Pamela M. Barnes

The Politics of Nuclear Energy in the European Union

Framing the Discourse: Actors, Positions and Dynamics

Co-Author: Ian Barnes

Barbara Budrich Publishers

Dedication to Wynn Christopher with our love

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Foreword

Demand for electricity is forecast to increase as consumers [industrial, business and domestic] switch to electricity from other energy resources in the pursuit of a decarbonised economy. However a key question for policy makers is how to generate electricity in sufficient volumes in a decarbonised economy to meet the increasing demand. Energy choice is not made in a vacuum. No energy choice will satisfy all the diverse interests and needs involved. Policy makers deciding which technology to support for electricity generation are faced by choices carrying with them complex and profound political and social implications. Nowhere is this more evident than in the debates about the use of nuclear energy in the European Union [EU]. Nuclear generated electricity has been part of the energy mix in countries, now members of the EU, since the first reactors began commercial operation to provide electricity for transmission to consumers [industrial, business and domestic] in the late 1950s and early 1960s. With 128 reactors operating in 14 of the EU's current 28 states, the EU in the twenty-first century is the most nuclearized region globally.

However the use of nuclear technology to generate electricity is highly controversial and has deeply divided public opinion in the EU. The peak period for large-scale, large generating capacity nuclear reactor development based on nuclear fission technology in Europe has ended. The numbers of new reactors being constructed has declined significantly since a peak in the mid 1980s. Political pressure in some EU states is growing and undermining support for developments. Programmes for reactor closure are in place in some states. There is much about nuclear energy that raises doubts and concerns about its input to the wider objectives of secure, competitive and sustainable energy to which the EU increasingly subscribes. The public has concerns about a variety of issues including safety of reactors, problems of de-commissioning the EU's ageing reactors, management of radioactive waste and proliferation of nuclear weapons. These appear exacerbated by increasing financial and economic difficulties experienced by the nuclear industry in the EU. But none of this means the use of the nuclear technology to generate electricity in the short to medium term is over in Europe. It continues to form a high level of electricity provision in some EU states and an important element of a diversified energy mix in others.

The future of nuclear energy will rely on energy policy makers achieving consensus about its use and, at the same time, being able to communicate a credible discourse narrative that makes its use acceptable to the public, in effect projecting a 'discourse of reassurance'. Throughout the history of the use of nuclear energy in the EU states a persuasive narrative in the political discourse showcased nuclear energy as a secure energy resource providing volume baseload electricity at stable prices. A new narrative in the discourse emerged in

the early 2000s portraying nuclear energy as a resource that is capable of meeting the increasingly urgent goals and targets of climate change adaptation and mitigation. The hegemonization in the energy discourse of climate change has given the nuclear sector a renewed credibility. Indeed the new orientation in the discourse caused many of those opposed to nuclear energy 'to think it out again', viewing nuclear energy as the lesser of the dangers to modern society given the growing scientific evidence linking human activity and damaging climate change. In this book questions are posed about the credibility of the discourse that portrays nuclear energy as occupying a central and pivotal role in providing a secure, competitive and sustainable energy resource.

Irrespective of the answer to these questions it is argued in this book that cooperation and collaboration in the nuclear sector is crucial to address the challenges associated with the current and future use of the technology. The states of the EU have a useful tool to hand to support this cooperative action, namely the Treaty that established the European Atomic Energy Community [Euratom] in 1957. The Euratom Treaty is a limited, sectoral Treaty but it does provide the legal framework to enable the states of the EU to work together to address a number of specific areas where cooperation is capable of bringing benefits to all the EU states, irrespective of the policy outcome of the dominant national political discourse. The Euratom Treaty has remained substantively unchanged since the 1950s and continues as a separate legal entity to the Treaty establishing the European Union. But Euratom action, measures and legislation are subject to the rulings of the Court of Justice of the European Union [CJEU]. The CJEU is responsible for interpreting European law, including Euratom legislation to ensure it is applied in the same manner in all EU states. The existence of the Treaty provides those living in states that do not use nuclear energy in their national energy mix with an opportunity to have an input into the development of the EU's nuclear safety regime and nuclear safeguards policy.

Competences conferred in the Euratom Treaty have enabled the EU states to engage in action to establish robust institutional and regulatory structures to ensure nuclear safety. This includes safety, not only for those working in the nuclear industry, but by extension to the general public living in the European Union. Frameworks have been established to deal with transnational implications of accidents at reactors and nuclear installations and safe transport of nuclear materials within the EU. A range of measures, procedure and structures are in place for effective monitoring of nuclear installation and materials to ensure they are not diverted to military use. There are evident synergies between safety security and safeguards at nuclear installations reinforcing the importance of cooperation and collaboration amongst all EU states. Reactors where safety concerns are given priority are also those where security and safeguards of materials are effectively implemented.

The EU recognises the competence of the member states to choose their energy resources dependent on the needs and resource base of the national economies. But when the EU acts as a group of states that includes 14 of the 30 states globally with nuclear generating capacity then it is able to influence the agenda of organisations such as the International Atomic Energy Agency [IAEA]. Cooperation between the EU and the IAEA has encouraged the development of a supportive culture globally leading to the strengthening of nuclear safety, security and safeguards for nuclear materials. It has also framed diplomatic action to contain nuclear weapons development in Iran. Supranational nuclear energy policy is the most effective way of ensuring that the future nuclear sector becomes more open, transparent and accountable and able to effectively respond to the public concerns about energy security, nuclear waste management and disposal and weapons non-proliferation. Collaboration on nuclear energy policy would support and enable wide-ranging debate about the role of nuclear energy in the development of the low carbon, job rich economy being sought within the EU.

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1 The future of nuclear energy in the European Union: political consensus and public acceptance

Introduction: The European Union's energy 'trilemma'

Energy and economic development are inextricably linked. It would be unacceptable in modern industrialised society for policy makers to introduce policies to prevent access to and consumption of energy. But the challenge for energy policy makers is to ensure delivery of increasing amounts of modern energy services that are compatible with further and future economic development. For the European Union's [EU] energy policy makers this presents a 'trilemma'. At the heart of the Treaty on European Union [TEU] are commitments made by the member states to the objectives of energy security, competitiveness and sustainability. Reconciling these objectives requires a myriad of diverse and often entrenched interests to be taken into account. These include competing demands for energy supply, public concerns about the cost of energy resources, the impact of energy usage on the environment and the challenges for the energy sector in responding to the potential impact of climate change. Reconciling all objectives requires a significant shift in energy policy making to achieve necessary, often radical, behavioral change from all energy consumers [industrial, business and domestic]. The advantage of making this shift would be not only to stimulate the desired growth and development of a low carbon economy for the EU but also enable the EU's member states to overcome the problems associated with high levels of energy import dependency.

No single energy resource will meet all challenges. The policy makers' search is for energy resources that will achieve the 'least worst' outcomes in terms of reconciling the differing interests in the energy debate and for which it is possible to garner public acceptance and support. This book questions 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 has been a significant energy resource within the EU since the late 1950s and early 1960s. By 1997 nuclear technology produced 33% of total EU electricity, reaching 1008 TWh in 2004. Since 2013 the EU has included 28 member states, predominantly medium and small sized states, in close geographical proximity to one another. [c.f. Annex 1. Enlargement of the EU]. In

2017 128 reactors were operational in 14 of the then EU 28[1] states, and produced 815.2 TWh electricity. [c.f. Table 1:1 Nuclear reactors in the EU (2017)]. Globally in April 2017 449 reactors were operating in 30 countries with 60 under construction in 15 countries, notably China [20] and Russia [7]. In contrast to the global picture only 4 new reactors were under construction in EU countries with a further 24 planned.

The fall in the number of new reactors being constructed does not signal the end of the use of the technology in the energy mix of the EU's member states. The EU remains the world's most nuclearized region. Nuclear technology continues to meet 13% of the EU's total energy needs, providing 27% of the electricity used and equalling 53% of the low carbon energy. The EU is one of only three major economies in which more than 50% of electricity is low carbon [the others being Brazil and Canada]. Recent forecasts by the Commission suggest a decline in nuclear generation capacity will take place to 2025, taking into consideration member states' decisions to phase out nuclear energy or reduce its use. But by 2030 this trend is expected to reverse as new reactors are attached to the grid and lifetime extensions given to others. As a result the trend to 2050 is perceived to be one of stability between 95 and 105 GWe being generated, but a reduction on the current level of approximately 120 GWe. Since electricity demand is expected to increase over the same period, the share of nuclear electricity in the EU would fall from its current level of 27% but remain around 20%. [COM (2016a) 177 final:4].

For nuclear energy to retain its position in the energy mix of EU states it must achieve political consensus and public acceptance for its use. Arguably public acceptance is the most difficult to achieve in the case of nuclear energy as it is perhaps the most controversial of the electricity generating technologies used in the EU. Its use deeply divides public opinion. Public acceptance of the use of the technology is not automatically guaranteed even with reassurance about robust safety standards and democratic oversight of the nuclear sector in place. There are levels of risk some of the public is prepared to tolerate, accepting what may be a 'devil's bargain' in exchange for low carbon energy. But equally in some EU states the public is not prepared to make this choice. The response of the politicians and public to the use of nuclear energy differs from state to state and contrasting positions have emerged about the modern

1 On 23rd June 2016 the United Kingdom held a referendum to determine whether or not the country should remain a member state of the European Union, the so-called 'Brexit'. 51.9% of those voting voted to leave and 48.1% of those voting voted to remain. The UK government decided not to invoke Article 50 TEU procedures to withdraw from the EU immediately but waited until spring 2017. On March 29th 2017 UK Prime Minister, Theresa May, formally notified President of the European Council, Donald Tusk, of the UK's intention to withdraw from the EU and at the same time the EAEC. The opportunity is taken in this book to reflect on the challenges that the Brexit vote has for the UK as a signatory of the Euratom Treaty and member of the European Atomic Energy Community, a separate legal entity from the Treaty on European Union and the European Union.

nuclear sector even in those states of the EU [France, Germany and the UK] early to use nuclear energy in their national energy mix in order to address the need for energy security.

A thematic approach has been adopted in this book to enable consideration of a number of issues that are highly pertinent to the future of nuclear energy in the geographical region of the EU. Case studies of the development of nuclear energy policy in individual member states of the EU and review of public opinion in member states are included. The focus of the critical commentary presented is the interaction between a number of forces - political, historical, economic and social - evident in the discourse surrounding nuclear energy use. Questions are posed about the impact of these forces on the discourse as it has evolved amongst the actors in the EU's nuclear policy-making process, namely the institutions of the EU and the national governments. The development of the discourse that portrays nuclear power as a reliable and predictable source of electricity with clear conditions that may be forecast 60 years ahead is unpicked. The underlying discourse narratives that portray nuclear energy as a resource that is cost efficient and capable of contributing to energy security and sustainable development are analysed.

Some elements of discourse favouring the use of nuclear energy on the basis of energy security have remained prominent since the 1950s. But this has not been enough to ensure continued support for the use of the technology throughout its history of commercial operation in Europe. Changes have taken place in the political and economic environments in which the energy sector operates that have had an impact on the dynamics of the discourse and the response and positions taken by the actors and policy makers. Underlying the discussion in this book is the view that as long as nuclear energy does retain a role in the energy mix of the EU, it is important for all EU states [supporters and opponents of the technology] to maintain cooperation and collaboration on nuclear related issues. There is evident mutual interest for all EU states to cooperate on issues such as nuclear safety, trade in nuclear fuels, mobility of workers, cooperation in nuclear research and development, development of innovative nuclear technology, wider nuclear regulatory cooperation and safeguard arrangements for non-proliferation of nuclear weapons.

Table 1:1 Nuclear Energy in Europe

Country	Nuclear generation 2015		Reactors operable March 2017		Reactors under construction March 2017		Reactors planned March 2017		Reactors proposed March 2017	
EU	TWh	%	No.	MWh net	No.	MWe gross	No.	MWe gross	No.	MWe gross
Belgium	24.8	37.5	7	5943	0	0	0	0	0	0
Bulgaria	14.7	31.3	2	1926	0	0	0	0	1	1200
Czech Republic	25.3	32.5	6	3904	0	0	2	2400	1	1200
Finland	22.3	33.7	4	2764	1	1700	1	1200	0	0
France	419	76.3	58	63130	1	1750	0	0	0/1?	1750?
Germany	86.8	14.1	8	10728	0	0	0	0	0	0
Hungary	15.0	52.7	4	1889	0	0	2	2400	0	0
Lithuania	0	0	0	0	0	0	0	0	2	2700
Nether-lands	3.9	4.0	1	485	0	0	0	0	0	0
Poland	0	0	0	0	0	0	6	6000	0	0
Romania	10.7	17.3	2	1310	0	0	2	1440	1	0
Slovakia	14.1	55.9	4	1816	2	942	0	0	1	1200
Slovenia	5.4	38.0	1	696	0	0	0	0	1	1000
Spain	54.8	20.3	7	7121	0	0	0	0	0	0
Sweden	54.5	34.3	9	8849	0	0	0	0	0	0
UK	63.9	19.9	15	8883	0	0	11	15,605	2	2300
EU total	815.2	c27%	128	119,421	4	4392	24	29.045	8/9	9600
EU Neigh-bours	**Nuclear generation 2015**		**Reactors operable April 2016**		**Reactors under construction April 2016**		**Reactors planned April 2016**		**Reactors proposed April 2016**	
	TWh	%	No.	MWh net	No.	MWe gross	No	MWe gross	No.	MWe
Belarus	0	0	0	0	2	2388	0	0	2	2400
Russia	18.2	18.6	35	26053	8	7104	25	27755	23	22800
Switzer-land	22.2	33.5	5	3333	0	0	0	0	3	4000
Turkey	0	0	0	0	0	0	4	4800	4	4500
Ukraine	82.4	56.5	15	13107	0	0	2	1900	11	12000
Total	287.4		55	42,493	10	9492	31	34,455	43	

Source: World Nuclear Association [WNA] (2017)

Nuclear energy in the EU's energy mix

The origins of nuclear technology are to be found in the theoretical and experimental work being carried out by the scientific community into atomic radiation, atomic change and nuclear fission from the late nineteenth and early twentieth centuries. During World War II [WWII] [1939-1945] the focus of this work turned to the development of the atomic bomb that culminated in the devastation of the Japanese cities of Hiroshima and Nagasaki in 1945. However, the potential of the technology to produce heat, steam and thus electricity was apparent. In the aftermath of WWII a number of storylines emerged in the political narrative that gained support and acceptance from the public. Concern emerged about security of access to energy supply and questions about what would replace coal as the primary source of energy in Western Europe if coal were to be no longer available. There was an optimistic view about the potential of the commercial application of nuclear technology as a producer of cheap electricity.

For European states the aftermath of WWII had deepened public concern not only about the importance of access to energy supplies but also how to avoid future conflict between European states. The political goal of furthering European integration through the device of a nuclear energy community thus proved attractive and nuclear energy appeared to be capable of fulfilling a number of economic and political goals. But although energy policy co-operation was an important aspect of progress towards European integration in the immediate period after WWII the EU has throughout its history struggled to develop a coherent energy policy.

The energy cooperation and collaboration begun in Europe during the 1950s was specific and sectorally focussed, coal being first in 1951 when the six European states [Germany, France, Italy, Belgium, the Netherlands and Luxemburg] formed the European Coal and Steel Community [ECSC, 1951]. The EU's nuclear energy policy originated in the Treaty that followed a few years later in 1957 and established the European Atomic Energy Community [Euratom]. The main purpose for establishing Euratom was to provide support for the commercial use of nuclear technology and the nascent European nuclear industry. The same six signatory states also formed the European Economic Community [EEC, 1957] but there was no chapter on energy in the EEC Treaty. It is in the integration of these three communities from the 1950s that the EU had its origins. [c.f Annex 2. The Treaties of the European Union]. Although the Euratom Treaty continues as a separate legal entity to the Treaty on European Union [TEU], on accession to the EU all states also become members of Euratom.

The existence of the energy focus in the ECSC and the EAEC and lack of reference to energy in the EEC Treaty resulted in limited progress on a more

integrated energy policy in the early history of the EU. Some progress was made in the 1990s as the EU strengthened its commitment to completion of the Single Market and supported the development of more integration in energy policy and the creation of the single energy market. [COM (1995) 682 final]. Subsequently three packages of measures were introduced to gradually open the national energy markets that were dominated predominantly by state owned monopoly energy companies. The principal objectives of these measures were to widen market access, increase transparency and regulation, and provide consumer protection, support interconnection and adequate levels of energy supply.

These 'packages' of EU legislation did not specifically refer to nuclear energy but to the product of the nuclear generation process – electricity – in the energy market. The first liberalisation directives [First Energy Package] were adopted in 1996 [electricity] and accompanied in 1998 [gas], to be transposed into Member States' legal systems by 1998 [electricity] and 2000 [gas]. The Second Energy Package was adopted in 2003, with directives to be transposed into national law by Member States by 2004, although some provisions did not enter into force until 2007. As a result, industrial and domestic consumers had more opportunity to choose their own gas and electricity suppliers from a wider range of competitors. The Third Energy Package in 2009 further liberalised the internal electricity market, amending the second package and strengthening implementation of the internal energy market.

More recently a significant step forward was made in energy policy development when the 2015 framework strategy for an Energy Union was adopted, coupling it with a forward-looking climate change policy to bring greater coherence to existing energy policy action and measures. [COM (2015) 80 final]. The strategy was based on five mutually reinforcing and closely interrelated dimensions, designed to bring greater energy security, sustainability and competitiveness:

- Energy security, solidarity and trust;
- A fully integrated European energy market;
- Energy efficiency contributing to moderation of demand;
- De-carbonizing the economy;
- Research, Innovation and Competitiveness

Diversification away from the use of fossil fuel based energy resources was one of the core principles underpinning the proposed Energy Union. Demand for electricity in a diversified energy mix is forecast to increase in the EU as consumers [industrial, business and domestic] switch to electricity from other energy resources as the European economy becomes more decarbonized. Energy scenarios provided by the European Commission show electricity potentially doubling its share in final EU energy demand by 2050. The importance of accelerating the modernization of the European economy, making it low carbon and energy resource efficient was highlighted in the Energy Union

strategy. Nuclear generated electricity was amongst the electricity producing technologies identified for support. Foratom, representing the nuclear industry, going so far as to 'welcome' the Commission's acknowledgement of the positive role of nuclear power in the meeting the EU's goal of de-carbonizing the economy by more than 80% by 2050. [Foratom (2017) cited WNN (2017)].

Limitations to energy policy development in the EU continue as the Commission has emphasised that the Energy Union does not necessitate any treaty change of the right for member states to choose their own national energy resources, enshrined in Article 194 TFEU. Article 4, Treaty on the functioning of the European Union [TFEU] conferred shared competence on the EU in the field of energy, but EU competence does not affect a member states' right to determine the conditions for exploiting its energy resources, its choice between different energy sources and general structure of its energy supply. [Article 194 (2) TFEU]. The use of nuclear energy is thus dependent on the national situation including the levels of political consensus and public acceptance of the technology in the EU's member states. But, irrespective of the choices in the national energy mix, the increasing integration of the European energy market leads to national energy policy decisions in one state impacting on the actions and decisions of other states.[2] As a consequence of the integration of the national energy systems national coordination between the member states, improved co-operation between stakeholders and greater transparency and public participation in nuclear issues is desirable.

Political debate about the use of nuclear energy in the EU takes place within an environment bounded by supranational action established in the Euratom Treaty and the national energy policies of the member states. The Treaty is an element of the 'acquis communautaire' [accepted law of the EU] that all member states have accepted, irrespective of their national views. [c.f. Annex 3. Membership of the EU and Euratom]. The objective of the Euratom Treaty was not to act as a policy instrument for clean technology; it was to facilitate the development of secure energy for the signatory states. It continues as a separate instrument to support the nuclear sector without prospect of change to the Treaty base of the EU and as such the Euratom Treaty contributes to the continuing constraints on the development of integration in EU energy policy. Although the Treaty has a specific and limited focus it has provided an opportunity for EU all states, both opposed to the use of nuclear technology and those supporting its use, to achieve a number of goals with regard to increasing safety

2 For example, in 2016 a dispute arose between the Belgian government and the German state Lander authorities in North Rhine-Westphalia and Rhineland-Palatinate. The Belgian government decided to extend the operating life of the Belgian reactors at Tihange [constructed 1974] and Doël [constructed 1975], scheduled for closure in 2015, in order to preserve jobs and support the Belgium's transition to a cleaner technology. Both reactors were close to the German border and both had been subject to safety problems ranging from leaks and cracks in the reactor vessels, fires in the electricity supply, to sabotage in 2015.

measures in the industry and re-assuring public concerns about the use of the technology. The Treaty provides legal and institutional structures to support neighbouring states working together to address transnational issues and respond to common concerns held by many members of the public across the EU.

There have been periods of considerable opposition to nuclear technology since it was introduced in Europe in the late 1950s, interspersed with periods of seeming 'renaissance' of interest. At the end of the second decade of the twenty first century the polarisation of public opinion in the EU was marked. The overall position of nuclear energy in the energy mix of the EU was one of decline in the rate of development but with a picture emerging of 'status quo' in terms of the levels of nuclear energy used for the foreseeable future. The credentials attributed to nuclear energy as a response to the search for low carbon energy in the EU had resulted in revival of support in some EU states and EU institutions. In addition support for nuclear energy appeared to be reinforced within the international community following the United Nations COP21 Climate Summit held in Paris, December 2015.[3] Ten countries, notably China and India, explicitly listed nuclear energy programmes in their Intended National Determined Contributions [INDCs] for reduction or mitigation of greenhouse gas emissions [GHG].

On the one hand nuclear energy appears to offer the opportunity to fulfil a number of goals and objectives. Electricity is portrayed as the energy of the future to underpin the development of a low carbon economy, to meet climate mitigation targets, support technological innovation and development of new products and services, including in the fields of transport and communications. It can be generated from a number of fuels as diverse as water, wind, coal, oil, natural gas, biomass, residues of animal rearing or uranium. But, on the other hand, inclusion of nuclear electricity in an energy policy mix carries a unique set of issues and concerns that challenge those tasked with policy making.

Since the 1950s study of the input of nuclear technology to national energy mix in European states has demonstrated the importance of active support from governments to deploy nuclear energy, a situation that remains unchanged. The public's concerns about safety of nuclear power plants, safe disposal of radioactive waste and risk of terrorist attack at nuclear power stations have intensified as a result of a number of events in recent years. Public acceptance relies on the persuasiveness of governments and their ability to establish a discourse based on credible arguments that nuclear energy is competitive, that nuclear energy is able to provide low carbon energy, that nuclear energy is safe, that

3 The 2015 United Nations Climate Change Conference, COP 21 or CMP 11 was held in Paris, France, from 30 November to 12 December 2015. It was the 21st yearly session of the Conference of the Parties (COP) to the 1992 United Nations Framework Convention on Climate Change (UNFCCC) and the 11th session of the Conference of the Parties (CMP) to the 1997 Kyoto Protocol.

disposal and long-term management of waste is possible, that transport of nuclear fuels and materials within the EU is safe, that the potential for widespread transnational impact in the event of a nuclear accident is limited and that nuclear weapons non-proliferation is guaranteed.

Framing the discourse – methodology

The above reflection on the role of nuclear energy in the EU's energy mix demonstrates that the energy sector is characterised by complexity. It encompasses many interconnected issues often making a coherent energy policy difficult to achieve from the discourse of the many interlocutors and vested interests. The nuclear energy debate is frequently contested and controversial, deeply polarising opinion amongst all groups including policy makers and the general public alike in the EU. In searching for a theoretical framework in which to ground analysis of nuclear energy and the contestation of arguments surrounding its use, discourse theory with its focus on discourse analysis was identified as providing an effective way forward to present critical commentary on a number of the most prominent ideas and issues. The starting point for any discourse analysis is the identification of what is meant by 'discourse'. It may be viewed at the most basic level as speaking to one another. Hajer [(1995): 44] however provides a more comprehensive definition of discourse as "… a specific ensemble of ideas, concepts and categorizations that are produced, reproduced and transformed in a particular set of practices through which meaning is given to physical and social realities." So, the focus is turned in the critical commentary in this book on the specific ideas and concepts evident in the debates about the use of nuclear technology in the EU and the policy outcomes that result.

Discourse theory provides a number of methodological approaches and tools to analyse how ideas come to be accepted and to be advanced. The breadth of approaches and methodologies encompassed within discourse theory facilitate consideration of the dynamic nature of the processes of change and continuity evident in the nuclear sector. Discourse analysis provides a framework for understanding the processes of continuity and change at play in the modern nuclear sector of the EU. By highlighting the importance of ideas and language, discourse provides "… a shared way of apprehending the world. Embedded in language it enables those who subscribe to it to interpret bits of information and put them into coherent stories or accounts." [Dryzek (2012): 9/10]. Discourse analysis is intrinsically political as it focuses on the power inter-play that takes place between the contributors to the discourse or the ideas coming together in the storylines and narratives. As such it enables critical

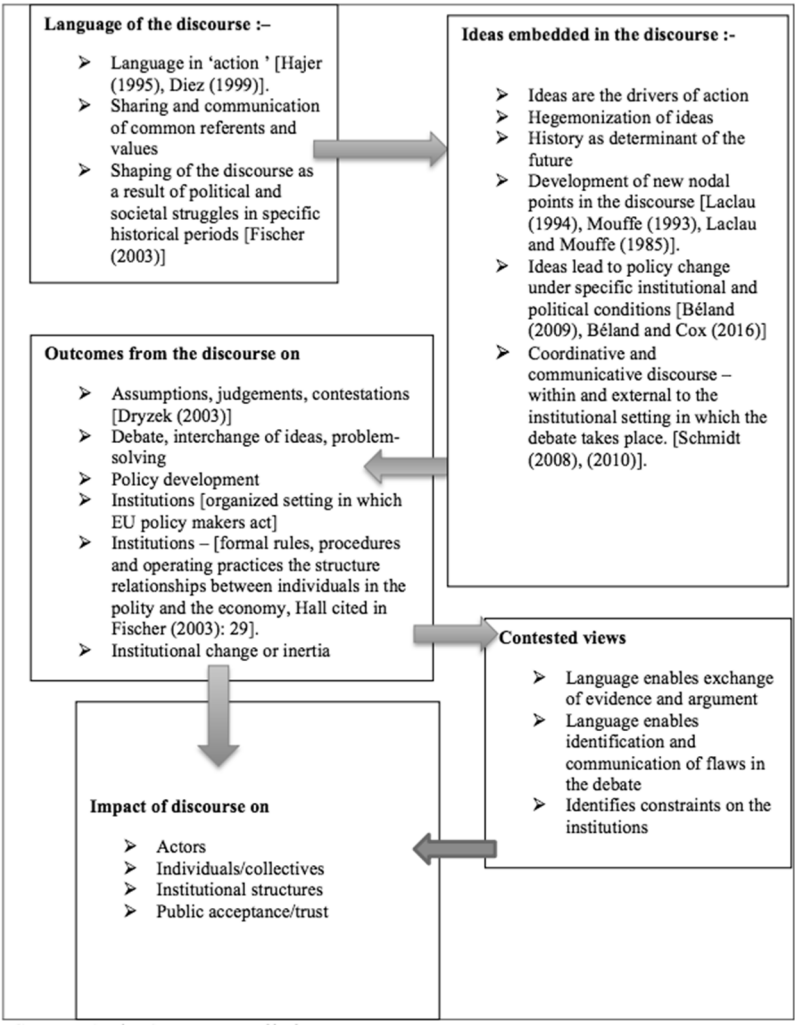
commentary and review of the policy outcomes that result. It facilitates understanding of differing perspectives that emerge in the discourse and the impact on policy outcomes which may as a result be constrained, subject to compromise and/or slow to result. Ideas achieving coherence in the narrative or storyline may be based on unfounded views, but the development of an accessible narrative or storyline in the discourse is crucial for debate and deliberation of ideas to take place.

It is not the intention of this book to present a critique of discourse theory but rather to use the insights provided from exponents and academics who have developed and used discourse theory to enable critical commentary on the position and role of nuclear energy in the energy mix of the European Union. [Figure 1:1. Framing the discourse.]. The importance of ideas and language are inextricably linked in discourse theory. All approaches to discourse theory take the language of the discourse, the evolution communication of ideas and discourse development seriously. Some approaches focus more on the language used, other on ideas and their evolution, others on the nature of discourse itself and yet others derive from a combination of the differing perspectives.

Jürgen Habermas demonstrated in his 1981 work 'Theory of Communicative Action', [TCA] [Habermas (1981), translated (1984), (1987)] how discourse theory, originating in the study of language and linguistics, is useful to political scientists because it is through communication that social change is achieved. Habermas portrayed language as one of the great levers of influence in the world, the others being money, as exercised by the market, and power, as exercised by the state. In the TCA he was concerned to offer a theory of rationality that was based on how, in speaking and acting, knowledge was acquired, language being the medium for co-ordinating action. Co-ordination of action requires the speaker to be able to understand the 'speech act' and as such to reach a level of understanding of language to be able to engage in communicative action to achieve shared goals. The shared goals of speakers must however be agreed as reasonable and meriting cooperative behaviour. Thus, for Habermas discourse is a process of argumentation and dialogue in which the claims [ideas] implicit in the speech act are tested for their rational justifiability as true, correct or authentic. [Bohman, J. and Rehg, W. (2014)].

The language of the discourse is important because it is through language that communication of ideas takes place, bringing social and political change. Language enables the sharing of ideas and communication of common referents and values to take place. Power relationships, as expressed through language, enable the contestation of ideas that are prevalent in the discourse to take place. It is from this contestation of ideas that policy choice and outcomes emerge. Language as 'action' and 'use' derive from a basic assumption of discourse analysis that language profoundly shapes world-views and reality for those participating in a discourse and is not merely a neutral mirror reflecting it.

Figure 1:1 Framing the Discourse



Source: Author's own compilation

Maarten Hajer, in his work on the evolution of the environmental discourse surrounding acid rain, (1995) and later Thomas Diez (1999), exploring the role of language in the construction of the EU, advanced the notion that language does not only capture and enable communication of shared ideas. In their case

analyses they demonstrated how language became an element of the construction of ideas and provided the vehicle by which they may be articulated and, importantly, reproduced. As a result language is one of the means by which individuals or groups [both formal and informal] are able to change the world around them. Hajer and Versteeg identifed a further strength of discourse theory in their review of a decade of discourse analysis applied to environmental politics, namely the capacity of discourse analysis to answer the 'how question' identifying new sites of politics in a dynamic and evolving policy environment. [Hajer and Versteeg (2005): 176].

It was Hajer (1995) who had highlighted the development and emergence of 'story lines' in the narrative of discourse. Story lines as presented by Hajer are intended to remove complexity and ambiguity in the discourse and build plausible arguments upon which to establish consensus and coalitions. Consensus is not however guaranteed as the outcome of an emergent story line in the discourse. The emergence of differing storylines is a response to the interests of differing actors and stakeholders and each requires additional credibility to be established in order to bring further support and hegemonize the ideas. Discourses thus may not directly impact on policies or institutions of government, but do enable a range of opinions/options to be deliberated. For the development of policy outcomes, it is important that the ideas prevalent in the discourse are stable through time so that goals and objectives of those participating in the discourse may be achieved. Stability of the ideas in the discourse enables consent and input from all actors and stakeholders ensuring their ability to participate fully in the discourse deliberations. Effective policy deliberation relies on the ability of the discourse participants establishing common referents for communication and deliberation of ideas. The process of determination and deliberation of ideas in a discourse may result in ideas that become entrenched in a discourse and in turn place constraints on policy outcomes.

Acceptance of a discourse does not however preclude the emergence of new shared values and norms that may have an impact on those already accepted by the discourse participants. Discourse concerns the contestation between ideas with meanings that are not fixed but have the ability to change. But the historical development of the frameworks in which the discourse developed has the potential to impose constraints on the actors and may limit the extent of future change that is possible. It may be that aspects of policy inertia result from the historical context in which the discourse narrative has evolved. Some elements may become redundant, others be introduced, either supplanting ideas or building incrementally on those already existing, some elements may remain constant [e.g. in the case of nuclear energy the contribution it may make to ensuring security of access to supply has remained a constant, although there have been changes in the definition of energy security in the discourse.].

The impact of frameworks and structures in which discourse takes place is demonstrated in chapter 8 where the national nuclear policies of France, Germany and the UK are analysed. In all three states energy security and climate change have remained hegemonized in the political discourse throughout the history of the use of the technology in the EU. But the interplay of more recent differing political, historical, economic and social forces in each state has resulted in differences in the discourse and hence policy outcome for the future of nuclear energy in each state. In other instances, the discourse may be so well entrenched as a result of historical events that it is difficult to challenge. This is seen in chapter 9 in the discussion of nuclear energy and public perception of risk arising from its use. An entrenched discourse presents the view of nuclear energy as an unsafe technology resulting from a 'strong emotional response' to an energy resource producing radioactive emissions that cannot be seen or smelt.

Different social groups, especially those with differing degrees of power and authority, may use the same words differently in their interpretations of social and political situations. [Fischer (2003): 74]. In such a scenario it is essential to establish the common referents in the discourse to enable sharing of values and belief systems to take place and to provide all participants in the discourse with the ability to communicate and understand these ideas. This is important in the work of Dryzek who, in attempting to make sense of the complexity in environmental affairs, emphasised the importance of putting discourse ideas together into coherent stories or accounts. [Dryzek (2012): 9]. He identified the extent of differences in the language in which the ideas of differing environmental discourses were expressed and the problems that proponents of one discourse may experience in communicating with those of another.

At the same time Dryzek highlighted the opportunities afforded from building coherence in the story lines or accounts and the possibilities to negotiate and build coalitions of actors and co-ordination of policy objectives. Emergent narratives or storylines in a discourse have the potential to facilitate policy understanding and resolution of conflicts and also demonstrate why 'shifts' occur in the discourse. The assumptions, judgements and contentions that come together to form the coherent stories and accounts and underlie each discourse provide the basis for analysis, debate, communication and negotiation and policy outcomes result. This does not mean that a discourse that achieves prominence may nonetheless be based on flawed assumptions, but irrespective of any shortcomings in the ideas being debated, the protagonists in the debate are able to build a story line that has credibility, is accepted and results in deliberation and debate.

It is equally important to enable the emergence of contesting views, judgements and assumptions in the discourse in order to identify flaws that might undermine the effective development and implementation of policy. The cred-

ibility of nuclear power as a low carbon technology in the sustainability discourse is contested. Ideas developed to support nuclear energy as a competitive, secure, low carbon technology are in contrast to narratives that demonstrate the un-competitiveness of the technology because of rising nuclear construction costs and failures to meet construction deadlines. Competiveness discourse, highlighting the importance of long term stability of prices for electricity produced, appears in contrast to an anti-nuclear energy discourse that demonstrates lack of competitiveness on the basis of decreasing prices for alternative energy sources such as renewable technology. Increasing costs and lack of competitiveness of nuclear technology may be seen counterbalanced by discourse story lines that emphasise the opportunities to be gained from developing access to smart grids ensuring constant supply of energy to meet demand. Environmental concerns maybe countered by environmental supporters of nuclear, as nuclear energy may be considered as an indigenous energy resource capable of lowering overall EU import dependency.

Dryzek drew attention to the manner in which discourse is bound with political power, as it is a sign of political power if the narratives supported by the political actors become acceptable to others [Dryzek (2012)] irrespective of the flaws that may exist. In essence "Political action, like action generally, is controlled by discourses that supply it with meaning." [Fischer (2003:23)]. The significance of the work of Laclau and Mouffe derives from the identification of a process of political contest that results in the hegemonization of particular ideas in the discourse. [Laclau and Mouffe (1985), Mouffe (1993) and Laclau (1994)]. Hegemonization is the political process by which the dominance of a particular idea becomes established as a result of contest and struggle amongst a number of 'nodal points' that have gained support amongst the discourse participants. Nodal points lead to the creation of centres of political focus in a discursive field, acting as an ordering mechanism in the discourse. The more hegemony a political group establish over a nodal point, the more powerful it is in politics, enabling the dominant political group to modify societal core values e.g. the way in which the nodal point 'nuclear power' has become accepted as contributing to the sustainability discourse. [Barnes and Hoerber (2013):7].

Scholars such as Torfing, (1999) and Howarth et al. (2000) focused on the importance of ideas in the development of storylines in the discourse. [cited in Guy Peters, (2012): 117]. Ideas, and the manner in which they become embedded in the discourse, matter to the understanding of political action. The extent to which they matter is a function of a number of contingent circumstances, including the institutional environment and normative frameworks within which they emerge and the conditions that are conducive to their acceptance. Specific ideas in a discourse are taken up and promoted by individuals/groups/collectives, acting as policy 'entrepreneurs', in institutional settings. Ideas as

they become embedded in the political discourse drive action forward and, given specific institutional and political conditions, may lead to policy change.

In her work on ideas and their impact on institutions that shape or influence the behaviour and policy preferences of political actors Vivien Schmidt developed a methodological approach she termed 'discursive institutionalism' [DI]. Schmidt describes DI as an umbrella term for all methodological approaches that take ideas and discourse seriously with a focus on the substantive content of ideas and the interactive processes of discourse at play in institutions, [accommodating both continuity and change in the discursive process.]. "By this I mean all approaches that consider ideas through which sentient agents conceptualize their actions and/or discourse through which they generate, convey, deliberate and legitimate those ideas according to a logic of communication with given meaning context." [Schmidt (2008):2]. She has labelled all scholars who take ideas and discourse seriously [to explain political change and continuity in institutions] as discursive institutionalists [Schmidt (2010): 2] because of the commonalities that exist between the various approaches, irrespective of the terminology used by the different scholars to describe their work.

Whilst seeing DI as an umbrella for methodological approaches taking ideas and discourse seriously, Schmidt also demonstrated the manner in which DI is complementary to three traditionally recognized 'neo-institutionalism' approaches – rational choice [RI], historical [HI], and sociological [SI] [Schmidt (2008), (2010)]. Schmidt highlighted the way in which HI can add insight into DI as it describes the formal institutional contexts that shape the interactive patterns which emerge in the discourse. [Schmidt (2010): 16]. HI suggests that the policy debates initiated when the organization began will have a continuing and largely determinant influence on all future developments. The historical context in which the EU's nuclear energy policy originates is clearly influential, as the policy remains based upon the frameworks and competences of the founding Euratom Treaty. But following the DI approach provides insights into the dynamics of change that may and have taken place within the EU, and particularly within the Commission. It enables an explanation of how the actual preferences, strategies and normative orientations of the Commissioners and officials may impact on the future development of EU nuclear energy.

The value of the DI approach for the study of the Commission included in this book is that, unlike other neo-institutionalism approaches, DI characterises the ideas of the discourse as largely the ideas that are generated discursively by individuals in the institution. These ideas are subsequently communicated and debated among the members of the institution.

The result of these deliberations within an institution is that a co-coordinative discourse will develop as the members create, elaborate and justify the ideas that become central to the construction of policy. It is the consensus that emerges as a result of the deliberations that forms the basis of a co-coordinative discourse of ideas, communicated to society and the other actors involved in

policy formulation. This discourse has the potential to achieve public acceptance and trust in policy proposals. [cf. Figure 1:2 The Discursive Process]. The DI approach is used to inform the analysis in chapter 3 that focuses on the emergence of the 'discourse of reassurance' in the Commission and highlights the argument advanced that the EU has in place a robust structure for monitoring safety and nuclear safeguards

Figure 1:2 The Discursive Process

Source: After Schmidt (2008), (2010)

Structure of the book: arguments and issues

It is not the intention of this book to provide arguments to support those who favour or arguments for those who object to the use of nuclear energy. Rather the intention is to analyse the political and public discourses and the role the technology plays in the energy trilemma evident in the EU. The purpose of this book is to examine the discourse that portrays nuclear energy as capable of responding to the challenges of providing reliable and predictable electricity in support of a low carbon future for the European economy, capable of leading European states into the 'Third Industrial Age' and supporting the 'Fourth Industrial Age' [Schwab (2016)] as electricity dependent technology becomes more embedded in daily life. The primary driver of future use of the nuclear energy technology will be the outcome of the political debate about how to reconcile the objectives of energy security, sustainable and competitive energy provision in the EU. Public acceptance of the use of the technology is dependent on the credibility of the emergent narratives and story lines in the political discourse. Hegemonization of nuclear energy as a low carbon energy resource has established a narrative that appears to be credible and acceptable to many different interests and groups.

Chapter 2 provides an insight into the legal and constitutional framework that underpins cooperation and collaboration on nuclear technology use in commercial production in the EU. The Euratom Treaty is directed to specific and limited action and competences but as demonstrated these competences conferred in the 1950s have been effectively used to achieve goals relating to nuclear safety and safeguards and remain relevant in the twenty-first century, Although there are clear and evident deep seated national differences with regard to the use of the technology in the EU the reality is that nuclear energy will continue to provide electricity for use in the EU for foreseeable future. There is clear advantage to be gained by all EU states, those supporting and those opposing the use of the technology, to continue to support patterns of cooperation and collaboration that been adopted since the 1950s on the basis of the Treaty that established the European Atomic Energy Community. As there appears to be little political willingness to establish a differing framework for EU nuclear energy policy, maintaining the current EU supranational nuclear energy policy is the most effective way of confronting the challenges of nuclear safety, research and technology development for programmes to deal with a range of issues including fusion research, de-commissioning, waste management and nuclear weapons non-proliferation. The Treaty provides support for the nuclear sector and the contribution it may make to the search for low carbon volume electricity resources for economic development in the twenty-first century.

The opportunity is taken in chapter 2 to reflect on the implications for the United Kingdom [UK] of the decision taken in 2016, following the June 23rd national referendum vote, to withdraw from the European Union. Arguably there is no necessity for the UK to also withdraw from the European Atomic Energy Community but it would be politically and practically problematic for the UK not to do so. In January 2017, the Bill was published to enable formal procedures to withdraw from the EU to be initiated. In presenting the Bill to the UK Parliament the UK Government also indicated its intention to initiate procedures to withdraw from the EAEC. The implications of this are wide ranging, encompassing a number of issues discussed in chapters 2 and 8. The ensuing debate about UK membership of the European Atomic Energy Community and adherence to Euratom competences demonstrated the continued advantage to be gained for all its signatory states from membership.

In chapter 3 the role of the European Commission as the institution of the EU conferred with competences in specific aspects of nuclear energy policy and action on behalf of the whole Euratom community is analysed. The competences were conferred on the Commission in order for it to act in the area of nuclear energy as a neutral, benevolent and technocratic institution. However, this does not recognise the more nuanced and indeed political role that the institution has performed in the context of support for the nuclear sector as reflected in the institution's discourse. The Commission has established credibility, performing a leading role in the evolving application of the Euratom Treaty, taking into account the wider needs of the EU, of its countries, of its industry and of its civil society. Consequently, the discourse being communicated by the institution to the public is one of 'reassurance' and at the same time appears to signal tacit support for the use of nuclear technology in the EU.

Chapter 4 considers the claim of the Members of the European Parliament [MEP] s that there is a democratic deficit in the nuclear sector. A discourse has developed amongst scholars, analysts, critics and the general public that a democratic deficit exists in the EU because of the lack of involvement of the EP, as the directly elected representation of the citizens of the EU, in the decision making process. Does a similar democratic deficit characterise nuclear energy policy making? The limited role for the EP in the exercise of the competences of the Euratom Treaty has led the MEPs to assert that there is an 'unacceptable' democratic deficit in the EU's nuclear policy. In the 1950s the commercial use of nuclear energy evolved on the basis of the military use of the technology. State collaboration on some aspects of commercial nuclear development was deemed to be fundamentally a technical issue appropriate for management by the Commission on behalf of the EAEC. Consequently, in the evolving atomic energy community there was no need for comprehensive political oversight and public scrutiny by parliamentarians. The substantive terms of the Euratom Treaty and therefore the lack of competence and role for the EP remains un-

changed since it was adopted in 1957. But, in practice in the twenty-first century, the role of the EP is more nuanced. The EP is able to exercise influence on the nuclear policy-making process, working with the Commission, to increase accountability and encourage transparency in policy making in the sector. There is support for the nuclear sector amongst the MEPs as an energy resource that can deliver low carbon energy needing little basic raw material input and thus capable of enhancing energy security. Storylines have emerged in the discourse within the EP emphasising the importance of clarifying the responsibilities of the EU's institutions and the Member States and strengthening the EU's actions in the fields of safety and environmental protection.

Chapters 5, 6, and 7 analyse the role that the nuclear energy is able to play responding to the EU's energy 'trilemma' i.e. the search for secure, sustainable and competitive energy. Nuclear energy carries with it a number of challenges. Security of access to supply is inextricably linked with EU external policy and actions in the wider European region. The energy relationship with Russia is predominantly couched in terms of a discourse focussed on the challenges resulting from the EU's high levels of dependency on Russian supplies of natural gas. However, the EU's member states are also dependent on supplies of uranium, nuclear fuels and nuclear technology from Russia.

Nuclear energy is not a sustainable energy resource. However, hegemonization has taken place in the discourse of nuclear energy as a low carbon energy resource, capable of significantly contributing to the challenge of mitigating the impact of the damage done to the environment by the use of fossil fuels and associated climate change. It should be acknowledged that no energy resource is cost competitive in all cases, but nuclear energy has a number of characteristics that are particularly challenging to its consideration as a cost competitive energy resource. In the 1950s the nuclear energy discourse portrayed the electricity produced as 'too cheap to meter'. But it very quickly became apparent this was not the case and costs associated with new reactor build began to become evident. By the twenty-first century in the EU it appeared that those new reactors under construction in France, Finland and Slovakia were considerably over budget and taking too long to build. The Hinkley Point C new reactor development in the UK demonstrated clearly the problems of securing finance and investment for new developments. Its development was based on input from the French company EDF and Chinese consortium. In July 2017 EDF announced an increase in construction costs from the projected £18 billion to £19.5 billion. The UK National Audit Office [NAO] highlighted the fall in wholesale electricity prices that had taken place after agreement was reached between EDF and the UK Government for a fixed price for electricity produced during the operation of the reactor. Taking into consideration payment of compensation to the company if that price is not achieved, the NAO estimated an increase in costs for the project to £50 billion during the lifetime of the reactor.

Other aspects of costs undermine the credential of nuclear energy as a competitive energy resource. The costs of de-commissioning of reactors were largely discounted in early nuclear developments but had become apparent as early as the 1960s. The costs associated with accidents and their consequent impact was also early evidenced. A combination of cost implications of both de-commissioning and the response needed to an accident associated with a single location have also become increasingly apparent as the history of the use of the technology has unfolded. Most recently in January 2017 the radiation levels inside the damaged reactors at the Dai-ichi nuclear plant, Fukushima, Japan [the site recorded as INES scale 7 following the disaster in 2011], were the highest recorded since the reactor meltdowns had occurred in 2011. The estimated costs for the work to de-commission the damaged reactors was increased, being placed at 21.5 tn yen [£150 billion], and projected to take up to four decades to complete all the required work.

One feature of reactor development that has affected both the cost of new build and de-commissioning was the failure to achieve a standardized design for reactors. In de-commissioning programmes, many of the earliest reactors had been unique prototype designs needing specific de-commissioning technology that was difficult to transfer to other sites. Later developments of new reactors still demonstrated the commitment to use of new technology because of the importance of nuclear technology to innovation, technology development and prestige for countries and companies.

The peak periods of reactor new build in the EU member states have come to an end. Marked differences have emerged in the role of nuclear electricity in the national energy policies within the EU. In chapter 8 the waxing and waning of support for nuclear electricity as an element in national nuclear energy policies is reviewed through the lens of three case studies – the United Kingdom, France and Germany. All three states have active past nuclear energy policies with a discourse focusing on the same basic tenets of energy policy i.e. energy security and the challenge of climate change. But, in the communication of the ideas, negotiation and deliberation of the political discourse, differing policy outcomes have emerged.

In chapter 9 analysis is focused on the development of public opinion within the EU with regard to the use of nuclear technology. Nuclear energy cannot develop without a consensus of public opinion and political support that gives long-term stability for the technology given the economic and technological constraints within which the industry operates. Public opinion polling on energy related issues in the EU frequently focuses on security of energy supply and/or cost. Unless prompted to do so the public does not routinely raise the issue of nuclear energy in polling. However, when the questions are more precisely directed towards nuclear energy then risk emerges as a major concern. It would appear many people in the EU take a rather pragmatic view about using nuclear energy. If a credible political discourse is established and public