Assume that a conductor is to be selected to carry 50 amperes for 4,200 hours per year, with the cost of wire at $1.75 per pound and electrical energy purchased at 5.5 cents per kw-hr. The life is estimated as 25 years with zero salvage value. The minimum attractive rate of return before income taxes is 14%, and average annual property taxes are estimated at 1.75% of first cost. These charges proportional to investment—namely, capital recovery cost of 14.55% and property taxes of 1.75%—are lumped together as investment charges of 16.3%.

The cross-sectional area of a copper conductor is expressed in circular mils, the weight of the conductor is directly proportional to the cross-sectional area, and the resistance to the flow of current is inversely proportional to the area. Therefore, let x represent the cross-sectional area in circular mils, and x_e represent the most economical size for the stated conditions. The resistance, R, for a conductor of 1,000 ft in length and 1 circular mil in cross-sectional area is approximately 10,580 ohms at 25°C, and the same conductor will weigh approximately 0.00302 lb.

The investment in the conductor will be