

**THE POLITICS OF NUCLEAR ENERGY IN THE EUROPEAN UNION.
FRAMING THE DISCOURSE: ACTORS, POSITIONS AND DYNAMICS**

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Dedication

To Professor Jacqueline 'Jacqui' Briggs, (R.I.P) without whose encouragement this PhD would have remained a long held, but unfulfilled, ambition.

To Ian, Greg, Neil and Wynn, for their ever constant love and support.

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THE POLITICS OF NUCLEAR ENERGY IN THE EUROPEAN UNION: FRAMING THE DISCOURSE – ACTORS, POSITIONS AND DYNAMICS

Abstract

The submission presents a body of work analyzing the impact of changes to the political environment in which the European Union (EU)'s nuclear energy policy operated during a period of dramatic change for the EU from the late 1990s to the late 2010s. In the late 1990s/early 2000s the process of enlargement taking the EU from 15 to 28 Member States by 2013 began, and brought with it significant energy policy challenges for all the states involved. As the 2000s advanced, hegemonization of climate change in the energy discourse further challenged the EU's policy makers searching for EU policy for sustainable, secure and competitive energy. Both events brought changes to the context in which the EU's nuclear energy policy operates and were formative moments in the policy process.

The publications were underpinned by three broad based and inter-linked themes, the: -

- 'stickiness' of the Euratom Treaty that provides the legal framework for EU nuclear energy policy,
- impact of the fifth enlargement of the EU on both EU internal nuclear energy policy and EU external nuclear energy policy,
- impact of the hegemonization of climate change in the energy discourse.

Notions underpinning the research – that history matters, institutions matter and ideas matter - were unpicked within the analysis. The use of nuclear energy in the EU's energy mix is highly controversial and deeply divides the governments and citizens of the Member States of the EU. As it was an integrative model first devised in the 1950s there is no apparent justification for the EU's model of nuclear integration to continue in the twenty-first century. I have argued in my work however, that despite many controversies surrounding the use of nuclear technology, it is in the interests of all EU states, nuclear generators and non-nuclear generators to support the model of nuclear integration that has evolved.

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Publications submitted for examination

The body of published work submitted for consideration for the award of Doctor of Philosophy by published work on nuclear energy politics in the European Union (EU) comprises 3 journal articles, 3 book chapters and a book of approximately 115,000 words. They were chosen from a wider body of research and publications including Barnes and Barnes, 1995; Barnes, 1996; Barnes and Barnes, 2000 (listed as a book of outstanding academic achievement in 2000 by the American Association of College and Research libraries); Barnes 2006b; Barnes, 2010a. Work was chosen to comprise a coherent, substantial body of work, knowledge and expertise, presenting study of a single area of EU nuclear energy policy.

(2003a) Nuclear Safety for nuclear electricity: the search for a solid legal basis for nuclear safety in an enlarged European Union. In *Managerial Law* 45 (5/6), Special Edition: Enlargement and the Future of the European Union, 115-143.

(2006a) The nuclear industry a particular challenge to democracy in Europe. In *Managerial Law*, (48) 4, Special edition, Law, Justice and Democracy in Europe, 400-429

(2007a) The Future of Euratom. In Neuwahl, N. and Haack, S. (eds.) *Unresolved Issues of the Constitution for Europe: re-thinking the Crisis*, Montreal: Les Editions Themis.

(2008a) Security of energy supply in the new Europe: a role for the EAEC in the EU's Neighbourhood policy. In *Journal of European Contemporary Research*, 4 (2), Special edition, 107-129

(2008b) The Resurrection of the Euratom Treaty: contributing to the legal and constitutional framework for secure, competitive and sustainable energy in the EU. Article in Etty, T. and Somsen, H. (eds.) *The Yearbook of European Environmental Law*, (8), 182-218. Oxford: Oxford University Press.

(2013a) The changing fortunes of nuclear energy in the environmental discourse. In Barnes, P.M. and Hoerber, T.C. (eds.), *Sustainable Development and Governance in*

Europe – the evolution of the discourse on sustainability. Oxford and New York: Routledge.

(2018) *The Politics of Nuclear Energy in the European Union, framing the discourse, actors, positions and dynamics*. Opladen, Berlin and Toronto: Barbara Budrich Publishers, also New York: Columbia University Press. (Chapter 7 Nuclear energy – “too costly to meter”, authored by I.G. Barnes).

Introduction

The body of work submitted for consideration for the award of PhD by published work comprises 3 journal articles, 3 book chapters and a book of approximately 115,000 words. The research on which the publications are based began in the late 1990s/early 2000s during the Presidency of the European Commission (Commission) of Romano Prodi¹ as negotiations for enlargement of the European Union (EU) from 15 to 28² states were intensifying. It was concluded in the early years of the Commission Presidency of Jean-Claude Juncker³, by which time climate change had become hegemonized in the political discourse of energy policy. Both events brought changes to the context in which the EU's nuclear energy policy operates and were formative moments in the policy process.

My research was based on new empirical material, addressing a gap I identified in the academic literature. The research and publications spanned a long period during my academic career. The work was not undertaken with a view to submit a series of publications for the award of PhD by published work at a future date. The publications were chosen to present a coherent, substantial body of work, knowledge and expertise, focusing on the single area of EU nuclear energy policy. It derived from a much wider body of research on EU environmental policy and EU enlargement, (Barnes and Barnes, 1995; 2000⁴; Barnes, 1996; 2006b; 2010a; 2010b; 2014).

Unpicking the EU's model for nuclear energy integration it was apparent that there is no justification for the model of nuclear integration to continue in the twenty-first century. It is based on a Treaty "...hardly known by European integration experts..." (Wolf, 2011). The Treaty that established the European Atomic Energy Community (Euratom) Treaty (ET), adopted in 1957, in force from January 1st 1958, has remained substantively unaltered throughout the history of the EU, unlike the Treaty, also adopted in 1957, establishing the European Economic Community. My research questioned why the national governments lack the political willingness to repeal or significantly amend the Euratom Treaty (Barnes, 2007a; 2008b; 2018). Is it an example of 'political inertia' (Pierson, 2000) or does the ET bring 'added value' to the EU's member states as a

¹ Romano Prodi, Commission President, 1999 - 2004.

² Following the UK referendum on EU membership in June 2016, the UK government notified the EU of its intention to withdraw from the EAEC at the same time as the EU, (Barnes 2018, 45).

³ Jean-Claude Juncker, Commission President, 2014-2019

⁴ Listed as a book of outstanding academic achievement in 2000 by the American Association of College and Research libraries

transnational instrument and basis for action (Barnes, 2007a, 375; 2008a, 121; 2008b, 200).

Further questions emerged about the capacity of the EU to respond to the impact of the fifth enlargement process on nuclear integration (Barnes, 2003a; 2008a) and the impact of the ideational change following the hegemonization of climate change in the energy discourse (Barnes, 2013a; 2018, chapter 6). Other work reflected on the relationships between the actors in the policy process including the formal sphere of EU institutional structures (Barnes, 2003a; 2006a; 2013a; 2018, chapters 3,4), the nation states and other stakeholders (Barnes, 2018, chapters 8,9). Analysis focused on the influence of events and ideas shaping the process of nuclear policy making (Barnes, 2003a; 2013a; 2018, chapter 6).

Three themes link the publications included in this thesis, establishing the context for the operation and development of EU nuclear energy policy during the chosen research period. The most important was consideration of the 'stickiness' of the Euratom Treaty questioning why, in the ever-evolving world of European integration, the Treaty has remained substantively unaltered (Barnes, 2006a; 2007a; 2008b; 2018, Chapter 2). The second theme analysed the impact of the fifth enlargement of the European Union between 2004 and 2013 on both internal nuclear energy policy (Barnes, 2003a; 2008a; 2018, Chapter 5); and developments in external nuclear energy policy, that were a consequence of EU enlargement (Barnes, 2003a; 2008a; 2018, Chapter 5). The third theme focused on the impact of the ideational change in the energy discourse that hegemonized sustainability and climate change in the political discourse (Barnes, 2013a; 2018, Chapters 3, 6.)

I identified enlargement of the EU and hegemonization of climate change in the energy discourse as the most important drivers of policy development, demonstrating potential for collective action amongst all the EU's Member States, whether they are nuclear generating states or not. Despite this neither enlargement nor increased concern about climate change has been the catalyst for change to the substantive terms of the Euratom Treaty, although both changed the context in which the EU's nuclear energy policy operates. Other themes such as the contribution of nuclear energy to energy security, public acceptance of the use of technology, concerns about cyber-attacks on power stations (Barnes 2018, chapters 8,9), or the economics of the industry (Barnes, 2008b;

2013a) are more relevant to analysis of national policy development as the choice of energy resources remains a national competence (TfEU Article 194).

The work is situated in the field of European Studies. Identifying a single area of EU policy to analyze was an empirical rather than a theoretical choice enabling me to trace the development of the policy over time and the impact of the changing policy context. This does not exclude consideration of the insights offered from selected theoretical frameworks. Theoretical frameworks, widely used in European Studies, are reviewed in section Analytical Approach below, including Europeanization, Ladrech, (1994); Radaelli, (2000); Radaelli, (2012); Borzel (2011); Bulmer (2007); Graziano and Vink in Bulmer and Lequesne, (2012); Featherstone and Raedelli, (2003); Borzel and Risse, (2003a); Borzel and Risse, (2003b); Borzel and Risse, (2012); Braun (2014).

I demonstrated how challenging it is for the EU to establish the conditions to re-frame the energy relationship with Russia post enlargement (Barnes 2018, chapter 5). Attempting to overcome this difficulty Johnson's analogy of a 'marriage of convenience' (Johnson, 2005) formed the basis of my analysis to capture the fragility and volatility of the relationship (Barnes 2018, chapter 5). Turning to analysis of external nuclear energy policy and energy security in Barnes (2008b) and (2018, chapter 5), the insights of Manners, (2002); (2009) on 'normative power' and Nye, (2005); (2007) on 'soft power' are considered to determine their value as frameworks for understanding the evolution of the nuclear energy relationship between Russia and the EU.

Notions explored in my research that institutions, history and ideas matter place my work in the constructivist turn in international relations and the institutionalist turn in politics prominent from the 1980s. Originating in the work of March and Olsen (1984), institutionalism has featured increasingly in the work of European Studies scholars since the early 1990s, notably Bulmer (1998); Pollack (2001). Hay identified three hybrid positions and inter-paradigm debates in the work of institutionalists (Hay, 2002). Arguably of the three, rational choice institutionalism (RI), sociological institutionalism (SI) and historical institutionalism (HI), I found the latter to be most useful in consideration of nuclear energy policy. Schmidt cautioned that as each of the three institutionalisms offers different insights, Europeanists should use whichever is appropriate to elucidate the problem at hand and to combine all three to gain a full sense of reality (Schmidt 1999, 4). She identified a fourth institutionalism, discursive

institutionalism (DI) (Schmidt, 2008; 2010) that provided the basis for my analysis of a ‘discourse of reassurance’ within the Commission (Barnes 2018, chapter 3).

In order to provide appropriate critical appraisal of the published work the commentary is organized into four main sections beginning with consideration of my research in the context of the academic literature to establish the originality of the work; sections on research methods and the analytical approach adopted to confirm in-depth review and scrutiny of the research; and finally identification of the research themes to demonstrate coherence.

Context of the Research

This section presents an overview of the literature relevant to EU nuclear energy highlighting the originality and scholarship of my research. My research is situated within the field of European Studies (ES). Whilst there are distinct sub-sets of disciplines in the ES field (e.g. European history, European law or European culture) much of the literature and analysis does not fall easily into a particular category. My research draws on concepts and ideas from politics, international relations, law and history. I considered it important to be able to analyze my research questions without the rigid disciplinary and sub-disciplinary fault lines and demarcation that "...do not prepare us well for a world of interdependence" (Hay, 2002, 5). Considering the importance of the Euratom Treaty as the basis for the development and operation of the policy I used a political science perspective, rather than doctrinal 'black letter' law or in-depth delimitation of the Treaty competences, considering the Treaty as a tool of nuclear energy policy (Barnes, 2003a; 2007a; 2008b; 2018 chapter 2).

In the late 1990s I found little interest in nuclear energy policy in mainstream literature on European integration. Yet the notion of energy integration had featured heavily for the European countries seeking models for collective action in the 1950s and 1960s. O'Driscoll viewed the 'tactical pairing' of Euratom with the European Economic Community (EEC) proposal as responsible for re-launching the European integration process (O'Driscoll, et al, 2002). But "...[f]rom the moment of ratification, Euratom's utility as a vehicle for European integration was spent..." (Scheinman, 1967, 11). The Euratom Treaty was little more than 'a sectoral sideshow' to the TEEC (Moravscik, 1998, in Barnes, 2008b). As a 'failed' model for European integration scant attention was given to the Euratom Treaty or the politics of nuclear energy by commentators on the early history of the EU, Archer, (1990); Holland, (1994); Dedman, (1996); Thody, (1997); Moravscik, (1998); Dinan, (2006); Blair, (2010; Dinan, (2014). I argued this situation remains unaltered. The model of nuclear integration that has been developed remains limited. National governments continue to jealously guard vital national interests in the sector, lacking political willingness to amend or repeal the Treaty (Barnes, 2007a; 2008b; 2018).

My research sought to contribute to the growing body of enlargement literature, focusing on this seemingly neglected aspect of the process (Barnes, 2003a; 2008b; 2018). I found

that the nuclear ‘acquis’ raised challenges not only for the candidate states of Central and Eastern Europe (CEE) but also for the existing Member States (Barnes, 2003a). Academic work on EU enlargement focused variously on the rationale for enlargement, the capacity of the acceding states to adopt the ‘acquis’ on market integration, or the capacity of the acceding states to transition to liberal democracy, Cremona, (2003); Schimmelfennig and Sedelmeier, (2005); Sjursen, (2006); Vachudova, (2005); Zielonka and Pravda, (2001). Others focused on the extent to which the acceding states had the capacity to adopt specific policies and implement the supporting institutional infrastructure, Barnes, (2006b); Barnes and Barnes, (2000); Barnes and Barnes, (2010); Apap et al, (2003); Borzel and Risse, (2003a); Bulmer and Raedelli, (2004); Dom and de Ridder, (2002); Jehlicka, (2002).

Questioning the competence for EU action on nuclear energy policy, my research focused on the surprising longevity of the Euratom Treaty (Barnes, 2003a; 2007a; 2008b; 2018, chapter 2). The Treaty formed the core of the nuclear ‘acquis’ to be adopted in the CEE states but it appeared neglected as “...learned authors tended to be overwhelmingly focused on the EC Treaty...” (Cusack, 2003, 17). However understanding the competences conferred by the Treaty is essential for analysis of the capacity of the EU to respond to the changed policy environment. The political, economic and institutional context for the policy has altered in the twenty-first century, but the Euratom Treaty has remained substantively unaltered since it came into force in 1958 (Barnes, 2003a; 2007a; 2008b; 2018). The continued existence of the Euratom Treaty as a separate legal instrument contributes to current challenges for the EU seeking a more coherent, integrated, sustainable, secure and competitive Energy Policy (Barnes, 2013a).

My 2008b work on the resurrection of the Euratom Treaty was recognized as one of the first to deal with the Treaty at length. Etty and Somsen noted it was the first chapter since the inception of the *Yearbook of European Environmental Law* to deal with the issue of the Euratom Treaty (Etty, T. and Somsen, H. 2008,ix). The importance of my research was also highlighted by Handrlica reflecting on renewed academic interest in the “...previously half-forgotten Treaty...”. He commented on the originality and the “...excellent contribution (of Barnes, 2018) to the current debate...build(ing) on her long-lasting, deep and serious academic interest in the issues of nuclear law and policy...” (Handrlica, 2019a, 439). Elsewhere Handrlica highlighted my research as an outstanding contribution from a policy rather than legal perspective, including novel aspects of issues

concerning Euratom's future and the 'added value' identified for all the member states from the continued existence of the Euratom Treaty (Handrlica, 2019b, 146).

Baker and Stoker highlighted the revival of academic interest in nuclear energy from 2007 as a low carbon resource (Baker and Stoker, 2012). Continuing my research interests, I analyzed the emergence of the new storyline within the political discourse (Barnes, 2013a). I argued there is much about nuclear energy that is not compatible with a scenario which includes nuclear energy as a sustainable energy resource in a diversified energy mix (Barnes, 2013a; 2018). Consideration of the impact of hegemonization of climate change in the energy discourse opened further dimensions in my research, particularly in relation to the potential impact for the Commission as an actor in nuclear energy policy-making. Academic attention concentrating on the role of the Commission in the policy-making process did not include nuclear energy policy-making (Hooghe, 2009; Kassim et al, 2013; Hartlapp et al, 2014; Nugent and Rhinard, 2015). The Commission is not the final decision maker in nuclear energy policy (Barnes, 2018). That role remains with the Euratom Council, but it was [and remains] expected that the intergovernmental Council of Ministers would not make any decisions without following the studies and recommendations of the Commission (Haas, 1958).

The role of the Commission during my research period was that of "...the guardian of the Treaty...(with) responsibility to raise the prominence of nuclear energy on the policy debate" ... (Barroso ⁵ 2010, in Barnes 2018, 54). I identified a 'discourse of reassurance' developing within the Commission (Barnes, 2018). Although the choice of energy resource remains a national competence, this 'discourse of reassurance' emerging during the two Barroso Commissions, 2004-2014, provided new credibility for the use of nuclear energy. The Commission appeared to move from a "neutral technocracy" (Hayward, 2008) to seeming "advocate" for the use of the technology (Barnes 2018, 64). Scheinman in his early seminal work, dismissed the Commission as a peripheral actor (Scheinman, 1967). Scheinman was viewing the Commission in the context of the nuclear debate in the late 1950s and 1960s. I argued convergence of enlargement and hegemonization of climate change in the energy discourse had provided the opportunities for the

⁵ José Manuel Barroso, Commission President, 2004-2009, 2009-2014.

Commission to take the more supportive stance for the nuclear industry (Barnes, 2003a; 2018).

Limited attention was paid to EU Energy Policy in much literature on EU policy and politics including Wallace et al, (eds.), (2020); Bulmer, S. et al, (eds.), (2020); Cini and Perez-Solorzano Borrigan, (eds.) (2019); Richardson and Mazey, (2015); Hix and Hoyland, (2011); Nugent (2017); Andersen, S.A. and Eliassen, K.A. (eds.), (2001). It appeared as if “Energy policy is a newcomer to the vast field of study focusing on the EU and EU policymaking” (Szulecki, et al, 2016, 550). In Table 1 a number of key works on the EU and EU policy making are identified to highlight the main contributions of the authors to the literature and the gaps in their treatment of nuclear energy policy. These works in Table 1 routinely include some discussion of the early history of the Euratom Treaty, outlining the establishment, competences and vested national interests constraining transfer of competences to the supranational level, highlighting the shortcomings of the Euratom Treaty as a tool for political integration. There is no consideration of other nuclear policy related issues.

My research highlighted the importance of understanding the history of nuclear integration in the EU, arguing analysis of the EU’s twenty-first century nuclear energy policy requires an understanding of the context in which the Euratom Treaty was negotiated (Barnes, 2007a; 2008b; 2018). This established the rationale for the Euratom Treaty competences, outlining the model of eclectic integrationalism, based on limited supranational action and inter-governmental agreement that has ensued. My argument was that it was this model that was responsible for the surprising longevity of the Treaty. It would be difficult to negotiate an alternative as the current model appears to satisfy all the Member States whether they generate nuclear electricity or not (Barnes, 2003a; 2007a; 2008b; 2018).

Although energy policy was an early focus in the search for integration amongst the states of Europe the literature on EU Energy Policy is limited. Key works are shown in Table 2. Of these Matlary (1997), is considered to be the first book-length analysis of European energy policy (Jordan, 1998). All the authors identified constraints on EU common energy policy from national interests, but little attention was paid to nuclear energy policy. In my publications I questioned the role of the Euratom Treaty as support for nuclear energy in an enlarged EU (Barnes, 2003a), highlighting the continued difficulties

in developing common energy policy (Barnes, 2013a). Agreeing with Buchan and Keay, (2015), that an overarching institutional framework for common energy policy is required, I argued it should also include changes to the Euratom Treaty. However the necessary Treaty change is not likely to occur in the short term so retaining the Euratom Treaty until such time as treaty change takes effect provides value added for all the member states (Barnes 2013a; 2018). In Barnes 2006a; 2018 I focused on in-depth analysis of the shortcomings of the Euratom institutional arrangements, including the existence of a nuclear democratic deficit.

My work focused on EU policy action and nuclear energy developments in Europe. Other literature on nuclear energy, shown in Table 3, focused variously on technological developments (Nuttall, 2005; Suppes and Storvik, 2007) or national cases studies of the USA or other nuclear energy states globally (Suppes and Storvik, 2007; Sovacool and Valentine, 2013). Although my focus was on the EU's nuclear energy policy discussion of national nuclear energy policies in EU member states and countries in the wider European region was included in my publications (Barnes, 2008a; 2018). Conclusions drawn by Sovacool and Valentine about the importance of energy security as a driver of the policy were present in my work (Barnes 2008a; 2018, chapter 5). But my primary focus was on the impact of enlargement of the EU and hegemonization of climate change as the main drivers of the policy (Barnes, 2018).

The literature considering the Euratom Treaty from a legal perspective is similarly limited. The most comprehensive review of the Euratom Treaty since Scheinman (1967) was O'Driscoll, M. et al, (2002). However more recent interest in nuclear energy has intensified and with it academic interest in the Euratom Treaty as a legal instrument for EU action, Ptasekaite (2011); Cenevska (2016); Söderston (2018). But these authors focus solely on competences of the Treaty or comparison of the Euratom Treaty with the Treaty on European Union or international nuclear related Treaties and conventions. Söderston (2018), did not include discussion of future nuclear energy from an economic or political perspective, deciding to leave such discussion to be dealt with elsewhere (Söderston, 2018, 10). Throughout my publications I adopted a political science perspective. My focus was on the Treaty as a policy instrument (Barnes 2007a; 2008a; 2018). My research sought to balance the legal and historical with the political and economic highlighting the importance of the Euratom Treaty as the framework for transnational and supranational action taken amongst the EU's Member States.

Table 1. Selected literature on the EU and EU policy-making (arranged by date of first published edition)

Author(s)/Title	Main contribution to understanding EU policy making	Treatment of energy policy/nuclear energy policy
Wallace, H.S., et al, (eds.) (2020) <i>Policy Making in the European Union</i> (2020). 8 th edition. Oxford: OUP. First published 1977.	Authoritative exposition and analysis of EU policy making. Standard text.	Energy policy featured as a single chapter in successive editions. Reference to nuclear energy policy in the history of the early development of the European Union. Little discussion of the evolution of nuclear energy policy and the potential contribution to overall EU energy policy. Notable contributions: - Matlary, J-H. (1996), 3rd edition , on barriers to energy policy created by national policies and increasing divergence amongst the Member States Buchan, D. (2014), 7th edition , examined three strands in EU energy policy – the internal market, energy security and climate change.
Nugent, N. (2017) <i>The Government and Politics of the European Union</i> . 8 th edition. London: Palgrave Macmillan. First published 1989.	Detailed and comprehensive discussion of the government and politics of the European Union.	Energy policy included as an area of functional policy. Short section on the policy concerns of the Euratom Treaty and its competences in the historical evolution of the European Union. No analysis of the Euratom Treaty as framework for current and future nuclear policymaking.
Andersen, S.A. and Eliassen, K.A. (eds.) (2001) <i>Making Policy in Europe</i> . 2 nd edition. London: Sage Publications. First published 1993.	Different perspectives on study of main institutional actors.	Limited coverage. No discussion of roles of Euratom institutions. Andersen, (2001), 2nd edition , identified drivers of energy policy. No discussion of Commission and nuclear energy competences. No consideration of nuclear energy as a sustainable resource.

Richardson, J. and Mazey, S. (eds.) (2015) <i>European Union: Power and Policy-Making</i> . 4 th edition. Oxford: Routledge. First published 1996.	Focus on policy-making process as ultimate arena of power. Analysis of roles of institutions and policy actors in policy process.	Limited discussion of energy policy-making/nuclear energy policy.
Hix, S. and Hoyland B. (2011) <i>The Political System of the European Union</i> London: Palgrave Macmillan. 3 rd edition. First published 1999.	Contrasted two distinct theoretical approaches to EU politics – intergovernmentalism and supranationalism, identifying five main types of EU policymaking drawing on the two basic approaches in differing combinations and constructions.	No reference is made to EU energy policy when discussing regulatory policies. Discussion of the democratic deficit within the EU is not applied to the arena of nuclear energy policy.
Bulmer, S. et al, (2020) (eds.) <i>Politics in the European Union</i> . 5 th edition. Oxford: OUP. First published 2001.	The editors argue the necessity of a historical overview of European integration as any “...comprehensive analysis of the European Union also needs to be rooted in history...” (Bulmer et al, 2020, xxiv).	Includes a brief analysis of the role of the Euratom Treaty as a driver of European integration. Section on policies does not include a chapter on energy policy or nuclear energy policy.
Cini, M. and Perez-Solorzano Borrigan, N. (eds.) (2019) <i>European Union Politics</i> . 6 th edition. Oxford: OUP. First published 2009	Comprehensive and authoritative core text covering integration theories, history, institutions, policies and contemporary issues.	Uses an issue based approach. Limited reference to the Euratom Treaty in section on historical context. Discussion of Energy Policy not included.

Table 2. Selected literature on EU Energy Policy (arranged chronologically by earliest first)

Author(s)/Title	Main contribution to understanding EU energy policy	Treatment of Nuclear energy policy
Lyons, P.K. (1994) <i>Energy Policies of the European Union</i> . London: Business Intelligence Report, EC Inform.	EU energy policy – “...a group of policies in a mess...” (Lyons, 1994, 143)	Identified the ‘stand-alone’ nature of nuclear energy. Concluded that the Euratom Treaty provided an instrument to support nuclear safety as the EU enlarged.
Matlary, J.H. (1997) <i>Energy policy in the European Union</i> . London: Macmillan.	Highlighted conflict of interest between the policy actors that left energy policy subject to national competences	Argued nuclear energy was important and should be included in the energy mix of the European Union but considered the Euratom Treaty to be obsolete because of the role of oil and gas in the EU’s energy mix. Did not provide an alternative model for nuclear energy integration amongst the Member States.
Buchan, D. (2009) <i>Energy and Climate Change: Europe at the Crossroads</i> . Oxford: OUP.	First major academic work since Matlary (1997) that concentrated on EU energy policy, albeit linking it with climate policy.	Chapter 13 – Nuclear Power – the impossible consensus. Concluded that nuclear power carried a high potential for collective action because of the institutional framework established in the Euratom Treaty. Cautioned that this did not necessarily lead to common energy policy as not all EU Member States were generating states.
Buchan, D. and Keay, M. (2015) <i>Europe’s long energy journey</i> . Oxford: OUP.	Concentrated on the importance of the creation of the requisite institutional framework for the EU’s Energy Union.	Includes nuclear energy as a technology in the search for sustainable low carbon energy, highlighting the consequences for the EU from diverging national policies.

Table 3. Selected literature on Nuclear Energy Policy/Euratom Treaty (arranged chronologically by earliest first)

Author/title	Focus	Treatment of nuclear energy/Euratom Treaty
Polach, J.G. (1964) <i>Euratom; its background, issues and economic implications</i> . Dobbs Ferry: Oceana Publications.	Comprehensive study of economic implications of Treaty.	Focus on atomic integration from historical perspective. Concludes Euratom not the stimulator of economic growth anticipated.
Scheinman, L. (1967) Euratom: Nuclear integration in Europe. In <i>International Conciliation</i> . Washington: Carnegie Endowment for International Peace.	Influential early analysis of nuclear integration in the European Community. Demonstrated how the politicization of the nuclear sector hardened national positions against transfer of competences to the national level.	Concluded role of Euratom as a promotional tool for the nuclear industry supporting nuclear research and development was the most important outcome of Treaty. Commission considered peripheral to the policy process and unable to influence national governments.
O'Driscoll, M. et al, (2002) <i>The EP and the Euratom Treaty, past, present and future</i> . Energy and Research Paper ENER 114. Luxemburg: European Parliament	Most comprehensive review of Euratom Treaty since Polach (1964).	Historical review of negotiations for Euratom. Identifies Euratom as a failed model for European integration. Analysis of terms and competences of Treaty and future prospects.
True, C. (2003) Legislative competences of Euratom and the EC in the energy sector: the nuclear package of the Commission. In <i>European Law Review</i> , 28(5), 664-685.	Limited legal focus.	Analysis of Commission legislative proposals in the nuclear 'pacquet', 2002.
Nuttall, W.J. (2005) <i>Nuclear Renaissance, technologies and policies for the future of nuclear power</i> . Bristol: Institute of Physics publishing	History of nuclear energy in the US and Europe with analysis of recent policy and technological developments. Some discussion of public trust in technology.	Limited discussion of EU nuclear energy policy/Euratom Treaty.
Elliott, D. (ed) (2007) <i>Nuclear or not? Does Nuclear Power have a place in a sustainable energy future?</i> London: Palgrave Macmillan.	Focused on the resurgence of interest in nuclear energy that took place in the early/mid 2000s.	Single chapter (Froggatt, 2007) focused on the European Dimension. Concluded that nuclear energy was not compatible with the environmental dimension of sustainability.

Suppes, G.J. and Storvik, T. (2007) (eds.) <i>Sustainable Nuclear Power</i> . Burlington: Academic Press.	Concentrated on the technology itself and how it could respond to the challenges of sustainability. Geographical focus on the USA.	No consideration of EU policy/Euratom Treaty.
Tromans, S. (2010) <i>Nuclear Law: the law applying to nuclear installations and radioactive substances in its historic context</i> . Oxford: Hart.	Practical guide to the application of International, EU (Euratom), and UK law to various uses of nuclear energy and radioactive substances.	Introductory section on the history of the Euratom.
Ptasekaite, R. (2011) <i>The Euratom Treaty v. Treaties of the European Union: limits of competence and interaction</i> . Report number 2011:32, Swedish Radiation Safety Authority, SSM.	Comparison between the distinguishing features of the Euratom treaty and other international treaties and the TEU and TFEU	Argued perception of the existence of the special features of the Euratom Treaty is essential to correctly understand the secondary legal system based on the treaty and to implement the treaty provisions (Ptasekaite, 2011, 3).
Sovacool, B.K. (2011) <i>Contesting the Future of Nuclear Power, a critical global assessment of atomic energy</i> . Singapore: US World Scientific Publishing	Thematic approach considering future developments in nuclear energy. Concluded for each of the issues costs outweighed the benefits.	No consideration of EU policy/Euratom Treaty.
Sovacool, B.K. and Valentine, S.V. (2013) <i>The National Politics of Nuclear Power</i> . London: Routledge.	Developed theory of nuclear socio-political economy on the basis of six factors used to compare and contrast the emergence of widely differing national views of nuclear energy.	Only EU state included, France. Other states included Russia and the former Soviet Union but not the EU's FSU States.
Hoerber, T.C. (2013) The role of Euratom in a sustainable energy future. In Barnes, P.M. and Hoerber T.C (2013) (eds.) <i>Sustainability and Governance in Europe – the evolution of the discourse on sustainability</i> . London: Routledge.	Focus on Euratom Treaty structures.	Argued Euratom Treaty assembled a considerable expertise in the energy sector that could be utilized in the development of a sustainable European energy policy.
Cenevska, I. (2016) <i>The European Atomic Energy Community in the European Union context: the 'outsider' within</i> . Cheltenham: Edward Elgar.	Relationship between the Euratom Treaty and the EU's other Treaty frameworks.	Limited to EU nuclear weapons non-proliferation and environmental policies.
Söderston, A. (2018) <i>Euratom at the Crossroads</i> . Cheltenham: Edward Elgar Publishing.	Legal issues associated with Euratom Treaty.	No discussion of future of nuclear energy from an economic or political perspective.

Research methods

“I keep six honest serving men (they taught me all I knew). Their names are what and why and when and how and where and who.”

(Rudyard Kipling, 1902, “The Elephant’s Child”, a tale of insatiable curiosity).

My research drew on a range of qualitative methods for each project, using methods relevant to the “...study of historical context, interviews based on people’s experience of politics and the attention to political and social meaning of text-based discourse analysis” (Vromen, 241, in Lowndes, et al, 2018). Triangulation of findings from these research methods and use of resources was important (Bryman, 2001, in Burnham, et al, 2008). Using this approach led me to question and develop my research agenda and enabled deepening of my research findings.

1. Interviews.

In the late 1990s/early 2000s, in association with on-going research interests in environmental and enlargement policies, I conducted a number of semi-structured interviews in Brussels with EU Commission officials who were Heads of Unit in the Directorate-General (DG) for Environment, DG Enlargement, DG for Employment and Social Affairs, DG Internal Market, and DG Regional Policy, the Director and officials from the European Environment Agency, Members of the European Parliament (MEPs) from the UK Labour Party, and experts of the European Environment Bureau. The purpose of the interview process was to obtain specific knowledge and information; to test the veracity of the material from documentary analysis and the other interviewees; and refine my research questions and findings and gain a deeper understanding of the evolving context in which policy is made. Using a semi-structured approach enabled direct questions on specific aspects of ongoing research, leaving opportunities for wider ranging discussion, identification of relevant documents and opening further research questions.

From these interviews it became apparent that amongst issues of concern in the enlargement process those relating to the civil nuclear energy sector were proving to be a particular challenge. Accession conditions for the new Member States appeared arguably more stringent than those in other energy policy areas. This did not have

prominence in contemporary academic debates about enlargement to the states of Central and Eastern Europe (CEE), Cremona, (2003); Schimmelfennig and Sedelmeier, (2005); Sjursen, (2006); Vachudova, (2005); Zielonka and Pravda, (2001); Barnes, (2006b); Apap et al, (2003); Borzel and Risse, (2003)a; Bulmer and Raedelli, (2004); Dom and de Ridder, (2002); Jehlicka, (2002). As the choice of energy resource is a national competence I questioned why these conditions of membership were being imposed and what competences the Commission was relying on to work with the candidate states (Barnes, 2003a). Nuclear safety was identified as of particular importance during interviews with Commission officials (interviews May 1999 DG Environment; June 2002, DG TREN) and media commentary (European Voice, 19.09.2001).

Subsequently, between 2002 and 2005, I interviewed and re-interviewed a Head of Unit dealing with nuclear policy issues within the Directorate-General responsible for Transport and Energy, (DG TREN), three times. These interviews followed a consistent pattern of prior contact, identifying specific questions for discussion, including more open questions to prompt discussion, followed up by email for clarification or further specific information. The interview data and subsequent follow up email correspondence was of particular relevance to my research on the impact of enlargement, (Barnes, 2003a); the Commission position for the Convention on the future of Europe (Barnes, 2007a; 2008a; 2008b); and also informed later analysis, (Barnes, 2013a; 2018, chapters 2, 3, 9).

Single in-depth interviews with individuals pivotal in the policy process are important components of political science research (Mosley, 2013) but were not relied upon as my sole research methodology. Interviewing individuals who may be considered as part of a political 'elite', i.e. an individual in closer proximity to the policy making process than the general public, provide insights into the mind-set of the actor and their subjective analysis of a particular situation (Richards, 1996, 200) and the inner workings of the political process (Lilleker, 2003, 208). However Lilleker cautioned that there are severe limitations to elite interviewing including potential inherent subjectivity in their views (Lilleker, 2003, 208).

My interviewee in DG TREN had a professional, technical and academic background in nuclear issues before taking up the policy related position within the Commission. Throughout our discussions my interviewee demonstrated high-level support for the use of nuclear energy. Confidence was expressed in the EU, as the holder of appropriate

competences and measures, to ensure nuclear safety (Interview, June 2002). It was important for me to reduce the impact of the interviewee's subjectivity and confirm the interview findings using documentary analysis and scrutiny of material from a number of differing sources. Being able to re-interview my respondent enabled a degree of interviewer-interviewee rapport, important for in-depth discussion and to identify consistency in the views expressed over time. Other less obvious advantages of in-person interviews included the phenomenon of metadata identified by Mosley (2013). She considered metadata gained during in-person elite interviews gave the interviewer information about the context in which the interview took place and how the respondent behaved, that facilitated more accurate use and interpretation of interview data, not often possible for survey responses and other quantitative methods (Mosley, 2013, 5).

From the wider-ranging series of in-person interviews I conducted with officials of the Commission I became aware of an institutional atmosphere and culture specific within each DG. The interviews were carried out in intensive blocks of several weeks annually. A range of in-person interviews with several different respondents was carried out during each visit to Brussels, consistent with the importance of the opportunity for immediacy of comparison between the views and mind-set of respondents (Richards, 1996; Lilleker, 2003). The semi-structured nature of the interviews facilitated broader discussion of contemporary issues impacting on the context of the policy debate. This was of particular value given the cross policy boundary nature of EU enlargement and the impact of climate change. Differences and tensions within the Commission also became apparent during these interviews. Disagreement between the Commissioners responsible for the Environment (Margot Wallström), favouring renewable energy, and Energy (Loyola de Palacio), favouring nuclear energy to combat climate change, was identified during an interview with an official of DG Environment (Interview 1999); (Barnes 2018, 59).

As a result of the nature of the institutional structures within the Commission, the number of individuals involved in any one policy area is small. Gaining access to these individuals was perhaps made easier as a member of the Jean Monnet global network of 'ad personam' Chair holders⁶. I found that Commission officials were open to approaches

⁶ The Jean Monnet Action Programme funds awards from the European Commission for research and teaching on European integration in institutions of Higher Education globally. The programme has run since 1990. There were approximately 900 awards of JM 'ad personam' Chairs and Chairs, made to individuals to 2020. Other awards were made to institutions, Centres of Excellence for EU studies, associations and networks of institutions.

from academic researchers, seeking feedback in return from the academic community specializing in EU matters. Information from my interviewees enabled me to target a Commission official with expertise in nuclear energy issues and policy, particularly nuclear safety, an interview outcome described by Richards as ‘snowballing’ (Richards, 1999, 200).

My research objectives at the time did not include ethnographic study to explore the extent to which the specific institutional atmosphere in each DG came to be adopted by the officials on appointment, or if views reflected their own pre-existing deep-seated interests. But Egeberg demonstrated that EU institutions and organizations were able to shape and re-shape individual actors’ preferences and sense of belonging, (Egeberg, 2001; 2004). Analysis of the academic and professional backgrounds of the individuals interviewed might also have established such a relationship, as Kassim et al’s study questioning the motivation of officials pursuing careers in the Commission (Kassim et al, 2013).

2. Documentary analysis

All stages of my research involved scrutiny of primary source documentary evidence including Commission staff working documents, communications and reports from the Commission, conclusions of the European Council summit meetings, reports from the European Parliament committees and plenary sessions, and UK House of Lords Select Committees on the EU and EU policies and House of Commons European Scrutiny Committee. Documentary analysis enabled insights into the debates surrounding nuclear power to be identified and confirmed and to map the sequence of events as they had taken place. This was important to make the most effective use of the interview data obtained, ensuring that specific focus was maintained throughout. Post 2005 my research was predominantly based on documentary analysis as the issue of climate change became hegemonized in the discourse and material became more widely available. In-depth review of wide-ranging documentary evidence was crucial at all times to provide evidence to validate my analysis and findings.

To ensure the quality and relevance of the documentary material it was important to unpick the information going back to available earlier drafts of documentation, ‘green papers’ from the Commission, opinion papers prepared by the Commission for the

European Council on the candidate states, reports commissioned by various think-tanks or academic organizations for EU institutions and consultation procedures launched by the Commission on new proposals. Of particular value for research was the increased availability and access to material on the websites of the EU institutions and agencies resulting from the Commission's commitment to openness, accountability, increased public scrutiny and transparency (COM (2001) 428 final). Speeches by Commission Presidents and Commissioners responsible for the energy portfolio in a number of forums were accessed. Evidence included in UK government documents and the select and scrutiny committee reports of the House of Lords and the House of Commons provided valuable material as the reports include the evidence taken from interested parties and stakeholders in the policy process and those involved in the nuclear energy industry. Where they were available in English, material was also accessed from French, German and Russian government websites.

Wide-ranging review of documentary evidence from other actors was also accessed, including international bodies and energy related bodies e.g. the International Atomic Energy Agency (IAEA), Organization for Economic Cooperation and Development (OECD), World Nuclear Association (WNA) and United Nations relevant agencies. Position papers of nuclear industry groups such as Foratom, environmental groups, academics, think tanks and pro-and anti-nuclear supporters were used in order to derive an alternative critical view and deepen my research findings. Annual World Nuclear Industry Reports, available online, the first of which was published in 1992, provided an invaluable source of analysis and statistical material organized in a consistent manner year on year, enabling identification of trends in the industry and issues of concern not just in the EU but globally. The 2019 report included a chapter on climate change and the nuclear industry for the first time, (Schneider and Froggatt, 2019). Specialist publications and reports from organizations such as *Energy Post Weekly*, (<https://www.energypost.eu>), were accessed. Less specialized and more general media commentaries, whilst containing only limited comment on the basis of press releases, often drew attention to issues that could be followed up with scrutiny of source documents (Barnes, 2018, 69).

3.Public Opinion

Generation and use of nuclear energy is an emotive issue that deeply divides public opinion within EU member states and across the EU. I concluded that the future of the

nuclear sector relied on political willingness to include the technology in national energy mix and public acceptance of this decision (Barnes, 2018). Evidence from public opinion polling and referendum results was used to gain a view of EU public opinion and support for nuclear energy.

Burstein (2003), presenting a distillation of considerable research into the impact of public opinion on public policy, highlighted agreement amongst most social scientists studying public opinion and public policy that public opinion influences public policy with the relationship becoming stronger the more salient an issue is for the public. But the relationship is nuanced as “No one believes that public opinion always determines public policy, [but] few believe it never does...” [as] “...public opinion affects policy three-quarters of the times its impact is gauged, its effect is of substantial policy importance at least a third of the time and probably a fair amount more” (Burstein, 2003, 36). The relationship may be threatened by the power of interest organizations, political parties and economic elites and “...democratic governments sometimes ignore the public” (Burstein, 2003, 29). I found that public perception of risk also impacts support for nuclear energy as catastrophes such as that at Chernobyl and Fukushima lowered levels of public support for the use of the technology (Barnes, 2018, 206). Where there was open and transparent debate about the use of the technology at national level, as in Finland, then public support was more likely to be garnered (Barnes, 2006a, 408).

Mayerhoeffer and Slacek Brlek consider public opinion polls as an integral part of political communications and an input factor providing political actors with information about the opinions of citizens. Polling has become an important factor to be taken into account when making decisions and communicating with citizens (Mayerhoeffer and Slacek Brlek, 2014, 105). “Clearly without surveys and forms of measurement we would not know of public opinion at all” (Osborn and Rose, 1999, in Mayerhoeffer and Slacek Brlek, 2014, 107). There are difficulties in assessing public opinion across the EU. In order to overcome some of the problems polls published in the EU’s Eurobarometer series and OECD/NEA polls were reviewed for evidence of public view of nuclear risk at the European level (Barnes, 2003a; 2018, chapter 9).

Eurobarometer polls ask the same question of sample populations across the EU so transnational comparison of opinion is possible. But there is the lack of frequency of Eurobarometer polling on nuclear issues. The most recent of such polls during my

research period was conducted in 2010 (Eurobarometer, 2010, in Barnes 2018, 192). Much of the polling about nuclear issues is done within a national context with specific national issues affecting the responses of those questioned. Polls carried out by other organizations, including by the nuclear industry association, Foratom, national governments and in academic studies were reviewed to draw conclusions about public acceptance of the technology at national level in EU states (Barnes, 2018).

Although polling is a useful tool to gauge public opinion in the EU (Barnes, 2003a; Barnes, 2018) there are a number of disadvantages. All polling provides a ‘snap shot’ of opinion at a particular point in time in a specific context, (Burnham, et. al., 2008, 97). As ‘snapshots’ opinion polls do not provide information about the longer-term impact of public opinion on policy. Polls do not provide information on how or why respondents act or react in a particular way in their responses. It appears that in the case of nuclear energy opinions tend to be polarized and, once formed, often difficult to change as “...each individual's world view shapes their opinions...Support or opposition to nuclear power, then, is... ‘part of who we are and how we feel about society and our place in it’ ” (Lovering, 2019). The public may respond differently to a question of whether their country should include nuclear energy in a national energy mix to a question about the construction of a new reactor in their local area. If the area is one with high levels of unemployment, then economic interests may be more important than concerns about risks from the industry (Barnes, 2018, 194).

Polling outcomes rely to a great extent on the amount and accuracy of the information that the public feel they have. Public trust in the sources of information is key to how risks are perceived (HMG, 2012, 3). In the case of the nuclear sector the public feel that information is lacking or is carefully controlled by the government (Barnes, 2018, 189). For many, the secrecy surrounding the 1986 Chernobyl incident demonstrated both lack of information and government control of information. The Soviet authorities were slow to evacuate the local areas. Some of the early warnings about release of radioactive materials over wide areas in Europe came not from Soviet, but from Swedish authorities. Much information about the catastrophe did not become available from the Soviet and Ukrainian authorities until following the fall of the Soviet Union in the early 1990s.

Referendums may be called for reasons of informing government action or may be required as a constitutional tool to affirm a policy decision. Referendum results from a

range of states reviewed in Barnes, 2018 demonstrated occasions when governments appeared to ignore referendum results if political interests support nuclear energy because of limited availability of alternative sources, e.g.in Sweden, which is more than 50% reliant on nuclear energy. Although there was a national referendum on phase out of the technology in 1980, the Swedish Parliament later reversed this decision (Barnes, 2006a, 408). In the case of the 2011 Italian referendum, a government decision to re-invigorate nuclear development was not accepted and Italy has retained a non-nuclear, policy (Barnes 2018, 194). As not all EU states have conducted referendums on nuclear energy the use of referendums as a tool to gauge public opinion may be limited (Barnes, 2018, 202).

Analytical approach.

Political analysts cannot ‘get by’ without a thorough grasp of the cognate disciplines on whose assumptions they rely (Hay, 2002, 5). In this section an overview of a number of analytical approaches and theoretical frameworks widely used by Europeanists is provided, seeking to identify the insights they may bring to my research. My research focus was not on applying or identifying a single research tradition or paradigm but rather responding to the complexity and dynamism of the issues. Reflecting on my work ‘analytical eclecticism’ provided a useful perspective (Sil and Katzenstein, 2010). The value of their approach was as “...an effort, ...to guard against the risks of excessive reliance on a single analytic framework and simplifying assumptions that come with it...” and acknowledge that inattention to theories embedded in research traditions may miss important insights, reinvent the wheel or produce analyses that appear idiosyncratic or unintelligible to other scholars (Sil and Katzenstein, 2010, 411). Each of the approaches and frameworks has strengths and weaknesses when applied to the issue of EU nuclear energy policy.

One of the most significant theories in the field of European integration studies is neo-functionalism (Haas, 1958; 1966; 2006). However neo-functionalism has less relevance as an approach to explain EU nuclear energy integration. The EAEC, and the Euratom Treaty establishing it failed, to provide a foundation for wider European integration from its very beginning (Scheinman, 1967; Lyons, 1994). The Treaty was the result of a series of compromises amongst the signatory states during negotiations in 1955/1956. The outcome was a tool designed for limited action in a specific sector of energy policy, not a tool for functional ‘spillover’ that would lead in time to ‘political spillover’ and political integration. There was no opportunity for bargaining amongst the Member States about increasing the number of policy areas or issues to be transferred to supranational action.

The Euratom model of nuclear integration established collective action in eight specific areas (Euratom Treaty, article 2). But national interests remained protected in the Treaty constraining action. The Euratom Council, representing the national governments, remained the determiner of legislation (Barnes, 2018). Prominent amongst national interests was the link between civilian use of nuclear technology and that of the military and strategic use, considered to be solely a national competence (Barnes, 2018). The constraints imposed by the national interests have continued. The outcome of the

Convention on the Future of Europe was to leave the 1957 structure of the Treaty unaltered. It seemed as if the established model of nuclear integration continued to satisfy all the Member States (Barnes 2007; 2008b).

As the prospect of enlargement to FSU states, Malta and Cyprus grew during the late 1990s, academic interest increasingly turned to the influence of the EU on national policy and the process of Europeanization. Perceived as an attempt to overcome a gap in European integration studies, Europeanization put the focus on systematic analysis of ongoing relationships between regional (EU) and domestic political regimes (the Member States), Ladrech (1994); Olsen, (2002); Radaelli, (2000; 2012); Graziano and Vink, in Bulmer and Lequesne, (2013). The literature on Europeanization appeared to offer an analytical tool for insight into the process of nuclear integration. The transfer of the ‘*acquis communautaire*’ (accepted law) of the European Union, including the Euratom Treaty, to an incoming member state is at the heart of Europeanization. However nuclear integration does not fit neatly within recognized definitions of Europeanization, undermining its value for my research.

Europeanization is a ‘phenomenon’ (Bulmer, 2007), and doubts exist about the extent to which Europeanization has a clearly specified testable theoretical core. Olsen questioned its usefulness as authors often delimit definitions for specific cases (Olsen, 2002). Kassim viewed Europeanization a process with no single precise or stable meaning (Kassim 2000, 238 in Olsen, 2002, 921). Radaelli cautioned against ‘concept stretching’, highlighting the need for more research at the policy level (Radaelli, 2000). Solorio found applying notions of Europeanization to energy policy occupied a remote place in European integration literature until greater prominence was given to energy policy in the Lisbon Treaty (Solorio, 2011).

My research found that nuclear energy policy remains an example of differentiated integration despite developments in nuclear safety policy (Barnes, 2018). All Member States are signatories of the Euratom Treaty but not all are generating states. The Member States retain the competence for choice of energy resource and have demonstrated lack of willingness to repeal or significantly amend the Treaty and change this situation (Barnes 2006a; 2007; 2008b). The characteristic of differential impact at national level is missing in the nuclear sector. The causal link between the EU and its transformative impact on the Member States’ politics and policies necessary for Europeanization is not

evident (Barnes 2003a).

The objective of my research was not to empirically test the process or phenomenon of Europeanization. Challenges for empirical work on the process of Europeanization of nuclear energy policy are highlighted in the literature (Saurugger 2005; Horst, 2010; Meyer, 2013; Tews, 2015; Aze et. al., 2016). Schimmefennig (2015) questioned the extent of Europeanization the further one moved geographically from the EU. As the EU does not adjust its approach with states with little prospect of membership, it makes less sense to speak of Europeanization the greater the distance the state lies from the EU (Borzel, 2011). I demonstrated the difficulties for the EU in using the conditionality approach in relations with Russia (Barnes, 2008a; 2018). National interests continue to dominate the discourse and it is difficult to reconcile EU and Russia interests despite interdependence of energy concerns between the two parties (Barnes, 2008a; 2018).

In focusing on the Euratom Treaty as a tool of EU external nuclear energy policy I argued the Treaty should be retained until such time as the EU is able to develop more coherent external action. Although a limited instrument, the Euratom Treaty continues to add value to EU's external nuclear energy policy (Barnes, 2008a). Achieving access to secure energy supplies has formed a core objective throughout the history of the EAEC. The fifth enlargement of the EU changed the context for the policy, bringing relations between the EU, Russia and neighbouring states to heightened prominence on the political agenda. Article 2, paragraph g, Euratom, provides competences for conclusion of agreements with countries and international organizations (Barnes, 2008a; 2018).

In later work on external nuclear energy policy I used a broader definition to include uninterrupted supply to all consumers, contingent on resilience in the energy system to respond to unique events threatening the physical integrity of energy flows (NEA/OECD, 2010 in Barnes, 2015; 2018). Enlargement resulted in a highly politicized relationship between Russia and the EU. No single model captures the complexity of the relationship (Rutland, 1999). Attempting to overcome the difficulty of defining a model for EU-Russian relations, I adopted Johnson's analogy of the relationship as a 'marriage of convenience' (Johnson, 2005). I found the relationship had become a 'marriage of inconvenience' with 'divorce' not possible despite the deterioration in the relationship because of Russian annexation of Crimea (2014) and continued support for armed conflict in eastern Ukraine because of the energy interdependency of the parties (Barnes, 2018).

Further unpicking the relationship between the EU and Russia, I questioned if the EU should worry about Russia as an 'energy superpower' (Barnes, 2018, 101). The essentially contested nature of the concept of power (Lukes, 2005) was evident in my research. Exerting power by non-military means has been used by Russia (Rutland, 1999; Malinova, 2010). The EU is also using energy to wield power over other states, but with differing perspectives and objectives (Barnes, 2008a; 2018). This raises questions about the nature of power being exerted by each party. The work of Nye (2005; 2007) and Manners (2002) is reviewed below to highlight insights their work may bring to the approach of each party.

Nye's positive descriptive notion of 'soft power' (Nye, 2005; 2007) offered insights into the approach of both Russia and the EU. Soft power co-opts rather than coerces others to change their position through its ability to entice and attract (Nye, 2005). The success of soft power depends on knowing how to make ideas attractive to a target population (Bially Mattern, in Berenskoetter and Williams, 2007). The main soft power tool the EU has at its disposal is liberalization of the energy market and access to the electricity transmission networks for the ENP states and Russia. The attraction of Euratom loans and other financial support mechanisms have also been available for ENP states (Barnes, 2008a). Nye cautioned however that in some real-world situations it is difficult to distinguish what part of an economic relationship is comprised of the hard command military and economic power and what of soft power (Nye, 2007, in Berenskoetter and Williams). A situation that appears apparent in the approach of Russia. Russia has used the attraction of financial incentives and subsidies to support new reactor build in Hungary and Finland but in its relations with Ukraine used coercion, bringing pressure on the Ukrainian authorities, to continue with Russian nuclear fuel supplies (Barnes, 2018).

My research suggested that normative power as defined by Manners has some limitations in explaining both EU and Russian exercise of power through energy. Manners, described the EU's foreign policy as normative power that works through ideas, opinions and conscience, shaping conceptions of what is normal (Manners, 2002). The EU is committed to democratic conditionality, and the pursuit of human rights "...as constitutive norms of a polity which is different to existing states and international relations..." (Manners, 2002, 253). For Manners the EU's difference from other contemporary global powers claiming to act as normative powers lies in its historical

context, hybrid polity and the political-legal constitution of the EU. The political constitutional framework for nuclear energy policy in the EU is the Euratom Treaty. The Treaty is limited to one energy sector but it has a clear focus on non-military action with a commitment for nuclear energy to “... permit the advancement of the cause of peace...”, (Euratom, Preamble).

Manners argued that to be successful normative power should encourage engagement and dialogue with non-EU states, that being for Manners the EU’s greatest strength (Manners, 2009). The case of the mediation role adopted by the EU in the international negotiations to curb Iranian ambitions to become a nuclear weapons state demonstrated limitations to Manners work (Barnes, 2018). My research found challenges for the EU to act as a normative power in the region. All EU States agreed that a nuclear armed Iran was not desirable, but the ability of the EU to define a common agenda with the US and Russia was constrained because of disagreement amongst the EU states about how to proceed, undermining the EU’s influence (Barnes, 2018). Russian energy policy has focused on economic efficiency to ensure energy resources and exert political influence over neighbouring states rather than encouraging engagement and dialogue (Barnes, 2015; 2018). Under the leadership of President Putin, Russia is using its energy wealth to gain economic benefits and to maintain, increase and exert its political influence in its ‘near abroad’ (Barnes, 2008a). In relations with the important energy transit state of Ukraine, portraying action as protecting Russian minorities living outside Russia, the state has adopted a more coercive approach (Barnes, 2018).

Turning to three notions underpinning my work - that institutions matter, that history matters, and that ideas matter - my research may be seen through the lens of the institutionalism trend in political analysis and constructivist turn in international relations.

Both:-

- provide frameworks for assumptions about the environments in which the actors involved in the policy process operate,
- take account of the structures, ideas and beliefs of the actors in the policy process,
- pay particular attention to the specificity of sequence and timing in the context under consideration.

There was a resurgence of academic interest in institutions in the US in the 1980s as a result of transformation in modern social, political and economic institutions that had become larger, more complex and more important to collective life (March and Olsen, 1984; 1989; Hall and Taylor, 1996). Institutionalism later became important in the work of scholars analyzing the process of EU integration (Bulmer, 1998; Jupille and Caparaso, 1999; Dowding, 2000; Schneider and Aspinwall, 2001; Pollack, 2019). Hay identified three hybrid positions and inter-paradigm debates - rational choice institutionalism (RI), sociological institutionalism (SI) and historical institutionalism (HI) (Hay, 2002). For Schmidt each of the three institutionalisms offered different insights into reality. She argued Europeanists should use whichever is appropriate to elucidate the problem at hand, and to gain a full sense of reality, combine all three (Schmidt, 1999).

Determining which is most important to my research, both RI and HI share interest in the historic design of the institutional frameworks, but have different emphases. HI explores how institutions develop over time with early institutional choices structuring their subsequent, path-dependent development (Pollack, 2019). RI explores how rational actors design political institutions to maximize their utility, shaping and constraining future decision-making in domestic and international politics. There is a functionalist perspective to RI, as those responsible for institutional design are assumed to have deliberately designed them to take into account the efficient performance of specific functions. But the institutional framework established in the Euratom Treaty was not effective at facilitating the political integration objectives of the original drafters of the Treaty. The 1955/6 negotiations for the Treaty were subject to compromise and limitations as national and industrial interests constrained action (Barnes, 2007a; Barnes, 2008b).

Historic inefficiencies, as institutions and policies are unlikely to be optimally adapted to current circumstances, are less evident. Whilst the Euratom Treaty has remained substantively unaltered throughout its history, it appears able to adapt to changing policy focus and opportunities for the institutions to respond (Barnes, 2018). SI takes into account changes in the mental frameworks of domestic political actors when domestic political actors use European resources to support their preferences (Checkel, 2001). But the national governments exercise competence with regard to choice of nuclear energy. Whilst there is evidence of national opposition to the use of nuclear technology, there is less evidence of attempts by national organizations seeking to use European resources to

achieve their goals, or indeed any opportunities for them to do so (Aze, et al, 2016; Barnes, 2018).

Of the three, HI, RI and SI, HI arguably provides the broadest basis for understanding the developments in nuclear energy policy and the roles of the institutions (Barnes, 2003a; 2006a; 2015; 2018). History matters because formations put in place at the early stages of an institutional or policy life constrain future action (Peters, 2001; Skocpol, 1992) with a continuing and largely determinant influence over future policy (Peters, 2012, 70). Formal rules, policy processes or social norms contemporary to the period at which the institution is formed will become embedded (Pierson, 1998, 29, in Bulmer, 2009, 308). HI thus provides insights into the formal institutional contexts that shaped the design and operation of institutional competences and the patterns in the discourse and the development of nuclear energy policy (Barnes, 2003a; 2006a; 2013a; 2018, chapter 3).

My research demonstrated that an important aspect of HI is not only what happens, but when it happens (Pierson, 2004). EU nuclear energy policy is characterized by temporal sequences, peculiar events and path dependency (Mahoney, 1999, 1164 in Baker and Stoker, 2012) (see Table 4 Chronology of EU nuclear energy policy). The process of nuclear energy integration was shaped by the institutional choices made by the founders of the EAEC and encapsulated in the Euratom Treaty. The patterns established in the late 1950s have remained unaltered. As a result political inertia appears to have taken hold, as positive gains from the continued policy became evident for all Member States (Barnes, 2018). Positive feedback effects from new technological developments also encourage political inertia (Pierson, 2004, 24). In the case of nuclear technology, because of high set up costs, positive feedback occurs as national governments are encouraged to maintain high levels of state support for the technology after initial investments are made. Support is maintained, as high levels of investment are needed for linked infrastructure. High levels of knowledge and innovation receive support to enable technology advantage to be gained in the global market, seen particularly in France (Barnes, 2018).

My research identified limited change in nuclear policy to the end of the 1980s/early 1990s, shown in Table 4. Substantial policy change is only possible in reaction to crises and as critical junctures appear in the pathways Pierson, (2004); Bulmer, (2009) or policy 'windows' emerge, Kingdon, (1984), before a new path is settled on and inertia or a state of equilibrium in the political process returns. The fifth enlargement of the EU

represented a ‘breakpoint’ and critical juncture in the policy development and policy discourse bringing change (Barnes, 2018). There was not an immediate response in the policy. The Commission’s proposals for specific legislative outcomes in the early 2000s were not successful, but action was later taken, beginning in 2009 (Barnes, 2003a; 2006a; 2018).

HI does not provide an explanation of the goals of the actors nor issues deemed of importance within the institutions to reveal why policy makers choose particular paths (Béland and Hacker, 2004, in Béland 2009). This limitation of HI raised the importance of consideration of ideas in the discourse (Barnes, 2018). Moravcsik commented that there is little point in debating the view that ideas matter as “...collective ideas are like air for humans and it is impossible to function without ideas as it would be without air...” (Moravcsik, 1999, 674/675). Baker pointed out that “...we should never underestimate the power of ideas in politics...” (Baker 2007, 314). My argument is that we should not ignore the importance of the correlation between collective ideas, communication of those ideas and policy outcomes (Barnes, 2018). As Hay comments “...ideas often hold the key to unlock political dynamics – as change in policy is often preceded by changes in ideas informing policy...” (Hay, 2002,194). Actors do not have perfect information, however the ideas they hold are crucial to the way they act and the policy outcomes. Ideas do not simply come from the policy context but as they are real and strongly held by policy actors, may affect and have a selective impact on the choices made by the policy makers (Hay, 2002).

I questioned the extent to which the Commission would be able to influence nuclear energy policy, as hegemonization of climate change in energy policy discourse became evident post 2007 (Barnes, 2018). Influence on the development of the policy occurs when institutional support is combined with changing ideas, backed by vocal powerful interests (Carsten and Schmidt, 2016). I argued the Commission is able to influence the policy debate by providing reassurance to the national governments and citizens of the EU that there is a robust system in place to support nuclear developments at the supranational level. This in turn has the potential to encourage nuclear developments. My research highlighted the importance of public perception of threat from nuclear energy and the importance of communication from trusted reliable source. I argued that the Commission’s ‘discourse of reassurance’ plays an important role in providing the story line to reassure the public about the future use of nuclear technology, overcoming the

deep-seated and emotional response the technology brings from many people (Barnes, 2018).

The concept of discourse in Barnes (2018) derived from two sources. In the work of Torfing, (1999) and Howarth and Torfing, (2005) the focus is on the importance of ideas as a means of understanding political action (Peters, 2012). Laclau and Mouffe in their analysis identify a process of political contest that results in the hegemonization of particular ideas (Laclau and Mouffe, 1985; Laclau, 1994). The importance of such hegemonization is demonstrated by Hay, who concluded that ideas matter in the discourse as informants of policy and the precursors to action (Hay, 2002). Béland, (2009) concluded that ideas only become a decisive factor leading to policy change under specific institutional and political conditions. Hegemonization of climate change in the European energy and environmental discourses provided the conditions for the Commission to appear to provide advocacy support for Member States including nuclear energy in the national energy policy mix (Barnes, 2018).

As my research progressed the value of the work of Schmidt on Discursive Institutionalism (DI) became apparent as a framework for bringing together the notion that ideas and institutions matter (Schmidt, 2008; 2010; 2017). DI was used to analyse changes in the discourse in the Commission during the 2000s (Barnes, 2018). Other neo-institutionalist approaches see change as the result of exogenous action. DI characterizes the ideas of the discourse as largely the ideas that are generated discursively by individuals of the institution, subsequently communicated and debated among the members of the institution. Consensus in the discourse becomes possible and develops as the members create, elaborate and justify the ideas that in turn become central to the construction of policy. This discourse provides the basis of the discourse of ideas communicated to society and the other actors involved in policy formulation. My research found that Commission President Barroso highlighted the importance of climate action during his Presidencies. Although there was opposition in the Commission to the inclusion of nuclear energy in the European energy mix, couching the discourse in terms of the contribution that nuclear energy could make to a low carbon energy mix provided the storyline in the discourse that brought renewed credibility and support for the technology (Barnes, 2018, 25, 55).

Hegemonization of climate change in the energy discourse led me to question the role of nuclear technology as a low carbon resource responding to the challenge of climate change (Barnes, 2013a; 2018). Hay highlighted the importance of according ideational factors as significant a role in international relations as material factors (Hay, 2002, 24). The lack of commitment to sustainable development in the Euratom Treaty has the potential to maintain fragmentation in EU future energy policy (Barnes, 2013a). Changes are evident in the socio-political environment of some Member States and amongst some populations providing an enabling condition for proposed action in support of the industry (Barnes, 2018). Support is growing from various policy stakeholders and interests, within the European Commission (Barnes, 2018) some national governments, (Barnes, 2018) and in a more pragmatic response from national populations as nuclear energy has gained credibility in a low carbon policy response to climate change (Barnes, 2018).

Table 4. Chronology of EU nuclear energy policy

	1950s	1957	1960s – early 1990s	Prodi Commission 1999-2004	Barroso I Commission 2004-2009	Barroso II Commission 2009-2014	Juncker Commission 2014-2019
Policy Aims	<i>Energy independence</i>	<i>Energy security</i> Promote the production of nuclear energy. <i>Raise the standard of living in the Member States</i>		<i>Nuclear safety</i> Nuclear safeguards	<i>Resilience of energy supply to interruption</i>	<i>Nuclear safety and security</i> Job creation in new nuclear technologies <i>Research and technology development</i>	<i>Continuance of Barroso initiatives and approach</i>
Driver of policy change		<i>Scarcity of energy for post war recovery</i> Development of nuclear weapons	<i>Chernobyl 1986, confidence in nuclear shattered</i>	Enlargement of the EU to FSU states* <i>Integration of the energy market</i>	Hegemonization of climate change in the energy discourse. *	<i>Support for nuclear as low carbon resource</i>	
Impact on policy	National policies <i>No EU policy.</i> 1955-1956 Negotiations for Euratom Treaty result in limited supranational action, protecting national interests	Euratom Treaty 1958	<i>Little change</i> Nuclear supply policy lost significance	<i>Call for more supranational action on nuclear safety, failure of 'nuclear paquet'.</i> Treaty unaltered by Convention 2002/2003	<i>Euratom Treaty left unaltered, Lisbon Treaty adopted</i> EU energy and climate strategy, COM (2007) 1 final	<i>Problematic engagement with Russia</i> Adoption of Dir. Euratom 2009/71, revised 2013, NSD. Dir. Euratom 2011/70, RWD.	Status quo
On-going objectives					Energy security		
					Nuclear safety		
						Support for nuclear energy in a low carbon energy mix	

Source: Author's own.

* Drivers of policy changes identified during my research period.

Research themes

The main arguments of three themes that link my publications are presented in this section. The:-

- ‘stickiness’ of the Euratom Treaty (Barnes, 2006a; 2007; 2008b, 2018, Chapter 2),
- impact of enlargement of the EU on a) EU internal nuclear energy policy , (Barnes, 2003a; 2008a; 2018, Chapter 5) and b) external nuclear energy policy (Barnes, 2003a; 2008a; 2018, Chapter 5),
- impact of hegemonization of climate change in EU energy policy (Barnes, 2013a; 2018, Chapters 3, 6.).

These themes highlighted the impact of the changing context in which EU level nuclear energy policy has operated since the late 1990s/early 2000s. I identified them as the main drivers of the policy, demonstrating the objectives and potential of collective action amongst all the Member States. Various other themes were also developed in my work, including the public’s acceptance of the use of the technology (Barnes, 2018), and the economics of the sector (Barnes, 2006a; 2008b). But I considered these more relevant to analysis of national nuclear energy policy (Barnes, 2006a). Energy security dominated the politics of nuclear energy throughout the history of the EAEC (Barnes, 2008a; 2018, chapter 5). Pursuing this as an overarching theme would not have captured the impact of more recent drivers of the policy (see Table 4). It would not have encapsulated the potential of the evolving impact of the hegemonization of climate change in the energy discourse (Barnes, 2018, chapter 3) nor support for nuclear energy in a sustainable low carbon energy mix (Barnes, 2013a). Focus on the role of the Commission would have limited the discussion of the role of other actors in the policy process, such as the European Parliament (Barnes, 2006a; 2018, chapter 4) or the national governments (Barnes 2018, chapters 8,9).

Theme 1. The ‘stickiness’ of the Treaty.

“ I believe you can be against nuclear but love the existence of Euratom”

(Commeau-Yannoussis, 2005, in Barnes, 2007a).

The most important theme was consideration of the ‘stickiness’ of the Euratom Treaty, questioning why, in the ever-evolving world of European integration, the Treaty, which had failed as a model for European integration, has remained substantively unaltered (Barnes, 2006a; 2008b; 2018, Chapter 2). Although not the primary focus of my first publication, Barnes 2003a, the ‘stickiness’ of the Treaty underpinned all my publications. Without the existence of the Euratom Treaty the current model of integration in the civil nuclear sector would not be possible. But at times in its history the ET had been variously described as undemocratic, outdated and biased towards the electro-nuclear industry (O’Driscoll, et. al, 2002a, 2 in Barnes, 2008b, 183), carrying the stigma of an undemocratic, outdated alien in the world of the liberalized market (Barnes, 2008b, 183), and as a tool to undermine the efforts of Member States, not supportive of nuclear energy, to discourage its use in the EU nuclear generating states (HMG, 2014, 69 point 2.6.10 in Barnes, 2018, 34).

The Treaty was conceived in a period of optimism about the use of nuclear fission technology but the political environment at the time of its birth was less supportive. The outcome was an instrument with important but limited objectives and competences (Barnes, 2007a; 2008b). It was conceived as a support for the development of innovative technology. Nuclear fission technology, the most widely used for generating nuclear electricity, is no longer innovative technology and as such should not be subject to support (Barnes, 2018). The Treaty does not include any environmental objectives or reference to the objectives of sustainable development (Barnes, 2013a). As a result the longevity of the Treaty is remarkable.

The Treaty was not time limited at its adoption, potentially creating a barrier to change. But it does not confer immortality on the Treaty nor provide an explanation for its ‘stickiness’ (Barnes, 2007a; 2008b; 2018). Narrow national interests limited the competences transferred to the supranational level during the negotiations for the Treaty in 1955-1956 (Scheinman, 1967; O’Driscoll et al 2002). As a result of the lack of willingness of the EU national governments to take opportunities to repeal or amend the Treaty (Barnes, 2007a; 2008b) no such action has been taken to date. There is little

evidence to suggest that the national governments would be willing to engage in an alternative model for nuclear integration (Barnes, 2007a; 2008b). I argued that this may be the result of ‘political inertia’ as institutions and policies have a tendency towards inertia once particular policy paths have been formed (Peters, 2001; Skocpol, 1992). Equally it may be because those involved in Treaty reform are more often concerned with reform of the EU’s institutional framework than with one specific aspect of energy policy (Barnes, 2008a, 112). I advanced the view that the Treaty provided ‘added value’ for all the Member States, irrespective of national generation and use of the technology (Barnes 2007a; 2008a; 2008b; 2018). Ironically, ‘Brexatom’ (the UK withdrawal from Euratom at the same time as from the EU) has highlighted the need for continued nuclear cooperation because of the transnational implications of failure to do so (Barnes, 2018).

I demonstrated that whilst issues of safety and safeguards are of primary importance in maintaining the Euratom Treaty other considerations have undermined arguments for its repeal or reform. Opportunities have occurred to alter or repeal the Treaty, the first being in 1967 with the merger of the institutions of the three communities – EEC, ECSC and EAEC in 1967 (Barnes, 2007a; 2008b) with other less significant opportunities in the 1970s and 1980s (Barnes, 2007; 2008b). But none were taken. Confidence in the nuclear sector was significantly undermined by the catastrophic INES 7 event at Chernobyl that released radioactive materials across much of Europe (Barnes, 2003a; 2018). From a practical point of view, failure to ensure nuclear safety in the geographical area of the EU could result in significant damage to human health and the environment. From a political viewpoint as the 1980s and 1990s progressed, the EU member states became preoccupied with negotiations for the Maastricht Treaty. To undertake Euratom Treaty change at that time would have taken too much political effort for too little gain (Barnes, 2008b, 192).

I found little consensus from the Member States about the future of Euratom in the early 2000s (Barnes, 2007a; 2008b). EU states did little more than acknowledge its existence, agreeing to consider it at a later date during the Convention on the Future of Europe, February 2002 to March 2003, (Barnes, 2007a; 2008b). Will the Euratom Treaty be repealed? “Never in my lifetime!” was the unequivocal answer given to my research question by a Head of Unit, DG TREN (interview, 2005 in Barnes, 2007a, 380). Why might this be the case? My interviewee considered that issues of nuclear safety and nuclear safeguards gave the Treaty its importance. It had supported the development of a safety regime for workers in the industry and voluntary harmonization of safety standards.

A regime I found enhanced following the enlargement of the EU (2003a). The Euratom safety requirements derived from those of the International Atomic Energy Agency [IAEA] with which agreements had been made under Euratom auspices. Euratom requirements were (and are) regarded as more comprehensive by the IAEA and the nuclear industry than those of other international agreements (Barnes, 2008a, 112, note 12).

My research was primarily concerned with the peaceful use of nuclear technology. Linkohr concluded that the Euratom competence for ownership of fissile material and nuclear safeguards was Euratom's main success, acting as a firewall against proliferation of nuclear weapons (Linkohr, 2007, in Barnes, 2008b). I argued the debate about the link between civilian and military use of nuclear fission technologies provides 'background noise' to debates about nuclear energy (Barnes, 2018, chapter 10). It contributes to lack of political willingness to open the sector to scrutiny and reluctance of the public to use the technology. The EU relies on the Euratom framework to ensure fissile materials are not diverted from peaceful to military use. Competences of the TEU are the basis for economic sanctions and diplomatic mediation. The Commission remains a key policy actor with considerable autonomy not only in nuclear safety and safeguards but also in international agreements in the field of nuclear energy. This has resulted in action with significant geopolitical implications. Because of Treaty conferred competences, the Commission was able to play a significant role in brokering the fragile agreement to develop the Joint Comprehensive Plan of Action with Iran on nuclear weapons non-proliferation (Barnes, 2018, 234 ff.).

Hegemonization of climate change in the energy discourse was the focus of my later work (see below) leading to a 'new realism' forcing governments to acknowledge nuclear energy as capable of combating climate change (Barnes, 2018). The Treaty competences include support for research and development, increasingly moving from a focus on fission to fusion technology to contribute to low carbon energy resources and non-energy uses in medical procedures, industrial processes and agriculture. I concluded this brings 'added value' for all states of the EU enabling a policy of co-operation and collective action in the field of nuclear energy (Barnes, 2008b)

Theme 2. Impact of the fifth enlargement process from 2004 to 2013.

The second theme analysed the impact of the fifth enlargement of the European Union between 2004 and 2013 on both internal nuclear energy policy, (Barnes, 2003a; 2008a; 2018) and developments in external nuclear energy policy, as a consequence of EU enlargement (Barnes, 2003a; 2008a; 2018).

a) Internal nuclear energy policy.

“It would be paradoxical...if the EU were to monitor nuclear safety in the new Member States, but not in the rest of the EU”.

Loyola de Palacio, Energy Commissioner, 2002.

My initial assumption was the impact would be seen in the acceding states through their acceptance and implementation of the nuclear energy ‘acquis’ (Barnes 2003a). As my research progressed, it was evident that there was also potential impact in the existing EU 15 states, because much of the legislation on safety particularly safety at nuclear installations was built on harmonization of a ‘non-binding acquis’ of voluntary action at national level (Barnes, 2003a, 117, 123; 2008a; 2018, Chapter 5). Within the EU 15 pressure grew for greater clarity and more supranational action on nuclear safety. Only a Community approach could guarantee nuclear safety in an enlarged EU. It was no longer desirable to consider nuclear safety in a national perspective (COM (2002b), 605,11, in Barnes, 2003a, 121). I questioned the ability of the Commission to ensure nuclear safety concerns were met in all the EU’s member states (Barnes, 2003a, 128).

Division within the Commission ⁷ about the continued use and generation of nuclear energy, had been highlighted during my interview with a Head of Unit, DG Environment, (summer 1999). My interviewee described Commissioner for the Environment, Margot Wallstrom as ‘ballistic with rage’ about Commissioner for Energy, Loyola de Palacio’s

⁷ The early phases of negotiations for enlargement began during the Presidency of the European Commission held by Jacques Santer from 1995 to 1999. At that time nuclear safety was within the remit of Commissioner for the Environment and Nuclear Safety and Civil Protection, Ritt Bjerregaard, who was not a supporter of nuclear generated electricity. The Euratom Supply Agency was within the Directorate General for Energy, Euratom Supply Agency, SMEs and Tourism where the Commissioner was Christos Papoutis. As the negotiations for accession proceeded in 1999 Commission President Santer was replaced by President Romano Prodi and nuclear matters were moved and came within the remit of the Directorate General for Transport and Energy [DG TREN]. Commissioner Loyola de Palacio, a supporter of nuclear energy, held the Transport and Energy portfolio. The Environment Commissioner was Margot Wallstrom who did not support nuclear energy and the difference of opinion amongst the Commissioners remained evident.

support for nuclear energy. There was agreement in the Commission for proposals of a ‘nuclear paquet’ of legislation based on a common approach to provide a binding legal framework, a single framework for control, and a single criterion for the interpretation of standards, (COM, (2003a) 32, final, in Barnes, 2003a). All were considered to be essential for an EU approach to nuclear safety post enlargement (COM, (2002b), 605, 13). The European Court of Justice (CJEU) strengthened support for the Commission view of increased EU action through a landmark ruling ‘on the scope of Euratom action’ (C29/22 para.1). The European Parliament (EP) also argued for a role in areas such as nuclear safety (O’Driscoll, 2002, in Barnes, 2003a, 129). However there was little support from the national governments for the proposed legislation (Barnes, 2006a).

My conclusion was that the impact of the fifth enlargement was evident in the acceding states but also, perhaps more surprisingly, in the EU15. There were no changes to the nuclear competences of the EU’s institutions as a result of the enlargement process. But ideas mattered, as the acceding states were required to accept direct intervention in their nuclear sector as a condition of accession because of the priority of nuclear safety in the EU’s political and public discourses. The EU15 states accepted the importance of nuclear safety in the energy discourse but were unwilling to introduce the legislative proposals from the Commission for increased supranational action because of vested national interests. Whilst this appears a failure on the part of the Commission to establish its preference for action at that time, it demonstrated increasing proactivity from the Commission on nuclear issues (Barnes, 2007a; 2008b; 2018, chapter 3).

The input of the EP to the Euratom decision-making process is limited (Barnes, 2006a). Opening a new line in my research, I questioned the extent to which the lack of input from the EP in legislative making indicated the existence of a nuclear democratic deficit (Barnes, 2006a). I argued that there is an urgent need for the EP to have more input to the nuclear decision making process to enhance openness and accountability in the sector and to enable constant confrontation of issues that are of most importance to EU citizens. Repeal or amendment of the Treaty is needed but as it is unlikely to happen in the short to medium term I concluded the Treaty should be retained for the time being. In my later research I found support from the Commission for increased input for the EP in Euratom legislative making (Barnes, 2007a; 2008b) and co-operation between the Commission and the EP (Barnes, 2018).

There were no changes to the nuclear competences of the EU's institutions or the substantive terms of Treaty as a result of the enlargement process. All EU states accepted hegemonization of nuclear safety in the energy discourse. The EU15 states were unwilling to adopt the 'nuclear pacquet' proposals because of their vested national interests (Barnes, 2003a; Barnes, 2006). But, nuclear safety remained high on the political agenda (Barnes, 2003a; 2006), later leading to directives on safety at nuclear installations (NSD) (Council Directive 2009/71/Euratom) and management of radioactive waste (RWD) (Council Directive 2011/70/Euratom). The NSD was strengthened in 2014 following stress tests authorized at European reactors after the catastrophic events at the Daichi, Fukushima reactors in 2011, (Barnes, 2018, 207).

b). External nuclear energy policy – energy security in the wider Europe.

‘ creating a circle of friends’ (Prodi, 2002).

In later research I focused on the impact of the fifth enlargement of the EU on external nuclear energy policy, particularly the relationship between the EU, the wider European region and EU-Russian energy relations (Barnes, 2008a; 2018, chapter 5). I concluded that geopolitics rather than economics is the driver of the energy relationship between the parties (Barnes, 2018, 113). Throughout the history of the European Union lack of sufficient indigenous energy resources to meet increasing demand has maintained the objective of energy security in a prominent position on the political agenda. Initially I used a definition of energy security as “...access to secure and sustainable energy resources”, (Barnes, 2008a, 109;). Later I included “...ensuring...the energy supply is sufficiently resilient to unique and unforeseeable events threatening the physical integrity of energy flows or leading to discontinuous energy price rises...” (OECD/NEA, 2010, 3 in Barnes, 2018, 97).

Deepening the energy dialogue between the EU, Russia and Former Soviet Union (FSU) states that had not applied for EU membership was an inevitable consequence of enlargement of the EU to states of CEE, formerly members of the Soviet Union (FSU). Priority was given to the form of engagement the EU entered into with these states, establishing an Eastern Partnership (EAP) with the six states, including Ukraine, lying to the east of the EU, to promote security and stability in the wider European region. Whilst some EAP states might have an ambition to accede to the EU in the longer term, the bilateral agreements established with the EAP states under the umbrella of the ENP were

not accession agreements. But the form of these agreements was based on the conditionality approach used with the accession states (Barnes, 2008a, 107).

Although EU external nuclear energy policy remains problematic (Barnes, 2018) I argued the Euratom Treaty provides the opportunity for the EU to act with one voice. It provides the competence for the EU to conclude nuclear energy agreements with Russia and the ENP/EAP states (Barnes, 2008a). The Treaty also provided the framework for the EU states to engage more easily with ENP partners planning to use nuclear energy in the future (Barnes, 2008a). Nuclear external relations policy is the area where the supranational aspect of Euratom is perhaps most apparent in the competence “...to establish, with other countries and international organisations, such relations as will foster progress in the peaceful uses of nuclear energy...(Euratom, Article 2, para. h). The Commission may enter into nuclear agreements with third countries or international organizations without seeking prior approval of the Council of Ministers. If no financial undertakings are involved Council approval is not needed for these agreements. The Commission identified a number of nuclear issues of ‘common interest’ (nuclear safety, safeguards and accountability of nuclear materials to ensure that they are not diverted to military usage, combating trafficking of nuclear fissile materials and technology transfer and co-operation). However national governments have diverse national policies towards Russia and the EAP countries undermining EU collaboration with third parties in external nuclear energy policy (Barnes, 2018).

Theme 3. Hegemonization of climate change in the energy discourse.

Developing a ‘discourse of reassurance’ – ‘an agnostic becomes a believer’.

The third theme focused on the impact of the ideational change in the energy discourse that hegemonized sustainability and climate change in the political discourse (Barnes, 2013a; 2018, Chapters 3, 6). Whilst the objective of energy security (see Table 4) was and continues to play a prominent role in energy policy the increased interest in climate change and the role usage of energy resources resulted in hegemonization of climate change in the discourse (Etty and Somsen, 2008; Baker and Stoker, 2012; Handrlica, 2019).

Using the discourse frameworks as outlined by Laclau and Mouffe (Laclau and Mouffe, 1985) I analysed this hegemonization in the discourse post 2007 (Barnes, 2013a; 2018,

chapter 3). Hegemonization is the term applied to the political process by which the dominance of political ideas is established (Barnes and Hoerber, 2013). As a framework it provided the political, ideational and institutional conditions for the evolution of a ‘discourse of reassurance’ from the Commission with seeming support for the inclusion of nuclear energy in a diversified energy mix underpinning the development of a low carbon European economy, (Barnes, 2013a; 2013b; 2014; 2018, chapter 3). This represented a move from the more skeptical view of nuclear energy as an ‘undesirable resource’ found in Commission documents relating to nuclear energy in the early 2000s (Barnes, 2003a, 119). I argued that the most direct impact of the hegemonization of climate change in the nuclear energy discourse was to the policy position and increased proactivity of the Commission (Barnes, 2013a; 2018, chapter 3). As my research progressed, focusing on the two Barroso Commissions, there was evidence of a shift in the discourse, suggesting whilst the Commission maintained a neutral stance vis-à-vis those national governments opting to use nuclear technology, had at the same time become a ‘de facto’ advocate for its use (see Table 4).

Hegemonization of climate change in the discourse was evidenced in different ways in my research. Institutional changes were made to the Commission during the second Barroso Commission demonstrating increased prominence given to the issue. In 2010 the DG for Climate Change (DG CLIMA) was established. Units dealing with climate action were re-located from DG ENVIRON. The portfolio for climate change was given to Commissioner Miguel Arias Cañete. Disagreement was evident between Energy and Transport Commissioner, Loyola de Palacio, supporting nuclear energy and Environment Commissioner Margot Wallstrom who, along with Fischler, Agriculture Commissioner, Schreyer, Budget Commissioner and Diamontopoulou, Social Affairs Commissioner all supported energy efficiency and renewable energy strategies rather than the nuclear option (Barnes, 2015; 2018, 59). Nevertheless the connection between reaching the Kyoto targets and the potential saving in carbon emissions from nuclear was made, showing increasing linkage of climate action and a role for nuclear energy.

There was more coherence in the discourse within the Commission and agreement on that nuclear energy had a role to support a low carbon economy, but it did not signal lack of support for the renewable energy sector (Barnes, 2018, chapter 3). The Commission was going for ‘realistic’ assuming that as a large scale low carbon resource nuclear would be playing a role in the EU power generation mix to 2050 (Barroso, 2010; Oettinger, 2012).

The ‘discourse of reassurance’ was based on three discourse storylines, forming the basis of a credible communicative discourse (Barnes, 2018, 55). Firstly, the Commission was portrayed as the most appropriate institution to monitor nuclear safety, secondly nuclear energy was a low carbon energy resource that could play a role in a decarbonized European economy, and finally continuing with innovative nuclear research would both contribute to job creation and enhance the EU’s profile globally (see Table 4).

The Commission focused on establishing a coherent and effectively implemented framework of action in those areas agreed by the member states of the EAEC. In creating a ‘discourse of reassurance’ and portraying the technology as one that can be safely produced and contribute in a low carbon energy mix the Commission has given the technology renewed credibility (Barnes, 2018). Language is one of the means by which individuals or groups of individuals in formal or informal settings are able to change the world around them, Hajer (1995), Diez (1999). I argued that if that is the case then the various statements made by President Barroso and the Commissioners indicated that the Commission was more supportive of the use of the technology (Barnes, 2013a). It appeared that the Commission had moved from a position of ‘neutral technocracy’, as envisaged in Euratom competences, to become a seeming advocate for its use in a future low carbon European economy. The consequence is that the calls being made for more openness and accountability in the nuclear sector, even those being made by the Commission, potentially will be undermined (Barnes, 2018).

I reviewed the response of the EU’s member states to the inclusion of nuclear energy within a diversified energy mix responding to climate change in Barnes (2018) chapters 8, 9. Analysis of political willingness to use nuclear energy technology was considered through the lens of three states where nuclear energy policy was developed early – the UK, France and Germany. All have responded in different ways during the last decade that has a significant impact on the future use of the technology in the EU. Chapter 9 turned attention on the public acceptance of the use of the technology. If the technology is to continue as a significant energy resource for the future public acceptance will be required. It is arguably more difficult to secure than political willingness to include it in a national energy mix because of the ‘emotional’ response by many to the use of the technology and deep-seated concerns about nuclear safety. It is in this context that the ‘discourse of reassurance’ emanating from the Commission has the potential to become an important influence on the future of nuclear energy in the EU.

Conclusions

This thesis presents the summation of the research I completed and published on the subject of nuclear energy policy and politics in the European Union from the early 2000s, concluding with the publication of a book in 2018. Although the work comprised a number of discrete projects, the overall direction of the work was to point to a number of important related themes, some of which were not part of the mainstream in the discourse at the time of my research and publications. The commentary has been organized in three sections to provide critical appraisal and reflection on my published work. Consideration was given to the position of my research in context of the academic literature to establish the originality of my work. In-depth review and scrutiny of my research is demonstrated in the discussion of the strengths and weaknesses of the research methods used, and the analytical approach adopted. Identification of the core themes underpinning the work demonstrated coherence in my research.

The starting point for my research was my increasing awareness of an important issue at the time that appeared to excite little academic interest (Barnes, 2003a). I felt EU nuclear energy policy was worthy of investigation for a number of reasons. Energy security remains a vital interest and objective for the energy dependent EU. Nuclear energy meets approximately 13% of total EU energy needs, providing 53% of EU low carbon energy (Barnes, 2018, 11). There is a strong case to be made for placing events and processes over an extended period to enrich understanding of the complexity of political life (Mahoney, 1999, in Baker and Stoker, 2012; Pierson, 2004). My study illustrated the importance of the temporal view and dimension in the analysis of EU nuclear policy. Significant threads tying my publications together were formed by the importance of past events to the current policy and impact for the roles of the institutions.

In order to respond to the under-lying ‘how’, ‘why’ and ‘when’ questions of my research I used a range of qualitative research methods, applied to a number of different resources, as my research progressed. Accessing different methods and sources in this way enabled triangulation of my findings enhancing the validity and effectiveness of my research. The qualitative research methods were chosen as appropriate to emphasis the legal and historical basis of the policy. Interviews were used to obtain the views of those closely

involved in the policy process (Vromen, in Lowndes et al, 2018). These were important both as mechanisms to ‘kick start’ the research process and to enable findings to be confirmed and finalized. My research objectives were not concerned with identifying patterns in the discourse through quantitative content analysis. I focused on the use of original policy documents in my documentary analysis and text-based research to unpick the political and social meaning of events and developments. Documentary analysis was used to identify the sequence of events and ‘tell the story’ of the development of the policy.

My findings showed how an outlier and minor backwater of policy discussion acquired prominence, driven by the impact of the fifth enlargement of the EU (Barnes, 2003a; 2008a) and hegemonization of climate change in energy policy (Barnes, 2013a; 2018). Responding to these drivers of change, nuclear energy policy has essentially moved from a policy to support an innovative industry capable of responding to concern about access to a cheap form of electricity, to a nuclear safety policy (see Table 4). The ideational change as a result of hegemonization of climate change in energy policy has provided an opportunity for the Commission, a major policy actor, to project a ‘discourse of reassurance’ adding credibility to the use of the technology (Barnes, 2018).

The research provided insights into a controversial aspect of European energy integration and to the specific issue of evolution in the governance of EU nuclear energy policy. The changing context for the nuclear sector explored in the publications provided me with insights into the capacity of the policy actors to respond to change (Barnes, 2003a; 2006a; 2007a; 2008b; 2013a) and enabled me to question the extent to which policy actors shape the policy context (Barnes, 2018, chapter 3). Whilst a study of a seemingly discrete and limited arena of EU action, exploring the development of nuclear energy policy, the dynamics of the policy and the roles of the actors (especially the Commission) in the policy process demonstrated considerable complexity. It provided insights into the nature of EU policy-making and the legislative process. My research is not a discrete and completed study but issues raised provide a rich agenda for future research.

Each of the publications presented the outcomes of a completed research project. Each project raised questions that formed the basis of further projects as the policy focus moved forward, addressing what were considered to be the most pressing issues of the day (summarized in Table 4). The findings of Barnes 2003a opened questions for Barnes,

2006a; 2008a; 2007a; 2008b). The book that formed the final project enabled me to deepen my earlier findings and develop research, begun in Barnes 2013a, on the impact of hegemonization of climate change in energy policy. This was done through analysis of the changing discourse within the Commission and consideration of nuclear energy as a sustainable energy resource (Barnes 2018, chapter 3, 5, 6). Analysis of other issues included different responses by national governments to nuclear energy (Barnes, 2018, chapters 8,9). Analysis of EU nuclear weapons non-proliferation policy demonstrated one of the many challenges for the EU in establishing policy that will lead to sustainable, secure and competitive energy (Barnes 2018, chapter 10).

In the early stages of my research the impact of the fifth enlargement of the EU as a catalyst for change in the EU's nuclear energy policy was highlighted. I found that the EU's nuclear energy policy, that had remained constrained by decades of national interests (Dehousse, 2012), was impacted by the significant change that resulted from the fifth enlargement. Evidence of pressure to enhance EU action, particularly on the aspects of nuclear safety policy was presented (Barnes, 2003a; 2018). The continuing strength of national interests was demonstrated in the lack of willingness of the national governments to amend or repeal the Euratom Treaty (Barnes 2007a; 2008b).

This characteristic of 'stickiness' of the Euratom Treaty underpinned all my publications. Throughout my research I found evidence of lack of political willingness by the national governments to repeal the Treaty and take the opportunity to develop an alternative model for nuclear integration. The reluctance to repeal or reform the Treaty was the result of a number of conflicting political pressures and divergent national interests (Barnes, 2008b). Some of the differences were not the result of support for the technology but rather support from national governments to ensure issues with cross-border implications could be addressed (Barnes, 2003a). The Treaty does not intrude on domestic national energy policies (Barnes, 2007a). It provides a framework for action in the international arena (Barnes, 2008a). The lack of political willingness to repeal or reform the Euratom Treaty and find an alternative model for nuclear integration has had a number of implications for the response of the EU to current challenges.

My more recent research focused on hegemonization of climate change in energy discourse. The impact of this ideational change was more difficult to evaluate as it does not represent a specific event or series of events, but rather longer-term evolution and

embedding of ideas in a discourse with the potential to lead to policy change. Hegemonization of climate change is a process that is continuing and ‘pushing’ other discourse away as more scientific evidence becomes available, public concern increases and policy makers are expected to respond (Barnes and Hoerber, 2013; Barnes, 2018).

I found that neither EU enlargement, nor increased concern about climate change, has been a catalyst for change to the substantive terms of the Euratom Treaty. But both changed the context in which the EU’s nuclear energy policy is debated and determined with implications for current and future developments. For the sector itself it has left in place a framework of support for an energy resource that is no longer innovative and deeply polarizes public opinion (Barnes, 2018). For the institutions it has left the European Parliament without the same legislative power and input as to other energy sectors subject to the TFEU (Barnes, 2006; Barnes, 2018). The Commission, as a key policy actor in EU’s nuclear energy policy, appears to be taking a more proactive stance with regard to support for the use of the technology. All of which adds to the challenges the EU has experienced in the development of a coherent energy policy.

My current research in nuclear energy policy is concluded but issues raised in my work provide an agenda for future research. The longer-term future of EU nuclear energy policy depends on consensus in the political discourse and acceptance in the public discourse that appears at present to be characterized by ‘cynical idealism’ by national governments and ‘pragmatic acceptance’ of the public has opened further research questions (Barnes, 2018, 244/245). Analysis of differing national responses (Barnes, 2018, chapters 8.9) sets the background for analysis of future scenarios for nuclear integration in the EU (COM (2019) 177 final). The development of a ‘discourse of reassurance’ from the Commission has established a framework from which to investigate and evaluate the potential for Commission influence on future policy developments (Barnes, 2018, 55).

Consultation within the EU about change to the Euratom Treaty is ongoing, but is unlikely to conclude before 2025 (COM (2019), 177 final). The Euratom Treaty was primarily a promotional instrument for the nascent nuclear industry in the early 1960s, supporting research for volume base-load energy production. New research questions are emerging about the extent to which this approach remains important to the EU. The policy context continues to be dynamic, requiring flexible research agendas from researchers with the capacity to respond to further changes in the policy context. The EU is concerned for

economic and political reasons to ensure that the EU's member states and companies remain globally competitive in the energy sector. Hegemonization of climate change in the energy discourse has brought new urgency to the debate about the potential of nuclear energy as a resource to contribute to a de-carbonized European economy. The search for energy security in the EU continues. Issues of safety, management of waste, safeguards and support for research in existing and new nuclear technologies remain high on the political agenda. Nuclear energy use remains a highly controversial and divisive issue amongst the citizens and Member States of the EU. Questions raised in my research remain highly relevant and issues highlighted will form the basis of the model of European nuclear integration that is adopted in the future.

ABBREVIATIONS USED

Acquis/acquis communautaire	Accepted law of the European Union
CEE	Central and Eastern European states
CJEU (also ECJ)	Court of Justice of the European Union
COM	Commission Communication
DCT	Draft Constitutional Treaty
DG	Directorate-General of the European Commission
DG CLIMA	Directorate-General for Climate Action
DG ENVIRON	DG for Environment
DG TREN	DG for Transport and Energy
DI	Discursive Institutionalism
EAEC	European Atomic Energy Community
EAP	Eastern Partnership
ECJ	European Court of Justice
ECSC	European Coal and Steel Community
EDC	European Defense Community
EEAS	European External Action Service.
EEB	European Environmental Bureau
EEC	European Economic Community
ENP	European Neighbourhood Policy
EP	European Parliament
ESA	Euratom Supply Agency
ESO	Euratom Safeguards Office
ET	Euratom Treaty
EU	European Union
EU 15	Member states of the EU prior to the fifth enlargement
FSU	Former Soviet Union states
HI	Historical Institutionalism
IAEA	International Atomic Energy Agency
INES	International Nuclear Event Scale
NIS	Newly Independent States
RI	Rational Choice Institutionalism
SI	Sociological Institutionalism
TEAEC	Treaty establishing the EAEC
TECSC	Treaty establishing the ECSC
TEEC	Treaty establishing the EEC
TfEU	Treaty on the functioning of the EU
TEU	Treaty on European Union
WCED	World Commission on Environment and Development
WNA	World Nuclear Association

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ANNEX 1

SYNOPSIS OF PUBLICATIONS

2003a Journal article	Nuclear Safety for nuclear electricity: the search for a solid legal basis for nuclear safety in an enlarged European Union. In <i>Managerial Law</i> 45 (5/6), Special Edition: Enlargement and the Future of the European Union, 115-143.
Context	The special edition was a collection of articles on the impact of the fifth enlargement of the EU for policy developments in both acceding and existing member states. My article examined the impact on the EU's nuclear energy policy.
Research questions	As it is a controversial and divisive energy resource does nuclear energy have a future in the enlarged EU? What is the basis for the nuclear 'acquis' and EU nuclear energy policy? What was the impact of EU enlargement on nuclear energy policy for both the acceding states and the existing Member States?
Literature	<ol style="list-style-type: none"> 1. Reliance on primary sources, noting the importance of contemporary documents to illuminate the issues, including <ul style="list-style-type: none"> ➤ Commission documents on the EU's environmental and energy acquis, Commission opinions on the preparations of the accession states to meet the conditions of membership, draft proposals for legislation, speeches by Commission officials, ➤ Enacted legislation of the European Union, rulings of the Court of Justice of the EU, ➤ Conclusions of the European Council, ➤ Reports to the Convention on the Future of Europe, ➤ Opinions of the European Economic and Social Committee, 2. OECD reports. 3. Eurobarometer public opinion polling. 4. Academic literature relating to nuclear energy sector.
Research methods	Approach based on triangulation of primary source documents, interview material and the wide-ranging use and analysis of specialized documents, including from independent think tanks and industry associations.
Key findings	The Euratom Treaty was the basis of the 'acquis' the acceding states were required to adopt, but Treaty competences did not include safety at nuclear installations. Enlargement of the European Union to the states of Central and Eastern Europe acted as a catalyst for increased EU intervention in the nuclear sector to ensure its safety, particularly at nuclear installations. Concerns were raised by the Commission about the need for enhanced supranational action to replace a regime of voluntary harmonization of practices across the existing states of the EU and prevent fragmentation of nuclear energy

	<p>safety policy (COM (2002), 605,11 in Barnes 2003a, 121). Increased proactivity by the Commission, resulted in a proposed ‘nuclear paquet’ of measures to enhance the policy, but national interests continued and undermined the proposals.</p> <p>The findings opened further research questions for later publications:-</p> <p>What was the role of the European Parliament in nuclear policy making? (Barnes, 2006a)</p> <p>What was the impact of enlargement of the EU on the energy relationship with Russia? (Barnes, 2008a)</p> <p>What were the prospects of amendment or repeal of the Euratom Treaty during the debates of the Convention on the Future of Europe, 2002/2003? (Barnes 2007, Barnes, 2008b)</p>
2006a Journal article	The nuclear industry: a particular challenge to democracy in Europe? In <i>Managerial Law</i> , (48) 4, Special edition, Law, Justice and Democracy in Europe, 400-429
Context	Invited as guest editor for a special edition of the Journal <i>Managerial Law</i> by the editor, Professor J. Carby-Hall, Director of Legal Research, Centre for Legislative Studies, University of Hull, I developed the theme of “Law, Justice and Democracy in Europe”. The contributors explored the impact of enlargement and the gravitational pull of the EU through analysis of operation of democracy and law providing insights into why EU continues to attract member states. The underlying question was - How could balance be achieved between differing groups and their needs in a democratic EU? My article questioned the nature of the nuclear democratic deficit in the EU, querying the extent to which it is possible to reconcile the opposing views of citizens about the use of nuclear energy as a competitive, sustainable and secure energy resource in an open and competitive European energy market.
Research questions	To what extent do national energy choices challenge democracy in the EU? Does a nuclear democratic deficit exist in the EU?
Literature	Primary source material was extensively used including the Treaty establishing the European Atomic Energy Community, documents of the European Union institutions particularly the Commission and the European Parliament, UK government House of Lords select committee on the European Union report, IAEA/OECD reports, academic analysis and commentary. Public opinion polls focusing on public support for nuclear energy and support for EU action were accessed.
Research methods	Approach based on triangulation of primary source documents, interview material and the use of specialized and wide ranging documentary analysis.
Key findings	Firstly, a nuclear democratic deficit exists in the European Union. There is a lack of opportunity for public debate about the use of nuclear energy. Secondly, the EU has the opportunity to exercise control over nuclear safety policy and radioactive waste management and disposal on behalf of the citizens of all EU states, but action is needed to change the Euratom Treaty. Thirdly, the opportunities for the European Parliament as the directly elected representatives of the citizens of the EU in the nuclear policy-making process should be urgently increased. Nuclear safety issues are transnational issues

	because of increased integration in the energy market and the impact of lack of safety. All the tools the EU has available, including the Euratom Treaty, should be used to ensure that concerns of the citizens are addressed in the transnational context until such time as the Treaty is amended/repealed (Barnes, 2006a, 425).
2007a Book chapter	The Future of Euratom. In Neuwahl, N. and Haack, S. (eds.) <i>Unresolved Issues of the Constitution for Europe: re-thinking the Crisis</i> , Montreal: Les Editions Themis.
Context	My chapter in this volume focused on the impact of the debate following the referendum votes against the Draft Treaty establishing a Constitution for Europe (DCT) in the Netherlands, May, 2005 and France, June 2005 on nuclear energy policy. The referendum results called into question the most important proposed decisions with regard to deepening of integration in the EU, the institutional architecture and a better delineation of the responsibilities between the EU and its member states. “In view of this aggravated situation of rejection, the need for decisions is becoming ever more acute. It is the aim of this volume to ... ponder the crisis, viewed as both a risk and as a chance, its causes and consequences” (Neuwahl and Haack, 2007, 1).
Research questions	How has the nuclear policy environment altered following enlargement of the EU? What was the outcome of the Convention deliberations with regard to the Euratom Treaty? Why has the Euratom Treaty continued as a substantively unaltered Treaty?
Literature	There was a heavy reliance on primary source material including position papers prepared for the Convention on the Future of Europe from the Commission, the EP and leading academics in the fields of European integration and European Law.
Research methods	Appropriate to qualitative research, using an approach based on triangulation of primary source documents, interview material, email correspondence and the analysis of documents from wide ranging sources.
Key findings	Following the Convention deliberations the decision was taken to leave the Euratom Treaty substantively unaltered. No other EU Treaty has demonstrated similar longevity in this way. The decision to leave the Euratom Treaty out of the constitutional process was taken as the Treaty was deemed to be dealing with a limited technical issue and did not have the capacity to deal with values and norms of the EU. I argued that it was also as a result of the lack of willingness of the national governments as the Treaty continued to provide advantages for all the Member States – those using and those not using the nuclear technology. The policy environment had altered, but national differences remain marked on the use of nuclear energy and a number of issues particularly safety of nuclear installations and the safe management and disposal of radioactive waste have become prominent. The existence of the Euratom Treaty keeps open the opportunity for debate amongst those who support future nuclear development and those opposing such measures. As such the Treaty continues to provide ‘value added’ for all the Member States of the EU. In the light of the lack of political willingness to make

	changes to the Treaty it may be better to acknowledge ‘value added’ of the Treaty with all its flaws than have no Treaty at all. (A conclusion identified by Handrlica as a notable aspect of my research (Handrlica, 2019a, 439)).
2008a Journal article	Security of energy supply in the new Europe: a role for the EAEC in the EU’s Neighbourhood policy. In <i>Journal of European Contemporary Research</i> , 4 (2), Special edition, Energy Supply Security in the ‘new Europe’: critical perspectives on the European Union’s External Energy Policy, 107-129
Context	My article was a contribution to a collection of articles included in a special edition of the journal with a focus on critical perspectives on the EU’s external Energy Policy. Specifically my article focused on the Euratom Treaty as an instrument of support for the EU’s external policy with regard to Russia and the states of the ENP/EAP. Other authors in the volume dealt with the securitization of energy policy, the extent to which EU energy market liberalization contributed to ensuring EU energy security and the Russian view of the EU energy projects in the ENP region.
Research questions	Is the Euratom Treaty an appropriate legal and constitutional basis for action in the wider European region? Does the Euratom Treaty have ‘value added’ as instrument of EU external nuclear energy policy?
Literature	Extensive use of primary source material including communications from the European Commission, the European Council and the European Parliament; the UK House of Lords Select Committee on the EU; country reports from the European Energy Charter Secretariat. Other sources included the opinion papers of Foratom, Brussels based trade association of the nuclear industry, academic analyses and commentaries from independent think-tanks providing analysis of European issues.
Research methods	Approach based on triangulation of primary source documents, the use of wide ranging academic commentary and analysis and other sources including independent think tanks.
Key findings	The high levels of energy interdependence of the EU, Russia and states of the European Neighbourhood Policy suggest that there are advantages for all parties to engage in dialogue and co-operation. This requires two considerations to be taken into account by the EU. Firstly the need to balance its response to Russia with awareness of the pressures on Russia to maintain its influence in the region. Secondly the EU, to develop a more coherent and holistic energy policy, must take urgent action. Despite these conclusions and absence of change to the Euratom treaty, it has retained importance as an instrument for collective action in energy dialogue and co-operation with Russia and within the EU’s Neighbourhood Policy.
2008b Book chapter	The Resurrection of the Euratom Treaty: contributing to the legal and constitutional framework for secure, competitive and sustainable energy in the EU. Article in Etty, T. and Somsen, H. (eds) <i>The Yearbook of European Environmental Law</i> , (8), 182-218. Oxford: Oxford University Press.

Context	The purpose of the article was to investigate the reasons for the reluctance of the Member States to amend or repeal the Euratom Treaty, reluctance that continues to be evident in the twenty-first century. It was written post the Convention on the Future of Europe, during the so-called ‘period of reflection’ on the outcomes of the Convention and the proposed Draft Constitutional Treaty between 2005 and 2007 and the Intergovernmental Conference convened in 2007 that led to the Lisbon Treaty. A critical overview of the Euratom Treaty, highlighting challenges posed by a series of developments including enlargement, increased environmental concerns focusing on the role that energy usage played in damaging the environment and liberalization of the energy market was provided.
Research questions	What are the origins and competences conferred in the Euratom Treaty? Does the reluctance of the national governments to repeal the Treaty lie in the negotiations for the Treaty in 1956/1957? What are the conditions in the early twenty-first century that have combined to create a revival in interest in nuclear energy? Why are the national governments reluctant to repeal/amend the Euratom Treaty?
Literature	Extensive use of primary sources – including the Treaty, communications from the European Commission, European Parliament, Council of Ministers, UK House of Lords and House of Commons select committees on the European Union, speeches of Commissioners and officials of the European Commission, reports of the International Atomic Energy Agency, proposals for legislation at various stages in the legislative process, cases and rulings of the Court of Justice of the European Union, opinion pieces and reports from energy and environmental think tanks, reports from industry associations.
Research methods	Appropriate to qualitative research, using an approach based on triangulation of primary source documents, the use of specialized and wide ranging academic commentary and analysis and reports of independent think tanks
Key findings	The Euratom Treaty was negotiated when the nuclear policy space had become crowded and national interests were dominant in the discourse about collective action rendering it difficult to transfer competence in the field of nuclear energy policy to the supranational level of the EU. The result was a limited Treaty. In the twenty first century the policy space remains crowded, complicated by the reality of the situation post enlargement of the EU. The early consensus on the use of nuclear energy amongst five of the six founding signatory states of the EAEC has been replaced by agreement of 14 of 28 states (pre-Brexit) generating nuclear electricity. Fission nuclear technology is no longer innovative technology and the industry no longer needs finance to help its ‘start-up’, national governments continue to jealously guard their national industry, yet there is no apparent political willingness to repeal or amend the Euratom Treaty. Interest in the use of nuclear energy amongst governments in the EU has increased as action on climate change turns its focus onto low carbon resources with the inclusion of nuclear technology. Though out-dated and biased towards nuclear industry the Euratom Treaty appears to retain value for all Member States of the European Union, those generating nuclear electricity and those vehemently opposed to its use. The flexibility of the Treaty is demonstrated in its effectiveness as a basis for a legal and

	constitutional framework able to respond to a change in objectives to include, not only energy security, but also a new focus on nuclear safety.
2013a Book chapter	The changing fortunes of nuclear energy in the environmental discourse. In Barnes, P.M. and Hoerber, T.C. (eds.), <i>Sustainable Development and Governance in Europe – the evolution of the discourse on sustainability</i> . Oxford and New York: Routledge.
Context	This book chapter was included in an edited volume for which I was co-editor. I compiled the introduction, co-authored chapter 1 and the conclusions in addition to authoring chapter 7 <i>The changing fortunes of nuclear energy in the sustainability discourse</i> . With my co-editor we posed two research questions for all contributors to the volume – firstly how was the nature of the discourse on sustainability in Europe changing and secondly and how were the hegemonic ideas of the discourse reflected in the governance structures that have emerged. Following on the increased interest in nuclear energy as a resource capable of delivering volume base-load electricity in a low carbon energy mix my research focused on the viability of nuclear energy as a sustainable resource.
Research questions	Has a coalition of new alliances emerged to produce a new hegemony in the nuclear energy discourse? What is the impact of the hegemonization of the discourse on climate change in the nuclear energy sector? Is nuclear energy compatible with sustainable development objectives?
Literature	The analytical tools used in the chapter derived from the literature of Laclau and Mouffe (1985), Laclau (1994) and Mouffe (1993) who identified the concepts of hegemony, antagonism and floating signifiers or nodal points in the discourse.
Research methods	Extensive use of primary source material provided the sources for the analysis of the changing nature of the discourse on nuclear energy as a sustainable source of energy.
Key findings	Although sustainable development has become the hegemonic discourse amongst the EU's energy policy makers, it has not acquired the same position in the arena of nuclear energy policy. The acceptance of nuclear energy as a sustainable resource is the result of 'capture' of the discourse by an increasingly pro-nuclear lobby with the national governments supported by the European Commission. There is much about nuclear energy that is not compatible with the concept of sustainable development. There are two obstacles to embed sustainable development objectives into the decisions of the policy makers. The first, the outcome of entrenched national interests and retained national competences in the arena of energy policy and the second, the complex legal and constitutional framework for energy policy as a result of the competences of the Euratom Treaty that has a separate legal personality from that of the TEU. The Euratom Treaty does not provide an appropriate framework for the competitive energy market to be established and to operate. The Treaty should be repealed and competences relating to nuclear safety and waste management incorporated into the energy chapter

	of the Treaty on European Union. This would represent an effective demonstration that sustainable development had become the hegemonic discourse in the EU's policy making.
2018 Book	<i>The Politics of Nuclear Energy in the European Union, framing the discourse, actors, positions and dynamics</i> . Opladen, Berlin and Toronto: Barbara Budrich Publishers, also New York: Columbia University Press.
Context	<p>The book:-</p> <p>Enabled a thematic approach in consideration of a number of issues deemed highly pertinent in the political discourse on nuclear energy, concentrating on the geographical area of the European Union that is the world's most nuclearized region. Development of the main research poles core throughout my research and publications was possible - the stickiness of the Euratom Treaty, the impact of enlargement of the European Union on both internal and external nuclear energy policy and the hegemonization of climate change in the energy discourse.</p> <p>Began from the perspective that energy and economic development are inextricably linked. I argue there is no single energy resource that will meet all challenges for the European Union's policy makers is to reconcile the objectives of energy security, competitiveness and sustainability. For the policy makers the search is for energy resources that will achieve the 'least worst' outcomes in terms of reconciling the differing interests in the energy debate.</p> <p>Questioned the viability of nuclear energy to respond to the challenges of the energy sector and actively contribute to a diversified energy mix in the EU that would ensure supplies of low carbon energy at affordable and competitive prices. Nuclear energy is a highly controversial energy resource. It deeply divides public opinion and support from national governments but the nuclear technology provides a significant proportion of electricity in the EU. Whilst it is a situation unlikely to change for the foreseeable future I argued that for nuclear energy to retain its position in the energy mix of the EU it must achieve political consensus and public acceptance for its use. Underlying the discussion in the book is the view that as long as nuclear energy remains an element of the energy mix in the EU it is in the interests of all the Member States, those with active policies of nuclear generation and those vehemently opposed to it use, to enable integration of the nuclear sector to ensure that issues of interest to the public such as nuclear safety and nuclear safeguards are addressed.</p>
Research questions	The overall research question posed in the book was "Does civilian use of nuclear energy have a future in the European Union?" The focus of the book was on the political, historical, legal, economic and social environment and the changes in the environment that provided the context in which nuclear energy policy and politics in the EU is made.
Literature	Wide-ranging literature included extensive use of primary sources – the Treaty, communications from the European Commission, European Parliament, Council of Ministers, UK House of Lords and House of Commons select committees

	<p>on the European Union, speeches of Commissioners and officials of the European Commission, reports of the International Atomic Energy Agency, proposals for legislation at various stages in the legislative process, cases and rulings of the Court of Justice of the European Union, opinion pieces and reports from energy and environmental think tanks, reports from industry associations.</p> <p>Using the framework of discourse analysis enabled analysis of the legal, historical, political and economic factors framing the pathway followed by the policy makers. The body of literature on discourse that informed the analysis in the book came from a number of sources (Barnes 2018, 20 Figure 1.1), including:-</p> <p>Habermas, (1981, translated 1984; 1987), demonstrated how discourse theory was of use to political scientists because it is through communication that change is achieved.</p> <p>Hajer, (1995,44) provided a comprehensive definition of discourse as a specific ensemble of ideas produced and re-produced in a particular set of practices that give meaning to physical and social realities. Discourse analysis examines the factors that influence the way in which we perceive problems, considering the context in which the discourse evolves as well as what is being communicated. Highlighted the development of storylines in the narrative of the discourse, intended to remove complexity and ambiguity in the discourse and build plausible arguments that establish consensus.</p> <p>Laclau and Mouffe demonstrated the importance of ideas as they become embedded in discourse, (Laclau and Mouffe, 1985; Mouffe, 1993; Laclau, 1994). Highlighted the contestation between ideas in the discourse, developing as ‘nodal points’ in the discourse with hegemonization of ideas taking place as consensus and support is built around one point. Argued hegemonic discourse must offer a compelling view of an alternative credible vision of society for it to be accepted.</p> <p>Schmidt emphasized the role of the actors in the discourse. Demonstrated that is it not just ideas or ‘text’ but also the context in which the discourse takes place that is important (Schmidt 2008). Identified development of a coordinative discourse within an institutional framework leads to a communicative discourse amongst the parties both internal to and external to the setting in which the debate takes place (Schmidt 2010). Further focus was given on the persuasive power of ideas in her analysis (Schmidt, 2017).</p> <p>Béland, 2009; Béland and Cox, (2016), demonstrated how ideas lead to policy change under specific institutional and political conditions.</p> <p>Dyzek, (2013) demonstrated the outcome of discourse on the debate and interchange of assumption, judgements and contestation of ideas in his work on environmental discourses.</p>
Research methods	The basic approach adopted was that of triangulation of research methods – including primary source materials from the EU institutions, national governments, international organizations involved in the nuclear sector, speeches by prominent

	<p>politicians involved in nuclear energy policy making, verification of findings in the documentation by accessing a wide range of other sources taking in industry specialized materials, independent policy think tanks analysis and academic commentary and analysis.</p>
<p>Key findings</p>	<p>The context in which the civilian nuclear sector operates in the twenty first century has altered significantly since the first reactors came ‘on stream’ in the late 1950s/1960s in Europe. Originally perceived as a resource that would provide cheap and readily available electricity it quickly became evident by the 1970s that this was not the case. By the 1990s the period of major large-scale development of nuclear reactors had ended. Only 4 reactors were under construction in the EU with a further 24 planned in 2018 although globally 60 reactors were under construction in 15 countries notably China (20) and Russia (7).</p> <p>The future of nuclear energy in the EU will rely on a combination of consensus in the political discourse and acceptance in the public discourse. It will depend on the credibility of the emerging storylines in the narrative that portray nuclear energy as capable of making a significant contribution to curbing greenhouse gas emissions and providing energy security, both contested arguments. Attitudes to nuclear energy remain divided but re-framing the discourse in terms of the threat from climate change has brought an element of acceptance, as it appears to provide a win-win situation for all, opponents and proponents. The political acceptance of the use of the technology appears to have been captured by a narrative that represents ‘cynical’ idealism in order to ensure that electorates have energy to meet increasing demand. Public acceptance overall appears to be based on a ‘pragmatic’ acceptance of the role that nuclear technology may respond to energy demand and the challenge of climate change than unconditional and enthusiastic support.</p> <p>Political division between the Member States about the use of nuclear energy challenges the ambition of the EU to develop an integrated energy policy. Uniquely in the EU the Euratom Treaty has continued substantively unaltered since it came into force remains as the legal framework on which the policy is based. The competences conferred in the Euratom Treaty were limited in the 1950s because of the national interests. National interests continue to constrain the collective and cooperative action amongst the EU Member States. As the EU has enlarged this diversity of national interests has increased but the Treaty remains unaltered. There is evidence of political unwillingness to amend or repeal the Euratom Treaty. Despite criticism of the model of nuclear integration that has developed, it has delivered ‘value added’ for all Member States. The nuclear energy policy that has been developed does not infringe on national sovereignty but does enable issues of transnational concern in the EU to be addressed, including safety and security, nuclear safeguards, future research initiatives in fission technology and small modular reactors and the free movement of scientists and nuclear</p>

	<p>personnel within the EU. Collective action is constrained by the terms of the Treaty but that does not diminish the importance of the possible action. Paradoxically, given the deep divisions within the EU about the use of the technology and Treaty affirmation of national competence for energy resource choice, increasing collective action in the nuclear energy sector would support and enable wide ranging and transparent debate about the viability of including nuclear energy in the EU's energy transition to a low carbon, job rich economy.</p>
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