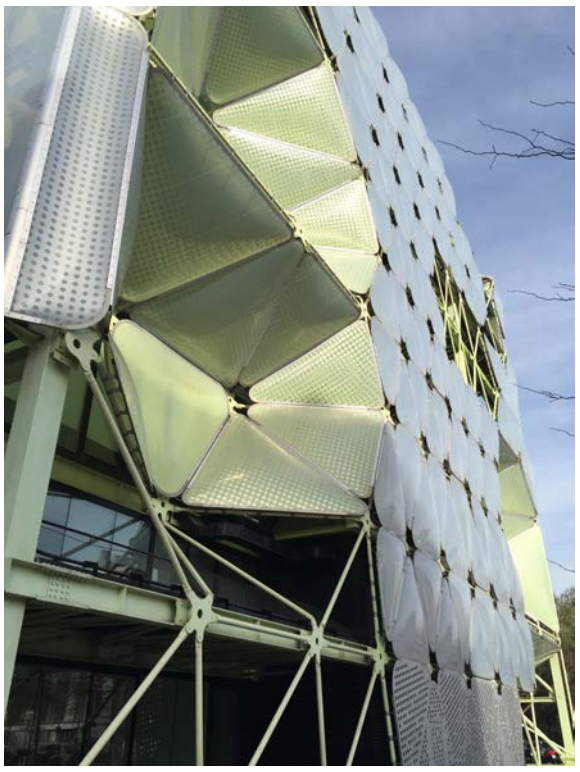


South-western facade

ETFE foil specifications

- 95% light transmission, 85% resistance to UV light.

- U-value: 2 layers: 1.96 W/m2K [SE facade, without counting nitrogen]
  3 layers: 2.94 W/m2K [SW facade, without counting shading pattern] 104 multi-layered ETFE cushions.

- Tensile strength: 42 N/mm2 [6100 PSI] without counting nitrogen

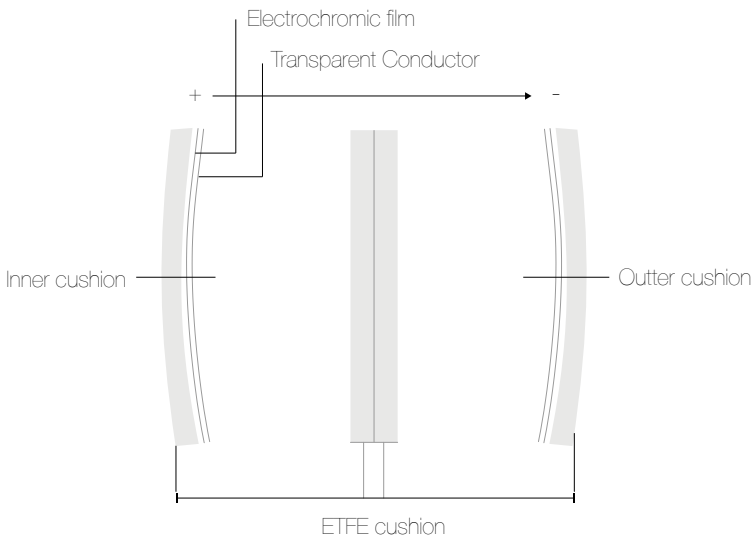
- Working temperature: -185 C to +150 C

- Durability: 25 - 30 years

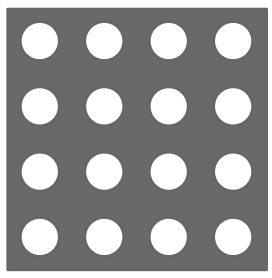
- Foil density: 350 g/m2

- Total foil area used: 2500m2

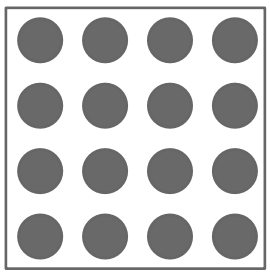
Being a stable chemical compound, the strong bonds make the material highly resistant to tension. Moreover, it has high chemical and abrassive resistance, able to function at high to low temperatures. The foil is non-flammable and if under fire, will shrink and not free-fall as molten plastic. Using several layers with air makes the achievable volumes extemely light (about 2% the weight of glass), and effective for thermal insulation. It is also recyclable. In a warm climate such as Barcelona, the building has proven that zero-energy efficiency can be achieved at a reasonable cost. The intelligent use of the material at the two most exposed facades (south west and south east) have brought a 20% energy efficiency in decreased cooling, and more use of natural light. Solar panels at the top of the building render an additional 60% energy efficiency. The structure consists of a steel gantry in which all nine floors are hung from the top with thin tension cables, in this way the building was build from top to down. With the minimalisation of structure where it is only needed, the building achieves around 40% decrease in weight. The south eastern facade consists of two ETFE layers running vertically along the whole facade. Gaseous nitrogen is released in warm days, such that sun radiation is reduced due to the opacity created by nitrogen, and its filtering of rays. The south western facade consists of 104 tripple layered triangular ETFE cushions varying in size depending on the geometry. They are all equipped with independent sensors [300 total] and compression pumps , making the facde an intelligent and dynamic, acting specifically to each region accordingly to relative climate throughout the year.

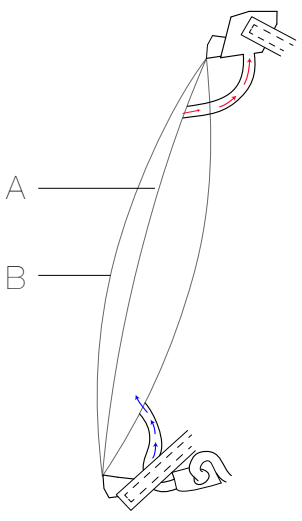


A
Blank circles, shaded negative

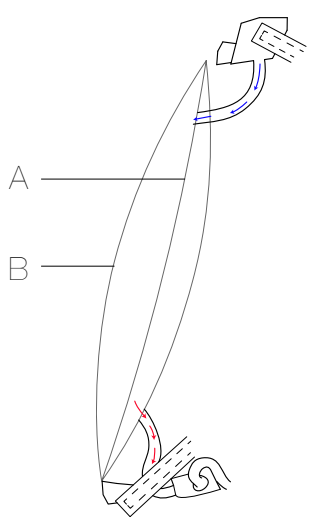


B
Shaded circles [slightly larger], blank negative

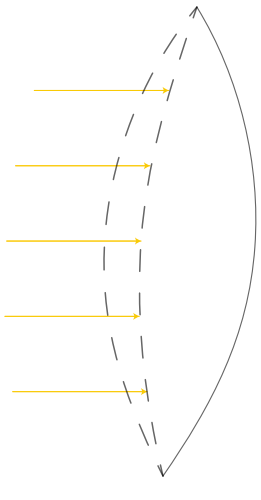




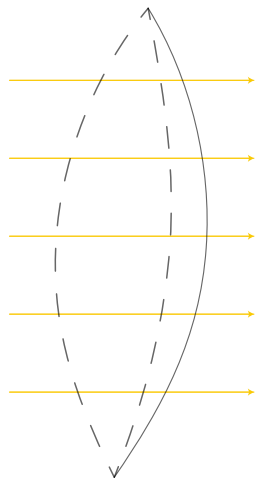
Decreased outter pressure, inner pessure increased [greater light blockage, hence less heating of the building by sun radiation].



Increased outter pressure, inner pessure decreased, [less light bloackage, hence more heating to the building by sun radiation].



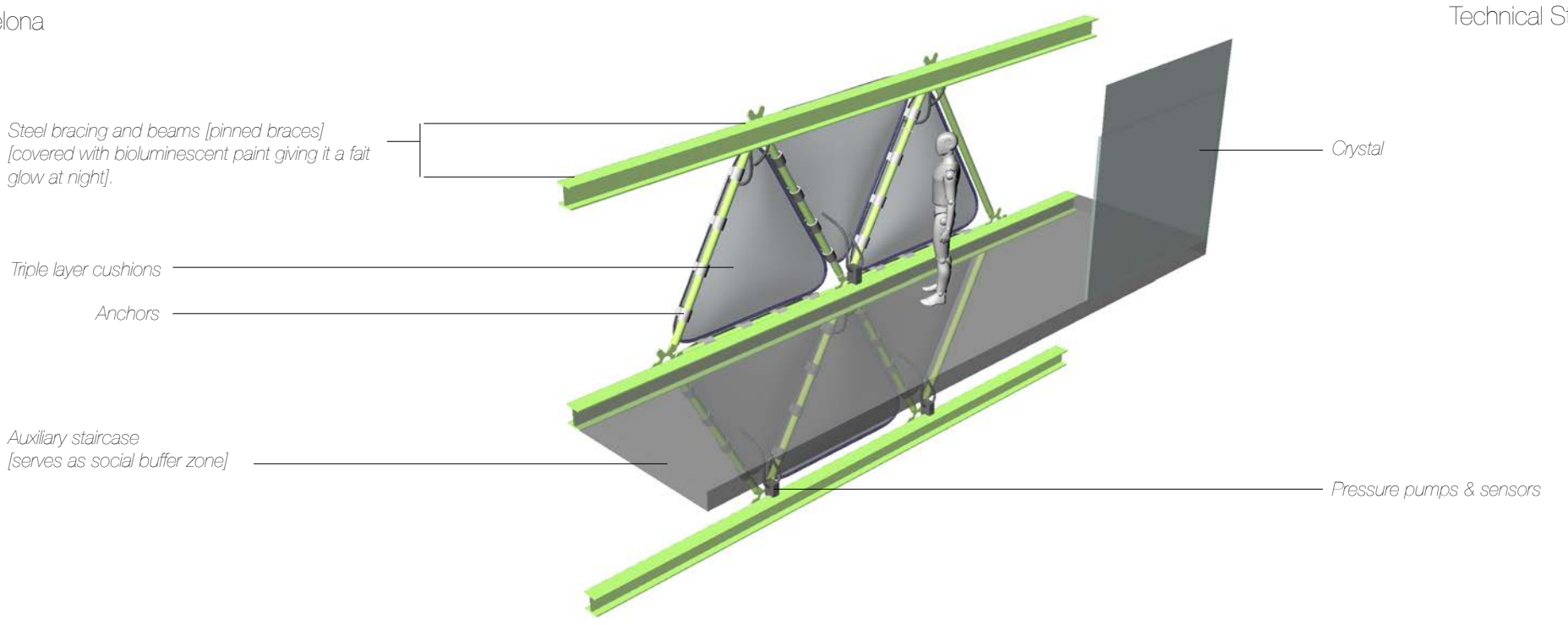
Complementary positive vs negative pattern on outter and middle ETFE cushion close enough to increase shading due to pressure differentials between the two cushions. [Hotter season]



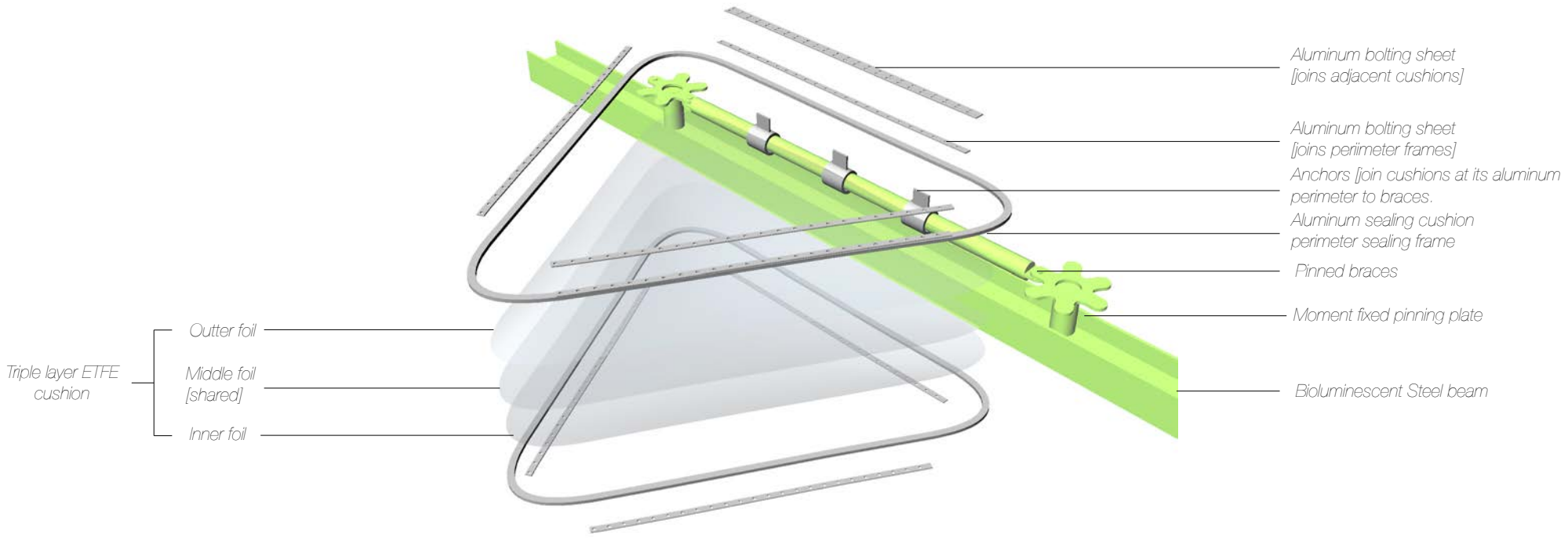
Complementary positive vs negative pattern on outter and middle ETFE cushion far enough to decrease shading due to pressure differentials between the two cushions. [colder seasons]

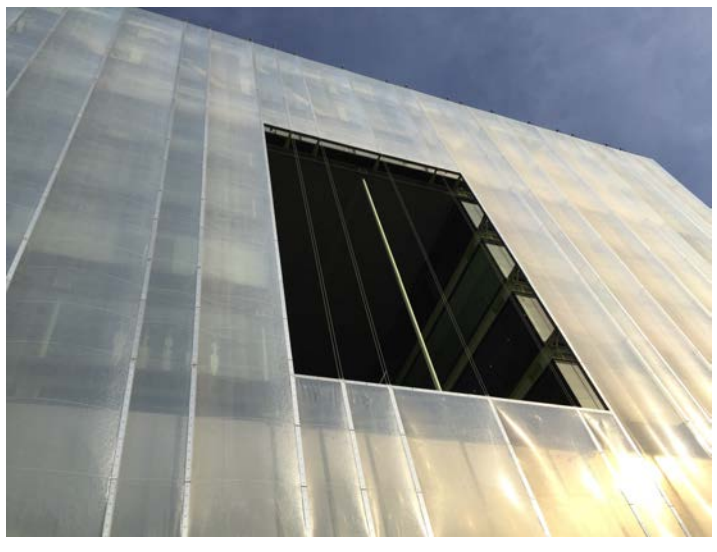
Media TIC
Cloud 9 architects
Barcelona

Erik Hoffmann
Facade build-up
Technical Studies Year 2
Material Systems



Structure consists of horizontal steel beams where electronic equipement is mounted. Bracing across the facade gives the triple layered cushion its perimeter to attach through four steel anchors at each strut. Bracing struts are joined by pinning to a common plate, which is momentarily fixed to the horizontal beams. Maximum distance between the ETFE envelope and the inner double glazed cristal wall is of five meters. Cushion facade rests on the outside serving purely as an autonomous shading mechanism controlled by sensons and compressor pumps, while crystal beneath serves to seal the building.

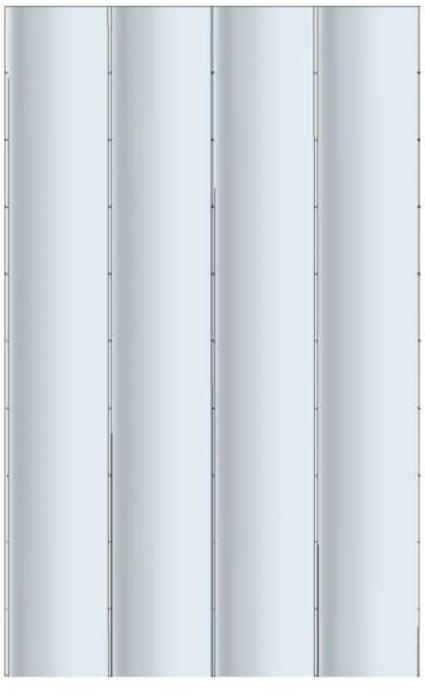




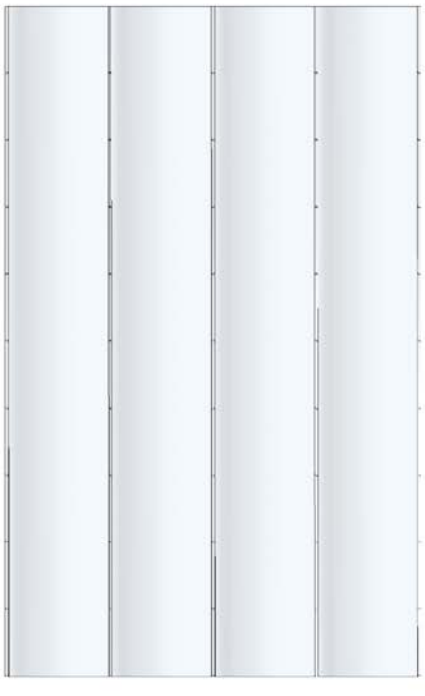
South-eastern facade

South-eastern facade and gaseous nitrogen increasing opacity to minimise incoming sun radiation heating the building.

Media-TIC targets and achievements:
1-20% CO2 reduction due to the use of District Cooling, clean energy.
2-10% CO2 reduction due to the photovoltaic roof.
3-55% CO2 reduction due to the dynamic ETFE sun filters.
4-10% CO2 reduction due to energy efficiency related to smart sensors.
Total 95% CO2 reduction, the Media-TIC is a NET building almost a net zero building.



Relatively cold climate: Little to no nitrogen released between double layer of ETFE running along SE facade. More sun radiation heating.



Hot climate: Gaseous nitrogen released increasing opacity. Less sun radiation, less AC use for cooling. Overall CO2 footprint reduced.