

## BACKGROUND

- CCA is a 501(c)(3) nonprofit organization that governs the Colorado Chautauqua National Historic Landmark (NHL), founded in 1898.
- CCA manages ~26 acres and 68 historic buildings (61 cottages that range from ~300 sq ft – 1,000 sq ft and 7 commercial buildings) and provides space for lodging, public programming, and private events.
- NHLs are held to strict local and national preservation standards that limit exterior changes to protect the cherished character of the site.
- In 2008, CCA pledged to make the Colorado Chautauqua the “greenest” NHL and coined the term **high performance preservation**, which embodies the interface between historic preservation and environmental stewardship.
- CCA rehabilitated drafty cabins (c. early 20th century) into tightly sealed cottages through proven building techniques (e.g., air sealing, insulation, whole house fans, high efficiency ceiling fans, tankless water heaters, tree shading, storm windows, where appropriate, etc.).
- Despite passive cooling efforts, increasingly hot summers correlated with guest expectation for air conditioning.
- To compete in the lodging market, CCA installed portable A/C units that proved to be inefficient and wasteful with a high carbon footprint.



Figure 1. Entrance to the Colorado Chautauqua

## OBJECTIVE

**Prepare for a renewable future and meet guest demands by replacing inefficient portable air conditioners with an efficient and electric air conditioning system that adheres to preservation guidelines and retains the historic character of the site.**

## METHOD: HIGH PERFORMANCE PRESERVATION

To maximize energy efficiency and preserve the historic integrity of the cottages, CCA:

- ✓ Reviewed historic preservation guidelines;
- ✓ Researched ductless units to reduce potential leaks and prevent structural and aesthetic impact;
- ✓ Selected highly efficient **mini-split heat pumps** that convert warm air to cool air through the process of refrigeration (Figure 2);
- ✓ Reduced the number of condensers on the grounds by utilizing a **district cooling approach**: one centralized multi-zone outdoor condenser provides cooling and back up heat to multiple cottages through underground trenching (Figure 3);
- ✓ Placed condensers in rear of cottages to prevent visual impact to primary elevations (Figure 4);
- ✓ Masked units with drought resistant vegetation;
- ✓ Installed line hide to mask piping.

### Ductless Mini-Split

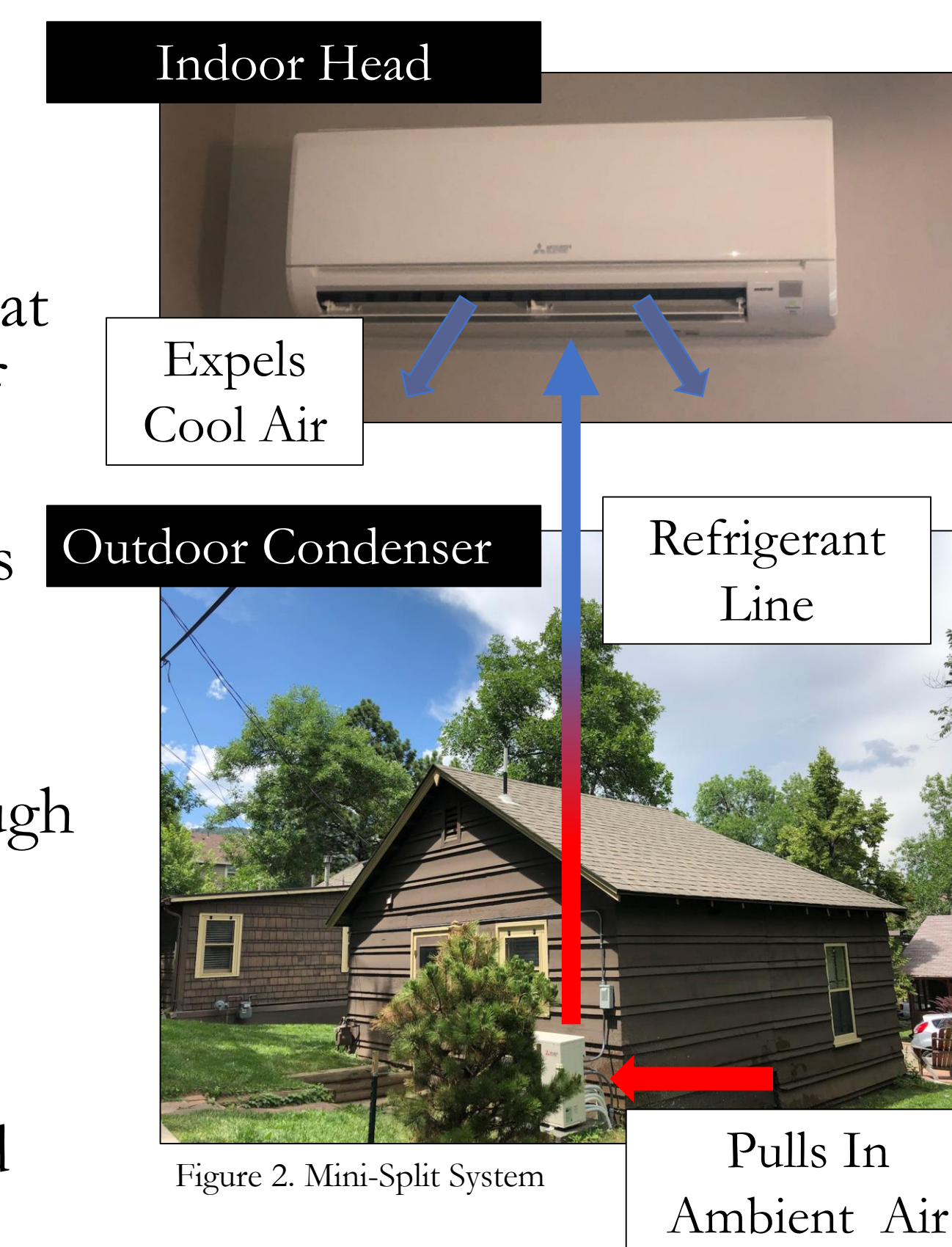


Figure 2. Mini-Split System

### District Cooling Approach

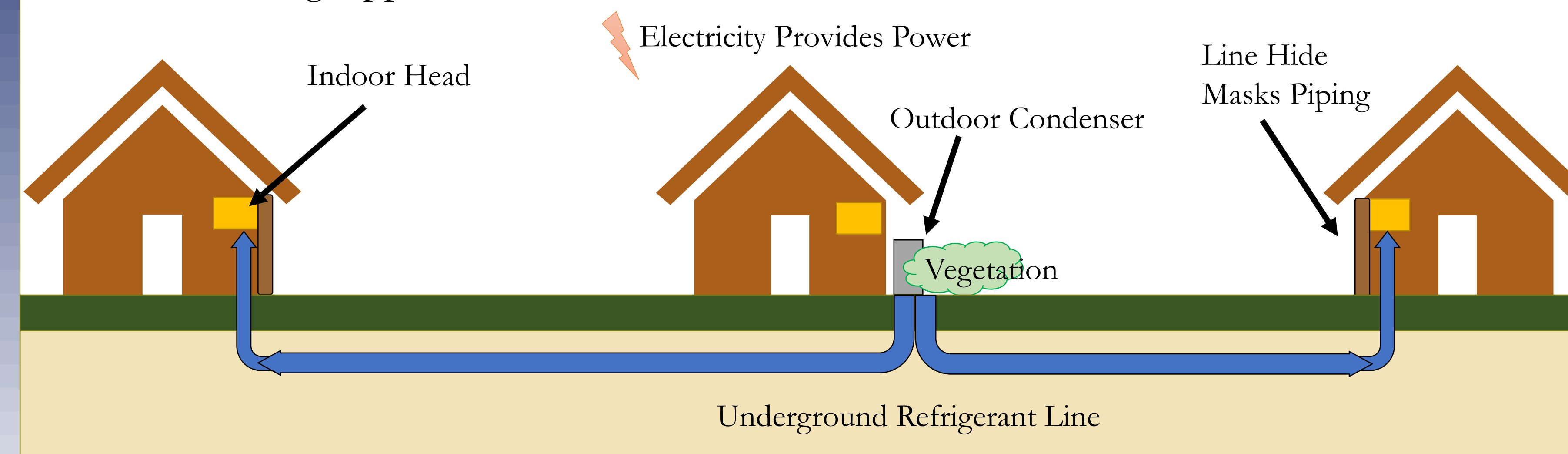


Figure 3. District cooling diagram. Not to scale.



Figure 4. Post installation, there is no visual impact on the primary elevation of the historic cottage.

## PRELIMINARY FINDINGS

- So far, CCA observed a 36% decrease in monthly electricity consumption for the 11 cottages involved in the district cooling pilot system. Further data collection is required for a complete statistical analysis.
- User education is important; all units must be on the same setting (heat or cool) or the system turns off.
- Guest feedback regarding comfort is positive.
- With careful planning, modern technology can be integrated in historic sites without impacting character.

## FUTURE OUTLOOK

- Energy efficiency and electrification are the first steps towards renewable energy.
- By utilizing electricity in efficient buildings, the project prepares the NHL for a renewable and resilient future.
- CCA and the City of Boulder are partnering with a local consulting firm, Resilient Analytics, to generate a Sustainability & Resilience Strategy, that includes an analysis of opportunities for renewable energy at the Colorado Chautauqua.

## PROJECT TEAM

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- With support from the CCA Facilities & Preservation Team, CCA Building & Grounds Committee, City of Boulder Landmarks Board, and Abacus Mechanical, Inc.