

Aggregate industrial energy consumer response to wholesale prices in the restructured Texas electricity market

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Abstract

The aggregate response of consumers to wholesale price signals is very limited in the restructured Electric Reliability Council of Texas (ERCOT) market. An overall average own-price elasticity of demand of -0.000008 for industrial energy consumers served at transmission voltage is estimated using a Symmetric Generalized McFadden cost function model. To date, ERCOT has sought to promote demand response to price signals without reliance on “stand alone” demand response programs, but with a market structure that is designed to facilitate economic demand response. This very limited responsiveness to wholesale price signals may prove problematic in light of policy decisions to pursue an “energy only” resource adequacy mechanism for ERCOT.

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1. Introduction

As noted by U.S. Federal Energy Commission (2002): “Demand response is essential in competitive markets, to assure the efficient interaction of supply and demand, as a check on supplier and locational market power, and as an opportunity for choice by wholesale and end-use customers.” Through the Energy Policy Act of 2005, the U.S. Congress affirmed the importance of expanding demand response opportunities as a matter of national policy.³

Nearly-vertical demand curves contribute to price spikes and volatility and can provide suppliers with greater market power if competition is imperfect. Studies repeatedly demonstrate that even a small amount of demand response to wholesale electricity prices can mitigate price spikes.⁴

In markets where an “energy only” approach is adopted to maintain resource adequacy, demand response plays an important role in maintaining a balance between supply and demand. This is particularly important in light of the cyclical nature of power plant construction activity. During periods when a market is left with inadequate reserve margins, demand response can provide an important backstop.

As electricity markets are redesigned to foster competition, stakeholders and policymakers are faced with the challenge of ensuring that consumers are presented with accurate price signals and the appropriate incentives to react to those prices in a manner that promotes economic efficiency and the efficient operation of the electricity market.

As the ERCOT market was redesigned in the 1999 to 2001 period to introduce retail competition and to refine wholesale operations, fostering demand response emerged as a policy objective. The Public Utility Commission of Texas (PUCT) ordered ERCOT to “Develop new measures and refine existing measures to enable load resources a greater opportunity to participate in the ERCOT market” (PUCT, 2000).

Due to features of the new market structure, some larger energy consumers who were formerly insulated from wholesale price signals through regulated tariffs with fixed pricing are now exposed to market-based wholesale market prices via creative contractual arrangements between retail electric providers (REPs) and consumers. A number of REPs offer “MCPE products” which enables a consumer to purchase power from the near-real-time balancing energy market through the REP and its scheduling entity. This is facilitated by ERCOT’s “relaxed balanced schedule” policies, particularly since this policy was formalized in October 2002. The direct assignment of transmission costs to industrial energy consumers based on their contribution to monthly system peak demand in four summer months also provides a strong price signal. Consequently, all of the industrial energy consumers in this market have an economic incentive to reduce their consumption during the peak periods upon which transmission prices are assessed. All have the ability to procure power through a widely-available MCPE product (similar to a spot market pricing arrangement). Yet the extent to which they procure power through this approach, as opposed to procurement through a fixed-price contract or a hedging instrument, is not known to the market.

The degree to which energy consumers react to wholesale price signals is not well known. Energy consumers do not presently announce to the market that they are responding to prices. There presently is no active economic demand response program which would encourage demand

³ *Energy Policy Act of 2005*, Section 1252(f). See also U.S. Department of Energy (2006).

⁴ For example: Faruqui and George (2002); Caves et al. (2000); and ISO-New England, Staff White Paper (2006).

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