



energizeEASTSIDE

underground transmission lines fact sheet

Growth is straining the region's electric transmission system. Growth studies project that demand for reliable power will exceed capacity as early as winter 2017-2018. This doesn't mean the lights will go out, but without substantial electrical infrastructure upgrades and aggressive conservation efforts, there is a greater possibility of outages for Eastside customers.

Puget Sound Energy launched the Energize Eastside project, which will build approximately 18 miles of new electric transmission lines and a new substation on the Eastside to deliver dependable power to homes and businesses for years to come.

The Energize Eastside project is currently planned as an overhead transmission line project, due in part to construction, environmental, operation and cost differences between overhead and underground transmission lines.

Transmission vs. distribution lines

There's a big difference between distribution lines that power your home or business and the

transmission lines that connect to substations, which in turn serve tens of thousands of customers and businesses. Transmission lines bring large amounts of power to a city or region but cost much more to build and maintain. More than 50% of PSE's distribution lines are underground, while very few of the thousands of miles of transmission lines that PSE owns are underground.

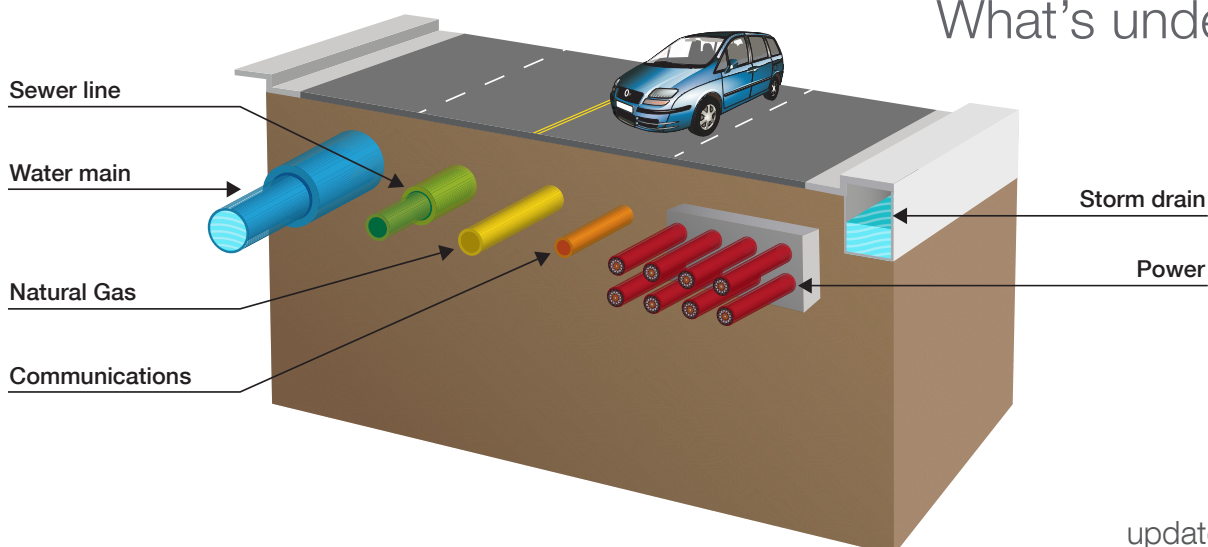
Advantages of undergrounding: reliability and visibility

Underground transmission systems are very reliable. Because lines are underground, they are less susceptible to storm-related outages. Visual impacts of underground transmission lines are reduced because fewer poles are required.

Disadvantages to undergrounding: footprint, costs, maintenance and environmental impacts

Construction

Because they need additional cooling and insulation, underground transmission lines are



typically installed in concrete duct banks, which can extend 5 or more feet below the surface.

These require an easement 30 feet to 50 feet wide, which, unlike with overhead lines, must be completely free of trees. With overhead lines, smaller trees that are compatible with the lines can remain.

Beneath our streets is a complex infrastructure that includes gas, sewer, water and communications lines. Adding the large footprint of underground transmission lines may mean rerouting some of these existing utilities, which increases project costs. Similarly, if future construction requires underground transmission lines to be moved, the expense is many times that of moving overhead lines.

Outside of urban streets, installing lines in bare earth can pose problems too. Unstable or steep slopes, bedrock, wetlands and sites with hazardous materials aren't suitable for undergrounding.

Environmental impacts

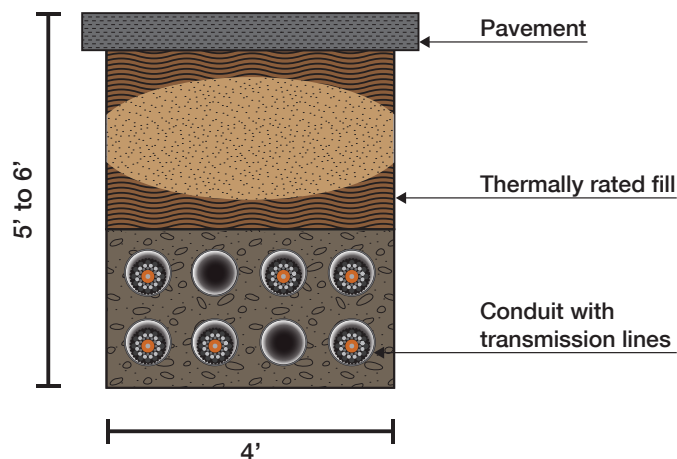
In addition to concrete trenches and treeless rights of ways, large concrete access vaults must be installed every quarter to half mile to allow for regular maintenance and inspection. Construction prep can include extensive clearing and grading and dust and noise from construction may last three to six times as long as installing an overhead line.

Operations and repairs

Underground lines typically take longer to repair, and repairs are more difficult. When an overhead line fails, our crews can often repair it within hours. Repair of underground transmission lines can take days and even weeks, depending on the repairs that need to be made.

Costs

Placing transmission lines underground costs more. The construction costs for an overhead transmission line will be about \$3 million to \$4 million per mile, versus \$20 million to \$28 million per mile to construct the line underground. These figures only take engineering and construction costs into consideration, not additional costs such as land acquisition, traffic control, relocation of



Typical underground line concrete duct bank.

existing underground facilities that may conflict with an underground transmission line, future increased operation and maintenance costs, or taxes and overheads. These additional costs can be very significant – sometimes two to three times the construction costs.

When the line is constructed overhead, project costs are distributed evenly between PSE's 1.1 million customers. If the transmission line were to be constructed underground, we can't justify asking customers across PSE's entire service territory to pay the significant cost increases for a local aesthetic benefit. That's why, when an overhead line is a viable option like in the case of the Energize Eastside project, our tariff from the Washington Utilities and Transportation Commission requires the local jurisdiction or customer group requesting that the transmission line go underground to pay the difference between the overhead and underground costs.

The tariff is in place to protect our customers from substantial bill increases that would result from frequent requests to underground or relocate transmission lines. To view the full tariff (Schedule 80, Section 34), please visit http://pse.com/aboutpse/Rates/Documents/elec_sch_080.pdf. Having the local community pay to underground power lines for the aesthetic benefit is not new – it is the same concept our communities follow today when a new development undergrounds the lower voltage distribution power lines.

