Connecting Alaska’s remote communities by electric grid is a difficult job that requires working far away from infrastructure. Access roads must be built in rugged terrain and weather conditions, including extreme cold and storms. That’s why hundreds of rural villages in Alaska are disconnected from other communities.

This briefing includes data from applications to the State of Alaska’s Renewable Energy Fund (REF), Rounds 1 through 8. Only applications that contained a budget and corresponding distance for a transmission project were included.

Current Installations in Alaska

Only 18 projects in the REF applications were found to meet the required data specifications detailed in the preceding resource and technology description.

Key Performance Metrics

Transmission lines vary from overhead to submarine to underground installations. Analysis indicates that overhead transmission lines are the least expensive to build, ranging from $100,000 to $400,000 per mile. Cost variability is influenced by pole spacing, pole heights, line ratings, river crossings, and the amount of work on energized power lines. Submarine lines and underground lines are substantially more expensive, ranging from less than $3 million to more than $4.5 million per mile, although there is some uncertainty in the datasets.

Materials, construction, and installation comprise just over half of total transmission costs, with remaining costs distributed among control system, substation, switchyard, road clearance, indirect costs, and contingencies. Operation and maintenance costs range from $2,800/mile to $4,200/mile, with an average of $3,560/mile. Expected lifetimes are 20–30 years.
Technology Trends

In general, transmission technology is not as dynamic as other areas of the energy market. Today’s techniques have been on the market for the past half-century, with updates only to 24-strand fiber optic cable for communication infrastructure.

Technology Gaps & Barriers to Success

Private investment and lower costs are not likely to occur in transmission projects unless individual community loads are linked together to make bigger loads and create economies of scale. With regard to technological advances, further development of conductors will also slightly cut costs, but these advances would be small improvements relative to overall construction costs.

Recommendations

Financing and initiatives to encourage interties are recommended to create bigger loads and economies of scale.