Electrification Case Study

Stuart Street Home & ADU

Year Completed	Average Monthly Utilities Bill	CO2 Emissions Saved (Home+ADU)
2024	$104	73.4 metric tons* equivalent to 1,213 trees planted

Background

The Stuart Street project looked at building a fully electric two-story single family home and accessory dwelling unit (ADU). Both are Habitat for Humanity homes, and make use of air source heat pumps and heat pump water heaters. They also use an energy recovery ventilator (ERV) that saves energy and improves indoor air quality. Building all-electric was streamlined and costs were minimal. Because of this, Habitat decided all future projects will also be all-electric.

"None of the steps are hard – they're achievable. You just need to know how to achieve them... Training your framers and getting the best quality out of your HVAC and other installers is important"

– Marianne Pascoe, Construction Supervisor for Habitat for Humanity of Metro Denver

Lessons Learned

The only challenge the team ran into was finding and installing an ERV. ERVs can be a great addition to a home because they help heating and cooling systems operate more efficiently. By transferring heat and moisture, the mechanical system doesn't have to work as hard to generate heat, so it can use less energy while improving indoor air quality. They can be an option to comply with code but aren't required. Marianne recommends collaboration as the best way to work through any challenges when building all-electric.

**indicates cumulative carbon emissions saved through 2040*

Key Takeaways

- Building an all-electric home is a smooth and easy process and can be more affordable than building mixed-fuel.
- Eliminating a gas line extension saves time and money and rebates help offset equipment cost differences.
- Coordination between consultants is key to a smooth design and construction process.

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Features

Heating/Cooling System
- Type: Split Air Source Heat Pump
- Outdoor Unit: Carrier 25VNA424A00300
- Indoor Unit: Carrier FE4ANF002L++UI+UI
- Rating: 22 SEER, 14 EER, 12 HSPF
- ERV: Panasonic #FV-04VE1

Water Heating System
- Type: Electric Heat Pump Water Heater
- Model #: Bradford White E2H50S10-CON, 4 UEF

Additional Electrification Features
- Electrical Service Size: 200 amps (for 1,699 sq. ft.) + 200 amps (for 780 sq. ft.)
- Electric range

Building Envelope (based on 2018 IECC)
- House tightness: 3 ACH50
- Wall Insulation: R-24 (R-5 continuous, R-19 cavity)
- Attic Insulation: R-49
- Foundation Insulation: R-19
- Window U-value: 0.27

Project Team

- **Architect:** Mues Architecture
- **General Contractor:** Habitat for Humanity Metro Denver, Marianne Pascoe & Colleen Mentz
- **Mechanical Contractor:** EnergyLogic Inc.

Cost Analysis

Total Construction Costs

Total Building Cost $1,000,000*
Cost/Square Foot $442
**Cost includes new alley, sewer line extension, and water main extension*

Upfront Cost Comparison

Electrification System Cost..... $28,086
Savings from No Gas Line Extension..... ($8,000)
Mixed-Fuel System Cost $28,900
Cost Difference for Electrification ..... -$814

Ongoing Utility Costs

Total Utility Costs for 1 year..... $1,251
Average Monthly Utility Bill $104.25

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https://bit.ly/Electric Pilots