aps fairfield photovoltaic manufacturing facility

This 70,000 square foot concrete and stainless steel structure housed the largest solar module manufacturing line in the United States. The facility was designed as a prototype both for the emerging photovoltaic (PV) industry and for integration of PV technology in architecture.

The heart of the project is a glass cube containing the factory's control center. The cube's PV cladding, in combination with a solar panel entrance canopy and a translucent PV skylight, produces all the power necessary for the control center's lighting and air conditioning.

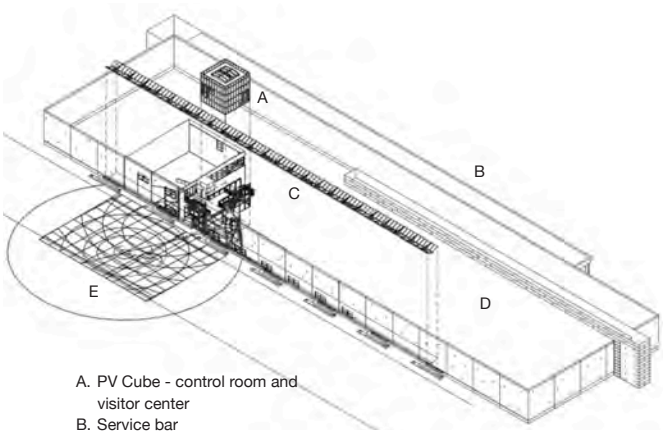
A diagram of the principles of photovoltaic energy at the atomic level is cast into the pavement at the entrance, further announcing the building's relationship to the renewable energy of the sun.

Completed in 1990, this was the first true building-integrated PV (BIPV) commercial building in the USA.

The Client:
APS Fairfield

The Team:
Kiss + Cathcart, Architects

Project Details:
$32.000,000
72.000 sf
Completed 1991



A. PV Cube - control room and visitor center
B. Service bar
C. PV awning
D. Production area
E. Entry plaza/didactic pattern

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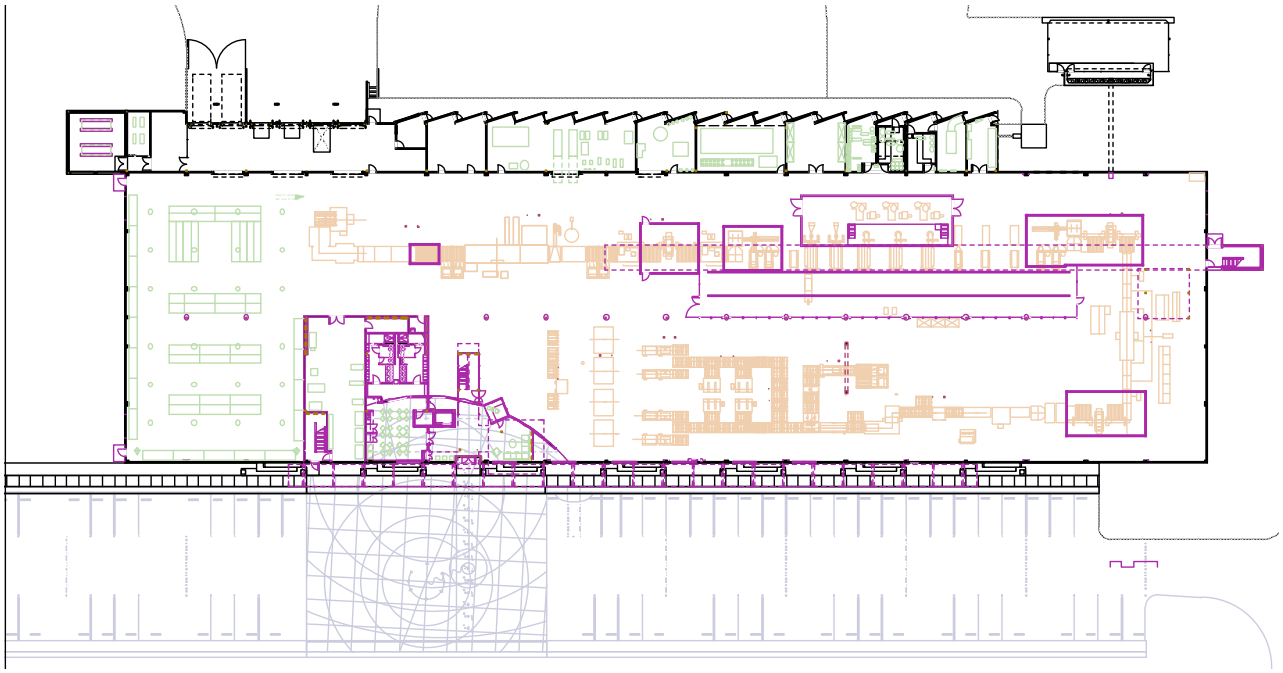


Site

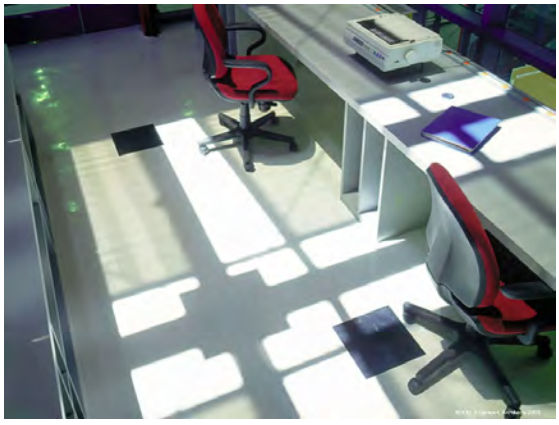
Fairfield, in California's Central Valley, is about halfway between San Francisco and Sacramento. Located at the northern end of the Solano Business Park, the APS facility is neighbors with Jelly Belly, the well-known jelly bean maker, and Fairfield's number one tourist attraction. With the site highly visible on all sides, and with many potential spillover visitors from next door, the factory had to be designed to accommodate it's many technical and human functions in an attractive as well as an efficient way.

As one of the first PV manufacturing facilities in the US, and the first application of commercial Building Integrated Photovoltaics (BIPV) in the US, the project was designed as a showcase and an educational tool.

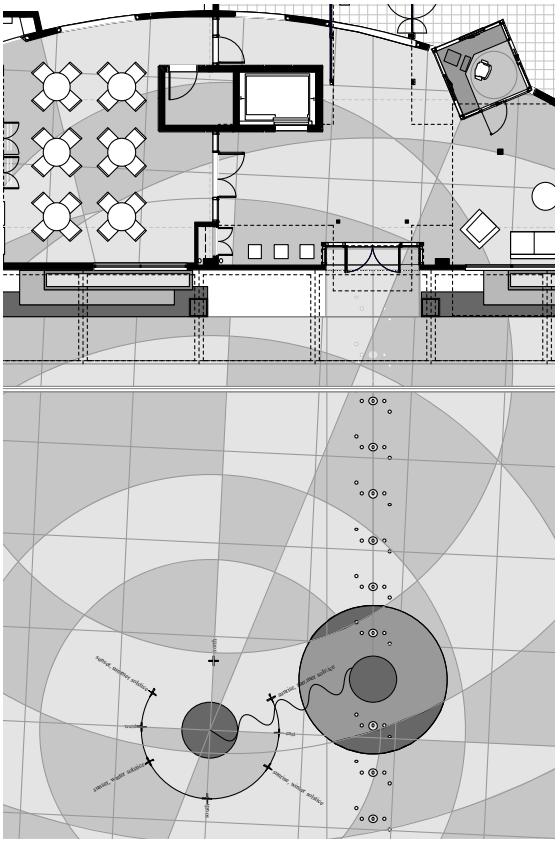
From the south, entry side, in addition to the visible applications of BIPV, the entry court is paved with a pattern that overlays a representation of the silicon atom with a sunpath diagram, and relates the two to narrate the photovoltaic effect.

On the north side, the many points of service access are integrated into a stainless steel service bar that functions as a giant louver.

Skylight with BIPV panels (corners) and standard skylight glass (center cross)..



The PV skylight provides diffuse, pleasant light while generating electricity.



Didactic paving pattern continues into the building lobby.

Materials

The building is a tilt up concrete structure with a wood roof, the typical low-cost construction method in this part of California. The normally banal construction is activated with a sandblasted surface, exposing a colored aggregate, and glass blocks embedded in a random pattern, creating a distinctive pattern of light, day and night. The service elements of the building are clad in a stainless steel skin.

Energy

The PV cube - visitor's Center and Control Room - is clad with the world's first use of thin film BIPVs, set in a ventilated curtain wall. Thin film (amorphous silicon) BIPV has the unique characteristics of good generation performance at high temperatures and low light levels, visual uniformity, and low cost. Most significantly, thin film BIPV has the potential to be by far the most economical source of renewable energy. Due to it's low cost per area (as little as $15/square foot in 1990, and approaching $10/square foot today), thin film BIPV costs less than certain high-end cladding materials, resulting in a low or even zero net cost.

The PV Cube is conceived of as an independent office building set into the larger factory. It has its own electrical subsystem, and a separate climate control system. Energy from the PVs in the Cube's curtain wall and skylight, and the awning shading the south facade of the factory, generate approximately 20% more energy than the Cube consumes, making it a first prototype of energy positive buildings of the future. Completed in 1991, few buildings have achieved this level of economical sustainable performance almost twenty years later.