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# *The role and potential of green nudges as a normative tool for sustainability policies: bridging the gap between theory and practice*

**ABSTRACT**: The research explores the potential of nudges as complementary tools to traditional regulatory instruments within the framework of sustainability goals. Nudges, grounded in behavioral economics, influence individual decisions through subtle adjustments to choice architecture, while preserving freedom of choice. Although nudges demonstrate effectiveness in guiding individual behaviors, their limitations make them insufficient for addressing the imperative goals of sustainability through a systematic approach. For this reason, their practical implementation requires a robust foundation to mitigate their limitations. In this research, Impact Assessment—particularly Environmental Impact Assessment (EIA) and the provisions of the European directive on EIA—is identified as a key platform for integrating green nudges. From this perspective, green nudges and EIA establish a

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complementary relationship: EIA's shortcomings are addressed through the use of nudging, while green nudges gain the regulatory tool necessary to enhance their effectiveness. This analysis embraces a fundamental duality, focusing on green nudges through two interconnected perspectives. First, green nudges are evaluated as essential tools in shaping specific types of impact assessments. Second, they are considered as outcomes, themselves influenced by the structure of these assessments, which in turn affect policymakers, stakeholders, and end-users who interact with or are impacted by these tools. Recognizing this duality is essential to enable a nuanced approach that highlights the need for context-dependent evaluations.

**KEYWORDS:** green nudges; impact assessment; sustainability policies

## 1. Introductory remarks: the role and potential of nudge-based normative strategies

As it is widely acknowledged in behavioral law and economics research, nudges are «*interventions that steer people in particular directions but that also allow them to go their own way*»[1]*;* this description links together two main aspects: the ability to influence behavior and freedom of choice, according to a philosophy called *libertarian paternalism* that is *at the heart of nudging*[2] . Libertarian paternalism identifies nudges as instruments that *attempt to use choice architecture to steer choosers in directions that will promote their* welfare. In this sense, nudges are a paternalistic tool. However, this form of paternalism is distinctive because it is soft, avoiding coercion or material incentives and maintains freedom of choice. Additionally, it is means-oriented, as it does not attempt to question or alter people's ends.[3] In legal scholarship, the underlying logic of libertarian paternalism is notoriously disputed, being identified as a meaningful policy tool in comparison to Command&Control strategies and, at the same time, being widely

[1] R.H. THALER and C. R. SUNSTEIN, *Nudge: improving decisions about health, wealth and happiness*, New Haven, Yale University Press, 2008, 6.
[2]R.H. THALER and C. R. SUNSTEIN, *The final edition of nudge,* New York, Pinguin Press, 2021, 5.
[3] C. R. SUNSTEIN, *Why nudge?: The politics of libertarian paternalism*, New Haven, Yale University Press, 2014, *passim.*

criticized as an oxymoron and as something that punishes freedom of choice, raising an ethical issue in a free society.[4]

According to the relevant literature in the field the definition of a nudge implies four main aspects: i) a change to the choice architecture (defined as *the inevitable context within which agents take decisions*), which aims to induce ii) a behavioral change in iii)an undisturbed choice set (implying both that no options are forbidden and none are imposed) and iv) the absence of monetary incentives.[5] It is worth noting, nevertheless, that an exhaustive definition seems to be still a matter of discussion[6] and it is essential to acknowledge that *The Nudge Theory* is often portrayed in literature not as a robust theoretical framework but, rather, as an «*empirical application of pioneering work in behavioral decision theory*»[7]. This is particularly relevant, for policymaking purposes, when the possibility to incorporate nudge-based approach into normative strategies is analyzed.

The Nudge Theory has as its fundamental pillars the main discoveries of behavioral economics: therefore the use of nudging needs to be contextualized in a miscalculation between the ideal model according to which consumers should choose and how they actually choose.

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[4] R.H. THALER AND CASS R. SUNSTEIN, *Libertarian Paternalism Is Not An Oxymoron*, Chicago, University of Chicago Press, 2003, *passim.*

[5] M. SANTOS SILVA, *Nudging and other behaviourally based policies as enablers for environmental sustainability*____in *Laws* vol.11, no.1, 2022, 1-13. Available at: https://*www.mdpi.com/journal/laws.*

[6] C. SCHUBERT, *Green nudges: Do they work? Are they ethical?* in *Ecological Economics*, 2017, *passim.*

[7] F. OLANDER AND J. THOGERSEN, *Informing versus Nudging in Environmental Policy* in *Journal of Consumer Policy*, vol. 37, n. 3, Berlin, Springer, 2014, 341–356.

Economist and social scientists assumed that individuals are "rational" in the sense they maximize their utility: on this view the role of the government is straightforward. Public officials should correct market failures by ensuring that consumers are adequately informed and by adopting policies to reduce transactions costs that prevent mutually advantageous deals or to correct for externalities.[8]

This framework has been revisited by behavioral economics, which has highlighted how consumers display bounded rationality (that reflects the limited cognitive abilities that constrain human problem solving), bounded willpower (that captures the fact that people sometimes make choices that are not in their long-run interest), and bounded self-interest (that incorporates the comforting fact that humans are often willing to sacrifice their own interests to help others)[9].

These discoveries translate into the assertion that in consumer choice there will be, presumably, a mistake leading to a different outcome than the one that would occur if individuals were always rational and able to maximize their utility. This mistake is both physiological and systematic: deriving from a common cognitive pattern, it is placed in a context of frequent errors that subjects are naturally keen on making.

[8] C. R. SUNSTEIN, *Behavioral Economics, Consumption, and Environmental Protection*, in L. REISCH, J. THØGERSEN (eds.), *Research in Sustainable Consumption*, Cheltenham, Edward Elgar Publishing, 2013, 313-327.

[9] S. MULLAINATHAN, R. H. THALER, *Behavioral Economics*, Cambridge, National Bureau of Economic Research, 2000, *passim.*

The central findings of behavioral research happen to be in four categories:

*i) Inertia and procrastination*: because of inertia people may decline to change from the status quo even if the costs of change are low and the benefits substantial (from this point of view default rules have a large effect on social outcomes). Also, on some occasions, the long-term consequences are overlooked in favor of short-term solutions.

*ii) Framing and presentation*: individuals are influenced by how the information is framed as they tend to prioritize vivid and salient information; human beings also display loss aversion.[10]

*iii) Social influences*: individual behavior is influenced by the perceived behavior of other people, especially their peers.

*iv) Probability assessment and attitude to risk*: individuals have unrealistic optimistic views about the objective risks they face and they use heuristic or mental shortcuts when assessing risks.[11]

These discoveries allow the use of nudging as a way to direct towards a decision in a non-invasive way (this aspect constituting the core of libertarian paternalism).

Additionally, in behavioral science it has become standard to distinguish between two families of cognitive operation. In *Thinking Fast and Slow*,

[10] A. TVERSKY, D. KAHNEMAN, *The Framing of Decisions and the Psychology of Choice*, in *Science*, vol. 211, Washington, American Association for the Advancement of Science, 1981, 453 ss.

[11] A. TVERSKY, D. KAHNEMAN, *Loss Aversion in Riskless Choice: A Reference-Dependent Model*, in *The Quarterly Journal of Economics*, vol. 106, Oxford, Oxford University Press, 1991.

Daniel Kahneman emphasizes the coexistence of two cognitive systems: the first one (System 1), which is fast, automatic and intuitive and the second one (System 2), which is slow, calculative and deliberative. Some nudges can work toward improving the role of deliberation and considered judgments and others can rely on appealing or activating system one, the fast and automatic one.

The application of nudges proves to be conducive in attaining objectives within the domain of sustainability and effectuating the shift from a linear to a circular economy. This correlation is accentuated in the subsequent section of the research manuscript.

Despite the existence of studies focused on demonstrating the persuasiveness of nudges, their implementation for regulatory purposes highlights the need to deal with both ethical and practical issues, as well as the demand to research valid measures to integrate nudges, and, more in general, alternative regulatory tools, with the traditional regulatory techniques. The effectiveness of nudges is subject to a significant limitation, not only due to the specific type of nudge employed but also due to variations among the individuals who are targeted by them. To overcome this challenge, nudges can be utilized synergically with traditional regulatory tools, being encompassed in their operativity and providing them with a framework respectful of the rule of law. However, this raises an important question: how can this complementarity be effectively implemented in practice?

After providing an overview of the main implication of nudge-strategies as normative tools in the field of sustainability law, this research will delve into this question by examining the practical challenges encountered throughout the implementation of green nudges. Such analysis, furthermore, will be supported by a review of relevant cases, that will determine the circumstances in which the application of green nudges proves to be beneficial or otherwise, and therefore worthy of (at least) normative consideration.

Subsequently, this research proposes an assessment to evaluate the benchmarks to implement a complementary relationship between green nudging and traditional regulatory means for sustainability, with a major focus on its potential as a structural component of impact assessment strategies. This assessment takes into account crucial factors such as the effectiveness of the nudge, its alignment with the intended objectives, and, notably, the desired goal. Consequently, the approach involves the deliberate selection of a specific type of nudge that addresses the limitations of the chosen regulatory tool, thereby establishing a synergy that enhances the overall effectiveness while mitigating the shortcomings of the traditional approach. This strategic integration of nudging theory aims at achieving practical and concrete results in enhancing the regulatory framework.

Indeed, relying solely on nudging to achieve sustainability goals is highly unrealistic due to the intrinsic limitations of this approach: while nudging has been shown to be effective in encouraging individuals towards more

sustainable choices, it cannot resolve the broader challenges of the environmental crisis or drive the transition to sustainability, which demand more robust interventions.

The goal, therefore, is to formalize the use of nudging within policy strategies that are comprehensive enough to address the systemic challenges of sustainability; these approaches, on the other hand, have the potential to become more effective if aligned with a well-structured nudging approach.

To achieve this balance, one promising approach to consider is the strategic application of nudging within one of the longstanding tools used in European Union policymaking[12]: impact assessments, which remain an ongoing subject of discussion. The ambitions associated with this approach are closely linked to the role of Impact assessment systems as instruments capable of shaping not only the outcomes but also the content and processes of European Union policies[13].

This reflection explores the intertwined roles of green nudges within policymaking, revealing their bidirectional influence on the design and outcomes of Impact Assessments. Nudges are both strategic instruments that can shape the framework and focus on these assessments and reactive elements whose deployment and effectiveness are influenced by the assessment process itself. This underscores a dynamic relationship between green nudges and the regulatory framework and highlights how

[12] A. BACKLUND, *Impact Assessment in the European Commission – A System with Multiple Objectives*, in *Environmental Science & Policy*, vol. 12, Amsterdam, Elsevier, 2009, 1077-1087.
[13] A. BACKLUND, *ibidem*.

green nudges not only guide policy evaluations but are also reshaped by the operational context in which they are embedded, calling for a flexible approach to their integration into sustainability strategies.

## 2. Nudging to support sustainability policies: normative cornerstones and operative potential

The Nudge Theory sees its applicability also in the field of sustainability policies, being especially consistent with the notion of *Sustainable Development* provided by the *United Nations Brundtland*[14] *Commission* in 1987. As it is widely acknowledged, the Commission's «Our Common Future» report articulated the concept of sustainable development as *«development that meets the needs of the present without compromising the ability of future generations to meet their own needs»*. This definition aims to reconcile economic progress with the preservation of social and environmental equilibrium, while juxtaposing principles of intergenerational and intra-generational equity. In such sense, it has been observed that nudge normative strategies are particularly apt to substantiate both the diachronic and synchronic dimensions of sustainability: being a flexible, and structurally open-ended policy strategy, nudge proves itself to be particularly effective in those field - such as sustainability - where the long-term dimension of the pursued

[14] The document came to be known as the «Brundtland report» after the commission's chairwoman, Gro Harlem Brundtland.

goal makes it particularly complex for traditional Command & Control approaches to be "future proof". In addition, its abovementioned liberalistic nature is seen as useful to overcome the potential democratic deficit arising from more traditional strategies, that have a binding intergenerational effect. By incorporating nudges, policymakers and practitioners seek to promote sustainable behaviors and choices that align with these principles and contribute to the overall goal of sustainable development, without constricting regulation and, at the same time, preserving the deliberative autonomy of subsequent generations.

Another frame of reference in support of the potential utilization of nudge mechanisms as alternative regulatory tools in order to promote sustainability emanates from the *«General Union Environment Action Program to 2020»*[15], which, in article 71(2), mentions that the transition to an inclusive green economy requires *«giving proper consideration to interplay between socioeconomic and environmental factors»;* the aforementioned transition can be achieved *inter alia* by understanding how societal and individual behavior change contributes to environmental outcomes. To this effect it mentions several nudges, like energy-efficiency labelling, next to the various command and control and market-based instruments.[16] Moreover, paragraph 33 of the Preamble to this Action Programme emphasizes the

[15] EUROPEAN COMMISSION, *General Union Environment Action Programme to 2020: Living well within the limits of our planet,* Luxemburg, Publication Office of the European Union, 2014.
[16] P. HACKER, G. DIMITROPOULOS, *Behavioural Law & Economics and Sustainable Regulation*, in K. MATHIS, B. HUBER (eds), *Environmental Law and Economics. Economic Analysis of Law in European Legal Scholarship*, Springer, 2017, *passim.*

imperative for businesses and consumers to cultivate a deeper comprehension of the environmental impacts stemming from their activities and to effectively manage these impacts. This goal has to be accomplished adopting «*an appropriate mix of policy instruments*» that includes *«economic incentives, market-based instruments, information requirements as well as voluntary tools and measures to complement legislative frameworks and to engage stakeholders at different level».*

As mentioned, a crucial policy instrument advocated in this context is the utilization of green nudges. Green nudges utilize three primary mechanisms — salience, default rules and social norms — to effectively attain the desired outcomes in fostering sustainable behavior.

Salience leverages individuals' inclination to uphold a positive self-image by embracing environmentally friendly behaviors or, at the very least, expressing a preference for greener alternatives. It is noteworthy that citizens, particularly in rich and industrialized countries, when surveyed often profess support for pro-environmental policies. However, these preferences are frequently not reflected in their actions.[17] In light of this phenomenon, salience materializes as an instrument for simplifying information with the purpose of accentuating specific attributes over others, as exemplified by the implementation of eco-labels.

Social norms capitalize on people's inclination to "follow the herd" and to imitate the behavior of their peers: this can be done by conveying certain

[17]D. PICHERT, K. V. KATSICOPOULOS, *Green Defaults: Information Presentation and Pro-Environmental Behaviour*, in *Journal of Environmental Psychology*, 2008, 63-73.

social norms through peer comparison; additionally, stimulating social status competition can be employed to encourage consumers to showcase their green behavior to others. There is extensive empirical evidence that people care about their status and relative consumption[18]: by leveraging these mechanisms, social norms can effectively influence and shape sustainable behaviors among individuals.[19]

Default rules possess significant influence over social outcomes. Deliberately establishing a default rule can effectively promote a sustainable option while preserving individuals' freedom of choice by allowing them to opt out at minimal costs. This is considered the most imminent implication of applying nudging since under many circumstances agents will not opt out of the suggested welfare maximizing choice they are nudged towards.[20]

## 3. An overview of relevant case studies on green nudges

A comprehensive (and, yet, non-exhaustive) analysis of different experiences in recent years unveils the potential of green nudges to

[18] R. FRANK, *The Demand for Unobservable and Other Non-Positional Goods*, in *American Economic Review*, 1985, *passim.*
O. JOHANSSON-STENMAN, F. CARLSSON, D. DARUVALA, *Measuring Future Grandparents' Preferences for Equality and Relative Standing*, in *Economic Journal*, volume 112, 2002, 362-383.
[19] M. SANTOS SILVA, n. 5, *passim.*
[20] C. SCHUBERT, 2017, n. 6, *passim.*

promote sustainable behaviors in different contexts, making the case for their regulatory potential.

In the city of Copenhagen, since the early 2000's, the Danish non-profit organization *iNudgeYou* grew out of the efforts of the Initiative for Science, Society & Policy (ISSP) at Roskilde University and the University of Southern Denmark.[21]With its explicit mission of testing and facilitating the practical application of behaviour-changing tools across various spheres of life, *iNudgeYou* made significant contributions to a project aimed at reducing littering in the city. In 2011, Pelle G. Hansen[22] and his students from Roskilde University managed to test in the streets of Copenhagen a litter-reducing nudge. First, the students handed out free caramels to pedestrians. Then they counted the number of wrappers on the street, in the street's garbage cans, on side streets and in bicycle baskets. Finally, they placed green footprints that led to the bins, handed out caramels again and repeated the counting exercise. The result was a startling 46% decrease in wrappers ending up on the streets.[23].

The experiment, referred to as "The green footprint", benefits from the power of salience: the footprints made the presence of the nearest bin more noticeable, working as a visible reminder for pedestrians who might

[21] O. MONT, M. LEHENER AND E. HEISKANEN, *Nudging: A tool for sustainable behavior?* in *Journal of Consumer Policy,* 2014..

[22] Pelle G. Hansen is a behavioral scientist at Roskilde University, founder of the Danish Nudging Network and chief scientist at iNudgeyou.

[23] INUDGEYOU-THE APPLIED BEHAVIOURAL SCIENCE CENTRE, *Green nudge: nudging litter into the bean*, 2012. See *https://inudgeyou.com/en/green-nudge-nudging-litter-into-the-bin/*.

otherwise litter unconsciously. Additionally, this experiment benefited from a simplification of the information, which is transmitted with a simple and clear image.

Other experiments have used the power of social norms to influence behavior in a pro-environmental way. For instance, in 2011 the economist and environmental scientist Hunt Allcott conducted a natural field experiment wherein households received information pertaining to their individual energy consumption as well as that of their neighbours. To further incentivize engagement, the electricity provider incorporated emoticons denoting performance as either «*great*», *«good»* or «*below average»*. The aftermath was a reduction of the total electricity use by 2%, leading Allcott to infer that the comparative element with neighbors had instigated a competitive dynamic, compelling households to strive for diminished energy consumption[24].

It should be observed that, in order to improve energy consumption results, it is possible to rely not only on the power of social norms but also on the force of default rules able to nudge consumers in greener directions. In this regard, an experiment worth of consideration concerns *Energiedienst GmbH*, a company supplying energy to an area in southern Germany[25]. In 1999, the company presented three distinct tariff options: the default option, being presented as green, was priced 8% lower than

[24]H. ALLCOTT, *Social Norms and Energy Conservation*, in *Journal of public economics,* 2011, 1082-1095.

[25]H. ALLCOTT,*ibidem.*

the previous tariff. The second option offered reduced environmental benefits but also an 8 % cost reduction, while the third option was greener but accompanied by a higher price increase of 23%. Where customers did not respond, the option would remain the default. The outcome exalts how about 94% of customers did not change their default option; about 4% made a change in favor of the cheaper and less green tariff, while the remaining percentage switched either to the greener alternative or to a different supplier. This result underlines the power of default rules as regulatory tools[26] and it even acquires greater value if contextualized; in Germany, many people say they would use green energy if presented with a choice, but the number of people who opt for green is limited (in almost all communities- except for the ones who use defaults- the green usage rate was for a long period under one percent).

Besides the abovementioned cases, it is worth acknowledging that the OECD's Observatory of Public Sector Innovation (OPSI) has been developing over time an interactive map showcasing behavioral insights units and projects around the world. Additionally, it has launched a pre-

[26] In literature, see C. SUNSTEIN *Default rules are even better than active chosing (Often*) in *Trends in cognitive sciences,* 2017.
R. H. THALER, C. R. SUNSTEIN, J. P. BALZ, *Choice Architecture*, 2010. Available at SSRN: https://ssrn.com/abstract=1583509;
E. J. JOHNSON, D. GOLDSTEIN, *Do Defaults Save Lives?*, in *Science*, vol. 302, Washington, American Association for the Advancement of Science, 2003, 1338–1339.

registration portal to enable behavioral insights practitioners to share pre-analysis plans at the early stages of experimentation and policy testing.[27]

## 4. Policymaking challenges: unraveling the practical application and criticalities of nudges

Whereas the potential of nudge-strategies in terms of sustainable policies is, without a doubt, consistent, their practical implementation encounters some fundamental challenges: first and foremost, determining the most suitable nudging strategy to employ based on the contextual circumstances. In this regard, a study examining a sample of 1019 German consumers was conducted with the aim of discerning the most suitable type of nudge to increase consumers' willingness to pay for bio-based plastic packaging.[28] Despite this study is focused on the b2c interactions and consumer protection (which goes beyond the scope of this research and where drawing a clear distinction between genuine nudging and marketing strategies becomes more complex[29]) the findings that it provides can still offer valuable insights for general reflections.

[27] For more, visit *OECD Observatory of Public Sector Innovation*, available at https://oecd-opsi.org/bi-units/.

[28] J. WENSING, V. CAPUTO, L. CARRARESI, S. BRORING, *The effects of green nudges on consumer valuation of bio-based plastic packaging*, in *Ecological Economics*, 2020, 1-23.

[29] P. G. HANSEN, A.M. JESPERSEN, *Nudge and the Manipulation of Choice: A Framework for the Responsible Use of the Nudge Approach to Behaviour Change in Public Policy,* in *European Journal of Risk Regulation,* 2013, p.3-28.

Four distinct green nudging strategies were tested: nature pictures, reflection questions, information on bio-based plastic packaging and normative information. The study revealed that a nudge's effectiveness depends on aligning with the cognitive system of its audience. For instance, providing nature pictures was found to increase willingness to pay only among individuals who rely on intuitive decision-making, while normative information or information on bio-based plastic packaging was effective only for consumers with a reflective and rational cognitive approach.

Hence, given the premise that the nudge being implemented must be compliant with the cognitive system of the individuals who receive it, an inevitable question arises: how can we ensure that the chosen form of nudge is the most effective when it comes to public policies where the targeted audience ideally consist of millions of citizens? Therefore, it becomes necessary to carry out a series of assessments before designing one nudging strategy rather than another, in order to increase its effectiveness. In other words, robustness and external validity constitutes a major source of concern when designing policymaking strategies based on nudges.

Scholarly literature presents a wide range of models that outlines approaches for designing policy interventions informed by behavioral science insights. One notable and widely embraced model is "*The Nine*

*Principles*," which was developed by Andrew Darnton[30] in 2008. This model relies on real-world observations and insights from behavioral modeling and it emphasizes the importance of an iterative and cyclical approach in both the development and implementation of the policy: this means that as the process unfolds, insights gained from later steps have the potential to prompt revisions of earlier assumptions and actions. The concept of iteration underscores the notion of "learning by doing," where interventions are continually refined through ongoing monitoring and evaluation efforts.[31]

The principles outlined in this model offer valuable guidance for policymakers seeking to incorporate behavioral science into their policy strategies, allowing for a systematic and evidence-based approach in shaping effective interventions[32].

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[30] Andrew Darnton is an independent researcher, specialising in behavioural theory and systems change.

[31] P. BONSALL, M. CONNER, A. DARNTON, G. MARSDEN, *Influencing Individual Citizens*, in *Institute for Transport Studies*, 2009, *passim.*

[32] Such principles are: I) Identify the audience groups and the target behavior. II) Identify relevant behavioral models including both individual and societal models and make a short list of the most prominent influencing factors. This step may involve literature review or consultation with stakeholders. III) Select the key influencing factors and use them to develop objectives for the intervention strategy/policy option. IV) Identify effective intervention techniques that have worked and were effective in the previous interventions that targeted specific influencing factors; the types of interventions mentioned in this step could be regulatory and coercive instruments, fiscal incentives and disincentives and soft-policy tools, including information based instruments and the nudge toolbox consisting of defaults, improving salience of information, changes in physical environment and engagement of social norms in behavior change. V) Engage the target audience for the intervention in better understanding their behavior and the influencing factors from the user/target audience perspective. VI) Develop a prototype

However, it is important to note that Darnton's work is based on assumptions that may not always be confirmed by practical experiences: firstly, identifying the target audience and behavior may be insufficient when dealing with emergent phenomenon lacking prior researches; in such cases, new empirical investigations may be necessary to gain a deeper understanding of the emerging behavior. Secondly, the assumption that extracting key factors influencing behavior from existing behavior models and past empirical studies is universally applicable may not always be valid, especially when addressing emerging behaviors with limited prior research. In such scenarios, relying exclusively on existing models and previous studies may not capture the full spectrum of the behavior. Thirdly, the assumption that co-creating and piloting intervention prototypes with the target audience is a prerequisite for developing effective interventions may be limited by resource constraints.[33] In cases where there are insufficient resources available for extensive co-creation and piloting, alternative approaches or adaptations may be necessary to develop interventions effectively.

These considerations highlight the need for flexibility and adaptability in policy interventions, recognizing that different contexts and behaviors

intervention and evaluate it against relevant policy frameworks and assessment tools. VII) Pilot the intervention and monitor the results. VIII) Evaluate impacts and processes against the objectives developed in step III linked to the factors influencing behavior. XI) Feedback the lessons learned in order to deepen understanding of the intervention and the target behavior.

[33] K. SUNG, T. COOPER, S. KETTLEY, *Adapting Darnton's Nine Principles Framework for Behaviour Change: The UK Upcycling Case Study*, in *Sustainability*, 2022.

may require different approaches. It is essential to critically evaluate and contextualize the assumptions and principles outlined in Darnton's work to ensure their applicability and effectiveness in real-world policy settings. Specifically, when it comes to employing nudging for sustainability, despite its potential effectiveness, it is crucial to recognize a series of problems that cannot be overlooked: first of all, the aforementioned logistical difficulty in reaching such a large number of individuals, each characterized by their own personal diversity and context. From this perspective, designing an efficient nudging strategy would ideally involve accommodating the multiple instances and minimizing contextual differences that may arise, such as socio-economic and cultural disparities. In addition, behavioral change often encounters resistance. Overcoming this resistance poses challenges to the successful implementation of nudging initiatives and requires careful attention and strategic planning.[34] Finally, it is imperative to acknowledge the significance of transparency, even though it is not the focal point of this research, as it constitutes a pivotal aspect in ethical discussions surrounding the use of nudging. Scholars have grappled with questions regarding the ethics of nudging and the importance of maintaining a delicate equilibrium between influencing behavior and upholding individual autonomy. Central to this equilibrium is the guarantee of freedom of choice, a defining characteristic of nudges. Various perspectives have arisen regarding this matter: it is argued that the

[34] E. ZAMIR AND D. TEICHMAN (eds). *The Oxford Handbook of Behavioral Economics and The Law*, Oxford, Oxford University Press, 2014.

practice of nudging can be considered ethical when done properly. Thaler himself affirmed that *all nudges should be transparent and never misleading*, reinforcing the fundamental principle of freedom of choice, which can only exist when nudges are transparent. Consequently, ensuring transparency in nudging practices becomes an essential undertaking, even if it comes at the expense of potentially reducing their effectiveness.

Due to the aforementioned aspects, considering the exclusive use of nudging as the only tool for promoting sustainability is overall deemed unrealistic, as this technique still possesses several limitations and it is clear that a generalized nudge design will not work for everyone[35].

At the same time, recent scholarly research has been growingly emphasizing the significance of nudges as being sufficient, scalable, subjective, and statistical significant to be an effective policy response.[36]

These studies, overall, make a strong case that – by carefully designing appropriate nudges and, even more importantly, by combining this tool with traditional regulatory approaches in a complementary manner – it becomes possible to effectively enhance outcomes and move closer to the desired goals.

[35] S. BANERJEE, P. JOHN, *Nudge and Nudging in Public Policy*, in M. VAN GERVEN, C. ROTHMAYR ALLISON, K, SCHUBERT *(eds) Encyclopedia of Public Policy,* Springer, 2023.

[36] S. MILLS, R. WHITTLE, *Seeing the nudge from the trees: The 4S framework for evaluating nudges*, in *Public Administration*, 2024.

## 5. Green nudges as complementary tools to conventional policy instruments for sustainability

The potential of nudge strategies is further underlined by the fact that, when attaining sustainability objectives, the conventional strategies employed in policymaking exhibit significant drawbacks.

*Command and Control strategies*, work through tools such as bans, duties, and standards, which serve as general rules applicable to all individuals. *Inter alia*, it has been observed that these instruments, although relatively cost-effective (with the exception of standards, which can entail substantial expenses in their formulation), possess a paternalistic nature: consequently, they are susceptible to the manifestation of biases originating from the policymakers[37].

*Disclosure duties and information-based regulations* use tools as *ex ante* information disclosure duties or *ex post* prohibition of false information, misleading advertising and unfair commercial practices, to shape the duty of market actors. Therefore, they are neutral regarding individual cognitive systems and preferences. While aiming to protect individual autonomy, they generally do not ensure a complete understanding due to the occurrence of major cognitive bias and the high risk of information overload.

[37] W. ESKRIDGE, J. FEREJOHN, *Structuring Lawmaking to Reduce Cognitive Bias: A Critical View*, in 87 *Cornell L. Rev.*, 2002, 616

Lastly, *incentive-based regulation* which utilizes economic incentives (e.g. by employing differentiated tax regimes and subsidies) generally provides a structural rules applicable to the whole community. Even if such a tool is relatively straightforward to enforce and allows freedom of choice, its impact and costs are difficult to determine, and it disregards the relevance of motivations other than purely economic ones.[38]

More in general, relying solely on a singular strategy would be overly simplistic and diminish its effectiveness. A more comprehensive approach could entail a combination of different strategies, blending cognitive-based information approaches with conventional tools. For instance, the establishment of explicit regulations and standards that prioritize sustainability would provide a solid foundation for the implementation of green nudges; in this context, nudging can be particularly effective in encouraging individuals to exceed the minimum requirements outlined by the regulations, thereby fostering a greater level of sustainable behavior. The same reasoning can be applied to disclosure regulation, which, when integrated with smart information nudging, could be streamlined by reducing less relevant components and utilizing the power of salience to emphasize the desired message: in this way the focus can be placed on highlighting the most pertinent information and effectively communicating the intended message. This approach allows for a more

[38] F. DI PORTO AND N. RANGONE, *Behavioural Sciences in Practice: Lessons for EU policymakers*, in A. ALEMANNO AND A. SIBONY (eds), *Nudge and The Law: a European Perspective*, Oxford, 2015.

targeted and impactful disclosure, ensuring that individuals are properly informed but also avoiding information overload.

In attempting to make a comparison, it is worth highlighting that, although there is limited empirical evidence in the literature comparing the effectiveness of nudges strategies embedded in traditional regulatory tools, some studies have provided insights into their relative impact. For instance, a study by Benartzi[39] examined the impact of a social norm message in conjunction with discounts on electricity bills. The findings indicated that the nudge intervention resulted in savings of 27.3 kWh per dollar spent, whereas the discount approach only achieved 3.41 kWh savings per dollar spent. Another study by Nauges and Whittington[40] compared the use of price instruments and social norm messages. The research suggested that price instruments generated higher net benefits for society compared to social-information nudges, but it was noted that price increases might also place a larger burden on households to bear the costs. Consistently the following section will offer a comprehensive overview of scenarios in which the incorporation of nudging techniques can enhance the effectiveness of traditional tools as economic incentives. The conceptual frameworks provided by Carlsson and Johansson-Stenman[41],

[39] S. BENARTZI, J. BESHEARS, KL MILKMAN, C. SUNSTEIN, R. THALER, M. SHANKAR, W. TUCKER-RAY, WJ CONGDON, S. GALING, *Should Governments Invest More in Nudging?* in *Psychological Science,* 2017.

[40] C. NAUGES and D. WHITTINGTON, *Social norms information treatments in the municipal water supply sector: some new insights on benefits and costs*, in *Water Economics Policy*, 2019.

[41] F. CARLSSON AND O. JOHANSSON-STENMAN, *Optimal prosocial nudging*, in *SSRN Electronic Journal*, 2019.

as well as Farhi and Gabaix[42], serve as the reference models for this analysis. These frameworks provide valuable insights into the potential synergies between nudging and economic incentives, shedding light on how these combined approaches can optimize desired outcomes in various contexts.

Yet, and before delving into the analysis, it is important to highlight the distinction between moral nudges and pure nudges. A pure nudge refers to a behavioral intervention designed to facilitate individuals in making choices that align with socially desirable behaviors. In the context of sustainability, a green pure nudge acknowledges that individuals may not necessarily be making errors in their decision-making. Instead utilizes inherent limitations in decision-making to guide behavior towards socially beneficial actions: the focus of a green pure nudge is to promote behaviors that contribute to sustainability without assuming that individuals are making deliberate mistakes or acting against their own best interests. On the contrary, moral nudges operate by providing psychological rewards for engaging in "the right thing" and intentionally evoke specific emotional reactions such as enjoyment, fear, shame, or pride. These nudges are designed to leverage individuals' psychological responses to incentivize and reinforce behaviors aligned with the desired goal.

Looking at how this difference impacts policymaking, it is possible to refer to a basic model characterized by identical individuals and two goods, one

[42] E. FARHI AND X. GABAIX, *Optimal taxation with behavioral agents*, in *American Economic Review,* 2019.

clean and one dirty, where the dirty good generates a negative environmental impact. The efficacy of implementing a pure green nudge alongside a Pigouvian tax[43] debated in studies such as the ones conducted by Farhi and Gabaix and by Carlsson and Johansson. The referred studies argue that in such a model, assuming it is free of administrative costs or limitation regarding the implementation of a tax, the inclusion of a pure green nudge would offer no additional advantages. According to their perspective, the pure green nudge can solely influence decision utility, implying that an optimal allocation can be achieved by relying solely on a perfect Pigouvian tax. On the contrary, an alternative approach could involve the implementation of a moral nudge that, in conjunction with the perfect Pigouvian tax, aims to reinforce a sense of pride associated with abstaining from consuming the dirty good; in this way, the moral nudge would operate by providing individuals with positive reinforcement and a sense of accomplishment for making environmentally conscious choices. However, in this scenario, it is important to note that if the employed nudge induces a sense of guilt in individuals who have not adopted sustainable behaviors, it would be necessary to solicit another question: to

[43] A Pigouvian tax (named after the British economist Arthur C. Pigou) is a type of tax designed to address negative externalities. Farhi and Gabaix claimed that Pigouvian Taxes have also utility in correcting internalities. However, considering that internalities tend to be more prevalent among the poor, implementing Pigouvian taxes may lead to unintended adverse distributional effects and create a trade-off between internality correction and redistribution. To overcome this trade-off and avoid exacerbating inequality, the implementation of nudging interventions becomes an attractive alternative.

what extend it is appropriate to associate a moral judgment with the choice to pursue less eco-friendly behaviors? This highlights the distinction between *moral subsidies* and *moral taxes*.[44]

Conversely, the situation changes when the tax level is not optimal and falls too low or is nonexistent. In such cases, the use of a pure nudge becomes highly valuable, and the selection of the nudge, combined with the imperfect tax, should aim to replicate the outcomes of a perfect tax.

In a more heterogeneous model, arise certain scenarios where nudges could be considered optimal even in cases where a first-best tax implementation is feasible. The rationale behind preferring nudges over taxes lies in their ability to effectively target individuals who may be subject to initial biases or cognitive limitations, which a tax may not be able to address as effectively.

## 6. Exploring new assessment strategies: modelling the approach

In light of the aforementioned discussion, the implementation of green nudges in complementarity with traditional regulatory tools for sustainability, while promising, should be subject to a careful evaluation. Within this evaluation, it is advisable to incorporate the principles proposed by Darnton[45], while also taking into account any exceptions that

[44] H. ALLCOTT, J. KESSLER *The welfare effects of nudges: A case study of energy use social comparison*, in *American Economic Journal,* 2019.
[45]See *supra* note 32.

arises regarding these principles and conducting additional research, where further evidence is needed.

From a methodological point of view, a set of three steps is suggested for conducting such an operation, consistently with the literature that has been analyzing the topic[46].

*a) Challenge identification:* in this initial phase, it is imperative to ascertain the specific sustainability domain in which the intended outcome is to be pursued. For instance, the focus could be on mitigating carbon emissions, reducing electricity consumption, fostering eco-friendly purchases or promoting recycling practices. By clearly defining the sustainability area, one can establish a targeted approach to address the desired outcome.

*b) Behavioral influences evaluation:* the objective of this phase is to identify the target audience and gain an understanding of the biases and cognitive barriers that may obstruct the attainment of the established goal. This phase encompasses three essential sub-stages:

i) *identify target people and behavior;*

ii) *Identify pertinent behavioral models* including both individual and societal perspectives, and compile a concise list of the most prominent influential factors. This process may entail conducting a comprehensive literature review and engaging in consultations with relevant stakeholders to gather insights and expertise;

[46] See in this regard S. RANCHORDAS, K. YOUNG, *Introduction to Law and Regulation*, Cambridge University Press, 2nd ed., 2024.

iii) *Select key influencing factors* and use them to define objectives in draft regulatory strategies for interventions (in cases where the phenomena or behaviors under analysis are novel or unexplored, it becomes imperative to undertake new researches during this stage in order to generate fresh insights).

Intuitively, this third phase constitutes a critical turning point as it aims at assessing, drawing upon the data collected in the previous phases and thorough an analysis of the behavioral models pertaining to the different cases at stake, whether *the use of behavioral insights is able, through the implementation of a form of green nudge in complementarity with a traditional tool, to truly enhance effectiveness in achieving the desired regulatory goal.* If the answer is negative, the subsequent step would involve selecting the appropriate regulatory tool to be employed in this specific scenario, asserting that there is no requirement to associate a type of green nudge with it. If the answer is affirmative, the assessment progresses to the final stage.

*c) Complementarity and efficiency:* the third phase focuses on how to effectively combine a specific form of nudging with an appropriate regulatory tool to achieve operational efficiency. The primary questions to address in such phase are:

*i) Taking into account the behavioral analysis conducted according to point b, what is the most appropriate nudge to implement the desired behavior? Specifically, considering the identified biases and cognitive barriers, which type of nudge would be most effective in promoting sustainable choices?* (For instance: if the main challenge in pursuing sustainable behavior derives from the lack of information or

from the overwhelming presence of redundant and conflicting information, an effective approach would involve smart information nudging that leverages salience. Also, if the barrier identified in the previous analysis is primarily caused by inertia, then the use of default rules could be beneficial).

*ii) Should be employed a green pure nudge or a green moral nudge?*

*iii) Which regulatory tool would provide a solid foundation to be enhanced in effectiveness through the implementation of green nudges?*

By carefully evaluating these aspects, the optimal combination of nudging and traditional regulatory tools can be determined to maximize efficiency and promote sustainable behavior effectively.

Following such a iterative process of development and validation allows for reevaluation and potential modifications of a regulatory approach in order to improve the initial assumptions incorporating insights gained from the subsequent stages. As such, it enables continual improvement and refinement of the model, ensuring its effectiveness in promoting the desired sustainable behavior.

As it was already clarified, a viable pathway lies in framing nudging as a strategic element within the tool represented by Impact Assessment., in alignment with the previously stated goal of integrating green nudges into policy strategies aimed at achieving sustainability goals. According to this perspective, green nudges, while relying on the robust foundation provided by the Impact Assessment to avoid their limitations, in turn

enhance the effectiveness of Impact Assessment, ensuring it is better equipped to achieve its objectives.

## 7. A focus on impact assessments as regulatory tools

Impact assessment (IA) is the process of identifying and evaluating the future consequences, both intended and unintended, of current or proposed actions, policies, or programs[47], to support the quality of governmental decision-making by providing essential information for informed policy choices and higher-quality legislation; according to the OECD, building and strengthening administrative capacity to carry out these assessments is vital to ensure that governments can make well-informed decisions, and even the application of basic IA principles can often eliminate the need for immediate policy amendments or redrafting.[48] By offering a systematic methodology for evaluating the potential impacts of policies, technologies, and projects, IA has become a foundation of modern regulatory frameworks. It works not only as a retrospective tool for assessing outcomes but also as a proactive mechanism embedded in decision-making processes, since its systematic approach (defined as a

[47] IAIA: *international association of impact assessment,* available at www.iaia.org.

[48] OECD, *Improving Policy Instruments through Impact Assessment*, *SIGMA Papers*, No. 31, OECD Publishing. 2001, *passim.*

coherent approach rather than an episodic or random one[49]) ensures that potential adverse effects are anticipated and managed before they materialize.[50]

The core principle of impact assessment lies in evaluating the anticipated costs and benefits of regulatory policy proposals.[51] This approach serves as a vital tool in evaluating and shaping policy proposals by analysing advantages and disadvantages systematically.[52]

Impact Assessments come in different forms, including Regulatory Impact Assessment (RIA), Sustainability Impact Assessment (SEA), Environmental Impact Assessment (EIA)—which will be the focus of further discussion— each serving distinct purposes.[53] Nevertheless, they share several key characteristics: all of these approaches aim to identify the main impacts of a proposed policy before a final decision is made, adhere to a structured administrative process, and culminate in the production of a formal report or statement.[54]

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[49] C. RADAELLI, F. DE FRANCESCO, *Regulatory Impact Assessment*, in R. BALDWIN, M. CAVE, AND M. LODGE (eds), *The Oxford Handbook of Regulation*, Oxford, 2010.

[50] A. MANTELERO, *The Fundamental Rights Impact Assessment (FRIA) in the AI Act: Roots, legal obligations and key elements for a model template*, in *Computer Law & Security Review*, Volume 54, 2024, *passim.*

[51] A. MANTELERO, *ibidem.*

[52] C. RADAELLI, F. DE FRANCESCO, n. 51.

[53] DE RIDDER *ET AL*, *A framework for tool selection and use in integrated assessment for sustainable development*, in *Journal of Environmental Policy Assessment and Management*, 2007; C. RADAELLI, *Diffusion without convergence: how political context shapes the adoption of regulatory impact assessment*, in *Journal of European Public Policy*, *12*(5), 2005, 924-943.

[54] J. HERTIN ET AL, *Rationalising the policy mess? The role of ex ante policy assessment and the utilization of knowledge in the policy process*, in *Environment and Planning A: Economy and Space*, 41(5), 2009, 1185-1200.

The European Commission, which has been a long-time advocate of Impact Assessment (IA)[55], committed to gradually implementing impact assessments for all significant legislative and policy initiatives[56]: this effort is part of the broader international movement led by the OECD, which has shifted its focus over the past 20 years *from deregulation to better regulation*.[57] In 1995, the OECD outlined the first internationally accepted set of principles for ensuring regulatory quality, including a ten-point Reference Checklist for Regulatory Decision-Making, which has shaped the global standards for regulatory impact assessment.[58]

Over the past two decades, the use of IA has advanced significantly to the point that this tool has been used not only to ensure regulatory efficiency but also to guarantee environmental responsibility.[59] Environmental Impact Assessment (EIA), in particular, has proven to be essential in incorporating environmental consideration into the decision-making process. Widely recognized as an effective policy, the European Union's

[55] EUROPEAN COMMISSION, *Action Plan on Simplifying and Improving the Regulatory Environment*, COM 2001, CDM 2002.

[56] EUROPEAN COMMISSION, *Communication on Impact Assessment*, COM 2002.

[57] OECD, *Regulatory Policies in OECD Countries: From Interventionism to Regulatory Governance*, in *OECD Reviews of Regulatory Reform*, Paris, OECD Publishing, 2002.

[58] OECD, *Improving the Quality of Government Regulation*, OECD/GD (95) 95, Paris, OECD Publishing, 1995.

[59] OECD, *Regulatory Impact Analysis: A Tool for Policy Coherence*, Paris, OECD Publishing, 2009. Available at https://doi.org/10.1787/9789264067110-en

adoption of EIA has significantly improved how environmental factors are addressed in project-related decisions.[60]

Despite these strengths, IA processes face criticism for falling short of delivering optimal regulation.[61] The risk is that IA processes might not fully meet the criteria for *smarter regulation*, where *smarter regulation*[62] refers to the design of fully functional regulatory systems by combining various institutions and techniques, in an approach that goes beyond government controls and considers a mix of regulatory methods implemented by a variety of actors, including public bodies, trade associations, pressure groups, businesses, and individuals.[63] A key principle of smarter regulation is the preference for policy mixes that incorporate a wider array of instruments and institutions.[64]

In this light, integrating green nudging into the stages of Environmental Impact Assessment (EIA) expands the regulatory tool kit through the juxtaposition between traditional environmental assessment methods and behavioural approaches that subtly influence decisions and actions, while increasing the involvement of different stakeholders. Additionally, green nudging meets the demand for *lighter-touch controls* -especially when

[60] EUROPEAN COMMISSION, *Study concerning the report on the application and effectiveness of the EIA Directive,* Bruxelles, 2009.

[61] R. BALDWIN, M. CAVE, AND M. LODGE, *Understanding Regulation: Theory, Strategy, and Practice*, 2nd ed., Oxford, 2011.

[62] R. BALDWIN, *Is Better Regulation Smarter Regulation?*, in *Public Law*, 2005.

[63] N. GUNNINGHAM AND P. GRABOSKY, *Smart Regulation: Designing Environment Policy*, Oxford, 1998

[64] R. BALDWIN, 2005, n. 64.

compared to more rigid regulatory frameworks- offering a way to achieve outcomes without imposing heavy-handed or uniform constraints. Assuming that adaptability to context is a fundamental requirement of smart regulation, then it must be said that this can be challenging for broad, general prescriptions; integrating green nudging into EIA can be customized to fit projects, sectors, or regions, making it a more effective tool for reducing environmental impacts. By incorporating green nudging into the EIA directive, the principles of smarter regulation are fully realized, enriching the regulatory framework with innovative and behavioural strategies, and promoting more effective, flexible, and participatory approaches to addressing environmental issues.

## 8. Environmental impact assessment meets green nudging

The European Union's Environmental Impact Assessment (EIA) Directive[65] is one of the most employed tools in order to evaluate the environmental impact of an activity. The incorporation of green nudging within the EIA report not only makes the directive more aligned with its objective, subtly guiding decision-makers and stakeholders towards more sustainable choices without restricting their freedom, but also strengthens the argument previously posited in the paper: nudging strategies, due to

[65] *Directive 2011/92/EU* as amended by *Directive 2014/52/EU*.

their intrinsic characteristics, require a robust foundation –here represented by the EIA Directive- to be fully effective.

The EIA directive frames the environmental impact assessment as a process involving several stages, their related documents and consultations[66]; nevertheless, regulatory shortcomings (as the lack of mandatory ex post monitoring) reduce its actual capacity to address long-term environmental impact effectively.[67] Given that the goal of green nudging is to guide individuals towards more sustainable choices by making sustainable options more salient[68], this can be particularly useful in the context of complex regulatory frameworks such as the EIA, where it is needed to navigate vast amounts of information.

The fundamental step in the EIA process is the development proposal[69], followed by a screening phase, which aims at identifying projects requiring an EIA: projects are distinguished between those that automatically

[66] EUROPEAN COMMISSION, *The process of an EIA*, Bruxelles, 2001.

[67] Article 8(a)(1) of the EIA Directive, which states that monitoring measures are only required in specific situations; as noted by J. GLASSON, AND R. THERIVEL in *The Effectiveness of EIA as an Instrument for Environmental Governance: Reflecting on 25 Years of EIA Practice in the Netherlands and the UK*, the EIA process is typically seen as concluding once the final decision is made.

[68] R.H. THALER and C. R. SUNSTEIN, 2008, n. 1.

[69] Art. 1(2), point g of the Directive 2011/92/EU as amended by Directive 2014/52/EU.

require it and those for which member states must assess the need based on thresholds and criteria.[70]

The screening process serves two purposes: first, to ensure that projects which might have significant environmental impacts are thoroughly assessed; second, to guarantee that only projects with actual potential for major environmental effects undergo an EIA.

When the need for an impact assessment is confirmed, the scoping phase follows.[71] This early step provides an opportunity to identify environmental effects and relevant concerns, helping both the developer and the competent authority determine the type and amount of information required. Because of the complex nature of this stage, it should be viewed not as a one-time event but as an ongoing process able to evolve as new insights emerge[72] and, in this context, the Commission's guidelines[73] serve as a practical resource.

In the screening and scoping phases of the EIA process, green nudging can play a crucial role by emphasizing the most critical environmental criteria or risks associated with a project: this can be done by reducing excessive textual content to prevent an information overload and focusing on visuals and clear indicators. In this way, green nudging fulfils its

[70] EUROPEAN COMMISSION, *Environmental Impact Assessment of projects: Guidance on Screening (Directive2011/92/EU as amended by 2014/52/EU),* EU Publications Office, 2017.

[71] UNITED NATIONS ENVIRONMENT PROGRAMME, *Environmental Impact Assessment Training Resource Manual*, second edition, 2002.

[72] E. ROMAGNOLI, *La procedura di Valutazione di Impatto Ambientale (VIA): evoluzione normativa e procedurale*, in *Ambiente e Diritto*, 2007.

[73] EUROPEAN COMMISSION, *Guidance on Scoping*, Bruxelles, 2001.

purpose as a tool for framing decision-making, ensuring that relevant factors stand out and guiding toward more informed and impactful choices.[74]

The preparation of the environmental assessment report is the most critical phase of the EIA process, since it must be detailed enough to allow the competent authority to make well-informed decisions. The Directive states that the assessment must address various environmental factors, such as population health, biodiversity, air, water, and climate, while considering their interconnections.[75] The report must also include reasonable alternatives, but it does not require developers to present them explicitly.[76]

At the final stage, the competent authority, which must have the necessary expertise and operate without conflicts of interest, is responsible for granting approval for the project. Approaching this step, green nudges can be used with the goal of ensuring that the final decision is based on clearly presented and unbiased information.

Lastly, monitoring measures, which represent the most difficult task to implement[77], could be improved by incorporating feedback loops, such as visual progress reports or real-time data visualization tools, to ensure

[74] R.H. THALER and C. R. SUNSTEIN, 2008, n. 1.
[75] Art. 3 of the EIA Directive 2011/92/EU as amended by Directive 2014/52/EU.
[76] Art. 5(1)(d) of the EIA Directive 2011/92/EU as amended by Directive 2014/52/EU.
[77] EUROPEAN COMMISSION, *Guidance on Scoping*, Bruxelles, 2001.

ongoing environmental considerations[78]; nudging can increase accountability and ensure that environmental impacts are consistently tracked over time. [79]

As previously outlined, green nudging strategies can be effectively integrated into the EIA process, offering a complementary approach that enhances its ability to address environmental concerns, by improving its limitations and fostering long-term sustainability. These strategies serve as a valuable addition to the regulatory toolkit, contributing to realizing smarter regulation by promoting a more context-specific approach to policymaking. This integration makes green nudging a crucial instrument in advancing the sustainability agenda, while remaining aware of its weaknesses (and therefore mitigating them by pairing them with the EIA), ensuring that environmental considerations remain at the forefront of policy and project development.

## 9. Conclusions

The research explored the use of green nudges as an innovative approach in the realm of promoting environmentally conscious behavior. The primary aim of this contribution was to establish a clear understanding of

[78] E. VAN DER ZEE, *Strengthening Environmental Decision Making through Legislation: Insights from Cognitive Science and Behavioural Economics*, in *Transnational Environmental Law*, 2023, 12(2), 295-317.
[79] OECD, *Better Regulation Practices across the European Union*, OECD Publishing, 2019.

green nudges and their practical implementation. To achieve this objective, the analysis first provided a concise overview of the key concepts involved: definitions of nudges, libertarian paternalism, behavioral economics, and the main tools utilized in nudge-based regulation. Subsequently, these general definitions have been declined in specific applications within sustainability policies, looking at relevant case studies observable in the field.

Then, the third part of this study aimed to address a fundamental objective: understanding the practical limitations of implementing green nudges and demonstrating their necessary complementarity with traditional regulatory tools. By analyzing practical examples and examining the operational principles developed in literature it was possible to establish a comprehensive list of factors that defines the limits of nudging. After observing the advantages and shortfalls that green nudging strategies entail, the research subsequently showed that nudge should operate not as a stand-alone tool but, rather, as a complementary resource to other form of regulation. Hence, the study explored how to effectively integrate green nudging with regulatory tools for more satisfactory results than those achievable through traditional approaches alone. In order to do so, the analysis started by evaluating the strengths and weaknesses of the most used regulatory tools in the sustainability field. Then, drawing upon existing literature, further insights are gained to identify situations where nudging proves to be particularly beneficial.

Finally, evidence gathered has been employed to suggest the development of a new impact assessment model, proposed as a premise for a case-by-case assessment of green nudging strategies. This model considers the surrounding context and enables decision-makers to determine when complementing a specific traditional regulatory tool with a green nudge is advantageous and, and, if necessary, guides them in selecting the most appropriate nudge strategy. This approach encourages a thoughtful and tailored integration of nudging into existing sustainability strategies, thereby enhancing the likelihood of achieving more effective and impactful outcomes. Lastly, in order to further validate this approach, the research focused on the current framework for impact assessment strategies in the European Union, devoting major attention to the Environmental Impact Assessment as a potential venue to encompass green-nudging strategies.

It is, however, clear that further research is imperative to understand the cost-effectiveness of green nudges and assess the sustainability of these costs over time. First and foremost, and consistently with the relevant literature in the field. translating such a theoretical framework into the development of concrete impact assessment models will require additional information regarding the enduring effects of nudging interventions. In such a sense it is worthy to ascertain whether the implementation of nudging can be facilitated through cross-sector collaboration, which entails exploring partnerships between public and private entities, civil society organizations and academia. Such collaborations have the potential

to leverage resources and expertise, thereby enhancing the effectiveness of nudging initiatives. Conducting research in these areas will contribute valuable insights to the field and support evidence-based decision-making in environmental policy.