



EMR Association of Australia Inc

Informing the community about electromagnetic radiation

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Electricity Undergrounding in NSW
Independent Pricing and Regulatory Tribunal of NSW
PO Box Q290
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To whom it may concern

The EMR Association of Australia would like to thank you for the opportunity to attend the public forum of 19 April and to submit comments regarding the *Interim Report to the Minister for Energy*.

The Association is concerned that the Report does not adequately the issue of electromagnetic radiation (EMR). Of the 39-page report itself, only two paragraphs (3.2.4) deal with the health implications of EMR. And neither of these addresses the concerns raised in several submissions. The document fails to acknowledge the need for a precautionary approach to installation so as to minimise emissions.

Appendix 9 makes the assumption that undergrounding cables will necessarily reduce public exposure. This is not always the case and will depend how and where cables are trenched. References provided in this section pertain to reviews that have found little connection between EMR and health risk and not from more recent data (such as the IARC Report) which have found a connection. The measurements provided in the appendix are from a high voltage line and are not applicable to the issue at hand.

The Association strongly believes that the Report to the Minister should be amended to include the following minimum statements:

- There is evidence that EMR may pose a risk to health.
- There is considerable community concern about this issue.
- There is a need for the State Government to implement the precautionary approach of reducing exposures when undergrounding cables.
- Some methods of undergrounding cables are more effective at reducing fields than others.

I encourage you to reconsider the issues raised in our previous submission (under the name of EMRAA) and attach it for your convenience. The Association would be happy to discuss the matter further with the State Government as the project proceeds.

Yours faithfully

Lyn McLean, 26 April 2002



Electromagnetic Radiation Alliance of Australia

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14 January 2002

Mr Thomas Parry
Chairman
Independent Pricing and Regulatory Tribunal
PO Box Q290
QVB Post Office
NSW 1230

Dear Mr Parry

IPART Review of the Costs, Benefits and Funding for Undergrounding Electricity Cables

EMRAA appreciates the opportunity to comment on the proposal to underground electricity cables in NSW.

By and large, EMRAA is supportive of the proposal in so far as it has obvious aesthetic and safety advantages.

However, undergrounding cables also has considerable implications for health, which we urge you to take into account.

As you would no doubt be aware, powerlines emit electromagnetic radiation (EMR; sometimes called fields) which consist of both an electric and a magnetic field. There is now a significant body of evidence that electromagnetic radiation from the power system is associated with a range of health problems including brain tumours, leukemia, cancer, heart problems, reproductive problems, problems with learning and performance, neurological problems, low immunity, neurodegenerative diseases, genetic damage and hormonal effects. Some studies showing this association are listed below.

Brain tumours

- Lin, Occup. Med., 27(6), pp. 413, 1985
- Savitz, Am. J. Epidemic. 128(1), pp. 21, 1988

- Juutilainen, Int. Arch. Occup. Environ. Health, 62(4), pp. 289, 1990
- Guenel, Am. J. Epidemiol. 144(12), pp. 1107, 1996
- Lai and Singh, Bioelectromagnetics, 18(2), pp. 156, 1997
- Thomas, J. Natl. Cancer Inst., 79(2), pp. 233, 1987
- Savitz, Am. J. Epidemiol. 141(2), pp. 123, 1995
- Fear, Br. J. Cancer 73(7), pp. 935, 1996

Leukemia

- Wertheimer and Leeper, Am. J. Epidemiol. 109(3), pp. 273, 1979
- Savitz, Am. J. Epidemiol. 128(1), pp. 21, 1998
- Coleman, Br. J. Cancer 60(5), pp. 793, 1989
- Juutilainen, Int. Arch. Occup. Environ. Health, 62(4), pp. 289, 1990
- London, Am J. Epidemiol. 134(9), pp. 923, 1991
- Feychting and Ahlbom, Am. J. Epidemiol. 138(7), pp. 467, 1993
- Fajardo-Gutierrez, Bol. Med. Hosp. Infant Mex. 50(1), pp. 32, 1993
- Matanoski, Am. J. Epidemiol. 137(6), pp. 609, 1993
- London, Am. J. Ind. Med. 26(1), pp. 47, 1994
- Theriault, Am. J. Epidemiol. 139(6), pp. 550, 1994
- Wertheimer, Bioelectromagnetics 16(2), pp. 86, 1995
- Miller, Am. J. Epidemiol. 144(2), pp. 150, 1996
- Michaelis, Cancer Causes Control 8(2), pp. 167, 1997
- Linet, New England J. Med. 337(1), pp. 1, 1997
- Feychting, Epidemiology 8(4), pp. 384, 1997
- Li, Epidemiology 8(1), pp. 25, 1997
- Li, J. Occup. Environ. Med. 40(2), pp. 144, 1998
- Wartenberg, Am. J. Public Health 88(12), pp. 1787, 1998
- Green, Int. J. Cancer 82(2), pp. 161, 1999
- Angelillo, Bulletin of WHO 77, pp. 906, 1999
- Greenland, Microwave News Sept. Oct, 1999
- Fear, Brit. J. Cancer 73(7), pp. 935, 1996
- Schüz, Int. J. Cancer, 5 March 2001
- Doll, *Electromagnetic Fields and the Risk of Cancer*, NRPB Report, vol 12 no. 1, 2001.

Breast Cancer

- Vena, Am. J. Epidemiol. 134(2), pp. 180, 1991
- Demers, Am. J. Epidemiol. 134(4), pp. 340, 1991
- Loomis, J. Natl. Cancer Inst. 86(12), pp. 921, 1994
- Coogan, Epidemiology 7(5), pp. 459, 1996

Heart problems

- Sastre, Bioelectromagnetics 19(2), pp. 98, 1998
- Savitz, Am. J. Epidemiol. 149(2), pp. 135, 1999

Miscarriages and birth defects

- Nordstrom, Bioelectromagnetics 4(1), pp. 91, 1983

- Spitz, Am. J. Epidemiol. 121(6), pp. 924, 1985
- Wertheimer, Bioelectromagnetics 7(1), pp. 13, 1986
- Wertheimer, Am. J. Epidemiol. 129(1), pp. 220, 1989
- Juutilainen, Bioelectromagnetics 14(3), pp. 229, 1993
- Li, Epidemiology 6(5), pp. 485, 1995
- Belanger, Epidemiology 9(1), pp. 36, 1998
- Blaasaas, BEMS abstract 12-5, 1999

Neurological problems

- Reichmanis, Physiol. Chem. Phys. 11(5), pp. 395, 1979
- Perry, Health Phys. 41(2), pp. 267, 1981
- Wolpaw, NY State Powerlines Project Scientific Advisory Panel, 1987
- Perry and Pearl, Public Health 102(1), pp. 11, 1988
- Perry, Public Health 103(3), pp. 177, 1989
- Poole, Am. J. Epidemiol. 137(3), pp. 318, 1993
- Baris, Occup. Environ. Med. 53(1), pp. 17, 1996
- Beale, Bioelectromagnetics 18(8), pp. 584, 1997
- Verkasalo, Am. J. Epidemiol. 146(12), pp. 1037, 1997
- Feychting, Scand. J. Work Environ. Health 24(1), pp. 46, 1998
- Bonhomme-Faivre, Arch. Environ. Health 53(2), pp. 87, 1998

Learning and performance

- Salzinger, NY State Powerlines Project Scientific Advisory Panel, 1987
- Lai, Bioelectromagnetics 17(6), pp. 494, 1996
- Lai, Bioelectromagnetics 19(2), pp. 117, 1998
- Sienkiewicz, Bioelectromagnetics, 19(2), pp. 79, 1998
- Kavaliers, J. Comp. Physiol. [A], 179(5), pp. 715, 1996
- Trimmel, Toxicol. Lett. 96, pp. 377, 1998

Neurodegenerative diseases

- Sobel, Am. J. Epidemiol. 142(5), pp. 515, 1995
- Sobel, Neurology 47(6), pp. 1477-81, 1996
- Sobel, Neurology 47(6), pp. 1594, 1996
- Schulte, Am. J. Public Health 86(9), pp. 1281, 1996
- Savitz, Archives Environ. Health 53(1-5), 1998
- Savitz, Epidemiology 9, pp. 398, 1998
- Feychting, Scand. J. Work Environ. Health 24(1), 1998
- Davanipour, Bioelectromagnetics 18(1), pp. 28, 1997
- Johansen, Am. J. Epidemiol. 148(4), 1998

Depression of immunity

- Lyle, Bioelectromagnetics 4(3), pp. 282, 1983
- Elekes, Bioelectromagnetics 17(3), pp. 246, 1996
- Mevissen, Carcinogenesis 17(5), pp. 903, 1996
- Bonhomme-Faivre, Arch. Environ. Health 53(2), pp. 87, 1998

Moreover, there is growing evidence that adverse health effects are experienced at very low levels of exposure, at levels that typical of everyday exposures, that are athermal (do not involve heating), and that are very much lower than those permitted by the Australian Guidelines of the NHMRC. For example, whereas the Australian Guidelines allow the public to be exposed to 1000 milligauss (mG), many studies have found an increase of childhood leukemia and other serious illnesses at exposures of 4 mG or less.

Studies showing problems at *very low* levels of exposure:

- Feychting and Ahlbom, 1993 (leukemia risk at 1 mG and above)
- Green, 1999 (leukemia risk at 1.4 mG and above)
- Greenland, 2000 (leukemia risk at 2 mG and above)
- Feychting, 1997 (leukemia risk at 2 mG and above)
- Linet, 1997 (leukemia risk at 3 mG or above)
- Tomenius, 1986 (cancer risk at 3 mG or above)
- Savitz, 1988 (cancer risk at 2 mG or above)
- Ahlbom, 2000 (double leukemia risk at 4 mG and above)
- Doll, 2001 (double leukemia risk at 4 mG and above)
- Schüz, 2001 (increased leukemia risk at 2 mG and above).

On the strength of the scientific literature, the International Agency for Research on Cancer (IARC) has recently classified magnetic fields from the power system as “possible carcinogens” (June 2001).

Over and beyond the scientific literature, there is a wealth of community experience of health problems from everyday levels of exposure to EMR – experience evidenced by EMRAA’s growing database of effects.

Undergrounding the powercables will not, as is sometimes thought, reduce the electromagnetic fields they emit. While it will eliminate the electric field, it will not reduce the magnetic field which travels through the earth. In fact, because the buried cables may be closer to the public than cables strung metres above ground level, it is possible that the public could be exposed to even greater fields than at present.

For example, the ground level magnetic field from a typical 415 volt suburban overhead power line would be approximately 5mG directly under the line. The same line placed underground with suitable insulation but without shielding would give a field at ground level of 20 to 50 milligauss. Undergrounding a high voltage line will produce a much higher magnetic field. A ground level magnetic field reading from an overhead high voltage powerline might be in the order of 80 mG. However, a Transgrid proposal to construct an underground high voltage cable from Picnic Point to the city projected a magnetic field of 400 mG directly above the cable.

These levels are well in excess of those levels at which health problems have been shown in the literature to occur.

The risk to health can, however, be avoided by undergrounding powerlines in such a way as to reduce the magnetic fields. This can be done by appropriately configuring the wiring and by using shielded materials.

In light of the growing evidence that associated electromagnetic fields from the power system with many health problems, EMRAA strongly submits that field-reducing techniques be factored into the undergrounding process. EMRAA would be happy to discuss this issue further and to assist with the planning process.

Yours faithfully

Lyn McLean
Secretary