The Failed Europeanisation of Carbon Capture and Storage (CCS)

A comparative analysis of the impact of domestic factors on six CCS demonstration projects

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Abbreviations and Acronyms

BECCS	bioenergy with carbon capture and storage
CCS	carbon capture and storage
CO_2	carbon dioxide
DAC	direct air capture
EEPR	European Energy Programme for Recovery
EU	European Union
GAL	green/alternative/libertarian
GDP	gross domestic product
GDP PPP	gross domestic product at purchasing power parity
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
MIT	Massachusetts Institute of Technology
Mt	megatonne
MW	megawatt
NET	negative emissions technology
TAN	traditional/authoritarian/nationalist

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1. Introduction

Energy use is the largest source of global carbon dioxide (CO_2) emissions (IPCC, 2007), discussions on global decarbonisation have primarily focused on changing how societies create and use energy. As identified by Dryzek (2013), a variety of discourses have formed on how to best decarbonise energy systems, with the popular discourse centred around 'ecological modernization' (p.165). Advocates of this discourse call for, amongst other measures, the greater deployment of renewable energy sources (e.g. wind, solar or hydroelectric power). However, an alternative discourse concerns itself with the development of negative emissions technologies (NETs) that potentially allow for both decarbonisation and the continued use of fossil fuels (see e.g. Stephens, 2006). Carbon capture and storage (CCS) is an example of such a NET. CCS involves the removal of CO_2 from its source (e.g. from the fumes released at power plants) or in the environment more generally, with the captured CO_2 then being stored under the earth's surface. This drastically reduces the volume of CO_2 released into the atmosphere caused by the burning of fossil fuels.

In 2008, the European Union (EU) attempted to support the implementation of CCS at coal power plants through the European Energy Programme for Recovery (EEPR), with approx. €1 billion being allocated to six privately-operated, coal-based CCS demonstration projects. Projects were funded in six different EU member states, from more natural CCS candidates, such as high coal users Germany and Poland, to candidates less suited to CCS, such as Spain and Italy. Ultimately, none of these six demonstration projects achieved implementation. Seeing as the projects were funded across member states with varying suitability to CCS, that all six projects failed is a puzzle worthy of investigation. It raises the question as to whether there were common domestic factors that were present in all cases that can explain their failure.

Considering the European Commission has committed itself to phase out coal-power, examining why these coal-based CCS projects failed may at first seem irrelevant. However, coal-based CCS is thus far the most widely pursued example of a NET in the EU. Exploring the reasons why a previous attempt to implement a NET failed can deliver insights into how newer NETs, such as direct air capture (DAC) or bioenergy with carbon capture and storage (BECCS), can be more successfully supported by the EU in the future.

There further exists an academic need to examine the failure of the CCS demonstration projects supported through the EEPR. Many studies on CCS in the EU have primarily examined domestic CCS initiatives, with European initiatives falling into the background (see e.g. Inderberg and Wettestad, 2015). These studies fail to recognise the impact that European initiatives have on domestic energy and environmental policy. Nevertheless, while this paper

intends to consider this European impact, its interest lies in examining how domestic factors influence the implementation of European initiatives. Theories on Europeanisation thus lend themselves as an ideal framework. While other studies have already examined the Europeanisation of the CCS Directive (see e.g. Fischer, 2012), these haven't explored the role of the EEPR in detail. Moreover, funding schemes such as the EEPR are underexamined within Europeanisation studies. An analysis of the impact of the EEPR on the development of CCS could thereby deliver insights into which domestic factors determine the success of European funding initiatives more generally.

In light of the existing stand of research, theories on Europeanisation are employed to answer the following question: which domestic factors led to the CCS demonstration projects funded under the EEPR to fail? As a variety of domestic factors could impact CCS development, to discern causality, a classification posited by Radaelli (2000) is adopted to code the outcome of each demonstration project based on the magnitude of failure. Common domestic factors are then detected through a comparative methodology.

The paper proceeds as follow: The next section offers a brief overview of theories on Europeanisation, elaborates on how the 'three-step' approach proposed by Risse, Cowles and Caporaso (2001) will be applied to the research question and discusses which domestic factors are anticipated to have impacted on the development of CCS. The third section generates case designs, elaborates on the criteria for case selection, and specifies data sources. The fourth section justifies the selection of the British and Italian cases for closer comparison. The fifth section compares the British and Italian cases along the domestic factors, performs an empirical analysis on how the common domestic factor detected (executive right-affiliation) impacted the British and Italian cases, and applies these findings to other EEPR cases to confirm validity. The final section concludes and offers implications on the study's findings for the development of CCS and other NETs within the EU, as well as for theories on Europeanisation more generally.

2. Theoretical Framework

2.1 Theories on Europeanisation and the 'Three-Step' Approach

Theories on Europeanisation seek to assess the effectiveness of European policies at the domestic level, while also analysing how new European opportunities and constraints affect national politics (Vink and Graziano, 2007). The Europeanisation approach differs from classic theories on European integration in that the domestic level serves as the primary level of analysis. As such, the most common conceptualisation understands Europeanisation to be the domestic adaptation to European regional integration. Theories on Europeanisation adopt the

same definition of regional integration as other conventional theories on European integration, namely the formation of closer economic or political linkages among states in close geographical proximity. Domestic adaptation (or domestic change) is a term that is understood broadly within theories on Europeanisation, referring to the administrative adaptation of the executive, of interest groups more generally, as well as the general normative effects for substantial political issues.

Risse, Cowles and Caporaso (2001) formulate a 'three-step' approach to explain how the process of Europeanisation can result in domestic change (see Figure 1). In the first step, a new EU norm, rule or procedure is generated (known collectively as Europeanisation processes), which necessitates some degree of domestic adjustment from the member states. In the second step, a 'goodness of fit' is generated between the Europeanisation process, on the one hand, and existing domestic structures, on the other. A significant gap between these two factors generates a 'policy misfit', which exerts adaptational pressure on domestic structures. Significant misfit results in high adaptational pressure that provides an impulse for domestic change to occur. The third step considers the mediating factors that mitigate high adaptational pressure, with these determining whether adaptational pressure results in domestic change. Indeed, mediating factors can both work for and against domestic change occurring. On the one hand, multiple veto points impede structural adaptation by increasing the difficulty with which a winning coalition can be formed to introduce institutional change (Tsebelis, 1995). On the other, mediating formal institutions increase the likelihood of domestic change occurring through the provision of material and ideational resources.

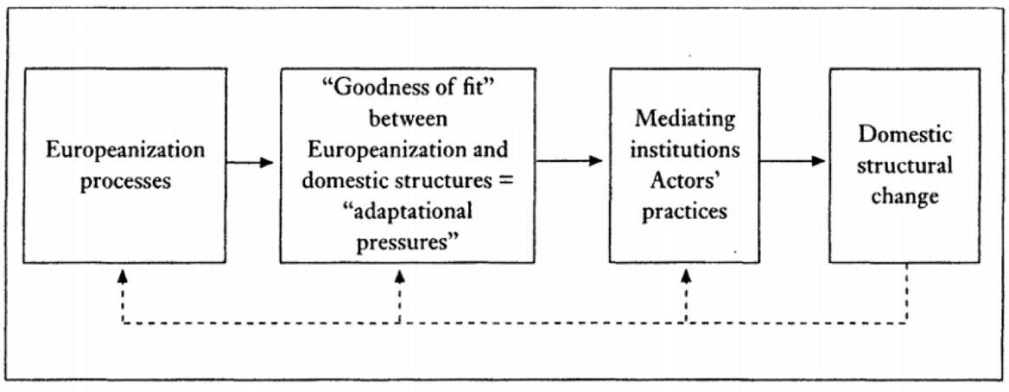

Figure 1: The 'three-step' approach to Europeanisation and domestic structural change (Risse, Cowles and Caporaso, 2001, Fig 1.1, p. 6)

The 'three-step' approach is adopted here to examine the process by which the CCS demonstration projects funded under the EEPR were implemented within the member states. In

so far, the funding released under the EEPR can be identified as the Europeanisation process. In terms of identifying the 'goodness of fit', the prior completion of a coal-based CCS demonstration project will be taken as the criteria for 'fit'. As only a single member state (Germany) had completed a coal-based CCS project, most member states were subject to a high degree of adaptational pressure. As such, analysing the role played by mediating factors is crucial. The paper identifies veto points coming in the intervention of the judiciary or in the form of public opposition. While the presence of a federal system is also expected to create veto points, as Germany is the only federal state among the six cases, the presence of a federal system will not be included as a domestic factor for comparison. The mediating actors for this study will be national governments in their support for the energy companies operating the demonstration projects. This support can come in the shape of financial support (i.e. via capital investment) or technical-administrative support (i.e. through public participation or support for projects).

Financial support is taken as a criterion for mediation due to the large amount of capital investment required for the development of CCS projects, with the EEPR funding only covering part of the total development costs. If no additional public or private investment could be generated, for a project to proceed, the companies operating would have to act as the sole carriers of risk. Such a scenario is anticipated to disincentivise the energy companies from circumventing or resisting the efforts of veto players. Moreover, the risks involved in investing in a novel technology such as CCS create higher barriers to private capital, meaning public financial support would have been vital for this scenario to be avoided. As to the second criterion, CCS's status as a novel technology creates technical and administrative hurdles, which opposing actors could use as veto points (e.g. through judicial appeals against planning permits). Support through national governments would have helped to prevent or overcome this.

2.2 Domestic Factors That Impede Government Support for CCS Projects

Four domestic factors that are expected to impede government support for CCS demonstration projects can be identified: Firstly, prior research has demonstrated the importance of public responses and public opposition for the implementation of CCS projects (see e.g. van Alphen et al., 2007). A hypothesis is thus generated that if public opposition against a demonstration project is formed, then participation by governments will be less likely, due to the potential electoral consequences that this might incur. Moreover, if public opposition is present, this is also hypothesised to increase the likelihood of judicial appeals being made to prevent projects from proceeding. Secondly, the presence of a national election is posited to have a negative

effect on government support for CCS projects. Katsimi and Sarantides (2012) posit that during election years, public spending shifts towards current expenditures at the expense of public investment. The presence of an election year would thus reduce the likelihood of public capital investment in CCS demonstration projects. Thirdly, the ideological affiliation of the ruling government is expected to have an impact, as left-affiliated governments are more disposed to provide investment and participation than right-affiliated governments (Laver and Budge, 1992). Right-affiliation is thus hypothesised to have a negative effect on government support for CCS demonstration projects, with left-affiliation hypothesised to have a positive effect. Finally, general economic conditions are expected to influence governments' willingness to support CCS projects, with poor economic conditions hypothesised to disrupt governments' ability to provide capital investment. The paper thus hypothesises that if a member state's economy is weak, then this will have a negative impact on its government's ability to support its demonstration project (and vice versa).

2.3 Operationalisation of Variables

For the operationalisation of the dependent variable, the paper will make use of the classification of domestic change resulting from Europeanisation first posited by Radaelli (2000). This classification allows for both the determination of the magnitude of domestic change (i.e. how much change occurred), as well as its direction (i.e. positive or negative change). Four possible outcomes can be discerned, though only the latter two negative outcomes of 'inertia' and 'retrenchment' are relevant for this study. Inertia refers to a lack of change, which can come in the form of delays in the transposition of directives or implementation of European initiatives, as well as protracted resistance to Europeanisation processes. Retrenchment refers to an outcome in which, as a result of Europeanisation processes, national policy has become distinctly less European. This can result from the transposition of directives which render them void at the national level, as well as derogation from European regulations. While it is possible to identify all cases as mere failure, differentiating between inertia and retrenchment allows for the identification of the factors that ruled out the implementation of CCS at the national level altogether (retrenchment), as opposed to those that only delayed its implementation (inertia). This will give insight into the domestic factors which, if present, were detrimental to the implementation of CCS.

The independent variables (i.e. the domestic factors) are operationalised as follows: Firstly, local opposition to CCS projects will be detected through the presence of protests. A binary variable between 'presence of protests' or 'absence of protests' is created for this, with no minimum value for the size of protests or their frequency required. Secondly, 2010 is taken

as the year of reference for detecting the presence of national elections, as it was the first year that public support could have occurred (with EEPR funding awarded in December 2009). The shift from public investment to current expenditures caused by an election at this stage of development is expected to have been detrimental to the progression of demonstration projects. Thirdly, the ideological affiliation of government will be operationalised based upon the programmes of the party or parties involved in government, with a binary left-right categorisation being adopted. Finally, changes in the gross domestic product (GDP) are taken to indicate the national economic performance of the member states. To account for the disparate economic backgrounds of the six cases, gross domestic product at purchasing power parity (GDP PPP) is taken as the unit of measurement (this is further weighted in 2011 US dollars). Change in GDP PPP from the years 2010 to 2014 is measured, as this was the period in which demonstration projects primarily sought additional investment.

3. Methodological Framework and Data

3.1 Generation of Case Designs

As the cause of failure for all demonstration projects is to be explained, the paper adopts a comparative framework based around the outcome measured on the dependent variable (domestic change). Considering that two outcomes are available on the dependent variable, the preference is for a comparative design comparing an inertia outcome with a retrenchment outcome. This is in the expectation that the inertia and retrenchment case will largely have the same characteristics, with the retrenchment case containing an additional domestic factor that can thus be argued as being causal for retrenchment. This case selection would opt for a 'most-similar' design, comparing the two member states with the greatest incentives and resources available for public support for the CCS projects (the criteria for this are specified later in this section). The presence of the independent variables would then be tested in both cases and compared to detect for the variance.

In light of the small number of cases in this study, an alternative design is also outlined should no suitable inertia–retrenchment pairing be available. Such a design would involve the comparison of two inertia outcomes or two retrenchment outcomes with each other. For this case selection, the study would adopt a 'most-different' design, selecting the case with the greatest amount of incentives and resources available for governments to publicly support CCS, as well as the case with the least amount of incentives and resources. Both cases would then be compared to identify common domestic factors. The paper would then proceed to analyse the impact common domestic factors had on the two cases in detail, before considering the wider impact on the other projects funded under the EEPR to confirm validity.

For either case design, four selection criteria are identified that, if fulfilled, should have provided both the necessary incentives and available resources for governments to publicly support CCS: Firstly, it would be expected that the higher the percentage of coal present in a member state's electricity mix, the greater the incentive a member state will have to adopt CCS and the more likely public support is to occur (and vice versa). Secondly, if a member state transposed the EU CCS Directive (Directive 2009/31/EC) without alteration, then CCS should be less contentious within this member state. Unaltered transposition is thus hypothesised to make projects both more likely to receive public support and less likely to generate public opposition (and vice versa). Thirdly, if a member state is a 'pace-setter' for CCS (i.e. an advocate for its use) at the European level, it would be expected to be more likely to offer public support for CCS projects (Börzel, 2002). By contrast, if a state is considered to be a 'fence-sitter' or 'foot-dragger', it's expected to be less likely to do so. Finally, if a member state is considered a policy 'leader' within the EU, it would be expected to have greater capacities to offer technical-administrative support to CCS projects (Börzel et al., 2010). If a member state is considered to be a 'laggard' or in the mid-field, it would be expected to have fewer resources at its disposal for doing so.

3.2 Data Sources

To classify the outcome of each demonstration project, data are taken from the 'Carbon Capture and Sequestration Project Database' published by the Carbon Capture and Sequestration Technologies Program from the Massachusetts Institute of Technology (MIT) (MIT, 2016).

As for the independent variables, data are gathered as follows: Firstly, data on protests against the CCS demonstration projects are gathered from news reports and government reports featured on each demonstration project's entry in the aforementioned 'Carbon Capture and Sequestration Project Database'. Secondly, data on government left-right affiliation are gathered from 'The Manifesto Project' database maintained by the *Wissenschaftszentrum Berlin für Sozialforschung* (Volkens et al., 2019). The 'right-left position' indicator in this database classifies parties as negative or positive integers based on a range of political positions, with negative values indicating a left-orientation and positive values a right-orientation. Values are taken from the most recently published manifestos before or during 2010. For coalition governments, a weighted average will be calculated based on the percentage of parliamentary seats each party holds within the government. Thirdly, the presence of an election year is also taken from 'The Manifesto Project' database, with the presence of manifestos for a member state in the year 2010 indicating that an election occurred. Manifestos compiled for European parliamentary elections or local elections within centralised systems will not be considered.

Finally, data on changes in GDP PPP between 2010 and 2014 are gathered from the World Bank's (2019) 'Open Data'.

Data for the case selection criteria are gathered as follows: Firstly, data on the percentage of coal used in electricity generation are taken from country profiles published by the International Energy Agency (IEA). Secondly, data on the transposition of the EU CCS Directive are gathered from a study by Shogenova et al. (2014). Thirdly, data on which member states were 'pace-setters' for CCS in the EU are gathered from previous national case studies on CCS, as well as from studies on CCS negotiations at the European level. Finally, data on the status of the member states as policy 'leaders' or 'laggards' are gathered from an overview of the EU-15 in this regard by Börzel et al. (2010), with additional data for the classification of Poland taken from a study by Börzel and Sedelmeier (2017).

4. Case Selection

4.1 Adoption of a 'Most-Different' Design Between the UK and Italy

Defining the outcome of the six cases according to Radaelli's (2000) classification gives the following result:

Project	Outcome	Reason
Belachatow, Poland	Inertia	Unable to secure public or private financing
Compostilla, Spain	Inertia	Demonstration project completed but not proceeded to full implementation.
Don Valley, UK	Inertia	Unable to secure public financing
Jänschwalde, Germany	Retrenchment	Local opposition; transpostion of EU CCS Directive that allowed for banning of CCS in the Bundesländer
Porto-Tolle, Italy	Inertia	Unable to gain operating license; unable to gain public or private financing
ROAD, Netherlands	Inertia	Unable to secure private financing

Table 1: CCS projects funded under the EEPR classified by outcome

Most cases are classified as inertia, with only the German case classified as retrenchment. Germany is classified as retrenchment due to *Bundesrat* adding a '*Länderklausel'* during the transposition of the EU CCS Directive, which gave the *Bundesländer* the right to ban the development of CCS within their territories (Volmer, 2011). As such, this granted them the opportunity to deviate from European policy. The introduction of the '*Länderklausel'* led the *Brandenburg* state government to openly question continued public support for the Jänschwalde CCS demonstration project, out of fears *Brandenburg* would become the only state in Germany to permit CCS plants (Welters, 2011). This questioning of public support led Vattenfall, the company operating Jänschwalde, to subsequently shelve the project.

Seeing as Germany is the only case with variance on the dependent variable, a 'most-similar' design featuring Germany is the most preferable option for the case selection. However, considering the prominence of the *Bundesrat* in the failure of the Jänschwalde project, this suggests that a veto point created by German federalism is the decisive factor in public support for the project falling away. As Inderberg and Wettestad (2015) have already discussed the impact of German federalism on the implementation of CCS within Germany at length, in the interest of the discovery of additional domestic factors, a 'most-different' design between two cases of inertia is thus adopted.

A comparison of the five cases of inertia along the criteria determining the availability of incentives and resources for public support for CCS is summarised below:

Country	Coal in electricity generation (% + Year)	Transposition of EU CCS Directive	Pace Setter–Fence Sitter–Foot Dragger	Leader–Laggard
Italy	16 (2008)	Permitting with restrictions	Foot Dragger	Laggard
Netherlands	27 (2006)	No restrictions	Pace Setter	Leader
Poland	55 (2009)	No permitting except for research	Fence Sitter	Laggard
Spain	15 (2008)	No restrictions	Foot Dragger	Mid-field
UK	29 (2010)	No restrictions	Pace Setter	Leader

Table 2: Presence of incentives and resources for public support in the inertia cases

The comparison shows that the UK is the case with the greatest amount of incentives and resources for public support: Firstly, as of 2010, a significant portion (29%) of its electricity was generated by coal (IEA, 2012). Secondly, it transposed the EU CCS Directive into national law without alteration, permitting the use of CCS in its entire territory for both commercial and research purposes. Thirdly, the UK has been a 'pace-setter' for CCS and helped push it onto the EU's energy agenda in 2007 (Fischer, 2012). Finally, the UK is considered to be a policy 'leader' in the EU, having the necessary institutional capacities and resources to implement European regulations (Börzel et al., 2010).

By contrast, Italy is the case with the least amount of incentives and resources: Firstly, as of 2008, coal played a lesser role (16%) in its electricity generation (IEA, 2010). Secondly, it altered the EU CCS Directive to a significant degree, banning the use of CCS in areas of seismic activity, effectively limiting the use of CCS to scattered parts of Northern Italy and the Southern tip of the province of Puglia. Thirdly, due to its inability to make use of CCS in large parts of its territory due to its seismically active zones, Italy was opposed to CCS landing on the European energy agenda (Fischer, 2012). Finally, Italy is considered to be a policy 'laggard' within the EU, often lacking the necessary bureaucratic efficiency and adequate resources to properly implement European regulations (Börzel et al., 2010).

To detect common domestic factors to both cases, a 'most-different' design comparing the cases of the UK and Italy is thus adopted.

5. Empirical Analysis

5.1 Executive Left-Right Affiliation as the Common Domestic Factor

Table 3 shows the variance in the domestic factors across the British and Italian cases:

Country	Right-left value	Election in 2010	Protests	Change GDP PPP 2010–14 (%)
UK	15.52 (Right)	Yes	No	9.16
Italy	10.7 (Right)	No	Yes	-8.26

Table 3: Comparison of the independent variables in the British and Italian cases

A common domestic factor can be found in the left-right affiliation of both national governments, with both Italy and the UK having governments with a right-affiliation. Local protests only took place against the Italian Porto-Tolle project (Trabattoni, 2012). The presence of an election could also only be found in the UK, with a national parliamentary election taking

place in May 2010. There was also a disparity in the economic conditions in both countries, with Italy experiencing a contraction, while the UK grew in the same period.

As previously outlined, executive right-affiliation is anticipated to have a negative impact on the development of CCS demonstration projects. This is because right-affiliated governments are less disposed to provide public investment and participation than left-affiliated governments (Laver and Budge, 1992). This preference of right-affiliated governments could have thus prevented them from supporting the energy companies in bringing their demonstration projects to completion.

A closer analysis of each case is now undertaken to determine whether this hypothesised association between right-affiliated governments and public support for the CCS demonstration projects bore itself out empirically.

5.2 The Impact of Executive Right-Affiliation on the UK and Italy

5.2.1 UK: The Don Valley Project

The Don Valley CCS project was to involve the construction of a brand new 650 MW coal power plant with the ability to capture 4.5 Mt CO_2 per year, representing about 90% of the CO_2 generated. The captured CO_2 was then to be transported via onshore pipeline for storage offshore in deep saline formations.

The change in 2010 from a left-affiliated government under the Labour Party to a right-affiliated coalition government between the Conservative Party and the Liberal Democrats seems to have had an impact on public support for the Don Valley project, as well as the development of CCS within the UK more generally. For instance, the left-affiliated Labour government had proposed the introduction of a levy to fund the development of additional CCS test plants. This was subsequently dropped by the coalition government in 2011. Indeed, the coalition government also generally did not support the CCS projects which the Labour government had supported. This included the Don Valley project, with the coalition government deciding in 2012 to not offer additional funding to Don Valley via the British CCS commercialisation programme (Murray, 2014). This led the European Commission to decide against granting the Don Valley its full funding under the EEPR (European Commission, 2016). This lack of public support through the coalition government appears to have been partially compensated by private investment, however. The operator, 2Co Energy, had considerable success in generating capital, securing an estimated £7 billion in private investment. Nevertheless, the decision of the British government to not supplement this private investment with public funding led 2Co Energy to sell the project to Sargas. Sargas then announced its

intention to convert Don Valley into a natural gas CCS project, ending its status as a coal-based CCS project.

Thus, the generation of private investment was insufficient to overcome the coalition government's lack of financial support for the Don Valley project. Indeed, no veto players can be identified in this case, with no local protests formed and the centralised nature of British politics all but eliminating systemic veto players. This lack of veto players allows for the ready identification of a right-affiliated government, which failed to mediate adaptational pressure through a lack of public investment or public participation, as being a cause in the failure of the Don Valley project.

5.2.2 Italy: The Porto-Tolle Project

The Porto-Tolle CCS project involved the conversion of an existing 250 MW oil boiler into a CCS-capable coal generator, with the potential to capture 1 Mt of CO_2 per year. The captured CO_2 was then to be transported via pipeline for storage in saline formations under the Adriatic Sea.

There was no public investment offered by the right-affiliated Italian government for the Porto-Tolle project, although ongoing austerity efforts did not provide a conducive environment for public investment. Indeed, the right-affiliated Berlusconi government appears to have been otherwise supportive of the Porto-Tolle project. This can be seen in the attempted introduction of a special measure within the government's failed 2011 national budget, which sought to permit the conversation of oil-fuelled power stations into clean coal stations (Trabattoni, 2012). This was in response to Italy's highest administrative court, the State Council, annulling the project's operating license (Kovalyova, 2011). Moreover, the Regional Government of Veneto, a right-affiliated coalition led by Lega Nord, also appears to have been supportive, with the regional government drafting legislation that reopened the possibility for the Porto-Tolle project to proceed, despite the intervention of the State Council (Trabattoni, 2012).

While the difficulties with securing operating licenses were cited as the primary reason for the final termination of Porto-Tolle, an inability to achieve the financial structure of the project was also cited as a contributing factor in this decision (European Commission, 2013). Although the project was the smallest CCS demonstration project funded under the EEPR, it still required a total of €2 billion in capital for completion. However, due to the poor condition of the Italian economy, the company leading the project, ENEL, was not successful in generating any private investment, forcing it to single-handedly fund Porto-Tolle. This left it the sole carrier of risk and likely disincentivised it to circumvent the veto of the State Council, despite pathways for this being available.

To place this within the 'three-step' approach, the Italian governments' right-affiliation does not appear to have had any effect on their ability to act as mediating actors for the Porto-Tolle project. When the intervention of a veto player threw the project's future into doubt, the regional government in Veneto drafted legislation that would have allowed for it to continue (the failed intervention of the Berlusconi government would have also provided for this). As such, considerable support was given to the company operating the project. While no public investment in the Porto-Tolle project occurred, due to the poor condition of the Italian economy, this lack of public investment cannot be linked to the governments' right-affiliation. Indeed, right-affiliated governments otherwise intervened to help the project overcome the actions of veto players. As such, a causal effect of executive right-affiliation cannot be determined in the Italian case.

5.2.3 Evaluation of Executive Right-Affiliation as a Causal Factor

An analysis of the two 'most-different' cases does not reveal a uniform attitude of right-affiliated governments to public investment and involvement in CCS demonstration projects. In the British case, a right-affiliated government scrapped a levy to raise capital for future CCS projects, declined to publicly invest in the Don Valley project via its national funding competition, and jeopardised the project's ability to secure the full sum of its EEPR funding. Considering that virtually no veto players were present in the UK case, executive right-affiliation can be shown to have had a clear effect on the government's ability to act as a mediating actor, fundamentally impacting on the ability of the energy company to bring its CCS project to completion. The same impact was not observed in the case of Italy. In order to overcome the veto exercised by the Italian judiciary, right-affiliated governments at both the national and regional level supported the Porto-Tolle project by drafting legislation that provided for this veto to be circumvented. Although both the Italian national government and regional Veneto government failed to offer public investment for Porto-Tolle, this was untenable due to the collapse in Italy's public finances and not a decision made due to a preference against public investment due to the governments' right-affiliation. Indeed, the poor condition of the Italian economy had a clear impact on the ability of the company operating to secure further private investment, leaving it the sole investor and carrier of risk. When veto players delayed the project, this status as sole risk-taker disincentivised ENEL to resist the challenge of veto players. The weak condition of the Italian economy thus appears to have had the greatest impact on the success of veto players in having the Porto-Tolle project cancelled.

5.3 Validation of the Null-Finding

As no uniform, causal effect of government right-affiliation on the development of CCS projects could be found in the two 'most-different' cases, a cursory analysis of a selection of the other cases will be carried out to confirm the validity of this null finding. On the one hand, the case of Spain suggests left-affiliated governments are more inclined to offer public support to CCS projects. This is because the Spanish project at Compostilla is both the only case to have been carried out in a member state being ruled by a left-affiliated government (see Table 4 for a summary of the left-right affiliation of all executives) and the only case to have demonstrated the ability to capture and store CO_2. Indeed, the Spanish government extensively participated both financially and technically in the development of its CCS demonstration project, with public money being spent through a state-owned research and development institute created specifically for the development of clean coal technologies (Lupion et al., 2013). On the other hand, the Dutch case further contradicts the hypothesis of right-affiliation having a negative impact on public support. The right-affiliated Dutch government invested €150 million into the ROAD project and beyond this financial assistance, the Dutch Ministry of Economic Affairs gave the project considerable assistance in acquiring environmental permits and local planning permissions (Read et al., 2014). This demonstrates the Dutch government acting as a mediating actor despite its right-affiliation.

Country	Right-left value
Germany	7.48 (Right)
Italy	10.7 (Right)
Netherlands	15.21 (Right)
Poland	5.52 (Right)
Spain	-22.9 (Left)
UK	15.52 (Right)

Table 4: Executive left-right affiliation values for all cases
(Positive values indicate a right-affiliation, negative values indicate a left-affiliation)

As such, an analysis of the impact of right-affiliation in the other cases confirms that executive left-right affiliation does not have the uniform, causal effect on public support for the

CCS projects that was theoretically expected. While the progress achieved in the Spanish project would suggest some positive impact of executive left-affiliation, due to it being the only left-affiliated government among these cases, this cannot be further validated within this study.

6. Discussion & Conclusion

This study aimed to analyse the domestic factors which contributed to the failure of six CCS demonstration projects funded under the EEPR using theories on Europeanisation. The UK and Italy were chosen as the cases for closer analysis, as they represented the two cases with the greatest and least amount of incentives and resources available for government support to the CCS projects, respectively. Upon comparison, executive right-affiliation was found to be the domestic factor common to both the British and Italian cases. Both cases were then analysed to determine whether, due to the tendency of right-affiliated governments to have a preference against public investment and participation, this interfered with the governments' ability to mediate the adaptational pressure generated by the EEPR funding. This was found to not consistently be the case. On the one hand, in the case of the UK, a right-affiliated coalition government indeed hindered the ability of a CCS demonstration project to proceed, despite the total absence of veto players. On the other hand, in the Italian case, while the weak Italian economy made public investment untenable, right-affiliated coalition governments at both the national and regional level sought to help an energy company bypass the efforts of veto players. This null-finding was then verified by briefly examining the effect of executive left-right affiliation in the case of Spain and the Netherlands, with similarly inconsistent findings being found. However, the case of Spain suggests that executive left-affiliation is indeed more conducive to the development of CCS as a technology.

As this study could not make any satisfactory conclusions about the independent variables common to the failure of the six EEPR projects, further research is needed on identifying what these domestic factors are. To clarify whether left-affiliated governments do indeed have a positive impact on the implementation of CCS, an avenue for future research could thus be a case study on the development of CCS in Spain. Another avenue could be an analysis of these six cases along the green/alternative/libertarian (GAL) to traditional/authoritarian/nationalist (TAN) dimension. Others such as Hooghe, Marks and Wilson (2002) have argued GAL-TAN to be a better dimension to explain differing governmental responses to European integration than the left-right dimension. The GAL-TAN index could thus clarify the inconsistencies found in the attitudes of right-affiliated governments to public support for CCS projects.

Despite the lack of a consistent finding, some insights have been generated for both CCS and future NETs, as well for studies on Europeanisation. To the former, as suggested by the

Spanish case, the development of novel, capital-intensive technologies could benefit from the extensive investment and technical involvement of public actors. Thus, if the EU decides to support the development of newer NETs in the future, this could depend on significant public financial and technical involvement by the governments of the member states. As to theories on Europeanisation, the analysis of the British case demonstrated that an absence of veto players does not automatically guarantee success for European initiatives. Indeed, even in circumstances where the conditions for domestic change are favourable (as was the case with CCS in the UK), the support of mediating actors is still needed for implementation to occur. This study also has implications for European funding schemes as 'Europeanisation processes'. Due to their often-limited financial scope, this study suggests that European funding schemes should be combined with public funding at the national level. Failing to do so could leave the projects being funded vulnerable to turbulent markets and the risk-aversion of private investors, as was the case with many of the CCS demonstration projects funded under the EEPR.

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