

<b>COMPLAINT NUMBER</b>	19/206
<b>COMPLAINANT</b>	P Gainsford
<b>ADVERTISER</b>	5G Free New Zealand
<b>ADVERTISEMENT</b>	5G Free New Zealand Flyer
<b>DATE OF MEETING</b>	9 July 2019
<b>OUTCOME</b>	Upheld in part Advertisement to be Removed

### Description of Advertisement

The flyer for 5G Free NZ said: “over 200 scientists and physicians worldwide who have researched the biological and health effects of radio-frequency radiation have signed the 5G appeal, calling for a moratorium on the use of 5G technology”... “the radiation from small cells is not small”... “Independent science shows the type of radiation emitted by 5G and wireless technologies is capable of harming our health” ... “exposures to wireless radiation can increase cancer risk, alter brain development and damage sperm” The flyer also said “5G poses a threat to our wildlife” and “wireless radiation consumes mega amounts more energy than do wired options of communication.”

### Summary of the Complaint

The Complainant said the advertisement is misleading because nearly all of the factual claims are false, specifically the claims regarding:

- ‘over 200 scientists and physicians’
- ‘radiation from small cells is not small’
- non-ionising radiation is harmful
- 5G is a threat to wildlife
- the science is ‘independent’
- and the claim that wireless radiation consumes a large amount of power is an argument against mobile phones generally, not against 5G.

### Issues Raised

- Advocacy Advertising
- Truthful Presentation

### Summary of the Advertiser’s Response

The Advertiser defended the advertisement saying all the claims made are based on published science and actions taken by scientists. The Advertiser provided responses to each aspect of the complaint, as well as links to further information.

### Summary of the Complaints Board Decision

The Complaints Board upheld in part a complaint about a 5G Free New Zealand flyer distributed to households in a Wellington suburb. The Complaints Board said the Advertiser had not provided sufficient substantiation to support four of the six claims which were the subject of this complaint.

## Relevant ASA Codes of Practice

The Chair directed the Complaints Board to consider the complaint with reference to the following codes:

**Principle 2:** Advertisements must be truthful, balanced and not misleading.

**Rule 2(b): Truthful Presentation:** Advertisements must not mislead or be likely to mislead, deceive or confuse consumers, abuse their trust or exploit their lack of knowledge. This includes by implication, inaccuracy, ambiguity, exaggeration, unrealistic claim, omission false representation or otherwise. Obvious hyperbole identifiable as such is not considered to be misleading.

**Rule 2(e): Advocacy Advertising:** Advocacy advertising must clearly state the identity and position of the advertiser. Opinion in support of the advertiser's position must be clearly distinguishable from factual information. Factual information must be able to be substantiated.

## Relevant precedent decision

In considering this complaint the Complaints Board referred to a precedent decision, Decision 19/025, which was Upheld.

The full versions of this decision can be found on the ASA website:

<https://www.asa.co.nz/decisions/>

**Decision 19/025** concerned a pamphlet for EarthWaves "Electromagnetic field detection and remediation" which the Complaints Board agreed was misleading. The Complaints Board said while the advertisement raised serious concerns about the possible health effects that could result from exposure to EMFs (Electromagnetic Fields) the Advertiser had not provided enough substantiation to support all the claims that were made.

## Complaints Board Discussion

### *Consumer Takeout*

The Complaints Board agreed the consumer takeout of the advertisement was a warning about wireless technology, especially 5G, because it could be harmful to human health and the environment, and a significant number of scientists are concerned about it.

### *Is it advocacy advertising?*

The Complaints Board agreed the flyer was advocacy advertising and the identity and position of the Advertiser were sufficiently clear.

The Complaints Board noted however the flyer included links to the websites for several different organisations and the identity of the main advertiser, 5G Free New Zealand, could have been made clearer. The Complaints Board noted that the inclusion of these additional references enabled the interested consumer to access more information about the advertiser and this subject if they wished.

The Complaints Board referred to the ASA Guidance Note on Advocacy Advertising, which includes the following definition of Advocacy Advertising: "Advocacy advertising is often characterised by parties having differing views that are expressed in robust terms. This is especially so when there is proposed legislation or a referendum on an issue. Examples include abortion, fluoridation, immunisation and legalisation of marijuana. Government advertising on a range of health and safety initiatives are also likely to be advocacy advertising."

The Chair noted the requirements of Rule 2(e) of the Advertising Standards Code. This Rule requires the identity and position of the advertiser to be clear; opinion to be distinguished from factual information and factual information must be able to be substantiated.

The Advocacy Principles developed by the Complaints Board in previous decisions considered under Rule 11 of the Code of Ethics remain relevant. They state:

1. That Section 14 of the Bill of Rights Act 1990, in granting the right of freedom of expression, allows advertisers to impart information and opinions but that in exercising that right what was factual information and what was opinion, should be clearly distinguishable.
2. That the right of freedom of expression as stated in Section 14 is not absolute as there could be an infringement of other people's rights. Care should be taken to ensure that this does not occur.
3. That the Codes fetter the right granted by Section 14 to ensure there is fair play between all parties on controversial issues. Therefore, in advocacy advertising and particularly on political matters the spirit of the Code is more important than technical breaches. People have the right to express their views and this right should not be unduly or unreasonably restricted by Rules.
4. That robust debate in a democratic society is to be encouraged by the media and advertiser and that the Codes should be interpreted liberally to ensure fair play by the contestants.
5. That it is essential in all advocacy advertisements that the identity of the advertiser is clear.

### **Substantiating Absolute Claims**

The Complaints Board said it was appropriate for the public to have access to information about new technology and to have the opportunity to debate its wider implications and possible impact on consumers.

The Complaints Board agreed that wherever any claims are made, including claims about potential harm that could result from the use of new technology, these claims need to be adequately substantiated.

The Complaints Board referred to the ASA guidelines on "How to Respond to a Complaint Regarding Misleading Claims" which say: "If scientific claims are made... a full copy of the relevant scientific evidence/study should be provided and taken into account by the Complaints Board and not just the extract which supports the claim... While the Complaints Board is not an arbiter of scientific fact it will make an assessment as to whether the evidence applies and supports the advertised claim." The Secretariat provided a copy of the ASA guidelines to the Advertiser when they were asked to respond to the complaint.

### *Is the advertisement misleading?*

The Complaints Board considered each of the six statements complained of in turn:

#### **Statement 1**

"Over 200 scientists and physicians worldwide who have researched the biological and health effects of radio-frequency radiation have signed the 5G appeal, calling for a moratorium on the use of 5G technology"

The Complaints Board agreed the Advertiser had provided sufficient substantiation to support this statement and this aspect of the complaint was Not Upheld. The Complaints Board noted the Advertiser had provided a link to a document providing details about each of the scientists and physicians worldwide, who have signed the appeal.

**Statement 2**

'The radiation from small cells is not small'

A majority of the Complaints Board said the Advertiser had not provided sufficient substantiation to support this scientific claim and this aspect of the complaint was Upheld. The majority said the Advertiser had only provided an abstract in support of this claim, and not the full scientific study.

A minority disagreed. The minority said this statement is a low-level claim and as such it does not require further substantiation.

**Statement 3**

'Wireless antennas emit microwaves - non-ionising radiofrequency radiation – and essentially function as cell towers'

The Complaints Board agreed this aspect of the complaint was Upheld. The Complaints Board said this scientific claim implies that non-ionising radiation is harmful. The Advertiser had not however provided sufficient substantiation to support this implication. The Complaints Board said the Advertiser had only provided an abstract in support of this claim, and not the full scientific study.

**Statement 4**

'5G poses a threat to our wildlife, particularly bees, butterflies and other pollinators, and threatens biodiversity'

The Complaints Board agreed the Advertiser had not provided sufficient substantiation to support this scientific claim and this aspect of the complaint was Upheld. The Complaints Board said the Advertiser had only provided abstracts in support of this claim, and not the full scientific studies.

**Statement 5**

'Independent science shows the type of radiation emitted by 5G and wireless technologies is capable of harming our health'

The Complaints Board agreed the Advertiser had not provided sufficient substantiation to support this scientific claim and this aspect of the complaint was Upheld. The Complaints Board said the Advertiser had only provided abstracts in support of the claim, and not the full scientific studies.

**Statement 6**

'Wireless radiation consumes mega amounts more energy than do wired options of communication'

The Complaints Board agreed this aspect of the complaint was Not Upheld. The Complaints Board said the Complainant was not disputing whether wireless radiation consumes more energy than wired options of communication, as stated by the Advertiser. Instead, the Complainant was commenting on how the Advertiser might present their arguments, suggesting their opposition is to mobile phones per se, not just to 5G. The Complaints Board said it is up to the Advertiser to present their arguments in the way they choose, and this statement was not misleading.

The Complaints Board said taking into account context, medium and audience part of the advertisement and was in breach of Principle 2 and Rule 2(b) of the Advertising Standards Code.

**Outcome**

The Complaints Board ruled the complaint was **Upheld in part and Not Upheld in part.**

Advertisement to be removed.

**APPEAL INFORMATION**

According to the procedures of the Advertising Standards Complaints Board, all decisions are able to be appealed by any party to the complaint. Information on our Appeal process is on our website [www.asa.co.nz](http://www.asa.co.nz). Appeals must be made in writing via email or letter within 14 days of receipt of this decision.

## APPENDICES

1. Complaint
  2. Response from Advertiser
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### Appendix 1

#### COMPLAINT FROM P GAINSFORD

Nearly all of the purportedly factual claims in the flyer are false, and are designed to mislead the reader and promote an irrational approach to the topic.

- (1) the claim about 'over 200 scientists and physicians' is unsubstantiated.
- (2) the claim that 'radiation from small cells is not small' is outright false. It is extremely small - much smaller than the radiation from a banana, for example (which is also very small). And bananas emit ionising radiation, which is much more harmful. Even just in the same frequency band as 5g alone, the sun is responsible for about ten times more radiation - but this is not one of the frequency bands where sunlight can be harmful.
- (3) non-ionising radiation is harmless in any practical situation (unless you're a small animal inside a 2000 w microwave oven; cell phone towers emit about 1.6 w).
- (4) the 'independent science' claim is unsubstantiated.
- (5) the claim that 5g is a threat to wildlife is fiction.
- (6) the claim that wireless radiation consumes a large amount of power is an argument against mobile phones as a whole, not an argument against 5g.

#### CODES OF PRACTICE

##### ADVERTISING STANDARDS CODE

**Principle 2:** Advertisements must be truthful, balanced and not misleading.

**Rule 2(b): Truthful Presentation:** Advertisements must not mislead or be likely to mislead, deceive or confuse consumers, abuse their trust or exploit their lack of knowledge. This includes by implication, inaccuracy, ambiguity, exaggeration, unrealistic claim, omission false representation or otherwise. Obvious hyperbole identifiable as such is not considered to be misleading.

**Rule 2(e): Advocacy Advertising:** Advocacy advertising must clearly state the identity and position of the advertiser. Opinion in support of the advertiser's position must be clearly distinguishable from factual information. Factual information must be able to be substantiated.

### Appendix 2

#### RESPONSE FROM ADVERTISER, 5G FREE NEW ZEALAND

##### Response to Advertising Standards Authority Re 5G Flyer Complaint

All the claims noted in this flyer are based on published science and actions taken by scientists.

- 1) **Current International Appeals against 5G signed by international Scientists**

The [EMF Scientist Appeal](https://emfscientist.org/index.php/emf-scientist-appeal) was signed by 244 scientists in August 2018. It calls on the United Nations, WHO, UN Environmental Programme and UN member states to “address the global public health concerns related to exposure to cell phones, power lines, electrical appliances, wireless devices, wireless utility meters and wireless infrastructure in residential homes, schools, communities and businesses”.<https://emfscientist.org/index.php/emf-scientist-appeal>

The [5G Appeal](#) to the EU was [signed](#) by 213 scientists in December 2018. It calls for a moratorium on the roll-out of 5G, which it claims will “substantially increase the exposure to radio-frequency electromagnetic fields RF-EMF, which has been proven to be harmful to humans and the environment”.

The [5G Space Appeal](#) has been signed by over 26,000 people, mostly citizens but also scientists and organisations, and claims: “If the telecommunications industry’s plans for 5G come to fruition, no person, no animal, no bird, no insect and no plant on Earth will be able to avoid exposure, 24 hours a day, 365 days a year, to levels of RF radiation that are tens to hundreds of times greater than what exists today, without any possibility of escape anywhere on the planet. These 5G plans threaten to provoke serious, irreversible effects on humans and permanent damage to all of the Earth’s ecosystems.”

## **2) Science showing adverse health effects caused by radio frequency radiation used in wireless communication technologies such as 5G**

*Environ Pollut* 2018 Nov;242(Pt A):643-658. doi: 10.1016/j.envpol.2018.07.019. Epub 2018 Jul 6. “Thermal and non-thermal health effects of low intensity non-ionizing radiation: An international perspective.” Belpomme D1, Hardell L2, Belyaev I3, Burgio E4, Carpenter DO5.

### **Abstract**

Exposure to low frequency and radiofrequency electromagnetic fields at low intensities poses a significant health hazard that has not been adequately addressed by national and international organizations such as the World Health Organization. There is strong evidence that excessive exposure to mobile phone-frequencies over long periods of time increases the risk of brain cancer both in humans and animals. The mechanism(s) responsible include induction of reactive oxygen species, gene expression alteration and DNA damage through both epigenetic and genetic processes. In vivo and in vitro studies demonstrate adverse effects on male and female reproduction, almost certainly due to generation of reactive oxygen species. There is increasing evidence the exposures can result in neurobehavioral decrements and that some individuals develop a syndrome of "electro-hypersensitivity" or "microwave illness", which is one of several syndromes commonly categorized as "idiopathic environmental intolerance". While the symptoms are non-specific, new biochemical indicators and imaging techniques allow diagnosis that excludes the symptoms as being only psychosomatic. Unfortunately standards set by most national and international bodies are not protective of human health. This is a particular concern in children, given the rapid expansion of use of wireless technologies, the greater susceptibility of the developing nervous system, the hyperconductivity of their brain tissue, the greater penetration of radiofrequency radiation relative to head size and their potential for a longer lifetime exposure.

<https://www.ncbi.nlm.nih.gov/pubmed/30025338>

## **3) The claims made in this flyer are based on the findings of independent science showing 68% of 2,266 studies examining the effects of man made non ionising radiation found harmful biological effects.**

“At the [Oceania Radiofrequency Scientific Advisory Association](#), an independent scientific organisation, volunteering scientists have constructed the world's largest categorised online database of peer-reviewed studies on radiofrequency electromagnetic radiation and other man-made [electromagnetic fields](#) of lower frequencies. A recent evaluation of 2266 studies (including in-vitro and in-vivo studies in human, animal, and plant experimental systems and population studies) found that most studies (n=1546, 68.2%) have demonstrated significant biological or health effects associated with exposure to anthropogenic electromagnetic fields. We have published our preliminary data on radiofrequency electromagnetic radiation, which shows that 89% (216 of 242) of [experimental studies](#) that investigated [oxidative stress](#) endpoints showed significant effects.<sup>7</sup> This weight of scientific evidence refutes the prominent claim that the deployment of wireless technologies poses no health risks at the currently permitted non-thermal radiofrequency exposure levels.”

Ref: <https://www.sciencedirect.com/science/article/pii/S2542519618302213?via%3Dihub>

As the paper below, by Huss et al, rightly concludes “The interpretation of results from studies of health effects of radiofrequency radiation should take sponsorship into account.” Industry-funded research are much less inclined to find health hazards than research with other sources of funding.

[Environ Health Perspect](#). 2007 Jan; 115(1): 1–4.

Published online 2006 Sep 15. doi: [10.1289/ehp.9149](https://doi.org/10.1289/ehp.9149)

PMCID: PMC1797826

PMID: [17366811](https://pubmed.ncbi.nlm.nih.gov/17366811/)

“Source of Funding and Results of Studies of Health Effects of Mobile Phone Use: Systematic Review of Experimental Studies”

Anke Huss,<sup>1</sup> Matthias Egger,<sup>1,2</sup> Kerstin Hug,<sup>3</sup> Karin Huwiler-Müntener,<sup>1</sup> and Martin Röösli<sup>1</sup>

## Abstract

### Objectives

There is concern regarding the possible health effects of cellular telephone use. We examined whether the source of funding of studies of the effects of low-level radiofrequency radiation is associated with the results of studies. We conducted a systematic review of studies of controlled exposure to radiofrequency radiation with health-related outcomes (electroencephalogram, cognitive or cardiovascular function, hormone levels, symptoms, and subjective well-being).

### Data sources

We searched EMBASE, Medline, and a specialist database in February 2005 and scrutinized reference lists from relevant publications.

### Data extraction

Data on the source of funding, study design, methodologic quality, and other study characteristics were extracted. The primary outcome was the reporting of at least one



statistically significant association between the exposure and a health-related outcome. Data were analyzed using logistic regression models.

#### Data synthesis

Of 59 studies, 12 (20%) were funded exclusively by the telecommunications industry, 11 (19%) were funded by public agencies or charities, 14 (24%) had mixed funding (including industry), and in 22 (37%) the source of funding was not reported. Studies funded exclusively by industry reported the largest number of outcomes, but were least likely to report a statistically significant result: The odds ratio was 0.11 (95% confidence interval, 0.02–0.78), compared with studies funded by public agencies or charities. This finding was not materially altered in analyses adjusted for the number of outcomes reported, study quality, and other factors.

#### Conclusion

Conclusions: The interpretation of results from studies of health effects of radiofrequency radiation should take sponsorship into account.

Ref: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1797826/>

#### 4) This radiation isn't small

The 5G super grid requires new radio frequencies in addition to those used by 2G, 3G & 4G.

Higher frequencies, between 10 and 300 GHz need more testing as evidenced in in this scientific article published in *Health Physics* whose scientists found radiation above 10 GHz may cause tissue damage from acute heating – the one health hazard everyone agrees on – because the energy comes in millisecond bursts.

“The results also show that the peak-to-average ratio of 1,000 tolerated by the International Council on Non-Ionizing Radiation Protection guidelines may lead to permanent tissue damage after even short exposures, highlighting the importance of revisiting existing exposure guidelines.”

“Systematic Derivation of Safety Limits for Time-Varying 5G Radiofrequency Exposure Based on Analytical Models and Thermal Dose”

Neufeld, Esra<sup>1</sup>; Kuster, Niels<sup>1,2</sup>

*Health Physics*: December 2018 - Volume 115 - Issue 6 - p 705–711

Extreme broadband wireless devices operating above 10 GHz may transmit data in bursts of a few milliseconds to seconds. Even though the time- and area-averaged power density values remain within the acceptable safety limits for continuous exposure, these bursts may lead to short temperature spikes in the skin of exposed people. In this paper, a novel analytical approach to pulsed heating is developed and applied to assess the peak-to-average temperature ratio as a function of the pulse fraction  $\alpha$  (relative to the averaging time [INCREMENT]T; it corresponds to the inverse of the peak-to-average ratio). This has been analyzed for two different perfusion-related thermal time constants ( $\tau_1 = 100$  s and 500 s) corresponding to plane-wave and localized exposures. To allow for peak temperatures that considerably exceed the 1 K increase, the CEM43 tissue damage model, with an experimental-data-based damage threshold for human skin of 600 min, is used to allow large

temperature oscillations that remain below the level at which tissue damage occurs. To stay consistent with the current safety guidelines, safety factors of 10 for occupational exposure and 50 for the general public were applied. The model assumptions and limitations (e.g., employed thermal and tissue damage models, homogeneous skin, consideration of localized exposure by a modified time constant) are discussed in detail. The results demonstrate that the maximum averaging time, based on the assumption of a thermal time constant of 100 s, is 240 s if the maximum local temperature increase for continuous-wave exposure is limited to 1 K and  $\alpha \geq 0.1$ . For a very low peak-to-average ratio of 100 ( $\alpha \geq 0.01$ ), it decreases to only 30 s. The results also show that the peak-to-average ratio of 1,000 tolerated by the International Council on Non-Ionizing Radiation Protection guidelines may lead to permanent tissue damage after even short exposures, highlighting the importance of revisiting existing exposure guidelines.

Ref:

[https://journals.lww.com/health-physics/Abstract/2018/12000/Systematic\\_Derivation\\_of\\_Safety\\_Limits\\_for.17.aspx](https://journals.lww.com/health-physics/Abstract/2018/12000/Systematic_Derivation_of_Safety_Limits_for.17.aspx)

### 5) Science showing wireless radiation is a threat to wildlife

This is sourced from the website of the Environmental Health Trust:

<https://ehtrust.org/science/bees-butterflies-wildlife-research-electromagnetic-fields-environment/>

Please view this link for more studies finding bio-effects from man made non ionising radiation.

Balmori, Alfonso. [“Anthropogenic radiofrequency electromagnetic fields as an emerging threat to wildlife orientation.”](#) *Science of The Total Environment*, vol. 518–519, 2015, pp. 58–60

- The growth of wireless telecommunication technologies causes increased electrosmog. Radio frequency fields in the MHz range disrupt insect and bird orientation.
- Radio frequency noise interferes with the primary process of magnetoreception. Existing guidelines do not adequately protect wildlife. Further research in this area is urgent.

Ref: <https://www.sciencedirect.com/science/article/pii/S0048969715002296>

Cucurachi, C., et al. [“A review of the ecological effects of radiofrequency electromagnetic fields \(RF-EMF\).”](#) *Environment International*, vol. 51, 2013, pp. 116–40.

- A Review of 113 studies from original peer-reviewed publications. RF-EMF had a significant effect on birds, insects, other vertebrates, other organisms and plants in 70% of the studies. Development and reproduction of birds and insects are the most strongly affected endpoints.

Ref: <https://www.sciencedirect.com/science/article/pii/S0160412012002334>

Balmori, A. [“Electrosmog and species conservation.”](#) *Science of the Total Environment*, vol. 496, 2014, pp. 314-6.

- “Conclusion: At the present time, there are reasonable grounds for believing that microwave radiation constitutes an environmental and health hazard....Concerning the exposure to electromagnetic fields, the precautionary principle is needed and should be applied to protect species from environmental non-thermal effects (Zinelis, 2010). Controls must be introduced and technology rendered safe to the environment, since this new ubiquitous and invisible pollutant could deplete the efforts devoted to species conservation.”

Ref: <https://www.sciencedirect.com/science/article/pii/S0048969714010912>

Manville, Albert M. [“A BRIEFING MEMORANDUM: What We Know, Can Infer, and Don’t Yet Know about Impacts from Thermal and Non-thermal Non-ionizing Radiation to Birds and Other Wildlife.”](#) *Wildlife and Habitat Conservation Solutions*, 2014.

- “In summary, we need to better understand ... how to address these growing and poorly understood radiation impacts to migratory birds, bees, bats, and myriad other wildlife. At present, given industry and agency intransigence ... massive amounts of money being spent to prevent addressing impacts from non-thermal radiation — not unlike the battles over tobacco and smoking — and a lack of significant, dedicated and reliable funding to advance independent field studies, ... we are left with few options. Currently, other than to proceed using the precautionary approach and keep emissions as low as reasonably achievable, we are at loggerheads in advancing meaningful guidelines, policies and regulations that address non-thermal effects....”

**EKLIPSE REPORT**, an EU-funded review body dedicated to policy that may impact biodiversity and the ecosystem, looked over 97 studies on how electromagnetic radiation may affect the environment. It concluded this radiation could indeed pose a potential risk to bird and insect orientation and plant health. [EKLIPSE REPORT WEBPAGE](#)

- Malkemper EP, Tscheulin T, VanBergen AJ, Vian A, Balian E, Goudeseune L (2018). [The impacts of artificial Electromagnetic Radiation on wildlife \(flora and fauna\). Current knowledge overview: a background document to the web conference.](#) A report of the EKLIPSE project.
- Goudeseune L, Balian E, Ventocilla J (2018). [The impacts of artificial Electromagnetic Radiation on wildlife \(flora and fauna\). Report of the web conference. A report of the EKLIPSE project.](#) <http://bit.ly/EKLIPSEconfreport>

A 2018 paper that specifically analyses risks to insects from radio frequency radiation in the 2 – 120 GHz range (which encompasses frequencies that telecommunications companies want to use for 5G) may be read at this link: <https://www.nature.com/articles/s41598-018-22271-3>

## **6) Energy consumption of the cellular network infrastructure as a whole will increase when 5G is introduced.**

Wireless technology’s high energy consumption is an environmental problem. The deputy director of Melbourne’s Centre for Energy Efficient Telecommunications, Dr Kerry Hinton, says “It’s the modern way but wireless is an energy monster, it’s just inherently inefficient”.<sup>7</sup>

Their recent report ‘The Power of Wireless Cloud’ estimates “the energy use required to power the cloud and wireless networks will grow up to 460 per cent – the equivalent of putting 4.9 million new cars on the road.”

<https://ceet.unimelb.edu.au/news/media/2013-04-09/>

<https://ehtrust.org/science/reports-on-power-consumption-and-increasing-energy-use-of-wireless-systems-and-digital-ecosystem/>