Electromagnetic Frequencies and Direct Current Transmission | Frequently Asked Questions

Southern Cross Transmission LLC has proposed to construct a direct current (DC) transmission line between DeSoto Parish, Louisiana, near the Texas border and Lowndes County, Mississippi, to provide an avenue for sharing renewable energy from wind farms and to diversify the supply of electricity in the region. Although DC transmission lines have been in operation in North America since1968, they are increasingly being called upon to carry and share renewable energy over large parts of the United States and Canada. Below is a collection of the most Frequently Asked Questions about the static electric and magnetic fields that are associated with modern DC transmission lines.

Q. What are the sources of the electric and magnetic fields from the Project?

A. The voltage on the transmission line's two energized conductors causes positive (+) electric charge to increase on one conductor and negative (-) electric charge to increase on the other conductor. These electric charges are the source of the static electric field around the conductors. The movement of these charges on the conductors produces the static magnetic field.

Q. Are static fields the same as the electric and magnetic fields produced by transmission lines, distribution lines, and everyday appliances that carry alternating current (AC) electricity?

A. No. Static fields from a DC line are produced by electricity flowing in a single direction, such as from a battery; AC electricity from common sources changes direction 60 times per second, which gives it different properties. People commonly refer to AC fields at this frequency by the abbreviation EMF or extremely-low-frequency (ELF) EMF.

Q. What are other sources of static electric and magnetic fields in our environment?

A. Naturally-occurring sources include the electric field associated with weather conditions (storm clouds), static electricity on clothing, and the earth's geomagnetic field that causes a compass to point north; such static fields are identical to those produced by a DC line.

Q. Will the intensity of the static fields from the DC line be similar to these natural sources?

A. Yes. The range of static electric and magnetic field intensities even directly under the DC line will be similar to that of natural sources. The intensity of the static magnetic field of the line also will be far lower than the static magnetic fields produced by permanent magnets used on refrigerators and in toys, in battery-powered appliances, and in some DC electrified railway systems.

Q. Will the intensity of the fields be constant because the DC line produces static fields?

A. No. The static magnetic field will vary directly with the rate of current flow on the line. The current flow will be affected by the amount of energy being delivered across the line which varies with the regional demand for electricity. While the electric field is more constant because the voltage of the line is fixed, it too will vary as the charge density around the line varies with weather conditions.

Q. Will the fields from the Project's DC line be strong enough to interfere with the operation of electrical or electronic devices under or near the line?

A. The performance of mobile phones; global positioning system receivers used by hikers, cars, and agricultural equipment; and implanted medical devices, such as pacemakers, are not reported to be affected by the

weak static fields around DC lines. In the past, both DC and AC lines close to television receivers could produce interference with television signals in rural areas, but television signals now are transmitted digitally, so they are not affected. Only AM-radio reception is susceptible to auditory static when very close to or driving under transmission lines.

Q. What do health and scientific agencies say about static fields and human health?

A. Multiple agencies including the International Agency for Research on Cancer; the Advisory Group on Non-Ionizing Radiation, an independent advisory group reporting to Public Health England; and the World Health Organization (WHO) have commissioned reviews of scientific research on static fields and health. These reviews have not identified any adverse effects of these fields at low levels of exposure, such as those that occur in nature or near DC lines and other common sources. At levels above those expected from this Project, static electric fields can be perceived by the movement of body hair, but the interior of the body is shielded from these fields. Static magnetic fields are not reported to have any adverse effects, even at levels many thousands of times greater than the earth's geomagnetic field or fields from the proposed line.

Q. I have heard that some wildlife and cattle can detect the static magnetic field of the earth. Would the proposed Project be likely to affect animals that might spend more time near the DC line than do people?

A. Studies of cattle have not provided any clear evidence that they detect variations in the earth's geomagnetic field. Multiple studies of cattle living near DC transmission lines have not reported any adverse effects. While the literature contains reports that some species of birds and bees can detect static magnetic fields at low levels and use these fields as a navigational aid, the research, including studies near DC transmission lines, does not suggest that the behavior of birds or other species would be adversely affected by the change in the static magnetic field near a DC line.

Q. Are there standards and guidelines that apply to static electric and magnetic fields?

A. No standards have been proposed for static electric fields to protect health; several agencies have made recommendations to minimize the perception of static electric fields at levels typically higher than those encountered on DC transmission line rights-of-way. No standard has been proposed to limit environmental exposure to low-level static magnetic fields but there are U.S. and international guidelines that limit exposure to very strong static magnetic fields (more than 4,000 times greater than that of a DC line or the earth) to minimize the possibility of transient sensory effects. Exposures to static magnetic fields at even higher levels occur during routine magnetic resonance imaging (MRI) diagnostic tests without producing adverse effects.

Additional Information:

Information about Southern Cross Project, its technology, and potential routes can be found in:

- Southern Cross Project Fact Sheet[1]
- DC Transmission Line White Paper[2]
- Study Area for Potential Line Routes[3]
- Frequently Asked Questions[4]

World Health Organization

Electromagnetic fields and public health - Static electric and magnetic fields
http://www.who.int/peh-emf/en/

International Commission on Non-ionizing Radiation Protection

Guidelines on limits of exposure to static magnetic fields
http://www.icnirp.org/cms/upload/publications/ICNIRPstatgdl.pdf

This brochure was created by epidemiologists and biological scientists in the Health Group at the scientific and engineering firm to summarize the current status of EMF research as reflected in reviews of research by national and international health agencies.

[1] http://southerncrosstransmission.com/wp-content/uploads/2016/03/SCT_factsheet_2016-03-25PQ.pdf
[2] http://southerncrosstransmission.com/wp-content/uploads/2016/03/DC-EMF-Fact-sheet_for-Pattern-review_050616_Pattern-002.pdf
[3] http://southerncrosstransmission.com/documents-downloads/
[4] http://southerncrosstransmission.com/faqs/

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