



FABRIC ENERGY ⓘ March 14, 2019

### Is burying power lines underground really worth it?

By [Theodore J. Kury](#)



Going down. Image: Getty.

Last year, the devastation of Hurricane Florence in North and South Carolina caused more than [1.4m customers to lose power](#) and Hurricane Michael has cut service to an [estimated 900,000 customers](#) in Florida, Alabama, Georgia, and the Carolinas. Later, winter storms brought wind and snow to much of the country

Anxious people everywhere worry about the impact these storms might have on their safety, comfort and convenience. Will they disrupt my commute to work? My children's ride to school? My electricity service?

When it comes to electricity, people turn their attention to the power lines overhead and wonder if their electricity service might be more secure if those lines were buried underground. But [having studied this question](#) for utilities and regulators, I can say the answer is not that straightforward. Burying power lines, also called undergrounding, is expensive, requires the involvement of many stakeholders and might not solve the problem at all.

### **Where should ratepayer money go?**

Electric utilities do not provide service for free, as everyone who opens their utility bill every month can attest. All of the costs of providing service are ultimately paid by the utility's customers, so it is critical that every dollar spent on that service provides good value for those customers. Utility regulators in every state have the responsibility to ensure that utilities provide safe and reliable service at just and reasonable rates.

But what are customers willing to pay for ensuring reliability and mitigating risk? That's complicated. Consider consumer choices in automobile insurance. Some consumers choose maximum insurance coverage through a zero deductible. Others blanch at the higher premiums zero deductibles bring and choose a higher deductible at lower premium cost.

To provide insurance for electricity service, regulators and utilities must aggregate the preferences of individual customers into a single standard for the grid. It's a difficult task that requires a collaborative effort.

The state of Florida's reaction in the wake of the 2004-05 hurricane seasons provides a [model for this type of cooperative effort](#). Utilities, regulators and government officials meet every year to address the efficacy of Florida's storm hardening efforts and discuss how these efforts should evolve, including the selective undergrounding of power lines. This collaborative effort has resulted in the refinement of utility "vegetation management practices" – selective pruning of trees and bushes to avoid contact with power lines and transformers – in the state as well as a simulation model to assess the economic costs and benefits of undergrounding power lines.

Nationally, roughly 25 per cent of new distribution and transmission lines are built underground, according to a [2012 industry study](#). Some European countries, including the Netherlands and Germany, have made [significant commitments to undergrounding](#).

Burying power lines costs roughly \$1m per mile, but the geography or population density of the service area can [halve this cost or triple it](#). In the wake of a statewide ice storm in December 2002, the North Carolina Utilities Commission and the electric utilities explored the feasibility of burying the state's distribution lines underground and concluded that the project would take [25 years to complete and increase electricity rates by 125 percent](#). The project was never begun, as the price increase was not seen as reasonable for consumers.



Construction at the Moody Air Force base in Georgia to put power lines underground in 2009. Image: [U.S. Air Force photo by Senior Airman Schelli Jones](#)/creative commons.

A [2010 engineering study](#) for the Public Service Commission on undergrounding a portion of the electricity system in the District of Columbia found that costs increased rapidly as utilities try to underground more of their service territory. The study concluded that a strategic \$1.1bn (in 2006 dollars) investment would improve the reliability for 65 per cent of the customers in the utility's service territory, but an additional \$4.7bn would be required to improve

service for the remaining 35 per cent of customers in outlying areas. So, over 80 per cent of the costs for the project would be required to benefit a little more than one third of the customers. The Mayor's Power Line Undergrounding Task Force ultimately recommended a [\\$1bn hardening project](#) that would increase customer bills by 3.2 per cent on average after seven years.

## Shifting risk

In addition to the capital cost, undergrounding may make routine maintenance of the system [more difficult](#), and thus more expensive, because of reduced accessibility to power lines. This may also make it more difficult to repair the system when outages do occur, prolonging the duration of each outage. Utility regulators and distribution utilities must weigh this cost against the costs of repairing and maintaining the electricity system in its overhead state.

Electricity service is valuable. A 2009 study from the Lawrence Berkeley National Laboratory [estimated an economic cost](#) of \$10.60 for an eight-hour interruption in electricity service to the average residential customer. For an average small commercial or industrial customer the cost grew to \$5,195, and to almost \$70,000 for an average medium to large commercial or industrial customer. The economic benefits of storm hardening, therefore, are significant.

Beyond the economic value of undergrounding, one could consider other benefits, such as aesthetic ones, which may be more difficult to quantify. The safety of the electricity grid is also a concern. The California Department of Forestry and Fire Protection recently concluded that high winds and above-ground power lines were the cause of the Cascade Fire of [October 2017](#). But all costs and benefits must be considered to ensure value for the customer's investment.

In terms of reliability, it is not correct to say that burying power lines protects them from storm damage. It simply shifts the risk of damage from one type of storm effect to another.

For example, it is true that undergrounding can mitigate damage from wind events such as flying debris, falling trees and limbs, and collected ice and snow. But alternatives, such as proper vegetation management practices, replacing wood poles with steel, concrete or composite ones, or reinforcing utility poles with guy wires, may be nearly as effective in mitigating storm damage and may cost less.

Also, undergrounding power lines may make them more susceptible to damage from corrosive storm surge and flooding from rainfall or melting ice and snow. Areas with greater vulnerability to storm surge and flooding will confront systems that are less reliable (and at greater cost) as a result of undergrounding.

So, 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. Otherwise consumers will end up spending more for their electricity service, and getting less.

[Theodore J. Kury](#), Director of Energy Studies, [University of Florida](#).

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FABRIC HOUSING ⓘ 1 hour ago

**Residential segregation shouldn't come as a surprise: in our developer-led housing system, it's endemic**

By [Tim White](#)



Oh wow, more luxury flats! Image: Getty.

A London housing development dividing children's play areas based on their tenure has been the source of widespread outrage in recent months. The 149-home Baylis Old School complex in south London was accused of denying children from social housing units access to a playground used by those from market-rate flats.

Politicians from across the spectrum, including Jeremy Corbyn, Sadiq Khan and James Brokenshire, all expressed moral indignation – putting pressure on the developer, Henley Homes, to remedy the situation. Amid heart wrenching stories of children from the same primary school being unable to play together, the local council agreed to take down the dividing wall.

As alarming as this individual case was – separating innocent children along class lines – it's far from an exception. Residential segregation has been an outcome of attempts to produce so-called “affordable” housing from market-rate housing in expensive cities across the world.

A recently approved tower in Vancouver's West End has been slated for having separate entrances for market and social housing residents, and attempts to [separate children's play areas](#). Until mayor De Blasio's clampdown, New York was in the spotlight over the likes of the Lincoln Square tower, where private tenants enjoyed uninterrupted river views and facilities including a pool, a movie theatre and a bowling alley – while low-income residents only had access to a bike storage closet, unfinished laundry room and tiny [common space](#).

Such disparities are only amplified when – rather than aiming at local residents most in need – developers look to an international market of property speculators. Appealing to vast amounts of investment pouring in from around the world, developers are increasingly throwing in amenities like swimming pools, concierges and cinemas. Whilst the private units attracting many millions are positioned to enjoy the best city views and are adorned with a myriad of additional luxuries, any “affordable” units that the developers haven't managed to avoid constructing are going to look very different.

The situation in the UK is, however, particularly acute. Forty years ago, local authorities were responsible for over 40 per cent of house building – which has now dropped to [below 2 per cent](#), and the construction of social housing has reduced by 80 per cent [over the past decade alone](#). As the role of government in directly producing low income housing has drastically diminished, private developers now have a near monopoly in generating it – technically obliged by planning gain to include a certain proportion of social or affordable units in their schemes.

In other words, the provision of a fundamental social good is now squarely in the hands of organisations with no incentive to foster an equal community, and whose mission is to cut costs and maximise profit wherever possible. To these firms, affordable housing provision – and everything that goes along with it – is simply an inconvenience: at best, a box ticking exercise.

Blindly following the “build, build, build” mantra, toothless local authorities constantly allow developers to skimp on affordable housing quotas and flout planning policies. The dull and compartmentalised open spaces linked to these developments – playgrounds included – resemble what they really are: the outcome of a haggling process in which local authorities are subservient.

It should come as no surprise, then, that playgrounds in new housing developments are divided. Residential segregation is a physical manifestation of the unequal urban citizenship perpetuated by our market-led housing system. Rather than appealing to the good nature of developers, we need to stop seeing affordable housing as a side-product of private gain, and see it as a human right.

*Time White is a researcher at LSE Cities at the London School of Economics.*

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