



Review of the security of supply in Turkish energy markets: Lessons from the winter shortages



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ABSTRACT

Turkey has changed the essentials of its energy markets more than a decade ago. It was mainly a transition from a state-led model to a free-market one. Although some levels of progress is observable; security of supply, particularly in times of short term supply disruption had not been widely tested. Harsh winter conditions set a litmus test for Turkish energy markets. Basing on the this test, this paper provides an analysis of to what extent Turkey is open to the risks of energy supply security; and discusses possible measures to relieve future supply disruption risks. Energy policy-making should consider the fact that electricity and gas markets are highly intertwined in Turkey; and security of supply measures could have cross-market implications, paper concludes.

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Abbreviations: MOSES, Model of Short-Term Security of Energy Supply; IEA, International Energy Agency; MW h, Megawatt hour; EMRA, Energy Market Regulatory Authority; GDP, Gross Domestic Product; BCM, Billion Cubic Meters; HHI, Herfindal-Hirshman Index; GW h, Gigawatt hour; TEIAS, Turkish Electricity Transmission Co.; TL, Turkish Lira; TEK, Turkish Electricity Institution; TEDAS, Turkish Distribution Co.; EML, Energy Market Law; TEAS, Turkish Electricity Co.; EUAS, Electricity Generation Co.; SP, Strategy Paper; TETAS, Turkish Electricity Wholesale Co.; SMP, System Marginal Price; MFCC, Market Financial Conciliation Center; MCP, Market Clearing Price; TOOR, Transfer of Operating Rights; BO, Build-Own; BOOT, Build-Own-Operate.

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1. Introduction

Turkey has legally liberalized its electricity and gas markets in 2001 with two reforming acts and various secondary legislations. New market models basically aim at diminishing state's role in supplying energy to the customers by enhancing competition in all segments of the markets. Security of supply, on the other hand, is part of the reform processes. These said goals are both enshrined in the first articles of the market laws 4628 and 4646, Electricity Market Law and Natural Gas Market Law, respectively.

After more than a decade of new market order, free-market model has made certain progress in some respects, especially in terms of new entrance, investments and cost-based pricing. However, security of supply, particularly in times of short term disruption had not been largely tested. Harsh winter conditions of 2012–2013 set the first litmus test for Turkish energy markets. They were strong tests, because temperatures remained low for a long time in Turkey and even throughout Europe while the gas demand for heating reached to its peak levels. Countries who are dependent on gas as a primary source of electricity generation caught highly vulnerable to the exceptionally high gas demand. As a consequence, the security of gas supply problem eventually turned out to be an electricity supply problem as well.

Based on the developments of 2012–2013 winter conditions, this paper's objective is to analyze to what extent Turkey is open to the risks of energy supply security. While the previous studies in this field largely focus on security of supply indexes, vulnerability analysis and supply disruption scenarios, this paper's analytical starting point is a specific gas and electricity disruption – an event not simulation. However, the paper is not unique in terms of its focal point and way to deal with the issue. Various studies directly deal with a particular supply disruption or a series of disruptions with a view to developing policy implications. Bo et al. [10], for instance, develops a review of previous blackouts and power restoration measures to provide policy suggestions for the Chinese power industry. Vleuten et al. [59], on the other hand, shed a light on the enmeshed European electricity markets by tracing the causes of 2006 European blackout from an historical perspective. Earlier versions of such studies (e.g. White et al. [61]; Dutzik [23]; Kirschen and Strbac [64]) make focus on the 2003 blackouts of the North Eastern America, lasted 31 h and covered parts of US and Canada. Both Each of these studies investigate the reasons of the black out and provide certain policy implications. Our paper largely falls into the category of the studies originating from a particular event. Following the traces of 2012 and 2013 winter shortages, our paper brings us to the root causes of the disruption and to the Turkey's vulnerabilities and resilient mechanisms. This allows us also to provide policy implications to avoid future risks. It should also be noted that its research field is centered on the regulatory mechanisms with market-based policy instruments. This is a separation from the literature focusing on

network management and on the technical and engineering dimensions of the supply disruptions, which are extensively documented in Castillo [17]. Bringing evidences from Turkey, the paper also joins to the discussions (e.g. Thomas and Hall [55], Bialek [9], Yu and Pollitt [62]) whether the liberalization of energy markets leads to greater supply disruptions.

The paper, as a first step, introduces a revision of studies on and practices of security of supply. Turkey's respective conditions of natural gas and electricity supply are dealt in the following chapters. Last two parts are devoted to the combining analyses for 2012–2013 winter tests and some policy recommendations for preventing future risks.

2. Securing energy supply: literature and practices

2.1. Natural gas supply security

The issue of gas supply security is relatively a new concern comparing to other fuels and in particular to oil. The intellectual concern on energy security had long been devoted to oil security since the 1973 oil embargo. The concern remained at the top of political and academic agendas due to a serial of events in the aftermath. In his 1988 dated article "Energy Security in the 1990s", Yergin [60], for example, devotes his analysis only to oil security. The efforts to provide security of supply indexes [30,32] and to apply quantitative methods [33,50] in the fields of energy security were realized again in the field of oil. Two factors put the security of gas supply issue at the focus of scholarly research. First, the liberalization streams of 1990s, privatization of gas networks and franchising of the gas supply service to private companies created the risk of replacing security of supply goals to the motivation of profit maximization [37]. Second, the strain between Russia and Ukraine as well as the tumultuous political scene in the Middle East and North Africa region (Arab spring being the last one) has increased the geopolitical concern on the gas supply security.

These newly flourishing studies on gas supply security can be mainly divided into two camps. Some group of researches aim at developing composite security of supply indexes allowing the assessment of countries against disruption vulnerabilities and providing tools for international comparison of risks and resilience capacities. Birisselioglu et al. [5] for instance, develops supply security index (principal component analysis) based on indicators that are applied various countries for the period of 2001 to 2013. Their prime concern was developing the most meaningful indicator to evaluate the security of supply. The most effective indicators as they found for the measurement of supply security are the number of supplier countries, supplier fragility, and the overall volume of imported gas. Cohen et al. [6], on the other hand, construct a global diversification index based on the source diversification. They document cross-country and cross-time changes of

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