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Policy Changes Post-Brexit: Evidence of Alignment and Divergence in the Field of Environmental Policy

Masterarbeit, Sommersemester 2025

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https://doi.org/10.5282/ubm/epub.128253

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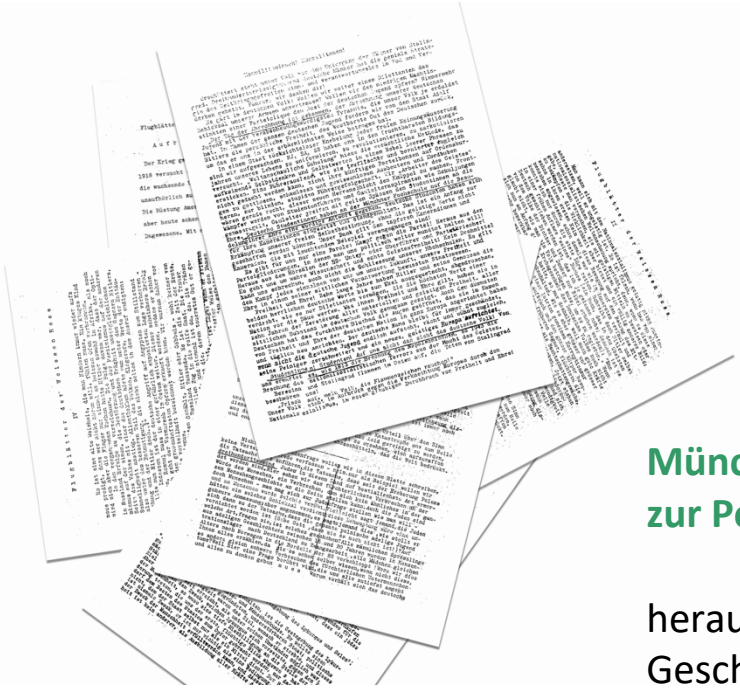

Münchener Beiträge zur Politikwissenschaft

herausgegeben vom
Geschwister-Scholl-Institut
für Politikwissenschaft

2025

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Masterarbeit bei
Prof. Dr. Christoph Knill
2025

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Abstract

The UK's departure from the EU represented a seismic shift in British policy, with the country for the first time in decades finding itself no longer subject to EU-made legislation. This new status quo created the potential for the UK to significantly depart from old policy patterns. With almost five years having now passed since the UK's withdrawal took effect, this research draws on new data from the sector of environmental policy to ask to what degree UK policy has indeed changed in terms of its outputs, in other words, what is regulated, by what means, and how stringently. The results corroborate evidence from previous studies that the overall pattern of change is one of disengagement, whereby ongoing processes of policy growth in the EU are not matched in the UK, causing increased divergence between the EU and its former member state. However, this research also challenges the characterisation of the possible directions of post-Brexit UK environmental policy which previous research has been based upon whereby the UK is seen as facing a choice of either alignment with EU policy at one extreme, or dismantling of EU policies at the other. Instead, the results show that alternative patterns of policy change which are implied by the output-focussed approach of this research can be empirically observed. Specifically, the UK is engaging in a significant amount of policy growth which is not occurring in the EU, a pattern which is termed here "differentiated growth". With the study of Brexit's effects on patterns of policy change being such a young area of research, these results therefore indicate that future efforts would benefit from broadening their conceptions of possible future dynamics of policy change so as not to overlook these changes, which represent a significant proportion of the total set of policy outputs.

1

Introduction

The United Kingdom's departure from the European Union, formally taking place on the last day of 2020, has created a great deal of uncertainty regarding the future relationship between the UK and EU. Chief among the questions raised is that of the future shape of British public policy. The UK's decades-long membership of the world's most wide-reaching supranational policymaking institution has left an indelible imprint on the makeup of the British policy mix, and in few other sectors is the impact quite so complete as in that of environmental policy. With the sector having had its genesis contemporaneously with the first efforts towards European supranational policymaking, the EU had assumed a central role in the formulation of policy ranging from product standards to species protection and water quality, as well as introducing world-first innovations such as emissions trading systems. Despite a great deal of political contention, Brexit came to pass in one of the "hardest" formulations possible, and with it the UK parliament abruptly became the lone authority in environmental policymaking for (more or less) the first time since the sector's inception. What would be done with this authority was, and remains, an open question. Voices from various political positions within the UK have suggested that this new state of affairs might represent an opportunity to rip up old regulations and start afresh with an entirely new regulatory philosophy, or alternatively that Brexit might serve to enable even higher standards of environmental regulation than the EU would previously allow. Almost five years have now passed since the UK's formal separation from the EU, marking a milestone opportunity to take stock of policy changes which have occurred in the environmental sector in this time. This paper will draw on new data to examine the patterns of policy change in the UK and EU's environmental sector since Brexit and draw conclusions as to how we might categorise these changes, with the aim of laying more solid foundations on which to build theoretical understandings of Brexit's influence on policy change, both in the environmental sector and further afield.

Environmental policy is not just highly salient in a political sense given heightened public conscience of the enduring strain placed on the natural world by human activity, but also forms a cornerstone of the body of regulation which provides for the functioning of the EU-wide single market, itself one of the core achievements and *raisons d'etre* of the European project. New patterns of policymaking emerging as a result of Brexit therefore not only have a great impact on

the shape and standards of environmental protection in the future but are also an indication of the UK's broader relationship with its closest neighbour and largest trading partner. In this way, environmental policy serves as a sort of microcosm for the wider level of regulatory alignment between the jurisdictions. Studying this sector in detail has the potential to yield generalisable conclusions concerning the influence of Brexit upon policy dynamics in other sectors, especially those connected with interoperability of trade between the UK and EU.

Brexit was only a recent phenomenon and as such there has been only limited time in which to collect empirics in terms of resultant policy changes. The complexity of the process of extricating the UK from EU regulation has drawn a lot of literary attention. Many case studies have been carried out relating to the impacts of Brexit on quite specific areas of the environmental sector, which go into detail about these complexities and the implications of Brexit for that area, for example chemical regulations (Jones & Burns 2024; Mullier & Tilling 2021) or agriculture, including the use of pesticides, the protection of species and habitats (Greer & Grant 2023; Coulson & Milbourne 2022; Petetin & Dobbs 2022). Equally, there is a growing body of theoretically focussed research which considers the drivers and determinants of different patterns of policy change (Copeland 2016; Burns et al. 2020; Gravey & Jordan 2023; Wolff & Piquet 2022). What is currently lacking is a more systematic study of empirics, which is the lacuna the current research aims to fill. Identifying empirical patterns can provide a foundation from which to induce theories about the drivers of these patterns. Taking a wide and comprehensive approach helps to avoid blind spots which may not have gained so much attention in other parts of the literature. Thus the aim of this paper is to contribute to this description of empirics. The recent updating of the CRISPOL project up to 2025 provides an opportunity to make use of thorough and wide-ranging data on policy changes in the environmental sector. Our aim is therefore to treat the environmental policy data provided by CRISPOL as a representative sample of changes in the environmental sector, which will not only elucidate patterns of policy change within this sector, but will also be generalisable across wider policy sectors.

Since this research is intended as an exploratory effort rather than a theory testing paper, we formulate expectations rather than concrete hypotheses. Primary among these is our expectation that post-Brexit policy changes will reflect a general pattern of disengagement. In terms of policy outputs, that means that large parts of the UK's environmental policy portfolio will display limited amounts of policy activity, while policy growth in the corresponding areas in the EU continues without being transposed into UK law. These expectations are based upon existing typologies of change developed by previous authors looking at dynamics of regulatory alignment between the UK and EU in the post-Brexit period. Our aim is to query these typologies, quantify the degree to

which they describe post-Brexit policy changes in the environmental sector, and suggest where this typology may be insufficient in terms of its ability to accurately describe real observed policy outputs, so as to take the first steps towards the development of a rigorous theoretical understanding of each type of empirically observed policy change.

The research also aims to encourage the exploration of the limits of the common conception of policy change in the UK and EU in terms of alignment and divergence. We suggest that this conception, while broadly encompassing the most striking implications of Brexit, may occasionally risk the oversight of other forms of policy change which do not neatly fit into this mould. Directions of policy travel can be imagined, and indeed identified, which are best described in other ways. By stepping back and taking a broad descriptive approach, we aim to shed light on the form and quantity of these alternative dynamics.

The paper will proceed in the following way: first, there will be a discussion of the state-of-the-art surrounding Brexit's impact on environmental policy, including theoretical frameworks of policy change and Europeanisation. This will be followed by an explanation of the research design and methodology of the current study, which is separated into the quantitative part and the qualitative part whereby instances of change identified in the data are categorised. We then turn to the results of the research, looking first at the big-picture trends we identify in terms of Brexit's effect on environmental policy change, and then at the more granular results in terms of the classification of each instance of change into our typology, where selected case studies are carried out to look in greater depth at the most puzzling findings of the research. Finally, the discussion covers the implications of the results, limitations and avenues for possible future research.

2

State of the Art

Brexit came as a shock to many, both in the UK and abroad. As the first case of a country leaving the European Union, it has drawn a great deal of literary attention. Among the literature that deals with policy, the question of greatest interest has been that of whether the UK and EU will continue to align or diverge in terms of the composition of their policy portfolios. Given the salience and highly Europeanised nature of environmental policy, it is unsurprising that this sector has received a large amount of attention, although perhaps less than other sectors such as trade and industrial policy. Broadly, the literature covers several themes: changes in terms of the legal and institutional arrangements which impact the formulation of policy, case studies which aim to shed light on the future outlook for specific areas of environmental policy, and wide-scope empirical studies which aim to build theoretical understandings of policy change. This latter category of research looks at the overall dynamics of environmental policy change in the UK, putting forward typologies of the different forms of change which seem to occur based on empirical evidence. This is the strand upon which this paper aims to build, aiming to quantify the relative proportions of each type of change and place these into comparative perspective.

The policymaking process requires time to yield outputs, and yet more time must pass before outcomes can be fully understood. Researchers have been eager to assess the impacts of Brexit on (environmental) policy (Dudley & Gamble 2023; Gravey & Jordan 2023; Greer & Grant 2023; Wolff & Piquet 2022) but have as yet had little ability to assess the consequences of the process. Drawing on the traditional conception of the policy process, which proceeds in a linear or cyclical fashion whereby agenda setting is followed by policy formulation, which is in turn followed by implementation, we can understand why there has been so little time for policy outputs to come into effect. With even the broadest framework of the UK's future relationship with the EU remaining in a state of deep uncertainty throughout the negotiation process which followed the referendum of 2016, and remaining somewhat (although less) uncertain even after the Withdrawal Agreement was signed in January of 2020 and the Trade and Cooperation Agreement was being negotiated, the context in which the practical work which comprises the policymaking

process could proceed was in a constant state of flux. As such, research up until now has largely been focussed on understanding these processes themselves and how the shape of the new relationship between the UK and EU may in future impact policy, with comparatively less focus on patterns of change in policy outputs. We turn first to a selection of these studies on the institutional and procedural changes caused by Brexit, which researchers expect to inform the potential for changes in policy output in the fullness of time.

Institutional Changes, Changes in Process: Law, Principles and Oversight

The threat to standards of environmental protection posed by the legal detachment of the UK from the EU's jurisdiction is the subject of a broad body of literature on post-Brexit environmental law. For example, the increasing room for manoeuvre afforded to the UK government in the absence of a supranational policymaking body and the associated legal constraints poses the risk not just of future governments gaining the freedom and incentive to deregulate (Ried 2017), but also the risk of the environmental policy field being opened up to increased politicisation, with the political right increasingly adopting de-regulatory rhetoric (Burns & Carter 2018, Macrory 2019). Within the wider legal literature, a subject of focus has been that of the legal principles of environmental policymaking in the UK following Brexit. The findings here are somewhat optimistic in terms of the survival of high standards of environmental regulation. Unusually among policy fields, environmental law within the EU is formally underpinned by a set of principles, these being the precautionary principle, the preventative principle, the "rectifying pollution at source" principle and the polluter pays principle. These principles are enshrined in EU law within Article 191 (2) of the Treaty on the Functioning of the European Union and therefore have provided a baseline policy paradigm for the EU and its member states since the inception of environmental policymaking in the mid-20th century (Proelss 2016). With the UK's departure from the EU, an opportunity arose to significantly depart from these principles and shape a new environmental policy paradigm.

As identified by Reid (2021), these principles have been largely transposed into UK law, although they may have been weakened due to the fact that the environmental policy statement published by the government in January of 2023 falls short of requiring that policymakers adhere to the principles, and rather requests that they "look for opportunities to embed environmental protection [principles] in fields of policy that have environmental effect" (Department for Environment, Food and Rural Affairs 2023). The creation of the Office for Environmental Protection (OEP) to fill the role of independent watchdog over UK environmental policy which was

previously carried out by the EU is an encouraging sign for optimism (Macrory 2024; Ried 2019), as is the rhetoric of UK governments on environmental policy since Brexit, promising to be the first generation to "leave the environment in a better state than they found it" (Department for Environment, Food and Rural Affairs 2018). Nevertheless, a tone of caution is common to these contributions, arguing that with policymaking now subject to a significantly lower degree of oversight compared to the pre-Brexit period, it may be too early to draw any conclusions on the future of environmental protection in the UK based on the retention of EU principles of environmental policymaking in EU law.

Other researchers stress that, despite the newfound institutional and legal freedom to diverge from EU rules, there are reasons to expect a high degree of continued alignment. Phinnemore (2023) maps the changes in the institutional relationship of the UK to the EU, arguing that although the UK has pursued a policy of minimal commitments towards the European project, a notable peculiarity of the new relationship is the arrangement regarding Northern Ireland, whereby this constituent country of the UK will continue to be subject to EU rules. This bakes an asymmetry into UK policy whereby variance may increasingly arise among different parts of the UK, which is likely to be counteracted by efforts of the UK government to remain in alignment with Northern Ireland, and by extension EU regulation, for the sake of reducing internal stresses caused by a customs border in the Irish sea.

Wider practical pressures and economic realities may also force the hand of the UK government to pursue a high degree of alignment with the EU (Jancic 2022; Leruth et al. 2019; Murphy 2019). Referenced here is the Brussels effect, whereby businesses in particular may be incentivised to adhere to EU regulations in order to simplify their production or increase their export opportunities (Bradford 2012). In turn, the UK government is incentivised to have regard to EU regulation when making its own legislation in order to minimise the costs to business of being forced to comply with two sets of differing regulations should they want to operate in both the EU and UK markets. This research draws on the extensive literature on differentiated integration to argue that variation in terms of regulatory alignment is likely to depend on the (low) degree of political acceptance within the UK for policy alignment, but with a notable shift towards a more Europhilic government having been elected since the writing of the paper, the politics of Brexit in the UK, and with it public support for alignment with EU policy, remain volatile (Frese & Hix 2024; Hix et al. 2023).

Overall, however, this literature is not conceptually rigorous in its expectations when it comes to the particular form of policy change which is likely within the UK. The general theme is one of a

risk of policy dismantling at the most extreme, or less extremely, a halting of UK environmental policy growth. The terms "alignment" and "divergence" are most predominantly presented as the defining dichotomy of the post-Brexit period in this literature, though concepts of policy change such as "passive" disengagement and possible "reengagement" are also introduced. Nonetheless, for a more rigorous disentanglement of these different dynamics, we must turn to a more theoretically-focussed body of literature, as will be discussed in the next section.

Europeanisation and De-Europeanisation

Although the theoretical literature on Brexit and its policy impacts is young and still developing, a promising strand has developed on the back of broader explanations of the Brexit phenomenon. The discussion centres on the body of "de-Europeanisation" literature, which itself builds upon the large corpus of research on the "Europeanisation" of politics, polity and policy which occurred among European states beginning in the mid-20th century. The additional focus on De-Europeanisation was a much later development in the literature. This can be partially explained by the early lack of empirics for such cases, but also by the fact that political scientists implicitly imagine countries to be different from one another by default, leading to a selection bias of research topics towards cases of convergence (Knill et al. 2023). With political integration having been a notable and defining characteristic of particularly European counties over the past eighty years or so, the process of ever-increasing similarity of public policies across countries has been the stand-out phenomenon drawing the attention of researchers. The reverse process of differentiation, whereby countries begin in a position of similarity and then diverge, has received less attention. As such, de-Europeanisation draws on many pre-existing concepts taken from the Europeanisation literature, but turns them on their heads, conceiving of de-Europeanisation as the "reverse gear" of Europeanisation processes (Gravey & Jordan 2016).

While there is much contestation concerning the definition of Europeanisation, the broadest conceptualisation is made by Radaelli (2004), who describes it as "processes of a) construction, b) diffusion and c) institutionalisation of formal and informal rules, procedures, policy paradigms, styles, 'ways of doing things' and shared beliefs and norms". This all-encompassing definition requires some breaking down. A popular framework for doing so involves dividing the object of de-Europeanisation into the threefold division of politics polity and policy, developed by Börzel and Risse (2003). This is another example of a foundational concept being drawn from the Europeanisation literature and widely integrated into theoretical literature on de-Europeanisation. Here, "politics" refers to discourses, interest formation and interest

representation; “polity” to both the formal institutions of European integration and the collective identities which legitimate them, and “policy” to the specific initiatives by which problems are resolved, or in other words, the targets and instruments of policy design. This division is reflected in the variation among the different strands of de-Europeanisation literature in terms of the forms de-Europeanisation processes might take. For some, de-Europeanisation represents a political process of contestation wherein differences between EU member states and the EU in terms of values, norms and interests lead to a decreased willingness to engage in collective policymaking which occasionally, but not always, impacts policy outputs (Müller et al. 2021). Tomini and Gürkan (2021) define it as the “progressive detachment [...] from the political, administrative and normative influence of the European Union and/or [...] a more overt and growing contestation over the EU or its policies”. Both of these understandings take the political processes leading to differentiation as well as reconceptualisations of polity as their focus, and in turn examine causes of these changes, with typical cases including those democratic backsliding and/or autocratisation, such as those of Hungary (Ágh 2015) or Turkey (Öniş & Kutlay 2019). Changes in policy outputs are not the primary focus of the studies, but rather an implied result of the reshaping of politics and polity.

Policy Effects

What then of the effects of Brexit in terms of its influence on policy specifically? In this area, there is an understanding within the literature that policy dynamics after Brexit are too varied and nuanced in character to be described by the application of the term de-Europeanisation alone. Instead, policy changes are portrayed as falling into different categories of change, of which de-Europeanisation is just one, usually being equated with the concept of policy dismantling (Wolff & Piquet 2022). In a reversal of the concept of differentiated integration, which is a common theme among literature covering European integration, contributors have also questioned the unidirectionality of Brexit, suggesting that processes of de-Europeanisation in one issue or policy area may also be accompanied by simultaneous processes of increasing Europeanisation in others. As a result, typologies have emerged in the literature which aim to capture all forms of policy change resulting from Brexit, each of which may occur simultaneously in different policy sectors and areas.

Wolff and Piquet (2022) open the discussion with their spectrum-like characterisation of the possible "pathways" on which the UK might embark in different areas of politics, polity and policy. This spectrum runs from "de-Europeanisation" at the most extreme end whereby previously Europeanised policies are dismantled, through "disengagement" and "reengagement" to "continued engagement" at the opposite extreme, where the effects of Brexit are barely perceptible and business continues largely as usual. The authors upend the idea that Brexit is a one-way path of differentiation, defining their pathways instead in relation to a background trend of continuing Europeanisation which had been ongoing throughout the UK's membership of the EU. The UK can variously depart from this course by distancing itself from Europeanised policy processes and dismantling Europeanised policies, or choose to attempt to either continue to participate in EU processes or rebuild coordination where the upheaval of Brexit had previously destroyed it. Baldrock and Nicholson (2022) also contribute a similar view with a greater focus on the intentionality of change, drawing upon the argument by Copeland (2016) that it is intent that differentiates active de-Europeanisation from passive divergence. Baldrock and Nicholson's typology thus ranges from divergence by design, being analogous to Wolff and Piquet's de-Europeanisation, through divergence by default, which reflects the concept of disengagement, on to ad-hoc divergence, and then selective alignment and dynamic alignment. These latter two types differ from the continued engagement and reengagement of Wolff and Piquet's typology in that they focus on the possibility of ongoing commitment (in the form of dynamic alignment) post-Brexit rather than the continuation of pre-Brexit status quo (as in the case of Wolff and Piquet's continued engagement).

	De-Europeanisation	***Disengagement***	***Reengagement***	***Continued Engagement***
Presence of policy dismantling	Dismantling of EU policy	No dismantling of EU policy	No dismantling of EU policy	No dismantling of EU policy
Degree of policy Europeanisation	No active Europeanisation	No active Europeanisation	Limited active Europeanisation	Active Europeanisation

Table 1: Types of post-Brexit policy change (reproduced from Wolff & Piquet 2022).

The two typologies are very similar for two reasons. First, they view the potential policy dynamics of the post-Brexit period as constituting a spectrum running from alignment between the UK and EU at one end and divergence at the other, each with varying degrees of comprehensiveness. Second, both take a broad view of the policy element of Börzel and Risse's tripartite "politics, polity and policy" division, whereby policy includes the broader policymaking process as well as its outputs. This is reflected in the terms "engagement" and "disengagement", which reflect differences in styles of policymaking and the agency of the policymakers involved – in other words – the question of whether the UK actively engages (process) with the EU when formulating its policies (resulting in outputs). Each of these characteristics has consequences for the application of such typologies to the empirical study of policy outputs. First, the conception of policy as one which encompasses both processes and outputs themselves means that when studying patterns in outputs alone, agency-based terminology such as "engagement" and "disengagement" may be less appropriate. Second, the spectrum-based nature of the typologies, ranging from engagement with the EU at one end to dismantling of EU policy at the other, excludes some potential types of policy change. Each of these points are considered in the following chapter.

Overall, Brexit has been the subject of a vast amount of research which aims to explain its causes and its impacts on politics and polity. Nonetheless, it is still early days in terms of efforts to develop a comprehensive theoretical understanding of the impacts on policy of a member state's departure from the EU. Research into policy impacts has focussed on institutional changes and made broad predictions that the general future direction of UK policy is likely to be one heading towards stagnation due to either limited capacities for home-grown policymaking or because of political preferences towards a lower regulation policy paradigm which may also lead to a certain amount of dismantling. Various researchers have observed that institutional changes within the environmental sector, such as the creation of the OEP to replace the oversight functions of the EU or the distortions of environmental legal principles during their transposition into UK law, open the door to less predictable patterns of policymaking which may differ from those in the EU. In terms of what such patterns may look like (or indeed, already do look like), the latest research is currently at the stage of developing frameworks of possible patterns of change and collecting empirical evidence for such changes. A growing body of literature engages in the task of relating the limited number of changes that have occurred in the post-Brexit UK environmental sector to such theoretically expected patterns of change, both in terms of institutional and procedural changes and in terms of the smaller number of post-Brexit environmental policy outputs.

However, as yet no comprehensive study has attempted to empirically measure the full range of policy dynamics within the sector to see if there is evidence for such patterns in terms of policy outputs, which is the task that the current research will take up. This contribution will allow the evaluation of the sufficiency of Wolff and Piquet's framework in describing post-Brexit environmental policy dynamics, which in turn will inform expectations about such dynamics in other sectors. By attempting to answer the question posed by Gravey and Jordan (2023) as to whether Brexit has led to de-Europeanised policy outcomes, the hope is that this research will prompt further research into the connection between different patterns of policy process and the different patterns of policy outcomes, both in terms of the changes described by Wollf and Piquet and in terms of those alternative patterns of change identified here. Additionally, by replicating such studies in other sectors, future research could confirm whether such phenomena are generalisable beyond the environmental sector.

3

Theoretical Framework

The following chapter will outline the theoretical basis on which this research will operate. In this research, we take Wolff and Piquet's (2022) framework as a starting point and add our own additional innovations. The first of these is about broadening the range of policy dynamics which are considered possible by taking an additional step beyond the engagement versus de-Europeanisation view of policy changes. The second concerns taking a more specific view of policy change by limiting our enquiry to policy outputs in order to understand what patterns within our data, which is drawn from the content of legislative acts and therefore considers policy outputs in isolation, we should search for in order to evidence each of Wollf and Piquet's types of policy change. We now consider each of these aspects in turn.

A Broader View of the Taxonomy of Post-Brexit Policy Changes

This research argues that when discussing regulatory similarity, it is beneficial to more finely dissect the different aspects of policy change. The typologies so far described take a wide definition of policy which includes both policy formulation processes, including norms and attitudes towards the EU, and the outputs of policy in terms of the content of rules. In doing so, they conflate the levels of engagement and disengagement in terms of the reference which policymakers pay to EU alignment during the policy formulation process with the similarity of the policy outputs which comes as a consequence. Our aim is to describe the range of patterns in policy outputs since Brexit, and assess whether these existing typologies of policy change, which include regard to policymaking process, are adequate to describe all of the patterns of similarity and difference in terms of policy outputs alone. Focussing on only outputs forces us to imagine a broader range of potential policy dynamics beyond the usual spectrum of engagement and de-Europeanisation.

This focus on outputs reflects the view that there may be value in going an extra step beyond the view of Brexit as a process of either distancing or nearing of the UK relative to the EU and instead observing the developments of each polity in absolute terms. We caution against the tendency to view differentiation as either dismantling on the part of the UK, or otherwise the UK's failure to keep up with new policies adopted by the EU. Alternative patterns of differentiation can be

conceived of, and therefore we should be careful not to overlook these, especially so early in the history of this hitherto unique case of a state's departure from the EU. By starting with a descriptive overview of the dynamics of change in policy in the UK, EU and in peer countries, we take a more inductive approach to identify patterns of empirical development which may be enlightening given the young state of theoretical literature on the policy implications of Brexit.

The reason for the caution advised here comes as a result of our output-based perspective, and the potential that policy outputs might not necessarily map one-to-one onto patterns in politics and policymaking processes. In politics and policymaking processes, there is a relatively one-dimensional spectrum of engagement with the EU: either there is cooperation and collaboration between the UK and EU, which may of course come in varying degrees, or there is the abandonment of this approach in favour of doing things a "different way". With regard to policy outputs, there is a wider range of possibilities. The UK and EU can aim to align with one another, working together in terms of policy process to achieve common objectives, which is then ultimately reflected in the similarity of their outputs. At the other extreme, the two polities may disengage from one another and create their own policy without input from the other. This is the traditional engagement-disengagement binary spoken about in much of the literature discussed so far. However there also exist alternative pathways: policy outputs of the two polities may display similarities in spite of the fact that no formal process of common policy formulation (being political engagement and membership of a unified polity) exists, or they may diverge despite the existence of political engagement. There is an element of unintentionality here, implied by the corollary of Baldrock and Nicholson's intentionality of divergence (Baldrock and Nicholson 2022). By contrast, it is more difficult to imagine unintentional political engagement between the UK and EU. In this way, policy portfolios can end up looking similar to one another even in the absence of any formal commitment to alignment, or political engagement can fail, resulting in unexpected policy divergence (Burns et al. 2019).

Gravey and Jordan (2023) question precisely this connection between politics, processes and policy when asking whether the de-Europeanisation *process* of Brexit may not necessarily lead to de-Europeanised *outcomes* in terms of policy outputs. Their discussion of the effects of Brexit upon Börzel and Risse's (2003) three elements of politics, polity and policy in the environmental sector places the greatest amount of emphasis on the policy dimension and is to date the most comprehensive assessment of the subject. Like Wolff and Piquet (2022) and Baldrock and Nicholson (2022), their focus is on the effect of Brexit on the wide concept of policy, including policymaking processes and policy outputs. Their findings draw upon selected empirical cases of Wolff and Piquet's four types of policy change and find disengagement to be the most common

type of change observed, with some instances of de-Europeanisation also occurring, though in lesser number. In their aim of reaching a thorough theoretical understanding of Brexit and policy change, Gravey and Jordan turn their attention towards the possible determinants of each of these policy pathways, identifying in particular the strain on state capacity that arises as a result of the UK taking on competencies previously the preserve of the EU as a key determining factor of disengagement. However, before beginning on the path of identifying causal theories, and given the strong possibility of a disconnect between de-Europeanisation of politics and polity and the de-Europeanisation of policy, it is worthwhile to examine policy changes in a greater degree of isolation by investigating what patterns of policy outputs can be empirically identified, especially since they seem to hold the potential to exist somewhat independently of policy processes of engagement and disengagement. This will lay the groundwork for future research which might identify the causal relationships between process and outputs. The next section will argue that while largely complete, the traditional spectrum-like classification of policy change ranging from divergence to alignment which is used by the studies hitherto described may risk the possibility of oversight of other forms of policy change.

Policy Growth in the UK: A New Kind of Divergence?

Given the complexity of the dynamics of change of post-Brexit policy outputs in the UK, it is argued here that it might be worthwhile to take a small step back from the important contribution of Gravey and Jordan (2023) and to aim to describe more fully the dynamics of post-Brexit policy change. Taking a more absolute view of policy dynamics may reveal new insight into the relative movement of policy in the UK and EU. The primary dynamic which we may identify, and which might otherwise be obscured by viewing policy changes in terms of de-Europeanisation or engagement, is that which involves policy growth in the UK which is unmatched by the EU. If the UK were to adopt new policies which did not resemble those adopted by the EU, this would mean an increase in the degree of difference between the polities' portfolios. While we might name this a form of divergence, this is not the typically imagined process by which divergence is proposed to occur in the literature to date: most researchers have imagined that divergence would take place in the form of policy dismantling on the part of the UK, or else policy growth in the EU which the UK is unwilling or unable to match. Indeed, this view is the natural result of viewing post-Brexit policy changes in terms of a one-dimensional spectrum ranging from de-Europeanisation (implying dismantling) to continued engagement. A divergence driven by policy growth in the UK which focusses on quite different policy targets and instruments to those of EU policies might be

seen as a less-expected alternative manifestation of the undoing of Radaelli's "policy paradigms, 'ways of doing things' and shared beliefs and norms" (Radaelli 2004), thus constituting an overlooked form of increased differentiation.

It is also conceivable that the UK may go further beyond the EU in terms of policy stringency. During the UK's membership of the EU, this was traditionally seen as something unattractive: excessively burdensome regulation may impose high costs of compliance on businesses and government, leading to reduced economic competitiveness and government efficiency. During the UK's EU membership, the UK government noted a susceptibility to this practice of "gold plating" EU laws which it aimed to clamp down upon (Miller 2011). Why this aversion to overburdensome regulation might change once alignment with the EU is no longer a legal necessity for the UK would not be clear. Nevertheless, for the sake of conceptual comprehensiveness it is worth consideration. Could we see the emergence of a different type of UK policymaking style which included selectively ambitious policies with higher levels of stringency than before?

Finally, a less likely form of divergence would constitute the dismantling of policy in the EU which remains preserved in the UK due to the retention of EU law following Brexit. While this would certainly be a striking development, it would not be entirely unimaginable: it is not correct to characterise the UK as a reluctant recipient of environmental policy from the ever-leading EU, and it has played a prominent role in advocating for higher standards of environmental regulation than those preferred by the EU commission in the past (Jordan & Lenschow 2000). Indeed, cases exist of the EU watering down the UK's environmental ambitions, as in the case of the formulation of the Common Agricultural Policy (CAP) (Hilson 2018), and it is therefore not inconceivable that, without the UK's voice being heard within EU policymaking institutions, a greater tendency towards dismantling on the part of the EU may come into play. Indeed, there are signs that the European Green deal may be stalling, potentially leading to a rollback of headline EU commitments. Gains among right-wing parties in the 2024 EU elections were driven in part by a popular distaste for climate politics (Arezki et al. 2024), and more concrete policy dismantling may soon be on the agenda, with Commission president Von der Lyon's EPP Group, the largest in the EU parliament, recently calling for a review on the timeline for the phasing out of internal combustion engines in the Union (European People's Party 2024). Empirical evidence has shown so far that policy dismantling has been notably rare within the EU (Gravey & Jordan 2020), but by broadening our search to include the possibility of such a dynamic we may be able to identify the first signs of a shift in this regard.

Describing Policy Outputs: The Portfolio Approach

This research will use the policy portfolio approach as a means of conceptualising and measuring the targets, instruments and stringencies of environmental policies in a standardised way which enables cross-jurisdictional comparison. This is not a theoretical approach per se, but rather a choice in terms of how to view different types of public policy which lends itself to comparative analysis (Fernández-I-Marín et al 2021). This approach requires the development of a standardised set of potential targets and instruments to be observed. Such a process was undertaken for the CRISPOL project in the environmental policy sector by induction based on analysis of regulations across the Jurisdictions of interest, these being twenty-three OECD countries plus the European Union, including thirteen EU countries and the UK. Policy outputs are then coded in each jurisdiction according to their targets (*what* is addressed), their instruments (*how* the target is addressed) and their stringency (crudely, *how much* it is addressed). Stringency is further broken down into setting, referring to the precise level of regulation set out by the policy, such as the rate of a tax or the specific limit on a type of emission, and scope, which refers to the coverage of the regulation, for example, precisely who or what is taxed, or what specific pesticides may be outlawed.

By dividing the composition of policies into these elements, similarities and differences between the policies of different jurisdictions, and of the same jurisdiction over time, can be more readily observed and quantified than if policies were considered individually as unique units in and of themselves. This improves the ease of analysis by drawing attention to potential instances of each type of policy change. The policy portfolio approach, and specifically the CRISPOL dataset, has been fruitfully applied to describe the evolution of policy mixes in the sectors of climate and environmental policy before, for example with regard to the EU's emissions trading schemes (Oberthür & von Homeyer 2022), and the impact of the EU on national policy portfolios (Fernández-I-Marín et al. 2024). However, it is yet to be used to identify the impacts of Brexit on policy outputs. The standardised nature of the CRISPOL dataset provides a unique opportunity to bring this alternative quantitative perspective to an area of research which has previously been characterised by solely qualitative analyses.

Describing Policy Outputs: Terminology

Some adaptations to the terminology of Wolff and Piquet (2022) are required if we are to accurately describe the dynamics of policy change which we are aiming to identify. The typology

of change described by Wolff and Piquet (2022) uses a broad conception of policy which encompasses not only the outputs, but also the processes of policymaking. This means that certain elements of the typology use language which is reflective of the process more than outputs. The phrases "engagement" and "disengagement" for example evoke agency and are reflective of the reference made my policymakers in one jurisdiction towards the policy of another. In terms of comparing policy outputs in isolation, it makes little sense to speak of the output itself of UK policy as "engaging" with the EU. Consequently, when describing the state of policy outputs alone, new more precise language is required. Table 2 shows how the concept of parity and disparity of policy changes can be used to describe the characteristics of policy changes in the UK and EU which correspond to the typology of policy changes described by Wolff and Piquet. It is this parity and disparity which we search for in order to find evidence of the existence of each of Wolff and Piquet's patterns of change.

	De-Europeanisation	***Disengagement***	***Reengagement***	***Continued Engagement***
Type of policy change (Wolff and Piquet 2022)	De-Europeanisation	Disengagement	Reengagement	Continued engagement
Corresponding characteristic of policy output	De-Europeanisation	Disparity	Renewed Parity	Continued parity

Table 2: characteristics of policy outputs associated with each of Wollf and Piquet's types of policy change.

De-Europeanisation, indicating the dismantling of previously Europeanised policy, does not connote the problematic concept of engagement and as such the term does not need to be modified to describe policy outputs. Disengagement, however, is best equated with the concept of disparity. When the disengagement type of change is occurring whereby EU policy growth is not being matched in the UK, we expect to see a disparity between either the targets and instruments addressed by each jurisdiction over a given time period, or else in the relative stringencies of the policies made whereby those of the UK do not apply as high a standard or are more limited in scope than those of the EU.

Engagement is in evidence when we observe policy parity in our data, that is, when each jurisdiction is simultaneously legislating to regulate the same policy targets, using the same policy instruments, and to the same level of stringency as one another. When this is parity is "renewed" – that is, when patterns of policy parity have been interrupted by de-Europeanisation, but this is followed by renewed patterns whereby policies' targets, instruments and stringencies are matched across each jurisdiction – then this can be taken as a first indication of renewed engagement in terms of Wollf and Piquet's typology of change. Finding evidence of continued engagement more simply requires the identification of ongoing and uninterrupted patterns of policy outputs which display parity across both jurisdictions.

Having laid out the theoretical basis for the current study, the next chapter will explain the paper's research design, including the specific methodological approaches and considerations required when handling the CRISPOL data. The research takes place using a quantitative and qualitative element, with the latter building upon the former. We first turn to the quantitative element, with discussion of the qualitative element following in chapter 5.

4

Methodology

As explained in the theory section, the aim of this research is to make a holistic investigation of the impact of Brexit on dynamics of environmental policy change in the UK and EU. The quantitative element of the research proceeds in the following way: three primary methods are used to process the CRISPOL data and yield descriptively informative results. First, we construct policy portfolio "snapshots" which illustrate the composition of the UK and EU's environmental policy portfolios at the moment of Brexit (before the UK had become the sole policymaking authority in the sector) and at the end of the period for which we have data, this being April of 2025. Second, we identify the changes in policy which took place in each jurisdiction both in the intervening period between Brexit's "IP completion day" and April of 2025, and for a corresponding period running from 2015 up until the end of the transition period. This allows us to make comparisons concerning the rate, quantity and type of change between comparable pre-Brexit and post-Brexit periods. Third, we calculate Jaccard coefficients for the sets of changes in order to quantify the degree to which policy in both jurisdictions changed in an alike manner.

Having obtained a picture of the changes in each jurisdiction, we are then able to assess the degree to which it is possible to categorise individual instances of change according to the theoretical typologies outlined earlier in the paper, specifically, Wolff and Piquet's (2022) typology of change ranging from de-Europeanisation to reengagement. Using our comprehensive picture of all policy change concerning the targets and instruments and their stringencies covered by our data, we can quantify the proportion of changes adhering to each theorised category, as well as identify those changes which do not so easily fit into one of these categories. Connected with this process is the final element of our analysis, which is to conduct detailed case studies into the specific changes which we identify, including assessing their relative levels of stringency. This is necessary for two reasons: first, to aid in categorisation of policy change. For example, a policy which is made in the UK may address the same target and instrument as one made in the EU, but it may not do so in accordance with any formalised joint policymaking process. Target and instrument categories, though quite precise, are broad enough that occasionally they can include a range of different types of policy which are qualitatively different from one another while still falling under the same combination of target and instrument. As an example, an EU directive which requires the limits on the volume of a specific pesticide allowable within water courses

would register as target 27 (pesticides) and instrument 102 (prohibition). While a change may be identified in the UK for this target-instrument combination, it may refer to a different type of pesticide and not in fact constitute a transposition of the EU directive. As such, it is important to investigate each change in detail to correctly characterise them. Secondly, detailed case studies provide the space to introduce more nuanced description than the limited set of variables which are measured by the quantitative part of this research, bringing light to potential drivers of trends which can set us on a path to developing a more fully fledged theoretical understanding of Brexit's effects on environmental policy.

Additionally, as the findings of prior research show (Gravey & Jordan 2023), variation at the sub-national level within the UK in terms of environmental policy dynamics forms a significant part of the picture. CRISPOL data codes only national-level policy changes, therefore we have also undertaken to code environmental policy changes in each of the UK's devolved parliaments of Scotland, Wales and Northern Ireland. Since this is coded on the same terms as the CRISPOL data, we can directly compare it with the UK and EU level changes. For reasons of limited time and resources, we only code the policy changes taking place since 2015. This means that we are not able to generate sufficiently accurate policy portfolio snapshots for the devolved nations of the UK for them to be of use in making comparisons with the portfolios of other jurisdictions. However, this has no impact on our ability to capture the changes taking place over our time period of interest. The results of this effort can be seen in appendix B.

Creating Snapshots of Policy Portfolios at Points in Time

The highest-level question when it comes to describing the environmental policy of a jurisdiction concerns what is regulated and how. This question can be answered by using CRISPOL data to create snapshots of policy portfolios at different points in time, allowing us to compare the composition of the portfolios of different jurisdictions. Throughout the literature which makes use of CRISPOL data, policy portfolios have been depicted graphically as combinations of policy targets (what is regulated) and policy instruments (what means are used to regulate it), displayed in a two-dimensional space (an illustration of such a graphic can be found in chapter 5, figure 2). Although this obscures the particular setting and scope of a policy, it allows us to answer this high-level question of what policy targets are addressed in what ways by each jurisdiction. Secondary to the ability to describe the composition of a jurisdiction's policy portfolio at a point in time, these snapshots also provide a baseline from which data concerning patterns of policy change (explained in the second methodological approach) can be measured. This allows us to

assess what proportion of a jurisdiction's policy portfolio has undergone change over a subsequent time period, and to normalise this measure against the size of the jurisdiction's existing portfolio to enable cross-country comparisons.

In order to create a complete picture of environmental policy portfolios at a particular point in time, we sort entries in the CRISPOL dataset by level in order to show only changes in instruments. Because the data is hierarchical, entries concerning instrument-level changes will also imply the existence of an associated target within the policy portfolio – that is, it is not possible to have an instrument in existence that is not associated with a policy target. We first create a complete list of all possible combinations of country, year, target and instrument, which results in a set of matrices comprising targets and instruments for each country-year pair. This is our "policy space" which remains consistent across all country-year pairs, allowing comparisons to be made between the EU and UK and between points in time on equal footing.

The process for checking for the existence of a policy addressing a specific target-instrument combination proceeds in two steps. First, the dataset is filtered according to country, year, target and instrument, with all years included preceding the one in which we are interested. The existence of any entry on the instrument level with direction "1" indicates the existence of some policy in that country addressing that target-instrument combination, and as a result we input a "1" into the corresponding location in the policy space. This is iterated for each combination. With two jurisdictions, fifty years, fifty policy targets and thirteen policy instruments this results in 32,500 possible combinations. The second step is to check for policy dismantling so that target-instrument combinations which have been dismantled can be removed from the portfolio snapshot. It is possible, for example, that a policy appears in the first step but is dismantled at a later date (indicated with a direction value of "2") and should therefore not be shown in the portfolio for our given year. We therefore filter for appearances of policy dismantling at the instrument level and verify that no re-establishment of that target-instrument combination has since occurred. This provides a list of dismantled target-instrument combinations which are then subtracted from the policy portfolio snapshot.

When capturing snapshots of a jurisdiction's policy portfolio at a specific point in time, attention should be paid to the fact that the dataset is fundamentally a depiction of change rather than a comprehensive assessment of the existence of policies. Given that the dataset begins to code legal acts from the year 1974, it is of course possible that policy changes could have occurred before this date which consequently are not captured in the dataset. However, we have reason to believe in the high accuracy of snapshots, since when looking at the data as a whole, we can see

that there was relatively little legislative activity around the cutoff time period (figure 1), and therefore it is unlikely that a significant volume of legislation is omitted from our yearly snapshots of each country's policy portfolios.

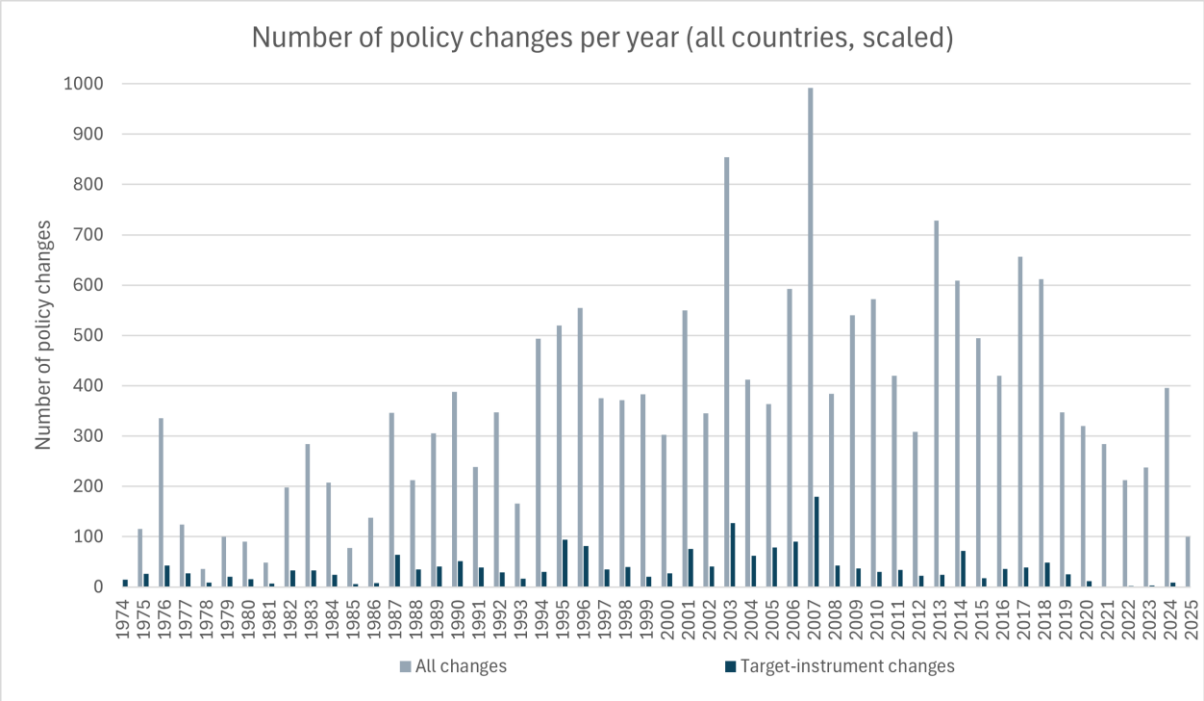

Figure 1: Number of policy changes per year across seven EU member states (including the UK) and the EU level.

A further reason to be confident in the accuracy of our snapshots of policy existence at specific points in time concerns the length of the timeframe over which our data are collected. Historical processes of rule growth mean that a greater proportion of a country's policy portfolio is captured within the generated policy portfolios when snapshots are taken in later years as compared to earlier years. For example, generating a policy portfolio for the year 1974 will only yield a small number of results, these being the legislative acts passed within that year, and will fail to capture previously existing policy target-instrument combinations. A hypothetical country with ten different target-instrument combinations, of which nine were established prior to 1974 and one was established in 1974, will therefore see only 10% of its existing legislation captured by the dataset when taking a snapshot of that year. However, as rules in that country accumulate over time and are captured in the data, an increasingly large proportion of the country's portfolio will be captured. For example, if an additional 10 target-instrument combinations are established by

1980, then the dataset will now have captured 55% of the country's actually existing portfolio in that year. As a result, policy portfolios constructed in this way become increasingly accurate over time. Since our time period of interest covers the Brexit process and its aftermath, it lies right at the end of the dataset's time span and therefore policy portfolio snapshots around this date are likely to be very representative of the true set of existing policies.

Figure 1 shows the number of policy changes appearing in the dataset per year. The paler bar indicates all entries in the dataset, therefore including changes in scope and setting of policies in which the target and instrument were unchanged. The darker bar indicates changes pertaining to targets and instruments. As can be seen, the largest volume of legislative activity took place in the late 20th and early 21st century, with a notable decline occurring as the 21st century proceeded. Target-instrument changes were relatively few at the beginning of the data's timespan and therefore few are likely to be missed. This pattern is consistent with historical accounts of the patterns of environmental policymaking: the decades preceding the point at which our dataset begins were approximately the time that environmental issues began to be constructed as policy issues among European countries, particularly within the United Kingdom and Germany (Böcher 2023; Solesbury 1976; Sommerer & Lim 2015). Given the fact that the stringency of environmental standards has increased significantly since the 1970s when our dataset begins (Steinebach 2023), it is very unlikely that policies which existed even prior to the beginning of the dataset would not have at some point been updated in terms of their setting and scope at some point during the dataset's time span, which would cause that target-instrument combination to enter the dataset and appear within the policy portfolio snapshot. Taken together, we have good reason to believe therefore that the policy portfolio snapshots we create are accurate depictions of the existence of policies within the environmental policy space covered by the data.

The process of capturing snapshots of the policy portfolios of the UK and EU is performed for the moment of Brexit, that is, the 31st December 2020,[1] and at the latest point for which CRISPOL data is currently complete, this being April 2025. The results and analysis of this process are discussed in chapter 6.

[1] The 31st December 2020 is known in British law as "IP completion day" where "IP" is an abbreviation for "implementation period". Despite the fact that in the Withdrawal Agreement between the UK and EU (which is the legal document which defines IP completion day) it is known instead as the "transition period", both "transition period" and "implementation period" have the same meaning.

Capturing Change

Capturing patterns of policy change constitutes the second methodological process in our analysis. Many of the concerns associated with the accuracy of identifying policy existence in our portfolio snapshots do not apply to the process of identifying policy change over time, since fundamentally, instances of policy change are what the dataset is designed to measure. Policy changes from year to year do not require knowledge of policy activity preceding the time period in which we are interested. Additionally, unlike the snapshots described earlier, which simply show the existence of any policy which aims to address a specific target using a specific instrument, by looking at change over time we can identify the direction of change in terms of increases or decreases in setting and scope. Such changes account for the majority of policy change activity, with the introduction or dismantling of target-instrument combinations being very rare by comparison (Hinterleitner et al. 2024). The data is structured such that changes in policy are coded on the appropriate level of target, instrument, setting and scope, and a single entry in the data may involve a combination of changes at each of these levels, including changes in different directions. For example, a standard for particulate emissions from vehicles may become more stringent (representing growth in setting stringency) while also being modified so as to apply to a more limited subset of vehicles, such as only heavy goods vehicles (representing a dismantling in terms of scope).

To analyse policy changes taking place over a given time period, we perform separate searches of the data for each direction and level of policy change, that is, four searches per jurisdiction for instances covering growth and dismantling in each of setting and scope. Instances of policy change of any given level (including setting and scope) are then graphically depicted on the same two-dimensional target-instrument space as would be done for snapshots of policy portfolios. However, the utility of distinguishing between scope and setting is not always clear and varies especially according to instrument. For example, when considering the stringency of a ban on a certain type of product, the scope (“what is covered”) is of greater interest; it is relatively meaningless to discuss the “setting” of a total ban. By contrast, in the case of a tax or subsidy, both scope (“what is covered”) and setting (the rate of tax or subsidy) are of equal interest. As such, the analyses in this research consider both scope and setting concurrently as changes in the wider concept of policy stringency, with distinctions being examined where necessary in the deeper case studies. Because of the structure of the data, in cases where a policy change comprises simultaneous expansion of scope and reduction of setting (or vice versa), it will be identified both in the searches for growth and dismantling, and thus there is no issue of miscategorisation of policy changes in this regard.

Jaccard Coefficient

While patterns of policy change are interesting in isolation, if we are to assess the degree of (non)alignment between jurisdictions it is necessary to quantify the similarity of these patterns of change. For this, we use the Jaccard coefficient, a method which is well established in the literature (Knill et al. 2023). The Jaccard coefficient is a measure of the proportion of the portfolio space which is the same across two portfolios, being the sum of target-instrument combinations which either appear or do not appear in both portfolios, divided by the total number of possible target-instrument combinations. Alternatively, it can be considered as the probability that, when selecting a single point in the policy space at random, we observe either the simultaneous presence or simultaneous absence of a policy in both jurisdictions. While it is usually applied to snapshots of portfolios at points in time to assess their overall similarity, it can also be applied to our depictions of policy change over time. Where each jurisdiction demonstrates similar patterns of change, regardless of the composition of the underlying portfolio of policy existence, Jaccard coefficients will be high.

One issue with using the Jaccard coefficient is that it does not distinguish between the significance of a policy change's existence and the significance of a policy change's absence. In other words, the simultaneous absence of a policy change across both jurisdictions in a given time period will have the same impact on the Jaccard coefficient as the simultaneous presence of a policy change. This means that the Jaccard coefficient is influenced by the size of the total policy space, including those areas in which no policy change has ever occurred. Since the size of the policy space is ultimately a result of choices made in the design of the data collection strategy, this can lead to the similarity of policy changes which actually occur being obfuscated by the size of the policy space in which neither jurisdiction carried out a change of policy. A Jaccard coefficient comparing policy changes in two jurisdictions, one of which has twice as much dismantling activity as another, could potentially be extremely high due to the large proportion of the policy space in which no dismantling activity occurs in either jurisdiction.

To address this problem, we can calculate an adjusted Jaccard coefficient which excludes those parts of the policy space in which neither jurisdiction is active. This has the effect of emphasising changes in the degree of alignment of policies actually made, rather than the similarity of absences of policy changes. Using the adjusted Jaccard coefficient, only the similarity of policies is considered for target-instrument combinations in which at least one jurisdiction implemented a policy change. This is especially relevant when analysing the similarity in policy dismantling activities between two jurisdictions: since policy dismantling is far rarer than policy growth, a

much larger proportion of the policy space is blank when viewing dismantled policies only, particularly when observing a relatively narrow time window such as the five-year periods studied here. By contrast, the effect of using the adjusted Jaccard coefficient is to prioritise and quantify the proportion of policy changes in one jurisdiction which are matched by the other.

It is important to note that while our analysis captures instances of change in policy scope and setting, as well as their direction in terms of either growth or dismantling, it does not capture the magnitude of each instance of change, nor the precise setting or scope arrived at for each policy. Thus, the policy activity of the UK and EU is considered similar if, for example, both jurisdictions tighten their standards concerning the permissible amount of a pollutant in the air within the same five-year period, but this does not necessarily mean that the standards were tightened up to reach the same degree of stringency as a result.

Such changes in stringency are highly pertinent to the evolving policy portfolios of the UK and EU. The erosion of environmental standards in the UK as a result of Brexit which some have feared (Burns 2020) needs not imply a complete dismantling of policy instruments; rather, processes of undercutting the relatively strict environmental standards of the EU by reducing the setting and scope of policy instruments may be tempting for UK policymakers. Much of the EU's raison d'etre centres on the provision of the "level playing field" to enable fair market competition, with the specific stringency of environmental standards and other regulations being deeply embedded in this function (Hallak 2021; Hudec 1996; Leonelli 2021). As such, the parity between the EU and UK of the stringency of policies in the environmental sector in terms of *outputs* bears an association with the policy *outcomes* in each jurisdiction in terms of effects on their economies and the quality of their environmental protections.

Luckily, the number of changes that occur in each of the UK and EU in our time periods of interest is small enough that it is practical to check each change individually and compare it to any supposedly matching changes in another jurisdiction. This allows us to identify whether jurisdictions are changing in parity with one another, or whether the stringency of their policies are imbalanced, as may occur in cases of disengagement or, for example, "gold plating" of EU regulations (Squintani et al. 2009). This deeper investigation is carried out in the case study analyses in the later sections of this paper.

5

Categorising Types of Policy Change

This chapter is focussed on the qualitative process of applying the real-world data on policy outputs to the theoretical typology of policy changes. Although this process fits within the frame of methodology, it brings to light interesting implications of the theoretical framework on which the research is based and therefore is itself part of the research's contribution to theories of Brexit and policy change. As a result of this, it is deserving of its own chapter to allow the space to consider these implications at length, and to provide the important background required to contextualise the analysis of empirical cases which follows in the subsequent chapter. Primarily, we will consider the extent to which each of the types of post-Brexit policy change laid out by Wolff and Piquet (2022) correspond to patterns observable in our data. Additionally, we consider the reverse – that is, what patterns in the data do not easily map onto theorised types of policy change?

Figure 2 below shows an imaginary sample of a change portfolio for a given time period. This type of visualisation will be used throughout the analysis section of this paper and is introduced here to provide clarity to the upcoming discussion of categorisation of policy changes. The Y axis shows policy instruments, and the X axis shows policy targets, with the presence of a coloured square indicating a change at any level (target, instrument, setting or scope) within the time period of interest. Changes are divided into policy growth, as shown on the left-hand side, and policy dismantling as shown on the right. Blue squares indicate changes taking place in only the EU, red squares indicate changes in only the UK, and purple squares indicate changes taking place in both. The visualisation therefore represents the results of the various data processing procedures described in the methods chapter for the UK and EU, overlaid on top of one another to provide information on the simultaneity of changes across both jurisdictions.

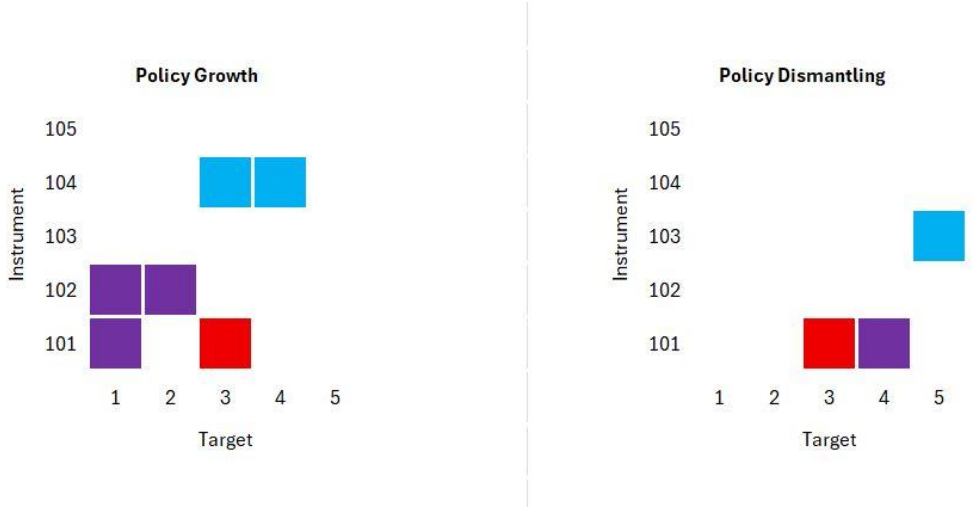

Figure 2: A visualisation of imaginary policy changes in the UK and EU over a constrained time period. This figure is provided to illustrate the method of data visualisation and does not represent real data.

Thinking back to Wolff and Piquet's typology of post-Brexit change (table 1 in chapter 1 of this research), we can see that it is defined by two variables, each corresponding to a row in the table. These two variables are the extent of dismantling of Europeanised policy, and the extent of Europeanisation. Together they determine the type of policy change (figure 3). While similar, these variables only approximately map onto aspects of the data as visualised in figure 2. Starting with the degree of dismantling, this is relatively clear to see in our data visualisation. Since we separate our visualisation in two to show growth and dismantling independently, we can easily look to identify cases of dismantling, and thus potentially de-Europeanisation, on the right-hand side of the visualisation. In terms of the Europeanisation variable, a little more clarity is needed. As discussed, Europeanisation is a broad concept which may refer to processes, politics and formal institutional arrangements as well as conceptions of collective identity, however in the context of policy outputs in isolation, it is best imagined as the similarity of policies. This variable is represented in the visualised data by the colour of the squares in our visualisation, with purple squares representing policies moving in unison in both the UK and EU. When looking for the type of change described by Wolff and Piquet which exhibits the highest degree of Europeanisation, this being continued engagement, we can look for purple squares in our visualisation.

Immediately, we can see why this equivalence is not entirely straightforward. What about the purple squares which exist on the dismantling side of the visualisation? Since these constitute the dismantling of a Europeanised policy (and it must indeed be a Europeanised one, since in

order to appear here it must already have been in existence in the EU and UK) are these not instances of change which are both high in terms of the level of dismantling of Europeanised policy and high in terms of engagement? As we can see, the application of Wolff and Piquet's typology to policy outputs gives rise to the need for new, more nuanced categorisations of change. We will now address each of the theorised types of change in turn in order to explain the particular difficulties with categorising the changes we observe empirically into the theorised types, and how the empirical data might provide direction towards a more nuanced typology.

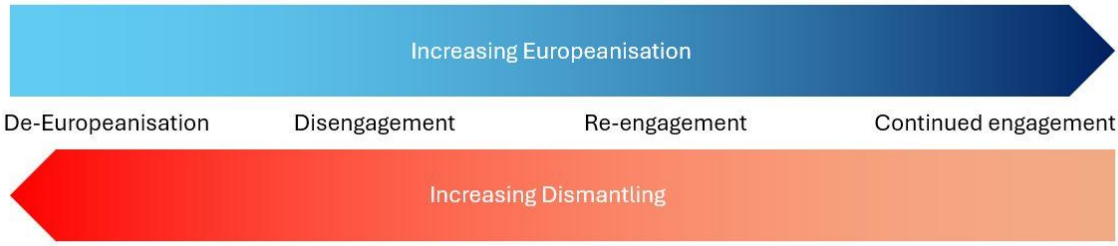

Figure 3: The two variables determining the categorisation of policy changes according to Wolff and Piquet's (2022) typology.

Disengagement

The "disengagement" type is perhaps the type of change from Wolff and Piquet's typology to which the empirical instances of change can be most easily attributed. This is the form of change whereby changes in the policy output of the EU are not matched by equivalent changes occurring in the UK, causing the UK to be "left behind". In other words, there is disparity between changes in the UK and EU, with the EU holding the higher regulatory standard. Translated onto our output-focussed data, it can therefore be identified as locations on the change portfolios which are shown in blue, since no equivalent policy change in terms of the same targets and instruments occurs in the UK. In accordance with the findings of Gravey and Jordan (2023), we expect disengagement to be the most commonly observed type in the post-Brexit period. As is the case across the literature, Gravey and Jordan identify only cases of policy growth in the EU which are unmatched in the UK, with these corresponding to the blue squares on the left-hand side of our visualisation. However, we must consider that it is possible that the EU dismantles policy while the UK does not, which we would see appearing on the right-hand (dismantling) side. Given trends

in policy growth over time, this is a policy output which we would imagine to be far rarer, but thanks to our methodological approach we may capture such instances of change.

Disengagement can also arise when the UK fails to keep up with the EU's level of policy stringency. Therefore, even in cases where we observe simultaneous change in both jurisdictions, it is possible that the policy change in the UK does not go far enough so as to match the stringency of the policy reached by the change carried out in the EU, and that there is therefore no complete parity between them. While this information is not contained within the visualisations of the change portfolios which we show here, it can be easily retrieved by looking at the raw data. To avoid overlooking instances of disengagement, which we might otherwise misclassify as instances of reengagement or continued engagement, we must therefore also check to see to what extent policy changes occurring in both jurisdictions and covering the same target-instrument combination bring each jurisdiction's policy to the same final setting and scope. Thankfully due to the relatively small number of instances of change which we assess, this process is practical to carry out.

An additional important factor to consider is that disengagement can take a longer time to become visible than de-Europeanisation (Wolff & Piquet 2022). Time must pass to allow growth in the EU to take place in such a way that it reveals cases of disengagement in the UK. By contrast, de-Europeanisation might emerge more immediately as the UK dismantles policies at the first available opportunity. A limitation caused by taking outputs as our starting point of analysis is that policymaking and political processes which can be characterised as disengaging from the EU will only reveal disengaged policy outputs when unmatched growth in the EU occurs, meaning that there may be target-instrument combinations in our wider portfolio snapshot which represent cases of disengagement at the political-institutional level, but which we overlook due to a lack of EU-level change in the corresponding area. Since our focus is on outputs, such political-institutional disengagement does not fall within the scope of the Brexit effects which we aim to capture, however, considering this possibility brings to light the importance of the timing of our investigation. Though several years have passed since the formal exit of the UK from the EU, when aiming to measure the volume of disengagement in particular, the results of this method will only become increasingly accurate as time is allowed to pass and the EU's legislative process is allowed to proceed sufficiently to cause policy differences to arise in those areas in which disengagement of institutions and processes may lead to disengagement in terms of policy outputs.

De-Europeanisation (and what it means for policies to be Europeanised)

Before we are able to proceed with the practicalities of classifying instances of change identified in the data into the next of Wolff and Piquet's policy change types, this being instances of de-Europeanisation, we must address the question of what it means for a policy to be Europeanised in the first place. Translating the qualitative characterisations of Europeanised policy into our quantitative output-focussed analysis requires us to be concrete and consistent in terms of our definition. However, the degree to which UK policy must resemble that of the EU in order to be counted as Europeanised could vary depending on the theoretical lens we choose to use. Broadly, this variance corresponds to whether our definition requires alignment at each level of target, instrument, setting and scope. For example, in the strictest definition, we might consider only policies which address the same target and instrument at precisely the same level of stringency, or in a more relaxed definition, any policies in the UK which address the same targets and instruments as EU policies could be considered Europeanised.

It might seem tempting given Radaelli's (2004) widely-used definition of Europeanisation as constituting "formal and informal rules, procedures, policy paradigms, styles, 'ways of doing things' and shared beliefs and norms", to cast our net wide in order to identify Europeanised policies. However, it would be a mistake to characterise this definition as broad because of its fuzzily defined quality. What the definition actually requires is evidence of ideational similarity between the two jurisdictions of interest, which is something that exists further up the policymaking process from our output-only focussed data. Notoriously, this ideational similarity, which is a key determinant of the existence of shared policy paradigms, is difficult to measure empirically (Daignault 2013). Consequently, given our output-focussed approach, we should err on the side of stringency in our definition of Europeanised policies. As such, the simultaneous existence of policies in both the EU and UK should not be taken at face value as existence of Europeanised policy in the UK.

What we can be certain of is that policy derived directly from the EU may be categorised as Europeanised, and fortunately, the CRISPOL data indicates the EU origin of UK policies as either regulations or transposed directives. This is of course not the case in the post-Brexit period, and as a result we must individually verify that there is a high degree of similarity in setting and scope for target-instrument combinations which are common to the UK and EU in order to classify these as Europeanised policies.

Taking our stricter definition of Europeanised policy, instances of de-Europeanisation are relatively easily identified from the empirical data, though like the instances of disengagement

they require some additional investigation into the details of the underlying data. Red boxes on the dismantling side of the visualisation represent instances of policy being dismantled in the UK but not simultaneously in the EU, constituting disparity and thus drawing attention to suspected instances of de-Europeanisation. Where these correspond to the dismantling of a policy previously created through EU directive or regulation, we can safely classify them as instances of de-Europeanisation.

Reengagement, Continued Engagement

Finally, we turn to reengagement and continued engagement, which are situated at the "more Europeanisation" end of Wolff and Piquet's spectrum of change. We consider these two forms of change together here because, from the data alone, they are difficult to distinguish from one another and instead require more careful case studies in order to categorise. According to Wolff and Piquet, reengagement takes place in the wake of some degree of de-Europeanisation, which is followed by a reversal whereby the UK aims to establish a renewed relationship with the EU in this policy area. Continued engagement, on the other hand, represents instances of policy change occurring in unison in the UK and EU without any intervening de-Europeanisation having taken place since Brexit.

Reengagement is the more complex of these forms of policy change, and makes a greater deal of intuitive sense when considered from the perspective of policy processes and institutional memberships. Stepping away from environmental policy, consider for example the case of the Horizon Europe research programme. The programme provides scientific funding for a range of research projects relating to sustainable technological development, and as an EU member, the UK was a central member of Horizon Europe as well. The UK left the programme when the Brexit transition period ended at the end of 2020, and negotiations to return stalled when the UK threatened in 2021 to unilaterally rewrite elements of the Withdrawal Agreement concerning customs checks on the Northern Ireland-Ireland border (McKee 2023). However, in 2023, an agreement was finally reached to allow the UK to return. To draw again on Börzel and Risse's threefold classification, we can see that a clear case of de-Europeanisation at the polity level was followed by a reengagement with the EU to ensure the UK's return to the programme, resulting in renewed parity of policies and thus an instance of policy reengagement.

There is some conceptual difficultly when applying this case to our policy output level. Throughout the changes that occurred with regard to the Horizon Europe programme, no

legislation was passed in the UK to provide for the exit from the programme or for its subsequent return, and as such, were a similar methodology as used in this research to be applied to the sector of science policy, the changes would not appear in the collected data as a policy output. Like in the case of classifying de-Europeanisation, in the interests of keeping the output-based focus of the research consistent, we would also therefore find in this instance that our data reflects no policy reengagement. If we are to see reengagement reflected in policy outputs, we would need to search for points in the visualised data whereby both dismantling and growth occurred in the UK for a target-instrument combination, and where this target-instrument combination was also one which in the UK had been previously Europeanised according to our requirements laid out earlier. This is a complex set of requirements which are not easily recognised at first glance, and it is likely that cases of reengagement at the political-institutional level will not be picked up when looking at policy outputs in isolation as we do here. Those which are picked up are likely to be only the most extreme cases of reengagement, whereby the initial de-Europeanisation and the subsequent reengagement were both significant enough from a policy output perspective to be captured within legislative acts. This further draws attention to the potential disconnect between de-Europeanisation processes and de-Europeanisation outcomes, as was suggested may be the case by Gravey and Jordan (2023) and increases the importance of paying thorough attention to instances of engagement when carrying out the case study stage of analysis later in this research.

Continued engagement, by contrast, is easier to identify. Here, we need to observe the simultaneous occurrence of policy change in the EU and UK, with the added requirement that this particular target-instrument combination in question also display a pattern of engagement during the UK's membership of the EU which is sufficient to constitute Europeanisation so as to justify the "continued" element of the definition. This does require that there has been enough time for some legislative activity to take place regarding a particular target-instrument combination in order for the potential for continued engagement to become visible, and additionally for both jurisdictions to implement the change in the form of passing respective legislative acts which display parity with one another. The primary concern raised here is that this is a process whereby the creation of policy at the EU level may not necessarily happen simultaneously with the corresponding transposition of that policy in the UK. Indeed, this is often the case with EU directives, whereby significant time differences may exist between the passing of the directive and the transposition of the directive into a member state's own legislation. This is an inherent difficulty with studying the effects of Brexit on policy output so soon after the end of the transition period, however it should not be seen to invalidate our method: finding no

examples of continued engagement, even if this is due to the limited time which has passed since Brexit, is itself an interesting finding which would provide us with novel information about the rates of policy change post-Brexit and the relative proportion of instances which can be classified as continued engagement with respect to other types of policy changes.

New Types of Change

So far, we have covered each of the theorised types of change as described by Wolff and Piquet (2022), and how these might be reflected in the visualisations of CRISPOL data. However, the data visualisations also provide clues to forms of change which do not fit well into any of the types described by Wollf and Piquet. Two forms of change in particular are apparent, which will be referred to here as "differentiated growth" and "simultaneous dismantling". It will be argued that simultaneous dismantling, while not explicitly referred to in Wolff and Piquet's typology, constitutes an overlooked form of engagement. Differentiated growth, however, is an entirely separate possibility which reflects a change in the types of environmental policies pursued by the UK as compared to those of the EU.

Differentiated growth refers to the possibility that the UK may choose to adopt new policies which are notably different to those of the EU, but nonetheless do not represent cases of dismantling and deregulation, but rather rule growth. In this sense, they are policy outputs which represent a disparity with EU policy, but cannot be classified as disengagement in the sense of the UK "doing nothing". This possibility is notably absent from the literature on post-Brexit policy change, which instead assumes that differentiation from the policy portfolio of the EU will occur as either dismantling of European policies (de-Europeanisation) or disengagement from EU policy growth whereby the UK's policy portfolio remains in a state of stagnation. That these are the patterns of change we might predict is quite understandable given for one that the Brexit is most obviously viewed as a rejection of EU policy, implying the desire for dismantling of established policy, and two, that the rhetoric of the various governments which held office in both the lead up to and the aftermath of Brexit was strongly characterised by support for deregulation more generally. Prominent members of the Conservative party, including prime ministers Johnson and Truss, voiced their support for a paradigm shift in British policymaking towards a lower regulation and low tax regime (Burns 2020). Environmental policy, particularly originating from the EU, was central to this rhetoric, with Truss arguing for example that "Brussels red tape" in the form of environmental measures such as nutrient neutrality requirements was proving to be excessively burdensome to housebuilders (Riley-Smith 2022).

However, we should not allow this concentration on dismantling to overshadow alternative possible patterns of post-Brexit policy change. This deregulatory rhetoric was largely confined to hard-Brexit-supporting members of the Conservative party and softened noticeably with the arrival of the Sunak government before undergoing a dramatic shift with the election of Starmer's labour party in 2024 (Sowels 2024). As such it is conceivable that, aside from the patterns of change already described, the UK may engage in its own form of policy growth in the environmental sector which nonetheless is different in focus to EU policy. In our visualisations, this would be relatively easy to identify as red squares on the policy growth side of the diagram. These would indicate either new target-instrument combinations which were not addressed by the EU, or otherwise could indicate a strengthening in the stringency of policies beyond that level which had existed in the pre-Brexit period, and in the case that these represent previously Europeanised areas, could represent the UK going above and beyond the regulatory standards of the EU.

Finally, we come to the simultaneous dismantling of policy. While not mentioned by Wolff and Piquet, this pattern would likely constitute engagement with the EU so as to coordinate the simultaneous dismantling. Such behaviour could also be an indicator of mirroring of EU policy regimes, for example the REACH regime which regulates chemical usage across the EU and which has been replicated in the UK in the form of UK REACH. Such regimes must be periodically updated by legal acts in order to address new regulatory challenges, with these amendments appearing in our dataset. Due to the relatively high volume of such amendments and the comparative rarity of other forms of policy dismantling, these are likely to form a large proportion of simultaneous policy dismantling activities.

Summary and Expectations

In summary, we can see that most of the observable dynamics revealed by our processing of the CRISPOL data can be mapped onto the types of change theorised by Wolff and Piquet (2022), though this often requires deeper investigation into the specificities of the policies, especially their relative stringencies and historical levels of Europeanisation, in order to be sufficiently rigorous. By classifying each of the policy changes observed in our representative sample of policy change covering the pre- and post-Brexit period, this research will be able to quantify the relative proportions of each type of policy change in the environmental sector and in so doing provide insight into the proportions which we might expect to observe in other sectors.

Additionally, however, there are also some exceptions to this rule which are revealed when we consider the full range of combinations of potential policy growth and dismantling activities in each of the UK and EU. Primary among these is the possibility of what we choose to call "differentiated growth" in the UK, whereby new policies are introduced which do not match with those of the EU. In a sense, this is the inverse of disengagement, whereby policies made in the EU are not adopted in the UK. In reality of course, EU member states have always made environmental policy of their own initiative, despite the high degree of Europeanisation of environmental policy across the EU. What our method will be able to determine is the potential extent of the effect of Brexit on this dynamic. By comparing the amount of differentiated growth in the pre-Brexit period to that in the post-Brexit period, we can quantify the degree to which Brexit may have led to an increased (or decreased) tendency for the UK to engage in its own patterns of policy growth. The implications of such a finding would be significant, as it would demonstrate that the UK and EU were on notably different paths in terms of their policymaking behaviour, but nonetheless both engaging in growth. This departs from the traditionally imagined binary options of alignment with EU policy on the one hand, or on the other, divergence in the form of either deregulation or stagnation on the part of the UK.

	UK Dismantling	***UK No Change***	***UK Growth***
EU Dismantling	Engagement (simultaneous dismantling)	Disengagement	Differentiated Growth
EU No Change	De-Europeanisation	Status quo	Differentiated Growth
EU Growth	De-Europeanisation	Disengagement	Engagement

Table 3: Likely types of change given dismantling and growth across specific target-instrument combinations in each jurisdiction. New forms of policy change which do not easily fit into Wolff and Piquet's (2022) typology are underlined.

Table 3 shows the possible combinations of patterns of growth and dismantling across each jurisdiction and the corresponding types of change implied, both drawing on those theorised by Wolff and Piquet and those which are logically necessary as a consequence of our output focussed data which distinguishes between growth and dismantling directions of policy change. In the next chapter, we will look at the results of our processing of the CRISPOL data and undertake the process of categorisation and quantification of each of the different types of change observed.

In accordance with the findings of Gravey and Jordan (2023), we expect that disengagement in the UK will be the most commonly identified type of policy change following our investigation of each instance of policy change. Secondly, changes to formal institutional conditions in the UK and its exclusion from EU policymaking processes mean that ongoing policymaking activity in the UK is likely to result in outputs which are different in terms of targets, instruments and stringency from those of the UK, leading to instances of differentiated growth. While we expect to identify examples of such instances, limitations on UK government capacity to adopt the full range of environmental policymaking functions formerly performed by the EU may mean that these instances are likely to be relatively fewer in number. The next chapter will discuss the initial results of the data processing before deeper case studies and categorisation of each type of changed are carried out in the subsequent chapter.

6

Results: The Big Picture

We turn now to the results of the data processing, beginning with the environmental policy portfolio snapshots of the UK and EU taken at the moment of the UK's departure from the EU in December 2020, and near to the time of writing in April 2025. We turn first to portfolio snapshots which show the existence of policies in each target-instrument combination, followed by the findings on policy changes taking place in each of our time periods. These are then compared by means of Jaccard coefficients.

Policy Snapshots

Figures 4 and 5 are the policy snapshots which show the *existence* of policies in each target-instrument combination, having taken into account all policy changes identified in the dataset since its beginning in 1974. The most significant policy changes, involving for example the dismantling of target-instrument combinations, are visible here. The first pre-Brexit snapshot additionally provides a baseline from which to measure the volume of policy changes occurring after Brexit. The first thing to note about the two graphics is the striking similarity of the portfolios at each point in time, betraying the extremely high degree to which the UK's environmental portfolio was, and remains, shaped by EU legislation. The Jaccard coefficient of the two portfolios is 0.94, or 0.84 when using the adjusted Jaccard coefficient. Of the UK's total policy portfolio, approximately 85% of target-instrument combinations regulated were covered by EU policies at the point of Brexit. Half of the remaining 15% comprises policies using instrument 113, which refers to the issuing of permits for discharging pollutants to watercourses, with the remaining policies which are unique to the UK concerning a mixture of other forms of water and waste management, as well as protections for native wildlife. Secondly, as can be seen in figure 5, this high level of Europeanisation survived the Brexit process entirely intact, with no target-instrument combinations experiencing complete dismantling of policy since the end of 2020, and the Jaccard coefficients for the two jurisdictions remaining substantially unchanged. As can be seen, both snapshots are almost entirely identical with only two exceptions representing policy growth, circled in figure 5 in yellow. One of these new target-instrument combinations occurred only in the EU, while the other occurred in both the UK and EU concurrently. This means that since Brexit, only three instances of new target-instrument combinations being established have occurred, two in the EU and one in the UK.

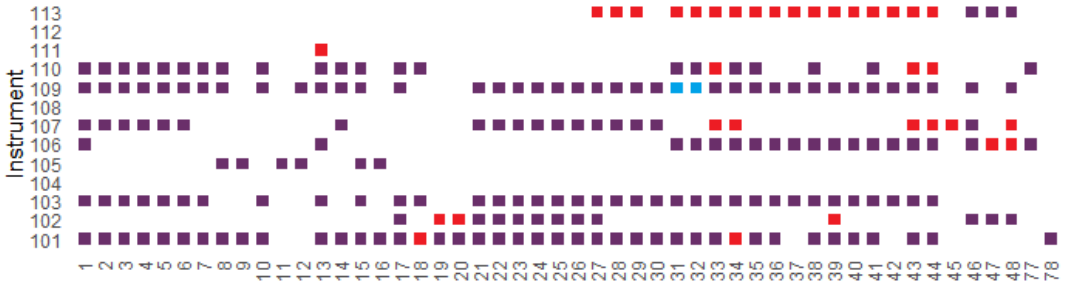

Figure 4: Environmental policy portfolios of the UK and EU as of December 2020. Jaccard similarity: 0.94, adjusted: 0.84.

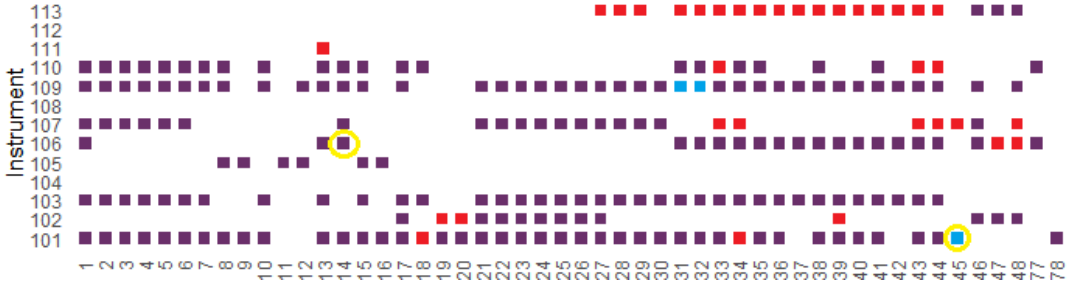

Figure 5: Environmental policy portfolios of the UK and EU as of April 2025. Jaccard similarity: 0.94, adjusted: 0.84.

The first of these changes is the simultaneous appearance of target 14, instrument 106 in both jurisdictions. The target here is emissions of carbon dioxide from passenger vehicles, which is being addressed by a "polluter pays" liability scheme, thus referring to the introduction of the new emissions trading schemes for passenger vehicles. While vehicular carbon emissions have been a heavily addressed policy target in both jurisdictions, this is the first time that an emissions trading scheme has existed targeting vehicle emissions for either the UK or EU. The near simultaneous introduction of both schemes suggests a degree of continued engagement between the jurisdictions, although it would be too soon to make this categorisation before examining the stringencies of the schemes in greater depth, as will be done in the next section.

Secondly, the appearance of target 45, instrument 101 in the dataset represents the first time the EU has applied an obligatory standard to the protection of native forests. This is not only the first appearance of this target-instrument combination for the EU, but the first time it has regulated this target at all by any instrument. Specifically, this policy represents Regulation (EU) 2024/1991,

which requires member states to act in order to increase various indices concerning the health of forest ecosystems. By contrast, the UK had addressed this policy target before, albeit with a different instrument, via the Wildlife and Countryside (Amendment) Act 1985, which amended the Forestry Act of 1967 to designate certain areas of forestry as native woodlands requiring additional protection. This geographical definition, as opposed to the EU's stipulation of standards for specific measurement indices, is the reason the UK legislation falls here under instrument 107 (planning instrument) rather than the EU's 101 (obligatory standard). Since Brexit, the UK has legislated further in this area to designate targets for increasing forestry cover across the country, though since this represents further activity in a target-instrument combination which was already covered, it is not visible in this graphic.

These results show that there has been very little change in either jurisdiction since Brexit in terms of *what* is regulated and *how*. The rest of the policy changes occurring since Brexit are confined to changes in stringency of policies covering existing target-instrument combinations, broadly referring to changes in the *degree* of regulation. We now investigate in greater detail these changes in stringency via the analyses of policy changes presented below.

Change Portfolios

In order to assess to make an assessment of the impact of Brexit on policy dynamics, we turn now not to measurements of policy existence, but of policy change over time. Departing from the graphics concerning policy portfolios shown above, the next set of graphics illustrate the targets and instruments to which policy changes occurring within the 2015-2020 and 2021-present time periods correspond, and must not be read as visualisations of the complete policy portfolios of each jurisdiction in those time periods. The graphics cover separately instances of growth and dismantling in the pre-Brexit and post-Brexit periods, and demonstrate that a clear change in patterns of policy outputs has taken place since Brexit. As will be shown, before Brexit, changes in the UK and EU were highly aligned. Unsurprisingly, policy changes in the EU were matched without exception by the UK, and a little more surprisingly, the UK made almost no policy changes of its own initiative, either in terms of policy growth or dismantling. In the post-Brexit period, the picture is starkly different: in only a select few areas do policy outputs in the EU and UK coincide with one another in terms of targets and instruments. Additionally, each jurisdiction engages in substantial policymaking activity of its own, resulting in a significant degree of difference in terms of the targets and instruments associated with their respective policy outputs.

Pre-Brexit: Close Engagement

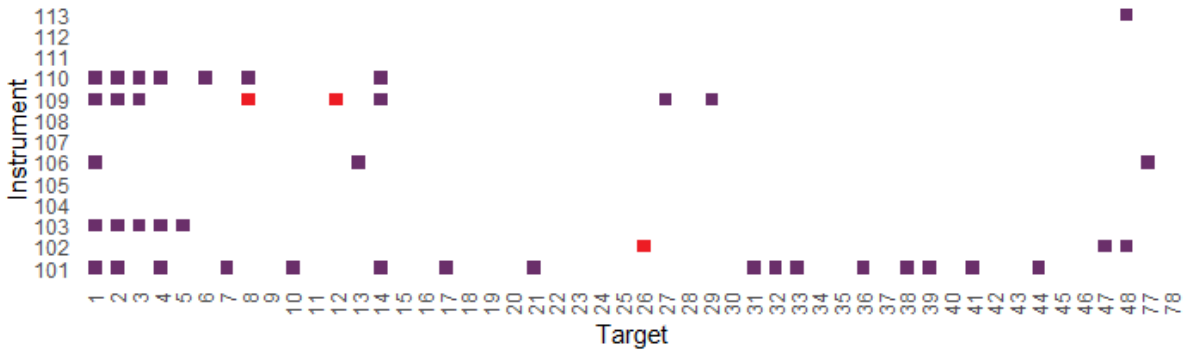

Figure 6: Pre-Brexit policy growth. Jaccard similarity: 0.99, adjusted: 0.93. With qualitative revisions: 0.98.

Figure 6 illustrates all instances of policy growth in the UK and EU in the period running from 2015 until 2020. The vast majority of changes in this period occurred both in the EU and UK, as indicated by the purple squares. Each point represents an instance of either EU regulation, which then directly applies within the UK, or directives and their corresponding transpositions into UK law. Due to the hard cutoff dates at either end of the time period in question, it is possible that some changes in the UK correspond to transpositions of EU directives which were made before 2015. This is the case for example for targets 8 and 12, instrument 109, referring to a UK statutory instrument mandating roadside inspection of vehicles to ensure their compliance with emissions standards (the Goods Vehicles Regulations 2017), which was made as a transposition of Directive 2014/47/EU. Taking these effects into account, the overall pattern is, as would be expected, one of extreme similarity in terms of policy changes introduced across the EU and UK. Of the 43 locations in the policy space where change occurred during the period, 40 of these locations saw changes in both the EU and UK, representing a Jaccard coefficient between the sets of changes in each jurisdiction of 0.99, or 0.93 when using the adjusted Jaccard coefficient. Of the remaining three instances, two of these constituted the transposition of an EU directive which fell outside of the time period sampled. Including these in the count of instances of change which represent engagement in terms of policy outputs brings the adjusted Jaccard coefficient to 0.98 for pre-Brexit policy growth, indicating an extremely high level of similarity.

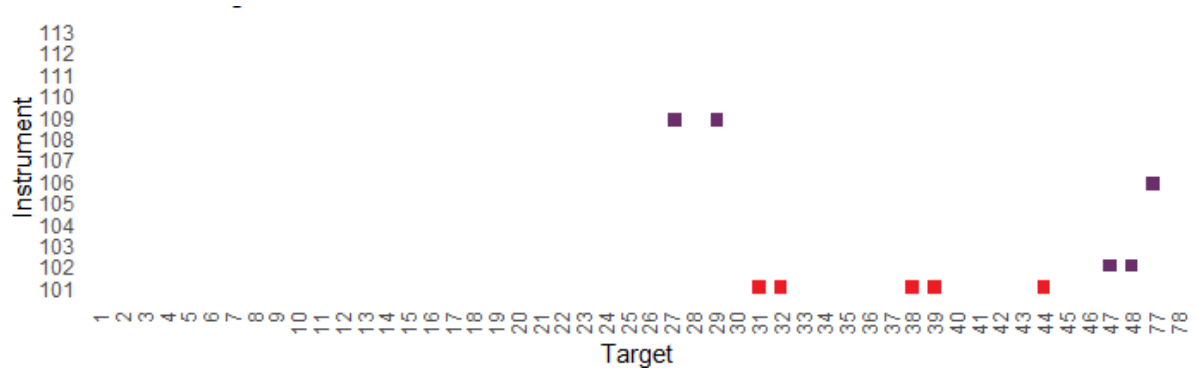

Figure 7: Pre-Brexit policy dismantling. Jaccard similarity: 0.99, adjusted: 0.50. With qualitative revisions: 1.00.

In the case of pre-Brexit policy dismantling, the story is much the same (figure 7). The data appears at first to show a higher degree of difference between patterns of policy change in the UK and EU, with the UK engaging in several instances of unmatched policy dismantling. On closer inspection, however, we can see that these instances in red are in fact all implementations of EU law, specifically, decisions concerning emission standards for wastewater. These standards are based on assessments of best available technologies (BAT) and correspond to the emission standards reasonably achievable when such technologies are employed for wastewater treatment. In UK law, the relevant standard before the BAT decision was implemented was previously more stringent, and as such it is shown in the UK as a case of dismantling. In EU law, the standard was previously lower, and consequently the change that resulted from this decision is coded as growth and consequently does not appear in this graphic. Consequently, all the red points on the bottom row of this chart represent instances of increasing parity between UK and EU law and reflect the UK's position as a relative environmental overachiever in the years around the end of its period of EU membership. Adjusting for this, the Jaccard coefficient is therefore 1.00, indicating complete parity between UK and EU changes.

There is little doubt that changes in the EU and UK were highly aligned in terms of not just the direction of the change in setting and scope, but also the actual setting and scope arrived at as a result of these changes. Of the 35 pieces of legislation which were made in the UK in the period from 2015 to the end of the Brexit transition period, all but two were implementations of EU law. Of the two remaining cases, only one, the Merchant Shipping (Prevention of Oil Pollution) Regulations 2019, originated purely on the UK's own initiative, and represents the only case of policy change in this sample, either of growth or dismantling, which is truly unmatched by the EU. The other, the Floods and Water (Amendment etc.) (EU Exit) Regulations 2019, which covers

target 29, instrument 109 where other EU and UK regulatory activity in the same location means that this point is shown in purple as the location of simultaneous policy outputs across the two jurisdictions, was a statutory instrument intended to make technical changes to UK law to ensure the continued operation of the EU's Water Framework Directive after the end of the transition period. It was therefore in effect a means of preventing against the accidental undermining of the functioning of EU law. The overall picture here is one of extremely close alignment with EU policy, whereby almost the entirety of policy formulation in the UK within the policy space covered by our sample was carried out by the EU.

After Brexit: Dramatic Changes

The pattern of post-Brexit policy change is strikingly different to that of the pre-Brexit period, as can be seen in figure 8. Where in the pre-Brexit period there was near complete overlap in terms of the instruments used and targets addressed by UK and EU policy, primarily owing to the fact that the vast majority of UK environmental policy was either transposed from EU directives or directly took effect in the UK through EU regulations or decisions addressed to the UK, in the post-Brexit period this overlap breaks down significantly. Outside of the jurisdiction of EU regulations and decisions and no longer required to transpose directives, changes made to EU policy are now left unmatched in the UK in a clear pattern of policy disengagement, confirming the trend observed by Gravey and Jordan's qualitative study (Gravey & Jordan 2023) and aligning with our first expectation. However, approximately equal in number to the instances of unmatched EU policy changes are new UK policy changes which do not also occur in the EU. This would seem to confirm the existence of differentiated growth in accordance with our second expectation, and even suggest that this pattern of change is more pronounced than had been predicted.

Concurrent with this pattern of unmatched UK legislation are the instances of policy dismantling which are unique to the UK. Since the locations of these changes in the policy space correspond to locations where Europeanised policy had previously existed (figure 5), we expect that these instances of change represent de-Europeanisation of British environmental policy.

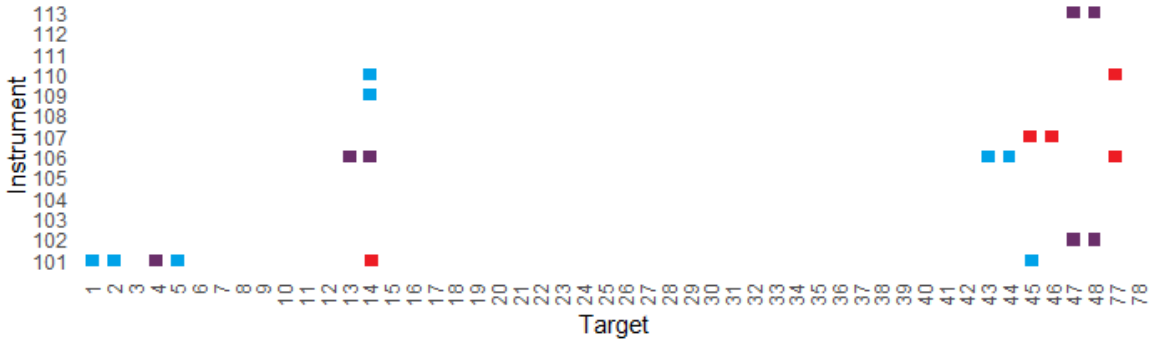

Figure 8: Post-Brexit policy growth. Jaccard similarity: 0.98, adjusted: 0.35.

Examining policy growth in more detail, we observe the distribution of these changes across the policy space. Turning first to locations in which we observe simultaneous growth in the UK and EU, we observe that targets 13 and 14 are each addressed by instrument 106, referring to emissions trading schemes for combustion plants and vehicles respectively. The simultaneous growth of policy regarding vehicular emissions trading was already identifiable in the examination of the policy portfolios, where this item appeared due to its status as an entirely new target-instrument combination since Brexit. However, as this closer examination of policy changes shows, policymaking activity is not limited to these new schemes, but rather also extends to the existing scheme regarding emissions from energy generation plants and industrial installations. Aside from this instance of simultaneous growth, vehicle emissions have been the target of further policy changes in the UK and EU in the post-Brexit period, albeit with the two jurisdictions now exhibiting divergent patterns of policymaking through their use of different instruments, representing both divergence and differentiated growth in this area. This increased differentiation is reflected in the significantly lower Jaccard coefficient for these set of changes: the unadjusted coefficient is 0.98, but adjusted to remove the effects of the parts of the policy space in which no activity occurs, the result is 0.35. This is dramatically lower than the pre-Brexit adjusted coefficient of 0.93, even without considering the revisions to the coefficient which were made due to qualitative analysis of the policy changes in that period.

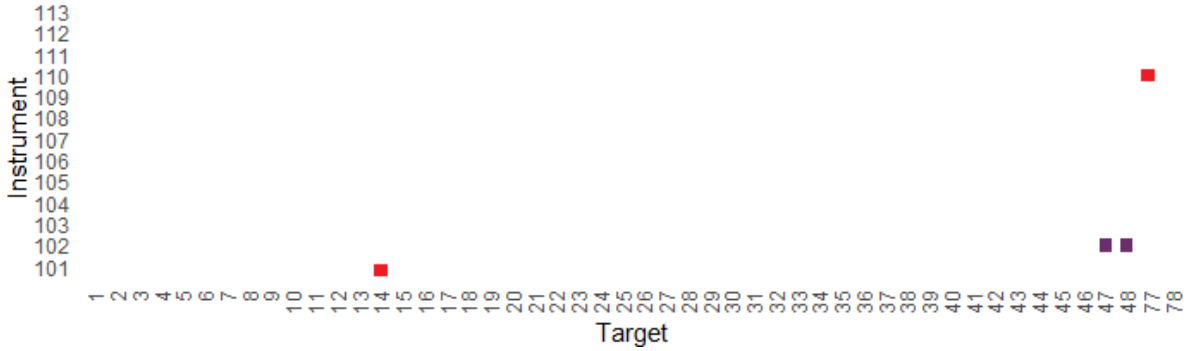

Figure 9: Post-Brexit dismantling. Jaccard similarity: 0.99, adjusted: 0.50.

Finally, we turn to the last set of policy changes, being post-Brexit policy dismantling (figure 9). Unlike policy growth, there is little change here from the pre-Brexit to post-Brexit periods. Some simultaneous dismantling occurs in the bottom right of the graphic, representing a number of species being exempted from a prohibition on import and export of endangered species and derived products. Notably, this same pair of target-instrument combinations can be seen in the set of changes relating to post-Brexit policy growth, suggesting an ongoing process of policy engagement in this area. These specific changes will be discussed in the next section to assess whether they indeed correspond to policy engagement.

Unlike the changes in the pre-Brexit dismantling set, the instances of UK-only dismantling in this post-Brexit period are on further inspection revealed to be true cases of unmatched dismantling which do not originate from any EU-initiated legislation. Nevertheless, these changes are minor in terms of impact. The dismantling concerning target 14 and instrument 101 refers to an extremely limited reduction in scope which temporally restricts the application of certain emissions standards to cars made up until the year 2024, after which new, likely more stringent, standards will be introduced. The second instance also relates to a change of scope, this time concerning aircraft operators required to monitor fuel usage, previously applying to all operators but after the adjustment applying to operators which emit a certain total quantity of carbon and use aircraft above a certain weight threshold. Taking these into account, the Jaccard coefficient in terms of post-Brexit dismantling activity in the UK and EU is measured at 0.99, or 0.50 when adjusted to exclude inactive areas. Compared to the pre-Brexit coefficient of 1.00 after accounting for revisions, this represents a substantial increase in difference between the patterns of policy change across the two jurisdictions.

That these are the only instances of policy dismantling registered suggests that, despite the concern that the erosion of environmental legal principles and political pressure for deregulation might result in widespread dismantling of environmental regulation, when considering the policy outputs actually produced, this outcome has largely not come to pass. In proportion to pre-Brexit dismantling, there has been a reduced volume of changes, with four target-instrument combinations having been impacted as opposed to the pre-Brexit period's 10. Nonetheless, despite the reduction in dismantling activity, there is evidence of de-Europeanisation in the form of the reduction in stringency of policies originating from the EU.

	Pre-Brexit		Post-Brexit	
Direction of change	Growth	Dismantling	Growth	Dismantling
Jaccard coefficient	0.99	0.99	0.98	0.99
Jaccard coefficient (adjusted)	0.93	0.50	0.35	0.50
Jaccard coefficient (adjusted with revisions)	0.98	1.00	0.35 (no revisions)	0.50 (no revisions)

Table 4: Jaccard coefficients of policy changes between the UK and EU.

Taken together, the processed data demonstrates a clear and significant change in the pattern of post-Brexit policy outputs. While the overall policy portfolios in terms of targets and instruments covered have undergone only minor changes in each jurisdiction, a closer analysis of the locations in each jurisdiction's policy space which are experiencing policy change reveals a strong shift in the outputs of the policymaking process. First, the volume of policy activity decreased. Normalised over time, approximately 12 policy changes per year occurred in the UK in the pre-Brexit period, falling to 5 post-Brexit. In the EU, the equivalent figures were 14 and 5 respectively, reflecting a general trend of decreased regulatory activity in the environmental sector. Considering the similarity of this activity, compared to the pre-Brexit period in which UK and EU policy changed almost entirely in step, the paths which each jurisdiction follows are now notably more different, as can be seen by the decrease in Jaccard coefficients for each set of

changes, outlined in table 4. Patterns of growth and dismantling in the years following Brexit show a range of new types of policy change. Non-existent before Brexit, the UK is now being left behind through a pattern of growth in EU policies which it does not itself replicate, representing the results of disengagement on the level of policy outputs. This both corresponds to the theoretical typology of policy change proposed by Wolff and Piquet (2022) and confirms the main finding of Gravey and Jordan (2023) that Brexit is leading to disengagement in both environmental policy processes and outputs. We additionally find indications that other types of change proposed by Wolff and Piquet may be unfolding: the continuity of simultaneous policy changes in the areas of emissions trading schemes, which are experiencing growth across both jurisdictions, and changes to restrictions on the trade in endangered species, experiencing both simultaneous growth and dismantling, suggest that these may constitute instances of continued engagement. Additionally, though small in scope, some de-Europeanisation appears to have taken place in the UK whereby EU policies have been dismantled. Finally, the results provide evidence of patterns of change in policy outputs which do not correspond to Wolff and Piquet's typology. A significant proportion of the UK's post-Brexit policy growth now occurs in locations in its policy space which see no activity from the EU, indicating the divergence of pathways which we call differentiated growth. Some instances also exist which indicate the simultaneous dismantling of policy in the UK and EU, showing that policy engagement in terms of outputs is not limited to instances of policy growth alone and indeed can occur in both directions.

However, even in this wide-perspective overview, these data can be misleading. As was the case for pre-Brexit growth and dismantling, some instances of policy change which at first appear to conform to one of our theorised categories reveal themselves to in fact belong to another on closer inspection of the details, context and history of the policy in question. With this in mind, the current chapter is best viewed as an indication of the existence of different types of change. Before making a judgement as to the relative proportions of each type, deeper case studies are required. This is the process which will be carried out in the next chapter.

7

Results: Diving into Detail

In this chapter, each of the instances of change identified in the data will be examined in turn and classified as conforming to either one of Wolff and Piquet's types, or otherwise one of the new types of change which have been proposed earlier in the paper. The chapter is divided into two sections: the first consists of three cases studies of policy areas which are more difficult to classify and require a deeper investigation of the context of each change, for example due to the existence of multiple directions of change within policy's stringency, and which speak to the relationship between policy process and policy outputs. These studies cover the areas of air quality, the trade in endangered species and emissions trading schemes specifically. The second set of instances of change are more straightforward to classify and are not investigated in the same degree of detail, but are nonetheless necessary to classify in order to identify the overall proportions of each type of post-Brexit policy change. The end result of this classification exercise reveals a varied picture of post-Brexit policy change, with all of the four types proposed by Woolf and Piquet (2022) as well as both of our additional types, differentiated growth and simultaneous dismantling, being empirically identified. After the discussion of each policy area, a count of the number of instances of each type of policy change will be given to aid readability, with a total for each type presented at the end of the chapter.

Air Quality Regulations: The UK Falls Behind

Ambient air quality is a policy area in which there appears to be a strong pattern of disengagement in the post-Brexit period in terms of policy outputs between the UK and EU, with the EU making a significant amount of legislation which is unmatched in the UK. Specifically, the EU introduced obligatory standards for ambient air quality covering nitrous oxides, sulphur dioxide, particulate matter and ozone, while the UK only displayed activity in terms of new obligatory standards covering particulate matter regulations. Even in the area of particulate matter, on closer inspection of the stringency of the regulation, we see evidence of the UK displaying patterns of the disengagement type of policy change.

Regulations on air quality in terms of particulate matter content appear at first to involve post-Brexit engagement, with both jurisdictions having legislated in the area since 2020. Specifically,

our data demonstrates common activity with regard to target number 4 (particulate matter air quality standards and instrument 101 (obligatory standards). However, closer inspection reveals significant differences between each of the policy changes made in this area. While bearing some superficial similarities, the UK's regulation is less stringent in terms of the setting applied, covers a more restricted scope than that of the EU, and also bears some difference in terms of the nature of the instrument used: while the EU lays out clear standards which member states must not breach, the UK regulates in the form of setting targets to for improvements to be achieved over a longer time period. Additionally, several other target-instrument combinations see new EU policy changes which are not matched by the UK, namely targets 1, 2 and 5, each addressed by instrument 101, referring to standards for nitrogen oxides, sulphur dioxide and ozone respectively. As such, despite similarities in terms of legislative activities in this area, considered in terms of policy outputs this case is one of disengagement across the board on the part of the UK.

In 2024, the EU introduced Directive 2024/2881 "on ambient air quality and cleaner air for Europe" in connection with the Commission's "European Green Deal" commitment to improve air quality standards across the EU. Specifically, the legislation forms part of the "Zero Pollution Action Plan", itself a strategy of the European Green Deal, which aims to introduce policy to reduce the impact of air quality on human health by at least 55% by 2030 (European Commission 2021). The directive lays out standards for ambient air quality relating to both PM2.5 and PM10 particulates, with standards for maximum allowable daily averages, maximum allowable annual averages and the number of occasions within any calendar year that the daily averages may be exceeded. For PM2.5, the allowable concentrations are an average of 25μg/m^3 over a single day, not to be exceeded more than 18 times per year, and an average of 10μg/m^3 over an entire year. For PM10, they are 45μg/m^3 per day, also not to be exceeded more than 18 times per calendar year, and 20μg/m^3 averaged over a year period. These allowances do not take immediate effect, but are rather targets to be achieved by the year 2030, with member states required to take action to ensure they reach these standards by that time.

By contrast, the UK's Environmental Targets (Fine Particulate Matter) (England) Regulations of 2023 are both narrower in scope and less stringent in setting. Unlike the EU directive, in terms of scope the regulations only concern PM2.5. In terms of setting, only an annual maximum concentration of 10μg/m^3 is laid out, with no daily maximum concentrations. The timeframe over which these standards must be reached is also longer, being 2040 as opposed to the EU's 2030. Finally, in terms of overall population exposure to particulates, the UK regulation aims to reduce this by 35% by 2040, rather than the EU's significantly more ambitious 55% by 2030.

Despite these differences, there are two notable similiarties between the two pieces of legislation. The first is the timing, with each being made within two years of the other, and the second is the commitment to reducing annual averages of PM2.5 concentrations. While these similarities in policy outputs might appear to be evidence of engagement in terms of policy processes, they in fact originate due to engagement with a different body, that being the World Health Organisation (WHO). Both the EU's directive and the UK's regulation in this area are informed by and make references to recommendations on safe levels of particulate matter in ambient air as prescribed by the WHO, which published the Global Air Quality Guidelines in 2021, including prescriptions for national air quality standards (World Health Organization 2021). This explains the similarity in timing as well as the headline standard on annual average PM2.5 concentrations, which was the primary policy recommendation made by the WHO.

In terms of the difference between the UK and EU legislation, with regard to the WHO guidelines, it would seem that this variation represents a case of the UK lagging behind in terms of its air quality standards rather than the EU going above and beyond. The WHO lays out recommended standards for both PM2.5 and PM10 over annual and 24-hour averaging periods, which the EU transposed directly into its legislation, with the only exception being that of 24-hour PM10 levels, whereby the EU goes beyond the recommended 50μg/m^3 per day and opts instead for the stricter standard of 45μg/m^3. While the WHO states that PM2.5 is the form of particulate matter which poses the greatest level of danger to human health, in adopting only annual targets for PM2.5 concentrations, the UK adopts a far less comprehensive set of regulations than those recommended by the WHO and adopted by the EU.

But in both cases, these policies are targets to aim for rather than specific means by which to achieve them. Higher stringency of such targets (policy outputs) does not necessarily correspond with better policy outcomes. There is a historical pattern of EU member states failing to achieve such targets in the area of ambient air quality, including the UK: in 2017, the EU commission issued warnings to five EU member states, being the UK, France, Spain, Italy and Germany, for failing to achieve the necessary reductions in Nitrogen Oxide concentrations in the ambient air (Barnes et al 2018). Although there are some concerning signs of failure to achieve particulate matter targets in the UK given the apparent "disconnect" between local governments, which is generally the level of government charged with implementing the necessary changes to reach the targets, and central government where targets are set (ibid.), it is not clear whether the elevated stringency in the EU will correspond to actually improved air quality outcomes in the EU as compared to the UK. Nevertheless, while studying the outcomes of policy are beyond the scope

of this research, even in terms of the stringency of outputs, a disparity can be seen between the UK and EU's policy, suggesting a pattern of disengagement.

This pattern of disengagement is further evidenced by the three other air quality targets adressed by the EU in the post-Brexit period, being ambient levels of nitrogen oxides, sulphur dioxide and ozone, to which no corresponding UK policy has been made, causing further regulatory disparity. These standards were laid out in Directive 2024/2881, the same legislation which set out the new particulate matter standards, and cover new more stringent ambient air quality standards. Broadly, while the maximum allowable annual average concentrations for each pollutant remain the same, the maximum allowable daily and hourly concentrations are reduced, as well as the number of occasions on which these can permissibly be exceeded. In the case of ozone, a target standard which member states must meet by 2050 is introduced. By contrast, UK law still makes reference to Directive 2008/50/EC, which was the previous EU legislation on air quality standards and which was amended by Directive 2024/2881, setting out the newly updated air quality standards. The 2024 directive also contains the provision that the former 2008 directive will be entirely repealed in 2026. The result is that the UK is left with weaker permissible levels of nitrogen oxides and sulphur dioxide in ambient air than the EU, and while the current standards remain equal for ozone levels across the jurisdictions, the UK lacks the longer-term target of the EU.

Notably, the UK appears not only to be disengaging from the EU due to the increased disparity between their policy outputs and the stringency of their regulations, but also seems to be disengaging from the WHO guidelines. EU air quality standards which were made with reference to WHO guidelines became incorporated into UK law during the UK's membership of the EU and retained following Brexit and the retention of EU law in the EU (Withdrawal) Act 2018. However, in the post-Brexit Environmental Targets (Fine Particulate Matter) (England) Regulations 2023, no reference is made to WHO guidelines and the recommendation to provide for increased standards for PM10 emissions is left out. The latest EU legislation, on the other hand, makes prominent mention of the Comission's commitment to "further improving air quality and to aligning Union air quality standards more closely with the recommendations of the World Health Organization" in the second recital of the act as well as throughout the enacting terms (Directive (EU) 2024/2881).[2]

That new UK legislation in this area no longer shows parity with the EU is perhaps unsurprising, but the disparity in terms of adherence to WHO guidelines shows a deeper disengagement which

[2] For references within the enacting terms to the commitment to WHO guidelines, see for example article 3 paragraph 1; article 12 paragraph 4 and article 22 paragraph 2.

goes beyond what might be expected as a result of de-Europeanisation processes. While it is not part of the current research to attempt to make a causal connection, it does not seem a stretch to view this as sign of something more than mere passivity in British policymaking. Rather than it being the case that EU rule growth marches on, leaving the inactive UK behind, this change in philosophy away from adherence to guidelines laid out by an international institution might be taken as evidence of a new emboldening of UK policymakers to set their own policymaking style in the post-Brexit era. Alternatively, it could simply be a sign of a lack of regulatory ambition, or a deficit of administrative capacity to monitor and enforce such standards (Dudley & Gamble 2023; Gravey & Jordan 2023).

Returning to the solid ground of policy outputs, however, all this is to say that Brexit has indeed led to UK policy falling behind that of the EU in terms of stringency in the area of air quality standards as compared to what would have been the case had the UK remained a member. With the EU's new directive being substantially stricter both in setting and scope than that of the UK, despite the existence of some simultaneous legislative activity in this area, we can confidently state that, owing to the disparity of policy outputs which has emerged due to post-Brexit legislative activity in these target-instrument combinations, these constitute instances of disengagement.

Verdict: four instances of disengagement.

Trade in Endangered Species: Engagement in Outputs Without Engagement in Process?

On the right-hand side of the graph, we see evidence of cases of simultaneous dismantling, namely targets 47 (import and export regulations for endangered plant species) and 48 (import and export regulations for endangered animal species), both addressed by instrument 102 (prohibitions) and 113 (permits). Both the UK and EU lifted bans on the trade in live specimens and products derived from various species in 2023, making this a clear case of simultaneous dismantling due to the complete parity of changes in UK and EU law. At the same time, both parties also introduced new bans and permit requirements which appear in the policy growth graph. Despite the occurrence of simultaneous dismantling and growth here, in this case this does not come as a consequence of any engagement in terms of policy formulation between the UK and EU, but rather as the result of other non-EU treaty obligations, namely the Convention on International Trade in Endangered Species of Wild Fauna and Flora, or CITES. This means that the case is an unusual one in terms of classifying it according to policy outputs alone. Since we

observe continuity in terms of the parity of regulations in both jurisdictions between the pre-Brexit and post-Brexit periods, we characterise this as a case of continued engagement of policy outputs, including two changes in the form of simultaneous dismantling, whereby Brexit did not impact existing policy dynamics. This contrasts with the case of air quality regulations, where Brexit caused an increased disparity in EU and UK policy due to the fact that the UK did not adopt WHO guidelines in the absence of EU law to that effect. In the case of endangered species, both jurisdictions' commitments under CITES are unimpacted by Brexit since this was always an area for which the UK held legislative responsibility even in the pre-Brexit period.

CITES is an international treaty, of which both the EU and UK are signatories, which aims to promote the conservation of endangered species of plants and animals by placing restrictions on their trade and trade in derivative products, and which entered force in 1975. The treaty provides for the maintenance of a unified list of protected species which member states must incorporate into their own domestic legislation. Changes can be made to the list by a two-thirds majority vote of members at the Conference of the Parties to the convention, which occurs every three years. The parity of changes which we observe between the UK and EU in this regard therefore represents an interesting and unique case of policy change, since in this case both the UK and EU are subject to a third-party forum for policy formulation in the form of the Conference of the Parties. This undermines the possibility of conceiving of these changes as instances of engagement between the UK and EU in terms of policy processes, since it is the common regard of UK and EU policymakers to the CITES treaty which causes the parity of legislation, rather than the regard of policymakers in the UK to the EU. Instead of the usual legal circumstances concerning policy alignment between the UK and EU, whereby UK law is derived from that of the EU, here both jurisdictions are instead subject to the authority of international law due to their common signing of the Treaty.

It might be tempting to place an asterisk on this case to mark it as something other than continued engagement due to the non-EU origin of the legislation, however, to do so would not be consistent with other classifications of instances of change within this research, namely those relating to air quality regulations whose stringencies are closely connected to guidelines set out by the WHO. What each of these cases speak to is the UK and EU's positions within what might be termed the wider "regime complex" (Alter & Raustiala 2018) of overlapping institutions and rules. As we have seen, in terms of the regimes governing air quality, the EU and WHO are not in conflict, neither are the EU and CITES in conflict when it comes to trade in endangered species. This makes it somewhat difficult to determine the "true" origin of rules: where in the air quality case, the UK rejected EU's authority and with it appeared to place diminished importance on the

recommendations of the WHO, in the case of CITES the UK maintained adherence to these rules despite de-Europeanisation processes with regard to the EU.

What this case brings to light is the relevance of polity to policy outputs. Brexit was a popular rejection of, among other things, the competency of European policymaking institutions across a broad range of policy areas and the legal reality whereby the UK was subject to EU law. In this sense, it was an attack on the entire EU polity rather than on specific rules (Schimmelfennig 2022). By contrast, international treaties whereby ultimately the authority rests with each member state to sign or withdraw from each treaty on an ad hoc basis do not represent such a broad concept of polity and as such were not subject to the same degree of "polity attack" as was the EU. The consequence is that, in this case, what we classify as policy engagement in terms of outputs is in fact likely illusory in terms of the degree to which it reflects actual commitment to engagement in terms of policy processes between the UK and EU.

Nevertheless, these instances do represent the continuance of parity of policy outputs in the UK and EU between the pre- and post-Brexit periods and thus are classified here as continued engagement and simultaneous dismantling for the instances of growth and dismantling respectively. This case should give us pause for thought when using an approach such as ours to quantify policy dynamics. Our methodology requires us to go deeper than simply observing a commonality of targets and instruments between jurisdictions and notes instead that differences in the nature of legislation in terms of its origins within wider regime complexes can mean that what at first glance appears to be a clear case of continued engagement is in fact a more complex picture.

Verdict: two instances of simultaneous dismantling; four instances of continued engagement.

Emissions Trading Schemes: Beyond De-Europeanisation and Engagement?

We now turn to consider the case of emissions trading schemes, where for the first time we see a pattern of increasing disparity of policy between the UK and EU which is in part driven by policy growth in the UK. The data point us towards simultaneous policy growth with regards to targets 13 and 14 and instrument 106 in both the EU and UK in the post-Brexit period. These target-instrument combinations concern emissions trading schemes relating to carbon dioxide emissions from combustion plants, that is, energy production and industrial installations, and from vehicles respectively. This is a policy area which has seen substantial legislative activity in both jurisdiction in the post-Brexit period, and presents a complex puzzle in terms of classifying

the types of policy change which can be observed. It will be demonstrated here that this pattern of policy change cannot be classified in terms of Wolff and Piquet's typology of changes ranging from de-Europeanisation to continued engagement, and in fact is better characterised by our new type, differentiated growth.

The activity relating to target 13, being trading schemes concerning emissions from combustion plants, comprises on the EU side Directive 2023/95, and the Greenhouse Gas Emissions Trading Scheme Order 2020 in the UK, as well as various additional statutory instruments which make amendments to it. These acts exhibit a pattern of increasing stringency of the two schemes approximately in parallel, with the UK's amendments coming in piecemeal steps as opposed to the EU's single large regulatory package. However, the existence of simultaneous activity here does not tell the whole story. In fact, what we observe is that the UK and EU, while both expanding their own emissions trading systems, are doing so by travelling in quite different directions, with the UK adopting a scheme which is perhaps more ambitious in terms of setting, but less so in scope. Despite an initial instance of de-Europeanisation when the UK left the EU's trading scheme with Brexit, this subsequent pattern represents neither de-Europeanisation on the part of the UK, nor disengagement in terms of policy outputs whereby the UK stagnates and is passive in the face of policy growth in the EU which it fails to match. It is also not a case of engagement: while both jurisdictions display policy growth, they are growing apart and developing increasingly different emissions trading systems. To borrow a term from biological taxonomy, the case of emissions trading schemes represents a sort of "type species" for the pattern of "differentiated growth" which was proposed earlier in this research, and which breaks from the usual spectrum of policy change running form de-Europeanisation to continued engagement as described by Wolff and Piquet (2022).

The primary difference between the systems is the way in which the "cap" on allowances is reduced over time. The EU ETS operates on a system of linear reduction factors (LRF) whereby the total number of available allowances (with each allowance corresponding to one tonne of carbon dioxide equivalent emissions) is decreased annually at a fixed rate, expressed as a percentage of the total cap as it stood in 2010. Up until 2020, the LRF was 1.74% annually, but was increased to 2.2% in 2021, and then further to 4.3% in 2024. From 2028, the LRF will increase further to 4.4%. Occasionally, the cap is decreased by a fixed number of allowances according to review in a process known as "rebasing". This is done in order to keep the EU ETS in line with the target to achieve a 55% reduction in net greenhouse gas emissions with regard to 1990 levels by 2030, as well as to accommodate changes to the size of the ETS market such as occurred with the UK's departure from the EU and with Croatia's earlier 2013 accession. The EU ETS was last rebased in

in 2024 when the cap was reduced by 90 million allowances, corresponding to an approximately 6.7% decrease compared to the previous year, and will next be rebased in 2026, when the cap is due to be reduced by 27 million allowances.

On the other hand, the trajectory of the UK's cap has followed a notably steeper downward curve. When the original legislation for the UK ETS was introduced, it stipulated that the overall cap on allowances was to fall linearly by 4 $MtCO_2e$ (million tonnes of carbon dioxide equivalent) per year in a similar fashion to the EU system's LRF (UK Government et al. 2023). In effect, this would correspond to an annual LRF of 2.72%.[3] However, in 2024 this was significantly changed in favour of a system of periodic rebasing events which aimed to couple the ETS to the reductions required in order to achieve the UK's net zero emissions goal by 2050. Consequently, the scheme now relies entirely on intermittent rebasing events. In this area, the UK scheme appears to be, on paper at least, substantially more ambitious than that of the EU: the UK has set itself the target of achieving a 68% reduction in overall greenhouse gas emissions by 2030 compared to 1990 levels, and it has bound the reductions in its ETS cap to this target. Consequently, by that date, the cap on allowances in the UK ETS will be approximately 50 $MtCO_2e$, being a fall of 68% from the initial level of 156 $MtCO_2e$ set in 2021, which itself was 5% below the national allocation of allowances to the UK under the pre-Brexit EU ETS (International Carbon Action Partnership 2025a).

This hard-binding of the cap to overall emissions reduction targets is a feature which is missing from the EU scheme. While the EU scheme was significantly expanded in 2023 to include a wider scope of emissions, the cap is not strictly bound to overall emissions reduction targets. In terms of comparison with the forecasted changes to the UK cap, the EU cap is set to fall from a level of 1,571 $MtCO_2e$ in 2021 to approximately 1,041 $MtCO_2e$ by 2030, representing a decrease of 34%, taking into account the updated LRFs and planned rebasings (Directive 2003/87/EU, Article 9). This is due to align with the EU's commitment to a 55% reduction in carbon emissions by 2030 as compared to 1990 levels, which contrasts with the UK's stricter 68% target (International Carbon Action Partnership 2025b).

In sum, then, regulatory changes since Brexit paint a picture of a more stringent setting in terms of the total reduction in emissions which is to be achieved by the UK's emissions trading scheme. Turning to the other side of the stringency coin, the scope of the two schemes run approximately in parity with one another. Both schemes apply the trading system to combustion plants with a

[3] This figure is calculated based on the table showing annual total caps laid out in The Greenhouse Gas Emissions Trading Scheme Order 2020, Article 22.

thermal output greater than 20MW, and both have legislated to extend their scope to cover waste incineration plants. It should be noted however that other extensions in scope also exist which are not covered by this target as per its definition in the CRISPOL coding system: the EU has moved ahead of the UK in terms of its timeline to add maritime emissions into the scheme, with these having come under the scheme's scope in 2024, whereas in the UK this remains in the consultation stage. However, considered purely in terms of what falls under the CRISPOL definition of this policy target, which is large combustion plants, we see that the two schemes remain in parity with one another in terms of scope. The pattern is therefore one of differentiated growth in terms of policy setting, with the UK system also becoming qualitatively different from that of the EU in terms of its operation regarding cap reductions.

The other target in this area in which we observe policy growth in the UK and EU is target 14, concerning carbon dioxide emissions from passenger vehicles. In this case, the differentiation of UK and EU policies is even clearer than before, with each jurisdiction setting up strikingly different schemes to cover this policy target. Beginning with the EU, this target is addressed via the new "ETS2" emissions trading scheme, which was set up as part of the same directive which amended the original ETS in 2023. This is a separate scheme to the original ETS which operates entirely independently, and applies to the producers of fuel in order to regulate downstream emissions in vehicles and buildings. The scheme, which is due to become active in 2027, will operate in a similar way to ETS1, with allowances being traded according to the quantity of emissions which the burnt fuel will produce once used by the end consumer.

Contrastingly, the UK scheme will apply to an entirely different regulatee, namely the manufacturers of vehicles themselves. Under this scheme, which is also independent of the UK's ETS, vehicle manufacturers are granted permits to sell cars with combustion engines based on the number of zero-emissions vehicles they sell, with allowances for the sale of combustion engine vehicles tradable between manufacturers. On top of this, an additional trading scheme for the emissions of any sold combustion engine vehicles is also created, whereby manufacturers are assigned allowances based on the per-kilometre carbon emissions of their vehicles, and may trade these among themselves to remain compliant with the scheme. The "cap" here is a target which is assigned to manufacturers based on historical emissions performance. Each scheme is divided into categories for cars and vans, meaning in total four new schemes are created.

Consequently, we can see that while both jurisdictions have introduced new policy covering emissions from vehicles, the schemes are so different from one another that it is scarcely possible to make an apples-to-apples comparison of the two. This is what marks out the pattern

of differentiated growth in this target-instrument combination. Constituting neither the dismantling of EU policy which would be entailed by Wolff and Piquet's de-Europeanisation type of policy change, nor the passive standing-by which we would expect from disengagement, these are instead instances of a new pattern of policy change.

While the situation according to current legislation displays a pattern of differentiated growth, looking to the future there may be signs that this could change. At the EU-UK "Reset Summit" in May 2025, an agreement was drawn up to link the two ETS, which would allow the trading of allowances between the schemes (International Carbon Action Partnership, 22nd May 2025). This would also have the benefit of allowing UK and EU polluters to avoid each of the jurisdictions' carbon border adjustment mechanisms (CBAM) which would otherwise effectively apply a tariff to products imported into each market proportional to the carbon emissions produced as part of the product's manufacturing. Such a linking would not be without precedent, since the EU ETS was linked to its Swiss equivalent in 2020. Additionally, the parity of scope of the UK and EU ETS would make such a linkage relatively straightforward as no changes would need to be made in terms of the producers affected by the scheme, meaning business would be able to proceed largely as usual with the added benefit of smoothened trade between the two markets. This is of course not the case for the UK's vehicle ETS or the EU's ETS2, which are likely to remain separate for the foreseeable future due to their significant operational differences. These developments provide the prospect of the pattern of policy change evolving from one of differentiated growth into one of reengagement, but nonetheless for the time being no formal agreement exists beyond the announcement of an intention to link the schemes, meaning until legislation is passed, the situation remains one of differentiated growth according to our data.

Verdict: two instances of differentiated growth.

Other Instances of Change

The next set of instances of change are more clear-cut than those examined in the case studies above. In these cases, there is usually no comparable legislation in one of the jurisdictions, and only one direction of change is involved in terms of changes in setting and scope. As a result, they are much simpler to classify. Nevertheless, even in these straightforward cases, the need to include categories beyond those of the de-Europeanisation-Engagement spectrum is clear, with many instances conforming to the categories of differentiated growth.

We turn first to vehicle emissions, which have seen other legislative activity in both the UK and EU beyond the changes to emissions trading schemes, although the instruments used differ across the jurisdictions. First, the EU tightened its rules on vehicle emissions reporting, laying out more detailed procedures with which vehicle manufacturers must comply, as well as procedures for member states in terms of their reporting of overall vehicle emissions within their territory. This regulation comprises both a data monitoring and information exchange instrument as according to the CRISPOL coding, and therefore appears in relation to target 14, instrument 109 as well as target 14, instrument 110 (Commission Implementing Regulation (EU) 2021/392). No comparable legislation was made in the UK in the post-Brexit period, meaning these are two clear cases of disengagement. However, the UK did increase the stringency of its vehicle emissions standards as part of an amendment to retained EU law, representing a case of differentiated growth with respect to target 14, instrument 101.

Verdict: two instances of disengagement; one instance of differentiated growth.

The UK has also made changes to policies regarding aircraft emissions which have not been matched by the EU, both in the growth and dismantling directions. The first of these relates to target 77, instrument 106, where a small increase in scope relating to flights covered by the UK ETS was made in order to include flights departing from or arriving in Switzerland. This brings the UK in line with the EU ETS, which began including flights connecting to Switzerland in 2020 when the EU and Swiss ETS were linked. As such, this represents an instance of reengagement due to the fact that EU and UK policies are increasingly in parity with one another following the de-Europeanisation entailed by the UK's exit from the EU ETS on 31st December 2020.

The second of these changes concerns an increase of stringency in aircraft emissions monitoring in the UK whereby operators are required to submit more detailed plans for their emissions monitoring activities to the regulator. This constitutes a case of differentiated growth regarding target 77, instrument 110. The same legislation also limits the scope of aircraft required to conform to such monitoring to only those of a certain weight which are operated as part of fleets with total emissions over a particular threshold, representing an instance of dismantling. This law is made in accordance with the Convention on Civil Aviation's Carbon Offsetting and Reduction Scheme for International Civil Aviation (CORSIA) and as such represents a treaty obligation which is also matched by EU policy, meaning that it constitutes an instance of simultaneous dismantling.

Verdict: one instance of reengagement; one instance of differentiated growth; one instance of simultaneous dismantling.

The only other instance of dismantling carried out by the UK in the post-Brexit period is with regard to target 14, instrument 101, being carbon dioxide emissions standards for passenger vehicles. The data shows that this instance represents a very minor reduction of scope, whereby standards previously applying to all newly registered vehicles were reduced to apply only to new vehicles registered between 2021 and 2024. While this represents a dismantling of EU regulation in the sense that the vehicle emission standards in question originate in EU law, this change is likely due to the upcoming introduction of new standards set to apply after the 2024 date, rather than any meaningful dismantling of the regulations in question. As a result, this instance of de-Europeanisation should be interpreted with some scepticism.

Verdict: one instance of de-Europeanisation.

A number of instances of policy growth in the EU can be observed in the area of water quality, visible on the graph with respect to targets 43 and 44, using instrument 106. These both refer to EU directive 2024/3019 concerning urban wastewater treatment and stipulate that member states legislate to ensure that manufacturers of medicinal and cosmetic products which have potential to cause damage to surface water via the emission of micropollutants must cover the costs of treating urban wastewater to remove these pollutants. The two targets addressed refer to the Neither of these policies are matched by UK legislation, causing increasing disparity through disengagement.

Verdict: two instances of disengagement.

Finally, we arrive at policy changes relating to habitat conservation. These changes take place regarding target 45 and 46, being the conservation of native woodland, and the designation of nature protection areas. Regarding the protection of woodland, we observe policy growth in both the EU and UK, albeit using different instruments, with neither policy change being matches in the other jurisdiction. The EU's 2024 "Nature Restoration Regulation", part of the package of measures comprising the Biodiversity Strategy for 2030 which was introduced in 2020, implements an obligatory standard for seven indices of forest ecosystem health, stipulating that

member states must achieve a nationwide upward trend in any six of these, to be assessed every six years. With no equivalent policy having been introduced in the UK, this is without a doubt a further instance of disengagement in terms of policy outputs regarding this target-instrument combination. Notably, this is the only instance identified in our data where either the UK or EU regulate a new target-instrument combination which is not also regulated by the other.

The UK on the other hand has been more active in the area, introducing a variety of statutory instruments in 2023 which set targets for the protection and expansion of natural habitats across the country. These provide for the restoration of at least 500,000 acres of wildlife-rich habitats, the expansion of woodland coverage to 16.5% of the total land area of the UK, and a target to improve the conditions of marine protected areas. While both the EU and UK have committed to the Convention on Biological Diversity's "30 by 30" goal to designate 30% of the earth's surface as protected habitat by 2030, the UK has built upon these to a greater extent by outlining more granular targets which have not been replicated by the EU. As a result, these instances of change are readily classifiable as differentiated growth.

Verdict: two instances of differentiated growth; one instance of disengagement.

Totals

De-Europeanisation: one instance.

Disengagement: nine instances.

Reengagement: one instance.

Continued Engagement: four instances.

Simultaneous Dismantling: three instances.

Differentiated Growth: six instances.

8

Discussion

Having investigated each instance of change identified by the data in turn, we finally reach the stage in the analysis in which it is possible to determine the proportions of each type of policy change. As the reader will recall from the "big picture" results in chapter four, forty of the forty-three target-instrument combinations which experienced policy change in the pre-Brexit period exhibited patterns of engagement. Two of the remaining three policies constituted the UK's transposition of EU directives made before the sampled time period, which can also be classified as engagement, meaning only one out of forty-three policies in this sample was made entirely of the UK's own initiative, or approximately 2% of all changes. Since this represents an instance of increasing disparity between portfolios driven by growth on the part of the UK, it is classified as differentiated growth.

In the post-Brexit period, what has changed? Table 5 summarises the results of our instance-by-instance investigation. The headline finding is that our results corroborate the empirical findings of Gravey and Jordan's (2023) study into patterns of environmental policy change in UK post-Brexit by demonstrating that the most common type of policy change is indeed that of disengagement, constituting 38% of the instances of policy change identified by the sample. This finding is therefore in line with our first expectation. However, the next largest grouping among the changes in our sample is differentiated growth, representing 25% of the instances of policy change. This not only represents a striking change as compared to the pre-Brexit period, when in the highly Europeanised sector of environmental policy only 2% of changes came from the UK's own initiative, but also demonstrates that a significant proportion of policy changes made by today's UK legislators fall outside of the typology of changes as proposed by Wollf and Piquet (2022). Our second expectation, that differentiated growth is likely to occur but to a lesser extent than disengagement, is therefore also supported by this finding.

This research also aimed to take the first steps towards answering the question posed by Gravey and Jordan (2023) regarding whether de-Europeanisation *processes* result in de-Europeanised *outcomes*, that is, whether the content of policies takes on a less European character following the upheaval of Brexit. The initial signs from the results of this research would suggest that this is not the case: only one instance of de-Europeanisation is observed in the sample, with this being the extremely minor change to the scope of vehicle emissions regulations. In fact, equally as

common as de-Europeanisation are dynamics of reengagement whereby the dismantling of Europeanised policies is reversed post-Brexit in favour of a trend towards restored policy parity. Where dismantling does occur, it is more commonly in accordance with treaty obligations outside of the EU, meaning that the UK and EU move in parallel with one another to dismantle policy due to their common signature of this treaty. This is perhaps one of the more surprising finds of the research, especially when coupled with the fact that the proportion of continued engagement (the "growth" sibling of simultaneous dismantling) is only a few percentage points more common: indeed, when these types are considered together, they comprise the second most common type of policy change only after disengagement. However, the proportion of instances of continued engagement and simultaneous dismantling is perhaps biased by the frequency with which instances of change driven by common membership of treaties appear in the data.

	Type of Policy Change	*Pre-Brexit*	*Post-Brexit*
Wolff and Piquet (2022)	De-Europeanisation		4%
	Disengagement		38%
	Reengagement		4%
	Continued Engagement	98%	17%
New types of policy change	Simultaneous Dismantling		12%
	Differentiated Growth	2%	25%
	Total Instances of Change	43	24

Table 5: Proportions of each type of change in the pre-Brexit and post-Brexit periods. Note that percentages are approximate due to rounding.

What is more likely given the proportions of each type of change identified here is that the policy portfolios of the UK and EU will become increasingly different via growth in both jurisdictions, both through unmatched growth in the EU in the form of UK disengagement and through the opposite of this in the form of differentiated growth in the UK. Understood as a process of

increasing difference in the content of policies, this could result in the UK's policy portfolio taking on a composition which eventually becomes significantly less "European" over time, albeit through a different process to that imagined by research which focusses on the risk of the dismantling of EU policy. This results in a curious phenomenon: to the extent that Brexit was brought about by the popular rejection of a Europeanised conception of polity in the sense that it was a rejection of feelings of belonging and shared principles with the European project (Schimmelfennig 2022), it has not apparently resulted in ongoing patterns of the rejection of EU policy. This is especially notable given the extent to which EU policy itself formed a cornerstone of Eurosceptic talking points, embodied by advocates of a low-regulation "Singapore-on-Thames". This puzzle is perhaps an indication that either a certain democratic deficit exists whereby policy outputs are not being de-Europeanised to the degree which the voting public would want, or otherwise that the de-Europeanisation of process, whereby the UK gains the legal freedom to be exempt from EU rules, was the object of public desires instead: think for example of the famous slogan "take back control".

However, there are signs that this process of increasing differentiation may be slowing and reaching a peak before reversing in direction. As the case study on emissions trading schemes shoes, there are signs of increasing trends towards reengagement, with agreement having been outlined already to link the ETS of the EU and UK less than five years after their separation. This is a significant development, going further than a decision to put policies in parity with one another in terms of scope as setting of the kind which could potentially be unilaterally made by either party, and instead representing the possibility of a formal commitment for ongoing systematic policy engagement which would also include a certain degree of common policy formulation processes. The passage of time will allow us to determine whether such patterns spread beyond this policy area in future, and may enable the drawing of conclusions as to the potential drivers of such patterns if for example another change of government occurs in the coming years, which makes the potential benefits of reperforming a study such as this all the greater. If a growing pattern of reengagement is observed, this would add yet more doubt to the idea that the de-Europeanisation process that was Brexit indeed leads to corresponding de-Europeanisation of policy in terms of its outputs.

Limitations

There are of course many limitations to this methodology and the study's contribution to our understanding of Brexit and policy. The first is that in the case studies, we consider only the

aspects of change which fall within the coverage of the targets and instruments as laid out by the CRISPOL codebook (a full list of the guidelines can be found in the appendix). For example, the EU's ETS2, by regulating fuel production at source, also addresses emissions from buildings, which are not included in the codebook. There is as yet no similar scheme in the UK which fulfils such a function, meaning that if we consider the contents of the ETS2 initiative as a whole, a case could be made for this to appear as an instance of disengagement in our policy space. This is a limitation of the methodological approach: while the definitions of targets and instruments clearly delineate which policies are of interest and permit comparison of portfolios on an aggregate scale, legislative acts are not always neatly confined to single target-instrument combinations. This means that researchers interested in more granular comparisons must choose between either discarding from their consideration elements of policies which do not fit the target definitions, thereby missing important context, or else undermining the accuracy of the "big picture" findings of the study in terms of comparisons of whole portfolios by introducing this context despite the fact that some policy changes may not map neatly onto the targets which make up the policy space. In this research we have erred on the former approach, since an important goal is to quantify the overall patterns of change across time, which requires a focus on comparability of time periods on like-for-like terms which may be undermined if case studies decided the classification of policy changes based on elements of policies which do not conform to the definitions of policy targets as described in the CRISPOL codebook.

Additionally, the method used to quantify the proportions of each type of policy change gives equal weight to all policy changes relating to each target-instrument combo, including very minor changes in stringency, despite potentially very different consequences in terms of outcomes and impacts. Remedying this while maintaining the quantitative character of the result would be a difficult task, especially since the recency of changes means that outcomes and impacts are likely not to be known for some time. It would be possible to weight each change based on its level, for example by placing more importance on new policy targets being regulated or deregulated, and to perhaps include a measure of novelty such as whether this was happening for the first time. However, it is not clear that this would aid in providing any additional analytical insight. For now, the combination of quantitative data supplemented by qualitative assessment would seem to be the most prudent approach.

This qualitative element also raises its own problems, particularly with regard to applying the methodology to larger scope studies in future, either in terms of greater coverage such as by the inclusion of multiple policy sectors, or by extending the time period over which changes are studied. It is likely that the qualitative analysis of each instance of change which is necessary to

be sure of the accurate classification of changes would quickly become impractical. Additionally, as time goes on and dynamics of policy change become more complex, any future replications of the study would need to find a way to accommodate these shifting patterns over time. In the case for example that policy growth and dismantling become more volatile in the UK given the increased legal room to manoeuvre outside of the EU, especially in the case of changing future governments, it is possible that policy target-instrument combinations may face successions of growth, dismantling and U-turns which lead to a complex history of changes which could not be captured by simply measuring at a greater number of time intervals. As a result, the methodology is best confined to studies restricted enough in scope so as to maintain the practicality of these qualitative assessments.

9

Conclusion

Almost five years on from Brexit, what conclusions can be drawn in terms of the impact of this unprecedented event on patterns of environmental policy outputs? The research undertaken here shows that the shift has been substantial. Compared to the former status quo, whereby environmental policy outputs in the UK moved almost entirely in parity with EU legislation, in the post-Brexit period, new patterns of policy change have been revealed. Surprisingly, there does not appear to be a significant ongoing pattern of dismantling of EU policy. Instead, the UK is increasingly being left behind as EU legislation is not transposed into UK law. The findings of our research demonstrate that this type of change is the most common one among post-Brexit policy changes, supporting the findings of prior studies (Gravey & Jordan 2023).

However, where much of the literature has imagined these to be the primary means by which UK and EU policy diverge, this research finds that a significant proportion of changes conform to a previously overlooked form of change, namely what has been termed here "differentiated growth". While policymaking activity in the environmental sector has decreased in the post-Brexit period, both in the UK and EU, the UK is nonetheless active in terms of producing new policies which are increasingly putting it on a different trajectory to that of the EU via processes of policy growth, rather than the more widely discussed policy dismantling. This implies the incompleteness of current typologies of post-Brexit policy change which have until now not provided the conceptual space for such a possibility.

On the other hand, the post-Brexit period still has room for a large amount of policy engagement. In several areas, policies in the UK and EU continue to change in parity with one another, both in the growth and dismantling directions. Thus in terms of the question as to whether de-Europeanisation of policy processes entailed by Brexit has resulted in de-Europeanised policy outputs, the answer would seem to be "not necessarily". As the empirical findings of this research demonstrate, there is not only evidence that the proportion of continued engagement taking place is significant, but also that indications towards potential realignment of UK and EU policy exist. Certainly, as far as policy outputs are concerned, it would seem that the UK is not on a path of widespread destruction of EU rules when it comes to environmental policy.

All this is to say that the time may have come to depart from narrower conceptions of possible policy dynamics in the post-Brexit world which are based on the possibility of either dismantling of EU policy, inaction on the part of the UK or else alignment with EU policy outputs, and instead to broaden our horizons to alternative patterns of policy change. For future research to know where to look for the most consequential impacts of Brexit on environmental policy, it is vital that this change of perspective occurs. Many questions remain for such future efforts: what factors determine whether certain areas of policy will exhibit each of these patterns of change? What are the effects of these developments on policy outcomes and their impacts in terms of environmental policy objectives? To what extent are these findings indicative of a general trend among other policy sectors? With the study of Brexit's impacts on policy being such a young area of research, it is hoped that the timing of the current contribution can be of benefit to these future efforts.

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Appendix A
Key to Target and Instrument Coding

Adapted the coding guidelines for the environmental sector used by the CRISPOL project. Descriptions have been simplified. More information on the project can be found at https://publicpolicy-knill.org/?post-type=research&post_id=3049.

Target Description	**Code**
Air quality standards for nitrogen oxides	1
Air quality standards for sulphur dioxide	2
Air quality standards for carbon monoxide	3
Air quality standards for particulate matter	4
Air quality standards for ozone	5
Air quality standards for lead	6
Emissions of nitrogen oxides from large combustion plants	7
Emissions of nitrogen oxides from passenger vehicles	8
Emissions of nitrogen oxides from diesel goods vehicles	9
Emissions of sulphur dioxide from large combustion plants	10
Emissions of sulphur dioxide from passenger vehicles	11
Emissions of sulphur dioxide from diesel goods vehicles	12
Emissions of carbon dioxide from large combustion plants	13
Emissions of carbon dioxide from passenger vehicles	14
Emissions of carbon monoxide from large combustion plants	15
Emissions of carbon monoxide from passenger vehicles	16
Emissions of particulate matter from large combustion plants	17
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Standards for the lead content of fuel	19
Standards for the sulphur content of diesel	20
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Standards for the sulphur content of fuel	78
Water quality standards for lead	21
Water quality standards for copper	22
Water quality standards for nitrates	23
Water quality standards for phosphates	24
Water quality standards for zinc	25
Water quality standards for oils	26
Water quality standards for pesticides (except DDT)	27
Water quality standards for DDT	28
Water quality standards for phenols	29
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Emissions standards for lead discharged into water	31
Emissions standards for copper discharged into water	32

Emissions standards for nitrates discharged into water	33
Emissions standards for phosphates discharged into water	34
Emissions standards for chloride discharged into water	35
Emissions standards for sulphates discharged into water	36
Emissions standards for iron discharged into water	37
Emissions standards for zinc discharged into water	38
Emissions standards for oils and greases discharged into water	39
Emissions standards for pesticides discharged into water	40
Emissions standards for phenols discharged into water	41
Emissions standards for coliform bacteria discharged into water	42
Emissions standards for the biochemical oxygen demand of discharges into water	43
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Import regulations for endangered plant species	47
Import regulations for endangered animal species	48

Instrument Description	**Code**
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Appendix B

National Parliaments

The UK's system of devolved parliaments means that substantial environmental competencies are in the hands of the Scottish Parliament, the Senedd Cymru and the Northern Ireland Assembly. Variation in terms of these nations' patterns of legislative behaviour post-Brexit compared to that of the central parliament in Westminster has been identified, with a notable trend of the devolved parliaments, particularly Scotland, pursuing a greater degree of environmental policy alignment with the EU than does Westminster (Gravey & Jordan 2023). To investigate this possibility further in the context of policy outputs, we also code the policy changes taking place in each of the national parliaments over the same time periods as those used in the main study. For reasons of limited resources, it was not possible to code all policy changes dating back to 1974 as the main dataset does, and therefore producing policy portfolio snapshots for each devolved nation is not possible. Additionally, the limited policymaking authorities of each of the devolved parliaments restricts their abilities to legislate, and interruptions in the sitting of the Northern Ireland Assembly makes comparisons of changes on like-for-like terms across time periods difficult, which has contributed to the decision to include these data in the appendix of this research. Nonetheless, the data yield some interesting findings which are shown here.

Figure 10: pre-Brexit growth across the devolved parliaments. Blue indicates Scotland, Green indicates Wales, and Pink Northern Ireland. Striped squares represent areas multiple legislatures were active.

Figure 11: post-Brexit growth across the devolved parliaments.

No dismantling took place across any government in either the pre- or post-Brexit periods, meaning the graphs here represent growth only. The most striking takeaway from these graphs is the lack of change between each period. Each devolved parliament continued a pattern of incremental legislative changes using the same instruments to address the same targets across time, which contrasts with the patterns observed in policy made at the Westminster level.

Looking at the acts themselves, the majority fall into three groups. First are carbon budgets set by each of the devolved parliaments, which place legal limits on the amount of carbon which can be emitted. Westminster also sets a UK-wide carbon budget, but notably the devolved parliaments have set more stringent standards in this regard. Second are the establishment and modification of low emissions zones and their standards in Scotland, visible by the blue line at instrument 107 (planning instrument). While widespread, these are not especially remarkable in terms of representing changes to patterns of policymaking as a result of Brexit, with low emissions zones having been common across the UK and EU for many years. Also among these planning instruments, however, are a significant number of extensions to habitat protections, particularly regarding marine habitats. This further reinforces the implication of the main research that the UK is moving ahead of the EU in terms of efforts to designate natural areas for protection, not just via policies in Westminster but in the national parliaments as well.

Despite a willingness to go beyond Westminster in terms of stringency of carbon budgets, there is little indication that the parliaments are picking up slack left by patterns of disengagement in Westminster, with few target-instrument combinations representing areas where post-Brexit EU growth was not matched by an equivalent at the UK level.

A Note on Northern Ireland

The Northern Ireland Assembly was suspended between 2017 and 2020 when Sinn Fein withdrew from the Assembly in protest against the Renewable Heat Incentive scandal, forcing new elections. Northern Ireland's power-sharing system requires that the First Minister and Deputy first minister be drawn from different political communities, that is, if the First Minister is from a Nationalist party, the Deputy must be from a Unionist party, and vice versa. After the 2017 elections, no such agreement could be found, and thus no executive could be formed. As a result, during this period Northern Ireland was administered from Westminster, with no legislation being passed in the Northern Ireland Assembly. A settlement was eventually reached in 2020 which saw government return to Stormont, but in 2022, members of the Democratic Unionist Party resigned in protest against the Northern Ireland Protocol, which threatened to institute border controls between Northern Ireland and the rest of the UK, leading to another collapse of government in Northern Ireland, which lasted until January 2024.

As a result of this discontinuity of devolved government, determining any pre-Brexit legislative patterns to provide a point of comparison for post-Brexit behaviour on equal terms with the other national parliaments and Westminster is not possible in the case of the Northern Ireland Assembly.