FACULTEIT ECONOMIE EN BEDRIJFSKUNDE

THE EFFECTS OF A NO-DEAL BREXIT ON THE FUTURE OF THE IRISH SINGLE ELECTRICITY MARKET: A POLICY ANALYSIS ON THE SHORT AND LONG TERM SUSTAINABILITY OF THE SEM

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Nederlandstalige Samenvatting

De masterproef beschrijft de invloed van een no-deal Brexit op de eengemaakte Ierse elektriciteitsmarkt. De eerste onderzoeksvraag die werd gesteld was: 'Welke veranderingen met effect op de Ierse eengemaakte elektriciteitsmarkt zullen zich voordoen als het Verenigd Koninkrijk de Europese Unie verlaat zonder een overeenkomst?'. Een documentanalyse bracht aan het licht dat talrijke delen van de elektriciteitsmarkt die onder de bevoegdheid van de eengemaakte elektriciteitsmarkt vallen fundamenteel zullen veranderen op korte termijn. Deze veranderingen zijn te wijten aan het feit dat de basis voor de samenwerking tussen Ierland en Noord Ierland berust op beleidskaders uitgevaardigd door Europese instellingen. Bij het verlaten van de EU zonder bijkomende overeenkomsten zouden deze beleidskaders worden opgeheven.

De tweede onderzoeksvraag luidde: 'Welke veranderingen na het verlaten van de Europese Unie zullen het moeilijkst te mediëren zijn om de eengemaakte elektriciteitsmarkt te behouden?'. Hieruit bleek dat nagenoeg alle veranderingen die werden geïdentificeerd kunnen worden opgelost indien de betrokken partijen dit zouden willen. Toch zouden niet alle aanpassingen even evident zijn om in te voeren. Het model van Cleaves (1980) werd in aangepaste vorm toegepast om te onderscheiden welke veranderingen gemakkelijk gerealiseerd zouden kunnen worden en welke niet. Het model beoordeelde dit op basis van vooraf gedefinieerde eigenschappen van de nodige beleidsverandering. De balans van deze eigenschappen categoriseerde de beleidsveranderingen als 'meer problematisch' of 'minder problematisch' om te bepalen en te implementeren. Er werd ontdekt dat de meer problematische beleidsveranderingen voornamelijk te maken hadden met de nood om doorgedreven EU wetgeving en handhavingsmechanismen in te voeren. Ook elementen die kenmerkend zijn voor de Ierse elektriciteitsmarkt en de Britse politieke cultuur werden verwacht een invloed uit te oefenen op het voortbestaan van de Ierse eengemaakte elektriciteitsmarkt.

De discussie onderzocht vier paden die het Verenigd Koninkrijk zou kunnen kiezen om de Ierse eengemaakte energiemarkt te behouden: lidmaatschap van de Europese Economische Ruimte, lidmaatschap van de Europese Energie Gemeenschap, bilaterale overeenkomsten en de mogelijkheid tot een nieuw multilateraal energiekader. Er werd geconcludeerd dat alle opties om de eengemaakte energiemarkt te behouden in zijn huidige vorm, lidmaatschap van, of op zijn minst een nauwe samenwerking met, de Europese interne energiemarkt zouden inhouden. Om dit te realiseren zou het onvermijdelijk zijn dat het Verenigd Koninkrijk Europese regelgeving en richtlijnen zou moeten toelaten op zijn grondgebied. Om te vermijden dat het Verenigd Koninkrijk in plaats van een regelzetter, een regelnemer zou worden, werd een scenario aangeraden waarbij de UK via bilaterale of multilaterale overeenkomsten een energiesamenwerking kan onderhandelen waarin het land nog een significante invloed kan uitoefenen op de Europese Unie's energieregelgeving.

English Abstract

The dissertation described the influence of a no-deal Brexit on the Irish Single Electricity Market. The first research question was: 'Which elements of the Irish wholesale Single Electricity Market will change if the United Kingdom leaves the European Union without an agreement?'. By means of a document analysis it was found that multiple areas of the electricity market that fall under the competences of the Single Electricity Market would face significant changes in the short term. Most changes can be related to the fact that the cooperation between the Republic of Ireland and Northern Ireland makes use of EU rules and guidelines that would cease to apply in case of a no-deal Brexit.

The second research question was: 'Which changes after a no-deal Brexit will be the most challenging to mediate to sustain the SEM?'. It was found that nearly all changes could be mediated to sustain the Single Electricity Market. However, not all mediating adjustments would be equally challenging to realise. The model of Cleaves (1980) was used in an adapted form to distinguish between policy changes that would be easy to negotiate and implement and policy changes that would not be. The model made a categorisation based on a set of pre-defined policy characteristics. These characteristics determined if the mediating policy changes were 'more problematic' or 'less problematic' to decide and implement. It was discovered that more problematic changes mostly related to the need to implement extensive EU frameworks and enforcement mechanisms. Also elements specific to the Irish electricity markets and the British political culture were found to impact the survival chances of the Single Electricity Market.

The discussion explored four paths that the UK could choose to sustain the Single Electricity Market: EEA membership, membership of the European Energy Community, bilateral agreements and a new multilateral framework. It was concluded that all possible scenarios would entail some form of membership or cooperation with the European Internal Energy Market. This would inevitably lead to the UK having to adopt EU rules and guidelines to some extent. To prevent the UK from transforming from rule-setter to rule-taker, it was recommended to move towards a solution in which the UK via bilateral or multilateral agreements can retain of influence over European electricity frameworks

Preface

I would like to thank professor Claire Dupont for her guidance during the writing of this dissertation. Her advice that made it possible for me to continuously improve my work. I also want to thank her for her trust and believe in my abilities to tackle this slightly unconventional dissertation topic. Writing this dissertation was an inspiring journey. I started the academic year knowing little about electricity markets but ended up being fascinated by its many aspects.

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1. Introduction

On the 29th of March 2016, then Prime Minister Theresa May triggered the article 50 procedure to negotiate the exit of the United Kingdom from the European Union in a letter to the President of the European Council Donald Tusk. From day one, the Irish border was one of the main matters of contention in the discussion leading up to the exit (Hayward, 2018). Not only the visible border between the Republic of Ireland and Northern Ireland, also the less tangible, but equally complex, connections between both countries might become subject to profound change due to Brexit. One of these connections was established through cross-border cooperation on the form of the Single Electricity Market that was established in 2006 between the Republic of Ireland and Northern Ireland to modulate wholesale electricity distribution on the entire Irish Island.

The dissertation discusses the influence of a no-deal Brexit on the sustainability of the Irish Single Electricity Market and its connection with the European Internal Energy Market after the UK would leave the EU. The Single Electricity Market (SEM) is part of the European Internal Energy Market that is based on free energy trade and non-discrimination between internal and cross-border transfers of electricity and gas. In 2017, the SEM was reformed to conform with the EU's Third Energy Package that deepened the European Internal Energy Market. Despite the consolidation with EU legislation, the origins of the SEM are found in cooperation commitments on a national level. The SEM was established as a bilateral agreement between the UK and Ireland. Its continuation and modus operandi thus rely on the UK's and Ireland's commitment to it.

The reason why it is relevant to look at the European electricity sector from the perspective of cross-border cooperation, is that electricity trade will become more important in the future to fulfil the European Union's obligations under the Paris Climate Agreement (European Commission, 2016d; Frogatt, Wright, & Lockwood, 2017). Between 2005 and 2016, the use of fossil fuels for energy generation dropped by 11% (European Environment Agency, 2018). The share of electricity generated from renewable sources reached 29% of all gross electricity generation in the EU in 2016 (European Environment Agency, 2018). The increased use of renewable energy sources led to an annual decrease of 2.6 % in CO_2 emissions per kWh between 2005 and 2016 (European Environment Agency, 2018). Despite the advantages and future prospects of these new, renewable electricity sources, they are less predictable than classic energy sources like oil or gas (European Commission, 2016d). Therefore cooperation and interconnection between countries will become increasingly more important to realise the full advantages of renewable energy (European Commission, 2014).

The coupling of markets within Europe centres around the European Union's Energy Strategy of which one of its four dimensions is the commitment to a European Integrated Energy Market. The article 50 procedure to leave the EU states that: 'Treaties shall cease to apply … from the date of entry into force of the withdrawal agreement or, failing that, two years after the notification… unless the European

Council, in agreement with the Member State concerned, unanimously decides to extend this period'(The Member States, 2012). For the electricity market, this means that without government interference, at the moment of a no-deal Brexit, the UK would no longer have to comply with European energy frameworks and the British electricity markets could be decoupled from the European Internal Energy Market. This would jeopardise the operability of the SEM because the cooperation in the SEM would become one between an EU Member State and a third country (Department for Business, Energy & Industrial Strategy, 2019b). The main decision-making body of the SEM, the SEM Committee, issued a notice on the 28th of March 2019, the evening of the first Brexit deadline, that informed the industry that trade on the island would be affected by a no-deal departure and cross-border trade would also be disrupted to some extent (SEM Committee, 2019). Ireland is somewhat isolated from the EU's internal market, nonetheless, it does depend for a part of its electricity production on cross-border trade. Ireland's level of electricity connectivity in 2017 was 7.4% of its installed generation capacity. The country is on track to reach the 10% mark by 2020 after the completion of planned cross-border infrastructure projects (Eirgrid, 2016a). Ireland's electricity interconnectivity to the European Integrated Energy Market is currently only facilitated through the United Kingdom.

In the months leading up to Brexit, the UK government ensured the implementation of statutory instruments to facilitate the continuation of electricity trade at the moment of Brexit (Department for Business, Energy & Industrial Strategy, 2019b). These statutory instruments are temporary. To find which elements of the SEM can be subject to change in case of a no-deal Brexit, the dissertation examines the answer to two key questions. The first research question is: 'Which elements of the Irish wholesale Single Electricity Market will change if the United Kingdom leaves the European Union without an agreement?'. It is expected that a no-deal scenario could undermine the workings of the SEM (Hayward, 2018). WTO rules for example do not provide a comprehensive framework for energy trade (Pollitt, 2017). This leads to the second research question: 'Which changes after a no-deal Brexit will be the most challenging to mediate to sustain the SEM?'. This question allows to delve deeper into the complexities of SEM in relation to the EU membership of both SEM members and adds an explanatory angle.

2. Research Design

The dissertation discussed the changes to the Irish single wholesale electricity market in case of a no-deal Brexit. It examined the effect on the internal cooperation and interaction between stakeholders as well as its connection to the European Internal Energy Market and third countries. Policy documents as well as literature often discuss electricity alongside gas, oil and nuclear energy under the umbrella term 'energy'. In this analysis, only electricity trade was considered because the other energy sources do not fall under the SEM's competences. The focus was narrowed further to wholesale electricity markets as the SEM is responsible for the wholesale electricity market on the Irish island. Wholesale electricity

markets were defined in the dissertation as the markets into which generators sell their energy and where it can be purchased by distributers to resell to consumers and industry (Fredriksson, Roth, Tagliapietra, & Zachmann, 2017). The wholesale electricity market is also the market into which electricity is imported for use on the island and via which electricity is sold for export (Fredriksson et al., 2017). Effects on consumers or industry were not discussed due to the narrowed focus on the SEM. The interpretation of a no-deal Brexit was the strictest one, namely the scenario in which the United Kingdom leaves the European Union without any form of trade agreement. In the no-deal scenario, WTO rules would apply. It must be acknowledged that a strict no-deal scenario is an unlikely situation for any EU Member to find themselves in since the article 50 procedure foresees a two-year negotiation period to give a country the time to negotiate alternative agreements. The strictest interpretation of a no-deal however is the most unambiguous one. It allowed to objectively analyse documents to answer the research questions since there would be an objective policy position to compare the pre-Brexit operations of the SEM to.

First, a literature review was made to frame the case of the SEM in light of Brexit. The literature review first presents relevant background information on the European Internal Energy Market and the SEM. Second, since the UK will be a third country in its relation to the EU, theories and policy relating to the European Internal Energy Market and third countries were discussed. Academic research on why third countries choose to closely cooperate with the EU in terms of electricity trade was also included in this part. Third, the literature review presents the research that has already been conducted about the potential effects of a no-deal Brexit on the energy markets of the European Union, the UK and Ireland.

The main body of the dissertation consists of a document analysis that identifies which elements of the SEM will change in case of a no-deal Brexit. All changes fall under categories that were referred to as ‘building blocks’. The building blocks were the metaphorical blocks that build the larger picture of the SEM after Brexit and are essentially the overarching categories under which all changes can be placed. The building blocks allowed to create structure to the data found in policy documents and academic sources. To provide an overview to the reader, the building blocks were displayed in tables that indicate which changes will occur. The second part of the policy analysis discusses which changes after a no-deal Brexit will potentially compromise the operability of the SEM. For each change that was expected to jeopardise the continuation of the SEM, the needed policy reform was sought to mediate this change. An adapted version of the model of Cleaves (1980) was used to determine if the policy reforms needed to sustain the SEM would be more or less problematic to decide and implement based on the policy’s characteristics. Changes with more problematic solutions were considered changes that might compromise the operability of the SEM after a no-deal Brexit.

After the policy analysis, a discussion part was included that reflects on the findings. Four possible future scenarios for EU-UK electricity relations were looked at: membership of the European Economic

Area, membership of the European Energy Community, bilateral agreements and a new multilateral framework. The advantages and disadvantages of each of these scenarios for the SEM were discussed based on the findings of the dissertation. This led to a policy recommendation on which type of trade agreement would mediate the biggest challenges to the SEM.

The dissertation closes with a conclusion that provides a summary of the findings. It also made a critical reflection on the overall strengths, weaknesses and constrictions of the research approach and findings. This was also the place where further research paths were explored.

3. Methodological Design

A policy analysis of Irish, British and EU electricity policy frameworks was made to uncover the effect of a no-deal Brexit on the Irish Single electricity market. The definition of Geva-May and Pal served as the definition for a policy analysis in this dissertation namely 'a course intended to choose the best policy alternatives among a set of alternatives with the aid of evidence and reason and which makes use of multiple methods of inquiry and argumentation to produce and transform policy-relevant information that may be utilised in political settings to resolve public problems' (Geva-May & Pal, 1999: 262-263).

3.1. Methodology

To find which changes affecting the SEM, would occur after a no-deal Brexit, a document analysis was conducted. The document analysis is considered a suitable method for in-depth studies of a single case, which in this dissertation is the SEM in context of Brexit (Bowen, 2009). To create an overview over the vast amount of information, the reoccurring themes were identified using a thematic analysis. In the early phase of reading the literature, re-occurring themes were determined. These themes were referred to as building blocks. For the building blocks derived from policy directly, they were found after a first reading of the electricity policy frameworks of the EU and the SEM. The Memorandum of Understanding (2006) and a guide about the SEM by Eirgrid (2016b) served as additional input because they gave a clear overview of the competences of the SEM. The building blocks not relating to policy frameworks in the strict sense were the result of re-occurring themes in the academic literature that was consulted for this dissertation.

After the building blocks were determined, a content analysis was done to explore the policy changes after Brexit. The interview method was used to extract data from the documents. In the interview method for data extraction, the researcher 'interviews' the documents by searching for the answer to a set of questions when reading the documents (Bowen, 2009). The question that was asked while reading the documents was: 'Will [building block x] be affected by a no-deal Brexit? If yes, how and in which timeframe?'.

The data from the document analysis was used to answer the second research question about which changes will be the most challenging to mediate to sustain the SEM. For each change after a no-deal

Brexit, it was explored which policy reform would be needed to keep the SEM operational in its pre-Brexit state. Then it was determined how challenging it would be to negotiate and implement these reforms. An adaptation of the model of Cleaves (1980) was made to categorise the reforms into more or less problematic to decide and implement. The model determined in which category the reforms fall based on a set of predetermined characteristics. The exact conceptualisation of the model was detailed in chapter 5.2.1. 'conceptualization: adaptation of cleaves' model'.

3.2. Data Characteristics

The evidence used to support the findings was qualitative because it came from policy documents from which textual conclusions were drawn (Witte & Witte, 2009). The decision was made to focus on legally binding documents and definitive decisions to support findings about the changes to the SEM after a no-deal Brexit. Myriad communication statements from Irish, British and EU institutions exist on the topic of the SEM, the European Internal Energy Market and Brexit. One cannot be certain that the promises and plans in these statements remain upheld. Legally binding documents, and definitive decisions do represent binding rights and obligations for the actors. Nevertheless, information from non-binding documents was used to frame the political context of the legislation and present possible future developments in the interactions between actors. Documents on the Irish and Northern Irish side consisted of decisions by the SEM Committee in the form of decision papers as well as informative and non-committal documents in the form of discussion papers. These documents were retrieved from the online database of the SEM Committee. The Memorandum of Understanding (2006) between the governments of Ireland and the UK was the most important non-binding document. It gave an overview of the vision and intent behind the Irish Single Electricity Market, which was the basis to understand the other documents drafted by Irish and Northern Irish institutions. This document was retrieved from the official website of the UK government. From the European side, regulations and directives were legally binding documents from which policy data could be retrieved. These documents were found by identifying the overarching policy packages in the exploratory phase of the research. Directives and regulations were namely often referred to by EU institutions under an overarching term. For example, the European Commission references the 'Third Energy Package' in its communications (European Commission, 2015b). The Third Energy Package is not one document, but is a collection of communications, regulations and directives that include policy decisions on unbundling, independent regulators, the agency of the cooperation of energy regulators, cross-border cooperation and open and fair retails markets. Two academic articles by Lockwood et al.(2017) and Frogatt et al. (2017) were found that listed EU energy legislation. They were used as input to check whether documents had been overlooked. Communications by EU institutions were treated as non-binding documents and thus used to contextualise policy. All documents authored by EU institutions and bodies were retrieved from the EUR-Lex database. The policy documents that were read in the context of the document analysis were listed in Appendix 1.

Academic literature and general information about the policies, organisations and programmes involved in European Internal Energy Market and the SEM complimented and strengthened the findings of the document analysis. Academic articles were retrieved from online academic databases and general information was retrieved from the websites of the actors at the subject of the informative documents.

The policy analysis had an ex ante approach because at the moment of the dissertation deadline in June 2019, the United Kingdom and the EU Member States did not manage to negotiate a mutually agreed withdrawal plan about the terms of the British exit. The timeframe for the analysis was the period before Brexit, from June 2016 when the referendum on Brexit was held until May 2019, the month before the deadline of the dissertation. Brexit was defined in the dissertation as the moment in time when either a parting agreement has been approved by the EU and the UK or the UK leaves without such an agreement. Throughout the dissertation, it was explicitly stated whether reference was made to a Brexit with an agreement or not by referring to a Brexit without an agreement as 'no-deal Brexit'. Only policy documents about policies that were in force in the timeframe stated above were considered. This decision was made for the simple reason that only those policies are expected to be in force before the UK withdraws from the European Union and hence, will be subject to change. When the policy was agreed on was not taken into account as long as it was still in force in the demarcated timeframe. Albeit it can not be definitively excluded that new electricity policies will go into force before Brexit, one can reasonably assume that no major policy changes in the electricity sector will be approved with the outlook on a different policy framework after Brexit.

Bowen (2009) warned about biased selectivity while conducting a document analysis. Researchers should not pick and choose documents to prove their theory. To avoid this pitfall, the overarching themes were identified first. Only after this, the content analysis was made that looked in depth at the changes after a no-deal Brexit. This approach secured that all relevant overarching themes in relation to the topic were included. A second bias that was important to be aware of while analysing documents was the author's bias (O'Leary, 2014). Throughout the research process, it was essential to keep the possible biases of the producers of the documents in mind. The documents used in the dissertation all have known authors that are acknowledged per in-text citations and in the bibliography to ensure transparency towards the reader about the authors of the sources.

3.3. Data Gathering and Processing

To work in a structured manner, 'The Steps in Document Analysis' by O'Leary (2014) were followed. These steps not only present clear guidelines for a document analysis, they also include ways to bypass the weaknesses of the document analysis approach. The six main steps were plan, gather, review, interrogate, reflect/refine and analyse data. The first step advised to plan the research, this included the investigation of possible extra needs like translations or ethics approval. The documents used in the analysis were all freely available in English and did not require ethics approval. The second step gave

instructions about the gathering of documents and the need for an organising method. The programme NVivo was used as a document management tool. All documents that were read for the document analysis were uploaded in this programme and provided with tags referring to their author and publication date. A list of all documents was added as Appendix 1 to give an overview of the consulted documents. In the third step, documents had to be reviewed for authenticity, credibility and bias. This was done by making sure that the policy documents were only retrieved from the official webpages and databases of the authors of said documents. In the fourth step, the content and background of the documents was explored. This was done using the interview method as described earlier. The fifth step pointed out that the document analysis is an ongoing process. Refinement of the plan as well as the continuous gathering, reviewing and interrogation of additional documents was needed. The refinements in the document analysis primarily consisted of the redefining of the building blocks to ensure all topics were covered and could be placed in a building block. While conducting the document analysis, new documents surfaced which were then included in the document list. The sixth and final step instructed the researcher to analyse the data. At that point the data was gathered and it was time to process it. The gathered data was grouped in tables that structure the information. The data was structured per building block. Under each building block, smaller topics that led to particular changes were deduced. After each chapter the data was presented in tables that summarise the findings. Inspiration for the tables was found in a paper by Fahy et al. (2017), who visualised changes in health policy after Brexit in similar tables. A distinction was made between no change, short-term change and long-term change. Short-term change was defined as immediate change and change up to one year after Brexit. Long-term change was defined as a change will unfold over 1 year after Brexit.

4. Literature Review

The literature review presents an overview of the relevant literature on the topic of the dissertation. The Single Electricity Market and the European Internal Energy Market are explained first. Since the UK will be a third country in the perspective of the EU, theories and policy relating to third countries will be looked at second. The part also includes academic theories on why third countries would choose to closely cooperate with the EU in terms of electricity trade. Lastly, the academic literature on how the European and national energy markets would be influenced by the departure of an EU member is discussed.

4.1. The Background of Irish Single Electricity Market and the European Internal Energy Market

The wholesale electricity market on the Irish island is directed by the Integrated Single Electricity Market (SEM) launched in 2006. The SEM functions as a gross mandatory pool market, meaning that all electricity produced on and imported to the island of Ireland must be sold into this market. Purchasing wholesale electricity for consumption on or export from the island also has to be done via the SEM

(Fredriksson et al., 2017). The SEM is 'designed to integrate the all-island electricity market with European electricity markets, making optimal use of cross-border transmission assets' (Eirgrid, 2016b: 3). The purpose of the SEM shows a clear connection with the European Integrated Electricity Market. The SEM however, is not an EU founded cooperation. It was established at the initiative of the Irish and UK governments in a Memorandum of Understanding (Government of Ireland & Government of the United Kingdom of Great Britain and Northern Ireland, 2006). The Memorandum is a political agreement that outlines the main structure and purpose of the SEM (Government of Ireland & Government of the United Kingdom of Great Britain and Northern Ireland, 2006). The Trade and Settlement Code (2017) determines the legally binding rules under which the market and its participants should operate. The actors that are bound to follow this code are the market operator, system operators, generators, suppliers, interconnector owners/operators and users (Frogatt et al., 2017). SEMO is responsible for the administration and operation of the Trade and Settlement Code. It is a joint-venture between the two transmission operators in the Republic of Ireland (EirGrid) and Northern Ireland (SONI). The decision-making body of the SEM is the SEM Committee. It contains members from the Commission for Energy Regulation in the Republic of Ireland, the Utility Regulator in Northern Ireland and independent experts. The SEM Committee expects to 'deliver increased levels of competition which should help put a downward pressure on prices as well as encouraging greater levels of security of supply and transparency' (Eirgrid, 2016b: 3).

The creation of the Irish Single Electricity Market can be seen as part of a bigger European effort to integrate the energy markets of EU Member States. The Memorandum of Understanding (2006) between both governments specifically states that: 'The Authorities intend that the SEM arrangements will be designed to promote the creation of a single competitive, sustainable and reliable market in wholesale electricity in Northern Ireland and Ireland within the context of the European Union's policy on the creation of an EU-wide internal market for electricity, while aiming to minimise the cost of establishing such a market' (Irish and UK government, 2006: 3). As of the first of October 2017, the inner workings of the SEM were consolidated with the requirements of the EU's Third Energy Package.

The Energy Union Strategy sets out the strategy behind the European Internal Energy Market. It has five mutually-reinforcing and interrelated dimensions designed to bring greater energy security, sustainability and competitiveness: energy security, solidarity and trust, a fully integrated European energy market, energy efficiency, decarbonising the economy, and research, innovation and competitiveness (European Commission, 2015b). The European Internal Energy Market is based on free energy trade and non-discrimination between internal and cross-border transfers of electricity and gas. This is done by coupling energy markets. All coupled markets implement the same set of common rules and standardised trading arrangements. The relation between the SEM and the European Internal Energy Market is one of nestedness (Young, 1996). The SEM is a smaller institution that is part of a functionally and geographically larger institution. Functionally, the European Integrated Energy Market covers a

larger policy area, overarching all energy matters, while the SEM is limited to the wholesale electricity market. Geographically, the European Internal Energy Market covers the whole EU area and maintains ties with third countries. The territory of the SEM is restricted to Ireland, third country electricity relations are overseen by the EU. The SEM and the European Internal Energy Market relate to each other in a vertical internal interaction (Nilsson et al., 2012). The Irish energy market is affected by decisions made in the framework of the Internal Energy Market. This was visible in the 2017 conversion of the SEM to meet the Third Energy Package that was meant to complete the Internal Energy Market. Also, the European Target Model for electricity integration was considered for the redesign of the SEM. The European Target Model is an informal reference model for developing the European Internal Electricity Market through commission issued guidelines, network codes and other instruments. One of its aims is to make electricity interconnection between EU members more efficient. This is especially relevant for Ireland due to its limited electricity connection with Great-Britain that in turn is only minimally connected to the European mainland in terms of electricity. Efficient interconnection can accommodate the large amount of renewable generation that is envisioned in Ireland in the future.

Energy policy can be traced back to the origins of the EU. Two of the three treaties that were the forerunners of the European Union, concern energy. The treaty founding the European Coal and Steel Community in 1951 concentrated on coal, then a main energy resource. The treaty founding the European Atomic Energy Community in 1957 was directed towards policing the nuclear sector. Both treaties showed a desire towards free and integrated sectors (McGowen, 1989). The treaty of Rome in 1957 also included the prospect of a common energy policy. Considering the changing balance of energy supply, supply considerations became increasingly more important the next decades (McGowen, 1989). Since 1996, directives and regulations have been signed to harmonise and liberalise the EU's internal energy market. Policy frameworks from then on aimed to gradually open the national energy markets of Member States. Specifically addressing electricity, the directive concerning common market rules for the internal energy market toughened regulations on access to markets by ordering all Member States to open their electricity markets and allow fair and equal network-access to third parties (European Parliament and the Council, 2003).

As of March 2011, all EU member states are required to enforce the Third Energy Package, a deadline that was later postponed to 2014. The aim of this legislative framework is to make a fully effective integrated energy market. It is designed to keep prices low, increase standards of service and reassure security of supply. The package consists of two directives and three regulations. The directive concerning common rules for the internal market in electricity is of relevance for wholesale electricity markets (European Parliament and the Council, 2009a). The regulation on conditions for access to the network for cross-border exchange of electricity (European Parliament and the Council, 2009d), that has to lead to better cross-border collaboration and investment, is also important in relation to electricity trade. In 2016, a new draft package for energy policy was published. Additionally, a proposal was done

that aims to make the electricity market fit for flexibility, decarbonisation and innovation by sustaining undistorted market signals (European Commission, 2016d). End 2010s, more proposals relating to electricity supply are being discussed in the European Commission. These proposals aim to revise the rules for electricity trading, clarify the responsibilities of market participants, and define principles for assessing capacity needs and for market-based capacity mechanisms. It has to be noted that not only rules and guidelines targeting energy influence energy markets, also wider EU law such as competition law and aid rules affect the European electricity market (Lockwood et al., 2017).

The European Internal Energy Market is not uncontested. Older as well as more recent literature pointed out internal contradictions within the EU's way of integrating the market. An internal contradiction that has been discussed is the combination of interventionism and free market principles (McGowen, 1989). The European Internal Energy Market tries to square the circle by combining these two seemingly incompatible concepts. Hancher (1990) criticised the inherently anti-competitive nature of the energy market. Supply of energy markets is was still mostly in the hands of regional monopolies and distribution is restricted by transmission networks. This contrasts with the desire to create an internal free trade zone for energy exchange. Padgett (1999) pointed out the territorial characteristics of how the energy market is segmented, referring to the often nationally organised supply mechanisms. Strambo et al. (2015) pointed to the inconsistency between energy security policies and climate policies. Researchers have also described interactions between energy security and climate change mitigation. For example, Criqui and Mima's (2012) scenario-analysis highlighted the dependency on the global energy context in relation to the EU's security-climate nexus. Umbach (2012) compared the way the EU and the USA balance the 'energy triangle' of energy objectives: economic competitiveness, environmental/climate sustainability and energy supply security. This research showed that even closely related policies can show inconsistency. Nilsson et al. (2012) analysed the coherence of renewable energy and cohesion policies in relation to different environmental policy areas. They found that objectives are often coherent, but instruments and implementation of policies can conflict.

4.2. The External Energy Policy of the European Union

External energy policy became a central pillar of the second strategic energy review as agreed by the European Commission in November 2008 (European Commission, 2008). The Energy 2020 Strategy that set out priorities and actions to be achieved by 2020 reiterated the three main pillars of the European energy policy: security of supply, competitiveness and sustainability. A 2011 commission communication (European Commission, 2011) that build upon the 2008 European Security Strategy, promoted further cross-border cooperation with neighbouring countries, giving a crucial role to the external dimension. Following this communication, an information exchange mechanism with regard to intergovernmental agreements between Member States and third countries in the field of energy was set to instate a framework for cooperation with third countries (European Parliament and the Council, 2017).

The UK will have to decide about its participation in the European Internal Energy Market. Hence why the question about why third countries would participate in the Internal Energy Market will have to be answered. Prange-Gstöhl (2009) developed three motives for countries with no or only vague membership aspirations: the identification motive, the independence motive and the economic motive. The identification motive explains the acceptance of European rules by pointing to a country's European identity. This motive seems less plausible for the UK. Henderson et al. (2016) found that British voters, generally speaking, did not feel a strong affinity with the EU. For English voters specifically, there was link between English nationalism and Euroscepticism, suggesting that the compatibility between Englishness and EU sentiment is low. The independence motive states that countries might join the European Internal Energy Market to keep a regional hegemon at a distance. This motive is difficult to relate to the UK. One could argue that the big regional hegemon they would face is the EU with its internal energy market whose influence reaches beyond its territory. Joining the hegemon to keep it at a distance would make it possible to retain some control by seeking decision-making power over its legislation. Russia could be considered another hegemon in the region on the energy market in general, but this does not apply to electricity trade. The country is geographically too far away to have a meaningful impact on electricity trade in the UK. The economic motive attributes the decision to join the Internal Energy Market to economic benefits. The examples of potential economic gain that Prange-Gstöhl (2009) offer, mainly include Eastern and Northern European countries. The data used was also outdated. Despite these remarks, it is plausible that the economic motive could provide a lead as to why the UK might want to sustain the SEM.

The literature has discussed the advantages of an integrated energy market extensively. Simplifying cross-border electricity trade for example secures supply in each of the countries in that market (de Nooij, 2011). Cooperation simultaneously warrants less reserve capacity which allows for a higher level of system performance (de Nooij, 2011). Economy of scale applies to the energy sector as well. An interconnected system will have lower operating costs. This is achieved by utilizing excess supply elsewhere, where the marginal cost would be higher for production (Charun & Morande, 1997). A greater arena of supply and demand was also found to lower wholesale prices and reduce intermarket and transaction costs (Lockwood et al., 2017). As the need for reserve production decreases, lower investment costs will be needed (Turvey, 2006). There is an indication that prices in integrated markets will be lower than for example in coordinated markets (Ehrenmann & Neuhoff, 2009). All EU Member States included, the benefits of day ahead trading in the Integrated Energy Market are estimated at EUR 3billion to 4 billion a year. The EU-wide benefits of shared balancing services are potentially much higher, they are estimated to range from EUR 5 billion to a maximum of EUR 43 billion by 2030 (Newbery, Strbac, & Viehoff, 2016).

4.3. The Effects of an Exit on the Energy Sector

The UK will be the first country to leave the European Union. Only limited research has been conducted on the effects that the departure of an EU Member State might have on the electricity sectors of the EU and the leaving country. The studies conducted after the Brexit referendum focus mainly on the specific influence of Brexit on the British, Irish and EU energy markets.

The majority of available research was done by research institutes. These studies primarily make broad estimations about the Irish and British energy markets after Brexit. The overview restricts itself to frequently cited reports. A study by Bruegel on behalf of the Committee on Industry, Research and Energy found a limited impact of Brexit on the EU's energy system (Fredriksson et al., 2017). The study projected that the EU would be able to finish its internal energy market, reach its climate and energy targets and maintain security of supply without the UK. The impact would however depend on which energy agreement the UK would make with the EU and third countries. The study predicted efficiency losses if the UK would decide to distance themselves from EU rules and institutions (Fredriksson et al., 2017). Additional tariffs would not be needed according to the study, and if they would be implemented, would not influence energy taxes in the UK. EU funds for energy related projects in the UK were predicted to be more limited (Fredriksson et al., 2017). The influence of the UK departure on the functioning of regulatory bodies of the Internal Energy Market would be minimal. If the UK would want to adhere to EU targets after Brexit, they would have to partake in the governance structure of the Energy Union (Fredriksson et al., 2017). The study also foresaw that the Irish electricity sector would be the most impacted by a Brexit because of the Single Electricity Market and the extensive electricity trade with Great Britain. The Economic and Social Research Institute described the future of the Irish energy market as dependent on which deal the UK will agree with the EU (Barrett et al., 2015). If the British energy market would remain independent from the European Integrated Energy Market, the researchers concluded that Ireland would become dependent on British energy markets. If a deal would be made, the Irish energy market would be minimally affected in their prognoses (Barrett et al., 2015). Higgins and Costello (2016) from the Institute of International and European Affairs argued that each aspect of what they call 'Ireland's energy trilemma' being competitiveness, sustainability and security of energy supply, would be affected to some extend by a Brexit. The immediate outcome they saw was a slowdown of energy activity across the Irish Sea because energy stakeholders would wait to see which agreement the UK will make with the EU (Higgins & Costello, 2016).

The limited research papers that are published in academic journals have narrower research designs with a more detailed outline of the research topic. Ramiah et al.(2017) used stock market data to predict the effect of a Brexit on different sectors in the UK. The effect on the renewable energy sector was tested and gave statistically insignificant results. The authors explained the result by mentioning that the UK is expected to develop their own renewable energy plan in the future. The effect on the SEM was not included in the article. Pollitt (2017) looked at the effect of Brexit from an economic perspective as well.

He concluded that energy will be a low priority for the UK government in negotiating a withdrawal agreement. The UK has been in close cooperation with the EU in terms of energy policy and trade, however can use Brexit as an opportunity to rationalise domestic energy policies for a more favourable effect on the national economy. Ifelebuegu et al. (2017) also used data about the British economy to prove the effects of Brexit on the energy security and climate policy in the British energy sector. They mostly saw threats to future investments in the British energy markets. Lockwood et al. (2017) made a connection between the economic cost-benefit thinking of economy scholars and political cost considerations. The economic gains to Great Britain from being integrated into the EU's electricity market were weighted against the loss of influence over policy and rulemaking by Great Britain. Ireland was not included in these considerations. The authors gave an overview of the literature on the economic benefits of being part of the European Internal Market and of increased interconnection between Great Britain and the European continent to show there would be economic losses if the UK would fully choose the route of energy independence. Taking back full control would also be relative since the UK would have to enter trade agreements with the EU or external countries (Lockwood et al., 2017).

5. Policy Analysis

The policy analysis consists of two parts. The first part answers the first research question: 'Which elements of the Irish wholesale Single Electricity Market will change if the UK leaves the EU without an agreement?'. It does this by discussing the changes to the building blocks that were identified during the document analysis conducted by the research method described in the chapter about methodological design.

The second part of the policy analysis answers the second research question: 'Which changes after a no-deal Brexit will be the most challenging to mediate to sustain the SEM?'. It is identified which policy reforms would be needed to mediate the short-term changes of Brexit and sustain the SEM. For each mediating reform, it is established how difficult it would be to implement these changes.

5.1. The Changes to the Irish Single Electricity Market after a No-Deal Brexit

Electricity is a shared competence between the EU and the national level. This is also the case for the competences in the Irish wholesale electricity market. Some areas are entirely determined by EU legislation, examples are network codes or the intraday trading mechanism. Other areas are influenced by the EU as well as Ireland and the UK. Cross border infrastructure projects for example are often subject to national law but fit within a broader European strategy or rely on European funds. This shows that the way the SEM operates can be complex and changes in legislation on different levels can impact the functioning of the integrated markets.

The building blocks were placed into three groups for the sake of structure and clarity. It makes the analysis more readable and highlights the common traits of the building blocks. The three groups are:

buildings blocks related to the EU policy framework, building blocks related to the specific Irish context and building blocks related to the broader relations between the UK and the EU.

5.1.1. EU Policy Framework: Common Electricity Policy

For some building blocks, the question whether a change will occur in case of a no-deal Brexit could be found by solely consulting EU and SEM legislation. The answer to which changes would occur was rather straightforward in a clear scenario such as a no-deal Brexit, because they relied on a policy or law being in place or not.

5.1.1.1. Infrastructure Funding

The SEM Committee does not issue or carry out infrastructure projects themselves, the actors participating in the SEM take initiative. Nevertheless, these infrastructure projects are essential for the operability of the SEM because they ensure energy connections on the island and with the European Integrated Energy Market. To realise big infrastructure projects, the SEM stakeholders rely on diversified funding sources. Several of these sources relate directly to EU membership or originate from EU founded institutions. The impact of a no-deal Brexit on funding from the European Investment Bank, the European Fund for Strategic Investments, Connecting Europe Facility and the European Energy Programme for Recovery will influence the investment rate in the Irish wholesale electricity market in the future. Funding instruments like Horizon 2020 and the European Structural and Investment Funds are also associated with energy policy. However, they have no direct link to the Irish wholesale Single Electricity market and therefore were not covered. The European Energy Efficiency Fund that supports energy efficiency projects and renewable energy sources could potentially impact the SEM to some extent, but insufficient information was found to make a final assessment.

The European Investment Bank is the EU's long-term lending bank of which all EU Member States are shareholders. The share of Member States depends on their economic weight, expressed in GDP relative to the GDP of all member states combined. The European Investment Bank lends money to projects that support the EU's objectives inside and outside of the EU. Between 2012 and 2017, the European Investment bank loaned EUR 6.86 billion to electricity projects in the UK (European Investment Bank, 2019). In case of a no-deal Brexit, the UK and thus Northern Ireland would lose its membership to this institution (The Member States, 2012). The UK would however still be eligible for loans for projects that fulfil EU objectives. In the specific case of the SEM, electricity projects conducted by Northern Ireland will likely have an EU component to them if the SEM continues in its given form. Infrastructure projects on the Irish island will advance the Irish electricity infrastructure, and in case of interconnectors also advance the liquidity of the European Internal Energy Market.

A fund closely related to the European Investment Bank is the European Fund for Strategic Investments. This fund is a strategic cooperation between the European Investment Bank and the European Commission. It lends money to more high-risk projects in strategically important sectors for the EU,

energy being one of them. Only projects in Member States or cross-border investments with a member state are eligible for funding. Cross-border projects between Northern Ireland and the Republic of Ireland or between Ireland and the UK would still fall under this requirement. Projects between Northern Ireland and the UK could lose their eligibility to receive these funds.

Connecting Europe Facility is an EU funding instrument used for direct investments in trans-European transport networks, trans-European energy networks, and broadband, information and communication technologies. The biggest part of the budget allocated to energy is made available in the form of grants to finance projects of common interest. These are projects that complete cross-border energy infrastructure in the priority corridors and areas that are set out by the European Parliament and the Council (2013a). The projects need to meet five criteria related to EU energy policy and must be assessed positively by regional groups that include representatives from EU countries, the European Commission, transmission system operators, project promoters, regulatory authorities and the Agency for the Cooperation of Energy Regulators. If a project is recognised as a project of common interest, it falls under EU legislation (European Parliament and the Council, 2013a). Connecting Europe Facility contributed EUR 4 million to finance the interconnector between Ireland and France that is scheduled to be finalised in 2026 (Eirgrid, 2019). For a project to be considered as project of common interest, it has to involve two or more Member States or at least one Member State and a member of the European Economic Area (European Parliament and the Council, 2013b). In case of a departure without a deal, the UK would not be a member of the EEA, thus cross-border projects inside the SEM could not qualify for acknowledgement as project of common interest. The acknowledgement would provide the advantage of a clear legal framework for all participants and the project would be eligible for financial assistance by the EU. Countries are also free to apply this legislation to electricity infrastructure that falls under the legislative responsibility of the national level (European Parliament and the Council, 2013b). This opens the possibility for the SEM bodies to still apply similar infrastructure requirements if both countries would agree to utilise EU legislation. This however does not recognise the project as project of common interest and it will not be eligible for EU funds from the Connecting Europe Facility.

The European Energy Programme for Recovery is a funding instrument from the European Commission. It provides grants to EU energy projects that facilitate stronger economic growth, increased security of supply and reduced greenhouse gas emissions (European Parliament and the Council, 2009e). EUR 345 million of the EUR 601 million to build the East-West interconnector was funded by this programme. The funds from the European Energy Programme for Recovery can be indirectly received by third countries if they cooperate with a Member State. In the context of the SEM, even after a no-deal Brexit Northern Ireland could still receive these funds indirectly in cooperation with the Republic of Ireland (Fredriksson et al., 2017).

5.1.1.2. Electricity Generation

Electricity generation situates itself on the supply side of the market. Electricity generators supply electricity to the grid to be sold in the Irish wholesale electricity market to electricity suppliers who will sell it for industrial use or to individual consumers. Electricity generation is a shared competence between the EU and the national government levels. The EU imposes the framework for Member States to authorise new generation capacity and the Member States set the guidelines for the specific authorisation procedure (European Parliament and the Council, 2009a). Also tendering of new capacity is subject to an EU framework in which Member States determine the specifics (European Parliament and the Council, 2009a).

To sell energy onto the European Internal Energy Market, generators must provide guarantees of origin if their energy is produced from renewable sources or from high-efficiency cogeneration. This system for labelling energy is set by the Renewable Energy Directive (European Parliament and the Council, 2009b). The labels provide customers, in the SEM these are the suppliers, with the guarantee that the energy they buy is generated from the claimed source. The system is needed for the Member States to comply with fuel mix disclosure regulations. The Member States issue guarantees of origin in their own territory and recognise guarantees of origin issued by other Member States. The European Commission functions as a regulator. In practice this means that when a Member State refuses to accept a guarantee of origin from a fellow Member State, the European Commission can intervene and has final decision power. At the moment of Brexit, the UK would not have to inform EU institutions when it refuses an EU member issued guarantee of origin. The European Commission will have no jurisdiction over the UK's decisions. For the Republic of Ireland that trades electricity with Northern Ireland and the UK, this can lead to failure to comply with fuel mix disclosure regulations. Additionally, the European Commission would no longer be able to mediate conflicts between the UK and a Member State in disputes about guarantees of origins, which would make electricity trade with the UK riskier.

5.1.1.3. Transmission and Distribution

Transmission is defined in EU legislation as 'the transport of electricity on the extra high-voltage and high-voltage interconnected system with a view to its delivery to final customers or to distributors, but does not include supply' (European Parliament and the Council, 2009a: 8). A transmission system operator is the entity responsible for operating and maintaining the transmission system. Distribution is defined as the 'transport of electricity on high voltage, medium-voltage and low-voltage distribution systems with a view to its delivery to customers, but does not include supply' (European Parliament and the Council, 2009a). A distribution system operator is the entity that operates and maintains the distribution system. EirGrid is licensed to act as transmission system operator in Ireland. In Northern Ireland SONI is licensed for this role. They are both responsible for operating the transmission system and carrying out its maintenance and construction in their respective countries. The distribution system operator in Ireland is ESB Group, in Northern Ireland this is NIE Networks. The distribution system

operators administer tasks such as planning, construction, maintenance, operation, metering of customer end use and data provision. The regulatory authorities of the SEM Utility Regulator and the Commission for Energy Regulation are also active in the field of transmission and distribution. They aim to harmonise transmission policy, systems and processes on the entire island. The scope of cooperation includes to harmonise transmission investment and outage planning, transmission loss adjustment factors, grid code requirements, transmission tariffs, and ancillary services and related payments.

The European regulation concerning common rules for the internal market in electricity determines that the transmission system operator has to be independent from supply and generation of electricity to ensure market competition (European Parliament and the Council, 2009a). There must be either legal unbundling or functional unbundling. In the case of legal unbundling, the transmission system is owned by a vertically-integrated company but managed by an independent system operator. In case of functional unbundling, a vertically-integrated company owns and manages the transmission system but complies with some rules that have to ensure independence from its generation and supply activities. A country can voluntarily decide to go a step further and apply ownership unbundling, then the transmission system operator owns and manages the transmission network independently from generation or distribution. The same requirements apply to unbundling of the distribution network (European Parliament and the Council, 2009a). Because the regulatory authorities in the SEM strive for a harmonisation of transmission rules, Northern Ireland would have to adopt EU transmission regulation after a no-deal Brexit. It is unlikely that the UK would object to this, since the country was one of the frontrunners to include the unbundling of transmission and distribution networks into EU energy policy (Vaitilingam, 1999).

The most important problem that might occur would be when the UK transmission or distribution system operator would enter into conflict with a transmission or distribution system operator from another country. In that case the Agency for the Cooperation of Energy Regulators (ACER) gives a non-binding advice to the national regulating authorities of the transmission or distribution networks (European Parliament and the Council, 2009e). Later, ACER is discussed more in-depth, for now it is sufficient to say that in case of a strict no-deal Brexit, the UK would not be a part of ACER. If one of the national regulating authorities chooses to ignore the advice and another national regulating authority objects to this decision, the European Commission has the final decision-power (European Parliament and the Council, 2009e). Since the UK would not be a Member State, this would imply that the UK would either have to accept the authority of the European Commission or could choose to ignore this decision.

5.1.1.4. Security of Supply

Early EU energy policy already identified security of supply as an important goal of the Union's energy policy. Also, the Third Energy Package continued to include security of supply. National governments are aware of its importance as well. The government of Ireland for example identified security of supply

as one of the three core concerns of their energy policy alongside sustainability and competitiveness (Department of Communications, Energy & Natural resources, 2015). The emphasis rests in the knowledge that electricity markets are only predictable to a certain extent. On the supply as well as on the demand side, multiple events can lead to an unforeseen sway of demand or supply. A generator can for example break, or the wind turbines can produce less than expected on a windless day. A cold winter could cause a peak in demand. Integrating electricity markets on a European or regional scale ensures liquidity to buffer supply and demand fluctuations since there are multiple markets to trade with in moments of shortage.

To ensure a sufficient electricity supply, supply and demand have to be balanced at all times. The EU established balancing guidelines to actualise this balance. The SEM adjusted its internal procedures based on the EU balancing guidelines and mechanisms by introducing a capacity remuneration mechanism (SEM Committee, 2015b). This mechanism incentivises electricity generators to secure enough electricity generation capacity to sustain a secure electricity supply. The Irish capacity remuneration mechanism is quantity based which means that generators receive payments for the amount of electricity in megawatt that they could generate if needed (SEM Committee, 2015a). Qualified capacity providers can offer reliability options in the form of capacity payments to electricity suppliers. In case of a price surge, the generator will pay back the difference with the previously agreed market reference price (SEM Committee, 2015a). Capacity payments are determined by means of a competitive mechanism, such as an auction. The SEM Committee allows cross-border participation in the capacity remuneration mechanism. The SEM Committee chose an interconnector led approach in which the interconnector participates directly in the mechanism (SEM Committee, 2016a). In case of a no-deal Brexit, the UK would no longer have to comply with EU legislation, thus Northern Irish stakeholders in the SEM would be unable to participate in this mechanism because it depends on EU legislation. Eirgrid made a forecast for the period between 2016 and 2025 that predicts the risk for a capacity shortfall if this would happen (Eirgrid, 2016a). For the majority of the tested scenarios reliance on the energy market and ancillary service revenues would be insufficient to secure enough capacity to meet a safe standard (Eirgrid, 2016a).

5.1.1.5. Wholesale Electricity Prices

In theory, market liquidity will lead to balancing of pricing in coupled markets. When for example the prices in the SEM area are higher than in Great Britain, more electricity from Great Britain will be imported. This will then stabilise the wholesale electricity price in the SEM. Prices can still diverge when the network is congested because optimal cross-border electricity trade would not be possible. The price differences between bidding zones incentivises investment in the most efficient infrastructure to relieve congestion and improve export capability. The European target model requires a common price coupling algorithm for scheduling day-ahead markets and determining flows between geographic regions. These algorithms are part of the ex-ante markets which are discussed in the next building block.

Additional information found on internal energy market pricing was restricted to a regulation on which pricing information has to be shared with Eurostat (European Parliament and the Council, 2016). Insufficient evidence was found to determine the effect of a no-deal Brexit on these price coupling algorithms.

After a no-deal Brexit, WTO rules would apply that define tariff rules. In most recent arrangements, energy would not be not subject to common tariff/non-tariff barrier rules (Pollitt, 2017). The UK department for Business, Energy and Industrial Strategy (2019b) however sees a possibility that tariffs might be put in place after a no-deal Brexit. The post-Brexit tariff regime would be temporary and last maximum up to 12 months until a permanent agreement is reached (Department for Business, Energy & Industrial Strategy, 2019b). It is not known how high these tariffs would be or if they would affect wholesale electricity prices on the island. Increased wholesale electricity prices do not necessarily form a threat to the existence of the SEM or would not cause profound changes to it.

5.1.1.6. Cross-Border Trade

The preamble of the decision by the Parliament and the Council (2017) to establish an information exchange mechanism opens with 'The proper functioning of the internal energy market requires that the energy imported into the Union be fully governed by the rules establishing the internal energy market' (European Parliament and the Council, 2017). The decision sets up an information exchange mechanism that requires EU members to share information on agreements with third countries with the European Commission to ensure the agreements do not violate EU law (European Parliament and the Council, 2017). After Brexit, the European Commission would have the right to be more involved in agreements between the Republic of Ireland and Northern Ireland since Northern Ireland would be part of a non-Member State (European Parliament and the Council, 2017). The Commission could request to participate in the negotiations as an observer and advice Ireland (European Parliament and the Council, 2017).

The SEM has six different markets that operate under its single market: two ex-ante markets (the day-ahead and intraday market), the balancing market, two markets for financial instruments (the forward market and financial transmission right auction) and the market for capacity remuneration. The market for capacity remuneration has been discussed under the building block 'security of supply'. The two financial markets are hedging instruments to negotiate electricity prices and capacities in advance and rely on conventional market mechanisms. The ex-ante and balancing markets are interesting to look at considering cross-border electricity trade and the effect of a no-deal Brexit on these markets.

Up until an hour before the actual trade, electricity market participants can ex-ante balance supply and demand according to their own forecasts by using forward, day-head and intraday trading. Every actor that wants to participate in selling or buying, locally and internationally in the Irish wholesale electricity market in the period between 19 day and 24 hours before the electricity delivery, has to use the European

day-ahead market as the 'exclusive' route to physical contract nomination (SEM Committee, 2014: 12). The wholesale electricity trade between 24 and one hour before the trade, to sell excess electricity or buy to prevent shortages, happens in the European intraday market. This market is the exclusive market for continuous intraday trading (SEM Committee, 2014: 13). Both markets fully operate under the EU market coupling algorithm. The European intraday price coupling mechanism XBID is used to determine prices in these markets. An hour before the electricity exchanges, the balancing market kicks in. The balancing market is led by the transmission system operators. EirGrid and SONI are the nominated electricity market operators for their geographic regions in the coupled ex-ante markets. These operators start from the agreements that were made ahead and manage the logic of electricity flows in the hour before delivery. The balancing market of the SEM operates inside the balancing market of the Internal Energy Market that operates in accordance with EU energy policy (European Commission, 2017). The national transmission system operators interact with the European market coupling operator, who is responsible for running the market coupling process in the entire Internal Energy Market (European Commission, 2015a).

According to a notice published by the SEM Committee (2019) the day before the first scheduled departure on the 29th of march 2019, a no-deal Brexit would not interrupt electricity trade on the island and with Great Britain for suppliers and generators. The SEM Committee warned that the use of interconnectors might be less efficient and that platforms that operated under EU rules may have to be used in a different way. Despite the reassurance, they acknowledge that the day-ahead and intraday trading markets would be disrupted by a no-deal Brexit. The trade mechanisms of the SEM operate as part of the pan-European Market with which it is connected only through Great Britain. Since Great Britain will not be a part of the pan-European day-ahead market, the SEM will face difficulties connecting to the wider European electricity market (SEM Committee, 2019). The energy regulator of Great Britain confirmed on its website that it does not expect to have made any arrangement with Ireland before an actual exit (Ofgem, 2019b). Under WTO rules it is always possible to sell electricity in bulk. Bulk trade would be a less efficient and inflexible way of trade (Fredriksson et al., 2017). The electricity networks of the countries involved do not need to be linked which means that optimisation of electricity flows in accordance with supply and demand would be impossible.

5.1.1.7. Industry Codes and Licences

To participate in wholesale electricity markets, market participants need to comply with industry codes. The conditions of a market participant's licence determine which exact codes they need to follow. Many of the licence conditions and industry codes for the electricity sector are determined by EU institutions in the form of European network codes. ACER determines the framework for these network codes, which are then further developed by ENTSO-E (European Commission, 2016a, 2016b, 2016c; European Parliament and the Council, 2009c). The European Commission, the European Parliament and the Member States review the propositions. The final vote happens in the Council of the EU and the

European Parliament (European Parliament and the Council, 2009d). Ofgem, the energy regulator for Great Britain made a detailed overview of which licences and codes would need to be amended in case of a no-deal exit. Codes that need to be amended relate to distribution, generation, interconnection, supply, transmission and SMART grids (Ofgem, 2019a). Preparations have been made to ensure that in case of a no-deal Brexit, the necessary EU law will be retained (Scott, 2019).

Table 1 Building Blocks Relating to the European Policy Framework

Building block	Detail	Change	Type of Change
Infrastructure Funding	European Investment Bank	Projects promoting EU objectives still eligible for funds	No Change
	European Fund for Strategic Investment	Cross-border projects between the Republic of Ireland and Northern Ireland or the UK still eligible for funds, projects between Northern Ireland and UK possibly not	Short Term
	European Connecting Facility	Funds only for projects between Member States or Member State and member EEA	Short Term
	European Energy Programme for Recovery	Cross-border projects between the Republic of Ireland and Northern Ireland or the UK still eligible for funds, projects between Northern Ireland and UK possibly not	Short Term
Electricity Generation	Guarantees of Origin	No obligation for both EU and UK to acknowledge each other's guarantees	Short Term
Transmission and Distribution	Transmission Network Unbundling	UK already implemented unbundling before it was required by the EU	No Change
	Distribution Network Unbundling	UK already implemented unbundling before it was required by the EU	No Change
	Access to the Transmission and Distribution System	Connections would be disrupted	Short Term
	Dispute Settlement	UK loses influence over Commission that retains final decision power	Short term
Security of Supply	Capacity Remuneration Mechanism	Northern Ireland would not be able to participate because the EU legislation it is based on would cease to apply	Short term
Wholesale Electricity Prices	Tariffs	Tariffs might be instated but have no effect on the structure of the SEM	No Change
Cross-Border Trade	Cross-Border Cooperation in the SEM	Obligation to inform the Commission about new agreements with Northern Ireland or the UK	Short Term
	Day-ahead Market	Impossible because of uncoupled markets	Short Term
	Intra-Day Market	Impossible because of uncoupled markets	Short Term
	Balancing Market	Impossible because of uncoupled markets	Short Term
Licences and Industry Codes	Licences and Industry Codes	Amendments needed in almost every area of electricity industry codes	Short Term

5.1.2. The Single Electricity Market in Ireland

The elements discussed above related to more general EU electricity legislation. The changes after a departure without a deal would largely be the same for all Member States that fully adhere to the rules and guidelines of the EU's Integrated Electricity Market. The elements discussed below relate directly to specific characteristics of the Irish Single Electricity Market. They were discussed separately because

these elements are either not directly addressed in EU policy or differ from other Member States because the specifics of the Irish context.

5.1.2.1. Regulatory Authorities and Enforcement Mechanisms

The European Internal Energy Market brought a diverse group of actors together that cooperate with each other in the area of electricity across regional and national borders. This large playing field harbours the potential for diverse conflict situations. To ensure all parties respect agreements and to mitigate conflicts among actors, several regulatory authorities in different areas of the electricity market have been created. It would be beyond the purpose of the dissertation, to give an overview of the full regulatory structure of the European Integrated Energy Market, hence only the regulatory authorities and enforcement mechanisms relevant to the SEM in light of a no-deal Brexit will be elaborated on.

The Memorandum of Understanding (2006) states that the SEM does not intend to harmonise all regulatory functions on its territory. The Northern Ireland Utility Regulator is the regulator of the electricity industry in Northern Ireland and the Commission for Energy Regulation does the same in the Republic of Ireland. The authorities only consult each other over electricity matters in their jurisdiction in contexts that materially affect the SEM (Memorandum of understanding, 2006). Disputes related to breaches of the Trading and Settlement Code fall under the jurisdiction of the Courts of Ireland and the Courts of Northern Ireland (SEM Committee, 2017).

The EirGrid Group is the transmission system operator, market operator and owner of the East-West interconnector between Ireland and the UK. It is therefore responsible for three areas in the SEM: the capacity market, the balancing mechanism and system services as part of the DS3 programme (SEM Committee, 2016b). The whole island falls under the operation of the EirGrid Group. The accumulation of responsibilities leads to concerns about the fair analysis of data, advantages related to product design and concerns related to the operation of the allocation mechanism (SEM Committee, 2016b). How internal conflicts in the EirGrid Group need to be approached is decided by the SEM Committee (2016b). Preventive measures have already been taken to impede conflicts of interest. These include a reconsidered organisational structure that divides powers and ensures broad representation of diverse interests (SEM Committee, 2016b). There are for example specific rules related to behaviour and activities for information sharing and staff transfers (SEM Committee, 2016b). Internal arrangements by the SEM Committee deal with internal conflicts. This means that a no-deal Brexit will not lead to changes in internal enforcement and dispute settlement.

The regulatory authority for the European Internal Energy Market is the Agency for the Cooperation of Energy Regulators (ACER). ACER is the key body that sets out the strategy and direction of electricity regulations in the energy union. It provides opinions, advice and recommendations to transmission system operators, national regulators, the European Parliament and the Council (European Parliament and the Council, 2009c). Full membership of ACER is only permitted to the national energy regulatory

authorities of Member States. The Northern Ireland Utility Regulator would lose membership while the Commission for Regulation of Utilities of the Republic of Ireland would still be included. This would lead to an imbalance to the possibility to influence the EU level among actors in the SEM committee. There is a possibility for the Utility Regulator to be part of ACER. Article 31 of the regulation establishing ACER states that: 'The Agency shall be open to the participation of third countries which have concluded agreements with the Community whereby they have adopted and are applying Community law in the field of energy and, if relevant, in the fields of environment and competition' (European Parliament and the Council, 2009c). If the Northern Ireland Utility Regulator would pursue this path, it would be the first regulatory authority from a non-Member State to have input in ACER. There is no consensus about whether or not the membership of the Northern Ireland Utility Regulator would include voting rights. Fredriksson et al.(2017) say explicitly that membership will not include voting rights in ACER, while Lockwood et al.(2017) and the regulation establishing ACER (2009c) make no mention of it, but also not explicitly deny the possibility. If indeed Northern Ireland would lose its voting rights, its influence on decision-making in ACER would be solely informal.

The strategic outlines agreed by ACER are passed to the European Network of Transmission System Operators for Electricity (ENTSO-E), that translates the strategies into network codes in areas such as network security rules, network connection rules, third-party access rules, data exchange rules, etc. (European Parliament and the Council, 2009d). ENTSO-E groups the transmission system operators from 35 countries across Europe to promote cooperation in the internal market of electricity and for cross-border trade (European Parliament and the Council, 2009d). There are three types of membership of ENTSO-E: member, associate member and observer. Only full members can attend all sessions and vote in all governing bodies. One does not have to be an EU Member to be a full member of ENTSO-E, but does need to have an agreement with the EU about the Internal Energy Market. Post-Brexit, the UK's transmission system operators, National Grid and SONI, and the Scottish transmission system operator could remain part of ENTSO-E in case of a strict no-deal. Their power will however diminish if they do not agree to a deal that establishes a relationship with the European Internal Energy Market.

The EU's Regulation on Energy Market Integrity and Transparency (REMIT) that prohibits insider trading and energy market manipulation is one of the EU energy policies that the UK and thus Northern Ireland must adopt to be able to continue electricity trade with EU Member States. REMIT is important to the EU because it describes provisions for market monitoring by regulators. REMIT requires all market participants to register with the national energy regulator in the country where they are based. In an open letter, Alberto Pototschnig, first director of ACER, confirmed that in any Brexit scenario, market participants that were previously registered in the UK will have to register with an EU Member state's regulatory authority to avoid a disruption to cross-border trade, trade in EU wholesale energy markets or trade in the Single Electricity Market (Pototschnig, 2019).

In case of a no-deal Brexit, Northern Ireland would leave the jurisdiction of the General Court and the Court of Justice of the European Union (CJEU), the Republic of Ireland remains. The General Court is responsible for actions brought by natural or legal persons against EU regulations, institutions, etc. It also decides over internal disputes and damages being sought for harm caused by EU related bodies or persons. The CJEU offers references for preliminary rulings to national courts about EU law, actions for failure to fulfil obligations, actions for annulments, actions for failures to act and appeals against orders of the general court. In a strict no-deal Brexit scenario, Northern Ireland would not comply with EU law and would not risk getting involved with the CJEU. The general court could still be in the picture if natural or legal persons in Northern Ireland would seek compensation for damages by EU institutions, bodies or staff.

5.1.2.2. Harmonisation of Climate Policy

One of the tasks of the SEM committee is to align national and European policy targets. Despite this task, the SEM's intention was never a complete harmonisation of rules and objectives inside the SEM. Nonetheless, in practice, there is a commitment among SEM stakeholders to thoroughly harmonise certain specific policy areas. This chapter elaborates on the most important theme that is subject to harmonisation that hasn't been discussed yet, climate policy. What is specific to the SEM is that both partners closely cooperate around expanding the use of wind energy as a renewable energy source. The SEM Committee bases its harmonisation of renewable energy targets on the European Target Model. The European Energy security strategy acknowledges that each Member State can determine their own energy mix, as long as European targets are met (European Commission, 2014). This gives Ireland and Northern Ireland significant freedom to choose which renewable source to invest in.

The Third Energy Package pays significant attention to climate change. Targets and guidelines for renewable energy use, greenhouse gas emission reduction and energy efficiency are all included in the EU's energy strategy. The EU's renewable energy targets set an EU-wide target of 20% for gross final energy consumption from renewable energy sources by 2020. To achieve that target, national targets are set for each Member State (European Parliament and the Council, 2009b). If the UK would leave without a deal, the country would be released from its obligations towards these targets. The SEM could continue to operate in the same way, with climate policy being something that the Irish and British governments can make agreements on as long as Ireland doesn't breach EU legislation.

The Renewable Energy Directive (European Parliament and the Council, 2009b: 5) states that cross-border trade of electricity from renewable sources with a third country can count towards the directive targets 'only if the contracting parties to the treaty become bound by the relevant provisions of the Directive'. This means that in case of a no-deal Brexit, the renewable energy that the Republic of Ireland receives from Northern Ireland, would only count towards their renewable energy targets if the UK decided to agree to the EU's Renewable Energy Directive. This would include drafting a national energy

plan based on the minimum guidelines as set out in the Renewable Energy Directive (European Parliament and the Council, 2009b). Energy efficiency is another element that has been included in the Third Energy Package. The EU strives for a 20% reduction of Union-wide energy consumption by 2020. For 2030, the European Council has endorsed an energy reduction target of 27% Union-wide (Commission of the European Communities, 2006). The Commission did not set binding targets per individual Member State to reach the energy efficiency target. This means that the SEM would not be restricted by a no-deal Brexit in terms of energy efficiency projects.

The SEM stakeholders have shown successful cooperation in efforts to harmonise renewable energy policies and strategies. In 2016, the DS3 programme for delivering a secure, sustainable energy system, was developed in agreement among all stakeholders to realise the renewable energy targets set by the EU. Ireland's renewable energy target under the EU's Renewable Energy Directive determines that 16% of all consumed energy must come from renewable energy sources by 2020. The UK's target is set at 15% (European Parliament and the Council, 2009b). Ireland relies mainly on wind power as a renewable energy source. Wind power is a non-synchronous source of power which means that the amount of electricity generated can fluctuate depending on energy availability. In contrary to synchronous energy sources that generate a stable amount of energy, non-synchronous power generation is inflexible. The difficulties accompanying the dominant use of this power source relate to frequency and voltage control, system inertia, the level of reserve, generation plant performance and flexibility (SEM Committee, 2019). These differences cause insecurity in terms of security of supply that need measures to mitigate. The SEM has developed the DS3 programme specifically to address and buffer these concerns. DS3 has 11 workstreams that are grouped under three pillars that are deemed essential to achieve the wind energy target: system performance of all electricity plants connected to the power system, system policies to manage the increasing complexity as a result of increasing use of non-synchronous energy sources and system tools being new principles and operational practices that serve the innovative spirit of the DS3 programme (SEM Committee, 2016b).

Another important instrument used in EU climate policy is the emissions trading system. The European Energy Strategy placed this system as the cornerstone of the EU's climate policy in reducing greenhouse gasses by industrial businesses (European Commission, 2015b). At the moment of a no-deal Brexit, EU rules over the EU emissions trading system seize to apply. There are indications that this would have significant effects on pricing in the system (Department for Business, Energy & Industrial Strategy, 2019a; Fredriksson et al., 2017). The emissions trading system however focusses on industry. There is not enough evidence to determine if changes would affect the SEM, hence why, despite it being a potential significant short-term change in case of a no-deal Brexit, the emissions trading system is not elaborated on.

5.1.2.3. Legal Basis

The SEM is the result of a bilateral agreement between the governments of the UK and the Republic of Ireland. The foundations of the SEM however have a close tie to EU membership. The Memorandum of Understanding (2006: 3) explicitly places the agreement in the 'context of the European Union's policy on the creation of an EU-wide internal market for electricity'. The Memorandum of Understanding is not a legally binding document, so a breach of the agreed conditions would have no direct legal consequences. However, the sentiment of the document says a lot about the spirit in which the SEM is rooted. In 2006 the European Internal Energy market was only an unfolding idea. The real policy framework was only introduced with the third energy package in 2009. The fact that these two countries committed to the idea of an integrated energy market at an early stage proves that they saw the merits of energy market integration even before the EU issued an in-depth policy framework. The SEM Committee (2014) mentions the European context in terms of short-term trading and market coupling. The Memorandum of Understanding (2006) did not yet do this. This is likely due to the fact that in 2006, the ambitions for a European wide integrated energy market were not solidified into legislation yet. In practice the rules and arrangements spoken of in the Memorandum of Understanding (2006: 3-4) are largely subject to regulations made in the context of the EU's third energy package. After a no-deal Brexit, this would still be the case on the Irish side, while the UK would be free to determine their own electricity policy. This freedom from the side of the UK is only relative since the SEM is based on the harmonisation of Irish electricity policy. The influence of EU legislation on almost all aspects if the electricity market in the Republic of Ireland would inevitably influence the Northern Irish market if any form of cooperation would continue.

5.1.2.4. Coupling to the Internal Energy Market

An important aspect of the EU's Third Energy Package is the coupling of electricity markets to serve the electricity security and climate change goals of the EU. The European energy strategy sets a target of 10% of the installed electricity production having to be traded with fellow Member States by 2020 (European Commission, 2015b). The trans-European energy networks policy is the cornerstone to realizing energy interconnection. This policy framework identifies four electricity priority corridors and three priority thematic areas that require urgent infrastructure investments. Projects of common interest fit in the goal of the trans-European energy networks policy of increasing electricity interconnection in the framework of the Internal Energy Market.

The SEM is only connected with the other EU electricity markets through Great-Britain. The Republic of Ireland is connected to Wales by the East-West interconnector and Northern Ireland is connected to Scotland through the Moyle interconnector. At the moment of a no-deal Brexit, Ireland's 7% interconnection level with the EU will fall to 0% and Ireland will become an isolated electricity island. This leads to important questions regarding electricity vulnerability. As already mentioned, wind energy was chosen to be at the centre of renewable energy policy in Ireland. The choice for this non-

synchronous energy source brings the need for electricity balancing through market coupling. Trading in the day-ahead and intraday markets happens exclusively through the European coupling process in the SEM (SEM Committee, 2014). The question will be whether the UK will decide to keep operating under EU trading agreements. The Irish and British governments have expressed the intention to sustain electricity trade with the continent. However, after a no-deal Brexit, the UK would have the freedom to change their electricity policies as they wish at any time.

The situation of isolation from the European Internal Energy Market on the European continent will last at least until 2026 when the Celtic Interconnector between Ireland and France is expected to be completed (Eirgrid, 2019). The Celtic Interconnector will connect the southern coast of Ireland with the north-western coast of France. In the update given by Eirgrid, they emphasise that the Celtic interconnector is still a proposal and that the decision to build it has not been formally made yet (Eirgrid, 2019). The Celtic interconnector project is designed as a project of common interest which means that it will be subject to EU legislation (Eirgrid, 2019). This status provides the project with additional funding opportunities. The European Commission for example has already committed to issue EUR 4 million for research (Eirgrid, 2019). Since the project is on schedule according to the step-by step process that was made available to the public and is recognised by the European Commission, one can reasonably estimate the chances that the Celtic interconnector will be built as high. It would be in the benefit of the Republic of Ireland to have a direct connection to the European continent. An additional connection can diversify risks by reducing dependence in the UK for electricity trade with fellow Members of the European Internal Energy Market. In terms of electricity efficiency, questions have to be raised about the benefits of an additional connection. In the long run it might be more costly to directly connect and trade with the continent than to trade via Great Britain (Fredriksson et al., 2017). If Great Britain would increase interconnection to the European continent in the future, prices on the British island would start to align with prices on the continent. If this would happen, the advantages in terms of cost to build direct connections with the continent would reduce (Fredriksson et al., 2017). This conclusion however would be based on an uncertain scenario. There are indeed plans for additional interconnections between Great Britain and the European continent but whether or not they will be sufficient to increase energy efficiency in such a way that the advantages of direct electricity trade between Ireland and the continent diminishes remains to be seen. Cost efficiency is also not the only element to take into account, security of supply in case of disagreements between the UK and the EU is also an important consideration for the Republic of Ireland.

Table 2 Building Blocks Relating to the Specific Characteristics of the Irish Single Electricity Market

Building block	Detail	Change	Type of Change
Regulatory Authorities and Enforcement Mechanisms	Trade and Settlement Code	Enforcement remains a competence of the SEM Committee	No Change
	ACER	Membership would stop, but possibility of renegotiation	Short Term
	ENTSO-E	Membership would stop, but possibility of renegotiation	Short Term
	REMIT	UK market participants have to register with an EU Member State's regulatory authority to avoid a disruption to cross-border trade	Short Term
	Court of Justice of the European Union	UK falls out the CJEU's jurisdiction	Short Term
Harmonisation of Climate Policy	Renewable Energy Targets	The Republic of Ireland needs to follow EU targets, Northern Ireland not	Long Term
	Energy Efficiency Targets	Targets not nationally determined	No Change
Legal Basis	Memorandum of Understanding	Needs to be updated to fit new situation	Long Term
Coupling to the Internal Energy Market	Market Coupling with the Internal Energy Market	No direct connection between the Republic of Ireland and the Internal Energy Market	Short Term

5.1.3. UK-EU Relations after Brexit

The previously discussed building blocks all revolve around legislation and policy directly related to the Irish Single Electricity Market. To justify whether there would be changes, a policy-technical answer sufficed. Nevertheless, solely looking at these elements would ignore the political context of Brexit. Some elements affect the SEM without the SEM authorities having control over them because the decision-making power is situated on a higher political level. Northern Ireland might be a sovereign country, it is still heavily influenced by the decision-makers in Westminster. The UK exercises the system of devolution of power without vertical separation. This means that the Westminster parliament can use parliamentary law anytime to pull back devolved tasks to the central level (Kuhlmann & Wollmann, 2014).

5.1.3.1. Autonomy

Making policy decisions is not only done with the economic benefits for the country in mind, the position of the country in the larger European context is also a concern of individual Member States. Hence why, a political cost-benefit calculation needs to be made as well when deciding about integration initiatives with other states. In recent UK history, sovereignty has been at the centre of public debates about EU membership. One of the main themes of in the 1975 referendum about membership of the EEC was national sovereignty. Opponents use the image of coercion through secret deals in Brussels to invoke fear among the electorate (Todd, 2016). In 1993, concerns about sovereignty came at the forefront again because of the referendum on the Maastricht Treaty. The anti-democratic nature of the EEC was used as an example to illustrate the threat to national democracy (Todd, 2016). The tone for the narrative around the most recent British EU referendum was set by David Cameron's speech on the European

Union in which he made the pledge to hold the Brexit referendum. In it, he characterised the EU as something that is done to the people instead of on their behalf, framing the EU as a threat to national sovereignty (Todd, 2016).

A case can be made that the influence of the EU institutions on electricity policy has increased significantly over the years. While the Second Energy Package advocated for voluntary harmonisation of rules and practices, the Third Energy Package mandated such harmonisation. This evolution eased the shift towards the removal of barriers for cross-border energy trade, one of the EU's main energy strategies (Eikeland, 2008). Eikeland (2011) discussed the third internal energy market package in terms of power relations. The proposal for mandatory ownership unbundling of distribution and transmission ownership was used to prove that between the Second and the Third Energy Package a shift of influence had taken place. The European Commission managed to include ownership unbundling in the Third Energy Package despite an alliance of Member States being against the proposal. Even though this was not a trend in all policy domains, it shows that the European Commission can exercise increased influence over policy if it can gather a strategic policy community within a policy network (Eikeland, 2011). A report by the same author made the case that the European Commission used a new multi-level game when negotiating the Third Energy Package, which was effective in pressuring Member States to adjust their national legislation (Eikeland, 2008). It also must be acknowledged that Christiansen and Fromage made the argument that national parliaments gained influence over EU decision-making. They ironically used the Brexit process as an example for the increased involvement (Christiansen & Fromage, 2019).

Being part of the European Integrated Energy Market in any form will be at the cost of authority over previously national electricity policies and regulations. Taking sovereignty and authority back over legislation is also only relative. The UK would remain part of international initiatives such as the UN Framework Convention on Climate Change, and the Paris Agreement. These agreements require less institutional integration or binding commitments, but do form a limit on the UK's autonomy (Lockwood et al., 2017). Even in case of a no-deal, the UK will have to make trade agreements in terms of cross-border electricity trade with members of the EU which will likely force the UK to make at least minor concessions.

While it is uncertain and even unlikely that the SEM will be used to make a statement about national autonomy, a subtle shift in discourse has happened between October 2018 and March 2019. In 2018 the website of the Department of Business, Energy and Industrial Strategy made no mention of the possibility of terminating the SEM. In March 2019, the website was adjusted to include a section that expresses a different sentiment (Department for Business, Energy & Industrial Strategy, 2019b). On the 25th of March the website explicitly stated: 'However, if such an agreement [about energy legislation] cannot be reached, there is a risk that the Single Electricity Market will be unable to continue, and the

Northern Ireland market would become separated from that of Ireland. Separate Ireland and Northern Ireland markets will be less efficient, with potential effects for producers and consumers on both sides of the border.' (Department for Business, Energy & Industrial Strategy, 2019b). The information then goes on to say that contingency planning will be done in cooperation with the Northern Irish stakeholders in the SEM to mitigate the negative effects to Northern Ireland and Great Britain if the SEM could not be maintained (Department for Business, Energy & Industrial Strategy, 2019b). This adjustment shows that British authorities publicly express that they would be prepared to give up the SEM if needed whereas previously there were only reassuring statements to the public that the electricity cooperation would continue.

5.1.3.2. Market Competition

The UK has a history of advocating for market liberalisation of the energy market to stimulate market competition. British politicians were namely at the centre of drafting the first internal market proposals (Lyons, 1992). The UK for example was one of the frontrunners of the group that was in favour of mandatory ownership unbundling in the transmission and distribution sector. While unbundling only became mandatory for Member States in 2009, the UK implemented ownership unbundling in the 80's (Eikeland, 2011). In 1996, the first liberalisation directives were adopted by the European electricity market as part of the first energy package. Also, the second energy package in 2003 included liberalisation directives. A 2007 review of the Commission of the European Communities (2007) concluded that the European energy markets were still national in scope and had maintained elements of the pre-liberalisation phase, namely a high level of market concentration and abilities to exercise market power. Another review presented the lack of infrastructure as the main barrier to prevent free competition (Commission of the European Communities, 2006). Since the Third Energy Package, the EU has made drastic changes to advance market liberalisation that are more in line with the UK's focus on market competition (Eikeland, 2011). The first electricity directive in the eighties had a liberal pro-market line and advocated electricity deregulation (Vaitilingam, 1999). The Third Energy Package shifts the emphasis to market power mitigation by means of rules and legislations that are binding to Member States. A free market to the EU, is a market that is accessible. The European Parliament and the Council's main focus is on preventing insider trading and (attempted) market manipulation to ensure fair and equal trade (European Parliament and the Council, 2011).

Elements of the EU's vision on wholesale energy market integrity and transparency can be found in the core values on which the SEM is based (European Parliament and the Council, 2011; Government of Ireland & Government of the United Kingdom of Great Britain and Northern Ireland, 2006). The Memorandum of Understanding (2006: 6) signed by both the Irish and the UK governments states that ensuring that the SEM is a competitive market is 'the paramount importance'. In the same document, competition, transparency and consumer choice are posted as three outcomes to strive towards above all else. To achieve these outcomes, SEM arrangements focus on mitigating market power. Market power

is defined by the SEM committee as 'the ability to profitably sustain prices above competitive levels or restrict output/quality below competitive levels' (SEM Committee, 2015b: 3). The exercise of market power is therefore seen as harmful to the interests of all market participants (SEM Committee, 2015b). Still, market power is a common phenomenon in the electricity markets due to the relatively inelastic nature of the short-term demand side (SEM Committee, 2015b).

After a no-deal Brexit, the UK government would have to harmonise their rules with the regulatory frameworks of the EU in Ireland. Northern Ireland would have to comply with certain rules, regarding market power mitigation, data sharing and data protection to sustain cross-border trade with the Republic of Ireland. For the SEM to be able to efficiently trade electricity with fellow Member States, Great Britain would have to honour EU rules and guidelines as well since the electricity trade with the rest of the European Internal Energy Market would go through their territory (European Parliament and the Council, 2011). The data that would need to be shared would be rather extensive and includes information about the wholesale energy products bought and sold, the price and quantity agreed, the dates and times of execution, the parties to the transaction, the beneficiaries of the transaction, etc. National and regional regulatory agencies would have to cooperate with the European agency for the Cooperation of Energy Regulators (European Parliament and the Council, 2011). It is uncertain which EU legislation the UK will be willing to accept and how efficient market cooperation will be.

5.1.3.3. Trade with Non-EU Members

The effect of a no-deal Brexit on the relations between the UK and the EU has been discussed already, however the UK will likely interact with non-EU countries for electricity trade in the future as well. The only electricity connection to a non-Member State is the interconnector between Great Britain and Norway that is expected to be delivered by 2020. It would be possible for Northern Ireland to seek such a connection in the future as well, however no intentions towards that goal have been expressed. Norway bases its energy relations on the agreement on the European Economic Area. Norway is linked to the European Internal Energy Market via its membership of the Nordpool (Frogatt et al., 2017). If Northern Ireland or Great Britain would want to build interconnectors to any country that participates in ENTSO-E, which is the case for Norway, it would have to comply with EU legislation (European Parliament and the Council, 2009d). This means that in the event of a no-deal Brexit, the UK is free to negotiate their own electricity agreements with other countries. It is however likely that EU electricity policy will be part of the negotiations since all countries surrounding the UK are members of either the EU or the EEA.

Table 3 Building Blocks Relating to EU-UK Relations

Building block	Detail	Change	Type of Change
Autonomy	Political versus Economic Cost-Benefit Analysis	Unsure what level of EU involvement the UK will allow on its territory on the future	Long Term
Market Competition	Market Competition Policy	UK frontrunner for liberalization of the energy market	Long Term
Trade with Non-EU Members	Electricity Trade with Norway	Norway is in the EEA, thus new agreement would include elements of EU legislation	Short Term

5.2. The Sustainability of the Single Electricity Market after a No-Deal Brexit

After the data collection, a suitable conceptual framework was sought to answer the second research question: 'Which changes after a no-deal Brexit will be the most challenging to mediate to sustain the SEM?'. This is a relevant question to ask since WTO rules will not provide an all-encompassing framework to continue cross-border trade on the island or with external countries. No country strictly follows WTO rules because they do not cover all aspects of trade relations. The WTO does not provide a clear-cut definition of energy, defining it both as a good and a service which makes it unclear which rules will apply (Pollitt, 2017). There are also several issues with dispute settlement that will be addressed below. Hayward (2018) therefore predicts that a no-deal Brexit under WTO would have a direct impact on the SEM. The dissertation follows the argumentation that WTO rules will not provide a solution, hence it is needed to explore which policy changes would be needed to sustain the SEM in its pre-Brexit condition.

The chapter starts with the explanation of the conceptual model that was used to analyse the data. Subsequently, the adapted model from Cleaves (1980) was applied to the findings from the document analysis per building block. The building blocks remain grouped under the same titles as in the document analysis for the sake of consistency and structure.

5.2.1. Conceptualization: Adaptation of Cleaves' Model

The document analysis established that a no-deal Brexit would lead to short term changes that would prohibit the SEM from functioning as it did before. EU policy frameworks in areas such as generation, transmission, distribution, etc. would cease to apply, making cooperation with EU countries at least difficult. Policy changes would have to be implemented to adjust areas of the SEM to be compatible with the European Internal Energy Market. The nature of these policy changes varies across the building blocks. Extensive theorization has been done about policy reform and implementation. This dissertation does not elaborate on policy reform and implementation theories, instead it focusses on the practical aspects of electricity policy in the SEM.

The aim of the second research question was to discover which short-term effects of a no-deal Brexit would be the most complex to solve to facilitate the continuation of the SEM in its current form. A conceptual framework was needed to categorise the policy reforms that could mediate the short-term changes affecting the SEM by difficulty. The categorisation used an adaptation of Cleaves'

'characteristics of policy affecting its implementation' (Cleaves, 1980) which splits policy reforms into 'less problematic' and 'more problematic'. Less problematic policies have characteristics that will make implementation easier, more problematic policies have characteristics that will make implementation more difficult. Cleaves' model (1980) was suitable to answer the research question because the changes found in the document analysis can be countered by the implementation of a new policy that differs in how easy their approval and implementation would be. The differences can be attributed to the characteristics of these policies. Cleaves' model (1980) emphasised the effect of the policy's characteristics on implementation specifically. The model was adapted to show the influence of a policy's characteristics on the difficulty of decision-making as well as implementation. Table 4 shows Cleaves' categorisation and the adapted version side by side (Cleaves, 1980). The two broad categories, 'less problematic' and 'more problematic' were retained. 'Less problematic' in the adapted model means that the policy contains characteristics that will make it likely that it would be accepted and easy to implement. Policy labelled as 'more problematic' contains characteristics that will complicate the decision-making or implementation process. The first characterisation based on technical features was adopted from Cleaves' model (1980). This allowed to take the technical aspects of the policy changes into account. Some policy changes require only minor technical adjustments, thus making policies less problematic to negotiate and implement while others need more complex policy frameworks. The second characterisation, based on the change from the status quo, was also retained from the original model. The status quo is the no-deal Brexit scenario that was established as the base scenario in the document analysis. Marginal changes would only bring small changes from the no-deal Brexit scenario, comprehensive changes introduce policy that is radically different from the no-deal scenario. The third and fourth characteristics from the original model were left out of the adapted model. The original model considered the number of targeted actors and the amount of goals that the objective contains. The first research question already addressed the impact of a no-deal Brexit on several stakeholders. The second research question focusses on the technical and political feasibility of the policy changes that are needed to sustain the SEM. These policy changes would be determined on a governmental level that has formal decision-making power. The amount of goals in the objective of the policy change was left out because the objective in the framework of this analysis was 'the continuation of the SEM in its current form'. The fifth characterisation of Cleaves (1980) focussed on the clarity of the policy goal. This was adjusted to the clarity of its outcome. The objective of all policies was assumed to be 'the continuation of the SEM in its current form'. However, the clarity of the outcomes of the policy changes differ. The outcome of some policy changes were predictable, other policy changes could have unintended side-effects. The last categorisation in the original model was adjusted from the duration of the policy implementation to the difficulty of decision-making. This permitted to incorporate additional political considerations into the assessment. Simple decision-making entails either a unilateral decision or a decision that is rather isolated from bigger, complex policy issues. One can speak of complex decision-making when a bilateral

or multilateral agreement would be needed to implement a policy change or a policy change interferes with larger political questions.

For the ultimate categorisation all characteristics were taken into account and balanced in relation to each other to form a conclusion. It was expected that some threats to the SEM could be easily mediated by a small policy change. Other short-term changes were expected to have a big impact and would be difficult to negotiate. These can be policies for which there is an obvious solution but lack of political will, as well as policies that have multiple solutions that would affect the actors involved in different ways. Policy changes to sustain the SEM that fall under the category 'more problematic' were considered more challenging to decide or implement in the long run, these elements will cause the SEM to be vulnerable in the future.

Table 4 Policy Characteristics affecting Decision-Making and Implementation

Cleaves' Characteristics of Policy Affecting its Implementation

Less Problematic	More Problematic
Simple technical features	Complex technical features
Marginal change from status quo	Comprehensive change from status quo
One-actor target	Multi-actor target
One-goal objective	Multi-goal objective
Clearly stated goals	Ambiguous or unclear goals
Short duration	Long duration

Cleaves, P. (1980). Implementation amidst scarcity and apathy: Political power and policy design. *Politics and policy implementation in the Third World*, *28*(1.303).

Characteristics of Policy Affecting Decision-Making and Implementation

Less Problematic	More Problematic
Simple technical features	Complex technical features
Marginal change from status quo	Comprehensive change from status quo
Clearly stated outcome	Ambiguous or unclear outcome
Simple decision-making	Complex decision-making

5.2.2. EU Policy Framework: Common Electricity Policy

In the building block 'infrastructure funding', small immediate changes were observed that relate to eligibility for EU issued funds. For the funds from the European Investment Bank, the European Fund for Strategic Investments and the European Energy Programme for Recovery, little would change in the SEM since most projects by SEM actors in the context of the SEM would still benefit the EU objectives of creating liquid energy markets and improving energy cooperation. No policy changes can be made to increase eligibility. To receive funds from the Connecting Europe Facility, the SEM would have to be involved in projects that could qualify as projects of common interest. A project only qualifies as such when it benefits two or more EU Members or a Member State and a member of the European Economic Area. Third countries can only receive support if it is necessary to realise the project. Joining the EEA or negotiating an energy arrangement with the EU could make projects in the SEM or between the SEM and Great Britain eligible to be recognised as project of common interest. Any arrangement would

require the UK to adopt a significant amount of EU energy policies. This would be a radical change from the no-deal scenario because Northern Ireland or the UK would have to adopt a broad international policy framework that would lead to close ties with the EU. Joining the EEA would bring the most profound change because it would influence multiple policy fields. Because of the severe impact and long-term commitment to the EU and EEA members, the negotiation procedure would be complex. This puts this policy reform in the category of 'more problematic'.

Under the building block 'electricity generation', the recognition of guarantees of origin formed the main short-term change. It is essential that a certification system for renewable energy remains in place that provides the Republic of Ireland with EU recognised proof of the origin of foreign bought electricity to comply with fuel mix disclosure requirements. In the short term, an amendment can be passed by the Westminster Government that requires the UK to accept EU guarantees of origin. This is a less problematic policy change because it is a technically simple amendment with a clear outcome that can be unilaterally decided. The Department for Business, Energy and Industrial Strategy (2019a) has confirmed that the UK will keep recognizing European guarantees of origin after Brexit. This however does not guarantee that the EU will accept guarantees of origin issued by the UK. The EU in its turn could decide unilaterally to also accept UK guarantees of origin. A problem could still arise when disputes would occur. The European Commission acts as the conflict mitigator, something that the UK might reject. The dispute settlement angle will be a reoccurring stumbling block, therefore, it will be discussed extensively later. If an amendment to recognise guarantees of origin would not be passed, the SEM could in theory continue to operate as before. In practice, this would put the Republic of Ireland in a difficult position. The operations of the SEM largely revolve around wind generated electricity exchanges. Without a valid guarantee of origin, the Republic of Ireland could not officially declare this energy as coming from a renewable source, lowering the incentive to continue investing in wind energy from Northern Ireland.

In the building block 'transmission and distribution', there would be minor short-term changes in a no-deal scenario. The UK has been a proponent of transmission and distribution unbundling from the start. One can reasonably expect that will not change in the near future since UK authorities have not openly questioned this requirement. Transmission and distribution unbundling would not be a stumbling block for Northern Ireland if they would want to sustain the SEM. The potential problem that might occur regarding transmission and distribution is again related to dispute settlement. When a conflict emerges between transmission or distribution system operators, ACER gives non-binding advice. The European Commission has the last word if one of the involved actors would dispute the decision of another actor to not follow the advice. The UK could unilaterally decide to accept the European Commission's authority, although it seems unlikely that a country would accept EU power over actors on their territory from an institution in which they would not have formal influence. It is more likely that an alternative dispute settlement mechanism would be agreed.

Relating to the building block ‘security of supply’, the SEM would be unable to continue its capacity remuneration mechanism after a no-deal Brexit. The mechanism was entirely modified in 2017 to meet EU legislation that would cease to apply in case of a no-deal scenario. Eirgrid researched the necessity of a capacity remuneration system and established that the lack of such a system would threaten the security of supply to the island (Eirgrid, 2016a). The Northern Irish SEM actors could choose to continue participation in the capacity remuneration mechanism if the Westminster government would be willing to adopt EU balancing guidelines and mechanisms in Northern Ireland. Purely technical this would not be difficult. The outcome of this decision would be clear. However, this mitigation is categorised as ‘more problematic’ because accepting EU legislation would be a comprehensive change from a no-deal scenario. For the UK this would mean that they would have to accept legislation from an institution in which their formal decision-making power would be at least limited, unless they would enter profound cooperation agreements with the decision-making bodies of the European Internal Energy Market. Another option would be to redesign the SEM capacity remuneration system to become a nationally decided matter between the Republic of Ireland and the UK. This policy change would be classified as ‘more problematic’ as well. It will be unsure if the EU would allow a member state to diverge from the EU balancing guidelines. This could have the unwanted outcome that it could set a precedent for other states to demand opt-outs.

Under the building block ‘wholesale electricity prices’, the main post-Brexit change would be the decoupling of the common price coupling algorithm for scheduling day-ahead markets and determining flows between geographic regions. For the Republic of Ireland to be able to trade with Northern Ireland, this system would have to be re-established after a no-deal Brexit. It is unlikely that the EU would allow an exemption from this requirement since it could influence prices in the European Internal Energy Market. The price coupling mechanism was put in place with the purpose of lowering and stabilising energy prices in its market. When the Republic of Ireland would be connected to and trade on the European Internal Energy Market, but set their own prices, the balance would be disrupted. The policy change that would keep the SEM the closest to what it is now is, would be for the UK to adopt all regulations, directives and guidelines from the Third Energy Package which couples European markets. This would be a ‘more problematic’ change due to the far-reaching cluster of policy changes that would need to be implemented. Another option for the SEM would be to decouple from the European Internal Energy Market in favour of a close cooperation on the island. This would be a highly problematic policy change. The change from the status quo would be limited and the technical details simple since a rather unambiguous pricing mechanism would have to be agreed, but the outcome would be significant. The Irish island would lose its close trade relationship with the European Internal Energy Market, negatively affecting the electricity market. There would also be a risk of potential tariffs for trade with the EU. Insufficient evidence was found to determine whether or not such tariffs would be put in place after Brexit. Tariffs on trade between Ireland and Northern Ireland would reduce the initial benefits of freely

trading electricity, however would not jeopardise the future of the SEM. To return to the pre-Brexit situation, the UK could decide to refrain from taxes on electricity imported into Northern Ireland or the UK as a whole. The EU from their side could also decide to lift import taxes. This would be a 'less problematic' change since it would be technically easy and a solely financial, marginal change from the status quo. The outcome would also be clear. The main risk is that the tariff negotiations would be put into a broader picture of import and export tariff negotiations across sectors, thus becoming part of political bargaining instead of a one-issue decision.

The information exchange mechanism under the building block 'cross-border trade', that requires EU members to share information on agreements with third countries with the European Commission, would not interfere with the workings of the SEM. The European Commission would have the right to be more involved in the agreements between the Republic of Ireland and Northern Ireland, but one can reasonably expect that they will not act as a disruptive power. The cooperation with its neighbour state benefits the Republic of Ireland and the EU's energy objectives of an integrated energy market, whether or not Northern Ireland is a Member State.

Also in the building block 'cross-border trade', the issue of interconnection was addressed. Whether or not the SEM would continue, Ireland would need to have sufficient interconnection with other countries to comply with the European electricity interconnection targets (European Commission, 2015b). Because of the rather isolated geographical location, extensive connection with Northern Ireland and Great Britain would remain the most accessible solution to ensure liquidity. This would count towards the interconnection targets since these targets don't require the interconnection to be with Member States. To achieve a convenient trade mechanism in the SEM, it would be the most beneficial to retain the pre-Brexit ex-ante electricity markets. The first reason is that there would be a single trading mechanism in place in Ireland, instead of multiple. When the interconnector with France is finished, the trade between France and the Republic of Ireland would be in compliance with the Third Energy Package. If a separate trading mechanism would be in place for trade with the UK, two mechanisms would co-exist next to each other. Second, the SEM has consolidated its ways of working with the Third Energy Package in 2017. Changing this again would lead to additional costs and another transition period in which new guidelines need to be established. To continue to participate in the European ex-ante markets, the UK would need to adopt at least parts of the regulation on establishing a guideline on electricity transmission system operation (European Commission, 2017). The guidelines explicitly state the commitment to support third countries in synchronous areas to apply similar rules. The Republic of Ireland and Northern Ireland operate in the same synchronous area because their transmission systems are interconnected and operate at the same frequency. However, Article 13 of the guideline on electricity transmission states that it is not obligated for a third party to adopt the exact same rules. Estonia, Latvia and Lithuania for example have exemptions from certain provisions listed in this regulation (European Commission, 2017). This could also be a route for the UK to take. The Westminster government could

negotiate opt-outs that would allow them to retain a level of decision-making power over their market. Even then, adopting parts of the guidelines on electricity transmission would be a 'more problematic' reform. It will be technically complex to assort which elements of the regulation can be scrapped and which will be essential to ensure the smooth workings of the ex-ante markets. An agreement on this issue would be a comprehensive change from the status quo in which day-ahead and intraday electricity trade became impossible after Brexit. The outcome of such a change will only become clear after a while. It remains to be seen if the UK would get opt-outs and how these would influence the electricity wholesale markets. In terms of negotiation, it will be a complex balancing exercise for the UK between retaining control over its markets and negotiating beneficial cooperation agreements.

In the building block 'industry codes and licences', minor policy reforms would have to be made to ensure cooperation in the SEM remains possible. Preparations have been made to amend UK industry and licensing codes to retain EU law. This makes trade and indirectly the continuation of the SEM after a Brexit possible (Scott, 2019). These amendments are technically simple. The outcome of these amendments would be clear and only bring marginal changes to the status-quo. It is already unilaterally decided by the UK to implement these amendments so these changes can be labelled as 'less problematic' (Ofgem, 2019a).

5.2.3. The Single Electricity Market in Ireland

Under the building block 'regulatory authorities and enforcement mechanisms', it was established that SEM actors will need to retain membership of the institutions that oversee cross-border cooperation in and around the EU to guard the operability of the SEM. Enforcement of the Trade and Settlement Code that determines the competences of the SEM would remain the same after a no-deal Brexit. The membership of ACER or ENTSO-E would have to be re-evaluated. One can expect that the transmission system operators of Northern Ireland and Great Britain, will seek to re-join ACER and ENTSO-E. To obtain membership of ACER, the UK would have to comply with three requirements: 1) dynamic incorporation of relevant EU legislation, 2) having a framework for enforcement and 3) financially contribute to ACER (Frogatt et al., 2017). The membership conditions of ENTSO-E are: 1) meeting the Third Energy Package requirements, 2) having an enforcement mechanism and 3) dynamic incorporation of the Internal Energy Market legislation (Frogatt et al., 2017). Additionally, to trade with EU countries, The UK regulators must conform with the EU's regulation on energy market integrity and transparency (REMIT). They have to do this by registering with the national regulators of an EU country. The policy changes needed to sustain the SEM regarding these two institutions and one policy framework can be summarised in two main requirements: implementation of EU policy frameworks and having an enforcement mechanism in place. The last requirement to join ACER about financial contributions would require a 'less problematic' policy change since it is technically simple and has a clear outcome, being that an agreed sum would have to be transferred every agreed timeframe. The change to the status quo would be merely financial.

The first policy change to address regarding ACER, ENTSO-E and REMIT is the requirement to implement EU policy frameworks. These frameworks are technically complex since they coexist next to national policies and encompass EU influence on the national territory. National policies will have to be matched to the EU's directives and regulations. Implementing these policy frameworks would bring a comprehensive change from a no-deal Brexit status-quo in which the Westminster government would have full control over the regulation and enforcement of electricity policy. Additionally, the implementation of EU frameworks, even if only partially, can have ambiguous outcomes. They will inevitably influence national and local policy frameworks. EU policies are long term commitments, but they also evolve over time. Once a part of these frameworks, a country is expected to follow any changes. In case of the UK, the formal power to influence decision-making significantly declines as non-Member State. What additionally complicates the process is that implementing EU energy law on Northern Irish territory alone is not evident. The Stormont assembly currently does not possess the power to translate EU directives into Northern Irish law. This can be solved by equipping this assembly with the needed powers. The Stormont assembly is not a stable institution (Jones & Norton, 2010). It has faced multiple disruptions over the years due to internal disputes and personal scandals. Between 2003 and 2007 the devolved assembly did not gather, between May and November 2008 the executive government did not meet and since January 2017 until the moment of writing in May 2019 Northern Ireland has been without an executive again. Another solution would be for the UK parliament to transpose the directives related to Northern Ireland into laws only applying on this territory (Frogatt et al., 2017). However, this would not solve the democratic issue of the people of Northern Ireland having to comply with laws they had no democratic influence over.

The second policy change would have to provide an answer to the requirement for an enforcement mechanism. In case the UK would enter ACER as the first ever non-Member State, dispute settlement would first be dealt with by the Board of Appeal, a body of ACER (European Parliament and the Council, 2009b). If this fails, the case must be brought before the Court of First Instance or the Court of Justice. ACER will need to comply with any judgements made by these courts (European Parliament and the Council, 2009b). In the aftermath of the Brexit vote, operating under the WTO rules has been presented as an option in case of a no-deal Brexit. For enforcement of agreements this would be problematic in different ways. First, WTO dispute resolution is only open to states. This means that if actors in the SEM would violate agreements with the EU or an EU Member State, the Republic of Ireland or Northern Ireland as states would have to go to court. Second, claims can only be made against states. A violation of terms would lead to a conviction of the Republic of Ireland or Northern Ireland, which might complicate relations between the countries. The fact that only states can make claims against other states would additionally be complicated by the fact that the EU represents Member States in WTO dispute resolution. Third, WTO dispute settlements do not offer the possibility of fines or compensation for damages, which leads to questions about the effectiveness of this enforcement mechanism (Pollitt,

2017). Lockwood et al.(2017) explored a path that bypasses the jurisdiction of the European Court of Justice. They give the example of EEA country Norway that falls under the EFTA Surveillance Authority and the EFTA Court. Another possibility would be to join the enforcement mechanism of the Energy Community which resembles the EU infringement procedure but is without judicial decision. In case of a bilateral agreement, jurisdiction of an authority above the national court level would have to be negotiated. All of the proposed solutions would be considered 'more problematic'. The complexity of deciding on a tool to enforce common agreements would be a challenge because it would need to fit into a broader policy context and would have important repercussions in times of conflict among actors in the SEM or between SEM actors and third parties.

The building block 'harmonisation of climate policy' established that there is extensive cooperation around harmonising climate goals in the SEM. The SEM actors must follow targets and guidelines for renewable energy use, green house emission reduction and energy efficiency targets as set up in the EU's energy strategy. Additionally, they have devised their own DS3 programme for a secure, sustainable energy system that addresses renewable energy targets and climate goals. After a no-deal Brexit, the SEM could continue the harmonisations of climate targets and policy as long as the Republic of Ireland respects the EU targets and guidelines. The main policy change that could benefit the Republic of Ireland would be for the UK to agree to the EU's Renewable Energy Directive (European Parliament and the Council, 2009a). In this way the renewable energy that would be traded inside the SEM could count towards Irelands renewable energy targets. This would be a less problematic change since this directive does not demand profound policy commitments. If the UK would decide not to adopt this directive, imported energy from renewable sources from Northern Ireland or Great Britain would not count towards the Republic of Ireland's renewable energy targets, reducing incentives for the Republic of Ireland to invest in cross-border trade of clean Northern Irish or British electricity.

The building block 'legal basis' concluded that after Brexit, the Memorandum of Understanding (2006) between the governments of Dublin and Westminster needs to be updated. Since there is a commitment to the continuation of the SEM it can be reasonably expected that adjusting this document will not form a significant stumbling block. The needed changes in the memorandum are restricted to the mentions of the framework of the European Integrated Energy Market. The main competences and goals of the SEM can remain the same, which leads to only a marginal change of the status-quo. The stakes of changing the memorandum are rather low, since it is a non-binding political declaration. The only obstacle might be the unclear outcome of negotiations of a new memorandum. Changing the memorandum can be an opportunity for either government to seriously reconsider the competences and purpose of the SEM. Because this scenario is rather unlikely, the change would qualify a 'less problematic'.

The building block 'coupling to the Internal Energy Market', found that the interconnection with the European Internal Energy Market will fall to 0% when the UK ceases to be an EU Member State unless

the Celtic interconnector is finished by that moment. The Republic of Ireland might get exemptions from the interconnection requirements by the EU because of its particular circumstances. Article 1(2) of the guideline on capacity allocation and congestion management for example says that this regulation 'shall apply to all transmission systems and interconnections in the Union except the transmission systems on islands which are not connected with other transmission systems via interconnections.' (European Commission, 2015b). It remains unclear if by 'other transmission systems', it is meant any other transmission system or a transmission system of an EU Member State (Fredriksson et al., 2017). Whether or not internal trade on the Irish Island can continue depends on the implementation of the policy changes mentioned above. It is difficult to make an accurate prediction on electricity trade between the SEM and third actors. This would depend on the agreement that the UK will make with the EU. How the SEM would fit in potential future energy trade relations between the UK and the EU is therefore more suitable to elaborate on in the discussion part of the dissertation.

5.2.4. UK-EU Relations after Brexit

It was already established that to sustain the SEM in its current form, adopting EU legislation in Northern Ireland and Great Britain will be inevitable. The building blocks autonomy and market liberalization relate back to the issue of EU legislation on UK territory. The effect that these building blocks will have on the SEM are difficult to predict. Autonomy and liberalisation will be two elements that will implicitly be present in future trade negotiations, but will not always be explicitly recognisable. These two elements are deeply ingrained in British political culture. Overtime these sentiments might change but in the short term there are no policy reforms that could mitigate them. One could even argue that they are not conscious decisions, hence can only organically change.

Cooperation with non-EU countries did not happen in the pre-Brexit SEM. It is unclear how trade relationships between the SEM and non-EU Member States will evolve in the future. Brexit could be an incentive for the UK to increase cooperation with non-EU Members. However, the options for the UK would be limited. Norway would be the only non-EU member feasible to trade electricity with. Since Norway is closely involved in the European Internal Energy Market, the link with the EU would remain.

Table 5 Categorisation 'More Problematic' or 'Less Problematic'

Theme	Building block	Detail	
EU Policy Framework: Common Electricity Policy	Infrastructure Funding	European Investment Bank	No Change
		European Fund for Strategic Investment	No Mitigation Possible
		European Connecting facility	More Problematic
		European Energy Programme for Recovery	No Mitigation Possible
	Electricity Generation	Guarantees of Origin	Less Problematic
	Transmission and Distribution	Transmission Network Unbundling	No Change
		Distribution Network Unbundling	No Change
		Access to the Transmission and Distribution System	More Problematic
		Dispute Settlement	More Problematic
	Security of Supply	Capacity Remuneration Mechanism	More Problematic
	Wholesale Electricity Prices	Tariffs	No Change
	Cross-Border Trade	Cross-Border Cooperation in the SEM	Less Problematic
		Day-ahead Market	More Problematic
		Intra-Day Market	More Problematic
		Balancing Market	More Problematic
	Licences and Industry Codes	Licences and Industry Codes	Less Problematic
The Single Electricity Market in Ireland	Regulatory Authorities and Enforcement Mechanisms	Trade and Settlement Code	No Change
		ACER	More Problematic
		ENTSO-E	More Problematic
		REMIT	More Problematic
		Court of Justice of the European Union	More Problematic
	Harmonisation of climate policy	Renewable Energy Targets	Less Problematic
		Energy Efficiency Targets	No Change
	Legal Basis	Memorandum of Understanding	Less Problematic
	Coupling to the Internal Energy Market	Market Coupling with the Internal Energy Market	More Problematic
UK and EU Relations after Brexit	Autonomy	Political versus Economic Cost-Benefit Analysis	No Mitigation Possible
	Market Competition	Market Competition Policy	No Mitigation Possible
	Trade with Non-EU Members	Electricity Trade with Norway	No Mitigation Possible

6. Discussion

If the UK leaves the EU before negotiating an extensive withdrawal agreement, the impact on the Irish Single Electricity Market will be significant. The short-term changes will make cross-border trade on the island complex because European rules and guidelines would cease to apply which can lead to the decoupling of the UK's electricity markets from the European Internal Energy Market. There are strong economic arguments in favour of retaining the SEM after Brexit. A single wholesale electricity market creates liquidity, which will become more important in the future when the Republic of Ireland and Northern Ireland increase the electricity generation from renewable energy sources. The ability to more effectively allocate capacity is particularly important to secure electricity supply for countries that invest in non-synchronous electricity sources like wind energy. In small markets such as the one in Ireland, there can also be scale advantages to working in a bigger area.

Besides economic advantages, political considerations can cause the UK to want to retain influence on regional electricity trade as well. This can be linked to the independence motive identified by Prange-

Gstöhl (2009). The European Internal Energy Market is the biggest electricity cooperation in the region. For the UK to defend their interests, it would be beneficial to be able to exert some influence over the rules and guidelines set by the market dominator. The only way to do this, is by finding a scenario in which the UK would still be in close cooperation with the European Internal Energy Market.

The data collected in the dissertation corroborates the argumentation of Fredriksson et al. (2017) that says that the UK remaining in the European Internal Energy Market is the best case scenario for the wholesale electricity markets on the Irish island. In this scenario operational efficiency is guaranteed because the actors in the SEM and its most important trade partner Great Britain would follow the same rules and guidelines. The UK as part of the European Internal Energy Market would ensure a direct, uncomplicated connection with the European mainland and the other members of the market. The second-best option would be for Northern Ireland to remain in the European Internal Energy Market but for Great Britain to leave. In this case the SEM could remain operational on the island, but the trade with third countries would become more difficult. The Celtic interconnector would in time provide a connection to France, thus easing this disadvantage. Nonetheless, the SEM's ties to its most important trade partner for electricity would weaken.

Several trade agreements could sustain the SEM in a scenario in which the Republic of Ireland remains an EU Member State and the UK not. Four of them are closer examined in this discussion: membership of the European Economic Area, membership of the European Energy Community, bilateral agreements and a new multilateral framework. This list is by no means exhaustive. The four scenarios were chosen because they give a diverse selection of the most wide-spread scenarios in which the UK would still cooperate with the EU for electricity trade.

The most talked about post-Brexit cooperation scenario is for the UK to remain in the European Economic Area, colloquially known as the 'Norway deal'. The EEA forms an internal market between EU Member States and three EFTA states, Norway, Iceland and Liechtenstein. Members of the EEA fully cooperate in the European Internal Energy Market, which would ensure the continuation of the SEM. The UK would have to comply with all energy market rules and couple their energy market to the Internal Energy Market (Frogatt et al., 2017). An advantage that goes along with EEA membership is that projects would be eligible for EU funds from the Connecting Europe Facility. Enforcement of agreements would be done by the EFTA surveillance authority and the EFTA court. The jurisdiction of the EFTA court over EFTA states is similar to that of the jurisdiction of the Court of Justice of the European Union over EU Member States. Being part of the EEA would allow the UK to indirectly influence Commission proposals for legislation like Norway is known to do (Lockwood et al., 2017). It is unsure if the UK would consider participating in the such an extensive cooperation. It would still be tied to EU rules and guidelines, with less power to influence electricity policy. Being part of the EEA also includes agreeing to the free movement of goods, people, services and capital. Free movement of

people has repeatedly been rejected by Prime Minister May and her party colleagues. The withdrawal agreement that was negotiated between the UK government and the European Commission, but that was ultimately voted down three times, contained the intention to end free movement between the UK and EU Member States (European Commission, 2018).

A second option would be for the UK to join the European Energy Community. The Energy Community was established in 2005 to facilitate energy cooperation between EU Member States and nine external countries to liberalise their energy markets. The external countries are all located in South East Europe and most of them have concrete membership aspirations. Even though the UK would not fit into this group of third countries at first sight, the arrangements of the Energy Community could be interesting for the UK. The Energy Community treaty requires its signatories to adopt the policy frameworks to join the Integrated Energy Market. The difference with the EEA is that this arrangement focusses on energy only, not requiring its members to accept policy in other areas. The members also must only comply with the energy market rules. This would allow the UK to keep more control over its market. Market coupling is not required by the agreement, however the Energy Community countries are taking initiatives towards a coupling mechanism to form a single pan-European energy market (Frogatt et al., 2017). It is important to acknowledge the 2018 report of the Energy Community Secretariat that was critical about its own community. Cooperation between EU Member and non-Members was considered 'very dissatisfactory' (Energy Community Secretariat, 2018: 6). One of the reasons given was that the network codes that lead to system security, market integration and market functioning happen on a voluntary basis. In the same 2018 report, the sanction regime was deemed insufficient (Energy Community Secretariat, 2018). As of 2018, efforts have been made to reform sanctioning and enforcement practices. For example, the Dispute Resolution and Negotiation Centre was founded in 2018 to facilitate disputes under the Energy Community Treaty. The Energy Community would be an interesting option for the UK to look into. The non-committal nature that the Energy Community Secretariat criticised, could play in the UK's favour. The lax enforcement and implementation culture would allow the UK to participate in the European Energy Market and still retain the freedom to implement EU policy as it wishes. If the UK would take the free-riding too far however, it could put pressure on the SEM because it would make the UK an unreliable trade partner.

The third option would be to move away from supranational arrangements and resort to bilateral agreements with EU Member States in the field of electricity. This would be a logical step for the UK because of its unique geographic location. It could for example negotiate specific arrangements with the Republic of Ireland to sustain the SEM. There are two ways of negotiating a bilateral energy agreement. The UK can seek sector-by-sector agreements or negotiate the single market in its entirety. Even if it would choose the former, policy decisions in the electricity field are likely to be influenced by policy decisions in different areas. This was exemplified by the case of Switzerland. After their 2014 referendum that limited immigration from EU countries, the EU suspended further cooperation in a

number of areas, including energy (Pollitt, 2017). It also remains to be seen if the EU would look favourably upon bilateral energy agreements. Allowing the UK to pick and choose, could give other countries leverage to demand ad-hoc policy implementation as well.

A last option would be to look beyond existing arrangements and look for a new multilateral solution, in which a new electricity relationship between the EU and its near neighbours is defined. This could be done by the proposal of Frogatt et al.(2017: 45) to create a new special zone in Northern Ireland. This could allow Northern Ireland to implement the needed policy to continue electricity cooperation on the island. The disadvantage for the UK would be that it would cause regulatory diversity inside the country. A variety of the special zone concept would be for the SEM to be given a special status in which SEM actors comply with EU law, but Northern Irish actors would not be subject to the jurisdiction of the European institutions (Frogatt et al., 2017). In that case, an enforcement mechanism would have to be agreed to make sure that Northern Ireland adheres to the agreements. Both proposals would also not solve the isolation problem that the SEM faces in the short term. Great Britain would negotiate their own trade deal with the EU for which there is no guarantee that it will include electricity cooperation. If Great Britain would not couple its electricity market to the European Internal Energy Market or implement sufficient policy requirements for close cooperation, it would complicate trade between the SEM and the other members of the European Integrated Energy Market. Frogatt et al.(2017) also proposed a more ambitious energy cooperation in the form of an 'Enlarged European Energy Union'. This union would operate under a common policy framework, but would include more sovereignty than the EU currently allows. It would give non-EU Member such as Norway and the UK more influence over EU policy making in the field of energy. The policy framework would encompass common goals for environmental protection, product standards and security of supply rules and requirements (Frogatt et al., 2017). The most novel thing about this proposal would be that it would eventually replace the Court of Justice of the European Union with reinforcing mechanisms for joint monitoring and dispute settlement (Frogatt et al., 2017).

Taking into account the possible scenarios, two common requirements to sustain the SEM can be identified. First, it will be needed that the UK accepts EU policy frameworks on its territory, at least in Northern Ireland to sustain the SEM. Second, there will need to be an enforcement mechanism in place to guard compliance and settle disputes. It is recommended for the UK to proactively seek an arrangement with the EU that makes it possible to continue cross-border electricity trade in an efficient manner while retaining some degree of influence over electricity policy in the region. This could be done by seeking membership of existing structures such as the European Economic Area or the European Energy Community. If the EU shows to be receptive to bilateral agreements or a new multilateral energy agreement, this could be an opportunity for the UK to formulate favourable demands for decision-making power while still securing the SEM. If the UK and the EU fail to negotiate an extensive energy agreement, the electricity markets of Ireland and Great Britain will be influenced. If a

hard border would be drawn on the Irish Island, the purpose of the SEM, being market cooperation, would be defeated. The Celtic interconnector could in time normalise the situation for the Republic of Ireland, but can drive the two Irelands even farther apart because it would reduce the need to cooperate on the island.

7. Conclusion

The dissertation researched the effect of the changes after a no-deal Brexit on the Irish Single wholesale Electricity Market by means of a policy analysis. It was found that many areas that are essential for the operability of the SEM would experience short-term changes. Most of the changes relate directly to the fact that EU legislation would cease to apply in Northern Ireland and Great Britain after the UK would leave the EU without an agreement. Electricity markets could be decoupled, making cross-border electricity trade between the Republic of Ireland and the UK nearly impossible. The SEM would also face challenges in the long run. The isolated geographical position of Ireland and its reliance on Great Britain for its electricity connection to the rest of the European Internal Energy Market create specific vulnerabilities in case of a no-deal Brexit.

It was also discovered that for the majority of the short-term changes, mediating policy can be implemented that would allow the SEM to remain operational. The most important adaptations relate to the implementation of EU rules and guidelines and instating appropriate enforcement mechanisms for it. In practice this translates to the need for the UK to enter a close electricity cooperation with the EU. The biggest challenge will be to resolve the question whether or not the UK should accept EU frameworks at the cost of their own decision-making power over them. It is unlikely but not impossible that the UK would sacrifice the SEM if it is unable to reach a satisfactory deal with the EU.

The dissertation looked at the Single Electricity Market as an isolated market, however it is unlikely that electricity policy will be negotiated as a single issue. Disagreement over the SEM will not make or break an agreement. The single-issue focus nonetheless had the advantage that it allowed to specifically identify the effects of a no-deal Brexit on that specific sector in Ireland. Available research on the electricity market was rather scarce and general. This created the need to establish a broader foundation first. That led to the decision to focus on policy changes and their effect on the SEM. It must be pointed out that the electricity market is a complex topic that involves many actors and contains detailed rules and legislation. To get a more precise picture, one would have to look into the details of every policy and discuss every actor individually to discover the intricate effects of Brexit.

The dissertation used qualitative data to determine policy changes and their effects on the SEM. One could also take a quantitative approach to answer the same research questions. For example, it would be interesting to use new economic data to test if Prange-Gstöhl's economic motive would apply to the UK as a motive to remain in the European Internal Energy Market. One could also take a more theoretical approach about a no-deal scenario and the possibilities going forward. In the dissertation a simple model

based on policy characteristics was used, but one could also use policy reform theories such as advocacy coalitions or path dependency to explain why choices were made or can be expected to be made.

The Irish case has distinct features, for example its close, yet complex cooperation with Northern Ireland and its geographical location, therefore it will be influenced by a Brexit in a different way than Scotland, Wales or England. The UK is not the only Member State in which mainstream political parties have supported the idea of leaving the EU. In the 2019 European Parliament elections, the support for Eurosceptic parties rose. The dissertation showed that leaving the EU is not only part of a political philosophic ideal, but has direct, noticeable effects on a country's markets. Specific sectors like the electricity sector would be profoundly impacted by an exit. The broad finding of the dissertation, namely that close wholesale electricity cooperation between a Member State and non-Member State will require the non-Member State to adopt and enforce EU rules and guidelines can be generalised to any EU Member State with Brexit-like aspirations. A Member State that would depart without a trade agreement would lose its connection to the Internal Energy Market, thus would have to negotiate a new electricity agreement. The advantages of cross-border electricity trade have been extensively discussed, therefore the new non-Member State would face the dilemma of accepting to be being bound to the terms of the European Internal Energy Market or risk disadvantaging their domestic electricity sector.

8. Bibliography

Barrett, A., Bergin, A., FitzGerald, J., Lambert, D., McCoy, D., Morgenroth, E., … Studnicka, Z. (2015). *Scoping the Possible Economic Implications of Brexit on Ireland*. Dublin: Economic and Social Research Institute.

Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, *9*(2), 27–40.

Charun, R., & Morande, F. (1997). The electric sector in Chile: main aspects. In R. Raineri & F. Morande, *(De)Regulation and Competition: The Electric Industry in Chile*. Georgetown University: ILADES.

Christiansen, T., & Fromage, D. (Eds.). (2019). *Brexit and democracy. The role of the parliaments in the UK and the European Union*. London: Palgrave Macmillan.

Cleaves, P. (1980). Implementation amidst scarcity and apathy: Political power and policy design. *Politics and Policy Implementation in the Third World*, *28*(1.303).

Commission of the European Communities. (2006). *Inquiry pursuant to Article 17 of Regulation (EC) No 1/2003 into the European gas and electricity sectors*.

Commission of the European Communities. (2007). *Communication from the Commission to the European Council and the European Parliament. an energy Policy for Europe.*

Criqui, P., & Mima, S. (2012). European climate-energy security nexus: A model-based scenario analysis. *Energy Policy*, *41*, 827–842.

de Nooij, M. (2011). Social cost-benefit analysis of electricity interconnector investment: A critical appraisal. *Energy Policy*, *39*(6), 3096–3105.

Department for Business, Energy & Industrial Strategy. (2019a). Guidance. Energy and climate after Brexit. Retrieved 8 April 2019, from https://www.gov.uk/guidance/energy-and-climate-after-brexit.

Department for Business, Energy & Industrial Strategy. (2019b, March 25). Guidance. Trading electricity if there's no Brexit deal. Retrieved 9 April 2019, from https://www.gov.uk/government/publications/trading-electricity-if-theres-no-brexit-deal/trading-electricity-if-theres-no-brexit-deal

Department of Communications, Energy & Natural resources. (2015). *Ireland's Transition to a Low Carbon Energy Future 2015-2030*. Dublin: Department of Communications, Energy & Natural resources.

Ehrenmann, A., & Neuhoff, K. (2009). A Comparison of Electricity Market Designs in Networks. *Operations Research*, *57*(2), 274–286.

Eikeland, P. O. (2008). *EU Internal Energy Market Policy: New Dynamics in the Brussels Policy Game?* (No. FNI Report 14/2008; p. 67). Lysaker, Norway: Fridtjof Nansen Institute.

Eikeland, P. O. (2011). The Third Internal Energy Market Package: New Power Relations among Member States, EU Institutions and Non-state Actors? *Journal of Common Market Studies*, *49*(2), 243–263.

Eirgrid. (2016a). *All-Island Generation Capacity Statement 2016-2025*. Retrieved 9 April 2019, from http://www.eirgridgroup.com/sitefiles/library/EirGrid/Generation_Capacity_Statement_20162025_FINAL.pdf.

Eirgrid. (2016b). *Quick Guide to the Integrated Single Energy Market*. Retrieved 9 April 2019, from http://www.eirgridgroup.com/__uuid/f110639e-9e21-4d28-b193-ed56ee372362/EirGrid-Group-I-SEM-Quick-Guide.pdf.

Eirgrid. (2019). *Celtic Interconnector Project Update. Step 3 Consultation Spring 2019*. Retrieved 9 April 2019, from Eirgrid. (2019). *Celtic Interconnector Project Update. Step 3 Consultation Spring 2019.*

Energy Community Secretariat. (2018). *Knocking on the EU's Door through the Energy Community: Integration of Western Balkans into the Pan-European Energy Market*. Vienna, Austria: Energy Community.

European Commission. (2008). Second Strategic Energy Review – An EU Energy Security and Solidarity Action Plan.

European Commission. (2011). Communication from the commission to the European parliament, the council, the European economic and social committee and the committee of the regions On security of energy supply and international cooperation - 'The EU Energy Policy: Engaging with Partners beyond Our Borders'.

European Commission. (2014). Communication from the Commission to the European Parliament and the Council. European Energy Security Strategy.

European Commission. (2015). Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management (Text with EEA relevance).

European Commission. (2015). Communication from the Commission to the European Parliament, the Council, the European Social and Economic Committee, the Committee of the Regions and the European Investment Bank. A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change.

European Commission. (2016). Commission Regulation (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators (Text with EEA relevance).

European Commission. (2016). Commission Regulation (EU) 2016/1388 of 17 August 2016 establishing a Network Code on Demand Connection (Text with EEA relevance).

European Commission. (2016). Commission Regulation (EU) 2016/1447 of 26 August 2016 establishing a network code on requirements for grid connection of high voltage direct current systems and direct current-connected power park modules (Text with EEA relevance).

European Commission. (2016). Proposal for a regulation of the European Parliament and the Council establishing a European Union Agency for the Cooperation of Energy Regulators (recast).

European Commission. (2017). Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (Text with EEA relevance).

European Commission. (2018). Draft Agreement on the withdrawal of the United Kingdom of Great Britain and Northern Ireland from the European Union and the European Atomic Energy Community, as agreed at negotiators' level on 14 November 2018.

European Environment Agency. (2018). *Overview of electricity production and use in Europe*. Copenhagen: European Environment Agency.

European Investment Bank. (2019). Financed projects. Retrieved 12 April 2019, from https://www.eib.org/en/projects/loan/list/index.htm?from=2012&region=1&sector=1000&to=2017&country=GB.

European Parliament and the Council. (2003). Directive 2003/54/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in electricity and repealing Directive 96/92/EC.

European Parliament and the Council. (2009). Directive 2009/72/EC of the European Parliament and the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC (Text with EEA relevance).

European Parliament and the Council. (2009). Directive of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

European Parliament and the Council. (2009). Regulation (EC) No 713/2009 of the European Parliament and the Council of 13 July 2009 establishing an Agency for the Cooperation of Energy Regulators.

European Parliament and the Council. (2009). Regulation (EC) No 714/2009 of the European Parliament and the Council of 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity and repealing Regulation (EC) No 1228/2003.

European Parliament and the Council. (2009). Regulation (EC) No 663/2009 of the European Parliament and the Council of 13 July 2009 establishing a programme to aid economic recovery by granting Community financial assistance to projects in the field of energy.

European Parliament and the Council. (2011). Regulation (EU) No 1227/2011 of the European Parliament and of the Council of 25 October 2011 on wholesale energy market integrity and transparency (Text with EEA relevance).

European Parliament and the Council. (2013). Regulation (EU) No 347/2013 of the European Parliament and of the Council of 17 April 2013 on guidelines for trans-European energy infrastructure and repealing Decision No 1364/2006/EC and amending Regulations (EC) No 713/2009, (EC) No 714/2009 and (EC) No 715/2009 (Text with EEA relevance).

European Parliament and the Council. (2013). Regulation (EU) No 1316/2013 of the European Parliament and of the Council of 11 December 2013 establishing the Connecting Europe Facility, amending Regulation (EU) No 913/2010 and repealing Regulations (EC) No 680/2007 and (EC) No 67/2010 (Text with EEA relevance).

European Parliament and the Council. (2016). Regulation (EU) 2016/1952 of the European Parliament and the Council of 26 October 2016 on European statistics on natural gas and electricity prices and repealing Directive 2008/92/EC (Text with EEA relevance).

European Parliament and the Council. (2017). Decision (EU) 2017/684 of the European Parliament and the Council of 5 April 2017 on establishing an information exchange mechanism with regard to intergovernmental agreements and non-binding instruments between Member States and third countries in the field of energy, and repealing Decision No 994/2012/EU (Text with EEA relevance).

Fahy, N., Hervey, T., Greer, S., Jarman, H., Stuckler, D., Galsworthy, M., & McKee, M. (2017). How will Brexit affect health and health services in the UK? *The Lancet*, *390*(10107), 2110–2118.

Fredriksson, G., Roth, A., Tagliapietra, S., & Zachmann, G. (2017). *The Impact of Brexit on the EU Energy System* (No. PE 614.181; p. 128). Study for the IRTE Committee.

Frogatt, A., Wright, G., & Lockwood, M. (2017). *Staying Connected. Key Elements for UK–EU27 Energy Cooperation After Brexit* [Research Paper]. Chatham House.

Geva-May, I., & Pal, L. (1999). Good Fences Make Good Neighbours. Policy Evaluation and Policy Analysis - Exploring the Differences. *Evaluation*, *5*(3), 259–277.

Government of Ireland, & Government of the United Kingdom of Great Britain and Northern Ireland. (2006. Memorandum of Understanding between the Government of the United Kingdom of Great Britain and Northern Ireland and the Government of Ireland. The Single Electricity Market (SEM) arrangements.

Hancher, L. (1990). Towards a Free Market for Energy? A Legal Perspective. *Energy Policy*, *18*(3), 233–245.

Hayward, K. (2018). The pivotal position of the Irish border in the UK's withdrawal from the European Union. *Space and Polity*, *22*(2), 238–254.

Henderson, A., Jeffery, C., Lineira, R., Scully, R., Wincott, D., & Jones, R. W. (2016). England, Englishness and Brexit. *The Political Quarterly*, *87*(2), 187–199.

Higgins, P., & Costello, R. (2016). *IIEA Policy Brief. What does the Brexit mean for the Energy Sector in Ireland?* Dublin: Institute for International and European Affairs.

Ifelebuegu, A., Aidelojie, K., & Acquah-Andoh, E. (2017). Brexit and Article 50 of the Treaty of the European Union: Implications for UK Energy Policy and Security. *Energies*, *10*(12).

Jones, B., & Norton, P. (2010). *UK Politics* (Seventh edition). Essex, UK: Pearson Education.

Kuhlmann, S., & Wollmann, H. (2014). *Introduction to Comparative Public Administration. Administrative Systems and Reforms in Europe*. Cheltenham, UK: Edward Elgar Publishing Limited.

Lockwood, M., Frogatt, A., Wright, G., & Dutton, J. (2017). The implications of Brexit for the electricity sector in Great Britain: Trade-offs between market integration and policy influence. *Energy Policy*, *110*, 137–143.

Lyons, P. K. (1992). *EC Energy Policy – A detailed guide to the Community's impact on the energy sector*. London: Financial Times Business Information.

McGowen, F. (1989). The single energy market and energy policy: conflicting agendas? *Energy Policy*, *17*(6), 547–553.

Newbery, D., Strbac, G., & Viehoff, I. (2016). *The benefits of integrating European electricity markets. 94*, 253–263.

Nilsson, M., Zamparutti, T., Petersen, J. E., Nykvist, B., Rudberg, P., & McGuinn, J. (2012). Understanding policy coherence: analytical framework and examples of sector–environment policy interactions in the EU. *Environmental Policy and Governance*, *22*(6), 395–423.

Ofgem. (2019a). *Initial analysis of licence and industry code references to EU law*.

Ofgem. (2019b). Preparing for EU exit. Retrieved 11 April 2019, from https://www.ofgem.gov.uk/about-us/ofgem-and-europe/preparing-eu-exit.

O'Leary, Z. (2014). *The essential guide to doing your research project (2nd ed.).* Thousand Oaks, CA: SAGE Publications Inc.

Padgett, S. (1999). The Single European Energy Market: The Politics of Realization. *Energy Policy*, *30*(1), 53–76.

Pollitt, M. (2017). The economic consequences of Brexit: energy. *Oxford Review of Economic Policy*, *33*(1), 134–143.

Pototschnig, A. (2019, January 8). *Open Letter on the Withdrawal ofthe UnitedKingdomftom the European Union and implications on the registration of market participants and data collection under Regulation (EU) No 1227/2011 on wholesale energy market integrity and transparency (REMIT).*

Prange-Gstöhl, H. (2009). Enlarging the EU's internal energy market: Why would third countries accept EU rule export? *Energy Policy*, *37*(12).

Ramiah, V., Pam, H., & Moosa, I. (2017). The sectoral effects of Brexit on the British economy: early evidence from the reaction of the stock market. *Applied Economics*, *49*(26), 2508–2514.

Scott, C. (2019, January 14). *Preparing for EU Exit: statutory consultation on consequential licence modifications in the event the UK leaves the EU without a deal*. Retrieved 9 April, from https://www.ofgem.gov.uk/system/files/docs/2019/01/eu_exit_statutory_consultation_letter.pdf.

SEM Committee. (2014). *Integrated Single Electricity Market (I-SEM) SEM Committee Decision on High Level Design*. Retrieved 8 April 2019, from https://www.semcommittee.com/sites/semcommittee.com/files/media-files/SEM-14-085a%20I-SEM%20SEMC%20Decision%20on%20HLD.pdf.

SEM Committee. (2015a). *Capacity Remuneration Mechanism. Decision Paper SEM-15-103*. Retrieved 8 April 2019, from https://www.semcommittee.com/sites/semcommittee.com/files/media-files/SEM-15-103%20CRM%20Decision%201_0.pdf.

SEM Committee. (2015b). *I-SEM Market Power Mitigation. Discussion Paper*. Retrieved 8 April 2019, from https://www.semcommittee.com/sites/semcommittee.com/files/media-files/SEM-15-031%20I-SEM%20Market%20Power%20Discussion%20Paper.pdf.

SEM Committee. (2016a). *Capacity Remuneration Mechanism. Detailed Design. Decision Paper 2*. Retrieved 8 April 2019, from https://www.semcommittee.com/sites/semcommittee.com/files/media-files/SEM-16 022%20I%20SEM%20CRM%20Detailed%20Design%20Decision%20Paper%202.pdf.

SEM Committee. (2016b). *Integrated Single Electricity Market (I-SEM) and DS3 (Delivering a Secure, Sustainable Electricity System). Information paper*. Retrieved 8 April 2019, from https://www.semcommittee.com/sites/semcommittee.com/files/media-files/SEM-16-041%20I-SEM%20DS3%20Mitigations%20for%20Potential%20Conflicts%20of%20Interest%20in%20 EirGrid%20Group.pdf.

SEM Committee. (2017). *Trading and Settlement code part B*. Retrieved 8 April 2019, from https://www.semcommittee.com/sites/semcommittee.com/files/media-files/SEM-17-024c%20Trading%20and%20Settlement%20Code%20Part%20B%20%28clean%29.pdf.

SEM Committee. (2019). *Notice to Industry in the event of a 'no deal' Brexit.* Retrieved 9 April 2019, from https://www.semcommittee.com/sites/semc/files/media files/SEM%20Committee%20Statement%20- %20Notice%20to%20Industry%20on%20a%20%27no-deal%27%20Brexit.pdf.

Strambo, C., Nilsson, M., & Mansson, A. (2015). Coherent or inconsistent? Assessing energy security and climate policy interaction within the European Union. *Energy Research & Social Science*, *8*, 1–12.

The Member States. (2012). Consolidated version of the Treaty on European Union. *Official Journal of the European Union*, *326*.

Todd, J. (2016). *The UK's relationship with Europe. Struggling over sovereignty*. London: Palgrave Macmillan.

Turvey, R. (2006). Interconnector Economics. *Energy Policy*, *34*(13), 1457–1472.

Umbach, F. (2012). The intersection of climate protection policies and energy security. *Journal of Transatlantic Studies*, *10*(4), 374–387.

Vaitilingam, R. (Ed.). (1999). *A European Market for Electricity? Monitoring European Deregulation 2.* London: Centre for Economic Policy Research.

Witte, R., & Witte, J. (2009). *Statistics* (Ninth Edition). Wiley.

Young, O. R. (1996). Institutional Linkages in International Society: Polar Perspectives. *Global Governance*, *2*(1), 1–24.

9. Appendix 1: Considered documents for the document analysis

European Documents

Date	Author	Rule	description
2003	The Council of the European Union	Directive 2003/96/EC	Restructures the framework for taxation of energy products and electricity
2008	European Parliament and the Council	Regulation (EC) No 593/2008	Sets rules on contractual obligations in civil and commercial matters
2009	European Parliament and the Council	Directive 2009/28/EC	Establishes a common framework for the promotion of energy from renewable sources
	European Parliament and the Council	Regulation (EC) No 713/2009	Establishes an agency for the cooperation of energy regulators
	European Parliament and the Council	Regulation (EC) No 714/2009	Sets rules for access to the network for cross-border exchanges in electricity
	European Parliament and the Council	Regulation (EC) No 663/2009	Establishes the European Energy Programme for Recovery
	European Parliament and the Council	Directive 2009/72/EC	Sets common rules for the internal market in electricity
2011	European Parliament and the Council	Regulation (EU) No 1227/2011	Sets rules on wholesale energy market integrity and transparency
2012	European Parliament and the Council	Regulation (EU) No 1215/2012	Defines the jurisdiction and the recognition and enforcement of judgments in civil and commercial matters
	The Member States	Treaty on European Union	Consolidated version of the Treaty on European Union
2013	European Parliament and the Council	Regulation (EU) No 347/2013	Establishes guidelines for trans-European energy infrastructure
	European Parliament and the Council	Regulation (EU) No 1316/2013	Establishes the Connecting Europe Facility fund
2015	European Commission	Regulation (EU) 2015/1222	Establishes a guideline on capacity allocation and congestion management
2016	European Commission	Regulation (EU) 2016/1719	Sets rules on cross-zonal capacity allocation in the forward markets
	European Commission	Regulation (EU) 2016/631	Establishes a network code on requirements for grid connection of generators
	European Commission	Regulation (EU) 2016/1447	Establishes a network code on requirements for grid connection of high voltage direct current systems and direct current-connected power park modules
	European Commission	Regulation (EU) 2016/1388	Establishes a network code on demand connection
	European Parliament and the Council	Regulation (EU) 2016/1952	Establishes a common framework for the development, production and dissemination of comparable European statistics on natural gas and electricity prices
2017	European Commission	Regulation (EU) 2017/2195	Establishes a guideline on electricity balancing
	European Commission	Regulation (EU) 2017/1485	Establishes a guideline on electricity transmission system operation
	European Parliament and the Council	Decision (EU) 2017/684	Establishes an information exchange mechanism with regard to intergovernmental agreements and non-binding instruments between Member States and third countries in the field of energy

Irish Documents

Date	Author	Type	Description
2006	Government of the United Kingdom of Great Britain and Northern Ireland and the Government of Ireland	Memorandum of understanding	Defines the purpose and competences of wholesale electricity cooperation in the framework of the Single Electricity Market
2014	SEM Committee	Decision Paper SEM-14-085d	Lays out recommendations for the authorities in Dublin and Belfast on the SEM energy trading arrangements and capacity remuneration mechanism
	SEM Committee	Decision Paper SEM-14-085a	Lays out recommendations for the authorities in Dublin and Belfast on the high level design of the Integrated Single Electricity Market
2015	SEM Committee	Discussion Paper SEM-15-031	Provides a background on market power and outlines views of stakeholders
	SEM Committee	Decision Paper SEM-15-103	Lays out recommendations on the detailed design of the capacity remuneration mechanism
	SEM Committee	Decision Paper SEM-15-077	Sets out the SEM Committee's Decisions on the assignment of operational roles for the SEM relating to the energy trading arrangements and the capacity remuneration mechanism
2016	SEM Committee	Information Paper SEM-16-041	outlines a set of measures that the Regulatory Authorities will use to mitigate potential conflicts of interest
	SEM Committee	Decision Paper SEM-16-022	Follows up on Decision Paper SEM-15-103 and details the SEM Committee's decisions on the second phase of the detailed design of the SEM capacity remuneration mechanism
	SEM Committee	Decision Paper SEM-16-039	Details the design of the capacity remuneration mechanism with a focus on its auction
2017	SEM Committee	Trading and Settlement Code	Sets out provisions relating to the governance and administration of the trading and settlement code