

The Gas market, transaction costs and efficient regulation

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Currently, much of the regulator's toolkit plus the framework for competition policy is based on the structure-conduct-performance paradigm. The New Institutional Economics (NIE), or transaction costs, approach takes a broader perspective. It considers the shape of firms, contract forms and the associated structure of the markets as alternative arrangements of internal and market governance, to deal with the risk involved in transacting. By being able to select the right form of governance for a transaction, involving the spot-market, a contract or some vertically integrated structure, etc., the parties to a transaction will be able to minimize the costs of the transaction and of the exposure to *ex post* risks. The adequacy of particular arrangements depends on the attributes of transactions between buyers and sellers in a specific market and how that affects the overall cost of a transaction. This paper explores the specific risk attributes of the developing EU gas market, by examining the several segments of the value chain. Examples of such attributes are the varying degrees of maturity of the national markets, variability of demand, the growth in dependence on imported long-distance gas potential competition in the transport and storage segments and the jurisdictional truncation of the value chain. The variation in the *ex post* risk profiles of different regional markets may suggest the use of a mix of regulatory approaches and competition policy, instead of the current single *market design*.

Keywords: Natural Gas, Regulation, Market Design, Market Integration, Energy

L5 - Regulation and Industrial Policy

1) Introduction

This paper presents an alternative perspective on the regulation of the natural gas industry. This perspective takes into account future challenges to the industry, involving an expected rise in world gas demand which calls for huge investments in additional gas production facilities, transmission and distribution pipelines, storage capacity and LNG trains, in the context of a relatively uncertain economic, regulatory and geo-political context¹.

Currently, much of the regulator's toolkit plus the framework for competition policy is based on the structure-conduct-performance paradigm. The *structure* of markets is considered a crucial driver for the *conduct* of firms and the eventual economic *performance*. The configuration and relative size of the firms, in terms of vertical and horizontal integration, is seen as a means to acquire economies of scale and scope, to the end of achieving market power in up or downstream markets. In this context, main objectives for regulator are 'full unbundling' and maximum entry in the potentially competitive

¹ IEA (2003) *World Energy Investment Outlook: 2003 Insights*, Paris, OECD/IEA; IEA (2004) *World Energy Outlook 2004*, Paris, OECD/IEA; and IEA (2005), *World Energy Outlook 2005*, Paris, OECD/IEA

segments of the value chain, market liquidity and effective access and performance regulation of the natural monopoly segments.

A set of powerful developments seems to require an evaluation of the current regulatory approaches in the sector and possibly signals the need for a revised conceptual framework for the governance of tomorrow's gas industry. These developments are associated with both the important changes that are taking place in the world's energy markets, as well as the specific alterations to the form, structure and dynamics of the regional gas markets in the US, Europe, Asia and Latin America.

In addition to these structural developments, there has been a steep learning curve in the 'art of regulation' itself and its theoretical underpinnings. On the basis of the varying experiences with the regulation of gas supply systems (and other industries) in a wide range of countries, a wealth of new theoretical and practical insights has grown that deserves to be taken on board in a revised framework for regulation. It should be noted, however, that these experiences have also yielded many critical questions, to which 'the artists of regulation' have not provided real answers, so far².

The New Institutional Economics (NIE), or transaction costs, approach takes a broader perspective in respect of the rationale of vertical integration (see Joskow 2005). It considers the shape of firms, contract forms and the associated structure of the markets as alternative arrangements of internal and market governance, to deal with the risk involved in transacting. By being able to select the right form of governance for a transaction, involving the spot-market, a contract or some vertically integrated structure, etc., the parties to a transaction will be able to minimize the costs of the transaction and of the exposure to *ex post* risks. When *ex ante*, it is considered that these costs are not manageable at an acceptable level, the transaction or investment will not materialize at all.

The adequacy of particular arrangements depends on the attributes of transactions between buyers and sellers in a specific market and how that affects the overall cost of a transaction. This paper explores the specific risk attributes of the developing EU gas market, by examining the several segments of the value chain. Examples of such attributes are the varying degrees of maturity of the national markets, variability of demand, the growth in dependence on imported long-distance gas potential competition in the transport and storage segments and the jurisdictional truncation of the value chain. The variation in the *ex post* risk profiles of different regional markets may suggest the use of a mix of regulatory approaches and competition policy, instead of the current single *market design*. A crucial question is how the regulatory framework may establish a 'workable' balance between, on the one hand, a sufficient degree of stability and coordination to bring about investments in the system, while on the other maintaining the 'credible' pressure of a dynamically competitive market

The objective of this paper is to identify and explain the main elements of change in the regional gas markets and, secondly, to link these changes to regulatory experiences and newly emerging insights in the regulation of the gas markets. Firstly, in Section 2, *Changes in the world energy and gas markets*, we will highlight the main changes that are taking place in the world energy and gas markets. Section 3, *Gas markets and the rationale for regulation: economics, transactions and policy*, briefly discusses shifts in the rationale for government involvement in the gas industry and the associated evolution in underlying theoretical concepts and perspectives.

Section 4, *Risk, rents, incentives and regulation: Investment and performance in the gas market* shows how regulation determines investors' risk evaluations and the distribution of rents and thus influences investments and performance patterns in the gas market. Section 5, will deal with *The interdependence*

² See for an extensive, selective, cross-sector overview: Jamison, M.A., Berg, S.V., Gasmi, J., Távara, L. (2005) *The Regulation of Utility Infrastructure and services: An Annotated Reading List* Developed for: The World Bank and The Public Private Infrastructure Advisory Facility (PPIAF), New York, The World bank, <http://rru.worldbank.org/features/regulationbook.aspx>

of policies, governance structures, regulation and instruments, also addressing the consequences of developments in the international gas market. The concluding Section 6 will summarize the main questions and issues relevant for further development.

2) Changes in the world energy and gas markets

These days, the prevailing perspective on the world energy markets is being shaken up thoroughly. On all fronts, *business as usual* has been truncated, as more or less unexpected events and phenomena began to herald a new era³.

In the oil market, a variety of factors drove up oil prices. On the demand side there was the growth in oil consumption of the US, India and China. The supply side is hampered by a strongly reduced surplus capacity in crude production and a weak processing and transport infrastructure, following years of rather meager investments. Geopolitical tensions evolving from the Iraq situation and local instabilities in Nigeria and Venezuela made the world aware again of its dependence on OPEC; a situation that is generally expected to worsen, when non-OPEC oil production declines in the future. The role of Russia in this play is still unsure and will depend primarily on internal political developments. In the electricity sector, several supply interruptions and black outs in the US, Italy and the UK illustrated the need to start investing again in power plants, in local networks and in transmission lines, after years of asset sweating. Also this industry sees its reserve margins dwindle rapidly, as is commonly argued. A critical consequence of these developments has been a considerable increase in the average and peak level of prices, as well as in their volatility. This is occurring, for all types of energy, in a context in which policy-makers had underlined a decline in energy prices, as one of the main promises of liberalization to the consumers. A further factor of potentially large importance is the increasing awareness and general acceptance of the danger of global warming caused by the emission of CO₂ from the large-scale use of fossil fuels. Step by step, a development is gaining momentum towards the taking of measures to reduce these emissions, via the use of 'sustainable' sources of energy and the enhancement of energy efficiency. In the gas sector, main issues are the growth in the consumption of natural gas while the indigenous production is falling in main gas consuming areas, such as the US and the EU. This implies an increasing external dependence of these areas, while the bulk of gas reserves is concentrated in only a few countries.

These fundamental shifts in energy systems all over the world are forcing a gradual re-evaluation of the prevailing market-based *energy paradigm* (see Helm 2005). Also de Jong (2005)⁴, Correljé⁵ (2005) and others, including the recent Shell (2005) scenarios⁶, observe this re-evaluation. Despite the fact that such a re-evaluation is taking place at a (geographically, ideologically and intellectually) very uneven rate, it is becoming obvious that the simple belief in 'the market' is losing ground. In respect of security of energy supply and the environmental aspects, the market is not expected to yield the preferred outcomes anymore and states are invoked again.

³ See for example: Helm, D. (2005) 'The assessment: The new energy paradigm', *Oxford Review of Economic Policy*, Vol. 21, no. 1, pp. 1-13. Stevens, P. (2005) 'Oil Markets', *Oxford Review of Economic Policy*, Vol. 21, no. 1, pp. 19-42. Michot Foss, M. (2005) 'Global Natural Gas Issues and Challenges: A Commentary', *The Energy Journal* Vol. 26, No. 2, pp. 111-128

⁴ De Jong, Weeda, Westerwoudt, Correljé (2005) *Dertig Jaar Nederlands Energiebeleid: Van Bonzen, Polders en Markten naar Brussel zonder Koolstof*, The Hague, Clingendael International Energy Programme.

⁵ Correljé A.F. (forthcoming 2005) 'Dilemmas in Network Regulation: The Dutch Gas Industry'. In: R. Künneke J. Groenewegen, A. Correljé (eds.) *Innovations in liberalized network industries: Between private initiatives and public interest*, Edward Elgar.

⁶ Shell International Limited (2005) *Shell Global Scenarios to 2025. The future business environment: trends, trade-offs and choices*, Shell International Limited, London.

Considering the gas industry in a somewhat greater degree of detail, a number of important developments should be highlighted:

- The consumption of natural gas has grown rapidly over the past decade and it will remain the fuel of choice for technical, environmental and – to a lesser extent - economic reasons.
- A growing share of the overall gas consumption is used as fuel input in electricity generation. The consequences of this development for seasonal and daily patterns of gas demand and the price and cross elasticity of gas demand are still uncertain⁷.
- All three large regional consumer markets, in the US, the EU and in Asia, face the need to import increasing volumes of natural gas from sources outside their back-yard, in the Middle East, Russia and Africa. The consequent dependence between suppliers and consumers, the imminent conflicts between their interest and the growing linkage of gas supply to the political economy of the world oil market imply the emergence of an increasingly politicized gas market⁸.
- Geopolitics matter and energy and gas producing countries seem willing to use this strategic asset to their advantage, if needed. For example, Russia, facing a decline in military power, may turn to using its energy sources as an effective power tool in foreign relations.
- As a consequence consumer governments focus on (external) supply security. This inspires policies to underscore the growth in gas consumption with assurances and guarantees in supplies. Large consumer regions increasingly compete for the same gas sources and regulatory models need to take this into account, to keep the respective region attractive for new investments in supply facilities.
- The issue arises as to what extent the political circumstances and E&P regimes allow for the necessary investments and production levels. The distribution of incentives, rents and risks is of fundamental importance, while geopolitical considerations and local socio-political conditions are essential determinants of supply security.
- The long-haul supply lines necessary to transport the gas to consumer markets will face more and more transition issues. Here a question arises about adequate transit regimes and the position of transit markets. Should there be differences between regulatory rules for the transit of gas and for gas imported into markets, crossed by these pipelines? What are connection rules when transit lines are entering the more integrated and connected gas networks (EU internal market) and what are the transmission conditions for volumes of long haul gas once they have entered entry/exit transmission systems?
- The supply of long haul gas, via pipelines as well as LNG, generally implies large and constant throughput factors for the infrastructures in place. This requires that the seasonal, weekly and daily demand patterns may have to be satisfied from the ‘local’ provision of storage and other forms of supply flexibility.
- The need to construct additional supply infrastructures, like pipelines, LNG terminals and storage and treatment facilities raises the question what parties will invest and operate these facilities. How much market and how much “essential facility” functionalities are to be respected, or to be allowed, involving TPA-rules or exemption policies. If any, how much regulatory policy “*ex ante*’s” would be necessary or achievable, in balancing investor requirements with the need to achieve effective and efficient competitive markets.

⁷ *Ibid.* IEA (2003), IEA (2004).

⁸ Correljé, A.F., Van der Linde, G.J., (2006) ‘Oil and Gas Supply Security and Geopolitics’, *Energy Policy*. 34 (2006) 532–543

- The traditional institutions for gas market coordination, like long-term contracts with *Take or Pay* provisions, destination clauses and oil price parity pricing in captive markets, joint horizontal and vertical ownership over production facilities and pipelines, have been removed to a varying extent in the several regional markets. Natural gas projects, given their high sunk costs and long repayment periods, are said to be suffering from a lack of certainty about the future regulatory framework, while restructuring should lead to the fragmentation of value chains and markets, creating noise in the information flows, and delaying the signals that invoke new investments. Is there a ratio in allowing 'alternative' structural coordinative devices, such as large conglomerates and joint-ventures in the market?
- The growing contribution of LNG and – to a lesser extent - GTLs to the market, may bring about a more direct economic integration of the, so far, separated, regional gas markets in the US, EU, Asia and Latin America, via arbitration, etc. How will this influence investment in production facilities and in creating new outlets in these markets?
- From a primarily regional form of organisation, via these LNG-flows, the natural gas market is developing into a world market. From a regulatory point of view, questions are relevant as to the regulatory regimes for the required infrastructures (pipelines, LNG-plants and storage) and how to secure investor confidence.

3) Gas markets and the rationale for regulation: Economics, transactions and policy

It is clear that the policy towards the functioning of gas markets and the safeguarding of the public interest involved is an urgent concern. In complex, specific, networks, like the gas systems, essential facilities are involved, through which the controlling party is able to obstruct any serious competition by other (potential) suppliers, while exploiting its monopolistic position *vis-à-vis* the consumers. At the same time, natural gas projects are delicate ventures as a consequence of their high sunk costs, long repayment periods and vulnerability for variations in supply and demand. Typically gas supply systems involve four segments, with a more or less specific focus of regulation under the free market paradigm:

- The *exploration and production* segment includes a variety of firms involved in exploration, drilling, production, and the collection of gas from the fields' wellheads, to move it to the transmission pipelines. Main elements of the regulatory environment involve a permit, depletion and taxation regime, plus environmental and safety requirements.
- Gas *transmission* involves the long distance, high-pressure pipeline transport of gas from the producers to the consumer markets, or LNG systems including, gasification, ocean-going tanker transport and re-gasification terminals. The pipeline transmission segment of the industry is seen as a natural monopoly, because of economies of scale and scope, the fixed costs of pipeline construction and the relatively low variable costs of their operation, plus their essential facility character. Yet, effective regulation is considered problematic, because of the cross-border character of the systems. LNG trains are considered as competitive, potentially.
- The natural gas *distribution* segment consists of the local operations necessary to deliver natural gas to the end users at home, including low-pressure pipeline transportation, metering, and supply activities *vis-à-vis* the several types of customers. The distribution segment of the industry is generally seen as a natural monopoly and an essential facility, to be regulated accordingly.

- A discussion exists in respect of the regulation of *storage, blending* and other facilities, to secure open access and avoid an abuse of a dominant market position in the provision of these services. If, because of the scarcity of such facilities, competition policy fails to provide the required openness, other forms of access regulation – similar to that for pipelines – may be taken into consideration.
- *Trading* refers to the resale of natural gas in the wholesale market and retail market. Unbundling of the vertical column of the gas industry is expected to create a large number of supply companies, which aggregate demand and supply for a number of smaller market participants by purchasing natural gas and transportation services on their behalf. New flexible short-term trading and contractual arrangements may balance supply and demand and give market participants the flexibility they need. Yet, end-users may have to be protected from the market power of gas traders, while *ex-ante* merger control or *ex-post* competition policy may be necessary to reduce anti-competitive behaviour in this segment.

In brief, the paradigmatic underpinnings of the regulation of the gas industry, since the end of the 1970s, underwent a shift from a traditional neo-classical view on the functioning of markets, towards paradigms that were based on monetarist and public choice theories. The standard neo-classical approach justified state intervention on the basis of the concepts of *market failure* and *public goods*, in which Pareto-optimal decision-making was not to be expected in the gas and power sector.

Traditionally, the *natural monopoly* character of such services had justified regulation and public ownership. So, the state had to jump in and remedy imperfections and failures, including problems of excessive market power, externalities, lumpy investments, spill-over and so on⁹. In the US, privately owned utilities were regulated by sector specific federal and state agencies. In Europe, the utilities were owned by the state, municipalities or other regional bodies. The regulators in the US and public ownership in Europe also secured the *public interest* elements or *public values* associated with these services, involving issues of safety, security of supply, acceptable prices for specific types of users, objectives of local and sector development, the supply of jobs, and - more recently - sustainability and environmental protection¹⁰.

By the late 1970s, this perspective was replaced by the kind of ‘liberalism’, associated with the late Ronald Reagan and Margaret Thatcher. Efficiency, economic reform and political power were sought through a reduction of taxes, “rolling back the state” and by bringing market-driven competition into so-called ‘gold-plated’ industries¹¹. Indeed, perfect competition - modeled after the revised economic textbooks - was to be imposed upon public sectors wherever possible¹². Gradually, and initially only in a number of Anglo Saxon countries and Chile, free access to consumers and markets, competition in production and retail sectors and privatization were introduced as the basic objectives of structural change in the energy sector. After the adoption of the Single European Market objective in 1985, these

⁹ Scherer, F.M. (1980) *Industrial market structure and economic performance*. (2nd. ed.), Boston: Houghton Mifflin Comp. Stiglitz, J. (1986) *Economics of the Public Sector* New York: W.W. Norton and Company.

¹⁰ See for example: Foreman-Peck, J., Milward, R. (1994) *Public and Private ownership of British Industry 1820-1990*, Oxford: Clarendon Press. MacAvoy, P.W., (2000), *The natural Gas market: Sixty years of regulation and deregulation*, New Haven, London, Yale University Press. Correljé, A.F. Van Der Linde, J.C., Westerwoudt, T. (2003), *Natural Gas in the Netherlands: From cooperation to competition?* The Hague: Clingendael International Energy Programme/Oranje Nassau.

¹¹ Helm, D. (2003), *Energy, the State and the Market: British Energy Policy since 1979*. Oxford: Oxford University Press. Parker, M.J. (2000) *Thatcherism and the Fall of Coal*, Oxford University Press, Oxford Institute for Energy Studies; Friedman, M. (1962) *Capitalism and Freedom*. Chicago: Chicago University Press.

¹² Friedman, M. (1962) *Capitalism and Freedom*. Chicago: Chicago University Press. Demsetz, H. (1968) Why Regulate Utilities? *Law and Economics*, 11.

objectives became the points of departure for the European Commission, initially as main instrument to tear down the prevailing intra-communal barriers to trade, later on as objectives as such¹³.

Under this paradigm, the perspective evolved of the gas supply system as an unbundled liberalized market, with competition in the production, services and retail segments, and regulated essential facilities. More recently, particularly through the developments in the deregulation of the utilities in the UK, the Austrian school of economics has become involved as an important source of wisdom, providing the basis for dynamic regulation. In contrast with the traditional static equilibrium approach, the Austrians focus on the dynamic process in competitive markets. Price cap regulation (RPI-X) entices operators to bring down their costs, while letting them keep the increased revenues for some time. Yardstick regulation of costs, tariffs and quality and efficient trading and auctioning arrangements are being applied in the gas and electricity industry¹⁴.

Moreover, a further requirement for 'dynamic' competition and for harvesting its advantages is that new concepts and solutions can enter the market. So, the success of competition is often defined as the number of (new) competitors in the market. Consequently, all new entry is seen as beneficial and, thus, incumbents must be obliged to sell their products and services as if they were a standalone business, on equal footing with each new entrant¹⁵.

Helm (2005) recently argued that are forced to consider a new energy paradigm, under the pressure of, firstly, the need to modernize and expand the current energy supply systems and, secondly, the need to adapt the energy system to the consequences of global warming by reducing CO₂ emissions. These pressures can be perceived as being market failures of the (by and large) liberalized international gas/energy market, as a consequence of externalities, high transaction costs and geopolitics. Helm suggests that these problems could be solved by: a) the (failing) market, causing very high costs and volatile prices; b) the development of new market-based regulatory concepts; or c) vertical and horizontal integration to reduce the uncertainties of incomplete contracting and asymmetric information. Helm therewith explicitly invokes an alternative perspective on economic coordination, the New Institutional Economics (NIE), which is based on the concept of *transaction costs*.

The traditional economic theories, referred to above, consider the *structure* markets as being a crucial driver for the *conduct* of firms and the eventual economic *performance*. The configuration and relative size of the firm itself was seen merely as a means to acquire economies of scale and scope through vertical and horizontal integration, to the end of achieving market power in up or downstream markets (Scherer 1980). The institutional, transaction costs, approach takes a broader perspective in respect of the rationale of vertical integration. It considers the shape of firms and the associated structure of the markets as alternative arrangements of internal and market governance, to deal with the risk involved in transacting.

The adequacy of particular arrangements is seen as dependent on the attributes of individual transactions between buyers and sellers of goods or services in a specific market and how that affects the overall cost of a transaction. Transactions costs include the direct costs of writing, monitoring and

¹³ Haaland Matl ary, J. (1997) *Energy policy in the European Union*. Houndmills: Macmillan.

¹⁴ See for example: Kirzner, Israel M (1997) Entrepreneurial discovery and the competitive market process: An Austrian approach. *Journal of Economic Literature*, Vol. 35 Issue 1. Laffont, J.J., Tirole, J. (1993), *A Theory of Incentives in Procurement and Regulation*. Cambridge MA, USA and London, UK: The MIT Press. Littlechild, S. C. (1983) *Regulation of British Telecommunication's Profitability*, Department of Industry, London: HMSO. Newbery, D.M. (2000) *Privatization, Restructuring and regulation of Network Utilities*. Cambridge MA, USA and London, UK: The MIT Press. Robinson, C. (2000) Energy economists and economic liberalism. *Energy Journal*, 21 (2), 1-22. Hawdon, D. & Stevens, N. (2001) 'Regulatory Reform of the UK gas market: the case of the storage auction' *Fiscal Studies*, June, 22(2), pp 217-232.

¹⁵ Shuttleworth, G. (2000) *Opening European Electricity and Gas Markets*. London: National Economic Research Associates, 15 November 2000

enforcing contracts, plus the costs associated with the risk of *ex ante* investments having an *ex post* performance that is lower than anticipated, as a consequence of contractual hazards of various types and of the costs associated with internal organization of the transactions. As stated by Joskow: “*The inefficiencies of particular interest are those that arise as a consequence of ex post bargaining, haggling, pricing and production decisions, especially those that arise as the relationship must adapt to changes in supply and demand conditions over time, though inefficiencies in ex ante investments are also relevant*”¹⁶.

The preferable structures of governance structures are those that best fit the character of the transactions involved and the broader context in which these take place (See Figure 1). Main characteristics involve, on the one hand, the extent to which parties to a transaction are locked-in, as a consequence of *asset specificity*. On the other, attributes like uncertainty, product complexity and information asymmetries play a role. In respect of asset specificity in the gas industry:

- It can be argued that a large portion of the investments are *site specific*, often linking up buyers and seller in tight relationship over the use of the asset.
- *Physical asset specificity* may be relevant as well, particularly when looking at the relation between suppliers and end-users, which have invested in boilers and appliances to burn gas of a specific type and composition, or investments in, for example, gas storage or treatment capacity.
- *Dedicated assets* involve the investment by a gas supplier in a remote field to sell a significant amount of gas to a particular (set of) customer(s) at a specific level of revenues, justifying the investment.
- The realization of lower sales or lower prices would imply an *ex post* hazard, not anticipated in the investment decision *ex ante*.

In essence, the idea is that by selecting the right form of governance, either involving the spot-market, a specific contract or a vertically integrated structure, the parties to a transaction will be able to modify the costs of the transaction and of the exposure to *ex ante* risks. When, *ex ante*, it is considered that these costs are not manageable at an acceptable level, most likely, the transaction or investment will never materialize. No additional facilities are constructed and no additional volumes of natural gas would reach the market. In respect of the gas markets, therefore, a leading question would be to what extent the regional/local governance regimes in place reflect the characteristics of the several types of transactions in the regional gas markets. Referring to these characteristics, it may emerge that the efficient development of markets of a different nature, maturity and risk profile may require different structures of governance, instead of one single *market design* geared towards a fully competitive market. Moreover, the issue of coordination between the several elements of the value chain becomes highly important, in terms of capacities, access rules, and tariffs.

As regards the regulatory perspective, the question seems to arise as to how this new institutional paradigm can contribute to the future gas market regulation to a greater degree. Currently, much of the regulator’s toolkit plus the framework for competition policy is based on the former paradigm of ‘full unbundling’ and maximum entry in competitive segments. Nevertheless, in the daily practice of regulation, elements of the transaction cost-based approach are already incorporated, like the

¹⁶ Joskow, P.L. (2003) Vertical Integration, Mimeo December 2, 2003, forthcoming, *Handbook of New Institutional Economics*, Kluwer; See also: Williamson, O. (1971) “The Vertical Integration of Production: Market Failure Considerations,” *American Economic Review*, 61: 112-123; Williamson, O. (1975). *Markets and Hierarchies: Analysis and Antitrust Implications*. New York: Free Press. Williamson, Oliver. 2000. “The New Institutional Economics: Taking Stock, Looking Ahead,” *Journal of Economic Literature* 38: 595-613.

conditional allowance of exemptions and large scale mergers. Moreover, the New Institutional – or Transaction Cost - Economics, also underscores abuse of market power as a strategy, which depending on the circumstances should be tackled by regulatory intervention. These observations suggest the need for a careful institutionalist reassessment of the coordination mechanisms which are considered as less beneficial for consumers under ‘structure-conduct-performance’ approaches.

		Asset specificity		
		<i>Low for both parties</i>	<i>High for both parties</i>	<i>High for only one party</i>
Uncertainty	<i>High</i>	Contract or vertical integration	Vertical integration	Vertical integration
	<i>Low</i>	Spot contracts	Long-term contract	Vertical integration

Based on Joskow (2003)

Figure 1 Asset specificity, uncertainty and governance structures

4) Risk, rents, incentives and regulation: Investment and performance in the gas market

The literature on regulation in general, or governance, has a broader perspective than the economic theories on industrial organization, on which economic *market* regulation is founded. It is more advanced in incorporating elements of the transaction cost approach¹⁷.

The regulation literature sees a main function for the system of governance in allocating business responsibilities and risks among the parties involved and to design tariff and other rules so as to achieve an allocation that stimulates the development of the industry and balanced trade patterns. Risk exists in an unpredictable world. Demand for gas may develop differently than expected. Costs may become higher or lower and exchange rates will vary. Some risks can be calculated, others remain completely uncertain or even unknown. The main question is who should bear these risks and bear the losses, or harvest the profits associated¹⁸.

Risks are allocated via the rules that determine how shifts in the distribution of rents (including revenues, costs and profits) along the value chain affect the position of the several parties involved. It is, thus, necessary to connect the notions of business responsibilities and risks. A main issue in the design of the governance structures is then to align the business responsibilities of the operator and the public bodies involved with the risk resulting from functional tasks and responsibilities. In essence, this involves the following steps: First, identify the main areas of responsibility involved and the risks associated; second, assign the responsibilities and associated risks to the party best able to manage it; third, establish the arrangement to achieve this allocation of risks and responsibilities.

¹⁷ See for a recent exception focussing on gas markets: Creti, A., Villeneuve, B. (2003) *Long-term contracts and take-or-pay clauses in natural gas markets*, Mimeo, IDEI, Université de Toulouse.

¹⁸ This paragraph extensively draws on: Berg, S.V. (2001) ‘Infrastructure regulation: Risk, Return and Performance’, *Global Utilities* 1 (May), pp 3-10. Estach, A., Martimort, D. (1999) *Politics, Transaction Cost, and the Design of Regulatory Institutions*, World Bank Policy Research Working Paper, No. 2073, March 1999. Baldwin, R., Cave, M. (1999) *Understanding Regulation: Theory, Strategy and Practice*. Oxford: Oxford University Press.

It is obvious that there exists a wide variety of governance solutions, ranging from purely public operated systems, to predominantly privately owned and operated industries with only minor public involvement. Bearing risk has a cost and the party bearing the risk will likely demand something in return. The aim of the design of governance systems should be to allocate responsibilities and risks between the operator(s) and public authorities so that, firstly, responsibilities are allocated to the parties best able to undertake them and, secondly, risks are borne by the parties best able to manage them. Allocating risk to a party, generally, gives the party an incentive to alter its behavior to minimize its costs. Risk allocation therefore affects the parties' incentives to improve efficiency. Moreover, some risks can not be controlled or anticipated and should be allocated to the party best able to diversify or absorb it. This latter notion means that parties should have the ability:

- to influence or control the risk factor;
- to predict changes in the relevant risk factor;
- to control the sensitivity of the business' value to the risk factor;
- to absorb the risk. Allocating each risk to the party best able to manage it reduces costs to the customers and attracts sound private investment.

A particular element of risk is located precisely in the role of the regulator itself. The performance of regulatory frameworks is essential in securing investors confidence. A regulatory system should be efficient, in the sense that the benefits of its involvement to society should outweigh the direct and indirect costs of its interventions:

- To operate effectively regulators should have a clear, politically determined, legislative mandate, establishing in unambiguous terms, their objectives, their tasks and the degree of freedom in developing guidelines and rules.
- To operate independently on behalf of their general public responsibilities, regulatory systems and regulators should seek to secure and carefully balance the interests of both the several segments of the gas industry and the consumers.
- To achieve an appropriate level of legitimization, regulators should be held accountable both in respect of the reasons they give for their decisions and by making the regulatory process fair, open and accessible to the firms and stakeholders alike.
- To gain trust in the industry and among consumers, regulators should have an adequate level of expertise, which is as independent as possible from industrial, consumer, or political interests.
- If regulatory uncertainty could be reduced, transaction costs would be reduced as well, what would possibly lessen the need for integration (cf. Table 1). Possibly, it also allows a reduction of the over-all scope and scale of regulation
- Regulators can contribute to market transparency by publishing assessments of market developments and investment opportunities.

Section 2 has outlined changes in supply and demand patterns, the impact of environmental and security of supply issues and shifting paradigms for market design. A number of issues for discussion can be formulated around the relationship between regulation, the development of the gas industry, private risk and ROI, consumer interests, public involvement and legitimization and national sovereignty.

- There is the demand for stability in terms of objectives, approaches and instruments, which may conflict with the need to adjust to changing circumstances.
- There is the learning curve through which the regulator, the industry, policy-makers and the general public are moving. The development of new insights – either positive or negative -

may suggest adjustments and revisions to the regulatory framework¹⁹. The question is how these factors can and should be incorporated in a credible way.

- There are possible shifts in the role of parties along the value chain. What are the consequences for market power of the development of strong trading companies with bargaining powers vis-à-vis large producers. What will be the impact of horizontal (or diagonal) integration with the electricity industry?
- The role of demand side activity in the market receives little attention, generally. Also consumers can contribute in addressing issues such as reducing price spikes and increasing security of supply by taking a more active stance in markets.

5) The interdependence of policies, governance structures, regulation and instruments.

Whereas the section above has focused on the role of regulation in bringing about a balanced system of governance of the value chain, this section will briefly locate the activity of regulating a gas sector with the broader societal context, involving other policy objectives, governance structures and policy instruments. Examples are fiscal policies, environmental objectives, sectoral and social policies, energy policies geared towards security of supply, via the stimulation of particular technologies, diversification by fuel and supplier, etc.

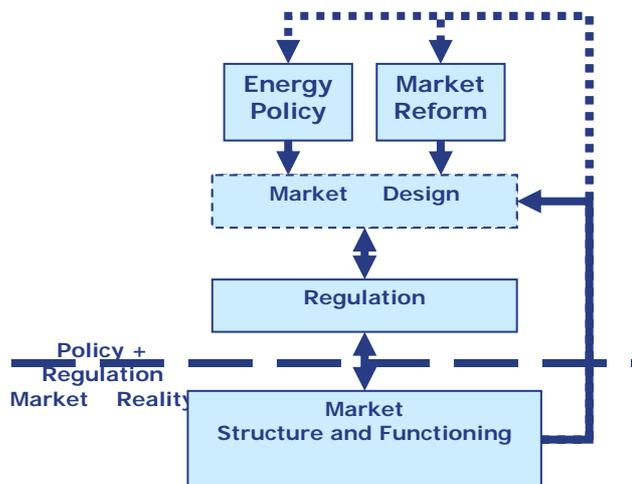


Figure 2: The Regulatory Framework and the Market

It is important to realize that the gas supply chain is often stretched over several national jurisdictions, with their own policies, cultures and approaches. A perspective on regulation will have to take account of the inherent fragmentation of the value chain. This implies that the system of governance has to

¹⁹ See: Aad Correljé., Jaques de Jong (2005) *'Liberaliseren: van beleid naar uitvoering: Lastig en ingewikkeld voor alle partijen'*, in (De Jong, Weeda, Westerwoudt, Correljé) *Dertig Jaar Nederlands Energiebeleid: Van Bonzen, Polders en Markten naar Brussel zonder Koolstof*, The Hague, Clingendael International Energy Programme, pp 337-383.

take into account a variety of national and international interests, objectives and policies. Traditional approaches basically assumed that *economic regulation* should and could stay clear from these other policies and concentrate on establishing a level playing field for market participants and bring about maximum competition among those. Other policy objectives were at best not included in the overall framework of governance²⁰ or, second-best, not mixed-up with the activities of the regulator. Nevertheless, in actual practice, *deregulation* has become *re-regulation*, and privatization has been undertaken as a strategic process. It has never been accepted that structural change and deregulation should fully abstract from public interest issues – either captive or not. In the process of devising the regulatory framework, politicians and interest groups manage to get all kinds of additional demands on the regulatory agenda. Particularly the protection of consumers, the environment, security of supply and the – often abused notion of – *national interest* score high, in this respect. This refinement of the recipe for restructuring induced an ongoing expansion of the regulatory framework and of the toolbox of instruments and, associated therewith, the responsibilities of the regulatory agencies.

Level 1	Informal institutions:	<i>Broad values, norms, technological and physical characteristics</i>	Broad (energy) policy objectives and balance between: SoS, market and environment
Level 2	Formal institutional environment:	<i>Laws and constitutions</i>	Regulatory models and market ‘design’
Level 3	Institutional arrangements:	<i>organisations, contracts and hybrids like PPPs</i>	- Actual regulatory instruments and decision; - Forms of PP cooperation - Firms tariff structures and trading practices; - Public and private evaluation and sharing of risk, profit, market, etc.
Level 4	(market) behaviour	<i>Interactions by actors with different objectives, strategies</i>	Market strategies, investments, lobbying, R&D, cooperation and conflict
<i>Source: Adaptation of Williamson 1998 and Groenewegen 2005²¹</i>			

Figure 3: The socio-political embedment of regulation

Therewith, as is illustrated in Figure 2 above, the structure and the functioning of the market evolve as the consequence of a process of market design, driven by the traditional principles of market reform (unbundling, access and competition) and modified by specific objectives of energy and other policies. Within the context of this market design, the actual process of hands-on regulation (involving the setting of tariffs and charges, X-factors, quota’s, etc.) influences the actual performance of the industry and the consequent value distributed over consumers and suppliers.

²⁰ See for a forceful exposition of this view: Robinson, C. (2000) Energy economists and economic liberalism. *Energy Journal*, 21 (2), 1-22.

²¹ Williamson, O.L. (1998) ‘Transaction Cost Economics: How it works; Where it is headed’, *De Economist* 146, No. 1, pp. 23-58. Groenewegen, J. (2005) *Designing Markets in Infrastructures: From Blueprints to Learning*, Inaugural Lecture 27th of May 2005, Section Economy of Infrastructures, Faculty TPM, TUDelft.

Figure 3 above illustrates the wider embedment of the governance structure, spread out over the informal and formal institutions of a society and the associated institutional arrangements, eventually influencing the behaviour of market actors and other parties involved (like NGOs, interest organizations, etc.).

At the highest level 1, the very basic, enduring, society specific beliefs, values and general objectives are located. Examples of drivers in this respect are: perceptions about sovereignty over national energy resources, equity, scarcity and resource (in)dependence, the environment, in/exclusion of social/ethnic groups, beliefs about states versus markets, etc. Often such principles vary over (groups of) countries and depend on substantial factors like the presence or lack of energy resources, the level and structure of economic development and the openness of the economy, the political culture, norms of 'good governance' and the involvement of the interest groups in society via 'deep' political principles and beliefs.

Without going into detail these basic factors are of influence, and partly crystallize, in the formal institutional framework at Level 2, including international treaties, national law and constitutions, defining the fiscal structures, elements of market design, the position of the regulator *vis à vis* the administration and the Court, etc.

These formal laws are operationalized in actual arrangements, often in the form of contracts, rules of conduct, permits and agreements, guidelines, net-codes, rulings, tariffs, etc. These, generally, are more flexible and malleable than the Level 2 institutions. Much of the actual regulatory activities will take place at this level, but also firms trading practices, contracting, price setting, joint-ventures and so forth belong to this realm. Fascinating elements at this level, moreover, are those institutions – or mores - that carry the public and private evaluation of risk, profit, price, quality, performance, etc. Typically, these attitudes and perceptions are phenomena which may derive from the 'deep' values at Level 1, being partly fixed in laws and procedures at Level 2, getting a real value and meaning at Level 3.

Eventually, at Level 4, the higher level determinants drive the actual interaction of actors with their specific objectives and inspire concrete strategies and approaches. This gives rise to market strategies, investments (also in lobbying), to cooperation and conflict and to consumer and producer transactions; buying and selling. The basic causality in this model flows from the top towards the behavioural layer. But it should be clear that via processes of learning, lobbying, technical development and societal change in the broader sense, there is also an upward influence on the form and content of the basic values and beliefs.

The up-shot of this discussion is that shifts in fundamental expectations and requirements in respect of energy policy and supply security at level 1, may cause tensions between those elements and their development and instrumentation in the lower levels. These tensions also may arise between regions/countries, in which shifts and developments take place at a different pace (or not at all) or in a different way, as a consequence of particular combinations of the factors, referred to above.

Via the interrelationship between the several layers of the institutional framework sketched above and the impact thereof on the growth of the regulatory system, we have indicated the complexity of the processes of regulation and the impact thereof on market behaviour. It seems appropriate to highlight a number of issues that may arise in the international gas market, as a consequence of the particular national embedment of these systems of governance.

Above we have argued that, typically, gas supply systems involve four segments. When the whole of the chain was still located within one 'brand' of jurisdiction, a more or less consistent structure could develop, based on the same type of principles, laws, arrangements, contracts, etc. By and large this has

been the case until recently in the US and within Europe. The more difficult development of the gas system in Asia and Latin America illustrate the problems of genuine cross-national systems. Therefore, the current developments in supply chains, which reach out far beyond the regional borders of the consumer areas and cross several transit jurisdictions, bring about the need to think about the consequences of the interaction between the several regulatory regimes, based on radically different traditions, as suggested in Figure 3.

Figure 4 below illustrates the segmentation of the supply chain. Main issues of attention are:

Firstly, the fact that the value chain of the gas supply systems covers various jurisdictions with different interests and roles in the value chain. Conflicts of interest and difficulties to arrive at mutually acceptable (coherent combinations of) regulatory regimes along the value chain are the logical consequence of this situation.

Secondly, as stated, the gas systems in the different world regions and countries stem from radically different traditions in terms of the contents of the layers of the governance scheme above and their institutional and structural characteristics. This may require different approaches for the systems of regulation. The question is then, how this fits into the general, 'one-size-fits-all' approaches and recipes for structural reform and market liberalization proposed by international organizations and the EU.

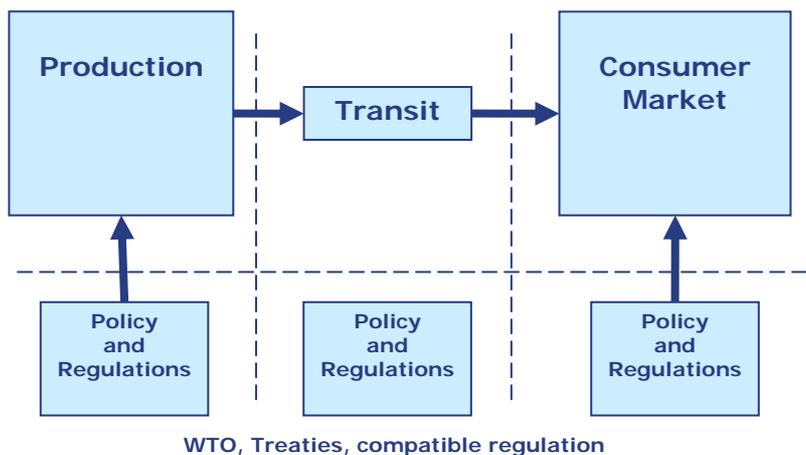


Figure 4: International segmentation of the supply chain

Thirdly, the maturity of the systems and basic geo-physical aspects are varying strongly. Apart from the fact that a regulatory structure is a system and context dependent phenomenon, emerging gas markets may need another regulatory approach than mature ones.

This begs for the question as to what extent particular arrangements are uniformly applicable to all stages of development of the gas market. In relatively small markets, interpipeline competition in transmission will be difficult and the incumbent pipeline owner will have a natural monopoly. This contrasts with larger markets, in which interpipeline competition is possible, such as the United States and, to a lesser extent, Germany. Where interpipeline

competition is indeed possible, regulatory approaches are not always properly accounting for this.

Fourthly, the existence of national regulatory regimes and systems of governance along the gas value chain will be of influence in the development of adequate, cross-regional supply chains. What are the consequences of this situation for the effect of the necessary mechanisms of coordination within the chain?

Fifth, as gas supply is becoming increasingly dependent on long-distance cross border pipelines, international treaties safeguarding *transit* will be required. WTO agreements may deal with the risk of international transport. Also multi-lateral treaties like the Energy Charter and its Transit Protocol have been established to this end. But, in other situations, specific bilateral transit treaties may be more appropriate.

6) Conclusions on the dynamic regulation of gas markets...

Over time, empirical evidence has shown that economies need an adequate institutional framework to reduce uncertainties among market participants, to correct un-avoidable failures in the operation of the market, or the sheer lack of a market for certain categories of goods and services, and to safeguard public interests²². Recent experiences in the economic regulation of sectors cover competition policy, aimed at the identification and correcting of abuse of dominant positions, as well as regulation geared towards the re-structuring of an industry and its trading processes, to create a competitive market. Particularly, the latter, in the absence of adequate experience, may involve experiments with an inherent risk of failure, causing significant uncertainty and bringing about many new insights. These characteristics render regulation a continuing, evolutionary, process of discovery and innovation, instead of the implementation of a clear cut package of measures. In general, it should be accepted that markets and regulatory models are dynamic and that a transition phase from regulated regional monopoly to liberalised markets with a stable regulatory regime could easily take a decade. Regulation will have strong impacts on market development, but can not be the driving force for market designs. Markets evolve under influence of a wide set of factors.

As argued, regulatory action may bring about anticipatory and protective measures, as well as corrective, interventions *ex ante* or *ex post*. *Ex ante* regulatory decisions are required when essential (monopolistic) facilities are in place and *ex ante* protective action is required to secure consumer interests. *Ex ante* regulatory decisions could also be necessary in market transitions when market forces may need support, for instance by regulating access to essential facilities. *Ex post* interventions are usually undertaken by competition authorities, when competition is hindered and/or dominant parties are abusing their market power. Given that ‘anti-competitive’ horizontal and vertical integration and other strategic reactions may follow regulatory decisions and unbundling in order to precisely bring about competition, an important issue is where in the value chain “sustainable” competition may emerge, and how.

What are the consequences of the interaction between different regional gas markets, in the EU, Russia, the US, Asia and Latin America,) and other components of the energy market, like oil? Is it possible to define menus for region- or country specific combinations of components of a governance structure, through which such a workable balance can be achieved along the supply chain. This may

²² North, D.C. (1990) *Institutions, Institutional Change and Economic Performance*. Cambridge: Cambridge University Press.

involve, on the one hand, *ex ante* regulatory concepts, like the degree of integration or unbundling, the regulated or 'free' determination of contract prices and tariffs, destination clauses and regulated access to markets, ToP provisions, etc., while on the other hand, *ex post* solutions based on competition policy may play a role. The existence of regional variation requires further analysis of the way in which characteristics of these systems influence the instabilities and the coordination of investments along the supply chain. What are there implications for the regulatory concepts and approaches to be applied? This raises the question what kind of stability in a regulatory framework is necessary to secure market confidence, versus the need for sufficient flexibility to adapt to changing market determinants? Is it possible to establish an efficient, or 'workable', balance between excessive market power and a sufficient degree of coordination within the market that facilitates timely and adequate investments at an acceptable rate of return?

Is it possible to free *ex ante* regulatory concepts and *ex post* competition policy from their rigid *structure-conduct-performance* embedment and to replace this by elements from a more dynamic, context- and institution-specific, framework of analysis and regulatory action. What does this mean for the location and nature of authority to change these regulatory rules, the role of the political process, and the input of market parties and possibly others?