



# **Pipeline Capacity Rights to Support a Competitive Gas Market:**

## **Theory and Applications**

September 26, 2015

## **Project Team**

Jeff D. Makholm, PhD

Nina Hitchins

National Economic Research Associates (NERA)  
200 Clarendon Street,  
Boston, Massachusetts 02116  
Tel: 1 (617) 927-4500  
[www.nera.com](http://www.nera.com)

## Contents

<b>Executive Summary</b>	<b>1</b>
<b>1. Deregulated Trade in Pipeline Capacity Rights</b>	<b>7</b>
1.1. The Coase Theorem	7
1.2. Property Rights and “Coasian” Markets in Legal Entitlements	8
<b>2. Criteria for Defining “Valuable and Tradable” Property in Gas Pipelines: The US Example</b>	<b>9</b>
2.1. Creating Highly Specific Physical Gas Transport Rights	10
2.2. Creating a Predictable Cost Basis for Transport Capacity Rights	11
2.3. Inventing a Fully-Informed and Costless Trading System	13
<b>3. Adapting to Pipeline Markets with “Valuable and Tradable” Property: The US Example</b>	<b>14</b>
3.1. The Regulator Adapts to its New Role in Overseeing the Market for Entitlements	14
3.2. The Market for Entitlements Itself Learns and Adapts	15
<b>4. Eastern Australian Gas Pipeline Capacity Products</b>	<b>18</b>
4.1. Coasian Bargaining in Eastern Australian Gas Transport Capacity	18
4.2. Development of Regulation of Eastern Australian Gas Pipelines	22
4.3. General Comments from Stakeholders	23
4.4. Australian Capacity Products	24
<b>5. Specific Recommendations</b>	<b>29</b>
<b>6. Conclusion</b>	<b>31</b>
<b>Appendix A. Institutional Foundations for the Deregulated US Capacity Market</b>	<b>33</b>
6.1. Establishing Federal Gas Pipeline Regulation	33
6.2. Licensing of Physical Capacity	35
6.3. Accounting and Public Access to Information	36
6.4. Federal Regulation as a Promoter of Investment	37
6.5. Reorienting Regulation to Promote a Deregulated Capacity Market	38

## List of Tables

Table 1 Evaluation of Existing Australian Capacity Products Against the Criteria for "Valuable and Tradable" Capacity Products	28
---	----

## List of Figures

Figure 1 Chicago Cold Snap of Winter 1996	16
Figure 2 The Hurricane Season of 2005	17
Figure 3 Major US Gas Pipelines, 1930, Before the Natural Gas Act	34

## Executive Summary

We wrote a report to the Victorian Government in January 2015 entitled “Pipeline Reform to Facilitate a Competitive Eastern Australian Gas Market.”<sup>1</sup> We related how the US Congress created a legislative framework for dealing with America’s gas industry problems; working over many years to implement the principle of “open access” and ultimately the operational and regulatory practices needed to create a deregulated market in the trade of pipeline capacity rights by about the year 2000. Drawing on a similar industry history, and largely similar regulatory institutions, Canada achieved a similar result. Drawing upon that successful North American experience in using its transmission pipeline “backbone” to create a competitive gas market, we described the current impediments in Eastern Australia to achieving the same outcome.

In this report, we describe the principles that lie behind North America’s competitive pipeline industry and the practical attributes that make it work. We also tell what it would take to develop such pipeline capacity markets that would support a competitive gas industry for Eastern Australia. We approach that description two ways. First, we use the accepted legal and economic scholarship to define the basis for such a market against current conditions in Eastern Australia. Second, we describe how the stakeholders and the federal regulator overcame various practical obstacles to achieving such a competitive transport market in the United States—also in reference to current conditions in Eastern Australia.

We must emphasize that making markets by defining and enforcing property rights is not easy—but it is highly worthwhile. The benefit to consumers takes the form of efficient investment, open and competitive access to capacity, and genuinely competitive markets in gas and pipeline construction. Realizing those benefits takes an institutional framework that is sensitive to the demands of the industry and highly cognizant of pipeline operational details to define, preserve and enforce “valuable and tradable” shipper property rights that fuel a

---

<sup>1</sup> Makhholm, J.D., Hitchins, N., Gainger, S., *Pipeline Reform to Facilitate a Competitive Eastern Australian Gas Market*, (2015).

competitive gas transport market. This paper is as much about those institutional issues and industrial details as it is about the conceptual parameters of the property rights themselves—which are simple by comparison. We must also emphasize that while pipeline property rights markets can be highly successful in removing obstructive layers of regulation and promoting gas supply competition, they do not spring up fully-formed with new rules. The industry has still to learn how to use and trade the new rights effectively. Furthermore, regulators and market authorities still have to be able to address abuse of market problems if such problems arise.

Eastern Australia does not have a competitive gas market. Despite having a largely unregulated pipeline sector with a number of recently-built pipeline links to the major cities, confidential contract arbitrations set gas prices, the spot gas trade is close to nil, and a gas futures market is non-existent. Without a competitive gas market, price formation is uncertain and producers face barriers to entry, the financial industry cannot participate in managing industry risk, consumers do not know whether the prices they see are efficient or otherwise reasonable and governmental agencies face increasing criticism. In the US gas market, by comparison, gas prices form in open spot markets, the use and expansion of the interstate pipelines are essentially deregulated,<sup>2</sup> gas producers (including from unconventional sources) face no particular barriers to entry, and the financial industry is fully engaged in managing industry risk through futures trading.

The US success with its gas market stems from its market in pipeline capacity rights that in turn depends on three specific and limited regulatory actions *that are not the same as traditional Australian notions of coverage or price control*: (1) the licensing of interstate pipeline capacity; (2) the limiting of physical pipeline capacity prices sold by pipeline companies to the cost of that capacity; and (3) mandatory electronic platforms for contract shippers to seamlessly trade contract rights to that licensed capacity. Combined with complete transparency in the market for capacity rights (covering parties, prices, and the underlying physical capacity), these

---

<sup>2</sup> The market is deregulated because, once defined, capacity products are seamlessly traded between shippers without regulatory intervention.

three strictly limited actions remove the ability of pipeline interests to obstruct gas markets. Such actions allowed for deregulated markets in US pipeline capacity rights and the vigorous, technology-driven competition in the gas markets they serve.

It may seem paradoxical that any regulatory actions promote efficient, unregulated markets. The seeming paradox goes away, however, with the recognition that such actions to promote gas markets are not targeted at controlling the monopoly power of traditional utilities—the traditional role of “coverage” in Australia. Rather, they define the reasonable way to organize the physical supply and capacity pricing of semi-rival pipeline companies (both incumbents and potential entrants) that serve major continental gas markets—including Eastern Australia. Those targeted actions ensure that the legitimate business interests of those transport companies do not obstruct the competitive market for gas—which left unregulated, they will do (as in Eastern Australia today and the United States in the past).

Unregulated markets built on such regulatory actions have a firm economic foundation. Such markets have formed in radio bandwidth and pollution control, among others, and exhibit “Coasian bargaining,” named after the 1991 Nobel laureate in economics, Ronald Coase. Such markets are defined by the open trade in intangible property rights created when regulation defines such rights, tells the market who possesses them, and facilitates a “frictionless” exchange between willing sellers and buyers. Regulation in such markets merely defines the rights and informs the market—the re-sale prices in those rights are left to the forces of supply and demand.

The trading of US interstate gas pipeline capacity is a successful industrial application of Coasian bargaining where, through those limited regulatory requirements, gas pipeline capacity rights have become freely-tradable shipper property. The Coasian market in US gas pipeline capacity ensures competitive use and competitive entry (in pipelines, storage, and new gas production). Its success depends on objectively equating tradable capacity rights to measurable physical pipeline capacity, which removes the need for a central planner or “system operator” and prevents regulatory intrusion from reducing the capacity product’s market value. Much of Eastern Australia (but for Victoria, with its “market carriage”) could implement Coasian bargaining, without expanding traditional Australian notions of regulatory “coverage,” with

straightforward federal licensing of existing physical capacity, reporting of nominal costs for the building and operation of that capacity, and assignment of capacity to gas distributors (for the ongoing use of retailers) and other major gas users.

Attempts to create capacity trading in more-or-less informal settings have been unsuccessful in Eastern Australia. Measured against the elements of deregulated US gas pipeline capacity markets (which reflect the conceptual elements that make such Coasian bargaining possible), the current Eastern Australian regime falls short for the following reasons:

- The specific quantities of physical pipeline capacity available for sale by contract—the “rights” that underlie Coasian bargaining—are ambiguously defined for both covered and uncovered pipelines.
- The cost of capacity rights for those who have contracts with either covered or uncovered gas pipelines is inherently unpredictable, both because of the unpredictability of costs and the ambiguity of defined physical quantities.
- Accurate and complete information on pipeline capacity (costs, quantities, parties, timing, etc.) is not available to potential users and traders.
- No mandatory and standardized platform exists for the open and frictionless trade in well-defined capacity rights in a fully-informed market.

Unregulated pipeline companies, including the existing pipeline suppliers to Eastern Australia, will not voluntarily take the steps to foster the elements of Coasian bargaining in capacity rights. They will not themselves provide full information on their capacities, costs, shippers and prices—no company wishes to provide open-book scrutiny of its business in the face of possible competitors. Yet as the “backbone” of competition in *another market*—the fuel they transport—semi-rival pipelines have an unavoidable public-interest role in Eastern Australia or any other continental gas market. That is, without known quantities, predictable costs, market information and required platforms for frictionless trade, whatever pipeline capacity contracts that shippers hold will not (and do not) form the basis for the competitive use and expansion of pipeline capacity or a competitive market in the fuel.

While total deregulation can spur development (as it did once in the United States and has in Australia), lack of transparency, entry-deterring behaviour and the search for higher



margins on the part of pipeline companies damages the prospect for competitive price formation in the fuel (as Australia has seen). Licensing physical capacity and structuring cost-regulated contract carriage with physical paths takes some more operational/engineering precision and industrial/shipper participation in the definition of capacity. It also takes some limited up-front intervention in licensing and costing, and a high degree of required transparency. But that path, which embraces Coasian bargaining, leads to deregulation in the use and expansion of the pipeline system fuel and in the fuel market they serve.

Bringing together the entire discussion in this paper, we recommend the following for legislators and policy makers concerning the gas industry in the whole of Eastern Australia (Victoria included):

- Recognize explicitly that a functioning gas market (with robust spot and futures markets like other commodity markets) requires an *open and competitive gas transport sector*.<sup>3</sup> Such a competitive sector is possible if:
  - Ownership and operation of pipelines is *separated* from the control/purchase/sale of contract capacity rights within those pipelines.
  - Regulation of the transport sector adopts a *different* model from traditional regulatory coverage of the distribution sector or other public utilities.
- Define capacity rights that usefully form the basis for an open and competitive transport sector by matching the underlying physical capacity on each pipeline, through the following specific measures:
  - Federal *licensing* of specific point-to-point capacity.
  - *Regulated pricing* of licensed capacity based on the *actual book capital* and operating costs of licensed pipelines.
  - *Total transparency* regarding pipeline operational and financial accounts.
  - Mandatory trading platforms for each licensed pipeline for unregulated secondary trades of licensed capacity rights, including *full transparency* of purchaser, seller, duration, locations, etc.

---

<sup>3</sup> “Transport sector” refers to the market for gas transport services in high-pressure transport pipelines, or “transmission pipelines.”

- Reject traditional access coverage as incompatible with effective pipeline transport sector regulation.
  - Traditional coverage targets the control of utility monopoly profits against an “efficient” entity as imagined by the regulatory agency; effective pipeline regulation targets the creation of a workable market in highly specific contract rights which allow users to select the most efficient provider.
  - Traditional coverage is insufficiently specific regarding physical capacity rights (and with market carriage in Victoria relies on planners’ estimates of the capacity at unconnected points of entry to and exit from the pipeline).
  - Traditional coverage is unnecessarily and harmfully intrusive for a quasi-competitive transmission sector that has high potential to expand competitively with highly limited regulatory oversight.

Converting an unregulated—or partially covered, or market carriage—pipeline sector to one that facilitates continental-scale competitive markets in capacity rights—and hence competitive gas markets—is an industrial challenge. But the potential benefits from clarifying regulation, promoting efficient investment and creating competitive markets are huge. And Australian policy makers have the benefit of hindsight and can learn from the experience of their counterparts in the United States and Canada. To that end, at the conclusion of this paper, we set out briefly the institutional evolution of the pipeline regulation in the United States (Appendix A). Indeed it is true that Australia and the United States have different histories, political endowments and institutional foundations for their gas industries. Nevertheless, the US experience is instructive in how another, now-vibrant, gas market dealt with industry problems not unlike those now facing Eastern Australia. All that is needed is a decision to apply that experience to Australian problems.

# 1. Deregulated Trade in Pipeline Capacity Rights

The deregulated trade in capacity rights on the US interstate pipeline system represents a highly successful example of a “Coasian” market—meaning the type of market in intangible rights named after Ronald Coase (the 1991 Nobel laureate in Economics). Those markets reflect an insight that Coase introduced to his highly sceptical colleagues at a symposium at the University of Chicago in 1960 regarding a paper that he had written discussing telecommunications and the radio spectrum.<sup>4</sup> Coase never himself defined the broad definitional elements of what others have called the “Coase theorem,” but instead used a series of examples to illustrate how a market works in particular settings when property rights are defined and enforced.

## 1.1. The Coase Theorem

Markets in pipeline property rights come from the *Coase theorem*. In his 1960 paper, Coase argued that given well-defined property rights, low transactions costs, perfect competition, and complete information, resources will be used efficiently regardless of who owns them, resolving all private externalities in the process.<sup>5</sup> Coasian markets in legal entitlements have been formed in pollution rights, carbon allowances, radio bandwidth, and other commodities through the creation and clear specification of property rights.<sup>6</sup>

---

<sup>4</sup> Coase, R.H., “The Federal Communications Commission,” *Journal of Law and Economics*, Vol. II (1959). Economist Steven N.S. Cheung relates the story of how Coase convinced a highly skeptical group of economists at the University of Chicago, including Milton Friedman, John McGee, George Stigler, Arnold Harberger, Aaron Director (the department Chair) and others. Director had brought Coase to his home in 1960 to an after dinner cross-examination by these economists. As Cheung relates:

The debate began with everyone siding with Pigou against Coase. It is recalled that Coase stood stoutly on his views. According to Stigler, in the midst of the debate Friedman open fired and the bullets hit everyone except Coase. Coase himself remembers that when he found himself still standing after Friedman’s slaughter, he knew he was home free. ... According to McGee, as the debaters left Director’s home in a state of shock they mumbled to one another that they had witnessed intellectual history. See: Cheung, S.N.S., “Ronald Henry Coase (b. 1910),” in *The New Palgrave Dictionary of Economics*, First Edition, Palgrave Macmillan (1987).

<sup>5</sup> Coase, R.L., “The Problem of Social Cost,” *Journal of Law and Economics*, Vol. 3 (1960), pp. 1-44.

<sup>6</sup> See: Ellerman, A.D., Joskow, P.L., and Harrison, D. Jr., “Emissions Trading in the US: Experience, Lessons and Considerations for Greenhouse Gases,” The Pew Center on Global Climate Change, May, 2003; Kwerel, E.R., and Rosston, G.L., “An Insider’s View of FCC Spectrum Auctions,” *Journal of Regulatory Economics*, Vol. 7, No. 3, (May 2000), pp. 253-289.

Coase convinced his peers that it takes property rights to endow a resource with institutional scarcity in order to form the basis for trade and that a market could form where none had existed before simply by creating and safeguarding that scarcity value. A deregulated Coasian market for intangible inland gas transport rights exists and flourishes in the United States. The role of the federal regulator has changed to include safeguarding intangible capacity rights and the means for frictionless trade—and has accompanied a substantial reduction in traditional regulatory litigation and intervention over cost-based pipeline tariffs.<sup>7</sup>

In the US pipeline market, pipelines companies own and operate the facilities that support those entitlements to transport gas. But they do not control the entitlements themselves once shippers sign long-term contracts for them. Nor do the pipeline companies possess any operational or financial information that is not an open book to those who would buy or sell those entitlements. The entitlements themselves are explicit in terms of the physical transport they cover, have a highly predictable cost basis for those who buy and sell them, do not expire for practical purposes (as long as shippers continue to commit to pay the maximum approved cost-based price) and trade almost without friction in standardized web-based exchanges on a daily basis. Thus, the legal entitlements to well-defined transport rights are a competitively created and traded commodity defined by the federal regulator. This is, of course, an example of the Coase Theorem at work—perhaps the best example of all such examples for the way in which an efficient market in well-defined legal entitlements so replaced an existing gas market that had been regulated on the presumption that pipeline companies would serve as intermediaries in the gas sales business.

## 1.2. Property Rights and “Coasian” Markets in Legal Entitlements

The notion of property rights is central to understanding modern pipeline markets. US gas pipeline shippers have the right to use or sell these physical rights at unregulated prices on organized exchanges. Further, the cost of these capacity rights is a well-known function of federal regulatory procedures that tie regulated pipeline rates to the specific pipeline and related facilities used to support the capacity rights. Those property rights in pipeline capacity are

---

<sup>7</sup> But to be sure, all US interstate gas pipelines continue to charge cost-based regulated prices.

different from the ownership rights associated with the steel pipes and compressor stations that create the capacity. Creating these property rights in pipeline capacity in the US was a challenge in a century-old US gas pipeline system. To understand what the industry accomplished, it helps to be precise in the specific elements involved.

The definition of property rights pertaining to assets, as in the right to pipeline capacity, consists of three elements: (1) the right to use an asset; (2) the right to appropriate returns to the asset; and (3) the right to change the asset's form and/or substance. Coase made considerable claims regarding the role of property rights as an approach to economic organization:

A private enterprise system cannot function unless property rights are created in resources, and when this is done, someone wishing to use a resource has to pay the owner to obtain it. Chaos disappears; and so does the government except that a legal system to define property rights and to arbitrate disputes is, of course, necessary.<sup>8</sup>

Of course, not only are property rights sometimes costly to define (consider intellectual property rights in the modern music industry), but the courts can also be a very expensive instrument for enforcing them if not defined objectively. Nevertheless, with the creation of binding property rights in physical gas pipeline capacity, which specify the procedures for determining costs and the quantity and locations of the capacity in great detail, the federal regulator relieved itself of much of the contentious work in regulating pipeline prices (other than its largely passive role in ensuring the protection of the property rights inherent in the legal transport entitlements that it was instrumental in forming during the 1990s).

## **2. Criteria for Defining “Valuable and Tradable” Property in Gas Pipelines: The US Example**

Pipeline companies had for decades dealt with their major customers—the gas distributors—according to rules in their tariffs designed around being the full-service gas supplier at distributors' city gate stations. The pipeline did not have open access tariff rules, and the ones they initially created did not treat pipeline-owned gas and third-party gas equally. When

---

<sup>8</sup> Coase, R.H., “The Federal Communications Commission,” *Journal of Law and Economics*, Vol. II (1959), p. 14.

the interstate gas pipelines as a group converted from the business of providing delivered gas for their customers to open access after 1986, the transport entitlements that later became the basis for the Coasian market were not well defined.<sup>9</sup>

There are three parts to that story of that transformation. First, was the transformation of a generalized notion of open access into an exacting specification of physical transport rights that could be traded without the operational discretion of the pipeline company itself.<sup>10</sup> Second was the creation of a predictable cost basis for those rights that buyers and sellers could rely upon into the future. Third was the invention of a trading and information system where buyers and sellers could transact with full information and very little cost or delay.

## 2.1. Creating Highly Specific Physical Gas Transport Rights

The US Federal Energy Regulatory Commission (FERC) issued two important orders dedicated to defining the nature of the contract capacity held by shippers that they could trade in “released capacity” markets. First, the FERC had to put pipeline-owned gas on an equal footing with third-party gas (to remove subtle advantages that pipelines could gain in selling their own gas in their own pipelines). Second, they had to greatly increase the technical specification of those capacity property rights.

In a brilliant move in its 1992 order, the FERC directed pipeline gas marketing affiliates to transfer title to gas sales at “pooling points” far upstream. Downstream of these pooling points, all gas would be owned by shippers.<sup>11</sup> With the change of title to gas supplies at the pooling

---

<sup>9</sup> The history of how the US interstate pipelines came voluntarily to convert their delivered gas business to open access transport is complicated—but not germane to this paper. See: Makhholm, J.D., *The Political Economy of Pipelines*, University of Chicago Press, Chicago and London (2012), pp. 132-140.

<sup>10</sup> The exception is under highly uncommon pre-defined emergency conditions when more restrictive gas transport specifications apply.

<sup>11</sup> The FERC described the pooling points as follows in its 1992 Order:

The FERC believes that the meeting of gas purchasers and gas sellers can be facilitated by the creation of production area pooling areas on individual pipelines. Production area pooling areas may facilitate the aggregation of supplies by all merchants. The pooling areas may either be places where title passes from the gas merchant to the shipper or they may be places where aggregation and balancing and penalties are determined (“paper” pooling points). The FERC will not mandate pooling areas, but will not permit actions that inhibit their development. (59 FERC 61,030, 18 CFR Part 284 (Order 636), p. 108)

points, any subtle or perceived advantage that pipelines' gas marketing affiliates may have had in the gas being delivered by their own pipelines vanished without the FERC having to restructure pipeline companies or create some sort of information barrier between pipeline companies and affiliated gas marketers.

But even after the 1992 order, barriers remained in the pipeline market in the precise definition of contract holders' physical rights to transport service, gas balancing and flexibility. The FERC issued another major order in 2000, after extensive evidentiary hearings, which dealt with the detailed operational work of implementing the provisions of the 1992 Order.<sup>12</sup> It required pipeline companies to modify their scheduling procedures to eliminate existing disadvantages for "released capacity" (*i.e.*, the sale of transport entitlements to others) relative to pipeline-controlled capacity (whether firm or interruptible); thus allowing released capacity to compete on a comparable basis with pipeline-owned capacity. That order also required pipeline companies to permit shippers to "segment" capacity for their own use or release. Segmenting broke up capacity into separate operational links in a complete chain, to facilitate using some segments and selling the entitlements to others. The order revised imbalance management and penalty provisions, limiting penalty assessment to only those where reliable evidence demonstrated they were needed to protect system reliability.

The 2000 order required that any operational restrictions on firm transport customers' use of their contract capacity entitlements—for themselves or to sell to others—required evidentiary justification related to safe and reliable pipeline operation. What firm shippers got was a well-defined and reliable definition of the physical parameters of their transport rights on the interstate gas pipelines. Those physical parameters were worked out on individual pipeline companies on a case-by-case basis recognizing the sometimes unique physical and operational attributes of each.

## 2.2. Creating a Predictable Cost Basis for Transport Capacity Rights

As it worked toward its 2000 order resolving the rights to capacity under gas transport contracts, the FERC had to deal with a number of disputes that would determine whether those

---

<sup>12</sup> 90 FERC 61,109, CFR Parts 154, 161, 250, and 254 (Order No. 637), February 9, 2000):

rights would have a predictable cost and tariff basis. That is, would the fees paid for capacity rights reflect largely-fixed capacity costs? Would pipeline companies be prevented from raising existing fees to subsidize new capacity expansions (and thus bar the entry of possible competitors)? Such were details related to the actions to limit fees to specific capacities so as to facilitate the market in the re-sale of those rights.<sup>13</sup>

The FERC dealt with the basic tariff design issues first by directing pipeline companies to charge “straight-fixed-variable” (SFV) prices. Such a tariff resembled a contract rental payments for the transport entitlements, as they would be largely invariant to how much gas actually passed through the pipeline.<sup>14</sup> SFV tariffs, as opposed to more volumetric tariffs that the FERC had employed all through the 1970s and 1980s, simply made the cost basis for entitlements easier to predict—facilitating their trading.

The FERC also dealt with unresolved questions about whether new capacity additions could be “rolled-in” to the cost base of existing services—thereby potentially marketing new capacity additions at less than the incremental cost of those additions (and hurting competition for new capacity projects in the process). In another action in 2000, the FERC directed pipelines to segregate new capacity construction costs for the purpose of calculating “incremental prices” for the new services.<sup>15</sup> Such pricing allowed the market to decide whether an incremental project is financially viable on its own economic merits. The change made new capacity licensing comparatively easy before the FERC if a project developer could show the FERC signed commitments from long-term prospective shippers.

---

<sup>13</sup> By analogy, the sub-let market for commercial office space (a Coasian market in rights of a different sort) would be impaired if the landlord set rents based on person-days of commercial space occupancy (rather than a fixed notion of square meters) and/or if the landlord reserved the right to raise existing rents to subsidize the construction of another office building next door.

<sup>14</sup> On most pipelines, the compression turbines employed by pipeline companies to maintain pressure and capacity draw upon the gas itself, which is paid for by shippers in kind. That is, the pipeline company delivers some fraction of the gas tendered to it (say, 96 percent), with the rest going to fuel the compressors needed to overcome friction in the line. This clever device means that pipeline companies do not have to separately purchase fuel for their compressors—keeping them even further removed from the gas commodity market.

<sup>15</sup> *Policy Statement on Determination of Need*; 1902-AB86, FERC Docket No. PL-3-000.



For existing holders of firm entitlements, the FERC's action meant that those entitlements' value in the market would not be drawn away by the pipeline to sell new capacity contracts. The value of those entitlements in the market for transport would stay put with the holders of those entitlements—to use or sell as they assess the value of those entitlements in the market.

### 2.3. Inventing a Fully-Informed and Costless Trading System

A critical element in establishing the market for the legal rights to capacity is the free and transparent flow of information. In its 2000 order, the FERC dealt with this issue directly:

The Commission finds that the disclosure of detailed transactional information is necessary to provide shippers with the price transparency they need to make informed decisions, and the ability to monitor transactions for undue discrimination and preference. Shippers need to know the price paid for capacity over a particular path to enable them to decide, for instance, how much to offer for the specific capacity they seek. ... The disclosure of all transactional information without the shipper's name will be inadequate for other shippers to determine whether they are similarly situated to the transacting shipper for purposes of revealing undue discrimination or preference. ... Finally, to be meaningful, for decision making purposes, the transactional information must be reported at the time of the actual transaction.<sup>16</sup>

The FERC acknowledged that some shippers thought that its information reporting requirement burdensome, and also that it may “give shippers knowledge of their competitors’ general marketing strategy.”<sup>17</sup> But the FERC held as more important considerations: (1) the need for the market to be fully informed to operate efficiently; and (2) the ability to uncover undue discrimination or market manipulation if and when it would appear. The FERC thus chose to require the most comprehensive and immediate provision of all information on the identities and quantities, locations, etc. of all shippers. For the FERC, there are no trade secrets with respect to the use of the regulated interstate pipeline system—it is an open book.

---

<sup>16</sup> 90 FERC 61,109 (Order No. 637), February 9, 2000, pp. 184-185.

<sup>17</sup> *Ibid*, p. 183.

In addition to making federally-regulated pipelines open books for buyers and sellers of capacity, the FERC also required as part of its 1992 order that the pipelines create web-based trading platforms (electronic bulletin boards).<sup>18</sup> Those bulletin boards have become the information and trading platform for the unregulated purchase and sale of transport entitlements on the regulated interstate gas pipelines.

### **3. Adapting to Pipeline Markets with “Valuable and Tradable” Property: The US Example**

The introduction of Coasian bargaining on the US interstate pipeline system had profound effects on the duties and focus of the FERC. In the past, the FERC acted like a high judge among many competing projects for every capacity addition, in years-long disputed litigations among many parties with a stake in the outcome. Now, it acts as little more than a licensing agency for new pipeline capacity projects (determined competitively and affecting only the only the pipeline and those who committed to sign contracts for new projects). Similarly in the past, the FERC adjudicated often endless and overlapping rate applications (that pitted large customer groups against each other). Modern rate applications are largely perfunctory and, more often than not, settled between the pipeline companies and their shippers. The FERC gas division has thus become an efficient and largely reactive-only regulator whose prime purpose in the gas market is to oversee the limited rules needed for competition to flourish—in both the use and expansion of the pipeline system and in the highly competitive market for gas.

#### **3.1. The Regulator Adapts to its New Role in Overseeing the Market for Entitlements**

The FERC was unsure how well the released capacity market would work, as such a market was a new experience for a somewhat traditional regulatory agency. Dealing with its uncertainty in orders in 1992, 2000 and 2008, the FERC first to capped, then deregulated for a temporary period, and finally deregulated permanently trading arrangements and prices in that market. In essence, the FERC decided, with experience to back up its deliberations, that the

---

<sup>18</sup> The FERC said: “Since electronic bulletin boards have become standard industry-wide practice, the Commission has designed a rule that builds upon their use and sees no new burden in this requirement. Electronic bulletin boards in particular will be required to comply with the new capacity releasing requirement... 59 FERC ¶61,030 (1992), p. 70.

transport entitlement market needs no special restrictions on trading arrangements (i.e., capacity marketing agents) or prices.<sup>19</sup> The FERC had also had to deal with the consequences of redundant capacity in the new market. In essence, the ability of shippers—mostly gas distributors—to select their best routes created a shakeout. Some entitlements were worth less to shippers than their underlying cost, and were “turned back” to their pipeline owners (particularly in the mid-1990s). The FERC had to deal with pipelines fairly, while ensuring that the costs for those entitlements were not merely transferred mechanistically to the pipeline customers that remained. Such case-by-case procedures have generally helped to deal with the result of the booming production from new unconventional gas fields: some pipelines designed to flow north or east have had to reverse their flow to south or west from the new fields.<sup>20</sup>

The FERC has had to be on the lookout for any source of market abuse that would impair the functioning of the market for capacity entitlements. That is, its new tasks have been less related to traditional rate regulation (which is no longer particularly controversial) than in the efficient functioning of the market in entitlements.

### 3.2. The Market for Entitlements Itself Learns and Adapts

It was one thing for the FERC to create the market in contractual entitlements for transport; it was another for those who bought and sold them to learn how to use or trade them effectively. Since the creation of these transport contracts, highly visible shocks to the transport market in the US show how the prices for those rights respond.

The first example of a stress in the transport entitlement market occurred at the start of the heating season of 1995-1996. Below average temperatures resulted in large gas storage withdrawals that could not be readily replaced with storage injections because high gas demand persisted for an extended period of time. When temperatures again dropped dramatically across

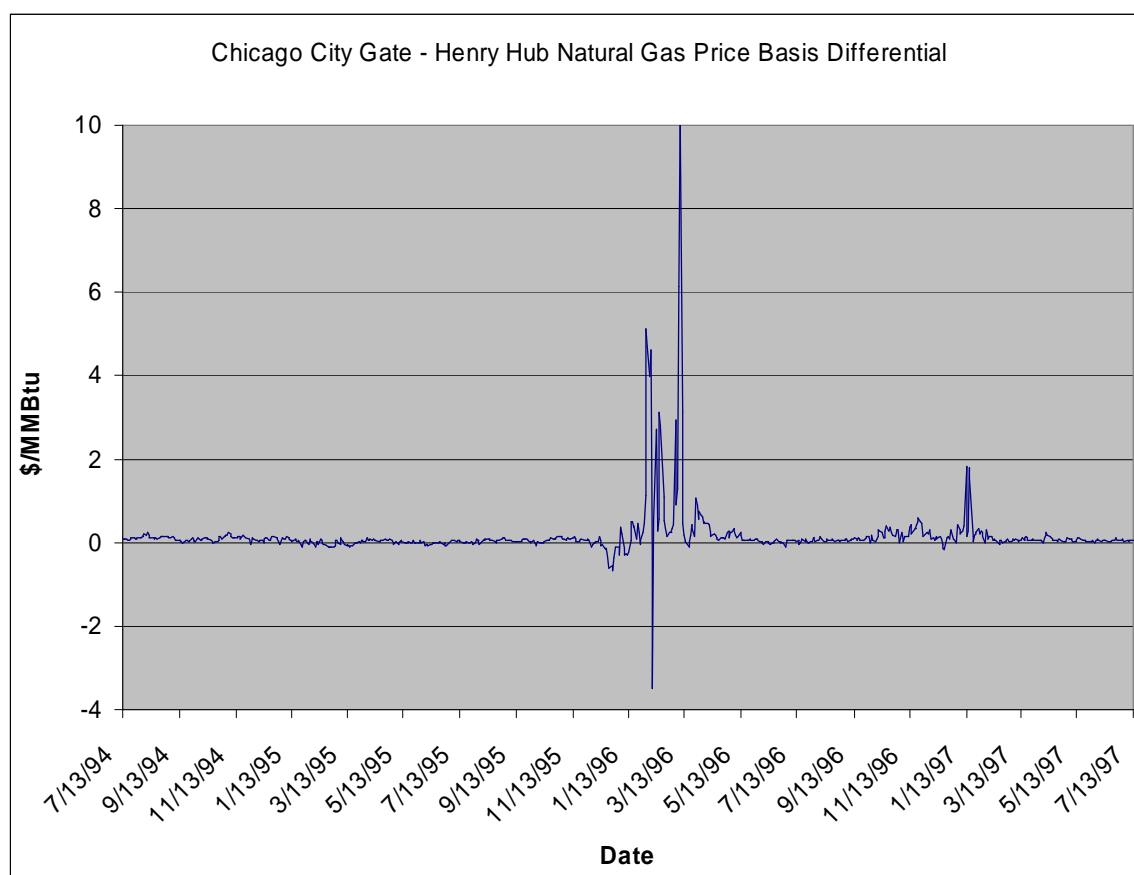
---

<sup>19</sup> The fully-evolved nature of gas pipeline regulations in the US is amply demonstrated in June 2008 by FERC Order No. 712, where the agency displayed its satisfaction with the competitiveness of the market in entitlements. It permanently eliminated any cap on the prices at which legal gas transport entitlements trade in the market. It also facilitated the assignment of entitlements to competitive aggregators for the purpose of more efficiently selling transport rights in a competitive market. See: 123 FERC ¶ 61,286 (issued June 19, 2008).

<sup>20</sup> See the examples of Tennessee Gas Pipeline and Rockies Express Pipeline.

the US Midwest, there was not enough available gas in storage to meet the spiking demand. Accordingly, gas traders panicked and the Chicago city gate pricing point spiked relative to the Henry Hub in Louisiana (reaching a differential of \$10 per mcf when the normal differential was a few cents). It was a learning experience for gas traders. The cold snap in 1997 was much like the one in 1996, but the gas market and traders had learned from the year before, and the relative price spike in Chicago was only one fifth as high.<sup>21</sup>

**Figure 1**  
**Chicago Cold Snap of Winter 1996**

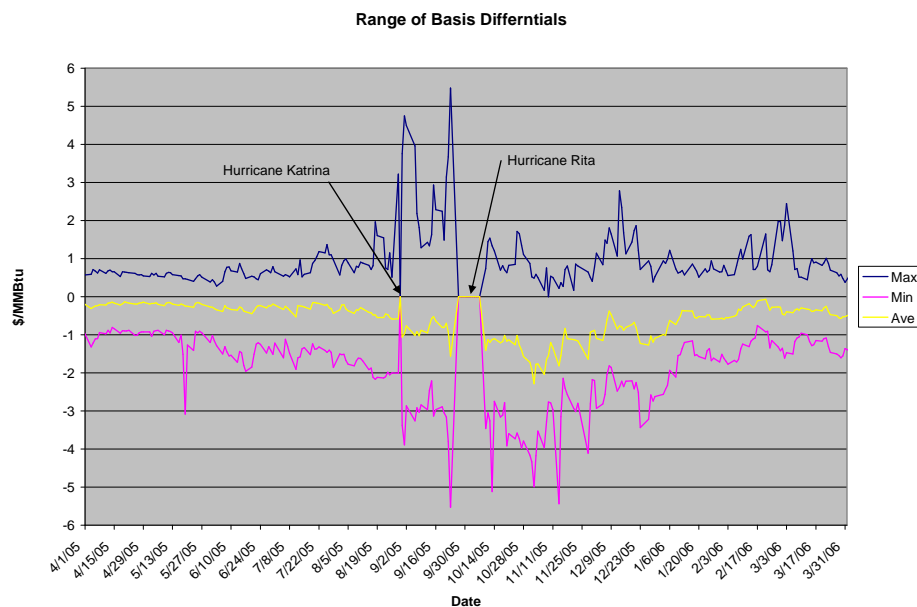


Source: Natural Gas Intelligence Press

<sup>21</sup> See: Trapmann, W. and Todaro, J., "Natural Gas Residential Pricing Development During the 1996-1997 Winter." Energy Information Administration / Natural Gas Monthly, August 1997.

Another stress on the gas system occurred in the summer of 2005, during hurricane season in the Gulf of Mexico. During this period of already tightening energy supplies, two hurricanes disrupted a large portion of the US gas supply and production. In addition to completely shutting down the Henry Hub for a day and week, respectively, Hurricanes Katrina and Rita led to different and larger than normal supply-demand imbalances across the country, and thus larger price spreads in transport entitlements. But the market cleared in this case, as with the others, and the pattern of entitlement values for transport to and from the different parts of the market returned to normal shortly thereafter.<sup>22</sup>

**Figure 2**  
**The Hurricane Season of 2005**



Source: Natural Gas Intelligence Press

These events illustrated how the flexible and well-informed market for contract entitlements learned to react to significant shocks in the market for gas. In each case, the market responded to an exogenous shock (winter peak or natural disaster) as the spot price in the free trade in contract entitlements moved according to the local supply and demand for gas.

<sup>22</sup> See: Energy Information Agency, Natural Gas Weekly Update, September 29, 2005.

## **4. Eastern Australian Gas Pipeline Capacity Products**

The essential practical difference between gas pipeline capacity offered in Eastern Australia and the US example rests in who controls capacity. In the United States, the contract shippers are in control: they own transparent and objective, highly-detailed physical rights to use or re-sell openly and unencumbered. That was the point: to limit pipeline companies to owning and operating pipelines—taking the competitive capacity market out of their hands. In that way, concentration in the pipeline market could not stand in the way of competition in the use and expansion of the gas transport system.

In Eastern Australia outside of Victoria, except for some uncommon “bare transfers” (which are private one-off negotiations), the pipelines control the transacting in the capacity market. Even on covered pipelines, some of the basic terms of forward-haul service are subject to negotiation (e.g., limitation of liability provisions), resulting in bespoke and tailored contracts for all shippers. In Victoria, market carriage is modelled on methods that govern access to the electric grid; breaking the link between physical pipeline capacity and shipper services. The operation of the Victorian system is in the hands of the Australian Energy Market Operator (AEMO), the “system operator,” eliminating any management or re-sale of notional capacity on the part of shippers.

### **4.1. Coasian Bargaining in Eastern Australian Gas Transport Capacity**

The elements necessary for Coasian bargaining for pipeline capacity do not exist in Eastern Australia. This is true for covered pipelines, uncovered pipelines, and the pipeline system in Victoria.

#### **4.1.1. Covered Pipelines (Outside of Victoria)**

High-pressure, long-distance gas pipelines in continental settings (like Eastern Australia and North America) represent a semi-rival transport industry consisting of sunk and immobile capital dedicated to fulfilling gas shipper contracts reliably. Such pipeline supply companies are not public utility monopolies. Nevertheless, owners and users of “covered” pipelines in Eastern Australia must deal with traditional Australian regulation geared to the control of such public utility monopolies. Such regulation devotes too much attention to the control of monopoly, with

5-year tariff cases, projections of what regulators imagine to be “efficient” costs in a CPI-X framework, and inflation indexation of the capital base.<sup>23</sup> Because it focusses on monopoly profitability measured against an “efficient” company, such regulation devotes very little—if any—effort the meticulous definition of physical capacity that would facilitate capacity markets. As such, it is not surprising that pipeline companies in Eastern Australia have stoutly resisted such regulation. It is also unsurprising that shippers have found the structuring of reliable capacity contracts difficult and time consuming even with covered pipelines.

#### 4.1.2. Uncovered Pipelines (Outside of Victoria)

Uncovered (i.e., unregulated) pipelines will act as one would expect of any unregulated business—to maximize their earnings and to in private exercise any market power they may enjoy. Of course, unregulated new gas pipelines have a powerful incentive to build clientele and expand the demand for gas. Nevertheless, unregulated pipelines can be expected to maximize transportation margins and earnings, to raise the cost of entry of potential market rivals (including re-sellers of existing capacity), and to protect the margins of any affiliated interests in the gas supply industry.

There are general operational and market problems to be expected with unregulated pipelines.

- They have the incentive to sign preferential contracts with its affiliates.<sup>24</sup>
- They have privileged access to information concerning competitors that would enable it to discriminate and effectively create a barrier to the entry of competing suppliers of firm capacity (whether new pipelines or re-sale of existing capacity).
- They have the incentive to create excessively tight operational rules that would also allow them to grant concessions by way of discriminating among customers for the purpose of extracting monopoly rents. Such restrictions could include high overrun and imbalance charges, long notice periods for changes in

---

<sup>23</sup> The CPI – X framework specifies that pipeline owners will adjust their prices year-to-year according to change in the consumer price index (CPI) and an “X-factor.”

<sup>24</sup> This type of behavior is widespread where pipelines affiliate with marketers. In the United States, the FERC has spent a great deal of time and effort trying to prevent the abuse of affiliate relationships. In Australia, pipeline owners do not have interests in production or retailing, but do have interests in distribution networks.

nominations, scheduling, etc., and restrictions on changes in contracts or between delivery points.

- They have the incentive to view new interconnections and requests for taps into their pipelines not with regard to economic efficiency in transportation or competition in the gas market, but from the prospects for own or affiliate profits.<sup>25</sup>
- They generally abhor public transparency of their operations and finances.

It is unlikely that uncovered pipelines would openly flout access principles or engage in pricing practices that are obviously excessive and discriminatory. However, because the services and prices offered by pipelines are complex in their formulation and implementation, little prevents uncovered pipelines from securing monopoly rents obtainable from price or access discrimination, from the erection of barriers to competitive entry into the gas transport business, or from the effective prevention of competition to their own services from the re-sale of firm capacity by contract holders.

#### 4.1.3. Market Carriage in Victoria

Market carriage in Victoria was modelled on the market rules and regulatory procedures for Victoria's electric grid management and power markets. As such, market carriage abstracts from physical pipeline capacity. It constitutes a regime that does not reflect the natural transacting practices of either unregulated pipelines or pipelines regulated with the goal of promoting Coasian bargaining in competitive secondary capacity markets.

Transacting by contract between points on a gas pipeline system is easy when the pipeline is engineered and licensed to handle the distinct physical needs of suppliers and consumers. It is straightforward accounting to track how much gas flows in and out of the pipeline at each location. The knowledge of how gas actually flows is the basis for licenses, contracts, tariffs, and the normal operational restrictions needed to make sure that the whole group of users is reliably served with the minimum of capital.

---

<sup>25</sup> Securing taps into an existing pipeline for the purpose of facilitating new gas sales has been a significant problem in the US and elsewhere. The FERC had to compel pipeline companies to strike language from their tariffs that permitted the decision to install a tap to be contingent on the incumbent pipeline company's commercial interests. This problem has also been exhibited on the Wilton to Horsley Park section of the EGP line, which may not have been necessary if EGP had been able to gain the type of transportation access rights it sought with AGLGN.



Such straightforward point-to-point transacting is impossible under current technology for AC electricity grids. It is common knowledge that electricity travels around the AC grid at the speed of light, and that such speed (in addition to technical features of power grids, such as “loop flow” and “reactive power”)<sup>26</sup> makes it impossible to predict where a particular power plant’s output will go at particular moment. Simple physics thus prevents the incorporation of any realistic notion of “distanced shipped” into AC transmission tariffs. Economists and regulators who make the rules of modern power markets have long recognized this transacting problem for electric grids. As a result, all newly competitive power markets around the world have come with regulated governance organizations (like AEMO) to deal with the electric grid operation, pricing and expansion. Regulating the operation, pricing and expansion of a transmission grid serving diverse electricity suppliers and users is a complicated task with its own direct governance costs, externalities, inefficiencies and uncertainties. However, given current technology, competitive power markets connected through AC grids have no other choice.

Prohibiting the use of point-to-point contracting in the Market Carriage regime, in favor of pricing plan that treats Victorian pipelines as natural monopolies rather than semi-rival transport companies, obscures the distance-based price signals that would otherwise emerge naturally on comparatively low-technology gas pipeline systems. In the absence of such pricing signals, pipeline system owners and the Australian Energy Regulator (AER) must either (1) consent to over-build the pipeline system to prevent congestion; or (2) live with occasional periods of congestion and allocate the associated costs to gas consumers who cannot procure the most economical fuel. From the perspective of minimizing the social cost of the pipeline system, both options are wasteful—one devotes too much capital to pipeline capacity and the other provides too little service.

Thus, because “capacity” is not a defined physical product in market carriage (like spectrum bandwidth, square meters, tons of SO<sub>2</sub>, etc.) there is no basis for Coasian bargaining in capacity in Victoria.

---

<sup>26</sup> Loop flow refers to power flow along an unintended path that loops away from the most direct geographic path or contract path. Reactive power describes the background energy movement in an AC system arising from the production of electric and magnetic fields.

## 4.2. Development of Regulation of Eastern Australian Gas Pipelines

We described in our January 2015 report the current structure of the Eastern Australian gas industry. The third-party access code that came out of the Hilmer Report recommendations dictated that Australian pipelines would be subject to access and tariff regulation.<sup>27</sup> That position began to change in 2000, with the application by the New South Wales Ministry for Industry, Tourism, and Resources to extend regulatory coverage to the Eastern Gas Pipeline (EGP). The National Competition Counsel (NCC) recommended in 2000 that the EGP be subject to access and tariff regulation, but this decision was later overturned by the Australian Competition Tribunal (ACT) in 2001.<sup>28</sup> The tribunal held that regulating the EGP would not promote competition in the gas markets, particularly given the EGP's uncommitted capacity and the incentive for the pipeline to maximize its shipments. At the same time, the ACT felt that the provision of public information that regulation would require would be of little benefit in preventing discrimination among customers, and would be more apt to facilitate collusion among alternative pipeline suppliers.<sup>29</sup>

The consequences of the ACT's decision regarding coverage for the EGP was the rejection of coverage for the other new pipeline companies, including those linking to Tasmania and the link between Victoria and Adelaide. The NSW Minister of Tourism, Industry and Resources deregulated on his own authority all but 27 percent of the length of the Moomba-Sydney pipeline in 2003, against the recommendation of the NCC. As a result, the only covered gas pipelines in Australia are the notional Victorian transmission system and two pipelines serving the smaller markets in Queensland and New South Wales.

---

<sup>27</sup> Report by the Independent Committee of Inquiry, National Competition Policy, AGPS, Canberra, 1993 (referred to as the "Hilmer Report" after its chair, Professor Frederick G. Hilmer, Dean and Director of the Australian Graduate School of Management, University of New South Wales).

<sup>28</sup> The National Competition Council (NCC) was established by all Australian governments in November 1995 to act as a policy advisory body to oversee their implementation of the recommendations of the Hilmer Report.

<sup>29</sup> Duke Eastern Gas Pipeline Pty Ltd [2001] ACompT 2 (4 May 2001), paragraphs 114-115. In that case, I was the witness for the NCC on the question of extending coverage to the EGP, as noted in that decision.

### 4.3. General Comments from Stakeholders

NERA scheduled meetings and interviewed representatives about capacity products and the working of the Eastern Australian pipeline system generally. Our meetings included the following organizations:

- AEMC, 3 representatives
- APA Group, 4 representatives
- Major Energy Users, 1 representative
- Origin Energy, 3 representatives
- EPIC Energy, 1 representative
- AEMO, 1 representative
- Jemena, 3 representatives
- AGL, 2 representatives
- Energy Australia, 4 representatives
- Stanwell, 3 representatives

The level of satisfaction differed among shippers regarding the current regulatory framework and the efficacy of the pipeline capacity market. Most expressed concern that pipeline owners exert market power because: (1) the access arrangement does not cover all the terms and conditions of a gas transportation agreement (GTA); (2) they can shape the fee structure of capacity rights to maximize rent extracted from shippers; and (3) they can use the actions of a shipper in one GTA negotiation to improve their bargaining power in a second GTA negotiation, on a different pipeline. As a result of the GTA negotiation process, GTAs on the same pipeline have different terms, including fee structures, which impede secondary trade.

Shippers reported that transaction costs can be prohibitive for exercising small capacity trades. One shipper estimated that they would unlikely trade capacity of less than 5TJ/day for a month (worth approximately \$150,000). These transaction costs partly explain the reason few trades occur via bare transfers and matching services. Only one trade had occurred on APA's capacity platforms since inception in March 2014. Concerned shippers pointed to an indicator that suggests something is wrong with the status quo: some shippers are buying interruptible capacity from pipeline owners at a high (near double) price, when firm capacity from other shippers is available.

That is not to say that all shippers agreed that the current regime is flawed. The representatives of one shipper stated that they were content with the regulation and operation of Australia contract carriage. They do not consider market power in pipelines problematic, and in their experience differences in GTAs do not impede trade of capacity rights. That shipper seemed to have a lot of pipeline capacity, using that capacity as a risk management strategy to manage its portfolio and hedge against difficulties potentially arising from the market shifts once the LNG trains come online. Its favourable position in the capacity market may contribute to its relaxed attitude towards capacity markets. Another shipper put the lack of liquidity in secondary markets down to the number of participants.

The pipeline owners also see no need to alter contract carriage arrangements. They deny any implication that they are exerting market power and cite their efforts to promote secondary trading as evidence. They reject the notion that some shippers are “hoarding” capacity and rather state that some participants are not willing to pay the market rate for that capacity. They expressed their concern that adjustments to the status quo are more likely to result in rent transfers rather than efficiency gains.

Opinions regarding market carriage were also split. Some liked that the framework seems to promote gas market competition and new entry, but most shippers would like to see firm capacity rights introduced in Victoria.

#### 4.4. Australian Capacity Products

In this section, we review what we heard regarding the mechanism for obtaining pipeline capacity through GTAs and other arrangements, and payment structures for capacity.

##### 4.4.1. Procurement details

Outside of Victoria, GTAs are the means by which pipelines sell capacity to their shippers. On an uncovered pipeline, all the terms of the GTA are subject to negotiation between the shipper and the pipeline owner. On covered contract carriage pipelines—the Roma to Brisbane Pipeline (RBP) and the Central Ranges Pipeline (CRP)—an access arrangement specifies *some* of the terms of the GTA while others, such as limitation of liability provisions, are subject to negotiation.

While some perceive the ability of shippers and pipeline owners to negotiate the terms of a tailored GTA as a benefit, it is hard to ignore the time and trouble that GTA entail. Some shippers reported GTA negotiation times in excess of eight months for uncovered pipelines. Those shippers discussed how, with such extended negotiations, pipeline companies themselves identify the type of service they believe is most important to the shipper; then used their market power to shape the fee profile to extract the maximum revenue.

The consequences of primary market inflexibility and lack of standardization and transparency impede the secondary market for capacity. Most secondary sales occur through “bare transfers,” where a shipper subcontracts capacity without the pipeline owner’s consent (although notification is required if the pipeline is covered). We do not know the number of bare transfers that occur, as they are private transactions. Anecdotal evidence suggests that they are infrequent. The cause of illiquidity comes down to trade friction. To start, shippers examine each other’s gas market activity to identify a likely trade opportunity. They then contact a prospective trade partner and commence negotiation. Complicating factors that hinder trade include differences in the fee structure of the shipper’s underlying GTAs (shippers are hesitant to reveal information about their pipeline costs to their competitor) and mismatches between negotiated delivery points and those listed in the selling shipper’s GTA (which can only be resolved by an additional negotiation with the pipeline owner).

Other, less popular, capacity procurement options in the secondary market include “assignment,” “matching services” and “gas swaps.” Assignments allow a shipper to dispose of an interest in a GTA with the prior written consent of the pipeline owner (which must not be unreasonably withheld in the case of a technically and financially capable assignee). Under an assignment, the selling shipper is released from all rights and obligations it assigns and the buying shipper is then responsible to the pipeline owner. Anecdotal evidence again suggests that assignments happen very rarely—generally linked to the sale of a business.

Matching services allow participants to list the details of the capacity product they are interested in buying/selling. There are two general types of matching services currently available in Eastern Australia: pipeline owners’ platforms and AEMO’s bulletin board. APA’s platform offers products for the South West Queensland Pipeline (SWQP) and the Roma to Brisbane

Pipeline (RBP). Jemena's platform offers products for the Queensland Gas Pipeline (QGP) and is considering another for the EGP. On their platforms, pipeline owners act as intermediaries, allowing the participants to remain anonymous. Details of the sale are confidential, except the volume and the pipeline name. The pipeline owner adjusts the capacity rights of each of the shipper and those shippers make their own nominations. AEMO's bulletin board also allows participants to list the details of the capacity product they wish to buy or sell. But their service ends there. The bulletin board facilitates bare transfers by assisting shippers to identify potential trades. All trades represent bilateral negotiation.

Gas swaps also provide the means to trade capacity. Two shippers enter into a Master Swap Agreement, which stipulates the receipt and delivery point. The agreement specifies that the seller receives the buyer's gas at one point and delivers it back to the buyer at another in exchange for a fee. The details of the trade are not public, and the pipeline owner need not know if the GTA contains the applicable delivery point.

Somewhat similarly, shippers can conduct in-pipe trades instead of capacity trades. Rather than exchanging the firm gas transport service gas, shippers can exchange the rights to gas at different points in the pipeline. In-pipe trades are not new. For years pipeline owners have kept track of gas ownership at each point in the pipeline at shippers' request. Recently, however, pipeline companies formalized the process and introduced an administrative fee for the service, giving them a share of those gains from trade.

Within Victoria the process of allocating pipeline capacity is intertwined with the gas market. Capacity allocations are implicit, resulting from the outcomes of the Declared Wholesale Gas Market (DWGM). Consequently, there are no firm capacities rights on pipelines within Victoria's Declared Transmission System (DTS). Shippers use an obscure risk management product (Authorized Maximum Daily Quantity (AMDQ)) in conjunction with the market carriage methodology to manage the cost of congestion. The AMDQ allows participants to hedge against "congestion uplift" payments (which are used to fund ancillary services such as LNG injections to maintain system pressure). However, the rights of AMDQ are constrained, since shippers remain without a guarantee of firm pipeline access. AMDQ can be acquired in a number of ways: (1) allocated by AEMO as directed by APA; (2) transferred between participants; (3)

created through an expansion negotiated between a shipper and APA; and (4) purchased from AEMO. In reality, however, there is very little trade of AMDQ and their usefulness is limited.

#### 4.4.2. Payment structure

With the exception of GTAs on covered pipelines, the payment structure of capacity outside Victoria is fully subject to negotiation. In the primary market, pipeline owners prefer a tariff that reflects costs, characterized by a large reservation tariff and a smaller throughput tariff. Pipeline owners suggest upwards of 85 percent of their firm capacity revenue come from reservation tariffs.<sup>30</sup> Beyond firm forward haul, they also have the discretion to negotiate charges for other services, such as overruns and in-pipe trades.

In the secondary market, the price of all capacity trades is bilaterally negotiated, but pipeline owners levy additional administrative fees on the trading platforms they provide. APA charges a fee of \$0.02/GJ for all capacity traded on their platform. Jemena charges a fee of \$5,000 to sign up for the platform service and \$0.03/GJ for all capacity traded on their platform. By contrast, there are no such fees for use of mandated electronic trading system in the United States.

Within Victoria, shippers pay tariffs to APA for the use of the DTS, according to their injection and withdrawal points. The tariffs are approved by the Australian Energy Regulator, in a similar way to the tariffs on covered pipelines outside Victoria.

---

<sup>30</sup> APA's indicative tariffs for all their pipelines are set out on their website.

**Table 1**  
**Evaluation of Existing Australian Capacity Products Against the Criteria for "Valuable and Tradable" Capacity Products**

Green = Purportedly Consistent with a Capacity Trading Regime (but Still Problematic)

Red = Evidently Inconsistent with Capacity Trading Regime

	<b>Criterion 1: Physical Gas Transport Rights</b>	<b>Criterion 2: Predictable Cost Basis for Rights</b>	<b>Criterion 3: Frictionless Exchange</b>
<b>Covered Pipelines (Outside Victoria)</b>	<ul style="list-style-type: none"> <li>▪ GTAs specify <i>purported</i> firm capacity.<sup>1</sup></li> <li>▪ Strict physical capacity specification needed.</li> <li>▪ Need to limit pipeline company discretion.</li> <li>▪ Operational restrictions must be evidence-based.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Access A's <i>purportedly</i> specify tariffs.<sup>2</sup></li> <li>▪ Tariffs recover subjective "efficient" costs.</li> <li>▪ Tariff level and structure remains uncertain.</li> <li>▪ Financial/operational accounts private.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Shippers trade only bilaterally, with costs.</li> <li>▪ Trades neither instantaneous nor costless.</li> <li>▪ No centralized/compulsory trade platform.</li> <li>▪ No transparency on trading parameters.</li> </ul>
<b>Uncovered Pipelines (Outside Victoria)</b>	<ul style="list-style-type: none"> <li>▪ GTAs specify <i>purported</i> firm capacity.<sup>1</sup></li> <li>▪ Strict physical capacity specification needed.</li> <li>▪ Widespread problems on costs of non-price provisions.</li> </ul>	<ul style="list-style-type: none"> <li>▪ All tariffs are negotiated.</li> <li>▪ Implement predictable straight-fixed variable that reflect actual nominal costs, minimizing regulatory costs.</li> <li>▪ Financial/operational accounts private.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Shippers trade only bilaterally, with costs.</li> <li>▪ Trades neither instantaneous nor costless.</li> <li>▪ No centralized/compulsory trade platform.</li> <li>▪ No transparency on trading parameters.</li> </ul>
<b>Market Carriage</b>	<ul style="list-style-type: none"> <li>▪ Capacity allocations merely implicit.</li> <li>▪ No firm physical capacities rights.</li> <li>▪ Need physical contract carriage to define capacity products.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Without physical rights, no basis for predicting the cost of such rights.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Without physical rights, there is nothing to reasonably exchange.</li> </ul>

1. The pipeline does not specify the exact physical capabilities of each segment of the pipeline, thus the rights are not confirmed, as a physical matter, by a party other than the pipeline company itself.

2. Those tariffs derive from traditional notions of "coverage" developed to regulate monopolies, including the inflation trending of capital costs and the forecasts of "efficient" performance of companies. Also, the relative prices among different customers or group are not necessarily specified with regularity. Thus, to a certain extent, even the "covered" prices are subject to changes that shippers cannot reasonably anticipate.



## 5. Specific Recommendations

Reflecting our discussing throughout this paper, and in particular drawing form the highly successful transport and gas markets in North America, we recommend that Australian policy makers pursue the following changes in the organization, regulation and management of the gas industry in Eastern Australia:

- Remove the pipeline coverage criteria from the National Gas Law and apply a different access regime to all transmission pipelines tailored to the specific need to permit the pipeline system to be an effective backbone for a competitive gas markets.
  - Recognize that Coasian bargaining on transmission pipelines works to make a vigorous and open gas market.
  - Orient the primary transmission pipeline regulatory function not to constraining monopoly profits but rather to making an effective market in capacity rights—which will itself constrain the market power of transmission pipelines in the market.
- Re-create a local gas distribution industry, reinstating distributors' obligation to plan for adequate transmission capacity to serve their shippers and connected users.<sup>31</sup>
  - Distributors are the natural planners for adequate service to retailers and their connected users.
  - Distributors' essential role gives them the standing to make efficient long-term commitments to capacity for the use of their retailers and connected users.
- License transmission capacity to define the point-to-point physical pipeline capacity and shippers' rights and obligations. This will create a highly specific

---

<sup>31</sup> In our January 15<sup>th</sup> report, we dealt at length with the special role of the owners of the local distribution pipeline systems. Regulated distribution utilities have three main roles in a competitive transport and gas market: (1) to act as organized, reliably-funded and long-term advocates for gas consumers; (2) to engage in long-term planning in the interests of the gas consumers to whom they connect (under the authority of their own regulators); and (3) to be the principal underwriters of pipeline investments, drawing their credit from the fact that they perform essential regulated service under prices designed to underwrite pipeline investments. The prevalence of separate retailers is generally not shared by Australian distributors' counterparts in North America. Nevertheless, there is no reason why the retailing function in Australia will not usefully co-exist with the local distributors when the latter plan for the upstream transport adequacy (that their permanent physical role provides) while continuing to be the vehicle for competitive retailing for Australian gas consumers.

gas transport product that is a well-defined intangible—but valuable and tradable—asset.

- The practical rules that permit effective markets in transmission capacity will vary from pipeline to pipeline.
  - Capacity trading has been defined successfully on all types of pipeline systems, including “meshed networks” like Victoria’s.<sup>32</sup>
- Pursuant to a standardized and regulated system of financial and operational accounting, set pipeline tariffs to recover actual capital and operating costs.
  - Such accounts, and practical methods for handling distance, will demystify transmission charges.
  - Request for justified price increases (or decreases), initiated by pipeline owners or shippers, become relatively perfunctory when led by reasonable evidence of changes against a backdrop of existing prices supported transparent accounting.
  - No other intervention in costs or transmission capacity pricing for pipeline owners is relevant to the functioning of competitive capacity markets, and we specifically recommend against inflation accounting, scheduled tariff reviews, or any sort of “incentive (e.g., RPI-X) regulatory regime targeted at utility monopolies.
- Specify separate tariffs for all newly-licensed capacity. This will ensure that value of existing capacity products are not undermined by new pipeline investment, maintaining the predictable cost basis of capacity rights.
  - Such “incremental pricing” is essential for capacity markets to be competitive.
  - It is straightforward to tie investments and shares of operating costs to incremental capacity projects within a standardized system of financial and operational accounting—and impossible without such a system.
- Mandate that shippers trade capacity on transparent web-based platforms for each transmission pipeline.
  - Competitive capacity markets depend on frictionless trade.

---

<sup>32</sup> The AEMC recently proposed a hub and spoke model to introduce contract carriage into Victoria. This proposal is a reasonable step in the right direction—effective if our other recommended steps are pursued also..

See: AEMC, Review of the Victorian Declared Wholesale Gas Market, Sydney (2015).

- The competitive benefits of fully-informed capacity markets (both in pipeline and gas markets) hugely outweigh considerations of commercial confidentiality regarding the use of transmission pipelines.

Combined, these reforms will elevate Australian pipeline capacity to valuable and tradable products and facilitate the creation of a competitive transport and liquid gas market.

## 6. Conclusion

The development of pipeline markets in Australia has been complicated by mixed signals on the part of government authorities, particular decisions on the part of ACT, and other decisions on how to structure the privatization of Gas and Fuel Company of Victoria. The current structure is a mix of mostly unregulated pipelines with some regulation and one notional, grid-like regime that does not effectively link to the other two. History matters indeed.

With respect to covered pipelines, the traditional Australian regulation is unsuited to the task of forming regular commercial pipeline capacity trading—lacking federal licensing or other specific operational parameters. In that respect, it is unsurprising that the shippers we spoke to had difficulty both in forming primary contracts and in trading their reserved capacity effectively in either informal or formal secondary markets. The type of regulatory action suited to creating reliable primary capacity services, and liquid secondary capacity markets, targets the detailed and transparent identification of available capacity and its cost—not the more unpredictable and intrusive manner of traditional Australian regulation targeted at utility monopolies.

The decision not to cover the EGP represents a visible fork in the road for the Eastern Australian gas pipeline industry. While it may have motivated the entry of new pipelines, it effectively prevented the use of uncovered pipelines to foster competition in the other market—the *gas market*—that is tied to those pipelines. The 2001 EGP decision reflected three opinions of the ACT: (1) pipelines have the strongest desire to maximize throughput; (2) information disclosure would do more to assist price collusion than prevent it; and (3) a high cross-elasticity of demand exists between pipelines. Longer US experience regulating pipelines does not support these conclusions. First, unregulated pipelines are primarily concerned with earnings and entry-deterrence, not throughput. Second, secrecy facilitates collusion and price discrimination. Third, high cross-elasticity between pipelines only exists if there are liquid secondary markets—which

cannot occur without transparency and limited regulatory actions in the primary market. In this respect, the EGP decision hurt the cause of competitive gas markets in Eastern Australia and would have to be dealt with in any new legislation or rules to foster such competition.

From the perspective of forming seamless pipeline links between the states and fostering a competitive market, market carriage was an unfortunate application of an electricity grid-inspired regulatory method totally unsuited to transmission pipeline or gas markets. In our experience, there is always the desire for quick fixes to difficult industrial problems—when time is short. The quickest fix of all was market carriage—which by prohibiting physical contract removed the ability of pipeline prices to signal the location of desirable pipeline links, effectively barred entry in favour of incumbent pipeline companies and added a layer of central system planning and administration that gas pipeline systems do not naturally require.

Total deregulation can spur development (as it did once in the US and has in Australia), but lack of transparency, entry-deterrence and the search for higher margins damages the prospect for competitive price formation in the fuel (as Australia has seen). Market-carriage-like regimes can enforce spot gas trading but at the expense of efficient market signals, predictability, efficient regulation and competitive entry. Such factors ultimately raise the risk for pipeline users and impair gas markets. Effective and limited regulatory action can promote competitive efficiency in pipeline markets and the gas markets that depend on the use of pipelines. Such action takes more operational work in the definition of capacity, limited up-front intervention in licensing and costing, and a high degree of transparency. But it leads to competition in the provision of the fuel. It takes political will to pursue that path, particularly in the face of other recent decisions to pursue other paths that do not lead to such competition.

## **Appendix A. Institutional Foundations for the Deregulated US Capacity Market<sup>33</sup>**

There are legislative, regulatory and administrative elements associated with US interstate pipeline service that are useful to recall in discussions of the principles and methods by which those gas pipeline capacity markets work. The role of history and various associated institutions matters a lot in how such industries grow and how they are regulated.

The transition from the unregulated market in vertically-integrated gas pipelines before 1935 to the unregulated market in well-defined legal entitlements after 2000 was largely an unscripted affair. No economist or legislator in the 1930s had any idea how to address all of the abusive practices of vertically-integrated gas pipelines. Indeed, the ultimate remedy lay in a type of market in intangible pipeline capacity rights that economists had not yet conceived in the 1930s. But in addressing immediate problems, and in being highly sensitive to the needs of a complex industry and its customers, the initial legislative moves satisfied a broad constituency and set the stage for ultimate success.

### **6.1. Establishing Federal Gas Pipeline Regulation**

US gas pipelines were unregulated at the federal level, like the uncovered pipelines in Eastern Australia today. That unregulated US gas pipeline industry grew quickly by the late 1920s to displace manufactured gas in supplying the major state-regulated gas distribution companies in numerous US cities. As it did so, however, the gas pipeline industry acquired and absorbed those distribution companies—forming major multi-state, vertically-integrated holding companies that dominated the US gas industry. Those multi-state holding companies engaged in a number of newsworthy financial abuses, including writing up subsidiary property values and charging excessive service fees through affiliates—and otherwise in various ways attempting to evade the jurisdiction of state regulators.

---

<sup>33</sup> We generalize the US rules for interstate gas pipelines to North America often in this paper, reflecting the general similarity between US and Canadian federal pipeline regulation (e.g., the legislative roles and regulatory activities of the Federal Energy Regulatory Commission and the National Energy Board, respectively) and the position of interstate or interprovincial pipelines within that regulatory framework. There are still important differences between the regulation, industry structures, and current issues facing the US and Canadian gas industries—but they are not particularly important for the limited purposes of this report.

**Figure 3**  
**Major US Gas Pipelines, 1930, Before the Natural Gas Act**



Source: Youngberg, *Natural Gas, America's Fastest Growing Industry*, p. 58.

The US Congress opened an investigation into the problem in 1928, directing the US Federal Trade Commission to investigate the holding company abuses. Two legislative initiatives came directly out of that investigation:

- *The Public Utility Holding Company Act of 1935*. This act was severe and almost punitive: it directed the interstate pipeline companies to divest their state-regulated distributors from their operations in what was described as “the most stringent, corrective legislation that ever was enacted against an American industry.”<sup>34</sup> The Act survived the inevitable Constitutional challenge by the pipeline industry and the dissolutions happened by the late 1940s.

<sup>34</sup> Troxel, *Economics of Public Utilities*, p. 172

- *The Natural Gas Act of 1938*. This act took longer, as it represented a wide-ranging compromise of interests. It limited federal jurisdiction to interstate pipelines (to satisfy the states), it rejected principles of “third-party access”<sup>35</sup> in favour of long-term contract-carriage (to satisfy distributors’ demand for privileged—essentially permanent—pipeline access on behalf of their millions of customers), it limited pipeline entry through federal licensing (to protect existing pipeline companies from “destructive competition”), it invoked accounting regulation (to satisfy Congress that its new industry regulator would have effective powers). The Act was also challenged as being a Constitutional overreach the first time the new Commission acted to set the rates of an interstate pipeline (for Hope Natural Gas—a Standard Oil Company affiliate). But the act survived in the Supreme Court’s famous ruling in the 1944 *Hope Natural Gas* decision that settled basic concepts of property value for regulated companies in the US.

The importance of these two legislative actions for the present paper is that it created an institutional foundation for the interstate pipeline business that could readily be adapted to Coasian bargaining in contract rights in licensed interstate pipelines.

## 6.2. Licensing of Physical Capacity

When the *Natural Gas Act* was being debated in Congress in the 1930s, “open access” pipeline service had not yet been invented—the general assumption was that interstate pipeline companies would sell “delivered gas” that they would acquire in the gas fields. Federal licensing resulted from pipeline company demands that the new regulator limit pipeline-on-pipeline competition to sell such gas supplies to local distributors and others. It permitted the FERC (and its precursor, the Federal Power Commission) to judge the “economic need” of new pipeline capacity proposals before licensing (or “certificating”)—which basically meant approving pipeline projects that investors would support (which in turn meant projects that were fully-subscribed with long-term contracts with gas distributors).<sup>36</sup> Very important in the creation of competitive gas transport markets is that the quantity of interstate pipeline capacity is objectively

---

<sup>35</sup> “Third party access” is an imprecise term, as is “common carriage” used in the US to describe the same general obligations to customers wishing service. The economic literature treats both terms as synonymous, but it is vague in both cases regarding the precise meaning and obligations attach to either term as commonly used.

<sup>36</sup> Of course, once certificated, the only way a pipeline could be taken out of gas service would be if the owners would apply to the regulator to “de-certify” a pipeline.

defined (as an engineering matter according to the models they use to design facilities) and publicly known.<sup>37</sup>

### 6.3. Accounting and Public Access to Information

With the *Natural Gas Act*, Congress for the first time invoked accounting regulation for any regulated industry at the federal level. Congress had learned in the early years of the twentieth century that weak accounting regulation invited abusive practices on the part of regulated companies, left abused customers or competitors without the means effectively to complain about such practices, and hindered the work of regulators generally. It took the new gas industry regulator two years to create a regulatory accounting standard (the Uniform System of Accounts based strictly on nominal accounting records) that became the general model for all regulatory accounting in the US.

Whether the publicly-transparent regulation of pipeline accounting would do more to assist price collusion than prevent it was an element in the reasoning of the Australian Competition Tribunal (ACT) to decide not to cover the Eastern Gas Pipeline in 2001. In that respect, the ACT's reasoning did not follow that of the US Supreme Court when deciding on the subject of publicly-accessible regulatory accounts early in the twentieth century. In the 1912 case involving transporters regulated by the Interstate Commerce Commission (ICC), the Supreme Court ruled that accounting systems for public utilities were public matters:

If the Commission is to successfully perform its duties in respect to reasonable rates, undue discrimination, and favoritism, it must be informed as to the business of the carriers by a system of accounting which will not permit the possible concealment of forbidden practices...<sup>38</sup>

The next year, in another ICC case, the Supreme Court confirmed that the regulation of accounts by a commission was lawful:

---

<sup>37</sup> Pipeline engineers design pipe and compression facilities to satisfy particular projected needs at the least cost using dynamic flow models that conform to what has long been known about the relationship between the length and size of pipelines and the number of necessary intake and offtake points that prospective users require. Those capacity requirements become the basis for the technical basis for authorized pipeline services and the license approved by the regulator.

<sup>38</sup> Troxel, *Economics of Public Utilities*, p. 120.



The very object of a system of accounts is to display the pertinent financial operations of the company, and throw light upon its present conditions.... So far as such uniformity requirements control or tend to control the conduct of the carrier in its capacity as a public servant engaged in interstate commerce, they are within the authority constitutionally conferred by Congress upon the Commission. There is no direct interference with the internal affairs of the corporation; and if such an interference indirectly results, it is only such as is incidental to lawful control of the carrier by the Federal authority....<sup>39</sup>

Combined with a 1912 US Supreme Court decision that ensured public access to the operating and financial accounts of regulated public service firms generally, this aspect of the *Natural Gas Act* ensured comprehensive public transparency in every aspect of the operations and finances of interstate pipelines. With such longstanding precedent supporting public access to information of regulated infrastructure service providers, it was entirely predictable that the FERC would decide in 2000 on total open-book and virtually instantaneous transparency regarding the market for the re-sale of capacity rights on the interstate system—completely overriding objections based on the release of supposedly confidential business information of pipeline companies or those who would use or re-sell pipeline capacity.

#### 6.4. Federal Regulation as a Promoter of Investment

As the *Holding Company Act* made vertical integration with state-regulated gas distributors illegal, an important question arose regarding where the new investment in pipelines would come from. The US petroleum industry had traditionally employed vertical integration as the vehicle to safeguard long-lived and immobile capital investments in “relationship-specific” assets such as petroleum wells, pipelines, refineries, etc. Without vertical integration who would fund new pipelines?

Fortunately, there was time to figure out the answer, as new pipeline construction stopped during the Great Depression and put those questions off until the 1940s. In the meantime, a group of American insurance companies did a comprehensive actuarial study of the newly independent interstate pipeline business. Recognizing the importance of the *Natural Gas Act*,

---

<sup>39</sup> *Ibid.*

including its accounting regulation, foundation on long-term distributor contracts and US Supreme Court validation with the *Hope Natural Gas* decision (defining the value of regulated property), these insurance companies decided that 40-year interstate pipeline bonds for this newly independent industry were very safe investments with such comprehensive, transparent, cost-based federal regulation as effective security on the loans. Those insurance companies readily invested in the fast-growing US interstate pipeline business from the late 1940s on knowing that their investments would be safely tracked in uniform accounting systems, based on nominal investment costs, and reliably repaid by high-creditworthy gas distribution monopolies according to known methods of making pipeline tariffs to accompany the pipeline companies' gas sales to those distributors.

## 6.5. Reorienting Regulation to Promote a Deregulated Capacity Market

What the *Natural Gas Act* did not do was to compel the pipeline companies to give up their central role of buying gas in the producing fields for re-sale to gas distributors and others.<sup>40</sup> That is, there was nothing like universal “open access” on the US interstate pipeline system—such a system had not yet been conceived for any industry. Furthermore, Coase had not yet described the principles for making markets in intangible property rights.

Congress in the 1930s had no real choice but to divorce pipelines from gas distributors, even if it would involve the most drastic intervention into private business affairs that the nation had yet seen. Rejecting common carriage was also a *fait accompli*, not just because it had failed as a way to regulate oil pipelines but also because the nation's gas consumers would never have accepted the risk of less than privileged access to the pipelines whose construction their business had motivated and upon whom their own customers would absolutely depend.

But the choice of Congress to regulate gas pipelines as local public utilities were regulated by the States—the only other regulatory model around in the 1930s—was itself doomed to fail, as the semi-rival interstate pipelines bought gas in a race to win new federal

---

<sup>40</sup> The act permitted pipelines to act as transporters-only to industrial firms, but the great majority of their services were devoted to providing *delivered gas* to US gas distribution companies.

licenses and invest in new pipeline, which were both low-risk and highly profitable. That race skewed gas markets in the fields, and there was never any chance that the millions of consumers connected to gas distributors (the ultimate engines for pipeline industry credit-worthiness) would agree to turn pipelines loose to buy gas as those pipelines wished. Regulating gas prices was itself no viable, long-term solution, however, for as highly reliable as the regulator was for the purpose of facilitating pipeline investment and limiting prices to reflect costs for essentially captive pipeline customers, it was proved no good at setting a compensatory price of gas in volatile fuel markets.

Congress faced many problems in the gas industry as “merchant gas pipelines” ultimately led to the federal regulation of gas prices, with costly shortages developing as a result by the 1970s. Those national shortages led Congress and the President to push to deregulate the volatile gas supply industry as a political imperative. They succeeded when, after much trying, pipelines became merely owners and operators of licensed pipeline capacity, with contracted prices based on nominal investment costs, where shippers bought and sold effectively perpetual transport entitlements according to the value of gas in the nation’s varied locations.

As we said in the body of this report, the new market also signalled a transformation of the prime job of the federal regulator. The regulator’s principal job had once been the *active* regulation of entry and pipeline prices in a non-open-access regime. Now its principal job is the preservation of the value of tradable entitlements for those who hold them, the comparatively *reactive* licensing of new projects and the occasional pipeline tariff case (although most tariff changes come through negotiated settlements between pipeline companies and their shippers rather than formal tariff cases), and the watch for any unexpected activities on the part of pipelines, producers or shippers that would harm competitive markets for either gas or pipeline capacity.



National Economic Research Associates (NERA)  
200 Clarendon Street  
Boston, Massachusetts 02116  
Tel: 1 (617) 927 4500  
[www.nera.com](http://www.nera.com)