

Energy Security

Managing Risk in a Dynamic Legal and Regulatory Environment

Edited by

BARRY BARTON
CATHERINE REDGWELL
ANITA RØNNE
and
DONALD N. ZILLMAN



Academic Advisory Group
Section on Energy and Resources Law
International Bar Association

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Contents

<i>List of Contributors</i>	xiii
<i>Table of Abbreviations</i>	xv

INTRODUCTION

1. Introduction	3
<i>Barry Barton, Catherine Redgwell, Anita Rønne, and Donald N. Zillman</i>	
I. The growth of concern for energy security	3
II. The concept of energy security	5
III. The present study	6
IV. Taking a global perspective	6
V. Characteristics of energy security	7
VI. Particular issues in energy security	8
VII. The chapters	10

INTERNATIONAL AND REGIONAL APPROACHES

2. International Energy Security	17
<i>Catherine Redgwell</i>	
I. Introduction	17
II. Infrastructure security issues	18
III. Personnel	27
IV. Guarding supply against disruption	28
V. Protection of the energy security interests of investors and traders	35
VI. Environment, human rights, and energy security	43
VII. Conclusion	45
3. Energy Security and the Development of International Energy Markets	47
<i>Andrei Konoplyanik</i>	
I. Introduction	47
II. Objective trends in the development of world energy markets	48
III. Evolution of concepts and dominant instruments of energy security at different stages of world energy markets' development	57
IV. Evolution of energy markets and the development of legal instruments of investment protection	75
V. The Energy Charter process and international energy security	79
VI. Conclusion	83

4. Shared Competences and Multi-Faceted Concepts—European Legal Framework for Security of Supply	85
<i>Leigh Hancher and Sally Janssen</i>	
I. Introduction	85
II. Competences and concepts	87
III. Community policy and legislative initiatives	91
IV. Security of supply and the Treaty principles	107
V. Conclusion	118
5. Regional and National Frameworks for Energy Security in Africa	121
<i>Yinka Omorogbe</i>	
I. Introduction	121
II. Energy sources in Africa	122
III. Energy security defined	124
IV. Regional and sub-regional cooperation in energy issues	126
V. National approaches to energy security	134
VI. Conflicts in Africa and energy security	138
VII. Security of supply and infrastructure	140
VIII. Conclusion	141
NATIONAL APPROACHES	
6. Security of Supply and Control of Terrorism: Energy Security in the United States in the Early Twenty-First Century	145
<i>Donald N. Zillman and Michael T. Bigos</i>	
I. Introduction	145
II. US energy production and consumption	146
III. The legal structure of US energy regulation	150
IV. Cross-border security concerns	151
V. Control of the domestic market in energy	153
VI. Physical security concerns	156
VII. Conclusion	169
7. Canada's Voluntary, Market-Based Approach to Energy Security	171
<i>Alastair R. Lucas</i>	
I. Introduction	171
II. Energy, supply, demand, and exports	173
III. Jurisdiction	178
IV. Historical energy security concerns: from regulation of exports to market liberalization	179
V. Factors influencing energy security	182
VI. Conclusions	202

8. Energy Security and Energy Sovereignty in Mexico	203
<i>José Juan González Márquez</i>	
I. Background	203
II. A general analysis of energy security issues	210
III. A sectoral analysis of energy security issues	214
IV. Conclusion	215
9. The Andes: So Much Energy, Such Little Security	217
<i>Lila Barrera-Hernández</i>	
I. Introduction	217
II. Venezuela	218
III. Colombia	234
IV. Catching up with the crisis: is trade the cure?	249
10. Energy Security as Denmark's Heavy-Handed Regulation Loosens	253
<i>Anita Rønne</i>	
I. Background	253
II. Emergency management of the energy sector	257
III. Sectoral analysis of energy security issues	259
IV. Constraints and options for meeting the challenge of energy security	276
11. Re-Regulating Energy Supply in the Netherlands: A Balancing Act between Energy Security and Energy Liberalization	279
<i>Martha M. Roggenkamp</i>	
I. Introduction	279
II. Structure of the energy sector before and after liberalization	282
III. Security of energy supply	287
IV. Reliability of energy supply	296
V. Conclusion	305
12. Norway: Security of Supply in Liberalized Energy Sectors: A New Role for Regulation	307
<i>Ulf Hammer</i>	
I. Introduction	307
II. The hydropower sector	308
III. The gas sector	323
IV. Conclusions	335
13. Energy Security and Conflict with Other Values: The Case of Germany	337
<i>Gunther Kühne</i>	
I. Security of energy supply as a key objective in the development of German energy law	337

II. Energy security as an 'element of most urgent public concern' from a constitutional law perspective (the ' <i>Oil Stock Obligation</i> ' case 1971)	338
III. Security of supply in German energy law—the two-tier approach	339
IV. The strategic energy situation in Germany with regard to the medium- and long-term availability of energy	340
V. Energy security-oriented emergency legislation	343
VI. Instruments of functional energy security in German energy law	345
VII. Energy security as a public policy balancing factor, primarily in antitrust law	348
VIII. Conclusions	353
14. Security, Continuity, and Regularity of Energy Supply: The Case of Spain	355
<i>Iñigo del Guayo</i>	
I. Background	355
II. Methodological premises	358
III. Sectoral analysis of energy security issues	361
IV. Merger of energy companies, regularity, and continuity of supply	366
V. Energy planning	367
VI. Security of supply and international interconnections	370
VII. Intervention in energy company activities	372
VIII. Final remarks	372
15. Reaching the Limits of What the Market will Provide: Energy Security in New Zealand	373
<i>Barry Barton</i>	
I. Energy security concerns	373
II. Energy policy	375
III. Exploration and development for energy sources: coal, oil, gas, hydro, geothermal, new renewables	377
IV. Oil	377
V. Coal	379
VI. Natural gas	379
VII. Electricity	381
VIII. Conclusion	389
16. Singapore: National Energy Security and Regional Cooperation	391
<i>Lye Lin-Heng and Chang Youngho</i>	
I. Introduction	391
II. Overview of Singapore's energy sources and consumption	393
III. Historical overview of Singapore's oil trade, electricity generation, and gas market	396
IV. Energy security policies	398
V. Energy security cooperation in ASEAN	409
VI. Conclusion	412

17. Energy Security and Japan: The Role of International Law, Domestic Law, and Diplomacy	413
<i>Kazuhiro Nakatani</i>	
I. Introduction	413
II. Japan's energy situation and current threats to Japanese energy security	414
III. Japan's legal framework for oil supply security	416
IV. International legal problems of oil transport to Japan	418
V. Energy security in East Asia and Japan's energy diplomacy	422
VI. Concluding remarks	424
Appendix	
I. Strategy and approaches of Japan's Energy Diplomacy, Ministry of Foreign Affairs (December 2002)	425
II. Energy cooperation among Japan, China, Korean and ASEAN (22 September 2002)	426
OVERVIEW	
18. The 'Fear Factor': Why We Should Not Allow Energy Security Rhetoric to Trump Sustainable Development	431
<i>Susan Y. Noé and George (Rock) Pring</i>	
I. Introduction	431
II. The Alaska National Wildlife Refuge: drill a wilderness or improve gas mileage?	435
III. Belize: hydropower or better alternatives?	440
IV. Thailand's energy security policy: import energy and export the problems?	445
V. Oil development in Chad: a 'new model for natural resources development'?	449
VI. Conclusion	454
19. Energy Security in the Twenty-First Century	457
<i>Barry Barton, Catherine Redgwell, Anita Rønne, and Donald N. Zillman</i>	
I. Understanding energy security	457
II. The role of law in energy security	460
III. Energy security: let the markets decide?	461
IV. The role of the state: legal and regulatory techniques	463
V. Sectoral approaches to energy security	466
VI. The relationship between energy security and environmental protection	470
VII. Emerging issues and trends in energy security	470
Index	473

3

Energy Security and the Development of International Energy Markets

ANDREI KONOPLYANIK*

I. INTRODUCTION

The aim of this chapter¹ is to describe the evolution of the concept of energy security in a broader historical perspective, from the economic, financial, and legal points of view. Each stage of the development of energy markets has its own most effective instruments for providing energy security. This is reflected in the structure of the present chapter, which starts with a description of the evolution of the dominant energy (ie oil and gas) market development. It then presents the evolution of concepts and dominant instruments of energy security and shows that each further instrument has increased efficiency, while diminishing the costs of providing adequate energy security at each stage of energy market development.

In this chapter, energy security is addressed from the energy investment cycle perspective, ie in terms of the 'manageable risks' concept. Each particular stage of market development demands its most effective set of legal instruments to protect investors' flows of capital and energy materials and products, and to minimize volume and price risks, and thus to provide energy security. The final part of the chapter considers the Energy Charter process and its instruments, including the Energy Charter Treaty (ECT) as the first multilateral investment

* Deputy Secretary General of the Energy Charter Secretariat; PhD, Doctor of Science (Moscow State University of Management); email Andrei.Konoplyanik@encharter.org.

¹ This chapter is based on the author's following presentations: *Global Security and Natural Resources: Geopolitical Aspects of Energy Security*, Seminar on Global Security and Natural Resources, London School of Economics Institute of World Economy and International Relations, Russian Academy of Sciences, 26 September 2002, Moscow; *Многосторонние тежсьдународно-правые инсруменмы как пумь снижения рисков проектного финансирования и смоимосми привлечения заемных средств*, Конференция Проектное финансирование в нефтегазовом секторе России и СНГ, Еврофорум 9–10 апреля 2003 г., Москва; *Formation of the Eurasian Energy Market and Energy Charter Process*, 26th IAEE International Conference, 4–7 June 2003, Prague; *Russia and the Energy Charter Process*, Conference on Energy Issues in Euro-American Relations and the Influence of Russia, Stiftung Wissenschaft und Politik, 29 June to 1 July 2003, Berlin; *Towards a Single Eurasian Energy Market: The Role of the Energy Charter Process*, IBC Conference on Natural Gas Markets, Supply and Technology, 1–2 July 2003, Paris.

and trade (including transit) treaty in energy. The ECT provides both security of energy supply and security of energy demand in a competitive, open, and transparent global energy market.

II. OBJECTIVE TRENDS IN THE DEVELOPMENT OF WORLD ENERGY MARKETS

The formation of a global energy market with common rules of the game, based on the principles of fair competition, non-discrimination, complementarity and mutual benefit, is the ultimate goal of energy market development. The aim of such a market is to provide stable, non-interruptible energy supplies with adequate quality, in adequate quantities and at adequate prices both for the producers and consumers of energy, ie to establish a more secure energy market. Even though the pace and scale of market development for each individual energy resource varies at any given time, it is guided by the same fundamental logic. In particular, each market has or will reach a stage where the monopoly form loses its potential for further effective market development and gives way to a competitive energy market structure. So it is necessary to understand the objective logic of energy market development in order to move from 'catch-up' to 'pre-emptive' energy policy formulation and implementation, thereby maximizing benefits and minimizing the risks and potential costs of further development of the energy market. The cumulative effect is to improve energy security, broadly speaking, from both the consumer and producer perspectives.

Current energy markets are being developed on the basis of the exploitation of non-renewable energy resources. Thus the development of this resource base is a fundamental feature of the market. It has been generally agreed among energy economists that development trends in the energy sector resource base are illustrated by the so-called 'Hubbert's curve' initially proposed by M. King Hubbert in 1949 in relation to US oil production, and further developed in his subsequent publications.² He used statistical methods to indicate that oil production has a limited life span and can be illustrated by a bell-shaped distribution curve. Production will peak at the top of the bell and would decline thereafter. Using this approach, the natural development trends of the currently dominant energy resources are presented in Figure 3.1.

Many seek to utilize Hubbert's curve in order to predict the end of the current oil era (or may wish to use it for the same reason in relation to the future gas era). This author disagrees with those who use the curve as a predictive tool for calculating the end of commercial exploitation of a particular resource. In my view, from an historical perspective the peak of the curve has moved upwards

² M. K. Hubbert, 'Energy from fossil fuels' (1949) 109:2823 *Science* 103–109; American Petroleum Institute, 'Nuclear energy and the fossil fuels', in *Drilling and Practice* (1956), 7–25; 'The Energy Resources of the World' in *Energy and Power. A Scientific American Book* (1971), 31–40.

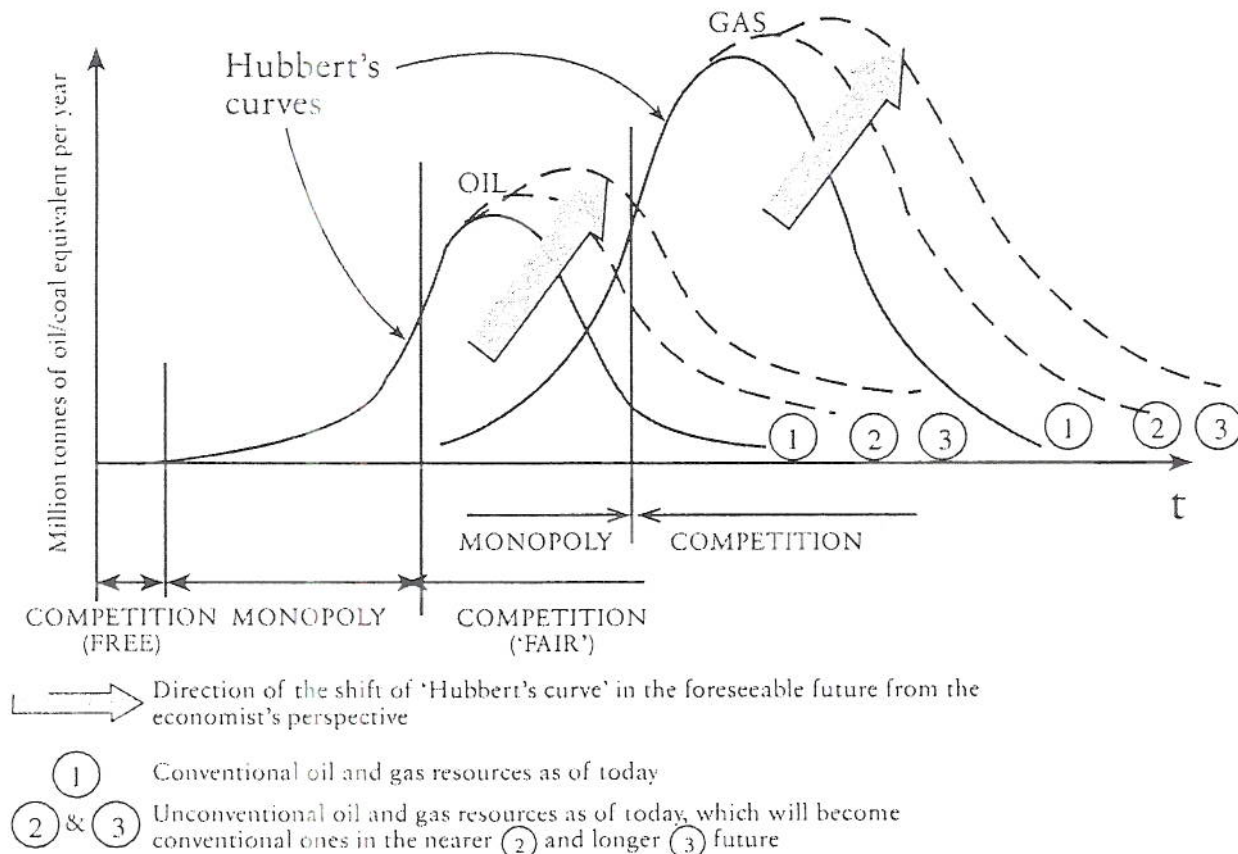


Figure 3.1: Natural development trends of non-renewable energy resources: from monopoly to competition

and to the right because new economically proven technologies have expanded the resource base (and the proven reserves) of both currently conventional and non-conventional energy resources. This analysis will use the curve for a different purpose, namely, to support the argument that the driving force in energy market development is the move from monopoly to competition. Hubbert's curve will thus be employed as an explanatory tool for the evolution of institutional structures within energy markets.

A. Trends in the development of the oil market

Global economic development has been accompanied by constant growth in energy consumption which, despite growing efficiency in energy resource utilization at each stage of the energy cycle, requires new energy volumes continually to be employed. Given that the principal producers and consumers of these resources are located in different regions, this process has resulted in the growth of international trade in energy resources, the formation of inter-state and regional markets and, for oil, the establishment of a global market.

Until the beginning of the 1970s, energy market development was described by the ascending branch of Hubbert's curve. This period in the evolution of the energy market was characterized by monopoly-based organizational structures. Swift escalation in energy consumption during the middle and second half of the

twentieth century took place mainly in the hydrocarbons sector, most notably for oil. Production growth was achieved, for the most part, by discovering new and major oil fields primarily in the Middle East which, until the early 1970s, were increasingly cheap to develop and exploit and where oil was cheap to deliver to consumers owing to the suitable geographical locations of these deposits and favourable climatic, geological, and other natural conditions. The international market at the time was tightly monopolized and closed to any outsiders. The monopoly-based petroleum market was strictly organized, mostly on the basis of the 1928 Achnacarry Agreement that established the International Oil Cartel (the so-called Seven Sisters) that went on to dominate the world market until the start of the 1970s. Energy monopolies derived additional profits owing both to economies of scale—the concentration of production operations on the best and largest fields—and an artificial pricing arrangement (the so-called single-base and double-base oil pricing systems) favourable to international oil corporations. This pricing system enabled them to stimulate a rapid growth in demand for liquid fuels and to displace coal in the principal areas of consumption where it was competing with petroleum products.³

The 1970s saw cardinal shifts in the development of the world energy sector's resource base, with consequential impacts upon the structure of global energy markets. On the threshold of the 1960s and 1970s, the tendency of decline in the marginal and average production costs of hydrocarbons (outside the then socialist states) took a U-turn.⁴ A series of oil price hikes which followed almost immediately afterwards (in 1970–71, 1973–74, and 1979–80), not only compensated for rising exploration and production costs, but brought about an influx of investments into hydrocarbon exploration and development in anticipation of further price rises, or at least of continuously high prices. High price levels had the effect, on the one hand, of slowing growth in energy consumption, yet, on the other hand, stimulating production growth.

During the 1970s, control over the oil market was increasingly seized by the OPEC nations, but the market itself retained its monopolized nature. By the 1980s, the cartel formed by the seven international companies was replaced by a cartel consisting of the 13 petroleum exporting countries, especially after the nationalization in OPEC states of these companies' oil-producing assets. One response to OPEC control was the widening of the geographic base of oil production beyond OPEC. In the 1980s, the resulting surplus of supply (including both an actual surplus above current consumption levels and a potential

³ For more detail about these and other developments in energy markets, see: J.-M. Chevalier, *Le nouvel enjeu pétrolier* (1973); C. Tugendhat and A. Hamilton, *Oil the Biggest Business* (1975); Глобальная проблема. Под ред. И.Д.Иванова, Москва, Мысль (1985); D. Yergin, *The Prize: The Epic Quest for Oil, Money and Power* (1991); А. Конопляник, *Мировой рынок нефти: возврат эпохи низких цен? (последствия для России)* (2000).

⁴ J.-M. Chevalier *ibid*; А. Конопляник and Ю. Конопляник, 'Динамика издержек производства и рентабельности в мировой нефтяной промышленности' (1985), 59–73.

superfluity in the form of excess production capacity) forced down prices for crude oil, first on a downward drift from 1980 to 1984 and then into a tailspin in 1985–86. This affected prices for other energy resources that were pegged to oil prices through special pricing mechanisms (escalation formulas). In these economic circumstances, cutting costs at every phase in the energy cycle and thus gaining a competitive edge amid surplus supply and an unfavourable natural operating environment turned into the main lever for generating extra profits available to those energy companies elbowed out of traditional low-cost production areas, as well as amounting to a condition for survival for many oil companies. The monopolized nature of the market was no longer effective following such changes, not least because almost one-half of the world's production of crude oil continued to be controlled by the cartel of oil producing nations that, at the time, enjoyed the lowest costs for extraction and supply to major markets. Therefore, as a matter of top priority energy companies confronted the need to ensure a speedy reduction of exploration and production costs in new prospective areas outside OPEC. These new areas were found in much more challenging natural conditions (remote areas, severe climate, deep offshore waters, increased wells' depths, smaller deposits, more complicated geology, etc) with correspondingly high costs of production notwithstanding significant scientific and technological progress. Further developments at affordable prices required a competitive market environment.

The growing scale of development of the oil market, diversification, internationalization, and further globalization of petroleum operations all presupposed a shift to the dominant competitive structure of the oil industry. New effective regulatory mechanisms had to be introduced which corresponded to the mature stage of its development, as well as mechanisms for reducing the risks of investment activities given the increasing capital intensiveness of new projects. During the period of monopoly structure in the oil market, long-term contracts were the dominant legal instrument in the market and were utilized to minimize supply risks by linking particular suppliers with consumers. Such contracts corresponded to the interests of buyers and sellers in the conditions of relatively stable oil prices that had prevailed before the early 1970s, with steady growth in demand for liquid fuel and a developing market infrastructure. The underdeveloped character of the latter at that time did not provide an opportunity to implement the 'multiple pipelines' supply concept that usually stimulates shorter-term contractual relations between producer and consumer. But in conditions of intensive price fluctuations and oversupply of products, the sellers' market turned into the buyers' market. Under long-term contracts buyers in these conditions would have to assume additional price risks. These risks were reduced as the market moved from long-term to short-term contracts. Supply risks were reduced by the creation of a diversified market infrastructure (networks of terminals, pipelines, and commercial stocks of liquid fuel around the globe) while the geography of hydrocarbons production broadened, thus ensuring both producers and consumers a choice of partners, ie the implementation

of the principle of multiplicity of buyers and suppliers (ie the 'multiple pipelines' concept).

Along with long-term and mid-term contracts, a market of short-term contracts began developing rapidly, including the spot and forward markets ('physical oil' market). As a result, in the second half of the 1980s there emerged preconditions for the creation of a futures market, a market of oil contracts ('paper oil' market) with all the attributes of the securities market and the possibility of speculative trading and using hedging mechanisms to insure against price risks. This new competitive structure of the oil market provided sellers and buyers with the ability to balance their interests by way of minimizing supply risks (ensured by developed diversified infrastructure) and price risks (ensured by the established futures market of oil contracts). Thus over a transition period of about 15 years, the world oil market was almost completely restructured from a monopoly to a competitive system.⁵

B. Gas market development trends

The development of gas markets may also be described as following Hubbert's curve, yet has clearly lagged behind the oil market's stages of development. Except for Southeast Asia, the formation of a liquefied natural gas (LNG) market has not yet reached the level where it is possible to link regional gas supply systems, developed primarily on the basis of pipeline grid gas, into a unified global gas supply system. True, there have been reports about orders placed for the construction of LNG-carriers intended for work in a spot market, rather than to serve particular LNG projects in the framework of long-term contracts between producers and consumers. This indicates the beginning of the formation of a global gas supply system. It is evidence that a global gas supply system has started to take shape and, with a time lag of some 30–40 years, it is actually repeating the evolution of the world oil market contractual system.

The US gas market was the first to have moved to a competitive state of development. A similar market then emerged in the United Kingdom. Such a market is now in the making in continental Europe, where its formation has been promoted by the EU Gas Directive. Therefore, although the pace and scale of market formation in the case of different energy resources and geographical areas are not uniform, the principal market features remain the same for each energy market. One central feature is that at a certain stage in development the monopoly-based form of market organization loses momentum and gives way to a more competitive market structure.

⁵ The development of oil market contractual structures and pricing mechanisms is examined in more depth in Конопляник (above n 3) and in a series of articles published in 'The Oil of Russia' magazine ('Нефть Россия') in 1999–2001. See also his forthcoming book, *Russia within an Emergent Eurasian Energy Space: Issues of Competitiveness* (Россия на формирующемся Евразийском энергетическом пространстве: проблемы конкурентоспособности) to be published in Russian in 2003. Details of further publications of this author are available at <www.encharter.org> and <www.enippf.ru>.

The availability of a diversified gas infrastructure, giving multiple choices to suppliers and consumers, serves as an objective precondition for moving to a competitive gas market structure. The ratio of the length of gas distribution networks to that of trunk gas pipelines may serve as a characteristic feature of the stage of the market's development. According to analysts, the ratio is 12:1 in the United States, 10:1 in continental Europe and 2:1 in Russia,⁶ which indicates that Russia is at an earlier stage of the gas market's development, with all the attendant consequences (see Figure 3.2).

At the earliest stage of a national or regional market's development, new gas fields are developed in the absence of an established gas supply system. Therefore gas contracts initially link particular producers and consumers one-to-one. Specifics of the gas business predetermine that at this stage the bulk of capital investment goes for laying gas pipelines rather than for gas production. The development of gas fields should then call for a lengthy period of maximum production to ensure optimal utilization of pipelines and a rapid payback of investment.

As a rule (and similar to oil), the development of gas fields starts with bigger fields. Therefore, to minimize costs of the formation of the initial gas infrastructure, gas consumers also have to be big and singular (eg those engaged in industrial production, power generation) or with concentrated demand in a

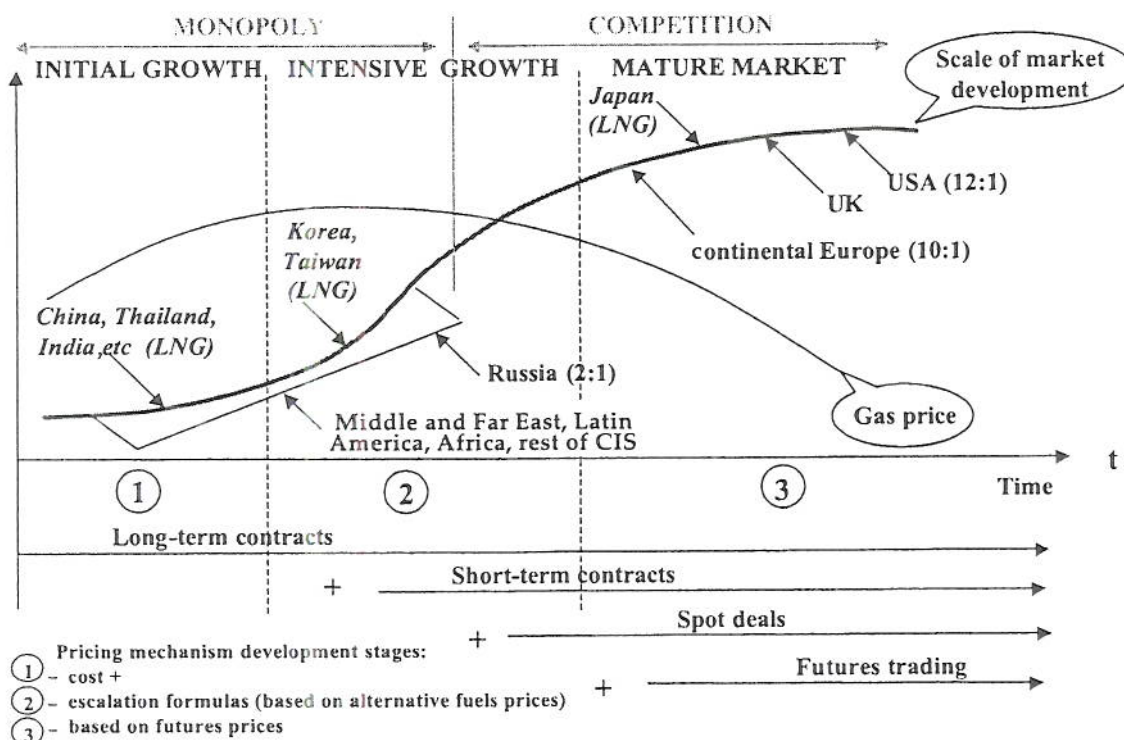


Figure 3.2: Evolution of gas markets' development and current position of different countries on that curve

⁶ К. Н. Миловидов, *Международные рынки газа*, РГУ нефти и газа им И.М. Губкина с. 48 (1998).

small area (public utilities in big cities). That is, gas consumers should be interested in stable long-term supplies. Minimization of supply risks at this stage is ensured through the application of a long-term contract mechanism of the 'take and/or pay' type, while price risks are offset through the application of the 'cost-plus' price formation mechanism. Here contract gas prices are fixed at a level covering costs plus taxes plus an acceptable profit ratio. A similar mechanism used to be applied at the initial stage of the oil market's formation in the traditional concessions framework.

A combination of long-term contracts guaranteeing sales throughout the whole (or the greater part) of the duration of a gas field development project, and guaranteed prices covering costs plus taxes, allows loans to be attracted, secured by future revenues, which are used for significant investment in gas supply and transportation projects. Such schemes minimize the risks of debt financing and the cost of raising capital, ie financial costs of the project, which may be particularly high in countries with economies in transition and legal systems in the making, where contract law is yet to be established and/or more deeply integrated into economic behaviour.

At the initial stage of a market's development, gas prices are determined on the basis of the economics of particular gas projects that are implemented independently from each other. No uniform gas price exists; rather, prices are fixed within each particular project thus minimizing price risk. Contract gas prices can grow when hard to recover fields are being developed and due to the monopoly nature of the market. When a market moves to an intensive development stage (see Figure 3.2), dominant price formation formulas and contractual mechanisms evolve with it. Broadening its sphere of application, gas enters into competition with other energy resources in various spheres of final consumption. As a gas infrastructure emerges and new market segments are taken over, it becomes possible to establish uniform gas prices.

For gas to have long-term competitive advantages, its price should be competitive with the price of alternative energy resources. Therefore, at this stage, various forms of 'escalation formulas' pegging gas prices to other energy prices—refined products, coal, power generation—in particular spheres of application are used. Such pegging as a mechanism for gas price formation also allows the smoothing of price fluctuations in the market of energy resources to which gas prices are pegged, and applying them in the market of that source of energy with a time lag (for example, by taking average prices of energy resources alternative to gas for a period of several months as a base).

This price formation mechanism, aided by escalation formulas, creates additional price incentives for expanding demand for gas when prices grow in the oil market. Gas prices then follow oil prices, but do not outpace them. However, gas prices may be higher than liquid fuel prices when oil prices go down, also as a result of this pegging mechanism. This encourages the use of energy resources alternative to gas, increasing its oversupply and leading to short-term offers of gas at dumping prices (below the pegged prices calculated by the escalation

formulas). Consumers then grow interested in moving from long-term to short-term gas supply contracts.

As the market further develops, gas obtains an optimal niche for itself, pre-determined by its competitive advantages. Growth in supply leads to tougher competition, the development of gas supply infrastructure and the emergence of multiple suppliers and routes for gas supplies to the market (ie the realization of the 'multiple pipelines' concept as a mechanism for reducing supply risks). Other consequences are growing spot trade volumes, resulting in further price decreases due to oversupply, with short-term contracts a mechanism for reducing price risks for consumers. But a shift to short-term contracts on a mass scale, as a prevailing form of contracts between suppliers and consumers, will only be possible when the formation of the basic gas infrastructure is completed and when capital investment in long-term capital-intensive gas production and transport projects is repaid. That is so, when capital investment in new projects will add new alternative routes and gas supply sources to already existing ones, rather than pioneering projects in new areas with little or no infrastructure.

Rejection before completion of long-term contracts and a move to short-term contracts increases the risks involved in financing large-scale investment projects in the gas sector and shifts the burden of those higher risks on to gas producers, who then face substantially higher financial costs in realizing such projects. As a result, capital investment in new projects may plummet due to shortage of funds, at least until new effective mechanisms are found for redistributing financial risks among all gas business players. In the future, this may slow down the market's development and, rather than creating incentives for stepping up supplies of primary energy resources, may encourage both improved efficiency in their utilization and the reduction of production costs.

At this stage of the market's intense development (see Figure 3.2), its monopoly form can no longer promote effective development and gives way to a competitive market form aimed at reducing costs and increasing the efficiency along the energy chain. Furthermore, short-term and spot deals start to prevail, creating preconditions for organizing futures gas trading (an exchange trade in 'paper' gas, ie exchanges of gas contracts) similar to the transition to futures trading in the oil market. Still, long-term contracts will remain within their economically proved niche, and their prices will depend on exchange quotations.

At the mature market stage, the further development of gas infrastructure will stimulate the replacement of escalation formulas with exchange quotations. Exchange prices will be fixed on the basis of gas-to-gas competition rather than on the 'gas-to-alternative-fuels competition principle' used in the price formation on the basis of escalation formulas. Prices in this mature competitive market will tend to go down (see Figure 3.2). Producers will have a competitive advantage in the market, which will be able to reduce costs and go deeper into the end-use market, where prices are relatively higher.