Should cities require utilities to bury electrical lines to make them less vulnerable to storms?

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City requirements to relocate electricity distribution lines underground would likely lead to an inefficient use of electricity consumers’ money. The city government is not as likely as the utility or its regulator to possess the technical expertise necessary to decide whether this undergrounding is either feasible or prudent.

First, burying electricity infrastructure is a significant capital expense. A rule of thumb is roughly $1 million per mile, but the particular geography or population density of an area can halve this cost or triple it. This is a significant investment that must be repaid by electricity consumers, and it is crucial to ensure that the consumer is receiving an increase in the quality of service commensurate with the cost. The utility and its regulator are staffed with professional engineers, economists, and accountants trained to assess the costs and feasibility of the construction, and to evaluate the prudency of the decision to proceed. In 2003, the state regulator and electric utilities in North Carolina explored the feasibility of relocating the state’s distribution lines underground and concluded that it would take 25 years and increase electricity prices by 125%. All parties agreed that the consumer would not receive fair value for this price increase and the project was never begun. A 2010 study of a portion of the electricity system in the District of Columbia for the Public Service Commission reviewed 16 reports from 8 states that studied undergrounding from 2000-2009 and found that no report identified a quantifiable net benefit from system-wide relocation of existing facilities. The study also found considerable variability in marginal costs of construction. A strategic $1.1 billion (in 2006 dollars) investment could improve the reliability for 65% of the customers in the project area, but an additional $4.7 billion would be required to affect the remaining 35%. If the marginal value that a customer receives for increased reliability is less than the marginal cost required to increase reliability for that customer, then a blanket mandate would likely lead to wasted resources. In addition to the capital cost, undergrounding makes routine maintenance of the system more difficult, and thus more expensive. Further, the reduced accessibility makes it more difficult to repair the system when outages do occur, prolonging the duration of each outage. The consumer impact of the duration, as well as the frequency, of the outages must be considered when assessing the effectiveness of the undergrounding.

Second, the relocation of power lines underground does not necessarily make them less vulnerable to storms. While relocating lines may mitigate some damage from wind events, principally flying debris and falling trees, there are other strategies that utilities may employ to mitigate this type of damage. Utilities can refine vegetation management and pole inspection programs, replace traditional wood poles with steel, concrete, or composite ones, or reinforce existing poles with guy wires. These strategies may be nearly as effective at mitigating damage as relocating power lines underground, at a fraction of the cost. Further, relocating power lines underground only shifts the risk of damage from wind events to the risk of damage from corrosive storm surge and flooding. Areas with relatively greater
vulnerability to storm surge and flooding will experience decreased system reliability at greater cost as a result of undergrounding.

The relocation of some power lines underground may provide a cost-effective strategy to mitigate the risk of damage to elements of a utility’s infrastructure, but these cases should be evaluated individually by the local distribution utility and its regulator. A government mandate to bury power lines will likely result in greater costs for all electricity consumers with no guarantee of increased system reliability.