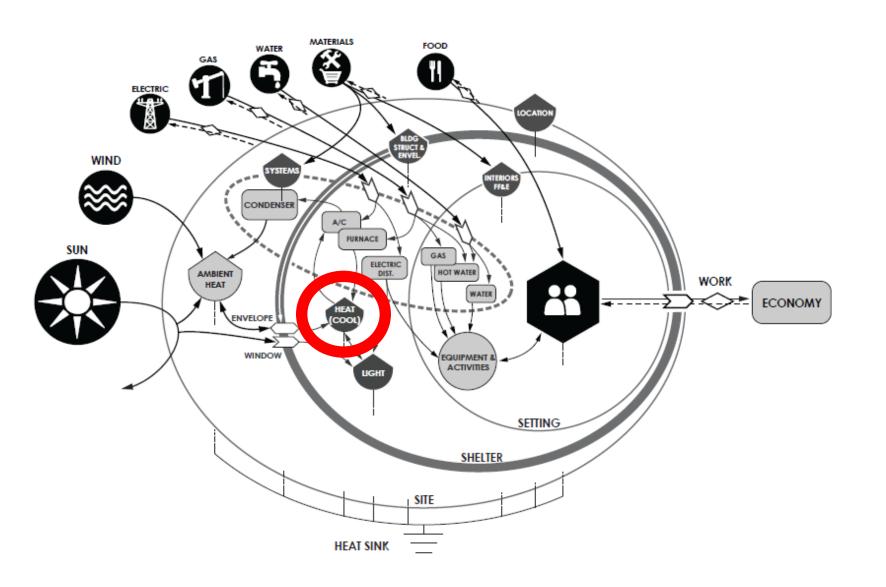
3.65E+03

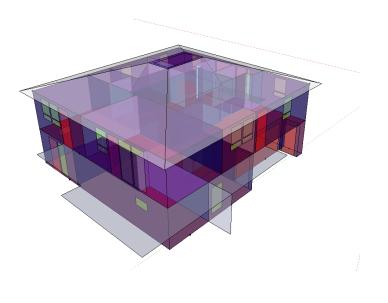
9,114

91,431



Original version with normative atilities



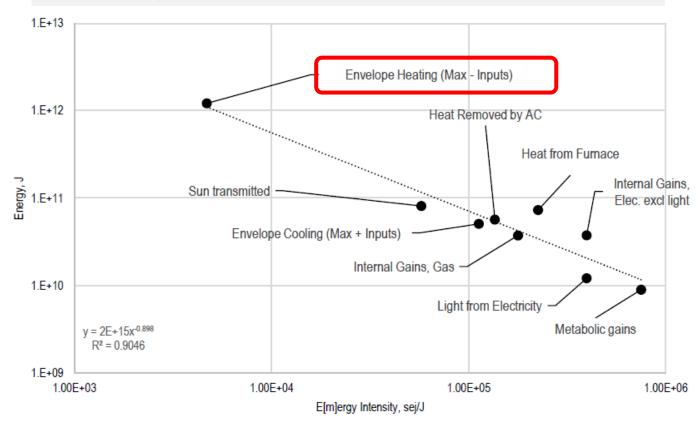


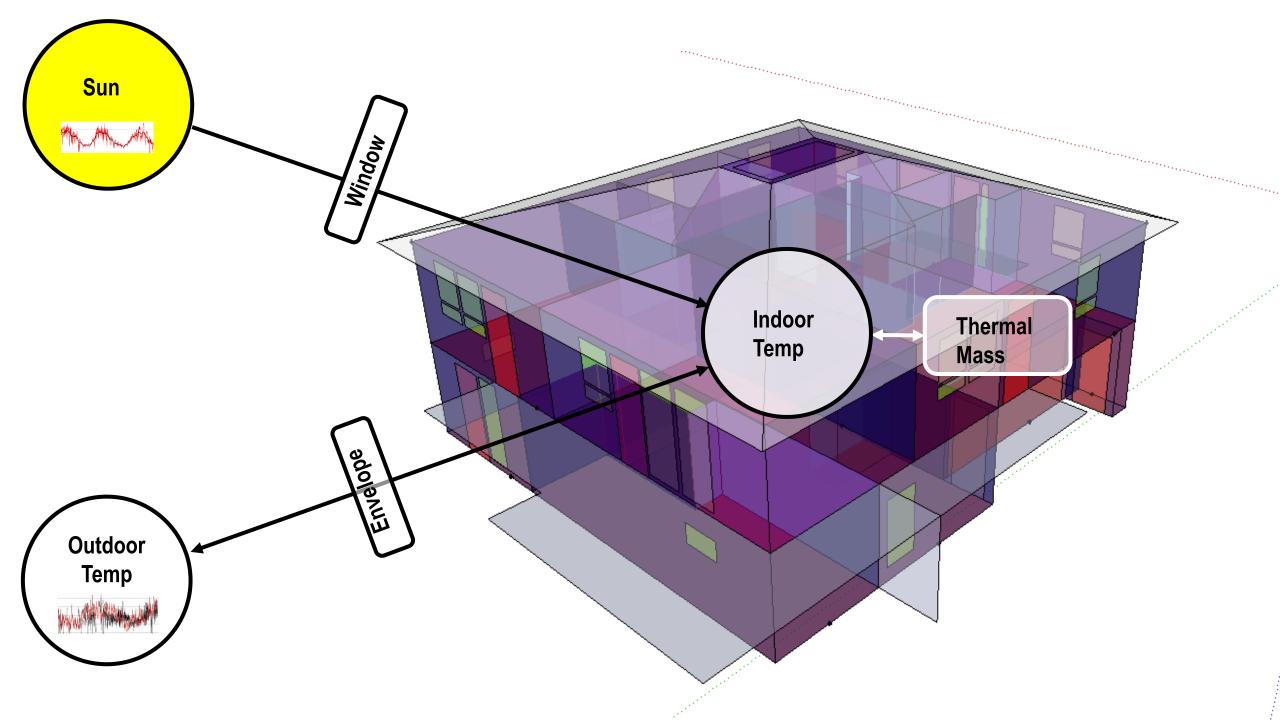
197,000,000,000 J 49,900,000,000,000,000 sej

Original version with normative utilities

| | Energy | | E[m]ergy | Intensity |
|---------------------------------------|-----------|--------|----------|-----------|
| Elements of Thermal Balance | (J) | | (sej) | (sej/J) |
| Internal Gains, Gas | 3.72E+10 | | 6.63E+15 | 1.78E+05 |
| Internal Gains, Elec. excl light | 3.73E+10 | | 1.48E+16 | 3.97E+05 |
| Metabolic gains | 8.91E+09 | | 6.69E+15 | 7.50E+05 |
| Sun transmitted | 8.09E+10 | | 4.66E+15 | 5.76E+04 |
| Light from Electricity | 1.20E+10 | | 4.77E+15 | 3.97E+05 |
| Heat from Furnace | 7.29E+10 | | 1.64E+16 | 2.25E+05 |
| Heat Removed by AC | 5.64E+10 | | 7.67E+15 | 1.36E+05 |
| | | | | |
| Energy Balance & Intensities | (J) | | (sej) | (sej/J) |
| Heating, hours | | | | |
| Internal Gains | 5.87E+10 | 4.2% | 2.81E+16 | 4.79E+05 |
| Sun transmitted | 5.69E+10 | 4.0% | 4.66E+15 | 8.20E+04 |
| Light from Electricity | 8.44E+09 | 0.6% | 4.77E+15 | 5.65E+05 |
| Furnace | 7.29E+10 | 5.2% | 1.64E+16 | 2.25E+05 |
| Max Potential Heating Load (hrs <20) | 1.41E+12 | | | |
| Envelope Heating (Max - Inputs) | 1.21E+12 | 86.0% | 5.70E+15 | 4.70E+03 |
| Cooling, hours | | | | |
| Internal Gains | 2.48E+10 | 45.4% | 2.81E+16 | 1.13E+06 |
| Sun transmitted | 2.40E+10 | 44.0% | 4.66E+15 | 1.94E+05 |
| Light from Electricity | 3.57E+09 | 6.5% | 4.77E+15 | 1.34E+06 |
| Air Conditioning | -5.64E+10 | 103.3% | 7.67E+15 | -1.36E+05 |
| Max Potential Cooling Load (hrs > 25) | 5.46E+10 | | | |
| Envelope Cooling (Max + Inputs) | 5.06E+10 | 92.6% | 5.70E+15 | 1.13E+05 |

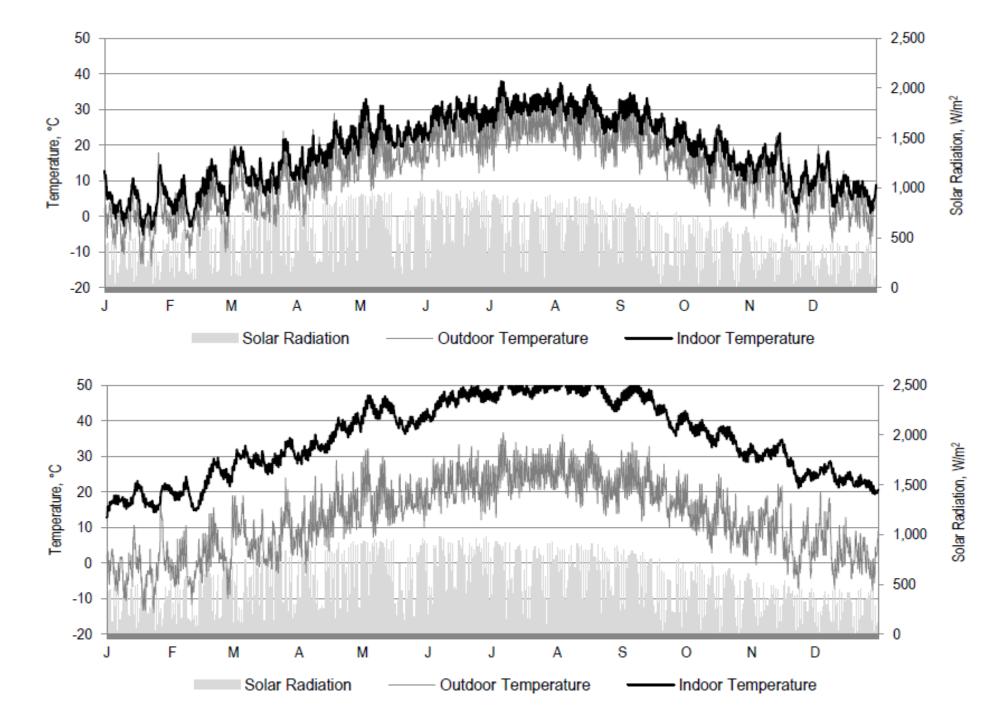
Hierarchy of e[m]ergy Intensities





Original version uncomfortable 86%

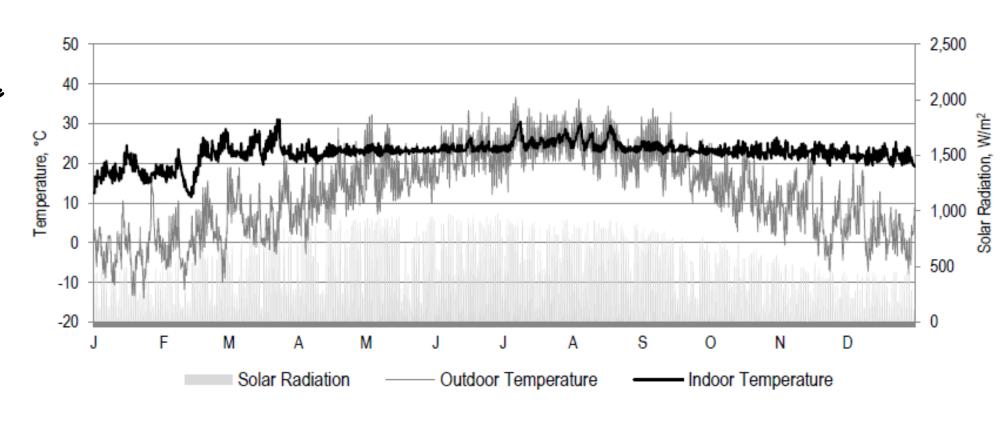
Passivhaus insulation uncomfortable 77%



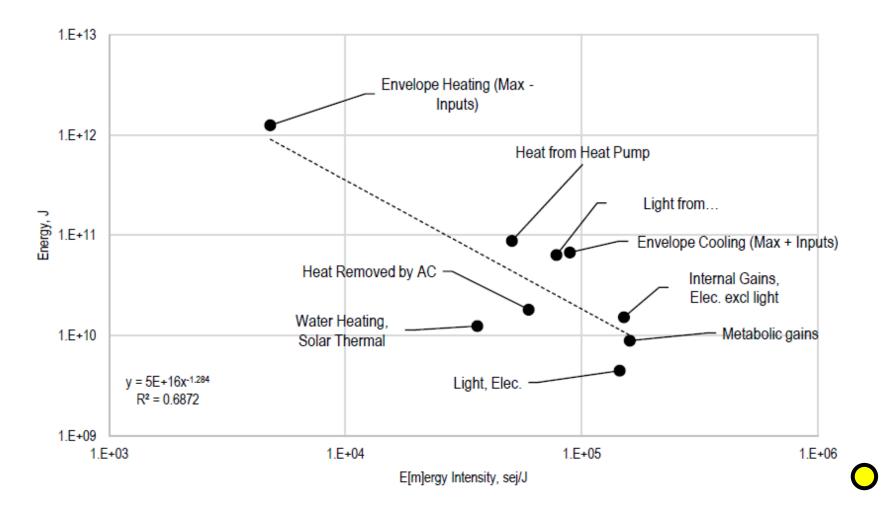


Passivhaus insulation
with "smart" control:
Windows opened and or
shaded according to
indoor and outdoor
temperature

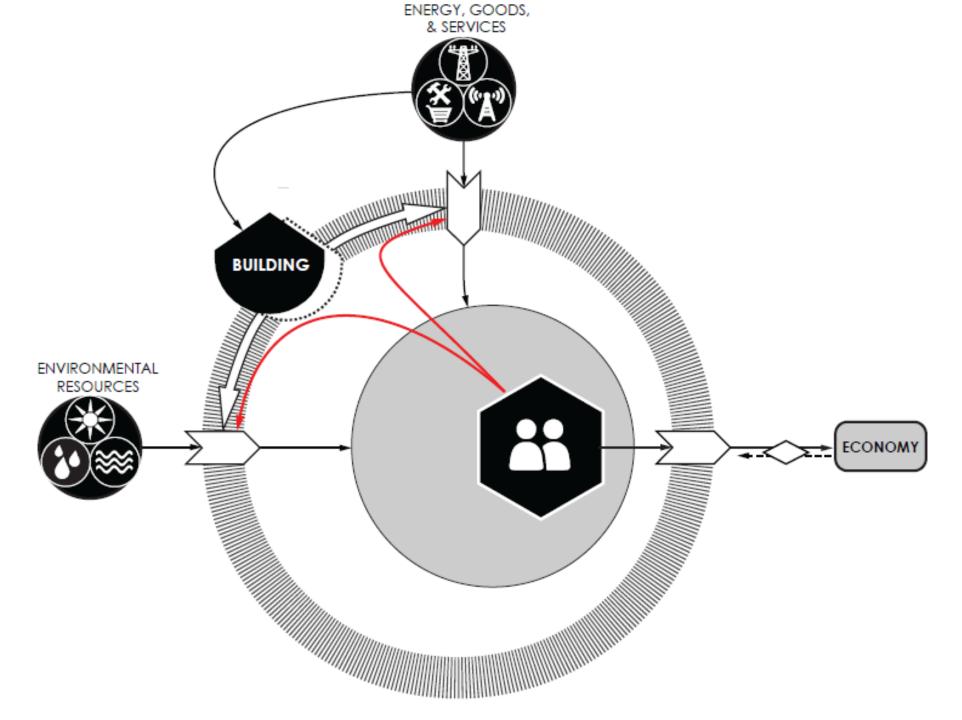
uncomfortable 8%



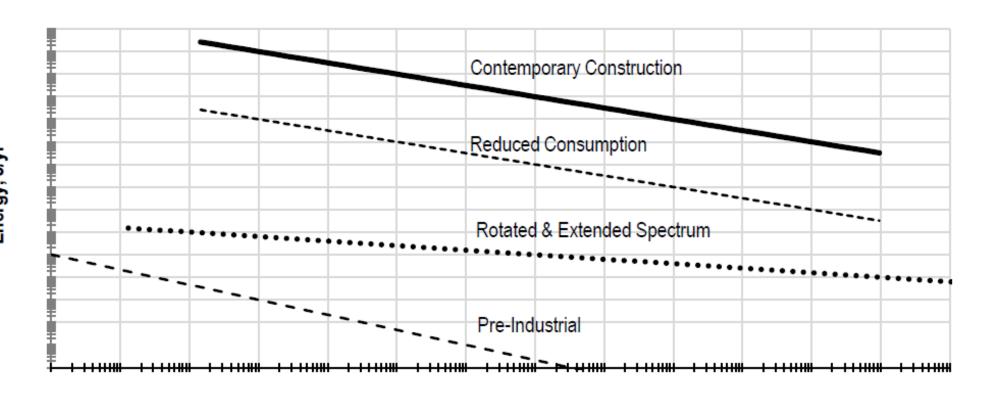
e[m]ergy intensity of labor to manage windows



Intelligence of Bailding Envelopes

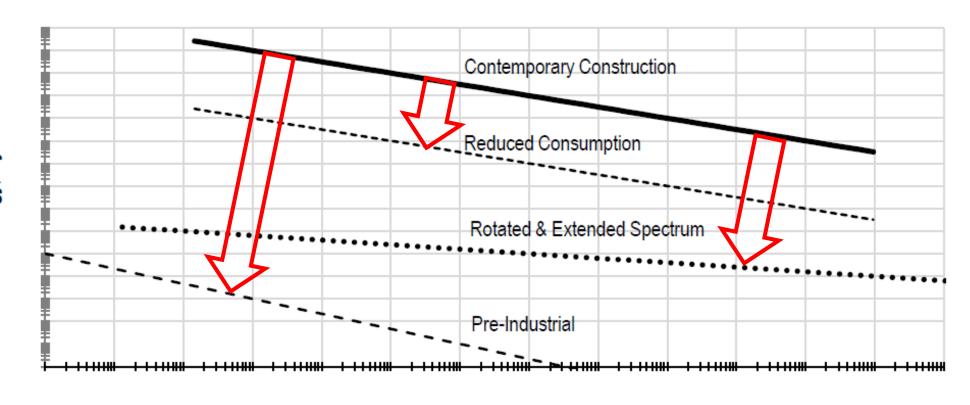


New hierarchies of signal second second signal second signal second seco

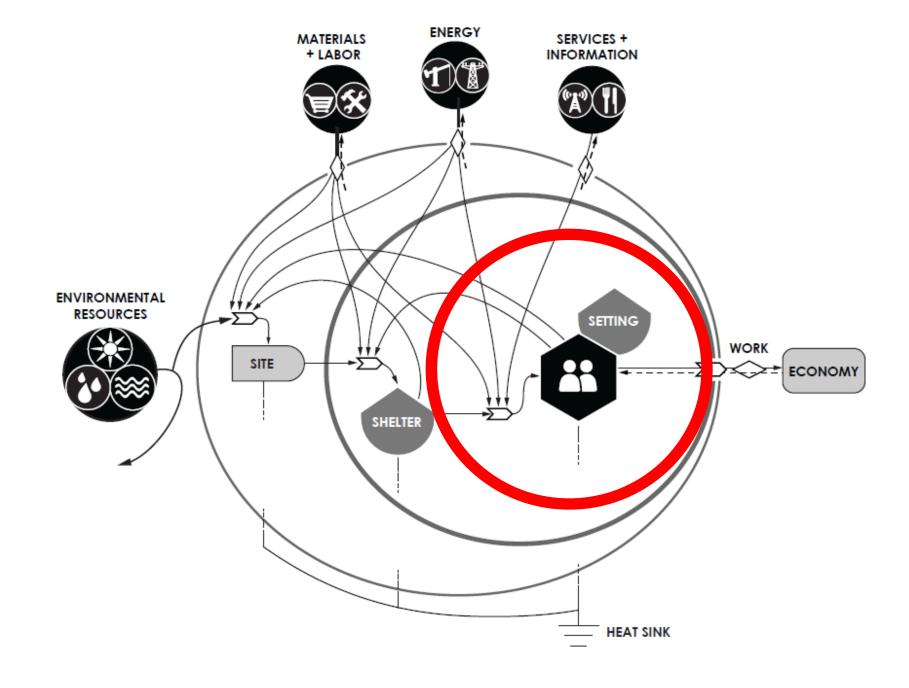


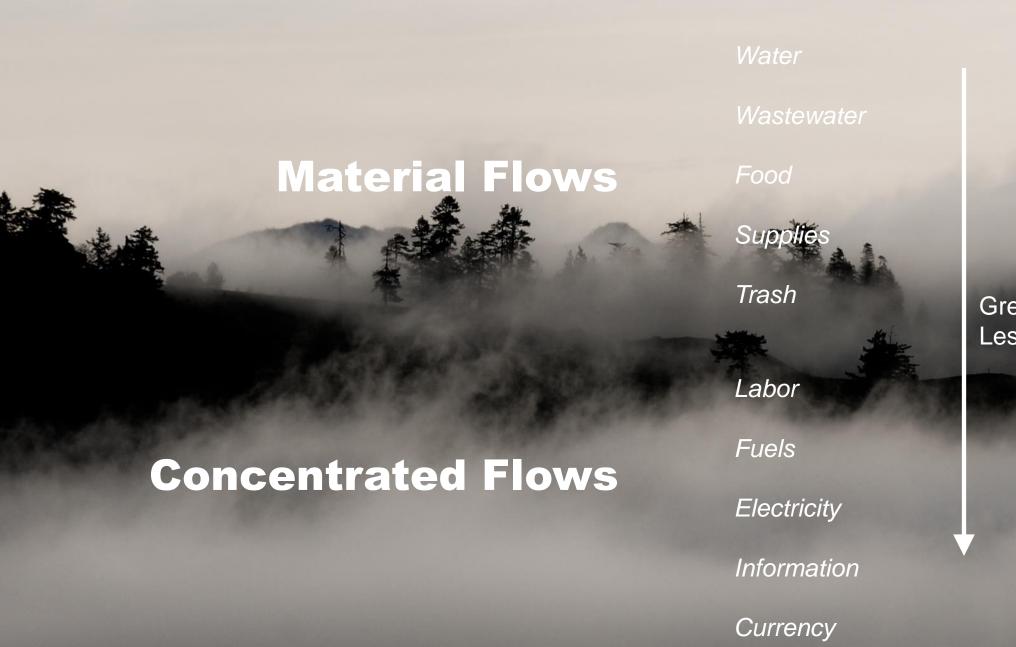
E[m]ergy Intensity, sej/J

New hierarchies of signal leads of the leading of t



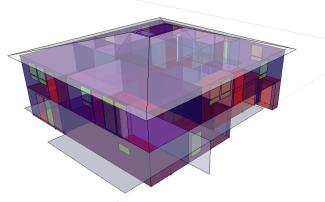
E[m]ergy Intensity, sej/J





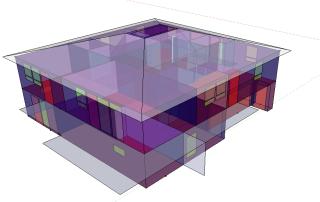
Greater transformity Less material

Original version with normative utilities



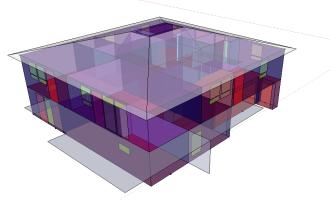
Improved version

with lower utilities



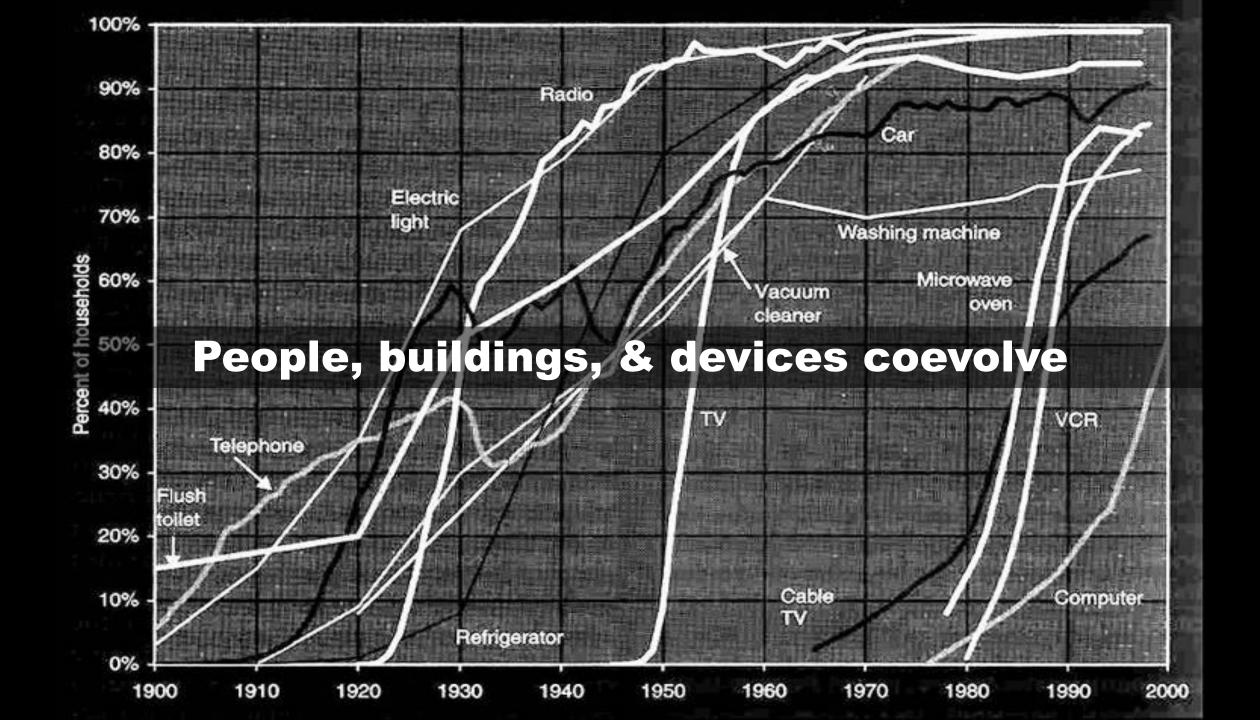
Passivhaus version

with NZE photovoltaics

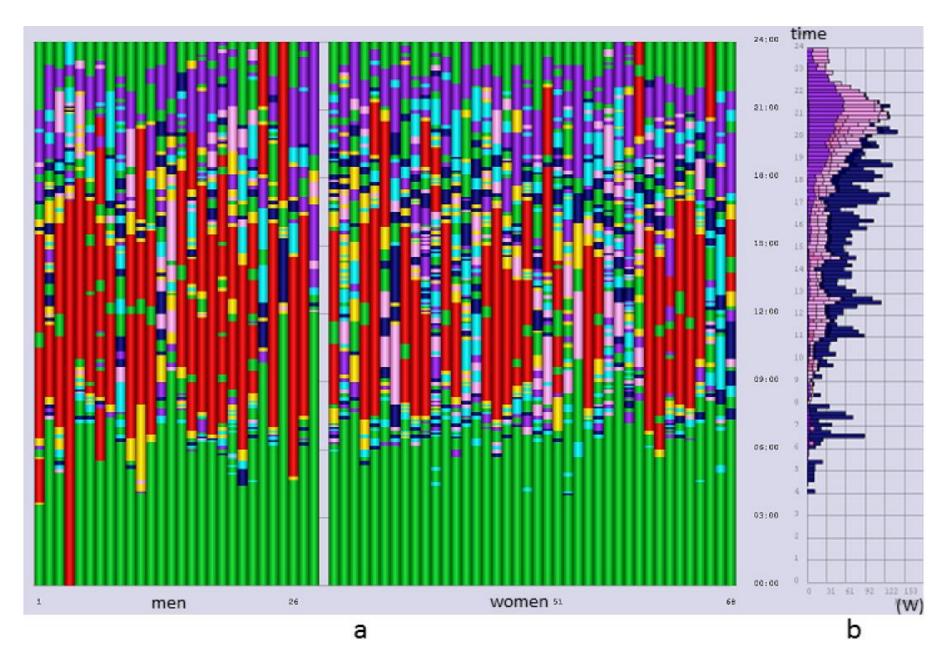


Setting

| Dela | | Ellis House, Base | | | | Ellis House, Improved | | | | Ellis House, Passivhaus | | | |
|---|----------------------------|--|------|------------|------------|-----------------------|------|------------|---------|-------------------------|------|------------|---------|
| Communing Comm | | | | | | | | | Solar | | | | Solar |
| Communication Communicatio | len. | | Hell | | | | Hell | | Emergy | | 11-3 | | Emergy |
| Sementable Impuls | nem | (units/yr) | Unit | | (E12 | (units/yr) | Onk | | (E12 | (units/yr) | Ont | | (E12 |
| Remember linguis Societies STE-07 J STE-05 J STE-07 J STE-06 J STE-07 J STE-06 J STE-07 J STE-06 J STE-07 J | | | | (sej/unit) | sej/yr) | | | (sej/unit) | sej/yr) | | | (sej/unit) | sej/yr) |
| Sundpart | | | | | | | | | | | | | |
| Ran [perpotential] 3565-06 J 3025-04 77 2555-09 J 3025-02 72 72 72 72 72 72 72 | | | | | | | | | | | | | |
| Ran genoterial 3665-96 J 4706-94 0.17 3665-96 J 4706-94 J | | | | | | | _ | | | | | | |
| Word [inches energy] Subblack 3.05C-10 J 9.83E-02 32 3.05C-10 J 9.83E-02 3.05C-10 3.05 | | | | | | | | | | | | | |
| Substate 116 | | | | | | | | | | | | | |
| Landscape Selection Sele | | 3.30E+10 | J | 9.83E+02 | | 3.30E+10 | J | 9.83E+02 | | 3.30E+10 | J | 9.83E+02 | |
| Steamonk Special Spe | | | | | 116 | | | | 116 | | | | 116 |
| Water_Outdoor | | | | 4 775 44 | | - co- co | | | | 5 005 03 | | | |
| Fertilizar, P. 3,92E-33 g 3,70E-10 146 0.00E-00 g 3,370E-10 0 0.00E-00 g 4,05E-10 0.00E-00 g 4 | | | | | | | | | | | | | |
| Fertilizer, N 1,16E-04 | | | | | | | | | | | | | |
| Labor, Homeowneme | | | | | | | _ | | _ | | | | |
| Cardion & Transportation Coation (properly lax) Coation (properly | | | 9 | | | | 9 | | _ | | 9 | | |
| Location Transportation | | 0.012-01 | • | 0.322-01 | | 0.012-01 | | 0.322-01 | | 0.012-01 | | 0.322-01 | |
| Lozation (property lax) 9,005-03 \$ 2,505-12 22,500 9,005-03 \$ 2,505-12 22,500 \$ 0,005-03 \$ 2,505-12 22,505-13 \$ 0,005-03 \$ 2,505-12 22,505-13 \$ 0,005-03 \$ 2,505-12 \$ 0,005-03 \$ | | | | | 0,200 | | | | 4,401 | | | | 4,401 |
| Communing, Paris Section Communing, Paris | | 9.00F+03 | \$ | 2.50E+12 | 22 500 | 9.00F+03 | \$ | 2.50F+12 | 22 500 | 9.00F+03 | \$ | 2.50E+12 | 22 500 |
| Community Tenin placebook Subboal Su | | | _ | | | | | | | | | | |
| Care [despriciated] Subbolal | | | | | | | | | | | | | |
| Subtolal | | | | | _ | | | | | | | | |
| Subtoral State | | | , | | | | | | | | | | |
| Shelter Building Construction, Shelter 7,47E-16 sej 80 933 7,47E-17 sej 80 933 7,47E-16 sej 80 933 7,47E-17 sej 80 933 7,47E-16 sej 80 933 7,47E-17 sej 80 93 37E-17 sej 80 1,26E-17 s | | | | | | | | | | | | | |
| Building Construction, Setting Subblotal Subblotal System (promoted deprex.) Subblotal System (promoted deprex.) Subblotal Subblotal Street, Part | | | | | - | | | | | | | | |
| Building Construction, Setting Subtobal Subtobal Subtobal Shelter Subtobal Sub | Shelter | | | | | | | | | | | | |
| Studenty Experience | | | | | life (yes) | | | life (ves) | | | | life (ves) | |
| Eaternal Envirope (degree.) 2,60E-17 set 70 3,730 2,57E-17 set 69 3,948 2,77E-17 set 69 4,942 2,94E-10 1,26E-16 set 61 206 1,26E-16 | | 7.47E+16 | sei | 80 | | 7,47E+16 | 200 | | 933 | 7.47E+16 | sei | | 933 |
| Systemic (prometical, desprec.) 1.26E-16 sej 61 206 1.26E-16 sej 61 206 1.26E-16 sej 61 206 1.26E-10 3.392E-07 1.041 2.65E-07 3.392E-07 3.041 2.65E-07 3.392E-07 | | | | | | | | | | | | | |
| Labor, Homeowner Sublotal | | | | | | | • | | | | | | |
| Building Conditioning - Utilities Heeling 9.12E-10 J 1.78E-05 16,229 Heeling 1.88E-10 J 3.97E-05 16,229 Heeling 1.88E-10 J 1.78E-05 1890 Heeling 1.88E-10 J 3.97E-05 0 1,28E-09 J 1.78E-05 1890 Heeling Subtotal Shelter 33,330 T7,055 Subtotal Shelter 33,330 T7,055 Subtotal Shelter 33,330 T7,055 Subtotal Shelter 1.88E-10 J 1.8E-05 1890 Heeling Subtotal Shelter 1.88E-10 J 1.8E-05 1890 Heeling Subtotal Shelter 33,330 T7,055 T7,055 Subtotal Shelter 1.88E-10 J 1.8E-05 1890 Heeling Subtotal Shelter 33,330 T7,055 Subtotal Shelter 1.88E-10 J 1.8E-05 1890 Heeling Subtotal Shelter 1.88E-10 J 1.8E-05 1890 Heeling Subtotal Shelter 1.88E-10 J 1.8E-05 1890 Heeling Heeling Subtotal Shelter 1.88E-10 J 1.8E-05 1890 Heeling T7,055 Subtotal Shelter 1.88E-10 J 1.8E-05 1890 Heeling Heeling Heelin | | | | | | | | | | | | | |
| Building Conditioning - Utilities 9.12E-10 | | | - | | • | | - | | | | - | | |
| Heating | | | | | - | | | | | | | | |
| Cooling | | 9.12E+10 | J | 1.78E+05 | 16.228 | 3.53E+10 | J | 1.78E+05 | 6,288 | 2.94E+10 | J | 1.45E+05 | 4.265 |
| Mentilation | | | | | | | | | | | | | |
| Subtotal | | | | | | | | | | | | | |
| Setting | Illumination | | | | 4,767 | 4.65E+09 | | | 1,847 | | | | |
| Setting Building Construction, Setting Interiors & Finishes (deprec.) 2.26E-17 sej 38 5.953 3.07E-05 | Subtotal | | | | | | | | | | | | 5,976 |
| Building Construction, Setting Infeciors & Finishers (degreec.) Section Setting Infeciors & Finishers (degreec.) Setting Infeciors & Finishers (degreec.) Loge-16 Seting Setting Set | Subtotal, Shelter | | | | 33,330 | | | | 17,055 | | | | 12,198 |
| Building Construction, Setting Infeciors & Finishers (degreec.) Section Setting Infeciors & Finishers (degreec.) Setting Infeciors & Finishers (degreec.) Loge-16 Seting Setting Set | | | | | | | | | | | | | |
| Building Construction, Setting Iffe (yrs) Iffe (yrs | Setting | | | | | | | | | | | | |
| Interiors & Finishers (deprec.) | | | | | life (yrs) | | | life (vrs) | | | | life (vrs) | |
| Furniture, Fist, Equip, (deprec.) Systems (proreted deprec.) Sublotal 1.26E+16 sej 24 1.716 206 1.26E+16 sej 61 206 7,874 Kitchen, Material Services Water Water 4.22E+04 L 1.22E+09 51 1.16E+04 L 1.22E+09 14 1.16E+04 L 1.22E+09 11.16E+04 L | | 2.26E+17 | sej | 38 | | 2.26E+17 | 36 | | 5,953 | 2.26E+17 | sej | | 5,953 |
| Systems (provided deprec.) 1.26E-16 sej 61 206 1.26E-16 sej 61 206 7,874 | | | | | | | • | | | | | | |
| Ritchen, Material Services | | | | | | | | | | | | | |
| Wilder W | | | - | | | | | | | | 4 | | |
| Water 4 22E-04 L 1.22E-09 51 1.15E-04 L 1.22E-09 14 1.16E-04 L 1.22E-09 15 1.20E-05 12 1.20E-05 12 1.20E-05 12 1.20E-05 12 1.20E-05 12 1.20E-05 | Kitchen, Material Services | | | | | | | | | | | | |
| Water - Heating 3.69E-09 J 1.78E-05 6.56 1.43E-09 J 1.78E-05 254 1.37E-09 J 3.62E-04 50 | | | L | | 51 | 1.16E+04 | L | | 14 | 1.16E+04 | L | | 14 |
| Food | Wastewater | | L | | | | L | | | 1.16E+04 | | | |
| Food - Refrigeration 7,93E+09 J 3,97E+05 3,146 3,07E+09 J 3,97E+05 1,219 2,95E+09 J 1,45E+05 428 666 1,45E+09 J 1,75E+05 575 2,76E+09 J 1,75E+05 0 0,00E+00 J 1,75E+05 0,00E+0 | Water - Heating | 3.69E+09 | J | | | | J | | 254 | | J | | |
| Food - Cooking, Gas 3.74E-09 J 1.78E-05 665 1.45E-09 J 1.78E-05 258 0.00E-00 J 1.78E-05 0 | Food | | J | | | | J | | | | J | | |
| Food - Cooking, Elec. 3.74E-09 J 3.97E-05 1,484 1,45E-09 J 3.97E-05 575 2.78E-09 J 1.45E-05 404 7.33E-02 kg 2.97E-11 218 7.33E-03 kg 2.97E-11 218 7.33E-02 kg 2.97E-11 218 | | | | | | | J | | | | | | |
| Solid Weste | | | | | | | | | | | | | |
| Sublotal Services | | | J | | | | J | | | | | | |
| Bathroom, Material Services 2.42E+05 L 1.22E+09 295 6.65E+04 L 1.22E+09 81 6.65E+04 L 3.54E+09 81 8.65E+04 L 3.54E+09 235 6.65E+04 L 3.54E+09 235 8.65E+04 L 3.54E+09 3.65E+04 | | 1.47E+03 | kg | 2.97E+11 | | 7.33E+02 | kg | 2.97E+11 | | 7.33E+02 | kg | 2.97E+11 | |
| Wastewater | | | | | 18,050 | | | | 14,041 | | | | 3,599 |
| Westewater | | | | | | | | | | | | | |
| Water - Heating | | | | | | | | | | | | | |
| Subloted | | | | | | | | | | | | | |
| Laundry, Material Services 9.89E+04 L 1.22E+09 121 2.72E+04 L 1.22E+09 33 2.72E+04 L 1.22E+09 33 2.72E+04 L 1.22E+09 33 2.72E+04 L 3.54E+09 96 2.72E+04 L 3.54E+09 96 96 96 96 96 96 96 | | 2.12E+10 | J | 1.78E+05 | | 8.20E+09 | J | 1.78E+05 | | 7.88E+09 | J | 3.62E+04 | |
| Water 9.89E-04 L 1.22E-09 121 2.72E+04 L 1.22E-09 33 2.72E-04 L 1.22E-09 33 3.72E-04 L 1.22E-09 33 3.72E-04 L 1.22E-09 33 3.72E-04 L 3.54E-09 96 2.72E-04 L 3.54E-09 J 3.72E-05 3.72 | | | | | 4,917 | | | | 1,775 | | | | 602 |
| Westewater | | | | | | | | | | | | | |
| Water - Heating 8.65E-09 J 1.78E+05 1.540 2.638 2.58E-09 J 3.97E-05 597 3.22E-09 J 3.62E-04 117 | | | L | | | | L | | | | _ | | |
| Elec - Wet Cleaning Sublotal 6.65E+09 J 3.97E+05 2,638 2.58E+09 J 3.97E+05 1,022 2.47E+09 J 1.45E+05 359 605 Work & entertainment, Material Services Non-durable Supplies 1.78E+04 \$ 2.50E+12 44,429 1.78E+04 \$ 2.50E+12 44,429 8.89E+03 \$ 2.50E+12 22,214 Solid Weste 1.47E+03 kg 2.97E+11 436 7.33E+02 kg 2.97E+11 218 7.33E+02 kg 2.97E+11 218 | | | | | | | | | | | | | |
| Subloted 4,649 1,748 605 6 | | | | | | | | | | | | | |
| Work & entertainment, Material Services 1.78E+04 \$ 2.50E+12 44,429 1.78E+04 \$ 2.50E+12 44,429 1.78E+04 \$ 2.50E+12 44,429 8.89E+03 \$ 2.50E+12 22,214 Solid Weste 1.47E+03 kg 2.97E+11 436 7.33E+02 kg 2.97E+11 218 7.33E+02 kg 2.97E+11 218 | | 6.65E+09 | J | 3.97E+05 | | 2.58E+09 | J | 3.97E+05 | | 2.47E+09 | J | 1.45E+05 | |
| Services 1.78E+04 \$ 2.50E+12 44,429 1.78E+04 \$ 2.50E+12 44,429 1.78E+04 \$ 2.50E+12 44,429 8.89E+03 \$ 2.50E+12 22,214 Solid Weste 1.47E+03 kg 2.97E+11 436 7.33E+02 kg 2.97E+11 218 7.33E+02 kg 2.97E+11 218 | | | | | 4,649 | | | | 1,748 | | | | 605 |
| Non-durable Supplies 1.76E+04 \$ 2.50E+12 44,429 1.78E+04 \$ 2.50E+12 44,429 8.89E+03 \$ 2.50E+12 22,214 Solid Weste 1.47E+03 kg 2.97E+11 436 7.33E+02 kg 2.97E+11 218 7.33E+02 kg 2.97E+11 218 | | | | | | | | | | | | | |
| Solid Weste 1.47E+03 kg 2.97E+11 436 7.33E+02 kg 2.97E+11 218 7.33E+02 kg 2.97E+11 218 | | | _ | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Flec - Flectronics 1 90F±10 3 97F±05 7 546 7 37F±00 3 97F±05 2 924 7 08F±09 1 45F±05 1 026 | | | kg | 2.97E+11 | | 7.33E+02 | kg | 2.97E+11 | | | kg | | |
| | Electronics | 1.90F+10 | _ | 3 97F±05 | | 7.37F±09 | !_ | 3.97F±05 | | 7.08F+09 | _ | 1.45F±05 | |
| | | | | | | | | | 47 570 | | | | |
| Subtotal, Setting 87,900 73,009 36,140 | Subtotal | | | | | | | | | | | | |



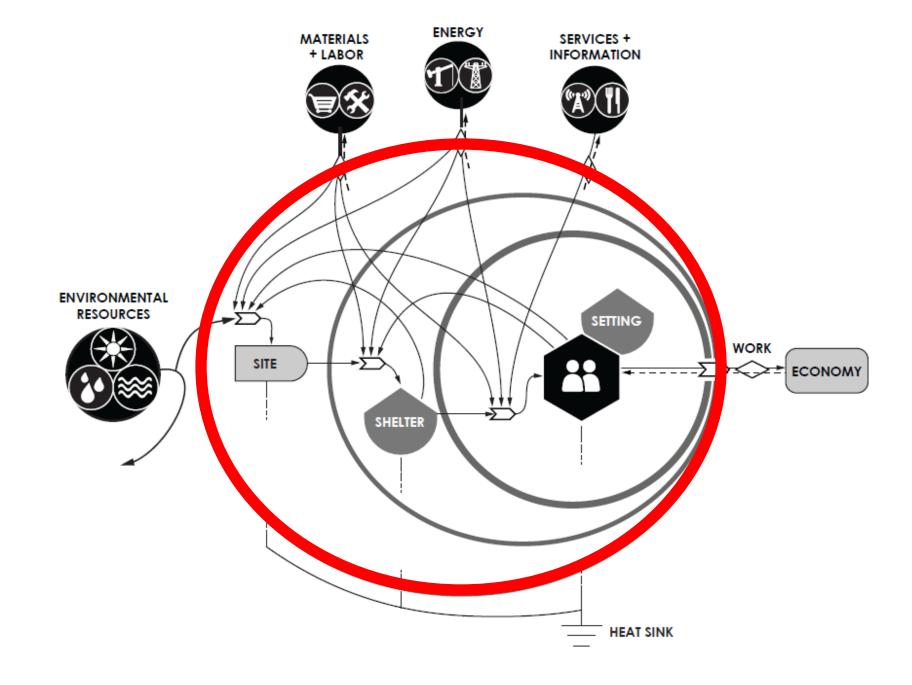




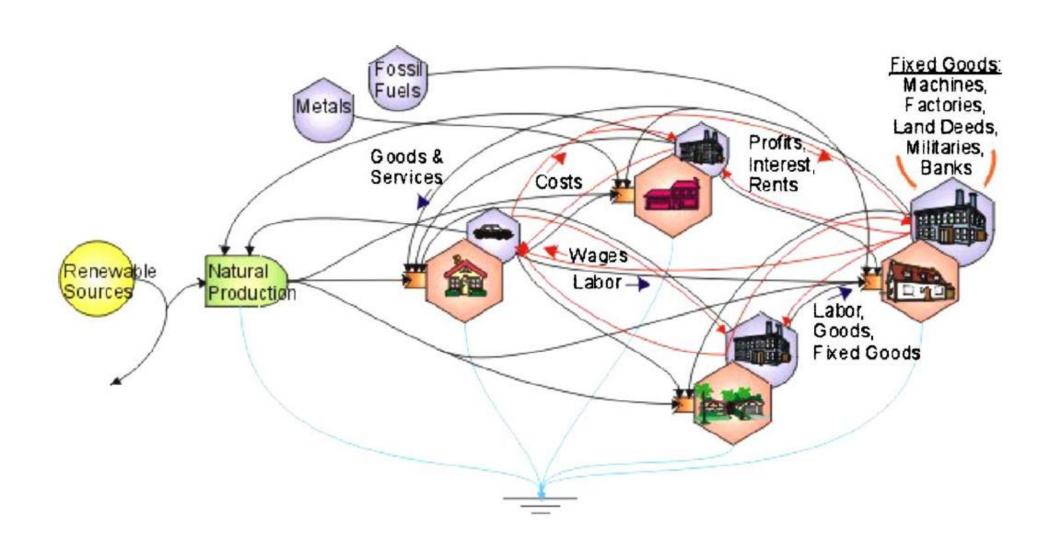
Relaxing and thinking (17 minutes) Playing games; using computer for leisure (26 minutes) Participating in sports, exercise, recreation (18 minutes) Socializing and communicating (37 minutes) NOTE: Data include all persons are 15 and over. Data include all days of the week and are annual averages for the sports of the week and are annual averages for the sports.

NOTE: Data include all persons age 15 and over. Data include all days of the week and are annual averages for 2011.

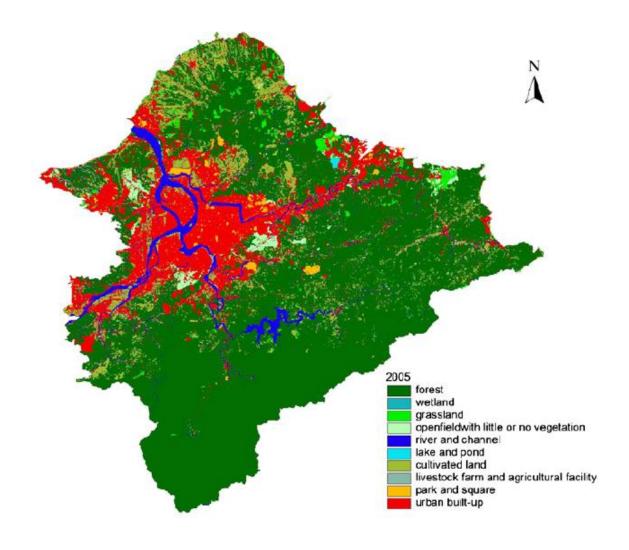
SOURCE: Bureau of Labor Statistics, American Time Use Survey



Location (site) within **socio-economic hierarchies**



Location (site) within urban land-use hierarchies



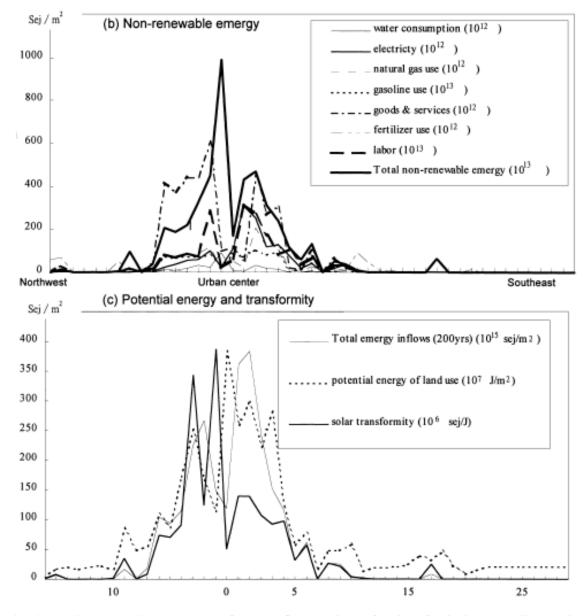
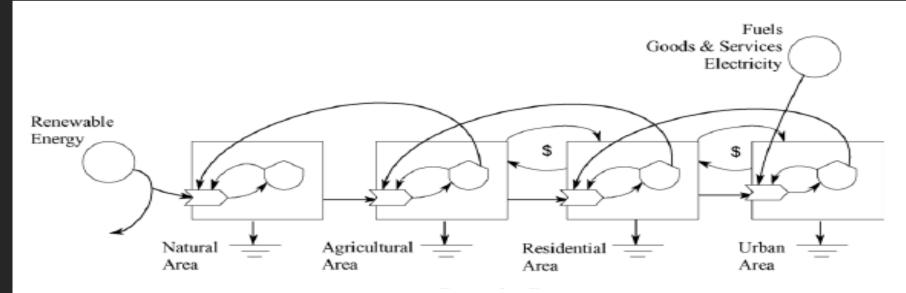


Fig. 4. Northwest-southeast transact of emergy flows and transformity of Taipei metropolitan region.

Cities by themselves are not sustainable, they gather & concentrate the resources of their region



| Empower densities, turnover time, and tra | ansformity of each la | and use in Taip | ei metropolitan regio | n | | | | |
|---|--|----------------------------|--|----------------------------|---|---|---|---|
| Land use type | Renewable emergy | | Non-renewable emergy and economic input | | Total empower density (10 ¹² sej/m ²) | Potential energy (10 ⁶ J/m ²) | Solar transformity (10 ⁶ sej/J) | |
| | Empower density (10 ¹² sej/m ² per year) | Turnover time (year) | Empower density (10 ¹⁰ sej/m ² per year) | Turnover time (year) | | | | |
| Forest | 60.44 | 100.00 | 0.00 | 0.00 | 60.44 | 210.00 | 0.29 | |
| Grassland | 36.65 | 5.00 | 0.00 | 0.00 | 1.83 | 12.70 | 0.14 | 1 |
| Wetland | 33.42 | 10.00 | 0.00 | 0.00 | 3.34 | 44.00 | 0.08 | |
| Farm | 27.55 | 20.00 | 11.75 | 10.00 | 123.01 | 31.90 | 3.85 | |
| River | 26.96 | 1.00 | 0.00 | 0.00 | 0.27 | 480.00 | _a | |
| Low density residential | 41.30 | 200.00 | 1618.68 | 25.00 | 78387.10 | 640.00 | 122.00 | |
| Medium density residential | 40.78 | 200.00 | 5879.30 | 50.00 | 579592.56 | 1290.00 | 151.00 | |
| High density residential and commercial | 42.70 | 200.00 | 8158.22 | 100.00 | 1129746.40 | 3020.00 | 207.00 | |
| Industrial | 41.99 | 200.00 | 1828.91 | 55.00 | 181838.08 | 2250.00 | 79.80 | |
| School | 45.81 | 200.00 | 1697.60 | 70.00 | 166515.22 | 1200.00 | 98.00 | |
| Institutional | 45.32 | 200.00 | 1420.79 | 81.00 | 232648.12 | 2250.00 | 107.00 | |
| Utility | 45.90 | 200.00 | 692.58 | 65.00 | 105715.50 | 1150.00 | 96.30 | |
| Transportation | 22.21 | 200.00 | 1856.02 | 70.00 | 283673.22 | 8030.00 | 29.60 | |
| Mining | 31.43 | 200.00 | 49.51 | 50.00 | 37087.36 | 2400.00 | 15.50 | |
| Recreation | 42.18 | 25.00 | 12.58 | 12.50 | 237.80 | 14.90 | 10.20 | |
| Fallow | 22.86 | 1.00 | 21.23 | 0.50 | 17.97 | 6.39 | 2.09 | |
| Others | 35.20 | 25.00 | 565.46 | 12.50 | 56403.80 | 318.00 | 177.00 | |
| | | | | | | | | |

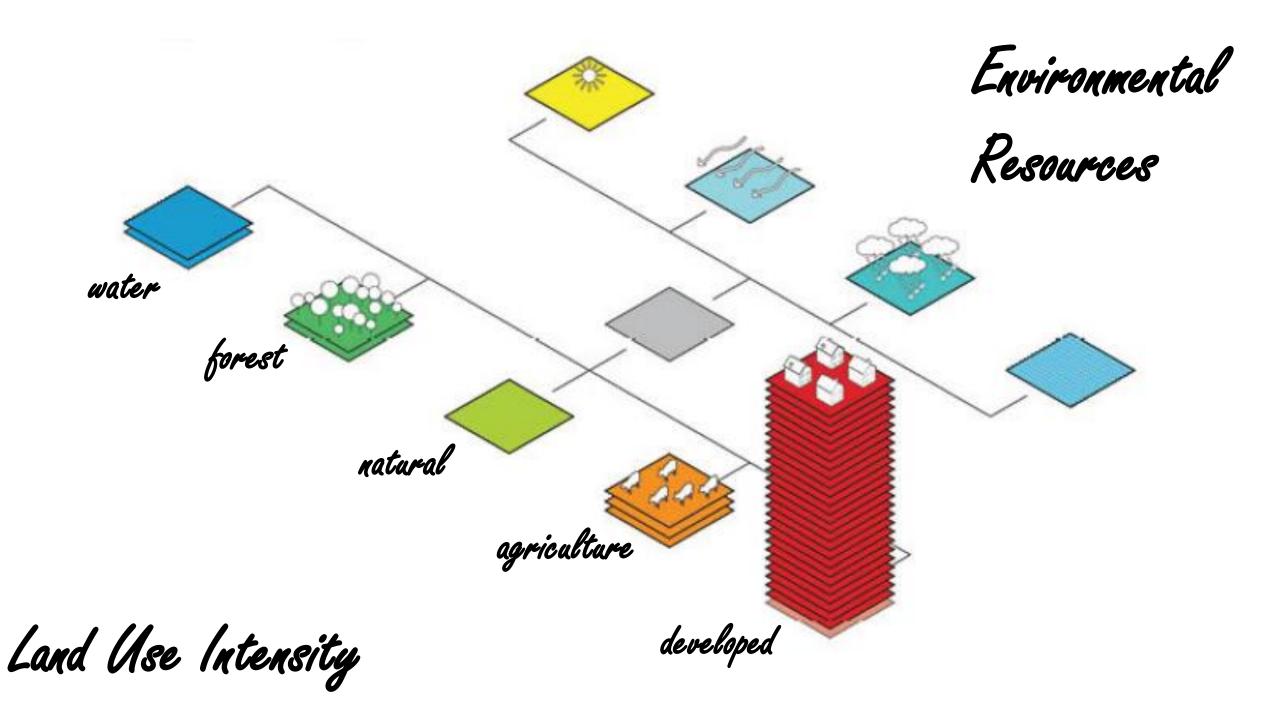
a Values less than 0.01.

Table 1







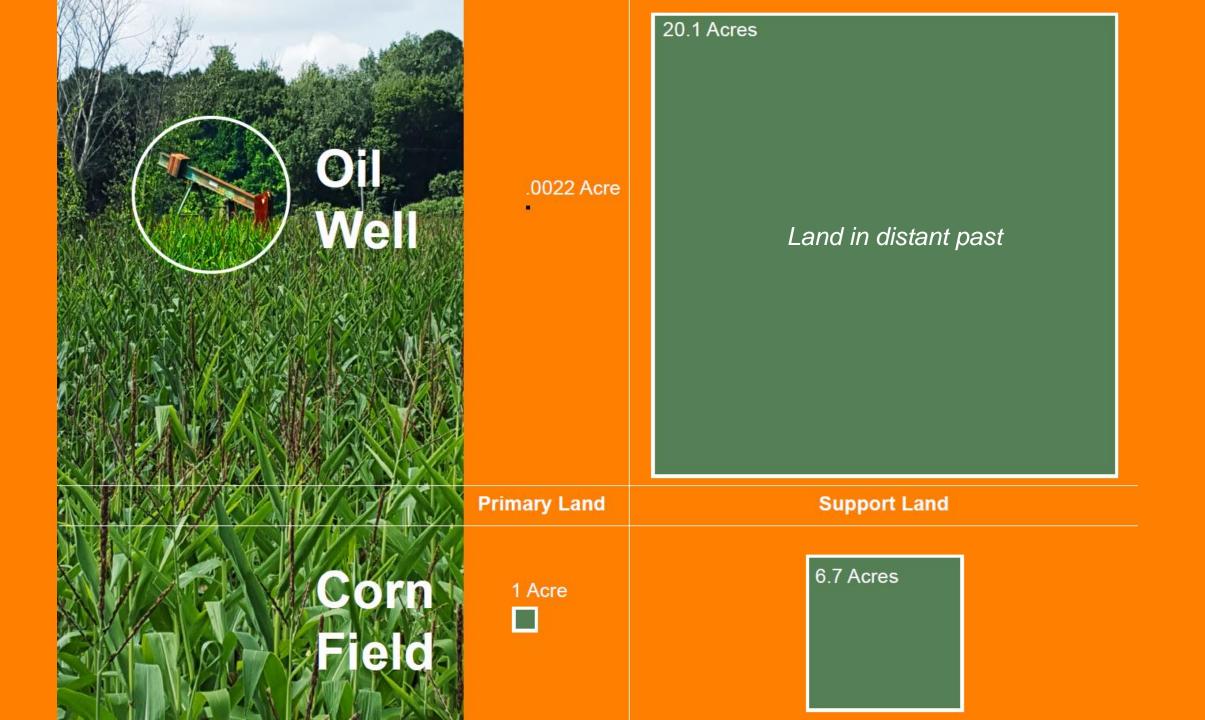


Photovolatics

Support

Support Land

Production 1*



Chautauqua, NY

| Existing | Data | Unit Solar Emergy sellunit | Solar Emergy | Land Area | Normalized Data |
|--|--|---|--|--------------------------|---|
| WATER & WETLANDS | units/year 6.92E+18 J | sejuni | E14 sej/year 8,898,803 E14sej | 323,981 34% | 21.29 El4sejacre |
| RENEWABLE INPUTS | 5.92E+18 J | 1.13E+02 | 6.67E+06 E14sej | 323,981 acres | 20.60 E14sej/acre |
| 1 SUNLIGHT | 5.84E+18 | 1.00E+00 | 58,444 1% | 323,981 | 0.18 |
| 2 RAIN - CHEMICAL | 1.68E+16 | 3.02E+04 | 5,015,289 73% | 323,981 | 15.48 |
| 3 WIND KINETIC ENERGY PURCHASED INPUTS | 6.38E+16 8.05E+12 J | 2.51E+03 2.76E+06 | 1,600,815 23% 222,255 E14sej | 323,981 281,178 acres | 4.94 0.79 E14sej/acre |
| 4 FISH | 8.05E+12 | 2.76E+06 | 222,255 3% | 281,178 acres | 0.79 |
| NATURAL LAND | 8.78E+17 J | | 728,682 E14sej | 37,082 4% | 19.88 E14sej/acre |
| RENEWABLE INPUTS | 6.78E+17 J | 1.07E+02 | 7.29E+05 E14sej | 37,062 acres | 19.66 E14sej/acre |
| 5 SUNLIGHT | 6.69E+17 | 1.00E+00 | 6,686 1% | 37,082 | 0.18 |
| 6 RAIN - CHEMICAL 7 WIND KINETIC ENERGY | 1.71E+15 8.19E+15 | 3.02E+04 2.51E+03 | 516,360 71% 205,516 28% | 37,062 37,062 | 13.93 |
| FOREST LAND | 8.20E+18 | 2.512403 | 8,742,142 E14sej | 338,768 18% | 19.90 E14sejacre |
| RENEWABLE INPUTS | 6.20E+18 J | 1.07E+02 | 6,55E+06 E14sel | 338,758 acres | 19.66 E14sej/acre |
| 8 SUNLIGHT | 6.11E+18 | 1.00E+00 | 61,110 1% | 338,758 338,758 | 0.18 |
| 9 RAIN - CHEMICAL | 1.56E+16 | 3.02E+04 | 4,719,644 70% | 338,758 | 13.93 |
| 10 WIND KINETIC ENERGY | 7.48E+16 | 2.51E+03 | 1,878,465 28% | 338,758 | 5.55 |
| PURCHASED INPUTS 11 HARVESTED WOOD | 1.23E+14 J 1.23E+14 | 6.72E+04 6.72E+04 | 82,923 E14sej 82,923 1% | 180,558 acres 180,558 | 0.46 E14sej/acre 0.46 |
| AGRICULTURE LAND | 3.85E+18 J | 0.120.00 | 9,818,820 E14sej | 210,484 22% | 48.84 £14sej/acre |
| RENEWABLE INPUTS | 3.85E+18 J | 1.07E+02 | 4,137,243.33 E14sej | 210,464 acres | 19.66 E14sej/acre |
| 12 SUNLIGHT | 3.80E+18 | 1.00E+00 | 37,986 0% | 210,464 acres | 0.18 |
| 13 RAIN - CHEMICAL | 9.70E+15 | 3.02E+04 | 2,932,223 30% | 210,464 | 13.93 |
| 14 WIND KINETIC ENERGY | 4.65E+16 | 2.51E+03 | 1,167,054 12% | 210,464 | 5.55 |
| PURCHASED INPUTS | 1.29E+15 J | 4.42E+05 | 5,679,377 E14sej | 150,567 acres | 37.72 E14sej/scre |
| 15 GRAIN GROPS HARVESTED | 7.84E+14 | 5.87E+05 | 4,604,540 47% | 88,088 | 53.50 |
| 16 VEGETABLES HARVESTED 17 FRUITS HARVESTED | 2.30E+11 3.55E+14 | 2.31E+05 1.89E+05 | 530 0% 670,989 7% | 349 19,440 | 1.52 34.52 |
| 18 MEAT PRODUCED | 5.55E+14 6.44E+12 | 8.60E+05 | 55.368 1% | 16,375 | 338 |
| 19 MLK PRODUCED | 2.00E+13 | 6.00E+05 | 119,943 1% | 23,936 | 5.01 |
| 20 BIOFUELS PRODUCED | 1.21E+14 | 1.89E+05 | 227,998 2% | 4,401 | 51.81 |
| DEVELOPED LAND | | | 42,381,681 E14sej | 49,860 8% | 849.79 E14sej/acm |
| RENEWABLE INPUTS | 9.01E+17 | 2.90E+01 | 260,879 E14sej | 49,850 | 5.23 E14sej/acre |
| 21 SUNLIGHT | 8.99E+17 | 1.00E+00 | 8,993 0% | 49,860 | 0.18 |
| 22 RAIN - CHEMICAL 23 WIND KINETIC ENERGY | 7.88E+14 5.20E+14 | 3.02E+04 2.51E+03 | 238,411 1% | 49,850 49,850 | 4.78 0.26 |
| 24 RAIN - GEOPOTENTIAL | 9.00E+11 | 4.70E+04 | 423 0% | 4,258 | 0.10 |
| PURCHASED INPUTS | | | 42,100,802 E14sej | 49,850 | 844.55 E14sej/acre |
| Construction Materials | 2.77E+08 m² | 8.32E+11 | 2,305,101 E14sej | 49,850 | 46.24 E14sej/scre |
| 25 BUILDING CONSTRUCTION 27 PARKING CONSTRUCTION | 9.26E+07 | 2.38E+12 3.08E+13 | 43,714 2% | 4,258 | 10.27 |
| 27 PARKING CONSTRUCTION 27 DEVELOPED LAND | 1.41E+08 | 3.08E+13 7.00E+10 | 1,563,525 68% 98,365 4% | 1,254 34,720 | 1,246.43 2.83 |
| | 3.89E+07 | 3.08E+13 | 509,507 26% | 9,620 | 62.32 |
| 28 ROAD CONSTRUCTION | | | | | |
| Water | 4.86E+10 L | 7.25E+08 | 352,002 E14sej | | 2.61 E14sej/perso |
| Water 29 POTABLE WATER | 2.88E+10 | 1.22E+09 | 381,250 100% | | 2.60 |
| Water | | | | | |
| Water 29 POTABLE WATER 30 WASTE WATER Food | 2.88E+10 1.98E+10 4.00E+14 J | 1.22E+09 3.80E+06 1.18E+06 | 351,250 100% 752 0% 4,709,023 E14sej | | 2.60 0.01 34.91 E14se/pers |
| Water 29 POTABLE WATER 30 WASTE WATER | 2.88E+10 1.98E+10 | 1.22E+09 3.80E+06 | 381,250 100% 752 0% | | 2.60 0.01 |
| Water 29 POTABLE WATER 30 WASTE WATER Food 31 GRAINS + CEREALS | 2.88E+10 1.98E+10 4.00E+14 J 1.84E+14 | 1.22E+09 3.80E+06 1.18E+06 6.00E+05 | 351,250 100% 752 0% 4,709,023 E14sej 1,105,482 23% | | 2.60 0.01 34.91 E14se@pens 8.19 |
| Water 29 POTABLE WATER 30 WASTE WATER Food 31 GRAINS - CEREALS 32 VEGETABLES | 2.88E+10 1.98E+10 4.00E+14 J 1.84E+14 4.33E+13 | 1.22E+09 3.80E+06 1.18E+06 6.00E+05 6.00E+05 | 351,250 100% 752 0% 4,709,023 E14sej 1,105,452 23% 45,642 1% | | 2.60 0.01 34.91 E14sej/pens 8.19 0.34 |
| Water 29 POTABLE WATER 30 POTABLE WATER Food 31 ORANG - CEREALS 32 FRUITS 34 MEAT 35 DARRY | 2.88E+10 1.98E+10 4.00E+14 J 1.84E+14 4.33E+13 3.73E+13 9.42E+13 2.00E+13 | 1.22E+09 3.80E+06 1.18E+06 6.00E+05 6.00E+05 6.00E+05 3.27E+06 6.00E+05 | 381,280 100% 752 0% 4,799,923 E14sej 1,105,482 23% 45,642 13% 223,901 5% 3,060,922 65% 119,943 3% | | 2.50 0.01 34.91 E14sej/pens 8.19 0.34 1.58 22.84 0.89 |
| Wider 29 POTABLE WATER 30 WASTE WATER Food 11 GRAINS + CEREALS 32 VEGETABLES 33 HEAT 34 MEAT | 2.88E+10 1.98E+10 4.00E+14 J 1.84E+14 4.33E+13 3.73E+13 9.42E+13 | 1.22E+09 3.80E+06 1.18E+06 6.00E+05 6.00E+05 6.00E+05 3.27E+06 | 381,250 100% 782 0% 4,709,023 £14sej 1,105,462 23% 45,642 1% 223,901 5% 3,080,922 65% | | 2.50 0.01 34.91 E14sej/pens 8.19 0.34 1.58 22.84 |
| Water 29 POTABLE WATER 30 WASTE WATER Food 10 GRAINS + CEREALS 32 VEGETARLES 33 FRAITS 34 MEAT 35 GAIRY 36 FIGH UBINES | 2.88E+10 1.98E+10 4.90E+14 J 1.84E+14 4.33E+13 3.73E+13 2.42E+13 2.00E+13 1.77E+16 J | 1.22E+09 3.80E+06 1.18E+06 6.00E+05 6.00E+05 6.00E+05 3.27E+06 6.00E+05 6.50E+05 1.49E+05 | 391,250 100% 752 00% 4,709,023 E14sej 1,105,452 23% 46,942 1% 203,001 5% 3,080,922 65% 119,943 3% 133,134 3% 26,391,215 E14sej | | 2.50 0.01 34.91 E14sejipens 8.19 0.34 1.85 22.84 0.89 0.99 |
| Water 29 POTABLE WATER 30 WASTE WATER Food 31 GRANG- CEREALS 22 VEGETABLES 38 FRATS 34 MEAT 36 SARRY 36 FISH UBBBES 37 ELECTRICTY PRODUCED IN CHAUTAUDUA | 2.88E+10 1.98E+10 4.00E+14 J 1.84E+14 4.33E+13 3.73E+13 9.42E+13 2.00E+13 2.05E+13 1.77E+16 J 2.59E+15 | 1.22E+09 3.80E+06 1.18E+06 6.00E+05 6.00E+05 6.00E+05 3.27E+06 6.00E+05 6.50E+05 1.49E+05 3.42E+05 | 381,280 100% 752 0% 4,799,823 El4sel 1,105,402 29% 45,642 1% 223,901 5% 3,060,922 65% 119,943 3% 133,134 3% 28,391,215 El4sel 6,965,375 34% | | 2.50 0.01 34.91 E14sejipen: 8.19 0.34 1.86 22.54 0.89 0.99 195.53 E14sejipen: 65.73 |
| Water 29 POTABLE WATER 30 WASTE WATER Food 10 GRAINS + CEREALS 32 VEGETABLES 39 FRATS 34 MEAT 35 DAIRY 36 JISH UBBBes 37 ELECTRICTY PRODUCED IN CHAUTAUDUA 38 ELECTRICTY PRODUCED OUTSIDE COUNTY | 2.88E+10 1.96E+10 4.90E+14 J 1.84E+14 4.33E+13 3.73E+13 2.00E+13 2.00E+13 2.05E+13 1.77E+16 J 2.59E+15 5.52E+15 | 1.22E+09 3.80E+06 1.18E+06 6.00E+05 6.00E+05 6.00E+05 3.27E+06 6.00E+05 6.50E+05 1.49E+05 3.42E+05 2.21E+05 | 351,250 100% 752 0% 4,759,020 E14eel 1,105,620 22% 45,542 1% 223,00 5% 3,000,322 65% 119,043 3% 25,391,215 E14eel 8,666,076 34% 12,075,801 49% | | 2.60 0.01 34.91 E14sej/pens 8.19 0.34 1.86 22.84 0.89 0.99 198.63 E14sej/pens 65.73 98.44 |
| Water 29 POTABLE WATER 30 WASTE WATER Food 31 GRANG- CEREALS 22 VEGETABLES 38 FRATS 34 MEAT 36 SARRY 36 FISH UBBBES 37 ELECTRICTY PRODUCED IN CHAUTAUDUA | 2.88E+10 1.98E+10 4.00E+14 J 1.84E+14 4.33E+13 3.73E+13 9.42E+13 2.00E+13 2.05E+13 1.77E+16 J 2.59E+15 | 1.22E+09 3.80E+06 1.18E+06 6.00E+05 6.00E+05 6.00E+05 3.27E+06 6.00E+05 6.50E+05 1.49E+05 3.42E+05 | 381,280 100% 752 0% 4,799,823 El4sel 1,105,402 29% 45,642 1% 223,901 5% 3,060,922 65% 119,943 3% 133,134 3% 28,391,215 El4sel 6,965,375 34% | | 2.50 0.01 34.91 E14sejipen: 8.19 0.34 1.86 22.54 0.89 0.99 195.53 E14sejipen: 65.73 |
| Water 29 POTABLE WATER 30 WASTE WATER Food 31 GRANS - CEREALS 32 FRUITS 33 HEAT 35 DARY 36 PISH UBBRS 37 ELECTRICTY PRODUCED IN CHAUTAUQUA 36 ELECTRICTY PRODUCED OUTSIDE COUNTY 38 MATURAL GAS | 2.88E+10 1.96E+10 4.06E+14 J 1.84E+14 4.33E+13 3.73E+13 2.00E+13 2.00E+13 1.77E+16 J 2.90E+15 7.70E+15 | 1.22E+09 3.80E+06 1.18E+06 6.00E+05 6.00E+05 6.00E+05 6.00E+05 6.00E+05 6.00E+05 6.00E+05 2.2E+05 4.00E+04 | 351,250 100% 4,790,022 E14sel 1,105,402 27% 4,556,21 1% 223,001 5% 3,000,022 55% 119,343 3% 133,134 3% 25,391,215 E14sel 8,669,076 34% 12,075,881 40% 3,000,091 12% | | 2.60 0.01 34.91 E14-ei/pens 8.19 0.34 1.86 22.84 0.89 0.99 198.63 E14-ei/pens 65.73 95.44 22.84 |
| Wider 29 POTABLE WATER 30 WASTE WATER Food 31 GRAINS + CEREALS 32 VIGOETABLES 33 FRATS 34 MEAT 36 FIGH UBBRes 31 GARY 38 FIGH UBBRES 31 ELECTRICTY PRODUCED IN CHAUTAUQUA 38 ELECTRICTY PRODUCED OUTSIDE COUNTY 39 NATURAL GAS 40 FUEL OR. | 2.88E+10 1.96E+10 1.96E+10 1.96E+14 J 1.96E+14 J 1.96E+14 4.33E+13 2.00E+13 2.00E+13 2.06E+13 1.77E+16 J 2.59E+15 5.50E+15 5.50E+15 9.97E+14 | 1.22E+09 3.80E+06 5.00E+05 6.00E+05 6.00E+05 6.00E+05 6.00E+05 6.50E+05 1.49E+05 2.21E+05 4.00E+04 5.54E+04 | 261,250 100% 4,790,022 E14eel 1,100,462 22% 46,542 1% 20,300 5% 3,000,022 65% 119,943 3% 133,134 3% 20,391,215 E14eel 8,000,979 34% 2,000,581 45% 3,000,991 12% 500,0091 12% | | 2.80 0.01 34.91 E14sej/pen- 8.19 0.34 1.86 22.84 0.89 0.99 198.83 E14sej/pen- 68.73 98.44 22.84 4.10 |
| Wider 29 POTABLE WATER 30 WASTE WATER Food 31 GRAINS + CEREALS 32 VIGOTABLES 33 FRAITS 34 MEAT 36 FIGH UBBIS 39 ELECTRICTY PRODUCED IN CHAUTAUDUA 38 ELECTRICTY PRODUCED OUTSIDE COUNTY 39 NATURAL GAS 40 FUEL OL. 41 BIOMASS 42 OTHER Transportation Fuels | 2.886+10 1.986+10 4.986+14 J 1.846+14 4.336+13 3.736+13 9.426+13 2.056+13 1.776+16 5.526+15 7.706+15 9.976+14 1.466+14 1.466+14 1.786+06 g | 1.22E+09 3.00E+05 6.00E+05 6.00E+05 6.00E+05 6.00E+05 6.00E+05 6.00E+05 1.49E+05 3.42E+05 2.21E+05 4.00E+04 5.54E+04 6.72E+05 1.90E+05 1.83E+12 | 261,250 100% 4,790,252 E14eel 1,105,462 22% 46,542 1% 22,300 5% 3,000,322 65% 119,943 3% 133,134 3% 23,911,215 E14eel 1,655,376 34% 12,675,591 45% 3,000,591 12% 552,562 2% 30,560 0% 917,115 3% 3,262,252 E14eel | | 280 001 3431 E14sejipen: 8.19 0.34 1.66 22.84 0.89 0.99 38.43 E14sejipen: 68.73 95.44 22.84 4.10 0.73 6.80 |
| Wider 29 POTABLE WATER 30 WASTE WATER Food 31 GRANG + CEREALS 20 VECETABLES 33 FRAITS 33 BAIRY 36 BIBN 19 BIBN 37 ELECTRICTY PRODUCED IN CHAUTAUQUA 38 ELECTRICTY PRODUCED OUTSIDE COUNTY 39 NATURAL OIL 41 BIDMASS 40 FUEL OIL 41 BIDMASS 42 VENCEL GASCURE CONSUMPTION | 2.58E+10 1.58E+10 1.58E+14 J 1.58E+14 J 1.58E+15 3.73E+13 2.00E+13 2.00E+13 2.00E+13 2.50E+15 5.50E+15 9.37E+14 4.60E+14 4.60E+14 4.60E+14 4.60E+14 | 1.22E+09 3.00E+06 1.18E+06 6.00E+05 6.00E+05 6.00E+05 6.00E+05 6.50E+05 1.49E+05 2.21E+05 4.00E+06 5.54E+04 6.72E+04 1.90E+05 1.33E+12 2.97E+11 | 391,290 100% 4,790,923 E14se(1,105,402 27% 4,594,21 1% 223,901 5% 3,000,922 65% 119,345 3% 133,134 3% 133,134 37% 12,975,381 47% 12,975,381 | | 2.80 0.01 34.91 E14se@pen- 8.19 0.34 1.86 22.84 0.89 0.99 195.63 E14se@pen- 65.73 95.44 22.64 4.10 0.73 6.80 24.18 E14se@pen- 24.18 E14se@pen- |
| Wider 29 POTABLE WATER 30 WASTE WATER Food 31 GRANG * CEREALS 32 FRUITS 33 MEAT 35 DAIRY 36 PIST 37 FLECTROCTY PRODUCED IN CHAUTAUQUA 38 ELECTROCTY PRODUCED OUTSIDE COUNTY 39 NATURAL OF 40 FUEL OR. 41 BIOMASS 42 OTHER Transportation Fuels 43 VENCE GASCUME CONSUMPTION 44 PUBLIC TRANST GASCUME CONSUMPTION | 2.886+10 1.986+10 4.986+14 J 1.846+14 4.336+13 3.736+13 9.426+13 2.056+13 1.776+16 5.526+15 7.706+15 9.976+14 1.466+14 1.466+14 1.786+06 g | 1.22E+09 3.00E+05 6.00E+05 6.00E+05 6.00E+05 6.00E+05 6.00E+05 6.00E+05 1.49E+05 3.42E+05 2.21E+05 4.00E+04 5.54E+04 6.72E+05 1.90E+05 1.83E+12 | 351,250 100% 4,790,022 E14sel 1,105,462 27% 455,021 1% 223,001 5% 3,000,022 65% 119,343 3% 123,134 3% 123,351,215 E14sel 5,660,767 34% 12,075,361 40% 3,000,091 12% 550,562 2% 98,950 0% 97,716 3% 3,260,2172 100% | | 280 001 34.91 E14se@pen- 8.19 0.34 1.86 22.84 0.89 0.89 08.73 95.44 22.84 4.10 0.73 6.80 24.18 E14se@pen- 24.18 |
| Wider 29 POTABLE WATER 30 WASTE WATER Food 31 GRANG * CEREALS 32 VECETABLES 33 PRAITS 34 MEAT 35 DARRY 36 INST 37 ELECTRICTY PRODUCED IN CHAUTAUQUA 36 ELECTRICTY PRODUCED OUTSIDE COUNTY 39 INST 30 ELECTRICTY PRODUCED OUTSIDE COUNTY 40 FUEL OL. 41 BIOMASS 42 OTHER 47 PUEL OL. 43 VENCE CASCUMPTION | 2.58E+10 1.58E+10 1.58E+14 J 1.58E+14 J 1.58E+15 3.73E+13 2.00E+13 2.00E+13 2.00E+13 2.50E+15 5.50E+15 9.37E+14 4.60E+14 4.60E+14 4.60E+14 4.60E+14 | 1.22E+09 3.00E+06 1.18E+06 6.00E+05 6.00E+05 6.00E+05 6.00E+05 6.50E+05 1.49E+05 2.21E+05 4.00E+06 5.54E+04 6.72E+04 1.90E+05 1.53E+12 2.97E+11 | 391,290 100% 4,790,923 E14se(1,105,402 27% 4,594,21 1% 223,901 5% 3,000,922 65% 119,345 3% 133,134 3% 133,134 37% 12,975,381 47% 12,975,381 | | 2.80 0.01 34.91 E14se@pens 8.19 0.34 1.86 22.84 0.89 935.83 E14se@pens 65.73 95.44 22.84 4.10 0.73 6.80 24.18 E14se@pens |
| Wider 29 POTABLE WATER 30 WASTE WATER Food 31 GRAINS - CEREALS 32 VEGETABLES 33 FRATS 34 MEAT 35 DARY 36 FISH UBBBs 37 ELECTRICTY PRODUCED IN CHAUTAUQUA 38 ELECTRICTY PRODUCED OUTSIDE COUNTY 39 NATURAL GAS 40 FUEL OIL 41 BIOMASS 42 OTHER Transportation Fuels 43 VERCLE GASCURE CONSUMPTION 44 PUBLIC TRANSIT GASCUINE CONSUMPTION Other 65 NONDURABLE GOODS 46 NONDURABLE GOODS 46 NONDURABLE GOODS 46 NONDURABLE GOODS | 2.886+10 1.980+10 4.980+14 J 1.840+14 4 1.840+14 4.320+13 3.720+13 9.420+13 2.006+13 2.006+13 2.006+15 5.500+15 5.500+15 9.970+14 1.460+14 1.760+06 g 1.760+06 g 2.760+06 g | 1.20E-00 3.00E-00 1.18E-06 6.00E-05 6.00E-05 6.00E-05 6.00E-05 6.00E-05 6.00E-05 6.00E-05 6.00E-05 6.00E-05 1.49E-05 2.20E-05 1.49E-05 1.20E-05 1.2 | 261,250 100% 4,799,025 E14sej 1,105,462 278 45,642 11, 223,001 5% 3,000,022 65% 119,943 3% 133,134 3% 26,381,215 E14sej 3,562,562 2% 38,050,091 12% 562,562 2% 38,050,091 12% 562,562 2% 38,050,091 12% 562,562 2% 38,050,091 12% 562,562 2% 38,050,091 12% 562,562 2% 38,050,091 12% 562,562 2% 38,050,091 12% 562,562 2% 38,050,091 12% 562,562 2% 38,050,091 12% 562,562 2% 38,050,091 12% 562,562 2% 38,050,091 12% 562,562 2% 38,050,091 12% 562,562 2% 38,050,091 12% 562,562 2% 38,050,091 12% 562,562 2% 563,050,091 1 | | 2.80 0.01 34.91 E14sel/pens 8.19 0.34 1.86 22.84 0.89 0.39 195.53 E14sel/pens 65.73 95.44 22.84 4.10 0.73 6.80 24.18 E14sel/pens 24.18 0.00 37.67 E14sel/pens 33.86 3.87 |
| Wilder 29 POTABLE WATER 30 WASTE WATER FOOD 31 GRANS - CEREALS 32 VEGETABLES 33 FRAITS 34 MEAT 35 DARY 36 INST 36 INST 37 FRAITS 37 ELECTRICTY PRODUCED IN CHAUTAUQUA 30 ELECTRICTY PRODUCED OUTSIDE COUNTY 39 NATURAL GAS 40 FUEL OIL 41 BIOMASS 40 OTHER Transportation Fuels 51 VEHICLE GASCUME CONSUMPTION 44 PUBLIC TRANST GASCUME CONSUMPTION 55 NONDURABLE GOODS | 2.58E+10 1.58E+10 4.00E+14 J 1.54E+14 4.33E+13 3.73E+13 2.00E+13 2.00E+13 2.00E+13 2.50E+15 5.50E+15 7.70E+15 9.97E+14 4.60E+14 4.60E+14 4.70E+06 g 2.76E+06 g | 1.22E-00 3.80E-05 1.18E-05 6.00E-05 6.00E-05 3.27E-05 6.00E-05 3.27E-05 4.00E-05 4.00E-04 5.27E-04 1.90E-04 1.9 | 351,250 100% 4,790,023 E14sei 1,105,462 27% 4,506,022 E55% 119,243 3% 123,134 3% 123,134 3% 123,134 3% 123,134 3% 123,134 3% 123,134 3% 123,134 3% 123,134 3% 123,134 3% 123,134 3% 123,134 3% 123,134 3% 123,134 3% 123,134 3% 123,134 3% 123,134 3% 123,134 3% 123,134 3% 13,134 3 | | 2.80 0.01 24.91 E14se@pens 8.19 0.34 1.86 22.84 0.89 0.89 18.83 E14se@pens 65.73 95.44 22.84 4.10 0.73 6.80 24.18 E14se@pens 24.18 0.00 37.67 E14se@pens |
| Water 20 POTABLE WATER 30 WASTE WATER Food 31 GRAINS + CEREALS 32 VECETABLES 33 FRUTS 34 MEAT 36 FIRST 36 FIRST 37 FIRST 38 FIRST 39 FIRST 30 FIRST 40 FIRST | 2.585=10 1.985=11 1.985=14 1.985=14 1.985=13 3.175=13 9.425=13 2.005=13 2.005=13 2.005=15 5.005=15 5.005=15 5.005=15 1.765=06 g 1.765=06 g 1.765=06 g 1.765=06 g 1.765=06 g 1.765=06 g 1.765=06 g 9.246=07 g | 1.22E-00 3.80E-00 1.18E-04 6.00E-05 6.00E-05 6.00E-05 6.00E-05 6.00E-05 6.00E-05 1.42E-05 2.21E-05 4.02E-05 2.21E-05 4.02E-05 1.32E-12 2.97E-11 3.43E-10 | 351,250 100% 4,790,923 E14eel 1,105,462 27% 45,542 1% 223,00 5% 3,000,922 65% 119,943 3% 133,134 3% 26,391,219 E14eel 3,565,977 34% 12,575,501 40% 3,000,991 12% 502,992 2% 90,090 0% 917,116 3% 3,282,253 E14eel 3,282,172 100% 5,041,200 E14eel 4,577,940 50% 5,161,200 E14eel 4,577,940 50% 5,161,200 E14eel 4,577,940 50% 5,161,200 E14eel 4,577,940 50% 5,161,200 E14eel | 960,115 ***** | 2.80 0.01 34.91 E14sel/pers 8.19 0.34 1.88 22.84 0.99 0.99 195.53 E14sel/pers 4.10 0.73 6.80 24.18 E14sel/pers 24.18 0.00 37.67 E14sel/pers 33.56 3.87 0.23 |
| Water 25 POTABLE WATER 30 WASTE WATER FOOD 31 GRAINS + CEREALS 32 VICETABLES 33 FRATS 34 MEAT 36 FIRS 36 PRITS | 2.986+10 1.986+14 J 1.986+14 J 1.986+14 J 1.986+14 J 1.986+13 2.006+13 2.006+13 2.006+13 2.006+13 2.006+15 5.002+15 5.002+15 5.002+15 1.986+16 4.002+14 4.002+14 4.002+14 1.786+06 g 2.706+06 g 1.786+06 g 9.246+07 g | 1.20E-00 3.00E-00 1.18E-06 6.00E-05 6.00E-05 6.00E-05 6.00E-05 6.00E-05 6.00E-05 6.00E-05 6.00E-05 6.00E-05 1.49E-05 2.20E-05 1.49E-05 1.20E-05 1.2 | 351,250 100% 4,790,923 E14eel 1,105,462 27% 45,542 1% 223,00 5% 3,000,922 65% 119,943 3% 133,134 3% 23,391,219 E14eel 1,565,970 34% 12,575,801 40% 3,000,991 12% 502,992 2% 90,990 0% 917,116 3% 3,282,255 E14eel 3,282,172 100% 5,561,200 E14eel 4,527,943 09% 31,572 1% 18,562,707 444 e1 | 960,115 «cn» | 2.80 0.01 34.91 E14se@pens 8.19 0.34 1.86 22.84 0.89 0.99 195.83 E14se@pens 68.73 98.44 22.84 4.10 0.73 6.80 24.18 E14se@pens 24.18 0.00 37.67 E14se@pens 33.87 0.23 |

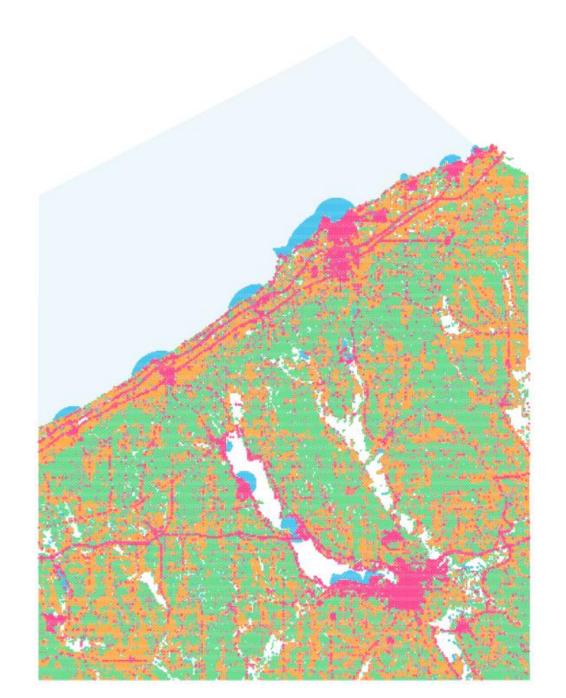
WATER & WETLANDS

NATURAL LAND

FOREST LAND

AGRICULTURE LAND

DEVELOPED LAND



Production vs. Support Footprint(s)

1



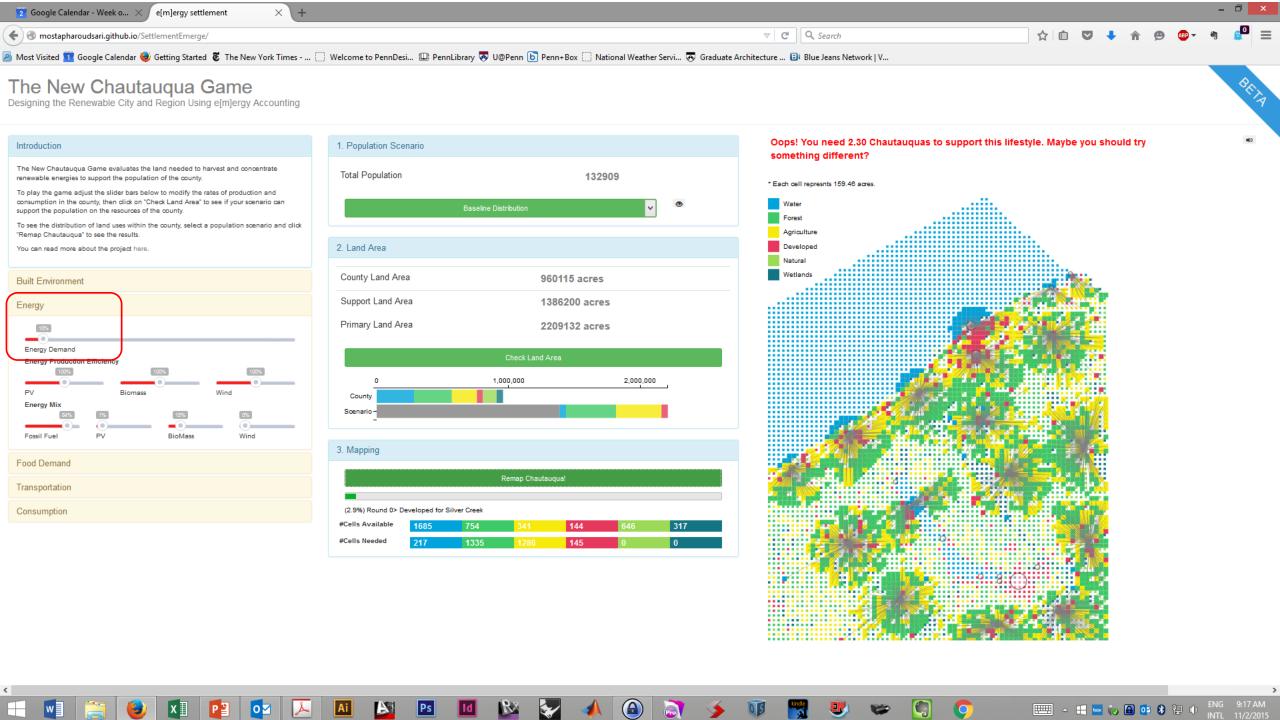
Production Inputs 1.04 e 21 sej
Support Inputs 6.95 e 21 sej
Total Inputs 7.99 e 21 sej

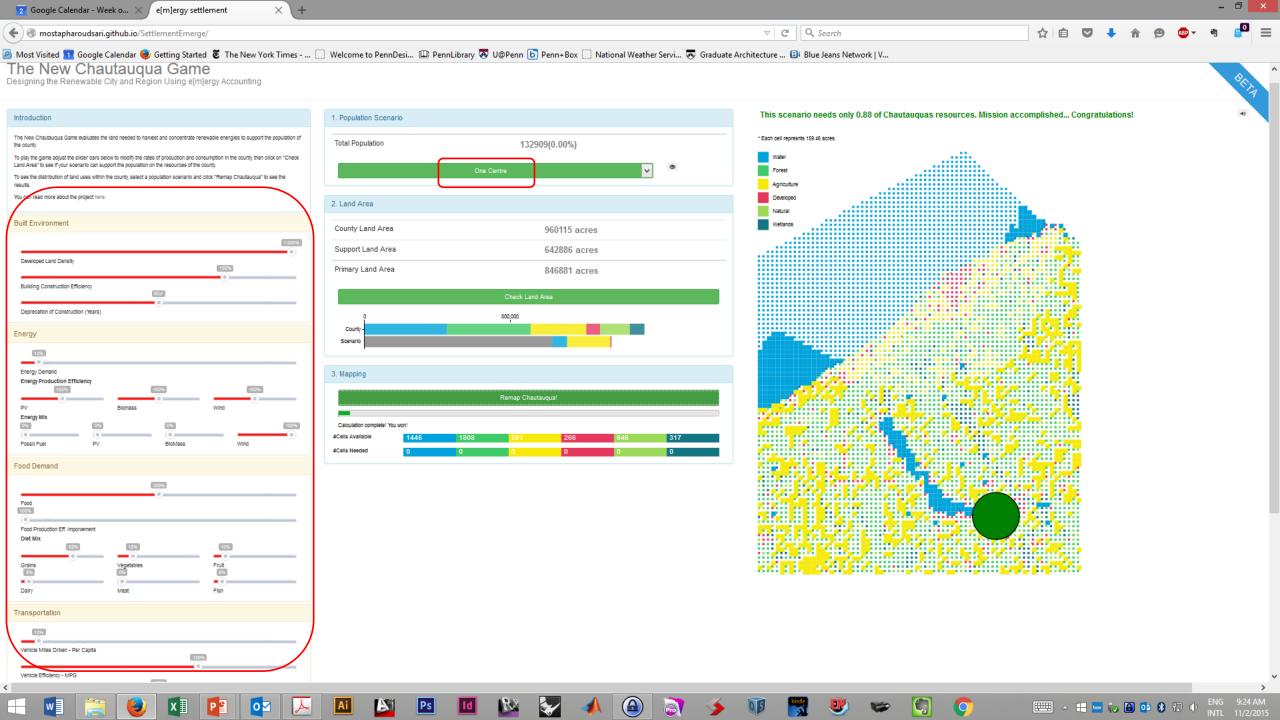
Production Land = 1 Chautauqua*

Support Land = 8.9 Chautauquas*

*As product of **Total Solar EmJoules (SeJ)** required to support current production and consumption.

1 Chautauqua = 960,115 square acres





ARCHITECTURE SSECOLOGY

