Fair Oaks Apartments Retrofit
The Team: Sunshine Upgrade

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Durability and Resilience

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Building Envelope, Occupant Experience

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Market analysis, Environmental impact

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Engineering, Comfort environmental quality

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Energy Performance, Irrigation Plan

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Homeowner: Caroline Cziesla

Industry Partners:
Design Philosophy

- Location
- Architecture
- Durability and Resilience
- Engineering
- Integrated Performance
- Community
- Climate
- Cost
- Environmental Impact
- Financial Analysis
- Energy Performance
- Comfort and Environmental Quality
- Occupant Experience
Location: Saint Petersburg, Florida, USA

- Population: 265,358
- City Density: 4,332/sq mile
- Growth Since 2010: 9.5%

Climate Zone: 2A Hot & Humid
- Average High/Low Temperature: 84°F / 62°F
- Average Wind Speed: 10.7-6.4 mph Annually
- Average Rainfall: 6.4 in (August) - 1.7in (November) extreme seasonal variation
- Daylight: 13 hrs 54 mins (June)/10 hr 23 mins (December)

 демонстрируйте экономически эффективные энергосберегающие реконструкции для старых домов
- Сохраните существующее
- Население
- Общественность (нет ущерба от сноса/строительства)

Historic Uptown Neighborhood
80% of homes in the area were built before 1980
Fair Oaks Apartments

Lot Size: 0.18 Acre
Building Size: 5000 ft\(^2\); 2 stories

8 Units:
- Six (1 Bed 1 Bath)
- Two (2 Bed 1 Bath)

Occupancy: 8-10 (532.92 ft\(^2\)/person)

Building age: 49 years old (1973)

1\(^{st}\) Floor Plan

- Unit 1
- Unit 2
- Unit 3
- Unit 4

Architecture

- New Exterior Insulation and Stucco
- Covered Parking
- EV Charging Stations
- Bike Parking

Community

- Sun Shades & Updated Windows
- Tied Down Metal Roof
- Solar Reflective Paint
- Updated Landscape & New Community Areas
Engineering

HVAC: multi-zone mini split

Building Envelope

Rainwater Harvest System and high-tech Irrigation

Cost
Durability and Resilience

- Standing seam metal roof
- Walls consist of Exterior insulation with stucco and masonry blocks
- Updated impact-resistant windows along with Sun Shades
Integrated Performance

- Multi-zone mini split HVAC
- Wireless programmable thermostat & motion detection sensor
- Exterior Insulation & Finishing System (EIFS) R-20

Community

- Onsite photovoltaic energy generation
- Electric car charging
- Rainwater harvesting for irrigation
- Geothermal water heating
Occupant Experience

- LED Lighting with integrated occupancy sensors
- WaterSense faucets, toilets, and showerheads
- New appliances are 40% to 50% more energy efficient

Community

- Community garden
- Picnic areas with shade and grill
- Communal bikes

- Ample daylight from windows
- New carpeting
- Natural air flow
Comfort and Environmental Quality

Air Purification kit 5-STEP filtration

- Pre-filter
- Dust electrification
- PM1.0 filter
- Deodorization filter
- Ionizer

Building Ventilation and Spot Ventilation Strategies

- Variable speeds of 50-80-110 CFM
- Smart flow technology
26 kW Mono-Crystalline Solar Panels

- 26 kW Mono-crystalline panels
- Produce 43,000 kW/year
- Saves $5,500 per year
- Approximately 8 years for return on investment
- Code compliant on-grid system with FL regulations

Climate

- Tilt: 18 degree

Occupancy

- Sensor Switch
- LED Saves 80%

High Solar Reflectivity from Metal Roof

Standard house built in 2006

Retrofitted without renewable energy

Retrofitted with renewable energy

HERS Score

- ~49
- ~2

5 Ton Geothermal Heat Pump (Open loop, Vertical System)

EUI: 49 kBtu/ (sq ft*yr)
Carbon emissions for the building calculated at

40-ton of CO$_2$e/ft$^2$/yr
### Financial Analysis

<table>
<thead>
<tr>
<th>System</th>
<th>Net Cost for 8 Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar System after 26% FL solar tax incentive (labor and convertor costs included) x72 LG 370 W solar panels</td>
<td>$44,000</td>
</tr>
<tr>
<td>New Multi split AC system (D wall mounted)(labor cost included) x8</td>
<td>$35,000</td>
</tr>
<tr>
<td>Metal roof (labor included) x1</td>
<td>$40,000</td>
</tr>
<tr>
<td>Bahama Shutter x10</td>
<td>$7,500</td>
</tr>
<tr>
<td>Insulation Roof (material &amp; installation cost)</td>
<td>$2,500</td>
</tr>
<tr>
<td>Insulation Exterior (material &amp; installation cost)</td>
<td>$56,300</td>
</tr>
<tr>
<td>Windows x24</td>
<td>$48,000</td>
</tr>
<tr>
<td>Updated plumbing</td>
<td>$5,600</td>
</tr>
<tr>
<td>Ventilation system</td>
<td>$5,500</td>
</tr>
<tr>
<td>Water heater (installation included) x2</td>
<td>$4,600</td>
</tr>
<tr>
<td>Biodegradable carpet</td>
<td>$40,000</td>
</tr>
<tr>
<td>Washer (Insignia) x1</td>
<td>$750</td>
</tr>
<tr>
<td>Hybrid heat pump Dryer (Whirlpool) x1</td>
<td>$1,750</td>
</tr>
<tr>
<td>Energy efficient refrigerator (Beko) x8</td>
<td>$8,800</td>
</tr>
<tr>
<td>Resistance heating stoves (Frigidaire) x8</td>
<td>$6,800</td>
</tr>
<tr>
<td>LED lightening x160</td>
<td>$220</td>
</tr>
<tr>
<td>Occupancy sensors switch x38</td>
<td>$750</td>
</tr>
<tr>
<td>High-tech irrigation system x1</td>
<td>$20,000</td>
</tr>
<tr>
<td>Rainwater harvest 1500-gallon tank x1</td>
<td>$1,400</td>
</tr>
<tr>
<td>Geothermal 2.5 Ton water heat pumps (after 26% FL tax incentive)</td>
<td>$15,000</td>
</tr>
</tbody>
</table>

**Total = $348,300**
**Market Analysis**

**Homeowner**
- Fix current profit margin at current rent
- Raise rent to market value
- Fund retrofit through profit increase

**Rent prices have increased 12% since 2017**
- Keep rent affordable and not higher than unrenovated units of equal size

**Apartments Size Market Value**
- $1,500
- $1,400
- $1,200
- $1,100

**Current Rental Price**
- $1,200
- $1,100

**Neighborhood Average Rent**
- $1,293

**Market Value**
- $2,293
- $1,500
- $1,400

**Annual Profit Increase**
- $29,000 (Rent) + $5,500 (Solar savings) = $34,500

**Current ROI for $348,300 cost = 10 years**

**Target Market**
Population % for zip code: 33701
- Renter Occupied: 35.0%
- Owner Occupied: 65.0%
Thank you for your time!