Pirelli: Checking Into a Historic Existing Buildings Hotel

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Since 1972, Steven Winter Associates, Inc. has been providing research, consulting, and advisory services to improve the built environment for private and public sector clients.

Our services include:

- Energy Conservation and Management
- Decarbonization
- Sustainability Consulting
- Green Building Certification
- Accessibility Consulting

We have over 100 staff across four office locations: New York, NY | Washington, DC | Norwalk, CT | Boston, MA

For more information, visit www.swinter.com
Outline

• Building overview & history
• Project Goals
• Net Zero
  • Mechanical challenges for electrification and reaching Net Zero
    • Kitchen energy consumption
    • Heat Recovery Ventilation
    • Electrification of domestic hot water
  • Renewables to offset building energy

• Passive House as a pathway towards Zero

Let’s check in at Hotel Marcel
Hotel Marcel

- **1967**: Designed by Modernist architect Marcel Breuer
- **1970-1988**: Owned/Operated by Armstrong Rubber
- **1988-2003**: Owned by Pirelli Tire Company—vacant
- **2000**: The building was added to the Connecticut State Register of Historic Places
- **2003-2019**: Owned by adjacent IKEA—vacant
- **2020**: Owner/architect Becker + Becker—redesign begins

Project Goals

- **Project Pursuing**
  - Net Zero
  - EnerPHit
  - LEED Platinum
  - Energy Star
  - UI (utility) incentives
  - Electrification

- **Historic Considerations**
  - Concrete panel façade
  - Window aesthetic
  - Original tile flooring

- Integrated Design—get everyone involved EARLY
Net Zero at Hotel Marcel

Net Zero – Energy Consumption

• **Goal** < 510,000 kWh/yr
  • Equates to a site EUI < 18.0 kBtu/sf.yr

**KEY CONSIDERATIONS**

• Reducing commercial kitchen energy use
• Reducing common area lighting energy
• Predicting annual average occupancy rates
• Ventilation controls
• Heat recovery on kitchen ventilation
• Electrification of domestic hot water (in addition to space heating)
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Kitchen Energy Use

- Coordination with the kitchen designer
  - List of equipment and electrical usage
  - Schedule for use of equipment
  - Exhaust hood specification
  - Possibility of all-electric appliances
Appliance Schedule

Kitchen Energy Use

Kitchen Electrification

- All electric possible? - YES
- Appliance choices
  - One less electric fryer
  - kettle use from 12hr/day -> 2hr/day
- savings of ~150,000 kWh/yr
- Menu
Kitchen Energy Use

Ventilation/ Heat Recovery

• Certified Type 1 Recirculation hood system
  • Does not require vent to exterior
  • Only compatible with electric appliances

SWA Podcast: It's Time to 86 Fossil Fuels in Commercial Kitchens with Chris Galarza

Electrification of DHW

• Load reduction measures
  • Low flow fixtures
  • Efficient recirculation pipe layout
  • Drain water heat recovery on shower drains

• Efficient heating strategy
  • 4 air-sourced heat pump water heaters (located indoors)
  • Supplemental electric tanks
  • 700 gallons of DHW storage

• Initial energy estimate = 48,000 kWh/yr (site EUI – 1.6 kBTU/sf.yr)
Use of Renewables

Energy Offset with Renewables

- PV (roof + carport arrays) covers 100% of building energy
- Demand response signals from utility grid
What is even better than using PV?

Not NEEDING as much PV to offset your building!!
Passive House: a Pathway to Lower Energy

Lower overall energy use = less renewables to reach Net Zero

What is Passive House (PH)?

- Emphasis on balanced ventilation
- First and foremost, PH is a building standard
- Attention to insulation continuity and reduction of thermal bridges
- Performance-based approach
- The most rigorous energy efficiency certification available
Goals of PH

- **Reduce energy** consumption/$
- **Reduce carbon** emissions
- **Provide superior** thermal comfort, indoor air quality, and acoustics
- **Increase durability** of building materials

PH Principles - Multifamily

- Performance based approach allows flexibility
- Same principals apply to all Passive House and will be required for certification
- The equation changes for multifamily buildings due to high density
- SWA adds two new principles for multifamily:
  1. Domestic Hot Water Design
  2. Efficient Lights and Appliances
- Heating and cooling systems are very important, but focus is on envelope and internal loads first
Lowering Energy with Passive House

- Continuous insulation and air barrier
  - Lower heat loss through envelope
- Airtight construction
  - Keep conditioned air in the building
- Primary Energy requirements w/ certification
  - Energy efficient mechanicals/appliances

Bonus:
- Building free of moisture concerns
- Comfort and IAQ

Historic Challenges

- Existing façade
  - Interior only insulation R-21 for EnerPHit
- Window limitations
  - Low profile-triple pane
- Existing steel structures/slab edges
  - 3D model
On Site Insulation

Breuer’s Drawings vs. Project Mockup

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Passive House Level Enclosure

- **Windows**
- **Shading Analysis in Sketchup / DesignPH**

Typical slab edge thermal bridge
- Condition modeled in 3D thermal modeling software
Thank you!

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