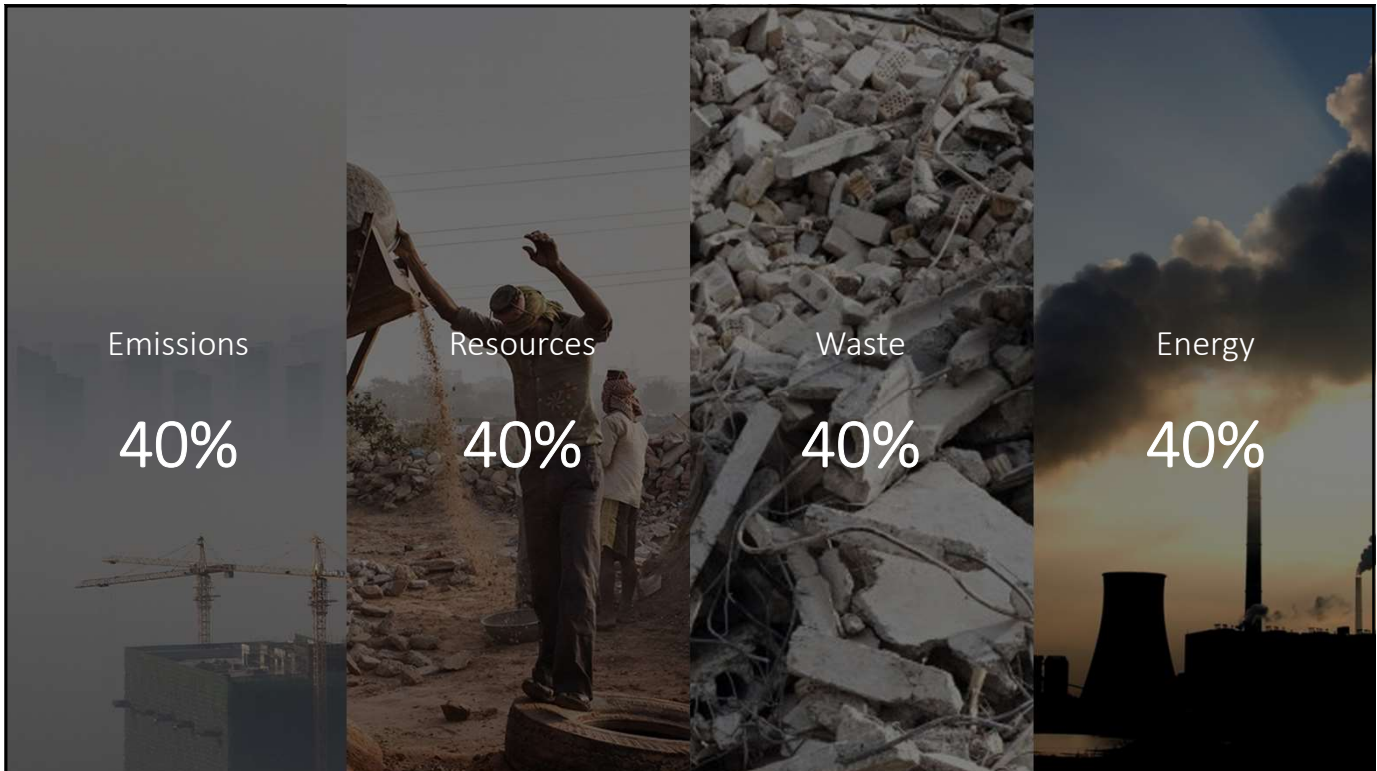
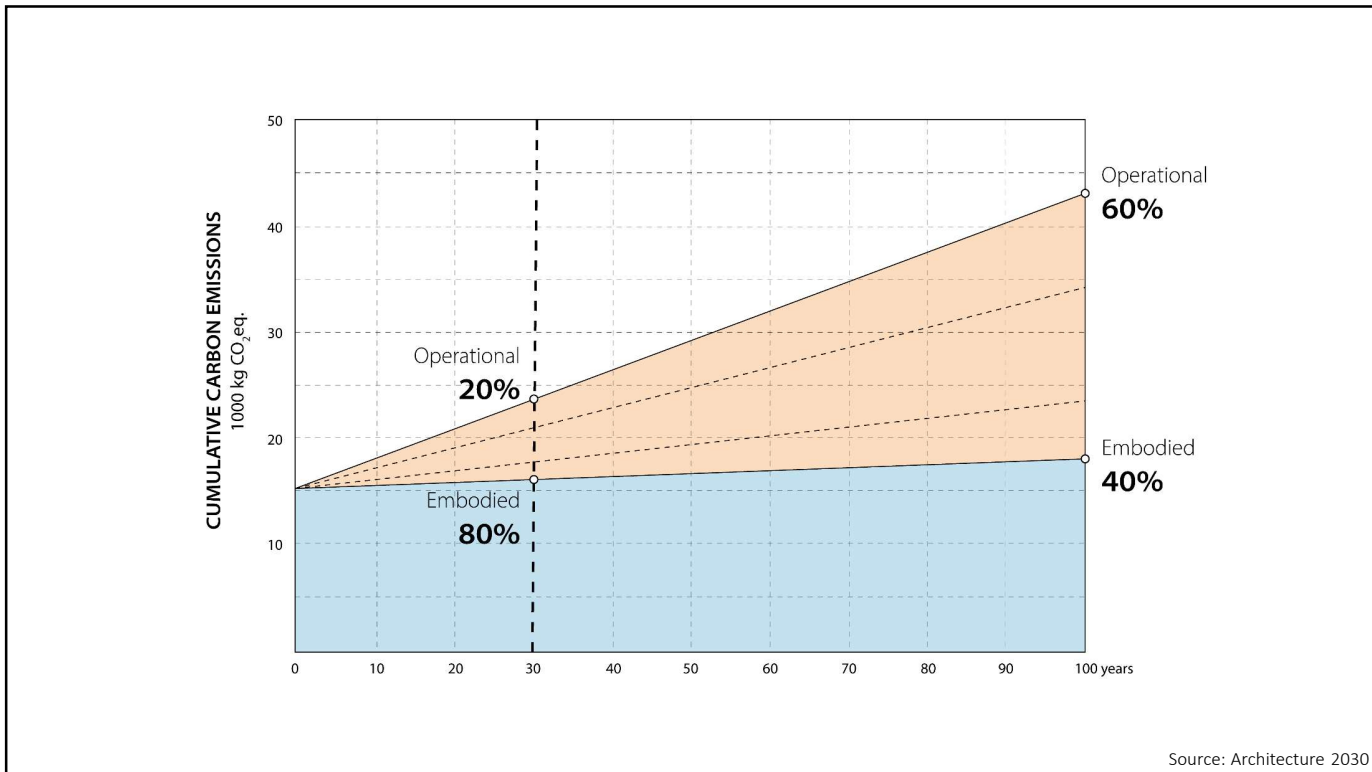




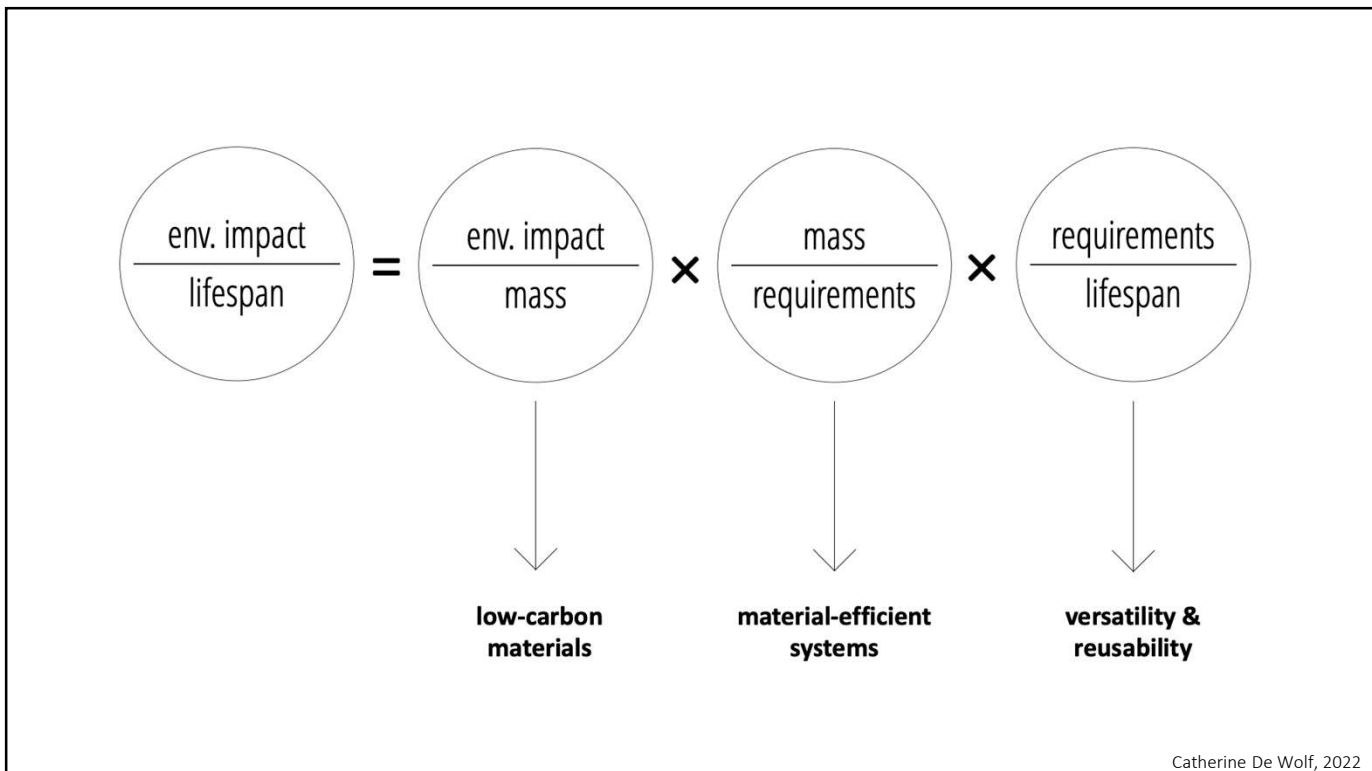
1



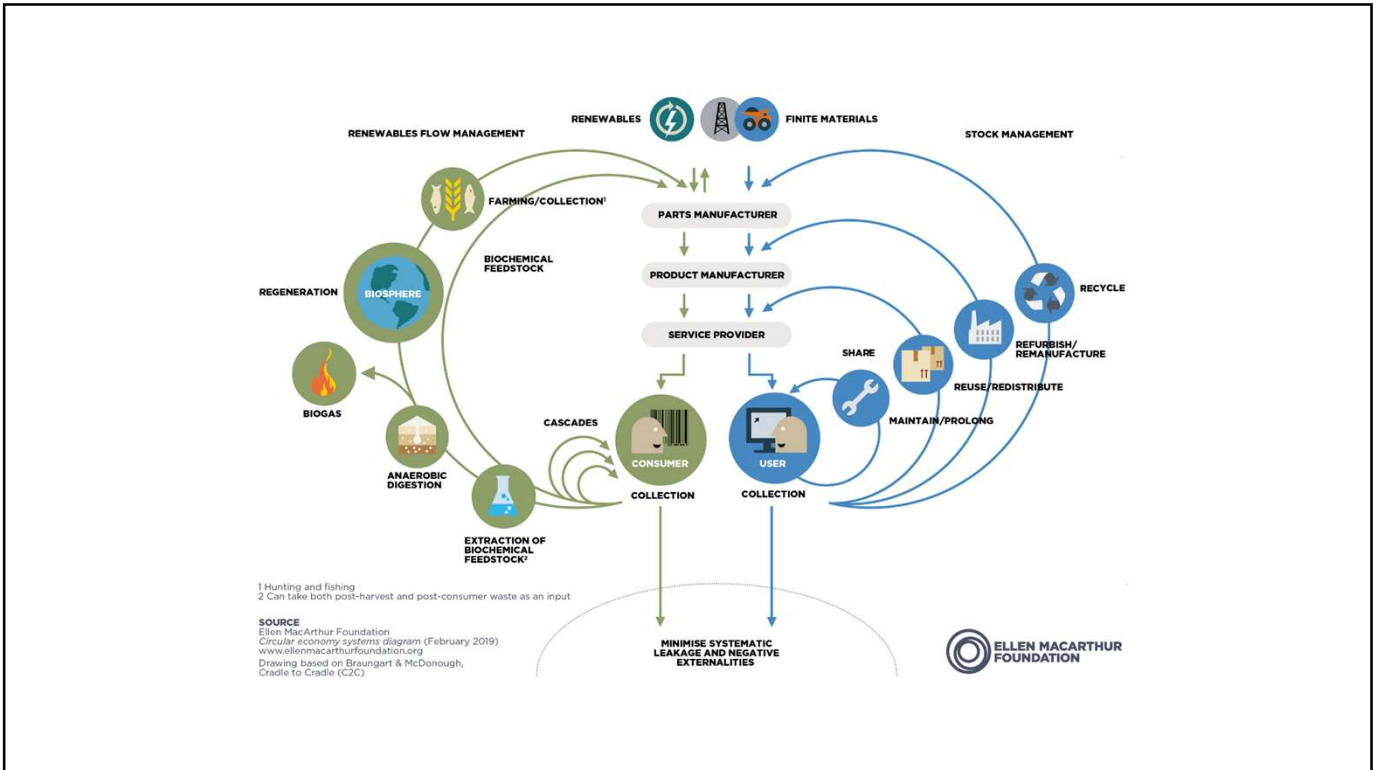
2



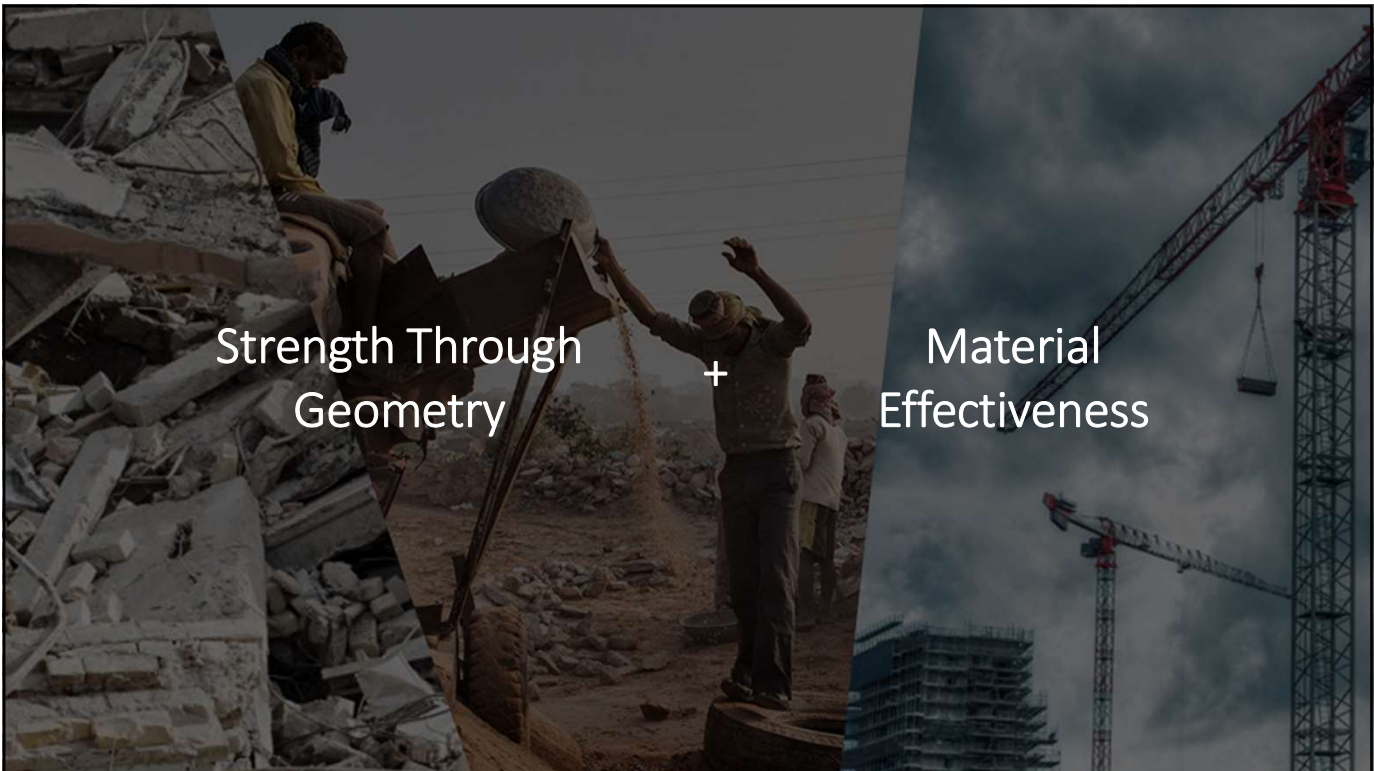
3



4



5



6

# STRENGTH THROUGH GEOMETRY

7



8



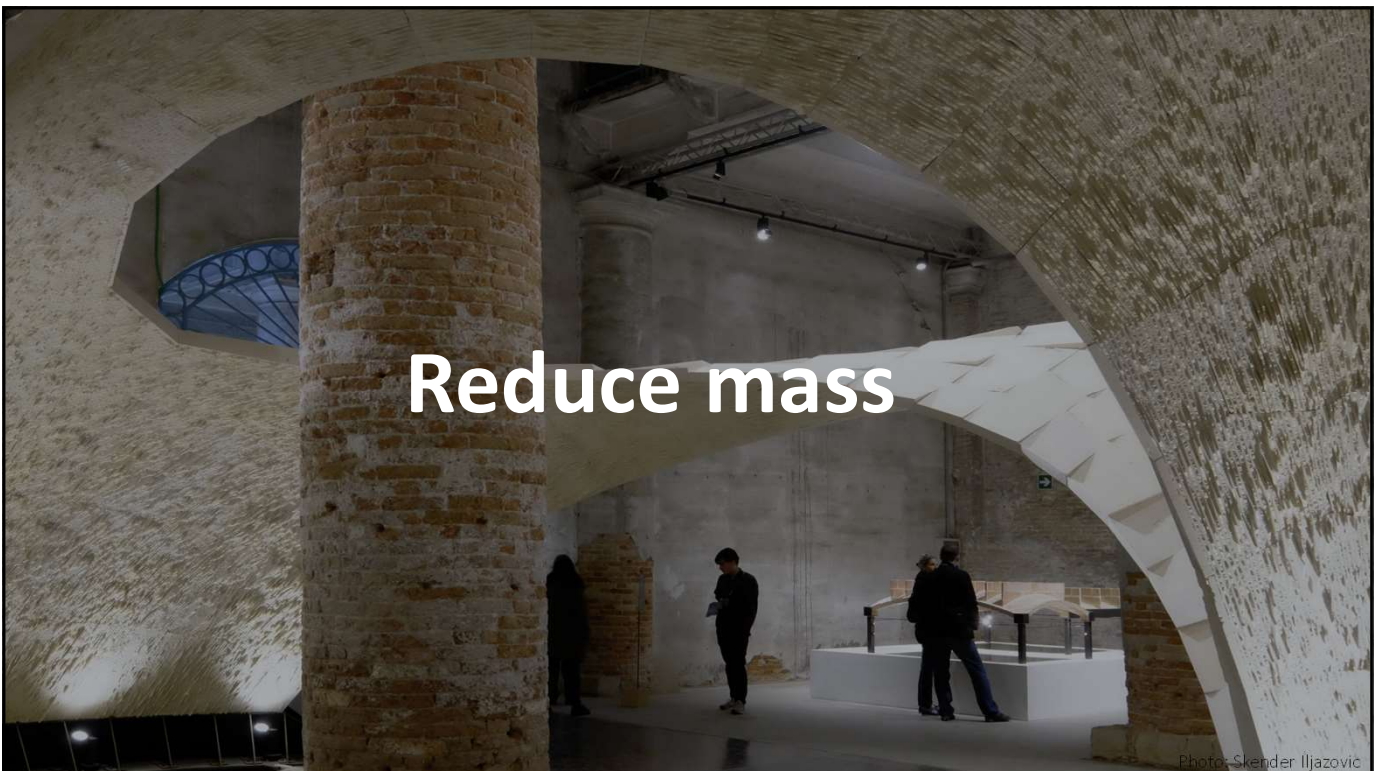
9



10



11



12



Photo: © Iwan Baan

13



Photos: James Bellamy

14



Photos: James Bellamy / Peter Rich Architects

15



Reduce ECC material

© Iwan Baan

16





17



18



Photo: Tom Van Mele

19



incremental3D

20



21



22



23



24



25



26



27



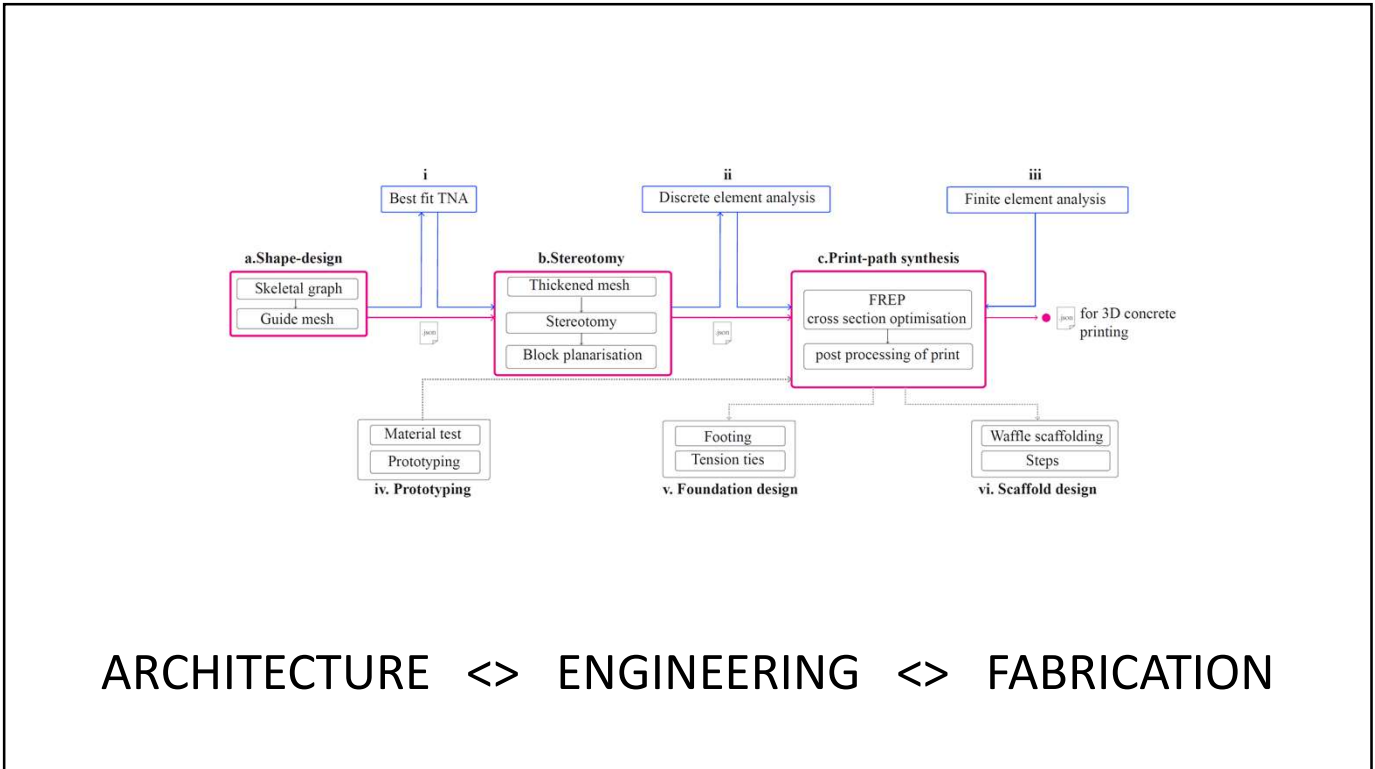
28



# Circular construction

Photo: naaro

29



ARCHITECTURE <> ENGINEERING <> FABRICATION

30



# COMPAS

Open-source computational framework for research and collaboration in  
Architecture, Engineering and Construction

<https://compas.dev/>

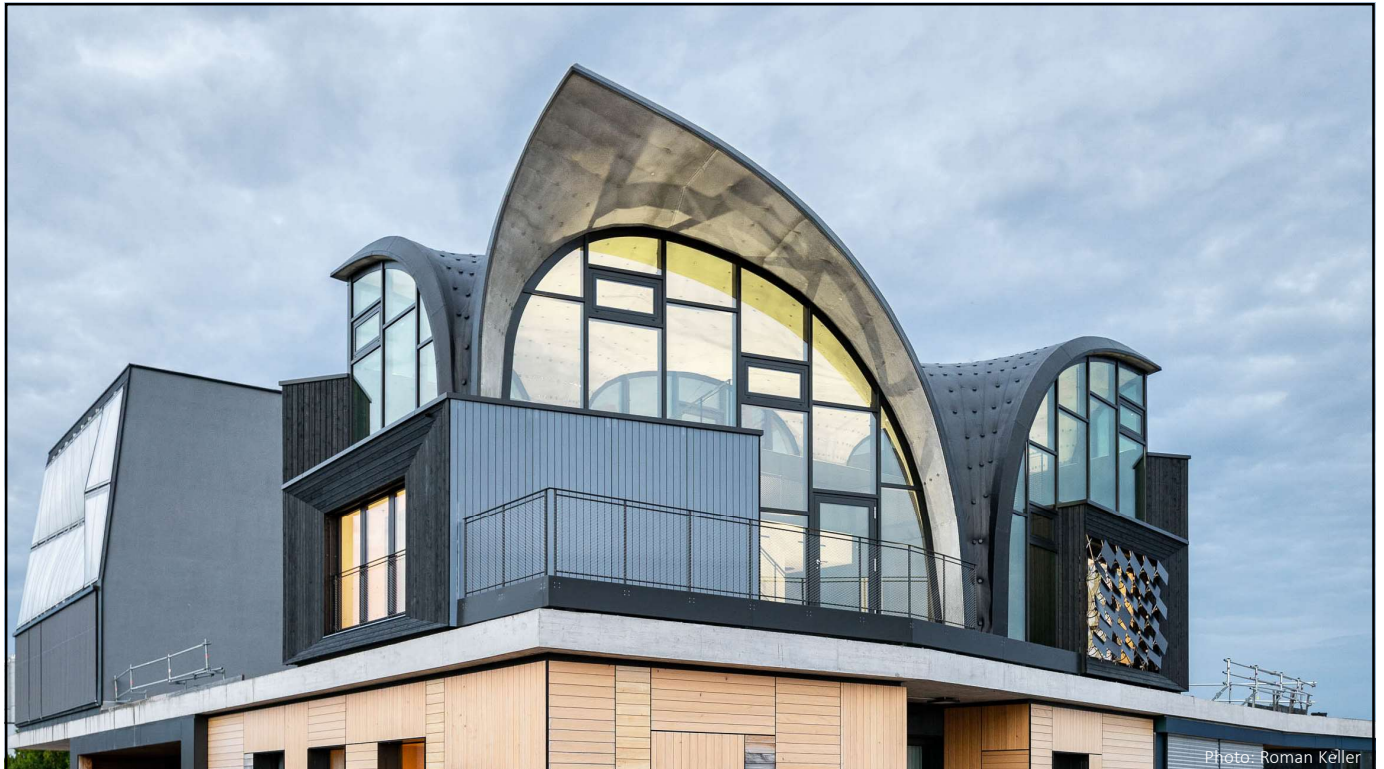
```
for key in mesh.vertices():
    if key in fixed:
        continue
    p = key_pts[key]
    nns = mesh.vertex_neighbours(k)
    c = center_of_mass_polygon([k

# update
attr = mesh.vertex[key]
attr['x'] += d * (c[0] - p[0])
attr['y'] += d * (c[1] - p[1])
attr['z'] += d * (c[2] - p[2])

callback(mesh, k, callback_arg

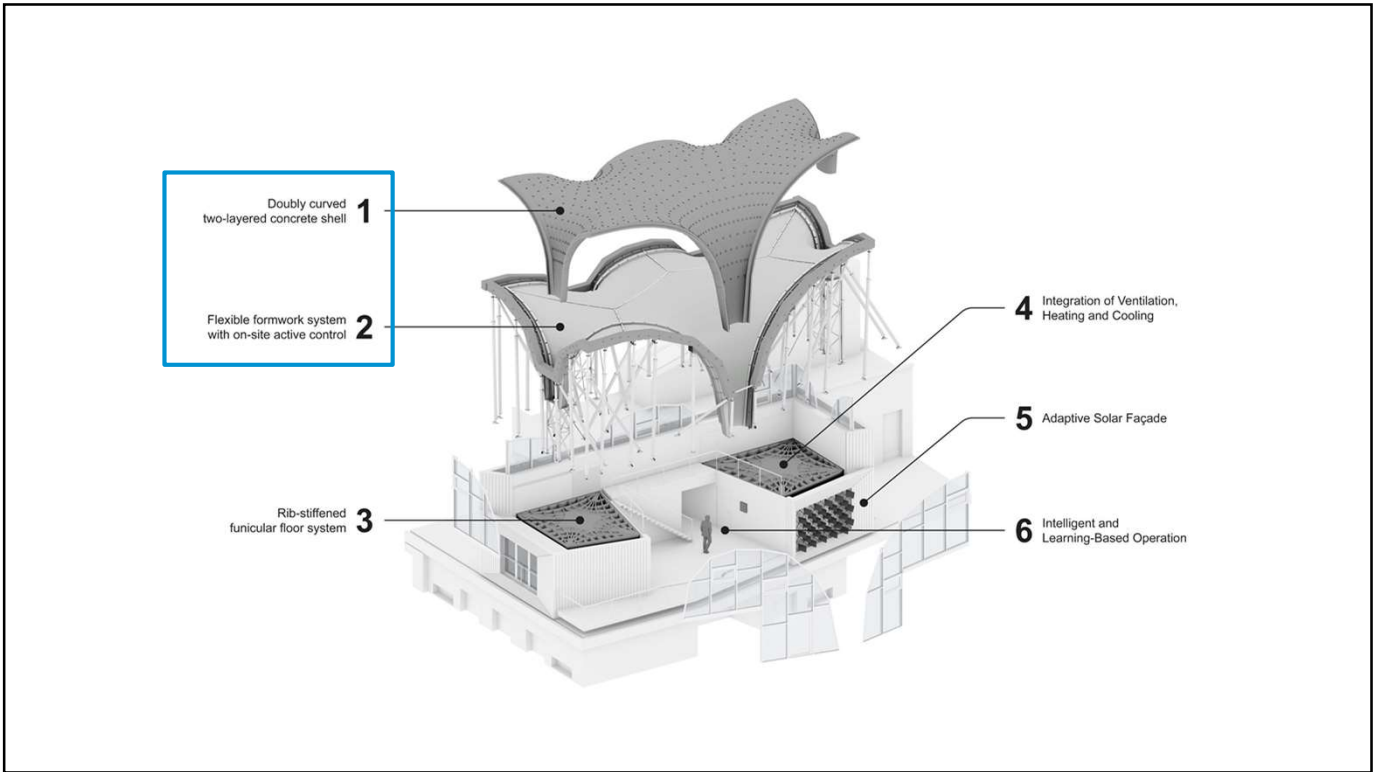
def smooth_mesh_length(mesh, lmin, lmax, f
    if callback:
        if not callable(callback):
            raise Exception('Callback is n
    fixed = fixed or []
    fixed = set(fixed)
    for k in range(kmax):
```

31

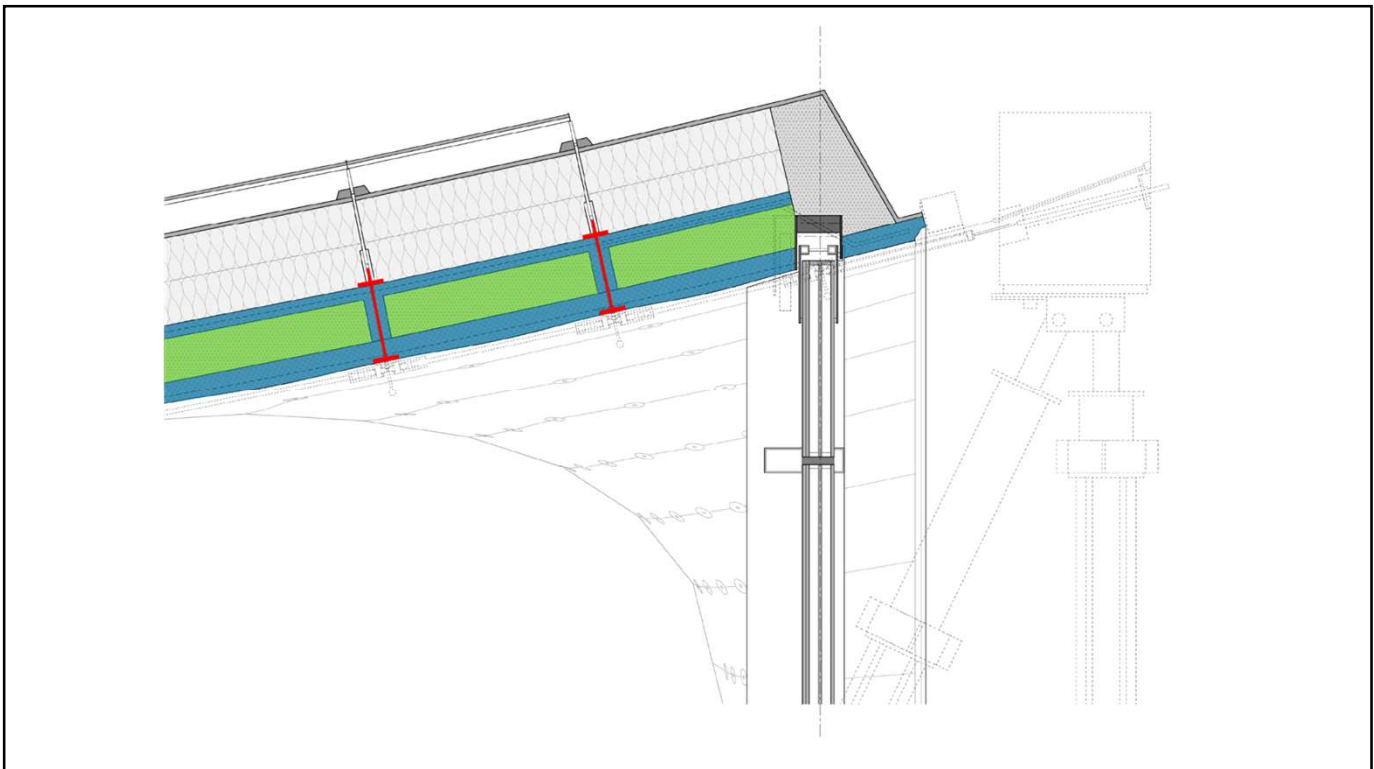


32





33



34



Rolex Learning Center, EPFL | SANAA

35



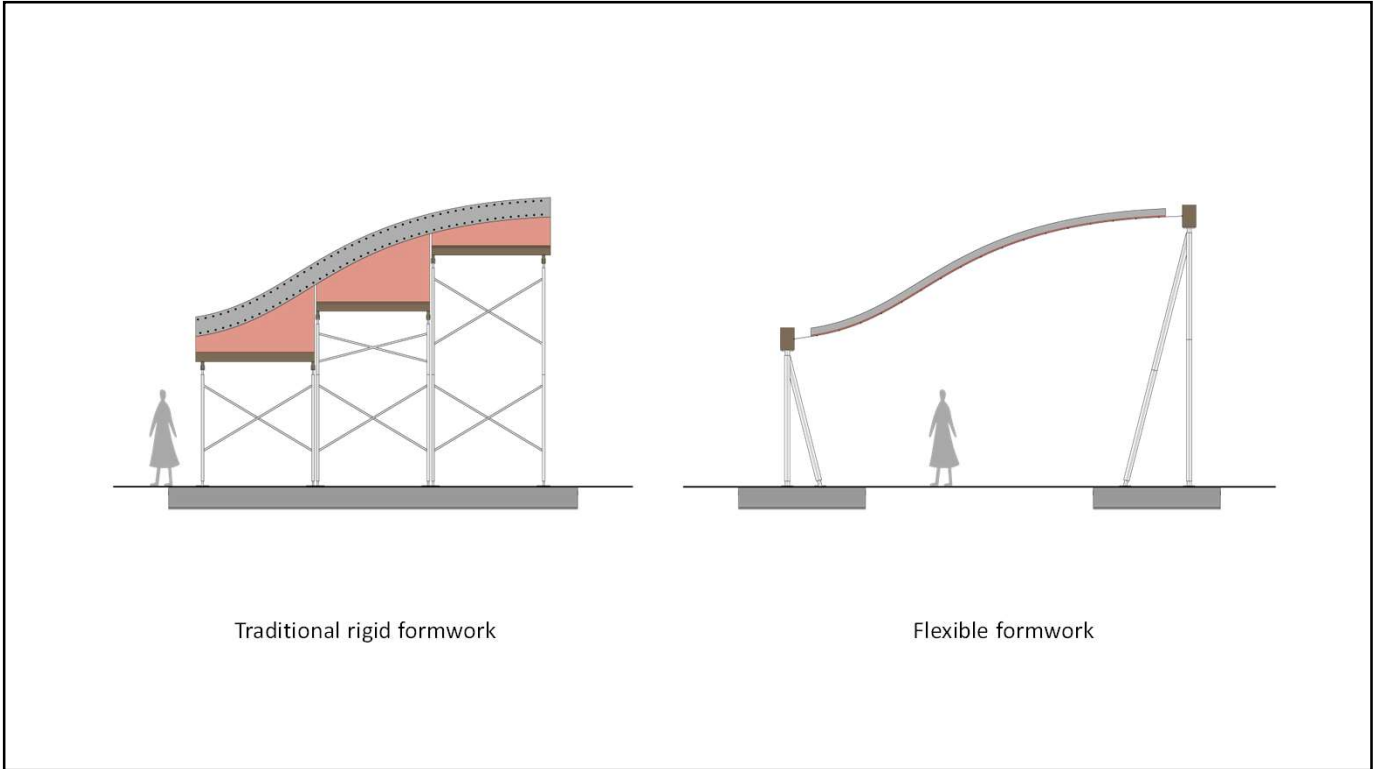
Photo: Fabian Scheurer / designtoproduction

36



Photo: Fabian Scheurer / designtoproduct

37



Traditional rigid formwork

Flexible formwork

38



Photo: Juney Lee

39

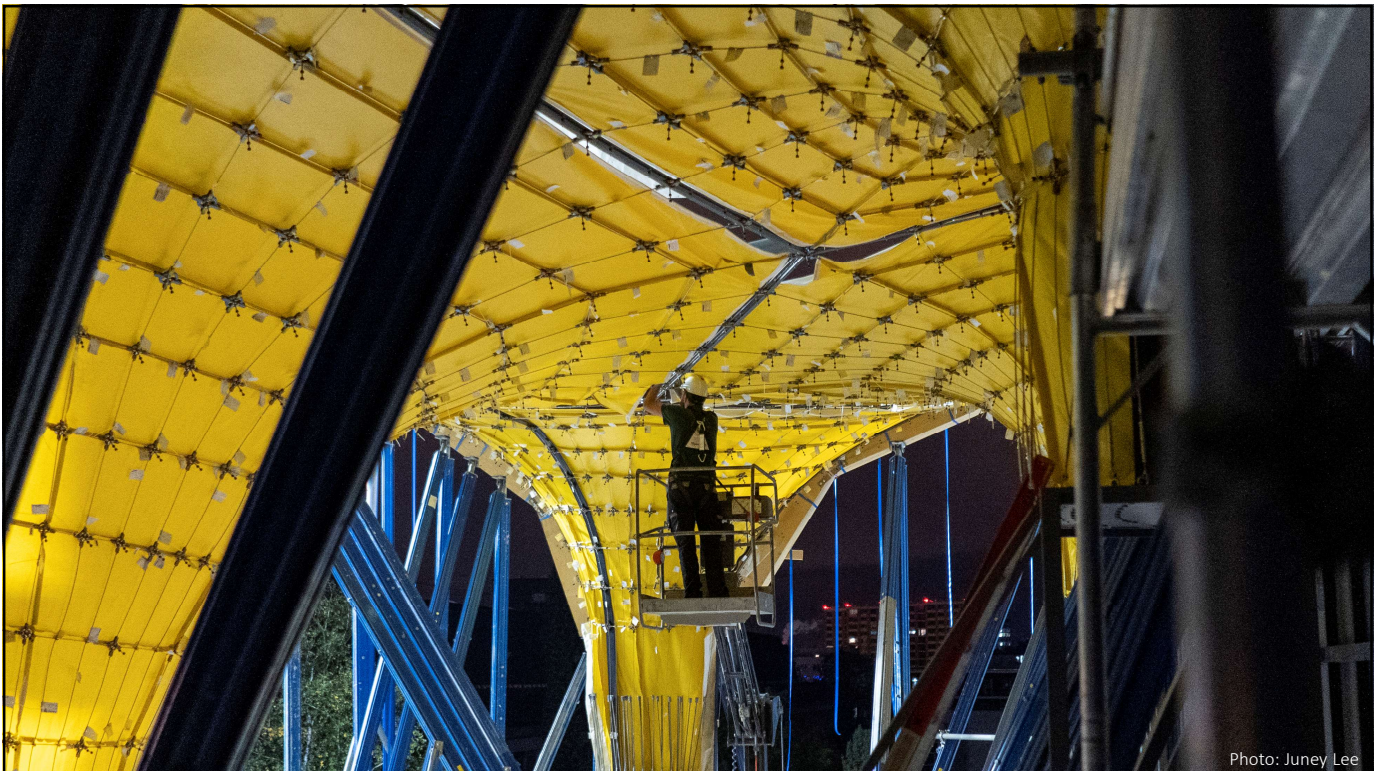


Photo: Juney Lee

40



Video: Juney Lee

41

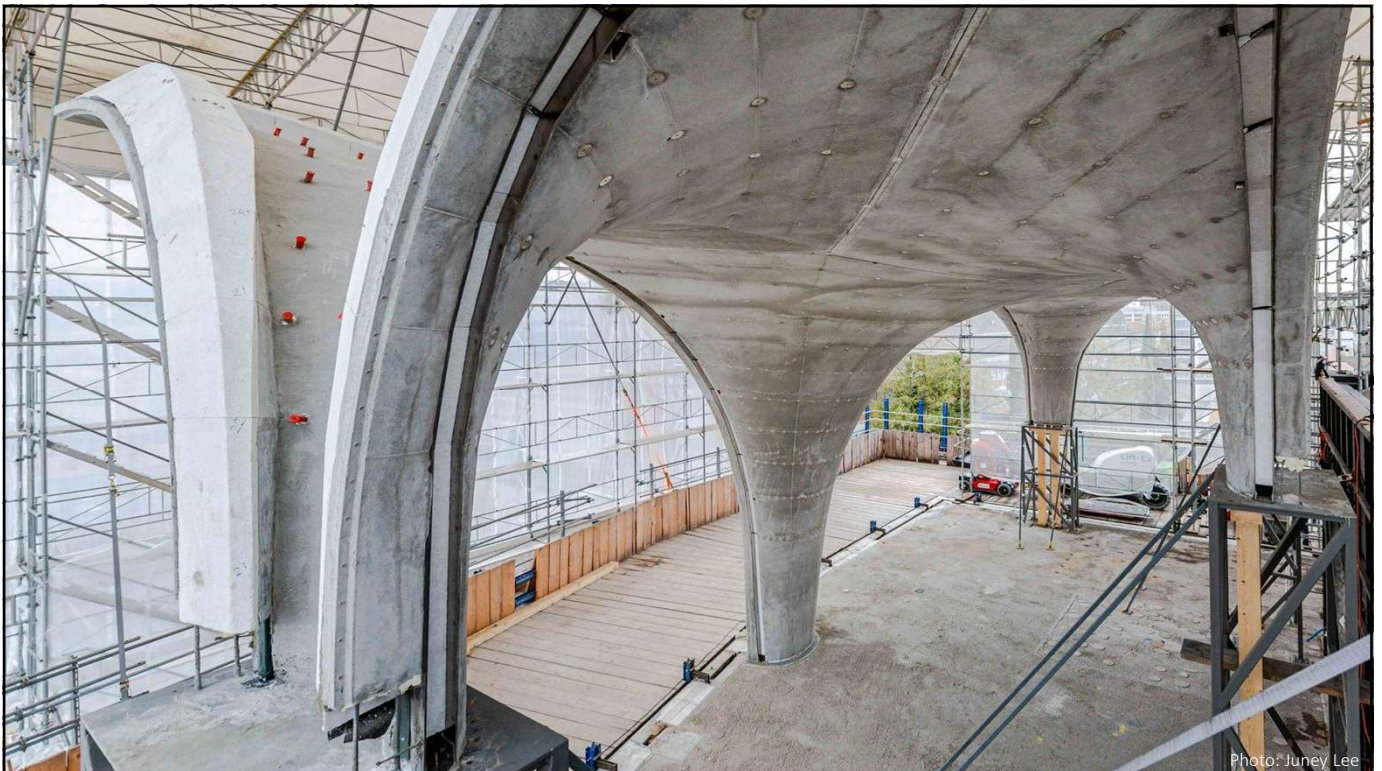
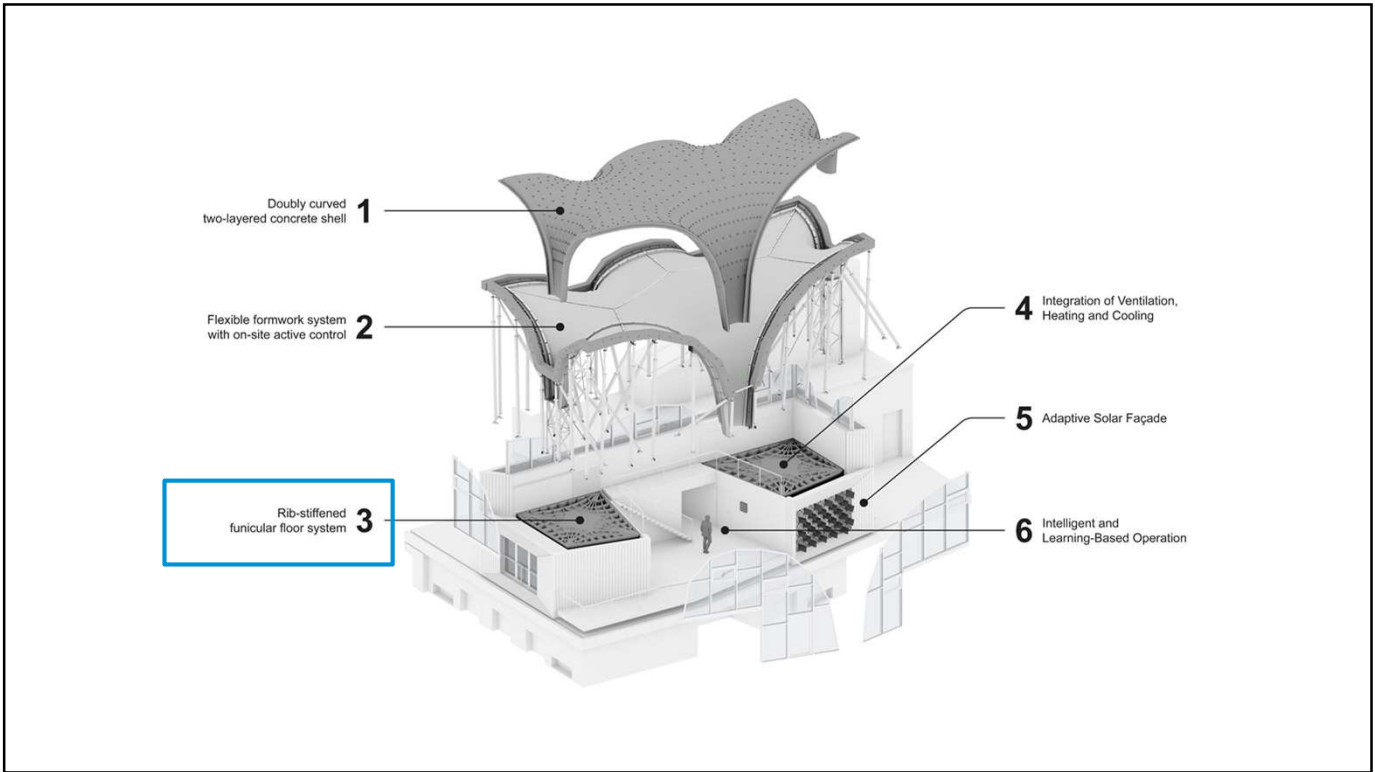
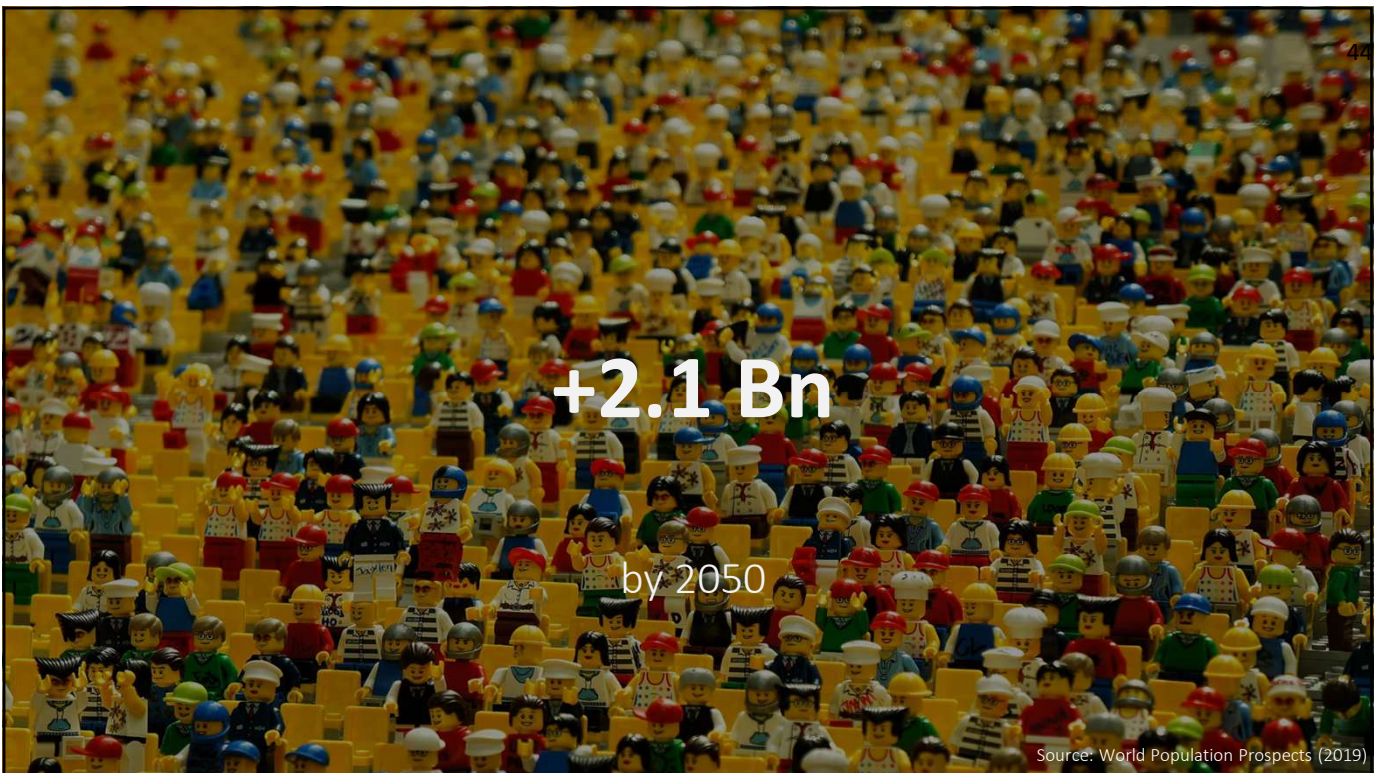


Photo: Juney Lee

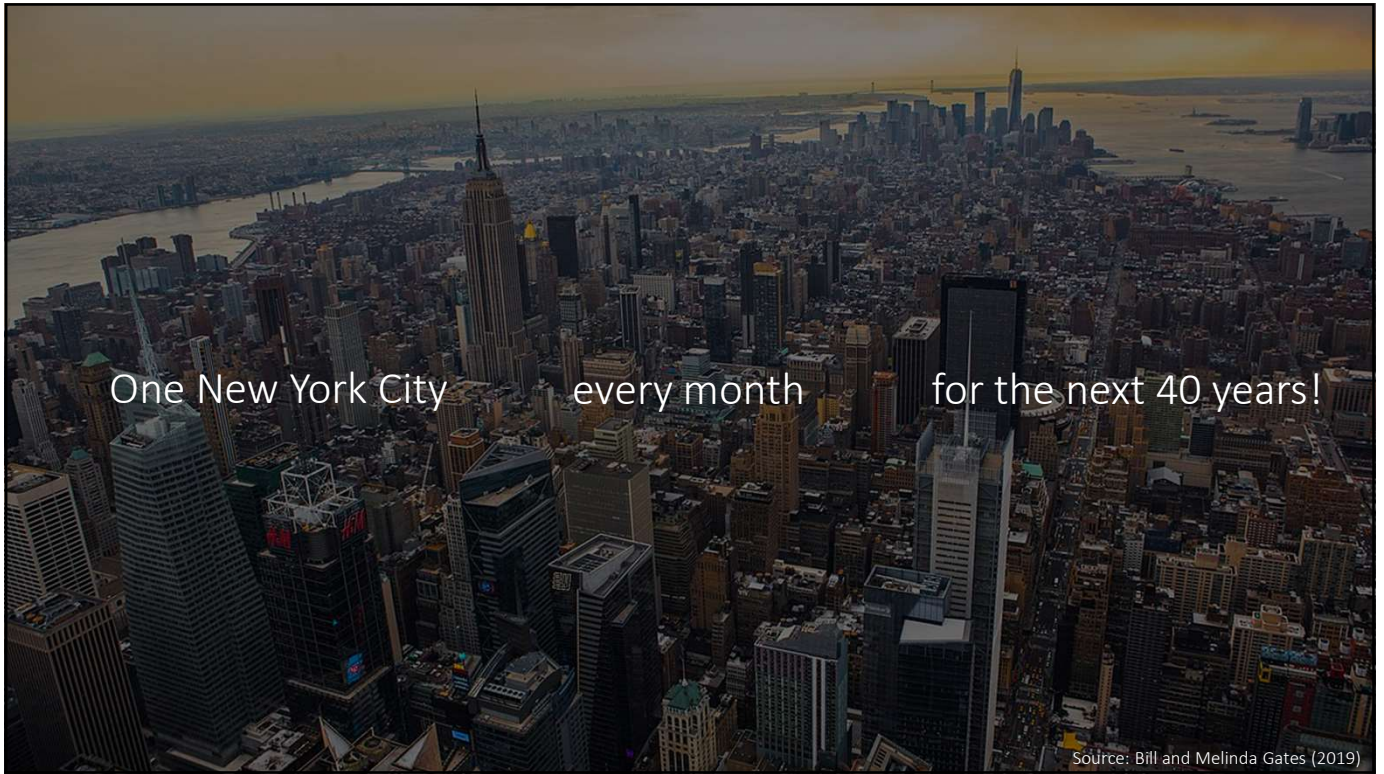
42



43



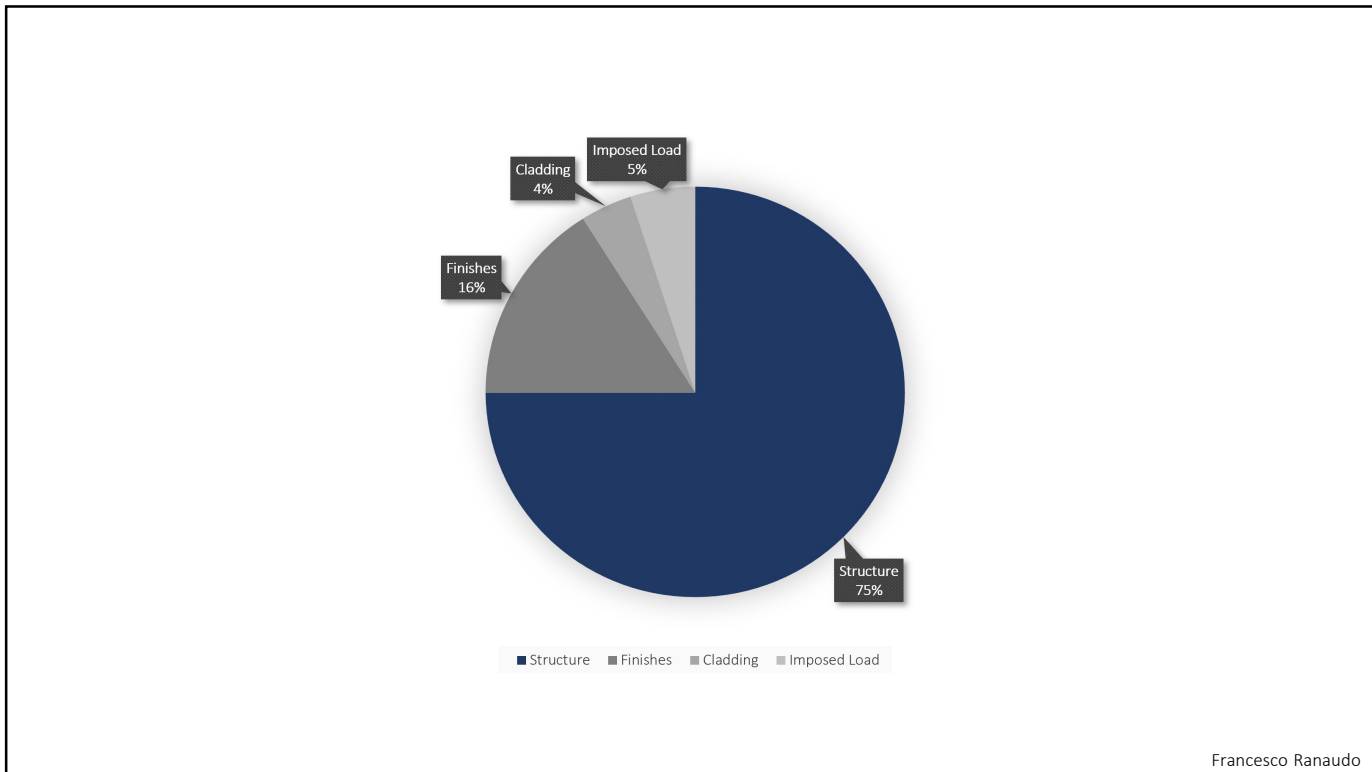
44



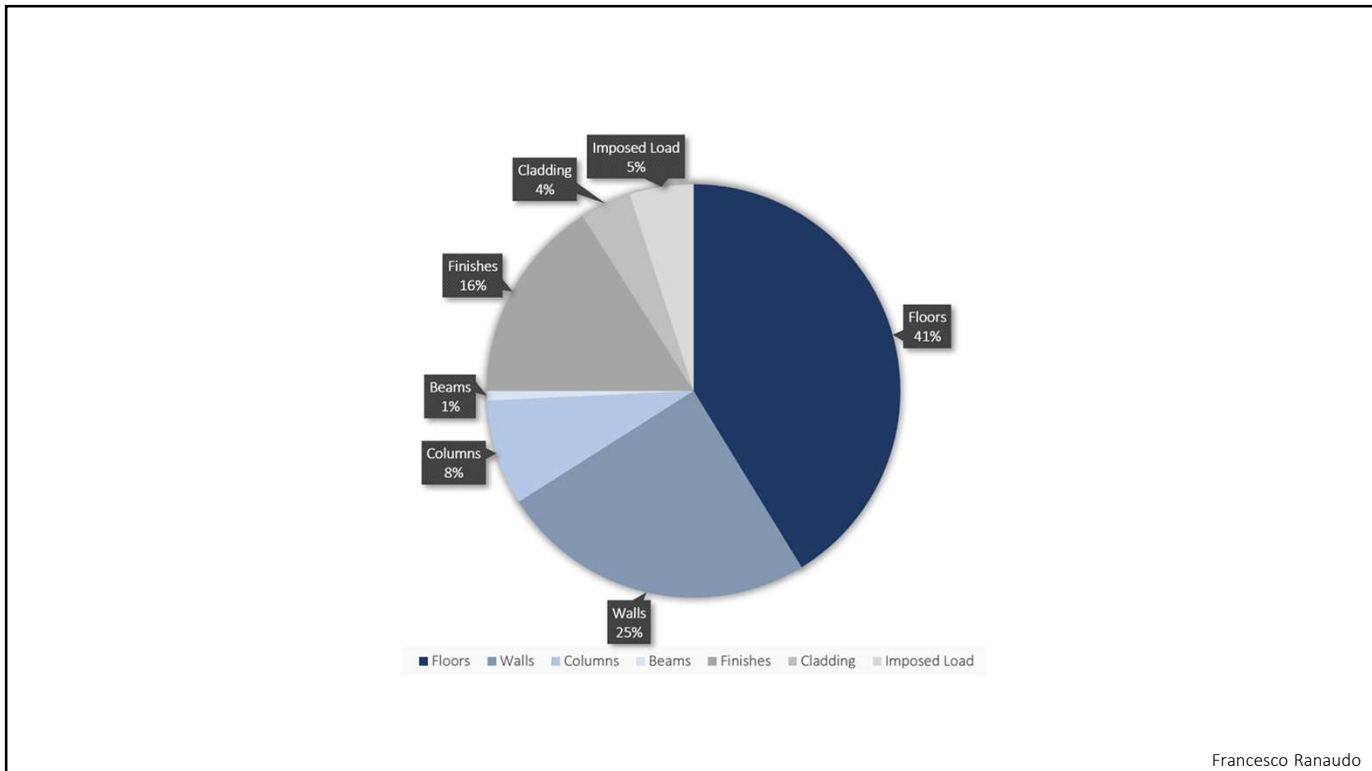
45



46

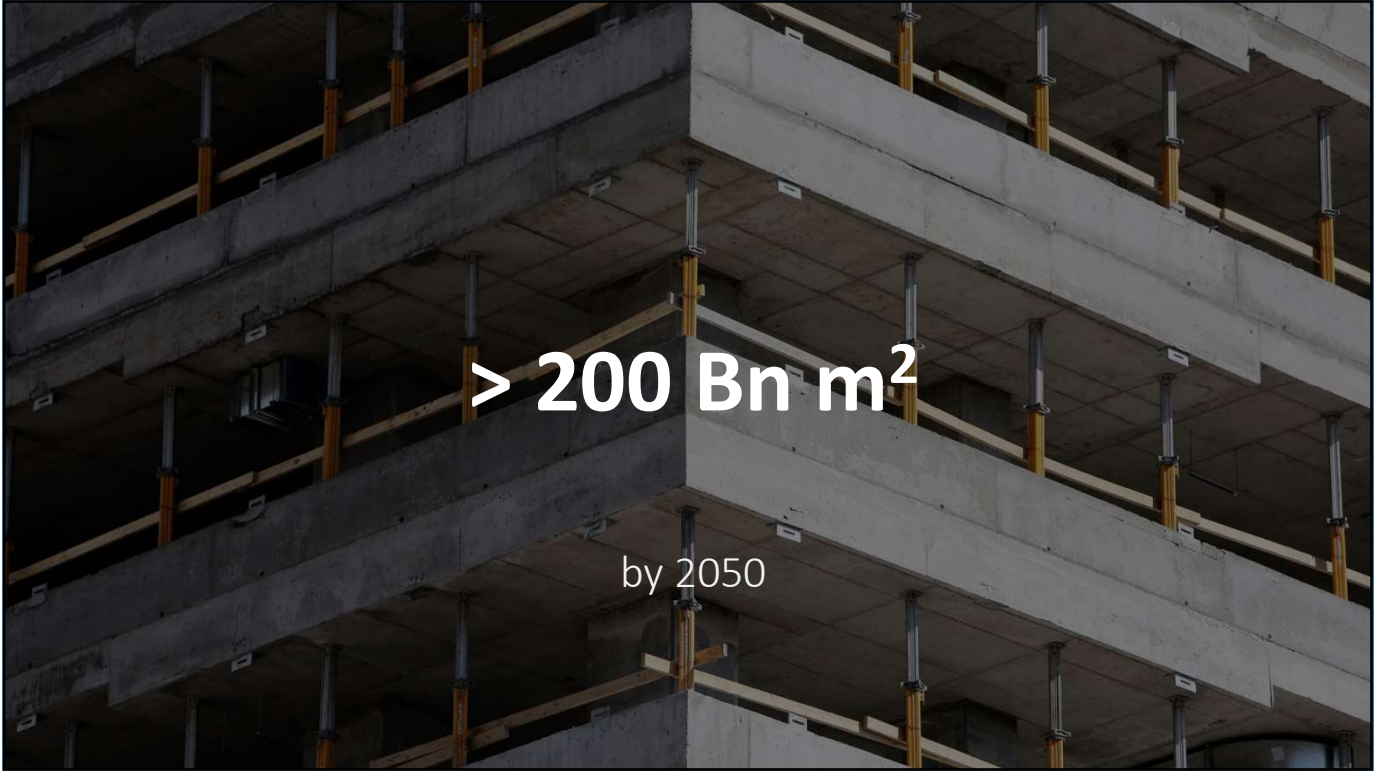


47



48





49



50



**Best of 2019**

## Concrete: the most destructive material on Earth

▲ Limestone quarries and cement factories are often sources of air pollution. Photograph: Zoonar GmbH/Alamy

After water, concrete is the most widely used substance on the planet. But its benefits mask enormous dangers to the planet, to human health - and to culture itself

- [A brief history of concrete: from 10,000BC to 3D printed houses](#)
- Editor's pick: best of 2019. We're bringing back some of our favorite stories of the past year. [Support the Guardian's journalism in 2020](#)

by [Jonathan Watts](#)

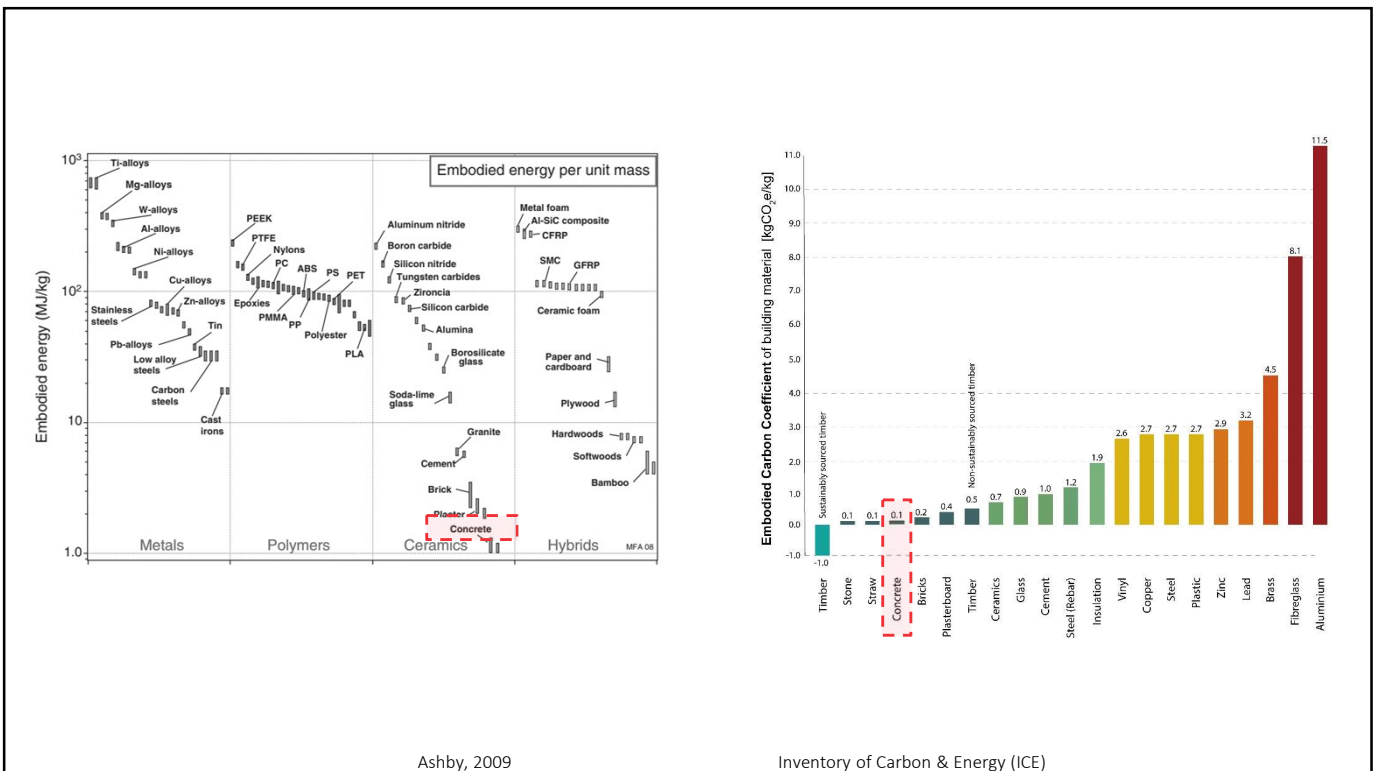
Mon 25 Feb 2019 06:00 GMT

17,506

**I**n the time it takes you to read this sentence, the global building industry will have poured more than 19,000 bathtubs of concrete. By the time you are halfway through this article, the volume would fill the Albert Hall and spill out into Hyde Park. In a day it would be almost the size of China's Three Gorges Dam. In a single year, there is enough to patio over every hill, dale, nook and cranny in England.

Source: The Guardian

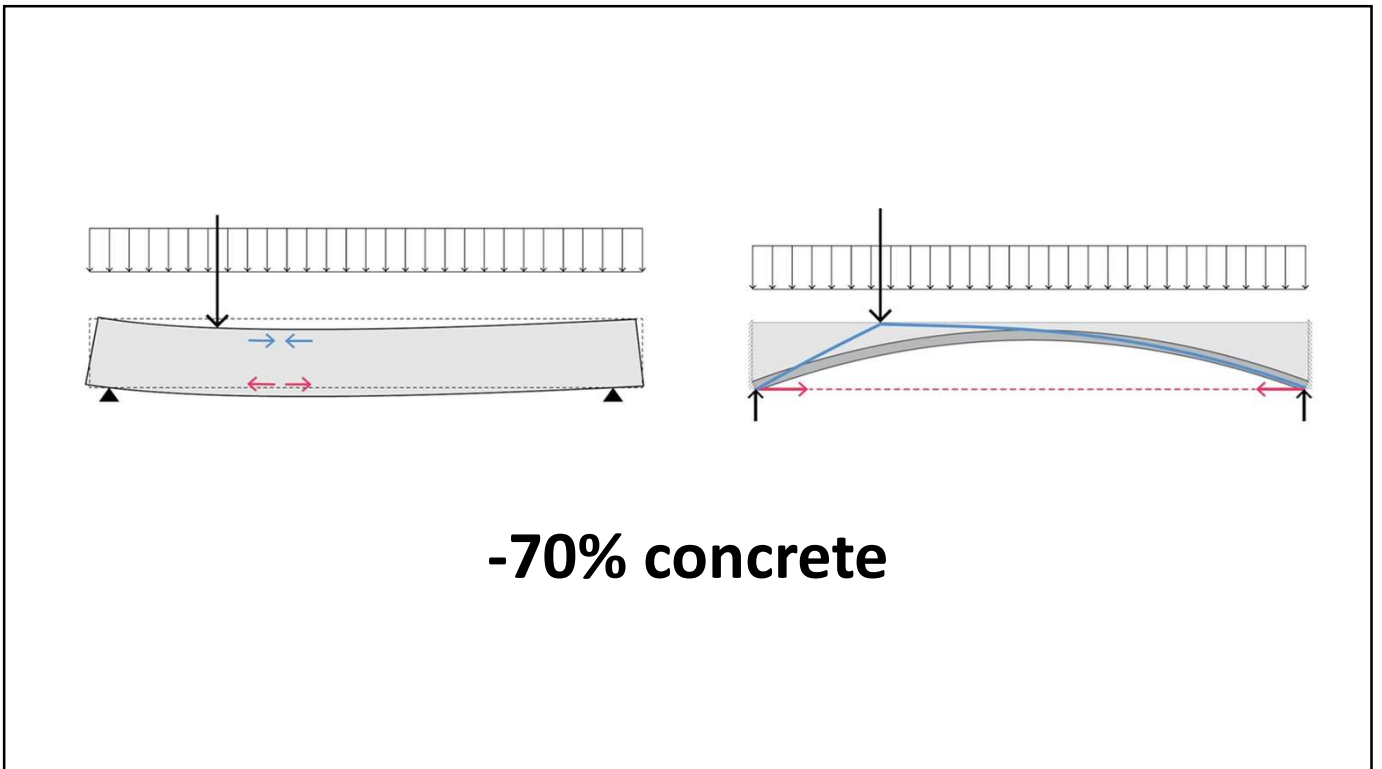
51



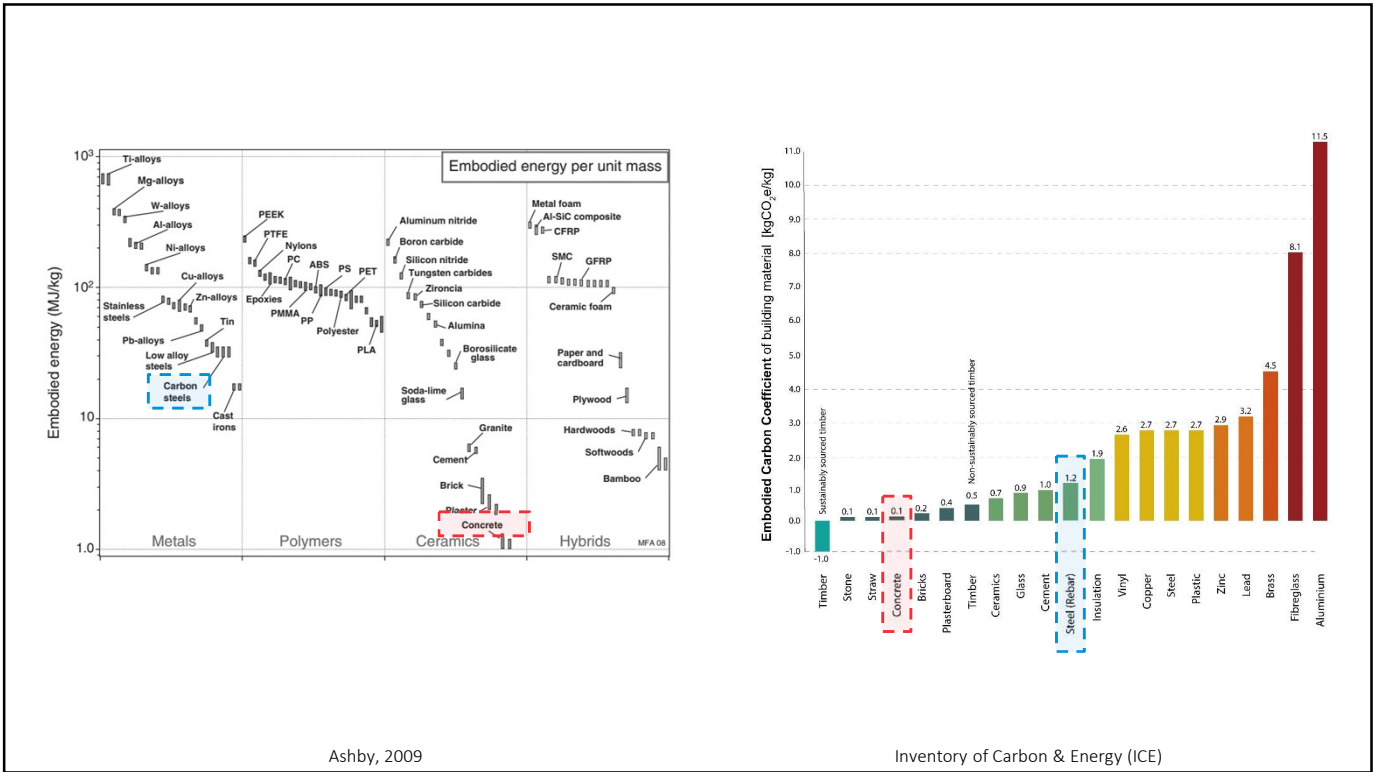
52



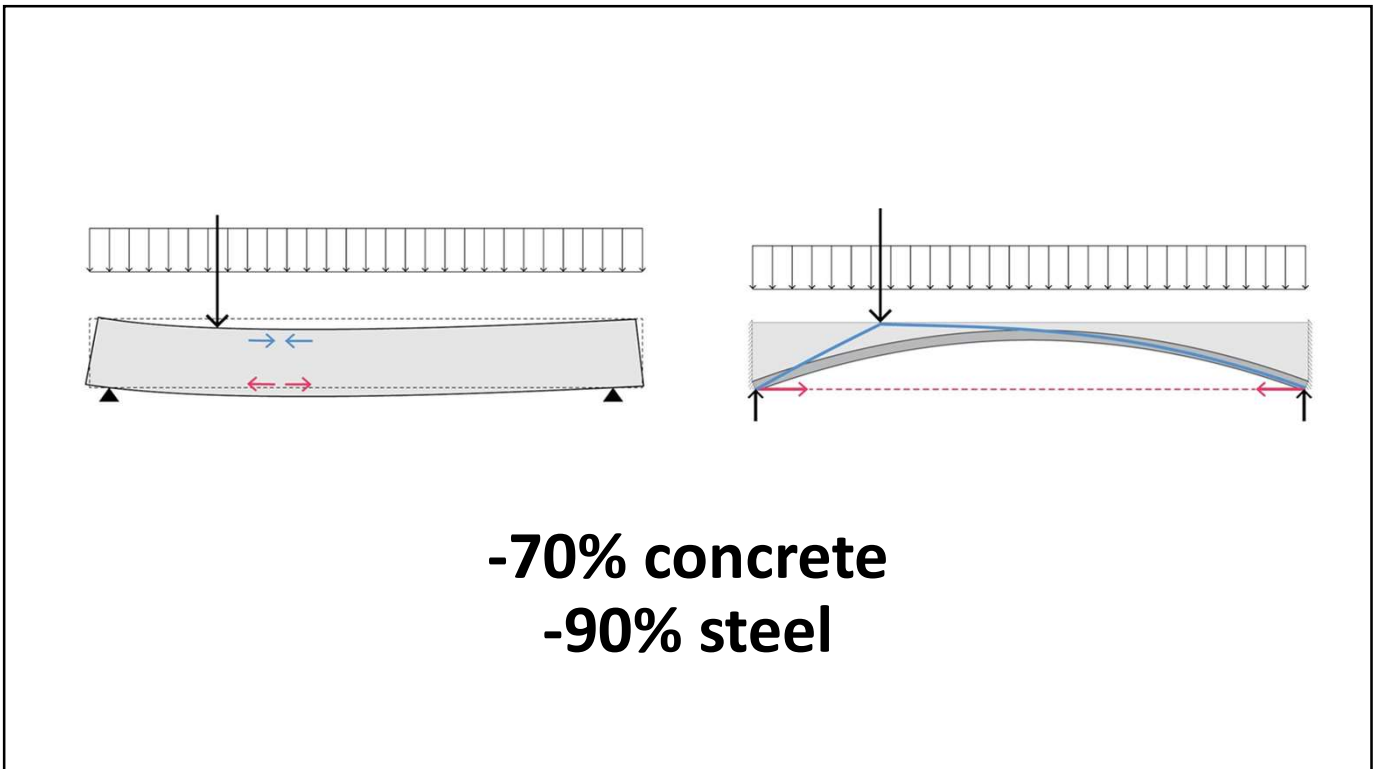
53



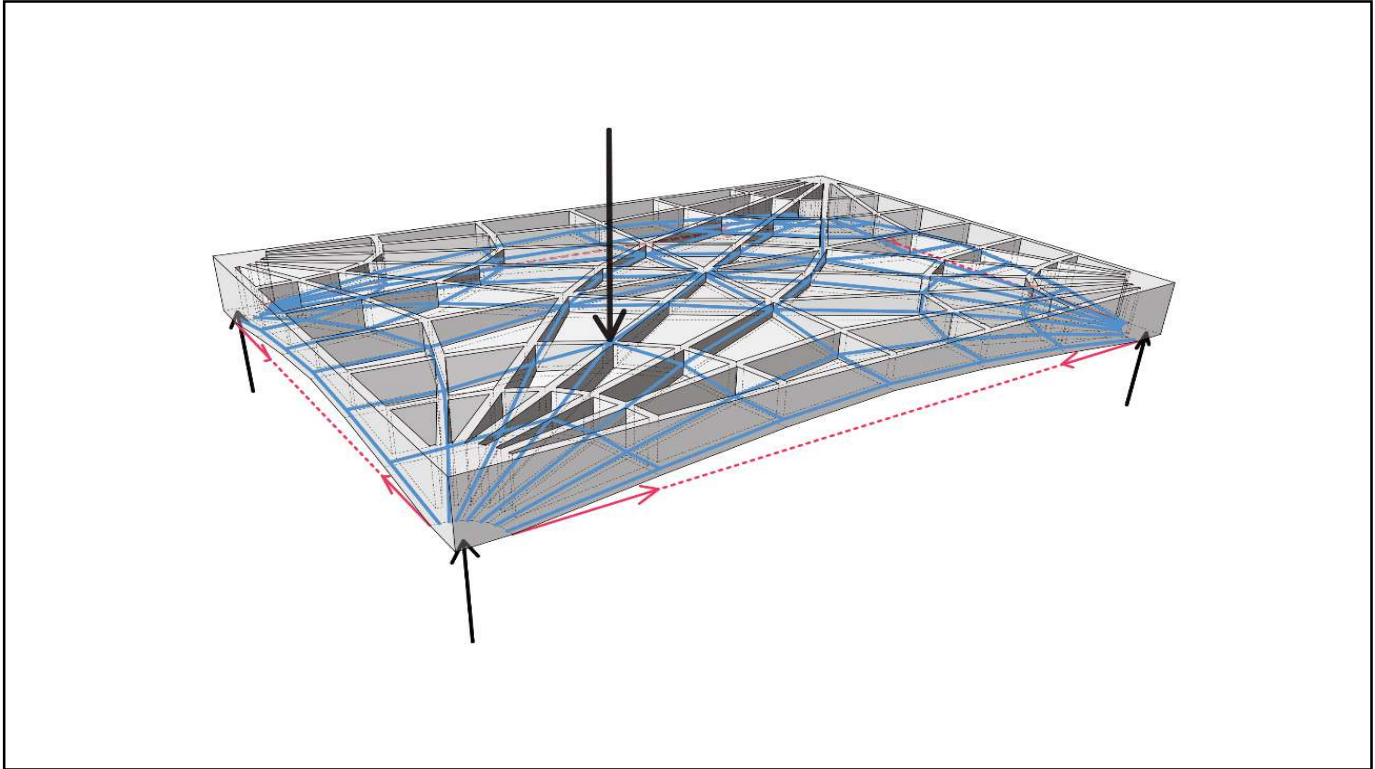
54



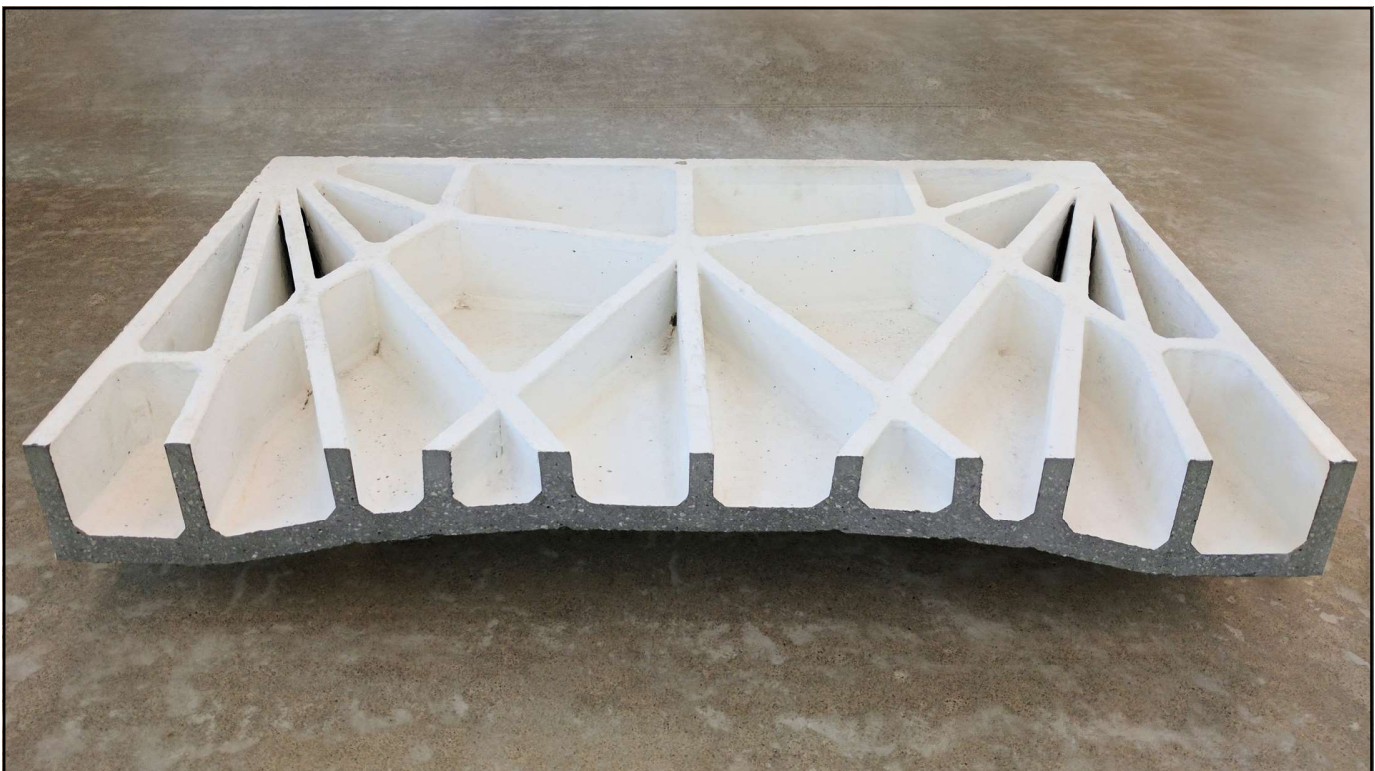
55



56



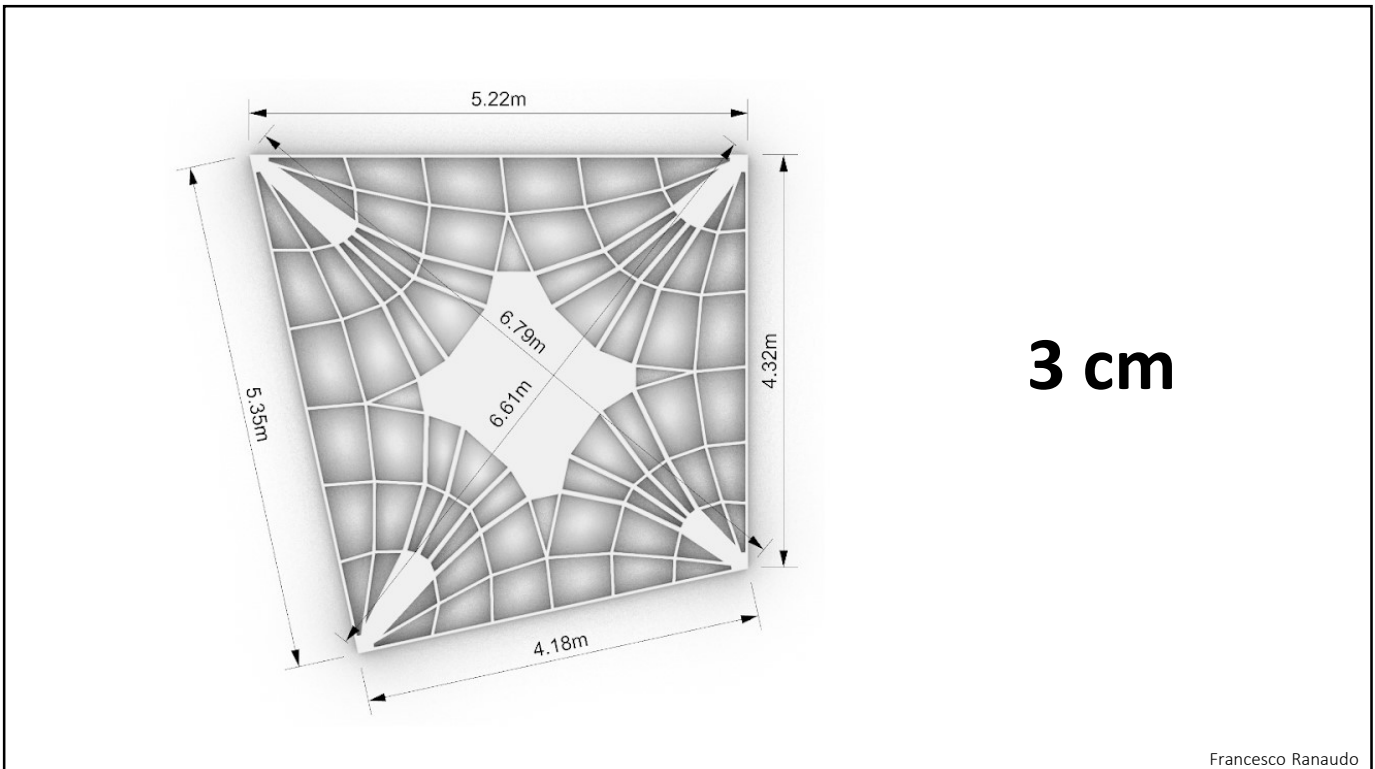
57



58



59



60

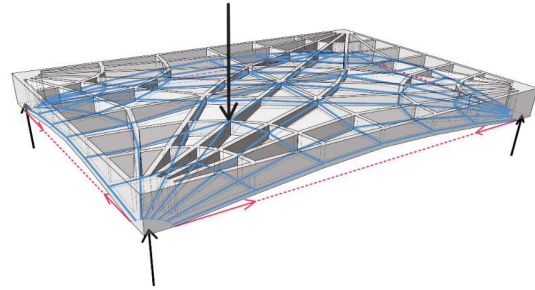
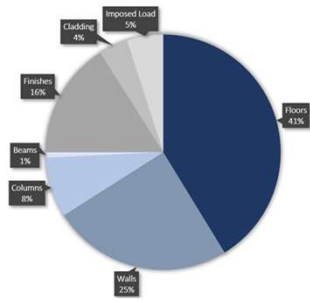


61

- Number of stories: 25
- Typical span: 26 ft
- Floor plate: 110 ft X 160. ft

Francesco Ranaudo

62



**> 40%**

**-67% concrete**  
**-80% steel**

63



64

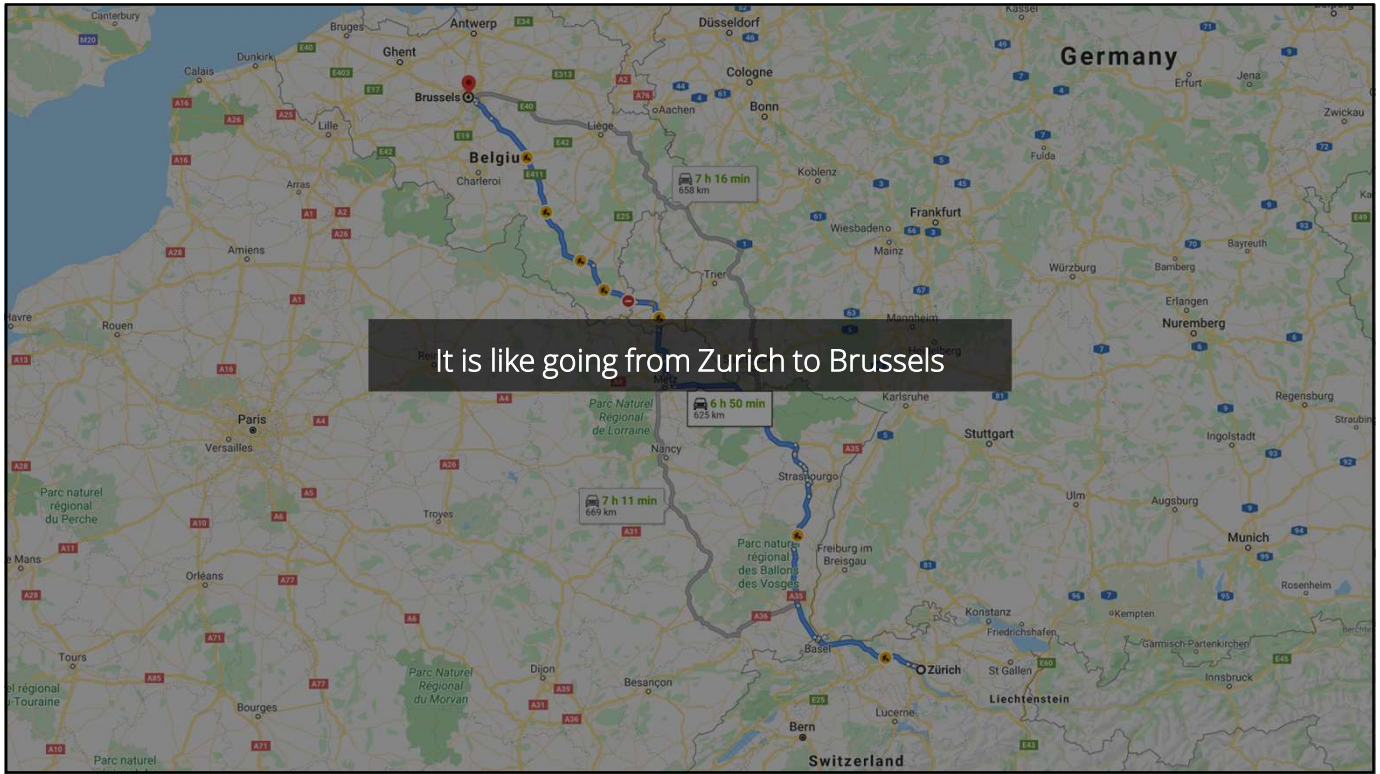




65

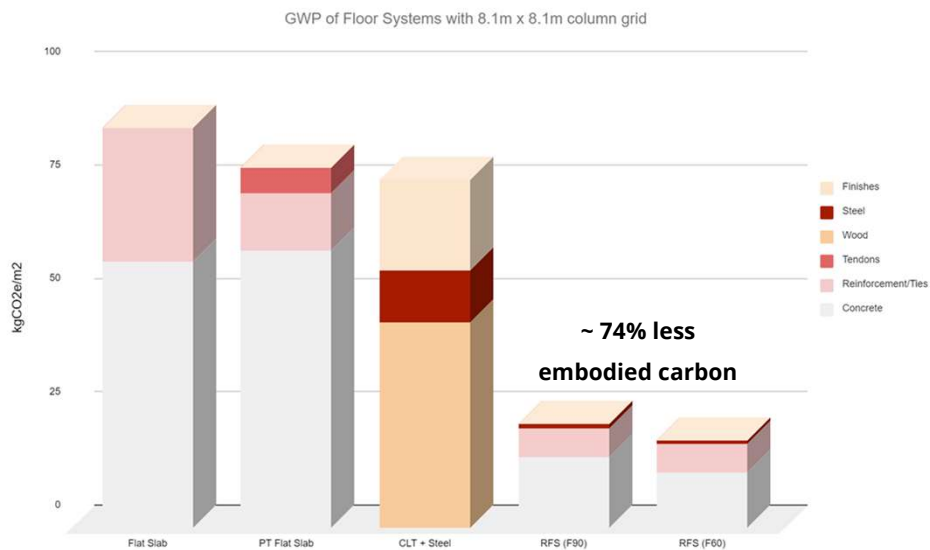


66



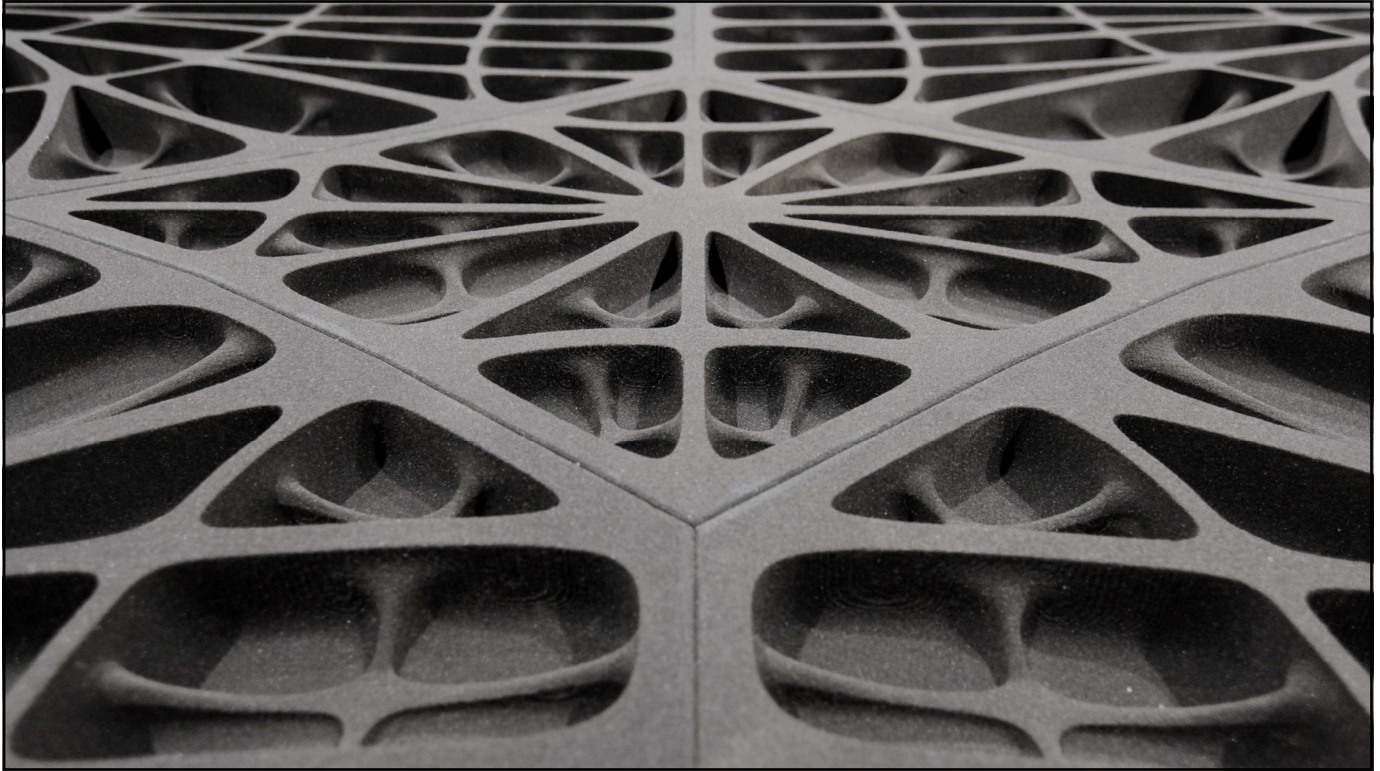
67

## Embodied Carbon comparison with conventional floors (larger spans)



Embodied Carbon Coefficients based on KBOB-Empfehlung "Ökobilanzdaten im Baubereich 2009/1:2016"

68



69

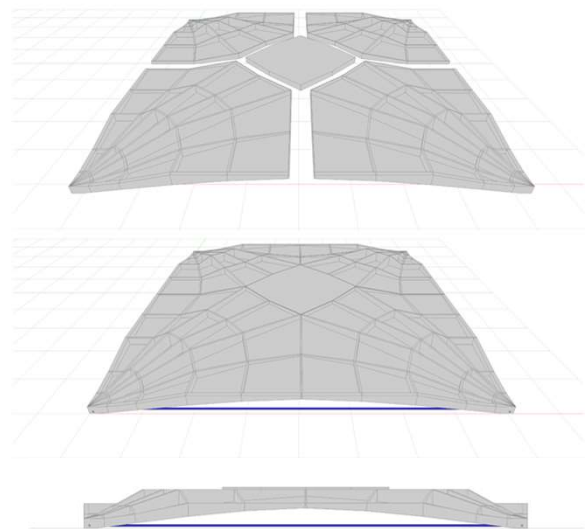
## Rippmann Floor System (RFS)

RFS is a rib-stiffened funicular floor that is

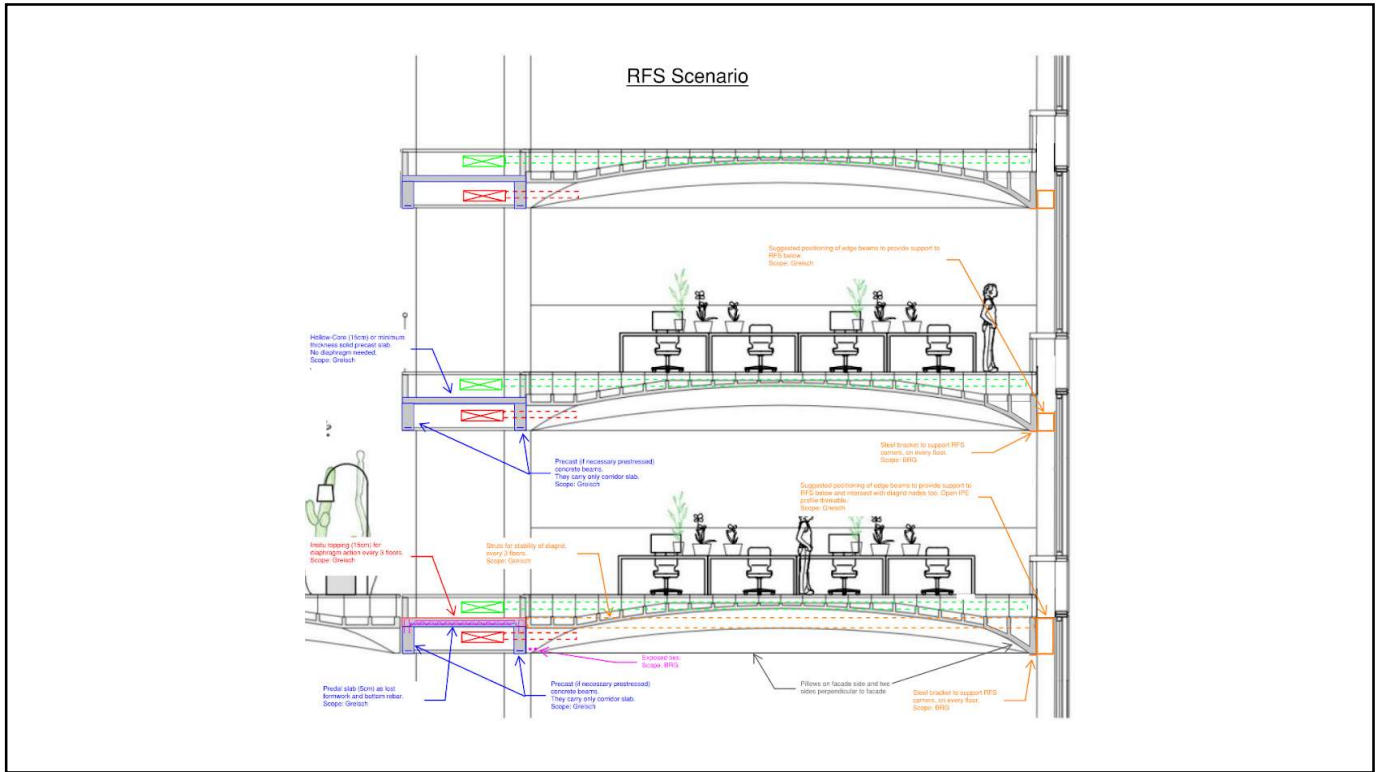
- discretised
- **dry assembled**, no chemical connection
- no embedded reinforcement
- using low-strength concrete
- prefabricated

and, as a result,

- lightweight
- low carbon footprint
- **completely demountable**
- easily recyclable
- allows a **Circular Economy**



70



71



CreaTower I - 10-storey office tower in Zug, Gigon+Guyer Architects, 1<sup>st</sup> place competition

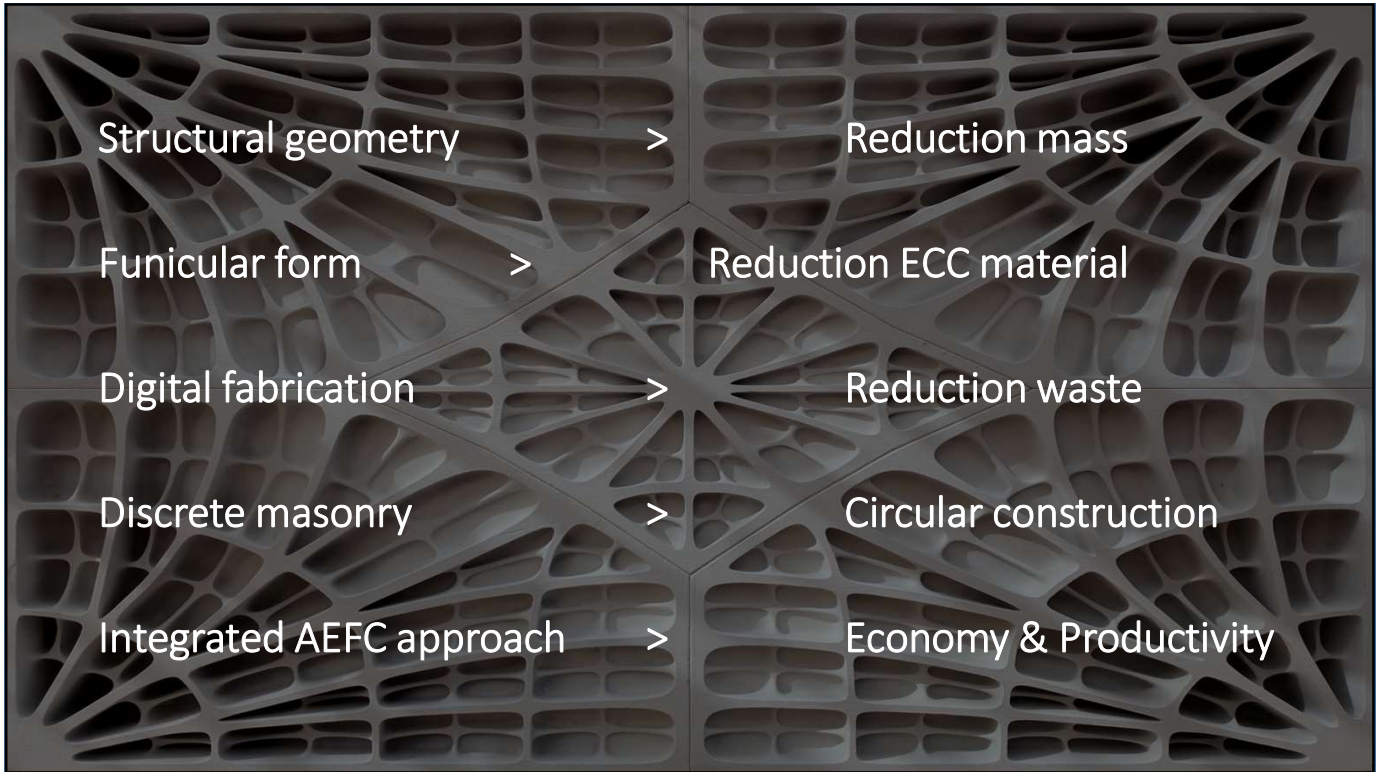
72



73



74



75



76



77

#### Basic Copyright Notice & Disclaimer

©2022 This presentation is copyright protected. All rights reserved. You may download or print out a hard copy for your private or internal use. You are not permitted to create any modifications or derivatives of this presentation without the prior written permission of the copyright owner.

This presentation is for information purposes only and contains non-binding indications. Any opinions or views expressed are of the author and do not necessarily represent those of Swiss Re. Swiss Re makes no warranties or representations as to the accuracy, comprehensiveness, timeliness or suitability of this presentation for a particular purpose. Anyone shall at its own risk interpret and employ this presentation without relying on it in isolation. In no event will Swiss Re be liable for any loss or damages of any kind, including any direct, indirect or consequential damages, arising out of or in connection with the use of this presentation.

78