

Delivering renewable energy with HVDC

Efficiently moving power from source to communities

Wyoming wind energy is among the richest in the nation. Harnessing that potential requires an efficient, cost-effective way to transport it long distances from where it is harvested to population centers where it can be used.

Alternating current lines are used in the majority of electric transmission lines throughout the country, and are the best choice for gathering and transmitting smaller amounts of power to multiple intermediate points over shorter distances. In situations where large amounts of bulk power need to be transported over very long distances, high-voltage direct-current is the most cost-effective, efficient and environmentally favorable means.

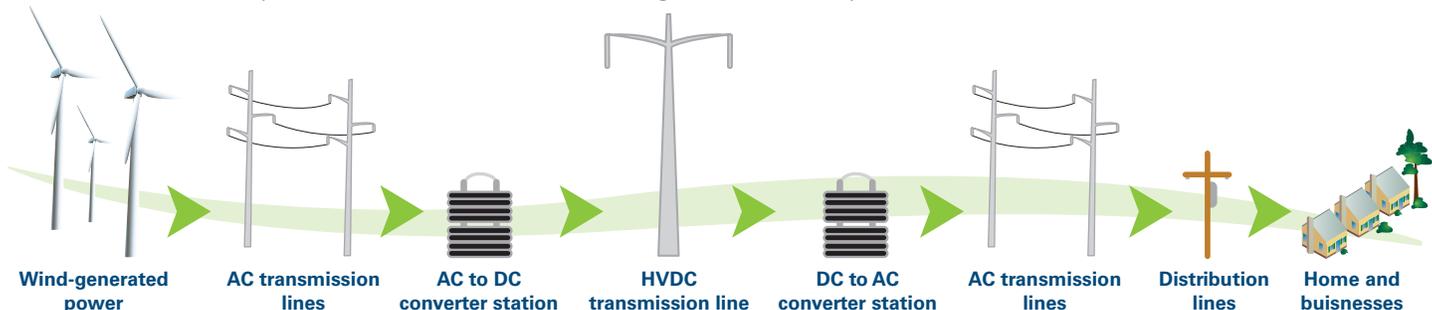
Benefits of HVDC

- **Improved electric reliability.** HVDC transmission systems are often point-to-point configurations where a large amount of energy is transmitted between two regions. One of the fundamental advantages of HVDC is that it is very easy to control the amount of power being transmitted. This control allows regional transmission grid operators flexibility when responding to changes in electric demand and facilitates the integration of wind energy from different sources into the grid.
- **Greater efficiency.** HVDC lines move energy more efficiently than AC lines. Whenever electricity is transported over long distances, some electricity is lost along the way. HVDC transmission lines are roughly 5 percent more efficient than equivalent AC lines when moving the same amount of energy. In the case of the Zephyr line, this would be enough to power approximately 48,400 additional homes.
- **Lower cost.** When moving large amounts of electricity over distances of 500 miles or more, HVDC transmission lines cost less than AC lines. Because HVDC is a more efficient way to transfer energy, transmission costs are lower, which helps renewable energy favorably compete against other power sources.
- **Environmentally sensitive.** HVDC lines require one-third fewer power conductors (wires) and insulators to transport energy than AC lines. This results in a narrower right-of-way and comparatively smaller footprint, minimizing effects on existing land use and lessening environmental impacts.



How HVDC works

Wind energy is transmitted on high-voltage AC transmission lines to a converter station, which converts the energy from AC to DC power to be transmitted long distances over the HVDC transmission line. On the other end, another converter station receives the energy from the HVDC line, converts it to AC power and connects to the existing transmission system.



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