****

**Habitat for Humanity – San Joaquin, Dream Creek Subdivision**

**PG&E ZNE Production Builder Demonstration**

**ENERGY FEATURE LIST**

**Adaptive and Efficient Architectural Design**

* Age-in-place design featuring no steps, elevation changes meeting ADA slope requirements
* Structure designed using tables in the California Building Code (IRC with California Amendments); no structural engineer required
* Avoided thermal bridging – no steel structural hardware used except next to the garage door, which isn’t part of the thermal enclosure (steel conducts heat 300 times faster than wood)
* Two-foot design modules used to reduce waste
* Framing layouts provided on plans to ensure efficient wood use
* Windows located to fit the framing layout
* Windows sized to fit within standard framing layout, eliminating need for redundant framing lumber
* Air infiltration reduced by using fixed windows at all locations except for bedroom egress
* All plumbing fixtures located near each other to reduce hot water waste and save pipe
* Ducts and HVAC equipment located in conditioned space for thermal efficiency
* Roof penetrations (plumbing vent and water heater vent) minimized and located on the north roof slope to maximize space for PV

**Advanced Framing and High Performance Enclosure**

* Framed with one-half to one-third of the lumber used in a typical new home – 12.5% framing factor
* Framing at 24 inches on center
* Single top plate
* Two-stud corners, no exterior wall framing at interior wall intersections
* Weight bearing gable end trusses so window headers can be eliminated on those walls
* 2 x 6 studs with properly installed R-21 insulation
* Continuous OSB sheathing installed horizontally allows use with studs at 24” o.c. (higher structural value); OSB used to gusset wall/truss connection
* Drywall clips used to eliminate use of lumber for backing
* Drywall splices used to greatly reduce drywall waste
* Attic and crawlspace access hatches do not penetrate the thermal enclosure
* Ceiling insulation performance optimized though use of raised-heel trusses and careful choice of attic venting locations
* 10% glass area
* High performance windows – U-0.28, SHGC-0.20
* 1” , R-5, insulated sheathing under the stucco
* R-42 (above-code) attic insulation
* Radiant barrier roof sheathing and gable end sheathing
* Electrical wiring located so that it doesn’t interfere with the installation of the wall insulation – run on top of the bottom plate at most locations
* No plumbing in (insulated) exterior walls improves thermal enclosure and reduces heat loss through hot water piping
* R-21 (above-code) insulated raised wood floor over a vented crawlspace
* Class 1 vapor retarder on the soil with a concrete rodent barrier – allows reduction of crawlspace ventilation to 1 sq.ft. for every 1,500 sq.ft. of floor area
* Air infiltration rate less than 1.5 ACH (less than one-third the average for new CA homes)

**High Performance Heating, Ventilation, and Air Conditioning (HVAC)**

* Heating and cooling with a ducted mini-split heat pump – ¾ ton, SEER 18.0, HSPF 11.0
* No auxiliary heating (resistance electric) installed.
* System shut-off switch next to the thermostat
* High-performance double-deflection supply grilles to assure good room air mixing and low static pressure
* MERV 8 air filtration
* Ducts located inside the home’s thermal and pressure boundaries to reduce heat loss
* Continuous fresh air ventilation with heat recovery provided by two Panasonic energy recovery ventilators (ERVs)
* Quiet, high-efficiency, moisture-controlling bathroom exhaust fans controlled by humidity and occupancy sensors – 110 CFM
* ERV and exhaust fan ducting is up-sized to reduce fan watt draw (ERV ducts up-sized from 4” to 6”, exhaust fan ducts up-sized form 6” to 8”)

**Water Heating**

* Condensing tankless gas water heater located in the center of the house so it is near all the plumbing fixtures
* Gas piping costs and installation labor have been reduced by downsizing piping from 1¼” to ¾” by utilizing a 2 PSI gas meter and a second attic mounted gas pressure regulator
* Compact hot water distribution system, longest hot water pipe is 12 feet
* Manifold water distribution system to reduce hot water delivery times and improve ease of fixture maintenance

**Water Conservation**

* No lawn, artificial grass used in the front yard
* Paving stone driveway to reduce surface runoff and aid ground water recharge

**Lighting**

* 100% high-efficacy LED – most fixtures 12 watts, 600 lumens (50 lumens per watt)
* Indicator lights on switches that control the garage light, back porch light, and front porch light to remind occupants to turn off when not needed

**Solar Electricity**

* 2-3 kW photovoltaic (PV) system expected to meet all the home’s annual energy needs
* Electric vehicle charging circuit is available

**PROJECT TEAM**

**Project Manager:** George Koertzen, Habitat for Humanity

**Consultants:** Ann Edminster, Design AVEnues LLC

Rick Chitwood, Chitwood Energy Management

Steve Easley, Easley & Associates