Science and law in environmental law and policy

Cavoski, Aleksandra

<Article>

SCIENCE AND LAW IN ENVIRONMENTAL LAW AND POLICY: THE CASE OF THE EUROPEAN COMMISSION

Aleksandra Čavoški[1]

Abstract: This article draws on empirical research conducted with European Commission officials in three Directorate-Generals (DGs) and its other services on their perception of how the legislative and policy-making process facilitates the interaction of science and environmental law. This article deploys Sheila Jasanoff's theoretical framework of co-production as an important lens to examine how the European Commission creates this interaction of science and law in environmental policy-making and identifies how the Commission incorporates different voices and stakeholders in this policy area. The Commission can be seen as a vehicle of co-production of science and law in EU environmental policy by building strong expert identities, putting in place institutional processes and instruments and creating discourse between scientists and lawyers leading to outputs of co-production. It is argued that in actively facilitating co-production, the Commission underpins the legislative and policy-making process with its institutional values.

Keywords: European Commission; Co-production; Jasanoff; Environmental law and policy; Interaction of science and law

1. INTRODUCTION

Environmental law and policy are infused with science; their production involves both scientists and lawyers and the outputs are shaped by science. However, the extent to which scientific knowledge is properly integrated into policy making is often unclear. This article draws on empirical research conducted with European Commission officials in three

[1] University of Birmingham (United Kingdom).
Email: A.Cavoski@bham.ac.uk.
I am grateful to Steven Vaughan, Fiona de Londras, Robert Lee and Conor Murphy for their comments. I am also thankful to the anonymous reviewers and editors for their feedback.

Directorate-Generals (DGs) and several other Commission services to examine their perception of how the legislative process facilitates and ensures the incorporation of science into European Union (EU) environmental law. The article argues that the Commission acts as a vehicle of co-production of science and law in EU environmental policy by building strong expert identities, putting in place institutional processes and instruments, and creating discourse between scientists and lawyers leading to what Sheila Jasanoff calls a 'serviceable truth'.[2] The Commission acts to embed scientific knowledge 'in social practices, identities, norms, conventions, discourses, instruments and institutions'.[3] It is argued that in actively facilitating co-production, the Commission underpins the legislative and policy-making process with its institutional values. In particular, it creates the context of independence and trust which ensures that scientific knowledge that has been incorporated into law has not been 'sacrificed on the altar of an impossible scientific certainty'[4] and the policy preferences of different stakeholders are taken into account.

This article deploys Jasanoff's theoretical framework of co-production as an important lens to examine how the European Commission creates the nexus of science and law in environmental policy making and explains how the Commission incorporates different voices and stakeholders in this policy area. Moreover, the article engages with this analytical framework to develop an empirically-grounded understanding of how the Commission acts at this nexus. This concept is of particular importance for the EU where this interaction occurs in a multi-level governance arena, with the interests of numerous actors and institutions holding different preferences and policy traditions. This is especially pertinent to environmental policy where

[2] S. Jasanoff, 'Serviceable Truths: Science for Action in Law and Policy' (2015) 93(7) *Texas Law Review*, pp. 1723-49.
[3] S. Jasanoff, 'The Idiom of Co-production', in S. Jasanoff (ed.), *States of Knowledge: The Co-production of Science and Social Order* (Routledge, 2006), pp. 1-12, at 3.
[4] Jasanoff, n. 2 above, p. 1730.

the Commission, with its exclusive power of legislative initiative, mediates between different interests and facilitates the interaction between science and law. Though the Commission, in translating science (in particular natural science) into law, is specifically concerned with maintaining the landscape of fact, one cannot overlook the importance of the context in which this social interaction between the legal and scientific domains occurs.

Thus, this empirically grounded study is of multi-faceted significance both for EU policy making and more broadly. It contributes to our understanding of how the Commission acts in areas of legal regulation heavily shaped by scientific insights and how policy making occurs in those areas. The study also engages with the question of deference to science and the Commission's ability to integrate scientific knowledge into law and policy that is fit for purpose.[5] Furthermore, the study makes a significant contribution to the socio-legal research on the interaction of science and law within the European Commission, especially in environmental legal research. There is a growing interest in the interaction between law and science and this article utilizes primary data to examine the legislative process as well as the perception of this interaction by officials in the European Commission. Finally, this article's application of Jasanoff's co-production idiom to the EU environmental legislative process not only demonstrates its relevance to the EU multi-level policy-making process but also provides an explanatory model to examine the broader social processes that incorporate scientific knowledge into law. It has important purchase in environmental policy making by shedding light on how scientists and policy makers bridge the gap between law and empirical evidence in the legislative process.

2. CO-PRODUCTION AND THE EUROPEAN COMMISSION

[5] Ibid., p. 1724-25.

Though cooperation between scientists and lawyers revolves primarily around questions of evidence,[6] the mutual reliance between the two disciplines is prominent in the policy-making process. This interaction between science and other social processes is best explored by Jasanoff's idiom of co-production which provides 'explanatory power by thinking of natural and social orders as being produced together'.[7] This allows us to examine how science, in particular natural sciences becomes part of the decision-making process.[8] Co-production entails the idea that science and social activity, including law, cannot be divorced from each other and they both support and shape each other. As Jasanoff argues, 'society cannot function without knowledge any more than knowledge can exist without appropriate social support'.[9]

This concept has been part and parcel of science and technology studies;[10] yet its reach is wider, including its deployment to political and social sciences. This concept is particularly significant to environmental legal scholarship as legal regulation in this area is heavily shaped by scientific insights. However, it has been under-utilized in legal research. Of particular importance in developing the idiom of co-production is the collected volume on co-production of EU expert and executive power in regulating health and environmental issues, which provides some excellent examples of co-production in specific contexts including law, governance, political science, and science and technology studies.[11] The most recent work of Maria Lee and others focuses on construction, use and impact of knowledge in administrative decision making by

[6] Ibid., p. 1723.
[7] Jasanoff, n. 3 above, p. 2.
[8] Ibid., p. 3.
[9] Ibid, pp. 2-3 See also A.C. Keller, *Science in Environmental Policy: The Politics of Objective Advice* (The MIT Press, 2009).
[10] See more in S. Jasanoff, G.E. Markle, J.C. Petersen & T. Pinch (eds), *Handbook of Science and Technology Studies, Revised Edition* (Sage, 2001).
[11] M. Weimer & A. de Ruijter (eds), *Regulating Risks in the European Union: The Co-production of Expert and Executive Power* (Hart Publishing, 2017).

examining the planning process for major off-shore winds farms through the lens of co-production.[12]

While there is a growing research on the interaction of science and law in social and political science, there is lack of primary data in socio-legal research on the process of incorporating science into EU environmental legislation given the importance of the Commission's exclusive power of legislative initiative at the EU level. Previous empirical studies on EU policy making and expertise have been predominantly carried out within political science.[13] Scholars in this field have primarily focused on the role of external expert groups at the EU level by looking at the activity of external expert groups in EU policy[14], knowledge utilization,[15] the role of national officials attending Commission committees[16] and views of external scientists in providing expertise to the European Commission.[17] This article focuses on how officials in the European Commission perceive the interaction of science and law in the environmental legislative process. It also adds to scholarship on the role of in-house providers of scientific input and other Commission services such as the Legal Service of the Commission.

[12] M. Lee et al, 'Techniques of Knowing in Administration: Co-production, Models, and Conservation Law' (2018) 45(3) *Journal of Law and Society*, pp. 427-56.

[13] The work recognizes the significant empirical research by political scientists with regard to environmental policy and EU institutions, including the European Commission, as well as work on compliance and effectiveness of EU environmental policy. Examples include: A. Weale et al., *Environmental Governance in Europe: An Ever Closer Ecological Union* (Oxford University Press, 2000); C. Knill, S. Heichel & D. Arndt, 'Really a Front-runner, really a Straggler? Of Environmental Leaders and Laggards in the European Union and Beyond: A Quantitative Policy Perspective' (2012) 48 *Energy Policy*, pp. 36-45.

[14] See Å. Gornitzka & U. Sverdrup, 'Who Consults? The Configuration of Expert Groups in the European Union' (2008) 31(4) *West European Politics*, pp. 725-50.

[15] See C. Boswell, 'The Political Functions of Expert Knowledge: Knowledge and Legitimation in European Union Immigration Policy' (2008) 15(4) *Journal of European Public Policy*, pp. 471-88.

[16] See M. Egeberg, G. Schaefer & J. Trondal, 'The Many Faces of EU Committee Governance' (2003) 26(3) *West European Politics*, pp. 19-40.

[17] See D. Rimkutė & M. Haverland, 'How does the European Commission use Scientific Expertise? Results from a Survey of Scientific Members of the Commission's Expert Committees' (2015) 13(4) *Comparative European Politics*, pp. 430–49.

As this article deploys the lens of co-production to examine the Commission's work in the environmental policy area, it is helpful to briefly clarify and contextualize this concept within the European Commission. In developing the concept of co-production, Jasanoff argues that there is no strict dichotomy between science and social activity. Science cannot be perceived as a discrete, empirically based discipline that operates in isolation from other social activities; rather it feeds into social and institutional activity. Science and social activity are intertwined and they reinforce and shape each other. Thus, co-production as a model explains the context in which those different domains interact. This process is not linear and its explanatory value lies in its ability to demonstrate how decisions in policy areas are heavily reliant on scientific evidence which in itself is value-laden.[18] Law is also a social construct that operates alongside other social activities, in particular science, technology and medicine.[19] As McDougal and Lasswell argue, authoritative decisions in law are inextricable components of social processes and 'such decisions are made in response to claims about particular interactions or events in social process'.[20] These views are deeply rooted in the work of political and legal philosophers such as Montesquieu, who advocated that law cannot be examined in isolation from other social processes, as it is 'an integral, organic component of a community's total culture'.[21]

In examining the literature on the interplay between science and social activity, including law, Jasanoff makes a distinction between constitutive and interactional strands.[22] The constitutive strand is concerned with ways in which stability is created and maintained, while the interactional strand is concerned with elucidating 'myriad mutual accommodations between

[18] Jasanoff, n. 3 above, pp. 3-4 and p. 277.
[19] See M. Lynch, 'Circumscribing Expertise: Membership Categories in Courtroom Testimony', in S. Jasanoff (ed.), *States of Knowledge: the Co-production of Science and Social Order* (Routledge, 2006), pp. 161-180, at 162-3.
[20] M.S. McDougal & H.D. Lasswell, 'The Relation of Law to Social Process: Trends in Theories about Law' (1976) 37 *U. Pitt. L. Rev*., pp. 465-85, at 465.
[21] Ibid., p. 469.
[22] S. Jasanoff, 'Ordering Knowledge, Ordering Society', in S. Jasanoff (ed.), *States of Knowledge: the Co-production of Science and Social Order* (Routledge, 2006), pp. 13-45, at pp. 18-9.

social and scientific practices that occur within existing socio-technical dispensations during times of conflict and change'.[23] This article seeks to understand the interactional strand; the policy-making process which requires accommodation and compromise within an already structured environment. The interaction of law and science in EU environmental policy and lawmaking within the Commission is examined through the four main pathways of co-production identified by Jasanoff: making identities, making institutions, making discourses, and making representations.[24] Making identities has a two-fold function. It allows for a redefinition and maintenance of various identities which should bring credibility and independence to co-production. Co-production also brings to the forefront expert identities which are particularly important in policy areas heavily reliant on scientific knowledge, such as environmental policy. Institutions, as a second pathway of co-production, can be regarded primarily as vehicles through which the interaction of science and law occurs. Policy making takes place through institutions, in this case the European Commission which deploys various processes and instruments that facilitate problem solving, interpretation of evidence, standardization of scientific methods, lawmaking and enforcement.[25] Moreover, institutions play an important role in constructing the institutional culture and agenda, by nurturing overarching values shared by their members.[26] Making discourses is particularly salient to the interaction of science and law due to different *modi operandi* of the two disciplines. As many novel phenomena in nature and society are surrounded by a degree of uncertainty, constructing discourses between lawyers and scientists allows for a better understanding and regulation of these phenomena. Finally, making representations unveils the artefacts of co-production by simultaneously ensuring the scientific integrity of the output and its applicability to those for whom it is intended. In the legal context, the artefacts of co-production will typically include

[23] Ibid., p. 19.
[24] Ibid., p. 38.
[25] Ibid., pp. 39-40.
[26] Ibid., p. 40.

legislation and court rulings, though in recent years soft law documents such as policy papers have become increasingly important.

An examination of the interaction between science and law through co-production has important purchase in the analysis of environmental law and policy, which is one of the most intensive science-based policies. Furthermore, the EU is distinctive due to its multi-level and multi-national layers of interaction bringing together various actors and interest groups which have become part of the decision-making process. Equally, scientists and officials from different professional backgrounds, working in both national and EU institutions, undoubtedly bring their own individual and national identities which shape the discourse within EU institutions in a specific way. Moreover, diverse legal, social and cultural traditions between member states have an impact on this interaction.

The European Commission is at the forefront of co-production in the EU with its exclusive powers of legislative initiative prescribed by Article 17 of the Treaty on European Union (TEU)[27] and enforcement powers prescribed by Articles 258 and 260 of the Treaty on the Functioning of the European Union (TFEU).[28] Over the years, the Commission has been recognized as a 'guardian of the treaties' and a 'vehicle of a federalist agenda'.[29] The Commission has proven itself instrumental in forming and maintaining its own identity as a central pillar that underpins EU environmental policy. Furthermore, the Commission has made significant contributions in developing this area.[30] This was achieved by developing its role as

[27] Lisbon (Portugal), 13 Dec. 2007, in force 1 Dec. 2009, [2007] OJ C 306/1, available at: http://europa.eu/lisbon_treaty/full_text.
[28] Lisbon (Portugal), 13 Dec. 2007, in force 1 Dec. 2009 [2012] OJ C 326/47, available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2012:326:FULL:EN:PDF.
[29] See N. Nugent & M. Rhinard, *The European Commission* (2nd Edition), (Red Globe Press, 2015).
[30] See more about the development, operation and functions of the European Commission in N. Nugent & M. Rhinard, n. 26 above, and A. Jordan & C. Adelle (eds), *Environmental Policy in the EU: Actors, Institutions and Processes*, 3rd Edn (Routledge, 2012).

the primary actor in creating the setting for the co-production of science and law to happen.[31] The Commission uses various methods to facilitate this interaction and mediates between different interests involved in the policy-making process aligned with the four main co-production pathways identified by Jasanoff.[32] As those pathways of co-production are interlinked and form part of the legislative and policy-making process, they may be regarded as benchmarks for assessing co-production in different settings, including the Commission.

In making identities, the Commission manages to accommodate different national and professional identities and build distinct expert identities of actors involved in co-production, which is an important feature of the European integration project.[33] This expert identity contains both organizational and individual expert identities of actors which are closely linked to the Commission's institutional values. Moreover, the Commission successfully built an institutional framework to facilitate co-production. It is the vehicle and the venue for this interaction of science and law to occur. Co-production happens through institutionalization in which robust legal and policy processes are deployed to assess, interpret and incorporate scientific knowledge into law. Aware of the importance of language as the main tool in making discourses, the Commission must overcome differences between scientific and legal language. To that end, the Commission has to ensure that the translation of scientific knowledge into law reduces the risks of both over- and under-regulation. The Commission produces legislative proposals as a physical outcome of co-production containing acceptable levels of scientific knowledge that is linked to all three above mentioned instruments. This outcome is not a

[31] See S. Kingston, V. Heyvaert & A. Čavoški, *European Environmental Law* (Cambridge University Press, 2017).
[32] See Jasanoff, n. 22 above, p. 38.
[33] See I. Bellier, 'A Europeanized Elite? An Anthropology of European Commission Officials' (2000) 14 *Yearbook of European Studies*, pp. 135-56.

'mirror of reality'[34] but the result of the social interaction between science and law within the Commission.

3. METHODOLOGY

This study offers an insight into the context the Commission creates to facilitate the co-production of scientific knowledge into the environmental legislative process. Furthermore, it provides us with a deeper understanding of the perceptions and views of Commission officials on how the legislative and policy-making process enables the incorporation of science into law and the values that underpin this process. This article draws on 18 interviews with officials in three DGs and other services of the European Commission, including DG Environment, DG Research, DG Agriculture, the Legal Service of the Commission, the Joint Research Centre (JRC)[35] and the Scientific Advice Mechanism (SAM). Interviews took place between July 2017 and December 2017 following ethical approval from the University of Birmingham. The scope of this research was limited to the co-production of science and law in the European Commission throughout the legal drafting procedure and enforcement procedure. An examination of the co-production in the European Parliament and the Council as the main legislators in the EU will be part of subsequent research. The research methodology was informed by the choice of co-production as a conceptual framework for this article. The empirical research was conducted through interviews as the most appropriate method for data collection. Information obtained through interviews about the process and perceptions of the interaction of science and law could not have been obtained through doctrinal analysis, surveys or other social and legal research methods. Interviews allowed for data collection in an

[34] Jasanoff, n. 3 above, p. 3.
[35] Joint Research Centre is the Commission's in-house provider of independent scientific knowledge at: https://ec.europa.eu/jrc/en.

interactive setting, which was beneficial for understanding the broader institutional context in which co-production occurs.[36]

Interviewees were senior and mid-ranking officials in the European Commission who could be categorized as EU elites. Vaughan explains the notion of elites and points out that their status, their employment, or title or role or function in society 'gives them a degree of power, privilege and expertise not enjoyed by the majority'.[37] In this empirical study, gaining access to Commission elites was particularly important both for their expertise in chosen areas and for their decision-making power. Access to elites is often perceived as a particular challenge for a researcher,[38] yet Commission officials were very open and willing to share their understanding of the science and law interaction.

Interviews took place in person (both one-to-one interviews and small group interviews at interviewees' place of work) or over the phone, lasting between 40 and 60 minutes. The author's approach was to send an initial email to the Deputy Director-General or Deputy Head of Unit. Interviewees received a semi-structured interview guide in advance, which specified numerous queries on the interaction of science and law in legal drafting. These included questions on the stages of legal drafting, involvement of experts, the quality of scientific advice, independence of evidence, the role of the JRC and Scientific Advice Mechanism (SAM), language, implementation and enforcement of EU environmental law. All interviewees agreed to participate in the research on the understanding that their contributions would remain anonymous. The author used anonymized identifiers to denote the interviewees. It is important

[36] See more in S. Qu & J. Dumay, 'The Qualitative Research Interview' (2011) 8(3) *Qualitative Research in Accounting and Management*, pp. 238-64.
[37] S. Vaughan, 'Elite and Elite-lite Interviewing: Managing our Industrial Legacy', in A. Franklin & P. Blyton (eds), *Researching Sustainability* (Earthscan, 2011), pp. 105-119, at 106.
[38] Vaughan, n. 37 above, p. 110.

to point out that the empirical research did not examine the relationship between the Commission and the EU agencies regulating certain environmental or cross-cutting issues.[39] The role and significance of external experts assisting the Commission in the legislative process is not part of this study.

4. PERSPECTIVES FROM THE COMMISSION

4.1. Making identities in EU environmental policy

Making identities represents the first of the four pathways of co-production and it is particularly salient to this process as it allows us to examine the formation and maintenance of identities in different contexts.[40] As Rabeharisoa and Callon point out, 'co-production translates an intertwined transformation of relations between science and society'.[41] One of the transformations manifests itself in identity building, which includes the reaffirmation of existing and emergence of new identities.[42] Jasanoff proposes the idea of collective, individual and other regional identities (such as 'European') within the co-production idiom.[43] In examining the interaction between science and law through co-production, we are primarily interested in the identity of the expert,[44] as the notion of 'expert' is often intertwined with the notion of science.[45] As Lynch points out, concepts like 'science' and 'experts' have various

[39] Significant empirical work has already been conducted with regard to agencies (e.g., E.I.L. Vos, 'EU Agencies on the Move: Challenges Ahead',(2018) 1 *SIEPS*, pp. 1-49; E.I.L. Vos, 'EU agencies and Independence', in D. Ritleng (ed.), Independence and Legitimacy in the Institutional System of the European Union: The Collected Courses of the Academy of European Law (Oxford University Press, 2016), pp. 206-27.
[40] Jasanoff, n. 22 above, p. 39.
[41] V. Rabeharisoa & M. Callon, 'Patients and Scientists in French Muscular Dystrophy Research', in S. Jasanoff (ed.), *States of Knowledge: The Co-production of Science and Social Order* (Routledge, 2006), pp. 142-160, at 142.
[42] Ibid.
[43] Jasanoff, n. 22 above, p. 39.
[44] Ibid.
[45] Lynch, n. 19 above, p. 161.

usages, including the denotation of someone with authority and credibility in formal and informal social interactions.[46]

Co-production of identities between scientists, lawyers, bureaucrats and politicians takes place within the Commission. Besides specific individual identities held by Commission officials, the Commission has its own collective identity as a collegiate body. The formation of identities has been examined in the wider EU context, through studies on the identities of officials in the European Commission. These studies have focused, in particular, on how different nationalities and cultures affect the shaping of a common European identity and Commission decision making.[47] The plethora of national and cultural identities is unsurprising as the Commission is involved in multi-level, multi-national decision-making processes and identities are formed across different institutional contexts. With regard to environmental issues, the various identities include those of civil servants in DGs responsible for environmental or cross-sectoral issues, of people working in other Commission services such as JRC or the Legal Service of the Commission, and of national experts who interact with the Commission through the legal drafting process.

Identity is not a static concept; identity building through co-production allows one to differentiate oneself from others and define one's role.[48] Expert identity entails someone with specialized skills and knowledge.[49] In the EU context, the notion of an expert is often associated

[46] Lynch, n. 19 above, p. 161.
[47] M. Egeberg, 'Organization and Nationality in the European Commission Services' (1996) 74(4) *Public Administration*, pp. 721-35; E. Tóth, 'National Cultures and European Identity: The Process of *Engrenage* among European Commission Civil Servants' (2007) 29(3) *Society and Economy*, pp. 413-31; Bellier, n. 33 above.
[48] R. Wodak, 'National and Transnational Identities and other Identities Constructed in Interviews with EU Officials', in R.K. Herrmann, T. Risse-Kappen & M.B. Brewer (eds), Transnational Identities: Becoming European in the EU (Rowman & Littlefield, 2004), pp. 97-128, at p. 99.
[49] See more in R.D. Putnam, 'Elite Transformation in Advanced Industrial Societies: An Empirical Assessment of the Theory of Technocracy' (1977) 10(3) *Comparative Political Studies*, pp. 383-412.

with the term of technocrat who 'exercises authority by virtue of his technical competence'[50] or expertise and is often insensitive to conflicting social interests in policy making.[51] Expert identity undoubtedly provides credentials to one's role. Moreover, Laffan argues identity is important in indicating a degree of commonality, shared values and new roles in the EU.[52] Scott emphasizes the importance of an organizational identity providing actors with 'a core set of normative values around which they craft their narratives', including those around the science and law interaction.[53]

The interview data supported the thesis that expert identity is built through co-production. Various identities formed in the Commission are subsumed under the notion of the 'expert' identity shaped through co-production. In co-producing environmental policy, 'expert' seems to trump other identities formed within the general context of the European Commission. Thus, expert identity becomes the primary identity of Commission officials in this policy area, sidelining all other identities officials may have. Moreover, interviewees pointed out that their individual and organizational identities in the Commission sit comfortably within the wider notion of expert identity in science more generally. These identities can be categorized in terms of their key characteristics, such as distinctiveness, endurance and centrality.[54]

The empirical research unveiled the importance of the interviewees' distinctive expert identity which is shaped through co-production. A defining characteristic of DG Environment, recognized by their colleagues in other DGs and Commission services, was said to be its staff's

[50] Putnam, n. 49 above, p. 384.
[51] Ibid., p. 404.
[52] B. Laffan, 'The European Union and its Institutions as "Identity Builders"', in R.K. Herrmann, T. Risse-Kappen & M.B. Brewer (eds), *Transnational Identities: Becoming European in the EU* (Rowman & Littlefield, 2004), pp. 75-96, at 78.
[53] W.R. Scott, *Institutions and Organizations* 4th ed (Sage, 2014), at p. 138.
[54] M. Alvesson, 'Organisational Culture: Meaning, Discourse and Identity' in N.M. Ashkanasy, C.P. M. Wilderom & M.F. Peterson (eds), *Handbook of Organisational Culture and Climate* (Sage, 2011), pp. 11-28, at 21.

expertise and experience in environmental issues. This aligns with the characteristics of a distinctive identity;[55] in this case a scientific or expert identity which distinguishes persons working in this field from others working within the Commission. Without prompting, civil servants in other DGs and Commission services spoke about DG Environment as having very qualified staff and 'extremely experienced people'[56]. For example:

> I must say, the level of qualification at DG Environment, with the people I am working with, is very high. (R4)

The formation of an 'expert' identity is important within DGs, not least because it can signal what Commission officials perceive to be the distinctive nature of the DG and provides them with a particular status that may make them stand out within the Commission on certain policy matters. Having a distinctive identity certainly is not unique to DG Environment. DG Agriculture, for example, 'wants to be very modern' and had to change its image as being 'reactionary' in its environmental policy making.[57] Interviewees in other DGs commended DG Agriculture for its use of modern policy-making instruments.[58] These include foresight, which is a process to identify possible future scenarios and develop policy directions in light of these scenarios.[59] DG Agriculture's process of re-making its identity in the expert, modern mould was, it seems, successful-- at least in the eyes of some. Its redefinition and creation of a new 'expert' identity is closely linked with improving the wider image of the Commission with the public and thus being perceived as credible in providing the institutional framework for the

[55] Ibid.
[56] (R10).
[57] (R17).
[58] (R3) and (R17).
[59] See more about foresight in research and innovation at: https://ec.europa.eu/info/research-and-innovation/strategy/support-policy-making/support-eu-research-and-innovation-policy-making/foresight/about-foresight-research-and-innovation_en

interaction of science and law as a part of co-production.[60] This approach taken by DGs is aligned with Jasanoff's proposition that knowledge and its production play an important part in shaping the social role or giving actors power or meaning.[61] DG Agriculture's effort to change its image feeds into the Commission's efforts to distinguish itself as an evidence-based and credible policy provider, which will assist in regaining the trust of relevant stakeholders.

Moreover, expertise as a distinctive feature of an identity provides officials with credibility and creates cohesive identity. Thus, co-production of expert identity becomes important in building a sense of common purpose among members of a group and ensures the highest level of independence in the provision of scientific knowledge intended for law. This is particularly important for the Commission, which is the locus of numerous different identities and interests. The Commission therefore needs to build this sense of common cause among its staff in order to overcome any challenges such a mixture of identities and interests may present. Developing an 'expert' identity achieves this end. Without prompting, interviewees across DGs and Commission services were able to identify this common purpose and its importance:

> Commission's Legal Services: So, we have very committed people in the DGs. You have other DGs where people do whatever they want, but in Agri, Environment, Climate, SANTE, you have people who really believe in what they do and, indeed, sometimes the challenge is to use that fountain of knowledge in a relatively structured way. (R10)

> DG Research: The high-level group [sic - SAM] knows how science works, understands concepts in relation to evidence, knows how to communicate these ideas to the users. (R8)

[60] See J.C. Juncker, 'A New Start for Europe: My Agenda for Jobs, Growth, Fairness and Democratic Change' - Political Guidelines for the Next European Commission https://ec.europa.eu/commission/sites/beta-political/files/juncker-political-guidelines-speech_en.pdf and European Commission, *Trust at Risk*, https://publications.europa.eu/en/publication-detail/-/publication/e512c11b-e922-11e6-ad7c-01aa75ed71a1

[61] Jasanoff, n. 22 above, p. 39.

This community of shared purpose in co-production through identity building is also dependent on the levels of trust between those involved in co-production. Trust is essential where 'risk is a part of the narrative'[62] as it inevitably is in science-law co-production. As Jasanoff argues, who should be trusted and on what basis, become central issues for people seeking reliable information about the state of the world.[63] Trust is also regarded as an important element for sustaining 'individual and organisational effectiveness' and 'effective social interactions'.[64] The Commission recognized the importance of this value in its work with citizens which involves 'trust in its integrity, trust in its purpose, and trust in its values'.[65] Trust infuses different levels of interaction within the Commission in the environmental policy area, including: interactions between scientists and civil servants in the DGs; scientists and the private sector and Member States in collecting data; interactions between DGs and the Legal Service of the Commission; and finally the relationship between the Commission and the wider public. Without prompting, the interviewees highlighted the importance of trust in their social interactions throughout the legal drafting stage.

> So, at a certain moment, it boils down a lot to trust, because this is something I have learnt. I have to build trust and in particular when it comes to the environment, you do not build trust by being overconfident. You need to admit as a scientist that you may be wrong, and you need to understand that at a certain moment, emotions and fear are coming in and you have to deal with that. So, the aspect of citizen engagement, the aspect of – and I mean citizen engagement involvement in the true sense, I am not saying about informing people, that is not enough, but making people part of what you are developing, that also I sense is gaining a lot of importance right now. (R4)

[62] J. Hawkins. 'The Legitimisation of Hydraulic Fracturing Regulation: Power, Prejudice and Public Participation; (PhD Thesis, University of Bristol, 2012) at Chapter Three.
[63] Jasanoff n. 22 above, p. 29.
[64] A. Lawton, Environmental Taxation as a Form of Environmental Protection: Exploring the Carbon Reduction Commitment, (Ph.D. thesis, University of Birmingham, April 2018) at 121.
[65] European Commission, n. 60 above, p. 7

This expert identity underpinned by trust between Commission officials facilitates the legislative process. Lawyers and scientists prefer to interact with officials whose expertise they trust. In building this relationship of trust, interviewees also emphasized the importance of interpersonal contact rather than relying on institutional affiliation or domain expertise of a person they work with. Cooperation and formal and informal networking are seen as key trust-building exercises through which one can get to know the person. To that end, expert identity acts as a bridge that overcomes boundaries between staff from different professional domains such as scientists and lawyers, in particular lawyers in the Legal Service of the Commission and scientists in DGs. The expert identity also overcomes institutional affiliations between different DGs and services within the Commission.

> And then, in my case, it depends on who I'm working with. I would check more or less, there are some of the experts I trust more because I know they are very thorough and that's something you learn with experience. (R11)

Co-production of identity also entails the production of a particular kind of authority[66] resulting from the fact that experts are associated with specialized and credible knowledge[67]. The interview data demonstrated that identity building through social interactions between scientists and lawyers is more likely to occur within forums recognized for their expertise and authority. Thus, the legislative process becomes contingent on expert identity. This is well illustrated by the JRC's standing within the Commission. As the Commission's in-house provider of scientific knowledge, the JRC is widely perceived by interviewees as 'a very good

[66] Peter Dear explains how the term expertise designates a particular kind of authority – See P. Dear, 'Mysteries of State, Mysteries of Nature: Authority, Knowledge and Expertise in the Seventeenth Century' in S. Jasanoff (ed.), *States of Knowledge: the Co-production of Science and Social Order* (Routledge, 2006), pp. 206-24, at p. 207.
[67] Lynch, n. 19, at p. 161.

partner' in the legislative process because it 'attracts the best researchers'.[68] As Alvesson points out, one of the main expressions of organizational identity is the ability of members to construct the perception of their organization having certain key characteristics distinctive from others and as possessing a 'degree of continuity over a period of time and in varying circumstances'.[69] This perception of the JRC suggests that it has succeeded in doing just that; it has successfully co-produced a multi-faceted expert identity, both institutionally and among its individual staff. In this way, as well as being seen as a scientific institution that conducts research and provides scientific knowledge, the JRC successfully extended its mandate to provide institutional support to the Commission in the production of environmental law and policy. It thus began to take on dual roles, based on its expert identity: it is both an 'organisation of science diplomacy' that facilitates a dialogue in the legislative process *and* the 'institutional memory for environmental issues' within the European Commission.[70] As one interviewee [from the JRC] put it:

> … the JRC is in its very origin an organization of science diplomacy, so whatever we are doing in terms of science is not only for the conception and implementation of policy, it has always [sic-been] a function also of dialogue. The dialogue can be between Member States of the EU, or regions in the EU, it can be between the EU and outside partners, but it can also be a local level, so in cities or regions, what have you. (R4)

> … I got that dossier on my table some three years ago, in the meantime at DG Environment they changed the director general, the director, the head of the unit, and the task officer twice in three years. Which means that in such a short time, I have become and my team has become the historic memory of what is or has been the development in terms of science and technology. (R4)

[68] (R14).
[69] Alvesson, n. 54, above, p. 22.
[70] (R4).

Co-production of identities in the Commission also manifests itself in the emergence of new expert identities. As an example of an emerging institution, the Scientific Advice Mechanism (SAM) offers the opportunity to consider how co-production may be supported and, more pertinently to this article, the role that 'expert' identity may play in this process. SAM is perceived to offer a strong reinforcement to science-based policy making in the European Commission, especially in the environmental policy area. This new model, which replaced the Chief Scientific Advisor office, is seen as a more appropriate forum for giving tailored scientific advice to individual DGs. Due to its ability to provide advice in various forms such as opinions, recommendations or reports,[71] SAM is regarded as an institution capable of providing comprehensive responses in the environmental policy area.[72] Moreover, due to its unique organizational structure, which entails a high-level expert group of seven independent scientific advisors acting in their own personal capacity in cooperation with the consortium of European academies,[73] SAM can be regarded as institution that offers independent advice. Such identification was clear from interviewees working with SAM, who emphasized that SAM provides more independent advice and opinions in addition to those offered by existing providers of scientific knowledge within the European policy-making space. Thus, co-production of scientists' identity within SAM renders their views as scientists more independent. The following extracts illustrate this well.

[71] See Art 7 of the Rule of Procedure of the High Level Group of Scientific Advisors and Guidelines – how SAM produces scientific advice at: https://ec.europa.eu/research/sam/pdf/guidelines_how_sam_produces_scientific_advice.pdf#view=fit&pagemode=none

[72] In particular, it has a rapid response capacity, which it used, e.g., with the CO_2 report 'Closing the Gap'. This opinion provided 'added value' to an already lengthy legislative process on CO_2 emissions from vehicles: European Commission, Scientific Advice Mechanism, 'Closing the gap between light-duty vehicle real-world CO2 emissions and laboratory testing' (November 2016) available at: https://ec.europa.eu/info/publications/closing-gap-between-light-duty-vehicle-real-world-co2-emissions-and-laboratory-testing_en

[73] Commission Decision of 16.10.2015 on the Setting up of the High Level Group of Scientific Advisors C(2015) 6946 final.

> I am tempted to believe that they (sic – Commissioners[74]) ask SAM when they really think an independent Commission advice might be helpful to them, and that can have many reasons. It can have reasons like that they believe it might be more trusted outside or in the parliament, for example, if it's independent. It might be that they know that there have been for years and years and years collaborations between the JRC and maybe they want a fresh view. (R9)

Co-production of identity may be affected by the status of expert and not just expert identity.[75] As Lynch explains, scientific or expert identity is 'more than a label; it is a term of praise and mark of privilege'.[76] Co-production of formalized knowledge through interaction of scientists and lawyers depends on the reputational identity of experts, which is best maintained by ensuring the credibility and independence of evidence provided in the process of legal drafting. Thus, identities become intertwined with the values structure of an institution as a venue of co-production. Moreover, the personal values Commission officials embrace as scientists represent broad goals that motivate their behaviour.[77] This is particularly salient to processes of legislative drafting in the environmental policy area, as the three relevant DGs (DG Environment, DG Agri and DG Research) engage with scientists from a variety of institutions such as the JRC, external experts from Member States, academics, and other international and regional organizations. Within this broader structure, the scientists in both the JRC and the SAM who were interviewed for this research, perceived themselves first and foremost as scientists and independent experts providing scientific advice; a self-identification quite in line with the organizational identity of those two institutions. According to interviewees, their expert identity is best expressed by presenting science in an unbiased manner which calls for

[74] Emphasized by the author.
[75] Lynch, n. 19 above, p. 163.
[76] Ibid., p. 165.
[77] See L.S, Shalom, H. Schwartz & S. Arieli, 'Personal Values, National Culture, and Organizations: Insights Applying the Schwartz Value Framework' in N.M. Ashkanasy, C.P. M. Wilderom & M.F. Peterson (eds), *Handbook of Organisational Culture and Climate* (Sage, 2011), pp. 515-37 at p. 515.

'identification of the level of uncertainty'[78] or 'the description of this degree of uncertainty',[79] recognition of lack of knowledge or conflicting evidence. As interviewees put it:

> … the High-level group is not the Commission side, we are the independent experts who act as an expert group for the Commission but we are not part of the Commission and our views and opinions do not represent the view of the Commission. So I can speak only as an independent expert who is giving service to the Commission. (R7)

> … Also bear in mind we don't – we avoid any political position or statement, that is not my job. My job is science. (R4)

Maintaining expert identity is particularly challenging for experts coming from Member States who, in addition to their identities as scientists, bring with them their national identities and member states' preferences in regard to environmental legislation. Although the interviewees pointed out that, in principle, national experts 'have to first of all express their national interests',[80] there were several instances in the legislative drafting process when those experts preferred to identify themselves as experts in their domains rather than be associated with their Member State. One example mentioned in the interviews was the drafting of the Guidance on the Application of the Environmental Impact Assessment for Large-Scale Transboundary Projects,[81] which was done in cooperation with Member State experts. In interacting with civil servants and lawyers from the DG Environment, some experts decided that their name or their Member State would not be included in the final output in order to allow them to act more freely and provide independent advice.[82] Similarly, interviewees pointed out that it is not

[78] (R5).
[79] (R2).
[80] (R16) and (R14).
[81] European Union, 2013 at: http://ec.europa.eu/environment/eia/pdf/Transboundry%20EIA%20Guide.pdf
[82] (R18).

unusual for national experts in the standing committees to express views which are not shared by their national administrations.[83] Thus, the identity of national experts as scientists is reaffirmed by interacting with Commission officials through legal and institutional processes, leaving aside their national identity.

The Commission can also engage academics as external experts providing scientific advice. However, this group has thus far failed to interact with Commission officials and build a distinctive identity as experts producing scientific knowledge. The reasons for this lack of social engagement are two-fold. Firstly, interviewees opined that academics' engagement is driven by different motivations, especially in terms of reward and recognition for their work and the potential scope of their contribution.[84] It was pointed out in the interviews that the Commission is making an effort to identify opportunities and areas where the input of academics would be particularly beneficial.[85] In certain areas of environmental law, such as nature conservation, at least some interviewees felt that more effort should be invested in engaging social scientists,[86] thereby extending the Commission's notion of science to be more inclusive of soft science experts as opposed to predominantly natural science experts. It was also felt by some interviewees that academics 'need to use much simpler language to communicate' and academic language is difficult to use for policy purposes.[87]

In summary, the interview data supported the thesis that identities are co-produced whereby strong individual and organizational expert identities of the Commission officials in the DGs and other Commission services are reaffirmed and trump other identities existing within the

[83] (R16).
[84] (R15).
[85] (R16).
[86] (R15). This was partly rectified with the establishment of SAM, which comprises social scientists as indicated by (R9).
[87] (R16).

Commission. This important finding contributes to our understanding of co-production in the EU context. Making identities as a first pathway of co-production serves various functions within the Commission. It enables the reaffirmation of identities and the emergence of new ones, which unites individual and different organizational units of the Commission with distinctive approaches to complex and science-based environmental issues. This expert identity impacts the legislative process as officials' views of their interactions within the process is positively enabled by expert identity based on trust. Co-production of identities through mutual influence of science and law also results in moulding the traditional understanding of an expert as someone who has specialized skills and knowledge to include a more multi-faceted expert identity which allocates a social role to experts as scientists. Finally, identity that is co-produced acts as a cohesive force between officials from different backgrounds and assists in building intra institutional trust among officials in different DGs and Commission services in producing credible scientific knowledge both through personal contact in formal and informal networking. As such, co-production of identities shapes values that underpin individual and organizational identities.[88]

4.2. Making Institutions: The European Commission as a vehicle of co-production

As Jasanoff argues, it would be inconceivable to think about co-production without regarding institutions which may assume many different roles at the nexus of science and law. Institutions act as venues for social interaction between different domains of expertise, repositories of new scientific knowledge and interpretation, and locations for the accreditation of evidence, law making, and dissemination of knowledge.[89] Through institutions, different social actors have

[88] See W.R. Scot, 'The Adolescence of Institutional Theory' (1987) 32(4) *Administrative Science Quarterly*, pp. 493-511, at 493-94.
[89] Jasanoff, n. 22 above, pp. 39-40.

access to problem-solving facilities, preferred forms of expertise, processes of inquiry, and methods for testing evidence.[90] These different functions are solidified in the form of administrative routines.[91] Jasanoff's interpretation of the role of institutions in co-production aligns with the views of institutional theory scholars who examine institutions as social structures.[92] Within that literature, institutions are regarded as primary venues for social interaction. Institutions matter in accounting for social behaviour and, to that end, they 'are governance structures, embodying rules for social conduct'.[93] Institutionalization is seen as a long-term process[94] that involves putting in place standardized procedures and routinization of practices within an organization.[95] These formalized structures become central to the creation and operation of institutions.

In the EU environmental law and policy context, the Commission is recognized as the main vehicle of co-production between science and law.[96] Although environmental policy was not conceived as a formal area of competence until 1986,[97] by that time the Commission already had a track record in pushing for the adoption of environmental legislation on waste and air pollution as artefacts of co-production. These were the immediate environmental and health concerns at that time.[98] Over the years, the Commission assumed many roles through which co-production of science and law occurred, manifesting in strengthening the knowledge base

[90] Ibid., p. 40.
[91] Ibid.
[92] See W.R Scott, 'Institutional Theory' in G. Ritzer (ed), *Encyclopedia of Social Theory* (Sage, 2005), pp. 409-14.
[93] Scott, n. 92 above, p. 408.
[94] See P. Selznick, *Leadership in Administration: A Sociological Interpretation (*Leadership in Administration. New York: Harper & Row, 1957), at p. 16.
[95] See more in V.A. Schmidt, 'Institutional Theory' in B. Badie, D. Berg-Schlosser & L. Morlino (eds), *International Encyclopedia of Political Science* (Sage, 2011), pp. 1188-1199.
[96] See J. McCormick, *Environmental Policy in the European Union* (Palgrave 2001).
[97] The Single European Act [1987] OJ L 169.
[98] E.g. Council Directive 75/442/EEC of 15 July 1975 on waste, [1975] OJ L 194 and Council Directive 80/779/EEC of 15 July 1980 on air quality limit values and guide values for sulphur dioxide and suspended particulates [1980] OJ L 229.

for policy making throughout the entire legal drafting process, thus increasing transparency, accountability and public engagement.[99] Interviewees unanimously confirmed the Commission's 'genuine appetite' for science as a part of its institutional culture. The following extract is illustrative:

> I think what is quite important to bear in mind is the Commission is profoundly, extensively using science advice always and has been doing so before Ms Glover[100] and has been doing so before SAM. So, the Commission is a very… is relying on science, has always been relying on science to a very great extent. (R9)

Co-production in the Commission at the nexus of science and law can be conceived as the result of formalization of institutional structures. The Commission is a highly institutionalized actor with routinized processes and practices. Over time, the Commission has refined some of these processes, including the latest procedural changes set out in the Commission's Better Regulation Agenda, which applies to environmental law and policy as well as other areas of law making. [101] One of the interviewees described Better Regulation as a 'toolbox' establishing a complex mechanism for law making 'which may take months, in some cases even years to be done'.[102] Despite criticisms of Better Regulation and the time it takes to complete each phase

[99] See COM(2015) 215 final; SWD (2017) 350 and COM(2001) 428 final.
[100] Anne Glover was the EU Chief Scientific Adviser until 2014.
[101] See COM(2015) 215 final; See also Inter-Institutional Agreement on Better Law-Making OJ L 123(59) 12 May 2016. This is how one of the interviews explains the legislative process (R14): "The legal drafting starts with the planning phase where a set of priorities are set out in the Working Programme, followed by a relatively short inception impact assessment which must be published for feedback. This is followed by the establishment of the interservice group which will steer the preparation of the impact assessment. In parallel, all three DGs conduct a very detailed internal analysis of scientific evidence, workshops with member states, working with JRC or external experts. In all those phases, the DGs are supported by the Legal Service of the Commission. After the proposal is adopted, the Commission is responsible for the implementation and evaluation of the legislation which is always externalised. Finally, the science permeates the enforcement process which is within the competences of the Legal Service in close cooperation with the DG environment and other DG responsible for cross-cutting issues." See more on Better Regulation Agenda in C.M. Radaelli, 'Halfway through the Better Regulation Strategy of the Juncker Commission: What Does the Evidence Say?' (2018) 56 *JCMS Annual Review*, pp. 85–95 and A. Alberto, 'How Much Better is Better Regulation?' Assessing the Impact of the Better Regulation Package on the European Union - A Research Agenda' (2015) 6(3) *European Journal of Risk Regulation*, pp. 344-356.
[102] (R5). Similar conclusions were raised by (R6).

of the legislative process, interviewees emphasized two important positive developments of social interaction, both of which arise in the *ex ante* impact assessment phase. One is citizen engagement and its contribution to policy making through venues of co-production within the Commission, the absence of which formerly was a major source of criticism of the Commission's institutional approach.[103] For example, in the public consultation on the future of the Common Agricultural Policy, which was required as part of the Better Regulation approach, DG Agriculture received 320,000 public submissions, including a large number of submissions from individuals.[104] Moreover, research confirmed closer and more valued engagement of JRC's scientists from early stages of the legislative process as required by the Better Regulation Guidelines on impact assessment.[105] Thus, co-production within the Commission also allows for the meaningful participation of scientific experts in designing specific environmental policies. As one interviewee put it:

> Yes, I mean … just now, I have just contributed significantly to the impact assessment on the legal instrument for water re-use, so that is normal. That is a different type of work, which I must say I am involved [in] now, I was not involved so much some years ago. So I noticed that there was a change, in particular with the Juncker Commission. I feel my work much more being appreciated, from that perspective, but it is also challenging for me, because I need to learn to think differently. (R4)

As Jasanoff argues, through formalized processes of co-production institutions serve as vehicles for interpreting evidence, and thus standardizing methods and law making.[106] This is particularly challenging for the Commission in the EU environmental context for two main

[103] See COM(2015) 215 final: "the Commission will invite citizens or stakeholders to provide feedback within eight weeks: to feed these views into the legislative debate, the Commission will collect them and present them to the European Parliament and the Council".
[104] (R6).
[105] Scientists are also part of the implementation and enforcement process. They also free to suggest new policy approaches based on the monitoring of how the legislation is implemented. See at: https://ec.europa.eu/info/sites/info/files/better-regulation-guidelines-impact-assessment.pdf
[106] Jasanoff, n. 22 above, p. 40.

reasons. Firstly, the evidence collected and provided by Member States to the Commission's in-house scientists varies in quality, sometimes considerably. The interviewees in JRC pointed out that their role is to search this collection of data for 'harmonised datasets that cover the whole of Europe'[107] and to develop methodologies that will allow for comparability of received data.[108] Secondly, the legal drafting process is heavily influenced by both the Member States' political preferences and the conflicting evidence they provide. This may seriously hinder the production of environmental law and policy within the Commission. At some point, final decisions may become political rather than scientific. However, the interviewees were able to point to evidence of co-production manifested in the legislative proposal where the views and contributions of all stakeholders were reflected. This becomes possible through the numerous phases of the formalized legislative process, which essentially enables compromise to be reached between the actors involved, thus helping to mitigate the challenges. As one interviewee put it:

> This is a procedure step by step [sic - so] you never arrive to that situation. You try to adjust the proposal according to various partners or stakeholders involved; so there is never the case when at the end of the cycle the Commission proposes something and everyone is shouting this is not. (R5)

In order to serve as venues of co-production, institutions have to put in place methods and processes to ensure credibility of knowledge used in legal drafting.[109] As scientific knowledge and its material embodiments are the products of social work,[110] actors of co-production, such as the Commission in the EU environmental context, have to mitigate or reduce bias in providing credible knowledge. Credibility of evidence is closely linked to the question of

[107] (R2).
[108] (R1) and (R2).
[109] See Jasanoff, n. 22 above, p. 40.
[110] Jasanoff, n. 3 above, pp. 2-3.

public trust in the Commission's capacity to provide independent expert knowledge. To that end, the Commission deploys various methods of gathering and verifying evidence in the legislative process. Interviewees in DG Environment identified different institutional mechanisms for limiting bias in legal drafting. In certain areas of work, DG Environment staff rely heavily on studies and views prepared by recognized international scientific bodies. For example, for nature and the marine environment, these are the European Topic Centre and the International Council for the Exploration of the Sea (ICES) respectively.[111] Moreover, Commission officials often deliberately choose not to attend some of the meetings organized by international scientific bodies 'to let them be scientific'.[112] In those instances, the output, as artefacts of co-production, is regarded as 'completely independent' and it becomes 'tricky'for Member States to accept those reports if 'they don't like the result', regardless of the fact that they are provided with independent scientific advice.[113] Thus, the Commission's deliberate strategy not to get involved in the work of other international organizations that provide scientific advice renders Member States less likely to question the validity of evidence and its deployment by the Commission in drafting legal proposals.

In developing the Scientific Advice Mechanism (SAM) as one of the more recent Commission initiatives, a considerable amount of work was put into designing structures and working methods which would allow for the mitigation of bias in providing scientific knowledge. The scientific objectivity and delivery of value-free scientific judgements has been widely recognized as a challenge in the policy-making process.[114] To overcome this

[111] (R15) and (R1).
[112] (R1).
[113] Ibid.
[114] E.J. Rykiel, 'Scientific Objectivity, Value Systems, and Policymaking' (2001) 51(6) *BioScience,* pp. 433–436 and R. Costanza, 'Visions, Values, Valuation, and the Need for an Ecological Economics: All Scientific Analysis is based on a "Preanalytic Vision" and the Major Source of Uncertainty about Current Environmental Policies Results from Differences in Visions and World View' (2001) 51(6) *BioScience*, pp. 459–468.

challenge, SAM deploys a top-down approach with a High-level Group of seven scientists from both natural and social sciences at the top, working together with a consortium of transnational European science academies.[115] In the first instance, SAM exclusively uses scientific evidence available in the public domain, while the limitation of bias is ensured through a variety of testing methods, which were described in interviews.[116] SAM also uses methods which facilitate different forms of interaction:

> We attach a great deal of importance to the avoidance of bias in the production of the opinions, right? So, we want not only to enable examination of evidence which is comprehensive but also that it should not be biased, which means, by the way, not only looking at classic literature but using a variety of different methods to examine available evidence. So, that might involve what we would call expert elicitation workshops, where you would capture ideas emerging from a representative sample of experts who have worked on the basis of a literature review. But then it might also involve bringing in practitioners, people who are involved in the implementation of whatever the legislation that you're looking at is intended to achieve. (R8)

Apart from the development of standardized processes and removal of bias within them, institutions as pathways of co-production also play an important role in ratifying new identities that have been produced through social interaction[117]. Institutional theory scholars point to the importance of individual identities in making institutions. Although most agree that individuals 'matter' in this context, consensus on their role is lacking among institutionalist scholars. There is an understanding that 'institutional structures persist while individuals come and go', [118] although some scholars emphasize that individuals also shape structures.[119] This is also the

[115] SAPEA (Science Advice for Policy by European Academies) consortium which consists of the 5 European Academy Networks Academia Europaea, ALLEA, EASAC, Euro-CASE and FEAM; See at: https://ec.europa.eu/research/sam/index.cfm?pg=about
[116] (R7) and (R8).
[117] Jasanoff, n. 22 above, p. 40.
[118] B.G. Peters, *Institutional Theory: Problems and Prospects* (Institute for Advanced Studies, Vienna, 2000), pp. 1-28, at p. 5.
[119] Ibid., p. 10.

case for the Commission, where leaders have reconciled the situational context with their own personality and objectives.[120] The identity of Commission Presidents emerged as an important factor in some of the interviews conducted for this research. A number of interviewees pointed out that each new President of the Commission tries to leave their mark, which may affect the institutional culture of the Commission negatively or positively. The Commission President at the time of the interviews, Jean Claude Juncker, introduced a 'new collaborative way of working' whereby 'each Commissioner is attached to one or several Vice-Presidents'.[121] To this end, Juncker entrusted several policy areas to Vice-Presidents with the responsibility to direct and coordinate work across the Commission in those key areas,[122] a move that interviewees perceived as significant. They pointed out that this organizational shift was introduced by the President of the Commission as a response to public opinion, lack of citizen involvement, and limited understanding of the Commission's work. Some interviewees highlighted the Juncker Commission pledge to focus on 'bigger issues' while avoiding the regulation of smaller or 'trivial things that don't bring any added value'.[123] However, as one interviewee pointed out, this approach disincentivized DGs to initiate new proposals as they had to 'think three times before they propose'.

> [sic - Junker] also changed the logic of the legal making in the Commission. Initially, before him, for instance, my experiences were mostly with Barroso Commission, it was bottom up. A lot of initiatives, the services they were very creative, inventing a lot of things and proposing them up to the political level. Now… they …reversed this completely, there are political objectives fixed and…even the

[120] I. Tömmel, 'The Presidents of the European Commission: Transactional or Transforming Leaders?' (2013) 51(4) *JCMS*, pp. 789-805.
[121] See C(2014) 9004 at: https://ec.europa.eu/info/sites/info/files/the_working_methods_of_the_european_commission_2014-2019_november2014_en.pdf
[122] Environment has been placed in the 'project team' Energy Union, which was the responsibility of Vice-President Maroš Šefčovič from Slovakia, and was very much focused on energy rather than the environment. See A. Čavoški, 'A Post-austerity European Commission: no Role for Environmental Policy?' (2015) 24 *Environmental Politics*, pp. 501-505, at 502.
[123] (R16). See COM(2016) 615 final.

> Commissioners…their right of initiative is very much diminished compared with previous Commission. (R16)

Finally, an important characteristic of each institution within the co-production model, especially in the area of environmental policy, is its ability to adapt to change and embrace technological and scientific advances. Jasanoff speaks about resilience and plasticity of institutions as a necessary requirement of co-production.[124] A good example of this ability to change is the use of foresight in environmental policy making, which is a novel and important policy-making tool. One of the interviewees defined foresight as a tool 'to see what's going to happen in the future, what are the issues we need to look in the future, where do we need to get prepared for'.[125] It is still in the early stages of conception within the Commission and there is still some underlying opposition in the Commission more widely to the structured use of this instrument.[126] Some interviewees pointed out that, unlike many other DGs, DGs Environment and Agriculture are very willing to use foresight methodologies to identify emerging environmental or agricultural issues.[127] Similarly, the JRC managed to fully institutionalize this tool, especially in the environmental policy area.[128] The interviewees explained that this new tool feeds into a wider impact assessment exercise (emanating from *Better Regulation*) but is also aligned with the Commission's commitment in the 7th Environmental Action Programme to be better prepared to deal with new and emerging environmental issues.[129] According to interviewees, the wider opposition to the Commission's use of this new tool may be explained

[124] Jasanoff, n. 22 above, p. 40.
[125] (R3).
[126] See about the foresight in the European Commission at: https://ec.europa.eu/info/research-and-innovation/strategy/support-policy-making/support-eu-research-and-innovation-policy-making/foresight/about-foresight-research-and-innovation_en
[127] (R17).
[128] See more at: https://ec.europa.eu/jrc/en/research/crosscutting-activities/foresight
[129] See (R3). See Decision No 1386/2013/EU of the European Parliament and of the Council of 20 November 2013 on a General Union Environment Action Programme to 2020 'Living well, within the limits of our planet' Text with EEA relevance *OJ L 354, 28.12.2013, p. 171–200,* para 72.

partly by the lack of certainty embedded in foresight, as well as the lack of political support for foresight as a result of a failure to understand the concept. Some interviewees addressed this:

> It's very difficult to, how can I say, to make politicians to react based on foresight outcomes; it is not going to be easy. This will need to see, how the foresight develops in policy making, how much it will gain acceptance; for the moment gaining acceptance is not very high in the policy-making field. I would say in my judgement because we still need to convince policy makers that a) it is useful and b) that it is producing something … useful for the future, that it means it has an impact. For the moment it's still considered as a kind of vague science, predictions. (R3)

> Yes, we are trying to do this here but of course it was incredibly difficult and one of the things people were telling me is that you need foresight to be near the top and I'm saying why, we need the team and then … by the time our voice reaches the Commission there are so many filters that it never actually never gets there. (R17)

In brief, the interview data support the proposition that the Commission is a vehicle of co-production of science and law in environmental policy. Through formalized processes the Commission serves as a venue for social interaction and mediation of different aims and interests. Thus, this finding of how co-production occurs in the Commission moves our understanding of the Commission from that of a purely technocratic and political body to a venue for social interaction. Unlike many other highly institutionalized organizations, the interaction of actors within the Commission legislative procedure is not *pro forma*, but allows for a genuine and constructive engagement between various actors, in particular scientists and citizens. Through these processes, in particular through problem solving, verification of evidence and lawmaking based on scientific evidence and knowledge, actors from different professional backgrounds determine the character of the Commission as an institution.

4.3. Making discourses within the European Commission

Together with several other cross-cutting policies such as agriculture and research, environmental policy may be regarded as a key area where making and maintaining a discourse between the different actors would be challenging. Environmental policy is an 'evidence-based' field which relies on scientific knowledge from various sources and requires a discourse between various professions in order to make informed policy decisions. As Jasanoff points out, making discourses plays an important role in solving problems as we need to 'find words for novel phenomena, give accounts of experiments, persuade sceptical audiences, and link knowledge to practice or action'.[130] Language is the primary tool in building this discourse through 'the appropriation of existing discourses' and their subsequent retailoring to accommodate new needs.[131] As Alvesson argues, language enables meaning to be constructed and transmitted and thus becomes embedded in discursive acts.[132]

In developing this discourse, co-production provides a framework for scientific language to take 'on board the tacit models of nature, society, culture and humanity that exist at any time in any given social order'.[133] This process should occur as a result of mutual interplay between science and any social activity, whereby science will permeate the social process, especially in the policy context. Though Jasanoff argues the lack of strict dichotomy between science and social activity through co-production, the differences between science and law may prove more challenging in making discourses in this policy area. Some of the interviewees illustrated the

[130] Jasanoff, n. 22 above, pp. 40-41.
[131] Ibid., p. 41.
[132] Alvesson, n. 54 above, p. 19.
[133] Jasanoff, n. 22 above, p. 41.

difficulty in co-producing discourse by pointing out that 'policy is not made for scientists and scientists are not made for policy'.[134]

One of the main challenges in enabling the discourse between science and law relates to how scientists and lawyers use language in problem solving regarding new phenomena. In the interviews, scientists recognized uncertainties surrounding many environmental issues that have to be acknowledged in the legal text as there is always a potential for 'side-effects or conditional reaction to occur'.[135] Moreover, as pointed out by interviewees who are scientists, lawyers find it difficult to 'cast technical issues into law'.[136] However, interviewed lawyers emphasized that they need to use precise and definitive language in imposing obligations on parties.[137] This calls for a 'clear scope of the legal obligation' in line with the principle of legal certainty.[138] This challenge was identified by some of the interviewees who gave their views on language at the nexus of science and law:

> It is a challenge though for the scientist to express him or herself in a way that you are clear and understood, and this has a lot to do with the concept and the notion of uncertainty and probability. So a lawyer always wants to have a yes or no, and a scientist is not capable of giving you that answer. (R4)

> With most environmental issues, very often there is no black and white answer. (R2)

In producing this new language or modifying the existing one, Jasanoff identifies the use of specialized languages of particular domains, such as law or medicine.[139] In the environmental

[134] (R3).
[135] (R2).
[136] (R9).
[137] (R10), (R11) and (R12).
[138] (R10). See R. Brownsword & K. Yeung, *Regulating Technologies: Legal Futures, Regulatory Frames and Technological Fixes* (Hart Publishing, 2008).
[139] Jasanoff, n. 22 above, p. 41.

policy area, this new legal language should enable accurate translation of scientific knowledge into law. Thus, the aim of the discourse is to 're-tailor' the language by accommodating differences between scientists and lawyers in denoting new scientific phenomena.[140] However, legal language is perceived as highly formulaic and technical with its 'own domain of use and particular linguistic norms'.[141] This is especially pertinent to the formulation of legal definitions, which are often used in environmental legal texts to explain scientific concepts. In creating this discourse, interviews evidenced that scientists find it difficult to shoehorn science into rigid legal definitions while simultaneously acknowledging uncertainties and probabilities.[142] In turn, lawyer interviewees underlined their own 'tendency of trying to capture everything possible" which may lead to 'definitions being broad'.[143]

Interviewed scientists particularly noticed this difference in their own perception of legal language in making discourse. For example:

> And we see that now with the biotechnology as well, where we really have great lawyers in the Commission, digging themselves into this area, but it is bloody difficult because scientists do not work in legal definitions, so they use words in a way that is not in a legal definition… then they are unable to define that." (R9)

The recent scandal about nitrogen oxide (NOx) emissions from diesel vehicles[144] was cited as an example of where the translation of science into legal definitions had failed:

[140] See Ibid., pp. 40-41.
[141] H.E.S. Mattila, *Comparative Legal Linguistics* (Ashgate Publishing Limited, 2006), at 3.
[142] (R2), (R4) and (R9).
[143] (R10).
[144] European Court of Auditors 'The EU's Response to the "Dieselgate" Scandal' (2019) at: https://www.eca.europa.eu/lists/ecadocuments/brp_vehicle_emissions/brp_vehicle_emissions_en.pdf

> I'm pretty sure that when the law was drafted in 2009, so to speak, [what] escaped from the initial meaning of what was wanted … in all of these legal definitions which have to be made in order to make actually a law, that you are defining so many things and you are obliged to define things, that this captures then only incompletely a technical reality. Maybe that difficulty exists in the social sphere as well, but that is, with the [carbon dioxide] CO_2, with the NOx emissions, I'm pretty sure that this was facilitated by this problem that we had there that there was a gap between the lawmaking and the technical knowledge. (R9)

In explaining social discourses as an instrument of co-production, Jasanoff argues that discourses such as law often incorporate or reinforce a tacit model or understanding of science.[145] This is particularly important in judicial proceedings where judges today have to evaluate volumes of scientific evidence brought by the parties to a proceeding.

The discourse in court proceedings is of great significance in EU infringement procedures where the Commission brings an action against a Member State for failure to comply with EU law.[146] In this procedure, the Commission is represented by its Legal Service, which develops and facilitates a discourse between the Commission and the Court of Justice of the EU (CJEU). Members of the Commission's Legal Service are entrusted with the demanding task of presenting scientific findings in a way that enables judges to follow and understand science in each case. One interviewee outlined this task:

> I think the chance for us, certainly in litigation, is very much on sometimes very complex technical and scientific issues that we have to be able to understand what this is really about in very simple terms, also to be able to explain, pass that message to the court in simple terms, because we're all lawyers. We don't have the experience or the ability to work on a daily basis on these highly complex scientific issues, so

[145] Jasanoff, n. 22 above, p. 41.
[146] Article 258 TFEU.

> that is, I think, what our added value as lawyers is in the whole process of litigation, in this case, to be able to explain in a very layman manner to the court, eventually to the court, what this is about and what our position is… (R12)

Thus, co-production of discourse requires significant institutional efforts in science-based policy areas in order to allow discourse to occur between actors from different professional domains.[147] This is even more challenging in the EU environmental context with its numerous actors from different backgrounds, cultures, and pursuing different agendas. Jasanoff advocates standardization as a way of facilitating discourse,[148] which at the EU level was best achieved by standardization of the policy-making processes through the Better Regulation Agenda. The Commission's decision to set out different phases of the legislative process enables dialogue throughout the policy cycle, from initiation to implementation and enforcement.[149] In the interviews, this dialogue was characterized as a 'translation exercise'[150] which happens throughout various stages of the legislative proposal.

Throughout the legal drafting process in environmental policy, communication between the scientists from the JRC and the Commission officials in respective DGs is vital. The interviews illustrated that JRC scientists were aware of the need to convey their scientific findings in an accessible form, and saw their role as 'trying to synthesize the knowledge and get the key message out'.[151] They were thus self-consciously engaged in a process of translation. This is followed by a discourse between the civil servants in each DG, which involves discussion between civil servants from different professions, mainly scientists and lawyers in the three

[147] See Jasanoff, n. 22 above, p. 41.
[148] Jasanoff, n. 22 above, p. 41.
[149] See SWD(2017) 350; See (R10).
[150] (R5).
[151] (R2).

selected DGs. At the enforcement stage, discourse takes place between the Legal Service and the civil servants in the DGs.

The quality of dialogue within co-production depends on the knowledge and expertise of actors involved, as well as their perception of the importance of standardized processes. Interviewees emphasized that legal staff are highly qualified, especially in the DG Environment which facilitates the discourse between lawyers and scientists.[152] In addition, achieving a balance between different professions forms part of the recruitment strategy of the individual DGs.[153] Dialogue is certainly facilitated by the Commission practice of having legal drafting done in mixed teams, hosting Commission officials from different professions in all three chosen DGs. More importantly, the involvement of the Legal Service from the very beginning of the legal drafting process not only furthers the development of a co-produced discourse but also allows the identification of controversial pieces of legislation that may end up in the court, or texts which may be subject to compromise between Member States:

> … Because the Commission is based on a lot of dialogues between DGs or with the Member States, with other stakeholders, you sometimes have compromised text and you need to understand at the end of the day what it means, because at the end there is only one text we can prove and it must make sense. Sometimes it doesn't because of consultative ambiguity. People didn't want to take side for the other, so you may have definition that doesn't make sense, or no definition. (R10)

Standardized processes are clearly an important means to facilitate discourse, but co-production may also involve other forms of dialogue-building. An example is the SAM, established in 2015 with the mandate to provide scientific advice to the College of

[152] (R1), (R4) and (R9).
[153] (R14) and (R16). For example, one of the interviewees pointed out that DG Agriculture struggles to recruit agro economists.

Commissioners. Though SAM is not part of the regular legislative procedure, it assists the Commission in enabling discourse of environmental issues, not only between the scientists and the DGs but also between the Commission and the public.[154] Some interviewees described SAM as a 'synthesizer', with the task of interpreting scientific knowledge for people who are not scientists.[155] There is no formal requirement for Commissioners to ask SAM to provide scientific advice on environmental or other issues. Nonetheless, it is now becoming Commission practice to ask for SAM's opinion, especially in regard to controversial or novel scientific issues.[156] Once Commissioners seek SAM's advice, dialogue becomes a means of formulating a policy response that will bridge the gap between law and empirical evidence in the legislative process. As one interviewee put it:

> What's more important here is the process that we have, so in the early stages, we will be aware that a commissioner is thinking about asking the high-level group a particular question. And then we go through a fairly extensive process of discussing what that question means, scoping it out, trying to bottom out all the different elements of that question to see if it is amenable to the provision of scientific advice, but also to try to understand the various sub-questions that such a question might imply, and that results in the production of what we call a scoping paper, and that is the starting point from which the high-level group then eventually produces its opinion at the end. So, that dialogue and exchange I think already helps in the eventual production of an opinion that is tailored to the needs of that DG. (R8)

The interview data demonstrated the importance attached to facilitating a discourse in environmental policymaking and the process put in place to enable this discourse. Scientists and lawyers use language for different purposes, with scientists seeking to recognize uncertainties surrounding environmental issues, while lawyers use language to anticipate all

[154] See Strengthening Evidence Based Policy Making through Scientific Advice: Reviewing existing practice and setting up a European Science Advice Mechanism at: https://ec.europa.eu/research/sam/pdf/strengthening_evidence_based_policy_making.pdf
[155] (R8).
[156] See more about SAM's reports and opinions at: https://ec.europa.eu/research/sam/index.cfm

probable scenarios and guarantee legal certainty. The data evidenced that through co-production of discourses, the Commission, with the important assistance of its Legal Service, successfully ensures that scientific knowledge is properly reflected into law that is fit for purpose and understandable. This is achieved by various formal and less formalized processes which involve highly qualified staff willing to engage in the 'translation exercise'.

4.4. Making representations

The fourth pathway of co-production comprises 'making representations', namely, the physical output of co-production and, more particularly, how it is 'made intelligible in diverse communities of practice'.[157] Making representations is linked to the remaining three pathways of co-production and reveals the product of the interaction between science and other social activity, including law and science. This product of the legal process is not, as Jasanoff argues, 'a mirror of nature'[158] but is a reflection of the context in which knowledge becomes embedded in institutions, practices, norms and material objects.[159] In the legal context, the artefacts of co-production are primarily legislation and court rulings, although in recent years policy documents and guidelines may also be regarded as emerging artefacts of this interaction.[160] In the EU environmental context, the main product of the legislative procedure in the Commission is the legislative proposal which, once adopted by the College of Commissioners, is sent for adoption to the European Parliament and the Council of the EU. Under Article 258 TFEU, the Commission has quasi-judicial powers to bring an action against a Member State which fails to comply with EU environmental law. Thus, the interactions of the Legal Service with judges

[157] Jasanoff n. 22 above, p. 41.
[158] Jasanoff, n. 2 above, p. 1730.
[159] Jasanoff, n. 3 above, p. 3.
[160] See more about the value of soft law as a source of EU law in L. Senden, *Soft Law in European Community Law* (Hart Publishing, 2004).

and Member States often take place within this enforcement context of the infringement procedure.

Making representations carries its own challenges. As Jasanoff asserts, one has to make a decision 'in the face of epistemic as well as normative uncertainty and how to strike a balance between the sometimes conflicting pressures of knowledge and norms'.[161] Even though making representation is facilitated by other pathways of co-production, in particular institutions and discourses, a representation may not always contain scientific knowledge, or that knowledge may be lost or mistranslated in the legislative process. Therefore, it is imperative to ensure that the co-production output contains an acceptable level of knowledge resulting from the mutual interaction between law and science. In the context of the Commission, scientists from the JRC who are involved in all phases of the legal drafting process reported that they were able to identify their output in EU environmental legislation, usually in the annexes which form part of the legislative proposal.

> Very short answer, a very, very clear answer, I can directly now trace my input to what is going out as a process, as a proposal. It is never part of the core regulation, it is always in the form of a technical annex. (R4)

What then is the acceptable level of knowledge resulting from this broader engagement of various actors in the legislative process and embedded into the artefacts of co-production? This is best articulated by Jasanoff's concept of serviceable truth which captures the outcomes of co-production.[162] This concept is defined as 'a state of knowledge that satisfies tests of scientific acceptability and supports reasoned decision making, but also assures those exposed

[161] Jasanoff, n. 2 above, p. 1724.
[162] Ibid.

to risk that their interests have not been sacrificed on the altar of an impossible scientific certainty'.[163] Hence, the interaction between the two disciplines should not only enable the preservation of credible science but also ensure that science fits the law for which it is intended. In order to achieve this objective, the policy maker needs to strike a balance between the scientific landscape of facts and the nurture and protection of humans and the environment in delivering the artefact of co-production.[164] This is best done by assessing competing scientific, economic and social interests in reaching an informed decision.

Over the years, the Commission has recognized scientific knowledge as a key element in the policy-making process, together with other social values and economic considerations.[165] In their policy documents, the EU institutions speak about 'science for policy', which should concurrently maintain this scientific landscape of facts and 'consider scientific evidence alongside societal values and political judgement when designing new policies'.[166] This is closely linked to the question of deference given to science which, as Jasanoff notes, can be framed along a spectrum, from full and total deference to claims originating in science, to a point of little to no deference, where the 'law's core concerns for representation, accountability, and justice, as defined by legal norms, should take precedence over science's claims to higher authority'.[167] With regard to law making in the Commission, while consideration is given to both science and socio-political impact, it is difficult to identify where the Commission sits on the spectrum of deference. As pointed by interviewees, in making representations of co-production, the Commission uses *ex ante* impact assessment as a credible tool to assess

[163] Ibid., p. 1730.
[164] Ibid.
[165] Communication from the Commission on the Collection and Use of Expertise by the Commission: Principles and Guidelines - Improving the Knowledge Base for Better Policies", 11 December 2002, COM(2002) 713 final and Scientific Advice for Policy–makers in the European Union at: http://www.europarl.europa.eu/RegData/etudes/BRIE/2015/559512/EPRS_BRI%282015%29559512_EN.pdf
[166] Scientific Advice for Policy–makers n. 165, above p. 2.
[167] Jasanoff, n. 2 above, pp. 1724-25.

competing interests, in line with the principles of the Better Regulation Agenda.[168] In the context of EU nature law, the Commission is often faced with deeply rooted social traditions of certain Member States. One example given by interviewees is the long standing tradition of hunting in some Member States, which brings to the forefront competing social interests of hunting with environmental interests of preserving acceptable levels of bird species. As one interviewee put it:

> … hunting is now being debated in the context of a declining population. There are still millions of turtle doves in Europe but they're declining rapidly. And, then the question is, 'How do we actually manage in a way that actually reverses the decline still recognizing that there's a social interest in terms of hunting as an activity, which is very deeply embedded, given that the major pressure is probably agriculture, but then hunting is not sustainable'? And, one of the issues then is, 'How do we determine the sustainability of hunting?' So, that requires scientific understanding of population dynamics, health, cleanse… and it requires modelling. (R15)

This 'science for policy' concept advocated by the Commission requires policy makers, including both scientists and lawyers, to leave their comfort zone and embrace different ways of thinking about competing interests. This was identified by some of the interviewees who found it challenging but at the same time rewarding to think about economic interests in making an informed decision based on science.

> A simple example, for instance, you are not used as a scientist at a first stage to think about economic impact. I mean very simply if I am making a threshold for removal of a pollutant this has an economic impact because you have to pay, you have to invest energy, you have to get the technology to obtain this. And I wasn't used as a scientist so much to think about these lines. And this has changed, and this is quite rewarding, because it gives also a monetary figure to my work, in a sense. (R4)

[168] (R4) and (R6).

Jasanoff also emphasizes the influence of history, politics and culture on making representations,[169] and politics poses a particular challenge in the EU context. The concept of 'serviceable truth' in pursuit of the artefact of representation implies reasoned decision making that considers various political interests without jeopardizing the scientific knowledge that needs to become part of the legislative proposal. This is particularly relevant to legislative drafting in EU environmental policy where there is always a degree of uncertainty and where numerous actors, especially the Member States, will have their own policy preferences. Interviewees pointed out that, in areas such as agriculture, a policy maker must also examine various other interests involved, such as the impact of a decision on small farmers, the forestry industry, and so on.[170] The interviewees confirmed that these political considerations form part of the legal drafting process in the Commission.

> It's not impacted by – directly by the preferences of Member States but what… we would have a kind of reality check because if one proposal is not likely to fly politically in the Council, we'd better be realistic from the outset. (R6)

In reaching this 'serviceable truth', the interviewees maintain that all those decisions are grounded in robust science without ever wiping out or losing something in translation from science into law.[171] This reaffirms the Commission's deference to scientific claims, which aligns with earlier finding that the Commission has a 'general appetite for science'. This was strongly echoed in interviews with scientists who try to alleviate the pressure that the Commission experiences in mediating different voices and interests by providing different options or scenarios which do not jeopardize science on account of different political

[169] Jasanoff, n. 22 above, p. 41.
[170] (R14) and (R16).
[171] (R3).

preferences. In each of these scenarios JRC scientists try to describe 'the degree of uncertainty that comes with a certain prediction or a certain scenario' which usually involves identification of the two extreme and one middle ground scenario.[172]

> The compromise or what we call options or alternative scenarios are based on what we are doing, are based on science. (R5)

Results of the empirical research demonstrated the capability of the Commission to produce the artefacts of environmental co-production which incorporate and aggregate input from scientists as well as political preferences and social interests. Thus, through making representations as the final pathway of co-production, scientific knowledge shaped by social processes within the Commission becomes embedded in the legal artefacts.[173] More importantly, the final outcome of co-production does not sacrifice scientific evidence to political preferences and provides credible input into the legislative process. This demonstrates that the Commission effectively ensures the incorporation of science into law as an artefact which is fit for purpose and which is legitimized by the inclusion of relevant stakeholder interests. Finally, these findings foster some understanding of the level of deference the Commission gives to scientific claims made in the legislative process. There is no doubt that the legislative process needs to be substantiated by objective and credible scientific knowledge; thus strongly prioritizing scientific claims in Jasanoff's spectrum of deference. However, the input of context through weighing historical, political and social influences on representation is reflected in the artefacts of co-production.

[172] (R2).
[173] See Y. Ezrahi, 'Science and the Political Imagination in Contemporary Democracies' in S. Jasanoff (ed.), *States of Knowledge: the Co-production of Science and Social Order* (Routledge, 2006), pp. 254-273.

5. Conclusion

The interaction of science and law is particularly significant in areas of legal regulation heavily based on scientific input, such as environmental policy. The extent and method of how science is incorporated and reflected into law becomes even more challenging in the EU multi-level policy-making arena. This empirically grounded study provides us with significant insights into the Commission's modus operandi in acting as a nexus between science and law in environmental policy making. As evidenced by the study, the Commission can be seen as a vehicle of co-production of science and law in EU environmental policy. The Commission actively pursues strategies that can be classified within the four pathways of co-production, including its ability to make identities, institutions and discourse, which results in artefacts of co-production reflected in legislation that is fit for purpose. These four pathways are underpinned by the value-based institutional culture that nurtures trust and independence both among relevant stakeholders and the Commission and European citizens.

The article deployed Jasanoff's theoretical framework of co-production as an explanatory model to examine how the European Commission engages as a vehicle of co-production and facilitates the interaction of scientific evidence and environmental law. This theory was mainly applied in social science and remains under-utilized in legal research, particularly empirical legal research. However, this study confirms the value and applicability of the co-production concept to the growing area of legal research in science-based policies. The model provides us with a framework for evaluating the capacity of an institution, in this case the European Commission, to gather and assess scientific input and subsequently incorporate it in a legislative proposal that reflects social and political interests. This article concludes that, in facilitating co-production, the Commission enables the social and natural order to be produced

together. An opportunity for further research could entail further testing of this theory by undertaking empirical research of co-production within the European Parliament and the Council as the legislators acting upon legal proposals prepared by the Commission. Furthermore, this framework can be further applied to policy making across all EU science-based policy sectors, such as research and health protection, but also to broader social processes that incorporate scientific knowledge into law.

This empirical study not only has academic value by examining the applicability of different theoretical models, but is also significant from a policy perspective. Though extensive work has been undertaken in the past on the functioning of the Commission especially by political scientists, there is limited knowledge and understanding of how scientific evidence becomes part of the legislative drafting prepared by the Commission. To that end, this study has a two-fold significance. It firstly has empirical value by opening up the black box on processes and methods that enable the interaction of science and environmental law in the Commission. The Commission established and, over time, refined formal and informal processes that enable genuine participation of numerous actors. Coupled with a recruitment policy that employs highly qualified staff across different professions and strong in-house scientific and legal expertise, this interaction allows for a constructive discourse in translating scientific input into law which will reflect wider social, economic and political interests. Secondly, the study reveals the applicability of the co-production model to policy making in the Commission. Multi-faceted identities are created, in which expert identity is still predominant. Through verification of evidence and the methodology of the policy-making process, the Commission acts as an institutional venue for co-production. This expertise and the policy-making process result in a discourse that supports the creation of representations which integrate both scientific evidence and expertise into legislative output.

These findings are linked to another contribution of this article. The study of the Commission at the interaction of science and law in environmental policy engages with the wider question of deference given to science in environmental policy making. As evidenced by the empirical data, during legislative drafting the Commission gives important consideration to science, while at the same time it assesses the political, economic and social impact of each measure. Thus, the artefacts of co-production embedded into legislation, case law and soft law should reflect the social interactions between science and law without jeopardising the quality and objectivity of scientific evidence translated into law. However, this study does not identify where the Commission sits on the spectrum of deference as identified by Jasanoff. An examination of the level of deference paid to science as opposed to other competing claims would be a valuable avenue for further research. Related to this question is the issue of what constitutes neutral science in policy making, as science is in itself value-laden. The interviewees perceive themselves as independent and using 'objective science'. They do not regard themselves as pursuing any particular agenda or using science to support Commission or national preferences. However, as science is not value-free, this study opens a further line of inquiry into how Commission officials in this policy area understand value-free scientific judgment within this context.[174]

[174] See Rimkutė & Haverland n. 17 above. Those authors consider some similar questions in relation to external experts.