

# Information Society and Global Warming

## The Dark Side of Virtuality

Anne-Marie KASSESSA, PhD student at the University of Kinshasa  
Faculty of Letters and Human Sciences  
Department of Information and Communication Sciences  
Kinshasa, DRC

**Abstract:-** The landscape of the 21st century has completely changed since it has been flooded in almost all areas of life and society by the surge of "New Information and Communication Technologies".<sup>1</sup>(NTIC, in acronym) constituting the information society.

To date, it has become common to get information online via online media, social networks and this, using this powerful tool that is the Internet which has profoundly changed our habits. Virtuality has become ubiquitous.

We tended to think, at its beginnings, that the information society presented no flaws, no negative effects. But the more time passes, the more it is proven that this company has an effect unknown, most of the time, to the general public. A pernicious side in several areas including among others that of the environment. Indeed, with the advent of NICTs, the information society, given the virtuality allowed by the Internet, had acquired the reputation of presenting a "zero" impact from an environmental point of view. However, some research tends to show the opposite.

The information society helps to generate, through many of its services, carbon dioxide (CO<sub>2</sub>) of human origin, which is causing the worsening of the phenomenon linked to global warming of the planet. It is this aspect of things that is analyzed in this article. Thus, in view of the dangerousness of global warming, responsible for a good number of harmful effects such as floods, the melting of polar glaciers, it is proposed to adopt responsible ethical behavior so that users of NTIC no longer contribute, consequently, to the aggravation of this phenomenon.

**Keywords:-** Carbon Dioxide, Information Society, Internet, Global Warming, NTIC, Virtuality.

### I. INTRODUCTION

The current society called information society is flooded by the advent of New Information and Communication Technologies. It has come to change, in a profound way, our habits of the past. Life now is made easier

by all these tools that save time, energy and money. This company, in its infancy, received nothing but praise. To speak only of the environmental field, it was thought that NICTs had no negative impact on ecology. But some scientific research tends to show the opposite.

The information society contributes, through the production of carbon dioxide of human origin, to the aggravation of the phenomenon of global warming, the consequences of which are unfortunate and are likely to compromise the future of humanity. Hence the need for this research, which will demonstrate that the information society has a negative impact on the environment, but also suggest actions to take so that consumers, by adopting responsible behavior, can reduce their production of carbon dioxide.

The information society that has upset the world in a profound, drastic and unavoidable way is specific to today's society. With it, the notions of time, space, and the impossible have been emptied of their substance. In our world, anything goes. Never, at any other time, has access to world information, and this, in a few seconds, been so much facilitated. Although providing humanity with essential services to date and having facilitated the existence of humans, in terms of saving energy, time and money, the information society unfortunately presents a pernicious side which is revealed by scientific studies that are conducted.

This research demonstrates that the zero impact of NICTs on the environment is not always verified. On the contrary, In order to carry out our research, we wondered about the analysis of the ecological impacts generated by the information society, notably through NICTs and more particularly by the Internet, as well as to highlight the different types of indicators capable of measuring them. While taking care to identify the consequences that these impacts could induce on the environment if the current destructive trend were not curbed. And all this in order to achieve a reasonable use of NICTs by adopting responsible ethical behavior when using these technologies.

Faced with this questioning, three hypotheses guided our thinking.

<sup>1</sup>"Innovations in Smart Cities Applications Edition 2", Springer Nature, 2019.

The ecological impacts of NICTs take different forms which can range from pollution to desertification. The indicator able to measure it is the quantity of CO<sub>2</sub> produced for global warming. The impacts of these NICTs are so harmful that they can compromise the future of humanity. It is possible to limit this kind of risk by implementing an ethical approach.

In the staggering of our thinking, we have opted to exploit, "with regard to the theoretical framework"<sup>2</sup>, the theory of appropriation which explains how users appropriate new technologies on a daily basis by making uses of them which, sometimes, even move away from those prescribed to them by their designers and this, by techniques of poaching. Ways of doing things that end up having a negative impact on the environment.

## II. METHODS

In order to carry out this study, we used the comprehensive and systemic method.

As for the comprehensive method, this is a scientific approach allowing the understanding of a social fact. It can be understood as a three-step process: understanding, interpretation and explanation of the social fact. The social fact is external to the individual, it has a power of coercion, that is to say of constraint, and is explained by other social facts. The social fact, here, is constituted by the ways of doing which result from the society of information specific to the current time and which imposes to make use of NTIC. Having recourse to new technologies is to this day inevitable given that they have penetrated all sectors of life to such an extent that not using them leads to becoming out of phase, to being placed out of circuit. Gold, using NICTs without knowing the environmental consequences jeopardizes the future of the planet and of humanity as a whole. It will therefore be a question of explaining what is involved in the information society, the environmental consequences attached to the exploitation of the NICTs attached to it.

With regard to the exploitation of the "systemic method", the Information Society has been examined in the form of a complex system which happens to be immersed in a large encompassing whole which is the environment in which it derives its means of subsistence which allow the manufacture of the elements on which it relies in order to be able to function, which are, for example, the Internet. The Information system also draws from this same environment the information that it conveys and this, through various elements that the planet Earth conceals such as the hertzian waves. But after consuming this different information and using NTIC products, it ends up dumping again in this same environment the waste produced in the form of carbon dioxide which will contribute to the phenomenon of global warming. Therefore, the movements between the Information System and the environment in which it is

included, are carried out in two directions, from the Information Society towards the environment and from the environment towards the Society of the Information.

## III. THE INFORMATION SOCIETY

### A. Analysis of the concept "information society"

The Information Society, which has come to upset our habits in the past in a very profound way, is to be placed in the extension of the Electronic Society following the way in which human societies have succeeded one another according to the media in vogue, specific to each era, which has conditioned and impacted them. We refer, in this perspective, to the technological determinism of the Canadian researcher Mac Luhan. Thus there was the society of orality, then the society of writing, then the society of printing and finally the electronic society.

The flagship medium of the information society is the Internet. This new technology brings about profound changes in the way of producing, working and consuming. It determines the present world in which we are currently evolving. A world where the notions of time and space have almost disappeared.

The information society, according to Jean-Pierre Pinet<sup>3</sup>, a society where everyone, without distinction, has the means, thanks to new information and communication technologies, "to create, receive, share, and freely use information and knowledge for their development. economic, social, cultural and political. The information society »<sup>4</sup>designates a state of society in which information technology and Ia communication not play a fundamental role. It is the society where the Internet is the flagship media with an excessive production and circulation of information on a planetary scale. With the information society came new concepts such as globalization, globalisation, cyber space, internet users, cyber world.

The information society is also a society dominated by virtuality, the immaterial, where knowledge and flexibility will be determining elements, which will lead to fundamental changes. It is the society of multimedia networks, digitization, digitization, communicating computing. In the information society, new types of work have appeared: teleworking; video conferencing, chat, digital libraries, online universities, e-learning, digital content, fake news. In this information society, the consumer is no longer passive but also becomes a producer and disseminator of information, and this process can be done ad infinitum.

In addition, with this information society, the meaning of words completely escapes those we know them, such as the case of the mouse with the computer or navigation with the Internet. People who have not been introduced to this code may not understand it.

<sup>2</sup> <https://tile.loc.gov/>

<sup>3</sup>JP. PINET, "The challenges of globalization" in Revue Quart Monde, "Internet: at whose service? », n°187, 2003,

available at the URL address: <https://acikbilim.yok.gov.tr/>, consulted online on 06/18/2022.

<sup>4</sup>Submitted to University of the West Indies.

## B. Characteristics of the Information Society

### ➤ Virtuality

“The term virtual from the Latin *virtualis* was born in the Middle Ages as a translation of the Aristotelian word *dunaton*. The virtual has nothing to do with the fictitious or the imaginary, it does not lack reality. Because it is equivalent to a principle of concrete movement, it is in no way a representation (the virtual house is not the image of a house, but the house which has a principle of movement which drives production of something, namely: a house in action.). The virtual concept insists on the reality of what is virtual. The virtual is real since it has the capacity to determine actuality. The fact that the virtual can be more perfect than the actual that derives from it demonstrates that one cannot allow the virtual to be less real than the actual. The virtual is a part of the real which is, so to speak, behind the actual and the structure. »<sup>5</sup>

“Virtualization is not an extension but a partial detachment from the individual bodies of the here and now and from clearly circumscribed space-times: it is the outside that abolishes the stable places of reference. »<sup>6</sup>

In the deterritorialized space of computer networks, the virtual makes it possible to designate the progressive exteriorization of the psychic and physical life of human beings. The duplication between the sound body and the tangible body, the gift of ubiquity provided by the media, are increased tenfold by virtual reality systems which, by transmitting quasi-presences, produce remotely controllable virtual puppets which make the body personal the temporary actualization of a hybrid hyper body, social and technological.<sup>7</sup>

### ➤ Appearance of a new man: the bionic man

With the information society, a new type of man has just appeared, it is the man who could be described as “bionic”. “Thanks to advances in robotics, bioengineering and medicine, the bionic human is already a reality. It is possible to repair the body with implants, prostheses, or even artificial organs.<sup>8</sup>

“Augmented men are stronger thanks to exoskeletons, smarter thanks to neurostimulation. Alive longer thanks to neuroscience, nanotechnology and DNA”.

It is now possible to implant a revolutionary system that makes it possible to hear again. A second chance to regain hearing is permitted. This is the case of Guillaume Rovere<sup>9</sup> who was able to benefit from technological prowess,

thereby demonstrating that modern techniques could offer a second birth and allow a reconnection with the world of listening. And this, thanks to an electronic and digital box, the power of hearing reappeared in him. And in this sense, many digital devices have come to replace certain deficiencies of the human body. Such as the pacemaker.

### ➤ Virtual community

When we evoke the term “community”, we think of a social group whose members live together or have common property or interests. And here, we are talking about a virtual community. The virtual refers, in this case, to what happens in a computer or on the Internet that is to say in a digital world as opposed to the physical world. To grasp the meaning of what is meant by the word “virtual”, we often speak of “virtual image”. The notion of virtual image appeared in geometric optics at the end of the 17th century to translate the fictitious or imaginary character of the image produced by reflection in a mirror, as opposed to real images produced by refraction. A virtual image makes an object sparkle where it is not,<sup>10</sup>

The Internet abolishes, thanks to its technological prowess allowed in this virtual community, the notions of geographical and temporal distances and suddenly, favors the emergence of a new type of community called virtual community (digital community, electronic community, community in online, cyber community, etc.) experienced through the Internet, particularly social networks or media. This virtual community designates the set of people who, sharing a common interest or the same values, meet and exchange through synchronous communication.

The virtual community is indeed real because the members of this community do, in this universe, everything that they do in real life in the real world: exchanging jokes, debating, doing business, exchanging information, supporting each other morally, making plans together, falling in love, making friends, losing them, arguing, reconciling, playing, “there's just the physical body that you leave behind. »<sup>11</sup>

In this community, the interlocutors are no longer confined to the unique roles of transmitter or receiver but on the contrary, they can be one like the other, the receiver occupying a dominating place. “Receivers become powerful transmitters, capable of conveying the message received to a large number of other receiver-transmitters thanks to the fantastic sounding board that the Internet constitutes. »<sup>12</sup>

<sup>5</sup>The virtuality of Internet-Sens public, available at the URL address: <https://sens-public.org/articles>, consulted online on 08/10/2022.

<sup>6</sup>L. KAUFMANN, “What is the virtual? (Pierre Levy) review” in *Networks-CommunicationTechnology-Society*, n°76, 1996, p.172.

<sup>7</sup>P. LEVY, *What is the virtual?*, Paris, ed. The Discovery, 1993, p.31.

<sup>8</sup>Transhumanism"-White Paper-Engineering Techniques, available at URL:

<https://www.techniquesengineer.fr/>, consulted online on 06/15/2022.

<sup>9</sup>“The meaning of evils” by @GuillaumeRovere a man..., available at URL: <https://albanjarry.com/>, consulted online on 08/10/2022.

<sup>10</sup>M. PARMENTIER, *Virtuality and theory of perception in Bergson*, Charles-de-Gaulle University, 17/2017.

<sup>11</sup> <https://seaopenresearch.eu/>

<sup>12</sup>D.BOURSIN and L.PUYFAUCHER, *The human media. Dangers and opportunities of social networks for the company*, Paris, Eyrolles, 2001, p.7.

Thus, the receivers who are in this case the Internet users are no longer simple consumers, they become consumers and consumers in the sense that they produce, publish, index, share, criticize web content.

➤ *Collapse of traditional values*

Most of the traditional values, in the information society, are being shaken up: we are witnessing in particular the emergence of another type of so-called digital identity, the displacement of the notion of identity in the traditional sense as well as shrinking boundaries between public and private. By digital identity, we mean the identity of a person (natural or legal) made up of all the traces left by the Internet, by the person himself and by third parties, in short digital traces or identifiers. These include "profile traces corresponding to what I say about myself (who am I?), navigational traces (which provide information on the sites I visit and on which I comment or buy; how I lastly, includes writable and declarative traces; what I publish on my blog for example-which directly reflect my ideas and my opinions (what I think). »<sup>13</sup>But it should all the same be noted that if we are not careful and do not implement safeguards, this logic of identity involves risks for and on our sociabilities both in the physical world and in the social world. digital.

These risks for individuals may include:

- profiling, i.e. the ability to be searched using geolocation tools that allow behavioral tracking and targeting, in particular by commercial companies (personalized and contextual marketing), institutions or States;
- Control and filing, favored by the interconnection of state or commercial files.

➤ *Breaking down the boundaries between public and private*

In the information society, privacy is nonsense.

Here are four constituent parameters of social networks quoted by Danah Boyd<sup>14</sup> that promote confusion between public and private space:

- The persistence of data or information: published information is likely to persist over time.
- Profiling which is the ability to be sought.
- Reproducibility: published information can be copied and replaced in a totally different universe of discourse and therefore be misunderstood or interpreted.
- Invisible audiences: these are audiences or recipients

Who are absent when the messages are formulated?

Moreover, the porosity between the public and the private in the new space built through social networks is reflected in particular by the publication of intimacy; the trivialization of the notion of modesty, in the sense that one can easily reveal oneself on the Internet (exposure of nudity, virtual sexuality, pornography).

13 O.ERTZSCHEID, *What is digital identity? Digital identity and e-reputation*, Marseille, Open Editions Press, 2013.

➤ *Increased performance and skills*

In the information society, informational activities take precedence over the other activities of society, in particular the activities of the secondary and tertiary sectors. This primacy is justified in the sense that informational activities, based on information and communication technologies, imply performances both at the level of individuals and companies or institutions that impact their activities.

These performances are reflected in particular in terms of accessibility to more information and knowledge, coupled with the reduction of cost and time, flexibility in the execution of tasks, the individual being able to carry out a whole series of tasks instead of handing over to someone else.

It is in this sense that we speak of work 2.0. , best of business 2.0., to designate a company which, with the aim of achieving sustainable economic performance, based on human capital, uses, in the performance of its tasks, emerging social platforms within societies, as well as other applications offered by information and communication technologies.

The majority of companies that have made a fortune have integrated social media into their respective managements.

➤ *Miscommunication*

The information overload in the information society fostered by the Internet and its various applications carries the risk of leading to incommunication. The omnipresence of information makes communication even more difficult, more uncertain to such an extent that incommunication most often presents itself as the horizon of communication.

"Everyone is looking for communication, relationship, understanding, on an individual scale, as a couple, as a couple, as a family, in society, and today in globalization. And most often, stumbles on incommunication. The other is not there, does not answer, does not listen, opposes or flees."<sup>15</sup>

These limits of communication are reflected in particular by behaviors of invasion (invasive or plethoric communication), abuse (abusive communication), and perversion (perverted communication):

- Communication becomes invasive or plethoric when the quantity of messages produced by the mass media or means of social communication exceeds, helping the speed of information, the capacity of reception and integration, in a word of reappropriation of consumers;
- Abusive communication consists of messages that appear inappropriate to the recipients (nuisance) thus making it difficult to balance individual aspirations and social mechanisms. In this sense, unlike bloated

14O.ERTZSCHEID, *What is digital identity? Digital identity and e-reputation*, Marseille, Open Editions Press, 2013.

<sup>15</sup>D.WOLTON, *We must save communication*, Paris, Flammarion, 2005, p.139.

communication, whose abuse is based on excessive quantity, abuse in abusive communication manifests itself in particular through advertising and other messages through the rape of personal or domestic space. Abusive communication also results in the disruption of lived time, the intensity (violence or aggression) of the messages favored by the iconic and phonic impact linked to new information technologies;

- The perversion of communication, translated within the framework of the political game (propaganda) and the advertising action, consists, it, in the deformed expression of a truth; of a partial and therefore partial knowledge, instead of an exhaustive knowledge, etc. However, about the exhaustiveness of knowledge, it is appropriate to recognize it, it is difficult to reach and to reproduce an exhaustive knowledge, given the finitude of the man, nevertheless the exhaustive knowledge must remain an ideal in the communication activity.

All in all, regardless of the form of incommunication (invasive communication, abusive communication, perverse communication) in which it appears, information overload in fact generates misinformation, that is to say "the non-conformity of the information accessible to the needs and legitimate expectations of each. This structural discrepancy relates to quantitative as well as qualitative aspects, of form as well as substance. »<sup>16</sup>

#### C. Actors in the information society

There are generally three categories of actors in cyberspace<sup>17</sup>:

##### ➤ Individual Actors

Internet user, consumer, worker, opinionist, citizen, fraudster, hawker watcher, identified.

##### ➤ Collective Actors

Companies, including those of information technology, media, political parties, ideological groups, churches, unions, schools, associations, mafias, criminal groups, pirates, terrorists, activists, groups of circumstance.

##### ➤ State Actors

Governments, administrations, local authorities, police, army, services, international organizations.

## IV. GLOBAL WARMING

### A. Concept of global warming

What is global warming? It is possible to give several answers to this question that complement each other. At first glance, it is interesting to note that in the term "global

warming", we discern a word which plays a central role in this phenomenon, it is "climate".

In the narrow sense of the term, "climate designates, in general, the average weather or more precisely, refers to a statistical description based on the averages and the variability of relevant quantities over periods varying from a few months to thousands, even to millions of years (the typical period, defined by the World Meteorological Organization, is 30 years). These quantities are most often surface variables such as temperature, precipitation depth and wind. In a broad sense, climate refers to the state of the climate system, including its statistical description."<sup>18</sup> Global warming can be understood as climate warming.

Global warming is often associated with that of "global change" and "climate change". Global change covers all modifications of natural or anthropogenic origin<sup>19</sup> likely to alter the Earth's ability to support life. "Climate change refers to all the climatic variations in a given place, over time; heating in cooling »<sup>20</sup>. Some forms of air pollution, resulting from human activities, threaten to significantly alter the climate in the direction of global warming. These are "changes that are attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that are in addition to natural climate variability observed over comparable time periods."<sup>21</sup>

If contradictory opinions still arise, the scientific community globally recognizes the existence of climate change. Indeed, "the fifth report of the IPCC (Intergovernmental Panel on Climate Change) states that it is certain that temperatures have increased during the twentieth century. On a global scale, the average increase in temperature is 0.85°C (0.65; 1.06) over the period 1880-2012. It is very likely that this warming has reversed a natural trend towards a cooling of the climate initiated 5000 years ago for the medium and high altitudes of the northern hemisphere."<sup>22</sup>

This climate change persists for a long time, usually for decades or more. It therefore concerns both climate changes due to natural variability and those linked to human activity. So, in a simple way, relying on all that has just been said, we can reach the following conclusion: global warming results in an increase in temperature on the surface of the globe, which has the consequence the intensification of natural disasters and their magnitude (floods, cyclones, droughts, etc.). "Human activities, and in particular greenhouse gas emissions, the most harmful of which turns out to be carbon dioxide, are one of the primary causes of current climate change"<sup>23</sup>.

<sup>16</sup>F. HEINDERYCKX, *Misinformation. Plea for a refoundation of information*, Brussels, Editions Labor, 2003, p.18, 23.

<sup>17</sup>O. KEMPF, *Introduction to cyber strategy*, Paris, Paperback, 2012.

<sup>18</sup><https://uwe-repository.worktribe.com/>

<sup>19</sup>Anthropogenic origin: made by a human being; due to the existence and presence of humans.

<sup>20</sup>Submitted to Universidad Carlos III de Madrid.

<sup>21</sup><https://www.emerald.com/>

<sup>22</sup><https://uwe-repository.worktribe.com/>

<sup>23</sup>Sikha Karki, Paul Burton, Brendan Mackey. "The experiences and perceptions of farmers about the impacts of climate change and variability on crop production: a review", Climate and Development, 2019.

This global warming causes "an average rise in the temperature of the Earth's atmosphere"<sup>24</sup> which is then transmitted in various environments as well as to the seas and oceans. The air we currently breathe is always much warmer to bear and to exhale, we are also witnessing meteorological disturbances such as the disruption of rainfall. In Kinshasa, for example, one can easily observe that the rainy period is disturbed because going beyond the time it has always recognized, it happens that in the middle of June it starts to rain while at this period- there of the year it is normally the dry season which reigns or even that instead of it being cold, it continues to be very hot.

The situation is truly dramatic because "under the influence of human activities, warming has recently reached a speed not equaled for more than a millennium...without mitigation measures, changes related to temperature, precipitation and vegetation will be faster and faster. Thus, the rate of warming will have doubled by the end of the century. However, if the measures taken are sufficient to limit the warming to 2°C, the speed and the perception of the changes will become negligible."<sup>25</sup>

#### A. Indicators of global warming

##### ➤ Definition of global warming indicators

According to the National Observatory on the Risks of Global Warming (ONERC), "an indicator is information associated with a phenomenon making it possible to indicate its evolution over time in an objective manner and being able to account for the reasons for this evolution. These are concrete data or facts that make it possible to ascertain the existence of a phenomenon."<sup>26</sup>

Indicators are measurements or readings that provide information about the state of something more complex. They can be tracked over time to monitor and detect significant changes. Climate change indicators help to determine how the global climate is changing or not changing. By examining historical records related to climate, water and population, one can assess the extent to which it may be necessary to readjust decisions, activities and ways of thinking in order to adapt to a changing climate.

##### ➤ Main indicators of global warming<sup>27</sup>

The main indicators of global warming are:

- rising temperatures
- rising water
- the increase in the concentration of greenhouse gases
- the retreat of glaciers and sea ice

- Drought
- Flooding
- the spread of algae
- hurricanes
- forest fires
- the gradual extinction of biodiversity
- the resurgence of landslides
- intensification of bad weather □ extreme rains
- decrease in snow cover
- accelerated coastal degradation and erosion

##### ➤ Impacts of global warming

If in recent times the problem of global warming has been attracting so much attention, it is because its repercussions are so serious for the future of the planet that we could not ignore them.

"The consequences of climate change are increasingly unavoidable and are attracting the attention of public authorities around the world. Already, we can see that few aspects of social and economic life will remain unaffected: in all likelihood, climate change will have repercussions on development, the protection of human rights and security".<sup>28</sup>

It is appropriate to worry about climate change because "warming temperatures or any change in climatic parameters can only cause impacts on the environment"<sup>29</sup> "and socio-economic activity. Indeed, sectors such as agriculture, forestry, ecosystems, infrastructure, fisheries, water management, tourism, economic activity, energy production and demand are all adjusted to historical climatic parameters. Whether we think of the design of a dam or a sewer network; to agriculture which manages crops of fruits, vegetables or cereals; fish and birds so sensitive to fluctuations in the level of Lake St Pierre; to the insurance companies that reimburse us during climatic anomalies; to Hydro-Québec, which manages the water in the basins where this resource is synonymous with income; to hospitals that observe an increase in attendance during episodes of smog and oppressive heat; organizers of activities and festivals whose climate will influence their success; airstrips and other infrastructure in the far north which are built on theoretically permanently frozen ground."<sup>30</sup>

<sup>24</sup>Louis Nyahunda, Happy Mathew Tirivangasi. "Chapter 282-1 Interdisciplinary Approach to Climate Change: Intersecting Environmental Social Work and Sociology in Climate Change Interventions from an Afrocentric Perspective", Springer Science and Business Media LLC, 2021.

<sup>25</sup>Y. CHAVAILLAZ, *The speed of climate change and its implications for the perception of future generations*, doctoral thesis in Environmental Sciences, University of Paris-Saclay, 2016, p.15.

<sup>26</sup>The 15 indicators of climate change! Available at the URL address: <https://www.planete-durable.com/les-15-indicateurs-du...>, consulted online on 04/17/2022.

<sup>27</sup>The 15 indicators of climate change! Available at the URL address: <https://www.planete-durable.com/les-15-indicateurs-du...>, consulted online on 04/17/2022.

<sup>28</sup>IOM, Intersessional Workshop on the theme: Climate change, environmental degradation and migration, 29-30/03/2011, p.1.

<sup>29</sup>Submitted to International School of Gabon Green Ribbon.

<sup>30</sup>Submitted to Greenwich School of Management.

"With an increase in the number of days with very hot temperatures, the frequency of heat waves and smog episodes should increase."<sup>31</sup>

And "juxtaposed with increasingly easy and frequent intercontinental transport, global warming could increase the risk of transmission of infectious diseases (malaria, dengue, yellow fever) by enlarging the territory favorable to the survival of disease-carrying organisms, increasing the thus increasing the burden on our health care system."<sup>32</sup>

The impacts of global warming on the environment are complex, serious and increasingly daily. The IPCC informs us that "over the past century, an average warming of the temperature at the earth's surface of 0.74°C has been observed, whereas the average temperature was predicted to increase by only 0.6°C. Forecasts for 2100 are even more alarming, with an expected increase in average temperature of 2 to 4.5°C"<sup>33</sup>.

The consequences of global warming are more formidable than each other. We cite the case of ocean acidification. The ocean fixes huge amounts of carbon. As it fills with carbon dioxide, seawater becomes acidic. "Many plants and animals build their shells (oysters) or their skeletons (corals) with calcium carbonate. This mineral is particularly sensitive to an acidic environment. Too much acidification of marine waters could cause the disappearance of these species and all those attached to them."<sup>34</sup>

The rise of sea water can lead to submersion or frequent flooding of low-lying coastal regions (large delta areas, in Bangladesh for example) or islands (Maldives, Vanuatu, etc.) and coastal erosion. Land damage will affect territories that are often very populated, forcing the inhabitants to abandon their country.

#### ➤ *Carbon footprint and ecological footprint*

When we talk about the problem linked to the phenomenon of global warming, two concepts are often mentioned, they are the carbon balance and the ecological footprint.

"The carbon footprint is a tool for accounting for direct and indirect greenhouse gas emissions according to a method whose rules are public and officially recognized. This means that any company, administration, community, or even an individual, can thus establish a carbon accounting of its activities."<sup>35</sup>

"The ecological footprint, also referred to as environmental footprint, is an indicator and a method of environmental assessment that takes into account the pressure exerted by humans on natural resources and the ecological services provided by nature."<sup>36</sup>

## V. THE INFORMATION SOCIETY AND GLOBAL WARMING

We have questioned three elements of the NTIC which are the Internet, the computer as well as the mobile phone as having a negative impact on the environment by contributing, to a certain extent, to the production of carbon dioxide of human origin.

It will therefore be a question, here, of demonstrating that each of these three elements participate in the production of CO<sub>2</sub>.

### A. *The Internet*

The Internet is singled out as contributing to the deterioration of the environment and this, among other things, by producing carbon dioxide through many of its services which we pin down below:

#### ➤ *Carbon footprint of emails*

E-mail is a tool that allows messages to be sent between several computers connected to a network such as the Internet. This term also refers to the message itself (abbreviated mail).

"A stored email is 10 grams of CO<sub>2</sub> generated per year (according to Cleanfox), ie the carbon footprint of a plastic bag."<sup>37</sup>; And "according to the Carbon Literacy Project, a standard email generates around 4g of CO<sub>2</sub>; with a bulky attachment,"<sup>38</sup> With a bulky attachment, it produces up to 50g of CO<sub>2</sub>. Sending a 1MB vacation photo to ten friends is the equivalent of driving 500 meters. Even when an e-mail is sent to an acquaintance who happens to be "a few meters away, this e-mail sends data to the Datacenters of Google or Yahoo which are located in the United States. It therefore travels thousands of kilometers passing through dozens of routers, servers and other computers which also consume energy to operate and which need to be cooled."<sup>39</sup>

Emails generate 410 million tons of CO<sub>2</sub> per year. The problem is compounded by the amount of messages piling up in our mailboxes. In France, an Internet user receives an average of 39 emails per day<sup>40</sup>, according to ContactLab. A

<sup>31</sup>Submitted to Greenwich School of Management.

<sup>32</sup>Submitted to Greenwich School of Management.

<sup>33</sup>IPCC, Climate Change, Synthesis Report, Annex II Glossary, 2008.

<sup>34</sup><https://www.ipcc.ch/>

<sup>35</sup>Submitted to Normandy Management School.

<sup>36</sup>Submitted to American University in Cairo.

<sup>37</sup>What is the footprint carbon of one email received and sent, available at the address URLs

:<https://www.hellocarbo.com> › blog › calculate › footprint..., consulted online on 04/10/2022.

<sup>38</sup>What is the carbon footprint of an email? - Futura-Sciences, available at the URL address: <https://www.futura-sciences.com> › questions-answers, consulted online on 04/10/2022.

<sup>39</sup>Submitted to Normandy School of Management.

<sup>40</sup>Submitted to Normandy School of Management.

total of 281 billion emails were sent worldwide every day in 2018<sup>41</sup>, according to research firm Radicati Group.

Taking this average of 4 g of CO<sub>2</sub> per e-mail, it is therefore “410 million tonnes of CO<sub>2</sub> per year that are generated. By comparison, global air transport produced 859 million tonnes of CO<sub>2</sub><sup>42</sup> in 2017<sup>43</sup>, according to IATA. However, this figure is largely underestimated because it does not take into account spam, which represents half of the messages received. However, even unopened, these unwanted messages produce 0.3 g of CO<sub>2</sub>! In total, 80% of emails are never opened. Finally, emails continue to spend energy on their storage.

“Each French person keeps between 10,000 and 50,000 unread emails in their inbox,” says Edouard Nattée, CEO of the startup Foxintelligence, which notably publishes Cleanfox, the automatic email sorting application. All this data is stored in datacenters, which annually consume “200 TWh per year and produce 0.3% of greenhouse gases”<sup>44</sup>.

#### ➤ *Carbon footprint of search engines*

A search engine is “a specific machine (hardware and software) responsible for indexing web pages in order to allow a search using keywords in a search form.”<sup>45</sup>

Nearly “93% of all internet traffic comes from search engines. It is estimated “on average that Google receives more than 63,000 requests per second”<sup>46</sup>, or 6.9 billion requests per day. Globally, Google holds nearly 91% of the market share<sup>47</sup>.

“On average, the carbon impact for all search engines combined is 1.106 gEqCO<sub>2</sub>. That of Google, the most widely used engine in the world, is 0.108 gEqCO<sub>2</sub>, the equivalent in carbon impact of one meter (0.96 m) carried out in a light vehicle.”<sup>48</sup>

A physicist from Harvard University, M. Wissner-Gross has just established that a classic search carried out on Google from a personal computer generates approximately 7 grams of carbon dioxide, two requests would therefore be equivalent to the energy necessary to make boil water from a kettle<sup>49</sup> (15 grams of CO<sub>2</sub>), 200 million are made per day.

<sup>41</sup>What is the carbon footprint of an email?-Futura-Sciences, available at URL: <https://www.futurasciences.com/>, consulted online on 04/10/2022.

<sup>42</sup>Submitted to ESC Rennes.

<sup>43</sup>Submitted to ESC Rennes.

<sup>44</sup>Submitted to University of East London.

<sup>45</sup>Submitted to Study Group Worldwide.

<sup>46</sup> <https://greenspector.com/>

<sup>47</sup>The environmental impact of search engines, available at the URL address: <https://greenspector.com/recherches>, consulted online on 10/04/2022.

<sup>48</sup>The environmental impact of search engines, available at the URL address: <https://greenspector.com/recherches>, consulted online on 10/04/2022.

#### ➤ *Carbon footprint of social networks and media*

A social networking service or site is a platform used to bring together people who have common centers or activities. This web-based system offers users a variety of ways to get in touch, “such as online chat, instant messaging, email, video, voice chat, file sharing, blogging, discussion, etc.”<sup>50</sup>

According to the 2019 Global Web Index, “We spend an average of 2 hours and 24 minutes on social media. If we project the average carbon impact of the 10 applications”<sup>51</sup>“(1.15 gEqCO<sub>2</sub>) over 60 seconds at the average time spent per user, we obtain for one user/day: 165.6 gEqCO<sub>2</sub>. That is the equivalent of 1.4 km traveled in a light vehicle.”<sup>52</sup>. “As of May 2021, the number of active social media users stands at 4.33 billion (55.1% of time spent.)”<sup>53</sup>

If we project our carbon impact per user to the above data, we get “262 million Tons EqCO<sub>2</sub> per year for the 4.33 billion mobile users, i.e. the equivalent of 0.61% of EqCO<sub>2</sub> impacts worldwide in 2019 and more than half of France's carbon emissions (56%).”<sup>55</sup>

We spend “53 minutes a day on Instagram, 46 minutes on TikTok, 34 minutes on Facebook.”<sup>56</sup>The company Greenspector has published a study on the carbon impact of the most popular applications and the Tik Tok application is the one with the highest ecological impact with 4.93 gEqCO<sub>2</sub> per minute (grams equivalent CO<sub>2</sub>).

Next comes the Reddit application with 4.54 gEqCO<sub>2</sub> per minute; then Pinterest with 3.53 gEqCO<sub>2</sub>; then Snapchat with 2.03 gEqCO<sub>2</sub>; then Instagram with 1.91 gEqCO<sub>2</sub> per minute; LinkedIn with 0.75; Facebook with 0.73 and Youtube with 0.66.

Other NICTs contribute to global warming, such as computers and mobile phones. “Studies offering a detailed life cycle analysis of computers are very rare, for the same reasons as those described in the section on mobile phones – product complexity, rapid planned obsolescence, confidentiality and lack of data. They often focus on energy

<sup>49</sup>A Google search is how much CO<sub>2</sub>? – ConsoGlobe, available at the URL address: <https://www.consoglobe.com/recherche-google-combi...>, consulted online on 04/10/2022.

<sup>50</sup><https://patents.google.com/>

<sup>51</sup>Submitted to Charles University.

<sup>52</sup>Global Web Index 2019.

<sup>53</sup>What environmental footprint for network applications..., available at the URL address: <https://greenspector.com/networks-s>, consulted online on 08/10/2021.

<sup>54</sup> <https://greenspector.com/>

<sup>55</sup> <https://greenspector.com/>

<sup>56</sup>How much time do people spend on social media?, available at URL: <https://www.les-conteurs/tem...>, consulted online on 10/04/2021.



consumption or greenhouse gases.<sup>57</sup>But we know, for example, that “the footprint of a mobile phone in 2008 in France was equivalent to 11 kg/inhabitant/year. »<sup>58</sup>

## VI. RESPONSIBILITY IN THE USE OF THE INTERNET

As already mentioned, the Internet contributes to global warming because various services attached to it, when used, cause the production of carbon dioxide. Aware of this and having demonstrated it throughout this article, it is now appropriate to adopt responsible behavior when using these services. Here is the ethical behavior we advocate:

### A. E-mail

The use of e-mails, it is appropriate to ensure the reduction of the impressions of these, by only sending them to the people who are really concerned because sending an e-mail to 10 people has an impact on climate change 4 times less important than a letter sent to 100 people. It is also appropriate to reduce the storage time of e-mails while favoring SMS for small simple texts.

### B. Search engine

Regarding the use of search engines, it is important to choose the search application carefully; to search by using the URL address without going through the results page while optimizing its request.

### C. Networks and social media

As regards the use of networks as well as social media, when possible, it is preferable to favor downloading over streaming, for music, also favor downloading, then music streaming and as a last resort YouTube videos. It is also appropriate to avoid using 4G as much as possible and to favor wifi if possible. You should also consider disabling the autoplay of videos.

From all that has just been seen, it is indisputable that, apart from all the beneficial and essential services provided by the information society, "the multiplication of equipment and uses linked to ICTs generates very heavy impacts on the 'environment. »<sup>59</sup>

This justifies the appeal launched, throughout this article, for a reasoned use of these technologies through the adoption of responsible ethical behavior.

## VII. CONCLUSION

This article is interested in the analysis of the information society on the aspect of its impact on global warming, thereby revealing the dark side of virtuality. The Information Society has profoundly changed our habits of the past. It is to be placed in the extension of the Electronic

Society following the way in which human societies have succeeded one another according to the media in vogue, specific to each era, which has conditioned and impacted them. We refer, in this perspective, to the technological determinism of the researcher Canadian McLuhan. Thus there was the society of orality, then the society of writing, then the society of printing and finally the electronic society.

This company has its own characteristics. It conditions new ways of doing things, has led to the development of new capacities; the requirement of acquisition as well as the increase of new skills, aptitudes; the appearance of a new community that is the virtual community; the appearance of a new type of man, the bionic man; the abolition of boundaries between public and private; the collapse of traditional values. The information society is also a society dominated by the immaterial, where knowledge and flexibility will be determining elements, which will lead to fundamental changes. It is the society of multimedia networks, digitization, digitization, communicating computing.

But it has been shown that, even if this information society renders us certain and undeniable services, virtuality presents a dark side, not very pleasant, linked among other things to the fact that it contributes to the production of carbon dioxide responsible for worsening global warming. We have thus been able to verify that the information society with its flagship medium, the Internet, through many of its services does indeed contribute to the production of carbon dioxide.

Thus certain services such as e-mails, search engines, networks and social media. have been analyzed by researchers, results that we have used in our study, and which demonstrate that they contribute to the production of carbon dioxide through the use made of them by consumers in the digital world. Yet it is this CO<sub>2</sub> of human origin that is incriminated as contributing to global warming.

It is this aspect of things that prompted us to make some suggestions regarding the adoption of ethical behavior capable of leading to a reasoned and responsible use of NICTs, and more specifically of the Internet through a number of its services. And all this, in the end, so that these instruments can no longer present negative ecological impacts and this, “for the good of present and future generations. »

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<sup>57</sup>F FLIPO et al., Digital technologies and environmental crisis: can we believe in green ICT?, Final report, 2009, p.54.

<sup>58</sup>F FLIPO et al, The hidden face of digital, the environmental impact of new technologies, Paris, ed. The Escape, 2013, p.24.

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