

POLITECNICO DI TORINO
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Honors theses

Zero net energy building in Tenderloin, San Francisco

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The whole thesis work starts from an International Contest, for engineers, architects and students from all over the world. Architecture at Zero 2013 is presented by Pacific Gas and Electric Company (PG&E) and the American Institute of Architects, San Francisco (AIASF) in partnership with the Tenderloin Neighborhood Development Corporation (TNDC). Contest attendance allow us to compete enthusiastically with a completely different contest from that one of Turin and Italy, motivating our professional skills improvement.

To meet the design challenge requests, we carry out a series of climate and environmental analysis, in order to define the appropriate technological and architectural solutions for the specific project area contest.



Project render

Generative concept, starting from different kind of analysis, inspire from natural solutions, aimed to maximize the environmental benefits of specific surrounding contest. Dynamic strategy of some vegetables are exemplar in this way; these plants are able to orient themselves through the space, reaching the best suitable position for their well-being.

The project, in accord with design contest, is composed by:

- A grocery store on the ground floor
- Offices on the first and second floor
- Residential spaces in remaining floors



Project perspective section

The main solutions adopted in order to achieve the goal of nearly zero energy building are numerous and include both the minimization of the needs that the energy production on site.

The main ones are:

- Presence of movable sunscreens, which in synergy with the horizontal lugs are able to modify the solar penetration according to external conditions or according to user needs
- Massive structures that coupled with the insulation solutions are able to provide a relevant response to the particular climatic conditions, highly variable also daily, of the city
- Presence of different systems of renewable energy production, such as a Solar Wall system for the production of thermal energy and a system of tracking photovoltaic panels for the production of electric energy
- Presence of a heat recovery unit that uses the waste heat from refrigeration equipment in the grocery store



Solar screens working scheme

As method of calculation was carried out with a dynamic simulation, using a specific calculation software developed by the University of California, Los Angeles, in accordance with the U.S. specific regulations.

The results of the simulations have returned the energy needs of a building that is very close to the requests for zero energy building, remarkable results especially if related to the huge energy consumption resulting from the many refrigerating machines of the grocery store.

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