

# **Risks and Responsibility**

Ethical analysis of public policy regarding exposure to electromagnetic fields.

Thesis for Master Course: Applied Ethics

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Dedicated to Jesus of Nazareth, the truly Good Shepherd.

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## **Abstract**

The question whether EMF exposure can cause health effects is the subject of a heavily polarised scientific debate. However, a guideline of the Health Council of the Netherlands (HCN) states that a risk can be considered plausible if “some” recognised experts in the relevant field express concerns. When I apply this to the current state of affairs in which 249 recognised experts in the relevant field have expressed their concerns regarding EMF exposure, I argue that the risk of EMF causing health effects is plausible.

The As Low As Reasonably Achievable (ALARA) principle is part of the system of radiation protection that was developed to manage risks in nuclear science. The government openly put aside the ALARA principle, despite HCN’s advice to apply the ALARA principle to EMF exposure and despite the fact that the government is an important stakeholder that should bear the accompanying responsibilities in the ALARA process. The telecom providers’ interpretation, of what reasonable is, is based on the rudimentary form of radiation protection, outdated exposure limits and lacks the adoption of the Linear No Threshold (LNT) model. It also lacks consideration of other economic and societal factors. Therefore, I argue that the argument of the government that the ALARA principle is already applied is not ethically justified.

The precautionary principle is a weak version of the original responsibility principle that was developed by Hans Jonas to address the magnitude of risks of modern technology. By designating precaution as being the main principle, the precautionary principle’s susceptibility to criticism has increased. Sunstein criticises the precautionary principle because it does not seem to offer guidance in cases with both potential gains and potential harms. The application of the principle also seems influenced by cognitive limitations. Taking into account funding sources of scientific studies may be a more practical solution than assuming that rational risk assessment will be free from cognitive limitations. HCN judges Jonas’ decision rule not suitable as an universally applicable principle, because it would only be useful in situations where there is little to be gained and a great deal to be lost. This assumption seems to be contradicted by the examples Jonas gives, which involve situations that have considerable potential gains. Van Dijk et al. also argue that the precautionary principle is not suitable as a decision rule, and they argue that advisory bodies should not advise concrete decisions, but should only provide information. This seems to contradict the very task of advisory bodies, namely providing advice. Van Dijk et al. and HCN consider the aim of the precautionary principle; arriving at a proper balance between dynamism and caution. This excludes two out

of three duties of Jonas' moral compass. Van Dijk et al. state that sacrificing benefits to avoid a particular risk can introduce other risks. However, the precondition of being riskless, in applying the precautionary principle, does not seem a valid argument since creating new risks is rather inevitable. From 2000 until 2008 the government could ethically justify EMF policy by referring to the *GSM-base stations* report. Since the *Prudent precaution* report in 2008 and its advised assessment of a plausible risk, and given the fact the amount of recognised experts at that time was amply exceeded, the government could no longer ethically justify disregarding the application of the precautionary principle in EMF policy.

Due to the fact that the ALARA principle is not applied according to the modern system of radiation protection, and the interpretation of the precautionary principle is not in line with Jonas' responsibility principle, I argue that the government's policy regarding exposure to EMF is not ethically justified.

## Introduction

“Let’s app!” Twenty years ago the probable answer would have been: “Let’s what?”

Nowadays the familiarity with the use of apps on a mobile phone is presupposed and when I answer: “I do not app” the common reaction is one of surprise and disappointment. In some cases it is accompanied by a, mostly concealed, reproach, suggesting that I am causing a problem. One of the main reasons for the popularity of wireless applications that use electromagnetic fields, such as mobile phones and wireless internet, is the convenience and utility it offers. These aspects are emphasized by countless advertisements and commercials that seem to convince people all around the world.

In Dutch media the topic of the safety of electromagnetic fields (EMF) is sometimes covered. The news item usually starts with a few critical questions from concerned citizens, patients or scientists. Then, scientists from advisory bodies and politicians reassure the public that there is no evidence for harmful effects, that scientific studies are carefully interpreted to monitor possible harm and that the current exposure to EMF is well below the EMF exposure limits, which results in a conclusion that there is no reason for concern.<sup>1</sup> Given the pervasive use of wireless devices, this conclusion seems to convince the majority of the Dutch population. This conviction is mainly based in trust and the assumption that responsible authorities will tell the truth and their policy will be ethically justified. Although I fully agree with the assumption that a policy *should* be ethically justified, the question is; Is this the case?

## **Research question**

Because of the status quo described above I have formulated the following research question:

**Is Dutch policy regarding the use of EMF ethically justified?**

Since this question addresses policy and its practical consequences I think that not exclusively theoretical ethics, but applied ethics, is the most appropriate instrument to study this research question. Regardless of what the answer will be, I think that the fact that this question and its ethical perspective is hardly discussed in the public debate on EMF exposure is a serious flaw. This thesis is my attempt to shift the debate from the discussion about conclusive evidence of harmful effects caused by EMF exposure, to an ethical debate about how to safeguard ethical values in the face of uncertainties, or risks, due to EMF exposure.

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1 An example: <https://nos.nl/nieuwsuur/artikel/2281832-straling-vormt-strijdpunt-bij-uitrol-5g.html>



Since I will focus on the situation in the Netherlands and on Dutch policy, from now on I will refrain from adding ‘Dutch’ to terms as policy and law. In chapter 1 I will sketch two examples of opposing views in the debate on safety of EMF exposure.

The government uses two arguments to claim that EMF policy is ethically justified. I will evaluate each argument with a separate method. In chapter 2 I will evaluate the government’s argument that EMF exposure is already kept As Low As Reasonably Achievable (ALARA), by means of the system of radiation protection which was developed for nuclear science. In this chapter I will answer the subquestion: **What is the ALARA principle and how should it be applied in EMF policy?**

In chapter 3 I will evaluate the government’s argument that the precautionary principle is not applicable to EMF from antenna masts because exposure limits are followed, by means of the book *Das Prinzip Verantwortung* by Hans Jonas.<sup>2</sup> Here I will answer the subquestion: **What does the precautionary principle entail according to Hans Jonas and what does this mean for EMF policy?**

By means of the answers found I will analyse whether the current EMF policy is indeed ethically justified.

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<sup>2</sup> Hans Jonas, *Het principe verantwoordelijkheid, Een onderzoek naar een ethiek voor de technologische civilisatie*, translation: Ingrid ten Bos. (Utrecht, Publisher: IJzer, 2011)

## Chapter 1. The Scientific Debate

The scientific debate concerning the use of EMF mainly focuses on whether or not EMF can, or do, cause health risks. Since this is a very extensive debate I cannot discuss this in detail. Instead, I will highlight two important disputes.

### **1. Exposure limits**

The first prominent argument in the debate is the use of exposure limits that are aimed at protecting public health. The International Committee on Non-Ionizing Radiation Protection (ICNIRP) in 1998 formulated exposure limits that the European Union consequently recommended to its member states. The Netherlands followed this advice and still applies the ICNIRP limits, that vary between 28 and 61 Volt per meter (V/m).

The Knowledge Platform EMF and Health<sup>3</sup> (KP) explains the justification of the current limits as follows; “There is a difference between biological effects and health effects. Sitting in the sun or jogging heightens the body temperature, but the body reacts, for instance, by sweating, which ensures a successful removal of the heat. These effects are called biological effects. They do not generate health effects. Health effects can occur when the body is not able to compensate changes, such as the heating of tissue. If exposure to EMF exceeds the exposure limits of the ICNIRP excessive heating can occur which could cause damage to the eye, dehydration and heat stress. In daily life EMF exposure does not exceed the exposure limits, resulting only in limited heating that can easily be removed from the body. Strong EMF can irritate nerves, which can manifest in tingling, pain, involuntary contraction of muscles, disturbance of heart rhythm and seeing flashes of light. In daily life no strong EMF occur, because of compliance with the ICNIRP exposure limits. The ICNIRP states: “The overall evaluation of all the research on HF fields as emitted by mobile phones leads to the conclusion that HF exposure below the thermal threshold is unlikely to be associated with adverse health effects.”<sup>4</sup> There is substantial research on other health effects as well. In some studies on specific cells DNA damage has occurred. The question whether this relates to the development of cancer is the subject of a scientific debate. Also other possible effects have been studied, such as the effects on the sense organs, brain, nervous system, heart, blood vessels, hormones, immune system, fertility and pregnancy. No connection has been found

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<sup>3</sup> [www.kennisplatform.nl](http://www.kennisplatform.nl)

<sup>4</sup> <https://www.icnirp.org/en/applications/mobile-phones/index.html>

between EMF exposure and health effects. The only reported effects were biological in nature or could be caused by other factors as well, such as stress.”<sup>5</sup>

This explanation is not undisputed. For instance, the European Environment Agency (EEA) warned that “harmful exposures can be widespread before there is both 'convincing' evidence of harm from long-term exposures, and biological understanding of how that harm is caused. ‘There are many examples of the failure to use the precautionary principle in the past, which have resulted in serious and often irreversible damage to health and environments.

Appropriate, precautionary and proportionate actions taken now to avoid plausible and potentially serious threats to health from EMF are likely to be seen as prudent and wise from future perspectives. We must remember that precaution is one of the principles of EU environmental policy,’ says Professor Jacqueline McGlade, Executive Director of the EEA.”<sup>6</sup>

The Austrian Medical Association’s Working Group (ÖÄK AG-EMF) noted that despite the application of the ICNIRP limits; “There has been a sharp rise in unspecific, often stress-associated health problems that increasingly present physicians with the challenge of complex differential diagnosis. A cause that has been accorded little attention so far is increasing electrosmog exposure at home, at work and during leisure activities, occurring in addition to chronic stress in personal and working life. It correlates with an overall situation of chronic stress that can lead to burnout. How can physicians respond to this development? The Austrian Medical Association has developed a guideline for differential diagnosis and potential treatment of unspecific stress-related health problems associated with electrosmog. The guideline was intended as an aid in diagnosing and treating EMF-related health problems.”<sup>7</sup> This guideline assessed a 0.02 V/m EMF exposure as a normal limit and assessed 0.06 V/m as slightly above the normal limit.

Another critical review of the ICNIRP limits was published in PubMed, an online database with more than 29 million citations for biomedical literature from MEDLINE, life science journals and online books<sup>8</sup>, citing an article of the European Academy for Environmental Medicine (EUROPAEM) – EMF working group that formulated a guideline

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<sup>5</sup> [https://www.kennisplatform.nl/onderzoek-naar-gezondheidseffecten-van-mobiele-telefoons/?search\\_text=stress](https://www.kennisplatform.nl/onderzoek-naar-gezondheidseffecten-van-mobiele-telefoons/?search_text=stress)

<sup>6</sup> European Environment Agency, *Radiation risk from everyday devices*, Copenhagen 2007

<sup>7</sup> <http://electromagnetichealth.org/electromagnetic-health-blog/oak-emf-guidelines/>

<sup>8</sup> <https://www.ncbi.nlm.nih.gov/pubmed/>

that proposed 0.6 V/m for GSM (2G), UMTS (3G) and DECT (wireless) telephones and 0.06 V/m for Wi-Fi.<sup>9</sup>

Finally, 249 scientists that have published peer-reviewed papers on the biological or health effects of non-ionizing electromagnetic fields support the EMF Scientist Appeal that was submitted several times to the World Health Organization, the United Nations Environment Programme (UNEP) and all U.N. Member Nations. This EMF scientist Appeal urgently calls for addressing the global public health concerns, the implementation of precautionary measures, weighing heavily the findings of the independent, non-industry associated EMF science, initiating an assessment of alternative exposure standards and educate the public about health risks, particularly risks posed to children and pregnant women.<sup>10</sup>

## **2. EMF and risks of cancer**

Another reoccurring argument is the question whether or not EMF are carcinogenic. In 2011 the International Agency for Research on Cancer (IARC) classified EMF as 2B, which means it is considered ‘possibly carcinogenic to humans’.<sup>11</sup> The IARC concluded that epidemiological and animal data provided “limited evidence”<sup>12</sup> for the carcinogenicity of EMF. The classification was based on two studies; a) research by the Hardell group and b) the Interphone research, conducted in 13 countries.

Lennart Hardell, a Swedish oncologist at Örebro University Hospital, argued for a revision of the ICNIRP limits, because the classification was too weak and requested the WHO/IARC to move EMF radiation from class 2B to class 1 ‘known carcinogen’.<sup>13</sup> “Based on the [Bradford] Hill criteria, glioma and acoustic neuroma should be considered to be caused by RF-EMF emissions from wireless phones and regarded as carcinogenic to humans, classifying it as group 1 according to the IARC classification. Current guidelines for exposure need to be urgently revised.”<sup>14 15</sup>

His petition to the WHO/IARC is currently supported by 17.112 subscribers.

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<sup>9</sup> <https://www.ncbi.nlm.nih.gov/pubmed/27454111>

<sup>10</sup> <https://www.emfscientist.org/>

<sup>11</sup> <https://www.iarc.fr/media-centre-iarc-news-82/>

<sup>12</sup> Idem, p. 2.

<sup>13</sup> <https://www.sciencedirect.com/science/article/pii/S0013935118303475>

<sup>14</sup> <https://lennarthardellenglish.wordpress.com/2015/01/30/radiofrequency-electromagnetic-fields-rf-emf-and-human-cancer/>

<sup>15</sup> <http://www.ncbi.nlm.nih.gov/pubmed/24192496>

On the other hand the Health Council of the Netherlands (HCN) argued that the classification 2B was too strong. “Overall the data from several epidemiological studies provide some indications for an association between long-term and/or intensive use of a mobile phone and an increased incidence of tumours in the brain and head and neck region, but the evidence is weak and inconsistent.”<sup>16</sup> This conclusion was based on three studies; a) a Danish cohort research, b) research by the Hardell group and c) the Interphone research, conducted in 13 countries.

Leendert Vriens, a physicist and former project lead at the Physical Research Laboratory of Philips, and Dariusz Leszczynski, specialised in Molecular Biology and in Biochemistry/Cell Biology, argued that HCN could only reach their conclusion because of the use of the Danish cohort study that, according to IARC, included various sources of misclassification. For instance, “members of the reference population, apart from the cohort members, may well have used mobile phones,”<sup>17</sup> and “[u]sing information from Statistics Denmark, it appeared that the cohort members represented a somewhat more affluent section of the Danish population.”<sup>18</sup> HCN acknowledged: “The Danish cohort study merely considered whether or not subjects held a private subscription that was started before 1996, and compared this group to all other residents of Denmark. Clearly the time that passed since a subscription started is a less meaningful endpoint than an estimate of the actual amount of use, which is more directly associated with exposure. In the later publications of this study with longer follow-up there will be increasing misclassification in the non-users group. This is because holders of business contracts, who are possibly among the heaviest users, were excluded from the users group, and because mobile phone possession in the Danish population strongly increased after 1996.”<sup>19</sup> Nevertheless, HCN stated: “Despite the lack of actual exposure data, the Committee considers the Danish cohort important for the overall evaluation. This is because misclassification in the non-users group has only very limited effect on the calculated risk and there is no misclassification in the users group.”<sup>20</sup> Vriens and Leszczynski challenged this “very limited effect on the calculated risk”, especially in the light of the expected increase of

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<sup>16</sup> HCN, *Mobile phones and cancer, Part 3: Update and overall conclusions from epidemiological and animal studies*, The Hague, 2016, p. 53.

<sup>17</sup> IARC Monographs 102, *Non-ionising radiation, Part II: Radiofrequency Electromagnetic Fields*, 2011. p. 199 <http://publications.iarc.fr/Book-And-Report-Series/Iarc-Monographs-On-The-Identification-Of-Carcinogenic-Hazards-To-Humans/Non-ionizing-Radiation-Part-2-Radiofrequency-Electromagnetic-Fields-2013>

<sup>18</sup> idem, p. 199.

<sup>19</sup> HCN, *Mobile phones and cancer, Part 1: Epidemiology of tumours in the head*, The Hague, 2013, p. 32.

<sup>20</sup> Idem, p. 32

misclassification, and argued that the exclusion of the heaviest users from the user group is a plausible reason to attribute no weight to the Danish cohort study.<sup>21</sup>

### 3. Conclusion

These two disputes are exemplary for the heavily polarised debate on the use of EMF. As an ethicist I do not have the expertise to make a final judgement on the plausibility of EMF causing health risks. Instead I refer to HCN's report *Prudent precaution* in which the application of the precautionary principle is examined. To determine whether or not a risk is plausible the authors suggest: "In general terms, an effect or correlation may be considered plausible if at least some recognised experts in the relevant field have concerns"<sup>22</sup> When I apply this guideline to the issue of the plausibility of EMF causing health effects I note that 249 recognised experts in the relevant field have expressed their concerns regarding the insufficiency of the ICNIRP exposure limits and the lack of precautionary measures in public health policy.<sup>23</sup> Since the amount of 249 recognised experts clearly exceeds the required amount of "some" recognised experts I argue that the risk of EMF causing health effects is plausible. This fact in itself does not provide unequivocal guidance, for life is full of small and not so small risks. Yet, the use of EMF is pervasive in society, which means that potential health risks could affect public health considerably. How to deal with this plausible risk can be considered an ethical question.

As indicated in the introduction the government argues that EMF policy is ethically justified. The government's first argument is the application of the ALARA principle, that will be discussed in more detail in the next chapter.

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<sup>21</sup>[https://www.stopumts.nl/doc.php/Artikelen/7493/gezondheidsraad\\_geen\\_duidelijk\\_bewijs\\_voor\\_verband\\_tussen\\_hersentumoren\\_en\\_langjarig\\_mobiel\\_bellen](https://www.stopumts.nl/doc.php/Artikelen/7493/gezondheidsraad_geen_duidelijk_bewijs_voor_verband_tussen_hersentumoren_en_langjarig_mobiel_bellen)

<sup>22</sup> <https://www.healthcouncil.nl/documents/advisory-reports/2008/09/26/prudent-precaution> p. 17

<sup>23</sup> <https://www.emfscientist.org/>

## **2. Introduction**

This chapter aims to answer the subquestion; What is the ALARA principle and how should it be applied in EMF policy? Hence, the origin and application of the ALARA principle, are discussed in this chapter. The ALARA principle is part of the system of radiation protection that was developed to manage risks in nuclear science. This system consists of 3 principles; 1) justification (do the benefits outweigh potential harms?), 2) optimisation (keeping radiation As Low As Reasonably Achievable, ALARA) and 3) dose limitation (by means of exposure limits).<sup>24</sup>

From 2013 until 2016 HCN published the study Mobile phones and cancer in three parts.<sup>25</sup> Both in part 1 and part 3 HCN stated that a link between the use of a mobile phone and tumours in the head was unlikely, but HCN also stated that the ALARA principle should be applied. As a result of this advice the government had a meeting with representatives of the telecom providers. Afterwards the government stated that the ALARA principle was indeed applied by the providers who ensured that EMF from antenna masts was kept as low as reasonably achievable. Since the ALARA principle is part of the system of radiation protection, which aims to address risks in an ethically justified way, I argue that the government's explanation of the application of the ALARA principle, is also meant as an ethical justification of EMF policy.

Although the technical characteristics differ, after all, nuclear energy is ionising radiation and EMF is non-ionising radiation, I do have 4 reasons to apply the system of radiation protection to EMF policy. First, the International Commission on Radiological Protection (ICRP) examined in publication 138 whether the system of radiation protection had ethical foundations. The ICRP concluded that this system indeed relied on four core ethical values; 1) beneficence/non-maleficence, 2) prudence, 3) justice and 4) fairness. The practical implementation of the system of radiation protection could be supported by three procedural values; 1) accountability, 2) transparency, and 3) inclusiveness.<sup>26</sup> Because the system of radiation protection is grounded in ethical values, I argue that it therefore can be used to judge

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<sup>24</sup> The International Commission on Radiological Protection (ICRP), *Ethical foundations of the system of radiological protection*. ICRP Publication 138. Ann. ICRP 47(1), 2018. p. 11.

<sup>25</sup> <https://www.healthcouncil.nl/search?keyword=Mobile+phones+and+cancer>

<sup>26</sup> ICRP, *Ethical foundations of the system of radiological protection*. ICRP Publication 138. Ann. ICRP 47(1), 2018. p. 11.

whether EMF policy is ethically justified. Second, the need for the system of radiation protection is identical, because we have discovered ways to utilise this invisible energy in ways we judge beneficial and simultaneously the use can cause health effects. Third, in practice the 3 principles of the system of radiation protection seem already applied to the use of EMF; 1) the decision regarding the justification of the use of EMF is already made by our government, 2) the use of the ALARA principle is applied by telecom providers and 3) exposure limits are observed, which means that indeed all 3 principles are applied. Fourth, the Dutch Association of Radiation Hygiene that applies the system of radiation protection, examines ionising radiation as well as non-ionising radiation.<sup>27</sup> In the next paragraph I will sketch the history of the system of radiation protection.

## 2.1 Development of the system of radiation protection

After the “discovery of x rays (Röntgen, 1895), natural radioactivity (Becquerel, 1896), and radium (Curie, 1898),”<sup>28</sup> radiation as a tool for treatment and diagnosis became more and more important in the medical field. However, since scientists and health professionals sometimes experienced skin problems, in 1928 the first recommendations for radiation protection were published by the International X-ray and Radium Protection Committee (IXRPC, which became ICRP in 1950).<sup>29</sup> The advice contained the following argument: “the dangers of over-exposure [...] can be avoided by the provision of adequate protection”<sup>30</sup> According to the ICRP Publication 138 this advice “was based on the best scientific knowledge at the time about the effects of radiation exposure, the experience of three decades of practice, and the desire to avoid harm. The relatively simple, implicit ethical principle of ‘doing no harm’ was sufficient, as it was thought that straightforward protection measures could keep exposures low enough to avoid injury entirely. The only type of effects known at that time were *deterministic* effects, which are considered to have a threshold below which no deleterious effects are seen, although they were not described in these terms until decades later.”<sup>31</sup> For this thesis it is not essential what exactly deterministic effects are, therefore I will describe them in a more general way, namely as short-term effects.

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<sup>27</sup> <https://www.nvs-straling.nl/over-nvs/afdelingen/afdeling-niet-ioniserende-straling-nis>

<sup>28</sup> ICRP Publication 138, *Ethical foundations of the system of radiological protection*, 2018, p. 22

<sup>29</sup> idem, p. 22

<sup>30</sup> idem, p. 22

<sup>31</sup> idem, p. 22



I would like to pause here to make an observation which I will use in chapter 3. Only one year after Röntgen discovered x rays the first early warning was published by W.C. Fuchs.<sup>32 33</sup> However, the first official recommendations were made three decades later. This reveals a scientific tendency, which can be observed in other scientific discoveries as well, such as asbestos, tobacco, lead and mercury,<sup>34</sup> that scientific curiosity is often accompanied by enthusiasm about the utility and very few (or perhaps even an absence of) studies that examine potential health effects. Given the limited research on health effects from ionising radiation, the estimation of what exposure would be low enough, was too optimistic. The consequence was that people were inadequately protected and sometimes experienced serious skin reactions. The ethical dimension of this practice was that radiation protection was not reconsidered unless signs of harm appeared. To put it more sharply, the optimistic assumption demanded proof of harm, before science would be willing to re-evaluate radiation protection. The philosopher Hans Jonas acknowledges that problems with uncertain risks are ethical problems. I will discuss his view in detail in chapter 3.

In 1951 the scientific ethical insights were more mature in the sense that the ICRP then recommended that radiation exposure should be kept at the “lowest possible level.”<sup>35</sup> In the fifties a growing amount of scientific studies linked radiation exposure to long-term health risks, such as cancer and hereditary effects. Therefore, in 1955, the ICRP stated that “no radiation level higher than the natural background can be regarded as absolutely “safe”.”<sup>36</sup> This was a breach with the insight that only ‘overexposure’ was harmful and that a threshold existed below which no harm would be caused. The ethical focus changed from avoiding harm to dealing with the plausibility of a risk.<sup>37</sup> The implications of this new view crystallised in Publication 9 (1966) that assumed “... a linear relationship between dose and effect, and that doses act cumulatively. By adopting this position, the Commission was fully aware ‘that the assumptions of no threshold and of complete additivity of all doses may be incorrect’, but it considered that there was no alternative given the information available at that time.”<sup>38</sup> In

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<sup>32</sup> ICRP Publication 138, *Ethical foundations of the system of radiological protection*, 2018, p. 22

<sup>33</sup> W.C. Fuchs, *Effects of the Röntgen rays on the skin*. West. Electr. December 1896, 291.

<sup>34</sup> European Environment Agency EEA Report, No. 1, *Late lessons from early warnings: science, precaution, innovation*, 2013. ISSN 1977-8449. P. 674.

<sup>35</sup> ICRP Publication 138, *Ethical foundations of the system of radiological protection* 2018, p. 23

<sup>36</sup> idem 2018, p. 23

<sup>37</sup> idem, p. 23

<sup>38</sup> idem, p. 23-24

1977 the three principles; “justification of practice, optimisation of protection and limitation of individual doses”<sup>39</sup> were introduced, which are still in use today.

## 2.2 The ALARA principle

The ALARA principle in radiation protection resulted from the assumption of a linear dose-effect which lacked a safety threshold for long-term effects. “It resulted in a search for risk reduction *whatever* the level of exposure, while taking into account economic and societal factors.”<sup>40</sup> The ALARA principle does not prescribe fixed results. It is an “obligation of means”<sup>41</sup>, such as examinations and judgements regarding quantity and quality.<sup>42</sup> The initiator of the ALARA process is the operator that is responsible for the radiation source, but he has a legal duty to consult a registered radiation expert. Since radiation experts have a duty to follow refresher courses their advice will be in accordance with the latest insights.<sup>43</sup>

Due to the limits of this thesis I cannot elaborate on all details of this process, but I will mention the general framework. First, the characteristics of an exposure situation are described. This description can cover sources of exposure, the number of people that are exposed, the frequency and duration of the exposure. Second, the initial dose is assessed. The third step in the ALARA process is an extensive ALARA analysis. This analysis is used for the fourth step; ALARA synthesis. The process is completed by a follow-up and feedback experience.

A precondition for a successful implementation of the ALARA process is a supporting ALARA culture. Important features of the ALARA culture are;

- Everybody working with radiation must be aware of its risk and must be aware of the requirement to reduce the dose to as low as reasonably achievable.
- A questioning attitude
- Commitment to dose reduction
- Openness and transparency<sup>44</sup>

This ALARA culture has to be applied at both individual and organisational level.

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<sup>39</sup> ICRP Publication 138, *Ethical foundations of the system of radiological protection* 2018, p. 24

<sup>40</sup> The European ALARA Network, *Draft: ALARA: a practical guidebook*, 2019, p. 9, emphasis added.

<sup>41</sup> *idem*, p.9

<sup>42</sup> *idem*, p.9

<sup>43</sup> E-mail correspondence with the National Association of Radiation Hygiene, NVS, [www.nvs-straling.nl](http://www.nvs-straling.nl)

<sup>44</sup> *Draft: ALARA: a practical guidebook*, p. 17.

### 2.3 ALARA, EMF exposure and policy

As mentioned in the introduction of this chapter HCN published its study ‘Mobile phones and cancer’ in three parts. In the conclusion of part 1 the following recommendation was stated: “Without implying that either the exposures currently experienced in daily life or the exposure limits such as those proposed by ICNIRP are too high, the Committee would like to suggest that there is no reason not to apply the ALARA principle to exposure to RF EMF, meaning that exposures should be As Low As Reasonably Achievable. This is fully in line with the suggestions from the Health Council’s advisory report ‘*Prudent precaution*’.”<sup>45</sup> In part three the HCN repeated this advice and added: “There is no need for any device to transmit with greater power or for a longer period of time than needed for an adequate connection.”<sup>46</sup>

The Ministry of Infrastructure and Environment (I & E) responded to part 1 in August 2013 by summarising the main points of the policy regarding the use of EMF, which were: promoting the research program ZonMw and promoting an “independent provision of information on this subject via the Knowledge Platform EMF and Health.”<sup>47</sup> The Ministry continued that since there were no signs that exposure limits were exceeded, the need for new binding governmental measures was not plausible, because the use of mobile phones could be considered safe and possible long-term health effects were too uncertain. The Ministry stated that there was no reason to interfere with the people’s individual freedom. Due to the absence of the need for measures the Ministry interpreted the ALARA advice as an appeal to *citizens* and *companies* to contribute to EMF exposure reduction where it would be reasonably possible.<sup>48</sup>

In October 2014, together with physicians, scientists and other citizens I formulated a public letter to the Ministry I & E arguing that a minimal EMF exposure, as is aimed for in the ALARA principle, will never be achieved by waiting until exposure limits are exceeded. We also put into perspective the claim that the current EMF policy would not interfere with people’s individual freedom, because in fact there is no freedom of choice in EMF exposure if one wants to participate in societal life. We concluded with several recommendation,

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<sup>45</sup> HCN, *Mobile phones and cancer, Part 1: Epidemiology of tumours in the head*, The Hague, 2013, p. 122-123.

<sup>46</sup> HCN, *Mobile phones and cancer, Part 3: Update and overall conclusions from epidemiological and animal studies*, p. 54.

<sup>47</sup> Ministry of Infrastructure and Environment, ref: IENM/BSK-2013/122 272, August 19<sup>th</sup>, 2013.

<sup>48</sup> *idem.* (emphasis added)

including the suggestion to move all health related matters concerning EMF to the Ministry of Health, Wellbeing and Sport (HW&S).<sup>49</sup>

The Ministry's response repeated that given the lack of evidence for health effects the government did not see a need for measure that could reduce EMF exposure. Neither would the Ministry stimulate citizens to reduce EMF exposure, since this would, incorrectly, suggest that the government regarded EMF exposure as a risk. The Ministry had consulted the telecommunication operators (providers). The providers ensured the Ministry that due to their societal responsibility they already applied the ALARA principle by keeping the frequency power of antenna masts as low as reasonably achievable. This also offered them economic benefits since the reduction of power resulted in lower energy costs. The Ministry saw no reason to transfer responsibilities to the Ministry of HW&S, because all required information was available at the Knowledge Platform that provided public information. Finally the Ministry claimed that it was the prime responsibility of medical professionals to judge symptoms of patients. The Ministry of HW&S did not play a role in this.<sup>50</sup>

## **2.4 Application of the ALARA principle**

In order to analyse the application of the ALARA principle I will use the system of radiation protection from which the ALARA principle originated. The Ministry's response resembles the initial assumption of the ICRP/ICRP in 1928, arguing that only exposure above a certain threshold could cause health effects. As we have seen, this assumption is ethically problematic, since it demands proof of harm before improving radiation protection. But the ICRP transcended this line of reasoning in the fifties by assuming that no threshold above the natural background exposure was safe. The ICNIRP, on the other hand, still defends the rudimentary form of radiation protection, suggesting that only overexposure can cause health effects, while more than a few recognised experts in the relevant field question the safety of the ICNIRP threshold. The Ministry was, or at least should have been, well aware of these facts, but nevertheless chose to rely on the ICNIRP exposure limits. This means that the Ministry's response did not comply with the modern, ethically justified system of radiation protection.

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<sup>49</sup>[https://www.stopumts.nl/doc.php/Reacties/8830/alara\\_principe;\\_brief\\_naar\\_de\\_ministeries\\_met\\_bedroeve\\_nd\\_antwoord\\_en\\_vervolg](https://www.stopumts.nl/doc.php/Reacties/8830/alara_principe;_brief_naar_de_ministeries_met_bedroeve_nd_antwoord_en_vervolg)

<sup>50</sup> Idem

Furthermore the Ministry ignored the fact that the ALARA principle is a “...direct consequence of the adoption of the linear dose-effect relationship with no threshold for stochastic [long-term] effects”<sup>51</sup>. This is called the Linear No Threshold (LNT) model and assumes that no exposure above the natural background can be considered safe.<sup>52</sup> In the system of radiation protection the existence of exposure limits do not imply the safety of exposure below these limits, because of the adoption of the LNT model. Hence, the Ministry’s statement that the use of mobile phones could be considered safe, because no exposure limits were exceeded, shows that the Ministry did not adopt the LNT model and consequently did not comply with the system of radiation protection. The government even openly put aside the ALARA principle itself by interpreting the advice as an appeal to citizens and companies. This interpretation is at odds with the purpose of the HCN which is explicitly aimed at advising the government and the parliament.

The government’s choice to put aside the ALARA principle was justified with the statement that no health effects from EMF exposure occurred below the current limits and therefore no governmental measures were necessary. This argument is false, because it turned HCN’s advice around. HCN concluded that *despite* the lack of evidence for a causal relation between the use of mobile phones and brain tumours, the ALARA principle *should* be applied. The government argued that *because* of the same lack of evidence, the government *did not need* to apply the ALARA principle. However, the government did ask the providers to explain how they applied the ALARA principle to EMF exposure. The question arises why providers, or citizens, would apply the ALARA principle to an application that is already considered safe. There is neither a logical nor a reasonable argument for asking this from them, because the risk, according to the government, does not exist. Evidently, as we have seen in chapter 1, risks from EMF exposure can be considered plausible, therefore the ALARA principle should be applied by all stakeholders, including the government.

#### **2.4.a The operator responsible**

Since the government considered the ALARA advice as an appeal to companies (next to citizens), they contacted the providers who are responsible for EMFs from antenna masts. But the providers only consulted the ICNIRP exposure limits. This is problematic in two way; 1) these exposure limits are far from up-to-date since they were formulated in 1998 and 2) these

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<sup>51</sup> Draft: ALARA: a practical guidebook, p. 9.

<sup>52</sup> Jim Malone, Friedo Zölzer, Gaston Meskens, Christina Skourou, *Ethics for Radiation Protection in Medicine*, Series in Medical Physics and Biomedical Engineering, Boca Raton, CRC Press, 2019, p. 33.

limits (28-61 V/m) exceed the natural background of EMFs (0.00002 V/m) substantially.<sup>53</sup>

The first fact is in conflict with the duty to consult radiation experts with the latest insights on radiation protection. This could be solved by using any of the more recent exposure limits of ÖÄK and/or of EUROPAEM as indicated in chapter 1. The second fact is in conflict with the LNT model which is an integral part of the system of radiation protection. This could be solved by adopting the LNT model.

#### **2.4.b Reasonableness**

Above two problematic facts result in an equally problematic assumption of what “reasonable” is in EMF exposure. Given the absence of the LNT model, there is no awareness of risks below the ICNIRP exposure limits. This can explain why providers argue that keeping the power of antenna masts ALARA is an adequate interpretation of “reasonableness” in the ALARA principle.

Beside the required adoption of the LNT model the ALARA principle requires that economic and societal factors are taken into account. Economic factors seem clear; providers promote and profit from the use of mobile devices and they meet society’s apparent need for these app(lication)s. However, the constantly rising health care costs and the plausibility of EMFs contributing to health problems can be an equally important economic factor, but is ignored because of the absence of the LNT model. A societal factor is the eagerness with which the majority of the population uses EMFs and the eagerness of companies to offer services via apps. The societal downside of it is the risk of addiction, especially visible in absent-minded people in traffic using their mobile phone while their alertness is required. A recent study showed that in 68% of the crashes *distraction* is one of the crash causal factors.<sup>54</sup> This is an extra risk, apart from the plausible health risks that were mentioned in chapter 1. All these risks inevitably influence society. Another societal factor is the estimated 1-3% of the population that experiences serious short term health effects during or shortly after EMF exposure. These citizens suffering from Electro Hyper Sensitivity (EHS) live their lives as refugees in their own country, constantly looking for a place to stay where EMF exposure is low enough to be bearable, which becomes increasingly more difficult.<sup>55</sup>

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<sup>53</sup> <https://www.ignir.org/Guidelines> p. 7

<sup>54</sup> <https://www.pnas.org/content/113/10/2636>

<sup>55</sup> [https://www.stopumts.nl/doc.php/Verhalen/8744/reacties\\_op\\_de\\_oproep\\_behoud\\_witte\\_zones\\_%28stralingssarme\\_gebieden%29](https://www.stopumts.nl/doc.php/Verhalen/8744/reacties_op_de_oproep_behoud_witte_zones_%28stralingssarme_gebieden%29)

If the providers would have complied with the system of radiation protection, which includes the ALARA principle and the LNT model, they would have taken risk awareness and commitment to dose reduction (whatever the level of exposure) as their reference to determine what reasonable is. Since the ALARA principle is not a principle of results, but of means, I cannot propose certain desired results that should be achieved by the providers. What I can do is list some logical steps that could be taken, when complying with both the ALARA principle and the system of radiation protection. In the search for dose reduction a questioning attitude is an important instrument. A relevant question could be: Are there safer alternatives to EMF exposure? For many applications the answer is: Yes, via wired internet connections and wired telephony. There are no technical hindrances to ensure that all homes and buildings have a wired internet network. This is not a mere matter of individual choice, but also of public facilities. The removal of all telephone booths and emergency telephones along highways, limits the public's choice for safe alternatives. Mobile telephony can generate benefits, but the use of wireless internet often has a high 'gadget' proportion, encouraging a depending attitude. With a little more effort a safe alternative is at hand or can be created.

Providers could stimulate risk awareness by being transparent about the potential health effects that can be caused by EMF exposure *below* the exposure limits. Providers could refrain from promoting wireless internet and encourage the wired use of internet. Instead of continuously introducing new technologies such as the new 5G network, providers could strive towards phasing out the 4G (LTE) network and limit the use of the 3G (UMTS) network to specific Wi-Fi areas, so people can make a conscious choice to be exposed to (extra) EMF or not. The 2G (GSM) network would then still facilitate mobile telephony and texting nationwide, but EMF exposure of the population would be reduced in a considerable way.

#### **2.4.c Other stakeholders**

Determining what reasonable is, is not the only requirement of the ALARA process. Another requirement is identifying relevant stakeholders.<sup>56</sup> The government can be considered an important stakeholder for two reasons. First, the government facilitates the wireless networks by selling frequencies via auctions. By now the government has earned more than 10 billion euro from selling GSM (2G) , UMTS (3G) and LTE (4G) frequencies.<sup>57</sup> In other words, the stakes of the government are high. Second, the activities of the providers and the Ministry of

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<sup>56</sup> Draft: ALARA: a practical guidebook, p. 17.

<sup>57</sup> GSM: 1,8 billion guilder, UMTS 5,9 billion euro, LTE 3,8 billion euro.

Economic Affairs and Climate (EA&C) are clearly intertwined in the Antenna Agency and the Telecom Agency that both are managed by the Ministry EA&C. Because of the choice of not applying the ALARA principle to the governments' EMF policy, both agencies claim that EMF exposure below the exposure limits is safe, which, as we have seen in chapter 1, is incorrect. The Telecom Agency is the most outspoken about its interests: "Society expects it can use telecommunication always and everywhere, with good accessibility for mobile telephony and internet for 24 hours a day and 7 days a week. And this *must* be so: without it the Netherlands get stuck."<sup>58</sup> Again, the apparent stakes are high. As we shall see below, the fact that a stakeholder of this magnitude does not apply the ALARA principle has far-reaching consequences.

According to the ALARA process authorities have the following responsibilities;

1. Including ALARA in safety standards.
2. Applying appropriate methodologies for the verification of the ALARA implementation.
3. Issuing recommendations and take enforcement actions if required.
4. Providing the public with transparent information and facilitate public involvement in the decision-making process.<sup>59</sup>

By ignoring the implications of the ALARA advice, the government evaded the responsibility to include ALARA in safety standards. Merely referring to maximum exposure limits, as was done by the Ministry I&E, was not applying the ALARA principle. As the responsible authority the Ministry should at least have examined the lower limits as indicated in chapter 1, since they are aimed at keeping EMF exposure as low as reasonably achievable.

Other consequences of the governments' choice are a lack of risk awareness in large parts of society, the fact that medical professionals do not consider EMF exposure a plausible cause for health effects, and manufacturers producing DECT telephones and Wi-Fi routers that emit radiation 24 hours a day, which, apart from the actual use, is a considerable amount of unnecessary EMF exposure, to name a few consequences.

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<sup>58</sup> <https://www.agentschaptelecom.nl/over-agentschap-telecom/wat-we-doen> (emphasis added)

<sup>59</sup> Draft: ALARA: a practical guidebook, p. 18.



#### **2.4.d Feedback of experiences due to EMF exposure**

The final step in the ALARA process is a follow-up and taking feedback seriously. The importance of this step becomes clear when we try to imagine what would have happened if the reports of short- and long-term health effects due to ionising radiation would not have been taken seriously. In that case we would still have the simple system of radiation protection, only paying attention to ‘overexposure’ and no ALARA nor LNT model would be applied, resulting in a higher radiological exposure of the population and an increase of unexplained health effects. Fortunately, this scenario was avoided by a proper application of the ALARA principle in ionising radiation. On the other hand, the government’s choice not to apply the ALARA principle to non-ionising radiation has unfortunately turned this scenario into reality. Because of the one-sided and incorrect information concerning the plausible risks of EMF exposure that was (and is) provided by governmental agencies, the majority of these people are not aware of the fact that a reduction of EMF exposure could reduce their symptoms. This means that part of the million citizens that were experiencing unexplained health effects in 2013, could have been helped by reducing EMF exposure.<sup>60</sup> However, the small minority of people that report a link between EMF exposure and health effects is sent to clinics for patients with unexplained health effects, by medical professionals. I consider this scientifically and ethically problematic. Scientifically, in the sense that a possible causal link between EMF exposure and health effects is systematically denied and the reported link interpreted as the patient being overly concerned, which effectively blocks the possibility of finding a causal link between the reported symptoms and EMF exposure. Ethically, because these patients are not protected from EMF exposure, since this supposedly could not cause their symptoms, while this is in conflict with the patient’s experience of harm and suffering.

#### **2.5 Ethical justification of EMF policy**

From the gathered information in this chapter I derive the following facts;

- The government’s argument that it does not need to apply the ALARA principle to EMF exposure is false, since it is based on a twist of HCN’s original advice.
- The government’s statement that the ALARA principle was already applied, was not compliant with the requirements for the implementation of the ALARA process.

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<sup>60</sup> [https://www.databankvaktherapie.nl/knowledge\\_base/van-lijfelijk-lijden-naar-je-lichaam-zorgvuldig-leiden-psychomotorische-therapie-voor-mensen-met-somatisch-onvoldoende-verklaarde-lichamelijke-klachten-met-als-doel-herstel-en-klachtvermindering/](https://www.databankvaktherapie.nl/knowledge_base/van-lijfelijk-lijden-naar-je-lichaam-zorgvuldig-leiden-psychomotorische-therapie-voor-mensen-met-somatisch-onvoldoende-verklaarde-lichamelijke-klachten-met-als-doel-herstel-en-klachtvermindering/)

- If the government would have applied the ALARA principle, the government would have been identified as an important stakeholder, who should be included in the implementation of the ALARA process.
- Neither the government, nor the providers take feedback of experiences due to EMF exposure seriously. This blocks one of the possibilities of finding a causal link between EMF exposure and health effects, and leaves patients unprotected against EMF exposure.
- Above four facts resemble the rudimentary form of the system of radiation protection and do not comply with the modern, ethically justified system of radiation protection.

Therefore I argue that the argument of the government that the ALARA principle is already applied is not ethically justified.

## **2.6 Summary**

This chapter was dedicated to answering the subquestion: What is the ALARA principle and how should it be applied in EMF policy? The ALARA principle is part of the system of radiation protection; a system that evolved from a simple system aimed at avoiding harm from ‘overexposure’ to a system of managing risks. This resulted in the three principles of radiation protection; justification, optimisation (ALARA) and dose limitation, and in the adoption of the LNT model that assumes that no exposure above the natural background can be considered safe. Despite the advice of the HCN to apply the ALARA principle to EMF exposure, the government interpreted this advice as an appeal to citizens and companies. When asked by the government, the providers confirmed applying the ALARA principle by keeping the power of antenna masts as low as reasonably achievable. This interpretation of what a ‘reasonable’ reduction of EMF exposure is, fell short in several aspects; the observed exposure limits were outdated (1998) and also exceeded the natural background of EMFs substantially. The latter was in conflict with the LNT model. Furthermore a range of economic and societal factors were not taken into account, which is a precondition for applying the ALARA principle. Part of the ALARA process is identifying stakeholders. Given the large revenues from selling frequencies to providers and the direct connection between governmental agencies and providers, the government can be considered an important stakeholder. However, because the government put aside the ALARA advice, the accompanying responsibilities as indicated in the ALARA process were evaded. Contrary to the assumption of a causal link between dose and effect of ionising radiation, this link is not

acknowledged with regard to EMF exposure, by the government nor by the medical field, resulting in a lack of risk awareness and dose reduction in society. It also effectively blocks a possibility of finding a causal link and leaves patients unprotected against EMF exposure, despite their reported suffering from it. Above interpretations and practices resemble the rudimentary form of the system of radiation protection and do not comply with the modern, ethically justified system of radiation protection. Therefore, I argue that the argument of the government that the ALARA principle is already applied is not ethically justified.

### Chapter 3 The Precautionary Principle, interpretations and EMF policy

#### **3. Introduction**

In this chapter I will explore the government's claim that the use of the precautionary principle and its obligations can be disregarded by referring to the use of exposure limits. The precautionary principle itself is subject to multiple interpretations. Beauchamp and Childress pointed out a report that found nineteen different formulations.<sup>61</sup> I argue that the most reliable way of interpreting the precautionary principle is to study its origin and I will use this as a touchstone for several interpretations of the precautionary principle. Therefore I shall start with Hans Jonas' ideas about the precautionary principle. Subsequently I will address two criticisms of the precautionary principle and review them. At the end of this chapter I will examine whether the government's claim that the use of the precautionary principle is not necessary, is ethically justified.

#### **3.1 The need for a new ethical theory**

This paragraph goes back to the roots of the precautionary principle by studying the initiator Hans Jonas' remarks in his book *Das Prinzip Verantwortung*. In his foreword Jonas establishes two facts; the first fact is that modern technology does not only offer promises, but also threats. The second fact is that all ethical theories that were handed down from history are not suitable to address ethical problems of the current magnitude.<sup>62</sup> Hence, Jonas devotes himself to developing a new ethical theory to fill this gap. The moral compass of this new theory should be "the anticipated threat itself".<sup>63</sup> By means of the severe implications, ethical

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<sup>61</sup> Tom L. Beauchamp and James F. Childress, *Principles of Biomedical Ethics* (New York, Oxford University Press, 2013) p. 236.

<sup>62</sup> Jonas, *Het principe verantwoordelijkheid*, p. 17

<sup>63</sup> idem, p. 17

principles emerge that generate new duties for these new and powerful technologies. Jonas calls this moral compass the heuristics of fear.<sup>64</sup> Due to “the magnitude of long-term effects, that are often irreversible, [the duty of responsibility] shifts [...] to the centre of ethics. [...] The ground for such ethics, that is no longer bound to the immediate humanitarian domain of simultaneity, reaches metaphysics, in which only the question can be posed why exactly human beings should be in the world; hence, why the absolute imperative applies that the existence of humanity should be safeguarded for the future.”<sup>65</sup> Jonas warns us that this theory will be demanding for the reader and the author and shall resemble “steel and not cotton wadding”.<sup>66</sup>

### 3.2 Responsibility Principle

Jonas’ foreword clarifies what the focal point of his theory is, namely responsibility. It also reveals the remarkable fact that Jonas was not the deviser of the precautionary principle, but of the responsibility principle. Jonas’ warning that this principle will be demanding is not unfounded, because he chooses Kant’s categorical imperative as point of departure in his search for a principle to guide our actions. He arrives at the following imperative; “Act in such a way that the consequences of your action do not conflict with the sustainability of genuine human life on earth.”<sup>67</sup> This principle is meant as a *categorical* imperative, in other words, a law that is not negotiable. It does not leave room for a continuation of business as usual until convincing scientific proof of harm is reported. Neither is there room for any benefit outweighing the harm of putting human life in its entirety at risk. It is, as Jonas explained in his foreword, an *absolute* imperative. Jonas acknowledges that every individual has a right to put his own life at risk, but not human life in general. Thus, this imperative is aimed at public policy. I therefore summarise the responsibility principle as a non-negotiable principle for public policy that prescribes: *The duty to bear responsibility for the continuation of the current and future existence of humanity*. Jonas also prescribes the means to apply the responsibility principle: *The duty to use the “heuristics of fear” as a moral compass*.

I consider the second aspect to be a means that prevents us from having to account for long term and often irreversible harmful effects. I base this consideration on the original German title of his book. In the German-Dutch dictionary the word *Verantwortung* has two meanings;

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<sup>64</sup> Jonas, *Het principe verantwoordelijkheid*, p. 18

<sup>65</sup> Idem, p. 18

<sup>66</sup> Idem, p. 19

<sup>67</sup> Idem, p. 39

responsibility and accountability. Given the fact that Jonas was a philosopher and since philosophers usually do not choose their words carelessly, I find it plausible that the moral compass is meant to address the full scope of the word *Verantwortung*, including the meaning “being accountable for”.

The application of the heuristics of fear is facilitated by two preliminary duties;

*1. Acquiring an impression of long-term consequences.*

Since potentially harmful long-term effects are not part of our current experience, it is our duty to deliberately search for an image of these harmful effects. In other words, it is our duty to conduct research that is aimed at studying potentially harmful consequences.<sup>68</sup>

*2. Evoking the appropriate feeling from this image*

The feeling Jonas is referring to is fear. However, it is not the acute fear in the face of a clear and present danger, but a psychological fear, which is the proper form of fear in the face of imagined harmful consequences. Jonas describes this as an attitude, as a deliberate choice to be willing to be influenced by the consequences for future generations.<sup>69</sup>

Having fulfilled both preliminary duties, responsible actors arrive at the final duty of the heuristics of fear;

*Attribute more weight to potential negative consequences of modern technology than to its potential positive consequences.*<sup>70</sup>

I will highlight two, for this chapter relevant, reasons that Jonas gives to ground this final duty.

### **3.3 Probabilities with large risks**

Jonas draws our attention to the fact that evolution takes small steps, has the ability to adapt due to the slow pace of the changes and never puts everything at risk in one step. Modern technology lacks this cautious tempo and inevitably will generate, beside major achievements, mistakes, since it is the result of human endeavours. Because of the high speed of modern technology, there is no time left to correct mistakes. Jonas point out that risking a lot in unimportant matters to achieve a rare success is allowed, but risking important things that

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<sup>68</sup> See also Elbert de Jong, *Voorzorgverplichtingen* (Den Haag, Boom juridisch, 2016) p. 61

<sup>69</sup> Jonas, *Het principe verantwoordelijkheid*, p. 63

<sup>70</sup> Idem, p. 66

touch upon the roots of human existence is in fact never allowed.<sup>71</sup> These considerations result in a duty to be cautious and to avoid putting everything at risk in modern technology.

### 3.4 Cumulation of technological developments

Experience has taught us, according to Jonas, that technological developments have the tendency to generate an inevitable dynamism, pushing us forward in an irreversible way.<sup>72</sup> A human actor who took the first step to act, is, by this dynamism, presented with a fait accompli and thereby from the second step onwards downgraded to a servant in a pattern that urges us forward. Even if there is room left to correct mistakes, because of this dynamism, the corrections become harder and the freedom to correct increasingly smaller.<sup>73</sup>

### 3.5 Politics and responsibility

The type of responsibility that Jonas has in mind for public policy is explained as follows: “The case becomes mine [i.e. the politician’s case] because I have power and a causal relationship with it. The depending becomes, by rights of itself, something dictating; the might [of the politician], by means of its causality, becomes a duty.”<sup>74</sup> The combination of the need to safeguard human life which is affected by power and the awareness of the causality of power, results in a conscious responsibility of a politician. “If love is added, this responsibility gets wings, by the dedication of someone who learns to shiver for the fate of a loved one who is worth being. *This* is the kind of responsibility and the feeling of responsibility that is meant when we speak of the currently necessary ethics of responsibility for the future and not the formal-empty responsibility of every actor for his act.”<sup>75</sup>

Concerning the heuristics of fear Jonas explains: “We do not mean the fear that prevents action, but incites it and essentially belongs to responsibility, and it concerns a fear for the object of responsibility.”<sup>76</sup> Jonas adds that this object is “fundamentally vulnerable”, which justifies the fear.<sup>77</sup>

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<sup>71</sup> Jonas, *Het principe verantwoordelijkheid*, p. 66

<sup>72</sup> Idem, p. 67

<sup>73</sup> Idem, p. 68

<sup>74</sup> Idem, p. 154

<sup>75</sup> Idem, p. 154-155 (emphasis in original)

<sup>76</sup> Idem, p. 347-348

<sup>77</sup> Idem, p. 348

### 3.6 First criticism: a paralyzing principle

Strong views or theories are bound to meet opposing views, as is also the case with the responsibility principle that in politics and law was translated into the precautionary principle. Cass R. Sunstein, working at Harvard University, does not object to the use of the precautionary principle at an individual level which often resembles common sense, e.g. taking care crossing the street and buying insurance.<sup>78</sup> Sunstein does, however, object to the use of the precautionary principle as a political instrument for decision-making since it does not result in any advice.<sup>79</sup> “The principle is literally paralyzing - forbidding inaction, stringent regulation, and everything in between.”<sup>80</sup> Sunstein endorses the good reasons people have to apply the precautionary principle, including “protecting health and the environment even from remote risks, the need to attend to unintended adverse effects of technological change, and the need to ensure that wealthy countries pay their fair share for environmental improvement and risk reduction.”<sup>81</sup>

However, the precautionary principle does only seem to offer guidance when it is considered via a narrow viewscreen that focuses on a selection of one or several risks, and thereby excluding other, also relevant, risks.<sup>82</sup> If a wider viewscreen is used the precautionary principle becomes a paralyzing principle. A few of the examples Sunstein mentions are; a) asbestos, which cannot be banned by the precautionary principle because alternatives involve risks as well, b) banning nuclear power cannot be defended by the precautionary principle, since some alternatives play their part in climate change, and c) assuming the Linear No Threshold Model for “low-level toxic agents, including carcinogens”<sup>83</sup> may cause preventable deaths, since “[s]ome evidence suggests that many toxic agents that are harmful at high levels are actually beneficial at low levels”<sup>84</sup>. All Sunstein’s examples illustrate that strong regulation banning a product or activity, which is the strongest form of the precautionary principle, cannot be justified by making an appeal to the precautionary principle, since preventing a risk creates a new risk, that simultaneously should be prevented by the same precautionary principle.

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<sup>78</sup> Cass R. Sunstein, *Beyond the Precautionary Principle*, (151 University of Pennsylvania Law Review, 2003), p. 1004.

<sup>79</sup> Cass R. Sunstein, *Beyond the Precautionary Principle*, p. 1057.

<sup>80</sup> *Idem*, p. 1003

<sup>81</sup> *Idem*, p. 1004

<sup>82</sup> *Idem*, p. 1003

<sup>83</sup> *Idem*, p. 1026

<sup>84</sup> *Idem*, p. 1026

The only way to infer guidance from the precautionary principle in its strongest form, according to Sunstein, is to “wear blinders”<sup>85</sup> that block the view on other aspects of the same situation. These blinders can be identified with the help of “behavioural economics and cognitive psychology”<sup>86</sup>

### **3.6 a Loss aversion and Familiarity**

The first characteristic of the blinders is loss aversion and familiarity. People usually tend to avoid losses and sustain the status quo, rather than allowing an uncertain solution or gain.<sup>87</sup> People are also “*far more willing to tolerate familiar risks than unfamiliar ones, even if they are statistically equivalent*”<sup>88</sup> Both preferences stimulate distrust in new developments and directs people’s focus on the potential risks, instead of the potential gains.<sup>89</sup>

### **3.6 b The Mythical Benevolence of Nature**

The second characteristic is the assumption that “nature is essentially benign and that human intervention is likely to carry risks.”<sup>90</sup> Sunstein points to the fact that “nature is often a realm of destruction, illness, killing, and death,”<sup>91</sup> and therefore human activity cannot be considered “necessarily or systematically more destructive than nature.”<sup>92</sup> He summarises; “the false belief in a benevolence of nature helps to explain why the precautionary principle is thought, quite incorrectly, to provide a great deal of analytical help.”<sup>93</sup>

### **3.6 c The Availability Heuristic**

The perception of the magnitude of a risk is influenced by the availability of examples. Known, recent and nearby risks are likely to be perceived as more relevant, which seems rational, but because of this rule of thumb, the more complex risks, such as risks resulting from strict regulation, remain out of sight.<sup>94</sup>

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<sup>85</sup> Cass R. Sunstein, *Beyond the Precautionary Principle*, p. 1035

<sup>86</sup> *idem*, p. 1036

<sup>87</sup> *idem*, p. 1036

<sup>88</sup> *idem*, p. 1037-1038 (emphasis in original)

<sup>89</sup> *idem*, p. 1038

<sup>90</sup> *idem*, p. 1038

<sup>91</sup> *idem*, p. 1039

<sup>92</sup> *idem*, p. 1039

<sup>93</sup> *idem*, p. 1040-1041

<sup>94</sup> *idem*, p. 1043



### **3.6 d Probability Neglect**

When strong emotions, such as fear, are involved, the probability of a risk is largely neglected. That is why Sunstein argues that “when the precautionary principle is operating, the low-probability losses have far more salience than they deserve”<sup>95</sup>.

### **3.6 e System Neglect**

When the precautionary principle is applied to a specific risk, it affects a situation that mostly has more systematic and risk related aspects. Those extra systematic effects are usually neglected by analysts using the precautionary principle.<sup>96</sup> Sunstein argues for a consideration of all risks involved and not just a selection of risks.

### **3.7 Concluding remarks**

In case of scientific uncertainty, Sunstein suggests that a decision-making tool that would simplify the options could be helpful.<sup>97</sup> An unequal distribution of benefits and burdens need not be addressed by the precautionary principle, but can be corrected directly by, “for example, requiring wealthy countries, major contributors to the problem of global warming, to pay poor countries to reduce greenhouse gases or to prepare themselves for the relevant risks”<sup>98</sup>. Instead of facilitating cognitive limitations by the precautionary principle, people should “produce sensible priority-setting. An effort to produce a fair accounting of the universe of dangers should also help to diminish the danger of interest-group manipulation”<sup>99</sup>. Sunstein concludes that for politics “[a] rational system of risk regulation certainly takes precautions. But it does not adopt the precautionary principle”<sup>100</sup>.

### **3.8 Review of the first criticism**

Due to the limitations of this thesis I cannot address all the arguments put forward by Sunstein. Instead, I will touch upon three of them and will add some additional arguments. Before discussing these, I first would like to mention a general observation.

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<sup>95</sup> Cass R. Sunstein, *Beyond the Precautionary Principle*, p. 1048

<sup>96</sup> *idem*, p. 1049

<sup>97</sup> *idem*, p. 1056

<sup>98</sup> *idem*, p. 1057

<sup>99</sup> *idem*, p. 1057

<sup>100</sup> *idem*, p. 1058

### 3.8 a Simplification of the responsibility principle

Sunstein criticism exposes that the simplification of the responsibility principle into the precautionary principle has a problematic impact on the principle. Jonas' responsibility principle has the *aim* to enable politicians to bear their responsibility and to account for their choices. The *means* to achieve this goal is the duty to attach more weight to potential negative consequences of a human activity than to its potential positive consequences<sup>101</sup>. This focus can be characterised as a cautious approach. However, in law and politics the *means* of the responsibility principle, being *precaution*, is designated as the *principle itself*. Because of this new focus on precaution Sunstein can legitimately point to the fact that in case of two (or more) conflicting risks, the obligation to prevent them both, paralyses the decision-making process. Another example Sunstein uses to explain his argument that the precautionary principle is paralysing a decision-making process, is the use of the LNT model, which assumes that a “dose-response curve is linear and without safe thresholds.”<sup>102</sup> Sunstein continues: “Some evidence suggests that toxic agents that are harmful at high levels are actually beneficial at low levels.”<sup>103</sup> This is indeed an accurate observation and is also applicable to EMF exposure. Robert O. Becker M.D. and Gary Selden wrote the book *The Body Electric* in which they describe research that confirms beneficial health effects from EMF exposure and electric currents, such as wound healing and the growing of bones.<sup>104</sup> If precaution is the guiding principle, I agree with Sunstein that the strongest form of the precautionary principle, forbidding a potentially harmful activity which simultaneously eliminates potential benefits, is a contradiction in terms. That is why I argue that the simplification of the responsibility principle into the precautionary principle, by designating the means as the main principle, has increased its susceptibility to criticism. If, instead, responsibility would have been the guiding principle, then forbidding or challenging modern technology would be an option. I will elaborate on this in paragraph 3.8 b.

### 3.8 b The Mythical Benevolence of Nature

According to Sunstein many proponents of the precautionary principle believe that “nature is essentially benign and that human intervention is likely to carry risks”<sup>105</sup>. Sunstein argues

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<sup>101</sup> Jonas, *Het principe verantwoordelijkheid*, p. 66

<sup>102</sup> Cass R. Sunstein, *Beyond the Precautionary Principle*, p. 1026

<sup>103</sup> Idem, p. 1026

<sup>104</sup> Robert O. Becker, Gary Selden, co-author Henk Becker, *The Body Electric*, (HarperCollins Publishers Inc, 1998)

<sup>105</sup> Cass R. Sunstein, *Beyond the Precautionary Principle*, p. 1038

that, since this belief is false, it cannot serve as guidance in the application of the precautionary principle. Personally, I doubt the accuracy of Sunstein's analyses of the reluctance to allow human intervention which would be based on a false belief that nature is benign. At any rate, it is not propagated in Jonas' responsibility principle. Instead, Jonas points to the differences in characteristics of nature and modern technology. He does not point to the benevolence of nature, but to the small steps nature takes in introducing changes in a slow pace, without putting the entire biological system at risk. The very reasons for the new responsibility principle were the characteristics of modern technology; a high speed, decreasing opportunities to correct and the unknown long-term consequences. In Jonas words a "take-over of technology (this by no one planned, anonymous and irresistible revolution)."<sup>106</sup> It is my impression that the reluctance to allow human intervention in natural processes, is based on conscious or intuitive knowledge of the characteristics of modern technology, rather than on a false belief of the benevolence of nature.

### **3.8 c System Neglect**

Sunstein argues that proponents of the precautionary principle can only apply it by neglecting others risks in the same system. This may be true when considering human intervention, however, the same seems to be true for proponents of modern technology. Sunstein mentions the potential benefits of genetically modified crops, but he does not mention the fact that problems with crops, plagues and extreme weather conditions may very well be the consequence of a short-term, profit driven economic system. Not mentioning this can also be considered as system neglect.

### **3.8 d Overcoming cognitive limitations**

After Sunstein's explanation of the cognitive limitations of proponents of the precautionary principle, he advocates a "rational system of risk regulation"<sup>107</sup> This seems to suggest that the use of rationality is a sufficient safeguard against similar or other cognitive limitations. Whether this is an accurate assumption remains to be seen.

### **3.8 e Power asymmetry**

In his criticism of the strongest form of the precautionary principle, Sunstein points at the "danger of interest-group manipulation"<sup>108</sup>. He does not mention the power asymmetry

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<sup>106</sup> Jonas, *Het principe verantwoordelijkheid*, p. 205

<sup>107</sup> Cass R. Sunstein, *Beyond the Precautionary Principle*, p. 1057-1058

<sup>108</sup> Idem, p. 1057

*between* interests groups. The danger of manipulation can be considered realistic when referring to well paid lobbyists, equipped with sales, marketing and rhetoric skills. The earnings and societal success of lobbyists are a risk factor, because it can stimulate a focus on potential benefits, rather than on potential harms. On the other hand scientists, patients and concerned citizens that diligently bring potential risks out into the open, usually do this in their spare time, without revenues from it, regularly suffering from bad health conditions, and often bringing considerable financial sacrifices, since their reported link between a potential risk and their symptoms is often not acknowledged and therefore also not financially compensated. In my experience the danger of manipulation by the latter group is negligible. Therefore, in line with the responsibility principle, I argue that the vulnerability of the latter groups should oblige politicians to stimulate and facilitate their participation in the decision-making process concerning a discussed potential risk. In this process it is possible that, at first instance, a too cautious policy is developed, but as HCN argued in 2008 as long as a cautious policy “results from a careful evaluation process, it cannot legitimately be criticised”<sup>109</sup>

### 3.8 f Funding bias

Another aspect of risk assessment that is not addressed by Sunstein is the potential influence financial contributions can have on the results of research studies. The European Environment Agency (EEA) reported that this funding bias had been “observed in the tobacco literature (Barnes, 1998) and then identified in other fields such as pharmaceuticals (Goldacre, 2012; Lexchin, 2003) the food and beverage industry (Levine, 2003) BPA, (Vom Saal, 2005), mobile phones (Huss et al., 2007), food, (Levine, 2003), biomedics (Bekelman, 2003), [and] GMOs (Diels, 2011).”<sup>110</sup> In the case of mobile phones Henry Lai, researcher of bioengineering and electromagnetic biology and medicine, made an overview of studies aimed at finding health effects from EMF exposure and the results.

<b>Funding</b>	<b>Effect</b>	<b>No Effect</b>
Industry	27 (32%)	57 (68%)
Non-Industry	96 (70%)	41 (30%)
Total	123 (56%)	98 (44%)

Source: Henry Lai, University of Washington  
 ([Table from Martin Blank on Electromagnetic Fields](#)).

<sup>109</sup> <https://www.healthcouncil.nl/documents/advisory-reports/2008/09/26/prudent-precaution> p. 21

<sup>110</sup> EEA, Report No. 1, 2013, ISSN 1977-8449, p. 654

This overview signals that accurate risk assessment would benefit from taking funding sources into account. Taking this consideration into account seems a more practical and feasible solution to cognitive limitations than assuming that rational risk assessment will be free from it.

### **3.9 Second criticism: not suitable as a decision rule.**

#### **3.9 a Health Council of the Netherlands (HCN)**

In 2008 HCN published the report *Prudent precaution*.<sup>111</sup> After summing up several formulations of the precautionary principle HCN confirms that the “view that the precautionary principle implies that, in situations characterised by serious uncertainty, more weight should be attached to the potential negative consequences of a human activity than to its potential positive consequences” is “consistent with the ideas put forward by the originally German philosopher Hans Jonas.”<sup>112</sup> However, contrary to Jonas who formulated the responsibility principle as a categorical imperative for public policy, HCN found the precautionary principle only useful “in situations where there is little to be gained and a great deal to be lost.”<sup>113</sup> HCN also notes that Jonas’ decision rule resembles the ‘maximin’ rule, which “requires that a course of action should be chosen solely on the basis of the potential negative consequences of the various options (the option likely to have the least serious undesirable effect being preferable).”<sup>114</sup> HCN argued that all “available decision rules have their own limitations”<sup>115</sup> and not one of them could be considered “universally applicable.”<sup>116</sup> For that reason the “committee takes the view that greater weight should not *always* be attached to (potential) negative consequence than to (potential) positive consequences. Thus, the committee does not regard the precautionary principle as a decision rule. Foregoing benefits in order to avoid a particular risk can itself introduce other risks.”<sup>117</sup>

#### **3.9 b Review of HCN criticism**

HCN is of the opinion that the ‘maximin’ rule and Jonas’ decision rule are only suitable for “situations where there is little to be gained and a great deal to be lost.”<sup>118</sup> The question is

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<sup>111</sup> <https://www.healthcouncil.nl/documents/advisory-reports/2008/09/26/prudent-precaution>

<sup>112</sup> *Idem*, p. 15

<sup>113</sup> *Idem*, p. 15

<sup>114</sup> *Idem*, p. 15

<sup>115</sup> *Idem*, p. 15

<sup>116</sup> *Idem*, p. 15

<sup>117</sup> <https://www.healthcouncil.nl/documents/advisory-reports/2008/09/26/prudent-precaution> p. 15

<sup>118</sup> *Idem*, p. 15

whether Jonas' responsibility principle was indeed developed to only address situations with the fairly uncomplicated features of small gains and great losses. This assumption seems to be contradicted by several examples that Jonas describes, in which the potential gains are considerable. He points to the emerging cell biology that seems to be capable of postponing physical death. Jonas, however, does not hesitate to pose the question how desirable this in fact is.<sup>119</sup> Genetic manipulation also promises a multitude of solutions to environmental and human problems. Again, Jonas challenges these promises by asking whether human beings are indeed capable of fulfilling this creative role. "Also the question with which moral right we experiment with future human beings should be posed here. These and similar questions have to be answered *before* we take the course of the unknown, and [they] show in a probing way how far our abilities have transgressed the concepts of all previous ethics."<sup>120</sup> From Jonas' examples we can infer the conclusion that his responsibility principle was not only designed for scenarios with small gains, therefore I do not find HCN's interpretation of the precautionary principle convincing.

### **3.9 c Van Dijk et al.**

In 2011 Van Dijk, a biologist and official secretary at HCN, and five co-authors referred to the *Prudent precaution* report and applied this to "the issue of potential health effects of electromagnetic fields (EMFs), which is characterised by considerable uncertainty."<sup>121</sup> The article addressed the "role of scientific advisory bodies in precaution-based risk governance"<sup>122</sup> and compared the advice of the HCN with that of the Belgian Superior Health Council (SHC) in dealing with EMF exposure. Both advisory bodies based their advices on the precautionary principle, but they nevertheless arrived at different recommendations.<sup>123</sup> The SHC proposed to lower EMF exposure limits to 3 V/m for public exposure from antennas "since most (90–95%) of the exposure levels in Belgium are below 3 V/m."<sup>124</sup> [...] SHC also suggested a number of risk management measures (Superior Health Council 2004) such as avoiding use of mobile phones while driving and in general in moving Faraday cages such as trains; restricting use of mobile phones by children and during pregnancy; using earphones

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<sup>119</sup> Jonas, *Het principe verantwoordelijkheid*, p. 49-51

<sup>120</sup> Idem, 53 (emphasis in original)

<sup>121</sup> Harrie F.G van Dijk, Erik van Rongen, Gilbert Eggermont, Erik Lebret, Wiebe E. Bijker and Daniëlle Timmermans, "The role of scientific advisory bodies in precaution-based risk governance illustrated with the issue of uncertain health effects of electromagnetic fields," in *Journal of Risk Research*, Vol. 14, No. 4, April 2011, p. 451.

<sup>122</sup> Van Dijk et al., The role of scientific advisory bodies in precaution-based risk governance, p. 451

<sup>123</sup> idem, p. 460.

<sup>124</sup> Idem, p. 459

and external antennas to reduce exposure and maintaining distance from medical implants and cautious use in hospitals. SHC, *concerned* by the development of advanced Wi-Fi technology, noticed that exposure continues to change by increasingly complex modulated signals.”<sup>125</sup>

On the other hand “the Dutch government had asked HCN whether there was reason to invoke the precautionary principle and to establish RF exposure limits below those based on thermal effects. HCN answered in the negative (Health Council of the Netherlands: Electromagnetic Fields Committee 2000). According to HCN, scientific evidence on biological, non-specific and carcinogenic effects was insufficient to support reduction of the exposure limits or to indicate how far they should be reduced.”<sup>126</sup> The only measures concerning a reduction of EMF exposure issued by HCN were;

- in 1997, advising to keep “a certain distance between mobile phones and medical implants and sensitive medical equipment to avoid interference.”<sup>127</sup>

- in 2003, advising to perform more studies on EMF and health effects.<sup>128</sup>

The article suggested that HCN’s interpretation of the precautionary principle was more focused on the prevention of false positives, i.e. avoiding something harmless. The SHC’s focus was on the prevention of false negatives, i.e. allowing something harmful. The consequences of the latter are evidently more severe.<sup>129</sup> The authors pointed out that putting the burden of proof of harm on either side (on society or on the manufacturer/proponent) can result in a deadlock. “In HCN’s view, the precautionary principle aims at breaking both deadlocks by pursuing a proper balance between dynamism and caution.”<sup>130</sup> The authors argued that advisory bodies should not advise concrete decisions, but should only provide information. Advising specific decisions could elicit the criticism of being biased.<sup>131</sup> “The central question, ‘How venturous or cautious do we want to be given the stakes involved?’, should be discussed in the political rather than the scientific arena. We encourage scientific advisory bodies to look for new ways to facilitate the interactions between the public, stakeholders, experts and political decision-makers. These interactions may bring parties

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<sup>125</sup> G.F.G. van Dijk et al, “The role of scientific advisory bodies in precaution-based risk governance”, p. 459 (emphasis added)

<sup>126</sup> idem, p. 458

<sup>127</sup> idem, p. 458

<sup>128</sup> idem, p. 458

<sup>129</sup> idem, p. 460

<sup>130</sup> idem, p. 453

<sup>131</sup> idem, p. 460

closer together, even in highly polarised debates such as that on the potential health effects of EMF exposure.”<sup>132</sup>

### **3.9 d Review of Van Dijk et al. criticism**

In this paragraph I will evaluate aforementioned article by means of Jonas’ responsibility principle. Considering the responsibility principle the first question arises: “What is the responsibility of advisory bodies?” The answer seems rather straightforward; “To give advice”. So, what is advice? Is it merely presenting several options with its potential benefits and harms and then *expecting* that this will result in good decisions? Is the gathering of information and listing all the scenarios not a preparation for the moment when actual advice is needed? If this is so, should not this advice entail a preferred choice, an advised decision? The responsibility principle never suggests that the principle may be used as a strategy of offering options and consequently expecting the best outcome. It is clearly formulated as a duty for politicians and I have not found clues in Jonas’ theory that justify that advisory bodies, whose task it is to advise politicians, can be exempted from this duty.

The HCN expects good decisions to result in the application of modern technologies while monitoring potential harmful effects. This monitoring would include observing early warnings and it would enable timely corrections. This expectation seems to pass over Jonas’ heuristics of fear and its grounds for it, namely the artificial high speed of technological changes compared to nature, and the dynamism that change the initiator of the technology into a servant with increasingly limited means to correct unintended harmful effects. With this in mind, the expectation that monitoring would enable timely corrections seems overly optimistic.

According to Jonas, bearing responsibility in an ethically justified way, prescribes the duty to use the moral compass of the heuristics of fear. The HCN’s view that the precautionary principle aims at arriving at a “proper balance between dynamism and caution”<sup>133</sup> is not in accordance with the responsibility principle because the moral compass was insufficiently observed. HCN’s advice to study health effects was indeed in accordance with the preliminary duty to acquire an impression of long-term consequences. However, contrary to SHC (see page 39), HCN did not express appropriate feelings of concern, or any feelings at all for that

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<sup>132</sup> G.F.G. van Dijk et al, “The role of scientific advisory bodies in precaution-based risk governance”, p. 461

<sup>133</sup> *idem*, p. 460



matter, nor the willingness to be influenced by the consequences for future generations.<sup>134</sup> Neither did HCN put more weight to potential negative consequences than to potential positive consequences.<sup>135</sup> Since two out of three duties of the moral compass are missing from HCN's considerations, and because of their focus on avoiding false positives instead of avoiding false negatives, I find their interpretation of the aim of the precautionary principle implausible.

Another objection that is mentioned by Van Dijk et al. is: "Sacrificing benefits to avoid a particular risk can introduce other risks."<sup>136</sup> This well-known argument is also used by both HCN and Sunstein. At first glance this seems like a valid, logical argument. However, on further consideration, if the absence of a new risk is a precondition for acceptability, what will meet the requirement of being riskless? Not even a vital substance as clear water is without risks, because under specific circumstances one can be poisoned by water. Perfect safety is an illusion in an imperfect world, as ours is. In that regard, the fact that not pursuing potential gains may create new risks, does not seem to be a valid argument to reject the precautionary principle, since this consequence is rather inevitable.

Finally, I would also like to point at an inconsistency between the, by the authors proposed, refraining from the provision of unequivocal advice, and the advice of the *GSM-base stations* report, published by HCN in 2000. In this report the need to apply the precautionary principle was denied. So, when the HCN was asked the crucial and political question whether or not to apply the precautionary principle regarding EMF exposure limits, the HCN did not offer different options to choose from, but chose an inherently political standpoint and did *not refrain* from giving unequivocal advice by stating that the application of the precautionary principle was not necessary.

### **3.10 EMF policy and the precautionary principle**

*The precautionary principle is a moral and political principle that can be deployed in case of scientific uncertainty. This principle originates from European Environmental Law and is also applicable in the Netherlands. It has to be applied when there are strong indications that an intervention, for instance the placement of an antenna mast, has serious effects on the environment or our health. As long as exposure limits are not exceeded, there are no*

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<sup>134</sup> Jonas, *Het principe verantwoordelijkheid*, p. 63

<sup>135</sup> *Idem*, p. 66

<sup>136</sup> G.F.G. van Dijk et al, "The role of scientific advisory bodies in precaution-based risk governance", p. 452

*indications that electromagnetic fields of antenna masts have effects on your health. That is why the precautionary principle is not applied to the placement of antenna masts.*

(Citation from the Antenna Agency.)<sup>137</sup>

As we see in this citation, the government does not apply the precautionary principle to the placement of antenna masts, because of the use of exposure limits. This statement is based on HCN's report *GSM-base stations* that was published in 2000.<sup>138</sup> In line with this statement all EMF policy is justified by the government by arguing that the government merely follows HCN's advice. In this paragraph I will examine this statement. As also mentioned by Van Dijk et al. the *GSM-base stations* report in 2000 advised to apply the ICNIRP exposure limits and claimed there was no need to apply the precautionary principle below these limits, because of the absence of plausible health effects from EMF exposure. The Council of the European Union stated: "...since there is a safety factor of about 50 between the threshold values for acute effects and the basis restrictions, this recommendation implicitly covers possible long-term effects in the whole frequency range."<sup>139</sup> In the same vein Van Rongen, as chair of the ICNIRP, explained in a recent hearing in the city of The Hague that the precautionary principle was applied to the current exposure limits, because of the use of the safety factor.<sup>140</sup> However, in the *GSM-base stations* report, HCN did not entirely endorse these claims and pointed to the distinction between thermal and non-thermal effects. In other words, the exposure limits may have a safety factor that expresses a cautious approach, all other potential health effects that lack the characteristic of heating, such as cancer, are neither addressed by the exposure limits nor by an application of the precautionary principle. However, according to HCN, given the absence of plausible health effects below the exposure limits, HCN considered the applications of the precautionary principle not necessary.<sup>141</sup> This advice is followed until now.

The *Prudent precaution* report in 2008, although promoting a weak version of the precautionary principle, also stated that a risk should be considered plausible if *some*

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<sup>137</sup> <https://www.antennebureau.nl/straling-en-gezondheid/het-voorzorgsprincipe>

<sup>138</sup> <https://www.healthcouncil.nl/documents/advisory-reports/2000/06/29/gsm-base-stations>

<sup>139</sup> *Idem*, p. 27

<sup>140</sup> [https://c.connectedviews.com/05/SitePlayer/Den\\_Haag?session=19318](https://c.connectedviews.com/05/SitePlayer/Den_Haag?session=19318)

<sup>141</sup> <https://www.healthcouncil.nl/documents/advisory-reports/2000/06/29/gsm-base-stations> p. 8

recognised experts expressed their concerns.<sup>142</sup> By 2008 the amount of some recognised experts that found health effects below the exposure limits was amply exceeded.<sup>143</sup>

This advice should have been sufficient to reconsider EMF policy, since the existence of a plausible risk would prescribe the application of the precautionary principle according to European law. However, EMF policy remained unchanged. This fact contradicts the government's statement of merely following HCN's advices. Instead, it shows that the advice that effectively paved the way for an hardly limited dynamism in the use of EMF was followed and the advice to apply the precautionary principle when some recognised experts expressed concerns, which could have tempered this dynamism, was not followed.

Since this thesis is aimed at examining whether EMF policy is ethically justified I argue that the government until 2008 could indeed ethically justify EMF policy by referring to the *GSM-base stations* report in 2000. However, since the *Prudent precaution* report in 2008 and its advised assessment of a plausible risk, and given the fact the amount of recognised experts at that time was amply exceeded, the government could no longer ethically justify disregarding the application of the precautionary principle in EMF policy.

### 3.11 Summary

The responsibility principle is a categorical imperative that is designed for public policy. It consists of the non-negotiable duty; *To bear responsibility for the continuation of the current and future existence of humanity*. The moral compass for the application of this duty is the heuristics of fear. This heuristics entails two preliminary duties; 1) *Acquiring an impression of long-term consequences*, and 2) *Evoking the appropriate feeling from this image*. The final duty of the heuristics of fear is; *Attribute more weight to potential negative consequences of modern technology than to its potential positive consequences*.

The simplification of the responsibility principle into the precautionary principle has increased its susceptibility to criticism. Sunstein argues that it can be considered a paralyzing principle when both potential gains and potential harms are involved. The reluctance to allow human intervention in natural processes, seems more likely to be based on conscious or intuitive knowledge of the characteristics of modern technology, than on a false belief of the benevolence of nature. Both proponents and opponents of the precautionary principle seem to use system neglect, which means that in their argumentation they neglect other risks in the

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<sup>142</sup> <https://www.healthcouncil.nl/documents/advisory-reports/2008/09/26/prudent-precaution> p. 17

<sup>143</sup> <https://www.stopumts.nl/doc.php/Onderzoeken/>

same system. Whether the use of a rational system of risk assessment will be exempted from cognitive limitations remains to be seen. The danger of interest-group manipulation seems only relevant for lobbyists. The vulnerability of patients seems to justify their participation in the decision-making process. Accurate risk assessment could benefit from taking funding sources into account.

HCN judged Jonas' decision rule not suitable as an universally applicable principle, because it would only be useful in situations where there is little to be gained and a great deal to be lost. This assumption seems to be contradicted by the examples Jonas gives, which involve situations that have considerable potential gains.

Van Dijk et al. argue that advisory bodies should not advise concrete decisions, but should only provide information. This seems to contradict the very task of advisory bodies, namely providing advice. The option to monitor new technologies seems to pass over Jonas' analyses that shows the artificial high speed of technological changes compared to nature, and the dynamism that change the initiator of the technology into a servant with increasingly limited means to correct unintended harmful effects. Van Dijk et al. and HCN consider the aim of the precautionary principle; arriving at a proper balance between dynamism and caution. This excludes two out of three duties of Jonas' moral compass. Van Dijk et al. state that sacrificing benefits to avoid a particular risk can introduce other risks. However, the precondition of being riskless, in applying the precautionary principle, seems not a valid argument since creating new risks is rather inevitable. The *GSM-base stations* report by HCN provided unequivocal advice which contradicts the advice in the article by Van Dijk et al.

From 2000 until 2008 the government could ethically justify EMF policy by referring to the *GSM-base stations* report. Since the *Prudent precaution* report in 2008 and its advised assessment of a plausible risk, and given the fact the amount of recognised experts at that time was amply exceeded, the government could no longer ethically justify disregarding the application of the precautionary principle in EMF policy.

## Chapter 4 Conclusion and recommendations

### **4.1 Introduction**

The research question of this thesis was: **Is Dutch policy regarding the use of EMF ethically justified?** In order to answer this question I formulated two subquestions. In chapter 2 I answered the subquestion: **What is the ALARA principle and how should it be applied in EMF policy?** I concluded that the government did not apply the ALARA principle to EMF policy and the telecom providers did not apply the ALARA principle according to the modern system of radiation protection. In chapter 3 I answered the subquestion: **What does the precautionary principle entail according to Hans Jonas and what does this mean for EMF policy?** I concluded that the interpretation of the precautionary principle by the government and HCN is not plausible, in comparison with the responsibility principle that Jonas developed. I also concluded that since the *Prudent precaution* report in 2008 and its advised assessment of a plausible risk, and given the fact the amount of recognised experts at that time was amply exceeded, the government could no longer ethically justify disregarding the application of the precautionary principle in EMF policy.

### **4.2 Conclusion**

Since both aforementioned ethical principles, that could have ethically justified EMF policy, are not (sufficiently) applied by the government, I cannot conclude anything else than that Dutch EMF policy is not ethically justified.

### **4.3 Recommendations**

This thesis inevitably leaves many questions unanswered. Yet, in light of my aim for this thesis to shift the focus of the debate to the question of how to safeguard ethical values in the face of risks, due to EMF exposure, I would like to suggest some recommendations to the government;

- Adopt the ALARA principle, which includes considering alternative exposure limits. In order to successfully implement the ALARA process, consider consulting the NVS, which seems a neutral organisation with substantial expertise in the application of the modern system of radiation protection.
- Acknowledge that the precautionary principle is indeed applicable to the placement of antenna masts and to the use of EMF in general.

- Untwine interests of providers and governmental agencies, and move all public health related issues concerning EMF exposure to the single appropriate Ministry, namely the Ministry Health, Welfare & Sports.

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