Builders Challenge

Comprehensive Energy Retrofit

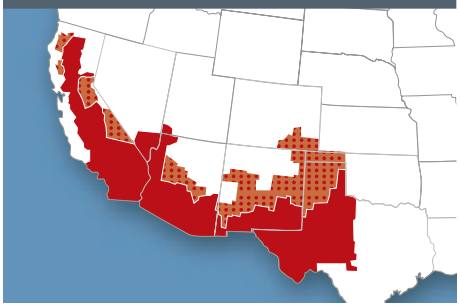
High Performance Builder Spotlight

ReVISION Home

Las Vegas, Nevada

This 1963 mid-century modern home in Las Vegas got an energy-efficiency overhaul, improving performance from a HERS score of 123 to 44. It will be a net-zero energy home when the 4.8 kW of photovoltaic panels are added.

HOT-DRY & MIXED-DRY CLIMATES



BUILDER PROFILE

Builder: Building Media, Inc. and Green Builder® Media, LLC

Project: Fourth home in the VISION demonstration home series, first retrofit

Size: 1,800 sq. ft. single-story home

"The trend is for people to live in smaller houses, closer to the city, and closer to transportation. With those trends, retrofits make sense."

Craig Savage, Co-President of Building Media

Building America® U.S. Department of Energy

Research Toward Zero Energy Homes

Building Media, Inc. and Green Builder® Media, LLC, have teamed with the U.S. Department of Energy and corporate sponsors on a net-zero energy remodel demonstration home for visitors at the 2010 International Builders Show in Las Vegas. Their ReVISION Vegas home is a deep retrofit of a 1963 ranch home that will cut energy bills by at least 60%, not counting photovoltaics.

A show piece in its time, the 1,800-square-foot home was built on the then-new Stardust Golf Course, in the mid-century modern style with an open, single-story floor plan, low-pitched roofs, post and beam construction, vaulted ceilings, and entire walls of windows. What was missing was insulation. By 2008, the house had utility bills up to $500 a month.

Craig Savage of Building Media, Inc. and his partners found the house in foreclosure with $456,000 in notes against it. They bought it for $145,000, and Savage estimates the cost of the retrofit at about $150,000 including labor and purchased and donated materials.

Before any retrofit work began, Building America's Consortium for Advanced Residential Buildings (CARB) team, led by Steven Winter Associates, conducted a thorough analysis of the home including air leakage testing of the ducts and whole house, Manual-J calculations and Energy Gauge U.S.A. analysis. CARB will conduct a year of energy use monitoring when the retrofit is complete.

The owners removed the old stucco and decayed wood siding and filled the 2x4, 16-inch on-center wall cavities with 3.5 inches of BASF ENERTITE® Open-Cell Spray-Applied Polyurethane Foam Insulation, covered by half-inch OSB, Tyvek® StuccoWrap®, and Dryvit Outsulation® consisting of 2 inches of rigid EPS and synthetic stucco. "It's an absolute thermos bottle of a wall," said Savage.

Most of the ceiling had been drywalled in a 1990 remodel following a fire. The old torch-down roofing and OSB roof sheathing were removed, and the rafter cavities were filled with 8 inches of BASF COMFORT FOAM® Closed-Cell Spray-Applied Insulation and Air Barrier then covered with 5/8-inch OSB. Over this, PetersenDean Roofing and Solar Systems laid DuPont™ RoofLiner underlayment. Next, wood 1x3 spacers were nailed vertically at 2-foot intervals from eave to ridge and topped with another set of 1x3 spacers laid horizontally. The spacers provide a 1.5-inch gap under the MBCI BattenLok® standing seam ENERGY STAR "cool" metal roof, which draws hot air up and out of the roof ridge vent.

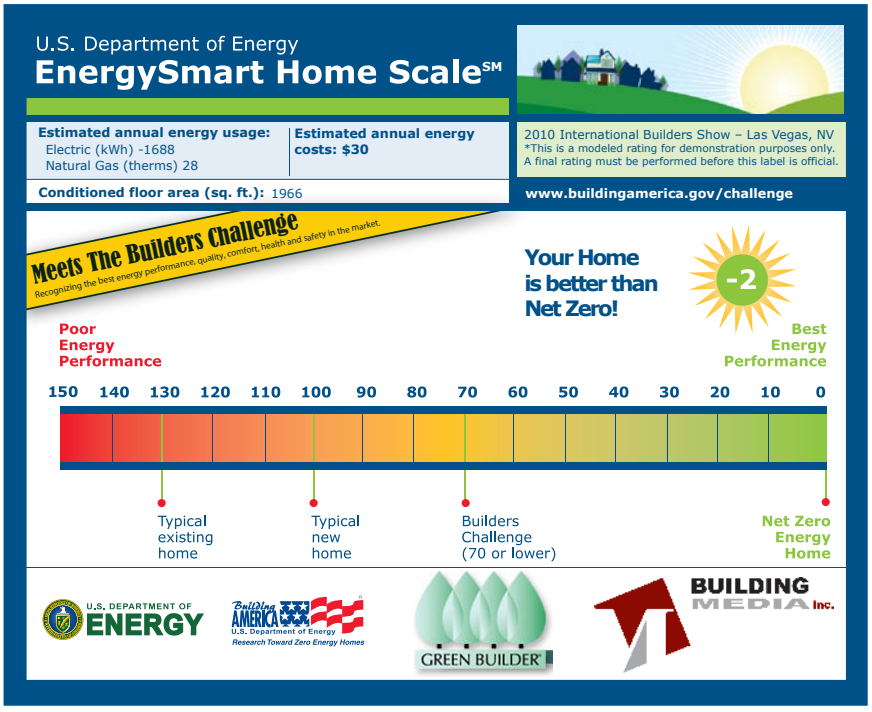
All of the home's single-pane, wood- or aluminum-framed windows were replaced with Milgard triple-pane, low-emissivity, argon-filled, fiberglass-framed windows. A new electric heat pump, tankless gas water heater, solar hot water heater, LED and CFL lights, and an upgraded pool pump add to the energy savings.

Bombard Renewable Energy donated 27 roof-mounted SunPower® photovoltaic panels yielding 4.8 kW of AC electricity. When installed, CARB estimates the PV will bring the home's HERS score from its pre-retrofit high of 123 to a -2, making this a net-zero energy home. Without the PV, the home achieves a very respectable HERS score of 44.

Building Media, Inc. has filmed each step of the retrofit for an online training program to be hosted on the Green Builder College website. Building Media, Inc., a wholly owned subsidiary of the DuPont Corp. that develops online training for the design/build community, teamed on this project with Green Builder® Media, LLC, its partner on Green Builder College (www.greenbuildercollege.com).

U.S. Department of Energy Builders Challenge

DOE seeks to give every consumer the opportunity to buy a cost-neutral, net-zero energy home anywhere in the U.S. by 2030. Homes that qualify for this Builders Challenge must achieve a 70 or less on the EnergySmart Home Scale (E-Scale) which is based on the Home Energy Rating System (HERS) index (www.natresnet.org). The E-Scale allows homebuyers to understand—at a glance—how the energy performance of a particular home compares with others.



To learn more about the Builders Challenge and find tools to help market your homes, visit www.buildingamerica.gov/challenge.

Energy-Efficient Features

- **HERS –** *Before:* 123
  After: -2 with PV, 44 without
- **Walls –** *Before:* 2x4 16-inch on-center; stucco and board & batt siding, some R-11 fiberglass batt
  After: Filled stud cavities with 3.5-inch BASF ENERTITE® Open-Cell Spray-Applied Polyurethane Foam Insulation, covered with half-inch OSB, Tyvec® StuccoWrap®, 2 inches EPS rigid foam insulation, and synthetic stucco
- **Roof Insulation –** *Before:* none
  After: Filled rafter cavities with 8 inches of BASF COMFORT FOAM® Closed-Cell Spray-Applied Insulation and Air Barrier, 5/8-inch OSB, DuPont™ RoofLiner underlayment, and a 1.5-inch air gap under MBCI BattenLok® standing seam metal roof, reflective paint
- **Ducts –** *Before:* Unsealed R-6 flex duct in unconditioned space; 11.2% duct leakage
  After: R-8 flex duct, mastic sealed. Compact duct design in conditioned space
- **HVAC –** *Before:* Two roof-mounted PTAC gas furnace/condenser units, 0.80 AFUE/SEER 10
  After: Trane Weathertron® heat pump, 36,000-BTU/hr capacity 9 HSPF/SEER 18
- **Water Heating –** *Before:* 56% efficiency electric water heater
  After: Rinnai 0.87 EF tankless gas water heater, Solar hot water
- **Ventilation –** *Before:* N/A
  After: Constant 50 cfm exhaust ventilation with 6 watt ENERGY STAR fan
- **Windows –** *Before:* Single-pane, wood- and aluminum-framed windows, U-1.11, SHGC-0.86
  After – Milgard triple-pane, low-e, fiberglass-framed, argon-filled windows; U-0.22, SHGC-0.19
- **Solar –** *Before:* N/A
  After: SunPower® 4.8 kW (AC) photovoltaic system (not installed yet)
- **Lighting –** *Before:* 18 recessed can lights with incandescent bulbs
  After: LED recessed can inserts, LED screw-based lamps, CFL bulbs
- **Pool Pump –** *Before:* old Pentair pool pump
  After: Pentair high-efficiency pool pump

U.S. DEPARTMENT OF ENERGY
Energy Efficiency & Renewable Energy

EERE Information Center
1-877-EERE-INF (1-877-337-3463)
www.eere.energy.gov/informationcenter

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For information on **Building America** visit **www.buildingamerica.gov**. The website contains expanded case studies, technical reports, and best practices guides.