

ELECTROMAGNETIC INTERFERENCE REPORT

Front Range-Midway Solar Project

Project Description

The Front Range-Midway Solar Project (Project) is a proposed photovoltaic solar facility located approximately nine miles south of the City of Fountain, El Paso County, Colorado. The Project is located on Rancho Colorado Boulevard, approximately 0.5 mi. west of Interstate 25 (I-25). The Project consists of a 100.2 MW photovoltaic (PV) solar array, a substation, energy storage, an operations and maintenance building, a transmission line connecting the Project with either an existing, adjacent Public Service Company of Colorado (PSCo) or Western Area Power Administration (WAPA) substation, a meteorological station, up to 50 inverters, site access roads, and other necessary ancillary features. The proposed Project would encompass approximately 939 acres.

Background

The development of utility-scale solar energy facilities, also referred to as photovoltaic (PV) systems, is relatively new for many communities. Some members of communities near these renewable energy facilities sometimes express concerns about the potential impacts of radiation associated with electromagnetic interference, emission levels, and general health and safety concerns with solar energy facilities. The following text in this document summarizes the facts surrounding the common misconceptions of potential hazards associated with PV systems.

Electromagnetic interference (EMI), is a disruption produced by an outside source, man-made or natural, that affects an electrical current through means of electromagnetic induction, electrostatic coupling, or conduction (Wikipedia 2020). EMI can include radiofrequency (RF), emissions emanating from PV systems, that could impact nearby radio receivers which may include blocking or attenuation of nearby radar or communications by the PV system (NREL 2015). Man-made sources generally consist of other electronic circuits or arise from switching of large currents. PV systems operate high-speed switching semiconductor circuits (inverters) to convert the voltage produced by the PV arrays (solar panels) to the voltage needed by to be placed on the grid. Electromagnetic radiation is produced by these switching circuits (inverters).

Emission Levels

The components of PV systems emit varying degrees of radiation associated with electromagnetic fields, however, these emissions are within the accepted FCC limits that can be tolerated for electrical devices (NREL 2015). Research has found that amount of actual radiation from PV systems is typically so small as to be immeasurable above typical background radiofrequency noise. Because PV inverters use such a low switching frequency, multiple studies were unable to detect any radiated EMI from PV inverters (NREL 2015). Further research has shown that electromagnetic emissions from PV arrays produce extremely low-level frequency that is similar to electrical appliances and wiring (< 1 MegaHertz (frequency unit)). At a distance of 150 feet from a PV inverter, electromagnetic emissions were measured in intensity units at levels of 0.5 milligauss (mG) or less, frequently lower than background levels of <0.2mG already present in the environment (NREL 2015).

Emission levels of EMI from PV systems are at low risk of interfering with radar transmissions as the electromagnetic waves diminish over distances. Communication or telemetry equipment is unlikely to be affected by PV systems when setbacks of 250 to 500 feet are employed (NREL 2015).

Health and Safety

While PV systems generate electromagnetic fields (EMF), the EMF produced by electricity is defined as non-ionizing radiation (heat producing) but does not produce sufficient energy to damage DNA. EMFs weaken drastically with distance from the source. Therefore, adhering to project setbacks, any location outside of the fenced perimeter of a PV system would be sufficient to prevent exposure to significant EMF (NCCTC 2017).

The inverters in PV systems convert electricity matching the 60Hz frequency of the grid and household appliances. This is known as extremely low frequency (ELF) EMF. The strength of ELF EMF measured at the fence line of PV systems was 0.5 mG or less. For comparison, ELF EMF background levels are 0.2mG, and measured at 6 mG when standing approximately three feet from a refrigerator, and 50 mG when three feet from a standard household microwave (NCCTC 2017).

In addition, medical devices, such as pacemakers and implanted devices, are not affected by the EMF beyond a solar facility's fence. The EMF outside a solar facility's fence is less than 1/1000 of the level at which manufacturers test ELF EMF interference which is 1,000 mG (NCCTC 2017).

References

NCCTC (NC Clean Energy Technology Center). 2017. Health and Safety Impacts of Solar Photovoltaics.

NREL (National Renewable Energy Laboratory). 2015. Renewable Energy, Photovoltaic Systems Near Airfields: Electromagnetic Interference. <https://www.nrel.gov/docs/fy15osti/63310.pdf>

Wikipedia. 2020. "Electromagnetic interference". Last modified May 21, 2020.
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