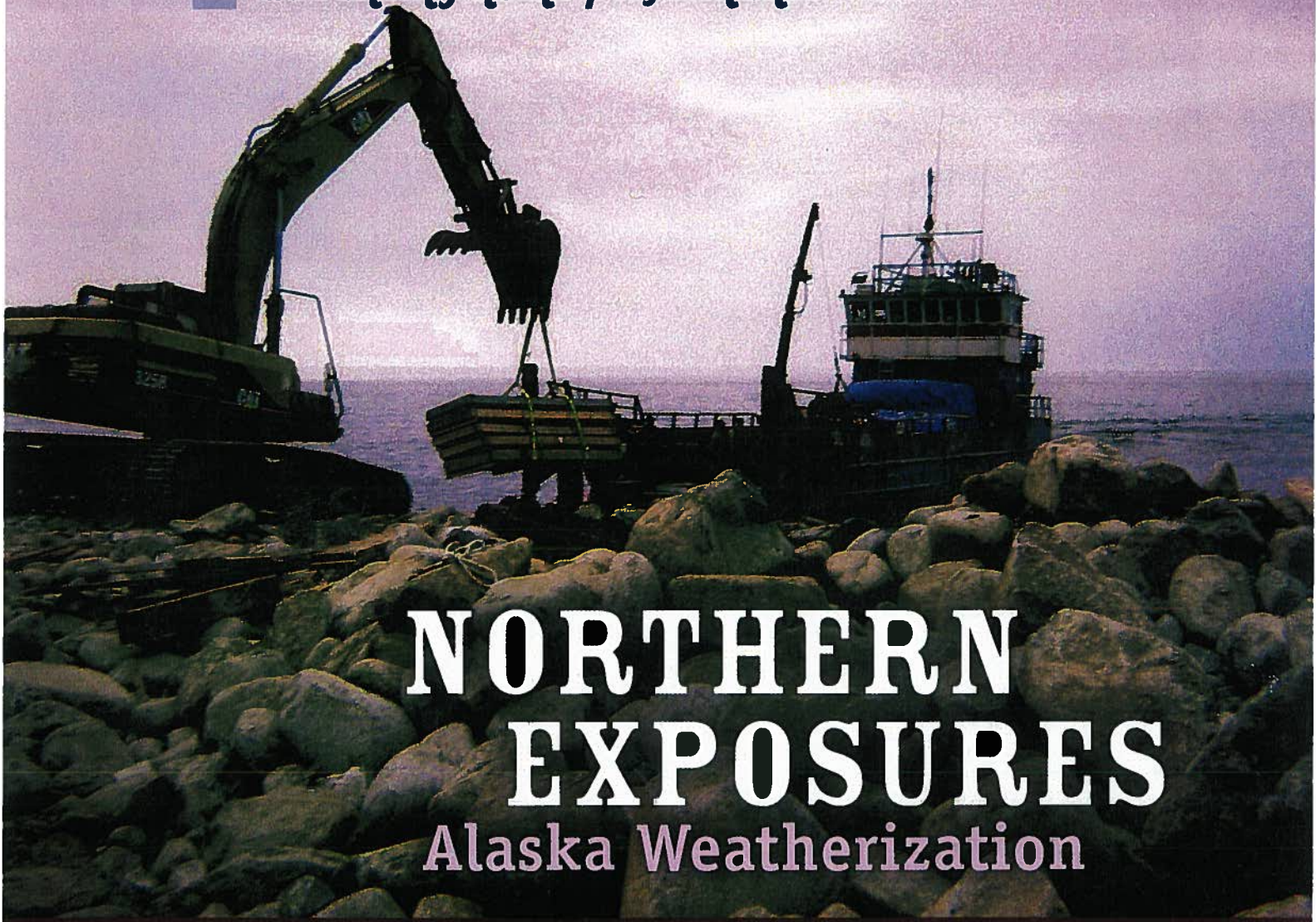


# HOME *energy*

*advancing home performance*



## NORTHERN EXPOSURES

Alaska Weatherization

Affordable Building Southern Style

Arizona's Construction Scholars

Guide to Training Programs

# ALASKA WEATHERIZATION

*In Alaska, it takes more than trains, planes, and automobiles to get to where the work needs to be done.*

BY MIMI BURBAGE

The state of Alaska comprises 570,000 square miles of wild and rugged landscape. There are extremely different climate regions within the state, with heating degree-days ranging from as low as 7,100 in the southern regions to over 21,000 at the arctic north slope, posing widely different challenges for weatherization programs and for residential construction in general. The far north and the interior regions are extremely cold and dry.

Fairbanks, the largest city in the interior, can dip to  $-60^{\circ}\text{F}$  in the winter and soar to over  $90^{\circ}\text{F}$  in the summer. One day this past winter, when a cold snap was breaking and a warm front was coming through, the temperature rose within several hours from  $-30^{\circ}\text{F}$  to almost  $30^{\circ}\text{F}$ .

The west and northwest coasts of Alaska also get hammered with sustained high winds, with gusts of over 70 mph on a regular basis. The southeast panhandle is much more like a rain forest, with high precipitation, high winds, and much warmer temperatures.

The weatherization program in Alaska is funded by DOE, the Low-Income Heating Energy Assistance program (LIHEAP), and the Alaska Housing Finance Corporation (AHFC). Because of the funds provided by AHFC, we are able to exceed the allowable average cost per unit (which was \$2,780 this year).



Alaska weatherization includes some interesting travel opportunities. This is what flying through the pass across Prince of Wales Island looks like on a good day.

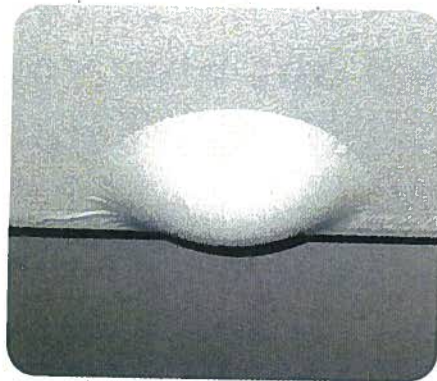
IAN SHARROCK

We run two programs within the Alaska Weatherization program. The first of these programs allows us to spend approximately \$3,000 per home in the cities for materials and labor, not counting travel, administrative costs, and so on. The second program allows us to spend up to approximately \$10,000 per home in remote villages for materials and labor. In the remote villages, we need to spend this much just to bring a meaningful retrofit package to each home.

Historically, the Alaska Weatherization program has brought many advanced technologies to the general residential building industry. It has given us the resources and the training opportunities to apply these technologies in the field, and to perfect them for the Alaska climate.

The weatherization agencies of Alaska face a myriad of difficult challenges; it requires innovation and constant vigilance to make their projects—especially those in remote communities—successful. The following stories by Ian Sharrock and Ralph Lee describe some of those challenges.

*Mimi Burbage is Alaska Housing Finance Corporation (AHFC)'s program coordinator for the state weatherization and housing rehabilitation programs. She also provides technical assistance to other agencies working in rural Alaska. She has worked steadily since 1978 serving Native Americans on Tribal Lands in Alaska and in the western region of the United States.*



Once we get there, this is the kind of problem we find. This bubble was caused by water backing up under the roof shingles. An ice dam formed on the edges of the roof; the Sheetrock got saturated; and water pooled in the paint layer, stretching the latex paint to form a bubble. Air sealing, a vapor barrier, and lots more insulation in the roof were needed to correct this problem.

MIMI BURBAGE

It would probably not be possible to work outside the urban areas if we could invest only that much in each home.

## Weatherization with Alaska Community Development Corporation

BY IAN SHARROCK

The state of Alaska, at more than twice the size of Texas, is a pretty big place. And because of this, weatherization in Alaska is all about transportation. Your main obstacle may be how to get you, your tools, and your materials to the client. Not to mention how much it will cost.

The Alaska Weatherization program is geographically divided among five different agencies. Two agencies cover population centers that make up half the state's 670,000 residents. Three others cover regions that would be considered immense by any state, but that have fewer than 300,000 people.

The AkCDC, where I work, has been a DOE Weatherization Assistance Provider (WAP) agency for over 25 years. Our current service area is larger than California, and yet has no town with more than 15,000 people. These spread-out communities have varied energy sources and rates. Some have hydroelectric power costing less than \$0.10/kWh; many have natural-gas-powered electricity rates near \$0.12/kWh; while others have diesel generators at \$0.23/kWh, after \$0.17/kWh of state-funded subsidy. It would be better not to offer subsidies, of course, and encourage energy efficiency instead, but we live in a state with a lot of oil largesse and an electric industry that still is of the mindset "the more electricity used, the more money we make"—especially with rural electricity fueled by diesel. Heating fuels consist mostly of natural gas at \$0.81 per hundred cubic feet (after a 100% increase over the last four years), and heating oil ranging between \$2.40 and \$3.70 per gallon. This is a range of \$0.81–\$2.79/ 100,000 Btu input.



Here is a well-worn example of the many mobile homes in our area. With the obvious expense of high energy costs, bringing questionable housing stock back from the brink is the only choice for many low income clients.



This is an example of rural weatherization where many homes are built out of pocket with no code enforcement and no consumer building-science education. These "good year homes" (more work done in years the money is good), often require dealing with many different ages and styles of "construction."

### The Alaska Version of Rural

The majority of our clients live in one of two areas. The first of these areas is within a two-hour drive of our offices, and the second is within a five-hour drive. But getting to some of our other clients takes a lot longer. One

locale within our service area covers most of southeast Alaska, a portion of coastline that extends to British Columbia. Because so few people live in Southeast, we weatherize only about 25–35 homes a year there.

Getting to the communities of Point Baker and Port Protection for assessments and inspections can be quite a jaunt. The first stage of travel means flying a commercial airline from Anchorage, where I live, to the town of Ketchikan 776 miles away, which is halfway to Seattle. Packing an entire assessment kit is a trick when you have to pay the airlines extra money if you have more than two checked bags or if they weigh more than 50 lb each. Not to mention today's security, where you could be levied a \$25,000 fine for carrying a chemical smoke pencil and have to explain the blower door frame stored in a gun case. And since Southeast is a coastal rain forest, I could get stuck in one of two stops along the way because of bad weather.

The airport for Ketchikan, a town of nearly 9,000, is all by itself on a separate island (the location of the "bridge to nowhere"). So I either drag my bags down to the ferry or rent a car at the airport and cross to town for any work I have there. The next stage depends once again on the weather. If the weather is too poor to fly, I can take a three-hour ferry to Prince of Wales Island. If the weather is OK, I take a plane on wheels from the airport to the town of Klawock on the far side of Prince of Wales Island. If the pass across the island is socked in, I get myself to the downtown float plane dock and take a 30-minute flight to the near side of the island, where the plane lands in the ocean and drops me at the boat harbor.

## Weatherization

No matter how I get to the island, I have to catch a ride or a shuttle to the town of Craig. Here I usually get the only rental around, a Chevy club-cab pickup for close to \$100 a day, which smells pretty rough from deer hunters using it to haul gear and meat from all over the island. Prince of Wales Island is the third largest in the United States, with approximately 2,000 miles of old logging roads and more than a few deer. Because of all the possible delays, it is only now that I schedule with the clients. The first appointment follows a three-hour drive north, where hopefully someone is waiting for me in a skiff at the end of the lonely road. Here I load my stuff and cross the bay in 20 minutes to Port Protection and then on to Point Baker.

### Once I Find the Place

Most homes in the area are right on the water, built from locally milled trees, and don't have power other than small generators. I bring a Duct Blaster (and my "can't reach 50 factor" chart) for blower door tests because it draws less power than a full-size fan (and it fits in a suitcase with other gear). Many people use the local abundance of trees or beached logs in their wood stoves; some have efficient oil space heaters; and some still use drip oil cookstoves for an oven, heat source—and water heater, if the stove is plumbed with a water jacket.

All this said, the assessments themselves can be pretty simple compared to others. Once I've gathered all my info and had my share of local color, I'm off to retrace my steps. When I am back in the office and my write-ups are done, I coordinate the purchasing of materials from different vendors and their delivery to the closest barge-shipment yard for the contractor to pick up. Then I'm off for another round.

*Ian Sharrock is a home assessor for the Alaska Community Development Corporation Weatherization program.*

## Rural Alaska Weatherization

BY RALPH LEE

Rural Alaska Community Action Program, Incorporated (RurAL CAP), the only community action program agency in the state of Alaska, provides weatherization services to the remote rural villages in the western and northwestern areas of the state. This includes more than 75 villages that range in size from a couple of hundred people to more than 1,000.

Construction in rural Alaska villages provides a unique set of challenges—challenges that builders seldom encounter elsewhere. A short construction season, high transportation costs, limited access, and lack of skilled local trade workers are among the problems faced by a builder working in rural Alaska (see "Training in the Canadian Arctic," *HE* Mar/Apr '03, p. 12).

### Getting There

Logistics provide the biggest challenge—just getting materials and manpower to the site. None of the villages in western Alaska is connected to a road system. Travel is exclusively by airplane or small boat. The "hub villages" of Bethel, Nome, and Kotzebue are served by regular jet aircraft. The local villages typically have short, gravel airstrips. Most travel is by single-engine, six-passenger plane. A few villages are close enough to be reached with a small outboard-powered boat, the primary means of transportation for local villagers during the summer, but no formal commercial boats are available for transportation.

It can take all day to get from Anchorage to a rural village, a distance of 300–400 miles from the main office to the job site. Consequently, RurAL



This is an "after" photo of a home in Nome, a joint weatherization/rehab project that included the Nome Eskimo community and the United States Department of Agriculture Rural Development program.

CAP field supervisors typically spend five to six weeks at a time in the village, and then take a short break.

The only feasible, economical way to get the large volume of materials needed for a major construction project to a village is to barge as much as possible, and then rely on small commercial air freight carriers to fly in incidental items. For a major project, virtually all suppliers will consolidate materials in the Puget Sound area of Washington State. Most villages in the region, those along the rivers as well as those on the coast, are locked in ice from late October until mid-May. The first ocean-crossing barges will arrive in the area about the first of June. Materials are transferred to smaller, lighter barges for delivery to individual villages. The first barge to some of the smaller, more remote villages may not arrive until late July. In some cases there will only be one barge delivery to a village, although many villages will have a second drop in late August or September.

Because of this transportation situation, planning has to start well in advance of beginning work. It can easily take a minimum of three months from the time materials are

ordered until they arrive on-site. Depending on the amount of materials ordered, it will take four to six weeks to consolidate the shipment, and longer if anything has to be special ordered. The materials will then be en route for another six weeks at least.

When the materials arrive at the village, they are typically stacked on the beach. They will have to be transported to the site with four-wheelers and small trailers, hauling 300–400 lb at a time. It takes several days to get materials delivered to the individual houses. Materials that are not barged have to be air freighted—few, if any, can be bought at the local store. Costs are high for air freight, up to \$1.50/lb from Anchorage to the village. So a \$20 sheet of plywood in Anchorage is worth close to \$75 in the village.

The main construction season in rural Alaska lasts from May until late October. Summer starts in June and turns into fall with the seasonal rains that start in August and September, usually changing to snow by October. By November most of the area will not see temperatures above freezing until the following spring, maybe late April. During the winter it can get down to 40°F–50°F below zero for several days at a time. These cold snaps are usually triggered by storms that produce high winds (often with a chill factor of 70°F–80°F below), making it impossible to work outside.

### Building Under the Midnight Sun

The advantage to working during the Alaska summer is the long daylight hours—18 hours a day or more. But productivity seems to drop after about 10 hours. Longer hours also increase labor costs, because additional overtime wages have to be paid. Conversely, during the winter, besides the extreme



RALPH LEE



RALPH LEE

These are before (top) and after (bottom) photos of the same house on Diomed Island—located in the Bering Straits, only two miles from Russia. This was one of 30 homes in the village involved in a joint weatherization/rehab project.

temperatures, daylight lasts usually less than 6 hours a day. Even though lights can be used, productivity usually drops in winter, because extended work in cold weather saps workers' energy, heavy clothing makes it difficult to move around, and tools break down quicker. Limited visibility, frostbite, and icy conditions may also increase the potential for accidents.

Although workers are usually readily available in the rural villages, most lack the skills required of a journeyman. To utilize the local work force, some on-the-job training is necessary. RurAL CAP employs local labor using a force account system. In this system two permanent supervisors travel to the village. One oversees the entire project. Both act as working foremen. Carpenters, helpers, and laborers from the community make up the remainder of the crew.

The houses in the villages are smaller than those in most communities. Homes are very basic, ranging from 250 to little more than 1,000 square feet; most range from 500 to 600 square feet, and many of them house up to ten family members. The homes are wood frame construction, built on a pad-and-post foundation sitting on top of the permafrost. Many have at best only minimal insulation before weatherization, maybe R-19 in the floors and attic and R-11 in the walls. This in a climate that exceeds 15,000 heating degree-days.

Among the measures that the program addresses are insulating floors, walls, and ceilings; weatherstripping windows and doors; repairing roofs and foundations; air sealing; and ventilation.

The homes are usually heated with small oil stoves—the heat circulating by natural convection, sometimes aided with a small fan. With the recent surge in oil prices, a gallon of stove oil costs from \$4.50 to more than \$7.00 a gallon, depending on the village. A normal preweatherization house can easily use 500 gallons of stove oil in one winter. Many use 1,000 gallons. This constitutes a major expense for a family that lives a subsistence lifestyle, a family whose members have very few opportunities for steady employment. In the worst-home cases, weatherization can usually cut fuel use in half.



*Ralph Lee has worked for RurAL CAP since 1989. He started at RurAL CAP as a field supervisor, working as foreman of a locally hired village crew. He became the weatherization program manager in 1995 and the weatherization program director in 1998.*