



COLD CLIMATE HOUSING RESEARCH CENTER

CCHRC

Sustainable Northern Communities Atmautluak

7.5 inches of polyurethane spray foam insulation for an R-45 building envelope. Spray foam is airtight and resists moisture and mold.

CCHRC worked with the Atmautluak Traditional Council in 2013 to design and build two prototype homes in the community and help launch a tribally owned construction company. The village of about 275 is on the Pitmiktalik River with extremely wet, unstable soils. There is no running water or sewer in the community, and few jobs. The cost of energy in Atmautluak is quite high, both for electricity (\$0.44/kilowatt-hour) and heating fuel (\$6.83/gallon).

Houses in the Bethel region are often overcrowded, under-ventilated, and expensive to heat. The region spends more than twice as much on annual heating than Anchorage and three times the national average, according to AHFC's Alaska Housing Assessment. More than a third of the homes in the region are overcrowded, and 30% are at risk of poor indoor air quality. The prototype homes in Atmautluak are modeled to use 50% less energy than the average home in the village. The first two, built in Summer 2013, demonstrate an affordable, healthy design that can provide much-needed housing.

The 1,100-square-foot homes use an integrated truss that combines the floor, walls, and roof into a single truss assembly. The trusses are set and braced every 2 feet. The advantage of this system is that framing can be completed in a single day without heavy equipment (Atmautluak has none). The entire shell is filled with

The homes were built in nine weeks with an all-local crew and two building instructors from CCHRC. One member of each family living in the new homes worked on the crew. Half of their wages went toward the cost of the home and the future homeowner learned the skills needed to maintain the home, from adjusting the foundation to operating mechanical systems.

Foundation design

Atmautluak, a boardwalk community, has a highly active layer of soil that freezes in the winter and melts in the summer, a unique challenge for foundation design. Most homes in the village are elevated from the ground on post-on-pad foundations, which often sink as the ground moves, compromising the structure. The prototypes sit



The Atmautluak Traditional Council founded the Pikat Construction Company and hired a local project manager and an all-local construction crew.

on steel pilings driven 35 feet into the ground with an adjustable bracket welded to the top so the house can move with the ground.

Improved health and comfort

There is no running water or sewer in Atmautluak. Residents collect rainwater and river ice and use 5-gallon honey buckets for waste, which are emptied into a central collection tank. The prototype homes use an innovative toilet that separates liquids from solids for more sanitary disposal. An internal fan dries solids into a patty inside a compostable bag in the toilet chamber, which can then be burned in the wood stove. The homes are heated with a small oil-fired space heater and a wood stove. HRVs maintain healthy indoor air quality by continually exchanging stale indoor air with fresh outdoor air, conserving the heat in the process.

Sustainability and ownership

This prototype reduces the cost of housing through using local labor and building techniques that speed up construction. By creating their own construction company and developing a housing design that fits their environment and culture, the people of Atmautluak are moving toward a sustainable future for their community.



The future homeowners learned the skills needed to operate the homes, such as seasonally leveling the foundation to respond to the dynamic ground.

Partners:

Atmautluak Traditional Council

Cold Climate Housing Research Center

U.S. Department of Housing and Urban Development

HUD's Rural Innovation Fund aims to improve quality of life in distressed rural areas through housing projects that promote innovation and local workforce development.

[Download Plans and Construction Manual at cchrc.org.](http://www.cchrc.org)

Project Highlights

- Durable adjustable piling foundations can respond to changing ground
- Monolithic thermal envelope modeled to be 50% more energy efficient than the average home in Atmautluak
- Heat Recovery Ventilation (HRV) for healthy indoor air quality
- Waterless toilet allows for hygienic disposal of waste
- Battery power backup in case of storm-related power outages

