



Media - TIC

ENRIC RUIZ GELLI



Image 1

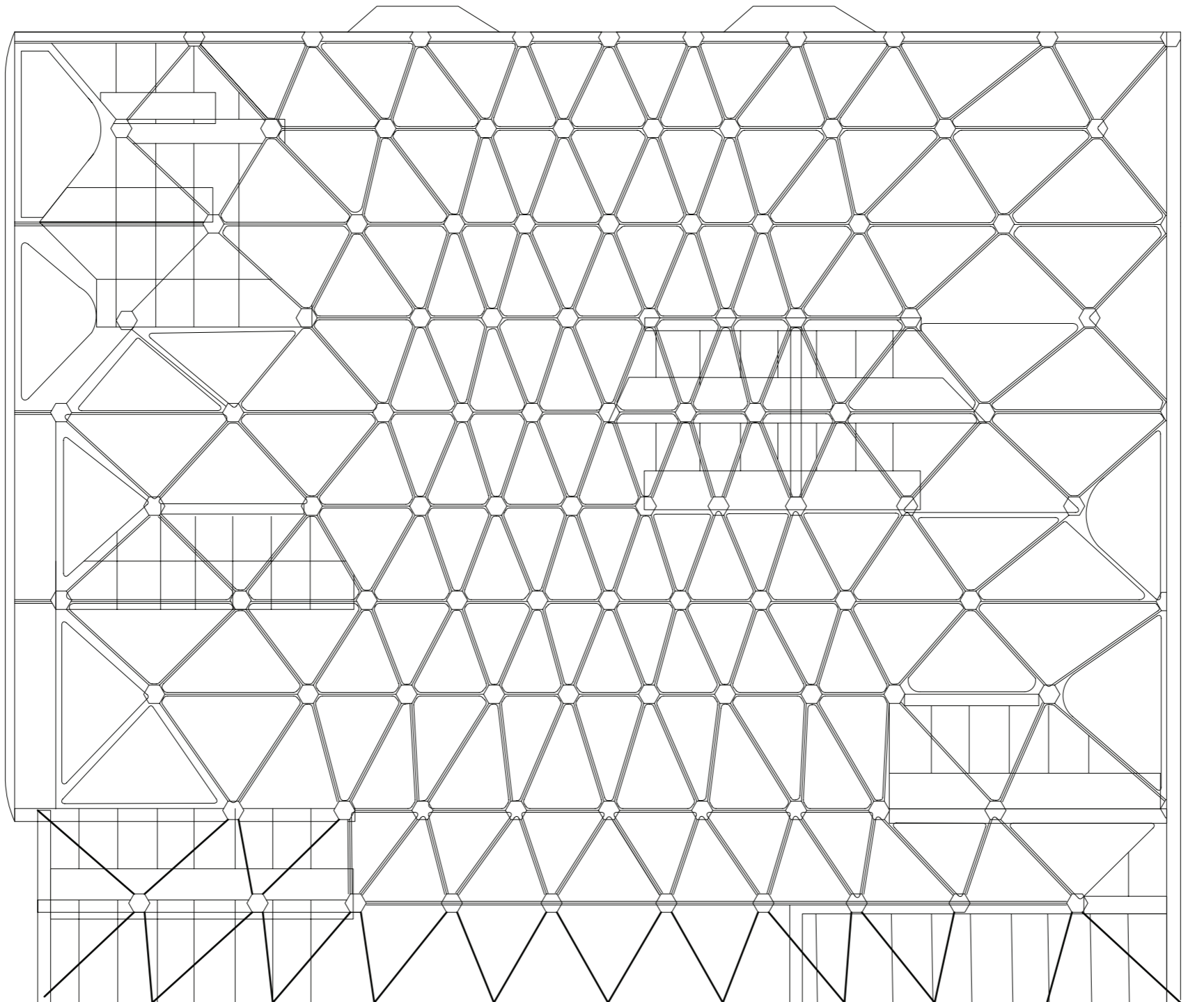
All Photos by Pranav Vakharia

Taken Dec 16, 2015

Architect: Cloud 9 (Enric Ruiz Gelli)

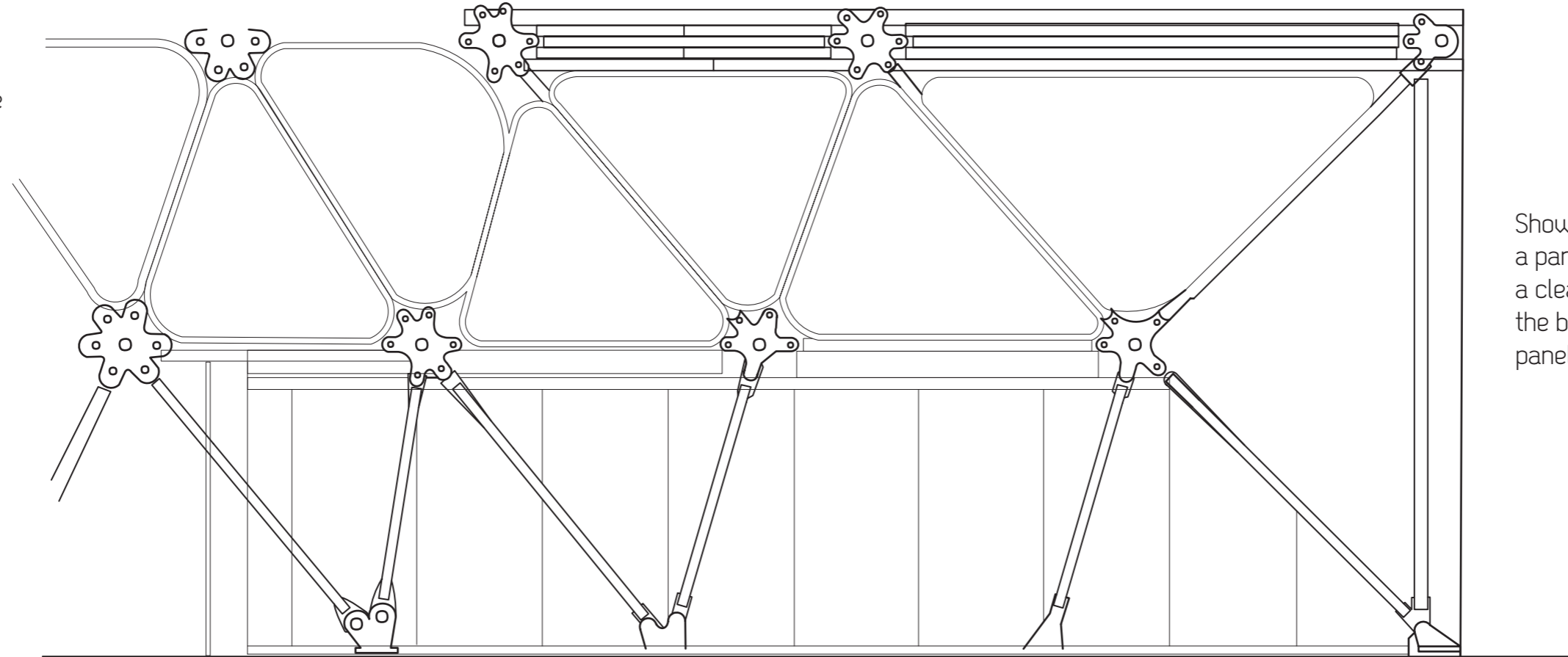
Location: Barcelona.

1:135 Section of the
façade



This unique, all-too-perfect building designed by Cloud 9 architects in Barcelona, Spain, uses a highly complex system of ETFE cushions to achieve a highly performative facade (see Image 1, previous page). ETFE (Ethylene Tetrafluoroethylene) film is a durable, highly transparent and lightweight material that allows for the maximisation of light transmission, solar control and shading, and acoustic performances. The 4 façades of the building are themselves different from one another. Each face of the building responds to a different environmental or structural parameter. For this analysis, I will be taking the south-east façade into consideration (as shown in this 1:135 section of the building).

1:45 zoomed in
Section a part of the
façade

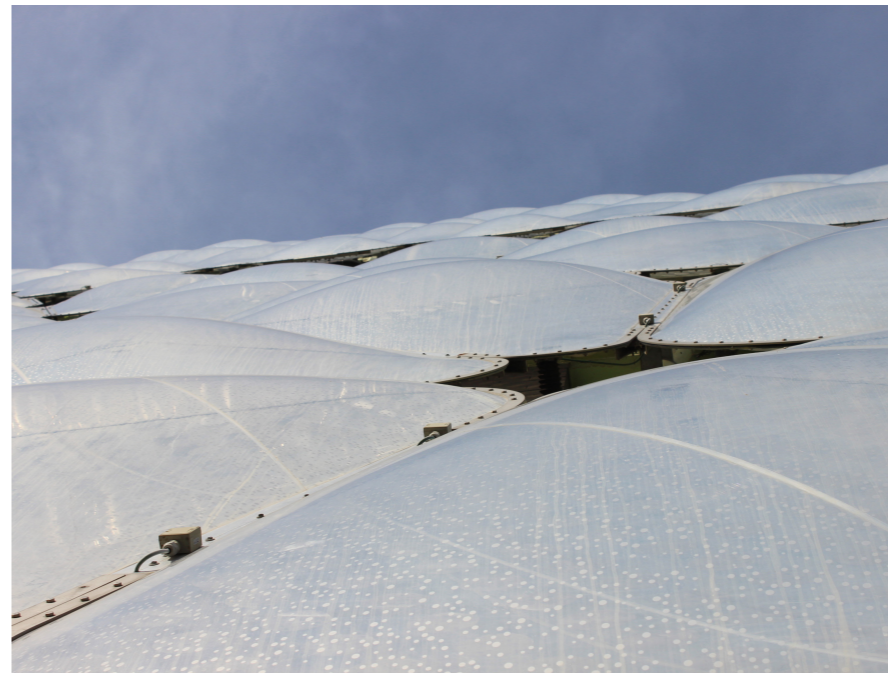


Shown alongside is a closer view of a part of the façade, that allows for a clearer analysis of the structure of the building itself as well as the ETFE panels.

Image 2
Close-up of the ETFE panels
connection point, and struc-
tural pinned-connection
behind the façade



Image 3
ETFE cushions as seen from
the ground. up.



Shown alongside is a closer view of a part of the façade, that allows for a clearer analysis of the structure of the building itself as well as the ETFE panels. The inflatable cushions are embedded with sensors reading the heat and the angle of the sun. Layers of ETFE create three inflatable chambers within each triangular frame, which provide both shade and thermal insulation



Image 4
ETFE cushions.



Image 3
Inside the Envelope: The ETFE cushion
façade a separate entity, completely
disconnected from the inner membrane
of the building.

As shown in Image 3, the ETFE cushions are completely separated from the inner façade of the building. This is achieved through the strategic placement of pinned connections to the primary structure. The primary structure frame itself consists of metal fink truss-style beams made of seven and eight-section forged-metal girders. Furthermore, as shown in Image 4, the ETFE cushions inflate and deflate to different thicknesses throughout the day in response to the changing angles of the sun's rays, and also the percentage of humidity in the air.



Image 5
Close-up of Photo Voltaic circles that enhance the performance of the ETFE cushion.



Image 6
The ETFE cushion is connected to sensors that control its inflation and deflation throughout the day.

Images 5 and 6 (above) are taken from behind the ETFE cushion. There are 4 different types of ETFE cushions, which are connected to their own embedded sensors, eliciting the following performances

- Photo voltaic modules (circular shapes on the ETFE cushion, image 5) : can generate upto 2300 kWp of solar energy.
- Type A cushions : Cushions that have 3 layers that allow for pneumatic sun shading. By inflating or deflating, these cushions can allow between 65% and 45% of sunlight to enter the membrane.
- Type B cushions : 2 layer cushions that allows a set value of 55% solar transmittance.
- Type C cushions : 2 layer cushions that allows a set value of 65% solar transmittance.
- Type D cushions : 2 layer cushions that allows a set value of 50% solar transmittance.