



Mutual  
Housing  
CALIFORNIA

# MUTUAL HOUSING AT SPRING LAKE

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THE NATION'S FIRST ZERO NET ENERGY  
RENTAL HOUSING COMMUNITY





## Key Statistics

Location:  
2170 Farmers Central Road  
Woodland, CA 95776

Completed: March 2015

Energy Climate Zone: 12

Units: 62

Site Size: 3.28 Acres

Density: 18.9 units per acre

### Unit Mix:

- 1-Bedrooms (Flats) 12
- 2-Bedrooms (Flats) 20
- 3-Bedrooms (Flats) 12
- 3-Bedrooms (Townhomes) 10
- 4-Bedrooms (Flats) 6
- 4-Bedrooms (Townhomes) 2



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# I. Project Overview

## A. Developer

Mutual Housing California, formed in 1989, is a nonprofit housing development corporation with a mission of developing, operating, and advocating for sustainable housing that builds strong communities through resident participation and leadership development. Mutual Housing has been a leader in green building since 2002 when it became the first developer in the Sacramento region to include solar photovoltaics for resident benefit in a multifamily residential property. Mutual Housing is committed to decreasing the use of fossil fuel, lowering the carbon footprint of its housing properties, and providing healthy living environments for households of modest means, while helping them live within their limited budgets. In 2013, Mutual Housing was named a NeighborWorks® Green Organization after an extensive review process that recognizes comprehensive green efforts throughout an organization that has embraced a sustainable business culture.

## B. Local Demographics and Land Use Considerations

Mutual Housing at Spring Lake is located in the City of Woodland, the county seat of Yolo County, where agriculture is among the leading industries. In 2015, Yolo County had an estimated 5,900 agricultural workers employed in the fields, packing houses and processing plants with an average hourly wage of about \$12. A majority of these workers live and work in the community year-round and have a difficult time finding suitable housing that they can afford.

The City of Woodland general plan calls for more energy efficient and agricultural worker housing. The City has a mixed income housing policy for new single family housing subdivisions, including the Spring Lake subdivision. The Spring Lake specific plan was approved in 2001, and when completely

Mutual Housing California has been a leader in green building since 2002.



City of Woodland, California.



Mutual Housing at Spring Lake site view, featuring solar arrays on units, carports and the Community Center.



Mutual Housing at Spring Lake site directory signage.

built out, Spring Lake will contain more than 4,000 housing units, primarily single-family homes, as well as schools, parks, city services and commercial development. In early 2017, Single Family Homes in the Spring Lake subdivision carried selling prices of mid-\$300,000 to mid-\$500,000 in early 2017.

Under the mixed income housing policy, developers of single family homes must sell a portion of the homes to low income households at an affordable sales price or they must pay into a low income housing fund to support development of affordable housing. Mutual Housing California purchased this site in the Spring Lake subdivision, utilized the low income housing fund, and saved this parcel from downzoning by the former owner who had plans for additional, market rate single family homes.

Building at this site helped to ensure economically inclusive development. The site location met principles of sustainable development due to its proximity to existing infrastructure as well as being within walking distance to public transportation, shopping, a school, a neighborhood park, and related community amenities.

### **C. Community Vision**

The construction completion and lease up of 62 affordable, sustainable homes in Mutual Housing at Spring Lake in early 2015 was the realization of a long-held Mutual Housing goal of creating housing for agricultural workers and their families in the region. The rationale for pursuing leading-edge green goals in this effort was made apparent when Mutual Housing first reached out to the target constituency in early stages of planning. In conducting a survey of local agricultural workers about their housing concerns, Mutual Housing discovered that while the most commonly mentioned concern was high rental housing costs, the next most commonly mentioned concern was high utility bills. With this in mind, Mutual Housing



set out to design and construct the homes in a manner that would bridge the “Green Divide.” The goal was to bring the health and economic benefits of sustainably developed housing to a population that has traditionally suffered some of the unhealthiest housing conditions and jobs in the country.

Supported by a community organizer who helps facilitate the formation of resident councils and other leadership building activities, Mutual Housing residents take an active role in decision-making in their communities. Common space in the attractive community building includes space for resident activities, financial education and peer lending circles, leadership training, health education, college planning, other educational and recreational programs, and a computer learning lab with lap tops available for residents to use at home. It also houses staff offices and a laundry room. In addition to the community room, Mutual Housing at Spring Lake features public art by regional artists, a children’s play

Top: Children’s play area.  
Above: Community Center interior.



“Marsh Madness” – an 8 1/2-foot metal sculpture by Steve Cook mirrors wildlife at local marshes. Common area, Mutual Housing at Spring Lake.

#### Affordability:

60% and below AMI . All households pay no more than 30% of their annual income.

#### Certifications Received:

- Zero Energy-Ready Homes (ZERH)
- LEED Platinum
- Enterprise Green Communities
- Energy Star for Homes
- Build It Green – Green Point Rated

area and scattered community gardening areas. All ground floor apartments are fully adaptable for those residents with physical disabilities.

Mutual Housing asserts that the Green Divide will only be closed if low income and non-English speaking households are provided with affordable, accessible access to green technology. Only then can we expect this constituency to embrace and become leaders in the green revolution. The organization proactively links its commitment to maximizing its sustainable building efforts with its green education and leadership development efforts.

## 2. Design Overview

### A. Design Team

Mutual Housing California relied on a trusted team to help design and build this ZNE development. The project team included Mutual Housing as the sponsor and developer, the architect and design consultants, the general contractor and key subcontractors, the energy consultant and the HERS rater, many of whom Mutual Housing had previously worked with in achieving high levels of sustainability at other Mutual Housing developments.

The design process began with a full-team charrette to lay out the overall sustainability goals and establish key points of coordination between the team members. Mutual Housing California, as the developer, set the stage for these discussions by mandating maximum feasible sustainability and Zero Net Energy.





Members of the design team continued this collaboration at several meetings held during conceptual design, design development, and while completing final plans and specifications. For certain aspects of the plan, particularly related to HVAC and hot water systems, there was a steep learning curve as alternative combinations for efficiency measures and onsite generation were proposed, analyzed, and evaluated for occupancy comfort as well as cost impacts on the project, both at installation and over time.

Problem-solving by this team continued throughout construction. Pre-construction meetings were held with all subcontractors as well as coordination meetings with subcontractors, the energy rater, and inspectors from the sustainability certification programs to ensure that all energy efficiency requirements and unique construction methods were understood and followed.



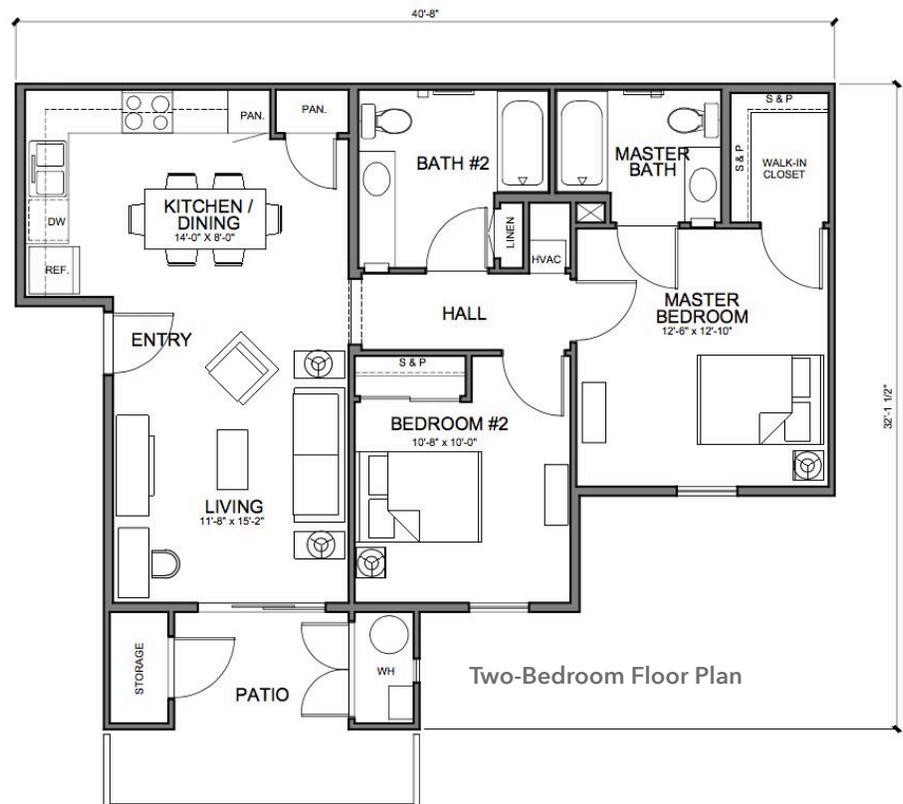
## **B. Zero Net Energy**

With the goal of creating a Zero Net Energy affordable housing community, one of the first steps was for the team to adopt a common definition of ZNE. Some proponents of ZNE consider only the extent to which on-site photovoltaics offset electrical energy used in the buildings without considering consumption of energy produced by other sources, such as natural gas.

# Mutual Housing at Spring Lake: Construction & Energy Systems

## Building Envelope

Exterior Wall Construction	2 x6 R-21 16" oc
Foundation Type	Slab, uninsulated
Attic Insulation	R-49 (Flats) R-49 (Townhomes)
Roofing Material	Comp Shingles, CRRC certified with radiant barrier
Housing Infiltration - Blower Door Test	4 ACH50
Glazing	U-value - 0.29, SHGC = 0.19





Window choices are critical to achieving high levels of energy efficiency, with selection guided by ratings that measure how well the windows both keep heat out and keep heat in. Highly rated dual pane windows with argon gas installed between the panes for greater insulation were selected for Mutual Housing at Spring Lake.

The foundation is uninsulated slab on grade. In places with significant summer heat, as in the California Central Valley, it is considered best practice to leave the slab uninsulated, allowing it to serve as a heat sink during the summer cooling season.

Air sealing throughout the building is an important means of conserving energy by limiting heat loss. One way to do this is to use house wrap for the entirety of the building, including party walls. Absent that, which was not implemented here, it became necessary to minimize leakage at all wall penetrations and where walls meet the ceiling and floor plates with caulking, foam, or fire-resistant putty pads for the fire-rated walls. Air sealing, which can be difficult to accomplish in multifamily buildings, was completed in accordance with Section 8 of the ENERGY STAR Thermal Enclosure System Rater Checklist. To test the effectiveness of the air sealing strategies, the builder completed multiple sequential blower door tests on prototype units following each improvement to identify and remediate problematic leakage points until leakage was reduced to levels acceptable for certification in the U.S. Department of Energy's Zero Energy Ready Home program.

### Window ratings

- Solar reflectance: 0.29 & thermal emittance 0.19
- Air sealing ratings: 2.3 - 4.0 ACH 50



Measure	2008 Title-24 Basecase	Spring Lake Specifications	Base Cost	Actual Project Cost	Incremental Cost
<b>Water Heating Equipment</b>					
Water Heater Type & Efficiency	Gas storage: 0.575 Energy Factor. Includes gas line	Altherma heat pump: 2.4 Energy Factor	\$67,300	\$0	-\$67,300
Evolve Shower Heads	No	Yes	\$0	\$5,464	\$5,464
<b>Appliances &amp; Lighting</b>					
EnergyStar Appliances	None	Dishwasher & refrigerator		\$6,200	\$6,200
Lighting Package	~1/2 fluorescent, ~1/2 incandescent	~1/3 fluorescent fixtures, ~2/3 LED A-lamp bulbs	\$81,600	\$187,800	\$106,200
<b>Solar PV System</b>					
PV System 209.04 kW DC	None		\$0	\$973,351	\$973,351

Unit Costs	
<b>Base Cost Per Unit</b>	<b>\$11,307</b>
<b>Actual cost Per Unit</b>	<b>\$29,187</b>
<b>Incremental Cost</b>	<b>\$17,879</b>
<b>Construction Cost Per Unit</b>	<b>\$229,339</b>
<b>Cost Increase</b>	<b>7.93%</b>

<b>Subtotals:</b>	<b>\$701,063</b>	<b>\$2,185,741</b>	<b>\$1,484,678</b>
<b>Incentives/Rebates:</b>	Estimated Rebates for solar PV (\$376,169)		<b>-\$376,169</b>
<b>Estimated Total Hard Cost Premium:</b>	<b>\$701,063</b>	<b>\$1,809,571</b>	<b>\$1,108,508</b>
<b>Total Construction Cost:</b>			<b>\$13,970,997</b>
<b>Cost Increase:</b>			<b>8%</b>

Uses of Funds	
<b>Acquisition</b>	<b>\$1,200,000</b>
<b>Hard Costs</b>	<b>\$13,000,000</b>
<b>Soft Costs</b>	<b>\$7,970,000</b>
<b>TOTAL</b>	<b>\$22,170,000</b>
Sources of Funds	
<b>Conventional Bank Loan</b>	<b>\$1,200,000</b>
<b>USDA 514/521 Loan</b>	<b>\$5,500,000</b>
<b>City of Woodland Loan</b>	<b>\$1,070,000</b>
<b>HCD - Joe Serna Jr Farmworker Housing Program Loan</b>	<b>\$1,000,000</b>
<b>9% LIHTC Investor Equity</b>	<b>\$13,400,000</b>
<b>TOTAL</b>	<b>\$22,170,000</b>

Achieving ZNE, though, made the full project more competitive for \$5.5 million in funding from the U.S. Department of Agriculture - Rural Development housing program that it would not have been able to obtain otherwise and which was awarded together with valuable rental subsidy.

ZNE features also made the project eligible for Business Energy Investment tax credits and increased its competitiveness in applying for federal Low Income Housing Tax Credits from the California Tax Credit Allocation Committee.



## 7. First Year Operations

### A. Resident Education and Involvement

Mutual Housing at Spring Lake opened its doors in March 2015 and was fully occupied with 62 agricultural worker families by June of that year. Many of the new residents came from sub-standard, older, and/or smaller housing situations and were unfamiliar with many of the energy efficiency features of their new homes, such as smart thermostats, thermostatic shower shut-off valves, ceiling fans, humidistat fans, energy monitors, and virtual net metering. This made resident education key to success in meeting the ZNE goals of this community.

Community outreach and marketing efforts began even before construction and included information on the green goals and energy efficient features of the community. Once residents moved in, they were given a Resident Green Guide that was published in both English and Spanish. The Resident Green Guide provides an overview of the Mutual Housing at Spring Lake green building features and graphically illustrates how to use the energy monitors, thermostats, and shower valves. The



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