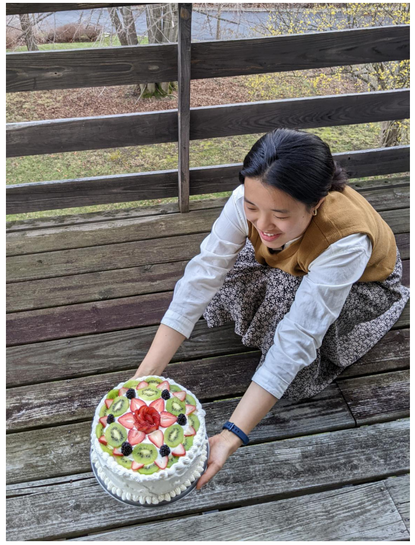
Desai Wang

```
let basics = function
    | “hometown” -> [ “Xi’an, China”;  “Ann Arbor,  Michigan” ]
    | “education” -> [ “BArch, Cornell University”;  “CompSci Minor” ]
    | “interests” -> [ “sustainable design”;  “software development” ]
```

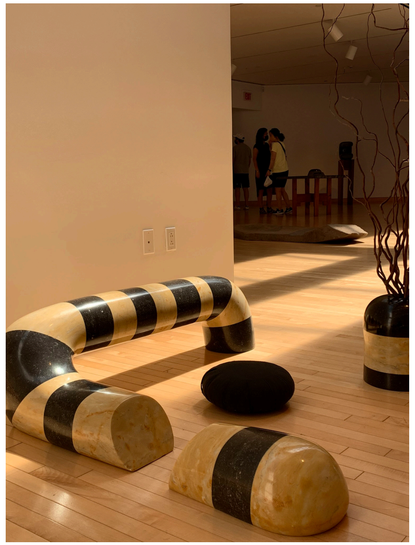
I like...
Mi piace...
我喜欢...

cooking
cucinare
做饭



baking
infornare
烘焙

running
correre
跑步

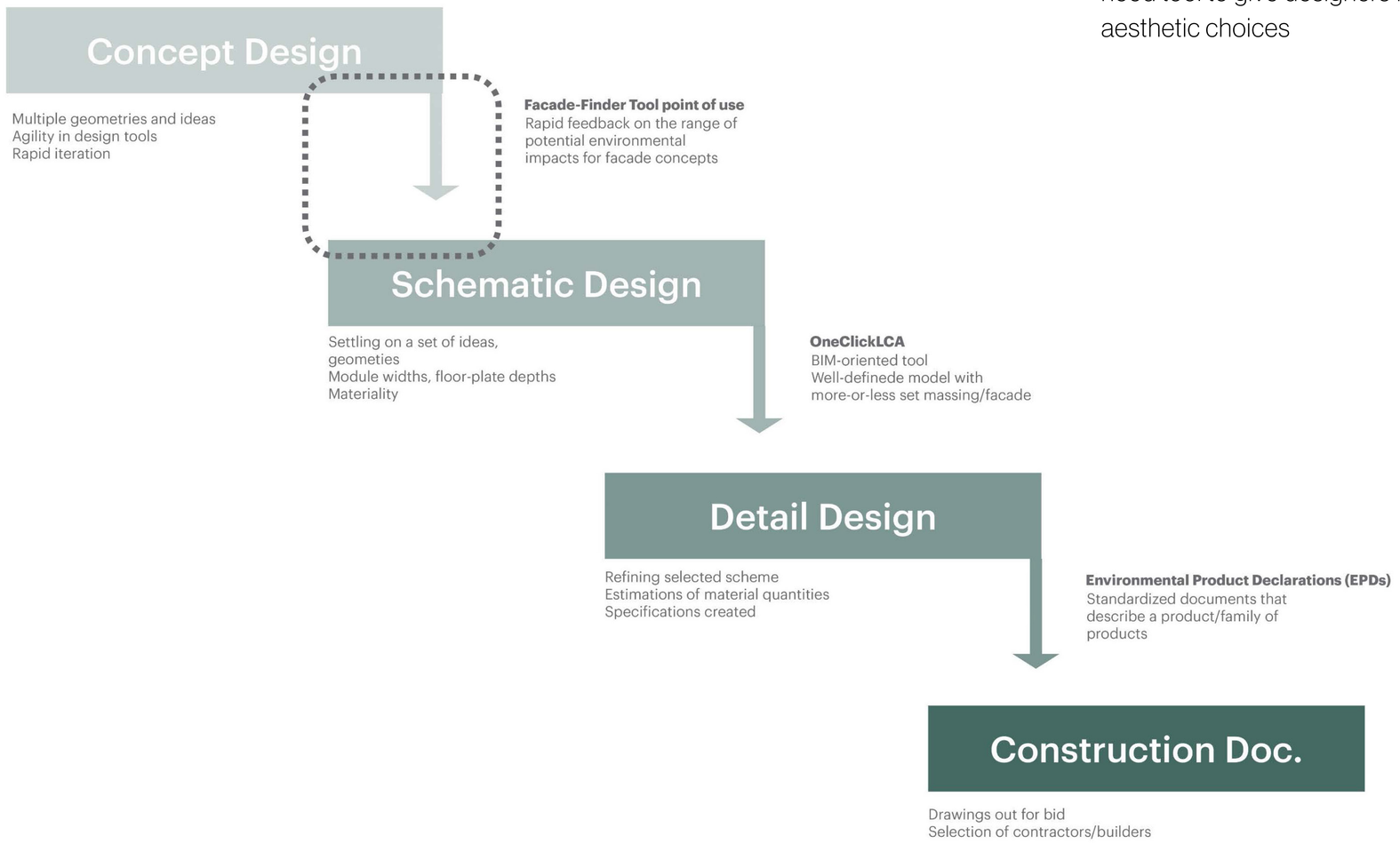


museums
musei
博物馆

Carbon Analysis

Motivation:
LCA needs to be integrated with design!

- early stage design offers most opportunities for embodied carbon reduction
- need tool to give designers feedback about aesthetic choices

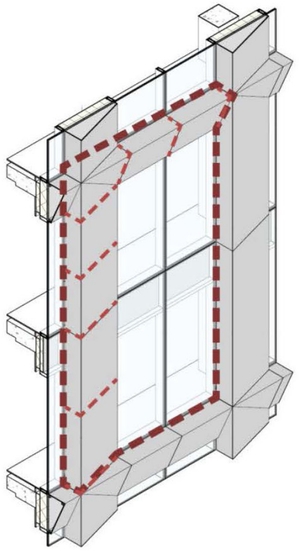


Tool Development

Early Stage Design Choices

- generalized parameters instead of specifc products
- interface to visualize and compare options

Aluminum panel

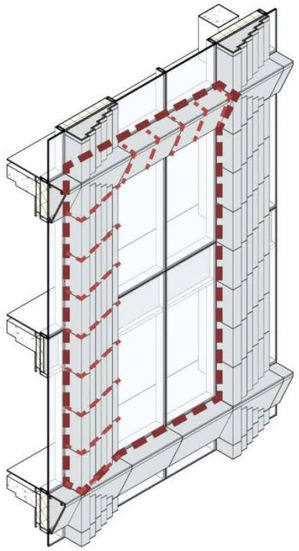


Cladding thickness: 3mm
Cladding Panel weight: 4.9 kg/m2
Cladding Support: x8 Aluminum Frames + Fixings

Embodied Carbon:

231 kgCO2e/sqm

Natural Stone

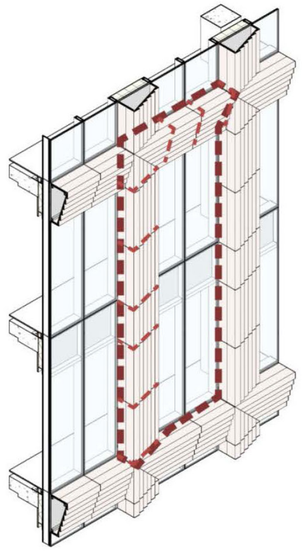


Cladding thickness: 30mm
Cladding Panel weight: 44.7 kg/m2
Cladding Support: x13 Aluminum Frames + Fixings

Embodied Carbon:

226 kgCO2e/sqm

Terracotta

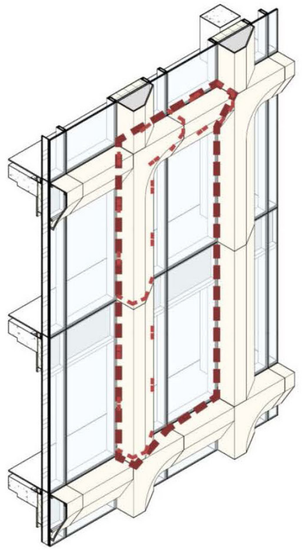


Cladding thickness: 40mm hollow extrusion
Cladding Panel weight: 31.7 kg/m2
Cladding Support: x9 Aluminum Frames + Fixings

Embodied Carbon:

223 kgCO2e/sqm

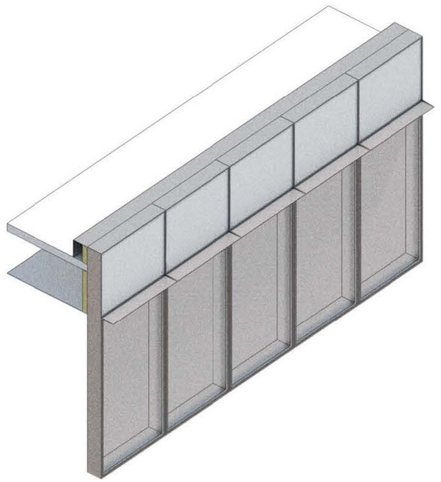
UHPC



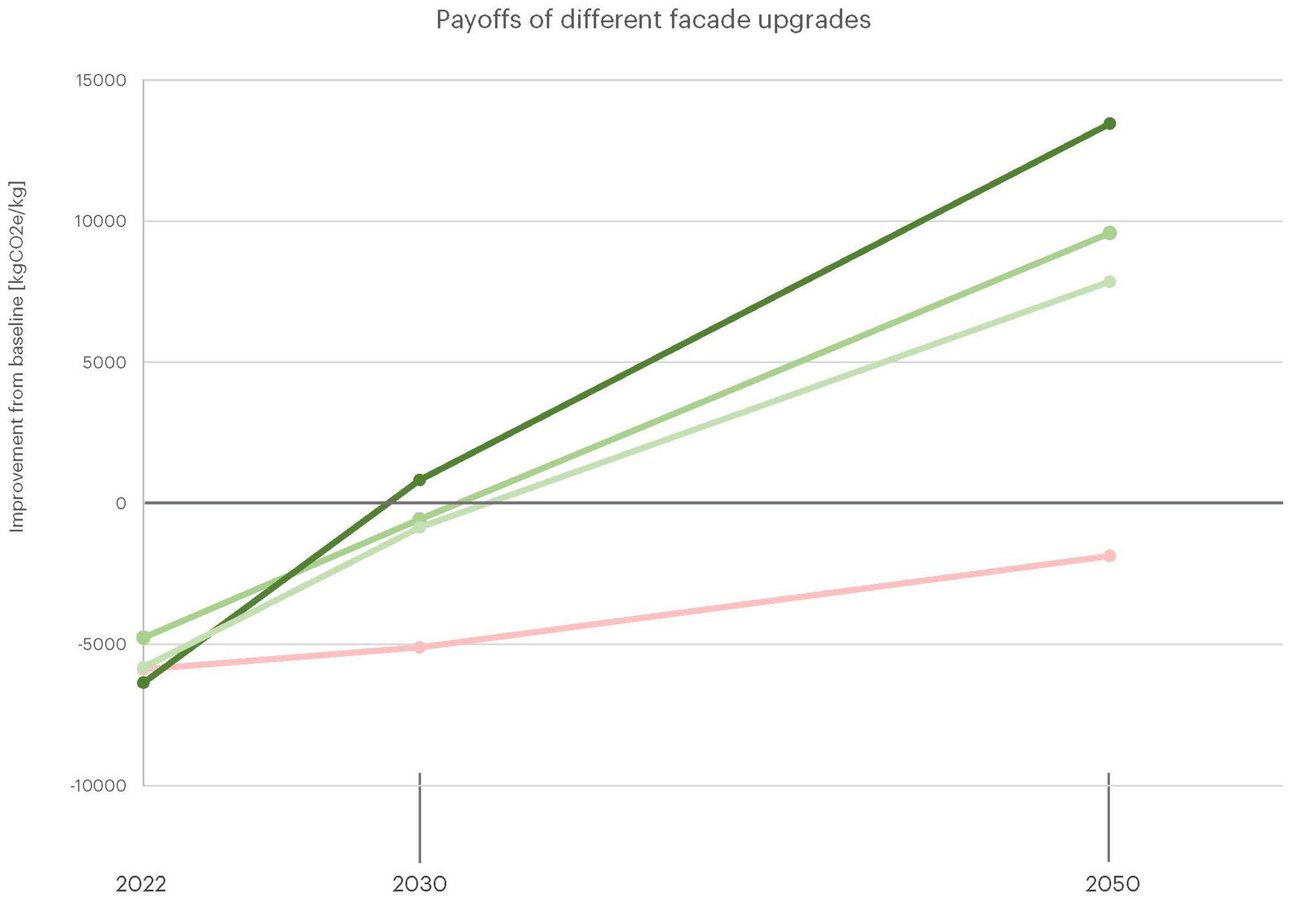
Cladding thickness: 30mm
Cladding Panel weight: 37.1 kg/m2
Cladding Support: Fixings

Embodied Carbon:

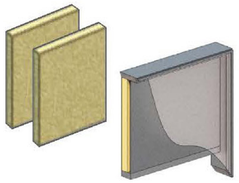
204 kgCO2e/sqm



Baseline Module



Dense horizontal shading:
Save 13452 kgCO2e by 2050

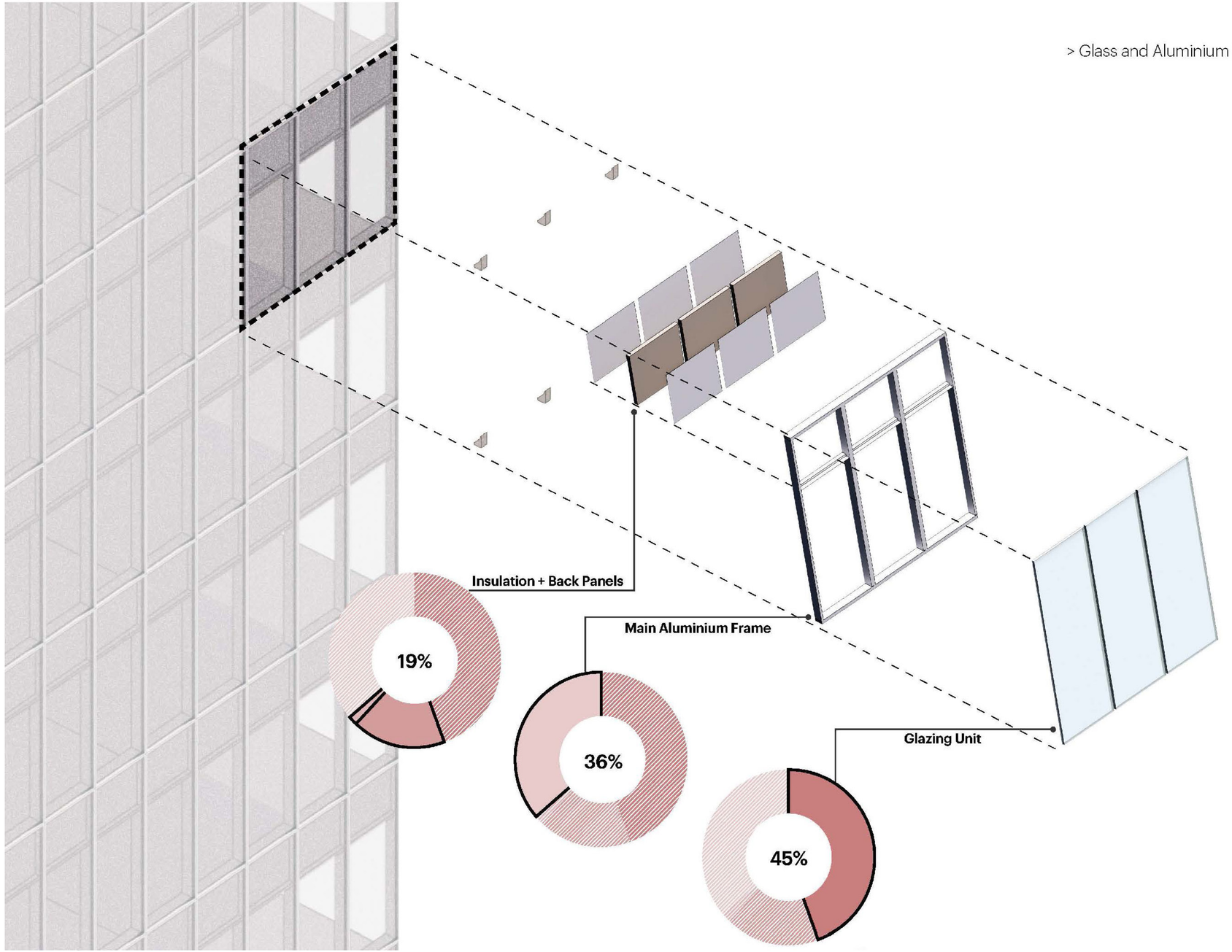


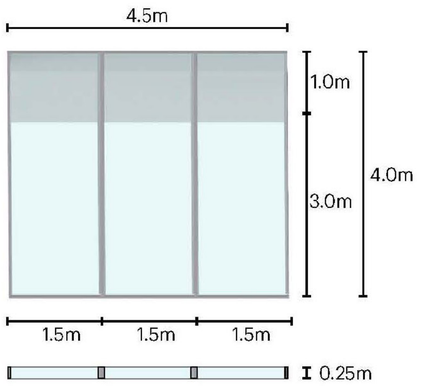
Extra insulation:
Save 9574 kgCO2e by 2050

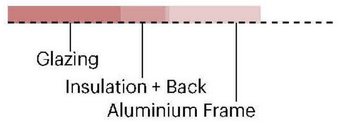
Triple-pane glazing:
Save 7854 kgCO2e by 2050

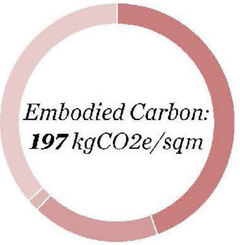
Vertical fins:
Spend 1867 kgCO2e by 2050

> Glass and Aluminium Curtain Wall









UK
Office

INPUT DATA

material database

geometry

↓

LIFE CYCLE ANALYSIS

embodied carbon

operational carbon

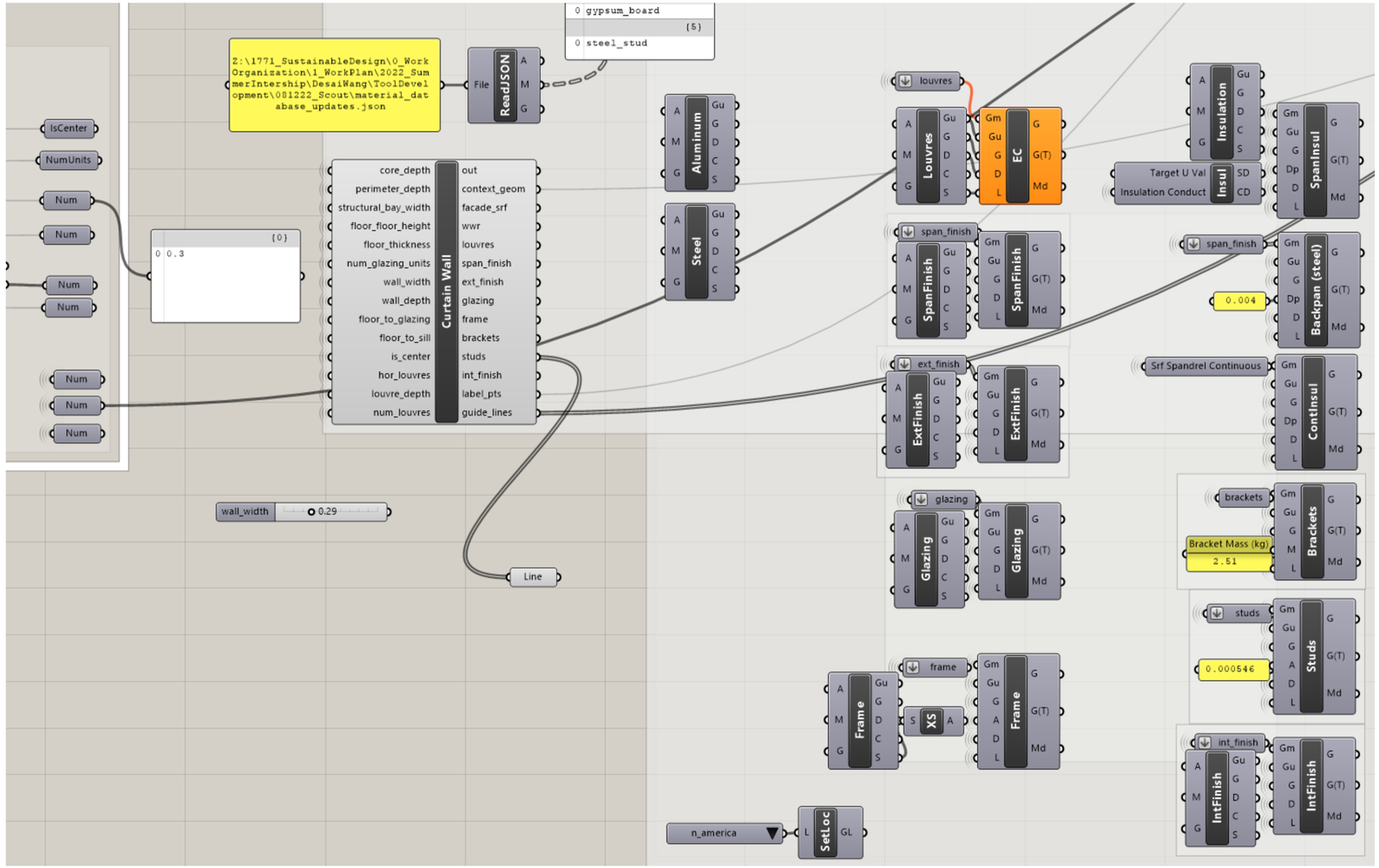
↓

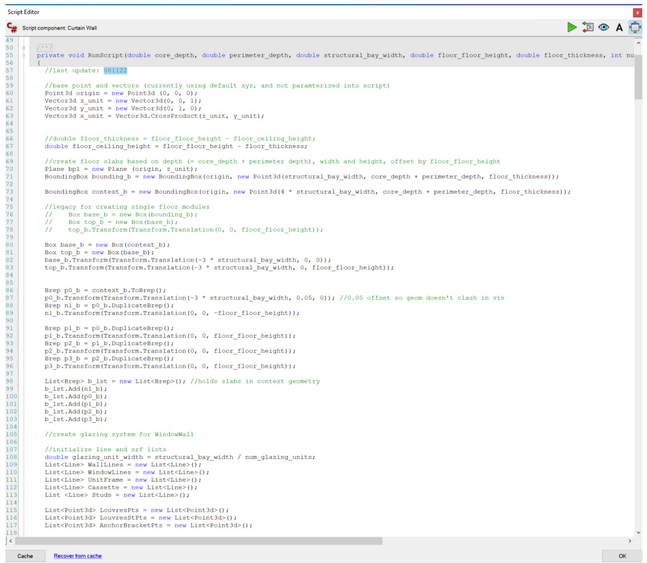
OPTIMIZATION

best options

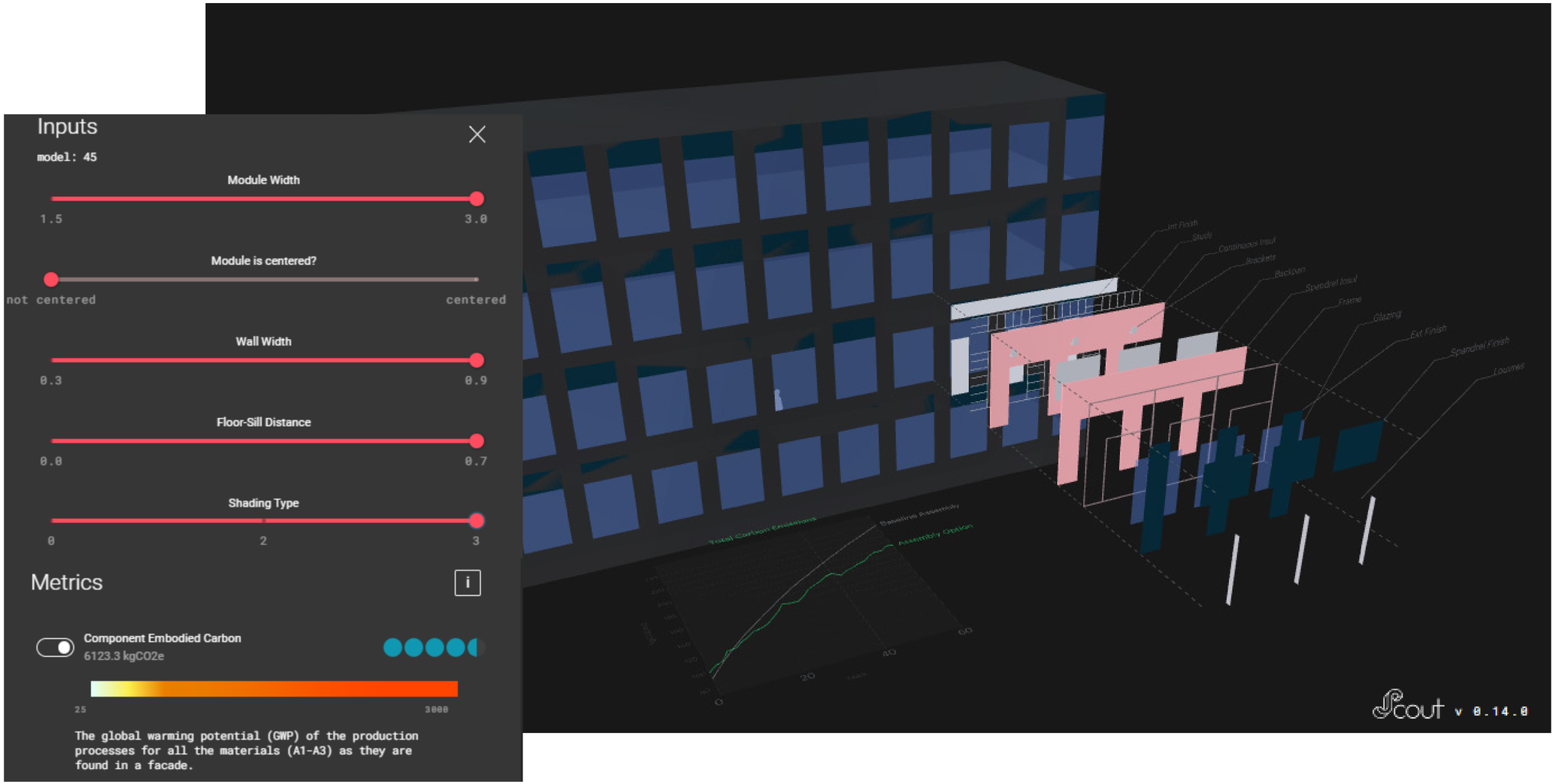
& visualizations

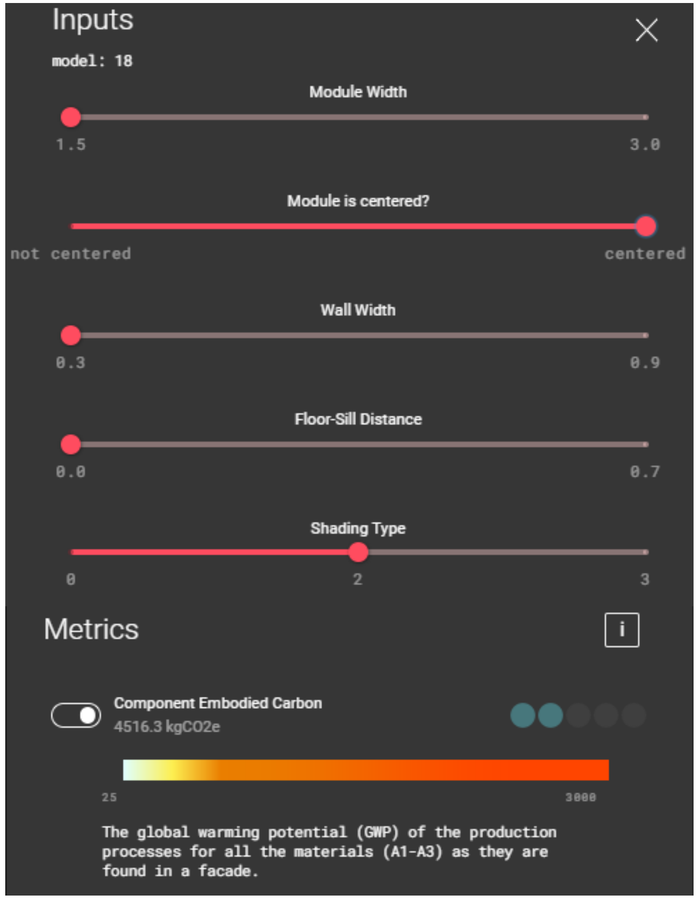
Grasshopper

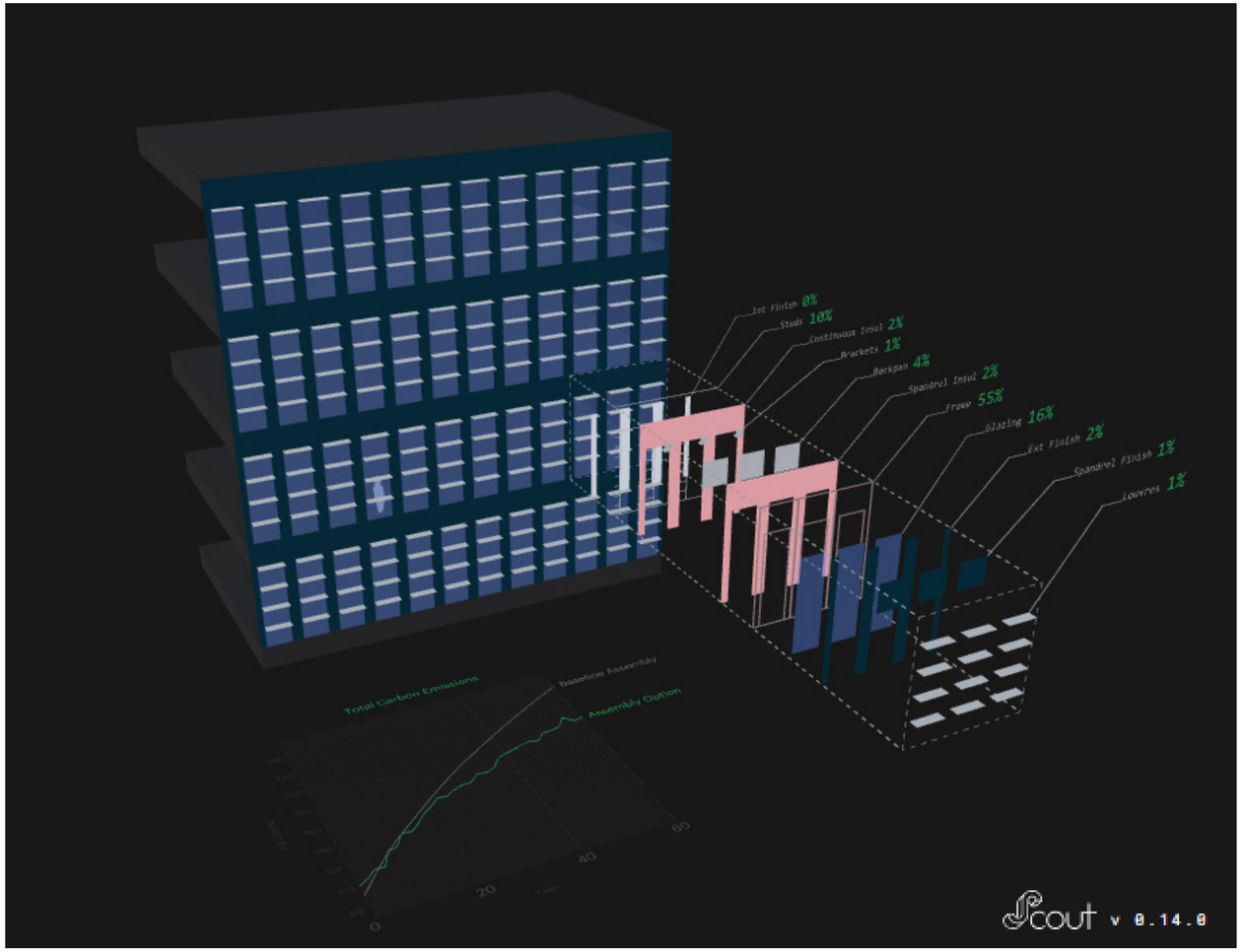




Web UI


Inputs
model: 45
Module Width
1.5
3.0
Module is centered?
not centered
centered
Wall Width
0.3
0.9
Floor-Sill Distance
0.0
0.7
Shading Type
0
2
3
Metrics
Component Embodied Carbon
6123.3 kgCO2e
25
3000
The global warming potential (GWP) of the production processes for all the materials (A1-A3) as they are found in a facade.
Scout v 0.14.0


Inputs
model: 18
Module Width
1.5
3.0
Module is centered?
not centered
centered
Wall Width
0.3
0.9
Floor-Sill Distance
0.0
0.7
Shading Type
0
2
3
Metrics
Component Embodied Carbon
4516.3 kgCO2e
25
3000
The global warming potential (GWP) of the production processes for all the materials (A1-A3) as they are found in a facade.


Int Finish 0%
Studs 10%
Continuous Insul 2%
Brackets 1%
Backpan 4%
Spandrel Insul 2%
Frame 55%
Glazing 16%
Ext Finish 2%
Spandrel Finish 1%
Louvres 1%
Total Carbon Emissions
Baseline Assembly
Assembly Option
Scout v 0.14.0

Thanks!

Carlos + Luc
Benjamin
Eric

EP + UI

KPF