

CHAPTER 1

The Regulation and Restructuring of Gas-to-power Markets

1. Introduction

Adopting Nigeria and the EU as case studies, this thesis primarily examines the role of regulation in the restructuring and development of gas-to-power markets, which were previously centralised and state-centred, towards private-sector-led competitiveness and enhancement of security of supply. Unlike oil, produced natural gas (whether in the process of oil production, i.e. associated gas or from non-associated gas fields) is difficult and expensive to store or transport to demand centres. Thus, significant ex ante investments in supply network infrastructure and predetermined creditworthy buyers are typically required for efficient gas commercialisation and utilisation. Security of supply in the natural gas industry and energy context, among other things, involve the legal, institutional and contractual arrangements for safeguarding adequate and timely investments in critical processing and supply infrastructure.¹ In this regard, the role of effective regulation through formal legal institutions (such as laws, judicial or quasi-judicial decisions, regulatory guidelines and instruments) as well as organisational institutions (such as contracts and public agencies) cannot be overemphasised. The notion of ‘security of supply’ as an aspect of energy security is vital to the socio-economic and industrial growth of both developed and developing economies. It also constitutes a major factor in the realisation of other mainstream energy policy objectives such as competitiveness and sustainability or vice-versa.

The typical gas supply value chain is as follows. Upstream producers hold a licence to explore and produce oil and natural gas, as a result of which gas is gathered through small diameter pipelines (gathering lines) from oil and gas fields.² The gas molecules then go

¹ In this thesis, ‘security of supply’ refers to conditions under which all or most operating firms, citizens and businesses have reliable access to a sufficient energy supply at reasonable prices for the foreseeable future, and where the risk of major disruptions is eliminated or effectively mitigated. See Tade Oyewunmi, ‘Energy Security and Gas Supply Regulation in the European Union’s Internal Market’, (2015) 3(3) ENLR 187-202; Barry Barton, Catherine Redgwell, Anita Rønne and Donald Zillman (eds), *Energy Security: Managing Risk in a Dynamic Legal and Regulatory Environment* (OUP, 2004) at 5; Peter D. Cameron, *Competition in Energy Markets Law and Regulation in the European Union* (2nd edition, OUP, 2007); Kim Talus, ‘Security Of Supply – An Increasingly Political Notion’, in Bram Delvaux, Michael Hunt and Kim Talus (eds), *EU Energy Law And Policy Issues* (Euroconfidentiel, 2008) 126-128; Kim Talus, *Vertical Natural Gas Transportation Capacity, Upstream Commodity Contracts and EU Competition Law* (Kluwer Law International, 2011) 9-31.

² Ernest E. Smith, John S. Dzienkowski, Owen L. Anderson, John S. Lowe, Bruce M. Kramer & Jacqueline L. Weaver, ‘International Transactions in Natural Gas’, in Ernest E. Smith et al. (eds), *International Petroleum Transactions* (3rd edition RMLLF, 2010) Ch. 13 at 1022-1101; US EIA. ‘Natural Gas Pipelines - Transporting Natural Gas in the US’, available at <www.eia.gov/pub/oil_gas/natural_gas/analysis_publications/ngpipeline/process.html> accessed on 19 January 2015. See also Figure 2 for a depiction of the typical gas commercialisation and supply value.

through the processing facilities to remove water and impurities, and the gas is compressed to boost its pressure to enable it to flow into large transmission pipelines (midstream) owned and operated by gas pipeline firms. The gas molecules are then transported to storage, distribution or marketing centres (downstream) to be taken up by end users like residential and commercial buildings to meet various energy needs such as heating and cooking. Wholesale buyers of gas often include power generation plants that use gas to produce electricity as well as industries that also use gas in the production of other goods and services.³ Typically, the network-bound segments of (i) gas transmission from the wellhead, i.e. upstream to local distributors or wholesale buyers, or (ii) distribution from local distribution centres to final consumers constitute a natural monopoly because of the large economies of scale involved.⁴ The electricity supply industry also comprises the generation, transmission and distribution segments, while the electricity transmission and distribution networks also have natural monopoly features.⁵

The relative efficiency and sustainability advantages of gas compared to other conventional energy sources, like coal,⁶ led to increasing gas utilisation for power generation

³ Tade Oyewunmi, 'Regulatory and Policy Issues for Natural Gas Supply to Power Markets: Examining the Energy Supply Crisis in Nigeria' OGEL 1 (2017) <www.ogel.org/article.asp?key=3677> (accessed 23 October 2016).

⁴ Supplying gas from producing fields upstream to demand centres typically require capital intensive gas gathering and processing facilities, as well as a network of pipelines and storage facilities. Consequently, the large economies of scale and natural monopoly feature of the industry implies that ordinarily the market is one which is better served (at a lower average cost) by one firm compared to one served by two or more firms. A natural monopoly market is one that experiences decreasing average costs over its entire range of production, thus the firm can increase its production or sales at a lower average cost than if a new entrant comes into the market to compete. Black's Law Dictionary (10th edition, 2014) defines a 'monopsony' as a market situation in which one buyer controls the market, while an 'oligopoly' entails control or dominance of a market by a few large sellers creating high prices and low output like those found in a monopoly scenario. It could also be a state of limited competition, in which a market is shared by a small number of producers and sellers. The natural gas industry in most jurisdictions traditionally had monopoly and monopsony features or variants of such. Thus, the question of whether the development and delivery of the energy resources are best approached on the basis of the government granting a monopoly to a single firm or whether a competitive market would be a fairer and more efficient means has been a key theme in the development of energy law and policy. See Robert Baldwin, Martin Cave & Martin Lodge, 'Regulating Prices in Natural Monopolies' in *Understanding Regulation: Theory, Strategy, and Practice* (1st edition, OUP, 2012) Ch. 22, 443-451; Joel Eisen, Emily Hammond, Jim Rossi, David Spence, Jacqueline Weaver & Hannah Wiseman, *Energy, Economics and the Environment, Cases and Materials* (University Casebook Series, 4th edition, Foundation Press, 2015) 11-19.

⁵ Tade Oyewunmi, 'Examining the legal and regulatory framework for domestic gas utilization and power generation in Nigeria', (2014) 7(6) JWELB 538-557.

⁶ Generally, natural gas is considered to be the most environmentally-friendly hydrocarbon and relatively the most efficient for power generation in an increasingly decarbonised global economy. Burning natural gas for energy results in fewer emissions of air pollutants and carbon dioxide (CO₂) per unit of heat produced (less than coal or refined petroleum products). About 117 pounds of CO₂ are produced per million MMBtu equivalent of natural gas compared to more than 200 pounds of CO₂ per MMBtu of coal and more than 160 pounds per MMBtu of distillate fuel oil. Additionally, the development of CCGT technology means that gas-fired generation becomes relatively more efficient. Ordinarily, power generators are less than 50% efficient because more than half of the energy and heat produced is wasted. With CCGT, electricity is produced cost-efficiently with a gas-turbine, while extra heat is used to create steam and thereon used to produce more electricity with a steam-turbine. Thus, energy efficiency levels are typically over 60% and if extra heat produced is used as a heat source in temperate/cold regions the efficiency of the process may be as high as 85%. See Smith et al. (n4) p. 1023; US EIA. 'Natural Gas and the Environment – Basics' (January 2016) <www.eia.gov/energyexplained/?page=natural_gas_environment> (accessed 20 March 2016); IEA, *Natural Gas Market Review 2008: Optimising investments and ensuring security in a high-*

and other industrial and domestic uses from the 1970s/1980s onwards. The gas supply industry evolved over the years amidst debates and concerns about whether a centralised state-centred framework would be a more efficient means of administering the huge investments and resources required to ensure security of energy supply or whether private-sector-oriented and competitively liberalised markets would be more effective. In this context, regulatory paradigms, such as privatisation and liberalisation of gas and electricity supply industries, which evolved in the US and the UK, especially in the 1980s and 1990s, became increasingly transnational in scope and began to inform the EU's quest to create a competitive, secure and sustainable internal energy market.⁷ For its part, Nigeria, as an emerging democracy, began a process of economic restructuring in 1999 and initiated wide-ranging structural reform in the key sectors of its economy, especially the energy industry.⁸

There has been a growing interdependence and interconnectedness of the gas supply industry to the power sectors in the EU (although in a supranational context) and in Nigeria (a forward-looking developing economy). As discussed in this thesis, experiences in the considered jurisdictions underscore the role of effective regulation and institutional frameworks in securing the necessary access to and supply of gas for energy.⁹ Notably, power generation has been a major driving force for the commercialisation and consumption of gas reserves over the past couple of decades. Thus, ineffectiveness in the regulatory and institutional framework for gas supply to power markets will typically have significant cross-sectoral and socio-economic implications, given the vital role electricity plays in maintaining modern standards of living.¹⁰

It is argued in this thesis that any framework or modern paradigms of regulation and governance, such as the privatisation and liberalisation of gas and electricity markets, must not be viewed as an end in itself, but rather as a means to an end of developing progressively

priced environment (OECD/IEA Publications 2008) 1-286; IEA, *World Energy Outlook 2012 - Special Report - Golden Rules for a Golden Age of Gas* (OECD/IEA Publications 2012) 1-150.

⁷ Oyewunmi (n1); Kim Talus, *EU Energy Law and Policy: A Critical Account* (OUP, 2013); Angus Johnston and Guy Block, *EU Energy Law* (OUP, 2012).

⁸ Oyewunmi (n5), p. 557; Yinka Omorogbe, 'Alternative Regulation and Governance Reform in Resource-Rich Developing Countries of Africa' in Barry Barton et al. (eds), *Regulating Energy and Natural Resources* (OUP, 2006) 39-65.

⁹ Tade Oyewunmi, 'Examining the Instrumental Role of Regulation in the Development of Gas Supply Markets: Highlights from the US and EU' (2017) 8(3) *George Washington Journal of Energy and Environmental Law* 1-70 (forthcoming); MM Roggenkamp et al. (eds), *Energy Networks and the Law: Innovative Solutions in Changing Markets* (OUP, 2012) 1-453, 1-18.

¹⁰ Anne-Sophie Corbeau et al, *Gas Pricing and Regulation China's Challenges and IEA Experience* (OECD/IEA Publications, 2012) 1-122, 33; Donna Peng and Rahmat Poudineh, *A holistic framework for the study of interdependence between electricity and gas sectors* (OIES, EL 16, November 2015) 1-81.

competitive, secure and sustainable gas-to-power markets. These ‘ends’, should be the effective achievement of defined policy objectives, such as competition and competitiveness, sustainability (environmental and consumer protection) and security of supply, through the relevant instruments of regulation. Nigeria is a developing country,¹¹ while the EU is an economic union of 28 Member States (at present). Thus, there is ostensibly a very limited basis for comparison. However, this study finds that formal and organisational institutions play a critical instrumental role in the restructuring of both the EU’s internal market for gas as well as the Nigerian gas-to-power market.¹² The role takes on a strategically similar paradigm in relation to establishing the most competitive and efficient means of resource allocation and governance in both contexts. The gas market restructuring and development experiences in the US and UK as pioneering jurisdictions for competition-based liberalisation and deregulation are also instructive.

Crude oil was discovered in commercial quantities in Nigeria in 1956, and most of its gas reserves were discovered in the process of searching for oil. Despite its potentials, Nigeria has been a resource-rich, yet energy-poor country. Over the years, there has been an entrenched paradigm of state-control and direct government participation in relation to the regulation, management and commercial operations of her petroleum and energy industries. Ownership and title in all petroleum resources (i.e. oil and natural gas) are vested in the Federal Government,¹³ while direct state participation in industry activities is primarily carried out through the NNPC and its subsidiaries such as the NGC.¹⁴ Before 1999, especially in the 1980s and 1990s, previous Nigerian military governments attempted to incentivise gas utilisation and curtail gas flaring, mostly through command-based regulation and penalties imposed by law. In some cases, the military governments also resorted to various forms of consensus-driven agreements with IOCs and other operators as well as national budget declarations to provide some fiscal incentives, as discussed in Chapter 3. Nonetheless, as oil and gas export revenues became the mainstay of the economy, the allure of foreign exchange

¹¹ Nigeria was recently classified as the largest economy in Africa in GDP terms. It also holds the largest reserves of oil and gas and is the biggest producer in Sub-Saharan Africa. See AfDB, *African Economic Outlook 2015: Towards more inclusive, place-based development strategies in Africa* (AFDB/OECD/UNDP 2016) 1 – 37 available at DOI: <<http://dx.doi.org/10.1787/aeo-2015-4-en>> accessed 12 September 2016.

¹² Oyewunmi (n1); Kim Talus, *Introduction to EU Energy Law* (OUP, 2016) 1-170; Angus Johnston, ‘The Interface between EU Energy, Environmental and Competition Law in the UK’ *OGEL* 4 (2012) 1-50 available at <www.ogel.org/article.asp?key=3300> accessed 22 September 2015.

¹³ See s 44(3) of the Constitution of the Federal Republic of Nigeria 1999 CAP C23 LFN 2004 (“Nigerian Constitution”); s 1 of the Nigerian Petroleum Act 1969 CAP P10 LFN 2004 (“Petroleum Act”).

¹⁴ Yinka Omorogbe, *Oil and Gas Law in Nigeria* (Malthouse Press, 2003); Tade Oyewunmi, ‘Natural Gas Exploration and Production in Nigeria and Mozambique: Legal and Contractual Issues’ *OGEL* 1 (2015) 1-25 available at <www.ogel.org/article.asp?key=3524> (accessed 22 May 2015).

earnings from oil exports, coupled with the opacity of, and neglect in developing, the required institutional framework for a viable domestic energy market, eventually led to infrastructural inadequacies and entrenched inefficiencies. Numerous investment and resource allocation challenges were faced by the state-centred gas industry, which was also exacerbated by institutional incoherence and arbitrariness. These issues led to justifiable calls for reform and restructuring, especially in the advent of a new democratic dispensation in 1999. Thus, there was a significant paradigm shift towards greater privatisation of state-managed utilities and industries, liberalisation, and the initiation of economic and institutional reforms in Nigeria.

Likewise, the gas and energy industries in most EU Member States were state-centred and monopolistic in nature before the initiation of various liberalisation and IEM integration objectives from the 1990s. Natural gas utilisation gained traction in Europe following major discoveries in Groningen in the Netherlands in 1959.¹⁵ Before then town gas (or coal gas) and coal itself had been the predominant fuel for energy. Thus, natural gas became a major fuel for domestic and industrial energy purposes in the 1960s and 1970s in the north-west and central Europe, consequently gaining precedence over coal and oil products.¹⁶ By and large, state-controlled or owned transmission and supply undertakings had exclusive or preferential rights to import or export, supply and distribute electricity and gas, including exclusive rights to own, operate and use national transmission networks and pipelines.¹⁷ Additionally, participation in E&P activities was also quite limited to a few ‘state-favoured’ or state-owned companies in most Member States before the introduction of EU-level reformative directives such as the Hydrocarbon Directive in 1994.¹⁸ Thus, the introduction of structural reforms and a liberalisation agenda has led to far-reaching institutional changes across the gas-to-power value chain.¹⁹

In studying the effectiveness of various reformative instruments and paradigms of regulation adopted in the restructuring of the considered gas-to-power markets, this thesis adopts an applied ‘law-in-context’ approach while drawing insights from relevant principles

¹⁵ Jonathan Stern and Howard Rogers, *Dynamics of a Liberalised European Gas Market – Key determinants of hub prices, and roles and risks of major players* (OIES, NG 94, December 2014) 1-90, 2.

¹⁶ Ibid.

¹⁷ MM Roggenkamp, ‘Re-Regulating Energy Supply in the Netherlands: A Balancing Act between Energy Security and Energy Liberalisation’ in Barry Barton et al. (eds), *Energy Security: Managing Risk in a Dynamic Legal and Regulatory Environment* (OUP, 2004) ch. 11, 279-305.

¹⁸ Talus (n7) 53-59; Oyewunmi (n1) 187-202.

¹⁹ Oyewunmi (n1) 187-202.

in the economic analysis of law school of thought²⁰ as well as notions of legal instrumentalism.²¹ It also expounds on the instrumental role of law, regulation and institutions in the path towards the efficient realisation of identified energy policy objectives such as security of supply, competitiveness in a gas-to-power market context.²²

1.1. Why Nigeria and the EU as case studies?

For countries like Nigeria, the regulation and allocation of gas for export in the form of LNG as well as for domestic purposes (especially a highly gas-dependent power sector) involves significant economic, regulatory and policy trade-offs.²³ Such trade-offs include striking an efficient balance between (i) providing adequate incentives for upstream producers and suppliers, (ii) securing appropriate ‘Government Take’ and (iii) sufficient domestic gas supplies while reducing pass-through costs for final consumers in the domestic energy value chain. Additionally, it entails matching the gains of the privatisation and ongoing liberalisation of the electricity supply industry with an effective regulatory framework for domestic gas supply, while also managing risks to external security of demand for exported gas in the international gas markets.²⁴ On the other hand, policy and decision-makers in the more developed economies of the EU and its Member States (predominantly net gas importers) are also contending with the relatively similar issues and trade-offs for policies and regulations aiming at enhancing energy market competitiveness through liberalisation while implementing parallel policy objectives of security of supply and sustainability as will be further discussed in Chapter 4.²⁵ Just as developments in the UK

²⁰ Richard A. Posner, 'The Economic Approach to Law' (1975) 53 *Texas Law Review* 757 - 782; Anthony Ogus, *Regulation: Legal Form and Economic Theory* (Hart Publishing, 2004); Oliver E. Williamson, 'The Economics of Organisation: The Transaction Cost Approach' (1981) 87(3) *American Journal of Sociology* 548 - 577; Richard A. Posner, 'Utilitarianism, Economics, and Legal Theory' (1979) 8 *Journal of Legal Studies* 103-140; Michael Dietrich, *Transaction Cost Economics and Beyond: Toward a New Economics of the Firm* (2nd edition, Routledge, 2008); Eisen et al. (n4).

²¹ Classical legal instrumentalists argue that the law should not be seen as merely a system of abstract principles, but as comprising instruments utilised by individuals and institutions to achieve their purposes, to the extent that the society has a common social purpose. Roscoe Pound in his 'Mechanical Jurisprudence' for instance opined that 'as a means to an end [law] must be judged by the results it achieves and not by the niceties of its internal structure ... we do not base institutions on deduction from assumed principles of human nature; we acquire them to exhibit practical utility, and we rest them upon a foundation of policy and established adaptation to human needs'. The attribution of this pragmatic and sociological perspective on law and regulation casts lawyers, jurists, judges and other members of regulatory institutions as social engineers, armed with identified policy and economic objectives. See Brian Z. Tamanaha, *Law as a Means to an End: Threat to the Rule of Law* (CUP, first edition, 2006) pp. 1-268.

²² Oyewunmi (n5).

²³ Oyewunmi (n3). See also David Santley, Robert Schlotterer, Anton Eberhard, *Harnessing African natural gas: a new opportunity for Africa's energy agenda?* (World Bank Group, 2014) 1-89 available at <<http://documents.worldbank.org/curated/en/858091468203694236/Harnessing-African-natural-gas-a-new-opportunity-for-Africas-energy-agenda>> (accessed 2 June 2016).

²⁴ Oyewunmi (n3).

²⁵ Tade Oyewunmi, Kaisa Huhta, James Kröger and Piti Eiamchamroonlarp, 'Legal and Policy Issues for Capacity Remuneration Mechanisms in the Evolving European Internal Energy Market' (2014) 23(3) *European Energy and Environmental Law Review* 76-88. The parallel implementation of competition vis-à-vis security of supply objectives, while

inspired the reforms and restructuring initiatives in the post-1999 Nigerian context, the EU's IEM liberalisation objectives pursued from the early 1990s were also inspired in the same vein, ultimately leading to the application of economic regulation principles and pro-competition regulatory paradigms that primarily evolved in the US in the earlier parts of the 20th century.²⁶ It is argued in this thesis that inefficiencies or misalignment in the institutional framework for the supply of gas to power markets eventually hinders the instrumental effectiveness of regulation. As stated by Joskow, and maintained in this thesis, there is generally no inherent conflict between the liberalisation of electricity and gas sectors that meet objectives such as security of supply, if the appropriate industry and market design (structure), as well as regulatory institutions, are developed and implemented.²⁷

Nigeria has had a longstanding need to monetise proven gas reserves, stop or as far as possible reduce gas flaring, finalise and consolidate uncompleted petroleum industry reforms and restructuring policies, while at the same time liberalising the privatised power sector.²⁸ In the EU, there have been ongoing attempts to implement the US and UK-style gas and electricity market restructuring.²⁹ This objective and the EU's energy market integration drive have been increasingly impacted by the parallel adoption of state-centred environmental protection and security of supply objectives.³⁰ Consequently, there is a constant need for assessment and evaluation of necessary trade-offs in both national and supranational (EU-level) contexts. Such trade-offs also entail the implementation of identified principles of economic regulation and the effectiveness of the overarching governance framework in respect of the gas supply to the power market.

beefing-up state support schemes for towards sustainability objectives over the past decade have generally led to significant concerns relating to medium to long-term energy capacity and adequacy. Such concerns have also led to discussion and debate relating to capacity remuneration mechanisms in the IEM.

²⁶ Oyewunmi (n3).

²⁷ Paul Joskow, 'Supply Security in Competitive Electricity and Natural Gas Markets' in Colin Robinson (ed), *Utility Regulation in Competitive Markets: Problems and Progress* (Edward Elgar, 2007) Ch. 4.

²⁸ Tade Oyewunmi, 'International best practices and participation in a private sector driven electricity industry in Nigeria: recent regulatory developments' (2013) (8) IELR 306 - 314.

²⁹ Nadine Haase and Hans Bressers, 'New Market Designs and their Effect on Economic Performance in European Union's Natural Gas Markets' (2010) 11(2) CRNI 176-206; Kim Talus, 'Long-term natural gas contracts and antitrust law in the European Union and the United States' (2011) 4(3) JWELB 260-315.

³⁰ Nadine Haase, 'European Gas Market Liberalisation Competition versus security of supply?' (PhD, University of Twente 2009); Stern and Howard Rogers (n15); Kim Talus, '(More Than) 10 Years of Antitrust Enforcement in EU Natural Gas Markets', OGEL 3 (2012) 1-40 available at <www.ogel.org/article.asp?key=3267> (accessed 23 March 2014).

1.2. Defining regulation and instrumental effectiveness

As argued by Black,³¹ the definitions of law and regulation might easily amount to descriptions of one another. Over the years, contentions have been raised as to whether ‘law’ is so much different and superior to ‘regulation’ in a functional and instrumental sense. Some pundits have argued that ‘regulation’ is less than ‘law’ to the extent that it is simply a category in the field of ‘law’.³² Others posit that ‘regulation’ is part of or an adjunct to law or a legal framework that is instrumentalist in orientation. In the latter sense, regulation comprises the mass of technical statutes, judicial and quasi-judicial decisions, statutory instruments and other secondary and tertiary rules and guidelines containing prescriptive and descriptive standards of social or economic conduct.³³ This thesis adopts a conception of law and regulation that adheres to the latter functional and instrumental approach as elements in the same institutional framework cycle.

Accordingly, the process of regulation includes the enactment of law (relating to a social or economic activity) and entails a thorough understanding of and engagement with the intended regulatory activity on the part of specialised governance institutions. Such institutions engage in fact-finding, sometimes in a quasi-judicial manner, and have rulemaking and law-implementation responsibilities.³⁴ The regulatory framework would also include contractual forms of behavioural and industrial guidance and standard-setting. ‘Regulation’ in this regard does not necessarily take a conventional, command-based, seemingly intrusive form. Rather, it encompasses the responsive, incentive-based, consensual or market-based models which are discussed further in Chapter 2.³⁵ Hence, relevant principles and notions relating to the instrumental and facilitative role of law and regulation as part of the critical social and economic infrastructure that links the state to the energy market (gas-to-power industry in this instance) and society are examined in this thesis.³⁶

³¹ Julia Black, ‘Critical Reflections on Regulation’ (2002) 27 *Australian Journal of Legal Philosophy* 1-36.

³² *Ibid.*

³³ It is also arguable that ‘law’ is simply a wider and more formalised technique or instrument of social and economic control that may or may not be involved in the practice of regulation.

³⁴ Pami Aalto, ‘Institutions in European and Asian energy markets: A methodological overview’ (2014) 74 *Energy Policy* 4 - 15; Heiko Lohmann, *The German Path to Natural Gas Liberalisation: Is it a special case?* (OIES, NG 14, January 2006) 10-183; Haase (n30) 44-46.

³⁵ For further analysis of ‘regulation’ in the energy industry context, see Barry Barton et al. (eds), *Regulating Energy and Natural Resources* (OUP, 2006); Baldwin, Cave & Lodge (n4) ch. 22, 23 and 24; Eisen et al. (n4).

³⁶ Instrumental approaches consider law and regulation ‘as it works’ in a social or economic context. Law and regulation in this sense are regarded as means through which behaviour modifying rules and incentives is introduced into a socio-

Furthermore, regulation is considered as an instrumental means of achieving defined policy objectives within an economic or social environment.³⁷ As agents of sectoral reform and structural change, relevant institutions facilitate transactions, create stability and (mutual) trust among relevant market actors, reduce transaction costs, mitigate information asymmetry and costs, reduce monitoring and enforcement costs, etc.³⁸

This thesis shows that institutional paradigms such as liberalisation, deregulation and decarbonisation are not ends in themselves but means by which to implement defined policy objectives like competitiveness, security of supply and sustainability. Thus, the relevant governance framework of laws, regulations and institutions through which such concepts are initiated and pursued can only be deemed effective by reference to the extent to which the underlying objectives are realised. An effective regulatory and institutional framework, or what Williamson (1979)³⁹ refers to as specialised governance structures, is necessary for dealing with market failures and the abuse of public or private economic powers often present in energy markets, due to the customary natural monopoly, monopsony and/or oligopolistic features of these markets.⁴⁰ Also, experiences in the most advanced deregulated energy markets underscore the relevance of appropriate levels of regulation and oversight by accountable institutions with the staffing, expertise, independence and budgetary resources to restructure a network-bound gas supply industry. Such institutions contend with the trilemma of opportunism, bounded rationality and asset-specificity issues often found in these network-bound markets and industrial environments.⁴¹

economic environment due to certain perceived institutional failures, challenges and inefficiencies in such an environment. The central objective of approaching law and regulation in such an instrumental sense is to highlight and examine its implications and effectiveness as an instrument of behavioural (social and economic) control and standard-setting, and more importantly a means of attaining defined policy objectives and ends.

³⁷ Baldwin, Cave & Lodge (n4) 409-424.

³⁸ Kirsten Westphal, 'Institutional Change in European Natural Gas Markets and Implications for Energy Security: Lessons from the German Case' (2014) 74 *Energy Policy* 35-43; Aalto (n34); Ronald Coase, 'The Problem of Social Cost', (1960) 3 *Journal of Law & Economics* 1-44; Oliver Williamson, 'Transaction-Cost Economics: The Governance of Contractual Relations' (1979) 22(2) *Journal of Law & Economics* 233-261; Williamson (n20), *The Economics of Organisation*, pp. 552-533.

³⁹ Williamson (n38), *Governance of Contractual Relations*, pp. 233-261. The objective of regulation through specialised governance structures is mainly to (i) protect the interests of the respective parties, and (ii) adapt the relevant relationships to changing circumstances. Such structures are needed for services in which natural monopoly features are great, such as gas supply and electricity markets.

⁴⁰ Ibid.

⁴¹ See Jacqueline Weaver, 'Can Energy Markets Be Trusted? The Effect of the Rise and Fall of Enron on Energy Markets' (2004) 4 *Houston Business and Tax Law Journal* 1-151. Opportunism entails 'self-interest seeking with guile' by private and public market participants, while 'asset specificity' refers to the degree to which human or physical assets are locked into a transaction and trading relationship via contracts, and hence the extent to which they place value on the foregoing alternative activities. Bounded rationality, on the other hand, implies the cognitive limits of rational actors in relation to information available pertaining to goods and services, which may arise due to complexities or uncertainties arising from long-term contract-based relationships and incomplete information. Williamson (n20), *Economics of Organisation*, 548-577; Dietrich

1.3. Research questions, aims and objectives

The primary focus of this thesis is to examine the role of effective regulation and institutional frameworks in the restructuring of gas supply industries and the development of competitive, secure and reliable arrangements for gas-to-power markets. Nigeria and the EU are adopted as case studies in carrying out the research objectives for reasons already highlighted above and discussed further in Chapters 1.6.2 and 1.6.3 as well as in Chapters 3 and 4. This thesis examines the restructuring initiatives implemented in view of regulatory paradigms such as liberalisation and independent economic regulation, coupled with the reliance on markets and competition-based mechanisms in the allocation and governance of gas and energy supply.⁴² From the US to the UK, the EU and countries such as Nigeria, the impulse to restructure the governance of gas and electricity supply had both an economic and political undertone with law and policy implications. Its economic rationale was part of the move in mainstream economic thinking of the 1970s and 1980s, which saw increased faith in the ability of markets to achieve efficient outcomes through competition and reduced confidence in the capacity of governments to achieve efficient outcomes through regulation or production of services.

In other to promote the development of competitive supply markets, these restructuring initiatives typically require e.g. the privatisation, unbundling of vertically integrated state-controlled networks for gas-to-power by (i) disentangling the ‘potentially competitive’ segments like production and supply from the natural monopolistic segments like pipelines and transmission, (ii) followed by the liberalisation or deregulation of the unbundled competitive segments, and (iii) application of the TPA framework on the transmission segment to curb the ills of market power, discriminatory pricing and entry foreclosures.⁴³ Implementing these objectives involve risks and losses across the value chain, therefore there is a critical need for an effective framework through which all stakeholders are properly guided through the transitional period. In all capital-intensive industrial contexts such as gas-to-power supply, rational private investors tend to value the ‘risk of losses’ more highly than the equivalent ‘risk to gains’, thus where environments are characterised by regulatory

(n20); Oyewunmi (n5); Paul Joskow, ‘Incentive Regulation and its Application to Electricity Networks’ (2008) 7(4) *Review of Network Economics* 547-560.

⁴² See. David B. Spence, ‘Can Law Manage Competitive Energy Markets’ (2007-2008) 93 *Cornell Law Review* 765-818.

⁴³ Paul Joskow, ‘Introducing Competition into Regulated Network Industries: from Hierarchy to Markets in Electricity’, (1996) 5(2) *Industrial and Corporate Change* 341-382; Severin Borenstein and James Bushnell, ‘Electricity Restructuring: Deregulation or Reregulation?’ (2000) 23(2) *Regulation* 1-19.

uncertainties and institutional inefficiencies, the typical response is to ‘to freeze’, divest or to preserve the status quo with the hope of acquiring more information to support future commercial investment decisions. Even though seemingly ‘rational’, such investor responses affect the timeliness and adequacy of investments in essential infrastructure and thus security and reliability of energy supply. Thus, whether in the context of a developing country like Nigeria or mostly developed but import-dependent EU Member States, formal and organisational institutions play a central role in the realisation of underlying objectives of competitiveness and security of supply.

These restructuring initiatives have clearly had diverse results in different contexts and jurisdictions.⁴⁴ Some of the experiences have also been similar, considering the significant initial opposition from incumbent network operators or eventual requests for exemptions from the application of open access rules for new major infrastructural investments in the EU or counteracting opposition to protracted institutional reforms in Nigeria.⁴⁵ Thus, the effectiveness of prescriptive standards of energy liberalisation such as unbundling and TPA to centralised network-bound supply industries and the regulatory reforms aimed at (i) facilitating competition and market-based affordability or (ii) security of supply or (iii) restraining rent-seeking by natural monopolist, largely depends on the applicable institutional design and regulatory framework.⁴⁶ Accordingly, the central research question and ancillary questions addressed in this thesis are as follows:

Is there a single and ‘ideal’ model or approach for attaining effectiveness in the restructuring and regulation of gas supply to power markets? If not, then what is the matrix of models and approaches?

In answering this central question, the following ancillary questions become relevant and are considered in the discussion:

- (1) What are the underlying theoretical assumptions, institutional structures and principles that underpin the identified modern approaches to the restructuring and regulation of gas-to-power markets?

⁴⁴Alberto Asquer, ‘Regulatory Reform and Industrial Restructuring: The Case of Water, Gas, and Electricity in Italy’ (2010) 11(1) CRNI 85-117

⁴⁵Haase and Bressers (n29).

⁴⁶Asquer (n44); Paul Joskow, ‘Restructuring, Competition and Regulatory Reform in the U.S. Electricity Sector’, (1997) 11(3) *Journal of Economic Perspectives* 119-138. See also David B. Spence, ‘Naive Energy Markets’ (2016-2017) 92 *Notre Dame Law Review* 973-1030.

- (2) What are the factors that determine or affect the instrumental effectiveness of such approaches and regulatory frameworks?
- (3) What approach should be taken or framework adopted for the restructuring and regulation of gas-to-power value chain(s) in Nigeria and the EU?
- (4) How instrumentally effective are the applicable regulatory and institutional models and approaches adopted in the restructuring and development of gas-to-power markets in Nigeria and the EU?

A central objective of raising the above questions is to enhance a more pragmatic understanding of regulatory and institutional approaches for efficient gas supply to power markets in a 21st century context.⁴⁷ Gaining such keen understanding is vital for a forward-looking developing economy like Nigeria that continues to grapple with an energy security crisis, even though it has an abundance of primary energy resources while seeking to also develop more competitive gas and energy markets through regulatory and institutional reforms. The EU, on the other hand, has also been in transitional mode since the late 1990s with the objective of creating a restructured, competitive, secure and sustainable internal market for gas and electricity.

The EU has its own unique policy-making and regulatory institutions and framework for gas and power markets as highlighted in Annex A, Table 5 of this thesis. These institutions are largely embedded in the IEM regulatory and institutional framework. The experiences of the ‘economic union’ following the process of energy market integration and restructuring are also varied depending on the Member States in question or the sub-region being considered, e.g. the Member States in Western Europe vis-à-vis Member States in Eastern Europe.⁴⁸ Despite the probable implications of recent developments like Brexit and

⁴⁷ As discussed in section 1.6 and ch. 3 to 5 of this thesis, while the gas supply industry is becoming increasingly international and functioning on less rigid contractual and decentralised institutional arrangements, the various national and supranational scenarios are also amongst other things increasingly marked by significant changes in market organisation and governance structures towards investment efficiency, competitiveness, security of supply and sustainability.

⁴⁸ Talus (n7); Johnston and Block (n7); Haase and Hans Bressers (n29). For instance, see the recent Commission press release relating to the effect of regulation-for-competition or pro-liberalisation initiatives: COMP/39.317 - E.ON gas foreclosure; European Commission Press Release: successful opening of German gas markets allows early termination of E.ON commitments Brussels, 26 July 2016, available at <http://europa.eu/rapid/press-release_IP-16-2646_en.htm> (accessed 2 September 2016). The Commission has released German energy firm E.ON from commitments to reduce long-term pipeline capacity reservations on the German gas grid almost five years ahead of schedule.

growing socio-political concerns about the concentration of decision- and rule-making powers at EU level rather than in the Member States, this thesis focuses on gas supply regulation at EU level, while drawing relevant analogies from scenarios in jurisdictions like the UK and US. In relation to Nigeria, the ongoing efforts to institutionalise the type of privatisation and pro-liberalisation initiatives that evolved in the more developed energy supply markets (i.e. the US in the 1980s and 1990s and the UK in the 1990s) are the primary focus of this study.⁴⁹

Generally, market or competition-based paradigms such as liberalisation, deregulation and organisational restructuring aim at correcting perceived investment challenges and market failures by seeking to ensure ex ante allocative efficiency and ex post productive and dynamic efficiency.⁵⁰ Such policies aim to enhance competitiveness by incentivising private-sector-led investments and market development while protecting or empowering end-users (consumers) from commercial rent-seeking and opportunism.⁵¹ The timeliness and efficiency of such investments are also crucial to the development of essential infrastructure needed for accessing primary resources like gas and securing reliable supplies of energy across the value chain. Therefore, this study examines the strategically similar and contextually different experiences of the EU and Nigeria in relation to the regulation of gas-to-power markets. In this regard, the aim is to identify the approach or a matrix of approaches and models that enhance instrumental effectiveness of gas-to-power market regulation as an increasingly transnational phenomenon and in the context of the jurisdictions examined.

To be considered effective, the applicable legal, institutional and regulatory framework should enhance and lead to the realisation of defined policy objectives which informed their establishment in the first place. The notion of ‘instrumental effectiveness’ espoused in this

⁴⁹ As a former British colony, most of the legal and regulatory developments in Nigeria have been directly or indirectly influenced by developments in the UK. It is noteworthy that English law is one of the sources of Nigerian law, although over the years the Nigerian law-making and judicial systems have developed a relatively more ‘Nigerian’ body of policies, laws and regulations. See Yemisi Dina, John Akintayo & Funke Ekundayo, ‘Guide to Nigerian Legal Information’ (February 2005) Hauser Global Law School Program, New York University School of Law, available at <www.chr.up.ac.za/chr_old/indigenous/documents/Nigeria/ILO/GlobaLex%20-%20GUIDE%20TO%20NIGERIAN%20LEGAL%20INFORMATION.htm> (accessed on 12 February 2016).

⁵⁰ Generally, ‘efficiency’ in thesis refers to the prudent governance, use or allocation of scarce resources. It includes ‘regulatory efficiency’ which should by and large lead to: (i) productive efficiency, i.e. goods and services are produced in the least costly manner; (ii) allocative efficiency, i.e. resources are allocated to the production of the goods and services (e.g. gas and electricity) that are most valued by consumers who are willing and able to pay for them; and (iii) dynamic efficiency, i.e. encouragement of innovation and better quality goods and services in the industry as well as appropriate responses to consumer choices and demands over time.

⁵¹ Won-Woo Lee, ‘US lessons for energy industry restructuring: based on natural gas and California electricity incidences’ (2004) 32 *Energy Policy* 237-259; Borenstein and Bushnell (n43); Baldwin, Cave and Lodge (n4) in *Understanding Regulation: Theory, Strategy, and Practice* and discussing on ‘What is Good Regulation?’ at pp. 30-31.

study entails (i) the theory that laws, regulations and institutions are instruments deployed in relation to an adopted regulatory paradigm and framework as a means to an end, the effectiveness of which is best measured in terms of the actual realisation of that end and the underlying policy objectives; and (ii) institutions enabled to address challenges like opportunism, information asymmetry, rent-seeking by private and public operators and bounded rationality in energy supply markets (liberalised, deregulated or re-regulated) have a pivotal role in ensuring an effective and functional regulatory framework.⁵²

1.3.1. Why examine the role of regulation and institutions in gas-to-power markets?

A considerable amount of academic commentary and literature addresses the subject of regulation of gas and electricity industries in the UK, USA and Western Europe.⁵³ Most of the literature is drawn from the purview of mainstream social science fields like economics and political science, perhaps due to the interdisciplinary and multidimensional nature of the industries in question.⁵⁴ The law and policy studies have mostly focused on the two industries as separate and distinct sectors while dealing with one or more sub-sectors and relevant issues like legal and contractual issues in the upstream gas sector or downstream gas supply contracts,⁵⁵ or electricity industry regulation and policy issues.⁵⁶ Likewise in Nigeria, there

⁵² In this paper 'effectiveness' refers to the quality and capacity of a legal and regulatory framework (comprising laws, regulations, institutions etc.) to be functional and instrumental to the realisation of energy policy objectives. To be effective, a regulatory framework should have qualities such as: (i) a clearly defined legislative mandate; (ii) accountability and responsiveness; (iii) due process and procedures which are fair, accessible and transparent; (iv) expertise and specialised knowledge of the regulatory paradigms and underlying principles such as economic regulation; and (v) efficiency, i.e. the governance and use or allocation of scarce resources based on the regulatory framework, leads to the maximisation of the utility and welfare of relevant actors and society. Regulatory efficiency should lead to ex ante allocative efficiency, i.e. resources are allocated to the production of the goods and services that are most valued by the society or industry; ex post productive efficiency, i.e. goods and services are produced in the least costly manner; and dynamic efficiency, i.e. encouragement of innovation and better-quality goods and services in the industry as well as appropriate responses to consumer choices and demands over time.

⁵³ For instance, Barry Barton et al. (n35); Donald Zillman et al. (n9); Eisen et al. (n4); Johnston and Block (n7); Talus (n7); Joskow (n27). See also Richard J. Pierce Jr., 'The Antitrust Implications of Energy Restructuring' (1997-1998) 12 *Natural Resources & Environment* 269-275; Jonathan Stern, *The Future of Gas in Decarbonising European Energy Markets – the need for a new approach* (OIES, NG 116, January 2017) 1-37.

⁵⁴ David Newbery, 'Electricity liberalization in Britain: The quest for a satisfactory wholesale market design' (2005) 26 *Energy Journal* 43-70; Adrien de Hauteclocque and Yannick Perez, *Law & Economics Perspectives on Electricity Regulation* (European University Institute, EUI RSCAS: 2011/21, Loyola de Palacio Programme on Energy Policy, 2011) 1-16; Stern and Rogers (n15); Nadine Haase, *European gas market liberalisation: Are regulatory regimes moving towards convergence?* (OIES, NG 24, May 2008) 1-155; Hakim Darbouche, *Issues in the pricing of domestic and internationally-traded gas in MENA and sub-Saharan Africa* (OIES Working Paper, NG 64, 2012) 1-37.

⁵⁵ For instance, Peter Roberts, 'Bankable Gas Sales Agreements in the Project Financing of Offshore Gas Production Projects' (1998) 16 *JENL* 200-207; Talus (n29), *Long-term natural gas contracts*; Eisen et al (n4).

⁵⁶ For instance, José Juan González, 'Law and Regulation Governing Electricity Networks in Mexico in the Context of Regional Integration with North and Central America' in MM Roggenkamp et al. (eds), *Energy Networks and the Law: Innovative Solutions in Changing Markets* (OUP, 2012) ch. 3 at pp. 42-60; John Gulliver and Donald Zillman, 'Contemporary United States Energy Regulation' in Barry Barton et al. (eds), *Regulating Energy and Natural*

are several scholarly contributions to the debates on the policy and regulatory complexities of the electricity sector (mostly from the economics spectrum and less from the mainstream legal perspective).⁵⁷ Studies relating to the Nigerian gas industry law and regulation have been traditionally overshadowed by the broader considerations of the petroleum (oil and gas) industry.⁵⁸

Notwithstanding the array of available literature related to the policy, institutional and regulatory framework for the energy (gas and electricity) industry as considered in this study, there remains a dearth of legal research and analysis dealing with the supply of gas as fuel for electricity generation, i.e. treating gas-to-power as a value chain and market. This is especially the case in respect of the Nigerian context where the legal and economic dimensions of gas commercialisation have been incapacitated by politics, non-accountability and opportunism by private and public stakeholders. The Nigerian context in this regard is that of a resource-rich, forward-looking developing country in the process of applying transnational paradigms like privatisation and liberalisation in relation to resource allocation and governance of gas-to-power.

A relevant study has been undertaken by OIES that suitably adopts a structure-conduct-performance framework for the study of the interdependence between the electricity and gas sectors,⁵⁹ while multinational finance organisations like the World Bank have also recently commissioned some relevant studies.⁶⁰ However, there is an apparent lack of legal and policy analyses that focus on the instrumental role of law and regulation in the restructuring of gas

Resources (OUP, 2006) ch. 6, 111-135; MM Roggenkamp, 'Implications of Privatisation, Liberalisation and Integration of Networkbound Energy Systems' (1997) 15(1) *JENL* 51 - 61.

⁵⁷ Prasad V.S.N. Tallapragada, 'Nigeria's Electricity Sector- Electricity and Gas Pricing Barriers', (2009) First Quarter *IAEE Energy Forum* 29-34; Akin Iwayemi, 'Nigeria's Dual Energy Problems: Policy Issues and Challenges' (2008) *Fourth Quarter IAEE Energy Forum* 17-21; Yemi Oke, *Nigerian Electricity Law and Regulation* (1st edition, The Law Lords Publications, Lagos 2013); Oyewunmi (n28).

⁵⁸ Godfrey Etikerentse, *Nigerian Petroleum Law* (Macmillan Education, 1985) 1-365; Omorogbe (n14). For specific works on the 'gas industry' see LO Akinpelu and AP Iwayemi, 'Appropriate Gas Price Determination in the Emerging Nigerian Gas Market', (Society of Petroleum Engineers International Conference, Tinapa - Calabar, Nigeria 31 July - 7 August 2010) pp. 1-8, available at <<https://doi.org/10.2118/136959-MS>> (accessed 16 March 2016); Emeka Duruigbo, 'The Global Energy Challenge and Nigeria's Emergence as a Major Gas Power: Promise, Peril, or Paradox of Plenty?' (2009) 21 *Georgetown International Environmental Law Review* 395-453; Yinka Omorogbe, 'Law and Investor Protection in the Nigerian Natural Gas Industry' (1996) 14 *JENL* 179-192.

⁵⁹ Peng and Poudineh (n10).

⁶⁰ Ashley C. Brown et al., *Handbook for Evaluating Infrastructure Regulatory Systems* (The International Bank for Reconstruction and Development / The World Bank, 2006) pp. 1-422. This handbook is not, however, intended for academic purposes, as pointed out by the authors, but directly aims at guiding governments and policymakers involved in the tasks of regulating and administering infrastructural developments. Another study by Santley, Schlotterer & Eberhard (n23), provides a relevant guide to the dynamics and factors at play when dealing with natural gas utilisation in the sub-Saharan African context.

and electricity industries, while implementing transnational regulatory paradigms like the liberalisation. Thus, this thesis highlights and explores the underlying models and approaches in this regard by adopting an applied ‘law-in-context’ approach as explained in Chapter 1.4 below.

The movement toward liberalisation, deregulation or better economic regulation in an electricity industry that is primarily designed to be fuelled by gas has enormous potential benefits (environmental, energy security and economic). There are also probable costs and risks if appropriate frameworks and institutions are not created or developed which duly incorporate the dynamics and peculiarities of the fuelling gas sector. For countries like Nigeria and gas-rich developing economies seeking to develop viable domestic energy supply markets, there is a dearth of legal and ‘law-in-context’ analysis that holistically considers the costs and benefits of transitioning from a centralised state-controlled industry towards a decentralised private-sector led and liberalised value chain. In a novel manner and from an instrumentalist perspective, this thesis seeks to identify the most efficient means of, and approaches to, regulating these interconnected spheres of modern economies.

1.3.2. Highlighting the institutional frameworks

Institutionalism as a concept in social science disciplines has its limitations, internal inconsistencies, and critics. Notwithstanding the fact that the definition of ‘institutions’ is typically central to any thesis in which ‘institutions matter’, Black (1997) opines that the definition of the concept tends to be vague, ambiguous and varies within and between disciplines.⁶¹ Studies relating to institutions can be criticised for being vague because there are different forms of new institutional studies, to the extent that different writers focus on different aspects, depending on the inherent approach and outlook of their particular disciplines, e.g. law, economics or political science. Thus, there is a risk(s) of incorporating the flaws as well as the strengths of other mainstream social science institutionalist analyses when adopting an ‘institutional’ approach to examining regulation. Such approaches generally offer the conclusions that ‘institutions’ structure actions and perhaps preferences,

⁶¹ Julia Black, ‘New Institutionalism and Naturalism in Socio-Legal Analysis: Institutional Approaches to Regulatory Decision Making’ (1997) 19 *Law & Policy* 51-94.

and are themselves shaped by the actions of individuals and organisations, for example within an industrial environment like the energy industry.⁶²

There are several scholarly assessments and classification of ‘institutions’ in the field of social science research, of which ‘law’ is a core part.⁶³ For instance, Aalto,⁶⁴ explains the various classifications of institutions from the new institutional economics, international relations and political science perspectives. He further distinguishes between formal and informal institutions. Aalto opines that unlike formal ones, informal institutions such as competition and decarbonisation comprise of well-established rules, norms and practices, albeit lacking the organisational or written format and wield less authority and create weaker obligations.⁶⁵ Formal institutions, on the other hand, comprise of the following:

- (i) Formal regulations, laws and rules.
- (ii) Formal organisations which act as principals or initiators of formal regulations and rules. Such organisations (e.g. the Commission or the CJEU) initiate, monitor or implement, enact and enforce the relevant regulations and rules. The judicial system in Nigeria, comprising of the Supreme Court and other courts-of-law established for the 36 states, the Federal Capital Territory and the federation, also provide an essential network of legal institutions in the Nigerian context through which laws and regulations are interpreted and applied in relevant cases (See Table 6 in Annex A below).
- (iii) State institutions such as those mentioned in (ii), companies and international financial institutions that establish further formal organisations. For instance, as outlined in Tables 5 and 6 in Annex A of this thesis, ACER is created for the EU, the Member States create various national regulatory authorities (NRAs), while in Nigeria the NERC is also established for the power sector. – as agents to coordinate certain aspects of energy policy or their mutual relations in the energy value chain.⁶⁶

⁶² Ibid.

⁶³ This thesis considers law and law-making based on policy objectives as a science of social and economic engineering.

⁶⁴ Aalto (n34).

⁶⁵ Ibid. However, they can impose formidable constraints upon the behaviour of actors in a given market or socio-economic sector. They can create path-dependencies where numerous choices made create an institutional structure resisting radical change and favouring incremental development. In a broader sense, informal institutions have a problem-solving element in terms of enabling interaction and coordination among actors without each time requiring formal negotiation on how to approach each other, act and react.

⁶⁶ Aalto (n34) 6-7.

Amongst other things, the order-creating institutions like the NRA, ACER and other organisational institutions established by law help to (i) create adequate level of stability, (ii) address information asymmetry problems and (iii) build trust and enhance cooperation among stakeholders across the value chain. By enhancing the competitive markets, institutions in a supranational and national context facilitate and underpin trade and the supply of energy.⁶⁷ Notably, Douglass North points out that- Institutions are the humanly devised constraints that structure human interaction.⁶⁸ They are made up of formal constraints (e.g. rules, laws, constitutions), informal constraints (norms of behaviour, conventions, voluntary codes of conduct), and their enforcement characteristics. Together they define the incentive structure of societies and specifically economies.⁶⁹ Haase understandably agrees, observing that ‘organisations’ are a special form of institution, especially those which are formal and shaped as corporate entities.⁷⁰

It is noteworthy that the Black’s Law Dictionary (10th edition, 2014) *among other things* defines ‘institutions’ as ‘an established organisation, especially one of a public character’. This study recognises that arriving at a watertight methodological classification of institutions and institutional arrangements in relation to a multidisciplinary and multifaceted sector like the energy industry is almost an impossible task. Thus, this thesis will not attempt to determine the most faultless classification or theoretical groupings of institutions. Rather, it focuses on a pragmatic examination of the facilitative and instrumental role of identified institutions in the gas supply to power value chain, especially in the formal, legal (e.g. laws, rules, regulatory instruments) and organisational (e.g. contracts, public and private agencies/corporations) senses. Annex A comprises tables 5 and 6 which outlines the relevant Nigerian and EU institutions considered in this research project, as well as their respective roles and regulatory designations.

1.4. Research methodology, thesis outline and approach

As stated earlier, this study adopts an applied ‘law-in-context’ dimension of doctrinal legal research, while drawing insights from relevant principles in approaches based on law and economics. Also, it adopts a comparative method to the extent that it examines similar

⁶⁷ Ibid.

⁶⁸ Douglass North, ‘Economic performance through time’, (1994) 84(3) *American Economic Review* 359-368; Douglass North, *Institutions, Institutional Change and Economic Performance* (CUP, 1990).

⁶⁹ Ibid.

⁷⁰ Haase (n30) 69.

paradigms of regulation and specific experiences of the EU and Nigeria in relation to the regulation and restructuring of gas-to-power markets. In this regard, the aim is to identify the approach or a matrix of approaches that enhance the instrumental effectiveness of gas-to-power market regulation as an increasingly transnational phenomenon and in the context of the considered jurisdictions.

Doctrinal legal methods are regarded as a defining feature of legal studies and research. The application of law to various aspects of society and economic development portends that the ‘classical legal approach’ has evolved into other various forms within the academic spectrum. Such forms include the applied law-in-context, expository or interdisciplinary dimensions.⁷¹ The legal doctrinal methodology typically comprises a two-part process of locating the sources of law (primary and secondary) and then interpreting and analysing the relevant texts.⁷² It, therefore, requires the location and analysis of the primary sources of law to establish the nature and parameters of the relevant legal framework. Furthermore, it involves a trained lawyer, jurist or law student to (i) read and analyse the law as contained in primary sources such as statutes, regulations and case law; and (ii) locate appropriate secondary sources such as commentaries, expert opinions, reports and records of the relevant facts, depending on the research questions and objectives involved. Thus, doctrinal research entails the intricacies of ‘reading, analysing and linking’ the new information to the known extant body of law. As stated by Hutchinson and Duncan, it requires the study of arguments or legal opinions relating to legal norms or standards, following which a distinction can be made between such standards and the facts of any given situation. Thus, classical legal doctrinal methods differ from other social science research methods because they involve ‘the

⁷¹ Paul Chynoweth, ‘Legal Research’ in Andrew Knight and Les Ruddock (eds), *Advanced Research Methods in the Built Environment* (Wiley-Blackwell, September 2008) ch. 3 at pp. 28-38; Mark Van Hoecke, ‘Legal Doctrine: Which Method(s) for What Kind of Discipline?’ in Mark Van Hoecke (ed), *Methodologies of Legal Research: Which Kind of Method for What Kind of Discipline?* (European Academy of Legal Theory Series, Hart Publishing, 2011) ch. 1 at pp. 1-17.

⁷² Terry Hutchinson and Nigel Duncan, ‘Defining and Describing What We Do: Doctrinal Legal Research’ (2012) 17(1) *Deakin Law Review* 83-119. In this regard, ‘doctrine’ refers to legal concepts and principles encompassing cases, statutes, and rules. It can also be defined as ‘[a] synthesis of various rules, principles, norms, interpretive guidelines and values. It explains, makes coherent or justifies a segment of the law as part of a larger system of law. Doctrines can be more or less abstract, binding or non-binding.’ In the Australian context, legal research methods have been classified as comprising: (i) doctrinal research – research which provides a systematic exposition of the rules governing a particular legal category, analyses the relationship between rules, explains areas of difficulty and, perhaps, predicts future developments; (ii) reform-oriented research – research which intensively evaluates the adequacy of existing rules and recommends changes to any rules found wanting; (iii) theoretical research – research which fosters a more complete understanding of the conceptual bases of legal principles and of the combined effects of a range of rules and procedures that touch on a particular area of activity; and (iv) non-doctrinal methodologies referred to as ‘fundamental’ research – research designed to secure a deeper understanding of law as a social phenomenon, including research on the historical, philosophical, linguistic, economic, social or political implications of law.

search for the particular rather than the general’ and ‘the non-probabilistic nature of statements of law’.⁷³

Hutchinson and Duncan opine that the methods of doctrinal legal research range from practical problem-solving to ‘straightforward descriptions of (new) laws, with some incidental interpretative comments’, to ‘innovative theory building (systematisation)’.⁷⁴ In this regard, the more ‘simple’ versions of legal research methods are often the essential components for, the more ‘sophisticated’ ones. A problem-solving approach to traditional doctrinal legal research could involve the process of (i) assembling relevant facts; (ii) identifying the legal issues; (iii) analysing the issues with a view to searching for the law; (iv) reading background material (including legal dictionaries, legal encyclopaedias, textbooks, law reform and policy papers, and journal articles); (v) locating primary material (including legislation, delegated legislation and case-law); and (vi) synthesising all the issues in context, and thereby coming to a tentative conclusion. Also, Mark Van Hoecke opines that:⁷⁵

Legal scholars collect empirical data (statutes, cases, etc.), word hypotheses on their meaning and scope, which they test, using the classic canons of interpretation. In a next stage, they build theories (e.g. the direct binding force of European Union (EU) law), which they test and from which they derive new hypotheses (e.g. on the validity, meaning or scope of a domestic rule which conflicts with EU law). Described in this way, doctrinal legal scholarship fits perfectly with the methodology of other disciplines: “Scientific inquiry, seen in a very broad perspective, may be said to present two main aspects. One is the ascertaining and discovery of facts, the other the construction of hypotheses and theories”.⁷⁶

On the other hand, Hutchinson and Duncan reiterate Richard Posner’s argument that ‘[the] law is “not a field with a distinct methodology, but an amalgam of applied logic,

⁷³ Ibid.

⁷⁴ Hutchinson and Duncan (n72) 106-107.

⁷⁵ Mark Van Hoecke (n71) 11.

⁷⁶ Ibid.

rhetoric, economics and familiarity with a specialised vocabulary and a particular body of texts, practices, and institutions”⁷⁷. Also, Chynoweth states as follows:

The process of doctrinal analysis is more at home within the humanities than the sciences. Its approach involves the development of scholastic arguments for subsequent criticism and reworking by other scholars, rather than any attempt to deliver results which purport to be definitive and final. Any “methodologies” in this type of research are therefore employed subconsciously by scholars (and by practising lawyers) who would most usually consider themselves to be involved in an exercise in logic and common sense rather than in the formal application of a methodology as understood by researchers in the scientific disciplines.⁷⁸

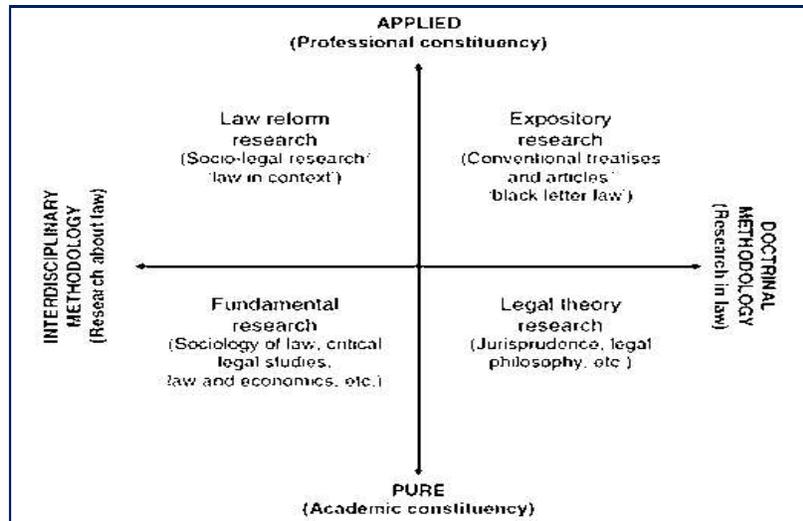
Thus, it can be argued that the strict delineation of legal research methods adopted in the context of an interdisciplinary and multidimensional industry like the supply of energy and gas is almost impossible. The nature of the industry presupposes an understanding and application of principles, terms and concepts from other related fields like economics, political science, international relations, engineering, physics and in some cases chemistry. As will be seen in this thesis, such a research endeavour as applied to energy regulation and industry restructuring involves elements of problem-solving, doctrinal and reform-oriented approaches. It entails an applied form of interdisciplinary and expository legal research focusing on the restructuring and development of the gas supply and energy industry. As shown in Figure 1 below, Arthurs outlines a useful taxonomy of legal research methodologies which is instructive and relied upon in explaining the dimension of doctrinal legal methodology adopted in this research study.⁷⁹

Figure 1: Legal research styles and methods (Arthurs, 1983)

⁷⁷ Hutchinson and Duncan (n72). See also Richard Posner, ‘Conventionalism: The Key to Law as an Autonomous Discipline’ (1988) 38 *University of Toronto Law Journal* 333, 345, quoted in Richard Schwartz, ‘Internal and External Method in the Study of Law’ (1992) 11(3) *Law and Philosophy* 179, 185.

⁷⁸ Hutchinson and Duncan (n72) at 31-33.

⁷⁹ Chynoweth (n71); HW Arthurs, *Law and Learning: Report to the Social Sciences and Humanities Research Council of Canada by the Consultative Group on Research and Education in Law*, Information Division, Social Sciences and Humanities Research Council of Canada (1983, Ottawa, Canada) 63-71.



On the right-hand side of the horizontal spectrum, doctrinal research could take a purely academic theoretical form or an applied exposition and analysis of relevant conventions, statutes, regulations and judicial decisions. In this regard, ‘doctrinal’ research is concerned with the formulation of legal ‘doctrines’ through the analysis of rules found in relevant primary and secondary sources. Furthermore, research questions raised under this method of legal research takes the form of asking ‘what is the law?’ in particular contexts. In contrast, other social science disciplines like economics and sociology rely mainly on the collection of empirical data, either as a basis for theories or as a means of testing them, thereby basing the validity of the conclusions reached in the process of empirical investigation. However, the validity of classic ‘legal doctrinal’ methods is generally not affected by the external empirical world, but by legal rules provided through statutes, regulations and judicial precedents.

In studying an industrial environment such as the gas-to-power markets in which activities have quintessential social and economic implications, some empirical fact-finding about the actual implications of the applicable laws and regulations become relevant. Such empirical activity and fact-checking are especially relevant when the researcher adopts a pragmatic approach to assessing the instrumental effectiveness of the relevant regulatory and institutional framework. It helps in explaining and ascertaining the implications of the adopted paradigms or instruments of law and regulation in such a multi-dimensional industry. Note, however, that the complexities of the industry also mean that the most comprehensive and reliable sources of information and fact-checking for such a research project are the institutions and agencies tasked with the specialised role of monitoring and processing such

data and the industry's development nationally, regionally or multinational such as the IEA, OPEC, NRAs and ACER as relied upon in this study.

Where legal research extends into consideration of the industrial, economic, and organisational context of laws or legal doctrines, then the researcher begins to move towards the left-hand side of Arthurs' spectrum. In that sense, the research methods take on a more interdisciplinary dimension. This can take the form of an applied law reform or law-in-context approach or a purely academic fundamental research approach. For example, an ambiguous legal ruling may be more easily interpreted when viewed in its proper industrial, economic or social context, while the implications and effectiveness of an obsolete statute may be better assessed following a clear and fact-based understanding of the industry and economic environment to which it relates. On the vertical dimension of the doctrinal and interdisciplinary forms of legal research, Arthurs identifies the following dimensions: (i) pure academic study (referred to as fundamental) about the economic or social operation of the law; and (ii) developing knowledge and research (referred to as law-in-context) with a reformist mindset or with a particular purpose in mind.⁸⁰ The purpose of the latter will generally be to facilitate a future change, either in the law or the applicable institutional and regulatory framework. The latter is one of the key aims of this thesis, especially in relation to the existing regulatory and institutional framework for gas supply to power markets in Nigeria and the EU.

There is also a strong connection between pure, fundamental research and the desire to question not simply the operation of law but also its underlying philosophical, moral, economic and political assumptions.⁸¹ In this regard, legal and interdisciplinary research takes various forms, such as sociology-of-law as well as the (left-wing) critical legal studies and (right wing) economic analysis of law paradigms. In this thesis, the primary methodology is found in the applied 'law-in-context' and reformative dimensions of doctrinal legal research methods, while leaning on and in some cases questioning certain principles adopted by the economic analysis of law movement in relation to the effectiveness and efficiency of regulation and its ability to be an instrument in attaining defined policy objectives in the gas-to-power industry.

⁸⁰ Ibid., pp. 31-32.

⁸¹ Ibid.

On the comparative element of this thesis, note that ‘comparative law’ is both a method (an intellectual activity with the law as its object and comparison as its process) and a subject which has its own methodologies.⁸² Comparative law research is often carried out to better understand a particular area of law or legal system, i.e. its aims, goals, substance and efficacy. As seen in this thesis, the comparative approach is also undertaken to identify the common themes across different legal systems with the aim of aiding the harmonisation of laws and law reform or simply to test whether an idea about law and regulation is true across different types of legal systems. Thus, it aims at determining whether ‘law and regulation’ reflects a consistent method of dealing with behaviour across the considered jurisdictions.⁸³ Two major problems that often arise when applying comparative legal methods are the issue of comparing like for like, and terms that are common in one or more systems or languages but mean different things. Any comparative study should show the extent to which comparisons are made on a like with like basis. Thus, it is important to note that this study is not a comparative analysis of EU and Nigerian legal and regulatory systems, especially since the EU is an amalgam of Member States with both civil law and common law traditions, as well as a diverse, institutional approach to law and regulation, while Nigeria is a country that has the common-law tradition and elements of English law and policy in the development of its legal system.⁸⁴

However, given the international nature of the energy industry and the increasing transnational application of the underlying paradigms of regulation such as liberalisation and contractual frameworks and institutions applicable in the gas supply value chain,⁸⁵ this study examines the experiences and approaches to the law and regulations governing gas-to-power markets in Nigeria and the EU. It also draws inferences from and seeks clarity on the basis of experiences in identified jurisdictions like the US and UK, which were the origins of the regulatory and legal approaches and principles considered here, especially the concept of restructuring to achieve industrial competitiveness while pursuing the parallel objectives of

⁸² Tamara Hervey et al., *Research Methodologies in EU and International Law* (Hart Publishing, USA/Canada 2011) at p. 28.

⁸³ In its simplest form, the comparative method entails the comparison of different legal systems or specific laws. Although it is often associated with different national legal systems, a comparative method can also be used in analysing key aspects of e.g. EU and international law. This may be done through a comparison of both systems or approaches within a national framework. See Hervey et al.

⁸⁴ On Nigerian legal methods and common-law system see Abiola O Sanni (ed) *Introduction to Nigerian Legal Methods* (2nd edition, Obafemi Awolowo University Press Limited, 2006); Dina, Akintayo & Ekundayo (n49).

⁸⁵ See Oyewunmi (n3); Kim Talus, Scott Looper, Steven Otillar, ‘Lex Petrolea and the internationalization of petroleum agreements: focus on Host Government Contracts’ (2012) 5(3) JWELB 181-193.

security of supply and sustainability. The primary objectives of the comparative element and case studies are to:

- (i) gain a more incisive and thorough understanding of gas-to-power market regulation and its application in the jurisdictions under consideration;
- (ii) identify the common paradigms and approaches across these jurisdictions with the aim of aiding the harmonisation of the haphazard and inconclusive reforms of the Nigerian gas-to-power value chain; and
- (iii) determine whether the notion of instrumental effectiveness of regulation is relevant and applicable in and across the jurisdictions under consideration, i.e. the EU and Nigeria.

1.4.1. A methodological approach to effective gas and energy supply regulation

As mentioned earlier, in carrying out any research project, a mutually reinforcing triangular relationship needs to be established between the following elements: (i) the highlighted research questions; (ii) the data acquired or information gathered through quantitative and/or qualitative means; and (iii) the method (comprising the relevant underlying theoretical principles, assumptions and systematic approach, i.e. the ‘why’ and ‘how’) by which the research objectives are to be accomplished. The evaluation of the framework for the gas and energy supply industry requires a methodology which is grounded in the core paradigms and character of the industry. Such paradigms include economic elements like vertical integration, natural monopolies, the emergence of monopsony and oligopolies, social and economic regulation, security of supply and demand. To address the research questions, it is important to examine and understand the applicable laws, regulations, contracts and institutions constituting the relevant regulatory frameworks. It is also essential to understand the underlying policy objectives, principles and the theoretical basis for adopting the legal and regulatory frameworks under consideration. Clearly identifying the factors or parameters for measuring effectiveness (which in this context is the degree to which a given legal and institutional framework is instrumental to the achievement of identified energy policy objectives)⁸⁶ is also essential. The energy policy objectives in question essentially involve the restructuring of previously centralised state-controlled energy

⁸⁶ Objectives such as consumer protection and environmental protection are largely socio-economic in nature and often have a broader in context than core energy industry policy objectives like security of energy supply, energy adequacy and access, and competitiveness of energy markets through efficient pricing and regulation.

supply markets towards competitiveness via liberalisation, ensuring security of supply and sustainability. In the case of Nigeria, fostering efficiency through structural reforms, privatisation and liberalisation are the main objectives, as discussed in Chapter 3. Thus, this thesis focuses on the effectiveness of economic regulation in the transition towards a competitive and secure gas supply to the power markets.⁸⁷

As posited by Anthony Ogus, regulation relating to economic organisations (involving industrial or non-industrial activities) can be classified as social regulation or as economic regulation.⁸⁸ In this regard, social regulation deals with matters such as health and safety, environmental protection, and consumer protection; while economic regulation applies primarily to industries with monopolistic tendencies such as the energy supply industry.⁸⁹ Generally speaking, competition and antitrust law have been developed to address the challenges posed by monopolistic and market power developments in industrial environments.

For instance, in the US context, the FERC applied the ‘essential facilities’ doctrine in the application of regulatory decisions to enhance competition and market-based resource allocation in the 1980s.⁹⁰ The restructuring of the US gas supply industry in this regard is

⁸⁷ Since the early days of the modern energy industry (especially in the US petroleum and energy industries) questions have been raised as to whether the development and delivery of energy are best approached on the basis of governments granting monopoly rights to a single vertically-integrated firm or whether a competitive market would be a fairer and more efficient means of achieving these goals. In general, the emergence of monopolies and vertically-integrated utilities in network-bound industries like telecommunications, gas and electricity has led to the development of competition and antitrust laws as well as the establishment of public utility agencies and regulators as organisational institutions to protect consumer and public interests in such industries. The perceived ineffectiveness of such institutions over time has led to the adoption of modern approaches and regulatory paradigms in the form of liberalisation and deregulation. See Eisen et al. (n4) 11-19; Westphal (n38) 36-37.

⁸⁸ Ogus (n20), pp. 4-5.

⁸⁹ Ibid. Inefficiencies and market failure trends such as market concentrations, lack of transparency, non-competitiveness of energy prices and poor resource allocation typically present in monopolistic or oligopolistic markets are regarded as a fundamental reason for the use of economic regulation mechanisms and approaches. On the other hand, ‘social regulation’ develops mainly due to: (i) information asymmetry or inadequacy of information relating to goods and services, meaning that participants (contracting parties, buyers and suppliers) in an unregulated market are unable to make rational choices and develop efficient preferences; and (ii) where there are no information challenges, market transactions may have spillover effects (or externalities) which adversely affect individuals who are not involved in the transactions, e.g. air pollution through gas flaring affects communities hosting oil and gas facilities regardless of whether the ‘energy’ derived as a result is supplied to such communities.

⁹⁰ As opined by Pierce Jr. (n53): ‘FERC Order 436, which began the transition to competition in the [US] gas industry in 1985, and FERC Order 888 which began the transition to competition in the electricity industry in 1994, shared a common central feature. Both were designed to force owners of “essential facilities” (i.e., gas pipelines and electricity transmission lines, to provide competitors equal access to those facilities). FERC simply transposed into the context of regulatory policy the “essential facilities” doctrine that had its genesis in 1912 as an interpretation of the Sherman Antitrust Act. See *United States v. Terminal Railroad Association*, 224 U.S. 383 (1912).’ The ‘essential facilities doctrine’ connotes that facilities – such as harbours and ports for shipping lines, computer reservation systems for airlines, and high voltage electricity transmission lines and gas transmission pipelines for energy companies – must be made available for use by competitors where those competitors cannot, or can only by incurring very high costs, build their own ‘version’ of such facilities. See also Talus (n30) on ‘Antitrust Enforcement in EU’; David M. Podell, ‘The Evolution of the Essential Facilities Doctrine and Its Application to the Deregulation of the Natural Gas Industry’ (1989) 24(4) *Tulsa Law Journal* 605 - 626.

discussed further in Chapter 5. It is noted that where a monopoly scenario naturally arises, such as in the energy supply industry, economic regulation is deployed to address the challenges and inefficiencies relating to pricing, resource allocation and public governance that may arise. Thus, regulation aims to produce a mix of price, output and profits that approximates to what would have been obtainable in a perfectly competitive market.⁹¹ Accordingly, the earliest forms of regulation in energy supply contexts were largely a response to market failures and challenges related to the rent-seeking or opportunistic behaviours of economic organisations, associated monopolies and vertically-integrated utilities. Accordingly, a methodological appraisal of the functional and instrumental effectiveness of such a regulatory and institutional framework calls for an approach grounded on basic economic principles, theories and assumptions pertaining to energy supply as a socio-economic phenomenon.

The approach adopted in this thesis involves (i) examination of the legal, regulatory and institutional frameworks for the supply of gas to power markets, especially in Nigeria and the EU, and (ii) assessment of the relevant principles of law and economics pertaining to efficient market organisation and restructuring, choice-making and new institutional economics. This approach seeks to enhance understanding of the inherent nature, as well as the regulatory and institutional development patterns of the gas-to-power markets in the highlighted jurisdictions. The efficiency of energy regulation could be considered as the relationship between (i) ex ante resource allocation (financial/investment, mineral/natural and administrative); and (ii) output, i.e. ex post performance or dynamism of a regulatory and institutional framework in terms of financial, transactional and socio-political costs and benefits as well as the innovativeness of the relevant market operators.

On the other hand, ‘effectiveness’ can be considered as the extent to which economic and industrial restructuring or reform goals are achieved through the adopted regulatory approaches and institutional framework. The aim should not be just to ‘liberalise’ or develop ‘privatised’ markets and announce national roadmaps or plans without developing the requisite transparent, coherent and accountable institutional structures as experienced in

⁹¹ Eisen (n4), pp. 456-457; UK’s Department for Business Innovation & Skills (DBIS) ‘Principles for Economic Regulation’ (2011), available at <www.gov.uk/government/uploads/system/uploads/attachment_data/file/31623/11-795-principles-for-economic-regulation.pdf> (accessed on 20 December 2014). The DBIS noted that ‘high quality and efficient economic infrastructure plays a vital role in supporting a competitive and growing economy by providing services on which all businesses and citizens depend. Competitive markets are the best way in the long run to deliver these services to consumers and provide incentives to invest and improve efficiency and service quality.’

Nigeria over the years. Neither should it be to apply multiple and in some cases counteracting regulatory and institutional approaches, without due regard for the organisational and productive efficiency implications.

1.4.2. Thesis outline and approach

In this study, necessary information has been gathered through an in-depth examination of expert-level texts and opinions, as well as reports providing quantitative analysis produced by energy industry organisations like the IEA (International), ACER (EU) and the NNPC (Nigeria).⁹² Information has also been gleaned from interviews and discussions in conferences and seminars,⁹³ from the process of delivering technical papers at local and international ‘energy’ conferences and receiving valuable feedback,⁹⁴ and from interviews and commentaries made by the relevant government and private-sector operators and published in various news and media outlets.⁹⁵ The study involved the presentation of

⁹² Such as the DPR (Nigeria) 2014 National Oil and Gas Report; NNPC Annual Statistical Bulletin 2014 (second edition) (last modified on 1 January 2016); IEA Energy Policy reviews of the EU, UK, Germany and USA; the ACER, *Consolidated report on the progress of electricity and gas Projects of Common Interest* (ACER, Ljubljana, ACR-2015-01, 2015) 1-159; ACER/CEER, *Annual Report on the Results of Monitoring the Internal Electricity and Natural Gas Markets in 2013* (Luxemburg, October 2014) 1-279; the Commission (DG Energy), *Quarterly Report on the European Gas Market* (EC Market Observatory for Energy, Volume 9, Issue 1, 4th Quarter 2015 and 1st Quarter 2016) 3-38.

⁹³ Such as the UEF Law School’s Energy Transitions International Conferences held in 2014, 2015 and 2016; the international conference on ‘the Changing Dynamics of Global Energy Markets Policy, Investment and Technology’ at Chatham House, London, UK, 4 to 5 November 2013; the Aleksanteri Conference on ‘Russia and the World: the Effects of Energy Politics and Russia’s energy foreign policy between Eastern and Western vector’ seminars on 24 to 25 October 2013 at the University of Helsinki; University of Tartu/CEURUS’s Autumn School on ‘Changing Policies and Cultures in Europe and Russia: Environment, Resources and Energy’, September 2013 in Tartu, Estonia.

⁹⁴ Such as: (i) ‘Gas Supply to Power Markets in Nigeria: A Regulatory and Economic Assessment’ at the 9th NAEE/IAEE International Conference on ‘Energizing Emerging Economies: The Role of Natural Gas and Renewable Energy’, 24-26 April 2016, Abuja, Nigeria; (ii) ‘The Evolving International Gas Market and the Security of Gas Supply to Power Markets in Nigeria’ at the Thurgood Marshall School of Law 2015 Energy Symposium, Texas Southern University, Houston, Texas, USA, 1-2 October 2015; (iii) ‘Security of Gas Supply and Energy Market Regulation: Outlook and Implications in the EU’, 33rd USAEE/IAEE North American Conference, 25-28 October 2015, Pittsburgh, USA; (iv) ‘Gas and electricity market regulation in the EU: energy security, implications and outlook’ at the 2015 Energy Transitions’ Conference, 25 February 2015, UEF Law School, Finland; (v) ‘Natural Gas Utilisation and Electricity in Nigeria and the EU: examining the legal and regulatory frameworks’, the 37th IAEE International Conference, 15-18 June 2014, New York, USA; (vi) ‘Gas to Power Regulation: Examining the Recent International Legal, Regulatory and Policy Trends’, ‘Energy Transitions’ Conference, 4 March 2014, UEF Law School, Finland; (vii) ‘Domestic Gas Utilisation and Power Generation in Nigeria: Examining the Legal and Regulatory Framework’, 7th NAEE/IAEE International Energy Conference, 18 February, 2014, Abuja, Nigeria.

⁹⁵ Such as the Oil & Gas Council ‘Executive Interviews: Felicia Kemi Segun, ACAS-Law’, June 2015, accessible at <www.oilandgascouncil.com/content/felicia-kemi-segun-acas-law-senior-partner> (accessed on 8 August 2015); ‘A media briefing by Dada Thomas (Managing Director of Frontier Oil Limited) on ‘How to resolve gas-to-power challenges in Nigeria’, *The Guardian*, 15 June 2016, available at <<http://guardian.ng/energy/how-to-resolve-gas-to-power-challenges-in-nigeria/>> (accessed 25 June 2016); *This Day* interview with Dr Sam Amadi (former NERC Chairman) on ‘The Nation Can Benefit From Single Regulator for Gas and Power’, 28 April 2015, available at <<http://allafrica.com/stories/201504280871.html>> (accessed 03 May 2015); Dr Sam Amadi, ‘Regulating Nigeria’s Power Sector: Opportunities, Challenges, Prospects’, *Premium Times*, 8 April 2014, available at <www.premiumtimesng.com/opinion/158378-regulating-nigerias-power-sector-opportunities-challenges-prospects-sam-amadi.html> (accessed on 21 January 2015); Johnston (n12).

relevant conference papers which culminated in the publication of peer-reviewed papers in several international energy law journals.⁹⁶

The in-depth studies, technical presentations and published papers provided a structured basis for information gathering and critical analysis of the regulatory and institutional frameworks considered within this research project. Accordingly, this thesis is divided into six chapters. This introductory chapter provides a preliminary exposition on the topic of ‘establishing an effective regulatory and institutional framework for the supply of gas to power markets’ as a quintessential segment of the Nigerian and EU economy. It goes on to highlight the relevant global trends, outlook and developments for access to gas resources, contracts and licensing as well as supply arrangements. The chapter offers a brief survey of the outlook for gas and energy supply in Nigeria and the EU. The research aims and objectives, as well as the key research questions and methodological approach are also elucidated above in this chapter.

Chapter 2 expounds on the ‘instrumental’ notions and perceptions of regulation and its relevance in developing competitive and economically secure gas supply to power markets. Such notions, paradigms and principles have over the last two or three decades become increasingly transnational and inspired energy market reforms globally. The chapter further discusses the theoretical principles that are relevant in assessing the effectiveness of regulation in the context of gas-to-power markets. It additionally provides an outline of international best practice principles for good quality regulation and institutional structures, given the identified inadequacies of mainstream economic and efficiency rationale to energy supply regulation. Furthermore, law and regulation are examined as a facilitative instrument, while pointing out the relevant mechanisms of regulation. The chapter ends with a further consideration of ‘regulation’ in network-bound industries while emphasising economic

⁹⁶ The publications are as follows: (i) ‘Examining the role of regulation in restructuring and development of gas supply markets in the United States and the European Union’ (2017) 40(1) *Houston Journal of International Law* (forthcoming); (ii) ‘Regulatory and Policy Issues for Natural Gas Supply to Power Markets: examining the energy supply crisis in Nigeria’, OGEL 1 (2017) *Special Issue on Oil and Gas Law in West Africa*; (iii) ‘Energy Security Implications of Gas Supply Regulation in the European Union’s Internal Energy Market’ (2015) 3(3) *European Networks Law & Regulation Quarterly* 187-202; (iv) ‘Natural Gas Exploration and Production in Nigeria and Mozambique: Legal and Contractual Issues’ OGEL 1 (2015); (v) ‘Regulatory Issues in the Downstream Gas Sector and Emerging Electricity Supply Industry in Nigeria’, (2014) Fourth Quarter *IAEE Energy Forum* 33-37; (vi) ‘Examining the legal and regulatory framework for domestic gas utilization and power generation in Nigeria’ (2014) 7(6) *Journal of World Energy Law & Business* 538-557; (vii) ‘Legal and Policy Issues for Capacity Remuneration Mechanisms in the Evolving European Internal Energy Market’, (2014) 23(3) *European Energy and Environmental Law Review* 76-88; and (viii) ‘International best practices and participation in a private-sector driven electricity industry in Nigeria: recent regulatory developments’, (2013) 32(8) *International Energy Law Review* 305-313.

regulation and liberalisation. Although concepts like ‘independent’ economic regulation and open access regulation of pipeline networks have proven relatively successful in countries like the US, the approach taken and the results achieved cannot be easily transferred to other sectors or countries without ‘good quality’ instrumentally effective regulatory and institutional frameworks.

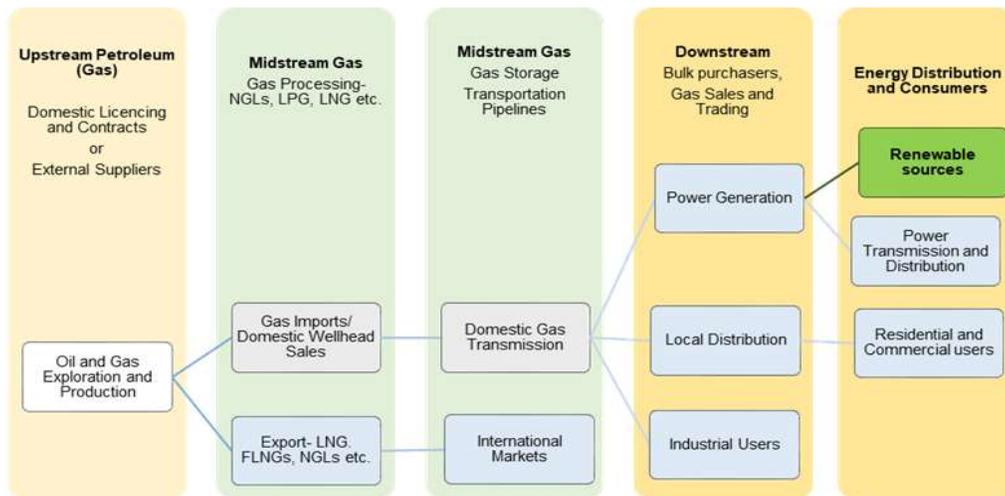
Chapter 3 examines the regulatory and institutional framework for the supply of gas to the power market in Nigeria. It considers the evolution of the industry in Nigerian and points out the key trends, outlook and challenges to regulatory and institutional effectiveness. The chapter ends by examining the lingering energy supply crisis as well as the institutional misalignments between the gas and power sectors in Nigeria. It discusses the role of regulation and institutional efficiency in the development and restructuring of the gas supply industry towards competitiveness and security of energy supply. Chapter 4 focuses on the regulation of gas supply within the EU’s internal energy market and examines the challenges to instrumental effectiveness that exist. The chapter also focuses on regulation for competitiveness as a tool in realising the central objective of security of energy supply in the EU. It emphasises the instrumental role of regulation and institutional development in the path towards developing a liberalised and integrated gas supply industry while also achieving security of supply.

Chapter 5 considers the origins of increasingly transnational concepts such as liberalisation via TPA and unbundling, and independent economic regulation in the context of US and UK gas market restructuring initiatives. It is instructive to consider how these market development paradigms have evolved and worked in such pioneering contexts while considering strategically similar initiatives being adopted and implemented in Nigeria and the EU. Thus, this chapter seeks to highlight the role of regulation in the restructuring of the US gas supply market as well as the approaches to economic regulation of the UK’s gas-to-power industry. Chapter 6 deliberates, summarises and concludes on the key findings and arguments made in response to the research questions and objectives. It also highlights the role of regulation in the development of a competitive and secure supply of gas-to-power markets in an increasingly international industry.

1.5. Understanding the gas supply to power value chain

Before discussing the dynamics of a typical centralised or decentralised gas supply value chain, it is pertinent to highlight the key features of the contractual and licensing framework through which industry operators obtain the legal rights to find, produce, take away and sell oil and gas resources (i.e. upstream licensing and contracts). Understanding the contractual and property rights issues and institutional dynamics created via upstream licensing and contracts as they relate to natural gas is essential to gaining a value chain purview adopted in this thesis and in relation to the economic regulation and resource allocation dynamics of energy derived from natural gas.⁹⁷ In this regard, the value chain entails the (i) upstream gas commercialisation; (ii) the midstream gas; and (iii) wholesale gas-to-power market context. This thesis contends that such a value chain perspective is essential in order to carry out a comprehensive examination – and foster a more incisive understanding – of the restructuring and regulation of gas-to-power industries. Such a perspective also allows for a more comprehensive examination of the legal and institutional dynamics resource allocation, governance, and ensuring security of demand and supply via timely and adequate investments either in the context of a consuming (import-reliant) region like the EU or a resource-rich and yet energy-poor country like Nigeria.

Figure 2: A Typical Gas Commercialisation and Energy Supply Value Chain



⁹⁷ In Silvana Tordo, *National Oil Companies and Value Creation* (World Bank, 2011) 1-148, the author aptly examines the role of NOCs in the activities and processes that contribute to the transformation of petroleum resources into useable end-products from a social value chain perspective. He notes that ‘[t]hese different activities are inherently linked with each other (conceptually, contractually, and physically), within or across firms, and national boundaries. Understanding how value is created along the [oil and gas] sector value chain is critical for the design of effective policies.’

The energy supply industry involves the exploration and production of primary energy resources like crude oil and natural gas as well as the processing of the discovered resources and transportation of the produced energy in a secondary form (e.g. LNG, cooking gas, heat or electricity) to final consumers as depicted in Figure 2 above. As a main facet of the international energy industry, this thesis focuses on the value chain for gas commercialisation and supply for power generation in the electricity markets. An equally essential part of the gas supply to power chain is the upstream E&P sub-sector which also has a mix of multinational and national organisational structures relating to investments, participation, costs and competitiveness. The governance framework upon which the pricing, resource allocation and cost recovery plus profits in the upstream segment is based is significant in determining whether these resources will be efficiently developed and to which market or demand centre the energy produced will be sold.⁹⁸

Natural gas has several distinct characteristics that differentiate it from oil as an energy source. These include (i) its physical properties (gas being of a lower density but higher volatility than oil), burning qualities and thermal efficiency (gas is cleaner and relatively more efficient for power generation); and (ii) the relative marketability challenge it presents, since gas requires large, fixed ex ante investments at the exploration, production, processing, transportation and distribution stages, including pre-designated buyers or markets, while crude oil may be freely traded internationally on the open market.⁹⁹ Due to the relative preference for oil and liquid hydrocarbons, countries with substantial oil and gas reserves and a mature petroleum industry have traditionally developed a single suite of regulations and upstream contracts dealing with both oil and gas. In such contexts, gas has historically been treated as a by-product at best or at worst as a nuisance to be flared. However, such disposition changed over the past several decades with more regulatory and institutional attention being given to gas commercialisation as it becomes increasingly more essential to energy supply across the globe.

1.5.1. International upstream petroleum licensing and contracts

Unlike most other jurisdictions, the US has a longstanding system of qualified and absolute private ownership and property in oil and gas resources, although typically subject to

⁹⁸ Oyewunmi (n14) on 'Natural Gas Exploration and Production'; Darbouche (n54).

⁹⁹ Oyewunmi (n14); Smith et al. (n2).

the rule of capture.¹⁰⁰ Other countries often provide for state ownership and control of land territory and oil and gas resources *in situ*, which are managed by governments based on relevant constitutional and legal provisions.¹⁰¹ Mostly due to the high-risk profile and capital-intensive nature of upstream petroleum operations, governments engage private investors and companies (including IOCs and local private firms) to explore and produce petroleum from a designated area of the country's territory, given the strength of the financial and technical capabilities of these private companies and due to the need to spread or share attendant risks.

Laws, regulations and upstream contracts typically guide the relationship between the host State and the E&P companies. Such legal and organisational institutions typically constitute part of the State's public and administrative regime. Upstream licensing and contracts also typically bear a transnational element as IOCs (i.e. the international vertically and horizontally integrated E&P and supply companies) operate and trade across countries and regions based on transactions recognised and protected by local and international law institutions.¹⁰² Furthermore, several petroleum-rich countries now have NOCs which also invest and operate in their respective national jurisdictions and internationally, e.g. StatoilHydro ASA of Norway, Petronas of Malaysia, Petrobras of Brazil, and Gazprom of Russia.¹⁰³

Host countries will ordinarily seek to maximise Government Take and socio-economic and political benefits from petroleum E&P operations, while private investors mainly seek to maximise profits and returns on investments and isolate or mitigate investment risks. These divergent interests often create major conflicts around two issues, which are (i) the allocation

¹⁰⁰ MK Woodward, 'Ownership of Interests in Oil and Gas' (1965) 26(3) *Ohio State Law Journal* 353-369; Smith et al. (n2) 180; Bruce M. Kramer and Owen Anderson, 'The Rule of Capture - An Oil and Gas Perspective' (2005) 35(4) *Environmental Law* 899-954; Omorogbe (n14); Smith et al. (n2) 180-191.

¹⁰¹ Omorogbe (n14) 30-37; Lanre Aladeitan, 'Ownership and Control of Oil, Gas, and Mineral Resources in Nigeria: Between Legality and Legitimacy', (2012) 38 *Thurgood Marshall Law Review* 159-198.

¹⁰² See Talus, Looper & Otilar (n85); Jubilee Easo (Ashurst LLP), 'Licenses, Concessions, Production Sharing Agreements and Service Contracts' in Geoffrey Picton-Turbervill (ed), *Oil and Gas: A Practical Handbook* (1st edition, Globe Business Publishing, 2009) at pp. 27-40. For a recent argument against the use of the term *lex petrolea* to evoke the existence of a distinct, and distinctive, group of rules that govern — or might govern — international petroleum transactions and relationships alongside applicable national and international law, see Terence Daintith, 'Against "*lex petrolea*"' (2017) 10 (1) *JWELB* 1-13. Prof. Wälde's comment on the development of 'international energy law' is however highlighted in this regard as follows: 'As energy (gas, electricity) trade transcends national borders, the commercial transaction forms take on the form of an international energy *lex mercatoria* (take-or-pay; gas and electricity sales; access to energy transport facilities; project finance agreements), i.e. standardised contractual documentation with some adjustment to the idiosyncrasies of national regulation'. See Thomas Wälde, 'International Energy Law: Concepts, Context and Players: A Preliminary Introduction', *OGEL* 4 (2003) 1-152, at p. 5 available at <www.ogel.org/article.asp?key=497> (accessed 20 September 2013).

¹⁰³ See David Ledesma, *The Changing Relationship between NOCs and IOCs in the LNG Chain* (OIES, NG 32, July 2009) 1-38; Tordo (n97); Smith et al. (n2) 41-48.

of risks and balancing of conflicting interests between the private investor and resource-rich host country; and (ii) the adequacy of incentives offered to private companies to help in meeting the host country's objectives.¹⁰⁴ It is worth noting that the technical and financial capacities of the State, the level of competition amongst IOCs and other companies for E&P rights, the scale of the risks involved at each stage of operations, as well as the relevant constitutional provisions usually determine the type of contractual regime under which the host country engages the private companies. By and large, the host country's upstream licensing arrangements and upstream can be classified as (i) licences and concessions; (ii) PSCs; and (iii) RSCs and pure service contracts.¹⁰⁵

(i) Licences and concessions

Old and traditional forms of concessions comprised the State's transfer of absolute control and ownership of land and hydrocarbons within vast areas of the State's territory to a private oil company (usually an IOC) for a lengthy duration, such as 70 to 90 years.¹⁰⁶ Furthermore, the IOC obtains title to all hydrocarbons *in situ* and produced, while paying some stipulated royalty and rent to the State. Typically, the IOCs bore all attendant risks and rewards under the old concession arrangements. Most of the old concessions did not accord any managerial or commercial rights and interests in the petroleum resources to host governments other than receipt of stipulated royalties or rents, while they also excluded the IOCs from paying any taxes apart from those specified in the respective contracts.¹⁰⁷

Following the formation of OPEC in 1960, and international events such as the UN Declaration of Permanent Sovereignty over Natural Resources, 1962 (resolution 1803 (XVII)),¹⁰⁸ OPEC resolution XVI. 90 1968, and the New International Economic Order, UN Resolution 3201 of 1974,¹⁰⁹ the major petroleum-producing countries developed the legal, regulatory and institutional arrangements to take ownership of

¹⁰⁴ See also Mohd Naseem and Saman Naseem, 'World Petroleum Regimes', in Kim Talus (ed) *Research Handbook on International Energy Law* (Edward Elgar, 2014) ch. 6 at pp. 149-180; Tade Oyewunmi, 'Stabilisation and Renegotiation Clauses in Production Sharing Contracts: Examining the Problems and Key Issues', *OGEL* 6 (2011) 1-26 available at <www.ogel.org/article.asp?key=3184> (accessed 15 October 2014)

¹⁰⁵ Omorogbe (n14) 38-53; Easo (n102); Smith et al. (n2) 429-524.

¹⁰⁶ Easo (n102); Smith et al. (n2).

¹⁰⁷ Smith et al. (n2) 429-430.

¹⁰⁸ See the UN Audio-visual Library of International Law, 'Permanent Sovereignty over Natural Resources General Assembly resolution 1803 (XVII) New York, 14 December 1962', available at <http://legal.un.org/avl/ha/ga_1803/ga_1803.html> (accessed 2 December 2016).

¹⁰⁹ UN Resolution adopted by the General Assembly 3201 (S-VI). Declaration on the Establishment of a New International Economic Order, 1 May 1974, available at <<http://www.un-documents.net/s6r3201.htm>> (accessed on 21 August 2015).

their resources and maximise commercial and economic benefits from E&P activities.¹¹⁰ Consequently, newer forms of licensing and concessions such as OPLs and OMLs under the Petroleum Act in Nigeria were introduced.¹¹¹ In this regard, the State maintains ownership and sovereignty over its land territory and mineral resources *in situ*, but grants the IOCs the licence and non-possessory interests (i.e. *profit-à-prendre* or right-of-taking) to find, produce and takeaway discovered petroleum. Depending on the terms and conditions of the granting instrument, the licensee or lessee obtains the exclusive right to carry out petroleum operations in a defined area and within a definite period, usually for 20 to 30 years. Such modern forms of licensing typically confer on the licensee or lessee ‘the exclusive right to take and dispose of produced hydrocarbon’ at the wellhead.

For instance, the Nigerian OML confers on the holder the exclusive right within the leased area to conduct exploration and prospecting operations and to win, get, work, store, carry away, transport, export or otherwise treat petroleum (including natural gas) discovered in or under the leased area for a maximum duration of 20 years subject to renewals.¹¹² However, ten years after the grant of an OML, one-half of the area of the lease must be relinquished.¹¹³ The relinquished areas may, of course, include any undeveloped gas fields and reservoirs.

By entering into a JVA and JOA, the State directly becomes a participant in the E&P operations and share with the IOC the attendant risks and benefits based on agreed participating interests and JOA terms. The JVA often comprises the participation agreement, which defines the relationship and participating interests of the parties, and the JOA, which defines the legal and operational relationship of the joint venturers by providing for issues such as the operator of the lease or concession, the operating committee, work programme and budget, disposition of production, relinquishment, decommissioning, allocation of costs and profit hydrocarbon, transfer of participating interests and rights etc.¹¹⁴ Under such a JV/JOA framework, the host State, through the NOC, holds a participating interest in the concession or lease. Thus, the State, through

¹¹⁰ Luis E. Cuervo, ‘OPEC: From Myth to Reality’, (March 2008) 30(2) *Houston Journal of International Law* 433-615.

¹¹¹ Petroleum Act, s. 2 and First Schedule, para 1 – 9. See also Etikerentse (n58).

¹¹² Petroleum Act, First Schedule at para 10.

¹¹³ Petroleum Act, First Schedule at para 12.

¹¹⁴ Omorogbe (n14); Etikerentse (n58).

the NOC, must bear some of the risks (especially financial) and rewards of the operations to the extent of its participating interest under the JVA/JOA. The State also earns taxes, royalties, and rents from the concession.¹¹⁵

(ii) Production-sharing contracts

While a concession or licence can be described as a permission to find, produce, take away and dispose of petroleum, a PSC is essentially an agreement in which the State holds the licence or lease and appoints the IOC or private independent firm as a contractor to carry out E&P operations. Under the PSC arrangement, the parties agree to share produced petroleum from the defined contract area in predetermined percentages.¹¹⁶ The portions due to the contractor and State party are also typically subject to the payment of taxes, bonuses and other charges. Ownership of petroleum produced and in situ remains vested in the State. The NOC is often designated as the mining licence or lease-holder. When production takes place, the contractor is entitled to a share of volumes – in order to recover costs (i.e. cost oil) subject to any agreed periodical cost-recovery ceilings – and the predetermined share of profit oil, after royalty or income tax is deducted and paid (in kind with quantities of oil) to the State or NOC as agreed.¹¹⁷ The contractor bears all the exploration and production risks and is usually in charge of operations and the management of the contract area unless the State party agrees to participate in the venture directly. If no oil is found, the contractor typically receives no compensation.¹¹⁸ This is perhaps the reason why PSCs are preferred by most host countries where probable reserves are high, and costs are relatively low, or at medium level, while licences or concessions are often adopted where reserves are relatively low and production costs are high. Furthermore, under a PSC arrangement, the host State typically seeks to avoid the burden of ‘cash call obligations’ that arises because of participating interests held under a JVA/JOA framework.

Depending on the agreement between the parties and especially the term of the underlying licence or lease, PSCs are usually designed to have a lifespan of 30 years

¹¹⁵ Naseem and Naseem (n104) 152-158; Oyewunmi (n14); Smith et al. (n2).

¹¹⁶ Oyewunmi (n14).

¹¹⁷ Naseem and Naseem (n104) 158-168.

¹¹⁸ Ibid. see also Oyewunmi (n14).

comprising ten years for exploration and twenty years for production.¹¹⁹ Generally speaking, the duration of the exploration and production period and the time frame for the announcement of a commercial discovery, completion of utilisation project feasibility and the issue of which party is responsible for marketing and commercialising gas discoveries (if any) are key parameters in the development of either associated or non-associated gas fields, which should be unequivocally guided by provisions of law and contract.¹²⁰ Likewise, the PSC may also be negotiated to cover subjects like health and safety, decommissioning, environmental issues, taxation and, where required by law, issues such as domestic gas supply obligation. As with a concession or JVA, a PSC can be used to cover perceived gaps in the applicable legal framework, especially when this framework is not very advanced or effective.

(iii) Service contracts¹²¹

This category of upstream contract is typically utilised in countries with a history of deep-rooted political considerations in their relationship with foreign and private investors, and which also have a strong sense of nationalism backed by constitutional provisions that prevent the use of PSCs and concessions.¹²² Petroleum development in such countries is managed by petroleum ministries or state-owned and controlled NOCs with entrenched monopolies over all segments of the value chain, while the IOCs are considered to be simply contractors. The E&P service contracts are either RSCs¹²³ or pure service contracts.¹²⁴ There is also a category known as technical assistance agreements (TAAs),¹²⁵ based on which the IOC or private company is simply engaged by the host government to provide technical services and technology transfer.¹²⁶

Under an RSC, the contractor bears the entire E&P capital and investment risk, while the State retains title to and ownership of the acreage and hydrocarbon produced

¹¹⁹ Oyewunmi (n14).

¹²⁰ Oyewunmi (n14).

¹²¹ Smith et al. (n2) 482-485; Naseem and Saman Naseem (n104).

¹²² Smith et al. (n2) 482.

¹²³ Omorogbe (n14); Naseem and Naseem (n104) 175-180. The RSCs have been used extensively in Latin American countries like Argentina, Bolivia and Columbia.

¹²⁴ Omorogbe (n14); Naseem and Naseem (n104) 175-180. The pure service contract model has been used in oil and gas-rich Middle Eastern countries like Saudi Arabia, Qatar and Kuwait.

¹²⁵ TAAs are not very common, but have been used in Iran and Venezuela. See Omorogbe (n14) at 44; Naseem and Naseem (n104).

¹²⁶ Omorogbe (n14) 44; Smith et al. (n2) 487.

in situ. Where the contractor fails to make a commercial discovery, the contract is terminated, with no obligation on either side and where a commercial discovery is made, the contractor is paid in cash or kind and entitled to recoup expenses made as may be agreed *inter vivos*.¹²⁷ In distinguishing between the obviously similar PSCs and RSCs, one key factor is that under an RSC, the IOC's service fees are sometimes converted into oil, while in a PSC the cost oil is often converted to money for cost recovery accounting purposes. Furthermore, unlike PSCs, the NOC in an RSC is usually designated as an 'operator'. Therefore, an RSC is usually used in cases where the NOC has considerable E&P experience and expertise.¹²⁸

On the other hand, a pure service contract is essentially a contract under which the capital and investment risks are borne primarily by the State, while the contractor is paid a flat fee for its technical services and work carried out in respect of E&P operations.¹²⁹ In this regard, the contractor is merely a technical service provider working under the State's supervision and has no legal or beneficial interest in the oil and gas resources or E&P venture.

It is worth noting that most traditional upstream contracts can be categorised under one of the above headings, which also signify different levels of resource ownership and control rights over the oil and gas resources within a country's territorial jurisdiction. Over the years, various hybrids and model forms of upstream contract have emerged in the international oil and gas industry.¹³⁰ For example, in some jurisdictions, PSC-type arrangements like profit oil and cost oil allocations have been inserted in JOAs and concessions. In other instances, PSCs have been awarded and arranged with a consortium of IOCs or private oil companies which have themselves entered into a JOA to guide their upstream operations. Furthermore, model upstream contracts, such as the model exploration and production concession contract (EPCC) used in Mozambique, have been developed by some host states.¹³¹

In Tanzania for instance, article 15 of the 2013 Model production sharing agreement adopted by the Tanzania Petroleum Development Corporation (TPDC) enjoins a contractor who has informed TPDC of potential commercial interest in discovered natural gas to submit

¹²⁷ Oyewunmi (n14).

¹²⁸ Naseem and Naseem (n104).

¹²⁹ Smith et al. (n2) 487; Omorogbe (n14) 43.

¹³⁰ Smith et al. (n2) 429.

¹³¹ Oyewunmi (n14).

proposals for an appraisal programme within 30 days. Following an approved appraisal programme, the TPDC and contractor shall execute other agreements on the development, production, processing and sale of such gas. Such further agreements shall be negotiated in good faith and ensure recovery of all expenses and costs incurred as well as a reasonable return on investments. In other several countries, upstream and midstream operators now resort to using models developed by industry organisations like the Association of International Petroleum Negotiators (AIPN), as a starting point in negotiations or renegotiations. Notably, specific petroleum or hydrocarbon legislation, regulations, guidelines and accepted practices help to guide and influence the content and performance of upstream contracts across the international energy industry.

1.5.2. Centralised and Decentralised gas supply value chains

The intrinsic nature of gas means that its processing, transmission and in some cases, storage depends heavily on its pressure levels and on the use of an efficient network-balancing system.¹³² The nature of electricity also means that it cannot be stored, and therefore power supply and demand flows must be balanced in real time from generation to consumption points.¹³³ Generally, the method of accurately matching the level of supply with demand is regarded as the conventional operating principle for the gas and power supply markets, because amongst other things: (i) the energy provided is essential to societal well-being, which means that periodic shortages are unacceptable from a socio-economic perspective; and (ii) imbalances in gas and power supply and demand are harmful to the network infrastructure used to deliver them.¹³⁴ The technical interdependence and interconnectedness of gas production, transmission and supply to the power generation units in a gas-based power system and value chain cannot be overemphasised. It is, therefore, typical for both upstream producers and midstream operators, or in the case of a vertically-integrated firm operating both upstream to downstream, to seek specific levels of regulatory certainty, stability and guarantees for a reasonable return on investments before committing to ex ante infrastructural investments. These operators would also naturally strive to agree on relevant supply contract terms like pricing formulae and take-or-pay clauses before committing to any final investment decisions (FID) which also often depend on third-party financing. Such commercial and regulatory issues are crucial for ensuring ex ante project

¹³² Peng and Poudineh (n10) 18-19; Oyewunmi (n3).

¹³³ Ibid.

¹³⁴ Peng and Poudineh (n10) 31-35.

viability for gas commercialisation and receiving the necessary support from financial institutions.¹³⁵

Transactions and arrangements between upstream producers and midstream pipeline companies on one hand and the pipeline companies and buyers downstream, on the other hand, are based on established regulatory and institutional frameworks which generally include laws, regulations, GSPAs, GTAs, tariffs, rates, etc.¹³⁶ The network-bound features of the gas transmission segment from the wellhead to final consumers or large-scale buyers (such as gas-based electricity generators) have traditionally led to the emergence of vertically integrated gas pipeline and transmission network companies. Apart from the US, such companies (sometimes referred to as ‘utilities’ or ‘undertakings’) were mostly state-owned or controlled in most jurisdictions, as was the case in Nigeria and in the EU Member States.¹³⁷ The organisation and institutional set-up of the typical gas supply industry can be described as centralised or decentralised. Peng and Poudineh provide an illustrative description of these centralised and decentralised archetypes and market organisational design of gas supply value chain as respectively shown in Figures 3 and 4 below.¹³⁸

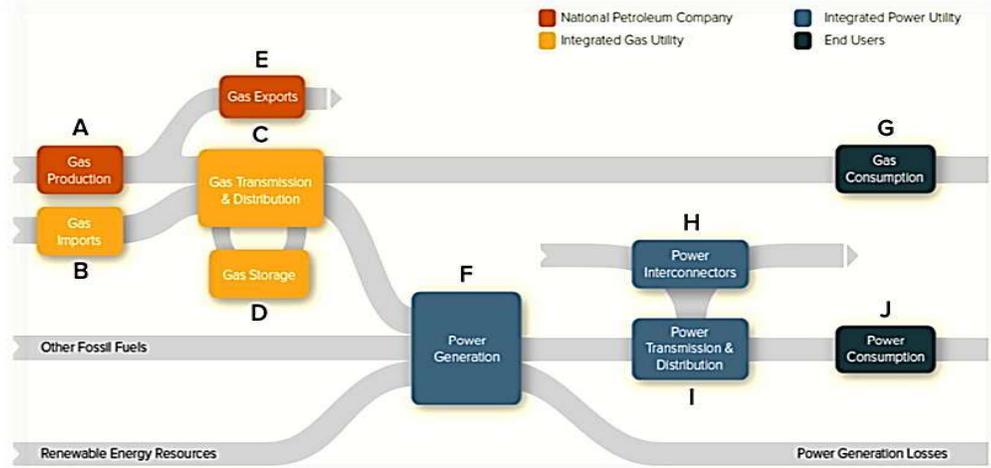
¹³⁵ Oyewunmi (n3); Roberts (n55).

¹³⁶ Ibid.

¹³⁷ The vertically integrated utilities were often state-owned or public corporations with interests upstream (exploration and production), midstream (supply pipelines and transmission networks) and downstream (sales and retail) of the energy value chain. Before the era in which US-style economic regulation models, in the form of liberalisation and open access to transmission networks, were introduced in the UK and later, gradually, in the rest of the EU, most countries established state-owned utilities with exclusive or preferential rights to import or export, supply and distribute electricity and gas, including exclusive rights to own, operate and use national transmission networks and pipelines. For instance, the NGC in Nigeria is the established national gas transmission and marketing subsidiary of the NNPC, while companies like British Gas in the UK and Gasunie in Netherlands also represented state-controlling interests over respective national gas markets before the decentralising effects of various privatisation or liberalisation initiatives were implemented as will be further discussed later. Even though there were no such state-owned utilities in the US, the vertically-integrated pipeline companies wielded significant monopsony and monopolistic market power and dominance that eventually necessitated the carrying out of various structural and economic regulatory reforms in the 1980s and 1990s. See Stern and Rogers (n15); Kim Talus, ‘United States natural gas markets, contracts and risks: What lessons for the European Union and Asia-Pacific natural gas markets?’, (2014) 74 *Energy Policy* 28-34.

¹³⁸ Peng and Poudineh (n10) 1-15.

Figure 3: Centralised archetype for the gas supply value chain



However, it is important to note that the actual market structures that exist in particular countries are more or less hybrids of the centralised and decentralised archetypes mentioned above. In a centralised gas supply market, the state-owned vertically integrated utility, which is often a subsidiary of the NOC, owns and operates the national gas supply infrastructure. Furthermore, NOCs are established to manage the State’s commercial interests upstream (production and export).¹³⁹ Such commercial interests are based on upstream contracts like the JV/JOAs and PSCs with IOCs or other private indigenous E&P firms.¹⁴⁰ The infrastructure and network(s) for midstream gas processing and transmission to downstream segments are typically owned and operated by the transmission and marketing subsidiary of the NOC. Examples of such relationships and organisation include the National Iranian Oil Company and National Iranian Gas Company, the Egyptian General Petroleum Corporation and Egyptian Natural Gas Company, as well as the NNPC and NGC. The NGC is the NNPC’s subsidiary and controls and owns the bulk of the transmission and marketing

¹³⁹ On the increasing role of NOCs in gas monetisation via LNG projects post-2003 see David Ledesma, ‘The Changing Relationship between NOCs and IOCs in the LNG Chain’, OIES, Oxford, NG 32, pp. 1-38. Ledesma notes that ‘[t]raditionally the government, usually through the Ministry of Petroleum (or Ministry of Oil or Gas), takes the role of managing a county’s hydrocarbon resources. Often, as owner of the gas (upstream exploration terms with IOCs usually leave the gas owned by the government not the IOC) the government, with the participation of IOCs, monetises the gas through a domestic or export project.’

¹⁴⁰ Oyewunmi (n14). See also Talus, Looper & Otillar (n85). Further analysis of the relevant features of international oil and gas upstream contracts is to be found in Chapter 3 in relation to discussion of the legal and institutional framework for the Nigerian gas supply value chain.

pipeline network in Nigeria.¹⁴¹ Furthermore, most of the gas markets in the EU Member States were largely centralised pre-reform and before the introduction of EU-level liberalisation and integration policies, as discussed in Chapter 4.¹⁴²

Before 1986 in the UK for instance, British Gas as a state-owned company, held a monopoly over the sale and distribution of natural gas to end-users, controlling the supply from landfall to the entirety of the industrial and domestic gas markets. It had several upstream investments, which saw its exploration affiliate acquiring gas production interests in the UKCS.¹⁴³ In France, Law No 46-628 of 1946 nationalised all activities concerning the generation, transmission, distribution, import and export of electricity and gas. These activities were entrusted exclusively to nationalised undertakings run by public companies Électricité de France (EDF) and Gaz de France (GDF). While EDF handles imports, exports and the transmission of electricity; GDF deals with imports and exports of gas.¹⁴⁴ In the Netherlands, private producers developed gas fields upstream under various licences and JVA arrangements in which the State held a participating interest. Thus, NV Nederlandse Gasunie ('Gasunie') which was owned by the State and the holders of the Groningen Concession had a monopoly over the purchase and transport of gas, gas marketing, conditions and tariffs of supply, export prices and purchasing contracts.¹⁴⁵

The centralised supply industry is mainly state-coordinated, and arrangements are consolidated following the execution of agreements such as a GSPA and GTA. A GSPA (which is also referred to as a gas sales agreement in some jurisdictions) between the upstream producer and the supply utility or pipeline network company typically aims at

¹⁴¹ The current domestic gas pipeline infrastructure mainly comprises two unintegrated pipeline networks of approximately 1,100 kilometres: (i) the Alakiri-Obigbo-Ikot Abasi Pipeline (the Eastern Network), and (ii) the Escravos-Lagos Pipeline System (ELPS) (the Western Network), as well as the dedicated pipeline infrastructure owned by the Nigerian Liquefied Natural Gas Company (NLNG), the NNPC/SPDC/Total JV and the Chevron/NNPC JV.

¹⁴² In Case C-265/08 *Federutility* ECR I-3377 [EU:C:2010:205] the Advocate General in his opinion to the ECJ opined that the development of European welfare state ideologies enshrined in the time honoured continental legal concept of *service public* and the setting apart of certain aspects of the economy of states from the free market philosophy, meant that state intervention in some sectors (e.g. gas and electricity) was intensified, while monopolies were created and regulation for public service protection purposes was enhanced. See Case C-265/08 *Federutility* ECR I-3377 [ECLI:EU:C:2009:640] (Opinion of Advocate General Ruiz-Jarabo Colomer delivered on 20 October 2009).

¹⁴³ Calliope Webber, *The Evolution of the Gas Industry in the UK: A case study prepared for the International Gas Union's Gas Market Integration Task Force* (2009) 1-14; Aileen McHarg, 'Evolution and Revolution of British Energy Network Regulation: from RPI-X to RIIO', in MM Roggenkamp et al. (eds), *Energy Networks and the Law: Innovative Solutions in Changing Markets* (OUP, 2012) ch. 17, pp. 313-332.

¹⁴⁴ The Commission, Press Release No 70/97 (1) 23 October 1997. In cases C-157/94 *Commission v Netherlands* EU:C:1997:499, C-158/94 *Commission v Italy* EU:C:1997:500, C-159/94 *Commission v France* EU:C:1997:501, and C-160/94 *Commission v Spain* EU:C:1997:502, the ECJ gave judgment on national monopolies in respect of the import and export of electricity and gas.

¹⁴⁵ Oyewunmi (n1) 189.

securing the former's commitment to sell and the latter's commitment to buy designated quantities of gas to be produced, subject to a predetermined pricing and/or rate-of-return framework.¹⁴⁶ In some cases, the purchaser, i.e. the pipeline network company, could be the end-user of the gas where such company also engages in gas-fired power generation. In other cases, the gas purchased is meant for another end-user, e.g. for export via LNG facilities and cross-border pipelines or to gas-fired power generators, industrial users and the downstream market. A GTA, on the other hand, is typically concluded between a pipeline utility company and a downstream buyer who could be a power generator, industrial user or local distribution firm seeking gas for residential or commercial users. The aim of a GTA is to agree on the relevant terms for transporting the gas, such as transportation tariffs and ancillary service obligations.

These contractual arrangements are all expected to be made before the upstream producers, and transmission firms commit to investing huge sums in gas production, transport and processing infrastructure.¹⁴⁷ Traditionally, they were also designed to have long-term duration, e.g. 20 to 30 years, with designated sellers and 'creditworthy' buyers and transmission service users. The typical international supply arrangements, such as a SPA for LNG also have similar contracting paradigms as well as provisions such as net-back pricing

¹⁴⁶ Essentially, the GSPA is an agreement for the sale and purchase of natural gas for delivery into a pipeline network or to large buyers such as a power generator, factory or LNG facility.

¹⁴⁷ Financiers and relevant contracting parties are typically unwilling to shoulder the significant capital and investments required for these projects, which have long payback periods and involve a large amount of risk, in the absence of certain reasonably firm long-term commitments and mechanisms, such as: (i) destination clauses limiting the supply of gas to pre-designated markets (such clauses are now considered restrictive and against the tenets of free trade and liberalisation in the EU, and are therefore prohibited in the EU); (ii) take-or-pay (ToP) clauses; (iii) deliver-or-pay (DoP) clauses; and (iv) a price adjustment mechanism typically linked to international oil prices and other alternative fuels. A ToP clause obligates a purchaser to make payment even if it fails to take the negotiated percentage of the quantity of gas that it has committed under the contract to pay for. This type of clause recognises the interest of the producer in seeking to secure guaranteed cash flow to cover ex ante costs. These arrangements also protect the purchaser by providing for make-up-rights, by which a buyer that incurs ToP liabilities in one year can recoup those amounts or part of them by taking more gas than the minimum in future years. On the other hand, DoP clauses are designed to protect the buyer's interests in receiving the gas it has already contracted for. They require a seller that fails to supply negotiated amounts to make compensatory payments. There is generally the need to provide for periodic price adjustments to reflect changes in the value of the product over time considering the traditional long-term duration of supply contracts. Parties also seek to reconcile the interests of buyers and sellers over the long-term duration of the contract. Following policy and regulatory changes and initiatives like liberalisation and deregulation of supply arrangements, the industry in the US and to a lesser extent the EU has moved towards short-term spot-market orientation, with more flexible supply arrangements and structures. See Peter Roberts and Ruchdi Maalouf, 'Contractual Issues in the International Gas Trade: LNG - the key to the Golden Age of Gas' in Kim Talus (ed), *Research Handbook on International Energy Law* (Edward Elgar, 2014) at pp. 329-357; Jonathan Stern and Howard Rogers, 'The Transition to Hub-Based Gas Pricing in Continental Europe', (OIES, NG 49, March 2014) at pp. 19-24; Smith et al. (n2) 1064-1066.

and international oil-price linkages, and destination clauses, which mean that the gas can only be delivered to pre-designated buyers or markets.¹⁴⁸

In an energy value chain context, a key argument in support of adopting a long-term contractual framework for ensuring ‘security of demand’ and ‘security of supply’ is that without such arrangements investments in capital-intensive large-scale pipelines and LNG infrastructure will be commercially unfeasible for upstream producers and suppliers. Such producers would ordinarily have to bear significant ex ante financing costs and volume risks, while firms buying at the wellhead as midstream suppliers also need to invest adequately in supply network and storage and processing facilities as well as bear commensurate price volatility risks attributable to an otherwise short-term contracting pattern. Nevertheless, the adoption of new risk-sharing and mitigation contracting tools and market formations spurred by policies such as liberalisation and short-term hub market pricing in the main international demand centres and markets like the US, Japan and Western Europe have shown that such risk perceptions can be mitigated, so long as functional and efficient institutions are established to provide the required investment safeguards. Such mitigation is, however, without prejudice to the peculiarities of gas projects requiring long payback periods and real-time demand and supply balancing considerations in national energy market contexts.¹⁴⁹

¹⁴⁸ Destination clauses and territorial sales restriction clauses in traditional long term LNG supply contracts were used to prohibit the buyer from reselling the gas in other countries or areas than those for which it was intended. Consequently, ‘national’ suppliers could charge different clients different prices at the same delivery point or in the same area. While such clauses may be permitted in the US, where regulators determine that they have no actual anti-competitive implications, they are categorically prohibited in the EU following the development of competition regulations and a liberalisation agenda. They are considered as antithetical to key free movement and completion policies as well as to the development of a functioning, fully flexible supply market in the EU’s IEM. As noted by Talus (n29), p. 264 on ‘long-term natural gas contracts’

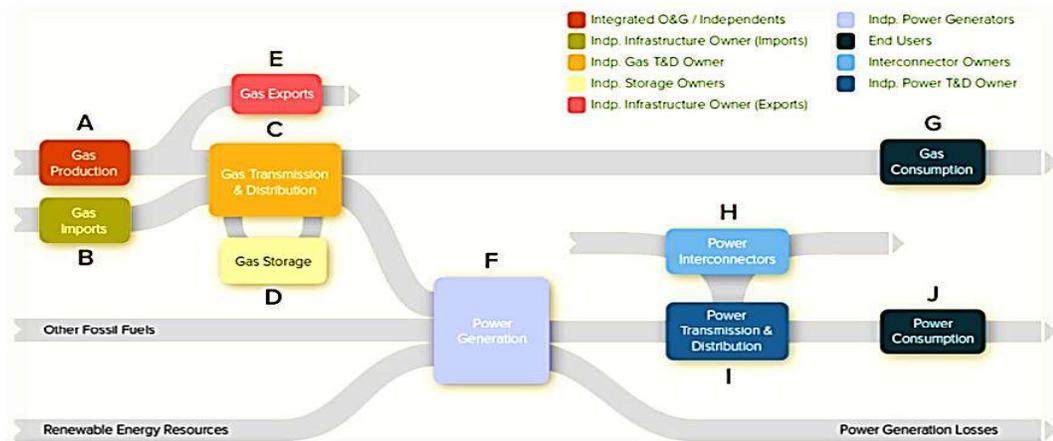
In approximately 20 years, the EU approach to natural gas markets has moved from very much a monopolistic and state controlled system to a more competitive and liberalized market. The regulatory framework that applies to natural gas transactions has changed considerably in the last 10 years. The introduction of third-party access (hereafter TPA) and congestion management as well as unbundling and the elimination of destination clauses and priority access regimes in the transmission system have all had a profound impact on the way in which natural gas markets function and on the role of long-term natural gas contracts.

¹⁴⁹ See. Stern and Rogers (n147), *Transition to Hub-Based Gas Pricing*, pp. 17-18. The EU’s internal energy market and the energy industry in most Member States are still in transition and notwithstanding the development of trading hubs, mostly in Western Europe, and increasing integration of regional and national markets, it is still generally unclear whether long-term security of demand and supply paradigms and arrangements provide for a more effective risk-sharing and mitigation framework in reality. In relation to the US, Eisen et al. (n4) 559-560 notes as follows:

Today most natural gas is purchased through contracts on the spot market. These transactions are short term [i.e. usually less than a year] ... are generally interruptible. These contracts respond to current market prices, but also expose the parties to the risks of price volatility or service interruption. In fact, price spikes have become part of the restructured gas markets. The development of spot markets in the physical sales of gas went hand in hand with the creation of a natural gas futures market on the New York Mercantile Exchange (NYMEX) which allows buyers and sellers of physical volumes of gas to hedge their price risks on a clearing house exchange thus reducing their exposure to price volatility...the array of new financial products created after restructuring can help large users natural gas insure their operations against losses from rapid [price] fluctuations...when tested during the California energy crises of 2000 – 2001, serious problems were discovered with linkages between the

Pro-liberalisation policies requiring mandatory or negotiated third-party access to monopoly controlled pipelines and supply networks, as well as the evolution of hub markets such as the Henry Hub in the US and the National Balancing Point in the UK, led to the emergence of more decentralised gas supply markets.¹⁵⁰ Consequently, a gas producer could, for example, execute a purchase and supply agreement with an end-user such as the operator of a CCGT power facility and agree on transportation terms with the ‘unbundled’ pipeline owner or network operating firm, subject to the relevant open access or TPA framework. Depending on the national gas policy and regulatory framework at hand, a decentralised archetype involves multiple private interest-holders and corporate participants engaged in non-network segments like gas production, import and export, gas storage, sales and marketing, as depicted in Figure 4. The typical decentralised context comprises transmission and distribution networks which are owned or operated by regulated monopolies or so-called independent transmission system operators.

Figure 4: Decentralised archetype for the gas supply value chain¹⁵¹



physical flow of natural gas and these financial markets... The switch to competitive gas market became possible because so many new pipelines had been built [and] most market areas had reasonably good access to more than one pipeline and because pipeline capacity had caught up with demand. Thus, few pipelines had monopoly positions and there was less need for major new capital facilities that could be financed only on the basis of long term contracts.

¹⁵⁰ For a discussion of how the liberalised gas market evolved in Britain see Patrick Heather, *The Evolution and Functioning of the Traded Gas Market in Britain* (OIES, NG 44, August 2010) 1-68.

¹⁵¹ Ibid.

Liberalisation policies aimed at fostering competitiveness and market-based supply arrangements generally involves the organisational and economic restructuring of the network-bound transmission and distribution segment of the energy value chain. The aim of such initiatives is to ensure non-discriminatory TPA to these networks, and the operators and network owners are typically required to provide ‘unbundled’ services. This means that network operating firms handle their production (if any), transportation and sales services separately. In this regard, unbundling entails separating competitive segments like production and downstream sales from the natural monopoly transmission segment.¹⁵² Thus, entry, pricing and resource allocation in the competitive segments are progressively deregulated, and where monopoly or monopsony bottlenecks exist, e.g. in transmission or distribution networks, their owners are mandated to make their assets available to competitors on non-discriminatory, just and reasonable terms.¹⁵³ The theoretical and underlying rationale for and against the open access and ‘unbundling’ paradigm is discussed in Chapter 2.¹⁵⁴

In both the centralised and decentralised archetypes, the role of regulation via formal and organisational institutions is pivotal and can be considered as providing the facilitative means towards the realisation of designated policy objectives. The UK’s gas supply market, depicted in Figure 5 and discussed in Chapter 5, offers an example of a decentralised national gas supply industry which has evolved over the years from a predominantly centralised structure. However, it should be noted that the UK’s gas supply industry is still largely dominated by six main energy firms, albeit with an increasing array of private interest holders and operators.¹⁵⁵ Undeniably, the resort to regulation to enhance competitiveness and liberalisation has led to more decentralised and hub-trading supply market arrangements in the US, UK and increasingly in the EU. As Roberts and Maalouf opine:

¹⁵² Baldwin, Cave & Lodge (n4) at pp. 456-458, 464-469.

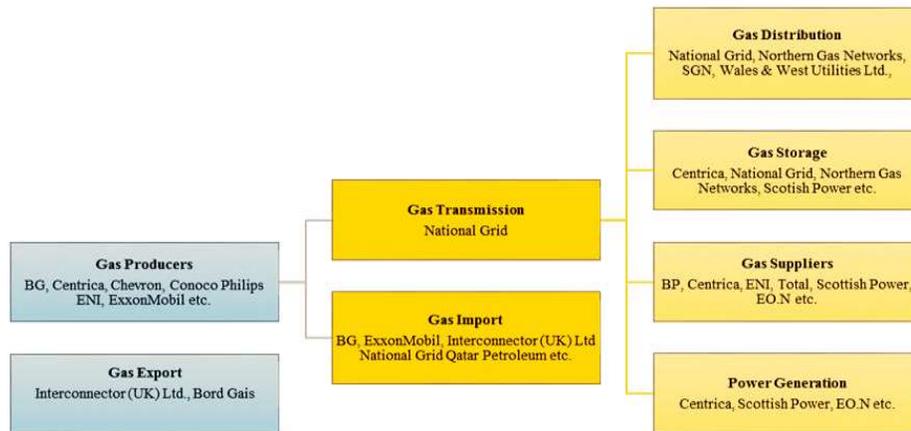
¹⁵³ Ibid. This is based on the rationale that the integration of transmission and distribution on the one hand and generation and retail on the other has a distorting effect on energy markets.

¹⁵⁴ Philip Lowe et al., ‘Effective unbundling of energy transmission networks: lessons from the Energy Sector Inquiry’ (Spring 2007) *Competition Policy Newsletter* 23-34; Christian von Hirschhausen, ‘Infrastructure, regulation, investment and security of supply: a case study of the restructured US natural gas market’ (2008) 16(1) *Utilities Policy* 1-10; Christian Growitsch and Marcus Stronzik, ‘Ownership unbundling of natural gas transmission networks: empirical evidence’ (2014) 46(2) *Journal of Regulatory Economics* 207–225.

¹⁵⁵ For example, the UK’s National Grid recently announced an agreement to sell a 61% stake in its UK gas distribution business to a consortium backed by various Australian and Chinese investors. See Lauren Fedor et al., ‘National Grid to sell 61% of gas business to Sino-Australian Group’, *Financial Times*, 8 December 2016; FTView, ‘Britain’s energy market is faulty but not broken’ *Financial Times* 24 April 2017.

No contracts are made in a vacuum: gas [supply and trade] agreements are affected by changing regulatory environments... Gas importation tends to favour the emergence of monopolistic national markets. The reasons can be found in the costs of infrastructure, energy security and social policy concerns... Deregulation involves the intervention of the regulator. Liberalisation of a gas importer’s market requires the realisation of a number of conditions: competitive supplies of gas must be available; customers must be free to choose among suppliers; a transmission system must be open to competitors, and pipeline access must not be discriminatory. In the USA, liberalisation of the gas market started in 1984 and was completed in the 1990s. A NYMEX futures market was established using the Henry Hub price. Other US gas pricing hubs have come to exist. In the UK, liberalisation of the gas market started in the 1990s, and in 1996, the National Balancing Point (NBP) became the national price marker.... In continental Europe, the European Union legislated over several years to create a more competitive and liberalised gas market... In each case, liberalisation allowed the development of trading hubs which in turn allowed gas price indexes to emerge.¹⁵⁶

Figure 5: Operators and firms in the UK gas supply value chain (as at 2015)



1.6. Supplying gas to power markets: regulation and institutional framework

Notwithstanding the ‘public service’ dimension of gas and electricity supply and the role of the State in this regard, there are concerns about the efficiency and competitiveness of centralised and state-owned or controlled supply networks. Such concerns mainly centre

¹⁵⁶ Roberts and Maalouf (n147) 348-349.