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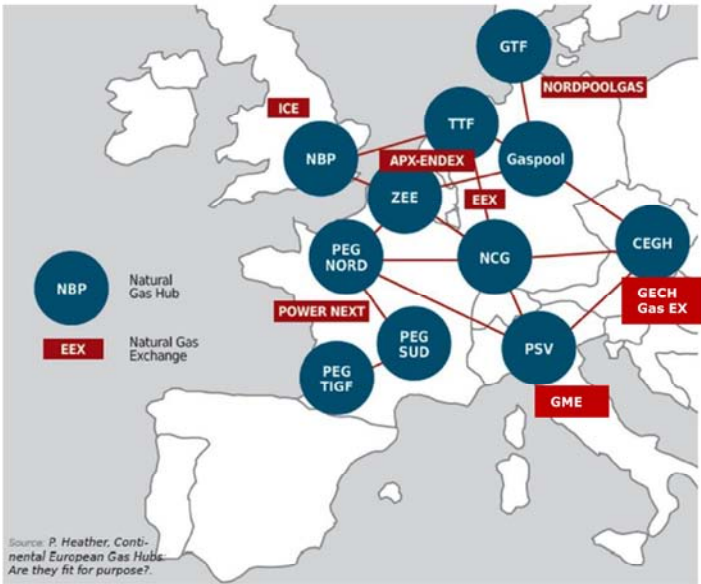
Energy Exchanges & Gas hubs **The European Practice**

June, 12th 2014

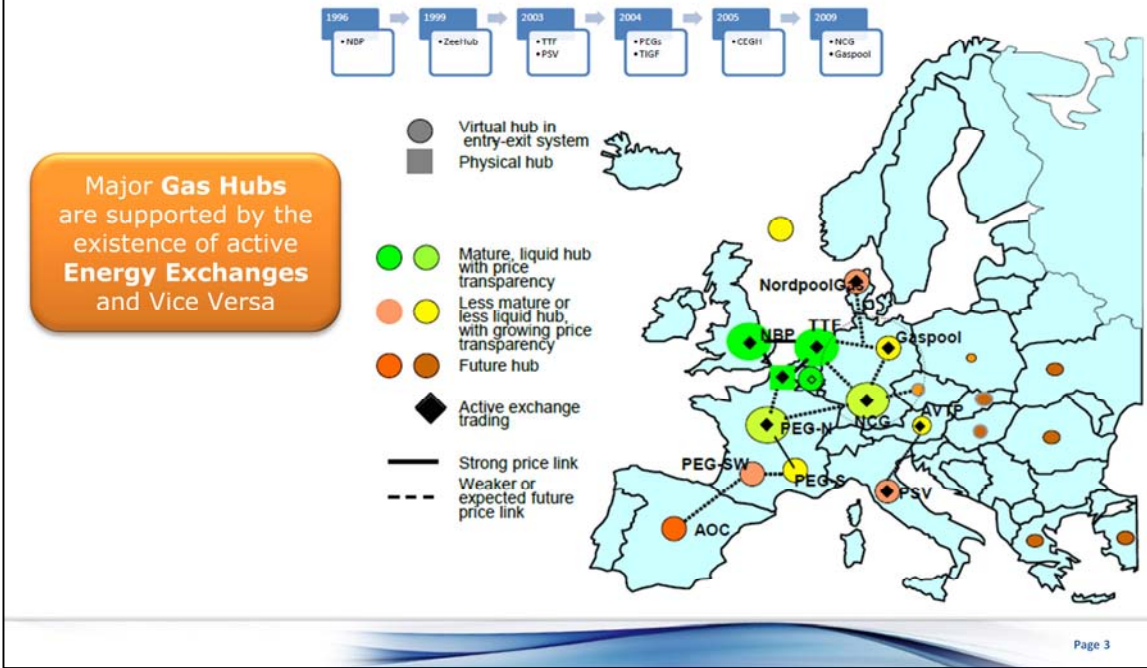
Hellenic Central Securities Depository (HCSD),
Thessaloniki Branch



The European landscape of Gas Hubs & Energy Exchanges



The European landscape of Gas Hubs & Energy Exchanges



Physical Vs. Virtual Hubs

- A hub can be a **physical** point, at which several pipelines come together (e.g. Zeebrugge) or it can be a **virtual** (balancing) point inside a pipeline system (like most of the hubs in Europe).
 - A Virtual hub is a **trading platform** for the financial transaction of natural gas, where a wide number of participants have access.
 - virtual hubs serve a **trans-regional zone** or an **entire country**.



Types of Hubs trading, transit & transition

- **Trading hubs** are mature hubs which allow the participants to manage gas portfolios.
 - The only two mature hubs are according to OIES, Britain's National Balancing Point (NBP) and the Dutch Title Transfer Facility (TTF).
- **Transit hubs** are physical transit points where natural gas is physically traded, the main role of which is to facilitate the onward transportation of gas.
 - There are two transit hubs in Europe: the Central European Gas Hub (CEGH) in Austria and the Zeebrugge hub (ZTP) in Belgium.
- **Transition hubs** are virtual hubs which are **relatively immature**, but have set benchmark prices for natural gas in their national markets.
 - These include the German Gaspool Balancing Services (GPL) hub and the NetConnect Germany (NCG) hub, the French Points d' Echange de Gaz (PEGs) and the Italian Punto di Scambio Virtuale (PSV).

Energy Exchanges in Europe

- Most Major Energy Exchanges in Europe facilitate Electricity and Gas Markets.

Energy Exchanges offer:

- **spot trading**
 - day-ahead and
 - within-day markets (starts to substitute the balancing markets)
- **Derivatives trading** (Future, forward and options contracts.)
- **Risk Management** with efficient systems and methods for:
 - Clearing
 - Settlement
 - Central Counter Party Services
 - Custody Services

Forms of Risks:

- **Credit**
- **Default**
- **Liquidity**
- **Systemic**
- **Counter party**
- **Settlement**

Energy Exchanges in Europe



NATIONAL BALANCING POINT (NBP) - UK

- The UK NBP gas market started operation in 1996 and is Europe's longest-established natural gas market and most liquid gas trading point.
- NBP is a virtual trading location, operating under the the OCM (On-the-day Commodity Market) trading system, managed by ICE-ENDEX
- around 70% of the total trade corresponds to Over-The-Counter volumes and the remaining 30% to ICE volumes
- The NBP price acts as an indicator for Europe's wholesale gas market, alongside the Dutch TTF.
- With its four LNG terminals and established market, the NBP is also used as an indicator for the European spot LNG market, something no other European hub is likely to achieve currently.
- Trading activity at the NBP accounted for 62% of all continental European gas trading activity in 2012, from nearly 90% in 2007.

TITLE TRANSFER FACILITY (TTF) - NL

- a virtual market place established in 2003 by Gasunie Transport Services (GTS), in order to facilitate trading in the Dutch natural gas market.
- With the introduction of the new market model in 2011 the TTF became the central trading point for all natural gas in the Dutch transmission system.
- the amount of gas traded is more than 14 times the amount of gas consumed in the Netherlands.
- TTF's location between Germany, France and the North Sea coast enables it to transfer gas from Norway to the German and French markets. The TTF is also connected to Britain's NBP hub. Additionally, the new Dutch liquefied natural gas (LNG) terminal opened gives TTF direct access to the global LNG market, an advantage that Germany and Austria both lack.
- ICE Endex provides the platform for spot trading at the TTF (Within-Day and Day-Ahead markets)
- Physical short-term gas and gas futures contracts are traded and handled by ICE ENDEX.

CENTRAL EUROPEAN GAS HUB (CEGH)

- The Austrian gas market is relatively bigger than the Greek in terms of consumption, reaching an annual consumption of about 7 bcm (Greece has 5 bcm).
- However it is an important crossroad for the natural gas going from Russia to Central Europe, reaching a total traded volume (including OTC) that exceeds 100 bcm.
- At the same time the storage capacity of the system is about 7 bcm, equivalent to the annual consumption of the Austrian market.
- This storage capacity increases the attractiveness of the Austrian Market, since it provides additional strategy options for traders, enhancing the role of the transit hub.

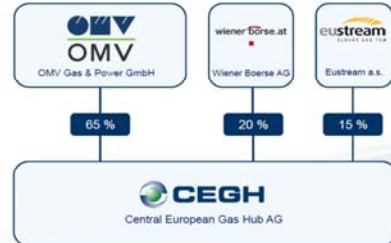


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Σημαντικό ρόλο παίζει το Χρηματιστήριο της Βιέννης το οποίο έχει δημιουργήσει την αγορά επόμενης ημέρας και την αγορά παραγώγων. Παρόλα αυτά υπάρχει αλληλοεπικάλυψη των δραστηριοτήτων, καθώς το GECH έχει αναλάβει μεγάλο όγκο εργασιών που θα έπρεπε να επωμιστεί το Χρηματιστήριο της Βιέννης, αναφορικά κυρίως με τη λειτουργία των αγορών αυτών, καθώς η αγορά λειτουργεί 24 ώρες την ημέρα για επτά ημέρες την εβδομάδα. Συνεπώς, τις ώρες μη λειτουργίας του χρηματιστηρίου, τα στελέχη του GECH επιφορτίζονται με την λειτουργία της αγοράς.

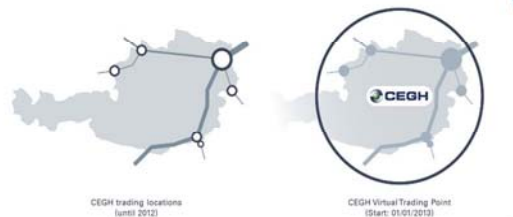
CENTRAL EUROPEAN GAS HUB (CEGH)

- The Austrian energy giant OMV is the majority shareholder of GECH with 65%, while 20% of the shares are held by the Vienna Stock Exchange and 15% by the gas network administrator of Slovakia.
- Vienna Stock Exchange plays an important role since it has created the Day Ahead market and the derivatives market



With the introduction of the new Law on Natural Gas in January 2013, the market model has changed from a set of 21 different physical points into a single Virtual Trading Point (VTP), managed by CEGH.

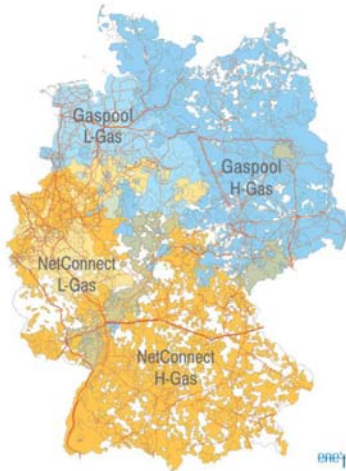
(Entry / Exit scheme).



ZEEBRUGGE (ZTP) - Belgium

- Belgium receives gas coming from Norway, the Netherlands, Algeria - through the Zeebrugge Beach LNG Terminal - and UK which is directed to France, Italy, Spain, UK, Luxemburg and Germany.
- with an overall throughput capacity of 48 bcm/year i.e. 10% of the border capacity needed to supply the EU27.
- The Zeebrugge hub is a physical transit hub
- Belgium has significant storage facilities,
 - Loenhout underground storage, with a working capacity of 700 mcm of high-calorific natural gas, a withdrawal capacity of 625 mcm/hour and an injection capacity of 325 mcm/hour.
 - Zeebrugge LNG Terminal has a storage capacity of 380 mcm and a send out capacity of 9 bcm/year.
- ICE Endex provides the platform for spot trading at the ZTP

NETCONNECT & GASPOOL - Germany



- The German territory is divided into two major market areas, which correspond to two gas hubs.
 - NetConnect Germany GmbH & Co. KG is Germany's largest natural-gas grid market area operator in the southern part and Gaspool is the second natural gas hub of Germany and like the NCG, it is run by six TSOs.
 - Germany is becoming an important transit hub for natural gas due to its broad cross-border pipeline infrastructure and its central location in Europe.
 - Germany has 48 gas storage facilities, making it the country with the largest storage capacity in Western Europe, with a capacity of 20,4 bcm.
- The European Energy Exchange offers products for the Spot and Derivatives market for both gas hubs

POINTS D' ECHANGE DE GAZ (PEGS) - France



- The French gas market is facilitated by the Gas Transfer Points (PEG: points d'échange de gaz), owned by Gaz de France.
 - The PEGs are linked to three balancing areas for the gas transmission network: the Northern zone (GRTgaz), the Southern zone (GRTgaz) and the South-West zone (TIGF).
 - To each of the three balancing zones there is a corresponding virtual trading point: PEG Nord, PEG Sud and PEG TIGF.
 - Nevertheless, the PEGs have only been used as balancing points rather than areas of trade due to low levels of liquidity.
- Powernext offers spot contracts for all three hubs, as well as future contracts for the PEG Nord.

PUNTO DI SCAMBIO VIRTUALE (PSV) - IT

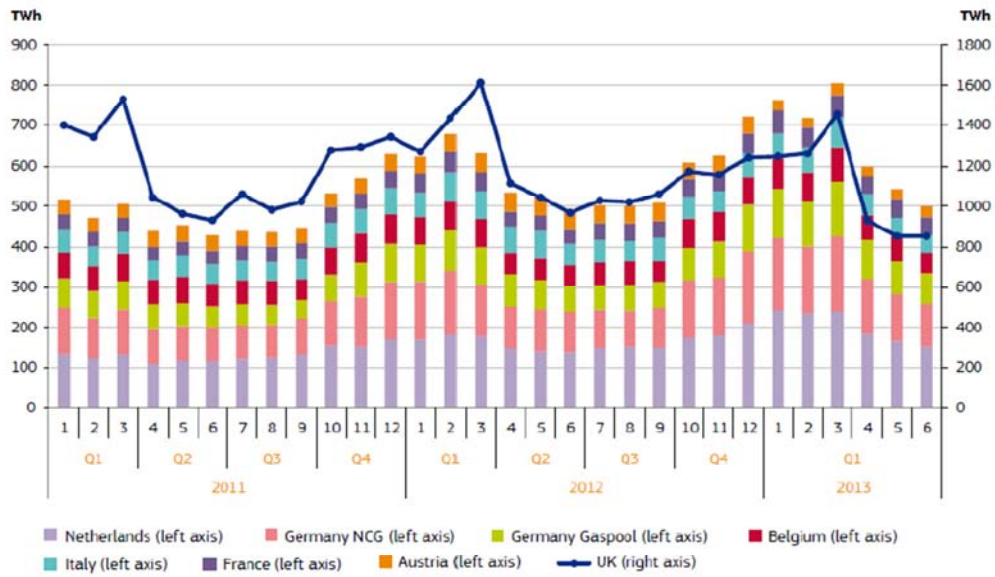


- Italy has strong gas demand growth since it generates almost half its power from gas.
 - Europe's third-biggest gas market after Britain and Germany is emerging as Southern Europe's core gas trading point, as new pipelines and liquefied natural gas (LNG) projects make it one of the continent's most diversely supplied markets.
 - There are around 150 operators trading gas on the PSV, from around 110 in 2011 and 82 in 2009.
 - The Virtual Trading Point PSV, created in 2003, is operated by the Italian natural gas transmission system operator (TSO) Snam Rete Gas.
- Energy market operator GME manages the M-GAS natural-gas market with forward and spot contracts available

Traded and delivered volumes

Physical delivered volumes								
	NBP	Zeebrugge	TTF	PSV	PEG's	GASPOOL	CEGH	NCG
2003	52.5	10.2	1.3	0.1				
2004	53.2	10.6	2.3	1.0	0.2			
2005	53.7	8.4	3.8	2.0	2.7	0.3	0.7	
2006	60.6	8.6	5.9	4.8	3.8	0.8	4.7	0.1
2007	66.8	7.9	7.4	6.8	5.1	2.2	6.9	4.1
2008	66.6	9.1	18.7	7.7	6.6	4.4	5.2	14.4
2009	74.6	12.9	25.0	11.0	8.1	12.9	7.6	25.0
2010	95.8	16.7	31.3	21.5	8.7	29.6	10.9	31.3
2011	79.6	14.3	35.6	23.0	12.8	29.6	11.6	35.5
2012	88.2*	12.6	39.6	25.9	17.0	35.0	13.4	42.3
Net traded/nominated volumes								
	NBP	Zeebrugge	TTF	PSV	PEG	GASPOOL	CEGH	NCG
2003	611.0	38.6	2.3	0.1				
2004	551.9	41.1	6.2	1.1	0.3			
2005	500.1	41.7	11.6	2.6	4.0	0.4	0.8	
2006	615.2	45.1	19.1	7.1	7.0	1.2	8.9	0.2
2007	902.6	40.2	27.6	11.5	11.1	4.8	17.7	6.6
2008	960.8	45.4	60.5	15.6	16.5	9.7	14.9	25.3
2009	1 016.1	64.9	73.6	23.5	23.1	28.6	22.8	56.0
2010	1 095.5	65.2	106.5	43.1	27.8	65.0	34.1	84.1
2011	1 137.2	69.3	151.7	57.7	39.8	75.8	39.2	108.5
2012	1 271.0	66.6	187.9	64.7	46.3	88.3	47.3	133.1

Traded volumes in the European Gas Hubs



Regional Energy Exchanges

- Regional Energy Exchanges have launched gas spot and derivatives trading without the existence of gas hubs
 - POLPEX (Poland)
 - OPCOM (Romania)
 - CEGH Czech Gas Exchange
 - Gas Point Nordic (Denmark)

- All these initiatives are relatively young and need time to show if they can become efficient

Think about what market users want

“Each new hub tries to reinvent services to market, incurring unnecessary costs for them and for traders”



Develop best practice model for creating a successful virtual trading point




Benchmark Europe's existing hubs and recommend improvements



Seek out what the users of the market actually want

Features of an efficient model

- Network grid capacity
 - Interconnection capacity
 - Storage facilities
 - Diversification of suppliers
 - Geopolitical location
 - Compliance with best practices in Europe
 - Establishing a single Entry – Exit market model
 - Establishing market based model for pricing, balancing and distribution
 - Offering hedging instruments
- 
- Infrastructure investments**

Major Gas hubs are supported by major Energy Exchanges