

Appendices

Figueres

A. The Grasshopper Script

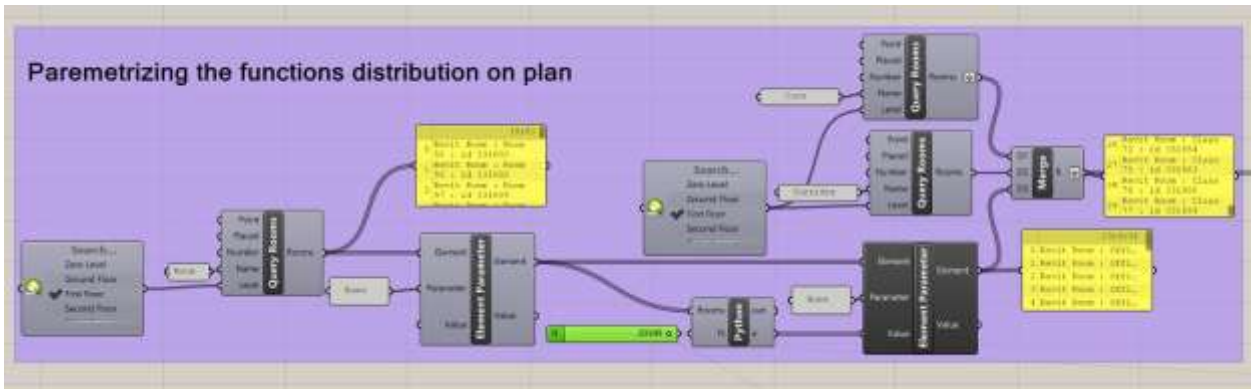


Figure A 1. Script for room querying and changing functions.

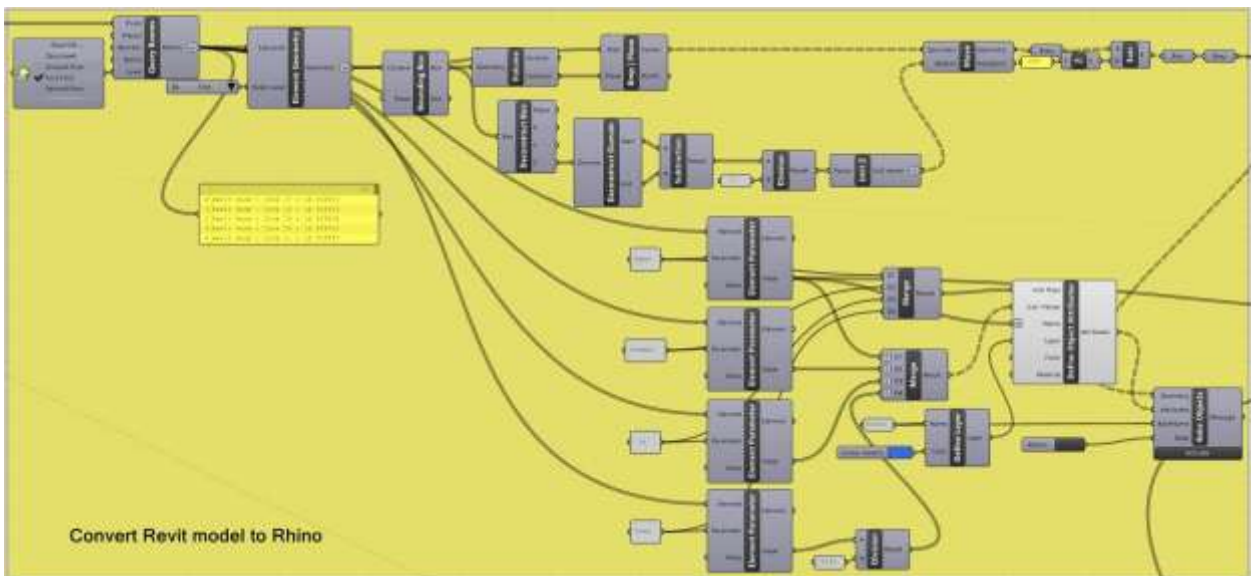


Figure A 2. Convert the Revit® model into a Rhino® model.

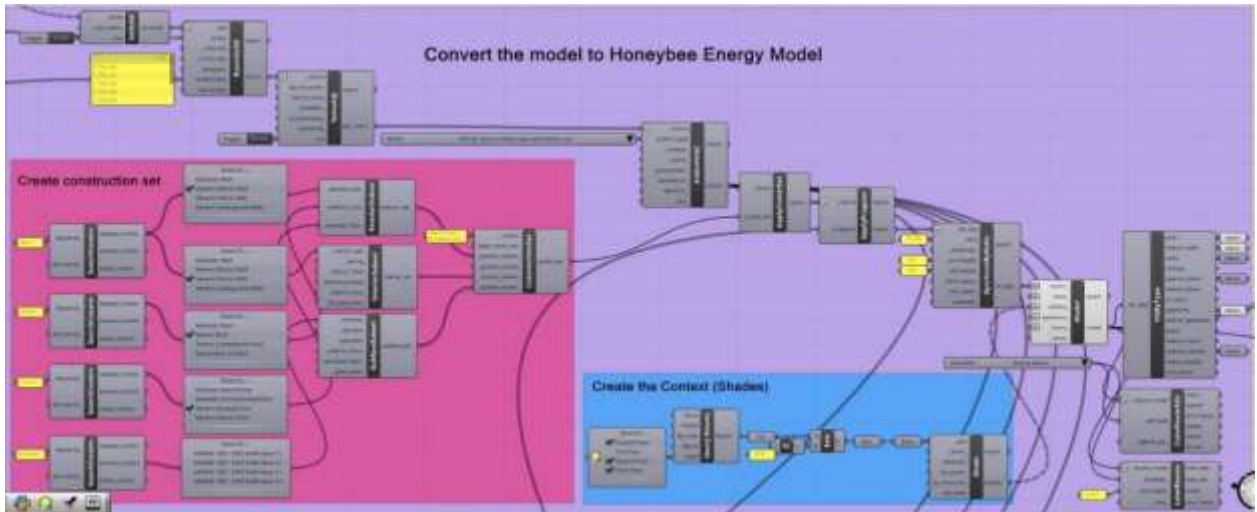


Figure A 3. Changing the model to an Energy model for simulation.

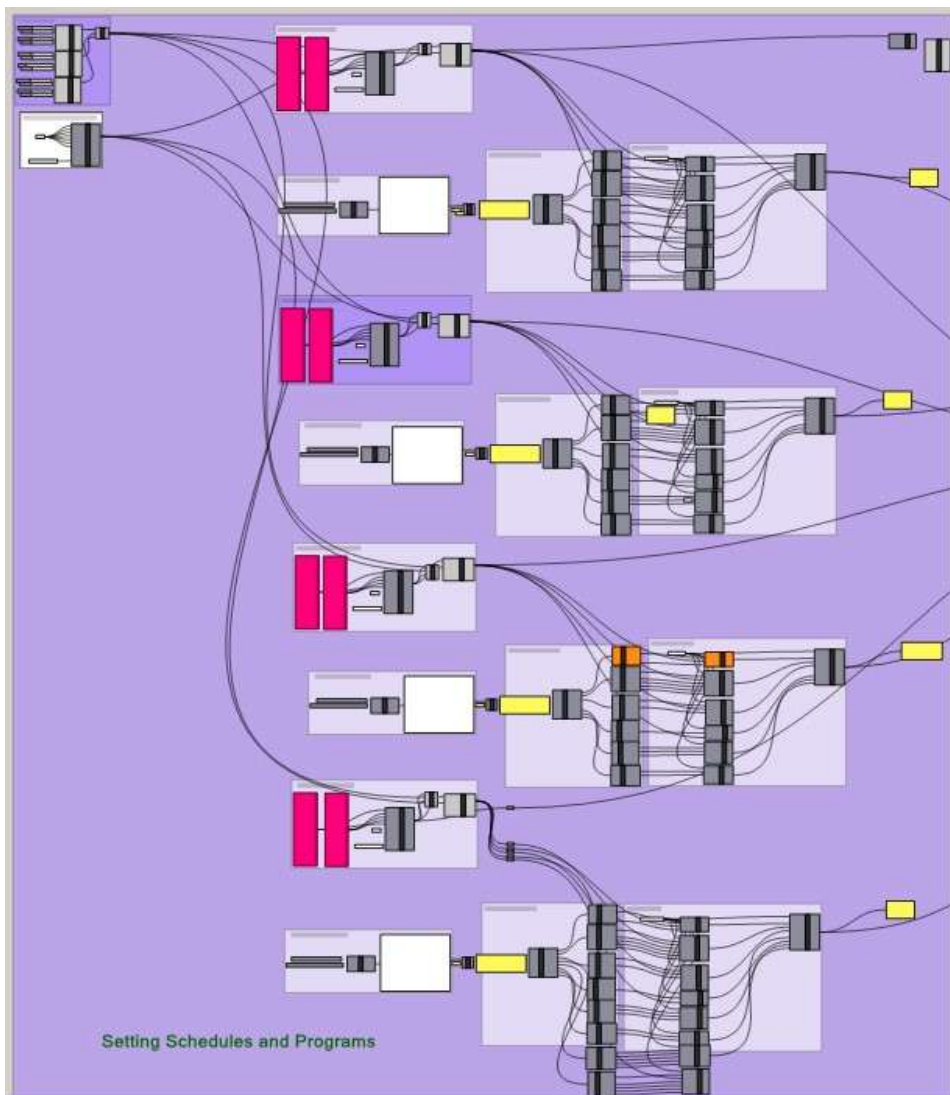


Figure A 4. Schedules and Programs for each different space function.

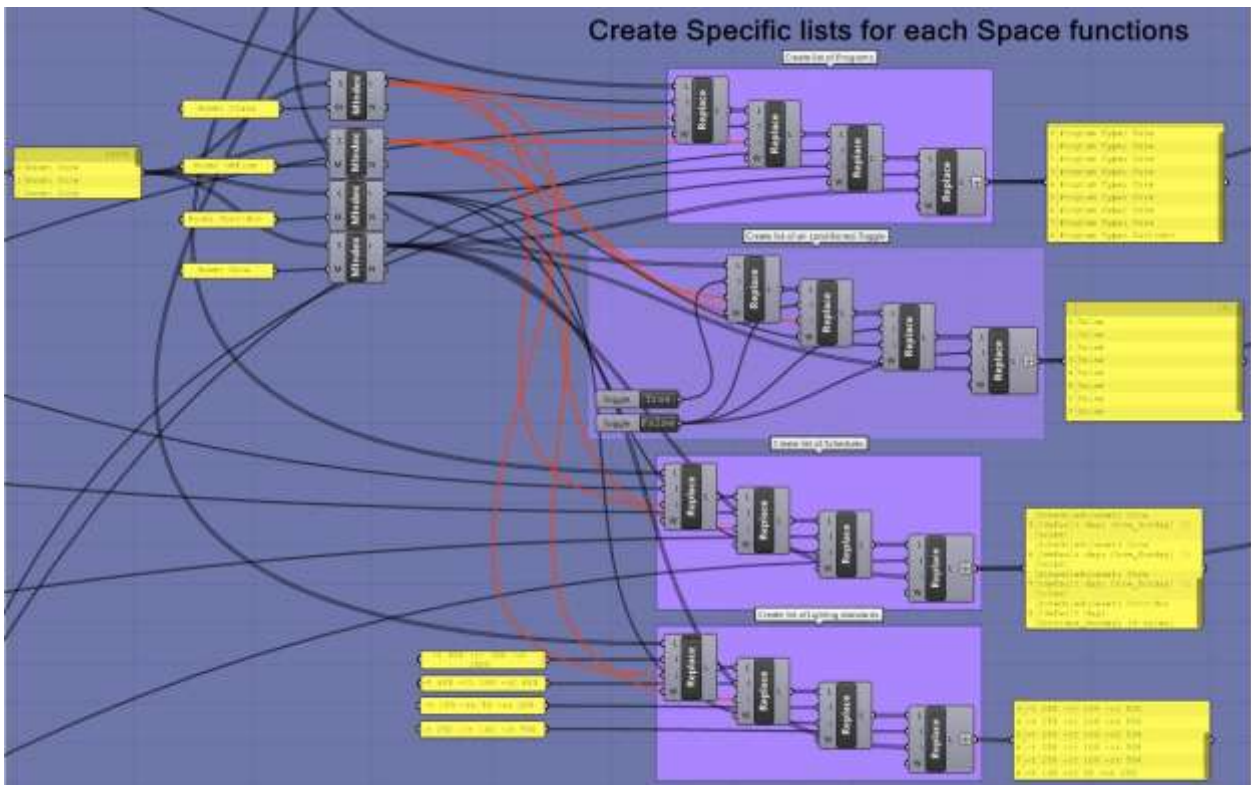


Figure A 5. Create specific lists for each space function.

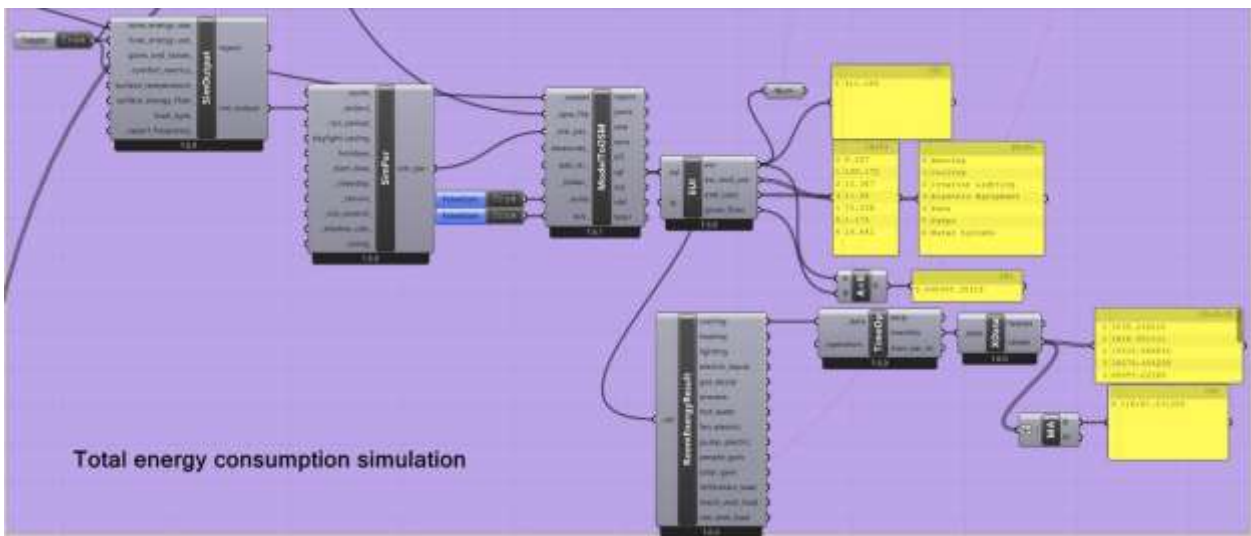


Figure A 6. Total End Use Intensity Simulation.

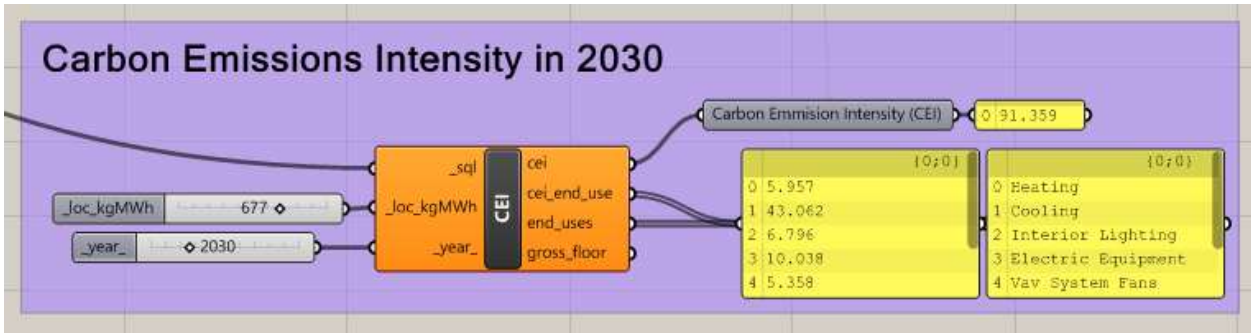


Figure A 7. Carbon Emissions Intensity script.

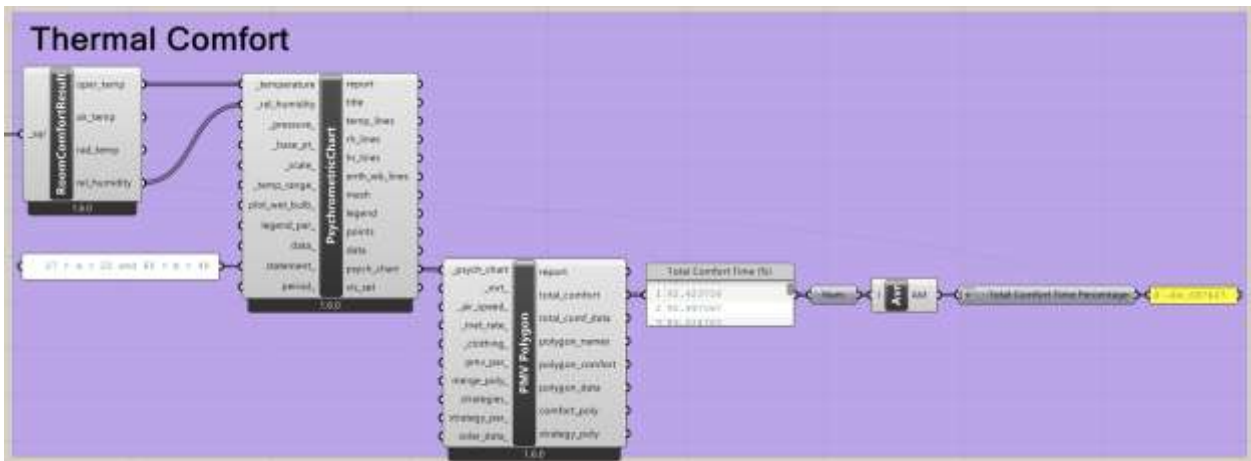


Figure A 8. Total Comfort script.

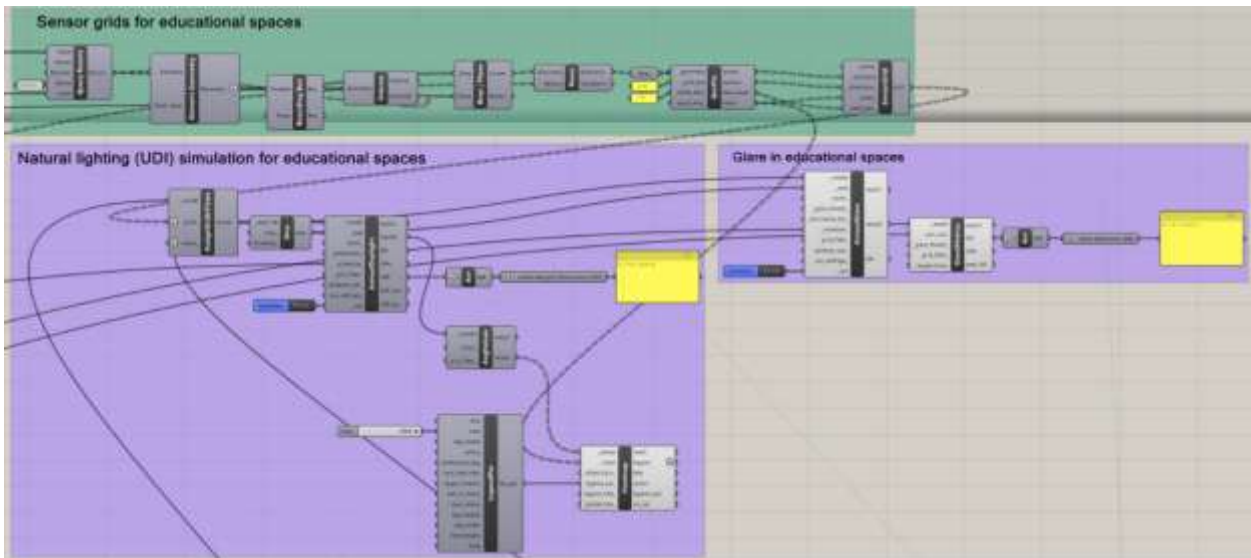


Figure A 9. Useful Daylight Illuminance and Glare Autonomy Script.



Figure A 10. Octopus© settings.

Tables

A. Results

Table A 1. Assiut Case 1, Best Designs

Generation number	Glare Autonomy (GA) %	Useful Daylight Illuminance (UDI) %	Total Comfort Time %	Carbon emission intensity (CEI) kgCO2/m ²	Total Energy Consumption (EUI) kWh/m ²	Slider Ratio	Slider	Results Summation	Attributes	Plan Design
1	89.37005	76.15721	84.24587	93.86500	138.64800	0.778678203	20506	-17.26013		
3	89.28570	76.28150	84.26687	93.95100	138.77600	0.786265697	20706	-17.10708		
4	88.75198	75.92181	84.29221	93.64400	138.32200	0.863386192	22737	-16.99999		
5	89.51886	75.80327	83.97028	93.59000	138.24200	0.006976522	185	-17.46042		
5	90.30088	76.56983	84.08512	93.86300	138.64600	0.890844563	23460	-18.44683	Best Overall Best GA	
6	88.67617	76.44206	84.26644	93.64900	138.32900	0.772886748	20353	-17.40667		
7	77.12026	74.09031	84.63080	93.88900	138.68400	0.994074043	26178	-3.26836	Best Total Comfort	
7	88.70268	76.19676	84.45799	93.56100	138.19900	0.773230737	20362	-17.59742		
9	84.69041	81.18936	84.18571	94.00200	138.85000	0.000429494	12	-17.21349	Best UDI	
9	78.81857	74.35327	84.19112	93.51300	138.12800	0.89097748	23463	-5.72195	Best CEI Best EUI	
9	88.60336	76.07104	84.29667	93.59500	138.25000	0.000347539	10	-17.12606		

Table A 2. Assiut Case 1, Worst Designs



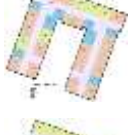



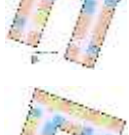

Generation number	Glare Autonomy (GA) %	Useful Daylight Illuminance (UDI) %	Total Comfort Time %	Carbon emission intensity (CEI) kgCO2/m ²	Total Energy Consumption (EUI) kWh/m ²	Slider Ratio	Slider	Results Summation	Attributes	Plan Design
1	75.25883	72.31533	84.03906	94.54800	139.65800	0.230697712	6076	2.59278	Worst GA Worst CEI Worst EUI	
2	75.34631	72.35251	84.10696	94.44100	139.49900	0.509778971	13425	2.13421		
3	75.40189	72.03456	84.11063	94.44200	139.50100	0.440953063	11613	2.39592		
5	75.28137	72.44413	84.06283	94.45000	139.51200	0.640215439	16860	2.17367		
6	75.28769	71.96017	83.98371	94.47200	139.54600	0.325154439	8563	2.78643	Worst Overall	
6	87.85628	72.85971	83.84790	94.29700	139.28700	0.134169333	3534	-10.97989	Worst Total Comfort	
6	75.50744	71.86380	84.19162	94.03900	138.90500	0.674333043	17758	1.38113	Worst UDI	
7	75.33561	72.22951	84.11735	94.44400	139.50400	0.393590153	10365	2.26553		
8	75.44401	71.88205	84.27109	94.38100	139.41000	0.730137875	19228	2.19386		
9	75.58111	72.12100	84.01279	94.45200	139.51500	0.323764634	8527	2.25210		
9	75.38792	72.04639	84.08669	94.42400	139.47400	0.640512922	16868	2.37700		

Table A 3. Assiut Case 2, Best Designs









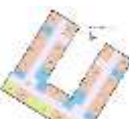




Generation number	Glare Autonomy (GA) %	Useful Daylight Illuminance (UDI) %	Total Comfort Time %	Carbon emission intensity (CEI) kgCO2/m ²	Total Energy Consumption (EUI) kWh/m ²	Slider Ratio	Slider	Results Summation	Attributes	Plan Design
1	91.08272	84.23277	82.73332	94.65100	139.81000	0.791572615	20845	-23.58781		
1	86.65906	80.63401	82.97244	94.52900	139.62900	0.317229366	8355	-16.10751		
1	90.59547	83.88234	82.68567	94.68300	139.85700	0.001369866	37	-22.62347		
2	83.65627	79.01521	83.39880	94.50800	139.59900	0.562873465	14823	-11.96328	Best Total Comfort	
5	90.32571	84.07083	82.86527	94.61900	139.76200	0.000422659	12	-22.88081		
5	83.43043	78.24311	83.16818	94.17800	139.11100	0.99403901	26177	-11.55271	Best CEI Best EUI	
5	86.09190	81.16360	82.89532	94.57100	139.69100	0.268869994	7081	-15.88883		
6	91.52623	84.45862	82.78442	94.69500	139.87500	0.103167236	2718	-24.19927	Best Overall Best GA Best UDI	
9	87.30953	80.64461	82.81075	94.56800	139.68700	0.303570094	7995	-16.50989		
10	90.43768	84.39331	82.83957	94.68700	139.86200	0.000819834	23	-23.12155		
10	86.90157	80.42275	82.85220	94.58800	139.71600	0.320413576	8438	-15.87252		

Table A 4. Assiut Case 2, Worst Designs

Generation number	Glare Autonomy (GA) %	Useful Daylight Illuminance (UDI) %	Total Comfort Time %	Carbon emission intensity (CEI) kgCO2/m ²	Total Energy Consumption (EUI) kWh/m ²	Slider Ratio	Slider	Results Summation	Attributes	Plan Design
1	86.06262	68.39925	82.80940	94.62600	139.77300	0.050962342	1343	-2.87226		
1	86.01902	68.28287	82.85269	94.57900	139.70400	0.965103802	25415	-2.87159		
1	84.27071	79.87825	82.78761	94.75100	139.95800	0.01364912	360	-12.22756	Worst CEI Worst EUI	
1	85.94899	68.21695	82.86345	94.55400	139.66600	0.825338284	21735	-2.80940		
3	86.17089	68.40768	82.87160	94.69200	139.87100	0.17702229	4663	-2.88717		
3	85.68346	68.72264	83.00389	94.55800	139.67200	0.076754406	2022	-3.17999		
3	85.43268	68.36230	82.97636	94.61700	139.75900	0.443280053	11674	-2.39534		
4	85.58855	67.90432	82.80045	94.65500	139.81600	0.008218177	217	-1.82232	Worst Overall Worst UDI	
4	84.91342	68.18687	82.90554	94.34300	139.35400	0.000858865	24	-2.30883		
4	85.15615	68.69164	83.03250	94.59900	139.73300	0.005128836	136	-2.54830		
8	83.08159	80.20880	83.03772	94.31900	139.32000	0.00017174	6	-12.68911	Worst GA	

9	84.97753	80.43770	82.67194	94.39400	139.43000	0.042738404	1126	-14.26316	Worst Total Comfort	
10	85.52222	67.96444	82.98283	94.63900	139.79200	0.5599203	14745	-2.03848		