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Tackling the negative environmental impact of AI systems

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Published in:

Governance of artificial intelligence in the European Union

Publication date:

2023

Document Version

Publisher's PDF, also known as Version of record

[Link to publication](#)

Citation for pulished version (HARVARD):

Bourguignon, C & Willem, P 2023, Tackling the negative environmental impact of AI systems: a case for EU consumer protection. in *Governance of artificial intelligence in the European Union : what place for consumer protection ?*. Droit de l'Union européenne : monographies, no. 19, Bruylant, Bruxelles, pp. 119-138.

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TACKLING THE NEGATIVE ENVIRONMENTAL IMPACT OF AI SYSTEMS – A CASE FOR EU CONSUMER PROTECTION

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ABSTRACT

While they are often presented as being efficient tools to fight environmental degradation and climate change, digital technologies, particularly artificial intelligence (AI) systems, must also be depicted as one of the causes of the environmental crisis. Important efforts should be made to limit their negative impacts, and at earlier stages to quantify those impacts, so that AI systems do not worsen the environmental crisis. Consumers themselves more and more interact with AI systems. This paper aims to verify whether EU consumer protection regulations could be efficient legal instruments for that purpose.

RÉSUMÉ

Alors qu'elles sont souvent présentées comme constituant des outils efficaces pour lutter contre la crise environnementale et le changement climatique, les technologies numériques, en particulier les systèmes d'intelligence artificielle, doivent également être vus comme étant l'une des causes de la crise environnementale. Des efforts importants devraient être faits pour limiter leurs impacts négatifs, et au préalable pour quantifier ces impacts, de sorte que les systèmes d'IA n'empirent pas la crise environnementale. Les consommateurs eux-mêmes sont de plus en plus amenés à interagir avec des systèmes d'IA. La présente contribution vise à vérifier dans quelle mesure les réglementations de l'UE en matière de protection du consommateur pourraient constituer des instruments juridiques efficaces pour atteindre ces objectifs.

INTRODUCTION

Society and the world at large are currently facing two major transitions. The first one is digital. The development and the use of artificial intelligence (hereafter “AI”) in almost all sectors of human activity is one of the most outstanding examples of this digital transition. The other one is ecological. All human activities must initiate this second transition so that the planet remains a viable area for all its inhabitants. Those two transitions seemed, for a long time, to evolve in parallel spheres without important

and solid links being identified or established between them. (1) It is now evolving, particularly within the European Union (hereafter “EU”).

The potentialities that the use of digital technologies, including AI systems, can offer in order to better control and limit the global environmental degradation and address climate change are now being actively highlighted. For instance, the European Commission’s Green Deal action plan presents digital technologies – such as AI, 5G, cloud and edge computing, Internet of Things, *etc.* – as “critical enabler[s] for attaining the sustainability goals of the Green Deal in many different sectors.” (2) The proposed Artificial Intelligence Act (hereafter the “AI Act”) is also imbued with this idea. The European Commission affirmed among the first reasons and objectives of the proposal that “by improving prediction, optimising operations and resource allocation, and personalising service delivery, the use of AI can support socially and environmentally beneficial outcomes [...]” (3) This idea that digital technologies are efficient tools to fight against the environmental degradation and climate change is supported by a collective belief that digital technologies would be “naturally green.” (4) Indeed,

(1) D. DEMAILLY, R. FRANCOU, D. KAPLAN and M. SAUJOT, “Faire converger les transitions numérique et écologique”, *Annales des Mines – Responsabilité et environnement*, 2017, Vol. 87, No. 3, p. 13. Regarding the question of ecological transition, for experts who did not take the environmental impacts of digital technologies into account, see, for instance, F. FLIPO, *L’impératif de la sobriété numérique, L’enjeu des modes de vie*, coll. Essais, Paris, Éditions Matériologiques, 2020, pp. 11 and 12; IDDRI, FING, WWF France and GreenIT.fr, *Livre blanc numérique et environnement*, p. 5, the authors regret that “the actors of ecology remain too rare to appropriate the potential of digital technologies, while those of digital sectors make as if the fact that digital technologies and their effects are apparently “immaterial” in terms of efficiency was enough to make them virtuous” (our translation).

(2) Communication from the European Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, “The European Green Deal”, COM(2019) 640 final, 11 December 2019, p. 10, § 2.1.3.

(3) Proposal for a regulation of the European Parliament and the Council laying down harmonized rules on artificial intelligence (artificial intelligence Act) and amending certain Union legislative acts, COM(2021) 206 final, 21 April 2021, pt 1.1.

(4) Whereas the negative environmental impacts of digital technologies were already identified in the early 2000s. See for instance S. FAUCHEUX, C. HUE and O. PETIT, “NTIC et Environnement: Enjeux, Risques et opportunités”, *Cahier du C3ED*, October 2001, No. 01-04, p. 8; F. BERKHOUT and J. HERTIN, “Impacts of Information and Communication Technologies on Environmental Sustainability: speculation and evidence”, *OECD Report*, Brighton, University of Sussex, 25 May 2001, pp. 7-9, available at: <https://www.oecd.org/sti/inno/1897156.pdf>. Criticising such a collective belief, the computing science engineer F. Berthoud evokes “a belief in the almost magical power of digital technologies to solve ecological challenges” (our translation) (F. BERTHOUD, “Numérique et écologie”, *Annales des Mines – Responsabilité et environnement*, 2017, Vol. 87, No. 3, p. 72).

since they are often presented as being “immaterial” or “virtual,” (5) how could they have negative impacts on the physical world and the environment then? (6)

However, even though they might be potential efficient tools to address some environmental issues, digital technologies, including AI systems, must also be depicted as one of the causes of the global environmental crisis. The collective belief mentioned above that digital technologies are “naturally green” is now seriously questioned and contradicted. (7) Digital technologies themselves also undoubtedly have negative impacts on the environment. Those impacts are, in addition, growing at a worrying pace. (8)

These negative impacts must be tackled so that, at the very least, they do not outweigh the positive effects of digital technologies on the preservation of the environment and, more broadly speaking, so that they do not worsen the environmental degradation. In that perspective, since consumers themselves use more and more AI systems in their daily life, our intuition is that EU Consumer Protection Law could be an efficient instrument to explore and mobilise to tackle the adverse impact of AI technologies on the environment. Such a hypothesis will be verified in Section II of this paper. In the first place, Section I aims to identify the specific environmental negative impacts of AI systems.

(5) The words usually used to describe or to mention digital technologies are important. They indeed often evoke “something” that is non-tangible or non-physical (“cloud”, “virtual”, *etc.*) and therefore support the idea of technologies that could not have any impact on the physical world. See F. RODHAIN, *La nouvelle religion du numérique, Le numérique est-il écologique?*, EMS Editions, Caen, 2019, pp. 28-41; L. CAILLOCE, “Le numérique: le grand gâchis énergétique”, *Numérique*, 16 May 2018, available at: <https://lejournal.cnrs.fr/articles/numerique-le-grand-gachis-energetique>.

(6) F. Berkhout and J. Hertin summarized this idea as follows (even though they largely nuance it): “at first sight, the environmental effects of ICTs appear to be exclusively positive because ‘information’ is generally considered to be quick distinct from the material aspects of the natural environment” (F. BERKHOUT and J. HERTIN, “Impacts of Information and Communication Technologies on Environmental Sustainability: speculation and evidence”, *op. cit.*, p. 2).

(7) The necessity to question digital technologies as being “natural green” tools has notably been highlighted by F. FLIPO, M. DOBRÉ and M. MICHOT, *in La face cachée du numérique: l’impact environnemental des nouvelles technologies*, January 2013, pp. 19 and 20, available at: www.researchgate.net; in addition, see S. AN-DAOUD, J. LAQUECHE, I. BOURDON et F. RODHAIN, “Ecologie & Technologies de l’Information et de la Communication (TIC): une étude exploratoire sur les éco-TIC”, *Management & Avenir*, 2010, Vol. 39, No. 9 and F. BERTHOUD, “Numérique et écologie”, *op. cit.*, pp. 72-75.

(8) “Déployer la sobriété numérique”, *The Shift Project*, October 2020, pp. 15 et seq., available at: theshiftproject.org; R. OBRINGER, B. RACHUNOK, D. MALA-SILVA, M. ARBAZADEH, R. NATEGHI and K. MADANI, “The overlooked environmental footprint of increasing Internet use”, *Resources, Conservation and Recycling*, April 2020, available at: www.sciencedirect.com; “Empreinte environnementale du numérique Mondial”, *GreenIT.fr*, October 2019, available at: <https://www.greenit.fr>; “Lean ICT – Pour une sobriété numérique”, *The Shift Project*, October 2018, available at: theshiftproject.org.

I. NEGATIVE ENVIRONMENTAL IMPACTS OF AI SYSTEMS

AI systems are developing in almost all sectors of human activity such as transport (*e.g.* development of autonomous vehicles), medical care (*e.g.* surgery robots or software facilitating medical decisions), farming (*e.g.* precision farming such as optimization of irrigation, the reduced size of machinery and the reduced use of fertilizers, energy and water), industrial production (*e.g.* monitoring of facilities, route optimization for supply chains), education, security, justice, *etc.* (9) Citizens, industry, and services of public interest are therefore all concerned by such an evolution. (10) Through many products of daily life (smart watches, connected fridges, cars, *etc.*), consumers use AI systems every day for a lot of activities (transport, running, social media, *etc.*) even without being aware of it.

The benefits that AI systems can bring to all these sectors must not hide the risks or negative impacts of their development. The risks regarding the respect of fundamental rights within the European Union are already pointed out in the AI Act Proposal. (11) But other potential negative impacts, among those negative environmental impacts, must also be emphasized and dealt with. This idea was already highlighted by the European Parliament which proposed, in a Resolution, “that, given the increasing development of AI applications, which require computational, storage and energy resources, the environmental impact of AI systems should be considered throughout their lifecycle.” (12)

In the AI Act Proposal, the European Commission made the difficult effort to elaborate a definition of the concept of “artificial intelligence system.” (13) In the meantime, the Council of the EU proposed to amend this definition. According to the Council’s position an “AI system” should cover “a system that is designed to operate with elements

(9) European Parliament, Resolution with recommendations to the Commission on Civil Law Rules on Robotics, 2015/2103 (INL), 16 February 2017, E and pt 47.

(10) Rec. 3 AI Act Proposal; European Commission, White Paper on Artificial Intelligence, “A European approach to excellence and trust”, COM(2020) 65 final, 19 February 2020, p. 2.

(11) AI Act Proposal, Explanatory memorandum, pt 1.1.

(12) European Parliament, with recommendations to the Commission on a framework of ethical aspects of artificial intelligence, robotics and related technologies, 2020/2012(INL), 20 October 2020, pt 59.

(13) Art. 3, pt 1, AI Act Proposal. In the initial proposal, the AI system is defined as any “software that is developed with one or more of the techniques and approaches listed in Annex I [*i.e.* machine learning approaches, logic- and knowledge based approaches and statistical approaches, Bayesian estimation search and optimization methods] and can, for a given set of human-defined objectives, generate outputs such as content, predictions, recommendations, or decisions influencing the environments they interact with.”

of autonomy and that, based on machine and/or human-provided data and inputs, infers how to achieve a given set of objectives using machine learning and/or logic- and knowledge based approaches, and produces system-generated outputs such as content (generative AI systems), predictions, recommendations or decisions, influencing the environments with which the AI system interacts.” (14) Through that definition, we already understand that to be created and to function, AI systems are based on elements and techniques that require important computing resources (huge amount of data and inputs needed, techniques of machine learning based on numerous tests, *etc.*). One must remember that behind any computing resource used and data stored there are data centres that consume a lot of energy and emit carbon. The more a system needs computing resources and data, the more it is harmful to the environment.

The negative environmental impacts of AI, precisely regarding climate change, seem to be essentially understood in terms of energy consumption and carbon footprint. (15) Researchers in computational engineering science are now leading projects with the aim to elaborating metrics and methodologies able to assess the negative impacts of AI, particularly machine learning and deep learning-based systems. (16) According to one of those research projects, a single training run of Generative Pre-trained Transformer 3 (GPT-3) (17) “could emit [in terms of CO₂ emissions] as much as 49 cars a year.” (18) And that result only concerns a single training run whereas AI researchers (19) “often

(14) Council of the European Union, “Proposal for a Regulation of the European Parliament and of the Council laying down harmonised rules on artificial intelligence (Artificial Intelligence Act) and amending certain Union legislative acts – General approach”, Interinstitutional File: 2021/0106(COD), 25 November 2022, Annex, Art. 3(1). It must be noted that we stopped the analysis on the 10 February 2023. Therefore, other institutional positions further published, particularly those that might be adopted by the European Parliament, could not be taken into account.

(15) See for instance M. TADDEO, A. TSAMADOS, J. COWLS and L. FLORIDI, “Artificial intelligence and the climate emergency: Opportunities, challenges, and recommendations”, *SSRN*, 8 June 2021, p. 1, available at: <https://ssrn.com/abstract=3873881>; P. HENDERSON, J. HU, J. ROMOFF, E. BRUNSKILL, D. JURAFSKY and J. PINEAU, “Towards the Systematic Reporting of the Energy and Carbon Footprints of Machine Learning”, *The Journal of Machine Learning Research*, 2020, Vol. 21, No. 1, available at: <https://jmlr.org>.

(16) *Ibid.*; R. SCHWARTZ, J. DODGE, N. A. SMITH and O. ETZIONI, “Green AI”, July 2019, available at <https://arxiv.org/pdf/1907.10597v3.pdf>.

(17) GPT-3 is “one of the many powerful natural languages that exist today, which are capable of excelling in a number of natural-language processing tasks, like translating between languages, composing text, or answering questions posed in plain language” (M. TADDEO, A. TSAMADOS, J. COWLS and L. FLORIDI, “Artificial intelligence and the climate emergency: Opportunities, challenges, and recommendations”, *op. cit.*, p. 1).

(18) For a typical passenger car in the United States, *ibid.*

(19) The research project was carried out on the scientific research field.

train thousands of models before achieving publishable results.” (20) The reasons why AI systems can be particularly costly for the environment can be better understood considering the different steps needed to develop a model based on AI. According to another computational engineering scientific research, “when considering the different factors that increase the computational and environmental cost of producing such a result, three factors come to mind: the cost of executing the model on a single (E)xample (either during training or at inference time); the size of the training (D)ataset, which controls the number of times the model is executed during training, and the number of (H)yperparameters experiments, which controls how many times the model is trained during model development. The total cost of producing a (R)esult in machine learning increases linearly with each of these quantities.” (21) We understand that, at the stage of the development of the AI system (before it can have interesting results and it can be used), different steps of tests and training are needed. The number of these tests and training depends on the size of the dataset with which they are run. The bigger the dataset is, the more numerous these tests and training are. To each step of training corresponds the use of important computing resources which are energy-consuming and have a sensitive carbon footprint. To these impacts linked to the development of the AI model must be added those linked to the use of the AI system by the user (*e.g.* the consumer).

The environmental impacts can also depend on the geographical locations of the infrastructures needed for the development of the model (based on the different energy grids chosen by the location considered) and on the time of the day the training is run. (22)

Considering all those elements, it is easy to understand how difficult it is to quantify the negative environmental impacts of an AI system, *i.e.* which impact should be quantified and how to integrate all the different steps needed for the development of an AI system model in the quantification, *etc.*? The computational engineering research

(20) M. TADDEO, A. TSAMADOS, J. COWLS and L. FLORIDI, “Artificial intelligence and the climate emergency: Opportunities, challenges, and recommendations”, *op. cit.*, p. 1.

(21) R. SCHWARTZ, J. DODGE, N. A. SMITH and O. ETZIONI, “Green AI”, *op. cit.*, p. 3.

(22) P. HENDERSON, J. HU, J. ROMOFF, E. BRUNSKILL, D. JURAFSKY and J. PINEAU, “Towards the Systematic Reporting of the Energy and Carbon Footprints of Machine Learning”, *op. cit.*, pp. 16 and 18. According to the authors, “an immediate drop in carbon emission can be made by moving all training jobs to carbon-efficient energy grids. In particular, Quebec is the cleanest available cloud region to our knowledge. Running a job in Quebec would result in carbon emission 30x lower than running a job in Estonia” (see p. 18).

projects mentioned above seem to be able to propose methodologies and metrics to assess those impacts and then to design and promote “greener” AI systems based on those assessments and metrics, at least in the research field. (23) Nevertheless, as of today, common metrics and methodologies to assess the negative environmental impacts of AI systems are still lacking. The immediate consequence is that policy makers, the industry, and civil society including the consumers, are lacking awareness regarding those impacts. (24)

However, now that the data and assessment methodologies are being defined, one must consider EU consumer protection provisions, such as the information obligations, *i.e.* the accurate and necessary information to be provided by the trader to allow consumers to take an informed transactional decision. On the one hand, these provisions may be efficient instruments for raising awareness within civil society about the negative environmental impacts of AI systems. On the other hand, they may incentivize the industry to better inform consumers about the AI-based products it puts on the market. These information obligations would therefore oblige the industry to make its best efforts to assess the environmental impacts of its AI-based products and then, at earlier stages, to identify the accurate ways to carry out such assessments. In the end, we assume that the industry would be incentivized to propose more eco-designed AI systems before placing them on the market. Based on the EU Consumer Law acquis and in discussion among the EU institutions, our paper proposes to assess whether those legal instruments might already be efficient to accurately inform consumers of the negative environmental impacts of the AI-based products they want to buy or use, or whether they should be reinforced, either by amendments or via other instruments such as soft law or labels developed by regulators or the industry.

(23) See notably R. SCHWARTZ, J. DODGE, N. A. SMITH and O. ETZIONI, “Green AI”, *op. cit.*; P. HENDERSON, J. HU, J. ROMOFF, E. BRUNSKILL, D. JURAFSKY and J. PINEAU, “Towards the Systematic Reporting of the Energy and Carbon Footprints of Machine Learning”, *op. cit.*; see also L. LEFÈVRE, A.-L. LIGOZAT, D. TRYSTRAM, S. BOUVERET, A. BUGEAU, J. COMBAZ, E. FRENOUX, G. GUENNEBAUD, J. LEFÈVRE and J.-P. NICOLAI, “Proposition de document de cadrage. Evaluation environnementale de projets impliquant des méthodes d’IA”, 15 March 2022, available at: <https://hal.archives-ouvertes.fr/hal-03853135>.

(24) For that reason, concerning more broadly all digital technologies, the first chapter of the French Law adopted on 15 November 2021 to reduce the environmental footprint of digital technology is specifically aimed at “making users aware” of that footprint (*Loi (FR) No. 2021-1485 du 15 novembre 2021 visant à réduire l’empreinte environnementale du numérique en France*, *JORF*, No. 0266 of 16 November 2021).

II. INFORMING CONSUMERS OF THE NEGATIVE ENVIRONMENTAL IMPACTS OF AI SYSTEMS

A. *The prohibition of unfair commercial practices*

One of the EU Consumer Law instruments that can be analysed to assess whether there is currently sufficient information available for the consumer about the environmental impacts of AI systems is the Directive 2005/29/EC of 11 May 2005 concerning unfair business-to-consumer commercial practices in the internal market (hereinafter, “Directive 2005/29/EC”). (25) This instrument prohibits unfair commercial practices in B2C relationships.

Under that Directive, commercial practices are “any act, omission, course of conduct or representation, commercial communication including advertising and marketing, by a trader, directly connected with the promotion, sale or supply of a product to consumers.” (26) They therefore cover a large number of practices by which the trader interacts and communicates with consumers. The practice is supposed to be connected with a product, which encompasses “any good or service including immovable property, digital service and digital content, as well as rights and obligations.” (27) According to the guidance of the European Commission on the interpretation and application of Directive 2005/29/EC, the Directive applies to products “that involve the use of technologies such as algorithms, automated decision-making and Artificial Intelligence (AI).” (28) Hence the Directive applies to products based on AI systems, such as smartwatches, smartphones, *etc.* Moreover, digital content and digital services are covered by the definition of products. (29) Very often, digital content is created thanks to the functioning of an AI system. Digital services are also frequently

(25) Directive 2005/29/EC of the European Parliament and of the Council of 11 May 2005 concerning unfair business-to-consumer commercial practices in the internal market and amending Council Directive 84/450/EEC, Directives 97/7/EC, 98/27/EC and 2002/65/EC of the European Parliament and of the Council and Regulation (EC) No. 2006/2004 of the European Parliament and of the Council, *OJ*, L 149 of 11 June 2005.

(26) Art. 2(d) Directive 2005/29/EC.

(27) Art. 2(c) Directive 2005/29/EC.

(28) European Commission, “Guidance on the interpretation and application of Directive 2005/29/EC of the European Parliament and of the Council concerning unfair business-to-consumer commercial practices in the internal market”, *OJ*, 2021/C 526/01, p. 86.

(29) The Directive does not define those notions. According to us, they should be understood in the same way as in Directive (UE) 2019/770 on certain aspects concerning contracts for the supply of digital content and digital services, *OJ*, L 136 of 22 May 2019, Art. 2(1) and (2).

based on AI systems. Therefore, even if the notion of “products” does not seem to encompass AI systems as such, they are indirectly affected by the Directive. (30)

By prohibiting unfair commercial practices, Directive 2005/29/EC prevents misleading or too aggressive actions by traders. Consequently, even if the instrument does not impose information obligations, it influences the ways of interaction and communication in B2C relationships.

The Directive 2005/29/EC provides a three-step process to detect unfair commercial practices. First, commercial practices that fall under one (or several) of the practices detailed in Annex I are unfair in all circumstances and thus, prohibited *per se*. If a commercial practice does not fall under one of the practices described in Annex I, it must be analysed in the light of the description of Articles 6 and 7 of the Directive (misleading commercial practices), and/or Articles 8 and 9 (aggressive commercial practices). This is the second step. If the commercial practice does not fulfil the conditions mentioned in those Articles and thus, is not misleading nor aggressive, it may nevertheless be considered unfair having regard to the general definition of unfair commercial practices under Article 5 of the Directive. Our objective is to assess whether the Directive 2005/29/EC is likely to improve the available information to consumers about the environmental impacts of AI systems. The same analysis should be conducted having regard to the proposal made by the Commission on 30 March 2022 to amend, among others, the Directive 2005/29/EC, to tackle greenwashing practices, early obsolescence practices and the use of unreliable and non-transparent sustainability labels and information tools. (31)

Regarding the list of unfair commercial practices contained in Annex I, the current version of the Directive states that it is an unfair (and thus, a prohibited) commercial practice to display “a trust mark, quality mark or equivalent without having obtained the necessary authorisation.” (32) This means that a trader cannot take undue advantage of a label or a certificate it has not obtained. Linked to that practice, the Commission proposed to add that “displaying a sustainability

(30) On that question, see the contribution of H. JACQUEMIN, “AI regulation in B2C contracts for the supply of digital content and services”, pp. 51 et seq. in this book.

(31) See the explanatory memorandum of Proposal for a Directive of the European Parliament and of the Council amending Directives 2005/25/EC and 2011/83/EU as regards empowering consumers for the green transition through better protection against unfair practices and better information, COM(2022) 143 final, 30 March 2022.

(32) Annex I, 2), Directive 2005/29/EC.

label which is not based on a certification scheme or not established by public authorities is unfair.” (33) Therefore, under this proposal, in B2C relationships, sustainability labels should be based solely on third-party certification (34) or put in place by public authorities. It would thus be unfair for a trader to create its own label and display it. This legislative amendment, if adopted, would ensure that if a piece of information is provided to the consumer regarding sustainability based on a label, there is a certain consistency and uniformity based on common European criteria in the way sustainability is assessed, as self-assessment is prohibited.

The Commission also proposed to add to the list of unfair commercial practices included in Annex I “making a generic environmental claim for which the trader is not able to demonstrate recognised excellent environmental performance relevant to the claim.” (35) This would force the trader, for example, to have documentation and to conduct scientific studies to be able to prove that its environmental claim is true. It could also help to strengthen the trader’s accountability. However, it is unsure that consumers will have access to that information because it could contain trade secrets. Moreover, even if consumers could access that information upon request, they may not be able to understand it as it may be very technical.

When it comes to misleading commercial practices, if a trader displays false information or a piece of information likely to deceive the average consumer regarding certain elements listed by Article 6, it can be unfair, provided that it causes or is likely to cause the consumer to take a transactional decision that would not have been taken otherwise. Among the elements listed by Article 6, there are the extent of the trader’s commitments and the “main characteristics” of the product. Therefore, if the trader pretends that its products are green in one or another way and that it is not true, or if the trader lies about its environmental commitments, it could be prohibited commercial practices.

(33) Annex I(1) Proposal, COM(2022) 143 final, 30 March 2022, cited above. Definition of sustainability label: Art. 1(1)(r) Proposal, COM(2022) 143 final, 30 March 2022, cited above.

(34) The “certification scheme” is defined in Article 1 of the proposal as “a third-party verification scheme that is open under transparent, fair and non-discriminatory terms to all traders willing and able to comply with the scheme’s requirements, which certifies that a product complies with certain requirements, and for which the monitoring of compliance is objective, based on international, Union or national standards and procedures and carried out by a party independent from both the scheme owner and the trader.”

(35) Annex I(2) Proposal, COM(2022) 143 final, 30 March 2022, cited above. Definition of environmental claim, generic environmental claim and recognised excellent environmental performance: Art. 1(1), (o), (p), (u) Proposal, COM(2022) 143 final, 30 March 2022, cited above.

The Commission proposed to add, in Article 6, environmental or social impacts, durability and reparability of the product in the non-exhaustive list of the “main characteristics” of the product. (36) This underlines that environmental characteristics of a product are of main importance. This proposed amendment goes in the same direction than the ones detailed above, meaning that if a trader wants to inform the consumer about an environmental aspect of the product, that information must be true.

However, this modification may have another important consequence, if adopted. In fact, Article 7(1) of the Directive states that a commercial practice shall be considered misleading if it omits material information that the average consumer needs to take an informed transactional decision. Article 7(4) then explains that in the case of an invitation to purchase, the main characteristics of the product are part of that material information. As mentioned above, the Commission proposed to add environmental or social impact, durability and reparability of the product as being main characteristics of the product. Therefore, it means that the trader will have to provide this information to avoid any risk of being condemned for unfair commercial practices. This modification would therefore amount to a ‘*de facto*’ obligation to provide information to consumers regarding certain environmental aspects of the product. However, the characteristic relating to the environmental or social impact is not defined in the proposal while durability and reparability are not likely to give rise to information on the environmental impact of AI systems as such. It is therefore quite unclear what kind of information the consumer is likely to receive regarding the environmental impacts of AI systems. Moreover, if the AI system is not sold directly to consumers but is put at their disposal through the use of their hardware (a smartwatch for example), one may wonder what information the consumer will receive and whether the information on the environmental impacts of the product extends to the environmental impacts of the components of the product, including the AI system on which the product is based.

To conclude this part, the Commission made interesting proposals in March 2022. However, having regard to our research objective, the proposed amendments seem insufficient, especially because the proposals and the Directive 2005/29/EC itself do not focus on AI in particular, but on the product. The link between the product and the

(36) Art. 1(2)(a) Proposal, COM(2022) 143 final, 30 March 2022, cited above.

AI systems may not be directly apparent to the average consumer or even to the enforcement authorities. Therefore, it is very unlikely that the Directive, even in its amended form, will awaken consumers and push them to adapt their behaviour in the light of environmental issues.

B. The compulsory pre-contractual information to be provided

With the Directive 2011/83/EU of 25 October 2011 on consumer rights (hereafter the “Directive 2011/83/EU”), (37) the information requirements go a step further. One of the main requirements imposed to the trader is the positive obligation to provide consumers with compulsory information before concluding a contract with them.

The contracts falling within the scope of the Directive 2011/83/EU are distance contracts, off-premises contracts and contracts other than distance and off-premises contracts concluded between a trader and a consumer. The contract covered by the Directive can be of different types. It can be a sales contract, *i.e.* “any contract under which the trader transfers or undertakes to transfer ownership of goods to the consumer, including any contract having as its object both goods and services.” (38) The concept of “goods” covers “any tangible movable items”, including those “that incorporate or are inter-connected with digital content or a digital service in such a way that the absence of that digital content or digital service would prevent the goods from performing their functions (‘goods with digital elements’).” (39) For instance, a smartwatch that could not perform its functions without the associated application is to be qualified as a good with digital elements under that definition. (40) The second type of contract covered is the “service contract” which is “any contract other than a sales contract under which the trader supplies or undertakes to supply a service, including a digital service, to the consumer.” (41) Another type

(37) Directive 2011/83/EU of the European Parliament and of the Council of 25 October 2011 on consumer rights, amending Council Directive 93/13/EEC and Directive 1999/44/EC of the European Parliament and of the Council and repealing Council Directive 85/577/EEC and Directive 97/7/EC of the European Parliament and of the Council, *OJ*, L 304 of 22 November 2011.

(38) Art. 2(5) Directive 2011/83/EU.

(39) Art. 2(3) Directive 2011/83/EU that refers to the definition of “goods” given in point (5) of Article 2 of Directive (EU) 2019/771 of the European Parliament and of the Council of 20 May 2019 on certain aspects concerning contracts for the sale of goods, amending Regulation (EU) 2017/2394 and Directive 2009/22/EC, and repealing Directive 1999/44/EC, *OJ*, L 136 of 22 May 2019.

(40) European Commission, “Guidance on the interpretation and application of Directive 2011/83/EU of the European Parliament and of the Council on consumer rights”, *OJ*, C 525 of 29 December 2021, p. 35.

(41) Art. 2(6) Directive 2011/83/EU.

of contract covered is the contract “for the supply of digital content which is not supplied on a tangible medium (‘contracts for online digital content’).” (42)

Even though it is not expressly stated, those three types of contracts could deal with digital contents based on AI systems, whether the contract concerns tangible movable items that incorporate digital elements or aims at supplying a digital service or an online digital content. (43) Therefore, we presume that AI systems on which those digital elements might be based are covered by the Directive 2011/83/EU. The trader offering such goods or services should comply with the specific information obligation the Directive provides.

That specific information is to be provided, in a clear and comprehensible manner, before the consumer is bound by a contract. (44)

The first information to be provided are “the main characteristics of the goods or services, to the extent appropriate to the medium and to the goods or services.” (45) With a broad interpretation, one could argue that the environmental impacts of the good sold or the service furnished (including the impacts of the AI system on which it might be based) are part of the “main characteristics” of the good or service in question. In certain sectors, information regarding the environmental impacts of the product the consumer wants to buy or use already appears to be of more and more importance. For instance, in food production, the fact that the product is organic or is locally produced is increasingly an element which consumers take into account when making a transactional choice. Such information could then be considered as a piece of information necessary for the consumer to take an informed decision. It could thus be qualified as being part of the pre-contractual information on the main characteristics of the good or service that must be provided. Nevertheless, on the one hand, it is not sure whether such a broad interpretation of the “main characteristics of the goods or services” could be accepted by the courts and/or the regulators. On the other hand, the elements that should be provided to ensure that the consumer is well informed regarding the

(42) European Commission, “Guidance on the interpretation and application of Directive 2011/83/EU of the European Parliament and of the Council on consumer rights”, cited above, p. 8.

(43) On that question, see the article of H. JACQUEMIN, “AI regulation in B2C contracts for the supply of digital content and services”, pp. 51 et seq. in this book.

(44) Art. 5(1) and 6(1) Directive 2011/83/EU.

(45) Art. 5(1)(a) and 6(1)(a) Directive 2011/83/EU.

environmental impacts of a good or service based on AI systems, given the fact that such elements must remain comprehensible (and then not be too technical) for the average consumer, are unclear for now.

The above-mentioned proposal of 30 March 2022 (46) could be a useful opportunity to strengthen the obligation to inform consumers of the environmental impacts of the AI systems on which the goods or services they want to buy or use are based. However, the version of the proposal published by the European Commission does not bring an accurate response in this respect.

That proposal states that Directive 2011/83/EU should be amended “to provide consumers with pre-contractual information about the durability, reparability, and the availability of updates.” (47) In that perspective, it is proposed to amend Articles 5 and 6 that list the pre-contractual information to be provided and to add information such as the reparability score of the goods or information related to the commercial guarantee of durability. (48) That new information does not seem accurate to allow the consumers to obtain information regarding the environmental impacts of the AI system on which the good or the service might be based.

However, as explained above, (49) the proposal brings new elements that must be integrated within the concept of “main characteristics of the products” as being material information to be provided under Directive 2005/29/EC. The Commission proposed indeed to add, within the main characteristics of the product, the environmental or social impact of the product.

The Commission considers that the Directive 2011/82/EU “regulates the pre-contractual stage in greater detail than the [Directive 2005/29/EC]. Articles 5 and 6 of the [Directive 2011/83/EU] cover all the information requirements laid down in Article 7(4) of the [Directive 2005/25/EC]. Therefore, when providing pre-contractual information in accordance with the [Directive 2011/83/EU], a trader will also comply with the specific information requirements for the invitation to purchase under Article 7(4) of the [Directive 2005/29/EC].” (50) Consequently, it could be considered that the concept of “main characteristics” of Directive

(46) Proposal, COM(2022) 143 final, 30 March 2022, cited above.

(47) Rec. 22 Proposal, COM(2022) 143 final, 30 March 2022, cited above.

(48) Art. 2, pts 2 and 3, Proposal, COM(2022) 143 final, 30 March 2022, cited above.

(49) See *supra*, § II, A.

(50) European Commission, “Guidance on the interpretation and application of Directive 2011/83/EU of the European Parliament and of the Council on consumer rights”, cited above, p. 26.

2011/83/EU could integrate the new elements proposed to be inserted in the concept of “main characteristics” under the Directive 2005/29/EC, in particular the environmental impact of the products. Pursuant to such an interpretation, the environmental impact of AI system-based goods or services would be part of the compulsory information to be provided by the trader as a pre-contractual information. Nevertheless, the same doubts as those developed above (51) regarding the proposed amendments of Article 7(4) of the Directive 2005/29/EC remain here.

That being said, there is still time for the proposal of March 2022 to be amended and it could provide a real opportunity to specifically address the lack of information and awareness of the negative environmental impacts of AI systems on which the goods and services offered to consumers might be based. One recommendation for the EU lawmaker would be to insert in the list of the pre-contractual information a new element on the environmental impacts of AI systems-based products, with an indication of the precise elements to be provided for that purpose. For a more flexible format, that indication could be done through guidance issued by the European Commission.

In the meantime, and as complementary tools, labels can be very useful means for the consumer to be better informed.

C. *Labels as a tool to inform consumers*

Labelling could be a useful way of reinforcing the obligations to provide certain information to consumers regarding the environmental impacts of AI systems. (52) Labels allow consumers to get clear information on the product or one of its aspects. For instance, energy labels rank appliances on a scale from A to G according to their energy consumption levels. (53)

When it comes to digital technologies and the environment, some labels already exist. However, many focus on digital technology products and/or data centres and not on the software itself. This is for example the case with the widespread “Energy Star” label and the “EU Ecolabel.”

(51) See *supra*, § II, A.

(52) Regarding the usefulness of labels to inform consumers, see also M. HO-DAC and E. THELISSON, “Le consommateur européen face à l’intelligence artificielle – Quel cadre réglementaire au sein du marché unique numérique”, in M. Combet (dir.), *Le droit européen de la consommation au XXI^e siècle*, Brussels, Bruylant, 2022, pp. 112 et seq.

(53) Regulation (EU) 2017/1369 of the European Parliament and of the Council of 4 July 2017 setting a framework for energy labelling and repealing Directive 2010/30/EU, *OJ*, L 198 of 28 July 2017. See also related delegated regulations (EU) No. 2019/2013 to 2019/2017.

The first one was created by the US Environmental Protection Agency. It focuses on the energy efficiency of (among others) electronics and office equipment (computers, displays, imaging equipment, telephones, televisions, *etc.*) and data centre equipment. (54) This label does not focus on the life cycle of the product but only on the use phase, which makes it also less “complete.”

The “EU Ecolabel” is another well-known label. Established by the European Union, the label is awarded to a group of products and services that meet certain environmental standards throughout their life cycle. (55) When it comes to digital technologies, the “EU Ecolabel” can be awarded to displays and screens. The eligibility criteria concern mainly the energy consumption of those products, restricted substances, reparability and commercial guarantee, and end-of-life management. (56)

Both the “Energy Star” label and the “EU Ecolabel” certify products but do not cover software. (57) However, software based on AI may have negative environmental impacts, as explained above. Labels focusing on the environmental impacts of software exist, even though they are not many of them and seem less popular.

For example, the “Blue Angel” label was created by the German Federal Government. Concerning digital technology products, it certifies among other data centres, printers, servers and data storage products. Since 2020, Blue Angel can also certify among other products “resources and energy-efficient software products.” They refer to “application software that has a user interface and can be run on one of the reference systems stated in Appendix D” (the Appendix D contains a description of the reference system for Windows/Linux and Mac OS and examples for standard usage

(54) The specifications for each category of products are on the following page: <https://www.energystar.gov/products/spec>.

(55) European Commission, “EU Ecolabel”, available at: https://environment.ec.europa.eu/topics/circular-economy/eu-ecolabel-home_en.

(56) Commission decision (EU) 2020/1804 of 27 November 2020 establishing EU Ecolabel criteria for electronic displays, *OJ*, L 402 of 1st December 2020.

(57) For Energy Star, see the catalogue of eligible products here: <https://www.energystar.gov/products/spec>; for the EU Ecolabel, see the catalogue of products and services that can be awarded the EU Ecolabel: <https://ec.europa.eu/ecat>. When it come to services, the EU Ecolabel can be awarded to tourist accommodation only, at the time of writing these lines (https://environment.ec.europa.eu/topics/circular-economy/eu-ecolabel-home/eu-ecolabel-tourist-accommodation/eu-ecolabel-tourist-accommodation-catalogue_en).

scenarios). (58) Nevertheless, if the vast majority of the computing work of the software is carried out on a remote server instead of on a local computer, the label cannot be awarded to the software. (59) Moreover, to be certified, the software must comply with a range of requirements. Next to requirements regarding energy-efficiency, the software products must for example be free from advertising, not contribute to the early replacement of existing hardware and be used for a long time without any serious disadvantages arising notably regarding IT security. (60) The Blue Angel label is thus an example of an existing label focusing on the environmental impact of software.

The existence of labels focusing on the environmental impact of software must of course be welcomed. Nevertheless, we regret that they are not widely used or well-known by the average consumer. This is demonstrated by the fact that the first certified software with the “Blue Angel” label was KDE OKULAR in 2022, (61) a universal document viewer. By now, this tool is therefore not yet effective to inform the consumer about the environmental impact of AI systems. Moreover, the use of labels is not mandatory and depends on the good will of the businesses.

CONCLUSIONS

To conclude, the current European Consumer Law and proposed amendments may be interpreted as meaning that the consumer must (or will have to) receive information concerning the negative environmental impact of AI systems on which the products they want to buy or use are based. Labels can be a tool to provide this information or to reinforce this obligation.

A central challenge remains to assess the environmental impact of AI systems and to identify which precise information should be provided to consumers considering that this information must be

(58) Blue Angel, “Resource and Energy-Efficient Software Products, DE-UZ 2015, Basic Award Criteria”, January 2020, p. 10, available at: <https://produktinfo.blauer-engel.de/uploads/criteriafile/en/DE-UZ%20215-202001-en-Criteria-V2.pdf>. This document contains the Appendix D referred to in the definition (see p. 34).

(59) *Ibid.*, p. 10.

(60) *Ibid.*, see requirements as from p. 10.

(61) “Environmentally friendly – digitalisation with the Blue Angel”, *Blue Angel – Press*, 25 October 2022, available at: <https://www.blauer-engel.de/en/press/detail/environmentally-friendly-digitalisation-blue-angel> (consulted on 23 December 2022). For more information, see also Okular – KDE Applications.

understandable and useful for them. However, we believe that if the industry is obliged to provide information on the environmental impacts of the AI systems, it will be forced to calculate these impacts. Even if the method used to do so may not be the best and the most accurate at first, it can be improved and refined with time and constructive criticism.

More generally, it is not because consumers receive information about the environmental impact of an AI system that they will be able and willing to adapt their consumption behaviour. Therefore, informing consumers may not be enough to create a radical behaviour change. Moreover, consumers' information cannot be a tool that States and businesses would use to absolve themselves of any responsibility for the environmental impacts of AI, and more generally, digital technologies. Consumers cannot be the sole actors of change.

In that regard, a more radical solution could be to simply prohibit certain AI systems or certain AI practices, those which would have an unacceptable negative environmental impact.

Another (or complementary) solution could be to impose eco-design requirements on AI systems and ban those that do not meet them. The European Declaration on Digital Rights and Principles for the Digital Decade signed in December 2022 expresses this idea by stating that "To avoid significant harm to the environment, and promote a circular economy, digital products and services should be designed, produced, used, disposed of and recycled in a way that minimises their environmental and social impact." (62) Therefore, according to the European Parliament, the Council, and the Commission, not only digital products but also digital services should be eco-designed. Accordingly, this would imply that the AI systems themselves, which are the foundation for some of those products and services, are designed and used in the least environmentally damaging way possible.

(62) The European Parliament, the Council and the Commission, "European Declaration on Digital Rights and Principles for the Digital Decade", COM(2022) 28 final, 26 January 2022, p. 6, Chapter 5: "Sustainability." This idea has been further confirmed, see European Declaration on Digital Rights and Principles for the Digital Decade 2023/C 23/01, JO, C 23 of 23 January 2023, Chapter VI: "Sustainability".

France wanted to go in that direction with its law to reduce the environmental impact of digital technology. (63) In fact, the ambition of the proposed text was to make the eco-design of certain online communication services (for example, websites) mandatory. (64) However, this proposal was not adopted because it would have been difficult to apply the eco-design requirements to non-French actors. (65) Indeed, as powerful actors regarding online communication services are most often located outside France, the provisions would not have worked effectively. Therefore, this obligation was replaced in the final text by an obligation for the French authorities to create a general frame of reference for the eco-design of digital services. (66) Even if this is far less ambitious than the original proposal, this framework may nevertheless be a very useful tool. It could help to assess the environmental impact of digital services and products and to answer one of the current challenges mentioned/tackled in this paper. However, we are facing such a big and important crisis that more should be done.

(63) Loi (FR) No. 2021-1485 du 15 novembre 2021 visant à réduire l’empreinte environnementale du numérique en France, *JORF*, No. 0266 of 16 November 2021.

(64) Proposition de loi visant à réduire l’empreinte environnementale du numérique en France, Sénat (fr.), 2020-2021, No. 42, 12 January 2021, Art. 16.

(65) The explanation given by France for this is that the eco-design obligations would have been a technical regulation under Directive (EU) 2015/1535 which lays down a procedure for the provision of information in the field of technical regulations and of rules on Information Society services. However, according to us, the fact this it is a technical regulation does not prevent the application of the rule to non-French actors if a certain procedure is followed. The real reason why it would have been difficult to apply the eco-design obligation to non-French actors is that it would have been a requirement falling within what is called the coordinated field, as it would have been a requirement concerning the quality of the service. Therefore, the internal market clause contained in Article 3 of the Directive 2000/31/EC on electronic commerce would have applied. According to this clause, and unless the conditions for derogation are fulfilled, the service provider of an information society service shall comply with the national provisions applicable in the Member State in which it is established. For an analysis of this amendment of the proposal, see C. BOURGUIGNON, “Le fonctionnement du marché intérieur de l’Union européenne devrait-il être repensé pour intégrer les impacts environnementaux des technologies numériques?”, in H. JACQUEMIN (coord.), *Time to reshape the digital society – 40th anniversary of the CRIDS*, November 2021, pp. 33-38.

(66) Loi (FR) No. 2021-1485 du 15 novembre 2021 visant à réduire l’empreinte environnementale du numérique en France, *JORF*, No. 0266, 16 November 2021, Art. 25.