Last Name	First name	Organisation/company	E-mail	Country	Please specify	Table of contents	Please indicate the line numbers of the text on which you comment, if appropriate	Please upload your file (max. 1MB per file)	Read the Privacy Statement: https://health.ec.europa.eu/document/download/5ed36750-a2c9-4c3c-affc-7fc26df3f9ee_en	SCHEER Response
ingham	katy		dewdropsonroses@protonmail.com	United Kingdom		4.2 Background	p8 35-39 This paragraph suggests that severe impairment cannot be caused by exposure to RF radiation. However, the causal link has been established in legal cases and there have now been four tribunal wins in UK courts as a result, with the decision based on medical evidence. These tribunal cases can be seen here: https://phiremedical.org		I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment. The SCHEER disagrees with your comment that a causal link can be established in a court of law.
Schriver	Pernille	Europeans for Safe Connections	stop5geci@protonmail.com	Denmark		5.3.1 Neoplastic diseases	Neoplasia Epidemiologic studies SCHEER quotes a range of meta-analysis regarding the association between mobile phone exposure and brain tumors that show an increased risk of brain tumors related to long-term use (> 10 years). Since induction time for brain tumours can be long, the results on long term exposure are the most relevant aspect in assessments of health risks – not results from short term exposure. But SCHEER ignores to highlight this fact. Also it is ignored, that because the exposure is mainly associated with specific tumor types (glioma and acoustic neoroma), studies that include all tumor types are less informative. SCHEER reference meta-analysis by Prasad (2017), Wang and Gou (2016), Yang et al (2017), and Bortkiewicz et al. (2017), all finding significant higher risk of glioma risk from long term exposure to mobile phone use. SCHEER also quote a meta-analysis by Wang (2018), that found a significant association with risk of glioma in long-term users		I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment. The SCHEER has amended the text to make clear the rationale for reaching its conclusion on neoplastic diseases according to its "Memorandum on weight of evidence and uncertainties". https://health.ec.europa.eu/system/files/2019-02/scheer_o_014_0.pdf

							(>10 years) with odds ratio of 1.33 (95% 50 CI 1.05-1.67). Nevertheless, SCHEER imply that the study shows no risk, based on the study's result on the criterion "ever using a mobile phone", thus violating the stated evaluation criteria. The meta-analysis by Choi et al. (2020) reported that "all studies reporting cumulative call times greater than 1000 h, cellular phone use with cumulative call time greater than 1000 h increased the risk of tumors by 60%." The conclusion was that studies so far show: "significant evidence linking cellular phone use to increased tumor risk, especially among cell phone users with cumulative cell phone use of 1000 or more hours in their lifetime, and especially among studies that employed high quality methods." Here again SCHEER displays a striking bias claiming that the Choi et al. study "triggered significant criticism" without reference. Even though SCHEER points to the importance of using objective data on exposure (p.16), they fail to report data from the CEFALO study on children (referenced in section om ICNIRP, concluding "The only study available on mobile phone use in children and brain tumor risk showed no increased risk of brain tumors.", but this interpretation is false. The CEFALO study comprised a data from 4 countries (Aydin et al.2011b), mostly recall data. The data from one country providing exact operator data on the children's use of mobile phones showed significant risk of glioblastoma, correlating quantitatively with the use of mobile phones. Despite the comprehensive number of studies and data that consistently shows increased risk of brain tumours in the most relevant exposure group, the long-term exposure group, SCHEER choose to conclude that there would be "uncertain to weak evidence" that exposure to RF increases the risk of neoplastic diseases. In this manner, SCHEER downplay the findings of the vast majority of the meta-analysis showing that long-time relevant exposure is consistently associated with glioma. Evaluating these together with studies on short-term exposure is misleading.			

ingham	katy		dewdropsonroses@protonmail.com	United Kingdom		4.2 Background	p 8 16-23 It is incorrect to state that correlations with cancer have not been established. The National Toxicology Program study found 'clear evidence' of heart tumours which are not mentioned in this paragraph. This is a major and worrying omission. Furthermore, the NTP study found evidence of brain and adrenal tumours. https://ntp.niehs.nih.gov/whatwestudy/topics/cellphones/index.html The findings of this major and authoritative study have been supported by the Ramazzini Cancer Research Institute study led by Belpoggi et al. Furthermore, the epidemiological literature shows an increase in aggressive brain gliomas in the general population, particularly in younger people. https://ehtrust.org/scientific-documentation-cell-phone-radiation-associated-brain-tumor-rates-rising/		I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment. The paragraph you are commenting refers to the previous (SCENIHR) opinion. In the current opinion both animal studies (NTP, Ramazzini Institute) are described in detail in §5.3.1.2 “In vivo studies”.
Schriver	Pernille	Europeans for Safe connections	stop5geci@protonmail.com	Denmark		1.1 Background	Introduction This SCHEER report has by design a predetermined outcome in favor of the telecommunications industry’s needs of continued adherence to ICNIRP’s guidelines. The SCHEER working group has conflicts of interest and is unbalanced as to the selection of its members. The SHEER Opinion fails to include any of the many scientific experts who agree that there is sufficient evidence of health risks well below ICNIRP’s guidelines. Thereby obstructing decisions to adopt much lower limits for better protection of the public and the environment. SCHEER’s so-called "assessment" is of low quality and fails to meet basic scientific criteria. Furthermore, SCHEER completely ignores to do risk assessment for the environment. The SCHEER Opinion mixes risk assessments and risk management The task for the SCHEER group is to ”Assist the Commission in the preparation of legislative proposals and policy initiatives”. Thus, SCHEER is part of the political system and the main task of SCHEER is to assist in risk management. The European Environmental Agency (EEA) was established in the ´90s due to the acknowledgment that a clear distinction between the European political system (responsible for risk management) and the organisation, providing the scientific risk assessment, is crucial. The main task of the EEA is to provide sound, independent information on the environment and related public health,	Scheer_letter_final_version.pdf	I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. This is a general comment outside the scope of the public consultation. Rules about conflict of interest of members of the committees and experts in the working groups are described in the rules of procedures of the Scientific Committees which are available on the website.

							including scientific risk assessments. The basis and motives behind the judgments that are fundamental in the assessment of risk and the handling of uncertainty, is a major contentious area. Therefore, it is a main obligation for the EEA to ensure that the scientific assessors are not disqualified due to political and economic interests. However, according to the Rules of Procedure from 2016 for the scientific committees under the EU Commission, SCHEER may perform risk assessments. In that case, "The Scientific Committees shall perform their tasks in compliance with the principles of excellence, independence, confidentiality, commitment and transparency". The present SCHEER report comprises both an opinion (risk management) and an assessment of the science, which is in clear conflict with the principle of a clear distinction of risk assessment and risk management. It also fails regarding both excellence and independence. As RF EMF is an emerging hazard, with huge amounts of scientific evidence for adverse effects, the SCHEER committee should refer to the EEA to perform the independent risk assessment of the science, as a tool for the subsequent risk management process. In conclusion - As the SCHEER report fails in regard to both excellence, transparency and independence, - As the conclusion from other EU bodies are in disagreement, - As the risk to both the environment and human health should be assessed, a scientific assessment and risk assessment should be performed by the relevant EU body, The European Environmental Agency. Scientific evidence shows that RF EMF causes chronic oxidative stress, hormonal alteration, fertility problems, opening of the blood brain barrier, DNA damage, cognitive and behavioral alterations and many other biological alterations that causes problems to human health and to nature. Several groups of scientists launched appeals and consensuses to push political decisions for better protection of the population, the animals and plants from RF EMF damages. Independent science must be included because the RF EMF damages are already increasing the health care cost. The employment of 5G is a clear example of the failure of the process of scientific risk assessment and risk management.			

							Read more in attached document and see who signed this comment.			
Schriver	Pernille	Europeans for Safe Connection	stop5geci@protonmail.com	Denmark		5.3.3 Symptoms	"Symptoms" The conculsion regarding EHS, the SCHEER concludes "the results from multiple double-blind provocation studies gave a strong overall weight of evidence that such effects are not caused by RF exposure", which is unscientific and misleading, even according to the criteria set by SCHEER. SCHEER ignores 1) that the provocation studies referenced by SCHENIR fail to show associations due to errors in the design, and should be discarded. 2) there are well-conducted blinded and double blinded provocation studies using objective response criteria showing an association between RF-EMR exposure and EHS. 3) that objective clicinal parameters for diagnosis of EHS have been identified. These include both parasympathic responses, biochemical parameters and imaging. (Consensus report, Belpommes et al 2021) 4) SCHEER fail to mention most of the recent systematic reviews, as well as the provocation studies showing effect based on objective criteria. Ad1: The fact that most of the provocation studies are flawed and deemed to fail by design has been documented in several reviews. Belpommes and Irigaray (2022) supports that the vast majority of the provocation studies are deemed to fail due to the design, listing typical error (Table 3: Lack of precise inclusion criteria, No objective criteria based on molecular biomarkers and imaging techniques, No clear consideration on medical anamnesis and degree of EHS severity; No consideration that EHS patients are intolerant to specific man-made EMF frequencies; Too short exposure duration; Symptom recording too early; Subjective Endpoint criteria; Possible significant EMF levels during sham exposure, a.o.) Leszczynski (2021) "It is time to drop out psychology driven provocation studies that ask about feelings-based non-specific symptoms experienced by volunteers under EMF exposure. Such research approach produces only subjective and therefore highly unreliable data that is insufficient to prove, or to disprove, causality link between EHS and EMF " SCHEER is unable to	Belpomme_2021.pdf; Dominique_Belpomme_et_al_2022.docx	I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. The literature referenced in the comment that meets those selection criteria has already been included in the opinion.

							refute this conclusion, but merely ignores the fact in the opinion. Ad 2: SCHEER conclude that “future research should always include objective measures (physical/biochemical/biological markers) of the response to EMF exposuretogether with other types of psychological measures or subjective reports. ” but fail to acknowledge that such studies are allready publised: Provocation studies based on objective criteria have evidenced an association between EHS and EMR exposure (Belpommes and Irigaray, 2022). The applied objective criteria comprises: Pupillary light reflex; Attention, perception and memory tests; Reduced performance of visual attention and perception; Sleep EEG; HRV; RBC clumping; capillary blood flow; SEP; ECG and EMG. Regaring pathofysiology Belpommes and Irigaray (2022) summarize“many EHS patients are characterized by possible low grade inflammation, nitroso-oxidative stress, BBB disruption/opening and brain neurotransmitter changes; all which have been shown in laboratory animals by different independent studies to be caused by man-made EMF exposure.” There is no valid evidence that EHS is a nocobo or placebo effects. Belpommes and Irigaray (2022): “while due to the use of incorrect methodology in EHS suffering patients [.....] Therefore negative provocation studies definitely cannot exclude a causal role of EMFs in EHS patients”. “EHS cannot be considered to originate from a nocebo effect i.e. be a psychiatric disease; due to the findings showing its association with somatic abnormalities such as low grade inflammation, OS, and consequent disruption/opening BBB as well as in some cases with anti-myelin Po autoimmune response. EHS should be therefore considered a somatic disease.”			
Ingha	katy		dewdropsonroses@protonmail.com	United Kingdom		ABSTRACT	p7 lines 10-12. Adverse health effects below current limits are very well established in the scientific literature and for the SCHEER to claim not to have identified them is unacceptable. Compilations of these studies can be seen on the physicians' website, bioinitiative.org, on the website of ehtrust.org, and at phiremedical.org as well as in the peer-reviewed medical and scientific literature. PHIRE medical has also published on its website a consensus statement from medical professionals. p 7 lines 22-23 Guidelines from the ICNIRP are not fit for purpose as the ICNIRP does not acknowledge or study biological effects but sets its guidelines according to thermal effects only, which occur only at exceptionally high levels of radiation. As shown by radiation scientists in this 2022 article in PubMed, the ICNIRP opinion	pubmed-35751553.txt	I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate according to its “Memorandum on weight of evidence and uncertainties”. https://health.ec.europa.eu/system/files/2019-02/scheer_o_014_0.pdf The SCHEER is independent from ICNIRP and formulates its own scientific opinions.

							contrasts with the majority of research findings https://pubmed.ncbi.nlm.nih.gov/35751553/			
Nyberg	Rainer	Abo Akademi University (retired)	NRNyberg@abo.fi	Finland		ABSTRACT	Lines 7-9 In the Abstract it is stated that SCHEER could not identify moderate or strong level of evidence for adverse health effects from cronic or acute RF EMF exposure at levels below the limits set in the annexes... Which honest sciedntists can state that when there are thousands of research reports, which prove adverse effects? Based on those studies lots of reviews have proven the opposite for example BioInitiative reports and other large reveiews show that depending on "endpoints /symptoms" the majority of ALL studies that is 65-90% of ALL studies show adverse effects on insects, animals, humans and especiallly children. Also in the EU Parliamentary Research studies for example Belpoggi the same shown. Belpoggi makes the following conclusions: 6.1.2 There is sufficient evidence in experimental animals for the carcinogenicity of radiofrequency radiation. 6.1.3 There is sufficient evidence of adverse effects on the fertility of men. There is limited evidence of adverse effects on fertility in women. There is limited evidence on developmental effects in offspring of mothers who were heavy users of mobile phones during pregnancy. 6.1.4 There is sufficient evidence of adverse effects on male rat and mouse fertility. There is limited evidence of adverse effects on female mouse fertility. There is limited evidence of adverse effects on the development in offspring of rats and mice exposed during embryo life. 6.3.2 FR1 (450 to 6000 MHz): These frequencies clearly affect male fertility. These frequencies possibly affect female fertility. They possibly have adverse effects on the development of embryos, foetuses and newborns. Why should the EU commission, the EU Council and the EU Parliament trust a "Preliminary Opinion" when it starts by claiming in the Abstracts that no adverse effects from cronic or acute EMF have been found when thousands of research reports (Bioinitiative Research summaries) and over 100 research reviews (Study overview EMF-Data) have documented adverse effects also at levels more than a million times lower than the current guidelines? (Bioinitiative Color-charts)	Belpoggi-EU-5G.-445K.pdf;BioInitiativeReport-RF-Color-Charts.pdf;Bioinitiative_Research_summaries.pdf;Study_overview_-_emfdata.org.pdf	I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence assessed following a quality evaluation.

Schriver	Pernille	Europeans for Safe Technology	stop5geci@protonmail.com	Denmark		5.3.4 Other health effects	Cardiovascular diseases The SCHEER's opinion that there is "strong evidence for a lack of effects" on the cardiovascular system is unscientific, misleading, and in contradiction to the applied methodology for weight of evidence. There is indeed conflicting evidence showing adverse cardiovascular effects from both long term and short-term exposure, which invalidates the conclusion of "strong evidence for a lack of effects". SCHEER refers to one meta-analysis on effects of 900 Mhz, and one review report from the Health Council of the Netherlands, including effects from exposure to 700 – 2200 MHz on humans. The SCHEER considered no animal studies or studies on exposure to other frequencies. Geronikoulou et al., excluded 25 more studies, which should be investigated evidence for cardiovascular effects. The Dutch report referenced 3 studies showing adverse effects, while twenty (20) studies were excluded (Table 20), and 11 of the excluded studies show adverse effects on the cardiovascular system. The meta-analysis (Geronikoulou et al., 2020) included 4 studies, investigating only the effect of vagal suppression on the heart rate variability (HRV) from up to minutes of exposure to mobile phone up to 35 minutes. It is misleading to conclude that this is evidence for "no-effect" as effects on HRV in healthy subjects cannot be expected in studies using short exposures SCHEER also ignored a recent meta-analysis indicating that mobile phone exposure is associated with cardiovascular changes in adults and fetal heart rate variability during pregnancy (Jarrah and Bandara, 2016). Reproductive and Developmental effects SCHEER's conclusion is that the "weight of evidence for reproduction and development effects is uncertain". SCHEER include in their weighing of evidence a meta-analysis that included 18 papers (Kim et al. 2021) but the conclusion of the referred paper is omitted by SCHEER and in stark contrast to SCHEER: "Accumulated data from in vivo studies show that mobile phone usage is harmful to sperm quality." Instead SCHEER raises doubt over the paper arguing that "many of the studies did not provide adequate information on dosimetry" and that "at least one study" (of 18) was excluded by SCENIHR, without explaining what adequate information on dosimetry is. It is unscientific to use the criterion "inadequate dosimetry" rigorously to discard studies, because this report focus on hazard identification (establishing a causal relationship), it is not on dose-response determination. In hazard identification, it is important that the exposure is relevant and sufficient in the exposure group.	Geronikoloou.pdf;Health_impact_5G_STOA_and_Panagopoulus_2019.pdf;Jarrah.pdf;Misek_et_all_2019.pdf;Usman_et_al_2020.pdf	I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The text has been amended accordingly. Thank you for the comment. The SCHEER believes that detailed description and reproducibility of the exposure parameters (dosimetry) are a basic

							It is important the exposure mimics real-life exposures regarding the quality and duration of the exposure, eg a mobile phone in speak mode will suffice. SCHEER has not included a relevant scientific review from Panagopoulos (2021), which demonstrates adverse effects to germ cells from modulated (non-sinusoidal) RF EMR. Furthermore, the consistent evidence showing that RF-EMR from telecommunication devices causes oxidative stress and DNA damage, corroborates the detrimental effects to germ cells (see our comment to section on oxidative stress and genotoxic effects). In a scientific review of the available evidence for the EPRS, European Parliamentary Research Service in 2021, the scientist's conclusion is in stark contrast to SCHEER's on reproductive anddevelopmental effects: "(450 to 6 000 MHz): these frequencies clearly affect male fertility and possibly female fertility too". SCHEER ignore this review and it's conclusion although one of its author's, Fiorella Belpoggi, is listed as a contributor to the SCHEER report. Health impact of 5G European Parliamentary Research Service Scientific Foresight Unit (STOA) July 2021			requirement for evaluating the quality of evidence used for risk assessment.
Polichetti	Alessandro	National Center for Radiation Protection and	alessandro.polichetti@iss.it	Italy		5.1.1 Wireless communication technologies	In section 5.1.1.2 "Dosimetry in epidemiological studies", summarizing the studies about dosimetry in epidemiological studies published since the SCENIHR Opinion of 2015, the paper "Estimation of RF and ELF dose by anatomical location in the brain from wireless phones in the MOBI-Kids study" by Calderón et al. (2022) (https://doi.org/10.1016/j.envint.2022.107189) could be taken into account. The above mentioned paper describes the method used to assess the localised RF and ELF dose arising from the use of mobile (cellular) and DECT (cordless) phones in the MOBI-Kids study, the results of which are described in the paper by Castaño-Vinyals et al. (2022) that in another comment I have also proposed to cite and discuss. Minor observations: Page 15, lines 38-39: "Aydin et al., 2011a" should be "Aydin et al., 2011", because just one paper by Aydin et al. is listed in the Reference section. On the contrary, "Vrijheid et al., 2006a, Vrijheid et al., 2006b" is correct, but I suggest to add the distinction between 2006a and 2006b in the two references reported in the Reference section.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The text has been amended.

Schriver	Pernille	Europeans for Safe Connections	stop5g@protonmail.com	Denmark		5.3.2 Neurological and neurobehavioural effects	Neurological and neurobehavioural effects SCHEER refer to only one epidemiological study investigating effects of RF radiation on neurodegenerative diseases. This study (Luna et al. 2019) showed a significant increased risk (1.78) of ALS for the group exposed to the highest levels of radiation from mobile phone masts. SCHEER refers to the Health Council of the Netherlands report which however excluded a study from Brasil (Silva et al 2004) on military personnel. The study reported that for radar operators, exposed to RF within the scope of SCHEER's evaluation, "nervous system diseases were six times more frequent than in other occupations." There are several studies showing that RF is a risk for neurodegenerative diseases. These findings are supported by many animal studies that show harmful effects on the brain that can lead to neurodegenerative diseases. A recent article by Nyberg et al. conclude that the scientific evidence from two major compilations of studies on biological effects of RF radiation show that biological effects occur far below ICNIRP limits: "These effects can lead to adverse health outcomes such as cancer, sleep disorders, anxiety and depression, chronic fatigue, respiratory issues, autoimmune disease, heart disease, neurodegeneration and issues with reproduction." A compilation of studies by Dr Henry Lai available at the Bioinitiative Group webpage show that the majority of studies or 73 % published since 2007 show significant neurological effects (244 of 335 studies). SCHEER conclude that effects related to neurodegeneration following exposure to the frequency range of 700-2200 MHz "are possible." The same conclusion was also reached by Health Council of the Netherlands. Effects on EEG, behavior and sleep A clear majority of effects on neurotransmission shows adverse effects. According to the Health Council of the Netherlands "A decrease in neurotransmission in nerves and brain tissue will have adverse consequences for brain function and therefore for the functioning of the body." The analysis of the Health Council of the Netherlands show a clear majority of studies report unfavorable effects on neurotransmission. The Dutch report conclude that an effect "is possible". However the report referred to by SCHEER misinterpret 8 studies as showing unclear or favourable effects on neurotransmission	Reviews_on_Environmental_Health_-_Nyberg_et_al._2022.pdf; Silva_2004.pdf	I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence assessed following a quality evaluation. The SCHEER cannot change the inclusion/exclusion criteria used in reviews, like the report of the Health Council of the Netherlands, although it critically evaluates them. This is an opinion article. This article does not comply with §4.2.4 of the Opinion. This is the conclusion of the Health Council of the Netherlands, not the SCHEER.

							that in reality showed adverse effects or effects that cannot be interpreted as favourable for public long term exposure. Thus the evidence for an adverse effect is stronger than that presented by the report. Sleep disturbances is one of the most common reported effects from exposure to RF radiation from wireless technologies. No doubt there is abundant evidence to support that RF cause sleep disturbances. The available science show that RF affects EEG and such disturbances can affect sleep particularly if the exposure is during nighttime and long-term. A meta-analysis by Balmori (2022) of studies on health effects in people living near mobile phone base stations includes 13 studies that show adverse effects on sleep in real life exposure situations. SCHEER refer to SCENIHR 2015 that concluded that it was not possible to derive firm conclusions on RF-EMF effects on sleep. It appears is incorrect in the light of the abundant evidence of RF negative impact on sleep. The conclusion of SCHEER on neurological and neurobehavioural effects is that the "weight of evidence for neurobehavioural effects in animal studies is "uncertain". The objective conclusion is that there is strong evidence for adverse effects. Reference: Evidence for a health risk by RF on humans living around mobile phone basestations: From radiofrequency sickness to cancer			The SCHEER disagrees with this, personal, interpretation of the Health Council of the Netherlands report. This claim is not supported by evidence. The reference cited is not a meta-analysis or systematic review. The search terms were very limited and the author did not adhere to the PRISMA, MOOSE or other similar guidelines. The SCHEER disagrees with this conclusion.
Nyberg	Rainer	Abo Akademi University (retired)	NRNyberg@abo.fi	Finland		6 RECOMMENDATIONS FOR FUTURE WORK	It is important that the EMF radiation guidelines protect humans and the environment from not onlly heating but from all kinds of adverse effects caused by non-ionising radiation. However, current (ICNIRP) guidelines protect ONLY from short term (acute) heating from ONE single radiating object during 6-30 minuites. This is not enough as the radiation can be lifelong andf coming from up to 20 or 50 simultaneously radiating sources for example in a school class, a restaurant, a train etc. According to a recent Review (Nyberg et al): "Alternative guidelines to protect citizens have been created by four groups of industry-independent scientists, based on best available scientific evidence; i.e., setting exposure levels lower than where biological effects with health implications have been found. As described in [101] these four groups recommend the following limits for human exposures to RF-EMR: - Building biologists [102] suggest a very low radiation level of no more than 0.1 µW/m2 (in sleeping areas); - EuropaEM-EMF Environmental Medicine researchers [103] suggest 1 µW/m2 during the night and 10 µW/m2 during the day time;	building-biology-guidelines-english.pdf; CoE-Resolution_1815_.pdf; EuropaEM-EMF_guidelines.pdf;Nyberg-et.al-2022.pdf	I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. This is a personal opinion of the commenter.

							- The BioInitiative-group conclusions (2012 update) [20], made by 29 prominent researchers, and based on 2200+ scientific reports, suggest 3-6 µW/m2 as the upper limit for exposures; - The Council of Europe (CoE) Resolution 1815 [104] Section 8.2.1 says set preventative thresholds for levels of long-term exposure to microwaves in all indoor areas, in accordance with the precautionary principle, not exceeding 0.6 volts per metre [1000 µW/m2], and in the medium term to reduce it to 0.2 volts per metre [100 µW/m2]."			
Shehu	Xhoana	ETNO	shehu@etno.eu	Belgium		2 OPINION	We comment on all the text.	ETNO_response_SCHEER_opinion.pdf	I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comments.
Schriver	Pernille	Europeans for Safe Technology	stop5geci@protonmail.com	Denmark		5.2.2 Cellular interaction mechanisms	There is very strong evidence that RF-EMF below ICNIRP limits causes oxidative stress, and prolonged oxidative stress from RF EMF can cause health effects at relevant exposures. SCHEER spreads doubt over the scientific evidence, by misleading quotations of the studies (substantiated below) The list compiled by Dr Henry Lai shows that 91%, (263 of 288 studies), reported significant effects related to oxidative stress (www.bioinitiative.org). Bandara et Weller (2018) reported "242 RF-EMR studies that investigated experimental endpoints related to oxidative stress (OS) were identified. A staggering 216 (89%) of them found significant effects related to OS" SCHEER references Schuerman and Mevissen (2021), as the most comprehensive review to date and acknowledge that RF-EMF can lead to oxidative stress, butfails to acknowledge the comprehensive evidence of the consequences to health from the prolonged oxidative stress (Schuerman and Mevissen, 2021). SHCEER claim that they “pointed out that some studies were subjected to methodological uncertainties or weakness or were not very comprehensive regarding exposure time, SAR level, number and quantitative analysis of the endpoints analysed”. This is misleading because the context is left out: Schuermann and Mevissen write that overall, the evidence for oxidative damage in several organs was consistent “investigations in Wistar and Sprague-Dawley rats provided	Bandara_2917.pdf;Lai__Panagopoulus.pdf;Nuszkiewicz_2020.pdf; Schuerman_2021.pdf	I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comments. The articles do not comply with §4.2.4 of the Opinion. The following comments reflect a personal opinion of the commenter.

							consistent evidence for oxidative stress...” (p 23), and conclude: “A trend is emerging, which becomes clear even when taking these methodological weaknesses into account, i.e., that EMF exposure, even in the low dose range, may well lead to changes in cellular oxidative balance. [.....] Adverse conditions, such as diseases (diabetes, neurodegenerative diseases), compromise the body’s defense mechanisms, including antioxidant protection mechanisms, and individuals with such pre-existing conditions are more likely to experience health effects.” SCHEER claims that the article concluded that there is an “adaptive process” to these effects “thus not leading to health effects”. This quotation is highly misleading, as this “adaptive process” is only relevant if the radiation is short-termed and limited. The quote is irrelevant for the real-life exposures; large parts of the human population are exposed up to 24 hours, 7 days a week. This is substantiated by the referenced animal studies: In an extensive rat study, “the capacity of the antioxidative protection system was exhausted” (p. 5). The exhaustion occurred after two hours exposure for 6 months, ie. much less than for the human population. “These results indicate that oxidative stress induced by RF-EMF can lead to DNA damage in neurons during prolonged exposure of the animals. Virtually identical results were also found in several other studies”. In conclusion, the animal studies show the RF-EMF exposure leads to ROS formation at real life exposures; when the exposure is prolonged, the protective mechanism is exhausted leading to oxidative stress, and eventually to serious health effects and chronic diseased, evidenced by increases in biochemical indicators of DNA and tissue damage. “ damage to the DNA were associated with prolonged exposure over weeks or months, applied in many cases only for a few hours per day [29–34].” (p11) Regarding the genotoxic effect, SCHEER ignores - The mutagenic effect of free radicals in relation to persistent oxidative stress is a proven mechanism - The importance of modulation and polarization. The vast majority of studies not finding genotoxic effects have used irrelevant RF-EMR exposures.			

							- Duration of exposure is important for genotoxicity. Variation in duration of the exposure is a likely cause of the apparent inconsistency of results.			
Bouteiller	Brigitte		brigittebouteiller@gmail.com	France		3 MINORITY OPINIONS	It is necessary to change ICNIRP levels. They represent effects on the low term and they belong to industrial interest .Many doctors disapprove the ICNIRP choice and have collected proves about the effects on the health. Listen to the voice of people suffering from the High levers of the magnetic fields. Respect their right to live in a good environment and please ask the industrial to invent technologies respecting life and the necessity of progress. Work for the peace between industrial progress and people suffering from electro-hyper-sensibility. Thank you for tour attention.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. This is a personal statement from the commenter.
Nyberg	Rainer	Abo Akademi University (retired)	NRNyberg@abo.fi	Finland		5.3 Health effects	The SCHEER evaluation is mainly based on meta-analysis without evaluation of the individual studies. Thus, cohort studies, e.g. Schüz et al (2022), are included to substantiate the no risk paradigm. In that study Women were resurveyed every 3-5 years, and questions on cellular telephone use were asked in median year 2001 (interquartile range = 2000-2003) and again in median year 2011 (interquartile range = 2010-2012). Thus assessment of exposure was made only at two occasions with no coverage of life time use of cellular phones. This is not sound epidemiology methods especially for use of mobile phones that has changed and increased dramatically since the study period with end point 2011. SCHEER states Specifically, compared with never-users no significant associations were found, overall or by tumour subtype, for daily cellular telephone use or for having used cellular telephones for at least 10 years. In fact it is not possible to define a ”never-use” group based on the study design. Furthermore regarding exposure variables Schüz et al (2022) stated that In median year 2001, women were asked, “About how often do you use a cellular telephone [‘mobile phone’ in the original British English questionnaire]?” and given 3 options to respond:—“never,” “less than once a day,” “every day”—and “For how long have you used one (in years)?” Women who reported in 2001 that they used a cellular telephone less than once a day or every day were classified as ”never-users”. In median year 2011, women were asked, “How long have you used a cellular telephone (in years)?” and “How much do you talk on a cellular telephone (in minutes per week)?” Women who reported in 2011	Schuz_et_al_2022.pdf	I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comments. The comments are the personal opinion of the commenter. The inclusion criteria for the sources of evidence used in the SCHEER Opinion are described clearly in §4.2.4.

							that they talked on a cellular telephone for at least 1 minute per week were classified as ever-users. Responses to the 2001 questionnaire are used as baseline for most analyses, providing mean follow-up time of 14.2 years for cancer incidence. Responses to the 2011 questionnaire were used as baseline in some analyses, providing mean follow-up time of 6.2 years. Thus the results are based on an inappropriate study design. Use of cordless (DECT) phone was not assessed. Of course these major limitations are not eliminated with longer follow-up as in Schüz et al (2022). Instead epidemiological limitations became worse over time since life-time assessment of exposure was not made, especially of a rapidly changing exposure. Due to limitations in the study design, such as no comprehensive assessment of life-time mobile phone use, the study is uninformative and should not be used as scientific evidence of lack of cancer risk. This is one example of major shortcomings in SCHEER 2022. Epidemiological studies, using sound scientific methods, have consistently found increased risks for brain tumors of the glioma type and acoustic neuroma in the head. This association was evaluated in 2011 at the International Agency for Research on Cancer (IARC) by 30 expert participants who concluded that RFR is a “possible”, Group 2B, human carcinogen (IARC, 2013). That important impartial evaluation is dismissed by SCHEER.			
Nyberg	Rainer	Åbo Akademi University retired	NRNyberg@abo.fi	Finland		5.2.3 Conclusions on interaction mechanisms	The Opinion says: Thermal effects or RF EMF are well established…”. However, non-thermal effects are also established but not considered by SCHEER, although they arise at far lower radiation levels than the guidelines. There is at least one Review concerning calcium signalling. It is written by prof. Martin L. Pall (Millimeter (MM) wave and microwave frequency radiation produce deeply penetrating effects) Here only thermal effects are considered. However non-thermal effects are proven also below the heating limits in most research in the area of EMF-health, because adverse effects on blood cells, the (electric) neurological and cardiovascular systems, fertility and cancer arise far below the outdated heating-only guidelines. The mechanism can be calcium signalling or weak EMF pulses and aggregations of pulses from several simultaneous radiation sources (for excample in a classroom with many activbe tablets and childrens cell phones which activate glial cells open calcium channels and open the Blood-brain-barrier. (Panagopoulos, Pall, Nyberg et al etc).	Nyberg-et.al-2022.pdf;Pall-Millimeter_MM_waves.pdf	I do not object to publication of my contribution, including my personal data, on internet	The SCHEER does not consider the activation of voltage-gated calcium channels as a plausible mechanism of interaction for RF-EMF (Wood and Karipidis, 2021).

Nyberg	Rainer	Åbo Akademi University	NRNyberg@abo.fi	Finland		5.3.1 Neoplastic diseases	SCHEER relies on the International Commission on Non-Ionizing Radiation Protection (ICNIRP) without a critical appraisal. ICNIRP published 2020 updated guidelines on radiofrequency (RF) radiation in the frequency range 100 kHz to 300 GHz (ICNIRP 2020). Harmful effects on human health and the environment at levels below the guidelines are downplayed although evidence is steadily increasing. We have made a critical review of ICNIRP 2020 (Hardell et al 2021). We concluded that ICNIRP's conclusion on cancer risks is: In summary, no effects of radiofrequency EMFs on the induction or development of cancer have been substantiated. This conclusion is not correct and is contradicted by scientific evidence. Abundant and convincing evidence of increased cancer risks and other negative health effects are today available. The ICNIRP 2020 guidelines allow exposure at levels known to be harmful. In the interest of public health, the ICNIRP 2020 guidelines should be immediately replaced by truly protective guidelines produced by independent scientists. In spite of these circumstances SCHEER is based on the ICNIRP 2020 evaluation. Only thermal (heating) effects are acknowledged by ICNIRP and form the basis for their guidelines. In spite of increasing scientific evidence of harmful effects of non-thermal RFR radiation, these new ICNIRP guidelines are not lower compared with the previous levels but in fact are higher as we have discussed in our critical analysis (Hardell et al 2021). Completely new guidelines are urgently needed because ICNIRP guidelines protect only against heating, but no other adverse effects. ICNIRP has been proven compromised by for example by two EU parliamentarians Buchner & Rivasi [72]. All kinds of biological and health effects - not only heating - must be considered in order to protect plants, insects, birds and their eggs, animals and humans especially children and foetuses. That is why the ICNIRP guidelines must be discarded and replaced by guidelines which really protect health. A new review (Nyberg et al 2022) summarises the problems for the EU caused by the ICNIRP guidelines. The many new and complex exposure-patterns that are now being used are addressed by directive 2013/35/EU of the EU Parliament [76] regarding exposure of workers to the risks from electromagnetic	Hardell-et.al-2021-ICNIRP.pdf ;Nyberg-et.al-2022.pdf	I do not object to publication of my contribution, including my personal data, on internet	The comments are the personal opinion of the commenter. The inclusion criteria for the sources of evidence used in the SCHEER Opinion are described clearly in §4.2.4.

							fields, that exposure limitation systems need to be exposure-pattern and frequency dependent in order to adequately protect workers exposed to electromagnetic fields. However, the ICNIRP calculations ignore this directive. They only use average values for heating of tissue, and simplistic modelling that does not include the effect of several important physical characteristics of telecommunication signals such as low frequency modulations, pulsing, polarisation [77 Panagopoulos et al] and the constant variability in intensity that occurs with real world signals used in many laboratory experiments [78]. Thus ICNIRP Guidelines must be replaced by new guidelines.			
Schriver	Pernille	Europeans for Safe Connection	stop5geci@protonmail.com	Denmark		5.1.2 Exposure from emerging technologies	Regarding the new 5G technology SCHEER writes (page 17): “i.e., higher maximum output power and dynamic pencil beam 22 forming with a larger number of antenna elements. The maximum transmitted power by 23 a 5G BS can reach up to 200 W, almost double the corresponding value for a 4G BS”. Furthermore, due to the beam formation, the intensity does not decrease with the square of the distance as for the previous technologies. The increase in intensity, and formation of high intensity beams rightfully causes concerns in the public. However, SCHEER take the industry perspective, writing twice that this can trigger health concern among the public - as if the problem was the concern among the public and not the increase in exposure. This is also a clear example of mixing risk assessment and risk management. SCHEER further writes: “Since the radiation pattern with massive MIMO varies over time and space, traditional assessment of compliance procedures to quantify the exposure can be misleading. These classical methods rely on conservative assumptions, e.g., all the users are in the same location that coincides with the testing point.” This is highly misleading, because the variation in radiation pattern with MIMO, does not change the fact that the beams reach very high intensities, which may cause acute damage to sensitive tissues, such as the eye retina and ovaries, which cannot regenerate. The statement that the "classical methods" assume that all users are in the same location coinciding with the testpoint is completely non-sense: The exposure limits should protect each individual, including those that happen to be present in a beam from MIMOs connecting to a nearby mobile phone. The statement from SCHEER suggests that lowering of the exposure limits is only warranted, if all people are damaged from the new technology! Furthermore, in large crowds (e.g. at concerts or football		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comments. The comments are not documented with the necessary scientific literature. They describe mainly hypothetical situations.

							stadions), many individuals will be exposed to multiple cross field exposure, causing even higher exposures than in a single beam, and thus, the risk of acute thermal damage, from exposure over the present thermal thresholds, is high. SCHEER proposes to change the dosimetry using stochastic methods, thus solving the problem for the industry. That is, using exposure averages in the simulation of the exposure, and thus ignoring that the high intensity beams are likely to cause acute, thermal damage, in particular in crossfields. SCHEER is here clearly bending the interpretation of scientific evidence and dosimetric methods in favor of the industry, prioritizing the interest of the industry over public safety.			
						2 OPINION	The Opinion does not consider EU:s own studies nor other important studies proving adverse effects below the guidelines. The EU's EPRS/STOA report (2021)"Health impact of 5G" (by F. Belpoggi) p. 1: (A) "Conclusions : 1) cancer: FR1 (450 to 6 000 MHz): EMF are probably carcinogenic for humans, in particular related to gliomas and acoustic neuromas; FR2 (24 to 100 GHz): no adequate studies were performed on the higher frequencies; 2) reproductive developmental effects: FR1 (450 to 6 000 MHz): these frequencies clearly affect male fertility and possibly female fertility too. They may have possible adverse effects on the development of embryos, foetuses and newborns; FR2 (24 to 100 GHz): no adequate studies were performed on non-thermal effects of the higher frequencies…" (B) (on p. 150-151) summarises: 6.1.2 There is sufficient evidence in experimental animals for the carcinogenicity of radiofrequency radiation. 6.1.3 There is sufficient evidence of adverse effects on the fertility of men. There is limited evidence of adverse effects on fertility in women. There is limited evidence on developmental effects in offspring of mothers who were heavy users of mobile phones during pregnancy. 6.1.4 There is sufficient evidence of adverse effects on male rat and mouse fertility. There is limited evidence of adverse effects on female mouse fertility. There is limited evidence of adverse effects on the development in offspring of rats and mice exposed during embryo life. 6.3.2 FR1(450 to 6000 MHz): These frequencies clearly affect	Belpoggi-EU-5G.-445K.pdf;Blackman-Forge-5G-EU.pdf;Nyberg-et.al-2022.pdf	I do object to publication of my contribution, including my personal data on internet to the grounds that such publication would harm my legitimate interests.	Thank you for the comment. The documents produced on the request of other EU institutions do not necessarily follow the working principles of the procedures of the Scientific Committees.

							male fertility. These frequencies possibly affect female fertility. They possibly have adverse effects on the development of embryos, foetuses and newborns. Similarly, the EU's own (ITRE committee) 2019 in-depth analysis, 5G Deployment: State of Play in Europe, USA and Asia [7] warned that, when added to 2G, 3G, 4G, WiFi, WIMAX, DECT, radar etc., 5G will cumulatively lead to dramatically more total radiation: "not only from the use of much higher frequencies in 5G but also from the potential for the aggregation of different signals, their dynamic nature, and the complex interference effects that may result, especially in dense urban areas" (p 11). Lines 17-20: The Opinion says: "emerging wireless applications using RF EMF tend to use higher frequencies and lower emitted power" That is not correct because for the higher frequencies ICNIRP has raised the guidelines from earlier 10 W/m2 but in the 2020 Guidelines even 200 W/m2 or 400 W/m2 in the narrow, steerable 5G beams. On top of that ICNIRP considers only heating. However many other mechanisms than heating have been proven to cause harm at exposures below the ICNIRP guidelines (i.e. affecting heart rhythm, damaging DNA in the germline and causing blood clots) (see Nyberg et al, 2022, p. 5, 11). Thus the ICNIRP guidelines are 1 million times higher than the Building biologists, EuropaEM-EMF and BioInitiative have said that would be safe for health.			
Polichetti	Alessandro	National Center for Radiation Protection and	alessandro.polichetti@iss.it	Italy		5.3.1 Neoplastic diseases	In section 4.2.2.9, page 11, lines 38-39, is reported that according to ICNIRP (2020) "the only study available on mobile phone use in children and brain tumour risk showed no increased risk of brain tumours", where the only study available in 2020 was a paper by Aydin et al. published in 2011 (352 cases from 4 countries). This is correct, but since studies on mobile phone use in children and brain tumor risk are no more cited in the rest of the SCHEER document, the reader could wrongly assume that no more such studies are currently available. Therefore, I think that at the end of section 5.3.1.1 - being an individual study like the one by Schüz et al. (2022), not a meta-analysis - the paper by Castaño-Vinyals et al. (2022), reporting the results of the international study MOBI-Kids on wireless phone use in childhood and adolescence and brain tumours (899 cases from 14 countries), could be cited and briefly discussed, even if it would confirm, in my opinion, the conclusion of SCHEER, reported in section 5.3.1.3 "Conclusions on neoplastic diseases", that "regarding carcinogenicity in humans, based on the available information provided in meta-analyses, and	Castano-Vinyals_2022.pdf	I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment, but the rationale for choosing the sources of evidence is clearly described in §4.2.4 of the Opinion. The Schüz et al (2022) study is one with a high statistical power in terms of sample size, as well as high level of representativeness.

							individual studies, the weight of evidence for adverse health effects from exposure to RF EMF is uncertain" (page 29, lines 44-46).			
Schriver	Pernille	Europeans for Safe Connections	stop5Geci@protonmail.com	Denmark		4.1 Data/Evidence	The selection of studies is both insufficient and biased. SCHEER states "The scientific assessments carried out should always be based on scientifically accepted approaches, and be transparent with regard to the data, methods and assumptions that are used in the risk assessment process." but does not meet the critera: 1) The criteria for selecting reviews and meta-analysis is not clear. Some narrative reviews are included, while other, both systematic and scientific reviews from the same period are not. Also, a large body of solid, high quality research has been omitted due to this criterium. 1) the criterium "when necessary" is subjective, unqualified and not at all clear or scientific. When scientific meta-analysis and scientific reviews are not available, peer-reviewed primary studies should be included systematically, but mostly they are not. Several scientific reviews showing significant effects are omitted (e.g. Yakamenko et al, 2016; Miller et al. 2019; Panagopoulos, 2019; Belpommes and Irigary, 2022). In contrast, some sections refer to reports that are not peer-reviewed science - e.g. the main reference in the section on cardiovascular effects. Assesment of evidence "For each line of evidence, the criteria of validity, reliability and relevance need to be applied and the overall quality has to be assessed. " SCHEER does not clarify which criteria has been applied. The criteria appers to be varying and are generally not justified report. SCHEER discards an important part of the studies, because dosimetry has not been applied. It is simply unscientific to use this criterion rigorously in this report, because the aim is hazard identification (establishing a qualitative causal relationship), not on dose-response determination. Dosimetry is insuffficient for determining whether the exposure is relevant and sufficient. There are other more relevant criteria to ensure that the exposure is relevant and sufficient, including crucial considerations of modulation and polarization (Lai, 2021; Panagopoulos, 2019). Weigth of evidence SCHEER refers to the SCHEER document Memorandum on weight of evidence and uncertainties (2018).	Cancer_epidemiology_update__following_the_2011_IARC_evaluation_of_radiofrequency_electromagnetic_fields__Monograph_102__-_Millller_et_al_2018.pdf;Lai__Panagopoulus.pdf;methodology.pdf;Miller_et_al.pdf	I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The methodology is described clearly in §4.2.4 of the amended text of the Opinion.

							This method is not a scientifically established method. In all lines of biological and medical research, there will be studies that do not find effect, but this is not proof that there is no effect. Applying the SCHEER methodology on e.g. smoking, would render the evidence on health effects of smoking "very weak". Using “no-effect “ studies to create doubt has been used by industies for decades to protect their products, and now it is used by SCHEER. The term “inconsistency” and the exxistence of studies not finding effect is abused in this report to conclude that the evidence is weak – or even that there is no effect. In medical and biologic science, the criteria for evaluate the findings ensure that only if the evidence is very strong, the findings are deemed “significant”. In contrast, if the correlation between exposure and disease is “only “ 80%, the finding is deemed insignificant, and is is concluded that no correlation. Therefore, studies not showing effect can never be interpreted as “proof” of “no effect”. Instead, evaluating the science it is pertinent to look for systematic differences between studies finding effect vs the “no-effect” studies. SCHEER has failed completely in this regard , in particular to consider whether the exposure is relevant (incl. modulation) and sufficient. (eg. see comments to sections on “oxidative stress”, “genotoxic effects”, "cancerepidemiology" and “symptoms). SCHEER conclude that there is strong evidence for “no-effect”, despite of numerous studies showing effect (e.g. on effect on cardiovascular system), which is clearly unscientific and misleading.			The SCHEER disagrees. This is a personal opinion of the commenter.
Dr ARAZI	Marc	ONG Alerte Phonegate	drarazi@phonegatealert.org	France		5.3.3 Symptoms	Symptoms (all line part 2) As Maxim Zhadobov (Senior Researcher in Biomedical Electromagnetics (BEM) at the IETR /CNRS) wrote in his 2006 PhD thesis1: "Low-power millimetre radiation (1-10 mW/cm2) is used for therapeutic applications [123, 124]. This method is recognised in some countries (Russia, Ukraine and other Eastern European countries) as a successful means of treatment and has applications in clinical medicine [125-127]." Thus he recalls:		I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment. The methodology for selecting the sources of evidence is described in §4.2.4. No meta-analyses or systematic reviews were found for the biological effects mentioned by the commenter. Therapeutic applications are outside the scope of the Opinion.

							"The first devices were developed and marketed in the 1980s. The three most frequently used frequencies are 42.2 GHz (λ0=7.1 mm), 53.6 GHz (λ0=5.6 mm) and 61.2 GHz (λ0=4.9 mm). Clinical results have been obtained for the treatment of different diseases: ([128]. OMs are used as monotherapy or in combination with other treatment methods. As adjuvant therapy, they are used to decrease the toxic effect of chemo-and radiotherapy in cancer treatment [1 29]. The OMs therapy method (OMT) consists of local exposure ofthe skin to OMs. The duration of exposure is 30 - 40 min per day for 7 - 15 days [130]. Since then, the uses of millimeter waves have been developing rapidly, as can be seen in the report "ENJEUX DES USAGES INDUSTRIELS ET COMMERCIAUX DES ONDES NON IONISANTES ELECTROMAGNÉTIQUES ET ACOUSTIQUES" published at the end of 2019 by the Conseil general de l'économie. 1 https://tel.archives-ouvertes.fr/tel-00121677/document 2 https://tel.archives-ouvertes.fr/tel-00121677/document 37/43 Thus the rapporteurs write, page 66/95: "Electromagnetic fields and microcurrents are officially used in several countries to diagnose and treat a wide variety of neurological (pain), allergic and musculoskeletal dysfunctions (Germany, Switzerland, China, Russia...), notably as an extension of acupuncture techniques (China). Under different conditions, various uses as treatment aids179 (or even treatments) for certain tumours are practised or studied. They are likely to replace chemical medications with equivalent or even superior efficacy 180, fewer side effects, lower costs, less energy consumption and greater ease of production (less cumbersome marketing authorisation, no chemical industrial sites, etc.), and are therefore accessible to small and medium-sized enterprises, particularly for relieving or treating chronic pathologies. " "They are the subject of major investments by digital majors such as Alphabet, which is becoming a global player in health (subsidiary Galvanibioelectronics with GlaxoSmithKline), but also Apple and Microsoft,.... Some of these alternative or			

							complementary techniques to chemical pharmaceuticals are announced as likely to arrive on the market as early as 2026. In view of the fundamentals mentioned above and the acceleration of publications and the resources deployed in Germany, but above all in China, the United States and India, it is likely that research in this field will lead fairly quickly (already today for some subjects, announced for 2026 for others) to targeted applications, as a complement to or replacement for conventional chemical and pharmaceutical methods... " And, of course, these are just a few examples highlighting the health effects of waves and, inparticular, millimetre waves on humans. So much evidence from both science and medical knowledge that contradicts the SCHEER report's conclusions on this subject https://www.economie.gouv.fr/files/files/directions_services/cge/ondes.pdf Finally, ANSES has added a section on medical uses in its report on 5G, following our comments https://www.anses.fr/fr/content/avis-et-rapport-de-lanses-relatif-%C3%A0-l%E2%80%99-exposition-de-la-population-aux-champs			
Dr ARAZI	Marc	ONG Alerte Phonegate	drarazi@phonegatealert.org	France		5.3.3 Symptoms	Symptoms (all line first part) We understand through this chapter that RF waves (the evidence pointed towards no effect of exposure). However, this is to be put in parallel with the therapeutic uses of waves and in particular millimeter waves which have a beneficial effect on patients' symptoms. You do not mention this point at all, although in our opinion it is particularly important. However, SCHEER seems to ignore a large body of scientific literature and the latest research in this area. In 2016, Remedee Labs1 designed the first endorphin stimulator for individual use to manage pain using millimetre waves. The solution is based on the patented MEET (Microelectronic Endorphin Trigger) module, the first miniaturised millimetre wave emission module for medical application. The MEET module can be integrated into very small devices, allowing individuals to		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. Therapeutic applications of RF-EMF are not in the scope of the mandate to SCHEER.

							manage their own pain management. The first device with the MEET module is undergoing several clinical trials in European hospitals. This bracelet uses millimetre waves to stimulate nerve endings in the wrist. The pain centre of the Grenoble Alpes University Hospital will start a multi-centre clinical research to study the Remedee Solution on the improvement of the quality of life of fibromyalgia sufferers. Currently the research will include teams from Paris, Valenciennes, Rouen and Grenoble. The Scientific Council of Remedee Labs includes Dr Yves Le Dréan, a scientist who is regularly involved in the work of ANSES on radiofrequencies. He is one of the authors of no less than 15 articles referenced in Pubmed on this issue. 1 https://remedeelabs.com/fr/ 2 https://www.ouest-france.fr/sante/prise-en-charge-traitements-diagnostic-vos-questions-sur-la-fibromyalgie-ebd39356-b324-11eb-936a-8b56d4eb2d1d However, there is no information on these recent medical and industrial developments in SCHEER report. However, the latter writes in an article (Le Dréan, 2012) on these subjects: "Three frequencies are commonly used in therapy: 42.2, 53.6 and 61.2 GHz, at surface power densities ranging from 5 to 15 mW/cm2. At these powers, a slight increase in temperature is recorded at the skin surface. Therefore, the biological effects described cannot be considered as purely non-thermal. For this therapeutic use, WMOs are used alone or in combination with another treatment. In Eastern European countries, exposure of patients to these waves has shown positive clinical results in the treatment of various diseases, such as ulcers, cardiovascular diseases, wound healing, bronchial asthma, skin disorders, cancers, and pain relief [3]. The scientific literature on this subject is very varied, but two main effects of WMO on the body can be highlighted: 1) an analgesic effect, and 2) an effect on the inflammatory response and the immune system. How these radiations (known to penetrate very little into biological tissues) can act on such diverse pathologies remains a mystery. More than 95% of the energy is absorbed by the skin [4], making this organ the main target of WMOs and surely the starting point for potential biological effects. The skin is not a barrier isolated from the rest of the body and signal transmissions are possible via the bloodstream or the nervous system. For example, it has been			

							proposed that MMOs may activate the peripheral nervous system [5, 6]. It is also possible that exposure induces the secretion by skin cells of molecules that can act as chemical mediators in the bloodstream.			
Dr Arazi	Marc	ONG Alerte Phonegate	drarazi@phonegatealert.org	France		5.3.1 Neoplastic diseases	In vivo studies (all line) We are surprised, to say the least, by the way in which the NTP study, as a reminder, a 10 year, 25 million dollar study, carried out by an American governmental agency and finally having been the subject of a peer review by international experts, is compared to other studies that are, to say the least, far from providing the same criteria of scientific guarantees. Moreover, it would have been necessary to repeat all the conclusions that go further than the presentation made here. We attach the letter that we sent in March 2018 to the president of the FCC and copied to the European Commission to clarify all the issues. Due to space limitations, we attach the link as a separate piece of our commentary on many aspects such as the FDA's response to the NTP study. We have not received a response to this letter from either the FCC or the European Commission. We also attach our comment made to the NTP https://www.phonegatealert.org/wp-content/uploads/2018/06/Comments-by-Phonegate-Alert-to-NTP-20-June-meeting-Rev.pdf	FCC-letter-20-march-2018.pdf	I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment, which is not within the remit of SCHEER to answer.
Polichetti	Alessandro	National Center for	alessandro.polichetti@iss.it	Italy		5.3.2 Neurological and	“Animal studies” in page 33, lines 14-15, should be the title of a new section numbered as 5.3.2.3. Consequently, section “Conclusions on neurological and neurobehavioural effects” should be re-numbered as 5.3.2.4.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The text has been amended.

Chou	Chung-Kwang	C-K. Chou Consulting	ck.chou@ieee.org	Other	USA	5.3.4 Other health effects	37, lines 32-35 Microwave pulses, upon absorption by soft tissues in the head, launch a thermoelastic wave of acoustic pressure that travels by bone conduction to the inner ear, where it activates the cochlear receptors via the same process involved in normal hearing (Lin and Wang, 2007; Lin, 2022). The original work of activation of cochlear via bone conduction and neural pathway to the cortex was done by Chou at the University of Washington in the 70's, which was summarized in a tutorial and review article in 1982. Add reference to the list. Chou C. K., Guy A. W., Galambos R. Auditory perception of radiofrequency electromagnetic fields. J. Acoust. Soc. Am., Vol. 71, Pg. 1321 - 1334, 1982 Change it to: Microwave pulses, upon absorption by soft tissues in the head, launch a thermoelastic wave of acoustic pressure that travels by bone conduction to the inner ear, where it activates the cochlear receptors via the same process involved in normal hearing (Chou et al., 1982; Lin and Wang, 2007; Lin, 2022). Add in reference: Chou C. K., Guy A. W., Galambos R. Auditory perception of radiofrequency electromagnetic fields. J. Acoust. Soc. Am., Vol. 71, Pg. 1321 - 1334, 1982		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The text has been amended.
Chou	Chung-Kwang	C-K. Chou Consulting	ck.chou@ieee.org	Other	USA	5.3.4 Other health effects	37, lines 12-14 On the other hand, the authors see growing evidence that damage induced by EMF to reproductive cells and organs is caused by deregulation of redox homeostasis due mitochondrial dysfunctions and ROS overproduction. Add "to" after "due". Change it to: On the other hand, the authors see growing evidence that		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The text has been amended.

							damage induced by EMF to reproductive cells and organs is caused by deregulation of redox homeostasis due to mitochondrial dysfunctions and ROS overproduction.			
Polichetti	Alessandro	National Center for Radiation	alessandro.polichetti@iss.it	Italy		5.1.3 Factors affecting	Page 17, line 43 (formula) and page 18, lines 14 and 18. I think that “closed devices” is an error already present in the original paper by Varsier et al. (2015) where it refers to “people in proximity of users of a wireless device”, therefore it should be (and should have been in the original paper) “close devices”.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The text has been amended.
Chou	Chung-Kwang	C-K. Chou Consulting	ck.chou@ieee.org	Other	USA	5.3.2 Neurological and	33, lines 14-15. Animal studies Similar to human studies, systematic reviews are very rare. Something wrong here. It should start as a new paragraph, with Animal studies as the title of the following text. Changes to make: Fix the format.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The text has been amended.
Chou	Chung-Kwang	C-K. Chou Consulting	ck.chou@ieee.org	Other	USA	5.3.2 Neurological and	pages 32-33 A long section on: Resting-state waking EEG. The effects of metallic wire leads on RF absorption at the electrode contacts with the skull are not mentioned. Angelone et al. (2010) pointed out: “Conversely, a comprehensive volumetric assessment of changes in the RF field with and without metallic EEG leads showed an increase of two orders of magnitude in single-voxel power absorption in the epidermis and a 40-fold increase in the brain during exposure to the 915 MHz mobile phone. Results varied with the geometry and conductivity of EEG electrodes/leads. This enhancement confirms the validity of the question whether any observed effects in studies involving EEG recordings during RF-field exposure are directly related to the RF		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER agrees that there are several methodological issues that have to be considered during human studies, but it is not the aim of the Opinion to enumerate or address them.

							fields generated by the source or indirectly to the RF-field-induced currents due to the presence of conductive EEG leads." Angelone L. M., Bit-Babik G., Chou C. K. Computational electromagnetic analysis in a human head model with EEG electrodes and leads exposed to RF-field sources at 915 MHz and 1748 MHz. Radiat Res, Vol. 174, Pg. 91 - 100, 2010 Changes to make: Add the above discussions and reference on EEG effects.			
Chou	Chung-Kwang	C-K. Chou Consulting	ck.chou@ieee.org	Other	USA	5.1.1 Wireless communication technologies	14, lines 12-17. The results of the study show that adolescents were more frequent mobile phone users and experienced higher modelled RF doses in the whole-brain (median 330.4 mJ/kg/day) compared to children (median 81.8 mJ/kg/day). Children spent more time using tablets or laptops compared to adolescents, resulting in higher RF doses in the whole-body (median whole-body dose of 81.8 mJ/kg/day) compared to adolescents (41.9 mJ/kg/day). 81.8 mJ/kg/day cannot be the same for both whole brain and whole body dose for children. The abstract of the paper was incorrect in the original paper, and which was transferred to the SCENHIR report incorrectly and finally quoted in the SCHEER report also incorrectly. Table 3 of the paper by Birks et al. (2021) shows 83.7 for the whole brain, not 81.7. Lots of coverage on this topic. These numbers are as a dose and with a unit of mJ/kg/day. There is no discussion in this SCHEER report on what these numbers mean and how are they compared with any limits such as derived from the limits of ICNIRP in SAR and averaged in any 6 minutes for local exposure and 30 minutes for whole body exposure? The bottom line is that the numbers in the Birks et al. (2021) are all well below the limits derived from ICNRIP guidelines. Change it to: The results of the study show that adolescents were more frequent mobile phone users and experienced higher modelled RF doses in the whole-brain (median 330.4 mJ/kg/day) compared to children (median 83.7 mJ/kg/day). Children spent more time using tablets or laptops compared to adolescents, resulting in higher RF doses in the whole-body (median whole-body dose of 81.8 mJ/kg/day) compared to adolescents (41.9 mJ/kg/day).		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The text has been amended.

							Add comments on comparison with ICNIRP limits, so the readers can understand what is the meaning of the data.			
Chou	Chung-Kwang	C-K. Chou	ck.chou@ieee.org	Other	USA	4.2.2 ICNIRP	11, lines 18-19 four by the U.S. National Toxicology Program and the other from the Ramazzini Institute in Italy. The “four” should be “one”. Change it to: one by the U.S. National Toxicology Program and the other 19 from the Ramazzini Institute in Italy.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The text has been amended.
Chou	Chung-Kwang	C-K. Chou Consulting	ck.chou@ieee.org	Other	USA	4.2.2 ICNIRP (2020) Guidelines - Summary on biological and	9, line 47 (35-100 µs) Guy et al. (1975) reported in human subject could hear microwave pulses from 1 to 32 µs. Frey and Messenger (1973) showed human perception at 10 to 70 µs, and the loudness at 70 µs was almost 2 orders of magnitude less than at 10 µs. Based on these human data, (1-70 µs) or (1-100 µs) would be better. Guy A. W., Chou C. K., Lin J. C., Christensen D. Microwave-induced acoustic effects in mammalian auditory systems and physical materials. Ann. New York Acad. Sci., Vol. 247, Pg. 194 - 218, 1975. Frey A. H., Messenger R. Human perception of illumination with pulsed ultrahigh-frequency electromagnetic energy. Science, Vol. 181, Pg. 356 - 358, 1973 Propsed changes: Change it to (1-100 µs)		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The text has been amended.
Polichetti	Alessandro	National Center	alessandro.polich	Italy		4.1	I suggest to add at the end of section 4.1, the following description of the classification of the levels/weights of evidence proposed in the Memorandum on Weight of Evidence (WoE) and uncertainties (SCHEER, 2018): • Strong weight of evidence: Coherent evidence from a primary line of evidence (human, animal, environment) and one or more other lines of evidence (in particular mode/mechanistic studies)		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the suggestion. The text has been amended.

							in the absence of conflicting evidence from one of the other lines of evidence (no important data gaps) • Moderate weight of evidence: good evidence from a primary line of evidence but evidence from several other lines is missing (important data gaps) • Weak overall weight of evidence: weak evidence from the primary lines of evidence (severe data gaps) • Uncertain weight of evidence: due to conflicting information from different lines of evidence that cannot be explained in scientific terms • Weighing of evidence not possible: No suitable evidence available While the three lowest weights of evidence (weak, uncertain, weighing not possible) are cited in section 5.3 for various lines of evidence, along with a brief explanation (e.g. “There is a weak weight of evidence on the interaction mechanisms causing genotoxicity and epigenetic effects, due to the severe data gaps that do not allow these mechanisms to be fully understood”, page 29, lines 16-18), the two highest weights of evidence (strong and moderate) are cited (apart from some cases of strong evidence for the lack of effects) just in the Abstract (page 2, lines 7-9) e in the Opinion (page 7, lines 10-12), without an explanation of their meaning, just stating that they were not identified by SCHEER. If my proposal were accepted, it would also be useful for the reader to add at the end of section 5.3 a table summarizing the results of weighing of evidence for the different lines of evidence, as the one presented in the Annex to the SCHEER Memorandum in order “to help people external to the Scientific Committee understand how conclusions have been reached” (SCHEER, 2018).			
						4.2.2 ICNIRP (2020)	I am commenting on this section.	Butler_Submission_to_SCHEER_September_2022_-_An_Opinion_on_Scientific_Bias_in_the_ICNIRP_Guideline	I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. This is a personal opinion on the ICNIRP Guidelines. No change in the text is required.

								s_and_its_Origins.pdf Butler_Submission_to_SCHEER_September_2022_-_An_Opinion_on_Scientific_Bias_in_the_ICNIRP_Guidelines_and_its_Origins.pdf		
Dr ARAZI	Marc	ONG Alerte Phonegate	drarazi@phonegatealert.org	France		5.3.1 Neoplastic diseases	Line 22 to 24 Epidemiological studies We would like to add to the analysis the elements of the Santé Publique France report In July 2019 (updated in September 2019), the French Public Health Agency “Santé Publique France“, together with the Francim cancer registries, the Hospices Civils de Lyon and the Institut National du Cancer, published national estimates of cancer incidence and mortality in metropolitan France between 1990 and 2018. These are based on the modeling of observed incidence data (new cases) until 2015 by cancer registries, supplemented by projections until 2018. Volume 1 of the report is devoted to solid tumors (27 tumors and 22 subtypes). Between 1990 and 2018, the overall incidence rate of solid tumors remained relatively stable in men and continued to increase in women. At the same time, the annual number of new cases of glioblastoma with histological confirmation (one of the most aggressive types of brain cancer) has increased fourfold and more for both sexes. Santé Publique France estimates that there will be 3,481 new cases of these glioblastomas in metropolitan France in 2018, 58% of them in men. There were only 823 in 1990. According to Santé Publique France, similar observations are observed in the United States where an increase in the incidence of glioblastoma was also observed in the years 1980-1990 in connection with diagnostic progress. In addition, an Australian study reports an increasing incidence of histological confirmed glioblastoma over the period 2000-2008. In conclusion of its analysis, Santé Publique France considers that the extrinsic factors that may play a role in increasing the incidence of glioblastoma could be:		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. No change in the text is required.

							“brain radiation therapy and possibly intense and prolonged exposure to pesticides (farmers)[14]. The latest epidemiological studies and animal experiments would support the carcinogenic role of exposure to electromagnetic fields[15]” https://www.santepubliquefrance.fr/maladies-et-traumatismes/cancers/cancer-du-sein/documents/rapport-synthese/estimations-nationales-de-l-incidence-et-de-la-mortalite-par-cancer-en-france-metropolitaine-entre-1990-et-2018-volume-1-tumeurs-solides-etud [15] Anthony B. Miller, L. Lloyd Morgan, Iris Udasin, Devra Lee Davis. Cancer epidemiology update, following the 2011 IARC evaluation of radiofrequency electromagnetic fields (Monograph 102) Environmental Research. 2018. 167:673-683.			
Dr Arazi	Marc	ONG Alerte Phonegate	drarazi@phonegatealert.org	France		5.1.1 Wireless communication technologies	Dosimetry in epidemiological study line 25 to 40 We propose that the recommendations made by Niels Kuster be taken into account in epidemiological dosimetric studies but not only In a study from 2015, Niels Kuster and Gernot Schmid closed an article published in the journal Bio Electro Magnetics in these terms:182 Consequently, the in vitro studies in which no or minimal effects were observed have limited value with respect to risk assessment regarding actual mobile phone use. This limitation of in vitro studies could be overcome by including avgSAR culture levels that extend to higher than 20 W/kg, As a reminder, Kuster is the Chair of the Board of SPEAG, the Swiss firm that has a near monopoly on SAR-measurement testing platforms. So he knows what he’s talking about. In fact, here is the appeal he makes to researchers at the very end of the article: We encourage all researchers working in this area to discuss these findings in future reviews. In future calls for research and recommendations of funding agencies, we strongly recommend the addition of exposure levels well above 2 W/kg for experiments intended for use in the context of risk assessments. This study escaped the SCHEER vigilance, despite the fact that Kuster mentions that cell tissues in contact with our cell phones could be exposed to levels exceeding 40 W/kg. The analysis demonstrated that exposure of skin, blood, and muscle tissues		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The design of experiments and the acquisition of the necessary ethical permits (where they apply) are left to the researchers and cannot be dictated by the SCHEER.

							may well exceed 40 W/kg at the cell level. Consequently, in vitro studies reporting minimal 182. https://pubmed.ncbi.nlm.nih.gov/25644546			
Dr ARAZI	Marc	ONG Alerte Phonegate	drarazi@phonegatealert.org	France		5.1.1 Wireless communication technologies	line 5 to 9 Dosimetry in epidemiological studies We repeat our comment about Xmobisense Thus, as we said for Mobi-kids, this software present in the cell phones was realized by the operator Orange and its collaborators. Can we accept that an industrialist takes part in this study in this way? The families would certainly have refused to allow an industrial company to develop the spyware (XMobisense) put inside the cell phones of the cases and controls. The purpose of this tool was to collect the data used in the study. The same is true for the tumor localization software (XGridMaster) that can be found above in a Mobi-kids presentation with the Whist Lab logo (a joint laboratory of the Institut Télécom and Orange Labs). The legitimate question is: were the children and their families and the medical teams informed that the scientific team had entrusted this part of the study to an industrial company? https://phonegatealert.org/en/mobi-kids-orange-at-the-heart-of-the-study		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment, which has to do with the methodology of this specific study.
Dr ARAZI	Marc	ONG Alerte Phonegate	drarazi@phonegatealert.org	France		5.1.1 Wireless communication	Line 25 to 31 We would like to remind you that for the Mobi-Expo study, which is a part of the Mobi-kids study, as well as for the software application (X Mobisense) the problem of conflicts of interest is omnipresent. Thus, as we said for Mobi-kids, this software present in the cell phones was realized by the operator Orange and its collaborators. Can we accept that an industrialist takes part in this study in this way? The families would certainly have refused to allow an industrial company to develop the spyware (XMobisense) put inside the cell phones of the cases and controls. The purpose of this tool was to collect the data used in the study. The same is true for the tumor localization software		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment, which has to do with the methodology of this specific study.

							(XGridMaster) that can be found above in a Mobi-kids presentation with the Whist Lab logo (a joint laboratory of the Institut Télécom and Orange Labs). The legitimate question is: were the children and their families and the medical teams informed that the scientific team had entrusted this part of the study to an industrial company? https://phonegatealert.org/en/mobi-kids-orange-at-the-heart-of-the-study			
Dr ARAZI	Marc	ONG Alerte Phonegate	drarazi@phonegatealert.org	France		4.2.2 ICNIRP (2020) Guidelines - Summary on biological and health	Line 37 to 39 The study on children that is not specified is certainly the Mobi-kids study. Regarding the modalities of this study, our NGO revealed : Our investigation into the conflicts of interest of the authors of the Mobi-kids study [which analyzes the impact of wireless phones on the risk of brain tumors in young people] has now shown that ten of the eighteen people in charge of measuring the exposure of patients worked directly or indirectly for the mobile phone industry. What is now also evident in the organization of this study are the proven conflicts of interest with the mobile phone industry of ISGlobal, the Institute of Global Health of Barcelona (which, according to their website, includes the banking foundation “la Caixa“, academic institutions and government agencies) In fact, that is where the problem lies because, according to the Wikipedia entry on “la Caixa“, there are several close financial ties with mobile phone companies such as Cellnex telecom and Telefónica : The La Caixa Banking Foundation manages the Group’s shareholdings through Criteria Caixa (formerly Criteria CaixaHolding), a equity instrumental company fully controlled by the foundation. The shares of Criteria Caixa include the ones		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment, which has to do with the methodology of this specific study but is outside the scope of this consultation.

							owned in CaixaBank (as of 31 December 2018: 40.00%),[19] as well as those held in several companies including Cellnex, Naturgy, Saba, Suez and Telefónica. Can this explain the choices of ISGlobal and its coordinator of the Mobi-kids study, Elisabeth Cardis, of, to say the least, highly controversial experts with important conflicts of interest? You be the judge! In an article published in June 2014 on the website dedicated to the Mobi-kids study, ISGlobal presents the international team in charge of the “exposure measurement”. There are a total of seventeen people in this specialized working group under the responsibility of the British researcher Myrion Maslanyi. The French team is led by Joe Wiart. At the time, Mr. Wiart was working directly for the mobile phone operator Orange. He is the manager of Orange Labs. However, despite the evidence of conflicts of interest, here is what has been added to the section “conflicts of interest” concerning him: « Before 2015 J Wiart was an employee of Orange. At that time, his work in the study was limited to dosimetry. In 2015 he became Ingenieur General des Mines, employed by the Institut Mines-Télécom, a state academic institute. J Wiart has no conflict of interest to declare. » To get a clearer picture, it is necessary to add that his team is composed of four other persons, they too working for the industrialist Orange, namely, Emmanuelle Conil, Nadège Varsier, Abdelhamid Hadjem, and also Thierry Sarrebrousse who was not quoted in the above article (it will be our eighteenth contributor). This means that no less than five people paid by Orange have contributed directly to the study. Also the Canadian scientist Daniel Krewski who failed to report more than 1.5 million euros in funding from the mobile phone industry; and after the Korean engineer Ae-Kyoung Lee who works directly with the organization « Electronics and Telecommunications Research Institute (ETRI) » which is participating in the hundreds of millions of dollars of royalties generated by companies such as the smartphone manufacturer Samsung, this new breach of scientific ethics by the Japanese expert Masao Taki clearly raises the question of the transparency of the information transmitted by certain authors of the Mobi-kids study.			

							It is clear that the ICNIRP did not do its job properly by not revealing such breaches of scientific ethics in this study. https://phonegatealert.org/en/investigation-mobi-kids-a-study-undermined-by-conflicts-of-interest			
Dr ARAZI	Marc	ONG Alerte Phonegate	drarazi@phonegatealert.org	France		4.2.2 ICNIRP (2020) Guidelines - Summary on biological and health	Line 43 to 49 et 1 to 6 A new Korean study confirms the link between the use of cell phones and the danger for fertility. Researchers have found a decline in the quality of spermatozoa in men: smartphones degrade the quality of sperm by reducing their motility, viability and concentration. This meta-analysis was published in the scientific journal Environmental Research after a peer-reviewed publication. Over the years, many international studies have shown the link between the use of cell phones and a significant decrease in sperm quality, which can lead to infertility in men. This Korean study confirms it! Assistant Professor Yun Hak Kim of the National University of Pusan warns: “Male cell-phone users should strive to reduce mobile phone use to protect their sperm quality.” Thus, according to a study published in 2016 by researchers from the Technion and Carmel Medical Center (Israel) and as reported on the website of Cnews, a 24-hour news channel: "Starting with the observation that male fertility in the West was steadily declining, the scientists studied how a sample of men used their smartphones, in order to compare these practices with the spermatozoa count in their semen. And they found that men		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The latest systematic reviews and meta-analyses on the effects of RF-EMF on reproduction, that fulfill the SCHEER selection criteria, have been cited.

							who kept their phones within 50 cm of their groin had insufficient levels of spermatozoa to reproduce." There are many studies that have not been taken into account by the ICNIRP concerning both the risks of infertility and the risks of use for pregnant women. We ask that an independent structure supervises the work of the ICNIRP globally https://www.sciencedirect.com/science/article/abs/pii/S0013935121010781?via%3Dihub https://www.israelscienceinfo.com/en/medecine/technion-parler-une-heure-par-jour-sur-son-telephone-portable-fragilise-la-fertilite-chez-lhomme/			
Dr ARAZI	Marc	ONG Alerte Phonegate	drarazi@phonegatealert.org	France		4.2.2 ICNIRP (2020) Guidelines - Summary on biological and health	line 28 to 38 In May 2021, the Food and Drug Administration (FDA) announced it was launching an investigation into whether smartphones or connected objects in contact with the body, such as Applewatch could pose a health risk to pacemaker or heart stimulator wearers. This investigation follows an alert launched in February 2021 by U.S. cardiologists in a study published by the Henry Ford Health System Study showing that the Apple iPhone 12 can disable the pacemaker or pacemaker when placed near the heart. The iPhone 12 and the Apple Watch 6 in the front line but not only … After conducting its own tests, the FDA in a statement published this August 26, 2021 has just confirmed that the risk of interference with implantable medical devices is real and warns that tested models such as the iPhone 12 or the Apple Watch 6 trigger a potentially dangerous situation for those concerned : “Today, the U.S. Food and Drug Administration is advising the public that some newer consumer electronic devices, such as certain cell phones and smartwatches, have high fields strength magnets capable of placing medical devices in their “magnet mode”, the agency wrote. “These magnets can affect normal operations of the medical device until the magnetic field is		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The interference of RF-EMF with the operation of medical implants is outside the scope of the SCHEER’s mandate.

							moved." ANSES alerts public authorities on the subject in 2016 However, in an opinion published as early as June 2016, entitled "Disturbance of medical devices by radio frequencies: practices to be adapted to each situation", the National Agency for Food, Environmental and Occupational Health Safety was already concerned about the risks associated with cell phone radio frequency waves and thus warned the public authorities: "The Agency recommends that wearers of active implanted medical devices (cardiac implants, pacemakers, etc.) to ensure that they keep the strongest sources of exposure (cell phones) away from their device. Thus, the recommendations contained in the information booklets or user manuals must be applied, particularly concerning the distances to be respected when using a cell phone (do not put the phone in a pocket near an implant, use the opposite ear, etc.) or passing under security gates (anti-theft, airports). This position of ANSES was already based on numerous scientific studies: The risk of electromagnetic disturbance of certain medical devices, generated by cell phones, has long been discussed. Do not keep your smartphone within 15 cm of the implant To examine the potential impact of smartphones, U.S. researchers tested all iPhone 12 and Apple Watch 6 models at different distances with a Medtronic implantable cardiac device (ICD). The results showed that the risk of interference was highest when the smartphone was within 15 cm of the heart. Therefore, people with implantable medical devices are urged to never keep their cell phones or connected objects in a pocket in contact with the implant. In addition, we would like to point out that the whole body SAR is never measured and in any case not in the European regulations, so it is completely unjustified to take this measure as a reference. It would seem necessary to us to fix the level of the related local SAR to evaluate the cardiovascular risk			

							https://www.fda.gov/news-events/press-announcements/fda-brief-fda-continues-monitor-effects-magnets-consumer-electronics-implanted-medical-devices https://www.heartrhythmjournal.com/article/S1547-5271(20)31227-3/fulltext			
Friesen	Margaret	Manitoibans for Safe Technology	manitobans4st@gmail.com	Other	Canada	5.3.1 Neoplastic diseases	5.3.1.3 Conclusions on neoplastic diseases, lines 16-18 Precisely because there are “severe data gaps” and potential consequences can be severe for human health, guidelines should be as protective as possible – not as lax as possible. It should be obvious to all that the Precautionary Principle should be applied for exposures to EMF-RF.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The implementation of the Precautionary Principle is not in the remit of SCHEER.
Friesen	Margaret	Manitobans for Safe Technology	manitoibans4st@gmail.com	Other	Canada	6 RECOMMENDATIONS FOR FUTURE	Continued... Direction for future studies needed are provided here: Miller, A. B., Morgan, L. L., Udasin, I., & Davis, D. L. (2018). Cancer epidemiology update, following the 2011 IARC evaluation of radiofrequency electromagnetic fields (Monograph 102). Environmental Research, 167(673-683. DOI. 10.1016/j.envres.2018.06.043). https://doi.org/10.1016/j.envres.2018.06.043 Extract: “Opportunistic epidemiological studies are proposed that can be carried out through cross-sectional analyses of high, medium, and low mobile phone users with respect to hearing, vision, memory, reaction time, and other indicators that can easily be assessed through standardized computer-based tests. As exposure data are not uniformly available, billing records should be used whenever available to corroborate reported exposures.”		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. No change in the text is required.
Dr Arazi	Marc	ONG Alerte	drarazi@pho	France		4.2.2	Line 25 To say that a small part of the population attributes non-specific symptoms to exposure to RF electromagnetic fields is both medically and scientifically very unclear, what symptoms are we talking about?		I do not object to publication of my contribution, including my personal data, on internet	Thank you for this comment. This section is a summary of the previous publications of ICNIRP and SCENIHR. All the references and citations can be traced in the original

							If these symptoms cover electrohypersensitivity (EHS), it is perfectly inaccurate to consider that this concerns a small part of the population. The ANSES in its 2018 report indicated that nearly 5% of the French population is affected, that is to say more than 3 million people in France alone. https://www.anses.fr/fr/system/files/AP2011SA0150Ra.pdf			documents of ICNIRP and SCENIHR and are not repeated here.
Friesen	Margart	Manitobans for Safe Technology	manitobans4st@gmail.com	Other	Canada	6 RECOMMENDATIONS FOR FUTURE WORK	FOR mmWAVES FOR 5G AND FUTURE GENERATIONS OF TECHNOLOGY: If a truly protective approach to setting guidelines is intended than it is crystal clear that thses studies should be conducted BEFORE more technology is deployed to which the general public is exposed. This oversight in the preliminary SCHEER report should be corrected. Any approvals should be contingent on research protocols when there is insufficient evidence of safety – which there is in this case with novel and emerging technologies such as MiMo and beam-forming. The decision makers who are depending on the opinion of the SCHEER report need to be made aware of the statements: Hinrikus, Hiie, Tarmo Koppel, Jaanus Lass, Hans Orru, Priit Roosipuu, and Maie Bachmann. “Possible Health Effects on the Human Brain by Various Generations of Mobile Telecommunication: A Review Based Estimation of 5G Impact.” International Journal of Radiation Biology 98, no. 7 (2022): 1210–21. https://doi.org/10.1080/09553002.2022.2026516.The search for publications indicated no human experimental studies by 5G nor at the RF EMF frequencies higher than 2500 MHz. Karipidis, K., et al(2021). 5G mobile networks and health-a state-of-the-science review of the research into low-level RF fields above 6 GHz. Journal of Exposure Science & Environmental Epidemiology, 31(4), 585–605. https://doi.org/10.1038/s41370-021-00297-6 Karapidis et al. (2021), page 595: Epidemiological studies. Extract: “There are no epidemiological studies that have directly investigated 5 G and potential health effects.” Health Canada unpublished report available to the public upon request: Gajda, G., Paradis, J., Lemay, E., Zhuk, M., McGarr, G., Bellier, P., & McNamee, J. (2021). Analysis of recommended localized human exposure limits for radiofrequency fields in the		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The systematic reviews have been considered and the text has been amended. Risk management and policy making are not in the remit of the SCHEER.

							frequency range, 6 GHz to 300 GHz. Health Canada, Consumer & Clinical Radiation Protection Bureau (CCRPB). Approved by Narine Martel, Director, 243. Page 32, Extract: “No human studies were identified that assessed endpoints such as cancer, ocular effects, reproductive system effects, cognitive effects, impacts on the immune system, non-specific symptoms or any other adverse health outcomes in response to exposure to RFEMF in the 6-300 GHz frequency range.” https://c4st.org/wp-content/uploads/docs/GovRelations/Fed/Health-Canada/Health_Canada_Analysis_of_Recommendations_above_6GHz.pdf As USA Senator Richard Blumenthal said after he asked Industry representatives if there was any research showing safety or any research being planned on 5G technologies: Blumenthal, R. (2019, February 7). Senate Commerce, Science, and Transportation Committee hearing of the future of 5G wireless technology. February 17, 2019. https://www.blumenthal.senate.gov/newsroom/press/release/at-senate-commerce-hearing-blumenthal-raises-concerns-on-5g-wireless-technologys-potential-health-risks . “So there really is no research ongoing. We’re kind of flying blind here, as far as health and safety is concerned.” Direction for future studies needed are provided here: Miller, A. B., Morgan, L. L., Udasin, I., & Davis, D. L. (2018). Cancer epidemiology update, following the 2011 IARC evaluation of radiofrequency electromagnetic fields (Monograph 102). Environmental Research, 167(673-683. DOI. 10.1016/j.envres.2018.06.043). https://doi.org/10.1016/j.envres.2018.06.043 Extract: “Opportunistic epidemiological studies are proposed that can be carried out through cross-sectional analyses of high, medium, and low mobile phone users with respect to hearing, vision, memory, reaction time, and other indicators that can easily be assessed through standardized computer-based tests. As exposure data are not uniformly available, billing records should be used when			

Friesen	Margaret	Manitobans for Safe TEchnology	manitiobans4st@gmail.com	Other	Canada	5.3 Health effects	5.3.1.2. In vivo studies The findings of the NTP rat studies was not “uncertain”. The findings were “clear evidence of carcinogenicity” This was arrived at after triple peer-review by a panel of scientists including representatives from industry. A thorough discussion can be found at: https://ehtrust.org/science/the-niehs-national-toxicology-program-study-on-cell-phone-radiation-and-cancer-2018-update-resources/ The NTP mice study found DNA damage. Smith-Roe, Stephanie L., Michael E. Wyde, Matthew D. Stout, John W. Winters, Cheryl A. Hobbs, Kim G. Shepard, Amanda S. Green, et al. “Evaluation of the Genotoxicity of Cell Phone Radiofrequency Radiation in Male and Female Rats and Mice Following Subchronic Exposure.” Environmental and Molecular Mutagenesis, October 21, 2019. https://doi.org/10.1002/em.22343 Studies by others have found impairment to DNA repair. When there is continuous DNA damage, any manner of adverse effects can occur including cancer, neurological disease and sperm abnormalities.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER is aware of the citations mentioned.
Dr Arazi	Marc	ONG Alerte Phonegate	drarazi@phonegatealert.org	France		3 MINORITY OPINIONS	In the current context of scientific controversy, the fact that there is no minority opinion raises questions		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. This is a personal opinion of the commenter.
Friesen	Margar	Manito	manito	Other	Canada	5.2.3	5.2.3. Conclusions on interaction mechanisms Lines 15-18.		I do not object to publication of my contribution, including my	Thank you for the comment. The first article is a narrative review and the second is a single study, therefore,

							Consistent evidence is not the problem. Experiments and other scientific studies are often inconsistent due to many factors. That does not make their findings invalid. What is key, are the studies that are well conducted which demonstrate harm or potential harm and the guidelines based on those. The Precautionary Principle should prevail. The review and studies by Yakymenko (omitted in the SCHEER report) provides ample evidence of harm through oxidative stress. Yakymenko, Igor, Olexandr Tsybulin, Evgeniy Sidorik, Diane Henshel, Olga Kyrylenko, and Sergiy Kyrylenko. "Oxidative Mechanisms of Biological Activity of Low-Intensity Radiofrequency Radiation." Electromagnetic Biology and Medicine 35, no. 2 (2016): 186–202. https://doi.org/10.3109/15368378.2015.1043557 Yakymenko, I., A. Burlaka, I. Tsybulin, I. Brieieva, L. Buchynska, I. Tsehmistrenko, and F. Chekhun. "Oxidative and Mutagenic Effects of Low Intensity GSM 1800 MHz Microwave Radiation." Experimental Oncology 40, no. 4 (December 2018): 282–87.		personal data, on internet	neither article complies with the inclusion criteria (§4.2.4 of the Opinion). No change in the text is required.
Dr Arazi	Marc	ONG Alerte Phonegate	drarazi@phonegatealert.org	France		2 OPINION	Line 21 to 26 ICNIRP Guidelines issued in 2020 These guidelines, still based solely on the thermal effects of waves, are just as controversial as the previous ones. The refusal to take into account non-thermal effects still shows how this organisation is only there to spread language. It is worth noting that in April 2020, four years after the Phonegate alert, the ICNIRP introduced the safety factor of 10 for local SARs for the general public. We see this as a timely attempt to avoid legal risk for mobile phone manufacturers. This is the hallmark of the ICNIRP. Furthermore, why did ICNIRP Vice President Eric Van Rongen wait more than 20 years to point out that the safety factor of 50 around SAR, which is supposed to protect the health of users and which is included in the 1999 European Directive, did not concern local SARs, even though this information has been included on all official government sites since then? Confirmation during a working meeting at the European Parliament via an exchange between Eric Van Rongen write to Marc Arazi: "Anyone who states that a reduction factor of 50 applies to local exposures obviously misinterprets the guidelines		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER cannot respond on behalf of the ICNIRP.

							althought the 1998 guidelines my not be very clear in that respect, the 2020 provides more clear information." This was confirmed during a meeting of the dialogue committee "Radiofrequencies and health" of ANSES by the president of ICNIRP Rodney Croft. However, public authorities and ICNIRP continue to ignore the recommendations of the ANSES report of July 2016 (page 15/17), namely concerning both distant (antennas) and nearby sources of exposure, and the specific case of children: "The Agency recommends, in this context, that the reference levels for limiting environmental exposure to radio frequency electromagnetic fields (related to distant sources) be reconsidered, in order to ensure sufficiently large safety margins to protect the health and safety of the general population, and especially of children... With regard to near-field exposures induced by the use of mobile communication devices, the Agency considers that it is necessary to: reassess the relevance of the specific absorption rate (SAR) used for the establishment of limit values for personal exposure, for the purposes of protection against the known and proven health effects (thermal effects) of radiofrequencies; and develop an indicator representative of the actual exposure of mobile phone users, regardlessof the conditions of use: signal used, good or poor reception, mode of use (call, data loading,etc.). ». Under these conditions, how can the European Commission justify having integrated scientifically false elements into its directives? And what confidence can we have in the ICNIRP, which waited 22 years to correct, under the constraint of the Phonegate revelations, such an error and its consequences on the overexposure of millions of cell phone users? https://phonegatealert.org/en/last-minute-phonegate-the-safety-factor-of-50-for-local-sars-never-existed			
Friesen	Margaret	Manitobans for Safe	manitobans4st@gm	Other	Canada	4 METHODOLOGY	Cancer. 4.2.29. Lines 38-43 and applies through the report It is widely known that special interests can manipulate scientific evidence and opinion. This undue influence has been complied by Moskowitz Moskowitz, Joel M., Seung-Kwon Myung, Yoon-Jung Choi, and Yun-Chul Hong. “Reply to Brzozek et al. Comment on ‘Choi et al. Cellular Phone Use and Risk of Tumors: Systematic Review and		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER is aware of the references and of perceived or actual conflicts of interests of authors who have been publishing results in this field of research.

							Meta-Analysis. Int. J. Environ. Res. Public Health 2020, 17, 8079.'" International Journal of Environmental Research and Public Health 18, no. 11 (January 2021): 5581. https://doi.org/10.3390/ijerph18115581 Also, the Working group, if not already aware, may benefit from reading this paper: Soskolne, C. L., Kramer, S., Ramos-Bonilla, J. P., Mandrioli, D., Sass, J., Gochfeld, M., … Bero, L. A. (2021). Toolkit for detecting misused epidemiological methods. Environmental Health: A Global Access Science Source, 20(1), 90. ABSTRACT: BACKGROUND: Critical knowledge of what we know about health and disease, risk factors, causation, prevention, and treatment, derives from epidemiology. Unfortunately, its methods and language can be misused and improperly applied. A repertoire of methods, techniques, arguments, and tactics are used by some people to manipulate science, usually in the service of powerful interests, and particularly those with a financial stake related to toxic agents. Such interests work to foment uncertainty, cast doubt, and mislead decision makers by seeding confusion about cause-and-effect relating to population health. We have compiled a toolkit of the methods used by those whose interests are not aligned with the public health sciences. Professional epidemiologists, as well as those who rely on their work, will thereby be more readily equipped to detect bias and flaws resulting from financial conflict-of-interest, improper study design, data collection, analysis, or interpretation, bringing greater clarity-not only to the advancement of knowledge, but, more immediately, to policy debates. METHODS: The summary of techniques used to manipulate epidemiological findings, compiled as part of the 2020 Position Statement of the International Network for Epidemiology in Policy (INEP) entitled Conflict-of-Interest and Disclosure in Epidemiology, has been expanded and further elucidated in this commentary. RESULTS: Some level of uncertainty is inherent in science. However, corrupted and incomplete literature contributes to confuse, foment further uncertainty, and cast doubt about the evidence under consideration. Confusion delays scientific advancement and leads to the inability of policymakers to make changes that, if enacted, would-supported by the body of valid			

							evidence-protect, maintain, and improve public health. An accessible toolkit is provided that brings attention to the misuse of the methods of epidemiology. Its usefulness is as a compendium of what those trained in epidemiology, as well as those reviewing epidemiological studies, should identify methodologically when assessing the transparency and validity of any epidemiological inquiry, evaluation, or argument. The problems resulting from financial conflicting interests and the misuse of scientific methods, in conjunction with the strategies that can be used to safeguard public health against them, apply not only to epidemiologists, but also to other public health professionals. CONCLUSIONS: This novel toolkit is for use in protecting the public. It is provided to assist public health professionals as gatekeepers of their respective specialty and subspecialty disciplines whose mission includes protecting, maintaining, and improving the public's health. It is intended to serve our roles as educators, reviewers, and researchers. https://doi.org/10.1186/s12940-021-00771-6			
Friesen	Margaret	Manitobans for Safe Technology	manitobans4st@gmail.com	Other	Canada	4.2 Background	4.2.2.9 Cancer, Line 34 "Only two cohort studies with prospective exposure information are available." If these refer to the UK Million woman study, then the conclusions are not reliable because of the poor exposure assessment. - Schüz, Joachim, Kirstin Pirie, Gillian K. Reeves, Sarah Floud, Valerie Beral, and Million Women Study Collaborators. "Cellular Telephone Use and the Risk of Brain Tumors: Update of the UK Million Women Study." Journal of the National Cancer Institute 114, no. 5 (May 9, 2022): 704–11. https://doi.org/10.1093/jnci/djac042 . - If the other study was the Danish studies, this has been heavily criticized as well: https://ehtrust.org/science/danish-cohort-cell-phone-and-cancer-study/ Söderqvist, Fredrik, Michael Carlberg, and Lennart Hardell. "Review of Four Publications on the Danish Cohort Study on Mobile Phone Subscribers and Risk of Brain Tumors." Reviews on Environmental Health 27, no. 1 (2012): 51–58. Abstract: BACKGROUND: Since the International Agency for Research on Cancer recently classified radiofrequency		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER are aware of all the references mentioned in the comment. The UK Million Women Study could not be one of the cohort studies, because it was published after the ICNIRP (2020) Guidelines.

							electromagnetic fields, such as those emanating from mobile and cordless phones, as possibly carcinogenic to humans (group 2B), two additional reports relevant to the topic have been published. Both articles were new updates of a Danish cohort on mobile phone subscribers and concern the possible association between assumed use of mobile phones and risk of brain tumors. The aim of the present review is to reexamine all four publications on this cohort. METHODS: In brief, publications were scrutinized, and in particular, if the authors made explicit claims to have either proved or disproved their hypothesis, such claims were reviewed in light of applied methods and study design, and in principle, the stronger the claims, the more careful our review. RESULTS: The nationwide Danish cohort study on mobile phone subscribers and risk of brain tumors, including at best 420,095 persons (58% of the initial cohort), is the only one of its kind. In comparison with previous investigations, i.e., case-control studies, its strength lies in the possibility to eliminate non-response, selection, and recall bias. Although at least non-response and recall bias can be excluded, the study has serious limitations related to exposure assessment. In fact, these limitations cloud the findings of the four reports to such an extent that render them uninformative at best. At worst, they may be used in a seemingly solid argument against an increased risk--as reassuring results from a large nationwide cohort study, which rules out not only non-response and recall bias but also an increased risk as indicated by tight confidence intervals. CONCLUSION: Although two of the most comprehensive case-control studies on the matter both have methodological limitations that need to be carefully considered, type I errors are not the only threats to the validity of studies on this topic--the Danish cohort study is a textbook example of that. Lines 35-36. Many might consider this invalid because assessment was not made in an ongoing manner.			
Friesen	Margaret	Manitobans for	manitobans4st	Other	Canada	4.2 Background	4.2.2.9. Cancer. Lines 8 -10 This statement flies in the face of the evidence reported in numerous peer-reviewed studies. See: Miller, Anthony B., L. Lloyd Morgan, Iris Udasin, and Devra Lee Davis. “Cancer Epidemiology Update, Following the 2011 IARC		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. In this section we summarize ICNIRP’s statements. These are not statements made by SCHEER.

							Evaluation of Radiofrequency Electromagnetic Fields (Monograph 102).” Environmental Research 167, no. 673-683. DOI. 10.1016/j.envres.2018.06.043 (July 17, 2018). https://doi.org/10.1016/j.envres.2018.06.043 Choi, Yoon-Jung, Joel M. Moskowitz, Seung-Kwon Myung, Yi-Ryoung Lee, and Yun-Chul Hong. “Cellular Phone Use and Risk of Tumors: Systematic Review and Meta-Analysis.” International Journal of Environmental Research and Public Health 17, no. 21 (January 2020): 8079. https://doi.org/10.3390/ijerph17218079 Note: Criticisms made about this study are addressed by - Moskowitz, J. M., Myung, S.-K., Choi, Y.-J., & Hong, Y.-C. (2021). Reply to Brzozek et al. Comment on “Choi et al. Cellular Phone Use and Risk of Tumors: Systematic Review and Meta-Analysis. Int. J. Environ. Res. Public Health 2020, 17, 8079.” International Journal of Environmental Research and Public Health, 18(11), 5581. https://doi.org/10.3390/ijerph18115581 - Myung, S.-K., Moskowitz, J. M., Choi, Y.-J., & Hong, Y.-C. (2021a). Reply to Comment on Choi, Y.-J., et al. Cellular Phone Use and Risk of Tumors: Systematic Review and Meta-Analysis. Int. J. Environ. Res. Public Health 2020, 17, 8079. International Journal of Environmental Research and Public Health, 18(6), 3326. https://doi.org/10.3390/ijerph18063326 Of special note: This latter comment was omitted by the SCHEER report.			
Dr ARAZI	Marc	ONG Alerte Phonegate	drarazi@phonegatealert.org	France		1.1 Background	Line 31 à 39 ICNIRP Guidelines published in 1998 We would like the report to state explicitly that these recommendations, which have been incorporated into European legislation, are at the root of the so-called "Phonegate" scandal, which has highlighted the overexposure of all mobile phone users for the past 30 years, well above the regulatory limits established for the thermal effects of waves and measured by the Specific Absorption Rate (SAR). In this regard, we are more than surprised that the conclusions of ANSES, in its 2016 report1 on SARs, are not even mentioned in this SCHEER scientific report. Even more worrying is the total absence of any reference to the ANSES report of October 2019	Article_Om_Ghandi_IEEE_18_avril_2019.pdf	I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. Compliance testing and standardization are not in the remit of SCHEER.

							on the health risks of mobile phones worn close to the body. So here is a quick extract from the ANSES opinion in its 2016 report p 6/17: "Local SAR measurements of mobile phones in contact with the body carried out in 2015 by the French radiofrequency agency (ANFR) showed, based on a sample of mobile phones, that the resulting exposure can sometimes be high: of the 95 mobile phones sampled by ANFR, 89% of them measured in contact with the body had a SAR greater than 2 W/kg and 25% a SAR greater than 4 W/kg. In addition, the instructions for use of 25% of the phones tested with a body contact SAR greater than 2 W/kg did not indicate a minimum distance for use. Numerical modelling of head exposure shows that, for anatomical reasons (size, weight) or due to the dielectric properties of young or immature tissues, children may be more exposed than adults, particularly in the brain areas closest to the skull. In addition, studies that have assessed whole-body SAR report higher exposure levels for children than for adults, particularly in two frequency ranges: around 100 MHz and around 1 to 4 GHz. The SAR can then exceed the basic restrictions by 40% when exposure is equal to the maximum permitted level for adults (reference levels). This means that for anyone shorter than 1.30 m, the regulatory exposure limits are less appropriate. » The choice of inappropriate distances for testing mobile phones (between 15 and 25 mm from the skin) until June 2017, the choice of testing values on 10 g of tissue instead of 1 g (FCC), the duration of exposure, the size of the dummy, etc., have resulted in hundreds of millions of users being exposed to actual SAR levels far in excess of the levels that should not be exceeded. Indeed, new evidence in our possession shows that since 2016 our fears concerning overexposure linked to the choice of a 10 g or 1 g SAR measurement are perfectly justified. The journalists of France Télévision (complément d'enquête) had SAR tests carried out for 1g and 10g For example, a new iPhone 8 tested on the rear panel at 2535 MHz: - at 5 mm for 10 g (1.251 W/kg) and for 1 g (3.226 W/kg) - at 0 mm for 10 g (3.298 W/kg) and for 1 g (10.168 W/kg)			

							All the measurements carried out show an increase in SAR when tested on 1 g of tissue according to the American standard of the Federal Communication Commission (FCC). Thus the second-hand iPhone 5 tested at 0 mm reached a SAR of over 12 W/kg (i.e. more than 3 times the authorised limit in Europe and the United States of 4 W/kg). This is also confirmed by Professor Om Ghandi's article based on the test reports published bthe ANFR, which states: "The ICNIRP guidelines state that the SAR at 10 g, under actual use conditions, should not exceed 2 W/kg and the FCC requires compliance with IEEE C95.1-1991 [1] which is set in terms of a SAR at 1 g of 1.6 W/kg. It has been shown in peer-reviewed publications [4], [6] that due to the relatively shallow penetration of RF energy coupled to tissues, e SAR at 1 g is generally 2.5 to 3 times higher than the SAR at 10 g."			
Friesen	Margaet	Manitobans for Safe Technology	manitobans4st@gmail.com	Other	Canada	4 METHODOLOGY	4.2.2.7 Immune System. Lines 2 and 3. How can this “opinion” report be considered independent when it relies on ICNIRP. Should not the authors (“independent scientists”) be doing their own searching for studies? What studies are being referring to?		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER did its own risk assessment with the methodology described in §4.1. This section is a summary of the previous publications of ICNIRP and SCENIHR. All the references and citations can be traced in the original documents of ICNIRP and SCENIHR and are not repeated here.
Friesen	Margaret	Manitobans for Safe	manitobans4st@gmail.	Other	Canada	4.2 Background	4.2.2.6 Cardiovascular, Lines 33-38 Which epidemiological studies are these? Citations, please. Also, clarification is needed as to if this is mixing effects that may be seen in individuals who are sensitive at low levels, with population-wide effects that may occur under consistent ongoing high exposure.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for this comment. This section is a summary of the previous publications of ICNIRP and SCENIHR. All the references and citations can be traced in the original documents of ICNIRP and SCENIHR and are not repeated here.

							What are the animal studies referred to? Details as to dosimetry, number of animals used, citations, please.			
Dr ARAZI	Marc	ONG Alerte Phonegate	drarazi@phonegatealert.org	France		4.2 Background	Line 8 to 15 ICNIRP and its guidelines There is considerable controversy surrounding the International Commission on Non-Ionising Radiation Protection (ICNIRP) 1and its role in setting recommendations to protect the health of mobile phone users. This is supported by numerous international publications showing a range of reasons why states and health agencies should step back from this organisation and its 'experts'. We would therefore like this controversy to be explicitly included in the final report. We provide you with several elements justifying this position: - The report on the conflicts of interest of ICNIRP experts by MEPs Michèle Rivasi and Klaus Buchner2, which concludes with a reminder: "In addition to the fact that some ICNIRP members are simultaneously members of the International Committee on Electromagnetic Safety (ICES) of the Institute of Electrical and Electronics Engineers (IEEE), registered in the United States, we have seen the close cooperation of ICNIRP members with ICES, the International Committee on Electromagnetic Safety of the Institute of Electrical and Electronics Engineers (IEEE). The IEE brings together many actively and structurally involved professionals from the media, telecommunications and military industries. - Under the current leadership of the ICNIRP, these links have been further strengthened "with the aim of setting internationally harmonised safety limits for exposure to electromagnetic fields". This can be seen as a potential real conflict of interest. - It is clear from the ICES minutes3 that ICNIRP worked very closely with IEEE/ICES on thecreation of the new RF safety guidelines that were published in March 2020. This means that major telecoms companies such as Motorola and others, as well		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. ICNIRP Guidelines were specifically mentioned in the mandate to the SCHEER. The SCHEER cannot respond on behalf of the ICNIRP.

							as the USmilitary, had a direct influence on the ICNIRP guidelines, which still form the basis of EU policies in this area." Many independent scientists denounce the unscientific nature of the ICNIRP's work,such as Finnish Professor Dariusz Leszczynski1 and Swedish Professor Lennart Hardell2who, in an article published in 2020, said of their work on 5G: "Conflicts of interest and industry links appear to have contributed to biased reporting. The lack of a proper and unbiased risk assessment of 5G technology puts people at risk. In addition, it appears that a cartel of individuals is monopolising the assessmentcommittees, reinforcing the risk-free paradigm. We believe that this activity should be labelled as scientific misconduct." This is also what Dr Joel Moskowitz, one of the authors of the study (Choi et al, 2020)3,based on a meta-analysis showing that exposure to one's mobile phone for 1000 hours or more or for 17 minutes a day for 10 years is associated with a 60% statistical increase in the risk of brain tumour. Thus, following its publication in the International Journal of Environmental Research and Public Health (IJERPH), two members of the ICNIRP commission (Röösli, Karapidis) engaged in a full-scale critique of this work. This practice of scientific harassment is characteristic of ICNIRP and is detailed in this article4! - The decision of the Court of Appeal of Turin5 in a landmark ruling in January 2020. CTU Turin states: "It is considered that less weight should be given to studies published by authors who have not declared conflicts of interest. In this case, conflict of interest situations may arise in relation to if the author himself is a member of the assessment of the health effect of radio frequencies, for example: 1. cases where the author of the study has advised the telephone industry or received funding for studies from the telephone industry 2. if the author himself is a member of the ICNIRP. »			
Dr	M	O	dr	Fr		1.	line 21		I do not object to publication of my	The Terms of Reference are part of the mandate and, as

							We propose that the term metrological be added (taking into account the latest scientific and metrological evidence available on radio frequencies)		contribution, including my personal data, on internet	such, cannot be changed by the SCHEER.
Dr ARAZI	Marc	ONG Alerte Phonegate	drarazi@phonegatealert.org	France		1.2 Terms of reference	We propose that the keywords SAR, Power density and 5G be added		I do not object to publication of my contribution, including my personal data, on internet	The Terms of Reference are part of the mandate and, as such, cannot be changed by the SCHEER.
ARAZI	Marc	ONG Alerte Phonegate	drarazi@phonegatealert.org	France		ABSTRACT	Line 7 8 9 RF EMF exposure at level below the limits set in the annexes of Council Recommendation 1999/519/EC and Directive 2013/35/UE have been largely exceeded The ANSES report entitled "Mobile phones worn close to the body and health", published in October 2019, is completely absent from the SCHEER report. However, the issue of overexposure to waves from our mobile phones has still not been resolved; SAR remains a poor indicator of health protection; It should be noted that the public authorities have not taken any serious measures to inform users of the potential risks to their health, any more than the measures recommended by the ANSES in its report, which we briefly recall here: Indeed, here is the conclusion of the report, signed by the Director General of ANSES, Roger Genet:	English_translation_of_the_Note_from_French_authorities-1.pdf	I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. Compliance testing and standardization are not in the remit of SCHEER.

							"The Anses repeats the conclusions and recommendations of its specialised expert committee. The mobile phones placed on the market until 13 June 2016, and potentially until 12 June 2017, were marketed under conditions of use "provided by the manufacturer" (i.e. providing for a minimum distance of use of the device ranging from 0 to 25 mm from the body, excluding the head). The majority of the phones tested by ANFR had trunk SAR values measured in contact with the body greater than 2 W/kg. As the average period of use of a phone is a few years (3-5 years), a certain number of these phones are probably still in use today. Thus, given that a significant proportion of phones placed on the market under the previous European directive (R&TTE) exceed the SAR limit value (2 W/kg) when used in the same way as they were in the past, it is likely that a number of these phones are still in use.TTE) when used in contact with the trunk, the evolution of practices which leads to an increasing proportion of use close to the body (very small distance or even zero between the device and the body), and the uncertainties on various long-term health effects, the Agency recommends that measures be taken so that users are no longer exposed to SARs exceeding 2 W/kg emitted by phones certified under the R&TTE directive (placed on the market until 13 June 2016 or even until 12 June 2017). To this end, the Agency considers that measures taken by manufacturers similar to those taken for phones placed on the market after 13 June 2016 and appearing to be non-compliant following ANFR inspections in 2017 would make it possible to achieve this objective: software updates, phone recalls, etc. Pending the implementation of such measures, the Agency invites users of these devices to comply with the instructions for use (distance) mentioned by the manufacturers in the manuals, when they are placed close to the body. Finally, the Agency recommends that the normative provisions on the distance of radio devices that can be placed close to the body should be changed so that SAR compliance measurements are carried out at contact (0mm). » To date, nothing has been put in place at the European level to withdraw or update the hundreds of models of cell phones whose SAR level in real use in contact with the body largely exceeds the regulatory limits. The formal objection filed by France in September 2020 to request a measurement of SAR trunk at 0 mm has not been taken into account either. We therefore hope			

							that the draft technical revision (line 10 to 13) will take this into account as well as other points that we will develop later.			
Friesen	Margaret	Manitobans for Safe Technology	manitobans4st@gmail.com	Other	Canada	5.3.3 Symptoms	Page 35 5.3.3.1 Conclusions on Symptoms. Lines 8 to 15. This section is particularly deficient and does not include key papers and other relevant information. Omitted studies include those with objective evidence for biomarkers, etc. Several are listed here: Belpomme, Dominique, Christine Campagnac, and Philippe Irigaray. Reliable Disease Biomarkers Characterizing and Identifying Electrohypersensitivity and Multiple Chemical Sensitivity as Two Etiopathogenic Aspects of a Unique Pathological Disorder." Reviews on Environmental Health 30, no. 4 (December 1, 2015): 251–71. https://doi.org/10.1515/reveh-2015-0027 & Corrigendum to: Reliable Disease Biomarkers Characterizing and Identifying Electrohypersensitivity and Multiple Chemical Sensitivity as Two Etiopathogenic Aspects of a Unique Pathological Disorder." Reviews on Environmental Health, October 26, 2016. https://doi.org/10.1515/reveh-2015-8888 Belpomme, Dominique, Lennart Hardell, Igor Belyaev, Ernesto Burgio, and David O. Carpenter. "Thermal and Non-Thermal Health Effects of Low Intensity Non-Ionizing Radiation: An International Perspective." Environmental Pollution 242 (November 1, 2018): 643–58. https://doi.org/10.1016/j.envpol.2018.07.019 Belpomme, Dominique, and Philippe Irigaray. "Electrohypersensitivity as a Newly Identified and Characterized Neurologic Pathological Disorder: How to Diagnose, Treat, and Prevent It." International Journal of Molecular Sciences 21, no. 6 (March 11, 2020). https://doi.org/10.3390/ijms21061915 Belyaev, Igor, Amy Dean, Horst Eger, Gerhard Hubmann, Reinhold Jandrisovits, Markus Kern, Michael Kundi, et al. "EUROPAEM EMF Guideline 2016 for the Prevention, Diagnosis and Treatment of EMF-Related Health Problems and Illnesses." Reviews on Environmental Health 31, no. 3 (January 1, 2016). https://doi.org/10.1515/reveh-2016-0011		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The inclusion criteria for the sources of evidence used in the SCHEER Opinion are described clearly in §4.2.4.

							Heuser, G., & Heuser, S. A. (2017). Functional brain MRI in patients complaining of electrohypersensitivity after long term exposure to electromagnetic fields. Reviews on Environmental Health, 32(3), 291–299. https://doi.org/10.1515/reveh-2017-0014 Physicians' Health Initiative for Radiation and Environment and British Society for Ecological Medicine et al. "2020 Consensus Statement of UK and International Medical and Scientific Experts and Practitioners on Health Effects of Non-Ionising Radiation (NIR)," October 11, 2020. https://phiremedical.org/wp-content/uploads/2020/11/2020-Non-Ionising-Radiation-Consensus-Statement.pdf			
Friesen	Margaret	Manitobans for Safe Technology	manitobans4ST@gmail.com	Other	Canada	2 OPINION	Page 7, Lines 17-20 Where are the studies showing exposure to beam-focusing energy is safe – either on the short term or the long term? This is a massive failing of the report to not make it clear that there are no long term safety studies on live humans or on plants and animals The appropriate statement that should follow this is that adequate studies on health impacts must be conducted before deployment of these novel technologies. Lines 21-26 Basing revisions to EMF-RF guidelines on thermal effects only, such as those used by ICNIRP, does not go far enough. Further major revision, to incorporate the substantial non-thermal adverse effects documented in the peer-reviewed literature, is required. Studies on adverse effects on sperm and more than 30 studies demonstrating DNA damage at below ICNIRP recommended guidelines would be a good place to begin. This is the topic of one of the reviews for which protocls have been studied. However, these reviews can be limiting by how the criteria are set. For example in their analysis Health Canada's report excluded all tissue and cell studies Gajda, G, J. Paradis, E Lemay, M Zhuk, G. McGarr, P Bellier, and J McNamee. "Analysis of Recommended Localized Human Exposure Limits for Radiofrequency Fields in the Frequency Range, 6 GHz to 300 GHz. Page 32." Health Canada, Consumer & Clinical Radiation Protection Bureau (CCRPB). Approved by		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment, but no such claim is made in the Opinion. This is a personal opinion of the commenter. No change in the text is required.

							Narine Martel, Director https://c4st.org/wp-content/uploads/docs/GovRelations/Fed/Health-Canada/Health_Canada_Analysis_of_Recommendations_above_6GHz.pdf (2021): 243. Signals emitted from wireless devices such as cell phones and cell tower antennas are complex and studies and “real-life” exposures are essential to assess harm. Special dosimetry is not mandatory for this. The manufacturers provide the SAR. Assuming the manufacturers can be trusted to stay within the prescribed standard, guidelines, exposure conditions would automatically be assumed to be below safety guideline levels.			
Friesen	Margaret	Manitobans for Safe Technology	manitobans4st@gmail.com	Other	Canada	2 OPINION	Lines 10-12 The SCHEER report has missed the obvious. Given that there are absolutely no chronic effects human health studies on exposure to millimetre waves, it is therefore highly misleading to give the impression that there are no adverse effects, as many would assume that this is evidence-based conclusion. The reason no evidence could be found it that there is no evidence, good, bad or neutral for long term exposures. Nor has the SCHEER report identified many of the emerging risks and the studies needed to fully understand how to adequately address them with appropriate studies. To name a few: ocular, reproductive effects, symptoms (electrosensitivity). The evidence of adverse effects on sperm is scientifically sound. The sperm studies alone merit … Properly conducted studies are essential to ensure adequate guidelines BEFORE these frequencies are allowed to become pervasive in the environment with 5G technologies.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment. The lines of the text you are referring to are not specific to millimetre waves but concern long-term exposure and several endpoints (neoplastic diseases, neurodegenerative diseases, reproduction, symptoms, etc.) that have been published and considered in the Opinion.

							It is remarkable that the SCHEER report failed to identify the compelling rationale that radiofrequency radiation should be classified as a known human carcinogen. 1. Hardell, Lennart, and Michael Carlberg. “Comments on the US National Toxicology Program Technical Reports on Toxicology and Carcinogenesis Study in Rats Exposed to Whole-Body Radiofrequency Radiation at 900 MHz and in Mice Exposed to Whole-Body Radiofrequency Radiation at 1,900 MHz.” International Journal of Oncology, October 24, 2018. https://doi.org/10.3892/ijo.2018.4606. “Based on the Preamble to the IARC Monographs, RF radiation should be classified as carcinogenic to humans, Group 1”. 2. Miller, A. B., Morgan, L. L., Udasin, I., & Davis, D. L. (2018). Cancer epidemiology update, following the 2011 IARC evaluation of radiofrequency electromagnetic fields (Monograph 102). Environmental Research, 167(673-683. “When considered with recent animal experimental evidence, the recent epidemiological studies strengthen and support the conclusion that RFR should be categorized as carcinogenic to humans (IARC Group 1).” https://doi.org/10.1016/j.envres.2018.06.043 3. Peleg, M., Nativ, O., & Richter, E. D. (2018). Radio frequency radiation-related cancer: assessing causation in the occupational/military setting. Environmental Research, 163, 123–133. “ We reexamine whether radio frequency radiation (RFR) in the occupational and military settings is a human carcinogen. METHODS: We extended an analysis of an already-reported case series of patients with cancer previously exposed to whole-body prolonged RFR, mainly from communication equipment and radar… Overall, the epidemiological studies on excess risk for HL [hematolymphatic]and other cancers together with brain tumors in cellphone users and experimental studies on RFR and carcinogenicity make a coherent case for a cause-effect relationship and classifying RFR exposure as a human carcinogen (IARC group 1). https://doi.org/10.1016/j.envres.2018.01.003			This is a personal opinion of the commenter.
Friesen	Margaret	Manitoba	manitoba	Other	Canada	2	Page 7, Lines 3-6 A substantial number of relevant publications (reviews, meta-analyses, primary studies and comments) have been omitted		I do not object to publication of my contribution, including my	Thank you for the comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate.

							making the SCHEER report incomplete and inadequate for making a risk assessment. Lines 7-9 Not all studies will always show effects. It is the ones that do show effects that need to be taken into consideration. See: See: Panagopoulos, Dimitris J., Andreas Karabarbounis, Igor Yakymenko, and George P. Chrousos. "Human made Electromagnetic Fields: Ion Forced oscillation and Voltage gated Ion Channel Dysfunction, https://doi.org/10.3892/ijo.2021.5272 Oxidative Stress and DNA Damage (Review)." International Journal of Oncology 59, no. 5 (November 2021): 92. Yakymenko, I., A. Burlaka, I. Tsybulin, I. Brieieva, L. Buchynska, I. Tsehmistrenko, and F. Chekhun. "Oxidative and Mutagenic Effects of Low Intensity GSM 1800 MHz Microwave Radiation." Experimental Oncology 40, no. 4 (December 2018): 282–87. Yakymenko, Igor, Olexandr Tsybulin, Evgeniy Sidorik, Diane Henshel, Olga Kyrylenko, and Sergiy Kyrylenko. "Oxidative Mechanisms of Biological Activity of Low-Intensity Radiofrequency Radiation." Electromagnetic Biology and Medicine 35, no. 2 (2016): 186–202. https://doi.org/10.3109/15368378.2015.1043557.		personal data, on internet	Thank you for the comment but this approach can be used for hazard identification, not risk assessment.
Friesen	Margaret	Manitobans for Safe Technology	manitobans4st@gmail.com	Other	Canada	ACKNOWLEDGMENTS	About the Scientific Committee, Page 3, Line 3 To ensure independence, the working group and external experts for this SCHEER opinion should not have ties to or be members of ICNIRP. Otherwise it will be a forgone conclusion that the ICNIRP guidelines, based on thermal (heating) effects, will be accepted as is. Meanwhile there is ample evidence that non-thermal effects can cause harm at levels below ICNIRP recommended limits. Page 3, line 20. The large number of studies showing adverse effects of EMF-RF to the environment (biota- wildlife such as pollinators) is completely lacking from this report (some of the omitted studies are listed elsewhere in our comments).		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER, and the external experts of the WG, perform their tasks in compliance with the principles of excellence, independence, confidentiality, commitment and transparency, as described in the SCHEER Rules of Procedure. Thank you for the comment. Environmental effects of RF-EMF are outside the scope of the mandating DGs.
Fri	M	M	m	Ot	C	A	Page 3, line 39		I do not object to publication of my	Thank you for your comment. The SCHEER and the

							To be truly independent all of the SCHEER working group members and external experts should not be members of, or closely associated with ICNIRP. Any associations should be clearly stated in the Declarations. It is highly unlikely that ICNIRP members would publicly disagree with an organization to which they belong, and indeed which seems to require adherence to the (now outdated) premise that only heating causes harm, as a prerequisite for membership. ICNIRP is a self-regulating body and is not accountable to any governmental body. See: Buchner, K., & Rivasi, M. (2020). The International Commission on Non-Ionizing Radiation Protection: Conflicts of Interest, Corporate Capture and the Push for 5G. This Report Was Commissioned, Coordinated and Published by Two Members of the European Parliament –Michèle Rivasi (Europe Écologie) and Klaus Buchner (Ökologisch-Demokratische Partei), and Financed by the Greens/EfAgroup in the European Parliament., 98. Retrieved from https://klaus-buchner.eu/wp-content/uploads/2020/06/ICNIRP-report-FINAL-19-JUNE-2020.pdf Hardell, Lennart. “World Health Organization, Radiofrequency Radiation and Health - a Hard Nut to Crack (Review).” International Journal of Oncology 51, no. 2 (August 1, 2017): 405–13. http://www.spandidos-publications.com/ijo/51/2/405/abstract Nyberg, Nils Rainer, Julie E. McCredden, Steven G. Weller, and Lennart Hardell. “The European Union Prioritises Economics over Health in the Rollout of Radiofrequency Technologies.” Reviews on Environmental Health, September 22, 2022. https://doi.org/10.1515/reveh-2022-0106.		contribution, including my personal data, on internet	external experts of the WG perform their tasks in compliance with the principles of excellence, independence, confidentiality, commitment and transparency, as described in the SCHEER Rules of Procedure.
Friesen	Margaret	Manitobans for Safe	manitobans4st@gmail.com	Other	Canada	ABSTRACT	Abstract, Page 2, lines 10-13 Basing revisions to EMF-RF guidelines on thermal effects only, such as those used by ICNIRP, do not go far enough. Further major revision, to incorporate the substantial non-thermal adverse effects documented in the peer-reviewed literature, is required. Studies on adverse effects on sperm and more than 30 studies demonstrating DNA damage at below ICNIRP recommended guidelines would be a good place to begin. Lai, Henry. “Genetic Effects of Non-Ionizing Electromagnetic Fields.” Electromagnetic Biology and Medicine 40, no. 2 (April 3, 2021): 264–73. https://doi.org/10.1080/15368378.2021.1881866		I do not object to publication of my contribution, including my personal data, on internet	This is a personal opinion of the commenter. No change in the text is required.

							Panagopoulos, D. J. (2019). Comparing DNA damage induced by mobile telephony and other types of man-made electromagnetic fields. Mutation Research/Reviews in Mutation Research, 781, 53–62. https://doi.org/10.1016/j.mrrev.2019.03.003 Smith-Roe, Stephanie L., Michael E. Wyde, Matthew D. Stout, John W. Winters, Cheryl A. Hobbs, Kim G. Shepard, Amanda S. Green, et al. “Evaluation of the Genotoxicity of Cell Phone Radiofrequency Radiation in Male and Female Rats and Mice Following Subchronic Exposure.” Environmental and Molecular Mutagenesis, October 21, 2019. https://doi.org/10.1002/em.22343. Signals emitted from wireless devices such as cell phones and cell tower antennas are complex and studies and “real-life” exposures are essential to assess harm. Special strict dosimetry is not mandatory for this. The manufacturers provide the Specific Absorption Rate (SAR). Assuming the manufacturers can be trusted to stay within the prescribed standards/guidelines, conditions would automatically be assumed to be below safety levels. This is not to say that confirmation of exposure levels is not necessary.			
Friesen	Margaret	Manitobans for Safe Technology	manitobans4st@gmail.com	Other	Canada	ABSTRACT	Abstract, Lines 7 to 9 continued: Omission of impacts on the environment studies: The preliminary SCHEER report has entirely omitted reporting on environmental studies even though this is in the title. Much of the literature has been reviewed by Levitt et al. 2021 in a 3 part review. PART 1. Levitt, B. B., Lai, H. C., & Manville, A. M. (2021a). Effects of non-ionizing electromagnetic fields on flora and fauna, Part 1. Rising ambient EMF levels in the environment. Reviews on Environmental Health. https://doi.org/10.1515/reveh-2021-0026 PART 2. Levitt, B. B., Lai, H. C., & Manville, A. M. (2021b). Effects of non-ionizing electromagnetic fields on flora and fauna, Part 2 impacts: how species interact with natural and man-made EMF. Reviews on Environmental Health. https://doi.org/10.1515/reveh-2021-0050 PART 3. Levitt, B. B., Lai, H. C., & Manville, A. M. (2021c). Effects of non-ionizing electromagnetic fields on flora and fauna, Part 3. Exposure standards, public policy, laws, and future directions.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. Environmental effects of RF-EMF are outside the scope of the mandating DGs.

							Reviews on Environmental Health. https://doi.org/10.1515/reveh-2021-0083 Of particular concern is the dramatic decline of insect populations and evidence that RF-EMR is a contributing factor. See: Balmori, A. (2022). Evidence for a health risk by RF on humans living around mobile phone base stations: From radiofrequency sickness to cancer. Environmental Research, 113851. https://doi.org/10.1016/j.envres.2022.113851 Evidence of harm to non-humans adds to the weight of evidence of harm to humans.			
Friesen	Margaret	Manitobans for Safe Technology	manitobans4st@gmail.com	Other	Canada	ABSTRACT	Abstract, Lines 7 to 9 continued: The preliminary SCHEER report has omitted the many studies showing adverse health effects of people living near cell tower antennas. Many of these can be found in this recent peer-reviewed paper: Balmori, A. (2022). Evidence for a health risk by RF on humans living around mobile phone base stations: From radiofrequency sickness to cancer. Environmental Research, 113851. https://doi.org/10.1016/j.envres.2022.113851 Radiofrequencies from cell tower antennas are complex communicating with thousands of devices and power density are likely not adequate to be used to establish adequate guidelines and standards. See: Belyaev, I Ya, and Yu G Grigoriev. “Problems in Assessment of Risks from Exposures to Microwaves of Mobile Communication.” Radiatsionnaia Biologiia, Radioecologiia / Rossiĭskaia Akademiia Nauk 47, no. 6 (December 2007): 727–32. Omission of Cell Tower Studies Showing Harm to Human Health: a partial list 1. Balmori, A. (2022) Evidence for a Health Risk by RF on Humans Living around Mobile Phone Base Stations: From Radiofrequency Sickness to Cancer.” Environmental Research, July 14, 2022, 113851. https://doi.org/10.1016/j.envres.2022.113851 2. Gulati, S., et al. Effects of different mobile phone UMTS signals on DNA, apoptosis and oxidative stress in human lymphocytes. Environmental Pollution, 267, 115632. (2020). https://doi.org/10.1016/j.envpol.2020.115632 3. López, I., et al. (2021). What is the radiation before 5G? A		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence assessed following a quality evaluation.

							correlation study between measurements in situ and in real time and epidemiological indicators in Vallecas, Madrid. Environmental Research, 194, 110734. https://doi.org/10.1016/j.envres.2021.110734 4. The Effect of Continuous Low-Intensity Exposure to Electromagnetic Fields from Radio Base Stations to Cancer Mortality in Brazil. International Journal of Environmental Research and Public Health, 18(3). Rodrigues, N. C. P., et al. (2021). https://doi.org/10.3390/ijerph18031229 5. Singh, K., et al. (2016). Effect of electromagnetic radiations from mobile phone base stations on general health and salivary function. Journal of International Society of Preventive & Community Dentistry, 6(1), 54–59. https://doi.org/10.4103/2231-0762.175413 6. Zothansiama, et al. (2017). Impact of radiofrequency radiation on DNA damage and antioxidants in peripheral blood lymphocytes of humans residing in the vicinity of mobile phone base stations. Electromagnetic Biology and Medicine, 1–11. https://doi.10.1080/15368378.2017.1350584			
Friesen	Margaret	Manitobans for Safe Technology	manitobans4st@gmail.com	Other	Canada	ABSTRACT	Abstract, Lines 7 to 9 The preliminary SCHEER report has missed, or at least, not articulated the obvious. Given that there are absolutely no chronic effects human health studies on exposure to millimetre waves, it is therefore highly misleading to give the impression that there are no adverse effects, as many would assume that this statement is evidence-based. The reason no evidence of harm could be found is that there is no evidence - good, bad or neutral for long term 24/7 exposures. The SCHEER report also has not identified many of the emerging risks and the studies needed to fully understand how to adequately address them with appropriate studies. To name a few: ocular, reproductive effects, systemic symptoms		I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment. The lines of the text you are referring to are not specific to millimetre waves but concern long-term exposure and several endpoints (neoplastic diseases, neurodegenerative diseases, reproduction, symptoms, etc.) that have been published and considered in the Opinion.

							(electrosensitivity). The evidence of adverse effects on sperm is scientifically sound and strong. Properly conducted studies are essential to ensure adequate guidelines BEFORE these frequencies are allowed to become pervasive in the environment with 5G and future generation technologies. It is remarkable that the SCHEER report failed to identify the compelling rationale that radiofrequency radiation should be classified as a known human carcinogen in at least three papers: 1. Hardell, Lennart, and Michael Carlberg. "Comments on the US National Toxicology Program Technical Reports on Toxicology and Carcinogenesis Study in Rats Exposed to Whole-Body Radiofrequency Radiation at 900 MHz and in Mice Exposed to Whole-Body Radiofrequency Radiation at 1,900 MHz." International Journal of Oncology, October 24, 2018. https://doi.org/10.3892/ijo.2018.4606 Extract: "Based on the Preamble to the IARC Monographs, RF radiation should be classified as carcinogenic to humans, Group 1". 2. Miller, A. B., Morgan, L. L., Udasin, I., & Davis, D. L. (2018). Cancer epidemiology update, following the 2011 IARC evaluation of radiofrequency electromagnetic fields (Monograph 102). Environmental Research, 167(673-683. https://doi.org/10.1016/j.envres.2018.06.043 Extract: "When considered with recent animal experimental evidence, the recent epidemiological studies strengthen and support the conclusion that RFR should be categorized as carcinogenic to humans (IARC Group 1)." 3. Peleg, M., Nativ, O., & Richter, E. D. (2018). Radio frequency radiation-related cancer: assessing causation in the occupational/military setting. Environmental Research, 163, 123–133. https://doi.org/10.1016/j.envres.2018.01.003 " We reexamine whether radio frequency radiation (RFR) in the occupational and military settings is a human carcinogen. METHODS: We extended an analysis of an already-reported case series of patients with cancer previously exposed to whole-body prolonged RFR, mainly from communication equipment and radar… Overall, the epidemiological studies on excess risk for HL			

							[hematolymphatic]and other cancers together with brain tumors in cellphone users and experimental studies on RFR and carcinogenicity make a coherent case for a cause-effect relationship and classifying RFR exposure as a human carcinogen (IARC group 1)."			
Friesen	Margaret	Manitobans for Safe Technology	manitobans4st@gmail.com	Other	Canada	7 REFERENCES	11 of at least 281 omitted references: 271. Yahyazadeh, Ahmad, & Altunkaynak, B. Z. (2020b). Neuroprotective efficacy of luteolin on a 900-MHz electromagnetic field-induced cerebellar alteration in adult male rat. Brain Research, 1744, 146919. https://doi.org/10.1016/j.brainres.2020.146919 272. Yahyazadeh, Ahmad, Altunkaynak, B. Z., & Kaplan, S. (2020). Biochemical, immunohistochemical and morphometrical investigation of the effect of thymoquinone on the rat testis following exposure to a 900-MHz electromagnetic field. Acta Histochemica, 122(1), 151467. https://doi.org/10.1016/j.acthis.2019.151467 273. Yakymenko, I., Burlaka, A., Tsybulin, I., Brieieva, I., Buchynska, L., Tsehmistrenko, I., & Chekhun, F. (2018). Oxidative and mutagenic effects of low intensity GSM 1800 MHz microwave radiation. Experimental Oncology, 40(4), 282–287. 274. Yang, M.-L., Hong, S.-Y., Huang, H.-H., Lyu, G.-R., & Wang, L.-X. (2020). [The effects of prenatal radiation of mobile phones on white matter in cerebellum of rat offspring]. Zhongguo Ying Yong Sheng Li Xue Za Zhi = Zhongguo Yingyong Shenglixue Zazhi = Chinese Journal of Applied Physiology, 36(1), 77–81. https://doi.org/10.12047/j.cjap.5880.2020.017 275. Yilmaz, A., Tumkaya, L., Akyildiz, K., Kalkan, Y., Bodur, A. F., Sargin, F., … Yazici, Z. A. (2017). Lasting hepatotoxic effects of prenatal mobile phone exposure. The Journal of Maternal-Fetal & Neonatal Medicine: The Official Journal of the European Association of Perinatal Medicine, the Federation of Asia and Oceania Perinatal Societies, the International Society of Perinatal Obstetricians, 30(11), 1355–1359. https://doi.org/10.1080/14767058.2016.1214124 276. Yorgancilar, E., Dasdag, S., Akdag, M. Z., Akkus, Z., Akdag, M., & Topcu, I. (2017). Does all-day and long-term exposure to radiofrequency radiation emitted from Wi-Fi affect hearing? Biotechnology & Biotechnological Equipment, 31(6), 1204–1209. https://doi.org/10.1080/13102818.2017.1373033 277. Zha, X.-D., Wang, W.-W., Xu, S., & Shang, X.-J. (2019). [Impacts of electromagnetic radiation from cellphones and Wi-Fi		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence assessed following a quality evaluation.

							on spermatogenesis]. Zhonghua Nan Ke Xue = National Journal of Andrology, 25(5), 451–455. 278. Zhang, J., Sumich, A., & Wang, G. Y. (2017). Acute effects of radiofrequency electromagnetic field emitted by mobile phone on brain function. Bioelectromagnetics, 38(5), 329–338. https://doi.org/10.1002/bem.22052 279. Zhao, L., Li, J., Hao, Y. H., Gao, Y. B., Wang, S. M., Zhang, J., … Peng, R. Y. (2017). Microwave-induced Apoptosis and Cytotoxicity of NK Cells through ERK1/2 Signaling. Biomedical and Environmental Sciences: BES, 30(5), 323–332. https://doi.org/10.3967/bes2017.043 280. Zong, L., Gao, Z., Xie, W., Tong, J., & Cao, Y. (2019). Role of NF-κB activation in mouse bone marrow stromal cells exposed to 900 MHz radiofrequency fields (RF). Journal of Toxicology and Environmental Health. Part A, 82(3), 157–162. https://doi.org/10.1080/15287394.2018.1564196 281. Zothansiama, -, Zosangzuali, M., Lalramdinpuii, M., & Jagetia, G. C. (2017). Impact of radiofrequency radiation on DNA damage and antioxidants in peripheral blood lymphocytes of humans residing in the vicinity of mobile phone base stations. Electromagnetic Biology and Medicine, 1–11. https://doi.org/10.1080/15368378.2017.1350584			
Friesen	Margaret	Manitobans for Safe Technology	manitobans4st@gmail.com	Other	Canada	7 REFERENCES	10 of at least 281 omitted references 261. Ward, A. F., Duke, K., Gneezy, A., & Bos, M. W. (2017). Brain Drain: The Mere Presence of One's Own Smartphone Reduces Available Cognitive Capacity. Journal of the Association for Consumer Research, 2(2), 140–154. https://doi.org/10.1086/691462 262. Wdowiak, A., Mazurek, P. A., Wdowiak, A., & Bojar, I. (2017). Effect of electromagnetic waves on human reproduction. Annals of Agricultural and Environmental Medicine: AAEM, 24(1), 13–18. https://doi.org/10.5604/12321966.1228394 263. Woelders, H., de Wit, A., Lourens, A., Stockhofe, N., Engel, B., Hulsegge, I., … Zwamborn, P. (2017). Study of potential health effects of electromagnetic fields of telephony and Wi-Fi, using chicken embryo development as animal model. Bioelectromagnetics, 38(3), 186–203.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence assessed following a quality evaluation.

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Friesen	Margaret	Manitobans for Safe	manitobans4st@gmail.co	Other	Canada	7 REFERENCES	10 of at least 281 omitted references 251. Türedi, S., Kerimoğlu, G., Mercantepe, T., & Odacı, E. (2017). Biochemical and pathological changes in the male rat kidney and bladder following exposure to continuous 900-MHz electromagnetic field on postnatal days 22-59(). International Journal of Radiation Biology, 1–10. https://doi.org/10.1080/09553002.2017.1350768 252. Van Huizen, A. V., Morton, J. M., Kinsey, L. J., Von Kannon, D. G., Saad, M. A., Birkholz, T. R., … Beane, W. S. (2019). Weak magnetic fields alter stem cell-mediated growth. Science Advances, 5(1), eaau7201.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence assessed following a quality evaluation.

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Margaret	Friesen	Manitobans for Safe Technology	manitobans4st@gmail.com	Other	Canada	7 REFERENCES	1. Ahmadi, S., Alavi, S. S., Jadidi, M., & Ardjmand, A. (2018). Exposure to GSM 900-MHz mobile radiation impaired inhibitory avoidance memory consolidation in rat: Involvements of opioidergic and nitrergic systems. Brain Research, 1701, 36–45. https://doi.org/10.1016/j.brainres.2018.07.016 2. Akdag, M., Dasdag, S., Canturk, F., & Akdag, M. Z. (2018). Exposure to non-ionizing electromagnetic fields emitted from mobile phones induced DNA damage in human ear canal hair follicle cells. Electromagnetic Biology and Medicine, 37(2), 66–75. https://doi.org/10.1080/15368378.2018.1463246 3. Alam, M., D'Este, C., Banwell, C., & Lokuge, K. (2017). The impact of mobile phone based messages on maternal and child healthcare behaviour: a retrospective cross-sectional survey in Bangladesh. BMC Health Services Research, 17(1), 434. https://doi.org/10.1186/s12913-017-2361-6 4. Alimohammadi, I., Ashtarinezhad, A., Asl, B. M., Masruri, B., & Moghadasi, N. (2018). The effects of radiofrequency radiation on mice fetus weight, length and tissues. Data in Brief, 19, 2189–2194. https://doi.org/10.1016/j.dib.2018.06.107 5. Alkis, Mehmet E., Akdag, M. Z., & Dasdag, S. (2021). Effects of Low-Intensity Microwave Radiation on Oxidant-Antioxidant Parameters and DNA Damage in the Liver of Rats. Bioelectromagnetics, 42(1), 76–85. https://doi.org/10.1002/bem.22315 6. Alkis, Mehmet Esref, Akdag, M. Z., Dasdag, S., Yegin, K., & Akpolat, V. (2019). Single-strand DNA breaks and oxidative changes in rat testes exposed to radiofrequency radiation emitted from cellular phones. Biotechnology & Biotechnological Equipment, 33(1), 1733–1740. https://doi.org/10.1080/13102818.2019.1696702 7. Alkis, Mehmet Esref, Bilgin, H. M., Akpolat, V., Dasdag, S., Yegin, K., Yavas, M. C., & Akdag, M. Z. (2019). Effect of 900-,		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence assessed following a quality evaluation.

							1800-, and 2100-MHz radiofrequency radiation on DNA and oxidative stress in brain. Electromagnetic Biology and Medicine, 38(1), 32–47. https://doi.org/10.1080/15368378.2019.1567526 8. Al-Serori, H., Kundi, M., Ferk, F., Mišík, M., Nersesyan, A., Murbach, M., … Knasmüller, S. (2017). Evaluation of the potential of mobile phone specific electromagnetic fields (UMTS) to produce micronuclei in human glioblastoma cell lines. Toxicology in Vitro: An International Journal Published in Association with BIBRA, 40, 264–271. https://doi.org/10.1016/j.tiv.2017.01.012 9. Altun G, Kaplan S, Deniz OG, Kocacan SE, Canan S, Davis D, & Marangoz C. (2017). Protective effects of melatonin and omega-3 on the hippocampus and the cerebellum of adult Wistar albino rats exposed to electromagnetic fields. JMAU, 5(4), 230–241. https://doi.org/10.1016/j.jmau.2017.05.006 10. Altuntas, G., Sadoglu, D., Ardic, S., Yilmaz, H., Imamoglu, M., & Turedi, S. (2017). Acute effects of the electromagnetic waves emitted by mobile phones on attention in emergency physicians. The American Journal of Emergency Medicine. https://doi.org/10.1016/j.ajem.2017.11.031			
Friesen	Margaret	Manitobans for Safe Technology	manitobans4st@gmail.com	Other	Canada	ABSTRACT	COMMENT: This is a fundamentally flawed report and cannot be relied on for an accurate assessment of “potential health effects” (see more under first point in 1. OPINION). Reasons: - Missing are many relevant studies and comments which would counter the obvious bias in the selection of studies and the interpretation of evidence in the studies in the report. - Inadequate methodology for gathering relevant studies. No methodology is provided on how the literature was compiled. Clearly, neither a systematic nor a comprehensive review was conducted in the compilation of the studies, etc. - The interpretation of studies demonstrating adverse biological and health effects is skewed with what seems to be an intent of neutralizing effects. Adverse effects are often downplayed and the protective messaging that studies include in concluding remarks are often omitted from the SCHEER report. - There is no section devoted to environmental effects. The studies cited are of human and laboratory studies with the		I do not object to publication of my contribution, including my personal data, on internet	- The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence assessed following a quality evaluation. - The SCHEER has used a Weight of Evidence approach to evaluate the numerous studies (reviews and meta-analyses) and report their findings.

							exclusion of the huge body of evidence demonstrating adverse effects on wildlife including pollinators and plants. Humans need a healthy environment to be healthy. - The report does not make clear that there are absolutely no studies on humans that include mm Waves that indicate safety for frequencies above 6 GHz for long term exposures. See statements by Hinrikus, Karipidis et al., and Health Canada below. Most, if not all of the papers that demonstrate adverse effects state that further studies are needed to confirm harm, or that various aspects that could potentially prove harmful should be studied. It is common sense that these should be done BEFORE further widespread deployment of new technologies. technical revision of current RF-EMF guidelines requires more than just improving limits for heating effects. Non-thermal effects, ignored in this report, must also be incorporated for truly protective guidelines. Much of the pertinent scientific evidence is lacking in this preliminary SCHEER report and so a credible "opinion" based on the "most recent literature" is impossible to make. The SCHEER report must include all that is known, as well as what is not known and what decision makers need to know before deploying untested for long-term safety technologies. Detailed comments follow.			- Environmental effects of RF-EMF are outside the scope of the mandating DGs. - The references mentioned in the comment are included in the Opinion. In Section 6 it is clearly written: "There is a need for more research in the higher frequency bands of the RF spectrum (i.e., millimetre waves) and their adverse, favourable or lack of health effects." Risk management and policy making is not in the remit of the SCHEER. Non-thermal effects have been considered in the Opinion. The SCHEER worked with reviews and meta-analyses published after the previous SCENIHR (2015) Opinion.
Scarato	Theodora	Environmental Health	theodora.scarato@ehtrus	Other	USA	6 RECOMMENDATIONS	RECOMMENDATIONS FOR FUTURE WORK should include the specific impacts of EMF radiation exposure on pregnancy, birth, and infant outcomes as recommended by the systematic review see El Jarrah I, Rababa M. Impacts of smartphone radiation on pregnancy: A systematic review. Heliyon. 2022 Feb;8(2):e08915. doi: 10.1016/j.heliyon.2022.e08915. Epub 2022 Feb 8. PMID: 35155842; PMCID: PMC8823972. The effects of microwave radiation on the brain, specifically learning and memory capabilities, brain development from the		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER is of the opinion that the research agenda will largely be determined by the results of the systematic reviews commissioned by the WHO.

							fetal period onward as well as the mechanisms of brain dysfunction with exposure as reported in the literature. See Mumtaz S, Rana JN, Choi EH, Han I. Microwave Radiation and the Brain: Mechanisms, Current Status, and Future Prospects. Int J Mol Sci. 2022 Aug 18;23(16):9288. doi: 10.3390/ijms23169288. PMID: 36012552; PMCID: PMC9409438. Research on impacts to bacteria and antibiotic resistance. See the following studies I H., S.-S., F A., J., H H., Y., & M E., M. (2019). Evaluation of Wi-Fi Radiation Effects on Antibiotic Susceptibility, Metabolic Activity and Biofilm Formation by Escherichia Coli 0157H7, Staphylococcus Aureus and Staphylococcus Epidermis. Journal of Biomedical Physics & Engineering, 9(5), 579–586. https://doi.org/10.31661/jbpe.v0i0.1106 Mortazavi, S. M. J., Taheri, M., Paknahad, M., & Khandadash, S. (2022). Effects of Radiofrequency Electromagnetic Fields Emitted from Mobile Phones and Wi-Fi Router on the Growth Rate and Susceptibility of Enterococcus faecalis to Antibiotics. Journal of Biomedical Physics & Engineering, 12(4), 387–394. https://doi.org/10.31661/jbpe.v0i0.1268 Movahedi, M. M., Nouri, F., Tavakoli Golpaygani, A., Ataee, L., Amani, S., & Taheri, M. (2019). Antibacterial Susceptibility Pattern of the Pseudomonas aeruginosa and Staphylococcus aureus after Exposure to Electromagnetic Waves Emitted from Mobile Phone Simulator. Journal of Biomedical Physics & Engineering, 9(6), 637–646. https://doi.org/10.31661/jbpe.v0i0.1107 Nakouti, I., Hobbs, G., Teethaisong, Y., & Phipps, D. (2017). A demonstration of athermal effects of continuous microwave irradiation on the growth and antibiotic sensitivity of Pseudomonas aeruginosa PAO1. Biotechnology Progress, 33(1), 37–44. https://doi.org/10.1002/btpr.2392 Pegios, A., Kavvadas, D., Zarras, K., Mpani, K., Soukiouroglou, P., Charalampidou, S., Vagdatli, E., & Papamitsou, T. (2022). The Effect of Electromagnetic Radiation Transmitted from Routers on Antibiotic Susceptibility of Bacterial Pathogens. Journal of Biomedical Physics & Engineering, 12(4), 327–338. https://doi.org/10.31661/jbpe.v0i0.2111-1433 Taheri, M., Mortazavi, S. M. J., Moradi, M., Mansouri, S., Hatam,			

							G. R., & Nouri, F. (2017). Evaluation of the Effect of Radiofrequency Radiation Emitted From Wi-Fi Router and Mobile Phone Simulator on the Antibacterial Susceptibility of Pathogenic Bacteria Listeria monocytogenes and Escherichia coli. Dose-Response: A Publication of International Hormesis Society, 15(1), 1559325816688527. https://doi.org/10.1177/1559325816688527 Torgomyan, H., & Trchounian, A. (2012). Escherichia coli membrane-associated energy-dependent processes and sensitivity toward antibiotics changes as responses to low-intensity electromagnetic irradiation of 70.6 and 73 GHz frequencies. Cell Biochemistry and Biophysics, 62(3), 451–461. https://doi.org/10.1007/s12013-011-9327-9			
Scarato	Theodora	Environmental Health Trust	theodora.scarato@ehtrust.org	Other	USA	5.2.2 Cellular interaction mechanisms	5.2.2.3 Calcium signaling (line 48 page 21) As the committee stated, Karipidis et al. [1] published a review stating that there is no confirmed evidence that radio frequency electromagnetic radiation (RFR) is hazardous to health in that it affects cellular Ca2+ levels, especially for the emerging 5G technologies. Karipidis et al. rejected most published experimental studies for failures to provide detailed information on exposures, while also not providing that same information for their definition of “low-level” conditions. They also reported positive findings of increased cancer mortality in studies of radar workers (exposed to higher frequencies occupationally), but dismissed these as reflecting the “healthy worker” effect. In fact, their study used overly stringent criteria that would exclude most critical studies. Effectively, they selected which studies are to be accorded valid concerns and rejected those that do not comport with their views and they have been criticized for such [2]. Even so, Karipidis recommended further intense study to resolve the uncertainty. RFR has also been shown to cause the perturbation of Voltage Gated Calcium Channels (VGCC) [2]–[6] and to promote the activation of mitogen activated protein kinase (MAPK) activity [7]. Ref. [2] pointed out that there is a plethora of studies demonstrating experimentally the disruption of VGCC by RFR at low intensities. VGCC are a class of membrane protein structures responsible for the transport of Ca2+ ions across the cellular membranes for the initiation of many different cellular events [8]. Integral to these processes are reactive oxygen species (ROS) and the interplay between intercellular calcium and ROS for		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The paper cited at this point of the Opinion should have been “Wood A and Karipidis K. Radiofrequency fields and calcium movements into and out of cells. Radiat Res 195, 101-113, 2021”, which, unfortunately, was missing from the references list. For this reason, the comments on the paper by Karipidis et al. are not pertinent to this subsection of the Opinion. The remaining papers listed are either single papers or do not match the inclusion criteria described clearly in §4.2.4.

signaling and regulation is well established [9], [10]. To paraphrase the title of one research paper – ROS and Ca2+ - Partners in sickness and in health [11].
The reliance of the committee on Karidipis et al. [1] for the dismissal of perturbations in Ca2+ cellular levels resulting from exposure to RFR is disturbing.

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[9] A. Görlach, K. Bertram, S. Hudecova, and O. Krizanova, Redox Biol, vol. 6, pp. 260–271, Dec. 2015, doi: 10.1016/j.redox.2015.08.010.

[10] C. Mazars, P. Thuleau, O. Lamotte, and S. Bourque, Molecular Plant, vol. 3, no. 4, pp. 706–718, Jul. 2010, doi: 10.1093/mp/ssq024.

[11] I. S. Ambudkar and S. Muallem, Cell Calcium, vol. 60, no. 2, pp. 51–54, Aug. 2016, doi: 10.1016/j.ceca.2016.06.003.

SCARATO	THEODORA	ENVIRONMENTAL HEALTH TRUST	theodorams@gmail.com	Other	USA	5.1.3 Factors affecting exposure to RF EMF	On page 17 the concept of the Exposure Index (EI) is introduced. The equation is complicated and fails to address the real impact of MIMO on the exposure of the general public [1] and in fact to date there is no real metric to assess the level of exposure caused by the implementation of 5G High Frequency (5G HF) networks for the general public [2]–[6]. Specifically, interference effects are unaccounted for. Various simulation studies do question whether it is possible to avoid over exposure (according to the permitted ICNIRP levels) [7], [8]. We note that the committee did not address this rather important issue. Succinctly put, networks are being planned with little real knowledge of the expected exposures in the public space. Reference [1] M. A. Jamshed, F. Héliot, and T. W. C. Brown, “A Survey on Electromagnetic Risk Assessment and Evaluation Mechanism for Future Wireless Communication Systems,” IEEE Journal of Electromagnetics, RF and Microwaves in Medicine and Biology, vol. 4, no. 1, pp. 24–36, Mar. 2020, doi: 10.1109/JERM.2019.2917766. [2] M. Velghe, S. Shikhantsov, E. Tanghe, L. Martens, W. Joseph, and A. Thielens, “FIELD ENHANCEMENT AND SIZE OF RADIO-FREQUENCY HOTSPOTS INDUCED BY MAXIMUM RATIO FIELD COMBINING IN FIFTH GENERATION NETWORK,” Radiat Prot Dosimetry, vol. 190, no. 4, pp. 400–411, Oct. 2020, doi: 10.1093/rpd/ncaa118. [3] C. Kurnaz and M. Mutlu, “Comprehensive radiofrequency electromagnetic field measurements and assessments: a city center example,” Environ Monit Assess, vol. 192, no. 6, p. 334, May 2020, doi: 10.1007/s10661-020-08312-3. [4] M. Bonato et al., “Computational Assessment of RF Exposure Levels due to 5G Mobile Phones,” in 2022 Microwave Mediterranean Symposium (MMS), May 2022, pp. 1–4. doi: 10.1109/MMS55062.2022.9825603. [5] D. Capriglione, “In-Situ RF Measurements of EMFs for Human Exposure Assessment Due to Modern Cellular Base Stations,” IEEE Instrumentation Measurement Magazine, vol. 24, no. 8, pp. 31–36, Nov. 2021, doi: 10.1109/MIM.2021.9580794. [6] A. M. El-Hajj and T. Naous, “Radiation Analysis in a Gradual 5G Network Deployment Strategy,” in 2020 IEEE 3rd 5G World Forum (5GWF), Sep. 2020, pp. 448–453. doi: 10.1109/5GWF49715.2020.9221314. [7] I. Nasim and S. Kim, “Human Exposure to RF Fields in 5G Downlink,” arXiv:1711.03683 [eess], Nov. 2017, Accessed: Nov. 15, 2021. [Online]. Available: http://arxiv.org/abs/1711.03683 [8] S. Kim and I. Nasim, “Human Electromagnetic Field Exposure		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The EI is an integrative index for exposure and can be adapted to include all technologies emitting RF-EMF. SCHEER considers it sufficiently robust and fit for purpose.

							in 5G at 28 GHz," IEEE Consumer Electronics Magazine, vol. 9, no. 6, pp. 41–48, Nov. 2020, doi: 10.1109/MCE.2019.2956223. This section also omits factors such as metal inside or outside the body that can affect exposure. Examples of mitted studies that should be included: E. Matsuda, K. Sakakibara, T. Hikage, M. Yamamoto and T. Nojima, "Estimation of SAR Enhancement Due to Implant Metal Exposed to External Electromagnetic Waves," 2018 IEEE International Workshop on Electromagnetics:Applications and Student Innovation Competition (iWEM), 2018, pp. 1-1, doi: 10.1109/iWEM.2018.8536666. M. A. Moutaouekkil, C. Taybi, A. Ziyyat and D. Picard, "The effect of metal braces on antenna parameters and the SAR distribution of the head exposed to popular cellular frequencie," 2017 Mediterranean Microwave Symposium (MMS), 2017, pp. 1-4, doi: 10.1109/MMS.2017.8497148. M. Safari and A. Abdolali, "Dental Implants and Mobile-Phone Use: How implant presence and position affect antenna parameters, specific absorption rate, and current density.," in IEEE Antennas and Propagation Magazine, vol. 58, no. 5, pp. 43-51, Oct. 2016, doi: 10.1109/MAP.2016.2593999.			
Scarato	Theodora	Environmental Health Trust	theodora.scarato@ehtrust.org	Other	USA	5.1.1 Wireless communication technologies	Omits that the public uses numerous devices in close proximity to their body and there are numerous data gaps regarding how to characterize a person's true far field and near field exposures throughout a typical day. Omits new research on exposure to the fetus and to children Mohammed, B., Jin, J., Abbosh, A. M., Bialkowski, K. S., Manoufali, M., & Crozier, S. (2017). Evaluation of Children's Exposure to Electromagnetic Fields of Mobile Phones Using Age-Specific Head Models With Age-Dependent Dielectric Properties. IEEE Access, 5, 27345–27353. https://doi.org/10.1109/ACCESS.2017.2767074 Siervo, B., Morelli, M. S., Landini, L., & Hartwig, V. (2018). Numerical evaluation of human exposure to WiMax patch antenna in tablet or laptop. Bioelectromagnetics, 39(5), 414–422. https://doi.org/10.1002/bem.22128 T. Nagaoka, A. Tateno, K. Saito, M. Takahashi, S. Watanabe and K. Ito, "Calculation of SAR and temperature in pregnant female models for a half-wavelength dipole antenna at 900 MHz and 2		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. This point is covered in the Opinion. However, it is not true that engineering and science lack methodologies to characterize typical exposure to RF-EMF. As technology and its use changes, these methodologies need to adapt, as well.

							GHz," 2016 International Symposium on Antennas and Propagation (ISAP), 2016, pp. 918-919.			
Scarato	Theodora	Environmental Health Trust	theodora.scarato@ehtrust.org	Other	USA	5.1.1 Wireless communication technologies	5.1.1.1 Typical exposure of population page 13 The preliminary opinion omits that the public uses numerous devices in close proximity to their body and there are numerous data gaps regarding how to characterize a person's true far field and near field exposures throughout a typical day. The preliminary opinion omits new research on exposure to the fetus and to children that should be included for example. Mohammed, B., Jin, J., Abbosh, A. M., Bialkowski, K. S., Manoufali, M., & Crozier, S. (2017). Evaluation of Children's Exposure to Electromagnetic Fields of Mobile Phones Using Age-Specific Head Models With Age-Dependent Dielectric Properties. IEEE Access, 5, 27345–27353. https://doi.org/10.1109/ACCESS.2017.2767074 Siervo, B., Morelli, M. S., Landini, L., & Hartwig, V. (2018). Numerical evaluation of human exposure to WiMax patch antenna in tablet or laptop. Bioelectromagnetics, 39(5), 414–422. https://doi.org/10.1002/bem.22128 T. Nagaoka, A. Tateno, K. Saito, M. Takahashi, S. Watanabe and K. Ito, "Calculation of SAR and temperature in pregnant female models for a half-wavelength dipole antenna at 900 MHz and 2 GHz," 2016 International Symposium on Antennas and Propagation (ISAP), 2016, pp. 918-919. F. Foroutan and N. Noori, "SAR Calculation of a Pregnant Woman Model Exposed to LTE and Wi-Fi Signals," 2020 10th International Symposium onTelecommunications (IST), 2020, pp. 207-210, doi: 10.1109/IST50524.2020.9345879. M. R. A. Qureshi, Y. Alfadhl and X. Chen, "The influence of children's weight on the absorption of electromagnetic fields," 2016 IEEE International Symposium on Antennas and Propagation (APSURSI), 2016, pp. 1631-1632, doi: 10.1109/APS.2016.7696522. M. Lyell and D. Aloi, "A study of SAR on child passengers and driver due to cellphone connectivity within vehicle," 2018 International Applied Computational Electromagnetics Society Symposium (ACES), 2018, pp. 1-2, doi:		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence assessed following a quality evaluation.

							10.23919/ROPACES.2018.8364177. R. D. Morris, L. L. Morgan and D. Davis, "Children Absorb Higher Doses of Radio Frequency Electromagnetic Radiation From Mobile Phones Than Adults," in IEEE Access, vol. 3, pp. 2379-2387, 2015, doi: 10.1109/ACCESS.2015.2478701. “The numerical results have shown that the obtained maximal SAR values in AustiWoman model is higher than are maximum values determined according to maximum SAR in European standards limit.” Z. Psenakova, M. Beňová and T. Lauková, "Investigation of Specific absorption rate (SAR) near model of fetus in uterus," 2020 ELEKTRO, 2020, pp. 1-6, doi: 10.1109/ELEKTRO49696.2020.9130308.			
Scarato	Theodora	Environmental Health Trust	theodora.scarato@ehtrust.org	Other	USA	2 OPINION	Pg 7 line 17 Regarding the statement “The SCHEER has also noted that new and emerging wireless applications using RF EMF tend to use higher frequencies and lower emitted power in closer vicinity to the human body. However, there are situations where beam focusing or intense pulsed radiation can increase exposure for short times.” This opinion should include a statement regarding far field exposure and the increase to those people in close proximity to base stations due to the densification of 5G and 4G new wireless networks. Studies show that the ambient RF levels have increased, especially when base stations are densified. Further, new and emerging technologies have resulted in billions of new wireless devices in the home, work, in the car and at school, which exist in combination with earlier technologies, increasing human exposures. Examples of studies omitted. El-Hajj, A. M., & Naous, T. (2020). Radiation Analysis in a Gradual 5G Network Deployment Strategy. 2020 IEEE 3rd 5G World Forum (5GWF), 448–453. https://doi.org/10.1109/5GWF49715.2020.9221314 Koppel, T., & Hardell, L. (2022). Measurements of radiofrequency electromagnetic fields, including 5G, in the city of Columbia, SC, USA. World Academy of Sciences Journal, 4(3), 1–12. https://doi.org/10.3892/wasj.2022.157		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. There is conflicting evidence in the literature using simulation data on the possible increase from the introduction of new cellular networks. The text has been amended accordingly. This is an area of ongoing research. The actual impact remains to be demonstrated with spot measurements and environmental monitoring.

							Hardell, L., Carlberg, M., & Hedendahl, L. K. (2018). Radiofrequency radiation from nearby base stations gives high levels in an apartment in Stockholm, Sweden: A case report. Oncology Letters, 15(5), 7871–7883. https://doi.org/10.3892/ol.2018.8285. Koppel T, Ahonen M, Carlberg M, Hardell L. Very high radiofrequency radiation at Skeppsbron in Stockholm, Sweden from mobile phone base station antennas positioned close to pedestrians' heads. Environ Res. 2022 May 15;208:112627. doi: 10.1016/j.envres.2021.112627. Epub 2022 Jan 4. PMID: 34995546. Pg 7 line 4 the preliminary opinion states, “when necessary, 3 narrative or scope reviews and single research papers” but the way such decisions were made regarding which reviews or studies was not systematic and numerous studies are omitted from the draft that should have been icluded, yet no reason was provided. Pg 7 line 4 states “The SCHEER could not identify moderate or strong level of evidence for adverse health 10 effects resulting from chronic or acute RF EMF exposure at levels below the limits “ and yet several of the reviews document cancer and impacts to reproduction that are at a minimum moderate and some strong. This opinion does not accurately characterize the existing literature.			Thank you for the comment. This part of the text (§4.2.4) has been amended for clarity. Thank you for the comment. The text in §4.1 has been amended for clarity on the WoE (Weight of Evidence) approach by the SCHEER.
Wright	Shelley	Canadian Educators for Safe Technology	shelleywright.ce4st@gmail.com	Other	Canada	2 OPINION	SCHEER OPINION, line 10,11,12: SCHEER could not identify moderate levels of evidence for adverse health effects resulting from chronic or acute RF EMF exposure at levels below the limits set in the annexes of Council Recommendation 1999/519/EC and Directive 2013/35/EU. There is a growing and significant body of scientific evidence which demonstrates adverse, biological effects resulting from chronic or acute RF EMF exposures well below sanctioned guidelines. Dr. Martin Pall, a leading EMF/RF researcher, Emeritus Biochemistry and Medical Sciences Professor, Washington State U. summarizes the non-thermal, adverse biological effects induced by RF exposure at levels below sanctioned health guidelines: 1. Nervous system – neurological/neuropsychiatric effects		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence assessed following a quality evaluation.

							https://pubmed.ncbi.nlm.nih.gov/27364114/ 2. Endocrine – hormones https://pubmed.ncbi.nlm.nih.gov/26841641/ 3. Oxidative stress and free radical damage, which have a central role in all chronic diseases https://pubmed.ncbi.nlm.nih.gov/26151230/ 4. Attack the DNA of cells producing single strand and double strand breaks in cellular DNA and oxidized bases in cellular DNA, creating mutations in germ line cells which produce mutations in future generations. 5. Produce elevated levels of apoptosis (programmed cell death), which can lead to neurodegenerative diseases and infertility (attack DNA in Sperm cells). https://www.sciencedirect.com/science/article/abs/pii/S0891061815000757 6. Lower male and female fertility, lower sex hormones, lower libido, and increased levels of spontaneous abortion: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8669072/ https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6469375/ 7. Produce excessive intracellular calcium [Ca2+] and excessive calcium signaling. https://pubmed.ncbi.nlm.nih.gov/18302487/ 8. 15 mechanisms of cancer causation (initiate and promote)https://www.taylorfrancis.com/chapters/edit/10.1201/b22486-7/cancer-caused-microwave-frequency-electromagnetic-field-emf-exposures-martin-pall Dr. Lai, professor emeritus at the University of Washington has focused on the biological effects of non-ionizing electromagnetic fields and their possible medical applications with research, neurochemistry, behaviour, and cancer treatment. On April 19, 2022, Dr. Henry Lai and B. Blake Levitt published an extensive review of the research on the biological effects of wireless radiation which calls for stronger limits on radio frequency radiation exposure to protect human health. They report on the roles of intensity, exposure duration and modulation on the biological effects of radiofrequency radiation and exposure guidelines. In this review of 112 low-intensity studies, they discovered that biological effects of RFR “could occur at a median specific absorption rate of 0.0165 W/kg.” They reported “Intensity			

							and exposure duration interact since the dose of energy absorbed is the product of intensity and time." Since RFR is modulated to allow information to be encrypted, research indicates that electromagnetic energy is more "biologically potent in causing effects other than thermal changes." They conclude, "RFR behaves like a biological stressor capable of affecting numerous living systems. Henry Lai & Blake Levitt, pages 230-255, April 19, 2022 https://www.tandfonline.com/doi/full/10.1080/15368378.2022.2065683 Based on current research, Dr. Lai and B. Levitt recommend governments should revise health guidelines which reflect a maximum fully-body Specific Absorption Rate (SAR) of 1.65 milliwatts per kilogram which is 48 times lower than current wireless exposure limits which allow the public to be exposed to a full-body SAR of 80 milliwatts per kilogram.			
Bevington	Michael	Electrosensitivity UK	michael@es-uk.info			5.3.3 Symptoms	5.3.3 Symptoms [lines 41ff] Schmiedchen et al. (2019) included as author a member of ICNIRP, which believes RFR produces adverse effects only by heating. Such a viewpoint is unlikely to deny this possibility, as in four particular areas. 1.Reviews etc shows the existence of electromagnetic hypersensitivity (EHS). Belpomme D et al., "Why scientifically unfounded … should be dismissed … in the acknowledgment of EHS …" (Rev Environ Health, 2021) Belpomme D et al., "Why EHS … are caused by non-ionizing man-made EMFs: An overview …" (Environ Res., 2022) Belpomme D et al: "Reliable disease biomarkers characterizing and identifying EHS and MCS as two etiopathogenic aspects of a unique pathological disorder" (Rev Environ Health, 2015) Belpomme D et al., "EHS as a Newly Identified and Characterized Neurologic Pathological Disorder …" (Int J Mol Sci., 2020) Belyaev I et al., "EUROPAEM EMF Guideline 2016 for the		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence assessed following a quality evaluation.

							prevention, diagnosis and treatment of EMF-related health problems …" (Rev Environ Health, 2016) 2. These studies show that EHS is the same condition as that established in 1746 and is different from eletrophobia, identified in 1903. 3. Ecological studies also confirm the existence of real EHS. Hardell L et al.: [Microwave radiation from base stations on rooftops gave medical symptoms consistent with the microwave syndrome] [Swedish] (Medicinsk Access, 2022) Hardell L et al.: "EHS close to mobile phone base stations …" (Rev Environ Health, 2022) 4. 3d fMRI scans and ultrasonic cerebral tomosphygmography can show EHS brain damage and confirm the Havana syndrome as consistent with EHS, just as RFR has been used in warfare since 1945. DARPA's Project Iceman seeks to solve EHS in aircrew. Greco F, "Technical Assessment of Ultrasonic Cerebral Tomosphygmography … for the Diagnosis of EHS and MCS" (Diagnostics (Basel), 2020) Heuser G et al., "Functional brain MRI in patients complaining of EHS after long term exposure to EMFs" (Rev Environ Health, 2017) Irigaray P et al., "How Ultrasonic Cerebral Tomosphygmography can Contribute to the Diagnosis of EHS" (J Clin Diagn Res., 2018) [lines 44ff] Huang et al. (2018) found that 0.58% of the population had impaired daily activities because of EHS. Another review found 3.6% had EHS and 1.2% severe symptoms or daily impairment, with an estimated 0.65% having restricted access to work. Bevington M, "The Prevalence of People with Restricted Access to Work in Manmade EM Environments" (J Environ Health Sci., 2019) [lines 1ff]			

							Leszczynski (2021) showed that the WHO/ICNIRP (2005) presumption that EHS is psychological despite the lack of proof is inconsistent with the scientific evidence. Comments showed that there is sufficient evidence to state that EHS is proven beyond all reasonable doubt, based on studies on provocation, ecology, objective markers, chronobiology from disturbances to atmospheric electricity, animals, and mechanisms, along with convincing and consistent evidence from thousands of physicians, scientists and reliable witnesses. Bevington M, "'Proof of EHS beyond all reasonable doubt'. Comment on: Leszczynski D. Review of the scientific evidence on the individual sensitivity to EMFs (EHS). Rev Environ Health 2021; doi: 10.1515/reveh-2021-0038." (Rev Environ Health, 2021) 5.3.3.1 Conclusions on symptoms [lines 18] Since 2015 courts have recognised that EHS exists and RFR causes functional disability, based on the weight of evidence. They consider EHS people are interested parties in siting masts. They require the removal of Wifi and mobile phone exposure to ensure equal opportunities for people with EHS. SCHEER's Opinion is inconsistent with this. Hardell L, "WHO, RFR and health – a hard nut to crack (Review)" (Int J Oncology, 2017)			Thank you for the comment. SCHEER performs risk assessment based on the WoE approach. It is not up to SCHEER to implement risk management. Moreover, causal links cannot be established by a court of law.
Bevington	Michael	Electrosensitivity UK	michael@es-uk.info	United Kingdom		4.2.2 ICNIRP (2020) Guidelines -	4.2.1.4. Fertility, Reproduction, and Childhood Development [lines 46ff] "Effects of exposure on foetuses from mother's mobile phone use during pregnancy were not plausible owing to extremely low foetal exposure" 4.2.2.8 Fertility, Reproduction, and Childhood Development [lines 3ff] "have not shown any substantiated evidence that RF EMF exposure from maternal mobile phone use affects child cognitive or psychomotor development or causes developmental milestone delays"		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. This is a personal opinion on the ICNIRP Guidelines. No change in the text is required.

							These statements raise the issue of prejudging the evidence as explained above and the imprecise or undefined use of terminology. ‘Plausible’, ‘low’, ‘substantiated’ are not defined, despite studies showing narrow ‘windows’ of effects where ‘low’ exposures are more bio-active than ‘high’ exposures. The second statement also appears to be restricted to a more limited range of outcomes than is expected for a review. Many studies show adverse non-thermal effects on fertility and fetal development, male and female. Some are summarised in Starkey SJ, “Inaccurate official assessment of radiofrequency safety by the Advisory Group on Non-ionising Radiation (AGNIR)” (Rev Environ Health, 2016) where this critique review showed that 78% of the 45 studies available found adverse effects on male fertility, yet the AGNIR reviewers, all inclined to the thermal hypothesis like, apparently, the members of SCHEER, denied adverse effects and harm by claiming the studies allowed “no conclusions”. Starkey’s devastating review is not included in SCHEER’s list of references. A very small selection of studies on this topic from 2015 include the following, not restricted to reviews. These studies do not appear totally reassuring in every respect as regards adverse non-thermal effects. However, they are not convincingly and consistently disproved or refuted by the SCHEER Opinion. (This selection is limited to over 20 studies whose initial authors have surnames beginning with the letter ‘A’, for reasons of space.) Abdollahi M-B et al., “Comparison of mice' sperm parameters exposed to some hazardous physical agents” (Environ Anal Health Toxicol., 2021) Adebayo EA et al., “Bio-physical effects of radiofrequency electromagnetic radiation (rf-emr) on blood parameters, spermatozoa, liver, kidney and heart of albino rats” (Journal of King Saud University – Science, 2018) Agarwal A et al., “Are men talking their reproductive health away?” (Asian J Androl., 2015) Ahmadi SS et al., “Effect of non-ionizing electromagnetic field on the alteration of ovarian follicles in rats” (Electron Physician, 2016) Akakin D et al., “Electromagnetic Waves from Mobile Phones may Affect Rat Brain During Development” (Turk Neurosurg.,			

							2020) Akbari HA et al., “Moderate exercise training as an effective strategy to reduce the harmful effects of cell phone radiation on Wistar rat's semen quality” (Int J Radiation Research, 2021) Akdag MZ et al., “Does prolonged radiofrequency radiation emitted from Wi-Fi devices induce DNA damage in various tissues of rats?” (J Chem Neuroanat., 2016) Al-Bayyari N, “The effect of cell phone usage on semen quality and fertility among Jordanian males” (Middle East Fert Soc J., 2017) Alchalabi ASH et al., “Different periods of intrauterine exposure to electromagnetic field: Influence on female rats' fertility, prenatal and postnatal development” (Asian Pacific Journal of Reproduction, 2016) Ali S et al., “Exposure to 1800 MHz GSM-like radiofrquency electromagnetic field reduces follicular development and overall fertility of female rats” (Asian Pacific J of Reproduction 2015) Alimohammadi I et al., “The effects of radiofrequency radiation on mice fetus weight, length and tissues” (Data Brief, 2018)			
Bevington	Michael	Electrosensitivity UK	michael@es-uk.info	United Kingdom		2 OPINION	2. Opinion [lines 10ff] 1.The SCHEER Opinion’s failure to “identify moderate or strong level of evidence for adverse health effects resulting from chronic or acute RF EMF exposure at levels below the limits set” conflicts with the established mainstream evidence covering the whole of the last century since the 1920s, and this should be noted in its Opinion to give a balanced viewpoint. An Opinion depends on the range of evidence on which it is based and the USA from the 1930s onwards admitted in the 1960s that it likewise failed to keep up with the mainstream scientific evidence, in this case from eastern European, partly because of their preconceived belief that neurophysiological effects were not ‘health’ in their opinion. The adoption of Aristotelian presumptions over Baconian empirical imperatives has produced similar divisions in scientific discourse, from Galileo’ heliocentrism in 1610 to Montagnier’s discovery of electromagnetic cellular communication from bacterial DNA at high aqueous solutions in 2009.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comments. The WoE approach followed by the SCHEER is described in https://health.ec.europa.eu/system/files/2019-02/scheer_o_014_0.pdf

							2. The SCHEER Opinion should contain reference to perceived Conflicts of Interest. For instance, one of its External Experts is listed among the eighteen “Persons who were members of more than one of the committees authoring ICNIRP 2020 and the literature reviews referenced in ICNIRP 2020”. See: Nordhagen EK et al., “Self-referencing authorships behind the ICNIRP 2020 radiation protection guidelines” (Rev Environ Health, 2022).			The SCHEER rules of procedures are described in https://health.ec.europa.eu/system/files/2022-02/rules_procedure_2016_en.pdf
Bevington	Michael	Electrosensitivity UK	michael@es-uk.info	United Kingdom		1.1 Background	1.1 Background [Lines 9ff] Given the criticism by the U.S. Appeal Court Judges in 2021 of the ‘arbitrary and capricious’ failure of the FCC to consider non-thermal effects of Radio Frequency Radiation (RFR) and the Appeal Court judgement requiring the FCC to undertake a review of the non-thermal effects of RFR, and given the fact that exactly the same criticism applies to the ICNIRP 1998 and 2020 guidelines, the Background information should explain the need for a full evaluation of such adverse non-thermal effects, known since 1893 and established since the 1920s. In addition to explaining the above judicial requirements, the Background should include further information relevant to this fundamental issue, as follows. 1. The ICNIRP 1998 and 2020 guidelines are based on the hypothesis that only thermal effects of RFR have adverse health effects. This was disproved by 1930 when it was established that the primary effects were non-thermal with thermal secondary. 2. The ICNIRP accepts (General Principles, 2002) adverse non-thermal effects and that people vulnerable to them need non-thermal guidelines, not thermal ones which are irrelevant to their adverse health effects. 3. The ICNIRP accepts that their 2020 guidelines protect against only thermal effects and do not include established non-thermal effects known since 1893. In 2022, in a critique of Professor JF William, “Electromagnetic Fields, 5G and Health: What about the Precautionary Principle?” (J Epidemiol Community Health, 2021), the ICNIRP stated its belief that “the lowest exposure levels that have been found to cause harm, cause that harm via heating” (p.3), an unequivocal endorsement of the thermal myth.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. This section contains information only on the background defined in the context of the mandate to the SCHEER. No changes to the text are required.

							4. In this critique, the ICNIRP failed to explain that adverse health effects from RFR depend in part on frequency modulation and amplitude and also duration of exposure. The failure to include chronic exposures invalidated Schwan's 1953 thermal hypothesis which arbitrarily limited exposure assessment to 6 or 30 minutes. This meant that U.S. experts in 1957 regarded Schwan's hypothesis as unscientific, arbitrary and unprotective. The same is true today of the ICNIRP 1998 and 2020 guidelines which are still based on Schwan's invalidated heating hypothesis. 5. The Background should include an assessment of the European Union's Treaty's Precautionary Principle. The SCHEER Preliminary Opinion fails to make any reference to the EU's Precautionary Principle, invalidating its conclusion. The EU's Precautionary Principle requires the prioritisation of health effects, established and potential, over economic justifications. See Nyberg NR et al., "The European Union prioritises economics over health in the rollout of radiofrequency technologies" (Rev Environ Health, 2022). 6. The Background fails to include international biological long-term RFR guidelines, limiting itself to only ICNIRP's short-term heating guidelines. It would help assessors, and be essential a valid peer-reviewed meta-review, to review the differences in methodology and outcome of between ICNIRP's short-term heating-only RFR guidelines and international biological long-term RFR guidelines. Non-thermal guidelines were the first guidelines promulgated, in 1935, long before the military imposed Schwan's invalidated heating limits in 1953. Recent international biological long-term RFR guidelines include Bioinitiative 2012, Building Biology 2008, EUROPAEM EMF Guidelines 2016, International Guidelines on Non-Ionising Radiation (IGNIR) 2018, and Seletun 2010.			
Denney	Michael	Arqiva	mike.denney	United		ABSTRACT	Arqiva has no comments on the content of the SCHEER Opinion (scheer_o_044_0.pdf), but we might have comments on any reviews that might follow of Recommendation 1999/519/EC and Directive 2013/35/EU.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment.

Scarato	Theodora	Environmental Health Trust	theodora.scarato@ehtrust.org	Other	USA	5 ASSESSMENT	Numerous endpoints should have been assessed that are omitted from the 2022 preliminary opinion. Although 4.2.2.4 in the 2015 opinion addresses the Neuroendocrine System, the 2022 draft opinion assessment does not include publications on this issue, nor is there any assessment. Sangun et al., 2015 reviewed the growing number of studies" on the impacts on metabolism and endocrine function. The 2022 draft opinion should be updated to include reviews and relevant studies on the impact to the endocrine system Sangün Ö, Dündar B, Çömlekçi S, Büyükgebiz A. The Effects of Electromagnetic Field on the Endocrine System in Children and Adolescents. Pediatr Endocrinol Rev. 2015 Dec;13(2):531-45. PMID: 26841641 Cantürk Tan, F., Yalçin, B., Yay, A. H., Tan, B., Yeğin, K., & Daşdağ, S. (2022). Effects of pre and postnatal 2450 MHz continuous wave (CW) radiofrequency radiation on thymus: Four generation exposure. Electromagnetic Biology and Medicine, 41(3), 315–324. https://doi.org/10.1080/15368378.2022.2079673 Siqueira, E. C., de Souza, F. T. A., Ferreira, E., Souza, R. P., Macedo, S. C., Friedman, E., Gomez, M. V., Gomes, C. C., & Gomez, R. S. (2016). Cell phone use is associated with an inflammatory cytokine profile of parotid gland saliva. Journal of Oral Pathology & Medicine, 45(9), 682–686. https://doi.org/10.1111/jop.12434 The 2022 preliminary opinion also omitted a section and any new data on what the 2015 opinion termed "Combined exposures to EMF" section 3.13.6. Several new studies have found effects from combined exposures. Ansarihadipour, H., & Bayatiani, M. (2016). Influence of Electromagnetic Fields on Lead Toxicity: A Study of Conformational Changes in Human Blood Proteins. Iranian Red Crescent Medical Journal, 18(7), e28050.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence assessed following a quality evaluation. No meta-analyses or systematic reviews on combined exposures to EMF could be found in the peer-reviewed literature.

https://doi.org/10.5812/ircmj.28050

Choi, K.-H., Ha, M., Ha, E.-H., Park, H., Kim, Y., Hong, Y.-C., Lee, A.-K., Hwa Kwon, J., Choi, H.-D., Kim, N., Kim, S., & Park, C. (2017). Neurodevelopment for the first three years following prenatal mobile phone use, radio frequency radiation and lead exposure. Environmental Research, 156, 810–817. https://doi.org/10.1016/j.envres.2017.04.029

Kostoff, R.N. and Clifford G.Y. Lau. 2017. “Modified health effects of non-ionizing electromagnetic radiation combined with other agents reported in the biomedical literature.” Microwave Effects on DNA and Proteins (2017): 97-158.

Lerchl, A., Klose, M., Grote, K., Wilhelm, A. F. X., Spathmann, O., Fiedler, T., Streckert, J., Hansen, V., & Clemens, M. (2015). Tumor promotion by exposure to radiofrequency electromagnetic fields below exposure limits for humans. Biochemical and Biophysical Research Communications, 459(4), 585–590. https://doi.org/10.1016/j.bbrc.2015.02.151

Sueiro-Benavides, R. A., Leiro-Vidal, J. M., Salas-Sánchez, A. Á., Rodríguez-González, J. A., Ares-Pena, F. J., & López-Martín, M. E. (2021). Radiofrequency at 2.45 GHz increases toxicity, pro-inflammatory and pre-apoptotic activity caused by black carbon in the RAW 264.7 macrophage cell line. Science of The Total Environment, 765, 142681. https://doi.org/10.1016/j.scitotenv.2020.142681

Vila, J., Turner, M. C., Gracia-Lavedan, E., Figuerola, J., Bowman, J. D., Kincl, L., Richardson, L., Benke, G., Hours, M., Krewski, D., McLean, D., Parent, M.-E., Sadetzki, S., Schlaefer, K., Schlehofer, B., Schüz, J., Siemiatycki, J., van Tongeren, M., Cardis, E., & INTEROCC Study Group. (2018). Occupational exposure to high-frequency electromagnetic fields and brain tumor risk in the INTEROCC study: An individualized assessment approach. Environment International, 119, 353–365. https://doi.org/10.1016/j.envint.2018.06.038

Scarato	Theodora	Environmental Health Trust	theodora.scarato@ehtrust.org	Other	USA	5.3.3 Symptoms	Page 34 line 28 3.6.3. The 2015 Report addresses headaches but studies on headaches were omitted from the 2022 Preliminary Opinion and they should be included as a symptom of exposure: The study Trigger of a migraine headache among Thai adolescents smartphone users: a time series study published in the journal Environmental Analysis Health and Toxicology found migraine headaches correlated in a non linear fashion with specific smartphone radiation levels. The authors conclude that "the findings from the present study point out that smartphone electromagnetic radiation is likely to be the trigger of migraine type headache" and "Finally, younger student, internet use and talking without hand-free devices were risk factors of migraines. It is recommended that limited time for smartphone talking with hand-free device and older age starting using smartphone be suggested in order to prevent migraine attack." A systematic review and meta-analysis of cell phone radiation and risk of headaches published in the International Archives of Occupational and Environmental Health found increasing call duration and mobile phone use in older individuals increased the risk of headache. Chongchitpaisan W, Wiwatanadate P, Tanprawate S, Narkpongphan A, Siripon N. Trigger of a migraine headache among Thai adolescents smartphone users: a time series study. Environ Anal Health Toxicol. 2021 Mar;36(1):e2021006-0. doi: 10.5620/eaht.2021006. Epub 2021 Mar 18. PMID: 33730793; PMCID: PMC8207005. Farashi S, Bashirian S, Khazaei S, Khazaei M, Farhadinasab A. Mobile phone electromagnetic radiation and the risk of headache: a systematic review and meta-analysis. Int Arch Occup Environ Health. 2022 Sep;95(7):1587-1601. doi: 10.1007/s00420-022-01835-x. Epub 2022 Jan 22. PMID: 35064837.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. The text has been amended to include the references that comply with these criteria.

Scarato	Theodora	Environmental Health Trust	theodora.scarato@ehtrust.org	Other	USA	5.3.2 Neurological and neurobehavioural effects	Page 30 line 2 The replicated study by Foerster on memory should have been included rather than concluding “the lack of evidence” Foerster, M., Thielens, A., Joseph, W., Eeftens, M., & R, öösli M. (n.d.). A Prospective Cohort Study of Adolescents’ Memory Performance and Individual Brain Dose of Microwave Radiation from Wireless Communication. Environmental Health Perspectives, 126(7), 077007. https://doi.org/10.1289/EHP2427 The 2022 Preliminary Opinion has omitted several review papers on neurological effects which should be included. A systematic review found that neuronal ion channels are particularly affected (Bertagna et al 2021). “Here, we systematically clarify how neuronal ion channels are particularly affected and differentially modulated by EMFs at multiple levels, such as gating dynamics, ion conductance, concentration in the membrane, and gene and protein expression. Ion channels represent a major transducer for EMF-related effects on the CNS” Bertagna F, Lewis R, Silva SRP, McFadden J, Jeevaratnam K. Effects of electromagnetic fields on neuronal ion channels: a systematic review. Ann N Y Acad Sci. 2021 Sep;1499(1):82-103. doi: 10.1111/nyas.14597. Epub 2021 May 4. PMID: 33945157. Hu et al., 2021 “In summary, research on the synthesis, metabolism and transport of neurotransmitters in the brain by EMR is increasing gradually, but due to the different parameters of EMR, experimental objects and conditions, the experimental results are not very consistent and comparative. Therefore, the effects of EMR on the metabolism and transport of neurotransmitters have not been clarified. Moreover, the role of neurotransmitters and their mechanism in the neurobehavioral dysfunction induced by EMR have not been revealed. Further detailed studies are needed. On the other hand, because of the complex diversity of neurotransmitters in the brain, the interaction, cotransmission and coregulation of neurotransmitters make it difficult to distinguish the primary and secondary changes of each neurotransmitter. Furthermore, the interaction of different neural nuclei in the brain constitutes sophisticated neural circuits, which is the fundamental basis of how the brain performs functions. Consequently, the regulation of neural circuits may be involved in the neurotransmitter disorder of the brain induced by EMR.”		I do not object to publication of my contribution, including my personal data, on internet	Thank you for this comment. This is an individual epidemiological study, not a meta-analysis or systematic review. Thank you for the comment. The text has been amended accordingly. Thank you for the comment, however, this is not a meta-analysis or systematic review.

							Hu C, Zuo H, Li Y. Effects of Radiofrequency Electromagnetic Radiation on Neurotransmitters in the Brain. Front Public Health. 2021 Aug 17;9:691880. doi: 10.3389/fpubh.2021.691880. PMID: 34485223; PMCID: PMC8415840. Review on RFR and the brain found the threshold for an effect in EEG is far lower than the level deemed safe by the U.S. FCC and ICNIRP (Hinrikus et al. 2021). "The analyses of the physical model of nonthermal mechanisms of RF EMF effect leads to conclusion that no principal threshold of the effect can be determined. According to the review of experimental data, the rate of detected RF EMF effects is 76.7% in resting EEG studies, 41.7% in sleep EEG and 38.5% in behavioral studies. The changes in EEG probably appear earlier than alterations in behavior become evident. The lowest level of RF EMF at which the effect in EEG was detected is 2.45 V/m (SAR = 0.003 W/kg)...The possible causal relationship between RF EMF effect and depression among young people is highly important problem." Hinrikus H, Lass J, Bachmann M. Threshold of radiofrequency electromagnetic field effect on human brain. Int J Radiat Biol. 2021;97(11):1505-1515. doi: 10.1080/09553002.2021.1969055. Epub 2021 Aug 23. PMID: 34402382.			Thank you for the comment. The text has been amended accordingly.
Paul	Ben Ishai	Environmental Health Trust	paulbi@ariel.ac.il	Other	Israel	5.3.1 Neoplastic diseases	5.3.1.2 In vivo studie (line 6 page 26) The committee devotes considerable space to dismissing the in-vivo studies of the National Toxicology Program in the carcinogenicity of exposure to radio frequency radiation (RFR). The NTP study employed validated state-of-the-art methods that have been honed over more than four decades with the concurrence of the FDA, EPA, and other federal agencies. Despite being approved at every stage of planning and operation by the FDA, some reject its findings [1]–[2]. The NTP study was a toxicology study on rats and mice to clarify the risks of disease from exposure to RFR [3]. A similar study [4] was carried out by the Ramazzini Institute, the Italian equivalent of the NTP.Its study also came to the conclusion that RFR is carcinogenic. Among the principal critiques of the NTP study are those from the FDA [1] and the ICNIRP [2], both of which were disputed in considerable detail [5], [6]. It must be noted that the NTP study was commissioned by the FDA at the behest of the FCC (Federal Communications Commission), reviewed and approved by them [6]. The study was specifically designed to test the null hypothesis		I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment. It should be stressed that the Ramazzini Institute is not the Italian equivalent of the National Institute of Environmental Health Sciences (NIEHS) which is responsible for the NTP. The two studies were not equivalent, as described in detail in the SCHEER Opinion.

							that cell phone radiation at non-thermal exposure intensities could not cause adverse health effects. By the definition of the FCC and ICNIRP “non-thermal” exposure intensities means that there is no more than a 1 degree rise in core body temperature resulting from acute exposures [5], [7]. The NTP carried out initial studies to find the exposure limit for rats and mice in terms of SAR to maintain this limit and found that the maximum wholebody exposure for such would be a SAR value of 6 W/kg [8]. In real life scenarios the cell phone is usually in contact with the skin during a conversation. Using the Standard Anthropometric Model (SAM), the National Agency ANFR of France routinely measured SAR values of 5 W/kg and above for over 450 mobile phone models [9] held in contact with the skin surface. In other words, claims that the exposure limit fixed for the NTP study were too high are not valid. The criticism of the findings of the NTP study were adequately answered by Melnick [6] and by Leach [10]. In particular the claim that whole body SAR was used instead of local SAR is invalid. Extensive care was taken in this study to assess the dosimetry for the animal assays [3]. Therefore the committee should accept that the implication of the NTP study is that RFR is carcinogenic. References FDA, FDA, Feb. 2020. [Online]. Available: https://www.fda.gov/media/135043/download I. C. on N.-I. R. Protection (ICNIRP)1, Health Physics, vol. 118, no. 5, pp. 525–532, May 2020, doi: 10.1097/HP.0000000000001137. Y. Gong et al., IEEE Transactions on Electromagnetic Compatibility, vol. 59, no. 6, pp. 1798–1808, Dec. 2017, doi: 10.1109/TEMC.2017.2665039. A. Vornoli, L. Falcioni, D. Mandrioli, L. Bua, and F. Belpoggi, International Journal of Environmental Research and Public Health, vol. 16, no. 18, Art. no. 18, Jan. 2019, doi: 10.3390/ijerph16183379. R. Melnick, Health Phys, vol. 118, no. 6, pp. 678–682, Jun. 2020, doi: 10.1097/HP.0000000000001268. R. L. Melnick, Environ. Res., vol. 168, pp. 1–6, 2019, doi: 10.1016/j.envres.2018.09.010.			The SCHEER disagrees with the discussion of dosimetry presented here. Such a claim was not made in the SCHEER Opinion.

							FCC, May 10, 2011. Accessed: Jan. 12, 2022. [Online]. Available: https://www.fcc.gov/general/oet-bulletins-line#65 M. E. Wyde et al., Bioelectromagnetics, vol. 39, no. 3, pp. 190–199, Apr. 2018, doi: 10.1002/bem.22116. O. P. Gandhi,IEEE Access, vol. 7, pp. 47050–47052, 2019, doi: 10.1109/ACCESS.2019.2906017. V. Leach,BRHP - Between a Rock and a Hard Place, Apr. 27, 2020. https://betweenrockandhardplace.wordpress.com/2020/04/27/victor-leach-of-orsaa-critical-review-of-the-fda-2020-report/			
Scarato	Theodora	Environmental Health Trust	theodora.scarato@ehtrust.org	Other	USA	5.3.1 Neoplastic diseases	5.3.1 5.3.1.1 Epidemiological studies (line 21 page 23) The committee admits that in the majority of studies they quote, there is a statistically significant association between brain tumours (gliomas) and heavy or long term cellphone use [1]–[6]. They neglected to add the CERENAT study [7], which also reached the same conclusion. Furthermore, In an analysis of nine epidemiological studies of brain cancers and mobile phones, Miller et al. [8] noted increased risks. Vienne-Jumeau et al. [9] while not observing heightened instances of brain tumor, did find robust epidemiological evidence of acoustic neuroma. Mialon and Nesson [10] found mobile subscription rates significantly and positively associated with death rates from brain cancer 15-20 years later. Pareja-Peña et al. [11] similarly found clear evidence that epidemiological studies detect a causal association between the exposure to RFR and the incidence of brain neoplasms. Given that the definition in section 5.1.1.1 (Typical exposures of population) of use of wireless communications (Table 1, page 14 of the SCHEER report), effectively meet the requirements for “heavy” or “long term use” as defined by the aforementioned studies, the final conclusion of the committee (line 47 page 29) that weight of evidence is weak of an increased risk of neoplastic diseases from RF exposure should be strengthened to at least “medium”. References [1] M. Prasad, P. Kathuria, P. Nair, A. Kumar, and K. Prasad, Neurol Sci, vol. 38, no. 5, pp. 797–810, May 2017, doi: 10.1007/s10072-017-2850-8. [2] M. Yang et al., “Mobile phone use and glioma risk: A		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence assessed following a quality evaluation. The text has been amended for clarity on the WoE approach for the overall level of evidence (§4.1).

							systematic review and meta-analysis," PLOS ONE, vol. 12, no. 5, p. e0175136, May 2017, doi: 10.1371/journal.pone.0175136. [3] A. Bortkiewicz, E. Gadzicka, and W. Szymczak, Int J Occup Med Environ Health, vol. 30, no. 1, pp. 27–43, Feb. 2017, doi: 10.13075/ijomeh.1896.00802. [4] Y.-J. Choi, J. M. Moskowitz, S.-K. Myung, Y.-R. Lee, and Y.-C. Hong, International Journal of Environmental Research and Public Health, vol. 17, no. 21, Art. no. 21, Jan. 2020, doi: 10.3390/ijerph17218079. [5] P. Wang, C. Hou, Y. Li, and D. Zhou, World Neurosurgery, vol. 115, pp. e629–e636, Jul. 2018, doi: 10.1016/j.wneu.2018.04.122. [6] Y. Wang and X. Guo, J Can Res Ther, vol. 12, no. 8, pp. 298–300, Dec. 2016, doi: 10.4103/0973-1482.200759. [7] G. Coureau et al., Occup Environ Med, vol. 71, no. 7, pp. 514–522, Jul. 2014, doi: 10.1136/oemed-2013-101754. [8] A. B. Miller, L. L. Morgan, I. Udasin, and D. L. Davis, Environmental Research, vol. 167, pp. 673–683, Nov. 2018, doi: 10.1016/j.envres.2018.06.043. [9] A. Vienne-Jumeau, C. Tafani, and D. Ricard, Revue Neurologique, vol. 175, no. 10, pp. 664–678, Dec. 2019, doi: 10.1016/j.neurol.2019.08.004. [10] H. M. Mialon and E. T. Nesson, Contemporary Economic Policy, vol. 38, no. 2, pp. 258–269, 2020, doi: 10.1111/coep.12456. [11] F. Pareja-Peña, A. M. Burgos-Molina, F. Sendra-Portero, and M. J. Ruiz-Gómez, International Journal of Environmental Health Research, vol. 0, no. 0, pp. 1–10, Mar. 2020, doi: 10.1080/09603123.2020.1738352.			
Scarato	Theodora	for Environmental Health Trust	theodora.scarato@ehtrust.org	Other	USA	5.2.3 Conclusions on interaction	5.2.3 Conclusions on interaction mechanisms (line 45 page 22) We are confused by the conclusions on interaction mechanisms. In the paragraph starting at line 6 of page 23 the committee admits that "The induction of increased levels of ROS (reactive oxygen species) measured in cells and tissues has been used as a marker of DNA impairment. In this sense, it is anticipated that exposure over time to RF EMF might result in building up ROS and disruption of homeostasis with epigenetic effects." Given that it is well recognized that an imbalance of ROS leads to Oxidative Stress (OS) and has been linked to inflammatory diseases in general and cancer in particular [1], [2], their concluding statement that "there is no consistent evidence of biological effects involving oxidative balance" is perplexing. It appears that the committee contradicts itself. There is indeed		I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment. The text has been amended for clarity.

							demonstrative evidence for the detrimental effect of RF EMF on OS [3]–[6]. Reference [1] E. Panieri and M. M. Santoro, “ROS homeostasis and metabolism: a dangerous liason in cancer cells,” Cell Death Dis, vol. 7, no. 6, pp. e2253–e2253, Jun. 2016, doi: 10.1038/cddis.2016.105. [2] S. Yang and G. Lian, “ROS and diseases: role in metabolism and energy supply,” Mol Cell Biochem, vol. 467, no. 1, pp. 1–12, 2020, doi: 10.1007/s11010-019-03667-9. [3] Zothansiama, M. Zosangzuali, M. Lalramdinpuii, and G. C. Jagetia, “Impact of radiofrequency radiation on DNA damage and antioxidants in peripheral blood lymphocytes of humans residing in the vicinity of mobile phone base stations,” Electromagn Biol Med, vol. 36, no. 3, pp. 295–305, 2017, doi: 10.1080/15368378.2017.1350584. [4] D. J. Panagopoulos, A. Karabarbounis, I. Yakymenko, and G. P. Chrousos, “Human-made electromagnetic fields: Ion forced-oscillation and voltage-gated ion channel dysfunction, oxidative stress and DNA damage (Review),” International Journal of Oncology, vol. 59, no. 5, pp. 1–16, Nov. 2021, doi: 10.3892/ijo.2021.5272. [5] J. Luo et al., “Genetic susceptibility may modify the association between cell phone use and thyroid cancer: A population-based case-control study in Connecticut,” Environmental Research, vol. 182, p. 109013, Mar. 2020, doi: 10.1016/j.envres.2019.109013. [6] S. L. Smith-Roe et al., “Evaluation of the genotoxicity of cell phone radiofrequency radiation in male and female rats and mice following subchronic exposure,” Environmental and Molecular Mutagenesis, vol. 61, no. 2, pp. 276–290, 2020, doi: 10.1002/em.22343.			The papers listed are single papers and do not match the inclusion criteria described clearly in §4.2.4.
Scarato	Theodora	Environmental	theodora.scarato@e	Other	USA	5.2.1 Thermal effects	The authors note that short pulses of millimeter and GHz waves can lead to heightened transient increases in surface temperature. In particular they note the work of Neufeld and Kuster [1], [2], who point out that gaussian beam profiles for pulsed signals in 6 and 30 GHz range could lead to 10 ∘C increases in skin temperature, well above the pain threshold. They neglect to note that this has been experimentally verified by Gultenkin and Siegel [3]. The conclusion is that the densification of 5G network base stations could realistically lead to thermal		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. References [3], [6] and [7] are not relevant either for hazard identification or for risk assessment, because they don’t mimic realistic exposure conditions or use frequencies that are outside the range

							effects that could seriously impinge on the health of the general public, if the current field strengths are maintained. We note that the authors rely on Li et al. [5] for the statement that surface temperature elevation strongly correlates to absorbed power density (line 29) above 6 GHz. They fail to note that this is a pure simulation study relying on a simplistic layer model for skin. Other simulation studies [6], [7] that take into account the rough nature of skin layer interfaces, the true water contents and structures in the skin, like the sweat duct, have demonstrated that the simple layer model greatly underestimates the absorption of electromagnetic radiation in this frequency range. Therefore, we find that the existing ICNIRP guidelines [4] are wholly inadequate. References [1] E. Neufeld and N. Kuster, “Systematic Derivation of Safety Limits for Time-Varying 5G Radiofrequency Exposure Based on Analytical Models and Thermal Dose,” Health Phys, Sep. 2018, doi: 10.1097/HP.0000000000000930. [2] E. Neufeld, T. Samaras, and N. Kuster, “Discussion on Spatial and Time Averaging Restrictions Within the Electromagnetic Exposure Safety Framework in the Frequency Range Above 6 GHz for Pulsed and Localized Exposures,” Bioelectromagnetics, vol. 41, no. 2, pp. 164–168, 2020, doi: 10.1002/bem.22244. [3] D. H. Gultekin and P. H. Siegel, “Absorption of 5G Radiation in Brain Tissue as a Function of Frequency, Power and Time,” IEEE Access, vol. 8, pp. 115593–115612, 2020, doi: 10.1109/ACCESS.2020.3002183. [4] I. C. on N.-I. R. Protection (ICNIRP)1, “Principles for Non-Ionizing Radiation Protection,” Health Physics, vol. 118, no. 5, pp. 477–482, May 2020, doi: 10.1097/HP.0000000000001252. [5] K. Li, K. Sasaki, S. Watanabe, and H. Shirai, “Relationship between power density and surface temperature elevation for human skin exposure to electromagnetic waves with oblique incidence angle from 6 GHz to 1 THz,” Phys. Med. Biol., vol. 64, no. 6, p. 065016, Mar. 2019, doi: 10.1088/1361-6560/ab057a. [6] N. Betzalel, Y. Feldman, and P. Ben Ishai, “The Modeling of the Absorbance of Sub-THz Radiation by Human Skin,” IEEE Transactions on Terahertz Science and Technology, vol. 7, no. 5, pp. 521–528, Sep. 2017, doi: 10.1109/TTHZ.2017.2736345.			discussed in the SCHEER Opinion.

							[7] N. Betzalel, P. Ben Ishai, and Y. Feldman, “The human skin as a sub-THz receiver – Does 5G pose a danger to it or not?,” Environmental Research, vol. 163, pp. 208–216, May 2018, doi: 10.1016/j.envres.2018.01.032.			
Scarato	Theodora	Environmental Health Trust	theodora.scarato@ehtrust.org	Other	USA	5.2.2 Cellular interaction mechanisms	RE 5.2.2.1 Oxidative stress (line 12 page 20) We note that the committee has accepted that prolonged exposure to anthropogenic electromagnetic radiation originating from the cellphone infrastructure leads to oxidative stress in biological cells. A number of publications indicate that electromagnetic radiation disturbs the balance of cellular ROS, indirectly damaging DNA [1], [2], and interferes with cellular membrane integrity [3]–[5]. However, these studies are not reviewed. Given the proven link between ROS, DNA damage and cancer [6] it is necessary to include this data. The authors base their assessment on a comprehensive review written by Shuermann and Mevissen [7]. However, they misrepresent the conclusions of the paper. As stated by the committee “The trend the authors evidenced is that, even at low dose exposure, RF can affect cellular oxidative balance that can also lead to an adaptation mechanism after a recovery phase, thus not leading to health effects”. In fact Shuermann and Mevissen state in their conclusion, “Adverse conditions, such as diseases (diabetes, neurodegenerative diseases), compromise the body’s defense mechanisms, including antioxidant protection mechanisms, and individuals with such pre-existing conditions are more likely to experience health effects. The studies show that very young or old individuals can react less efficiently to oxidative stress, which of course also applies to other stressors that cause oxidative stress.” Therefore the committee’s statement “not leading to health effects" is disingenuous. While Schuermann and Mevissen did note the ability of an adaptive mechanism and a recovery phase once the radiation was removed, this point becomes mute, given the constant exposure of the general public to RF radiation. Zothansiama et al. measured heightened levels of oxidative stress in the blood of individuals living in close proximity (< 80 m) to cell phone base stations compared to those living far from the base station (> 300 m) [8] . Given the accepted link between cumulative oxidative stress and such maladies as inflammatory diseases in general and cancer in particular [9], [10], the dismissal by the committee of health effects linked to ROS is surprising, if not questionable. References		I do not object to publication of my contribution, including my personal data, on internet	The comments reflect a personal interpretation of the commenter. The health effects due to oxidative stress resulting from RF exposure have not been demonstrated.

							[1] J. Luo et al., Environmental Research, vol. 182, p. 109013, Mar. 2020, doi: 10.1016/j.envres.2019.109013. [2] S. L. Smith-Roe et al., Environmental and Molecular Mutagenesis, vol. 61, no. 2, pp. 276–290, 2020, doi: 10.1002/em.22343. [3] N. R. Desai, K. K. Kesari, and A. Agarwal, Reprod Biol Endocrinol, vol. 7, no. 1, p. 114, 2009, doi: 10.1186/1477-7827-7-114. [4] R. Gautam, K. V. Singh, J. Nirala, N. N. Murmu, R. Meena, and P. Rajamani, Andrologia, vol. 51, no. 3, p. e13201, 2019, doi: 10.1111/and.13201. [5] T.-Y. Zhao, S.-P. Zou, and P. E. Knapp,Neurosci Lett, vol. 412, no. 1, pp. 34–38, Jan. 2007, doi: 10.1016/j.neulet.2006.09.092. [6] M. Prasad, P. Kathuria, P. Nair, A. Kumar, and K. Prasad, Neurol Sci, vol. 38, no. 5, pp. 797–810, May 2017, doi: 10.1007/s10072-017-2850-8. [7] D. Schuermann and M. Mevissen, International Journal of Molecular Sciences, vol. 22, no. 7, Art. no. 7, Jan. 2021, doi: 10.3390/ijms22073772. [8] Zothansiama, M. Zosangzuali, M. Lalramdinpuii, and G. C. Jagetia, Electromagn Biol Med, vol. 36, no. 3, pp. 295–305, 2017, doi: 10.1080/15368378.2017.1350584. [9] E. Panieri and M. M. Santoro, Cell Death Dis, vol. 7, no. 6, pp. e2253–e2253, Jun. 2016, doi: 10.1038/cddis.2016.105. [10] S. Yang and G. Lian, Mol Cell Biochem, vol. 467, no. 1, pp. 1–12, 2020, doi: 10.1007/s11010-019-03667-9.			
Scarato	Theodora	Environmental Health Trust	theodora.scarato@ehtrust.org	Other	USA	5.2 Interaction mechanisms	The authors note that short pulses of millimeter and GHz waves can lead to heightened transient increases in surface temperature. In particular they note the work of Neufeld and Kuster [1], [2], who point out that gaussian beam profiles for pulsed signals in 6 and 30 GHz range could lead to 10 ◦C increases in skin temperature, well above the pain threshold. They neglect to note that this has been experimentally verified by Gultenkin and Siegel [3]. The conclusion is that the densification of 5G network base stations could realistically lead to thermal effects that could seriously impinge on the health of the general public, if the current field strengths are maintained. We note that the authors rely on Li et al. [5] for the statement that surface temperature elevation strongly correlates to absorbed power density (line 29) above 6 GHz. They fail to note that this is a pure simulation study relying on a simplistic layer model for skin. Other simulation studies [6], [7] that take into account the rough nature		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. References [3], [6] and [7] are not relevant either for hazard identification or for risk assessment, because they don't mimic realistic exposure conditions or use frequencies that are outside the range discussed in the Opinion.

							of skin layer interfaces, the true water contents and structures in the skin, like the sweat duct, have demonstrated that the simple layer model greatly underestimates the absorption of electromagnetic radiation in this frequency range. Therefore, we find that the existing ICNIRP guidelines [4] are wholly inadequate. References [1] E. Neufeld and N. Kuster, “Systematic Derivation of Safety Limits for Time-Varying 5G Radiofrequency Exposure Based on Analytical Models and Thermal Dose,” Health Phys, Sep. 2018, doi: 10.1097/HP.0000000000000930. [2] E. Neufeld, T. Samaras, and N. Kuster, “Discussion on Spatial and Time Averaging Restrictions Within the Electromagnetic Exposure Safety Framework in the Frequency Range Above 6 GHz for Pulsed and Localized Exposures,” Bioelectromagnetics, vol. 41, no. 2, pp. 164–168, 2020, doi: 10.1002/bem.22244. [3] D. H. Gultekin and P. H. Siegel, “Absorption of 5G Radiation in Brain Tissue as a Function of Frequency, Power and Time,” IEEE Access, vol. 8, pp. 115593–115612, 2020, doi: 10.1109/ACCESS.2020.3002183. [4] I. C. on N.-I. R. Protection (ICNIRP)1, “Principles for Non-Ionizing Radiation Protection,” Health Physics, vol. 118, no. 5, pp. 477–482, May 2020, doi: 10.1097/HP.0000000000001252. [5] K. Li, K. Sasaki, S. Watanabe, and H. Shirai, “Relationship between power density and surface temperature elevation for human skin exposure to electromagnetic waves with oblique incidence angle from 6 GHz to 1 THz,” Phys. Med. Biol., vol. 64, no. 6, p. 065016, Mar. 2019, doi: 10.1088/1361-6560/ab057a. [6] N. Betzalel, Y. Feldman, and P. Ben Ishai, “The Modeling of the Absorbance of Sub-THz Radiation by Human Skin,” IEEE Transactions on Terahertz Science and Technology, vol. 7, no. 5, pp. 521–528, Sep. 2017, doi: 10.1109/TTHZ.2017.2736345. [7] N. Betzalel, P. Ben Ishai, and Y. Feldman, “The human skin as a sub-THz receiver – Does 5G pose a danger to it or not?,” Environmental Research, vol. 163, pp. 208–216, May 2018, doi: 10.1016/j.envres.2018.01.032.			
Scarato	Theodora	Environmental	theodora.scarat	Other	USA	4.2.1	The summary of the SCENIHR (2015) Opinion omits the extensive published criticisms of the 2015 Report. For example Sage 2015 states “Brain activities. The letter fails to note a “possible effect” where there is clear evidence presented by SCENIHR that pulsed RF		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. This part of text intended to summarize the SCENIHR Opinion. Criticism to it and the responses to it can be found in the literature.

							affects electroencephalogram (EEG), sleep structure and duration, evoked potentials, and brainwave activity…The sheer volume of studies on neurological effects refutes the statement "human studies show no clear effect, but evidence is limited." Neurological/behavioral effects of ELF–EMF and radiofrequency radiation (RFR) were dismissed as "not firmly identified." We have documented a significant number of studies of ELF radiation reported to cause nervous system effects in 90% of the 105 studies available from 2007 to 2014 BioInitiative Working Group, 2014; SCENIHR, 2015a]. New neurological RFR studies report effects in 68% of studies on RF radiation (or 144 of 211 studies) in 2014. This has increased from 63% in 2012 (93 of 150 studies). Neurological health effects resulting from non-thermal ELF and RF exposures are clearly documented. Another fundamental flaw is in neglecting many studies showing dependence of nonthermal microwave effects on exposure duration or dose (defined in radiation physics as multiplication of SAR on exposure duration) [BioInitiative Working Group, 2014; SCENIHR, 2015a]. Reproduction and development. SCENIHR concludes that inclusion of new studies of pulsed RF on male fertility at non-thermal levels provide weak evidence only. Their analysis misreads evidence of effects of some studies when drawing conclusions" Sage C, Carpenter D, Hardell L. Comments on SCENIHR: Opinion on potential health effects of exposure to electromagnetic fields, Bioelectromagnetics 36:480-484 (2015). Bioelectromagnetics. 2016 Apr;37(3):190-192. doi: 10.1002/bem.21949. Epub 2015 Dec 20. PMID: 26688202			
Theodora	Scarato	Environmental Health Trust	theodora.scarato@ehtrust.org	Other	United States	4.1 Data/Evidence	Omitted from this report are peer-reviewed laboratory and field research publications demonstrating DNA damage and other biologically important impacts on flora and fauna that occur at nonthermal levels comparable to far field exposures from cell antennas. Since DNA is the primary building block and genetic "map" for growth, production, replication and survival of all living organisms, these deleterious effects can be critical. A three part 2021 research review on effects to wildlife published in Reviews on Environmental Health by experts including former U.S. Fish and Wildlife senior biologist Albert Manville cites more than 1,200 scientific references which found adverse biological effects to wildlife from even very low intensities of non-ionizing radiation with findings of impacts to orientation and migration, reproduction[DLD1] , mating, nest, den building and survivorship (Levitt et al., 2021a, Levitt et al., 2021b, Levitt et al., 2021c). "Literature also confirms impacts on pollinators that appear uniquely sensitive to and absorb higher frequencies (2 GHz to		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The mandate to SCHEER did not include the environmental impact of RF-EMF.

							120 GHz) to be employed in the 4G/5G rollout with absorbed power between 3% to 370%. Researchers concluded, “This could lead to changes in insect behavior, physiology, and morphology over time.” Other studies of pollinators have experimented with phone radiation in actual beehives and found that bees in hives in which RF signals are operating stop producing honey, engage in abnormal dance patterns, and do not return to the hive. (Indian references) A machine learning analysis of impacts on plants confirms a range of critical negative effects on reproduction and growth, including effects on nitrification, oxidation, and other vital processes.(Halgamuge and Davis, 2019 extracted data from 45 articles published between 1996 and 2016 that included 169 experimental case studies of plant responses to RF-EMF that included six different attributes: frequency, specific absorption rate (SAR), power flux density, electric field strength, exposure time and plant type (species). Very strong correlations were observed between SAR and frequency, and SAR with power flux density and electric field strength. Finally amphibians also appear sensitive to ambient RF levels. Frogs experimentally exposed to cell phone antennas for two months from the egg phase until an advanced phase of tadpole incurred low coordination of movements, asynchronous growth, resulting in both big and small tadpoles, and a high mortality rate. The authors conclude, “these results indicate that radiation emitted by phone masts in a real situation may affect the development and may cause an increase in mortality of exposed tadpoles.” Similar findings have been reported in studies of RF exposures to other invertebrates including zebrafish and planaria. Levitt, B. B., Lai, H. C., & Manville, A. M. (2021). Effects of non-ionizing electromagnetic fields on flora and fauna, Part 3. Exposure standards, public policy, laws, and future directions. Reviews on Environmental Health. https://doi.org/10.1515/reveh-2021-0083 Levitt, B. B., Lai, H. C., & Manville, A. M. (2022a). Effects of non-ionizing electromagnetic fields on flora and fauna, part 1. Rising ambient EMF levels in the environment. Reviews on Environmental Health, 37(1), 81–122. https://doi.org/10.1515/reveh-2021-0026 Levitt, B. B., Lai, H. C., & Manville, A. M. (2022b). Effects of non-ionizing electromagnetic fields on flora and fauna, Part 2 impacts: How species interact with natural and man-made EMF. Reviews			

							on Environmental Health, 37(3), 327–406. https://doi.org/10.1515/reveh-2021-0050			
Pophof	Blanka	Federal Office for	bpophof@bfs.de	Germany		4.2.4 Differences in	Lines 9-10: Annex C is mentioned, but not provided with the document.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. This typo has been edited.
Pophof	Blanka	Federal Office for Radiation	bpophof@bfs.de	Germany		4.2.2 ICNIRP (2020) Guidelines -	Line 35-37: "..except for pain, which is related to elevated temperature at high exposure levels (from both direct and indirect exposure)" What do you mean by "direct" and "indirect" exposure, I did not find this terms in the ICNIRP (2020) guidelines.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. According to ICNIRP (2020) "*indirect exposure* via contact currents, where radiofrequency EMFs in the environment are redirected via a conducting object to a person, and the resultant current flow, dependent on frequency, can stimulate nerves, cause pain, and/or damage tissue."
Merckel	Olivier	Anses - French Agency for Food,	olivier.merckel@ans	France		6 RECOMMENDATIONS FOR	Our recommendations are the following: -Take better account of the very rapid fluctuations of exposure characteristics in the vicinity of 5G base stations, with a field level and duration of less than one second. -Investigate the need for introducing: i) the notion of exposure level in operational conditions for a given percentage of occurrence and, ii) the notion of RF EMF daily dose (duration-amplitude) and how this concept of dose may be introduced for studying health effects. - Investigate the applicability of the ICNIRP guidelines for mmWaves communication systems, taking into account the important space and time fluctuations of the electromagnetic field mainly occurring in indoor communications. - Define typical scenarios of exposure in order to introduce their time – frequency characteristics in in-vitro and in-vivo		I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comments and recommendations. The SCHEER agrees with them. To the SCHEER's best knowledge, all research recommendations already form research tasks to be undertaken within the research projects on EMF and Health funded by Horizon Europe and currently running in Europe.

							configurations when studying health effect of EM waves. If the guidelines published by ICNIRP in 2020 are fully integrated into the European regulatory texts, certain hazards or effects taken into account in the guidelines published in 1998 (e.g. contact currents) will no longer be considered.			This is a risk management issue and policy makers may decide that they keep certain hazards or effects in the European regulatory texts.
Merckel	Olivier	Anses - French Agency for	olivier.merckel@anses.fr	France		5.3.4 Other health effects	Chapter 5.3.4.1: Cardiovascular diseases A stronger justification of the opinion of “strong evidence for the lack of effects” could be made, as only one meta-analysis and one report are cited as references.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The text has been changed and §4.1 has been amended to provide more information on the WoE approach.
Merckel	Olivier	Anses - French Agency	olivier.merckel@anses.fr	France		5.3.2 Neurological and	Chapter 5.3.2.1 Epidemiological studies Lines 14 – 17: The animal studies reported here are actually epidemiological studies (subject of the paragraph). Chapter 5.3.2.2 Neurophysiological and neuropsychological human studies Editorial: p. 33 lines 18-19: the title “animal studies” should be moved to the line beneath.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The text has been amended.
Merckel	Olivier	Anses - French Agency for Food,	olivier.merckel@anses.fr	France		5.3.1 Neoplastic diseases	Page 28, Line 41 In the previous sections, the term “CDMA-modulated signal” is used while here “UMTS signal” is used. The same notation should be used throughout.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The Opinion reports on the original methodology and materials as described in the respective papers. No change in the text is needed.
M	Ol	A	oli	Fr		5.	The conclusion could be less definitive, since this chapter is based on "narrative" reviews, for which, unlike systematic		I do not object to publication of my	Thank you for the comment. The conclusion is about

							reviews, the exhaustiveness of publications is not the goal. In addition, the conclusion asks about health effects, whereas the paragraph only refers to interaction mechanisms.		contribution, including my personal data, on internet	interaction mechanisms and not about health effects. No changes in the text are necessary.
Merckel	Olivier	Anses - French Agency for	olivier.merckel@anses.fr	France		5.1.3 Factors affecting	To assess the realistic exposure of a given population, the concept of an exposure index has been introduced and explained in some papers. The basic principle recalled in the document is interesting, but it is dependent upon more than 10 different parameters. A brief presentation of typical examples showing the interest of this approach is missing.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The reader of the Opinion can refer to the citations to find examples of the use of the EI in realistic scenarios. No change in the text is needed.
Merckel	Olivier	Anses - French Agency for Food, Environmental and	olivier.merckel@anses.fr	France		5.1.2 Exposure from emerging technologies	Page 17, line 8: It is mentioned that FR2 5G signals do not travel large distances. This statement is very vague. Indeed, in free space, the longitudinal attenuation does not depend on frequency. However penetration in structures and diffraction phenomena strongly decrease with frequency, leading to a smaller coverage area from a base station, as explained in a following paragraph. Reformulation of this sentence would therefore be helpful. Lines 27-28: The paper from Ericsson cited in this paragraph deals with the compliance distance for transmission in the 28 GHz band. This paper is thus not related to the 200 W transmitting power of a 5G BS as mentioned in line 28. Lines 28-35: The problem related to measurement or calculation of the exposure based on conservative assumptions has been raised in many papers, such as those cited in the report. Nevertheless comments on these papers being incomplete and sometimes inaccurate, the following text is proposed from line 30: These classical methods rely on conservative assumptions, e.g. all the users are in the location that coincides with the testing point. These assumptions over-estimate the exposure from 5G BSs, leading to a lower maximum allowable power. To overcome		I do not object to publication of my contribution, including my personal data, on internet	Thank you for this comment. However, the justification of this statement already exists in the Opinion. No changes in the text are necessary. Thank you for this comment. The reference has been removed. Thank you for the comment. We have amended the text to reflect the adoption of the latest IEC 62232:2022 standard on the assessment of human exposure in the vicinity of base stations.

							this problem, a first approach (ANFR, 2020) introduces an exposure indicator based on the foreseeable use of 5G working in the FR1 frequency band, around 3.5 GHz, and assuming that one gigabyte of data is sent in a given direction every 6 minutes. These values result from an extrapolation of current 4G traffic. Furthermore, assumptions such as number of users, their spatial distribution in the network, number of beams of the fixed antenna array, and statistical variations for fixed beam antennas, are introduced to evaluate a reduction factor. It is defined as the difference between the maximum level of exposure (assuming that the power of the base station is sent in a single beam towards a user or a group of users close to each other), and the foreseen values with the previously mentioned assumptions. This reduction factor estimated by ANFR is 13.5 dB. It must be noted that this value will have to be modified over the years to take into account changes in user behaviour in terms of connection time and size of the downlink data packets. The methodology of another approach (Baracca et al., 2018) consists in performing system simulations that take into account realistic deployment scenarios in terms of BS installation height, user distribution, and traffic, so as to evaluate the cumulative distribution function of the actual BS transmit power. By using channel models, the compliance boundary around the BS is calculated for a given percentile of the transmit power as the 95th or 99th percentile. A stochastic geometry approach has been applied by Bonato et al. (2021), while Chiaraviglio et al. (2022) target the planning of a 5G cellular network, taking electromagnetic field constraints into account. For 5G massive MIMO working in the millimetre wave band, the distribution of exposure for different implementation scenarios is provided by Al Hajj et al. (2020). In conclusion, the important question arises as to whether the exposure values are those calculated or measured in the worst case (conservative approach), even if this configuration is highly unlikely, or whether a probabilistic approach must be used. In this last case, a related question deals with the choice of the percentile of the cumulative distribution function (the 95th or 99th, for example). This point would need to be discussed.			

Merckel	Olivier	Anses - French Agency for Food, Environmental and Occupational Health & Safety	olivier.merckel@anses.fr	France		5.1.1 Wireless communication technologies	Page 13, Line 16: At the end of the SCHEER document, in the list of references, the date of the Sagar et al. paper is 2018 and not 2017. The first paragraph of 5.1.1.1 is a "copy and paste" of the Sagar paper without providing the definition of a "microenvironment" or the meaning of "mean RF exposure". Is it a time average measurement, or a space-time averaging? In what frequency band? A conclusion on exposure due to uplink is presented but where has the exposure level been measured? Without any additional information, these results cannot be exploited. Qualitative results of typical exposure are presented in the first two paragraphs of 5.1.1.1, but no analysis or physical interpretation is given. As an example, for exposure in public transport, it is written in the second paragraph that "highest level […] in public transport station [...] with downlink as the most relevant contributor". However, in the previous paragraph, the uplink was the main contributor in the train. A very brief interpretation of these results based on the characteristics of wave propagation in these two environments is missing. Page 14, line 5: It is surprising to describe results of a paper published in 2021 but related to a 2G-generation mobile phone. Page 14, line 17 and beyond: A rather long presentation is given dealing with the dose produced by mobile phone devices and published in various papers. This dose is expressed in mJ/kg/day. However, the possible correlation between dose and health effect is not treated. It is thus questionable whether this concept of dose is important and whether it should be included in the guidelines for limiting the exposure. Table 1 gives informative results on the use of telecommunication devices. However, there is no indication on how data presented in this table could be used to evaluate health risk. Page 16, lines 37-38 This recommendation could be extended to unrealistically low exposures. Deleting data should be considered with caution, as epidemiology takes into account biases in the analysis.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The citation has been corrected. Thank you for the comment. Further analysis of the systematic review results is not necessary in the Opinion. The reader is referred to the paper for more information and interpretation of results. Thank you for the comment. The SCHEER agrees that the dose concept is still under research and, before being adopted for limiting human exposure, its correlation with health effects needs to be established. Here the SCHEER only reports the results of the systemic review without further assessing other exposure metrics. Thank you for this comment. The SCHEER makes a recommendation that can be assessed and quantified in epidemiology. No changes in the text are needed.
Mrck	Olivi	Anse	olivie	Fran		4.2.2	In this summary of the biological and health effects considered by ICNIRP in its guidelines published in 2020, it would be interesting to consider the thermal effects, since the main		I do not object to publication of my contribution,	Thank you for the comment. In this section the SCHEER

							changes in quantities (for example, an increase from 6 to 30mn for SAR, a change in frequency range) are linked to this effect. Indeed, it is essentially based on these elements that ICNIRP has justified the changes proposed in 2020. Chapter 4.2.2.3 Auditory, Vestibular, and Ocular function The auditory (sensory) effect was already mentioned in the guidelines published in 1998, with the same conclusions, and restrictions were proposed to guard against it. This is no longer the case, and the argument given to explain this change in position is that there is no evidence of a health effect under realistic exposure conditions. But restrictions should apply regardless of foreseeable exposure conditions, which may change. Furthermore, repeated or prolonged exposure to the auditory effects of microwaves might cause stress and/or be a risk factor for accidents in the case of occupational exposures. Chapter 4.2.2.9 Cancer (lines 32-38) The wording of this paragraph seems to reduce the relevance of case-control studies in favour of cohort studies. But in the case of rare tumours, cohort studies are not necessarily the most appropriate.		including my personal data, on internet	just summarizes the ICNIRP document.
Merckel	Olivier	Anses -	olivier.merckel@anses.fr	France		2 OPINION	Same remark as that in the abstract. Line 23: It does not seem that the SCHEER has tried to carefully analyze the ICNIRP 2020 document to propose improvements or amendments, taking the experience of the SCHEER members into account. Since only a review of the possible health effects of RF exposure described in the ICNIRP and other documents was provided, this of course led to an endorsement of the ICNIRP guidelines. The 2020 ICNIRP guidelines indicate that two new restrictions are likely to further enhance health protection. The first concerns the development of technologies that use EMF frequencies above 6 GHz, such as 5G, with new restrictions to better protect people from an excessive rise in body temperature. The second concerns brief exposures to RF EMF (< 6 minutes) to ensure that the transient rise in temperature is not sufficient to cause pain or adverse effects in biological tissues. Other changes were made to improve the accuracy of the restrictions or resulted in more conservative restrictions. However, as the differences are small compared to the original restrictions themselves, stating that “the latest (2020) ICNIRP exposure guidelines introduce new dosimetric quantities and limits to them, that can protect humans		I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment. The SCHEER has evaluated the new exposure concepts introduced by ICNIRP (2020) and has found sufficient supporting evidence for them, as described in §5.2.1.

							more effectively from emerging technological applications of RF EMF" (lines 21 to 23), without clearly distinguishing which changes are affected, they appear to be insufficiently precise. Directive 2013/35/EU was established for the protection of workers between 100 kHz and 300 GHz. Professionals are exposed to large number of applications (induction, dielectric loss heating, microwaves, etc.). This opinion focuses on the need to develop the restrictions in line with developments in communication technologies. However, the modifications proposed by the ICNIRP for certain quantities concern the entire electromagnetic spectrum, and not only the frequencies dedicated to telecommunications, such as the suppression of the limit for contact currents or certain sensory effects such as auditory effects. All the changes proposed by ICNIRP should be examined by the SCHEER in order to assess whether the new guidelines contribute to improved health protection. The different exposure situations, not only for 5G communication technologies, but also for all other applications of EM fields, should be taken into account.			Thank you for the comment. The SCHEER has recommended positively on the change of the technical annexes to include new dosimetric concepts, but it is the responsibility of the policy makers to decide which changes (if any) should be implemented.
Merckel	Olivier	ANSES - French Agency for	olivier.merckel@anses.fr	France		ABSTRACT	The SCHEER supports the idea of a technical revision of the 2013 EU directive. The reason given for this is that recently dosimetric quantities and new limits, such as those recommended by ICNIRP 2020, must be taken into account. Unfortunately, the document does not clearly justify this choice, since the new dosimetric quantities are not introduced, nor are the links between the new exposure limits and health effects. A critical review of the new dosimetric quantities suggested by ICNIRP could be included in the document.		I do not object to publication of my contribution, including my personal data, on internet	Please, see answer above.
Butler	Thomas	University College Cork	tbutler@ucc.ie	Ireland		4.2.2 ICNIRP (2020)	My comments refer to the ICNIRP and the acceptance of the Commission's Guidelines (2020) in their entirety by SCHEER.	Butler_Submission_to_SCHEER_September_2022_-_An_Opinion_on_Scientific_Bias_in_the_ICNIRP_Guidelines_and_it	I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment. This section is a summary of the ICNIRP guidelines and does not imply acceptance by the SCHEER. The rationale for the SCHEER's Opinion is described further below in the text.

								s_Origins.pdf		
Belyaev	Igor	Department of Radiobiology, Cancer Research	Igor.Beliaev@savba.sk	Slovakia		5.3.3 Symptoms	The report has dismissed evidence for possible objectification of electromagnetic hypersensitivity (EHS, IEI-EMF), severe limitation of double blind provocation studies, and opinion of many scientists, which is stemming from this evidence and in evident contradiction with the conclusion of the report (Belyaev, Dean et al. 2016; Belpomme, Carlo et al. 2021).	2016_EUROPAEM_EMF_Guideline_2016_for_the_prevention__diagnosis_and_treatment_of_EMF-related_health_problems_and_illnesses.pdf;2021_Belpomme_Molecular_Biomarkers_Imaging_Electrohypersensitivity.pdf	I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence assessed following a quality evaluation.
Belyaev	Igor	Department of Radiobiology, Cancer Research Institute,	Igor.Beliaev@savba.sk	Slovakia		5.3.1 Neoplastic diseases	Reference is missing for: “In another meta-analysis of three case-control studies that evaluated the association between mobile phone use and parotid gland tumours, authors reported that cell phone use was associated with greater odds (OR = 1.28, 95%CI: 1.09-1.51) to develop salivary gland tumours”. In general, while studies consistently showing increased cancer risks in hard users of mobile phones (>10yers) are criticized in this report, the studies with negative outcomes have not been that much criticized. For example, at least two publications have found severe shortcomings in the Schüz et al., 2022 study (Birnbaum, Taylor et al. 2022; Moskowitz 2022). It was reported that “the Schuz et al. (2) study provides no assurance of safety from brain tumors for most cell phone users, especially those who start using cell phones at a younger age than the middle-aged and elderly women who participated in this study”(Moskowitz 2022). To exclude bias from this report, both negative and positive findings should be considered applying the same criteria.	2022_Birnbaum_Cellular_phone_Use_and_the_Risk_of_Brain_Tumors-_the_UK_Million_Women_Study_by_Schuz.pdf;2022_Moskowitz_Cellular_phone_Use_and_the_Risk_of_Brain_Tumors_-_the_UK_Million_Women_Study_by_Schuz.pdf	I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The citation has been added. Thank you for the comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence assessed following a quality evaluation.

Belyaev	Igor	Department of Radiobiology, Cancer Research Institute,	Igor.Beliaev@savba.sk	Slovakia		5.2 Interaction mechanisms	5.2.2.1 Oxidative stress More than 90% of studies reviewed by Yakymenko et al. have shown that non-thermal exposure to RF induces oxidative stress (Yakymenko, Tsybulin et al. 2016). 5.2.2.2 Genetic and epigenetic effects A vast majority of studies, also reviewed by Lai, 2021 and Jageta, 2022, as have been cited in this report, has reported genotoxic RF effects. The investigations reporting the adverse/ genotoxic/mutagenic effects of mobile phone exposures outnumber those that report no effect (Jageta, 2022). The statement “since the energy level of RF EMF is not sufficient to break the intermolecular chemical bonds” should be extended. Multi quantum interaction was proposed to account for the non-thermal RF effects, see for review (Belyaev 2015). 5.2.3 Conclusions on interaction mechanisms As far as the vast majority of studies reported oxidative stress and genotoxic RF effects and apparent inconsistence between studies is likely accounted for difference in physical and biological variables (Belyaev 2010), which have been shown to be of key importance for appearance of non-thermal RF effects, the provided conclusion is not based on the body of evidence.	2010_ICEMS_13-belyaev.pdf;2015_Belyaev_Biophysical_mechanisms_NT_MW_effects.pdf;2015_Yakymenko_ROS_Oxidative_mechanisms_low-intensity_RF_review.pdf	I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence assessed following a quality evaluation.
Belyaev	Igor	Department of Radiobiology, Cancer Research Institute,	Igor.Beliaev@savba.sk	Slovakia		4.2.1 SCENIHR (2015) Opinion – Summary on biological	Contrary to the statement of the report, no one from positive studies (reporting non-thermal RF effects) has been dismissed in a valid replication and no one negative study (showing no effects) has been independently replicated. As a matter of fact, dependence of the non-thermal RF effects on several biological and physical variables represents an important issue for considering in replication studies. The representative international panel of 30 scientists has stated in the monograph of the International Agency for Research on Cancer (IARC) on carcinogenesis of radiofrequency (RF, 30 kHz - 300 GHz) radiations, pages 101-102: "The reproducibility of reported effects may be influenced by exposure characteristics (including SAR or power density, duration of exposure, carrier frequency, type of modulation, polarization, continuous versus intermittent exposures, pulsed-field variables, and background electromagnetic environment), biological parameters (including cell type, growth phase, cell density, sex, and age) and environmental conditions (including culture medium, aeration, and antioxidant levels)" (IARC 2013). The IARC international panel admitted also that some of the inconsistencies between RF studies could be due to differences in species, page 416 (IARC 2013), and other biological factors, page 104: "Biological systems are complex and factors such as	2010_ICEMS_13-belyaev.pdf	I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment. This section just summarizes the findings of the previous SCENIHR Opinion.

							metabolic activity, growth phase, cell density, and antioxidant level might alter the potential effects of RF radiation". Multiple physical variables that may affect study results were considered in the IARC monograph on pages 385-387 (IARC 2013). These variables were not reproduced in the purported replications of the original positive studies (Belyaev 2010; IARC 2013) [the files larger 1 Mb were not allowed to include but can be submitted by e-mail upon request].			
Malfait-Guilbaud	Ingrid	Iliad	imalfaitguilbaud@iliad.fr	France		2 OPINION	Safeguarding public health is a must for the iliad Group. Therefore, iliad understands the need to pay adequate attention to the use of new and emerging technologies based on higher frequencies and lower emitted power in closer vicinity to the human body. According to the above, iliad do not oppose the SCHEER advice about the need of technical revision of electromagnetic fields for those frequencies and, in this respect, recommends that any eventual review will be limited exclusively to the higher frequency bands such as the so called mmWaves (e.g., 26GHz) that are used by such emerging technologies and have triggered the concerns reported within the report. On the contrary, and on the basis of what reported at page 7 (lines 10-12) of the report, a horizontal review of electromagnetic fields limits - applied to all frequencies currently used by mobile operators (e.g., also mid-bands used for 5G) – wouldn't be justified by scientific reasons and, moreover, would be detrimental to the deployment of innovative mobile networks/services and, ultimately, to customers welfare.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. This is a risk management issue and policy makers will decide how to update/revise European regulatory texts.
Malfait-Guilbaud	Ingrid	Iliad	imalfaitguilbaud@ilia	France		4.2 Background	Iliad would like to draw the Commission's attention to the fact that, as mentioned in the opinion (p.5), a number of countries apply stricter rules on EMC. This was the case until recently in Poland and is still the case in Italy, two countries where iliad operates, with a direct negative impact on the deployment of mobile networks as well as on competitive dynamics. For example, in Poland until the end of 2019, much more restrictive electromagnetic field limits were in force than those		I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment. No changes in the text are required.

							resulting from the Recommendation 1999/519/EC and ICNIRP guidelines (up to 7V / m instead of 61 V / m). According to the analysis of telecommunications operators, external consulting companies and scientific institutes, such restrictive limits meant that for a significant part of the locations it was impossible (or it was significantly difficult) to expand the installation with new radio systems or build new installations. Thus, the lack of harmonization of the electromagnetic field limits with the standards resulting from the Recommendation / ICNIRP guidelines, due to the growing network traffic, could result in a gradual degradation of the quality of services based on LTE systems, and in the future the inability to effectively implement the 5G network. The lack of harmonization of EMF limits was therefore one of the key administrative barriers in the investment process for mobile networks, the effects of which ultimately affected not only operators, but also end users. The process of introducing harmonized electromagnetic field limits into Polish regulations in 2019 was difficult to achieve and took many years of discussions between operators and public administration. In Italy, electromagnetic limits are still the most stringent (6 V/m) across Europe and the direct consequence is a significant negative impact on operators' capability to rapidly and effectively deploy their mobile network (thus representing a relevant roadblock mainly for new entrants) as well as on competitive dynamics. This is the case especially in urban centres, due to the saturation or near saturation of sites and the issue is exacerbated by two additional factors: i) the Italian system governing the control of electromagnetic space; ii) opposition by local administrations. Under Italian law, a "first in/first serve" model applies, according to which the available "electromagnetic space" is allocated to the first operator - or operators - requesting it (also in case it is not used). Accordingly, incumbent/historical operators have privileged access to the electromagnetic space over new entrants, also considering that such requests, once approved, grants timeless permits. Moreover, there are cases of local administrations which, due to EMF-related concerns, have enforced a ban on the installation of new 5G equipment throughout their municipalities. The above leads to unjustified restrictions of competition in the telecommunications markets in Italy, raising barriers to entry and limitations to the effective deployment of network infrastructures.			

							Indeed, also the Italian Competition Authority (AGCM) has recently recognized the need to “verify the validity of the current electromagnetic limits, which are extremely low compared to those recommended by the European Union” and “constitute a barrier to the entry and expansion of new operators and new services”. According to the Authority it is necessary to find out the right balance between the need to safeguard public health and the need to develop a competitive market characterised by competitive dynamics that foster the effective implementation of 5G networks.			
Malfait-Guilbaud	Ingrid	Iliad	imalfaitguilbaud@iliad.fr	France		ABSTRACT	Founded in 1999, the iliad Group is a major player in the European telecoms sector. An innovative telco and the inventor of the world’s first triple-play box, the Group now operates in France, Italy and Poland and has over 15,000 employees serving 41,4 million active subscribers. The iliad Group is investing continuously on providing digital networks and services whose crucial role has been highlighted by the recent pandemic. Paying the utmost heed to social concerns surrounding mobile network roll out, the iliad Group is closely and strictly complying with health regulations regarding EMF from the very beginning of network design as well during each upgrade steps toward new technologies. In addition, the iliad group continuously updates its employees on the latest position of health authorities pertaining to EMF issue and work on raising awareness of responsible digital use. During the last years, European Governments, Regulatory Authorities and telecom operators have indeed encountered an increasing diffidence of the European population towards 5G and the impact of EMF, in most of the cases not backed by scientific reasons/evidence but instead by partial level of information about the topic and -in most of the cases- by misinformation triggered by the spreading-off of so called “fake news” through social networks. The iliad group strongly supports science-based approach to the topic and, in this respect, we welcome SCHEER expertise based on an extensive knowledge socle which covers several years of		I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment. No changes in the text are required.

							studies, as well as the opportunity to provide a feedback through this public consultation. Moreover, iliad firmly believes that transparency on the matter is key to enable a better understanding by non-scientific public and, to this purpose, respectfully suggests that the outcomes of the SCHEER opinion will be actively publicized by the European Commission.			
Serdengecti	Pinar	European competitive telecommunications association (ecta)	pserdengecti@ectaportal.com	Belgium		6 RECOMMENDATIONS FOR FUTURE WORK	ecta substantially agrees with all the recommendations provided by the SCHEER on the future scientific work. Having stated that, ecta would like to take the opportunity to remind the Commission of a crucial problem which, even though not in the direct scope of this public consultation, is directly related, in terms of the effects, to the same. As is known, according to the current rules, the Member States can either adopt the recommended emission limits in the EU Recommendation of July 1999 or stricter ones. The differentiated application of the limits so far by the Member States created a two speed Europe, with negative effects on the internal market, as some of the Member States have adopted stricter limits vis a vis those contained in the Recommendation. This discriminatory situation in which the majority of Member States correctly adopted the recommended emission limits, while a minority of them regretfully imposed very strict values (just to mention a few, Italy, Bulgaria, Brussels Capital Region), which has a detrimental effect on competition, preventing challenger/newer operators from deploying 3G and 4G. Just recently, the Wallonia Region of Belgium has taken measures which amount to blocking 26 GHz fixed-wireless access network deployment, while it is in this region of the country that broadband white spots remain. In Italy, which represents the worst Member State case, the Prime Minister's Decree of July 8, 2003, in implementation of Article 4, Paragraph 2 (a) of Law No. 36/01, has defined three different limits for antennas: exposure, attention value and quality objective. In particular, the exposure limit depends on the	ecta_evidence_doc_Italian_EMF_Limits_Case_EC_PC_Scheer_Opinion_.pdf	I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment. No changes in the text are required.

							frequency as represented in the following Table 1 (enclosed in the uploaded ecta evidence document). ecta would like to highlight that those limits are significantly more stringent than the European reference levels presented in Table 2 (enclosed in the uploaded ecta evidence document). Particularly for the bands between 700 MHz and 26 GHz, which are used for 5G, the European reference levels for electric field values range between 36 and 61 V/m, while the limits of the Italian regulations are 20 V/m below 3 GHz and 40 V/m for higher frequencies. In addition, also the attention value and quality objective, which apply to areas of prolonged occupancy and intensively frequented areas, are more restrictive than the exposure limits, reaching values as much as 10 times lower than the European reference levels, as shown in the Table 3 (enclosed in uploaded ecta evidence document). Those stringent limits particularly hamper late entrant operators' network deployment, as their EMF space is lower than that of early entrants who took all the available EMF space. The consequence is a significant negative effect on 5G deployment, damage to competition and ultimately to citizens' interests. There are locations where new competitors cannot roll out their networks, and the operators are forced to densify their networks to cover a specific area and consequently to significantly increase their required investments. ecta therefore takes this opportunity to call on the Commission to contemplate reviewing the recommendation and to change the legislative instrument (by foreseeing a Regulation) to make sure that the internal market is not distorted, and operators are not discriminated. The Regulation should foresee to this purpose a range of values, and all Member States should set the limits at least equal to the lower end of this range while the Member States that prefer can also set the values at the higher end (and thus apply less restrictive limits).			
Belyae	Igor	Depart	Igor.Bel	Slovaki		1.1	The SCHEER relies only on the bodies (ICNIRP, SCENIHR), which contrary to the enormous evidence neglect non-thermal RF effects, and plays down the fact that other bodies did accept health risks from non-thermal RF exposures and suggested much	2008_building-biology-guidelines-english.pdf;	I do not object to publication of my contribution, including my	Thank you for your comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information

							lower safety levels than the ICNIRP. In particular, the Building biologists suggest a very low RF radiation level of no more than 0.1 µW/m2 in sleeping areas (Institut für Baubiologie+Ökologie IBN, 2008). The EMF Working Group of the European Academy for Environmental Medicine (EUROPAEM) has reviewed the biological effects and health risks from RF exposures and suggested 1 µW/m2 during the night and 10 µW/m2 during the day time (Belyaev, Dean et al. 2016). This is close to the suggestion of the BioInitiative group that based on reviewing more than 2000 studies has suggested 3 - 6 µW/m2 as the limit for RF exposures (Sage, Carpenter et al. 2012). These values are based on the reported non-thermal RF effects in acute and chronic exposures and are orders of magnitude lower than the currently accepted ICNIRP levels, which are based on thermal RF effects in acute exposures [the files larger 1 Mb were not allowed to include but can be submitted by e-mail upon request].	2016_EUROPAEM_EMF_Guideline_2016_for_the_prevention__diagnosis_and_treatment_of_EMF-related_health_problems_and_illnesses.pdf	personal data, on internet	sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence assessed following a quality evaluation. No changes in the text are required.
Serdengecti	Pinar	european competitive telecommunications association (ecta)	pserdengecti@ectaportal.com	Belgium		2 OPINION	ecta welcomes the SCHEER Opinion and appreciates the literature overview provided by SCHEER on such a complex issue which is not always easy to understand and interpret by readers not having a scientific background. Within the limits of its understanding of the issue, ecta agrees with the SCHEER Opinion outcome “The SCHEER could not identify moderate or strong level of evidence for adverse health effects resulting from chronic or acute RF EMF exposure at levels below the limits set in the annexes of Council Recommendation 1999/519/EC and Directive 2013/35/EU”. ecta strongly recommends that the Commission actively publicize such findings, since many operators who are deploying 5G networks in numerous Member States encounter difficulties resulting from diffidence of the population towards 5G. For example, in the deployment of their 5G networks in Italy, ecta members FASTWEB and ILIAD have often encountered the opposition of Local Administrations concerned by the effects of RF EMF exposure. Those Local Administrations, by mis-interpretating the precautionary principle, have enforced a ban on the installation of new 5G equipment throughout their municipalities, due to alleged increased risks to human health associated with the use of 5G technology. These measures are clearly unlawful since an operator has the right to use the frequencies it has legitimately acquired, and - to use those frequencies - it needs to install new antennas. This creates paradoxically for those operators a concrete risk: one the one hand, the spectrum licensing terms require them (in accordance		I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment. No changes in the text are required.

							with the principle of efficient spectrum use) to comply with the applicable coverage obligations, which is directly related to the installation of infrastructure, while on the other hand Local Authorities prevent it. In addition, it creates a financial inefficiency due to the fact that the frequency resources have a significant cost of acquisition due to their scarcity. Therefore, active publication of the SCHEER Opinion towards European citizens and elected officials, could raise the awareness about the absence of negative health effects deriving from the RF EMF, and can reduce undue opposition coming from public opinion. In relation to the contents of the SCHEER Opinion on the emerging wireless applications, ecta acknowledges that the SCHEER notes, on one hand, that new and emerging wireless applications using RF EMF tend to use higher frequencies and lower emitted power in closer vicinity to the human body and on the other hand, there are situations where beam focusing, or intense pulsed radiation can increase exposure for short times. ecta notes, in this context, that the SCHEER acknowledges that the latest (2020) ICNIRP exposure guidelines introduce new dosimetric quantities and limits to them, that can protect humans more effectively from emerging technological applications of RF EMF, and, therefore, advises positively on the need of a technical revision of the annexes in Council Recommendation 1999/519/EC and Directive 2013/35/EU with regard to radiofrequency electromagnetic fields (100 kHz to 300 GHz). ecta does not oppose to such advice, but calls on the Commission to exercise caution to find a right balance between the need of not raising obstacles to 5G deployments, and the need of respecting the precaution principle. ecta also underlines that the introduction of new dosimetric quantities and limits to them should be limited only to the high frequencies currently used by emerging technological applications (i.e., 26 GHz band) in order to not include those frequencies that are not yet used.			
Serdenge	Pinar	european	pserdeng	Belgium		ABSTRA	ecta, the european competitive telecommunications association, welcomes the opportunity to provide feedback on the European Commission's public consultation launched on 22 August 2022 on the Scientific Committee on Health, Environmental and Emerging Risks (hereinafter "SCHEER") preliminary opinion on		I do not object to publication of my contribution, including my	Thank you for your comment. No changes in the text are required.

							the need of a revision of the annexes in Council Recommendation 1999/519/EC and Directive 2013/35/EU, in view of the latest scientific evidence available with regard to radiofrequency (100kHz - 300GHz) (hereinafter “The SCHEER Opinion”). ecta represents those alternative operators who, relying on the pro-competitive EU legal framework that has created a free market for electronic communications, have helped overcome national monopolies to give EU citizens, businesses and public administrations quality and choice at affordable prices. ecta represents at large those operators who are driving the development of an accessible Gigabit society, who represent significant investments in fixed, mobile and fixed wireless access networks that qualify as Very High-Capacity Networks (hereinafter “VHCN”) and who demonstrate unique innovation capabilities. ecta counts Mobile Network Operators (hereafter 'MNOs'), Fixed Wireless Access operators (hereafter 'FWA operators') as well as Mobile Virtual Network Operators (hereafter 'MVNOs') among its members, who will be directly impacted by the outcome of this Commission public consultation. Therefore, ecta appreciates that the Commission consults on the Preliminary Scheer Opinion and gives the opportunity to all stakeholders that will be impacted by the SCHEER recommendations in terms of changes to the Council Recommendation 1999/519/EC to express their views. ecta provides its comments on the SCHEER Opinion and on the issue of diversified implementation of Recommendation 1999/519/EC by Member States respectively in the chapters dedicated to “Opinion” and to “Recommendations for Future Work”.		personal data, on internet	
Belyaev	Igor	Department of	Igor.Beliaev@sav	Slovakia		2 OPINION	While the mission of the report is “meta-analyses, systematic reviews, and, when necessary, narrative or scope reviews and single research papers published after and including 2015 on radiofrequency electromagnetic fields (100 kHz to 300 GHz)” it extensively cites papers published earlier than 2015 if they report negative (no effects) findings. At the same time, the report missed multiple reviews showing detrimental health effects from mobile communication, which include but not limited to (Wilke 2018;	2018_Wilke_2.45_GHz_Wi-Fi_biological_pathological_effects_Review.pdf;2019_Mill	I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence

							Miller, Sears et al. 2019; Narayanan, Jetti et al. 2019; Vornoli, Falcioni et al. 2019; Alkayyali, Ochuba et al. 2021; Hu, Zuo et al. 2021; Yu, Bai et al. 2021; Balmori 2022; Dangi, Lalwani et al. 2022; Gautam, Priyadarshini et al. 2022; Hinrikus, Koppel et al. 2022; Mumtaz, Rana et al. 2022; Shirbandi, Khalafi et al. 2022) [the files larger 1 Mb were not allowed to include but can be submitted by e-mail upon request].	er_Risks_to_Health_from_RFR_Review.pdf;2019_Narayanan_RF_behavioral_changes_Review.pdf;2019_Vornoli_In_Vivo_Mammalian_Studies_Adverse_Effects_RF_Human_Health_Review.pdf;2021_Alkayyali_RF_Mobile_Phones_ELF_Thyroid_Hormones_and_Thyroid_Gland_Histopathology_Review.pdf;2021_Hu_RF_Neurotransmitters_in_the_Brain_Review.pdf;2022_Balmori_Evidence_health_risk_RF_mobile_base_stations_Review.pdf.pdf;2022_Gautam_RF_male_infertility_Review.zip;2022_Hinrikus_EEG_human		assessed following a quality evaluation. The references provided with the comment (some of which were published after the cut-off date for literature search) have now been considered, if they fulfil these criteria, and the text has been amended accordingly.

								_brain_various_generations_of_mobile_telecommunication_review.zip;2022_Shirbandi_RF_Cell_phones_Alzheimer_Review.zip		
Belyaev	Igor	Department of Radiobiology, Cancer Research Institute,	Igor.Beliaev@savba.sk	Slovakia		5.2 Interaction mechanisms	The major problem of this report, which makes it inconclusive for the matter of exposure to RF from mobile communication, is neglecting the non-thermal RF effects and their possible mechanisms. See for review of non-thermal effects RF effects (Belpomme, Hardell et al. 2018) and for their biophysical mechanisms for non-thermal (Belyaev 2015). The main issue for non-thermal effects is their dependence on multiple physical as well biological variables (Belyaev 2010). These dependences explain why biological and health effects of RF may seem to be inconsistent between different studies (Belyaev 2019). For example, specific GSM/UMTS uplink signals may or may not cause genonotoxic effects depending on GSM/UMTS carrier frequency (Markova, Malmgren et al. 2010; Gulati, Kosik et al. 2020). Another example is duration of exposure, which in combination with very low SAR/PD values may result in the same effects as much higher SAR/PD at lower durations (Belyaev 2017; Belyaev 2019).	2010_EHP_stem_MW.pdf;2010_ICEMS_13-belyaev.pdf;2015_Belyaev_Biophysical_mechanisms_NT_MW_effects.pdf;2017_Belyaev_Duration_Exposure_Dose_Assessing_Nonthermal_Biological_Effects_Microwaves.zip;2018_Belpomme_thermal_and_non-thermal_health_effects.pdf;2019_Belyaev_Health_effects_chronic_expos	I do not object to publication of my contribution, including my personal data, on internet	The remaining papers listed are either single papers or do not match the inclusion criteria described clearly in §4.2.4.

								ure_mobile_communication.pdf;2019_Belyaev_Regularities_Health_Risks_Non-Thermal_Microwaves_of_Mobile_Communication.pdf;2020_Gulati_UMTS_UCB_ROS_DNA_damage_apoptosis.pdf		
Lafuente	Javier	CCARS-The Scientific Advisory Committee on Radio Frequencies and	secretariatecnica@ccars.org.es	Spain		5.2.2 Cellular interaction mechanisms	There is a revision published by BERENIS. The conclusions on oxidative stress are as follows: In summary, the majority of the animal and more than half of the cell studies provided evidence of increased oxidative stress caused by RF-EMF or ELF-MF. This notion is based on observations in a large number of cell types, applying different exposure times and dosages (SAR or field strengths), also in the range of the regulatory limits. Certainly, some studies are burdened with methodological uncertainties and weaknesses or are not very comprehensive in terms of exposure time, dose, number and quantitative analysis of the biomarkers used to name a few. Taking these methodological weaknesses into account, nonetheless, a tendency becomes apparent, namely that EMF exposure, even in the low dose range, can lead to changes in oxidative balance. Organisms and cells are generally able to react to oxidative stress, and many studies showed adaptation to EMF exposure after a recovery phase. Pre-existing conditions, such as immune deficiencies or diseases (diabetes, neurodegenerative diseases), compromise the body's defence mechanisms, including antioxidative protection, and it is therefore possible that individuals with these conditions experience more severe health effects. In addition, the studies show that very young and elderly individuals can react less efficiently to oxidative stress induced by EMF, which of course also applies to other stressors that cause oxidative stress. More extensive studies under standardised conditions are necessary, to better understand and confirm these phenomena and observations.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment. The BERENIS Newsletter contains the same information like the paper cited in the Opinion. Schuermann, D., & Mevissen, M. (2021). Manmade Electromagnetic Fields and Oxidative Stress - Biological Effects and Consequences for Health. International Journal of Molecular Sciences, 22(7), 3772. https://doi.org/10.3390/ijms22073772

							7. REFERENCE to add: BERENIS – The Swiss expert group on electromagnetic fields and non-ionising radiation Newsletter – Special Issue January 2021 https://www.bafu.admin.ch/bafu/en/home/topics/electrosmog/newsletter-of-the-swiss-expert-group-on-electromagnetic-fields-a.html			
Lafuente	Javier	CCARS-The Scientific Advisory Committee on Radio Frequencies and	secretariatecnica@ccars.org.es	Spain		5.3.1 Neoplastic diseases	Page 32 Sleep: to add this 2 studies between page 25-26 The study by Danker-Hopfe et al. (2020) is a first human experimental study that investigated the effects of a Wi-Fi router emitting all night on sleep. The study participants were 34 healthy young men aged 20-30 years who were exposed to Wi-Fi (2.45 GHz) or sham exposure during sleep. A baseline night was followed by an experimental night with real or sham exposure, and this procedure was repeated a week later with the other condition (double-blind and randomised). The exposure consisted of a Wi-Fi signal, with traffic of varying intensity alternating with "beacon only" transmission. The maximum local SAR was <25 mW/kg, and the time average over 6 minutes was <6.4 mW/kg. This corresponds to a rather strong Wi-Fi exposure, but is still realistic in a home setting. Subjective and objective sleep parameters were not affected by whole-night Wi-Fi exposure. Also, arousals (wake-up reactions) did not differ between the two exposure conditions. However, the proportion of non-REM sleep stage 1 (light sleep) was slightly increased in the second half of the night. Analysis of the spectral composition of the non-REM sleep EEG showed a slight reduction in EEG power in the alpha frequency range after Wi-Fi exposure. This reduction, though, is not an indication of disturbed sleep and the effect size was small. In addition, multiple testing was not adjusted for, so this could also be a chance finding. In summary, sleeping next to a Wi-Fi router did not result in any sleep disturbing effects. The interpretation of the results is limited by the fact that only young healthy men participated in the study who were not concerned about Wi-Fi exposure, and that the observation was restricted to a single night of exposure.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The papers listed are single papers. No changes in the text are required.

							Mobile phone use and self-reported sleep quality in the COSMOS study (Tettamanti et al. 2020) First results of the COSMOS cohort study on mobile phone use and symptoms such as of headaches, tinnitus and hearing loss were presented in Newsletter No. 20 (Auvinen et al. 2019)10. In a second publication, possible associations between mobile phone use and self-reported sleep quality were investigated (Tettamanti et al. 2020). Again, data from over 24,000 participants from Sweden and Finland were included in the analysis. Data on mobile phone use were collected by means of a questionnaire at the beginning of the study. In addition, objective data on call duration in the GSM (2G) and UMTS (3G) networks were obtained from the mobile phone operators for a period of three months at the start of the study. At the beginning of the study and after four years, the study participants completed a questionnaire regarding sleep disturbance, sleep adequacy, daytime sleepiness, sleep latency, and insomnia. The group of participants with the longest talk duration (>258 minutes/week) had a higher risk of insomnia than those with the shortest call duration (OR=1.24, 95% confidence interval: 1.03-1.51). However, the correlation was less pronounced in an analysis accounting for the fact that less radiation is emitted while using the UMTS network compared to the GSM network. For the other aspects related to sleep quality, no significant associations with mobile phone use were observed. In addition to the prospective approach mentioned above, major strengths of this study are the large number of participants and the use of objective data from mobile phone operators. 7. REFERENCE: To add: Danker-Hopfe H, Bueno-Lopez A, Dorn H, Schmid G, Hirtl R, Eggert T (2020): Spending the night next to a router - Results from the first human experimental study investigating the impact of Wi-Fi exposure on sleep. Int J Hyg Environ			
Lafuente	Javier	CCARS- The Scientific	secretariatecnica@cca	Spain		5.3.1 Neoplastic	Page 26 line page 33 To add. The international MOBI-Kids (2022) study analysed the relationship between the use of mobile and cordless telephones and brain tumour risk in young people from 14 different countries. The possibility that using of mobile communication devices could increase the risk of brain tumours has been a topic of growing public health concern in recent decades, particularly in light of the considerable increase in use of such devices by young people.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The papers listed are single papers. No changes in the text are required.

							MOBI-Kids, an international case-control study set out to study this possible link using data from nearly 900 young people aged 10-24 years with brain tumours—most of the neuroepithelial type, mainly glioma—and 1,900 controls from 14 different countries matched to the cases on region, sex, age and date of diagnosis. To ensure sufficient participation, the controls were recruited from hospitals (people who had undergone surgery for appendicitis). Participants completed a questionnaire with detailed information on their wireless device use history. Parents also completed a questionnaire on exposures that might have occurred prior to conception, during pregnancy and in the participant's first year of life. To evaluate the adequacy of the data collected, various methodological sub-studies were conducted, including two validation studies. The first involved obtaining records from mobile phone operators to compare the number and duration of calls with those reported in the questionnaire. In the second validation study, participants were asked to install a mobile application on their phone to record their use of the device over four weeks. Exposure to RF and ELF electromagnetic fields from the phones was calculated using algorithms developed in MOBI-Kids. This is the largest study of brain tumours in young people to date, but the number of subjects in each subgroup may have been too small to evaluate possible associations, for example, in specific windows of time, in specific age groups and in different anatomical locations of tumours. One important strength of MOBI-Kids is the fact that brain tumour risk was analysed in relation to the estimated specific RF energy and ELF-induced current density at the location of the tumour. This is important because the RF and ELF doses at the tumour site depend not only on the duration and amount of telephone use, but also on the location of the tumour, the frequency band in which the telephones emit and the emission technology. The study, concluded there was no evidence of a causal association between brain tumours and use of mobile and cordless telephones and, in particular, exposure to radiofrequency (RF) and extremely-low-frequency (ELF) electromagnetic fields from these phones. 7 REFERENCE To add : G Castaño-Vinyals el al. Wireless phone use in childhood and adolescence and neuroepithelial brain tumours: Results from the international MOBI-Kids study,			

							Environment International, Volume 160,2022,107069,ISSN 0160-4120, https://doi.org/10.1016/j.envint.2021.107069			
Lafuente	Javier	CCARS- The Scientific Advisory Committee on Radio Frequencies and Health	secretariatecnica@ccars.org	Spain		5.3.1 Neoplastic diseases	Page 45 to add: A study published by the Joint Research Centre (2021) identified the possible links between health effects and the spread of mobile networks. This study was a scope systematic revision that analyzed statistical database (European Cancer Information System) publicly available, to explore relationships between the growth of mobile networks and the incidence of some pathologies such as brain cancer. The report does not address a possible link of other sources of radio frequency emissions including Wi-Fi, broadcasting, electric power lines and military communication systems. The study is based on a broad analysis of historical data from the last thirty years, which covers the deployment of successive generations of cellular networks from 2G to the present. Not all the sources of radio frequency emissions were considered for this study: only the ones based on cellular networks including the mobile phone emissions. In the conclusions of this report the authors established: The current statistical analysis by the JRC found no evidence of an increase in the incidence of brain and other CNS cancers during the years that followed the evolution of cellular networks in the regions under study. Despite the different types of identified uncertainties, the above finding is in agreement with the conclusions of the literature review, which does not report a significant correlation among the emergence of cancers and the mobile communications. 7 REFERENCE To add: Chountala C., Baldini G., Electromagnetic emissions from mobile networks and potential effect on health - Preliminary study, EUR 30586 EN, Publications Office of the European Union, 2021, ISBN 978-92-76-29839-7, doi:10.2760/41189, JRC123365. Page 25, line 46: To delete the word ”Finally” because we propose to add the previous comment		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The papers listed are single papers. No changes in the text are required.
La	Ja	C	se	S		5.	CCARS (2020) has published its triennial report to update the highest quality scientific evidence during the period from July		I do not object to publication of my	Thank you for the comment. The SCHEER has set specific

							2016 to December 2019. The report conclusions confirm the evidence observed in the previous CCARS report regarding the scientific evidence to date, showing that there is no evidence of risk to human health under normal levels of personal exposure to RF EMF. This report is not a systematic review or meta-analysis but has followed a methodology similar to that of a scoping review. Once the studies have been classified according to their methodological quality, those that provide the highest quality of evidence, based on criteria accepted by the scientific community, are included. The scientific information is obtained from clinical and epidemiological studies that provide the greatest weight of evidence, depending on the study design, methodology, quality, validity, consistency and reproducibility. This report includes an extensive chapter dedicated to dosimetry and assessment of exposure to new 5G-based technologies and wi-fi systems. Analysis of trends in the incidence rates of CNS tumours over long periods of time can help to identify risk factors related to the etiology (causes) and prevention of the disease. No relationship is observed in Spain between the number of mobile phone users and the incidence of brain tumours, according to data published by REDECAN (Spanish Network of Cancer Registries). From the results of most of the studies reviewed, it can be deduced that no carcinogenic effect is observed from exposure to RF EMF at usual levels for the population. The latest systematic reviews by agencies and committees specializing in EMF risk assessment (SSM, 2019, Netherlands Health Council, 2016, Italian Health Ministry -Istituto Superiore de Sanita, 2019 and CCARS 2020) agree that the results point to an absence of association between the use of mobile phones and an increased risk of tumours. A recent systematic review (Röösli et al., 2019) used current evidence from in vitro, in vivo and epidemiological studies and showed no association between mobile phone use and the development of tumours in the most exposed organs and tissues. Most agencies, committees and research groups agree there is still slight uncertainty about the long-term effects. Thus, due to the long latency periods of brain tumours, it is recommended that high quality, long-term prospective cohort studies with larger samples should be performed, especially in the assessment of individual exposure, with improved and accurate dosimetry in adults and children. To reduce the negative impact of false information, society must be provided with the most appropriate means and tools to disprove		contribution, including my personal data, on internet	criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence assessed following a quality evaluation.

							hoaxes, dismantle erroneous beliefs and disrupt the financial interests of those who take advantage of ignorance and fear about EMF. 7 REFERENCE to add. Radio Frequency and Health Report 2016-2019 (CCARS, 2020) https://ccars.org.es/publicaciones/documentos-elaborados-por-el-ccars			
Lafuente	Javier	CCARS- The Scientific Advisory Committee on	secretariatecnica@ccars.org.es	Spain		5.1.2 Exposure from emerging technologies	Page 16 between line 32and 33 The ANSES (2022) has published a systematic review on EMF related witn 5G. In a systematic rewiew that ANSES has established that available data on the health effects of frequencies, around 3.5 GHz, do not show and early exposure data do not show, at the present time, a significant increase in the average exposure of the population. Exposure induced by 5G deployment does not constitute a new health risk (page 18/27). 7 REFERENCE to add: AVIS de l'Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail relatif à l'« Exposition de la population aux champs électromagnétiques liée au déploiement de la technologie de communication « 5G » et effets sanitaires associés », actualisant l'avis du 12 avril 2021. Fevrier 2022 https://www.anses.fr/fr/system/files/AP2019SA0006RA-2.pdf		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The measurements for assessing changes in exposure due to 5G are considered insufficient by ANSES (2022), whereas the simulation of ANFR (2020), on which the conclusion of that report and the comment is based, has been added to the text.
Lafuente	Javier	CCARS	secretariatecnica	Spain		5.1 Exposure to	Page 14 Line number 25: To add a new line 26 with this text: Dongus el al. (2021) in a review based on systematic quality evaluation on health effects of wifi radiation have reported that their review does not suggest detrimental health effects wifi exposure below regulatory limits. They conducted a systematic literature search for all papers published between january1997 and august 2020 followed by a quality review addressing blinding and dosimetry in experimental studies and various types of		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The text has been amended.

							biases in epidemiological studies. 7 REFERENCE: To add: Stefan Dongus, Hamed Jalilian, David Schürmann & Martin Röösli (2022) Health effects of WiFi radiation: a review based on systematic quality evaluation, Critical Reviews in Environmental Science and Technology, 52:19, 3547-3566, DOI: 10.1080/10643389.2021.1951549			
Wright	Martin	EBU	Martin.emc.wright@gmail.com	Other	European Broadcasting Union based in Geneva	1.2 Terms of reference	The European Broadcasting Union fully supports the opinion that there should be a technical revision of the annexes in Council Recommendation 1999/519/EC and Directive 2013/35/EU with regard to radiofrequency electromagnetic fields (100 kHz to 300 GHz). Although this report considers the technical reasons for a revision we would add that EMF exposure is a very emotive topic in some areas. Therefore, delays in updating these annexes in line with the most recent scientific advice only adds to the confusion and misunderstanding. i.e. Carrying out a technical revision will not only ensure that the Recommendation and Directive remain relevant technically but, by being aligned with the most recent ICNIRP guidance, there will be less scope for confusion in their applicability. Furthermore, Directive 2013/35/EU itself acknowledges the possible need for updates in paragraph 16 ("In order to ensure that this Directive remains up-to-date ….."). Similarly, paragraph 10 of the Recommendation includes, "… reassessed in the light of new knowledge…" Therefore, carrying out technical updates will also be in line with the intentions when these documents were drafted.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment.
Barmueller	Thomas	Mobile & Wireless Forum (MWF)	thomas.barmueller@mwfai.org	Belgium		5.1.1 Wireless communication	The Mobile & Wireless Forum (MWF, www.mwfai.org) thanks SCHEER for the opportunity to provide comments on the 'Preliminary Opinion on the need of a revision of the annexes in Council Recommendation 1999/519/EC and Directive 2013/35/EU, in view of the latest scientific evidence available with regard to RF (100kHz - 300GHz)'. Our comments are related to chapter '5.1.1 Wireless communication technologies', in particular '5.1.1.1 Typical exposure of population' as it seems that the following publications were not included in the scientific basis of the preliminary opinion: 1. Power Level Distributions of Radio Base Station Equipment and User Devices in a 3G Mobile Communication Network in India and the Impact on Assessments of Realistic RF EMF	15_Joshi_3G_Realistic_Power_Levels._Part1.pdf;15_Joshi_3G_Realistic_Power_Levels._Part2.pdf;17_Joshi_4G_Realistic_Power_Levels.pdf;21_Joshi_5G_Realistic_P	I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence assessed following a quality evaluation.

							Exposure, Paramananda JOSHI et al, 2015 https://ieeexplore.ieee.org/document/7151792 2. Output Power Levels of 4G User Equipment and Implications on Realistic RF EMF Exposure Assessments, Paramananda JOSHI et al, 2017 https://ieeexplore.ieee.org/document/7879218 3. Actual Output Power Levels of User Equipment in 5G Commercial Networks and Implications on Realistic RF EMF Exposure Assessment, Paramananda JOSHI et al, 2020; https://ieeexplore.ieee.org/document/9252895 Corresponding author 1 to 3: Paramananda Joshi (paramananda.joshi@ericsson.com) The three studies determine actual output power levels of 3G, 4G and 5G user equipment in real operation. The studies cover a variety of usage (e.g., voice, voice plus data, data only) in a variety of environments (e.g., rural, suburban, urban and indoor environments) and involve analysis based on substantial volumes of network traffic: 700,000 hours of voice calls for the 4G paper and between 300,000 to 545 million power samples for the 3G and 5G papers respectively. The study authors point out that „the standardized procedures may lead to very conservative estimations of EMF exposure“ and that “knowledge of the actual transmit power levels is therefore of fundamental importance in accurately evaluating real EMF exposure from user equipment such as for epidemiological investigations of potential associations between mobile phone usage and adverse health effects.“	ower_Levels.pdf		
Melnick	Ronald		ron.melnick@gmail.com	Other	United States	6 RECOMMENDATIONS	p.38, lines 13-28. This section is extremely weak since it makes no specific recommendations for future work to address data gaps on the health effects of RF radiation. The statement that the SCHEER welcomes the development of WHO protocols for systematic reviews concerning the strength of evidence on health effects of exposure to RF radiation is simply a delaying tactic that does not serve the best interests of public health. What is truly needed is a re-evaluation of RF-EMF by the International Agency for Research on Cancer (IARC). Because the mandate from the EU Commission Services invited the SCHEER to consider “relevant aspects of precaution,” and because there is an abundance of scientific evidence from human studies, animal		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER is of the opinion that the research agenda will largely be determined by the results of the systematic reviews commissioned by the WHO. The text has been amended.

							studies, and mechanistic studies linking RF radiation to increased cancer risk, it would be appropriate for the SCHEER to promote precautionary advice on human exposures to RF radiation. A second recommendation is that there is a need for more research in the higher frequency bands of the RF spectrum. Because of the lack of health effects information on the higher 5G frequencies, it is surprising that the SCHEER report does not question the rationale for the continued deployment of 5G networks.			
Melnick	Ronald		ron.melnick@gmail.com	Other	United States	5.3.1 Neoplastic diseases	Page 26, lines 26-33. The SCHEER report should note that in the NTP study there were also increases in focal Schwann cell hyperplasia of the heart and glial cell hyperplasia of the brain in RF exposed rats. Page 27, lines12-24. The SCHEER claims there is strong evidence of thermoregulatory stress in the high dose groups, which likely caused lower body weights and affected survival and tumor incidences. These assertions, which come from the model-based predictions of Kuhne et al. 2020, are wrong. Model-based predictions without validation from experimental data is not "strong evidence," and the animals did not suffer from thermoregulatory stress: body weights of male rats in the 6 W/kg groups differed from sham controls by less than 5% throughout most of the chronic study, there were no exposure-related clinical observations, and survival was greater in the RF exposed groups of male rats compared to sham controls. Thus, the animals tolerated the exposure levels used in the NTP 2-year studies (Melnick 2019, 2020). The SCHEER report claims there was a "lack of tumors in the sham controls," yet, the incidence of tumors in sham control male rats was 63%. Page 29, lines 3-14. The SCHEER criticizes the study by Lerchl et al. (2015) which was intended to confirm or counter the study by Tillmann et al. (2012), but fails to note two major conclusions of the that study: the tumor-promoting effects were seen at exposure level well below exposure limits for the users of mobile phones and their "findings are a very clear indication that … tumor-promoting effects of life-long RF-EMF exposure may occur at levels supposedly too low to cause thermal effects." The SCHEER claims "studies testing potential tumor promoters may be useful as long as humans are simultaneously exposed to several promoting agents and tumor initiating carcinogens." This claim is nonsense, since simultaneous exposure to initiators is not a necessity for tumor promotion. Tumor promotion at low RF exposures is a concern for humans. Page 29, lines 16-48. The report's conclusions use terms such as "weak weight of evidence" or "uncertain weight of evidence" without establishing criteria on how the modifiers of the weight of	IARC_2012b_butadiene_mono_100F.pdf;Melnick_2019_Env_Res.pdf;Melnick_2020.pdf	I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment. The SCHEER did not overlook the mentioned tumours and hyperplasias. The SCHEER mentioned strong evidence on thermoregulatory stress in high dose male rats, but not in all "high dose groups" (i.e., females and males). The SCHEER does not support the authors' conclusion on tumour-promoting effects, nor does it claim that simultaneous exposure is necessary for tumour promotion. 1) The SCHEER has used the WoE approach which can be downloaded from here:

							evidence are determined. Hence, these conclusions do not appear to be objective. The report claims there are inconsistencies and partial inaccuracies in the rat carcinogenicity studies. However, and in spite of the different exposure methodologies, tumor findings in the NTP and Ramazzini studies showed remarkable site concordance, and "partial inaccuracies" were never addressed in the text. The SCHEER report relies on the "different tumor responses in the (NTP) mouse studies compared to the rat studies" as support for a lack of human relevance. The studies in mice were not negative, there were 5 equivocal findings. Different tumor responses between mice and rats are not unusual in experimental carcinogenicity studies, e.g., benzene and butadiene (IARC, 2012a,b). Public health agencies do not require site concordance in rats and mice to assess the relevancy and risk of exposure to humans. The remarkable concordance of tumor cell type in the studies in rats and in epidemiology studies in humans (Schwann cells and glial cells), adds relevancy to the risk in humans and should have been highlighted or at least acknowledged by the SCHEER. In spite of the results by Lerchl SCHEER claims co-carcinogenicity "studies so far do not provide any further insight towards a carcinogenic risk, because mouse-specific tumors may have been promoted." Liver and lung tumors are not specific to mice. The overall conclusion appears to be a superficial whitewash of health effects data that demonstrate increased carcinogenic risks from exposure to RF radiation.			https://health.ec.europa.eu/system/files/2019-02/scheer_o_014_0.pdf 2) For "partial inaccuracies" please consider the described limitations in §5.3.2.1 3) The SCHEER does not qualify the NTP mouse studies as negative.
						7 REFERENCES	5 G wireless telecommunications expansion: Public health and environmental implications. Environmental Research. 2018 Aug;165:484-495. https://pubmed.ncbi.nlm.nih.gov/29655646/ Building Science and Radiofrequency Radiation: What makes smart and healthy buildings. (2019) Clegg F et al. Building and Environment. Open Access. Aug 6, 2019. https://www.sciencedirect.com/science/article/pii/S0360132319305347 Evidence for a health risk by RF on humans living around mobile phone base stations: from radiofrequency sickness to cancer. Alfonso Balmori. Environmental Research. 2022 Nov;214(Pt 2):113851. https://pubmed.ncbi.nlm.nih.gov/35843283/ Electromagnetic radiation as an emerging driver factor for the decline of insects. A BAlmori. Science of the Total Environment. 1 May 2021, 144913. https://www.sciencedirect.com/science/article/abs/pii/S0048969		I do object to publication of my contribution, including my personal data on internet to the grounds that such publication would harm my legitimate interests.	Thank you for the comment and the literature provided. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence assessed following a quality evaluation. The references that comply with these criteria have been considered.

							720384461 Levitt, Lai, Manville. (2021) Effects of non-ionizing electromagnetic fields on flora and fauna, Part 1. Rising ambient EMF levels in the environment. Rev Environ Health. 2021 May 27. https://pubmed.ncbi.nlm.nih.gov/34047144/ Levitt, Lai, Manville (2021) Effects of non-ionizing electromagnetic fields on flora and fauna, Part 2 impacts: how species interact with natural and man-made EMF. Rev Environ Health. 2021 Jul 8. https://pubmed.ncbi.nlm.nih.gov/34243228/ Human-made electromagnetic fields: Ion forced-oscillation and voltage-gated ion channel dysfunction, oxidative stress and DNA damage (Review).(2021) Pangopolous DJ, et al. International Journal of Oncology. August 23, 2021. https://pubmed.ncbi.nlm.nih.gov/34617575/ Levitt, Lai, Manville (2021) Effects of non-ionizing electromagnetic fields on flora and fauna, Part 3. Exposure standards, public policy, laws, and future directions. Rev Environ Health. 2021 Sep 27. https://pubmed.ncbi.nlm.nih.gov/34563106/ Towards predicting intracellular radiofrequency radiation effects. (2019) Nielson C et al. PLOS One. March 14, 2019. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0213286 On the magnetosensitivity of lipid peroxidation: two- versus three-radical dynamics. (2019) Sampson C et al. Physical Chemistry Chemical Physics. Issue 25, 2019. https://pubs.rsc.org/en/content/articlelanding/2019/cp/c9cp01746a#!divAbstract International Perspective on Health Effects of Low Intensity Non-Ionizing Radiation.(2018) Thermal and non-thermal health effects of low intensity non-ionizing radiation: An international perspective. (2018) Belpomme D et al. Environ Pollut. 2018 Jul 6; 242(Pt A):643-658. https://www.ncbi.nlm.nih.gov/pubmed/30025338 Understanding physical mechanism of low-level microwave radiation effect. (2018) Hinrikus H. Int J Radiat Biol. 2018 Oct;94(10):877-882. https://www.ncbi.nlm.nih.gov/pubmed/29775391https://www.ncbi.nlm.nih.gov/pubmed/29775391 Discussion on Spatial and Time Averaging Restrictions Within the Electromagnetic Exposure Safety Framework in the Frequency Range Above 6 GHz for Pulsed and Localized Exposures. Neufeld E et al. Bioelectromagnetics, 2020 Feb;41(2):164-168. https://www.ncbi.nlm.nih.gov/pubmed/31885092			

							EXPOSURE ASSESSMENT OF PORTABLE WIRELESS DEVICES ABOVE 6 GHz. (2019) Carrasco E et al. Radiat Prot Dosimetry. 2019 Jun 1;183(4):488-495. https://www.researchgate.net/publication/328125644_ Human EMF Exposure in Wearable Networks for Internet of Battlefield Things. (2019) Nasim and Kim. IEEE Military Communications Conference 2019. https://ieeexplore.ieee.org/document/9020889 Systematic Derivation of Safety Limits for Time-Varying 5G Radiofrequency Exposure Based on Analytical Models and Thermal Dose. (2018) Neufeld and Kuster Health Physics. 2018 Sep 21. https://www.ncbi.nlm.nih.gov/pubmed/30247338			
Correia	Luis M.	IST - Univ. Lisbon	luis.m.correia@tecnico.ulisboa.pt	Portugal		5.1 Exposure to RF EMF	After reading the report, I noticed some errors in the area in which I work (telecommunications engineering), e.g.: --- one can read things like “EMF exposure was 0.16 V/m”, but V/m is for the electric-field, not for the electromagnetic field; depending on certain conditions, the electric and the magnetic fields may or may not be separable, hence, when one reads a sentence like this, one may suspect that the author of these statements has no background in engineering, and was writing about matters for which has no expertise; --- one can read things like “SAR transfer algorithms to provide RF EMF daily dose 47 estimates (mJ/kg/day)”, but SAR (Specific Absorption Rate) is measured in W/g, not in J/g; once again, this reveals the same problem of the previous statement. These inconsistencies/errors may be symptoms of other problems in the report. Given the importance of a report of this nature, I would recommend that the Committee includes proper expertise in telecommunications engineering (at least) and corrects all the errors that it currently contains.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER would like to highlight the following: - There are several places in the Opinion where the SCHEER reports exposure as described in the literature source. - SAR is measured in W/kg. The daily dose in mJ/kg/day. - The SCHEER is confident that the WG has the necessary and sufficient expertise to carry out its task.
Stam	Rianne	Nationa	rianne.	Netherl		4	In section 4.1 (Data/Evidence), SCHEER states that "The scientific assessments carried out should always be based on scientifically accepted approaches, and be transparent with regard to the data, methods and assumptions that are used in the		I do not object to publication of my contribution, including my	Thank you for the comment. The Annex with the information about the application of the WoE

							risk assessment process". Reference is made to SCHEER's Memorandum on Weight of Evidence (WoE) and uncertainties (2018). In section 4.2.4 (Differences in methodology from SCENIHR (2015)), SCHEER states that "Due to the increased number of meta-analyses and systematic reviews, it was decided to address the Terms of Reference of the current Opinion using mainly meta-analyses and systematic reviews, since they can efficiently handle the heterogeneity of individual studies resulting in an improved reliability of the level of evidence. When there was a lack of meta-analyses and/or systematic reviews on a biological/health effect, other reviews or research papers that fulfilled the required quality criteria were used for risk assessment". Unfortunately, details of the search criteria and outcome, selection criteria, references selected and grading as missing. In the interest of transparency, reproducibility and quality control, it is important that, in the final Opinion, SCHEER not only includes an Annex (already announced in page 13, lines 9-10) that contains all the references that have been considered for risk assessment along with their grading and the weight of evidence approach taken by the working group, but also adds more information on the literature search methods and selection criteria and a list of the references not used for the Opinion, with motivation.		personal data, on internet	approach for this Opinion, will be published with its final version.
Stam	Rianne	National Institute for Public health and the	rianne.stam@rivm.nl	Netherlands		2 OPINION	The terms of reference for this opinion (Opinion I) were: "To advise on the need of a (technical) revision of the Council Recommendation 1999/519/EC annexes and of the annexes of Directive 2013/35/EU in view of the latest scientific evidence available, in particular that of the ICNIRP-guidelines updated in 2020, with regard to radio frequency 100 kHz to 300 GHz". The last bullet under "2 OPINION" states that "SCHEER acknowledges that the latest (2020) ICNIRP exposure guidelines introduce new dosimetric quantities and limits to them, that can protect humans more effectively from emerging technological applications of RF EMF, and, therefore, advises positively on the need of a technical revision of the annexes in Council Recommendation 1999/519/EC and Directive 2013/35/EU with regard to radiofrequency electromagnetic fields (100 kHz to 300 GHz)." Most of the draft opinion is taken up with an assessment of the literature on exposure, interaction mechanisms and health effects of radiofrequency electromagnetic fields (RF EMF). What is missing is an explanation of the changes in dosimetric quantities		I do not object to publication of my contribution, including my personal data, on internet	Thank you for this comment. This bullet point of the Opinion is based on the last part of §5.2.1.

							and values of reference levels and basic restrictions in ICNIRP 2020, how these would protect humans more effectively from emerging technological applications of RF EMF and what the advantages and disadvantages would be of implementing the advised technical revision of the annexes in the Council Recommendation end EMF Directive. It would be helpful if SCHEER could supply more supporting material for this part of the Opinion.			
Melnick	Ronald		ron.melnick@gmail.com	Other	United States	5.2.3 Conclusions on interaction mechanisms	Page 23, lines 1-18. While there will always be inconsistencies in studies of biological effects due to different conditions of exposure to RF radiation, experimental design, endpoints or biomarkers evaluated, dismissing the abundance of studies showing increased oxidative stress and genetic damage at this time because there are no meta-analyses or systematic reviews of these effects is a delaying tactic that does not serve the best interest of public health. Furthermore, because the SCHEER relied on the reviews, including that of Vijayalaxmi and Prihoda (2019), and did not perform their own evaluation of design or quality factors that might have impacted positive or negative results of oxidative stress or genetic effects, the SCHEER is not in position to offer any meaningful conclusion on the strengthen of evidence for these important biological effects. Claiming that "its [oxidative stress] correlation with possible adverse effects is not clear" demonstrates a lack of knowledge by the SCHEER on this issue. Oxidative stress is a key characteristic of several human carcinogens including ionizing radiation and asbestos (Smith et al., 2016); and, on page 20, lines 13-17, the SCHEER document notes that reaction with oxidants give rise to "alteration in cellular functions related to several diseases like cancer and neurodegenerative diseases." Consequently, the conclusion is inconsistent with the text. In the mandate from the EU Commission Services, the SCHEER was invited to consider "relevant aspects of precaution." There is an abundance scientific evidence from mechanistic studies on RF radiation that have been published over the past 25 years to support precautionary advice from the SCHEER on human exposures to RF radiation.	Smith_2016__Key_characteristics.pdf	I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. However, the SCHEER remains of the opinion that health effects due to oxidative stress resulting from RF exposure have not been demonstrated. The text has been amended for clarity.
Melnick	Ronald		ron.melnick@gm	Other	United States	5.2.2 Cellular	Page 20, lines 1-47. In discussing RF exposure and biomarkers of oxidative stress, the SCHEER needs to note that more than 100 studies reported this effect. While writing that RF may affect biomarkers of oxidative stress at exposure levels close to the ICNIRP guidelines, the document should mention that effects below the ICNIRP guidelines have also been reported. The frame of reference for an effect of RF exposure should be the ICNIRP claimed threshold level of 4 W/kg, not the guideline level in which		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence

							arbitrary safety factors had been applied. This is because if 4 W/kg is not a true threshold level, then safety factors need to be applied to the real threshold dose. Simply claiming “the majority of studies [on oxidative stress and genetic effects] do not comply with quality criteria” (sham control, positive control, blind evaluation and temperature control) is not sufficient rationale to dismiss positive findings that have been detected in the majority of studies of these effects. This statement has no credibility without a thorough evaluation of possible factors that could have affected the results in each of these studies. In light of the abundance of scientific studies demonstrating increased oxidative stress associated with exposure to RF radiation, to dismiss this endpoint as “not leading to health effects” is misleading. In contrast, the section on genetic effects notes that “one of the most important agents explaining the genotoxic effects of RF are the reactive oxygen species” Page 21, lines 8-47. The SCHEER also dismisses the more than 100 studies showing genotoxic effects by relying on a review of four quality control measures (blind collection/analysis, adequate dosimetry description, positive control, and sham control) in studies of genetic damage in cells exposed to RF radiation that the authors consider useful for evaluating potential health risks (Vijayalaxmi and Prihoda, 2019). However, lacking one or more of these measures does not signify a false positive result. For example, while blinding may appear to avoid bias, non-blinding does not mean the samples were analyzed by biased individuals. While a positive control is useful to demonstrate the responsiveness of the test procedure and for comparing relative responses to a known inducer of the specific endpoint, lack of one does not indicate that a positive finding was incorrect. Dosimetry is an essential parameter for understanding dose-response relationships, however, if the emission source was a mobile phone, then a positive effect (genetic or oxidative stress) should not be casually dismissed. While the application of these “quality criteria” appears to be aimed at dismissing positive results, the SCHEER makes no comment on the reliability of negative studies, e.g., whether or not those studies used challenging exposure levels and had sufficient exposure duration to avoid reporting a false negative result. Also, the review by Vijayalaxmi did not distinguish various genetic endpoints, the nature of RF exposures, types of cells evaluated, and sample size/statistical power which can vary greatly among studies. Rather than simply accepting the conclusions of that review, the SCHEER needs to provide a critical evaluation of the underpinnings of that review to form its own conclusion on the			assessed, following a quality evaluation of them.

							consistency of genotoxic effects of RF radiation. Inconsistency of published results does not justify dismissing the vast number of studies showing genotoxic effects or oxidative stress, because experimental studies from different laboratories often used different exposure scenarios (e.g., exposure sources/intensities, frequencies, carrier wave modulations, etc.), examined different types of cells, and evaluated different endpoints or biomarkers.			
Nyberg	Rainer	Abo Akademi University -(retired) professor emeritus	Rainer.Nyberg@abo.fi	Finland		ABSTRACT	Lines 7-9: It is not difficult to find proofs of harmful effects of radiofrequency radiation on humans, animals, birds, insects and even trees and plants. Most industry-independent researchers can find several thousand scientific proofs of harm from radiation below the ICNIRP guidelines. (A) Dr Zory Glaser (1, 2) already in the 1970ies found 3700 scientific studies and publications, the majority of them proving adverse effects of radiation. Since that time RF radiation from billions of devices and antennas (2G, 3G, 4G, WiFi, WIMAX & DECT have been introduced. (B) "BioInitiative reports" in reviews, made by 29 scientists, found that between 65 and 91% of 1299 studies (depending on endpoints) reported harmful biological effects (references 3-5). (C) The Oceania Radiofrequency Science Advisory Association (ORSAA, ODEB database, reference 6) stated that 69% of 2065 relevant peer reviewed studies in the ODEB database show significant biological effects. These three oversights of research (A, B, C) give more than enough scientific evidence of harmful effects from electromagnetic fields (EMF) below the current guidelines. References: 1. Glaser ZR. Bibliography of reported biological phenomena ('effects') and clinical manifestations attributed to microwave and radio-frequency radiation. Naval Medical Research Inst Bethsada MD; 1972. https://apps.dtic.mil/sti/pdfs/AD0750271.pdf 2. Glaser ZR, Brown PF, Brown MS. Bibliography of reported biological phenomena ('effects') and clinical manifestations attributed to microwave and radio-frequency radiation: Compilation and integration of report and seven supplements. Bethsesda MD: Naval Medical Research Institute Detachment at		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment and the literature provided. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence assessed following a quality evaluation.

							Naval Surface Weapons Centre; 1976. https://ehtrust.org/wp-content/uploads/Naval-MRI-Glaser-Report-1976.pdf 3. BioInitiative Working Group. BioInitiative report: A rationale for a biologically-based public exposure standard for electromagnetic fields (ELF and RF). Sage C, Carpenter DO, editors 2007. https://www.centerforadvancedmed.com/wp-content/uploads/2018/10/bioInitiativeReport2012.pdf 4. BioInitiative Working Group. Bioinitiative report: A rationale for a biologically-based public exposure standard for electromagnetic radiation. Sage C, Carpenter DO, editors; 2012. https://bioinitiative.org/ 5. BioInitiative Working Group. Bioinitiative report: 2020 updated research summaries. Sage C, Carpenter DO, editors; 2020. https://bioinitiative.org/research-summaries/ 6. Oceania Radiofrequency Scientific Advisory Association. Statement regarding harmful biological effects of communication radiofrequencies. 2021. https://www.orsaa.org/uploads/6/7/7/9/67791943/eu-attachment1-orsaa.pdf Below, please find many more proofs of harmful biological effects from EMF.			
Rowley	Jack	GSMA	jrowley@gsma.com	Belgium		6 RECOMMENDATIONS FOR FUTURE	Page 38, Lines 18-19: The Horizon Europe Framework Programme (2021) is supporting forward-looking research projects to provide information on potential hazards and risks of existing and emerging EMF exposures. There is a need for more research in the higher frequency bands of the RF spectrum (i.e., millimetre waves) and their adverse, beneficial or lack of health effects. Justification: The Horizon Europe Framework Programme is providing significant support for RF-EMF related research and this should be brought to the attention of readers of the SCHEER preliminary opinion. Add: • Horizon Europe Framework programme (2021), Exposure to electromagnetic fields (EMF) and health, TOPIC ID: HORIZON-	GSMA_Response_to_SCHEER_Consultation_on_the_Preliminary_Opinion_RF_220921.pdf	I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. It is not necessary to refer to specific research funding frameworks. No change in the text is required.

							HLTH-2021-ENVHLTH-02-01, accessed 1 September 2022. https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/horizon-hlth-2021-envhlth-02-01;callCode=null;freeTextSearchKeyword=emf;matchWholeText=true;typeCodes=1;statusCodes=31094501,31094502,31094503;programmePeriod=2021%20-%202027;programCcm2Id=43108390;programDivisionCode=null;focusAreaCode=null;destination=null;mission=null;geographicalZonesCode=null;programmeDivisionProspect=null;startDateLte=null;startDateGte=null;crossCuttingPriorityCode=null;cpvCode=null;performanceOfDelivery=null;sortQuery=sortStatus;orderBy=asc;onlyTenders=false;topicListKey=topicSearchTablePageState In case our feedback is unclear, comments to all the sections are attached in PDF format.			
Rowley	Jack	GSMA	jrowley@gsma.com	Belgium		5.3.4 Other health effects	Page 37, Lines 43-46: However, in a study about rigger safety in the telecommunications industry (Boulais, 2016), about 37% of the surveyed riggers reported the microwave hearing effect as a distraction: as explained in the study, such a distraction poses an occupational risk that may result in indirect health damage. However, the sample size was small (99) and the author cautions that there is a need for validation of the questionnaire response. More broadly, audible sensations are not identified as critical parameter in the COMAR (2002) guidelines on medical aspects of RF-EMF overexposures. There is also no mention of audible sensations in a report of 330 RF-EMF overexposure incidents (58 confirmed) in the US Air Force (Graham, 1984). Add: • Medical Aspects of Radiofrequency Radiation Overexposure, IEEE Committee on Man and Radiation (COMAR), Health Physics, 82(3):387-391, March 2002. https://doi.org/10.1097/00004032-200203000-00011 • The Medical Results of Human Exposures to Radiofrequency Radiation, Graham, Report 85-029CV111ARA):21, December 1984. https://apps.dtic.mil/sti/citations/ADA149718		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. No change in the text is required. The sample size is sufficient for safety hazard identification. The report on the overexposure incidents is not pertinent here, because it is not clear in it, if audible effects were even among the clinical symptoms that were investigated.

							Justification: Using 75% overstates the significance in the total survey responses. The cautions of the study author should also be reflected as other papers report that the microwave hearing effect only occurs in quiet conditions. Furthermore, we note that aside from the single small study from Australia, there is little evidence that microwave hearing effects are significant for workers.			
Rowley	Jack	GSMA	jrowley@gsma.com	Belgium		5.3.4 Other health effects	Page 37, Lines 26-29: Insert new paragraph before current sentence. A systematic review by Kacprzyk et al., 2021 whether mobile phone (MP) use increases the risk of tinnitus identified eight studies and included six high-quality studies in a meta-analysis. They concluded that current scientific knowledge does not support the hypothesis that mobile phone use is associated with tinnitus. Similarly, Balajelini et al., 2021 conducted a systematic review and meta-analysis, which identified five relevant studies (two cross-sectional and three cohort studies) with 92,978 participants. They concluded that their findings indicate no association between mobile phone use and hearing impairment. Furthermore, Auvinen et al., 2019 reported that the international Cohort Study of Mobile Phone Use and Health (COSMOS) in Sweden and Finland with over 24,000 participants found that tinnitus and hearing loss were not associated with amount of call-time. Add: • The Impact of Mobile Phone Use on Tinnitus: A Systematic Review and Meta-Analysis, Kacprzyk et al., Bioelectromagnetics, 42(2):105-114, February 2021. https://doi.org/10.1002/bem.22316 • Association between Mobile Phone Use and Hearing Impairment: A Systematic Review and Meta-Analysis, Balajelini et al., Reviews on Environmental Health, 000010151520210062): Online 22 July 2021. https://doi.org/10.1515/reveh-2021-0062 • Headache, Tinnitus and Hearing Loss in the International Cohort Study of Mobile Phone Use and Health (Cosmos) in Sweden and Finland, Auvinen et al., International Journal of Epidemiology, 48(5):1567-1579, October 2019.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The text has been amended.

							https://doi.org/10.1093/ije/dyz127 Justification: Insert new paragrap) at the start of this section referring to conclusions of two relevant reviews and an important study related to auditory effects. Page 37, Lines 36-37: Microwave hearing is an acute effect and occurs for as long as the head of a subject is exposed to pulsed RF EMF of specific frequency and pulse width but is generally only heard in a quiet environment (Elder and Chou, 2003). In order to generate perceptible acoustical stimuli a very high energy per single pulse is necessary. If the energy per pulse is limited such effects cannot occur. The electromagnetic fields of radio and television transmitters as well as of mobile telecommunication cannot evoke 'microwave hearing.' In the immediate vicinity of high-power radar units perception is possible (BfS, 2021). Add: • Auditory Response to Pulsed Radiofrequency Energy, Elder, Bioelectromagnetics, 24(Supplement 6):S162-S173, 2003. https://doi.org/10.1002/bem.10163 • Bundesamt für Strahlenschutz (BfS), Biological effects of radiofrequency electromagnetic fields due to energy absorption and heating, last updated 25 March 2021, accessed 1 September 2022. https://www.bfs.de/EN/topics/emf/hff/effect/hff-established/hff-established.html Justification: Add Elder and Chou (2003) for more complete explanation. Elder and Chou (2003) note that earplugs were used in some experiments because 'investigators were generally aware that a quiet environment was required because, in many cases, the normal noise levels in outdoor, laboratory, and MRI environments masked the hearing of RF sounds.' Add BfS explanation of the type of signals that may and may not give rise to microwave hearing.			The text has been amended.
Rowley	Jack	GSMA	jrowley@gsma.	Belgium		5.3.2	Page 30, Lines 44-47: GSMA notes the following additional systematic review that may be relevant to this section Add:		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The text was amended.

							• Systematic Review of the Physiological and Health-Related Effects of Radiofrequency Electromagnetic Field Exposure from Wireless Communication Devices on Children and Adolescents in Experimental and Epidemiological Human Studies, Bodewein et al., PLoS ONE, 17(6):e0268641, Published: 1 June 2022. https://doi.org/10.1371/journal.pone.0268641 Page 32, Lines 17-19: Furthermore, studies should be carried out with a detailed dosimetry and standardised protocol criteria controlling the variability of the physiological state of the brain between participants, e.g., by performing test sessions at the same time of the day. A systematic review by Asadi-Pooya et al., 2021 identified 14 reports of human investigations, seven studies suggested detrimental RF EMF effects on brain function/seizure activity, while seven studies negated this hypothesis. The authors say that none of the studies provided a good level of evidence. Add: • Smart Devices/Mobile Phone in Patients with Epilepsy? A Systematic Review, Asadi-Pooya et al., Acta Neurologica Scandinavica, 144(4):355-365, October 2021. https://doi.org/10.1111/ane.13492 Justification: Add a summary of another relevant paper.			
Rowley	Jack	GSMA	jrowley@gsma.com	Belgium		5.3.1 Neoplastic diseases	Page 27, Lines 25-28: This results in a considerable uncertainty about how to interpret the results of the NTP rat studies (SSM, 2019) whereas the mouse studies showed equivocal results describing background fluctuations of the observed tumours “and not an increase caused by exposure to RF radiation” (FDA, 2020). Follow-up studies are ongoing or planned (Ahn et al., 2022; NTP, 2022). Add: • An International Collaborative Animal Study of the Carcinogenicity of Mobile Phone Radiofrequency Radiation: Considerations for Preparation of a Global Project, Ahn et al., Bioelectromagnetics, 43(4):218-224, May 2022. https://doi.org/10.1002/bem.22407 • Cell Phone Radio Frequency Radiation, National Toxicology		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The text has been amended.

							Program, Last updated: 1 June 2022. https://ntp.niehs.nih.gov/whatwestudy/topics/cellphones/index.html#studies Justification: Add information on follow-up studies to clarify the NTP results.			
Rowley	Jack	GSMA	jrowley@gsma.com	Belgium		5.3.1 Neoplastic diseases	Page 25, Lines 29-32: Especially for glioma and acoustic neuroma, the pooled effect estimates of the meta-analysis were mainly driven by the pooled Orebro studies (Hardell and Carlberg, 2015; Hardell et al., 2013), which produced excess pooled estimates of risk that are hardly ever observed in clinical setting. Some recent studies show that large risk increases are incompatible with observed cancer incidence rates (Deltour et al., 2022a; Deltour et al., 2022b; de Vocht, 2021; de Vocht, 2016). Add: • Trends in Brain Cancers (Glioma) in New Zealand from 1995 to 2020, with Reference to Mobile Phone Use, Elwood et al., Cancer Epidemiology, 80(102234), October 2022. https://doi.org/10.1016/j.canep.2022.102234 • Time Trends in Mobile Phone Use and Glioma Incidence among Males in the Nordic Countries, 1979-2016, Deltour et al., Environment International, 107487, 24 August 2022a. https://doi.org/10.1016/j.envint.2022.107487 • [Mobile phone use and time trends of glioma incidence since 1979 - Project 3618S00000], Deltour et al., 2022b, Federal Office for Radiation Protection (BfS), Ressortforschungsberichte zum Strahlenschutz, BfS-RESFOR-198/22: 1-70, available at https://doris.bfs.de/jspui/bitstream/urn:nbn:de:0221-2022063033222/4/BfS_2022_3618S00000.pdf • Interpretation of Timetrends (1996–2017) of the Incidence of Selected Cancers in England in Relation to Mobile Phone Use as a Possible Risk Factor, de Vocht, Bioelectromagnetics, 42(8):609-615, December 2021. https://doi.org/10.1002/bem.22375 • Inferring the 1985–2014 Impact of Mobile Phone Use on Selected Brain Cancer Subtypes Using Bayesian Structural Time Series and Synthetic Controls, de Vocht, Environment		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. This incompatibility has been addressed in the SCHEER 2015 Opinion.

							International, 97(100-107), December 2016 (see also the corrigendum). http://dx.doi.org/10.1016/j.envint.2016.10.019 Justification: Add sentence pointing out that several studies have shown the incompatibility between the high RR of the Hardell studies and observed brain tumour rates. Page 26, Lines 3-5: Add new sentences. Regarding epidemiological studies of occupational RF EMF exposures, the INTEROCC study of high-frequency EMF exposures (with nearly 4000 cases and over 5000 controls) found no clear associations between occupational exposure to RF or intermediate frequency (IF) EMF and brain cancer but noted suggestive evidence of promotion effect that should be further investigated (Vila et al., 2018). The AIRWAVE study investigated possible health effects among police officers (n= 48,518) of use of Tetra two-way radios. They found no evidence of an association with cancer after 5.9 year median follow-up and recommend continued follow-up (Gao et al., 2018). • Occupational Exposure to High-Frequency Electromagnetic Fields and Brain Tumor Risk in the Interocc Study: An Individualized Assessment Approach, Vila et al., Environment International, 119(353-365), October 2018. https://doi.org/10.1016/j.envint.2018.06.038 • Personal Radio Use and Cancer Risks among 48,518 British Police Officers and Staff from the Airwave Health Monitoring Study, Gao et al., British Journal of Cancer, 120(375-378), 2018. https://doi.org/10.1038/s41416-018-0365-6 Justification: The Preliminary Opinion lacks mention of epidemiological studies of occupational RF EMF exposures of neoplastic disease. Page 27, Lines 13-14: • no temperature measurements but strong evidence on thermoregulatory stress in the “high dose” groups (wbSAR of 6 W/kg) of male rats that might be a mediating factor for the observed effects rather than a thus-far unknown nonthermal mechanism (Kuhne et al., 2020),			The articles do not comply with §4.2.4 of the Opinion.

							Justification: Add more detail on the conclusion of Kuhne et al., 2020 for greater clarity for the reader.			
Rowley	Jack	GSMA	jrowley@gsma.com	Belgium		5.2.2 Cellular interaction mechanisms	Page 21, Lines 13-17: Delete [One of the most important agents explaining the genotoxic effects of RF are the reactive oxygen species (ROS), since the energy level of RF EMF is not sufficient to break the intermolecular chemical bonds, and the intracellular effects of RF appear indirectly, the effect of free radicals being the most relevant (Kocaman et al., 2018).] Justification: We propose deletion of this sentence as it could be read as suggesting that SCHEER has concluded that there is an established direct causal relationship between RF exposure - oxidative stress and damage to intermolecular chemical bonds. This assumption does not seem consistent with the Henschenmacher et al., 2022 protocol as quoted above and appears premature before the outcome of the WHO commissioned oxidative stress systematic review. Furthermore, Kocaman et al., 2018 and Jagetia, 2022 did not consider study quality, which is important as discussed in the following paragraph of the current SCHEER preliminary opinion. If the sentence is not deleted then we suggest that the sentence be edited as follows: Kocaman et al., 2018 hypothesize that one of the most important agents explaining observations of the genotoxic effects of RF are the reactive oxygen species (ROS), since the energy level of RF EMF is not sufficient to break the intermolecular chemical bonds, and the intracellular effects of RF appear indirectly, the effect of free radicals being the most relevant.' Page 21, Lines 39-41: The SCHEER noted that in 2021 a protocol for a quality-based systematic review of experimental studies investigating genotoxic effects induced by RF EMF in in vitro cell models was published (Romeo et al., 2021). Justification: We suggest adding the reference, already listed in the preliminary opinion references. Page 22, Lines 22:		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The text has been amended for clarity. The citation was added.

							Pall M., 2013; Pall M., 2014 are cited but not listed in the reference list. Justification: Typographical, missing references. Page 22, Lines 46-47: Thermal effects of RF EMF are well established and have been extensively studied. They form the basis of health protection guidelines that cover the frequency range 100 kHz to 300 GHz. Justification: The addition explains the significance of tissue heating as a mechanism for establishing human exposure limits. Page 22, Lines 51-53: Reviews dealing with the effects of RF exposure on oxidative stress, genetic and epigenetic effects, and calcium signalling have been considered here to provide evidence of potential cellular mechanisms that are proposed to operate at RF exposure levels found in the everyday environment though none are validated. Justification: Many of the potential cellular mechanisms only exist as hypothesises with good theoretical arguments why some cannot operate at the RF levels in the everyday environment. See for example: • Radiofrequency Fields and Calcium Movements into and out of Cells, Wood et al., Radiation Research, 195(1):101-113, January 2021. https://doi.org/10.1667/RADE-20-00101.1 • SCENIHR (Scientific Committee on Emerging and Newly Identified Health Risks), Potential health effects of exposure to electromagnetic fields (EMF), 27 January 2015. • The Brain Is Not a Radio Receiver for Wireless Phone Signals: Human Tissue Does Not Demodulate a Modulated Radiofrequency Carrier, Davis et al., Comptes Rendus Physique, 11(9-10):585-591, November-December 2010. http://dx.doi.org/10.1016/j.crhy.2010.09.002 • Quantitative Evaluations of Mechanisms of Radiofrequency Interactions with Biological Molecules and Processes, Sheppard			The references were added. Thank you for the comment. The SCHEER does not find it necessary to add the sentence. No changes in the text are required. Thank you for the comment. The SCHEER does not find it necessary change the text. The status of validation of the mechanisms is made obvious later in the text.

							et al., Health Physics, 95(4):365-396, October 2008. https://dx.doi.org/10.1097/01.HP.0000319903.20660.37			
Rowley	Jack	GSMA	jrowley@gsma.com	Belgium		5.2.2 Cellular interaction mechanisms	Page 19, Lines 42-43: Several studies have investigated or theorised potential cellular mechanisms that might operate at RF exposure levels found in the everyday environment, however, there are theoretical arguments against their operation (Davis et al., 2010; Sheppard et al., 2008; SCENIHR, 2015; Wood et al., 2021). Add: • Radiofrequency Fields and Calcium Movements into and out of Cells, Wood et al., Radiation Research, 195(1):101-113, January 2021. https://doi.org/10.1667/RADE-20-00101.1 • SCENIHR (Scientific Committee on Emerging and Newly Identified Health Risks), Potential health effects of exposure to electromagnetic fields (EMF), 27 January 2015. • The Brain Is Not a Radio Receiver for Wireless Phone Signals: Human Tissue Does Not Demodulate a Modulated Radiofrequency Carrier, Davis et al., Comptes Rendus Physique, 11(9-10):585-591, November-December 2010. http://dx.doi.org/10.1016/j.crhy.2010.09.002 • Quantitative Evaluations of Mechanisms of Radiofrequency Interactions with Biological Molecules and Processes, Sheppard et al., Health Physics, 95(4):365-396, October 2008. https://dx.doi.org/10.1097/01.HP.0000319903.20660.37 Justification: Many of the potential cellular mechanisms only exist as hypothesises with good theoretical arguments why some cannot operate at the RF levels in the everyday environment. Page 20, Lines 20-23: In 2020, the WHO commissioned a systematic review of in vivo and in vitro experimental studies to analyse and synthesise the available evidence on oxidative stress induced by RF exposure (see 4.2.3 above). Henschenmacher et al., (2021) explain that oxidative stress is a state or a mechanism that cannot be measured in a simple way and that it is not a health outcome per se (meaning here any influence on health), but it could provide		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The text has been amended for clarity. Thank you for the comment. The text has been amended for clarity.

							evidence of a mechanism by which RF EMF exposure might affect health. Justification: We suggest adding the edited observation from the WHO systematic review protocol (Henschenmacher et al., 2022) to better explain the status of oxidative stress for readers: 'Oxidative stress is a state or a mechanism that cannot be measured in a simple way, in part because oxidants have very short half-lives. Various biomarkers have been proposed to represent the state of oxidative stress, typically oxidation products of lipids, proteins, and nucleic acids (Frijhoff et al., 2015). Oxidative stress is not a health outcome per se (meaning here any influence on health), but it could provide evidence of a mechanism by which radiofrequency radiation exposure might affect health.'			
Rowley	Jack	GSMA	jrowley@gsma.com	Belgium		5.2.1 Thermal effects	Page 19, Lines 2-3: Tissue heating is an important effect of RF EMF exposure of biological organisms that has been unequivocally demonstrated and forms the basis of EMF limits for this frequency range that provide protection against all established human health hazards (ICNIRP, 2020). Justification: The addition explains the significance of tissue heating as a mechanism for establishing human exposure limits.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER does not find it necessary to repeat here the rationale of the ICNIRP guidelines.
Rowley	Jack	GSMA	jrowley@gsma.com	Belgium		5.1.3 Factors affecting	Page 17, lines starting at 33: This is a detailed discussion on the concept of the Exposure Index (EI). While this is an interesting approach from a scientific perspective and presents some context, EI is not the basis for ICNIRP limit values, nor it directly relate to assessing compliance with ICNIRP limits. This could be clarified by adding a note. On the other hand, the ITU and IEC have published international standards (IEC, 2019; IEC 2022; ITU, 2022) on the assessment of RF exposure by base station. We suggest adding a paragraph to discuss the factors affecting exposure from the perspective of these standards as well as the use cases and literature behind them.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The concept of the EI is presented here in order to introduce the idea of an index that characterizes exposure from all RF EMF sources and can be used to compare exposure situations, as the systematic reviews do. No change in the text is required.

							Add: • IEC/TR 62669:2019: Case Studies Supporting IEC 62232 - Determination of RF Field Strength, Power Density and SAR in the Vicinity of Radiocommunication Base Stations for the Purpose of Evaluating Human Exposure, IEC, April 2019. https://webstore.iec.ch/publication/62014 • IEC 62232:2022 Ed3.0: Determination of RF field strength, power density and SAR in the vicinity of base stations for the purpose of evaluating human exposure (Final Draft – forecast publication by end 2022). https://webstore.iec.ch/publication/28673 • ITU-T Rec. Series K Supplement 16 (07/2022) Electromagnetic field compliance assessments for 5G wireless networks. 1 July 2022. https://www.itu.int/rec/T-REC-K.Sup16/en Page 17, Lines 34-39: Some researchers quantify exposure to RF EMF (mainly from cellular networks) for scientific purposes (not compliance with EMF limits) with the introduction of the Exposure Index (EI) concept, which looks at the exposure of a population during a given time frame in a given area incurred by a wireless cellular network as a whole, aggregating downlink (DL) exposure induced by base stations and access points and the uplink (UL) exposure incurred by all individual wireless communication devices, including devices operated by other users nearby. Justification: Add note clarifying that while this is an interesting scientific approach it is not the basis for ICNIRP limits values.			
Rowley	Jack	GSMA	jrowley@gsma.com	Belgium		5.1.2 Exposure from emerging	Page 17, Lines 30-32: However, stochastic dosimetry approaches offer a solution to exposure characterisation in 5G massive MIMO networks (Al Hajj et al., 2020; Bonato et al., 2021). Technical standards exist that describe methods for accurate compliance assessment considering the actual operation of the base station by using power reduction factor(s) that account for the difference between the configured maximum and the actual maximum exposure (IEC, 2019; IEC 2022; ITU, 2022). Add:		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The text has been amended.

							• IEC/TR 62669:2019: Case Studies Supporting IEC 62232 - Determination of RF Field Strength, Power Density and SAR in the Vicinity of Radiocommunication Base Stations for the Purpose of Evaluating Human Exposure, IEC, April 2019. https://webstore.iec.ch/publication/62014 • IEC 62232:2022 Ed3.0: Determination of RF field strength, power density and SAR in the vicinity of base stations for the purpose of evaluating human exposure (Final Draft – forecast publication by end 2022). https://webstore.iec.ch/publication/28673 • ITU-T Rec. Series K Supplement 16 (07/2022) Electromagnetic field compliance assessments for 5G wireless networks. 1 July 2022. https://www.itu.int/rec/T-REC-K.Sup16/en Justification: The proposed additional text shows that that these approaches have moved beyond scientific papers and are reflected in key reference international technical standards, such as IE 62232, which are applicable globally. While MIMO has been used with 3G already, massive MIMO (the combination of MIMO and beam forming) was widely introduced with 5G and is now also used in 4G networks.			
Rowley	Jack	GSMA	jrowley@gsma.com	Belgium		5.1.2 Exposure from emerging technologies	Page 17, Lines 18-19: Another novel feature in 5G that triggers health concerns among some of the public is massive MIMO/beamforming adopted in some 5G Base Stations (BS). Justification: Public concern about 5G is generally low. Information about levels of concern specific to massive MIMO/beamforming is not available to our knowledge. While MIMO has been used with 3G already, massive MIMO (the combination of MIMO and beam forming) was widely introduced with 5G and is now also used in 4G networks. See for data on 5G health concern in Europe: https://www.etno.eu/news/all-news/682-eu-5g-sentiment-2020.html Page 17, Lines 19-20: In fact, massive MIMO and beamforming techniques are also used in 4G networks (Werner et al., 2019).		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comments. The text has been amended accordingly.

							Add: • A Comparison between Measured and Computed Assessments of the RF Exposure Compliance Boundary of an in-Situ Radio Base Station Massive MIMO Antenna, Werner et al., IEEE Access, 7(170682 - 170689), 25 November 2019. https://doi.org/10.1109/ACCESS.2019.2955715 Justification: While MIMO has been used with 3G already, massive MIMO (the combination of MIMO and beam forming) was widely introduced with 5G and is now also used in 4G networks. Page 17, Lines 22-25: Delete [The maximum transmitted power by a 5G BS can reach up to 200 W, almost double the corresponding value for a 4G BS. This increase in power can trigger the population's concern about potential health risks (Ericsson, 2018).] The maximum rated power of 5G macro cell BS (FR1) is typically around 200-300 W. This is similar to the power used by 4G BS. In many cases the same base station is used for both 4G and 5G, and with the same maximum power (Colombi et al., 2022). Add: • Implications of ICNIRP 2020 Exposure Guidelines on the RF EMF Compliance Boundary of Base Stations, Colombi et al., Frontiers in Communications and Networks, 3:4 March 2022. https://doi.org/10.3389/frcmn.2022.744528 Justification: The maximum transmitted power of a 5G BS varies a lot depending on the type of deployment (indoor, outdoor, urban, rural). The maximum rated power of 5G macro cell BS (FR1) is typically around 200-300 W. This is similar to the power used by 4G base stations. In many cases the same BS is used for both 4G and 5G, and with the same maximum power. The reference is not relevant and should be removed since it does not address the topic of 5G power levels or potential public concern.			
Rowley	Jack	GSMA	jrowley@gs	Belgium		5.1.2	Page 16, Lines 49-52: So, in addition to the continuous exposure to environmental EMF, wireless access points (due to frequent use), mobile phones and other personal communication devices (due to their use close to		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The text has been amended.

							the body) continue to represent the bulk of the RF EMF exposure in the smart home (van Wel et al., 2021). Add: • Radio-Frequency Electromagnetic Field Exposure and Contribution of Sources in the General Population: An Organ-Specific Integrative Exposure Assessment, van Wel et al., Journal of Exposure Science & Environmental Epidemiology, 31(999-1007), Published: 02 March 2021. https://doi.org/10.1038/s41370-021-00287-8 Justification: Figure A.6 from van Wel et al., 2021 suggests that while mobile phones were a major source of exposure for 2G, this is less true for later mobile technologies. We propose deletion of 'and especially' for this reason. Page 17, Lines 2-4: It uses devices within frequency range 1 (FR1) (< 6 GHz) and frequency range 2 (FR2) (24 – 54 GHz), that is a range of higher frequencies than those used in 4G (fourth generation) networks for mobile communication links, though similar frequencies are used for data backhaul connections also in earlier generations of networks. Justification: Some frequencies similar to the FR2 range are used in 4G mobile networks (and other telecommunication applications) to provide radio links for data. Page 17, Lines 6-7: The use of the higher frequency band (FR2) requires positioning 5G small cell base stations every few hundred meters in dense urban areas, where resources such as power and data backhaul links are available. Current indications are for deployment in specific locations (i.e., airport, stadiums, shopping malls) and not for deployment in whole urban areas (Chiaraviglio et al., 2021). Add: • Health Risks Associated with 5G Exposure: A View from the Communications Engineering Perspective, Chiaraviglio et al., IEEE Open Journal of the Communications Society, 2(2131-2179, Date of Publication: 19 August 2021. https://doi.org/10.1109/OJCOMS.2021.3106052			The operational / technical characteristics of backhaul networks do not lead to the same exposure situations like those of 5G cellular networks. No change in the text is required. The text has been amended.

							Justification: 5G FR2 small cell deployment is only likely to be feasible in dense urban areas where resources such as power and data backhaul links are available. Page 17, Lines 9-15: Small cells combine low-power transmitters and antennas. Nowadays, small cells are important for 4G networks in some countries. Small cells are well suited for coverage extent, as well as capacity issues. Their proximity to users enables them to provide better quality and reduced power radiated to and from mobile phones. Over the next few years, these small cell antenna installations may multiply in mobile networks in dense urban areas and other areas needing coverage. Access to power and data backhaul are necessary for the operation of small cells and easy access to existing physical infrastructure (e.g., buildings, streetlights and bus shelters) (ITU, 2019). The small cells are necessary as emissions (or signals) at the higher FR2 frequency/shorter wavelength have more difficulty passing through solid objects and may also be intercepted by rain. Add: • ITU-T K Series, Supplement 9: 5G Technology and Human Exposure to RF EMF, ITU, May 2019. https://www.itu.int/itu-t/recommendations/rec.aspx?rec=13939 Justification: Al-Falahy and Alani, 2017 is an interesting paper but we recommend section 9.7 of ITU-T K.supplement 9 as a more up-to-date view of the use of small cells in 4G and 5G networks.			The SCHEER does not find it necessary to give this level of technical detail. No change in the text is required.
Rowley	Jack	GSMA	jrowley@gsma.com	Belgium		5.1.1 Wireless	Page 16, lines 6-9: Validity of self-reported mobile phone use was lower in women, younger age groups and those reporting symptoms during/shortly after using a mobile phone. This study highlights the ongoing value of using self-report data to measure mobile phone use. There is evidence that for young people, Wi-Fi is an important alternative exposure source that also needs to be considered (Mireku et al., 2018). Add:		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The text has been amended.

							• Total Recall in the SCAMP Cohort: Validation of Self-Reported Mobile Phone Use in the Smartphone Era, Mireku et al., Environmental Research, 161(1-8), February 2018. https://doi.org/10.1016/j.envres.2017.10.034 Justification: We note that Mireku et al., 2018 report that for adolescents, Wi-Fi is increasingly important as an exposure source, and this is not captured by operator traffic data. They recommend a combination of self-reported use of Wi-Fi & operator traffic data. Page 16, Lines 27-30: - the assessment of the exposure should be based on objective measurements, not on the personal recalls or provider's information and other relevant exposure sources (eg., Wi-Fi); Add: • Total Recall in the SCAMP Cohort: Validation of Self-Reported Mobile Phone Use in the Smartphone Era, Mireku et al., Environmental Research, 161(1-8), February 2018. https://doi.org/10.1016/j.envres.2017.10.034 Justification: The information provided by operators may not be exclusively bills paid. We note that Mireku et al., 2018 report that for adolescents, Wi-Fi is increasingly important as an exposure source, and this is not captured by operator traffic data. They recommend a combination of self-reported use over Wi-Fi & operator traffic data.			
Rowley	Jack	GSMA	jrowley@gsma.com	Belgium		5.1.1 Wireless communication	Page 13, Line 13: 5.1.1.1 Typical exposure of population The discussion in section 5.1.1.1 is not very informative without providing the relevant limit values so that non-specialist readers can interpret the values. In addition, it does not address exposure of particular populations, such as workers, or locations, such as restricted access rooftops or towers, where exposure limits may be exceeded close to antennas. We suggest an additional section (or paragraph) addressing occupational RF EMF exposures with the following as potential references:		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The readers can find the limits in the regulatory documents cited in the Opinion. There is no need to repeat them here.

							• Near-Field Exposure in FM Frequencies: New Methodology and Estimation Formulas, Fetouri et al., Bioelectromagnetics, 43(3):182-192, April 2022. https://doi.org/10.1002/bem.22391 • Exposure Assessment to Radiofrequency Electromagnetic Fields in Occupational Military Scenarios: A Review, Gallucci et al., International Journal of Environmental Research and Public Health, 19(2):920, 14 January 2022. https://doi.org/10.3390/ijerph19020920 • Occupational Exposure to Radiofrequency Electromagnetic Fields, Stam, Industrial Health, 60(3):201-215, May 2022. https://doi.org/10.2486/indhealth.2021-0129 • Radiofrequency Exposure Amongst Employees of Mobile Network Operators and Broadcasters, Litchfield et al., Radiation Protection Dosimetry, 175(2):178-185, June 2017. https://doi.org/10.1093/rpd/ncw283 Page 13, Lines 14-15: In a systematic literature review, Sagar et al. (2018) assessed RF EMF exposure in everyday microenvironments in Europe. Justification: wrong year for the reference. Page 13, Lines 28-30: There were considerable differences between studies according to the type of measurements procedures, which prevented cross-country comparison or evaluating temporal trends, however, they noted no distinct differences between countries, some of which used public limits more restrictive than the EC recommendation, and no obvious temporal trend between 2005 and 2013. Justification: Sagar et al, 2018 say in the discussion: 'There was no indication about distinct differences between countries. If differences exist, they are considerably smaller than the data variability that is introduced from the various study settings, measurement protocols and data analysis procedures including reporting of the study results. Similarly, no obvious temporal trend was visible for the time between 2005 and 2013. If there were such a trend, as for instance observed in a single study in urban outdoor microenvironments measured over a period of 2 years,11 it would be masked in the overall			The text has been amended. The typo has been corrected. It goes beyond the scope of this Opinion to elaborate on typical exposure by making a comparative country analysis. No change in the text is required.

							heterogeneity of the results.' The included countries with EMF restrictive limits were Belgium, Greece, Switzerland, and Slovenia. Page 13: Lines 42-44: In an attempt to quantify RF EMF exposure in the general population, for scientific purposes, van Wel et al. (2021) took an integrative approach (distinguishing the contribution of various sources) for individual exposure assessment at the organ scale. Justification: Clarify that the IEM is an interesting scientific approach, but it is not the basis for ICNIRP limit values. Page 14, Lines 6-9: Using an integrated RF dose model, Birks et al. (2021) estimated the daily RF dose in the brain (whole-brain, cerebellum, frontal lobe, midbrain, occipital lobe, parietal lobe, temporal lobes) and the whole body in 8358 children (ages 8–12) and adolescents (ages 8 14–18) from the Netherlands, Spain, and Switzerland during 2012–2016. Justification: Clarify that the RF dose model does not relate to exposure metrics as defined in the ICNIRP guidelines.			In the text the different approaches (mentioned in the comment) are only mentioned as approaches for assessing exposure. It is nowhere mentioned that they have been used for actual risk assessment, by ICNIRP or otherwise. No change in the text is required.
Rowley	Jack	GSMA	jrowley@gsma.com	Belgium		4.2.3 WHO Survey on Priority Outcomes	Page 12, Lines 26-28: The SCHEER opinion lists five of the WHO systematic review protocols. Currently, four others are published and should be included. Add: • The effect of exposure to radiofrequency fields on cancer risk in the general and working population: A protocol for a systematic review of human observational studies. Lagorio et al., Environment International. 157(106828). December 2021. https://doi.org/10.1016/j.envint.2021.106828 • The effect of long-term radiofrequency exposure on cognition in human observational studies: A protocol for a systematic review. Benke et al., Environment International. 159(106972). 15 January 2022. https://doi.org/10.1016/j.envint.2021.106972		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The references have been added.

							• The effects of radiofrequency exposure on male fertility and adverse reproductive outcomes: A protocol for two systematic reviews of human observational studies with meta-analysis. Kenny et al., Environment International. 158(106968. January 2022. https://doi.org/10.1016/j.envint.2021.106968 • Effects of radiofrequency electromagnetic fields (RF EMF) on cancer in laboratory animal studies. Mevissen et al., Environment International. 161(107106). March 2022. https://doi.org/10.1016/j.envint.2022.107106 Justification: Additional complementary information.			
Rowley	Jack	GSMA	jrowley@gsma.com	Belgium		4.1 Data/Evidence	Lines 42-44: It would bring greater transparency to the opinion of SCHEER if further details of the weight assigned to studies in arriving at the conclusions were provided. This could include listing studies that were considered but regarded as uninformative for the opinion. Justification: Consistent with the Annex of SCHEER, 2018.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The table with the WoE grading of the sources of information will be published with the final Opinion.
Rowley	Jack	GSMA	jrowley@gsma.com	Belgium		2 OPINION	Lines 19-20: replace with: However, there are situations where beam forming may lead to higher instantaneous RF EMF levels than the time-averaged exposure (Conil et al., 2021). Add: • In-Situ Evaluation of Exposure Induced by 5G Antennas in the 3.4–3.8 GHz Band, Conil et al., Comptes Rendus. Physique, 22(S1):3-13, 2021. https://doi.org/10.5802/crphys.65 Justification: New and emerging wireless communications applications neither use beam focusing nor intense pulsed radiation. Beam forming (not focusing) is used to improve performance, which may lead to higher momentary RF EMF levels compared to the use of wide beams, but the time-averaged exposure is similar. Note that there are international standards by		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. This sentence does not refer only to telecommunications but also to other wireless technologies. No change in the text is required.

							ITU and IEC advising on the assessment of RF exposure by base stations.			
Rowley	Jack	GSMA	jrowley@gsma.com	Belgium		2 OPINION	Line 7: The SCHEER has also noted that new … Justification: Typographical correction, replace 'alsonoted.'		I do not object to publication of my contribution, including my personal data, on internet	Thank you. The typo has been corrected.
Rowley	Jack	GSMA	jrowley@gsma.com	Belgium		ABSTRACT	Lines 10-13: GSMA welcomes this assessment and encourages the European Commission to move forward with the necessary steps in consultation with member states and affected stakeholders. GSMA encourages the Commission to prepare a one-page plain language summary, as was done with the SCENIHR (2015) opinion and make the summary available in multiple EU languages. GSMA also encourages preparation of a layman language summary (similar to https://ec.europa.eu/health/scientific_committees/opinions_layman/en/electromagnetic-fields/index.htm) to assist understanding among non-scientists, MEPs and EU citizens. Previous SCENIHR opinions have been referenced outside Europe and we expect the same to be the case with the final SCHEER opinion. Additionally, GSMA encourages the Commission and SCHEER to continue engagement with MEPs on the EMF topic. There have been some MEP led initiatives with scientists presenting from a minority point of view, and it would important that MEPs are made aware of the major new European scientific opinion from SCHEER.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. No change in the text is required.
Kuhne	Jens	BfS	jkuhne@bfs.de	Germany		5.3.1 Neoplastic	p25 l37: In the meantime another important study that adds weight on the issue has been published, Please include: Deltour I, Poulsen AH, Johansen C, et al. Time trends in mobile phone use and glioma incidence among males in the Nordic Countries, 1979-2016 [published online ahead of print, 2022 Aug 24]. Environ Int. 2022;168:107487. doi:10.1016/j.envint.2022.107487		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate.

							p27 l13: "no temperature measurements" should read "no temperature measurements during the main study" p27 l24: Reference is missing p27 l48: Here, the missing correction for multiple testing in statistical analysis could also be mentioned			The text has been amended. The references are mentioned above (second paragraph of this subsection). The text has been amended.
Kuhne	Jens	BfS	jkuhne@bfs.de	Germany		5.2.2 Cellular interaction	General: It might be worth briefly addressing that there is a difference between biophysical mechanisms and cellular interaction mechanisms and only the latter are discussed here. p20 l8: please include a reference that explicitly covers dosimetry, e.g. Kuster N, Schönborn F. Recommended minimal requirements and development guidelines for exposure setups of bio-experiments addressing the health risk concern of wireless communications. Bioelectromagnetics. 2000;21(7):508-514		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER does not find it necessary to make this distinction. No changes in the text are required. Thank you for the comment. The citation and the reference have been added.
Kuhne	Jens	BfS	jkuhne@bfs.de	Germany		5.1.2 Exposure from emerging	General: It should be made clear if cumulative or acute exposures are meant. P17 l8-9: The meaning of this sentence is not clear to me p17 l21: istead "maximum output power", "maximum equivalent isotropically radiated power (EIRP) " should be used. p17 l21: What is a dynamic pencil beam? p17 l22-25: The quoted information is not found in the cited reference. Further, I think EIRP values are meant.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The sentence refers to the fast attenuation of millimetre wave radiation. The text has been amended. This is a beam with a narrow half-power beam width changing its direction. The text has been amended.
Kuhne	Jens	BfS	jkuhne@bfs.de	Germany		5.1.1 Wireless	p14 l29-34: Here, only uplink exposure is relevant, this should be made clear. Further, push messages are not necessarily corellated with uplink transmission. p16 l29: received calls (which also are not neccessarily reported on bills) might be the even bigger problem here. general: For future epi-studies including recent mobile phone generations (3G-5G) it might be worth adressing the challanges		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The details of the exposure assessment are mentioned in the cited paper.

							that arise due to the adaptive power control (APC) which results in low average output power (some orders of magnitude lower than 2G) and an extreme huge variety of possible uplink output powers. further reading (papers exceed allowed 1MB size and are therefore not uploaded): Journal of Exposure Science and Environmental Epidemiology (2015) 25, 80–83; doi:10.1038/jes.2014.74; published online 5 November 2014 Lee, A. K. and H. D. Choi (2020). "Brain EM Exposure for Voice Calls of Mobile Phones in Wireless Communication Environment of Seoul, Korea." IEEE Access 8: 163176-163185.			
Kuhne	Jens	BfS	jkuhne@bfs.de	Germany		4.2 Background	l13: please indicate if adverse or beneficial effects are meant here.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The text has been amended.
Crean	Michael	European Academy of	crean@ean.org	Austria		5.3.2 Neurological and	According to feedback recieved from our Scientific Committee, the neurological sections are well drafted and appear consistent with the available evidence.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment.
Melnick	Ronald		ron.melnic	Other	USA	5.1.1	Page 15, lines 20-24 The report claims that there was “significant impact of the level of phone use on recall” (i.e., recall bias) including in the Interphone study. This comment ignores the report by Momoli et al. (2017) that found no effects of recall or selection bias in the Canadian contribution to the Interphone	Momoli_et_al_2017.pdf	I do not object to publication of my contribution, including my	Thank you for the comment. The paper cited, considers only a subgroup of the INTERPHONE study

							study. The SCHEER report must acknowledge the work of Momoli et al. Page. 16, lines 27-30. On the issue of dosimetry of exposure for epidemiological studies the SCHEER conclude “the assessment of the exposure should be based on objective measurements, not on personal recalls…,” but offers no recommendation on how that could be achieved (i.e., objective measurements during long-term exposures) or whether that is even possible for cancer or other chronic conditions. This recommendation is meaningless without any guidance on how it can be accomplished.		personal data, on internet	population. No change in the text is required. In the papers cited in the Opinion there are technical solutions proposed for exposure assessment more accurate than use recall.
Melnick	Ronald		ron.melnick@gmail.com	Other	USA	4 METHODOLOGY	Page 7, lines 38-44. The criteria used by the SCHEER for judging validity, reliability and relevance of the evidence should be described. Without specifying the criteria used by SCHEER, the opinions expressed in this document become highly subjective and therefore a function of the SCHEER member composition.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. Information about the WoE approach used by SCHEER can be found in https://health.ec.europa.eu/system/files/2019-02/scheer_o_014_0.pdf
Melnick	Ronald		ron.melnick@gmail.com	Other	USA	2 OPINION	Page 7, lines 3-8 and 21-23. The document uses terms like “uncertain weight of evidence,” “limited evidence,” “there is strong evidence for the lack of effects,” or “the SCHEER could not identify moderate or strong level of evidence for adverse health effects” without providing criteria for these qualitative terms. The International Agency for Research on Cancer (https://monographs.iarc.who.int/wp-content/uploads/2019/07/Preamble-2019.pdf) and other health agencies provide specify their criteria for judging levels of evidence. Without specific criteria, the assessment becomes highly subjective and therefore a function of the SCHEER member composition. This issue pertains to several topics addressed in the SCHEER assessment since they form the basis for the overall opinion. The opinion also claims that “the latest (2020) ICNIRP exposure guidelines introduce new dosimetric quantities and limits to them that can protect humans more effectively from emerging technological applications of RF EMF….”, yet there are no adequate health effects data on these		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. Information about the WoE approach used by SCHEER can be found in https://health.ec.europa.eu/system/files/2019-02/scheer_o_014_0.pdf The SCHEER received a mandate to give an Opinion on the need of a revision of the technical annexes of two regulatory documents. The

							emerging applications to support this claim. This statement gives the impression that the SCHEER assessment was intended to simply endorse the ICNIRP guidelines in which adverse effects are largely attributed to increases in body temperature or were dismissed because of alleged methodological or study design limitations and inconsistencies.			decision that a revision is needed does not imply endorsement of the ICNIRP guidelines.
Ashton	Dave		dashton42@hotmail.com	United Kingdom		5.3.3 Symptoms	The SCHEER reaffirms SCENIHR's 2015 conclusions regarding 'Symptoms', aka electromagnetic hypersensitivity (EHS). However, this is on the basis of just three reviews published since 2015, which seems to be a very perfunctory examination of the science upon which to draw a conclusion, and particularly one that states that the 'strong overall weight of evidence [is] that such effects are not caused by RF exposures...'. For example, the Schmiedchen et al review states that 'Our primary inclusion criterion ("studies examined the well-being or the number/severity of symptoms upon exposure to EMF") ruled out the evaluation of objective measures of health effects, i.e., studies investigating physiological or cognitive parameters, including blood pressure, heart rate, electrical activity of the brain and visual attention'. It seems quite extraordinary to review electromagnetic hypersensitivity, or 'symptoms', and yet to rule out objective, measurable, parameters. What does this leave? It leaves subjectivity. Moreover, only 'acute or semi-acute' effects were considered. As the authors note: 'The conclusions of this systematic review may thus not apply to objective outcomes, nor do they have implications for potential chronic effects of exposure to EMF'. The Huang et al survey was looking at the prevalence of the condition, and the apparent disparity between the number of male and female sufferers. This does nothing to determine whether or not EHS is associated with EMFs, and it is unclear why it was included. Also, it was based upon subjective responses. The conclusion of the Leszczynski paper directly contradicts your WoE conclusion: 'The opinion that there is no causality link between EHS and EMF is unproven. This opinion, expressed by the World Health Organization EMF Project, the International Commission on Non-Ionizing Radiation Protection, International Committee on Electromagnetic Safety and numerous governmental		I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence assessed following a quality evaluation.

							organizations, should be revised because the scientific research data is of insufficient quality to be used as a proof of the lack of causality.' Respectfully, I do not think that SCHEER carried out a thorough enough review of the recent literature on 'Symptoms' in order to draw a conclusion, and particularly not the one that you did reach, given the methodological limitations affecting many of the studies. However, I do think that the recommendation to include 'objective measures' in future studies makes eminent good sense.			
Salinas Álvarez	Blanca	Asociación "Electro y Químico Sensibles por el Derecho a la Salud"	blanca.salinas.alvarez@gmail.com	Spain		6 RECOMMENDATIONS FOR FUTURE WORK	Page 38, line 13-28. The SCHEER admits in almost all the sections of its report the existence of numerous studies that find scientific evidence of the relationship between radiofrequencies and health effects, but considers that they are not sufficient or are not of sufficient quality to determine the scientific evidence with certainty. Or alleges that there are other studies that find contradictory results, which is inevitable in an extremely complex topic such as radio frequencies in which the possible variables of the experiments are infinite (frequencies, intensity, windows and exposure time, pulsation, polarization, modulation, dosimetry etc.). Absolute scientific certainty will take a long time to achieve, but inaction on early warnings can have huge costs. Science takes a long time to build unquestionable certainties, but if radiofrequencies did not have risks to health, there would no longer be thousands of scientific studies that find evidence of risk. The consequences can be so serious if the existing scientific evidence is confirmed that I consider the application of the precautionary principle justified, even more so when SCHEER itself has classified the risks of 5G technology for wildlife with a 3 out of 3 based on studies existing scientists in that year. We remember that exposure to radio frequencies, with the arrival of 5G, aspires to cover the entire territory and it will be very difficult to find the unexposed population, which will make it almost impossible to carry out epidemiological studies. If there are effects on health, by the time the scientific evidence is unquestionable, the situation will already be irreversible, the damage immense and the economic and social costs incalculable. Even more so when, as stated by the European Parliament in its 2009 resolution, insurers are already applying		I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment. The application of the precautionary principle is not within the remit of SCHEER.

							their own precautionary principle by tending to exclude damage to health from civil liability policies. In this sense, I consider that the SCHEER has enough scientific evidence to demand that a minimum precautionary principle be applied and, as demanded in Resolution 1815 of the Council of Europe, at least “white zones” be reserved in all European countries. not covered by wireless waves but by wired technologies. The precautionary principle, which is among the constitutive principles of the European Union, defends that: "The existence of well-founded indications of a possible serious affectation to the health of the population, even when there is scientific uncertainty about the nature of the risk, will determine the cessation , prohibition or limitation of the activity in which they participate (Article 191 of the Treaty on the Functioning of the European Union). The reservation of white areas is the minimum possible application of the precautionary principle.			
Salinas Álvarez	Blanca	Asociación "Electro y Químico Sensibles	blanca.sslainas.alvarez@gmail.com	Spain		5.3.4 Other health effects	In section 5.3.4.3 on effects on reproduction and development, on page 36, lines 46-51, it is mentioned that the effects of FR are long-term (Maluin et al. study 2021). On page 37 , lines 1-14 in the Santini et al 2018 study it is stated: "the authors see growing evidence that damage induced by EMF to reproductive cells and organs is caused by deregulation of redox homeostasis due mitochondrial dysfunctions and ROS overproduction". Tipos de traducción Traducción de texto Texto original 1.348 / 5.000		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. This comment contains personal opinions and hypotheses of the commenter.

							Resultados de traducción It seems that there is numerous and qualified scientific evidence that health problems caused by RF are produced in the long term by oxidative stress, reactive oxygen species (ROS) and mitochondrial alteration. There seems to be increasing evidence that IEI-EMF and EHS diseases and even all central sensitization diseases are also caused by this. I understand that the research methodology should be the same for all health problems: in vivo, in vitro and epidemiological studies. If it were to investigate any other health problem generated by radiofrequency, such as damage to reproductive health, through provocation studies, the results would be null. Through the REACH program, the EU has already made it compulsory for companies to demonstrate the non-dangerousness of chemical substances, but with the research systems that prevail ICNIRP, SCENHIR and even SCHEER (experimental provocation studies together with psychological measures and reports subjective) places the weight of the research evidence on electrohypersensitivity not on the telecommunications companies, but on people who have already become ill. Waiting for unquestionable scientific evidence could have unquantifiable social and economic consequences.			
Salinas Álvarez	Blanca	Electro y Químico Sensibles por el Derecho	blanca.salinas.alvarez@gmail.com	Spain		5.3.3 Symptoms	Page 34, line 29-38 and line 46-52. Page 35, line 1-6. It is quite possible that the double-blind provocation experimental studies - which according to ICNIRP, SCENHIR and SCHEER provide a strong weight of credence that the effects are not caused by RF exposure - incur a serious methodological bias that distorts the conclusions and makes the results inconsistent. This methodology is only valid if the effects are immediate. If, as more and more studies point out, IEI-EMF and EHS and even other central sensitization diseases could be caused by chronic cellular oxidative stress leading to functional cellular and metabolic alterations, it is quite possible that these are produced by long-term chronic exposures, not by a punctual exposure to RF that causes immediate symptoms, as it is attempted to demonstrate with provocation studies, which are also usually subjective. Experimental provocation studies that look for biological or physical markers, including those suggested by Leszczynski		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. This comment contains personal opinions and hypotheses of the commenter.

							(2021), (which SCHEER supports) investigate these pathologies as if they were an allergy, immediate cause-effect, but if this were not so and were the result of chronic exposures that cause long-term systemic effects as occurs with other diseases such as cancer, Alzheimer's, etc., the experimental research methodology that is now being prioritized would be biased, ineffective and its results would be completely wrong. However, SCHEER ignores research that is already finding biomarkers of oxidative stress and objective images of brain alterations in EHS individuals (International Consensus Criteria Belpomme et al 2021). It seems that the only way to demonstrate causality is to expose diagnosed persons to that which has made them ill. Has this been done to demonstrate causality with cancer, Alzheimer's or Parkinson's? Would it have been ethical? Would it have yielded results? If under the pretext of seeking the "best science" a study path is followed that relies on hypotheses and research methodologies that may be wrong, as could happen with Leszczynski (2021), because he is looking for immediate effects of exposures and these may be the result of chronic exposures, we may lose many years and the damage caused may be immense. If Leszczynski's methodology and assumptions were wrong, his research would not yield any results and the conclusion, which would be wrong if it is based on a wrong assumption, would be that there is no cause-effect between RF exposure and EHS. We are in danger of having this happen as with tobacco. Research that finds evidence of harm will be disqualified for years for its lack of quality while the industry funds research that does not find results. This makes it possible for meta-analyses to conclude that the research is inconsistent. With the added danger that ICNIRP, the body whose guidelines SCHEER analyzes, is a private and opaque body and has been denounced in a report as a body whose members have a conflict of interest and are not sufficiently qualified (its president is a psychologist). https://www.michele-rivasi.eu/wp-content/uploads/2020/06/ICNIRP-report-FINAL-JUNE-2020_EN.pdf			The SCHEER cannot answer on behalf of the ICNIRP.

Salinas Álvarez	Blanca	Asociación "Electro y Químico Sensibles por el Derecho a la Salud"	blanca.salinas.alvarez@gmail.com	Spain		5.3.2 Neurological and neurobehavioural effects	Numerous studies have found evidence that RF-EMF may affect EEG, blood-brain barrier, sleep, cognitive abilities, neurodegeneration. The diseases called by many researchers central sensitization diseases (fibromyalgia, chronic fatigue syndrome, multiple chemical sensitivity, electromagnetic electrohypersensitivity), diseases that have increased exponentially in the last thirty years in parallel to the deployment of wireless technology, are characterized by cognitive problems, sleep, headaches, etc.. All of these symptoms are closely related to the evidence of neurological and neurobehavioral effects being found for RF. Given the huge number of the population that is already being affected by them, it would be essential to apply the precautionary principle before the damage is even greater. It is important to ask the question: What causes central sensitization? The mere possibility that the answer could be: radio frequencies combined with the effects of other toxicants such as chemicals makes it imperative to apply the precautionary principle. The EU has already obliged companies to demonstrate the non-hazardousness of chemicals through the REACH program. However, with the research systems it suggests for EHS (experimental provocation studies together with psychological measures and subjective reports), it places the burden of evidence for electrohypersensitivity research not on the telecommunications companies, but on the people who have already become ill. Waiting for unquestionable scientific evidence could have unquantifiable social and economic consequences.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. This is a personal opinion of the commenter and touches on issues of risk management, which is outside the scope of the SCHEER. No change in the text is required.
Salinas Álvarez	Blanca	Asociación Electro y Químico Sensibles	blanca.salinas.alvarez@gmail.com	Spain		5.2.3 Conclusions on interaction	page 23, lines 6-10 As pointed out in the studies provided in the comments sent for section 5.2.2, more and more scientific studies on "Central Sensitization Diseases" (Fibromyalgia, chronic fatigue syndrome, multiple chemical sensitivity and eletrohypersensitivity) point out their relationship with cellular oxidative stress, reactive oxygen and nitrogen species, cellular ionic alterations, etc. Since there are already hundreds of scientific studies in vitro, in vivo and epidemiological studies that point to radiofrequency causing these types of health effects, there should be no quality meta-analysis to apply the precautionary principle with respect to these technologies, since the damage they may already be causing is enormous. Nor do we understand that this review does not even allude to the International Consensus Criteria on electrosensitivity		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. This comment is a personal opinion / hypothesis. No change in the text is required.

							(belpomme et al 2021)drafted by prestigious scientists from all over the world that objectify in electrposensitive people cellular oxidative stress markers and functional brain alterations objectified by imaging. The criticism that this type of study has no control group and is therefore of poor quality is unfounded, since it is impossible to find a non-exposed population that could be in the control group. Thousands of people have had severe physical and cognitive symptoms for years. We have been diagnosed first with fibromyalgia, chronic fatigue syndrome, multiple chemical sensitivity and have been told of chronic and incurable diseases. They found us (me in particular), a 40% deficit of coenzyme Q10, but when they carried out a genetic study they did not find any mutations that would justify this deficit. They suspect an epigenetic cause. After many years of immense sufferings and receiving an incapacity to work, after being exposed for several days to radiofrequency as a treatment for a knee injury, when severe adverse effects were produced, I was diagnosed with an epigenetic cause. After receiving several days of radiofrequency treatment for a knee injury, severe adverse effects have occurred and I have been diagnosed with electrohypersensitivity. Only then did I discover that I had been living in front of a cell phone antenna for 25 years. I now know that these antennas cause cellular oxidative stress, which is greater the shorter the distance from the antenna: Zothansiama et al (2017): Impact of radiofrequency radiation on DNA damage and antioxidants in peripheral blood lymphocytes of humans residing in the vicinity of mobile phone base stations. Electromagn Biol Med. 2017;36(3):295-305. doi: 10.1080/15368378.2017.1350584. Epub 2017 Aug 4. Since I have been diagnosed with electrosensitivity and avoid EMF and RF exposures, the symptoms of my other diagnosed central sensitization diseases have disappeared, but reappear when I am subjected to cumulative exposures. My symptoms are not immediate. This is why I believe that provocation studies are a fallacy. I would also not be willing to participate in a provocation study even if I am looking for objective physical symptoms. I am not an animal, I am a person, a woman, and I have already endured too much pain and suffering. I am not willing to expose my physical or cognitive integrity.			

Salinas Álvarez	Blanca	Electro y Químico Sensibles por el Derecho a la Salud	blanca.salinas.alvarez@gmail.com	Spain		5.2.2 Cellular interaction mechanisms	page 20, lines 13-17 There is experimental evidence that radio frequencies cause cellular oxidative stress (Schuermann and Mevissen (2021). SCHEER does not collect reviews and articles that are finding objective biomarkers of cellular oxidative stress in people with environmental idiopathic diseases and in people with electrosensitivity (Belpomme et al 2021, 2022), MCS (De Luca et al 2010, 2011) chronic fatigue syndrome (Sara Myhill et al 2009, 2013; Booth et al 2012) and in fibromyalgia (David Cordero 2013, 2014). That oxidative stress and redox imbalance found in these individuals could be the result of chronic radiofrequency exposures, which could be causing cellular functional alterations. Let us remember that all these highly disabling emerging diseases have increased exponentially in parallel with the deployment of radio frequencies, as they were hardly known before. They affect millions of people worldwide. 1- Belpomme et al The Critical Importance of Molecular Biomarkers and Imaging in the Study of Electrohypersensitivity. A Scientific Consensus International Report. Int. J. Mol. Sci. 2021, 22(14), 7321; https://doi.org/10.3390/ijms22147321 2- Belpomme et al: Why electrohypersensitivity and related symptoms are caused by non-ionizing man-made electromagnetic fields: An overview and medical assessment. Environ Res. 2022 Sep;212(Pt A):113374. doi: 10.1016/j.envres.2022.113374. 3- Myhill S, Booth NE, McLaren-Howard J. Chronic fatigue syndrome and mitochondrial dysfunction. Int J Clin Exp Med. 2009 jan.;2(1):1-16 4- Myhill S, Booth NE, McLaren-Howard J. Targeting mitochondrial dysfunction in the treatment of Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS) - a clinical audit. Int J Clin Exp Med. 2013 nov.;6(1):1-15 5- Booth NE, Myhill S, McLaren-Howard J. Mitochondrial dysfunction and the pathophysiology of Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS). Int J Clin Exp Med. 2012 jun.;5(3):208-20. 6- Di Luca,C; Sordo, M.; Cesareo, E.; Pastore, S.; Mariani, S.; Mariani, G.; Stancato, A.; Loreti, B.; Valahi, G.; Lubrano, C.; Raskovic, D.; DePadova, L.; Genovesi, G.; Korkina, L.: Biological definition of multiple chemical sensitivity from redox state and cytokine profiling and not from polymorphisms of xenobiotic-metabolizing enzymes. Toxicol and Pharmacology 248. 2010. 258-292.????? 7- Di Luca C.; Raskovic R.; Pacífico V.; Chung Sheun J.; korkina		I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence assessed following a quality evaluation. No change in the text is required.

							L.: The search for reliable biomarkers of disease in multiple chemical sensitivity and other environmental intolerances. Int J Environ Res Public Health. 2011 Jul; 8(7):2770-97. 8- Castro-Marrero J1, Cordero MD, Sáez-Francas N, Jimenez-Gutierrez C, Aguilar-Montilla FJ, Aliste L, Alegre-Martin J. Could mitochondrial dysfunction be a differentiating marker between chronic fatigue syndrome and fibromyalgia? Antioxid Redox Signal. 2013 Nov 20;19(15):1855-60 9- Cordero MD, Alcocer-Gómez E, Culic O, Carrión AM, de Miguel M, Díaz-Parrado E, Pérez-Villegas EM, Bullón P, Battino M, Sánchez-Alcazar JA. NLRP3 inflammasome is activated in fibromyalgia: the effect of coenzyme Q10. Antioxid Redox Signal. 2014 Mar 10;20(8):1169-80.			
Salinas Álvarez	Blanca	Asociación Electro y Químico Sensibles	blanca.salinas.alvarez@gmail.com	Spain		4.2.2 ICNIRP (2020) Guidelines -	Page 10. line 15. "Due to ethical considerations, there are no human experimental studies on adverse effects in neurodegenerative diseases." Experimental studies are conducted only on animals. We wonder why these same ethical considerations are not taken into account with respect to IEI-EMF diseases and EHS. Except in allergies where the immediate mechanism is known and exposure is minimal (electrosensitivity has nothing to do with them), never ever, neither for scientific nor for ethical reasons, have people been exposed to that which causes them illness in order to demonstrate causality, even less so if the damage could be the result of long-term chronic exposure. These studies have always been carried out on cells or animals. We ask ourselves: How long would it take to expose electrosensitive people to obtain the same results as with animals and thus unquestionably demonstrate causality? With what consequences for these people?		I do not object to publication of my contribution, including my personal data, on internet	Thank you for this comment. This section is a summary of the previous publications of ICNIRP and SCENIHR.
						5.3 Health effects	P23 lines 22-25 Undue weight has been given to the mix of epidemiological studies regarding brain cancer. The NTP and Ramazzini Institute studies showed a direct causal link, and several studies show increased brain cancer incidence in populations. https://ehtrust.org/scientific-documentation-cell-phone-radiation-associated-brain-tumor-rates-rising/ Therefore, to discuss the ambiguous nature of some epidemiological studies, which may have flawed methodology, would appear to miss the crucial point, that a link has been proven. P 33 lines 49-50 It is implied that studies are inadequate to determine neurophysiological effects. Yet such effects have been		I do object to publication of my contribution, including my personal data on internet	Thank you for this comment. This is a personal opinion of the commenter. Effects have been observed, however as far as EEG

							established in high-quality studies. A compilation of those studies can be found here. https://bioinitiative.org/wp-content/uploads/2020/09/6-RFR-Neurological-Effects-Abstracts-2020.pdf This entire section gives an overall impression of succumbing to what is known as the 'tobacco playbook' in which poor-quality studies showing null effect are wrongly judged to negate strong studies showing a positive effect. An impression of ambiguity counters the scientific consensus, as shown on the PHIRE medical Consensus Statement (phiremedical.org), that RF radiation causes harm, often serious harm, in a number of ways, including carcinogenic and neurological effects. It is well-known that there is a strong push from governments and the powerful wireless industry for the deployment of Fifth Generation Technology and it is apparent that the SCHEER document is giving undue weight to supposed 'ambiguity' of the science in order to satisfy vested interests, when amongst the scientific community, in particular independent experts who have extensively studied the biological effects of RF radiation, no such ambiguity exists.			studies are concerned these do not indicate adverse health effects.
						5.2.3 Conclusions on interaction	P23 lines 3-18 There are contradictions within this section. It is stated that oxidative stress is likely (as shown in the scientific research) and also that there is 'no consistent evidence.' It is imperative that the studies showing a positive effect are given due weight and not negated by studies showing a null result, which may have methodological flaws or where the researchers may have conflicts of interest. Oxidative damage caused by RF radiation has been well-established by several authoritative sources including the Swiss agency BERENIS: https://ehtrust.org/wp-content/uploads/Newsletter-BERENIS-Special-Issue-January-2021-1.pdf Oxidative damage is a cause of DNA damage and therefore cancer and the body of evidence showing oxidative damage has not been given due weight in this section.		I do object to publication of my contribution, including my personal data on internet	Thank you for the comment. This is the conclusion of the authors and it refers to other cellular endpoints, not oxidative stress. This is a personal opinion of the commenter.
						4.2.2 ICNIRP	P9 lines 3-12 It is well-established amongst the independent scientific community that the ICNIRP do not provide guidelines that are protective of public health. It is not possible that SCHEER is not already aware of this and it does not reflect well on SCHEER that they are referring to the ICNIRP. The ICNIRP consider only thermal effects and therefore do not have a place in setting guidelines relating to harmful biological effects which are well-		I do object to publication of my contribution, including my personal data on internet	Thank you for this comment. This section is a summary of the previous publications of ICNIRP and SCENIHR.

							established in the medical literature. Please see the following: The ICNIRP do not reflect majority medical and scientific opinion regarding RF radiation: https://pubmed.ncbi.nlm.nih.gov/35751553/ The ICNIRP have conflicts of interest, as shown in this investigative report by two MEPs: https://www.michele-rivasi.eu/wp-content/uploads/2020/06/ICNIRP-report-FINAL-JUNE-2020_EN.pdf The ICNIRP are non-accountable and have conflicts of interest: https://pubmed.ncbi.nlm.nih.gov/28656257/			The SCHEER cannot answer of behalf of the ICNIRP.
						4	p8 35-39 This paragraph suggests that severe impairment cannot be caused by exposure to RF radiation. However, the causal link has been established in legal cases and there have now been four tribunal wins in UK courts as a result, with the decision based on medical evidence. These tribunal cases can be seen here: https://phiremedical.org		I do object to publication of my contribution, including my personal data on internet	Thank you for this comment. This section is a summary of the previous publications of ICNIRP and SCENIHR.
						4 METHODOLOGY	p 8 16-23 It is incorrect to state that correlations with cancer have not been established. The National Toxicology Program study found 'clear evidence' of heart tumours which are not mentioned in this paragraph. This is a major and worrying omission. Furthermore the NTP study found evidence of brain and adrenal tumours. https://ntp.niehs.nih.gov/whatwestudy/topics/cellphones/index.html The findings of this major and authoritative study have been supported by the Ramazzini Cancer Research Institute study led by Belpoggi et al. Furthermore the epidemiological literature shows an increase in aggressive brain gliomas in the general population, particularly in younger people. https://ehtrust.org/scientific-documentation-cell-phone-radiation-associated-brain-tumor-rates-rising/		I do object to publication of my contribution, including my personal data on internet	Thank you for this comment. This section is a summary of the previous publications of ICNIRP and SCENIHR.
						2 OPINION	p7 lines 10-12. Adverse health effects below current limits are very well established in the scientific literature and for the SCHEER to claim not to have identified them is unacceptable. Compilations of these studies can be seen on the physicians' website, bioinitiative.org, on the website of ehtrust.org, and at phiremedical.org as well as in the peer-reviewed medical and scientific literature. PHIRE medical has also published on its website a consensus statement from medical professionals.		I do object to publication of my contribution, including my personal data on internet	Thank you for the comment. This is a personal opinion of the commenter. No change in the text is required.

							p 7 lines 22-23 Guidelines from the ICNIRP are not fit for purpose as the ICNIRP does not acknowledge or study biological effects but sets its guidelines according to thermal effects only, which occur only at exceptionally high levels of radiation. As shown by radiation scientists in this 2022 article in PubMed, the ICNIRP opinion contrasts with the majority of research findings https://pubmed.ncbi.nlm.nih.gov/35751553/			
						7 REFERENCES	A comparison of the articles included here with those in other recent reviews shows clear omission of studies with negative results. Relevant reviews are https://www.europarl.europa.eu/RegData/etudes/STUD/2021/690012/EPRS_STU(2021)690012_EN.pdf and https://www.emf-portal.org/de/article/47918		I do object to publication of my contribution, including my personal data on internet	Thank you for your comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence assessed following a quality evaluation. No change in the text is required.
Ashton	Dave		dashton42@hotmail.com	United Kingdom		2 OPINION	Line 10. The WoE wording here is convoluted, and it is not (directly) one of the five classifications, as is described in the associated WoE Memorandum. Could this wording be replaced with one of the five classifications?		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The phrase used here reflects the fact that in the Opinion uncertain and weak WoE has been identified for health endpoints/biological effects as is described in detail in Chapter 5 (Assessment) of the Opinion. No change in the text is required.
Ashton	Dave		dashton42@hotmail.com	United Kingdom		1 MANDATE FROM THE	General comment. It isn't apparent why this Opinion is limited to potential adverse effects of RF radiation on humans, when flora and fauna are increasingly exposed to this radiation from human activities. This will become even more of an issue with the forthcoming 5G 'densification', whereby a dramatic increase in the number of transmitters will be required to facilitate the use of millimeter wave frequencies. In addition, 5G will incorporate novel technologies, including 'beamforming', which may have profound effects on flora and fauna which is, or which gets, in the way		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. Environmental effects of RF-EMF are not in the scope of the mandate to SCHEER. The mandate is received by the Commission Services.

							SCHEER appear to be avoiding an examination of the possible environmental and ecological costs associated with these emerging technologies, which seems inconsistent with its very name: 'Scientific Committee on Health, Environmental and Emerging Risks'.			
de Vocht	Frank	University of Bristol	frank.devocht@bristol.ac.uk	United Kingdom		5.3.1 Neoplastic diseases	First of all I would like to emphasize that in my opinion the committee did an excellent job in summarising the evidence, and have come to a balanced opinion. With respect to neoplastic diseases, I believe the Committee missed recent discussions on the increased incidence in glioblastoma multiforme (GBM), and which some have linked to RF. The most comprehensive analyses however, do not suggest that RF/mobile phones are an important driver of such trends. This is discussed here: https://www.sciencedirect.com/science/article/pii/S0013935118305462 other studies discussing this, and are likely of relevance: https://www.sciencedirect.com/science/article/pii/S0160412016303 8 https://www.sciencedirect.com/science/article/pii/S0928468012001101		I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence assessed following a quality evaluation. No change in the text is required.
Shardlow	Matt	Buglife - The Invertebrate Conservation Trust	matt.shardlow@buglife.org.uk	United Kingdom		1 MANDATE FROM THE EU COMMISSION SERVICES	Given the concern about environmental effects from radio wave pollution, and particularly the identification of a risk to wildlife in the SCHEER Statement on emerging health and environmental issues (2018) rated at the highest level of concern, it is perplexing that this evidence review only covers human health aspects. Humans are dependent on a healthy environment and therefore we need to properly assess and understand the risks that 5G and other radio frequencies pose to other species. Concerns about the risks to insects are particularly high, with evidence available indicating impacts at biological, behavioural and potentially population levels. For instance see the papers by Vanbergen et al 2019 and Balmori 2021 - https://www.sciencedirect.com/science/article/pii/S0048969719337805 and https://stopsmartmetersbc.com/wp-content/uploads/2021/02/EMR-as-an-emerging-driver-factor-for-the-decline-of-insects-by-Alfonso-Balmori-Elsevier-December-29-2020.pdf We hope that another review is planned to ensure that the risks to the environment are also given full consideration.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. Environmental effects of RF-EMF are not in the scope of the mandate to SCHEER.

Thiele	Michaela	ECI Stop 5G - Stay Connected but Protected	kabelvorrang@posteo.de	Germany		7 REFERENCES	The UK Million Women study as a reference. This study does not prove that cell phones do not cause tumors, for two reasons: 1. the study did not adequately analyze the group that could be at risk for increased brain tumors in the first place, namely long-term and frequent users (1,640 hours cumulatively). In the critique by Prof. Joel Moskowitz, University of Berkeley (USA), it is stated: "The study is not sufficiently powered because the analysis sample included few participants with intensive cell phone use, the group at greatest risk for brain tumors (https://doi.org/10.1093/jnci/djac042). Only 18% of female cell phone users made calls ≥ 30 minutes per week (approximately 4 minutes per day or 26 hours per year). No "more than 3%" of female cell phone users had a cumulative talk time ≥ 1,640 hours, the top decile of cell phone use in the 13-nation Interphone Study (https://doi.org/10.1093/ije/dyq079), and the only subgroup at significantly higher brain tumor risk." [https://www.emf-portal.org/de/article/47697] The all-clear messages in the media are based on data from few-user women, from which no conclusions for tumor risk can be drawn. 2 The UK Million Women study is an epidemiological study that used questionnaires. It cannot make causal statements in the sense of proof, but is a correlation with a partial truth and must be compared according to the Bradford-Hill criteria in the context of results from in vivo and in vitro studies to be able to make such a proof. Studies using this scientific method conclude: there is an increased risk of tumors for frequent and long-term users.[https://www.emf-portal.org/de/article/31674] Conclusion: Nobody claims that every cell phone user gets a brain tumor. According to the current state of science, long-term and frequent users are exposed to this risk, but their number has increased since the beginning of the smartphone era. This subgroup, which could have provided meaningful information, is not analyzed and evaluated separately in the UK Million study. Joachim Schüz had already scientifically disqualified himself with the Danish Cohort Study of 2006 (update 2011) [https://doi.org/10.1136/bmj.d6387]. This study also went		I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. Systematic reviews and meta-analyses contributed the majority of evidence assessed following a quality evaluation. The use of single large-scale population-based studies is now explained in the amended text.

							through the press worldwide with the message: No increased tumor risk. The leading portal Microwave News wrote in 2011: - "The latest update of the Danish cell phone cancer study is touted as the biggest and best ever. It shows 'no association between cell phone use and [brain] tumors,' the press release says." - Don't believe a word of it. - On Oct. 20, the British Medical Journal published the third part of the Danish Cancer Society's cohort study, which has followed some 400,000 cell phone users since the 1980s ... From the start, the Danish project was criticized for excluding more than 200,000 corporate users, one-third of the actual number of Danish cell phone users, the intended study population. The researchers had little choice: They did not know the names of the people using cell phones paid for by their employers, and therefore had no way of matching the people in the cell phone subscriber lists with those in the tumor registries. All agree that those who were excluded were the heaviest users. During the period of the Danish project - from 1987 to 1995 - cell phones were expensive, and it is not unreasonable to assume that those who did not have to pay their own bills spent the most talk time."[https://microwavenews.com/DanishCohort.html]. Because of this obfuscation of usage times and habits, this study was criticized as inconclusive even in the conservatively written WHO Monograph 102 in the chapter Cohort study and early case-control studies.			

Thiele	Michaela	ECI Stop 5G - Stay Connected but Protected	kabelvorrang@posteo.de	Germany		4.2.2 ICNIRP (2020) Guidelines - Summary on biological and health effects	We demand a dissolution and independent replacement of the ICNIRP. Justification: Self-referencing authorships behind the ICNIRP 2020 radiation protection guidelines: Researchers Else K. Nordhagen and Einar Flydalziehen conclude after their analyses that the literature used by ICNIRP 2020 to support its guidelines is neither diverse, nor independent, nor balanced, and is by no means "consistent with current scientific knowledge" as ICNIRP 2020 claims [2 p. 484]. ICNIRP 2020 bases this assertion only on this small network, an assertion that is contrary to the majority of biologically oriented researchers and publications in this research area. Therefore, the evaluation shows that the ICNIRP 2020 guidelines do not meet basic scientific quality requirements because they build on a broad, solid, and established knowledge base, represent a view that is contrary to established knowledge in the field, and therefore cannot provide a basis for good governance in setting RF exposure limits to protect human health. Source: https://www.degruyter.com/document/doi/10.1515/reveh-2022-0037/html?fbclid=IwAR19FlAn7RNF7E0pBp0WtQg-EvYDOA8iC06uMrn993kythoXaeLih-NhrPA German consumer protection oraganisation diagnose:funk reveals: Radiation protection policy dominated by industry-affiliated, unscientific lobby organization ICNIRP: https://www.presseportal.de/pm/134366/4902631 The report 'The International Commission on Non-Ionizing Radiation Protection: Conflicts of interest corporate capture and the push for 5G' was commissioned, coordinated and published by the two MEPs Michèle Rivasi (Europe Écologie) and Klaus Buchner (Ecological Democratic Party). https://www.michele-rivasi.eu/wp-content/uploads/2020/06/ICNIRP-report-FINAL-JUNE-2020_EN.pdf		I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment. The SCHEER cannot respond on behalf of the ICNIRP.

Bertová	Petra		petra.bertova@gmail.com	Slovakia		5.3.4 Other health effects	I would like to draw attention to slovak study "The potential adverse effect of 2.45 GHz microwave radiation on the testes of prenatally exposed peripubertal male rats" https://pubmed.ncbi.nlm.nih.gov/34854072 / This study revealed that the prenatal exposure to microwave radiation had an adverse effect on the postnatal testicular development in rats. Best regards, Petra Bertova		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The SCHEER has set specific criteria (§4.2.4) for the selection of information sources to fulfil the mandate. No change in the text is required.
Conrad	Christoph		electric.monk@posteo.net	Germany		ABSTRACT	The document is not downloadable - "Access denied". https://health.ec.europa.eu/system/files/2022-08/scheer_o_044.pdf		I do not object to publication of my contribution, including my personal data, on internet	The opinion can be downloaded at https://health.ec.europa.eu/publications/scheer-scientific-evidence-radiofrequency_en

Lech	James	Diplomatic Science Officer bi-lateral of Netherlands & South Africa. National Research Foundation & NUFFIC.	i.c.lech@amsterdamumc.nl	Netherlands		6 RECOMMENDATIONS FOR FUTURE WORK	Good afternoon Review team. I thank you for your proposal on public comment. The presented information is relevant to the entire document however, based on our reviews, we propose an alternative strategy that so far has provided exception and significant results in a short time span. This is published in our latest WHO National Report publication [https://bit.ly/3HkQ4vh]. These are results from our projects in Netherlands, France, USA, Nigeria, and South Africa. We going onto our second year now the teaching of our new graduate courses [https://vu.nl/en/education/professionals/courses-programmes/introduction-to-sub-molecular-medical-and-agricultural-sciences] This is the realm of sub-molecular medical and agricultural sciences. Available is a endorsement and review of said course and content by Nobel Peace Prize co-recipient Ivan Culjak [https://www.dropbox.com/s/vmn1nmqgy9pod6h/220621%20Ivan%20Culjak-compressed.pdf?dl=0] In summary: imposing limits only is fruitless, particularly given front-end spectrum arrays being configured differently. Instead, we have focused on bioadaptive strategies and solutions as per the NASA Human Research Methodical approach. In such, noticeable effects derived from pragmatic, and cost-effective interventions have been achieved and demonstrated. From this demonstration, using AI modelling and probability forecasting, it is easier and more efficient from a HYGEIA scientific-technical analysis, to derive policies and project implementation demonstrations accordingly. We have setup said public demonstration spaces here in Amsterdam at the Amsterdam Medical Center, and OurDomain SouthEast residency. This was strategically chosen to be easy access for visitors arriving on the plane and then train nearby. Any visitors would be able to quickly notice and feel the difference. This then makes it easier to converse the application in quantum mechanics and quantum biology. Kind regards James Lech		I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comments. No change in the text is necessary.

							Diplomatic Science Officer – ZA Doctoral Candidate Amsterdam University Medical Center, Department of Radiology & Nuclear Medicine – MRI & EEG Division. World Health Organization - International EMF Project & Optical Radiation - ZA, Chair Email: j.c.lech@amsterdamumc.nl https://www.linkedin.com/in/jameslech/			
Taccetta	Carol		ctaccetta2020@gmail.com	Other	USA	5 ASSESSMENT	Please consider the below references in your assessment. Thank you, Carol Taccetta, MD, FCAP Moskowitz JM, Myung S-K, Choi Y-J, Hong Y-C. Reply to Brzozek et al. Comment on "Choi et al. Cellular Phone Use and Risk of Tumors: Systematic Review and Meta-Analysis. Int. J. Environ. Res. Public Health 2020, 17, 8079". International Journal of Environmental Research and Public Health. 2021; 18(11):5581. https://doi.org/10.3390/ijerph18115581 Myung S-K, Moskowitz JM, Choi Y-J, Hong Y-C. Reply to Comment on Choi, Y.-J., et al. Cellular Phone Use and Risk of Tumors: Systematic Review and Meta-Analysis. Int. J. Environ. Res. Public Health 2020, 17, 8079. International Journal of Environmental Research and Public Health. 2021; 18(6):3326. https://doi.org/10.3390/ijerph18063326		I do not object to publication of my contribution, including my personal data, on internet	Thank you for the comment. The text has been amended.

Moskowitz	Joel	University of California, Berkeley	imm@berkeley.edu	Other	United States of America	5.3.1 Neoplastic diseases	The SCHEER preliminary opinion provides a biased summary of the peer-reviewed research which it employs to argue that the health risks from exposure to low intensity radiofrequency radiation are minimal. For example, on page 24 (lines 30-56) and page 25 (lines 1-20), the preliminary opinion summarized the findings of our 2020 meta-analysis of mobile phone use and tumor risk (1) and summarized the contents of two letters prepared by members of ICNIRP and their colleagues which provided specious criticisms of our study (2, 3). However, the opinion failed to discuss the two letters we published which rebut these specious criticisms (4, 5). For more information on this and other issues pertinent to this opinion see the posts on my Electromagnetic Radiation Safety website (https://www.saferemr.com): https://www.saferemr.com/2020/11/new-review-study-tumor-risk.html (1) Choi Y-J, Moskowitz JM, Myung S-K, Lee Y-R, Hong Y-C. Cellular Phone Use and Risk of Tumors: Systematic Review and Meta-Analysis. International Journal of Environmental Research and Public Health. 2020; 17(21):8079. https://doi.org/10.3390/ijerph17218079 (2) Brzozek C, Abramson MJ, Benke G, Karipidis K. Comment on Choi et al. Cellular Phone Use and Risk of Tumors: Systematic Review and Meta-Analysis. Int. J. Environ. Res. Public Health 2020, 17, 8079. International Journal of Environmental Research and Public Health. 2021; 18(10):5459. https://doi.org/10.3390/ijerph18105459 (3) de Vocht F, Röösli M. Comment on Choi, Y.-J., et al. Cellular Phone Use and Risk of Tumors: Systematic Review and Meta-Analysis. Int. J. Environ. Res. Public Health 2020, 17, 8079. International Journal of Environmental Research and Public Health. 2021; 18(6):3125. https://doi.org/10.3390/ijerph18063125 (4) Moskowitz JM, Myung S-K, Choi Y-J, Hong Y-C. Reply to Brzozek et al. Comment on “Choi et al. Cellular Phone Use and Risk of Tumors: Systematic Review and Meta-Analysis. Int. J. Environ. Res. Public Health 2020, 17, 8079”. International Journal of Environmental Research and Public Health. 2021; 18(11):5581. https://doi.org/10.3390/ijerph18115581 (5) Myung S-K, Moskowitz JM, Choi Y-J, Hong Y-C. Reply to		I do not object to publication of my contribution, including my personal data, on internet	Thank you for this comment. We disagree that the SCHEER provides a biased summary. All references have been considered and the text has been amended.

							Comment on Choi, Y.-J., et al. Cellular Phone Use and Risk of Tumors: Systematic Review and Meta-Analysis. Int. J. Environ. Res. Public Health 2020, 17, 8079. International Journal of Environmental Research and Public Health. 2021; 18(6):3326. https://doi.org/10.3390/ijerph18063326			
Crespo	Ediberto	None	edibertocrespo@yahoo.com	Other	Miami Florida USA	5.1 Exposure to RF EMF	Hi I'm a Civilian victim of Acoustic Attacks in Cuba on September 2016 perpetrated by Security state of Cuban Government, I have 110 pages of medical records from UM Miami conducted by Dr Michael Ellis Hoffer and USGVT is lying about it		I do not object to publication of my contribution, including my personal data, on internet	Thank you. No change in the opinion required.
Roth	Bradley	Oakland University	roth@oakland.edu	Other	United States	ABSTRACT	My comment is that overall, the study appears well done and accurate. It is consistent with what I found in my book "Are Electromagnetic Fields Making Me Ill?". I believe the topic of health effects of electromagnetic fields is subject to many conspiracy theories and false fears, and I am glad to see the study address these fears with facts and data.		I do not object to publication of my contribution, including my personal data, on internet	Thank you for your comment.