



**NORTH CAROLINA
PUBLIC STAFF
UTILITIES COMMISSION
News Release**

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Report is available on Utilities Commission website at www.ncuc.commerce.state.nc.us

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In early December 2002, a major ice storm blanketed much of North Carolina with up to one inch of ice, causing an unprecedented power outage to approximately two million electric utility customers. In the immediate aftermath of the storm, the public expressed considerable interest in burying all overhead power lines in the state. The Public Staff responded by investigating the desirability and feasibility of converting the existing overhead lines of the state's three investor-owned electric utilities – Duke Power, Progress Energy Carolinas, and Dominion North Carolina Power (collectively, "the Utilities") – to underground. Since the majority of the damage sustained in severe weather events usually involves distribution rather than transmission lines, the Public Staff's investigation focused on undergrounding this portion of the electrical power delivery system. The primary purpose of this report is to present the results of that investigation.

The investigation consisted of (1) comparing the operational advantages and disadvantages of overhead and underground power distribution systems; (2) estimating and comparing the capital costs of converting overhead lines to underground, along with the differences in operation and maintenance costs for the two types of systems; (3) estimating the time and human resources required to bury underground lines; (4) identifying potential additional costs to customers, municipalities, and other utilities that may result from conversion; and (5) exploring options for financing conversion projects.

The Public Staff has determined that replacing the existing overhead distribution lines of the Utilities with underground lines would be prohibitively expensive. Such an undertaking would cost approximately \$41 billion, nearly six times the net book value of the Utilities' current distribution assets, and would require approximately 25 years to complete. The ultimate impact of the capital costs alone on an average residential customer's monthly electric bill would be an increase of more than 125%. Rates would also be impacted by the higher operation and maintenance costs associated with direct-buried underground systems, particularly in urban areas, where underground conductors are four times more costly to maintain than overhead facilities. Even reduced investments in underground facilities would have significant rate impact. Assuming costs were spread to all customers, the average bill of a residential customer using 1,000 kWh per month would increase by \$2.34 for each one billion dollars spent on converting overhead distribution lines to underground.

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In addition to the impact on the cost of providing utility service, conversion to underground would impose the following costs on individual customers, municipalities, and other utilities:

1. Customer service drops would have to be buried, which requires trenching in residential yards and commercial properties that can cause disruption of existing landscapes.
2. Burying power lines requires digging large ditches that could harm existing landscapes. If trenching were to take place near existing trees, there is the possibility that root systems of nearby trees would be damaged and this could eventually weaken or kill the trees in or near the right-of-way.
3. A properly maintained underground right-of-way must be kept clear of trees. Thus, while properly trimmed trees can grow near overhead power lines, no trees would be permitted in the underground right-of-way. Further, when outages occur to underground lines, repairs may involve digging in the right-of-way.
4. Customers would have to bear certain new expenses. Customers would be required to hire licensed electricians to modify their service entrances. The cost of this service would depend on the specifics of each property, but a rough estimate would be around \$400 per residential and small commercial customers. In addition, there may be additional costs if dwellings do not meet current electrical codes, as is often the case with older dwellings. The local municipality may require the property owner to make modifications to bring the dwelling to current code before underground electric service would be permitted.
5. Municipalities would be responsible for paying for the undergrounding of service to streetlights and traffic signals that are mounted on electrical service poles. Furthermore, there would be inconvenience and traffic congestion caused by the digging into streets and rights-of-way.
6. Currently, other utilities, such as telephone and cable television, may share space on poles with electric service. If power lines are buried in order to eliminate the utility poles, these other services will also have to be buried at significant costs. This could raise rates for these services, as well as for electric service.

While these costs have not been quantified, they could be significant. In addition to the huge costs of burying distribution lines, the Utilities would incur the costs of burying service drop lines from the street to homes and businesses. Service drops would have to be buried at a cost ranging from \$1,500 for a 100-foot suburban drop to \$2,350 for a 250-foot rural drop. Since the Utilities serve more than 2.7 million customers, the costs of paying for new service drops would be enormous and cause additional rate increases.

The Public Staff's investigation found that the reliability of underground systems during normal weather conditions is better than overhead systems. Underground systems experience about half as many system interruptions and tap line interruptions as overhead systems. This gain in reliability, however, is offset by a 58% increase in repair time, as underground faults require specialized repair crews to locate the faults, dig up the area around the fault, and repair the cable. In most cases, such an effort requires different crews and scheduling. During severe weather events, such as hurricanes and ice storms, customers with underground facilities are less likely to be interrupted but will be among the last to have power restored when there is an underground fault.

The investigation also found that the costs of burying distribution lines in newly developed commercial and residential areas is often feasible and cost-effective. All of the Utilities have plans on file with the Commission detailing the terms, conditions, and charges under which they agree to extend distribution service to customer locations. Each utility will place new facilities underground when the additional revenues cover the costs or the cost differential is recovered through a contribution in aid of construction. In addition, conversion of overhead lines to underground may be done on a case-by-case basis when the requesting party pays the conversion costs.

Considering the overwhelming direct and indirect costs and environmental impacts, the Public Staff does not recommend that the Utilities undertake the wholesale conversion of their overhead distribution systems to underground. The Public Staff does recommend, however, that each of the Utilities (1) identify the overhead facilities in each region it serves that repeatedly experience reliability problems based on measures such as the number of outages or number of customer-hours out of service, (2) determine whether conversion to underground is a cost-effective option for improving reliability of those facilities, and, if so, (3) develop a plan for converting those facilities to underground in an orderly and efficient manner, taking into account the outage histories and the impact on service reliability.

In the meantime, the Public Staff recommends that the Utilities continue their current practices of (1) placing new facilities underground when the additional revenues cover the costs or the cost differential is recovered through a contribution in aid of construction, (2) replacing existing overhead facilities with underground facilities when the requesting party pays the conversion costs, and (3) replacing overhead facilities with underground facilities in urban areas where factors such as load density and physical congestion make service impractical from overhead feeders.