

SUCCESS!



1907 HOME OF THE FUTURE



This transitional Victorian house is better than net-zero in energy consumption—and *very* comfortable. **By Stewart W. Herman, Minneapolis, Minn.**

Our intention: turn an average old house, on a standard urban lot in a very cold city, into an affordable place to live, combining net-zero energy consumption with creature comforts and the ability to “age in place.”

Our daughter found this house in Minneapolis, where Linda and I intended to move after retirement; it was in foreclosure, had basement water damage, and had an unfortunate rear addition with a mismatched roof pitch. It was in need of renovation. Linda was, at first, not so sure about “net zero.” She assumed that both aesthetics and comfort would be compromised in the quest for super-efficiency. Nor was I sure

that, once the numbers were crunched, reaching net zero in an old house on a small city lot would be feasible, or affordably so. So we hired Marc Sloat of SALA Architects, who has experience in green building. “It wasn’t just about reaching energy goals,” Sloat says. “It was also about preserving a 1907 house and keeping the character of the neighborhood.” Sean Morrissey (Morrissey Builders, St. Paul), also with considerable experience in sustainable construction, was hired as general contractor.

After a 15-month renovation, the result was an all-electric house that surpassed net zero—producing 17,000 solar kW hours but using



ABOVE The 1907 late-Queen Anne cottage, which had previously been remodeled and its porch enclosed, has elements of Victorian and Free Classic design. Inside, the Arts & Crafts-leaning woodwork was retained.

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BETTER THAN NET-ZERO

- 'PERSIST' system **wall insulation** to R-40
- Foundation insulation effectively R-30 with **cocoon-method** foam sheet and spray foam
- New roofing system insulated to R-80 and **supporting 42 solar collectors**; an additional **12 collectors are on the garage**
- Captured heat: exhaust from baths and kitchen warms incoming outside air through an **enthalpy recovery ventilator (ERV)**; excess heat from **geothermal heat exchanger** pre-heats water; water heater heat pump captures heat from basement air
- **Triple-glazed windows** cut down on heat transfer in all seasons
- Result year one is net-positive: electricity consumption 12,000 kW hours with **17,000 kW hours generated** by solar panels



ABOVE CertainTeed roofing shingles offer solar reflection to lower energy costs. Andersen triple-glazed windows manage the amount of heat generated by solar energy. Sherwin-Williams acrylic-latex paint provides mold and moisture resistance. Insulating was done from the outside during a major renovation. **TOP CENTER** A small, two-storey bump-out at the rear yielded a mudroom, an owners' suite above, and this sunroom. With super-insulation and triple glazing, the room is comfortable even in winter.



only 12,000. It has 54 solar panels, four 25-foot-deep geothermal wells, and super-insulation. The house is heated with the wattage equivalent of a blow dryer.

We sell the surplus energy to our utility. In the first year, the system produced about \$3,000 worth of electricity, yielding a return of about 7% on the initial investment of \$40,000 (after the federal tax credit). And we have the satisfaction of knowing that we rescued and improved a sound, 111-year-old house.

Because of housing density and existing trees, "passive solar was out of the picture here," our architect explains. "To get to net zero, we had to reduce energy consumption drastically, relying on the performance of the structure and systems. "In addition, solar exposure on the main roof and the garage roof would allow for installation of photovoltaic panels to produce electricity."

From the street, the house looks like a Victorian cottage, albeit brand new. A passerby isn't aware of new energy technologies. Inside, the house is filled with original woodwork that was saved and reused, while new millwork in sustainable lumber was faithfully copied. (The previous rear addition had been poorly constructed and had no detail.) Structural problems—including the broken roof line and floor



PHOTO: STEPHEN HARRIS; PHOTO: STEPHEN HARRIS



BELOW Cambria quartz countertops, Marmoleum flooring, Energy Star-rated appliances, and cabinets made from sustainable wood species are practical and classic. **MIDDLE** The floor plan was reconfigured with a new staircase. **BOTTOM** New woodwork is reused or reclaimed birch and maple.



comfort

- **Constant temperature** with no need for nightly setbacks at thermostat
- Continual **fresh air**, conditioned through a heat exchanger: no need to open windows
- Gentle forced-air heat, auto-regulated to a **comfortable humidity**
- **No drafts or cold spots**, thanks to super-insulation and an envelope that meets the passive-house standard for infiltration
- No combustion in the house, **reducing dust** to a minimum (we dust once a month, if that)
- A four-season sunroom owing to **triple-glazed windows**
- Little to **no condensation** on window glass, thanks to a 60% outside/40% inside insulation split at the vapor barrier
- Absorption of formaldehyde into **specialty wallboard**, rendering it inert
- Hot water arrives at any faucet within five seconds, thanks to a **recirculation loop**
- A never-depleted supply of hot water from a **heat pump-driven water heater**
- **Basement temperature of 64°** without supplemental heating, due to cocoon method of insulating the basement exterior to R-30 (without disturbing flowerbeds)
- Triple glazing substantially **reduces outside noise**

