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Greening AI? The new principle of sustainable digital products and services in the EU

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Abstract: The EU legislator has so far focused on the data-privacy and consumer-protection aspects of AI technologies. At the same time, AI is seen as a key driver of the green strategies of the EU. Yet, the EU regulatory and policy framework tends to neglect the environmental implications of AI. The massive employment of AI technologies results in a significant increase in energy consumption and affects the exploitation of rare natural resources dramatically. The Declaration on Digital Rights and Principles for the Digital Decade, whose final chapter is dedicated to digital sustainability, is a first step in the attempt to plug this gap. The present paper assesses the nature of the principles that have been proposed and traces their conceptual genealogy within the EU regulatory and policy framework. It identifies the emergence of a new principle of sustainable digital products and services, which is made explicit by the Declaration through a process of normative retrofitting. The paper questions the ambitions behind this principle by reference to the oxymoron of the twin transitions, which pervades the current economic model of the EU and its sustainability targets, and to the emerging idea of digital sobriety.

Keywords: AI; sustainability; digital products and services; twin transitions; digital sobriety.

1. Introduction

The deployment of artificial intelligence ('AI') exercises a profound influence on society and the economic market. The regulatory attention of the EU has recently geared towards the problems that may arise from this, as some of the adopted legislation attest. Article 22 of the General Data Protection Regulation was the first norm adopted in the EU to tackle these issues. It prohibits exclusively automatic decisions if they are liable to have a significant impact on a data subject.¹ This principle was introduced in 2016, and it soon demonstrated to be insufficient to regulate the now-widespread use of AI systems. Proposed in 2021 and finally adopted in 2024, the AI Act has excited heated policy debates about privacy and

¹ See Reuben Binns and Michael Veale, 'Is That Your Final Decision? Multi-Stage Profiling, Selective Effects, and Article 22 of the GDPR' (2021) 11 *International Data Privacy Law* 319; Edoardo Celeste and Giovanni De Gregorio, 'Digital Humanism: The Constitutional Message of the GDPR' (2022) 3 *Global Privacy Law Review* 4.

consumer protection throughout its passage through the legislative process.² Several complementary provisions have also been collated in the proposed AI Liability Directive.³ These pieces of legislation will be key to addressing the legal uncertainties that the commercial use of AI engenders, and they indicate the EU's aim to create a more fertile ground for AI development in the private sector due to its thus far limited role in the global scene.⁴ At the same time, it is possible to note that the environmental implications of AI have been subjected to somewhat less intensive scrutiny by the EU. This can be problematic since AI generates large amounts of carbon emissions,⁵ and AI technologies can obstruct progress towards the climate-change and environmental-protection objectives of the EU.⁶

It is arguably in this context that the EU has begun to refer to digitalisation and decarbonisation by using the umbrella term the 'twin transitions'.⁷ The word 'twin' is meant to denote the idea that the two transformations should be contemporaneous as well as interconnected. Despite these flagship commitments, there has been a tendency to treat the digital and the green policies of the EU as distinct policy clusters.⁸ This approach has reverberated on the adjacent EU regulatory framework. For instance, in the field of AI, the EU legislator has largely developed regulation around consumer protection and data privacy concerns. Regulatory provisions aimed at addressing environmental risks posed by AI have entered the AI Act only after the latest amendments by the European Parliament.⁹ In particular, the amendments require the disclosure of energy consumption information during

² European Commission, 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 2021 [COM/2021/206 final]. See, e.g., Onur Bakiner, 'Pluralistic Sociotechnical Imaginaries in Artificial Intelligence (AI) Law: The Case of the European Union's AI Act' (2023) 15 Law, Innovation and Technology 558.

³ European Commission, Proposal for a Directive of the European Parliament and of the Council on Adapting Non-contractual Civil Liability Rules to Artificial Intelligence (AI Liability Directive) 2022 [COM/2022/496 final]. See, e.g., Jan De Bruyne, Orian Dheu and Charlotte Ducuing, 'The European Commission's Approach to Extra-Contractual Liability and AI – An Evaluation of the AI Liability Directive and the Revised Product Liability Directive' (2023) 51 Computer Law & Security Review 105894.

⁴ According to 'The AI Index 24 Annual Report', in 2023 AI private investment was led by the United States (USD 67.2 billion). Its investment was approximately 8.7 times greater than the investment in China (USD 7.8 billion), and 17.8 times greater than the investment in the United Kingdom (USD 3.8 billion). In Europe, the amount of investment is much lower, with only USD 1.91 billion in Germany, 1.89 billion in Sweden, 1.69 billion in France and 0.36 billion in Spain. See Nestor Maslej, Loredana Fattorini, Raymond Perrault, Vanessa Parli, Anka Reuel, Erik Brynjolfsson, John Etchemendy, Katrina Ligett, Terah Lyons, James Manyika, Juan Carlos Niebles, Yoav Shoham, Russell Wald, and Jack Clark, 'The AI Index 2024 Annual Report' (AI Index Steering Committee, Institute for Human-Centered AI, Stanford University, Stanford 2024) <<https://aiindex.stanford.edu/report/>>.

⁵ See subsection 2.2.

⁶ Regulation (EU) 2021/1119 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law') OJ L 243/1.

⁷ See Joint Research Centre (European Commission) and others, Towards a Green & Digital Future: Key Requirements for Successful Twin Transitions in the European Union (Publications Office of the European Union 2022); Directorate-General for Research and Innovation (European Commission), *Science, Research and Innovation Performance of the EU, 2020: A Fair, Green and Digital Europe* (Publications Office of the European Union 2020) <<https://data.europa.eu/doi/10.2777/534046>> accessed 23 August 2023; European Commission, 'Making the Twin Transition a Reality | Knowledge for Policy' <https://knowledge4policy.ec.europa.eu/foresight/making-twin-transition-reality_en> accessed 22 August 2023.

⁸ See Edoardo Celeste and Goran Dominioni, 'Digital and Green: Reconciling the EU Twin Transitions in Times of War and Energy Crisis' in Federico Fabbrini and Christy A. Petit, *Research Handbook on Post-Pandemic Economic Governance & NGEU Law* (Edward Elgar 2024).

⁹ European Parliament, Amendments adopted by the European Parliament on 14 June 2023 on the proposal for a regulation of the European Parliament and of the Council on laying down harmonised rules on artificial intelligence (Artificial Intelligence Act) and amending certain Union legislative acts (COM(2021)0206 – C9-0146/2021 – 2021/0106(COD)) 2023 [P9_TA(2023)0236].

AI development and use as well as the inclusion of environmental protection within the mandatory risk assessment and management framework.¹⁰

This paper analyses one of the first attempts to plug this gap in EU law. In January 2023 the EU solemnly adopted the European Declaration on Digital Rights and Principles for the Digital Decade. This Declaration constitutes a non-binding instrument that articulates the approach of the EU to the digital transformation in the form of rights, principles and commitments. Those rights, principles and commitments are expressed in a solemn and quasi-constitutional tone.¹¹ The final chapter (Chapter VI) of the Declaration is dedicated to the environmental impact of digital technologies. Although the Declaration is not meant to be a full-fledged guarantee of environmental protection in the domain of AI technology, we argue that it cannot be considered as being entirely moot. Despite its soft law nature, the Declaration is the outcome of a significant process of what we call ‘normative retrofitting’ of EU digital principles. In other words, the Declaration renders a number of hitherto implicit principles of EU digital policy explicit. Accordingly, soft law can be used to address a normative gap left by hard law, as the EU Court of Justice has demonstrated in the early years of the Charter of Fundamental Rights of the EU.¹²

In our examination of the sustainability chapter of the Declaration, we assess the nature of the principles that it advances, and we reconstruct their conceptual genealogy in EU regulation and policy. We focus, in particular, on the emergence of a new principle of sustainable digital products and services. We question the extent to which it may contribute effectively to the greening of the digital sector and, specifically, AI technologies. We also consider the potential impact of such a soft-law principle, highlighting its potential to inspire hard law at both the EU and the Member State level as well as to pave the way for progressive judicial decisions on the environmental effects of AI technologies.

The remainder of this article is structured as follows: Section 2 shows that AI technologies have not only a beneficial effect on environmental protection but also a negative impact on decarbonisation efforts. Section 3 revolves around the latest attempts to integrate environmental considerations into the regulation of AI technologies, focusing, in particular, on the sustainability chapter of the new Declaration on Digital Rights and Principles. Section 4 assesses the novelty of the principle of sustainable digital products and services that emerges from said chapter. Section 5 highlights the limitations of the Declaration by questioning the feasibility of reconciling the digital and the environmental transition. Section 6 concludes.

¹⁰ Philipp Hacker, ‘Sustainable AI regulation’ (2024) 61(2) *Common Market Law Review* 345, at 371 ss.

¹¹ European Declaration on Digital Rights and Principles for the Digital Decade (2023/C) 23/01/2023. See Edoardo Celeste, ‘Digital Constitutionalism, EU Digital Sovereignty Ambitions and the Role of the European Declaration on Digital Rights’ in Annegret Engel, Xavier Groussot and Gunnar Thor Petursson (eds), *New Directions in Digitalisation: Perspectives from EU Competition Law and the Charter of Fundamental Rights* (Springer 2024).

¹² See Bruno de Witte, ‘The Legal Status of the Charter: Vital Question or Non-Issue?’ (2001) 8 *Maastricht Journal of European and Comparative Law* 81; Gráinne De Búrca, ‘After the EU Charter of Fundamental Rights: The Court of Justice as a Human Rights Adjudicator?’ (2013) 20 *Maastricht Journal of European and Comparative Law* 168.

2. Earth-friendly AI? Only a part of the story

2.1. The positive environmental impact of AI technologies

AI technologies have given strong impetus to the digital revolution. The development of AI began more than five decades ago, but it has only come into widespread use recently.¹³ A glut of data, advanced processing capabilities and a sharp decline in the cost of storage have contributed to its ascent. The use of AI has thus taken a prominent place in the digital revolution and, relatedly, started impacting many areas, including environmental protection.

Those who are concerned with environmental matters have generally met the advent of AI with enthusiasm. It is expected that AI can enhance environmental protection and contribute to combating climate change and to conserving biodiversity.¹⁴ The emergence of fields such as climate informatics reflects this enthusiasm. Machine learning can improve climate models.¹⁵ It can also contribute to conservation efforts, say by identifying the areas that poachers frequent.¹⁶ There are many other examples of the utility of AI.¹⁷ For instance, a study that was commissioned by the EU Parliament's Special Committee on Artificial Intelligence in a Digital Age showed that the gains in environmental protection that AI technologies can produce will benefit various actors, including policymakers, citizens, consumers and industries.¹⁸

Furthermore, one should notice that the positive impact on the environment by AI technology does not solely occur in a direct manner – i.e., the main aim of the development and deployment of AI technology is environmental protection.¹⁹ There are cases in which AI applications that have no obvious relationship with the environment contribute to attempts to protect it indirectly. For instance, AI can be used to optimise transport infrastructure and planning, as well as to promote platooning.²⁰ Consequently, transportation becomes more rapid and less expensive as emissions decline.²¹ Similarly, AI-enhanced agriculture can produce more bountiful yields at lower labour costs. The incidents of these improvements include lower consumption of water, fertilisers, and pesticides.

It is evident from the foregoing that AI applications can – directly or indirectly – accelerate the pursuit of environmental goals. Consequently, those applications are widely perceived as Earth-friendly technologies. The attitudes of the EU institutions largely conform to this trend. For instance, according to the EU Commission, digital technologies such as AI

¹³ The concept of AI was first used by Marvin Minsky and John McCarthy in 1956 in a workshop at Dartmouth College. See Michael Haenlein and Andreas Kaplan, 'A Brief History of Artificial Intelligence: On the Past, Present, and Future of Artificial Intelligence' (2019) 61 *California Management Review* 5.

¹⁴ World Economic Forum, 'Harnessing Artificial Intelligence for the Earth' (*World Economic Forum*, 2018) 9.

¹⁵ See e.g. Lily Roberts, 'Machine Learning Techniques Can Speed Up Glacier Modeling By A Thousand Times' (*Columbia Climate School*, 25 March 2022) <<https://news.climate.columbia.edu/2022/03/25/machine-learning-techniques-can-speed-up-glacier-modeling-by-a-thousand-times/>>.

¹⁶ Roberta Kwok, 'AI Empowers Conservation Biology' (2019) 567(7746) *Nature* 133.

¹⁷ See, e.g., Emmanuel Kwame Nti, Samuel Jerry Cobbina, Eunice Efua Attafuaah, Evelyn Opoku and Michael Amoah Gyan, 'Environmental Sustainability Technologies in Biodiversity, Energy, Transportation and Water Management using Artificial Intelligence: A Systematic Review' (2022) *Sustainable Futures* 100068.

¹⁸ Peter Gailhofer et al., *The role of Artificial Intelligence in the European Green Deal*, Study for the special committee on Artificial Intelligence in a Digital Age, European Parliament (2021) 16-20.

¹⁹ Alberto Quintavalla, 'Artificial Intelligence and the Right to a Healthy Environment' in A. Quintavalla and J. Temperman (eds), *Artificial Intelligence & Human Rights* (Oxford University Press 2023) 425.

²⁰ Nadia Giuffrida, Jenny Fajardo-Calderin, Antonio D Masegosa, Frank Werner, Margarete Steudter and Francesco Pilla, 'Optimization and Machine Learning Applied to Last-Mile Logistics: A Review' (2022) 14(9) *Sustainability* 5329.

²¹ These benefits may also arise from ride-sharing services. However, this type of AI may have rebound effect as well (see the following subsection).

‘can accelerate and maximise the impact of policies to deal with climate change and protect the environment’.²² Likewise, the European Parliament is of the view that technology is a ‘game-changer’ in logistics.²³ However, the following subsection will show that the impact of AI technologies on the environment is mixed: AI can also be a source of pollution.

2.2. *The negative environmental impact of AI technologies*

AI is energy intensive. This would not necessarily be a problem if the energy would originate from carbon-neutral sources. However, this is not the case. The carbon footprint of the areas that house large data centres tends to be unusually large due to the use of non-renewable energy sources.²⁴ Although most of the recent empirical research on the carbon footprint of data centres has focused on non-EU countries,²⁵ a current study by the Joint Research Centre warns against the significant impact that AI technology is likely to have on the energy and carbon footprint of data centres in the EU.²⁶

AI models are also inordinately energy intensive.²⁷ For instance, the training of a large language model of the kind that is in vogue at the time of writing produces the equivalent of 300 tonnes of carbon dioxide,²⁸ which is not a negligible amount. These trends in the tech industry are unlikely to be reversed in the near future. The computational demands of AI training models have been doubling every 3.4 months since 2012, a 30,000,000% increase.²⁹

Other factors associated with the development and deployment of AI technology can negatively affect environmental protection. First, the natural and human resources that are needed for AI-enabled devices to be rolled out to the mass market also tend to be exploited unsustainably.³⁰ Second, AI poses concrete risks for the environment due to its technological characteristics.³¹ For example, AI predictions can be erroneous for reasons that humans are unlikely to grasp. The ramifications of prognostic errors can be harrowing, especially if AI is tasked with predicting natural disasters.³² Moreover, one does not need to be paranoid to conceive of scenarios in which hostile actors hack into AI systems to disrupt national energy

²² European Commission, The European Green Deal [Com/2019/640 Final] 9.

²³ European Parliamentary Research Services, ‘Artificial Intelligence in Transport: Current and Future Developments, Opportunities and Challenges’ (2019) available at <[https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/635609/EPRS_BRI\(2019\)635609_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/635609/EPRS_BRI(2019)635609_EN.pdf)> 10.

²⁴ Nicola Jones, ‘How to stop data centres from gobbling up the world’s electricity’ (2018) 561(7722) *Nature* 163.

²⁵ Gary Cook, Jude Lee, Tamina Tsai, Ada Kong, John Deans, Brian Johnson and Elizabeth Jardim, ‘Clicking Clean: Who Is Winning the Race to Build a Green Internet’ (2017) Greenpeace DC 5.

²⁶ Joint Research Centre, *Energy Consumption in Data Centres and Broadband Communication Networks in the EU* (European Commission 2024) at 12.

²⁷ See e.g. Da Li, Xinbo Chen, Michela Becchi, and Ziliang Zong, ‘Evaluating the Energy Efficiency of Deep Convolutional Neural Networks on cpus and gpus’ (2016) IEEE International Conferences on Big Data and Cloud Computing 477; Alfredo Canziani, Adam Paszke and Eugenio Culurciello, ‘An Analysis of Deep Neural Network Models for Practical Applications’ (2016) arXiv preprint arXiv:1605.07678.

²⁸ Emma Strubell, Ananya Ganesh and Andrew McCallum, ‘Energy and Policy Considerations for Deep Learning in NLP’ (2019) arXiv preprint arXiv:1906.02243.

²⁹ D Amodei and D Hernandez, ‘AI and Compute’ (2018) <<https://openai.com/blog/ai-and-compute/>>.

³⁰ On the specific case of Amazon’s Echo, see Kate Crawford and Vladan Joler, ‘An Anatomy of an AI system’ (2018) <<https://anatomyof.ai/index.html>>.

³¹ Quintavalla (n 16); K. Prifti, A. Quintavalla and J. Temperman, ‘Artificial Intelligence and Human Rights: Understanding and Governing Common Risks and Benefits’ in A. Quintavalla and J. Temperman (eds), *Artificial Intelligence & Human Rights* (Oxford University Press 2023) 441.

³² Ziheng Sun, Laura Sandoval, Robert Crystal-Ornelas, S Mostafa Mousavi, Jinbo Wang, Cindy Lin, Nicoleta Cristea et al, ‘A Review of Earth Artificial Intelligence’ (2022) 159 *Computers & Geosciences* 105034; World Economic Forum, ‘Harnessing Artificial Intelligence for the Earth’ (*World Economic Forum*, 2018) 18.

infrastructures or water grids.³³ When AI is used for unintended purposes, it can produce unintended consequences. We noted earlier that AI can detect areas that poachers frequent, but it is equally possible for poachers to use AI to identify areas with high concentrations of patrols.³⁴ That these concerns are currently not being treated as particularly pressing should be a cause for concern, especially given the perilous state of the planet. In the next section, we will discuss the attempts of the EU to address the adverse impact of AI on the environment.

3. EU regulatory efforts to green AI

3.1. From constitutional requirements to soft-law principles

We have shown the Janus-like role of AI: it can both improve and harm the environment. However, there has thus far been a tendency by the EU legislator to treat these aspects as secondary. EU legislation is intended to enhance economic performance in a safe and fundamental rights-compliant manner by making AI ‘human-centric’ and ‘trustworthy’.³⁵ The rules on AI that the EU has adopted over the last decade as well as the legislative initiatives that the EU Commission has proposed attest to the veracity of this proposition: the main targets are ensuring safety or shaping liability rules to bring them into line with technological advances.

The foregoing should not be taken to imply that environmental matters are altogether absent from EU regulatory and policy strategies. For instance, environmental robustness and the protection of societal and environmental wellbeing are two of the six requirements that AI systems must satisfy to comply with the Ethical Guidelines that were drafted by the EU High-Level Expert Group on AI.³⁶ Similarly, the Explanatory Memorandum to the Artificial Intelligence Act does refer to the relevance of the environment when it discusses the need to ensure a high level of protection from the risks that the use of AI systems entails.³⁷

Likewise, and as already flagged in the introduction, the EU has recently begun to refer to the environment more forcefully in the recently adopted AI legislation. The amendments brought forward by the European Parliament in the last iteration of the legislative process related to the AI Act put more emphasis on the fact that AI systems can be harmful to the environment.³⁸ Accordingly, the AI Act calls for purposely considering the right to a high level of environmental protection when assessing the severity of harm caused by AI systems.³⁹ It is to note that the proposed amendments are not confined to a potential environmental harm, but they further encourage “environmentally friendly” AI by establishing it as one of the general principles applicable to all AI systems.⁴⁰ Indeed, the

³³ Eoghan McKenna, Ian Richardson and Murray Thomson, ‘Smart Meter Data: Balancing Consumer Privacy Concerns with Legitimate Applications’ (2012) 41 *Energy Policy* 807; Florian Skopik and Paul Smith (eds), *Smart Grid Security: Innovative Solutions for a Modernized Grid* (Syngress 2015).

³⁴ Ricardo Vinuesa, Hossein Azizpour, Iolanda Leite, Madeline Balaam, Virginia Dignum, Sami Domisch, Anna Felländer, Simone Daniela Langhans, Max Tegmark and Francesco Fuso Nerini, ‘The Role of Artificial Intelligence in Achieving the Sustainable Development Goals’ (2020) 11(1) *Nature Communications* 1.

³⁵ Ugo Pagallo, Jacopo Ciani Sciolla and Massimo Durante, ‘The environmental challenges of AI in EU law: lessons learned from the Artificial Intelligence Act (AIA) with its drawbacks’ (2022) 16(3) *Transforming Government: People, Process and Policy* 359.

³⁶ See, e.g., HLEG (2019), *Ethical Guidelines for Trustworthy AI*, <<https://digital-strategy.ec.europa.eu/en/library/ethics-guidelines-trustworthy-ai>>.

³⁷ European Commission (n 2) 11.

³⁸ See, e.g., recitals 1, 1a, 13, 27.

³⁹ See, e.g., recital 28 and Article 3(44)(a).

⁴⁰ Article 4a(1)(f).

AI Act considers the general environmental impact of AI in a broad sense. With a view to bringing light to that impact, providers shall display energy consumption information in the technical documentation of AI systems.⁴¹ At the same time, they are encouraged to develop codes of conduct including provisions that increase environmental sustainability in line with the European Green Deal and the European Declaration on Digital Rights and Principles.⁴² This said, that the problem has garnered attention only in sharp bursts is remarkable, especially given the environmental-integration requirements that stem from the EU regulatory framework – i.e., Article 11 TFEU and Article 37 of the Charter of Fundamental Rights. The two provisions aim for balancing the economic and the environmental dimensions, and the ideal social market economy which they envisage is certainly one in which the environment is protected adequately.⁴³ Specifically, they do not merely acknowledge the link between the economy and the environment; they *require* a balance to be struck between the two.⁴⁴

On the other hand, one should acknowledge that it is not clear what specific outcomes should result from the application of this EU constitutional duty. The EU and its Member States are free to subscribe to a wide range of views on the weight that environmental protection should carry when pitted against other desiderata, such as, say, growth or social equality.⁴⁵ This wide interpretative latitude is an obstacle to the actuation of the environmental-integration requirements from Article 11 TFEU and Article 37 of the Charter of Fundamental Rights.⁴⁶

In the light of the foregoing, it is interesting that the EU has recently attempted to plug some of the gaps in its policy on the greening of AI and of digital technology generally through the adoption of a soft-law instrument. Similarly to the Charter of Fundamental Rights of the EU, before integrating EU primary law after the Lisbon Treaty, the Declaration was solemnly proclaimed by the EU Commission, Parliament and the Council, but does not possess any legally binding value.⁴⁷ Despite its formal nature, both the EU and its Member States are encouraged to treat it as a source of guidance.⁴⁸ Permeated by European values, the Declaration includes a commitment to a secure, safe and *sustainable* digital transformation, and it promotes digital sovereignty to the status of an imperative in EU policy on the globalised economy.⁴⁹

Building on these objectives, the Declaration purports to integrate environmental considerations into the digital context as a whole: the entire Chapter VI of the Declaration is dedicated to digital sustainability. Specifically, Chapter VI identifies concrete actions that can mitigate the negative impact of digital products and services on the environment, it promotes the circular economy, and it empowers users to make environmentally responsible choices. It also contains a list of commitments that provide clear guidelines for the integration of sustainability into the policies of the EU and its Member States. Accordingly, Chapter VI

⁴¹ See, e.g., Article 11 together with Annex IV under 3.

⁴² See, e.g., Title IX.

⁴³ Suzanne Kingston, *Greening EU competition Law and Policy* (CUP 2012), ch 3 and Beate Sjaafjell, ‘The legal significance of Article 11 TFEU for EU institutions and member states’ in Beate Sjaafjell and Anje Wiesbrock, *The Greening of European Business under EU law: Taking Article 11 TFEU Seriously* (Routledge, 2014).

⁴⁴ Suzanne Kingston, Veerle Heyvaert and Aleksandra Čavoški, *European Environmental Law* (CUP 2017) 15.

⁴⁵ *Ibid.*

⁴⁶ Jan Jans, ‘Stop the integration principle?’ (2010) 33(3) *Fordham International Law Journal* 1533, 1546-7.

⁴⁷ European Declaration on Digital Rights and Principles for the Digital Decade [2023/C 23/01].

⁴⁸ *Ibid.*, Preamble.

⁴⁹ See Celeste (n 9). For an analysis of EU digital sovereignty strategies see Edoardo Celeste, ‘Digital Sovereignty in the EU: Challenges and Future Perspectives’ in Federico Fabbrini, Edoardo Celeste and John Quinn (eds), *Data Protection Beyond Borders: Transatlantic Perspectives on Extraterritoriality and Sovereignty* (Hart 2021).

seems to go further than Article 37 of the Charter of Fundamental Rights in articulating the substance of sustainability and its positive echoes,⁵⁰ and, as explained in the next few sections, it can play a role in the specific context of AI technology.

3.2. Chapter VI of the Declaration: Digital sustainability

On January 23, 2023, the EU Commission, the European Parliament and the Council adopted the second and final version of the European Declaration on Digital Rights and Principles.⁵¹ Sustainability did not feature in the very first version of the document,⁵² but it was promptly incorporated into the text during the legislative process. The European Commission proposed to codify a set of principles for ‘digital systems and devices that respect the environment’ amid the public consultations that preceded the adoption of the Declaration.⁵³ Such principles were ventilated throughout the process and appear both in the 2022 draft and in the final text, as does Chapter VI.

Chapter VI of the Declaration is entitled ‘Sustainability’, and it consists of two articles, Article 23 and Article 24. Article 23 is substantive, in that its purpose is to prevent harm to the environment, while Article 24 is procedural, in that it structures user choice. Chapter VI also includes a series of commitments. In both versions of the Declaration, the promotion of sustainable digital products and services that prevent significant harm to the environment lies at the core of Chapter VI. That objective is meant to be achieved through the stimulation of a circular economy and by raising awareness of environmental matters among the public. In the final version of the Declaration, the capacity of Chapter 6 to have a real impact is enhanced by refining its target and better concretizing the specific means to achieve it. This denotes an increasing attention of the EU to environmental matters in the digital context – a trend also observed before in relation to the AI Act.

More in particular, the final version of Article 23 stipulates that the design, production, use, repair, recycling, and disposal of digital products and services should be responsive to the need to mitigate environmental impacts and that premature obsolescence ought to be avoided. Article 23 thus emphasises the circular economy. It is important to note that the level of environmental protection that the Declaration promotes decreased in the course of its passage to promulgation. The first version of Article 23 referred to *minimising* environmental and social impacts, while the final one refers to *mitigation*. To minimise is to reduce something to its lowest possible level; to mitigate is to make something less harmful. Therefore, the Declaration requires that the environmental and social impact of digital products and services be reduced, but not necessarily to the lowest possible degree.

Article 24 promotes access to accurate and digestible information about environmental impacts and energy consumption, as well as about the reparability and lifetimes of digital products. According to the Declaration, the provision of such information should enable those

⁵⁰ Cf. Gracia Marin-Duran and Elisa Morgera, ‘Commentary on Article 37 of the EU Charter of Fundamental Rights: Environmental Protection’ Europa Working Papers, no. 2013/02, Europa Working Paper.

⁵¹ We use the terms ‘first version’ and ‘previous version’ to refer to the first draft of the Declaration (26 January 2022) and ‘second version’, ‘final version’, or ‘the Declaration’ to denote the final text that was published in January 2023.

⁵² It was not included in the set of digital principles and rights to be declared in the declaration envisioned by European Commission, 2030 Digital Compass: the European way for the Digital Decade 2021 [COM/2021/118 final].

⁵³ See European Commission, ‘Public Consultation on a Set of European Digital Principles | Shaping Europe’s Digital Future’ (12 May 2021) <<https://digital-strategy.ec.europa.eu/en/consultations/public-consultation-set-european-digital-principles>>.

who live in the EU to make responsible choices.⁵⁴ The final version defines the types of information that should be made more accessible. The first version of the Declaration only referred to information about environmental impacts and energy consumption, while the version that was eventually adopted also refers to information about reparability, lifecycle duration and premature obsolescence.

The role of users was also strengthened through the addition of a ‘choice period’ that begins to run after a product has begun circulating in the economy. At the time when a product is rolled out to the market, information about the environmental impacts and the energy consumption of a product enables users to make responsible purchasing decisions. A second choice period begins thereafter. During that period, information about reparability and lifecycle duration enables users to act pro-environmentally if they so choose. The decision to repair or update the product or service after it has deteriorated is made jointly by users and manufacturers⁵⁵ – a user can only decide whether to repair or update if repairs or updates are made available by the manufacturer. The second version of the Declaration allocates greater responsibility to manufacturers, who may, for instance, offer convenient repairs, make products that are easy to repair, or design them so that they do not become obsolete rapidly and so that they can be updated if necessary.

As noted previously, the two articles are followed by commitments. The first version of the Declaration included two commitments; the second version includes four. The two commitments that the EU made originally, which were later modified slightly, are to support the development and use of sustainable digital technologies⁵⁶ and to promote the ‘development, deployment and active use’ of innovative digital technologies that fosters the green transition. AI technologies can certainly be subsumed into that definition.⁵⁷ One may assume that the quasi-constitutional tone of the Declaration made it more appropriate to focus on digital technologies in general, rather than narrowing down the norm to AI technologies specifically. The specific mention of the green transition in the second commitment was only added in the second version, and it is fully in line with the Strategic Foresight Report on twinning the digital and the green transition that the Commission adopted in 2022.⁵⁸

The two commitments that were added to the final version are to encourage consumers and businesses to make sustainable choices and to promote responsible corporate behaviour in environmental and labour-rights matters in global value chains.⁵⁹ The EU also committed itself to promoting sustainability standards and labels for digital products and services. This provision seems particularly promising in the context of the fast-changing field of AI, where standards are increasingly being considered as an effective means of regulating the development of AI in a futureproof and flexible way.⁶⁰ The changes that were made to the second draft of the provision imply more concrete action and a broader scope of application.

⁵⁴ Article 24 uses the expression ‘everyone’, but the Declaration is consistent in using the expression ‘people living in the EU’. Therefore, ‘everyone’ is here interpreted as limited to people living in the EU, being this comprehensive of EU citizens and non-EU citizens that live in the EU.

⁵⁵ Manufacturer is understood in broad terms and may also encompass the producer, importer, seller, or any other person which intervenes in the value chain of the product or service.

⁵⁶ Chapter VI, letter a.

⁵⁷ Chapter VI, letter c.

⁵⁸ European Commission, 2022 Strategic Foresight Report Twinning the green and digital transitions in the new geopolitical context 2022 [COM/2022/289 final].

⁵⁹ Chapter VI, letter b.

⁶⁰ Chapter VI, letter d. See Nora von Ingersleben-Seip, ‘Competition and Cooperation in Artificial Intelligence Standard Setting: Explaining Emergent Patterns’ (2023) 40 *Review of Policy Research* 781; José Samaniego, ‘Practices of Governing and Making Artificial Intelligences’ (2018) 7 *Disputatio: Philosophical Research Bulletin*.

Both the additional commitments emphasise the roles of the EU institutions, users and corporations, which should be spurred to make sustainable and responsible choices. The promotion of standards and labels also accentuates those roles because it implies that corporations will affix them to their products and services and that users will consider them when they select products.

Notwithstanding the shift from minimisation to mitigation in Article 23, the scope of Chapter VI was ultimately extended, as were the other rights and principles that the document contains.⁶¹ An attempt was made to render the Declaration more effective and inclusive.⁶² For example, in the first version, it was only ‘Europeans’ who would benefit from the rights and principles in the Declaration. In the final document, the word ‘Europeans’ was replaced by the more inclusive ‘people living in the EU’. More generally, the commitments of the EU that featured in the first version were either maintained or enhanced in the final document,⁶³ and a stronger emphasis was placed on the responsibilities of users.⁶⁴

4. Sustainable digital products and services: a new principle?

4.1. An implicit principle

The Declaration includes two types of articles, namely rights and principles.⁶⁵ Rights can be identified from the expression ‘everyone has the right to’. Principles are in the present tense or use modal verbs. Articles 23 and 24 take the latter form; extensive use is made of the verb ‘should’. The Declaration thus only contains a *principle* of sustainable digital products and services. It includes neither a broader right to a healthy environment nor a right to sustainable digital products and services. Still, it can be argued that the principle of sustainable digital products and services is necessary for the creation of a healthy environment, and it might be seen as a specific articulation of the corresponding right. According to the Special Rapporteur of the Human Rights Council, a right to a healthy environment would imply both procedural rights, such as the right to receive information and to participate in decision-making processes, and substantive ones, such as the right to breathe air that is not harmful.⁶⁶ The principle of sustainable digital products and services is thus an instrument for the implementation of the broader right to a healthy environment: it indicates how digital technologies should be designed and used and what information should be made available to users if they are to make greener and better-informed choices.

The Declaration is indicative of the political objectives of the EU in the digital realm, which revolve around individual rights, as well as of the commitments that must be made for those objectives to be achieved.⁶⁷ The Declaration claims to build on pre-existing EU law.⁶⁸ In particular, it aims to transpose the European values and fundamental rights that apply offline

⁶¹ For example, the section ‘Working conditions’ in ‘Chapter II: Solidarity and inclusion’ is renamed ‘Fair and just working conditions’ in the second version, and an article on the role of trade unions and employers’ organisations in the digital transformation is added.

⁶² Celeste (n 9).

⁶³ For example, in the section ‘Fair and just working conditions’, four commitments are added.

⁶⁴ Another clear example of that increased responsibility is to be found in the promotion of ‘consumer’s ability to make autonomous and informed choices’ in ‘Chapter III: Freedom of choice’. However, it is not possible to affirm that this increased attention on the user is seen globally in the second version of the Declaration.

⁶⁵ Celeste (n 9).

⁶⁶ See Human Rights Council, ‘Report of the Special Rapporteur on the Issue of Human Rights Obligations Relating to the Enjoyment of a Safe, Clean, Healthy and Sustainable Environment’ (UN, 2018) A/73/188 <<https://digitallibrary.un.org/record/1639368>>.

⁶⁷ Declaration, Preamble 7.

⁶⁸ Declaration, Preamble 10. See Celeste (n 9).

onto the digital world.⁶⁹ If this line of argument is followed through to its conclusion, then it should be possible to identify the existence of a principle of sustainable products in the *analogue* world which the Declaration is transposing onto the digital realm. Surprisingly, despite the importance of sustainability to the EU, there is no principle of sustainable *analogue* products and services in the EU Charter of Fundamental Rights or in the Treaties. Likewise, our empirical analysis of recent EU Court of Justice judgments revealed no explicit or implicit references to such a principle.⁷⁰ The Court has discussed other principles, such as the ‘waste hierarchy principle’⁷¹ and ‘the general environmental protection principles of precaution and sustainability, technical feasibility and economic viability, protection of resources as well as the overall environmental, human health, economic and social impacts’.⁷² Judges have also examined access to information, public participation in decision making, and access to justice in environmental matters.⁷³

However, some EU regulations do recognise a principle of sustainable analogue products implicitly. For example, the European Green Deal refers to the potential that sustainable products and services have for the promotion of a clean and circular economy.⁷⁴ The Circular Economy Action Plan (CEAP) is one of the main elements of the European Green Deal.⁷⁵ The CEAP initiatives pertain to the entire lifecycle of products and are intended to ensure that products are designed with a view to encouraging the adoption of circular-economy processes, sustainable consumption and the prevention of waste. The underlying premise is that sustainable products should become the norm in the EU.⁷⁶ For instance, in the EU Ecolabel scheme that was established as part of the CEAP, certification is conditional on environmental performance.⁷⁷ In addition, the New Consumer Agenda 2020 empowers consumers by supplying them with the information that they need to make environmentally conscious purchasing decisions and to eradicate greenwashing.⁷⁸ One proposal that also forms part of that agenda is to amend the Consumer Rights Directive so as to create a new right to information about the durability and reparability of products.⁷⁹

More recently, the EU adopted the Sustainable Products Initiative.⁸⁰ Its aim is to promote efficiency and climate neutrality and to accelerate progress towards a circular

⁶⁹ Declaration, Preamble 3.

⁷⁰ The methodology involved a search using the European Court of Justice search engine (curia.europa.eu) of decisions from January 2019, year of publication of the EU Green Deal, till September 2023. The criteria selected were ‘Environment’ as the subject-matter, and different searches combining one, some or all the following words: ‘sustainable product’, ‘sustainable products’, ‘product sustainability’, ‘ecodesign’, ‘ecolabel’, ‘products’, ‘product’, ‘sustainability’, ‘sustainability of products’.

⁷¹ This principle is enshrined in Article 4 of Directive 2008/98/EC, which reads as follows: ‘1. The following waste hierarchy shall apply as a priority order in waste prevention and management legislation and policy: (a) prevention; (b) preparing for re-use; (c) recycling; (d) other recovery, e.g., energy recovery; and (e) disposal.’ See Case C-305/18 *Verdi Ambiente e Società - Aps Onulu and others* [2019].

⁷² These principles are enshrined in Article 4(2) Directive 2008/98/EC. See Case C-305/18 *Verdi Ambiente e Società - Aps Onulu and others* [2019] and Case C-487/17 *Criminal proceedings against Alfonso Verlezza and Others* [2019].

⁷³ See Case C-432/21 *Commission v Poland (Gestion et bonne pratique forestières)* [2023] and Case T-9/19 *ClientEarth v EIB. External relations - international agreement* [2021].

⁷⁴ European Green Deal, Chapter 2, 2.1.3 *Mobilising industry for a clean and circular economy*.

⁷⁵ European Commission, A new Circular Economy Action Plan For a cleaner and more competitive Europe [COM/2020/98 final] 2020.

⁷⁶ *Ibid*, Chapter 1. Introduction.

⁷⁷ *Ibid*, Chapter 2. A Sustainable Product Policy Framework.

⁷⁸ European Commission, New Consumer Agenda Strengthening consumer resilience for sustainable recovery [COM/2020/696 final] 2020.

⁷⁹ ‘Circular Economy: Commission Proposes New Consumer Rights’ (*European Commission - European Commission*) <https://ec.europa.eu/commission/presscorner/detail/en/ip_22_2098> accessed 23 July 2023.

⁸⁰ European Commission, Making sustainable products the norm [COM/2022/140 final] 2022.

economy that is free of pollution. It was in this context that the proposal for a new Ecodesign for Sustainable Products Regulation (ESPR) was published.⁸¹ The Regulation in question establishes requirements for reparability at the phase of product manufacture. The focus is on design and the availability of spare parts. These requirements are related, among others, to durability, reliability, reusability, upgradability, reparability, maintenance, recyclability, carbon footprints and expected waste.⁸² The Directive on Empowering Consumers for the Green Transition (ECGT)⁸³ elaborates on the New Consumer Agenda 2020 and provides consumers with more accurate information about durability and reparability at the time of purchase. The EU has also proposed a Directive that should contain common rules for the repair of goods.⁸⁴ The Proposal for a Green Claims Directive⁸⁵ is intended to make claims about sustainability reliable, comparable and verifiable across the European Union. Importantly, the Commission has argued that the ESPR, the ECGT and the Directive on the repair of goods, when taken in their totality, reflect the recognition of a ‘right to repair’.⁸⁶ There are also more specific instruments that promote sustainability in specific analogue domains, including textiles,⁸⁷ constructions products,⁸⁸ industrial emissions and microplastics.⁸⁹ Ultimately, circular economy principles have also found their way into the AI Act through the amendments proposed by the EU Parliament. In particular, besides energy use, AI systems should reduce the use of resources and waste.⁹⁰

The approach held by Member States tends to reflect the European one. Thus, various EU countries have passed similar measures to promote sustainable products and services, but

⁸¹ Proposal for a Regulation of the European Parliament and of the Council Establishing a framework for setting ecodesign requirements for sustainable products and repealing Directive 2009/125/EC [COM (2022) 142 final] 2022.

⁸² ESPR, Article 1.1.

⁸³ Directive (EU) 2024/825 of the European Parliament and of the Council of 28 February 2024 amending Directives 2005/29/EC and 2011/83/EU as regards empowering consumers for the green transition through better protection against unfair practices and through better information.

⁸⁴ Proposal for a Directive of the European Parliament and of the Council on common rules promoting the repair of goods and amending Regulation (EU) 2017/2394, Directives (EU) 2019/771 and (EU) 2020/1828 [COM/2023/155 final] 2023; European Parliament Legislative Resolution of 23 April 2024 on the Proposal for a Directive of the European Parliament and of the Council on Common Rules Promoting the Repair of Goods and Amending Regulation (EU) 2017/2394, Directives (EU) 2019/771 and (EU) 2020/1828 (COM(2023)0155 – C9-0117/2023 – 2023/0083(COD)) [P9_TA(2024)0308].

⁸⁵ Proposal for a Directive of the European Parliament and of the Council on substantiation and communication of explicit environmental claims (Green Claims Directive) [COM/2023/166 final] 2023. See also Think Tank European Parliament, “‘Green Claims’ Directive: Protecting Consumers from Greenwashing” (europa.eu) <[https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI\(2023\)753958](https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI(2023)753958)>.

⁸⁶ European Commission, ‘Rules Promoting the Repair of Goods’ <https://commission.europa.eu/law/law-topic/consumer-protection-law/consumer-contract-law/rules-promoting-repair-goods_en>.

⁸⁷ European Commission, ‘Textiles Strategy’ <https://environment.ec.europa.eu/publications/textiles-strategy_en>.

⁸⁸ European Commission, ‘Review of the Construction Products Regulation’ <https://single-market-economy.ec.europa.eu/sectors/construction/construction-products-regulation-cpr/review_en>.

⁸⁹ For example, see European Commission, ‘Proposal Revision Industrial Emissions Directive’ <https://environment.ec.europa.eu/publications/proposal-revision-industrial-emissions-directive_en> ; European Commission, ‘Microplastics Pollution – Measures to Reduce Its Impact on the Environment’ (*European Commission - Have your say*, 18 January 2022) <https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12823-Microplastics-pollution-measures-to-reduce-its-impact-on-the-environment_en>.

⁹⁰ European Parliament (n 8) recitals 46(a) and 87(a), Articles 28(b)(d) and 84(3)(b)(d).

those measures do not refer explicitly to either digital products or AI technologies.⁹¹ As in EU law, although the principle of sustainable analogue products and services has not been recognised explicitly, it is latent in the various instruments that put it into effect.

4.2. Digital constitutionalism and normative retrofitting

The adoption of a non-binding instrument that articulates digital rights and principles, such as the Declaration, is not a unique EU development. Over the past years, more than 200 such documents have been adopted by a wide assortment of entities, from civil-society groups to international organisations. This phenomenon has been dubbed ‘digital constitutionalism’.⁹² The documents, which academics call ‘Internet bills of rights’, share various characteristics: they are often couched in constitutional language; they purport to transplant existing constitutional principles into the digital society; they address both private and public actors; and they lack legal force, playing essentially a policy-advocacy function.⁹³ At the same time, since they are free of the formalism of institutionalised political and legislative processes, they are important indicia of salient societal concerns that have not been addressed adequately or at all in normative instruments. In other words, they might be regarded as the ‘voice’ of society, expressed almost in real time and in a language that is normative and constitutional.⁹⁴

In the light of the foregoing, we thought it prudent to examine a public dataset of Internet bills of rights in order to determine whether a right to sustainable digital products and services or an equivalent principle has emerged at societal level.⁹⁵ On the whole, it would be inaccurate to say that such principle features prominently in the extant Internet bills of rights. However, some of these documents do refer to the principle explicitly. For example, the *Carta Catalana per als Drets i les Responsabilitats Digitals* (‘Catalan Charter on Digital Rights and Responsibilities’)⁹⁶ adopted in December 2019 states that Internet access must be sustainable and provided in a manner that protects the environment.⁹⁷ Similarly, Article XXII.1 of the Spanish *Carta de Derechos Digitales* (‘Charter of Digital Rights’)⁹⁸ of July 2021 stipulates that those who develop digital technologies must pursue environmental

⁹¹ See, e.g., Loi n° 2021-1104 du 22 août 2021 portant lutte contre le dérèglement climatique et renforcement de la résilience face à ses effets (1) and Loi n° 2014-344 du 17 mars 2014 relative à la consommation in France; ‘Estrategia Española de Economía Circular, España Circular 2030’ and Ley 2/2011, de 4 de marzo, de Economía Sostenible in Spain; Decreto Legislativo 8 novembre 2021, n. 196. Attuazione della direttiva (UE) 2019/904, del Parlamento europeo e del Consiglio del 5 giugno 2019 sulla riduzione dell’incidenza di determinati prodotti di plastica sull’ambiente (21G00210) in Italy; and Decreto-Lei n.o 83/2022 de 9 de dezembro in Portugal.

⁹² On Internet bills of rights, see Edoardo Celeste, *Digital Constitutionalism: The Role of Internet Bills of Rights* (Routledge 2022); for a panoramic of theories on digital constitutionalism please see Edoardo Celeste, ‘Digital Constitutionalism: A New Systematic Theorisation’ (2019) 33 *International Review of Law, Computers & Technology* 76.

⁹³ See Edoardo Celeste, ‘Internet Bills of Rights: Generalisation and Re-Specification Towards a Digital Constitution’ (2023) 30 *Indiana Journal of Global Legal Studies* 25.

⁹⁴ On the same line, but focusing on the context of social media, see Edoardo Celeste and others, *The Content Governance Dilemma: Digital Constitutionalism, Social Media and the Search for a Global Standard* (Palgrave Macmillan 2023); Edoardo Celeste and others, ‘Digital Constitutionalism: In Search of a Content Governance Standard’ in Edoardo Celeste, Amélie Heldt and Clara Iglesias Keller (eds), *Constitutionalising Social Media* (Hart 2022).

⁹⁵ The database is available at <www.digitalconstitutionalism.org>.

⁹⁶ Generalitat de Catalunya, ‘Carta catalana per als drets i les responsabilitats digitals’ (gencat | Polítiques Digitals) <<http://politiquestdigitals.gencat.cat/ca/ciutadania/drets-responsabilitats/carta/>>.

⁹⁷ Carta Catalana per als Drets i les Responsabilitats Digitals, Article 4.g). (Authors’ translation)

⁹⁸ Gobierno de España. Ministerio para la Transformación Digital y de la Función Pública, ‘Carta de Derechos Digitales | España Digital 2026’ (espanadigital.gob.es) <<https://espanadigital.gob.es/lineas-de-actuacion/carta-de-derechos-digitales>>.

sustainability and ensure respect for the rights of future generations.⁹⁹ The second part of that Article runs as follows: ‘[...] public powers will promote policies aimed at achieving such objectives with particular attention to the sustainability, durability, repairability and backward compatibility of devices and systems, avoiding comprehensive replacement and planned obsolescence policies’.¹⁰⁰ This formulation is similar to Article 23 from Chapter VI of the EU Declaration, and it also provides that the principle of sustainable digital products and services (‘devices and systems’) must guide public policy.

It follows from the foregoing that the principle of sustainable products and services is implicit at both the EU and the Member State level, while calls for constitutionalisation are beginning to emerge from some Internet bills of rights. The Declaration does not, ultimately, create a new principle; it merely renders an assumption that underlies several existing EU policy and regulatory strategies explicit. In this sense, the Declaration is an exercise in normative retrofitting: it clarifies a policy principle that has guided the regulatory strategies of the EU in the environmental domain.¹⁰¹ This normative postulate is articulated *ex post*, as if its formulation is the product of reflections on past regulatory strategies. In this way, the Declaration strengthens the loose connection between the digital and the green transition within the EU through a short and accessible soft-law principle. The commitments from the Declaration point to specific actions, which makes it easier for its addressees to understand how they could comply with the principle in question.

The Declaration, then, has the potential to become a point of reference for individuals, businesses, and courts when it comes to addressing environmental concerns in the digital context. As already mentioned, a similar process characterised the first years of life of the Charter of Fundamental Rights of the EU, which was progressively used as a reference by the EU Court of Justice. Moreover, the EU legislature could take into consideration how these principles have been operationalised when called to balance all the different societal interests in regulating the internal market. Having said that, one should note that the adoption of the Declaration reflects a recent trend in EU law, namely that of seeking to bring EU policies and regulatory measures on digital products and services closer to the public.¹⁰² The Declaration discharges a constitutionalising function in the digital realm and thus contributes to the normative movement of digital constitutionalism in the EU. Chapter VI establishes a link between the general principles and values that are enshrined in EU primary law, in this case in particular Article 37 of the Charter of Fundamental Rights, and the concrete objectives of particular EU regulations and Commission strategies. The result is the explicit recognition of a principle that straddles the digital and the green domains, thereby partly remedying the limited attention so far placed by the EU legislature on greening the digital and, more specifically, the AI sector. This is because there has been a tendency to present AI technology as an Earth-friendly technology, the use of which would contribute to addressing environmental challenges. However, the fact that AI technology itself is a pollutant may call for the emergence of a specific reading of this principle, which would foster the development and use of greener AI technologies. In this way, the principle would make a potentially not so sustainable AI more sustainable.

⁹⁹ Carta de Derechos Digitales, Article XXII.1.

¹⁰⁰ *Ibid.* (Authors’ translation)

¹⁰¹ Celeste (n 9).

¹⁰² See, e.g., Vagelis Papakonstantinou and Paul de Hert, ‘The Regulation of Digital Technologies in the EU: The Law-Making Phenomena of “Act-ification”, “GDPR Mimesis” and “EU Law Brutality”’ (2022) *Technology and Regulation* 48. They refer to the phenomenon of ‘Act-ification’, defined as the trend in EU law to publish eponymous regulations in the digital context. As opposed to anonymous regulations, which are numbered, eponymous regulations contain a name in their title and are more accessible and easier to remember for the general public.

5. Questioning the ambitions of the Declaration

5.1. *Is it possible to green the digital world?*

Chapter VI of the Declaration emphasises the interaction between the green and the digital transition, that is, the ‘twin transitions’.¹⁰³ In 2020, the President of the EU Commission claimed that the twin transitions are a priority for the EU,¹⁰⁴ and more recent EU policy strategies appear to have been designed with the same imperative in mind.¹⁰⁵ For example, in the Strategic Foresight Report, the Commission pointed at digital technologies as key to climate neutrality, reductions in pollution and the restoration of biodiversity in the EU.

The EU Declaration of Digital Rights and Principles is a twin-transitions policy. Chapter VI reflects the incorporation of green-transition considerations into the digital framework – it provides a clear and concise example of what the EU means when it speaks of the intertwinement of the two transitions. The principle of sustainable digital products and services in Chapter VI evidently promotes digital products and services (the digital transition) as well as sustainability (the green transition). However, the phrase ‘sustainable digital product or service’ is something of an oxymoron. Presently, we will argue that the objectives that it pursues are likely to remain elusive due to two main problems applicable to the digital context and, in particular, AI technologies: the inherent unsustainability of digital products and services and the heavy responsibility that consumers are expected to assume. The first problem is linked to Article 23, while the second is linked to Article 24.

The principle of sustainable digital products and services is attuned to the aims of the digital transformation. It obviously promotes the digitalisation of the economy and of society. It might appear that the principle is also in line with the objectives of the green transition – it is meant to create a more sustainable economy. However, as we showed in Section 2, the promotion of sustainable products and services is liable to engender serious environmental risks, the most acute of which is the large carbon footprint of AI technology and, more broadly, the ICT sector.¹⁰⁶ That theme is developed at length in a recent report by the French think tank The Shift Project (TSP). The report questions the assumption that the digital transformation will reduce energy consumption or result in energy balance.¹⁰⁷ According to TSP, the positive impact of digitalisation on global emissions has been exaggerated, largely because most estimates neglect the rebound effect. Sorrel characterised the rebound effect as ‘an umbrella term for a variety of economic mechanisms that reduce the “energy savings”

¹⁰³ See Jan Bednorz and others, ‘Unionisation and the Twin Transition’ (Policy Department for Economic, Scientific and Quality of Life Policies 2022) PE 733.972; Stefan Muench and others, ‘Towards a Green & Digital Future’ (*JRC Publications Repository*, 27 June 2022) <<https://publications.jrc.ec.europa.eu/repository/handle/JRC129319>>; European Commission, ‘Making the Twin Transition a Reality | Knowledge for Policy’ (n 6).

¹⁰⁴ European Commission, ‘State of the Union 2020. The EC President’s Address’ <https://state-of-the-union.ec.europa.eu/state-union-2020_en>.

¹⁰⁵ For a recent example, note that several programmes within the Horizon Europe - Work Programme 2023-2024 allocate a big amount of funds to the ‘Twin Green and Digital Transition’. Indeed, the Destination 1 of the funds is ‘Climate neutral, Circular and Digitised Production.’ See European Commission, ‘Horizon Europe Work Programme for 2023-24 Now Available’ (<https://cinea.ec.europa.eu/>) <https://cinea.ec.europa.eu/news-events/news/horizon-europe-work-programme-2023-24-now-available-2022-12-07_en> accessed 4 September 2023.

¹⁰⁶ See Stefano Bianchini, Giacomo Damioli and Claudia Ghisetti, ‘The Environmental Effects of the “Twin” Green and Digital Transition in European Regions’ (2023) 84 *Environmental & resource economics* 877; Charlotte Freitag and others, ‘The Real Climate and Transformative Impact of ICT: A Critique of Estimates, Trends, and Regulations’ (2021) 2 *Patterns*.

¹⁰⁷ The Shift Project, ‘Lean ICT: Towards Digital Sobriety’ (2019) 429 *Futuribles*.

from improved energy efficiency'.¹⁰⁸ In the digital realm, this means that, even if technology becomes more energy efficient, energy consumption and carbon emissions will increase – efficiency boosts consumption, which makes technology less sustainable in practice.¹⁰⁹ The TSP report also provides a salient example: although the average capacity of smartphone batteries has doubled over the last few years, the frequency with which those phones are charged has remained constant.¹¹⁰ This problem can in principle become even more pronounced if applied to the specific context of AI. The AI industry tends to develop new models, rather than reuse old ones. Moreover, these new models focus on high accuracy rather than efficiency, thereby significantly increasing the carbon footprint.¹¹¹

Although it is undeniable that these considerations are germane, it is difficult to develop concrete legislation from them. The reason mainly lies in the difficulty to have reliable data on the unsustainability of digital products and services. For instance, it has been argued that addressing the carbon footprint of AI is problematic due to the lack of standards of measurement and the consequent exact quantification of energy consumption.¹¹² A similar discourse applies to the empirical measurement of the previously mentioned rebound effect. While three metrics are usually considered in such measurements – i.e., energy consumption, greenhouse-gas emissions, and the consumption of raw materials – there is no consensus on the impact of efficiency improvements induced by ICT on the first two.¹¹³ Some studies show that developments in ICT result in reductions in energy consumption and/or emissions, others find that they result in increases, and others still furnish evidence of nonlinear correlations.¹¹⁴

5.2. Rethinking the economic model: towards digital sobriety?

That the impact of digital products and services on emissions is difficult to compute does not mean that it is impalpable or unimportant – digital products and services such as AI technologies, no matter how green, may well generate more carbon emissions than they eliminate. Digitalisation does not necessarily improve sustainability. With the lack of an *ad hoc* regulation addressing companies, it is consumers who may be playing a more active role in greening the digital sector.

It is in this context that ‘digital sobriety’, as advocated in the abovementioned TSP report, may prove to be an important virtue.¹¹⁵ According to the report, digital sobriety refers

¹⁰⁸ Steve Sorrell, ‘Energy Substitution, Technical Change and Rebound Effects’ (2014) 7 *Energies* 2850. See also Steffen Lange and others, ‘The Jevons Paradox Unravelling: A Multi-Level Typology of Rebound Effects and Mechanisms’ (2021) 74 *Energy Research & Social Science* 101982.

¹⁰⁹ For an insight on the rebound effect of digital technologies (the so-called ‘digital rebound’) see Vlad C Coroama and Friedemann Mattern, ‘Digital Rebound - Why Digitalization Will Not Redeem Us Our Environmental Sins’, *Proceedings of the 6th International Conference on ICT for Sustainability (ICT4S 2019)* (RWTH 2019); Ray Galvin, ‘The ICT/Electronics Question: Structural Change and the Rebound Effect’ (2015) 120 *Ecological Economics* 23.

¹¹⁰ The Shift Project (n 103) 20.

¹¹¹ Roy Schwartz, Jesse Dodge, Noah A Smith and Oren Etzioni, ‘Green AI’ (2020) 63(12) *Communications of the ACM* 54.

¹¹² Payal Dhar, ‘The Carbon Impact of Artificial Intelligence’ (2020) 2(8) *Nature Machine Intelligence* 423, 423.

¹¹³ The Shift Project (n 103).

¹¹⁴ Zhouyi Zhang and others, ‘Effects of Heterogeneous ICT on Critical Metal Supply: A Differentiated Perspective on Primary and Secondary Supply’ (2023) 83 *Resources Policy* 103690; Huanyu Cui and others, ‘Multiple Effects of ICT Investment on Carbon Emissions: Evidence from China’ (2023) 30 *Environmental Science and Pollution Research* 4399.

¹¹⁵ See also Céline Péréa, Jessica Gérard and Julien De Benedittis, ‘Digital Sobriety: From Awareness of the Negative Impacts of IT Usages to Degrowth Technology at Work’ (2023) 194 *Technological Forecasting and Social Change* 122670.

to a change of paradigm in the ICT sector implying a more considered use of digital technologies. Namely, digital sobriety would call for a more careful monitoring of the energy adequacy of digital technologies and an evaluation of their impact.¹¹⁶ Remarkably, this approach is also reflected in the amendments adopted by the European Parliament on the last version of the AI Act preceding its adoption, which call for measuring and evaluating the enduring effects of AI on society and on the environment.¹¹⁷ In addition, in a digital sobriety context, the aforementioned energy adequacy shall not only serve as a guiding line for organisations and businesses when carrying out their activities, but also determine consumer's digital uses.¹¹⁸

It seems that Article 24 of the Declaration embraces this idea because it promotes access to environment-related information. However, the effectiveness of Article 24 may be limited in practice: consumers may choose not to access the information in question, or they may access it and then decide to ignore it, say because the product or service that exerts a more pernicious influence on the environment is also cheaper or more reputable. At the same time, the information that is provided to consumers can also be deceptive and, accordingly, diminish their ability to make informed choices.¹¹⁹ Thus, the impact of that procedural provision is unlikely to live up to the expectations of the advocates of digital sobriety.

Although the Declaration is indicative of the commitment of the EU to incentivising more responsible choices,¹²⁰ it ultimately passes the baton to consumers and businesses. This decision is not wholly unjustified. Incentives for consumers, both material and non-pecuniary, have proven influential on some occasions. For instance, in e-commerce deliveries, the provision of information about the footprint of a product has had a remarkably profound influence on consumer decision making.¹²¹ Financial incentives such as tax reductions and exemptions have also been used successfully to increase the popularity of hybrid and electric vehicles.¹²² As a general matter, it is undeniable that sustainable choices ought to be incentivised.

However, mobilising consumers for greening the digital and, in particular, the AI sector may not lead to attain the desired results. First, and as a general matter, incentives and behaviour are seldom in perfect synchrony – the field of digital products and services being no exception. For example, smart energy and water meters that provide accurate consumption information to consumers have not automatically translated into energy or water savings in households.¹²³ In addition, the efficacy of financial incentives in encouraging the durable

¹¹⁶ The Shift Project (n 103).

¹¹⁷ European Parliament (n 8) Article 4(a)(1)(f).

¹¹⁸ The Shift Project (n 103). Note that digital sobriety is not unanimously defined by the literature. Péréa et al. (n 112) claim that this concept is polysemous. Indeed, other names such as 'Green IT', 'responsible digital' or 'dedigitalisation', among others, have been used to refer to the same idea. Digital sobriety is thus seen as a phenomenon that raises a number of new challenges that are related to the voluntary abandonment or moderate use of information technologies.

¹¹⁹ Kent Walker and Fang Wan, 'The harm of symbolic actions and green-washing: Corporate actions and communications on environmental performance and their financial implications' (2012) 109(2) *Journal of Business Ethics* 227.

¹²⁰ Declaration, Chapter VI, letter b.

¹²¹ See Heleen Buldeo Rai and others, 'Sharing Is Caring: How Non-Financial Incentives Drive Sustainable e-Commerce Delivery' (2021) 93 *Transportation Research Part D: Transport and Environment* 102794.

¹²² See Kristin Ystmark Bjerkan, Tom E Nørbech and Marianne Elvsaaas Nordtømme, 'Incentives for Promoting Battery Electric Vehicle (BEV) Adoption in Norway' (2016) 43 *Transportation Research Part D: Transport and Environment* 169; Shiyu Yan, 'The Economic and Environmental Impacts of Tax Incentives for Battery Electric Vehicles in Europe' (2018) 123 *Energy policy* 53.

¹²³ Elisha R Frederiks, Karen Stenner and Elizabeth V Hobman, 'Household Energy Use: Applying Behavioural Economics to Understand Consumer Decision-Making and Behaviour' (2015) 41 *Renewable and Sustainable*

adoption of pro-environmental behaviours among consumers is thought to be limited because the effects of those incentives only hold in the short run¹²⁴ and because they may have other shortcomings.¹²⁵

Second, it seems that the role played by consumers in the AI sector could only be a limited one. The production of carbon emissions by AI technologies mostly stems from their development, which is in the remit of corporations. Consumers could in principle urge corporations to develop more environmental-friendly AI technologies by, e.g., choosing less carbon-intensive products and services. However, this course of action seems unlikely to occur. As mentioned earlier, the adoption of commonly agreed standards on energy intensiveness of AI technologies by corporations will not soon materialise due to a lack of agreement on what factors to include in the calculation.¹²⁶ Moreover, even if consumers did have access to the carbon footprint of AI technologies, it is improbable that they would base their decision to access a product or service on the said footprint.

Despite the importance that the EU ascribes to labels, the measures that implement them are timid. Because of the unreliability of the consumer's decision-making process, mandatory product requirements may prove much more effective than incentives.¹²⁷ In this context, mitigation – as proposed in the second version of the Declaration – is a much more realistic aim than minimisation – as proposed in the first version –, since it allows for less stringent measures that may prove less effective.¹²⁸ In this line, it is possible to note that the policy of digital sobriety, as advanced in the TSP report and partially reflected in Article 24, can be seen as a moderate rendition of the theory of economic degrowth. Most members of the degrowth community believe that conventional economic growth – that is, GDP growth – is incompatible with sustainability.¹²⁹ Therefore, “innovation for growth” narratives are widely rejected.¹³⁰

It is evident from this tension, as well as from the other arguments that we presented in this subsection, that the reconciliation of the green and the digital transitions in Chapter VI of the Declaration can only be partial. In other words, the principle of sustainable digital products and services arising from this soft law instrument can have limited effect in greening

Energy Reviews 1385. See also Paul C Stern, ‘Information, Incentives, and Proenvironmental Consumer Behavior’ (1999) 22 *Journal of Consumer Policy* 461.

¹²⁴ See P Wesley Schultz, ‘Strategies for Promoting Proenvironmental Behavior’ (2014) 19 *European Psychologist* 107.

¹²⁵ See Jan Willem Bolderdijk and Linda Steg, ‘Promoting Sustainable Consumption: The Risks of Using Financial Incentives’ in Lucia A Reisch and John Thøgersen (eds), *Handbook of Research on Sustainable Consumption* (Edward Elgar 2014).

¹²⁶ Dhar (n 108).

¹²⁷ For example, research has suggested that financial incentives may reduce motivation, leading to consumer behaviours that are inimical to their objectives. See Bruno S Frey and Reto Jegen, ‘Motivation Crowding Theory’ (2001) 15 *Journal of Economic Surveys* 589.

¹²⁸ See Section 3.2 of this article.

¹²⁹ See Jan Pollex and Andrea Lenschow, ‘Surrendering to Growth? The European Union’s Goals for Research and Technology in the Horizon 2020 Framework’ (2018) 197 *Journal of Cleaner Production* 1863. For a critical position on that, see Hubert Buch-Hansen and Iana Nesterova, ‘Less and More: Conceptualising Degrowth Transformations’ (2023) 205 *Ecological Economics* 107731.

¹³⁰ Mario Pansera, Melf-Hinrich Ehlers and Christian Kerschner, ‘Unlocking Wise Digital Techno-Futures: Contributions from the Degrowth Community’ (2019) 114 *Futures* 102474. On the other hand, degrowth authors exhibit varying degrees of scepticism about technology. For a more enthusiastic view, see Peter Howson, Jillian Crandall and Xavier Balaguer Rasillo, ‘Digital Degrowth Innovation: Less Growth, More Play’ (2021) 88 *Political Geography* 102415. For other views, see Christian Kerschner and others, ‘Degrowth and Technology: Towards Feasible, Viable, Appropriate and Convivial Imaginaries’ (2018) 197 *Journal of Cleaner Production* 1619; Pasi Heikkurinen, ‘Degrowth by Means of Technology? A Treatise for an Ethos of Releasement’ (2018) 197 *Journal of Cleaner Production* 1654.

the AI sector. The reason is twofold. Firstly, digital sustainable products and services may be unsuitable for the environmental goals of the green-transition policy framework. Secondly, the choices of consumers, which would play an essential role in this policy framework, may ultimately transpire to be misaligned with the goals in question.

6. Conclusion

As AI disrupts our economies and societies, the EU legislator is focusing on data privacy and consumer protection. AI is perceived as a key driver of the green-transition strategies of the EU, too, but the regulatory and policy frameworks of the Union largely neglect its environmental implications. The Declaration on Digital Rights and Principles for the Digital Decade is a first attempt to formulate a concrete response to the environmental threats arising from the digital context. The Declaration is not a set of granular guidelines for addressing the negative environmental impact of AI technologies; its scope is broader. Nevertheless, the text confirms the existence of a principle of sustainable digital products and services that is relevant to AI, too. Its implications include the incorporation of green principles into the lifecycles of digital products and services and the promotion of labels that can help consumers to choose eco-friendly digital technologies.

The Declaration, despite having been cast as a quasi-constitutional instrument that contains rights and principles for contemporary digital society, does not refer explicitly to a broader right to a healthy environment. However, by articulating the principle of digital sustainable products and services, Chapter VI codifies some procedural concepts that may be derived from such a right. Even if the future reveals that the link between said right and the principle in the Declaration is tenuous, a self-standing principle of sustainable digital products and services has other virtues. Previously, that principle was only tacit in EU and Member State law, and may now more easily be relied upon by citizens, businesses, courts and legislators. The normative retrofitting of the Declaration clarified its status, thus charting a clearer course of action for all actors within the Union and enhancing the accessibility and clarity of its law- and policy-making processes. Most importantly, individuals and businesses, who are among the named addressees of the Declaration, can now rely on a more concrete formulation of EU values such as, in this case, digital sustainability.

The Declaration is a unique instrument because it offers normative guidance at the intersection between the digital and the green transition, contributing to a broader constitutionalisation movement that is gaining traction in the digital ecosystem.¹³¹ This said, the effectiveness of the principle of sustainable digital products and services may be jeopardised by irrational consumer behaviour and by the intensive energy demands of digital products and services, particularly those of AI systems. This argument impinges on a broader issue, namely the feasibility of the smart green growth strategy of the EU. A question that depends on whether contemporary economic growth is sustainable in the long run and, more generally, on our ability to formulate specific policies without becoming blind to their holistic impact.

¹³¹ See Edoardo Celeste, 'The Constitutionalisation of the Digital Ecosystem: Lessons from International Law' in Angelo Golia, Matthias C Kettmann and Raffaella Kunz (eds), *Digital Transformations in Public International Law* (Nomos 2022).