

415 Mathilda, a ZNE Office Retrofit & 2030 Blueprint in Sunnyvale, Calif.

Submission No:

208

Award:

Sustainable Design/Architecture - Commercial

Submitter:

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Background:

What is the nature of your organization and the context in which it operates? In what professional sector does your organization operate?

Five California companies — View, Hillhouse Construction, Sharp Development Company, Studio G and Integral Group, — recently partnered to transform a 1970s office building in the heart of Silicon Valley into a vibrant zero net energy (ZNE) office space. The renovation of the 34,875-square-foot 1970's concrete tilt up structure, located at 415 Mathilda Ave. in Sunnyvale, California, was sponsored by the California Energy Commission to serve as a blueprint for buildings aiming to abide to California's Title 24 regulation of zero net energy commercial buildings by year 2030. This has since been termed the "Mathilda" project demonstrates that energy-progressive building practices could be both market attractive & cost competitive through innovative uses of energy-efficient building technology

Initiative:

Describe the initiative and why you created it. Give emphasis to include key objectives and how these objectives contributed to the overall organizational objectives and strategies.

This project sought to catalyze ZNE construction in California by showing how it could be economically compelling in addition to environmentally responsible & yielded net-positive-cash-flow, 20% higher ROI than conventional

- Reduces cooling energy by 3x at an HVAC capital cost 5x lower than required for Title 24
- Reduces lighting energy by 3x at a lighting installed-cost 1.5x lower than required for Title 24
- Reduces heating energy by 7x at an HVAC capital cost 5x lower than required for Title 24
- Generates sufficient incremental net-operating income to provide a positive cash-flow after servicing debt equal to the total incremental renovation costs over Title 24
- Has an incremental ROI greater than market rate on comparable non-sustainable construction (7.5 percent)

Collaboration (if applicable):

Describe why your project represents a collaborative effort between two or more companies and what processes you developed to ensure all participated fully.

- View: prime contractor, responsible for overall project management and reporting, as well as design and construction of custom dynamic glass IGUs. Brandon Tinianov served as program manager. Taniguchi Landscape and Clark Street also helped facilitate the CEC Grant
- Integral Group was responsible for the Net Zero Carbon design of the renovation, worked with all technology suppliers & was responsible for site modeling
- Sharp Development: site owner agent
- Hillhouse Partners: managing construction.
- Architect: Studio G
- Structural engineer: SEI
- Living Wall: Habitat Horticulture
- Interior fans: Big Ass Solutions
- EBS Consultants: all energy savings measurement & verification (M&V).
- Broker Steve Clark of JLL represented the tenant
- Brokers Steve Horton & Kelly Yoder represented the landlord

Implementation:

Describe the implementation, the outcome and its impact. Give emphasis to the leadership challenges and choices made.

An integrated package of 3 advanced emerging & 5 mature technologies were used in this design:

- 1)Low-cost dynamic windows: windows capable of changing tint throughout the day to maximize daylighting, minimize glare & tailor solar heat-gain

- 2)Advanced skylighting: provides 100 percent daylighting across work-surfaces, minimizing solar heat and glare
- 3)Extreme insulation/night flushing: This combination provides “free” cooling through passive ventilation that draws in cool air at night and traps it to cool the building in the day
- 4)HVAC: All heating/cooling load is provided by night-flushing and dynamic solar heating, so a minimum HVAC system was installed
- 5)LED lighting
- 6)Plug-load management: eliminates vampire power draw & minimizes plug loads
- 7)Renewable power
- 8)Building controls: EMCS

Lessons Learned:

Describe challenges, things you would have done differently, unexpected successes, etc.

Renovating a building constructed in a different era is a challenge in of and itself, but transitioning it to a ZNE building that meets Title 24 requirements compounds this challenge. One task that made this more difficult was the need to aggressively expand the number of windows within the facility. Since the building was previously a racquetball facility where windows were not needed, the team had to add 86 new windows, increasing from a 5 percent window area to more than 40 percent window area while maintaining a highly efficient building skin. Most façade options would have forced the architects to reduce the total glass area in order to meet the code.

Another challenge was keeping costs down; the team took a holistic approach to sustainable design so the design was affordable.

Outcome:

Describe the outcome and its impact. Show evidence of quantifiable metrics and a statement of external verification, if available. How is the project or program being monitored? What is the reporting cycle?

The Mathilda project succeeded in its goal to become an affordable commercial design that meets ZNE and Zero Net Carbon guidelines.

The integrated package of technologies achieved a ROI 20 percent higher than for conventional (non-sustainable) construction projects. As a demonstration of its impact, the Mathilda approach has already spawned clones. The building was also able to quickly attract a new tenant in Clover, a tech org.

Beyond commercial market recognition, the Mathilda project was recognized by the California Energy Commission as a demonstration project and technology platform for the state's future mandate of Net Zero commercial buildings. The commission awarded the project a \$1.5 million grant in exchange for sharing its insights as a model for ZNE renovation strategies.

Best Practices (if applicable):

Describe best practices that have been a result of this initiative.

- Approach sustainable building with practical economics. While high-performance building carries higher initial construction costs, the Mathilda project's costs were significantly outweighed by the near-term benefits of reduced operating expenses, accelerated lease-up and premium rent over the life of the occupant's lease.
- Progressive developers can voluntarily undertake market-attractive ZNE buildings that cost less to build and rent for a premium. While new construction is the primary focus of building efficiency policy, the Mathilda project demonstrates the immense opportunity to remake current buildings on a sustainable model and at a compelling ROI.
- Leverage industry-leading technologies. ZNE strategies must be broadly replicable to achieve true scale.

Innovation (if applicable):

An innovation brings about a paradigm shift in the way business is done in a rapidly globalizing economy. It reduces a new concept to practice and makes it a commercial success. It concerns the search for and the discovery, experimentation, development, imitation and adoption of new products, processes and organizational set-ups. Given this definition, provide a specific statement of why you believe your submission describes an innovation

If so, explain how.

The technologies applied at Mathilda demonstrate the power that the Internet of Things, nanotechnology, smart systems and next-generation architectural thinking can have when deployed in concert for the purposes of net-zero construction. This project highlights the ability of the construction industry to thrive in a progressive policy environment, and provides a blueprint for developers to create cost-effective, profitable renovation designs that comply with California's Title 24 regulation.

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