

Converting Pipelines for Alternative Energy by Andrew Hunter

Background

305,000 miles of interstate and intrastate transmission pipelines carry natural gas around the country, north to south and east to west. Another 150,000 miles carry crude oil and refined products. Unlike the 450,000 miles of high voltage power lines in the electricity grid, these pipelines are almost everywhere buried several feet underground.

As the output from solar and wind power grows, the delivery needs could change significantly as the solar and wind output displaces coal and natural gas. Some pipelines will become redundant.

Could these lines be converted to safely carry the new grid cables?

Discussion

One advantage to burying the lines inside the pipelines would be to reduce certain types of accidents. Up until recently almost all the high-voltage grid transmission lines have been carried above ground and uncoated. This makes sense because air is a good insulator. This system fails occasionally because somebody mistakenly causes a physical disruption of the pylon structure or a power line sags and then suddenly “earths” to the ground or to nearby branches.

Another advantage would be to eliminate the eyesore that is the modern above-ground grid as it crosses the country.

Then there is security. The present above-ground grid system is susceptible to damage by low-level terrorists.

Task

First establish where we are likely to see this possibility occur and catalog the technical challenges of placing very high voltage current inside a metal pipeline. Then there is the question of how to extract the line losses as heat and how to deal with the structure of the grid line with its valves and, in the case of oil, pump stations.

Finally develop a testbed or pilot plant study to test the technical viability of converting existing pipelines to electricity carriers.