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Biological Effects of Emissions from High Voltage Direct Current (HVDC) Power Lines

Recommendation by the German Commission on Radiological Protection, with scientific reasoning

– Excerpt –

Adopted at the 263rd meeting of the German Commission on Radiological Protection, on 12 September 2013

Introduction

The governmentally encouraged use of renewable energy sources as a result of the transformation of the energy system (*energy turnaround - Energiewende*) in Germany leads to long distances between the points at which electric power is generated and consumed. This presents a need to build new long-distance power transmission lines. High voltage direct current (HVDC) power lines are to be employed as a part of this grid expansion.

The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) requested the Commission on Radiological Protection (SSK) to supplement its previous statement on alternating voltage energy supply systems (SSK 2008) by providing an assessment of HVDC lines, especially of their constant electric and magnetic fields, in terms of radiation protection aspects with regard to human exposure. The SSK subsequently prepared the following recommendation. Deriving limit values is not a subject of this recommendation.

Recommendations

In view of the anticipated ambient levels of electric and magnetic fields generated by HVDC overhead power lines, and considering the prevailing regulatory gaps, the SSK makes the following recommendations:

- The SSK recommends that the constant electric fields of HVDC lines be limited with the goal of preventing health impairment or substantial discomfort, and that a weighted summation of the individual contributions be conducted in cases of simultaneous exposure to constant and alternating electric fields.
- Due to the limited data, notably with regard to the numbers of persons studied and the influences of cofactors such as ion density, it is not possible at present to derive reliable threshold values for perception, discomfort, pain and danger. The SSK therefore recommends that further research be conducted on perception, mainly in the form of human studies under well-controlled conditions.
- The SSK recommends that grid operators be requested to prevent possible secondary effects (such as electric shocks caused by discharges to or from conductive surfaces) by taking suitable corrective action, primarily with a focus on constructive measures.
- The SSK notes the need to protect individuals who carry magnetically activatable implants. For instance, in order to definitely ensure that no interference with cardiac pacemakers occurs, the SSK recommends that the magnetic flux density be limited to 500 µT.