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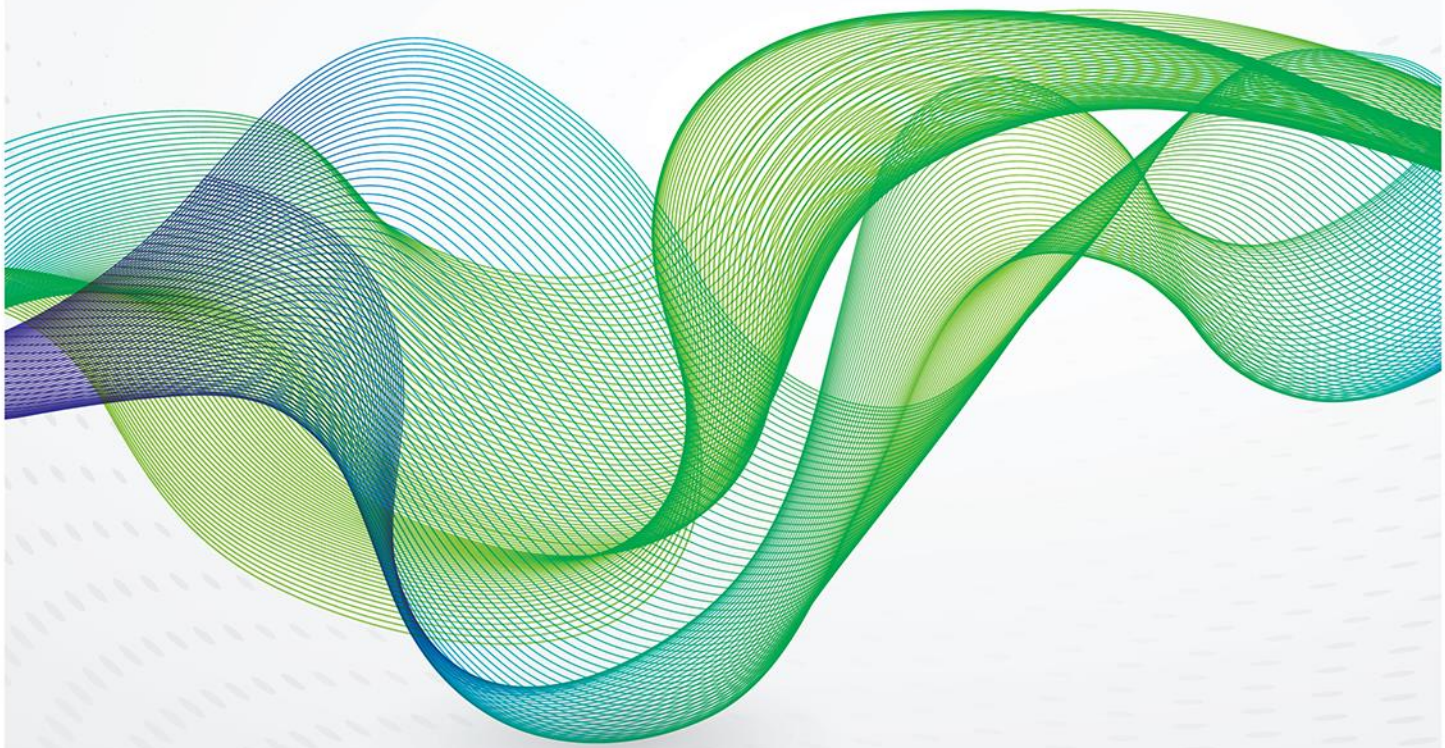
Reflection on the Baumgarten Gas Explosion:

Markets are Working



OXFORD ENERGY COMMENT

Thierry Bros

On the morning of 12 December (9:00 CET), an explosion at the major European gas hub at Baumgarten in Austria forced the operator to close the gas facility. Italian gas prices surged as a result to 80€/MWh or 27$/MMBtu and Italy declared a state of emergency regarding energy supplies. Flows restarted later the same evening (24:00 CET) and Month-Ahead prices returned to close to their pre-blast level (c. 8$/MMBtu) on 13 December.

In recent years, gas markets have also been impacted by other such unexpected events (see the table below), including the Fukushima disaster in 2011 (globally), the US Polar Vortex in 2014 (US only[1]), the Groningen cap reduction (since 2013 for Europe[2]) and some tightness in Southern Europe in 2017 leading to some policy "declarations"[3]. But in fact, gas markets are mature and liquid enough to have mitigated such issues without any state intervention: the recent Italian position was, again, simply a "declaration" as the security of the Italian system is guaranteed by the storage facilities made available by Snam[4]. What the emergency declaration shows though, is that whilst the gas industry is resilient and markets do work, implementation of the existing regulation is needed.

Date	Event	Market Results	State intervention
2011	Fukushima: 7% of global LNG rerouted to Japan	Higher prices in Asia and Europe with demand destruction	No
2014	US Polar Vortex	Short-lived higher HH prices with fuel substitution in power generation	No
2015	Groningen cap: loss of 9% of European supply	Lower prices	No
Winter 2016/2017	Cold weather & nuclear shortages in France	Short-lived higher prices in Southern Europe	Greece and Italy declare alert
12 Dec. 2017	Baumgarten blast	Very short-lived spike mainly in Italy	Italy declares emergency

Market concentration Remains Too High

The European Union Agency for the Cooperation of Energy Regulators (ACER), recommends in its Gas Target Model [5] that EU member States should:

1) have at least three distinct origin sources (defined as gas-producing countries or countries hosting a liquid hub from where gas is purchased);

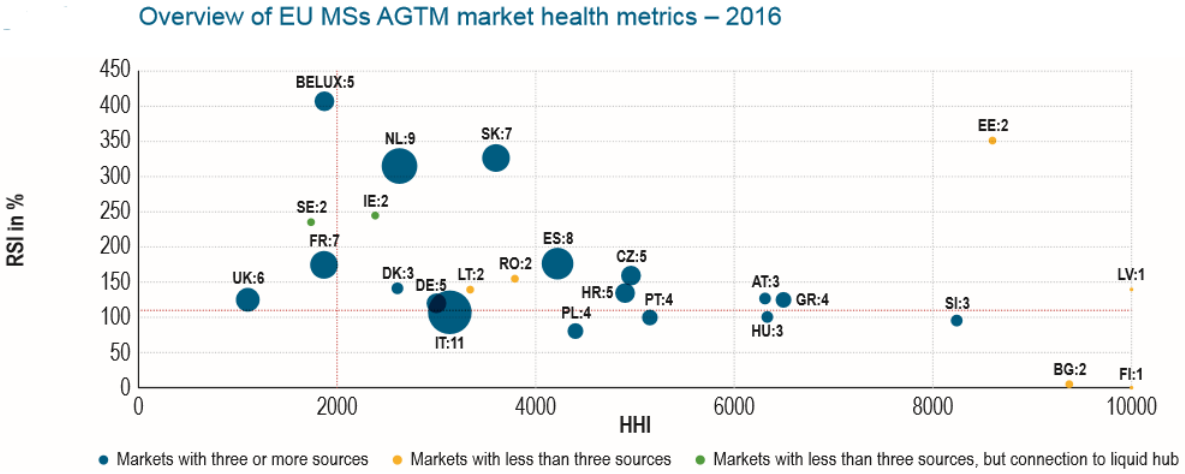
[1] The US experienced price spikes during the Polar Vortex in January 2014 (from 4 to 8$/MMBtu which lasted for a few days instead of just a few hours as in the case of Italy). The abnormally cold winter caused significant freeze-offs in production from non-conventional basins across the US while demand soared.
[2] "2 major gas shocks with completely different outcomes", Thierry Bros in Natural Gas World, February 2017
[3] In January 2017 a cold spell in Italy led to high demand and storage withdrawals, and the authorities declared an alert level for part of the month. For more info, please go to IEA Gas Market Report 2017, page 27 and to IEA Global Gas Security Review 2017 pages 14 to 27
[4] Snam 12 December press release available at http://www.snam.it/en/Media/Press-releases/2017/Baumgarten-Snam.html
[5] https://www.acer.europa.eu/Events/Presentation-of-ACER-Gas-Target-Model-/Documents/European%20Gas%20Target%20Model%20Review%20and%20Update.pdf "Market health" metrics are disclosed page 22

2) have a market concentration, as measured by the Herfindahl-Hirschman Index (HHI)[6], lower than 2,000;

3) have the capacity to meet yearly demand without their largest upstream supplier, which equates to a Residual Supply Index (RSI) greater than 110% of demand.[7]

So why has Italy, which complies with 1) and 3) and should therefore have the capacity to meet yearly demand without its largest upstream supplier, faced two gas alerts in less than a year? The obvious answer is: Italy's market-concentration is too high with an HHI higher than 2,000 (see Figure below).

Overview of EU Member States' ACER Gas Target Model (AGTM) market health metrics – 2016:
For Italy HHI is above the 2,000 ACER recommendation



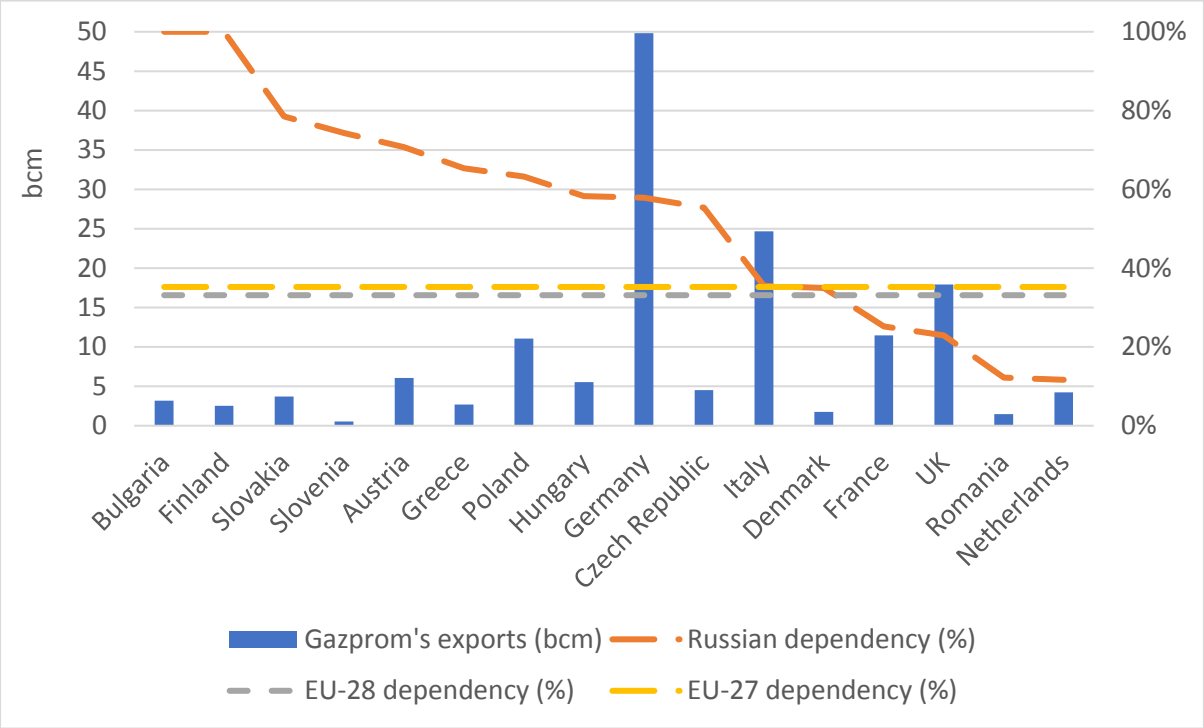
Source: ACER 2017 Report on the Results of Monitoring the Internal Markets; See the appendix for country abbreviations.

Italy is the second largest EU-27 market with a diversified gas supply coming through pipelines from Russia, Algeria, Libya, and EU sources; from LNG terminals and from storage capacity (16 bcm including 4.6 bcm of strategic reserve). Nevertheless, in 2016, Italy was still 36% dependant on Russian gas (via the Trans Austria Gasleitung (TAG) pipeline) vs. an average of 35% for EU-27 and its HHI was 3,000 (i.e. above the Acer Gas Target Model threshold of 2,000)[8].

The Italian Energy Minister said the incident in Austria in December 2017 revealed that Italy had "a serious supply problem" and underlined the need to develop the Trans Adriatic Pipeline (TAP). He stated that if Italy had the TAP, the country "would not have had to declare a state of emergency"[9], underlining the need to diversify further.

[6] HHI is a commonly accepted measure of market concentration and is calculated by squaring the market share of each firm competing in the market and then summing the resulting numbers.
[7] https://www.acer.europa.eu/en/The_agency/Pages/default.aspx
[8] ACER 2017 Report on the Results of Monitoring the Internal Markets. https://www.acer.europa.eu/Events/ACER-CEER-Market-Monitoring-Report-Launch-Event-2017/Documents/MMR%20Launch%20Event%20Persentation_Final.pdf
[9] https://af.reuters.com/article/commoditiesNews/idAFR1N14500F

2016 Country and EU dependency on Gazprom



Source: Gazprom Export, Eurogas, thierrybros.com

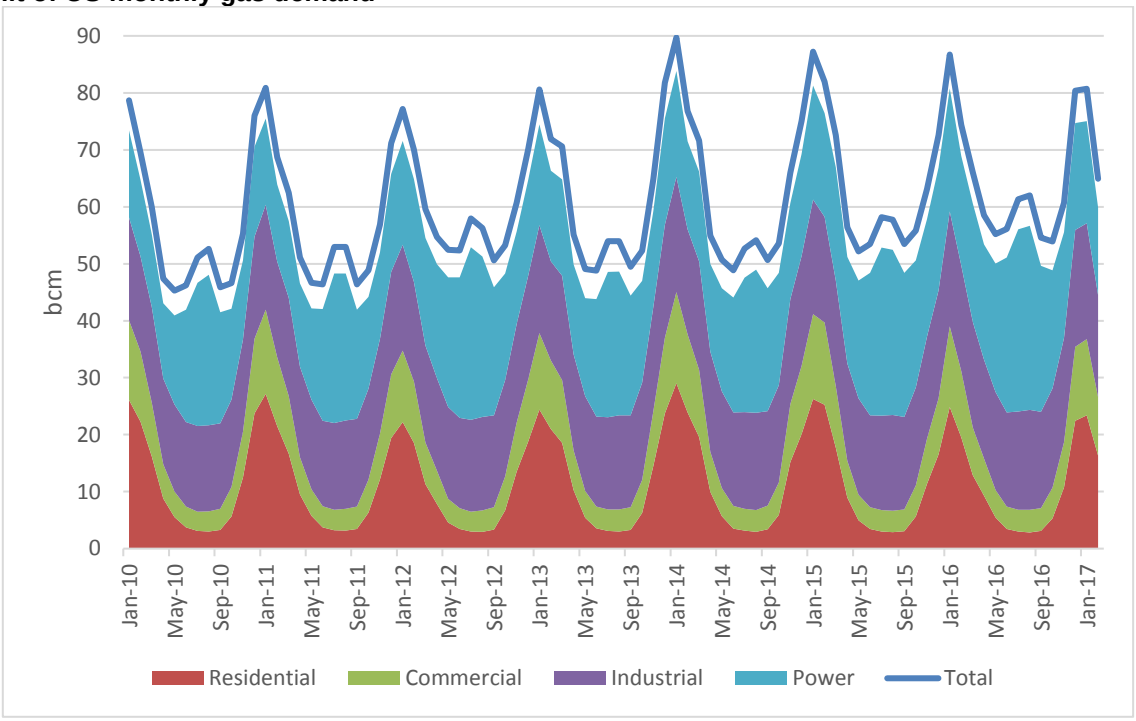
Problem Compounded

With the continued retirement of coal-fired plants, and the growing interdependency between gas and electricity, the price consequences of a gas crisis could be compounded as the 2014 US Polar Vortex experience shows. Thanks to cheap gas prices, gas has overtaken coal as the first fuel for power generation in the US. While in 2013 gas was providing 28% of the total annual electricity generation (vs. 39% for coal), in 2016, gas provided 33% and coal only 29%. With coal exiting power generation, the price consequences of a gas crisis have been severe. During the winter of 2014, the EIA noted that

> Although power sector natural gas consumption grew throughout most of the United States as cold temperatures led to increased electric demand for space heating, it decreased in the Northeast and Southeast, in response to higher prices. States in the Northeast increasingly relied on distillate fuel oil-fired electric generation when prices spiked. During a cold period in January, oil accounted for 25% of New England's total power generation, compared to 24% from natural gas. States in the Appalachian region and the Southeast region increasingly relied on coal-fired electric generation to meet higher power demand. Electric power sector consumption rose on cold days and contributed to pushing total US natural gas consumption to record-high levels this winter. [10]

[10] https://www.eia.gov/naturalgas/review/winterlookback/2013/

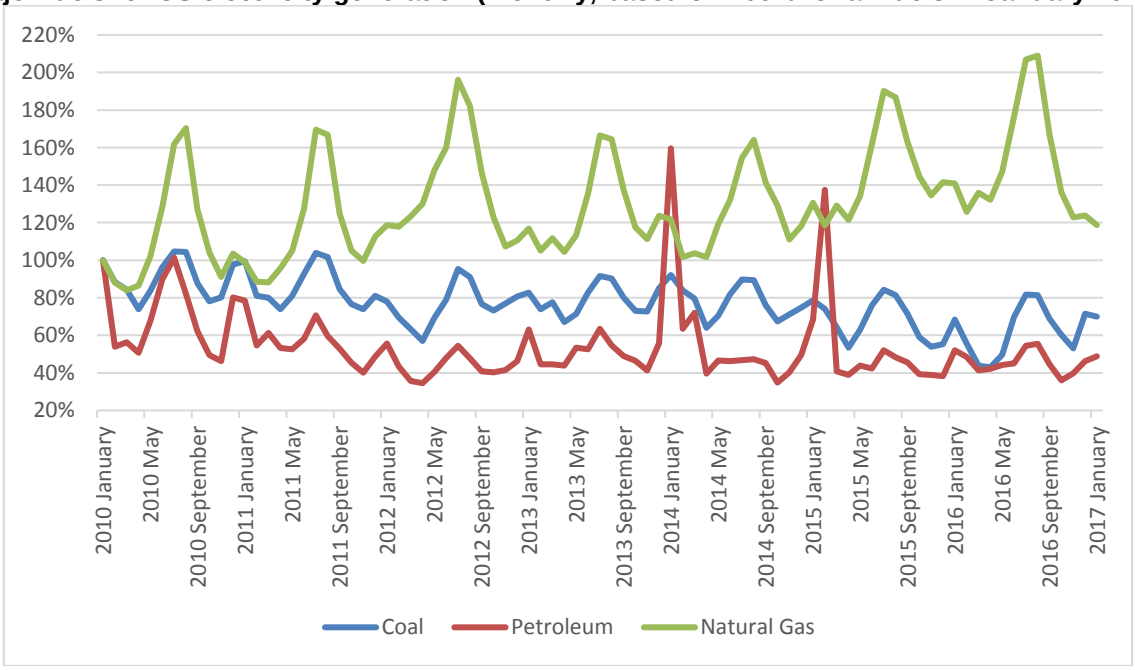
Split of US monthly gas demand



Source: US DoE, thierrybros.com

For US power, a record level of petroleum products was then needed to avoid electricity blackouts. High prices incentivised demand switching where it was still possible in power generation. So with the continued retirement of coal-fired plants, and the growing interdependency between gas and electricity in the US, the next Polar Vortex could prove to be more problematic: the past-embedded flexibility in power generation cannot be relied upon in the future.

Major fuels for US electricity generation (monthly, based on 100% for all fuels in January 2010)



Source: US DoE, thierrybros.com

Instead of calling for emergency measures during a crisis, EU-27 should protect markets

If a gas crisis could have repercussions both in gas and electricity markets, it is interesting to look at what the EU-27 should do now to avoid repeated emergency situations. The Italian Minister touched on part of the solution: pipeline diversification (TAP as long as supply is available) or, more likely for Europe, LNG diversification. Most market commentary on the day in question was on how to attract LNG carriers.

If Italy, which provides a good representation of the EU-27 gas market as a whole, witnessed repeated alerts in 2017, the rest of Europe should take the HHI metric seriously in order to evaluate the potential risk of a non-competitive EU market (for instance one relying too heavily on Russian gas). In fact, the 2017 Italian crisis illustrates that it is worth enforcing the existing EU regulation! Italy and the EU-27 do not need any additional storage -Italy and the EU-27 are already long in storage capacity- nor any major infrastructure. They simply need to ensure that the diversification metric is enforced! Without enforcing this regulation, Italy and the EU-27 allow companies to choose the cheapest supplier so as to maximize short-term profits, exposing the system to unexpected shocks, with negative economic impact if EU gas prices spike for more than just a few hours! If this entails too much work for energy regulators[11], perhaps the EU's Directorate-General for Competition (DG Comp) should take a more active role: either the diversification of supply rule is relevant and must be enforced, or the rule is irrelevant and must be cancelled.

[11] So far, except for measuring the non-compliance with the ACER Gas Target Model, nothing has been done in any country not meeting the recommendation

Appendix

Key to EU Member States

Kingdom of Belgium	B
Bulgaria	BG
Czech Republic	CZ
Denmark	DK
Germany	DE
Estonia	EE
Ireland	IE
Greece	EL
Spain	ES
France	FR
Croatia	HR
Italy	IT
Cyprus	CY
Latvia	LV
Lithuania	LT
Luxembourg	LU
Hungary	HU
Malta	MT
Netherlands	NL
Austria	AT
Poland	PL
Portugal	PT
Romania	RO
Slovenia	SI
Slovakia	SK
Finland	FI
Sweden	SE
United Kingdom	UK