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Contents

Natural Gas Pipeline Regulation in the United States: Past, Present, and Future

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ABSTRACT

This monograph provides a detailed overview of federal-level regulation of the U.S. interstate natural gas pipeline industry. To develop a more complete understanding of the current regulatory environment, we place contemporary rules and regulations into their proper historical context by first reviewing the evolution of gas pipeline regulation over the course of the 20th Century. We then discuss the market restructuring process that culminated in 1992 with FERC Order No. 636, review the economic and policy research that studied its effects on pipeline operations (and on the U.S. natural gas market writ large), and examine the current regulations and industry structure that have since emerged. Finally, we explore possibilities for the future of regulation in the gas pipeline industry, offering some predictions regarding the likely direction of regulatory changes, paying particular attention to the possibility of incentive-based regulation in natural gas transmission.

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1

Introduction

> *"Natural gas is better distributed than any other fuel in the United States. It's down every street and up every alley. There's a pipeline."* – U.S. energy magnate, T. Boone Pickens

The North American "shale revolution" in natural gas (and oil) production has already impacted the U.S. economy and is poised to affect energy markets globally. Despite salient but tractable environmental concerns, the potential benefits of developing this resource – both in terms of direct market impacts and reduced carbon emissions – are immense (Mason *et al.*, 2015). This, coupled with the electricity sector transitioning away from coal toward gas-fired generation, leads many to expect that the U.S. natural gas industry will continue to grow enormously over the coming decades. The U.S. Energy Information Administration has projected that domestic natural gas production will increase from its mark of just over 25 trillion cubic feet (Tcf) in 2015 to more than 40 Tcf by 2040. Even absent a federal Clean Power Plan, gas will overtake coal as the dominant fuel in electric power generation by 2030 (EIA 2016).

A fundamental aspect of this critical energy market that is often overlooked, however, is that it is supported by the most extensive

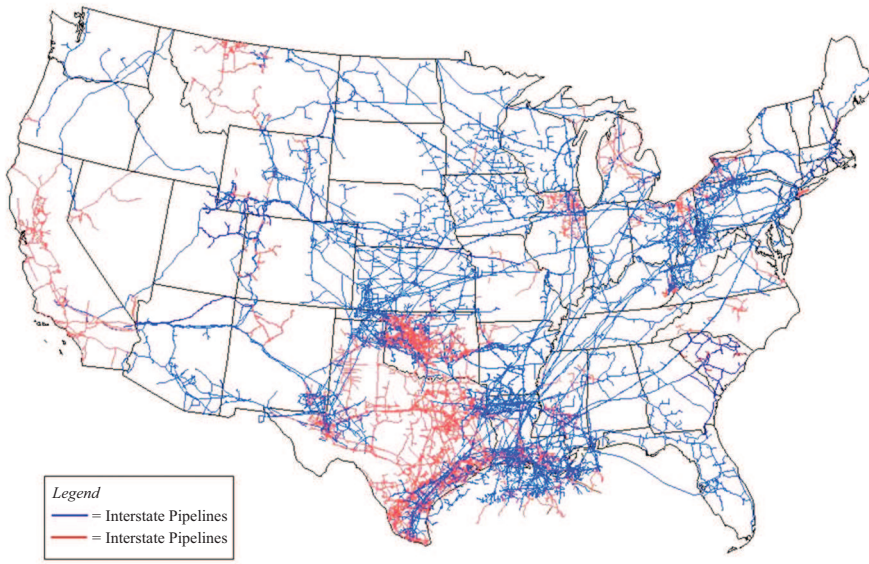

Figure 1.1: U.S. natural gas pipeline network (Source: EIA).

pipeline transmission network in the world. Along with over 1,400 compression stations and 400 underground storage facilities, the U.S. natural gas pipeline network consists of roughly 305,000 miles (491,000 km) of interconnected pipelines operated by more than 210 independent firms (see Figures 1.1 and 1.2).[1] Because over 70 percent of network transmission mileage is classified as *interstate* pipeline, most operators are subject to U.S. federal regulation. The main focus of this monograph is to provide a detailed economic overview of these regulations; we review the relevant economic and policy literature that has tracked the evolution and regulation of the U.S. gas transmission market over the past century.[2]

[1] Source: U.S. Energy Information Administration.

[2] Our use of the term "regulation" throughout this monograph should be interpreted in the economic sense of *price regulation*, as opposed to the engineering concept of physical regulation of gas flows. For an up-to-date review of the engineering and operations research literature on gas pipeline network optimization, see Rios-Mercado and Borraz-Sánchez (2015).

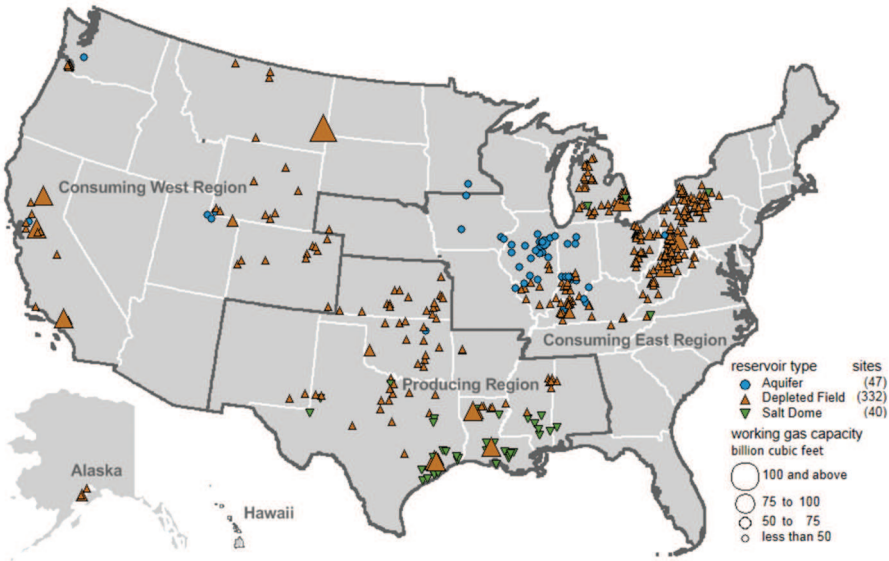

Figure 1.2: U.S. natural gas storage facilities (Source: EIA).

The development of the interstate natural gas pipeline network, and its regulation, is indelibly etched in the U.S. natural gas industry. To understand the current regulatory framework, it is important to place contemporary rules and regulations into their proper historical context. As noted by Joskow (2013), the aforementioned benefits of the United States' new bounty in economically recoverable shale gas reserves "would not have been realized as quickly and efficiently absent deregulation of the wellhead price of natural gas, unbundling of gas supplies from pipeline transportation services, the associated development of efficient liquid markets for natural gas, and reforms to the licensing and regulation of prices gas pipelines charge to move gas from where it is produced to where it is consumed." In this spirit, Section 2 provides a detailed history of U.S. federal regulation of interstate gas pipelines, highlighting the most impactful regulatory changes and discussing both the immediate and lasting effects they had on the market. The history of gas pipeline regulation in the U.S. is a fascinating case study in both the benefits and unintended consequences of direct market intervention. Our goal in Section 2 is to show how specific regulatory measures were

critical in helping the nascent (and integrated) natural gas extraction and transmission industry establish itself as a cornerstone of the U.S. energy portfolio, and how these same regulations, after the industry had grown, resulted in severe market distortions.

In response to these distortions and to increase market competition, the Federal Energy Regulatory Commission (FERC) issued Order 636 in 1992, mandating that the U.S. natural gas industry be fully restructured into separate production, transportation, and distribution sectors. Twenty-five years later, FERC Order 636 remains the defining document in shaping the current regulatory framework faced by U.S. gas pipeline firms. A wealth of economic and policy literature has since analyzed the impacts of Order 636, both on the behavior of pipeline operators specifically, and on the U.S. natural gas market writ large. We provide a thorough review of this literature in the Section 3, and discuss the current industry structure that has emerged in response to arguably one of the most impactful regulatory regime shifts in U.S. history. Section 3 also includes a detailed explanation of FERC's current rate setting methodology for gas pipelines, a discussion of the "primary" and "secondary" markets for natural gas transmission and FERC's formal capacity release system, and a brief review of several important non-price regulations faced by pipeline operators.

Finally, in Section 4 we discuss the future of regulation in the gas pipeline industry, offering predictions and recommendations to policy makers and pipeline operators regarding the likely direction of regulatory changes. Despite the significant deregulatory push ushered in by Order 636, FERC maintains some key controls over the natural gas transmission market. Perhaps the most consequential is the use of price controls based on 'reasonable' rates-of-return on cost-of-service. A growing body of economic literature now praises the benefits of transitioning away from rate-of-return regulation in infrastructure-intensive industries, in favor of more flexible 'incentive-based' regulatory models. We discuss the likelihood and implications of a move toward incentive-based regulation in the U.S. gas pipeline industry.

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