



## Design of the gas hubs & exchanges and evolution on the example of the Central European Gas Hub

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# Agenda



- 1. Introduction & CEGH at a glance**
- 2. Austria Market Model & CEGH OTC Services**
- 3. PEGAS CEGH GAS Markets**

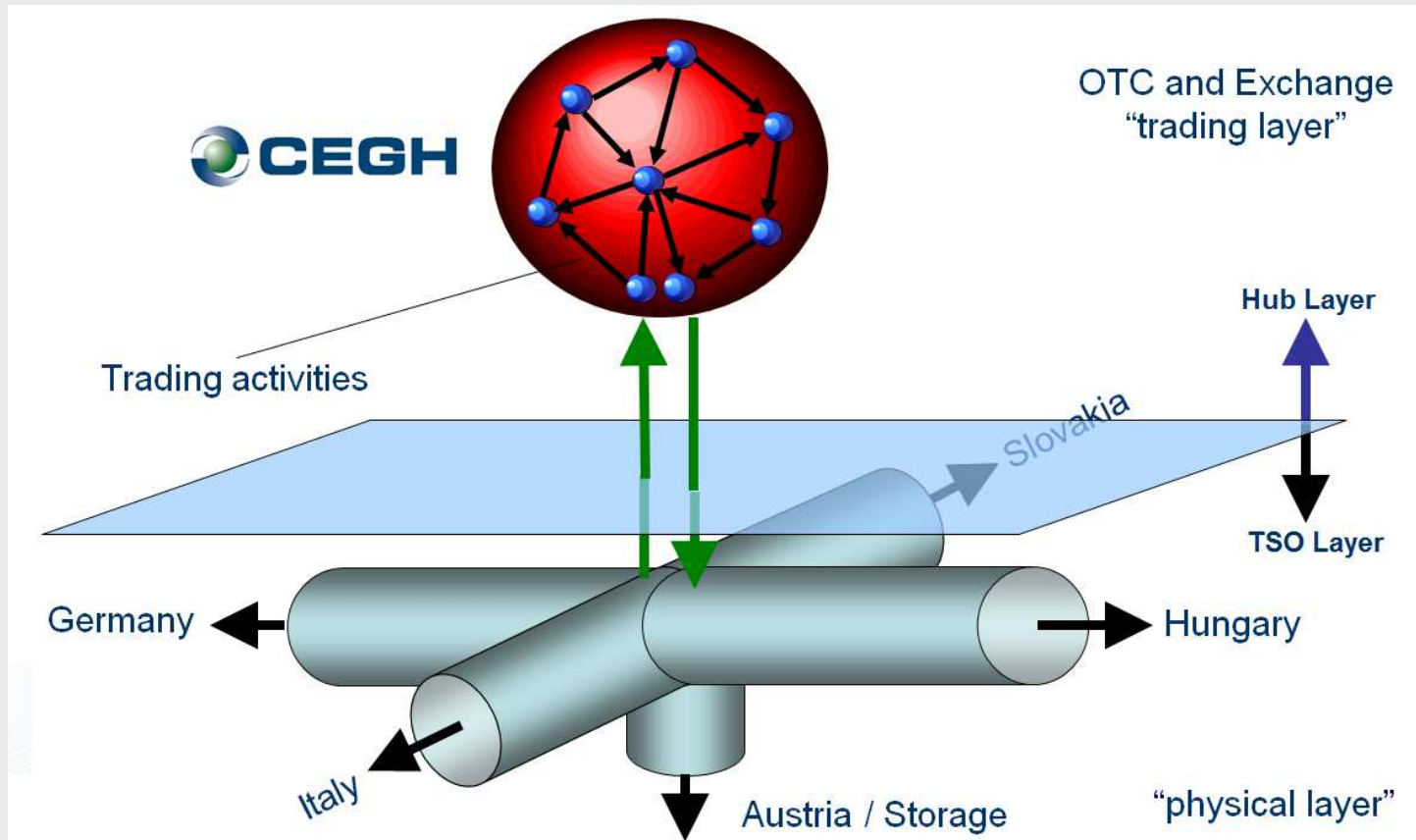
# CEGH - The gateway from East to West within Europe's hub landscape



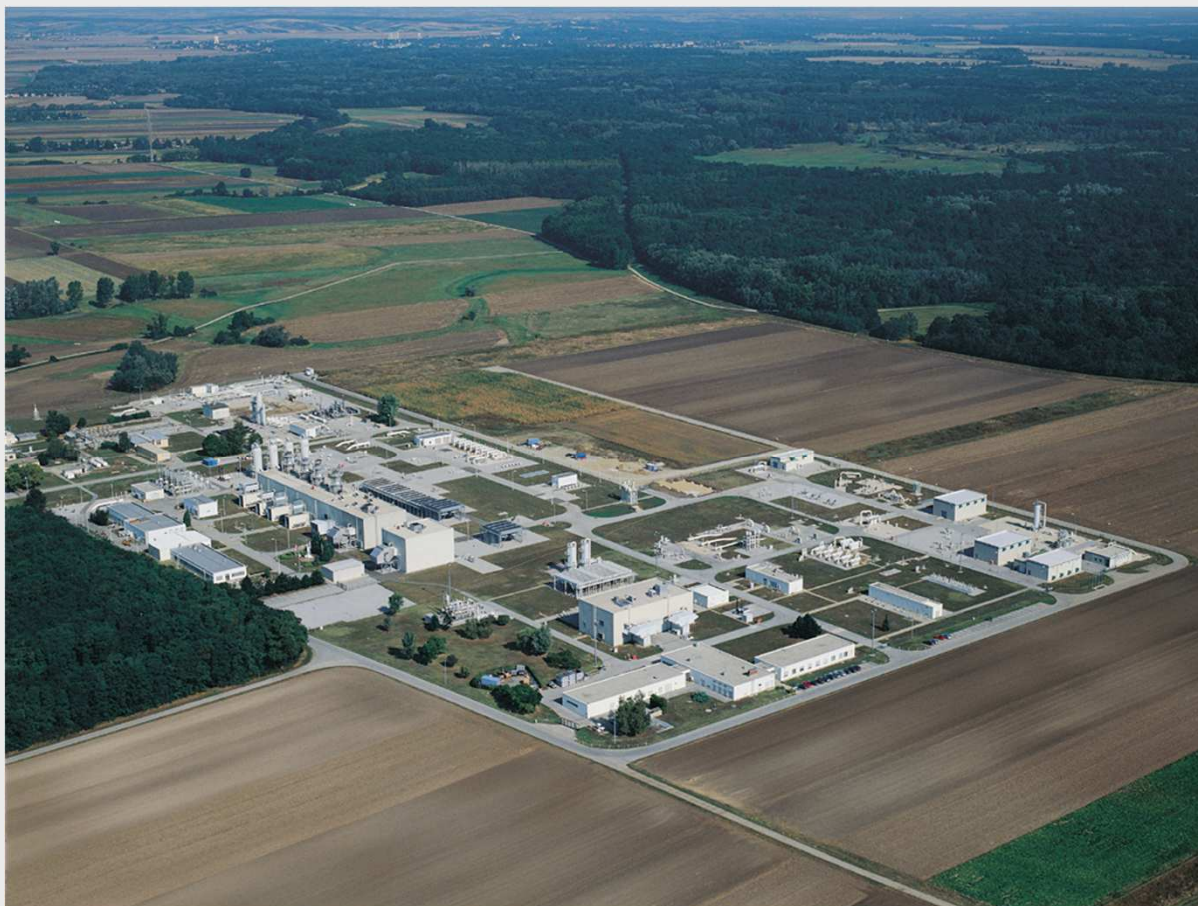
## CEGH:

- *Strategic location*
- *Gas transit routes*
- *Storage facilities*

# “Trading layer” (hub) versus “physical layer”



## Baumgarten Station (\*)



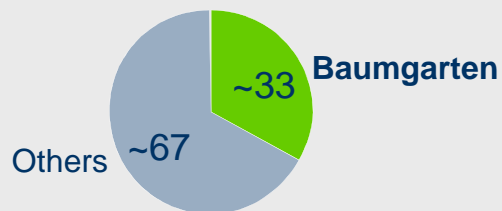
**(\*) ... owned and operated by  
Gas Connect Austria**

# CEGH-VTP will be developed to an even more liquid and attractive gas hub



## Gas hub Baumgarten

Russian gas exports to Western Europe, in %



Largest station for natural gas in CE and first major gas hub for gas from East

Source of storage volumes: Gas Storage Europe

## Infrastructure and storage facilities

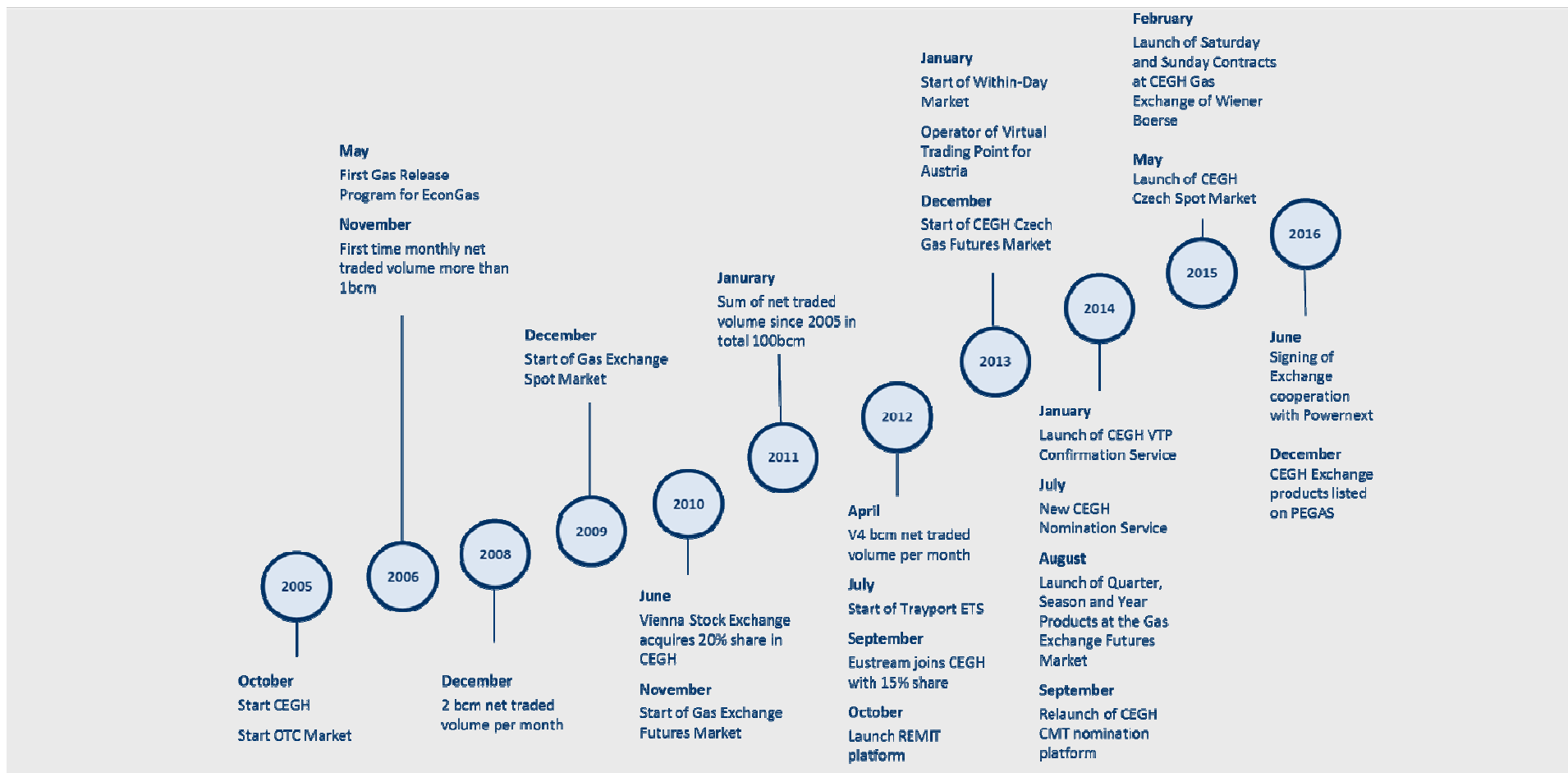


20 storage capacity within 400 km

High storage capacity around Baumgarten assuring high flexibility and supply security

- *Baumgarten offers an excellent location for international gas trading*
- *State-of-the-art infrastructure, gas supply routes and modern gas trading platform of Central European Gas Hub (CEGH)*
- *Unique location between (more) liquid and (more) illiquid markets*

# CEGH – Historic Development



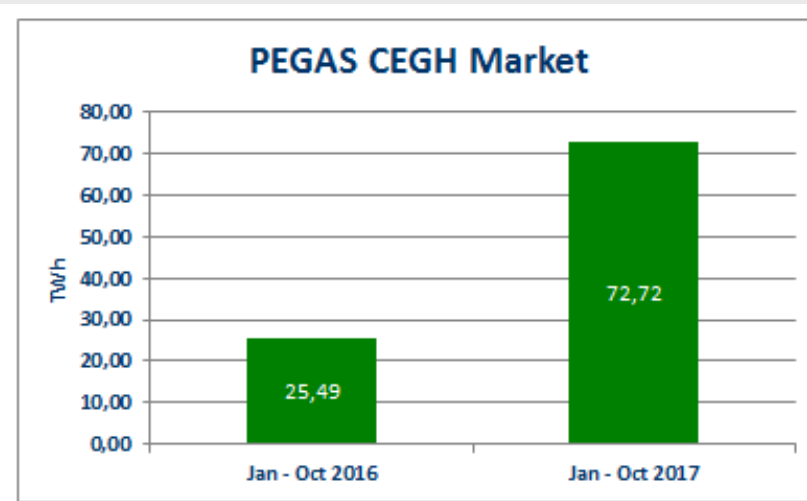
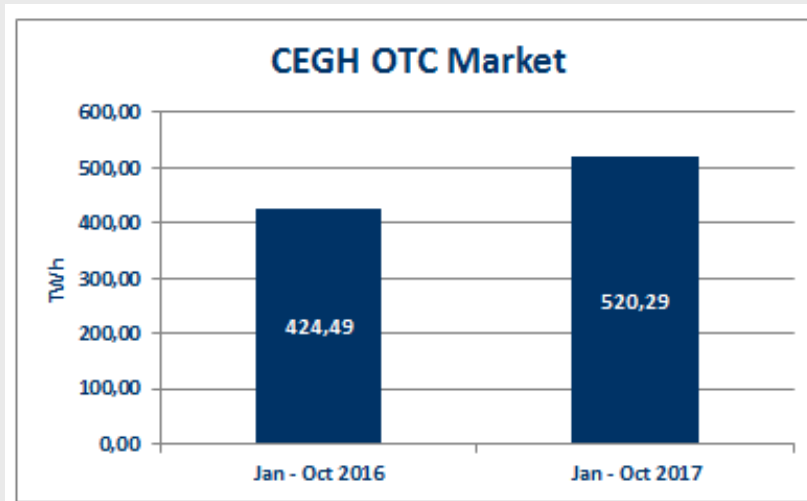
# CEGH Volume Development 1 – 10 / 2017

## CEGH VTP:

1 - 10 / 2017: 520.29 TWh  
 (y-t-y: **+22,6%**)

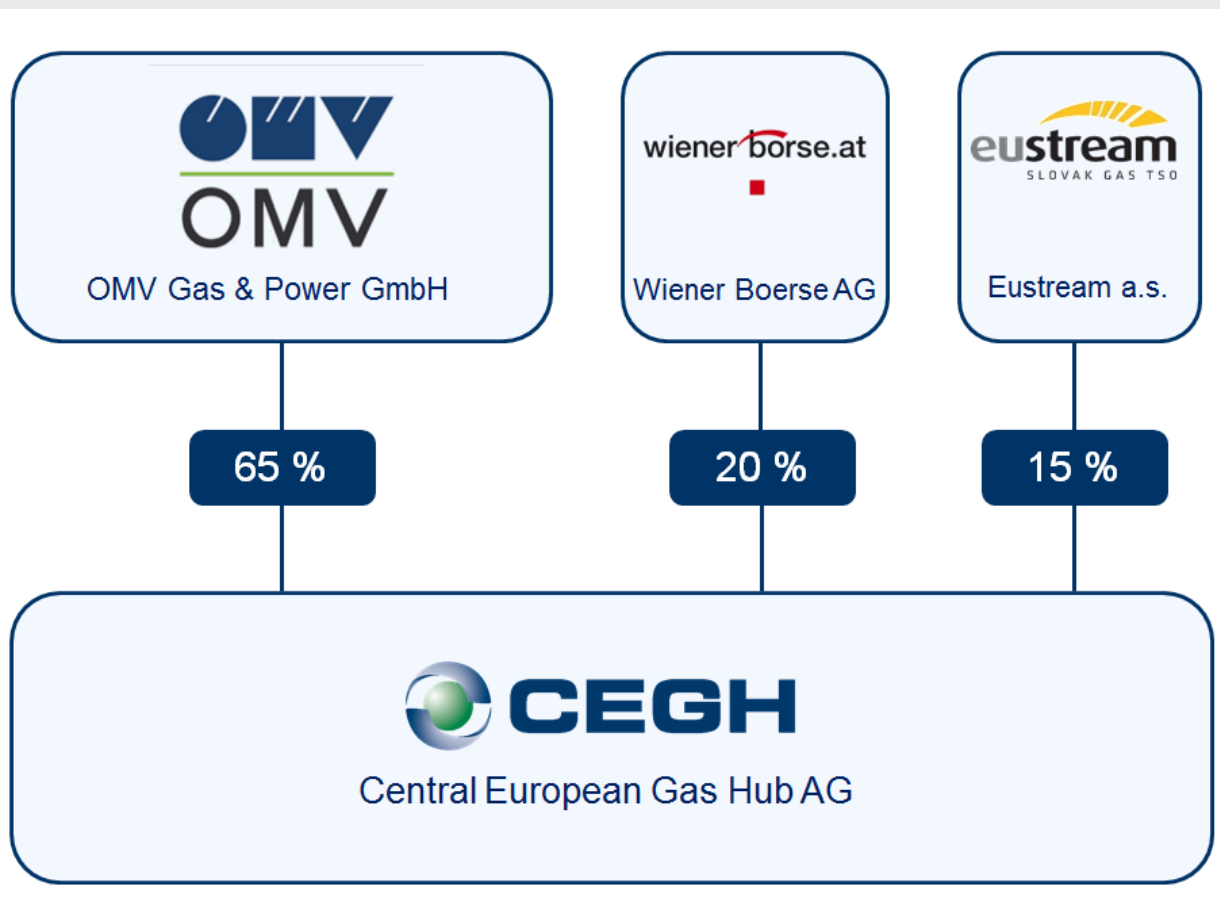
## PEGAS CEGH Gas Market:

1 - 10 / 2017: 72.71 TWh  
 (y-t-y: **+185.3%**)





## CEGH – Shareholder Structure



## 2 Pillars for CEGH's success

**CEGH Operations**

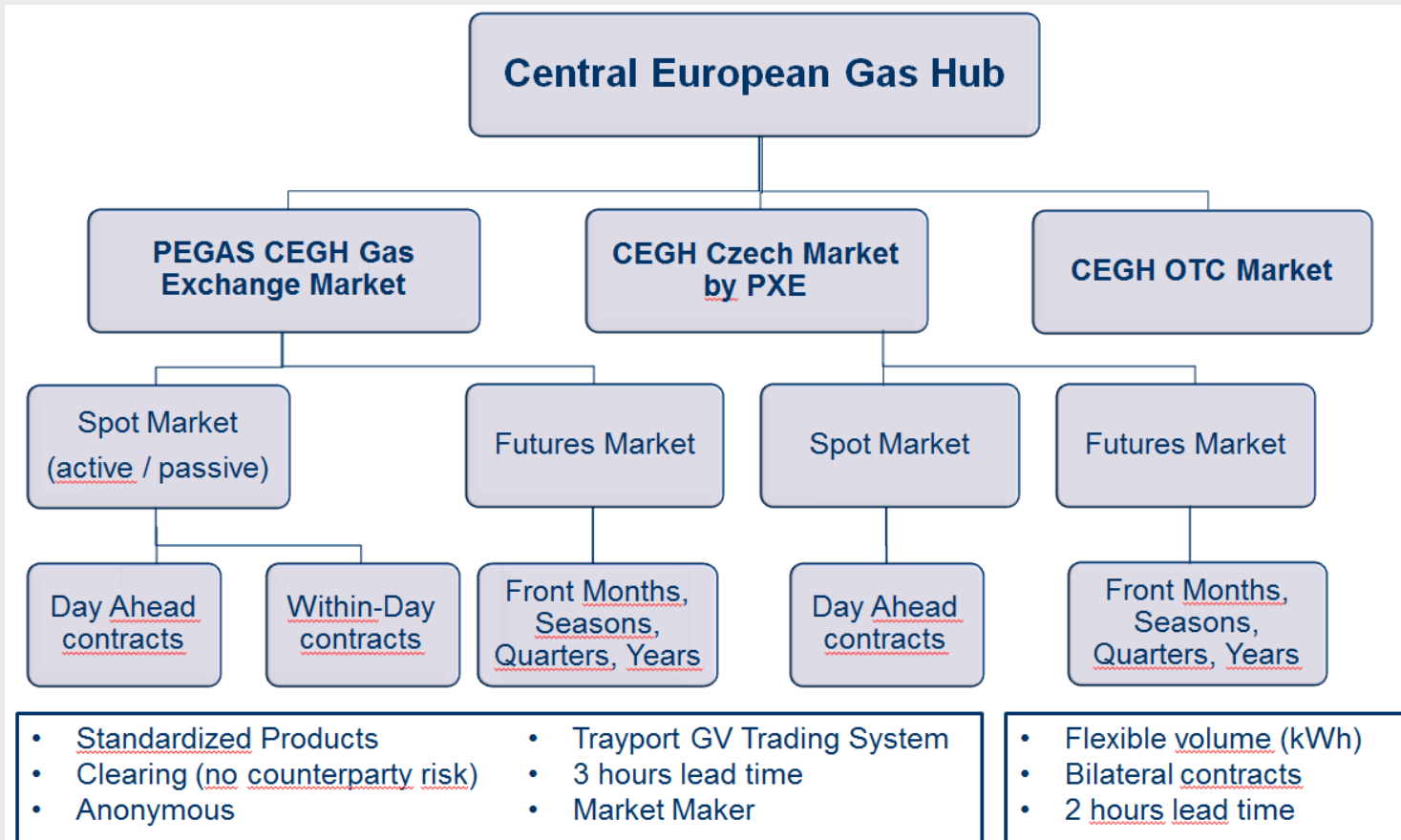
**OTC  
Services**

**Gas  
Exchange  
Services**

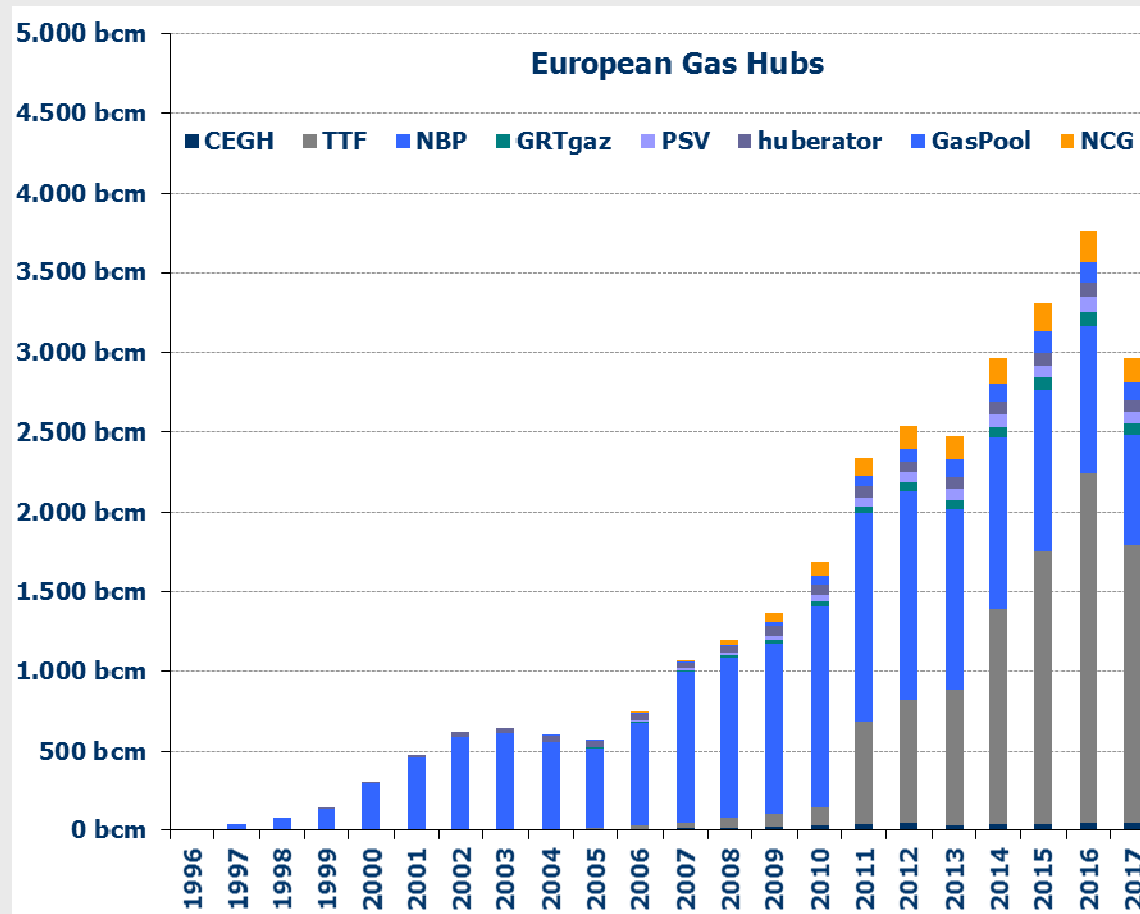


**CEGH as cross regional balancing platform  
(OTC + Gas Exchange)**

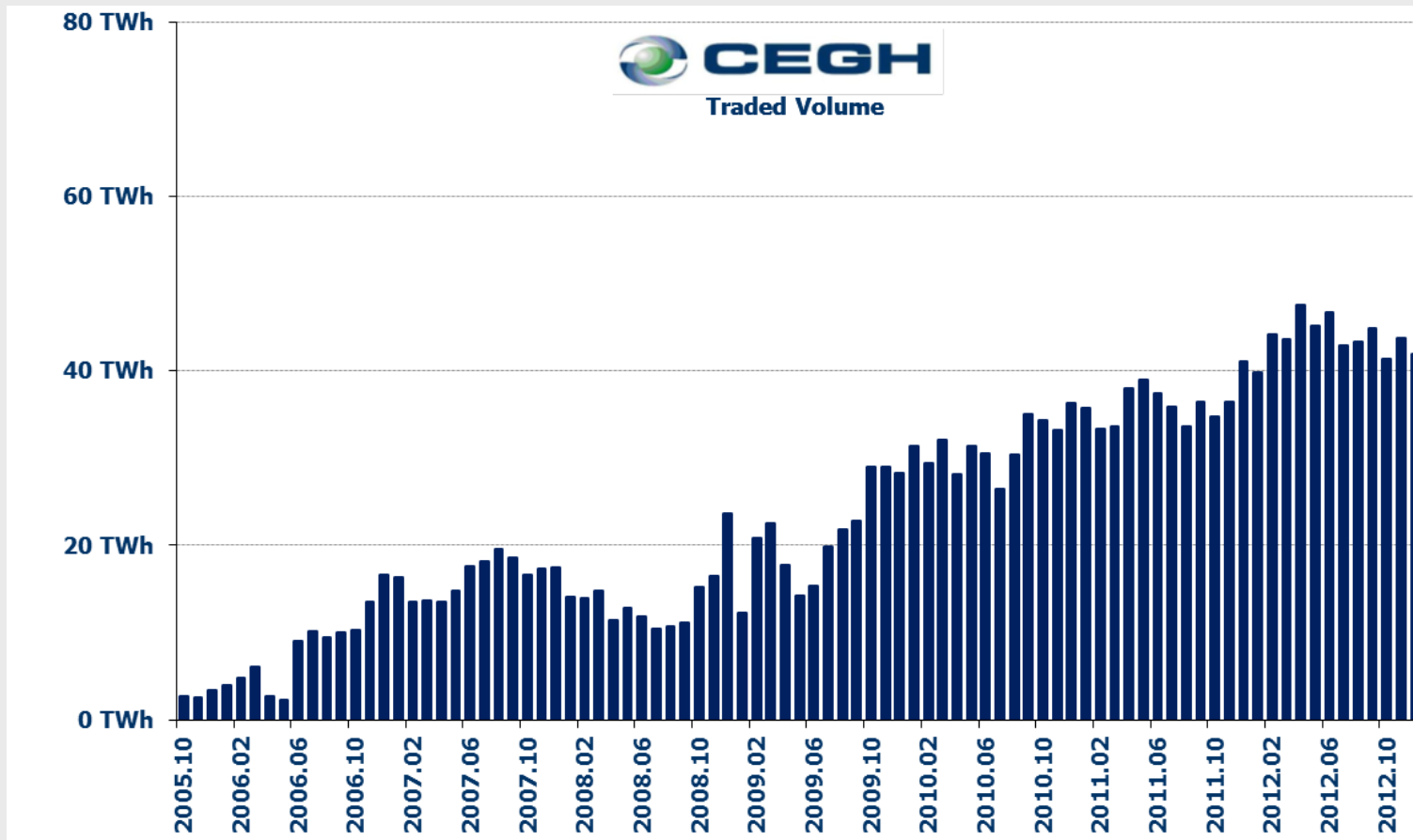
# CEGH Markets: OTC and Exchange under one umbrella



## Development of Hubs – OTC Volumes



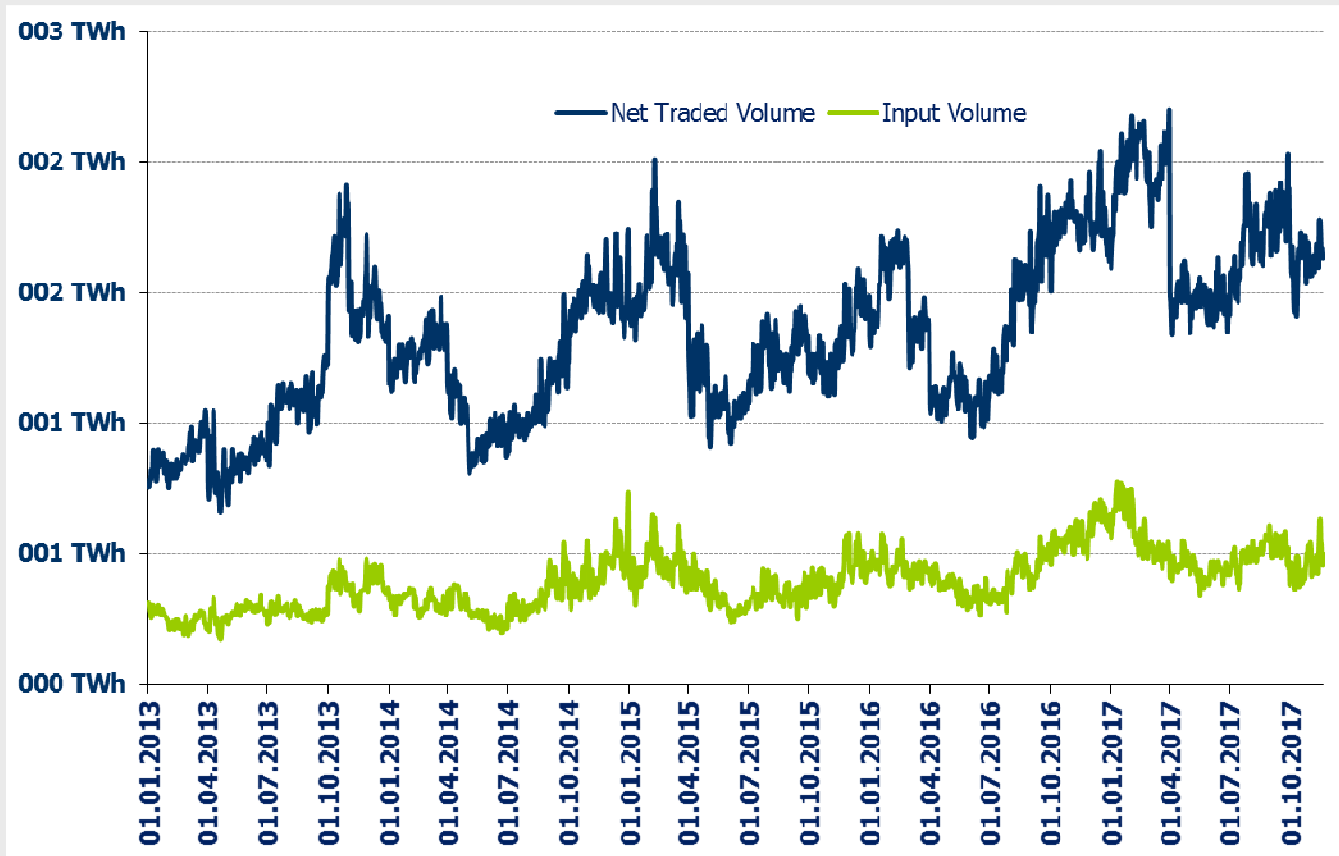
# CEGH Development of OTC Trading Traded Volume 12.2012



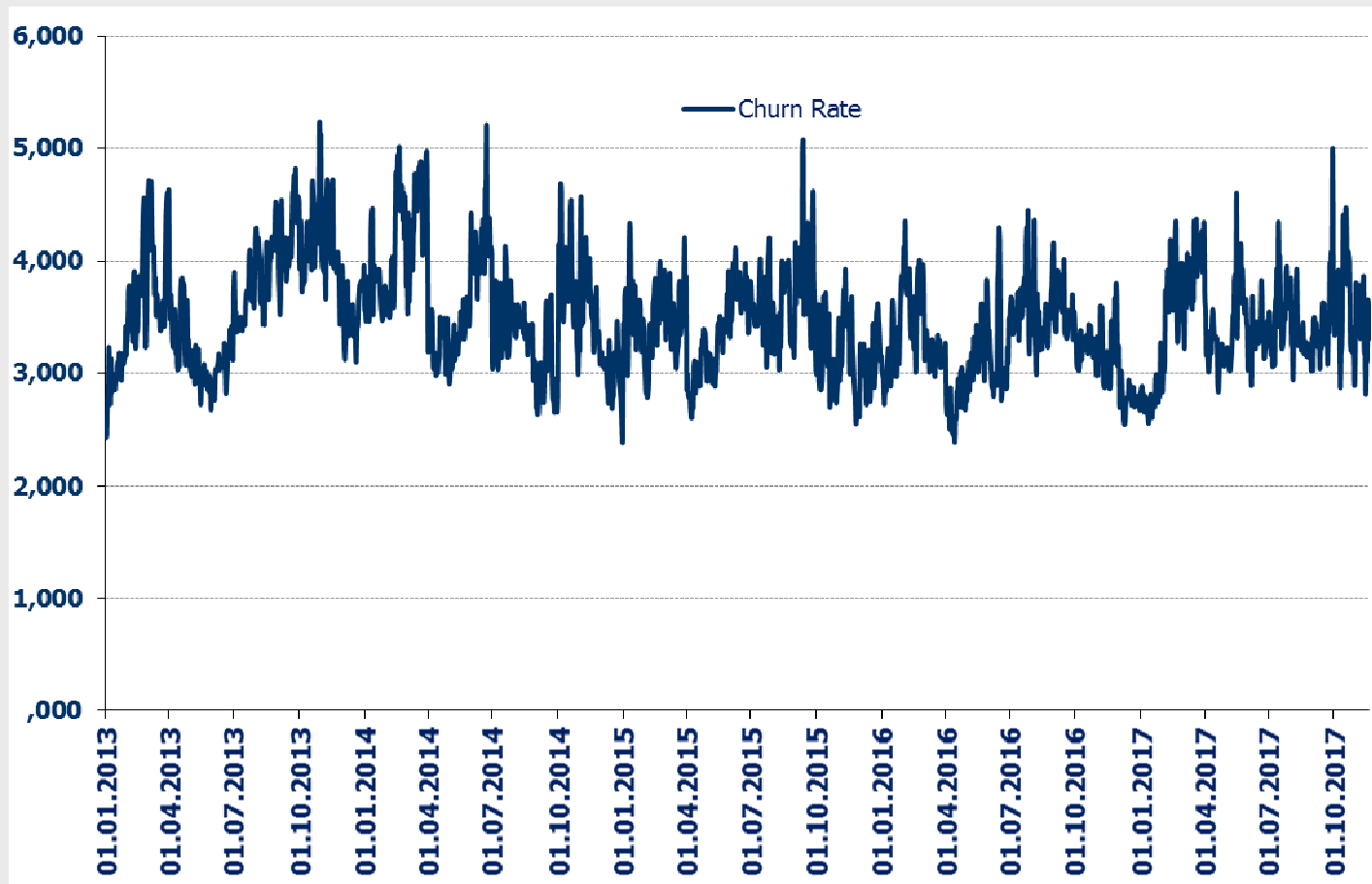
# CEGH VTP : Daily nominated volumes and physical input since 2013



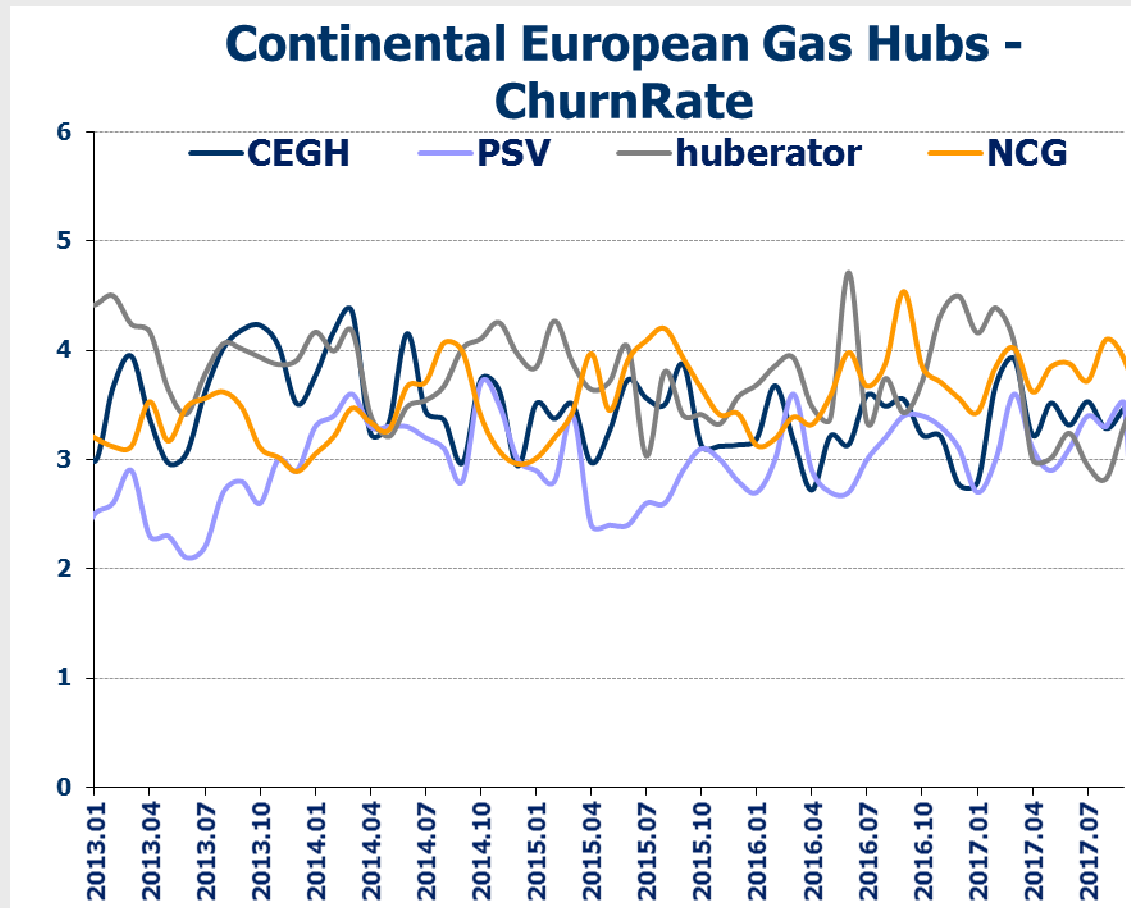
All-time high: 31.3.2017



# Daily churn rate since 2013

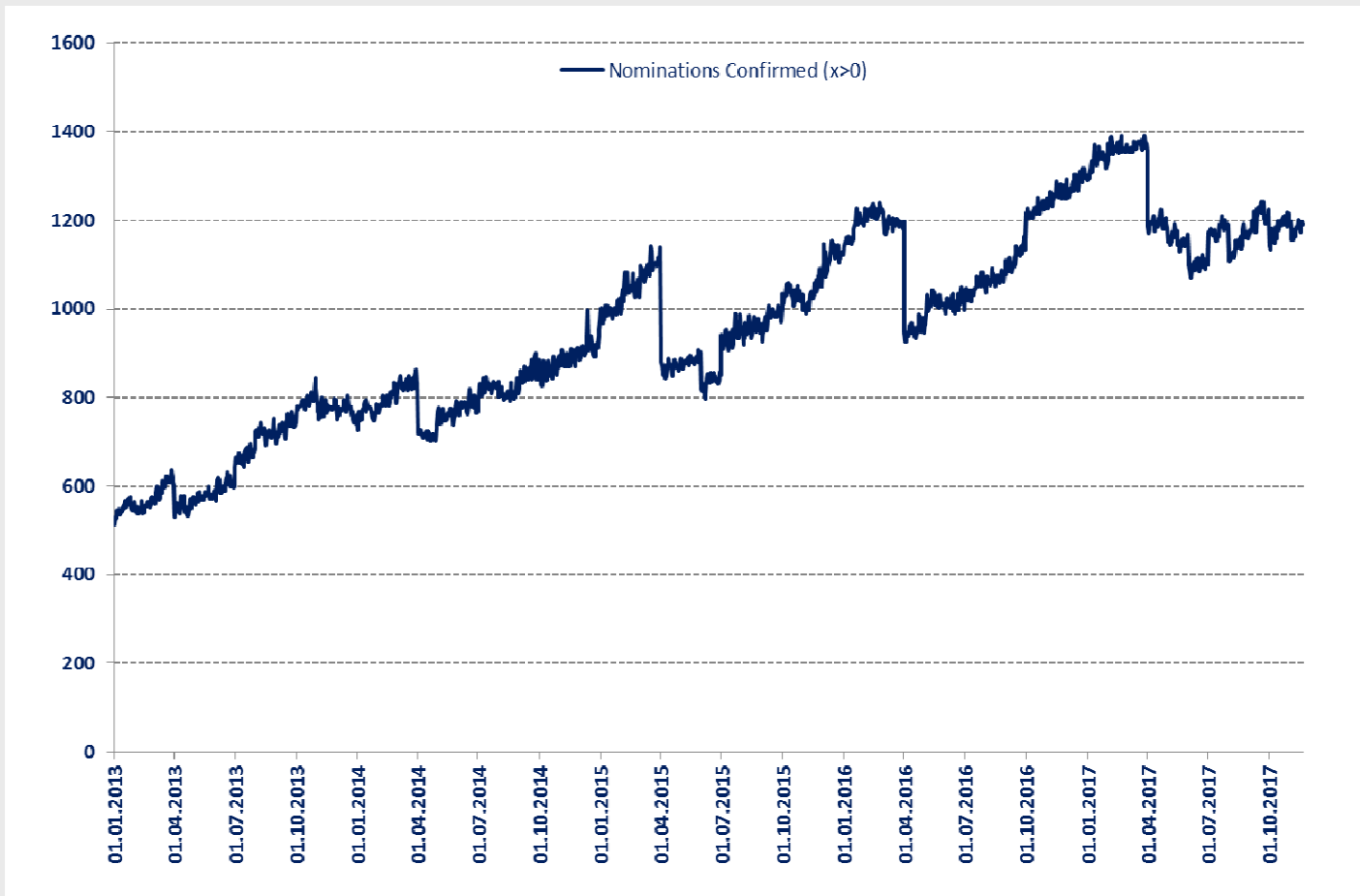


# CEGH Development of OTC Trading Continental European Gas Hubs - Churn Rate

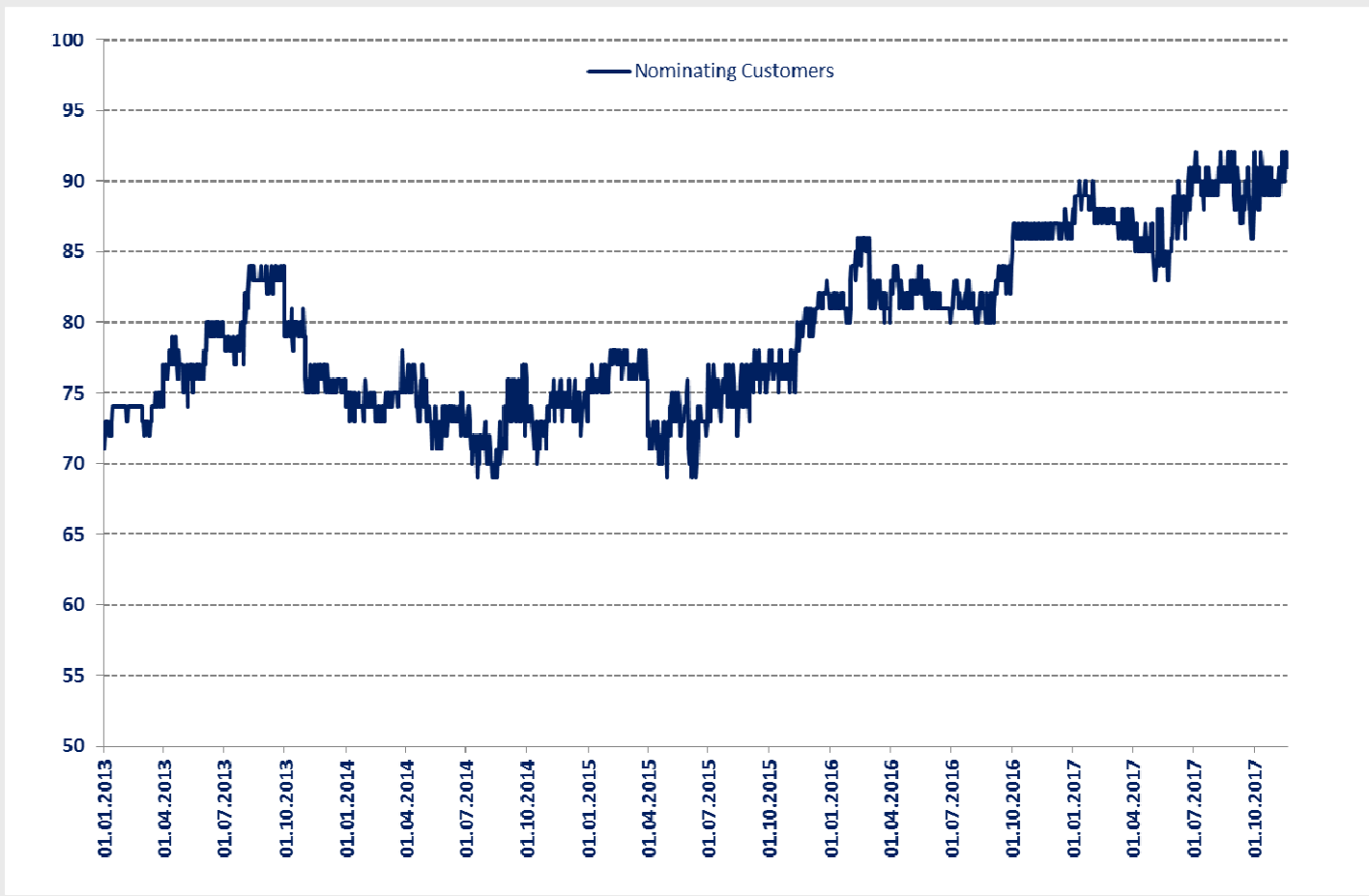




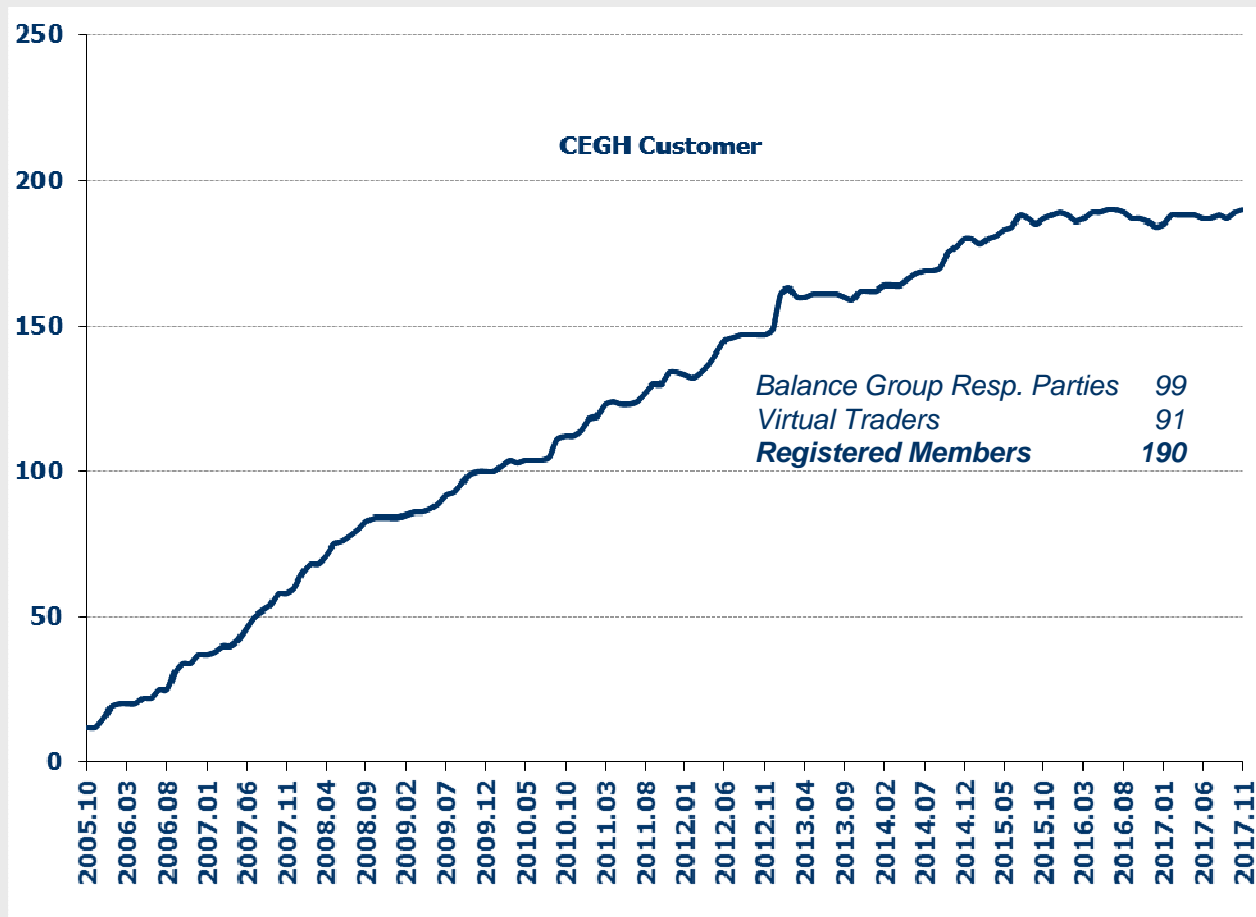
# CEGH VTP: Daily Nominations since Jan 2013



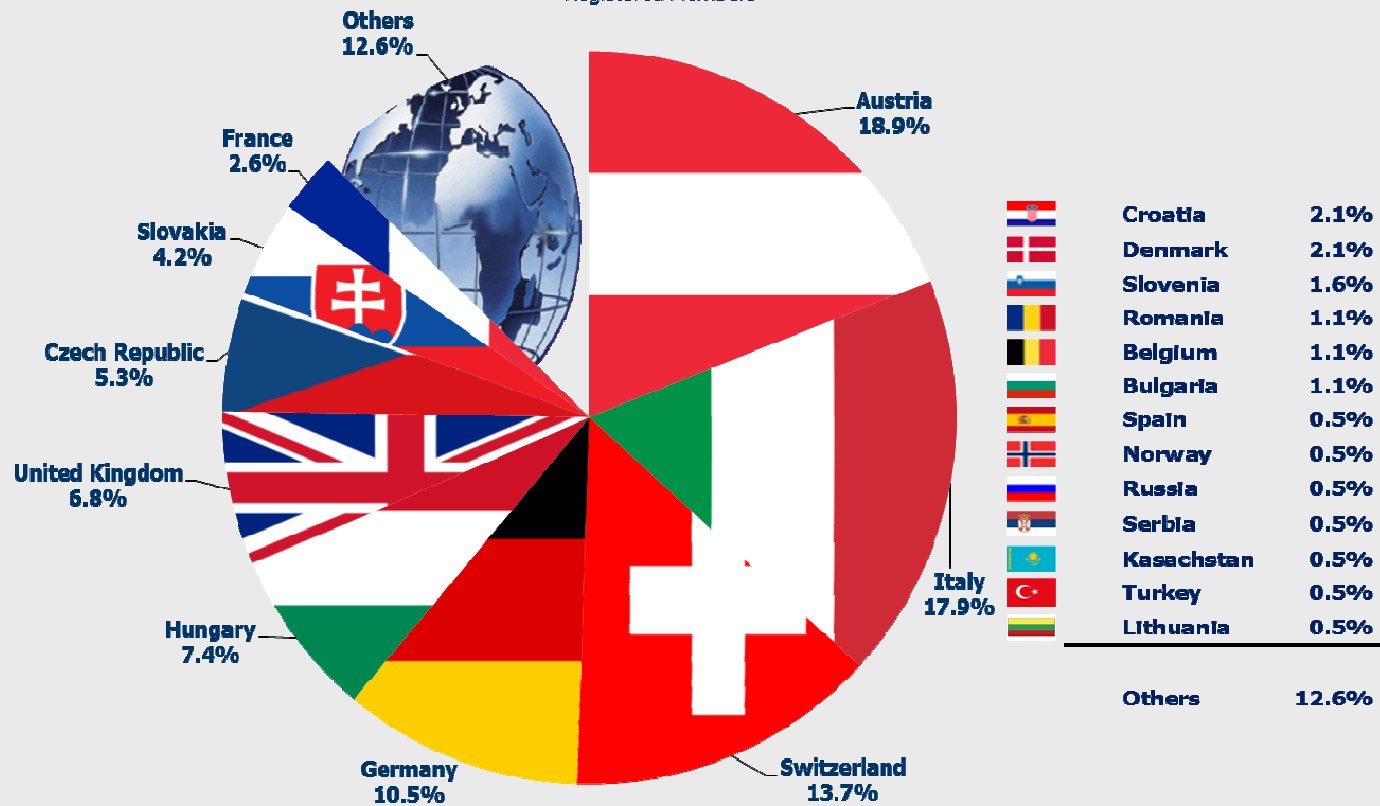
# CEGH VTP: Active Customers on daily basis since 2013



# CEGH - Development of OTC Trading Registered Members



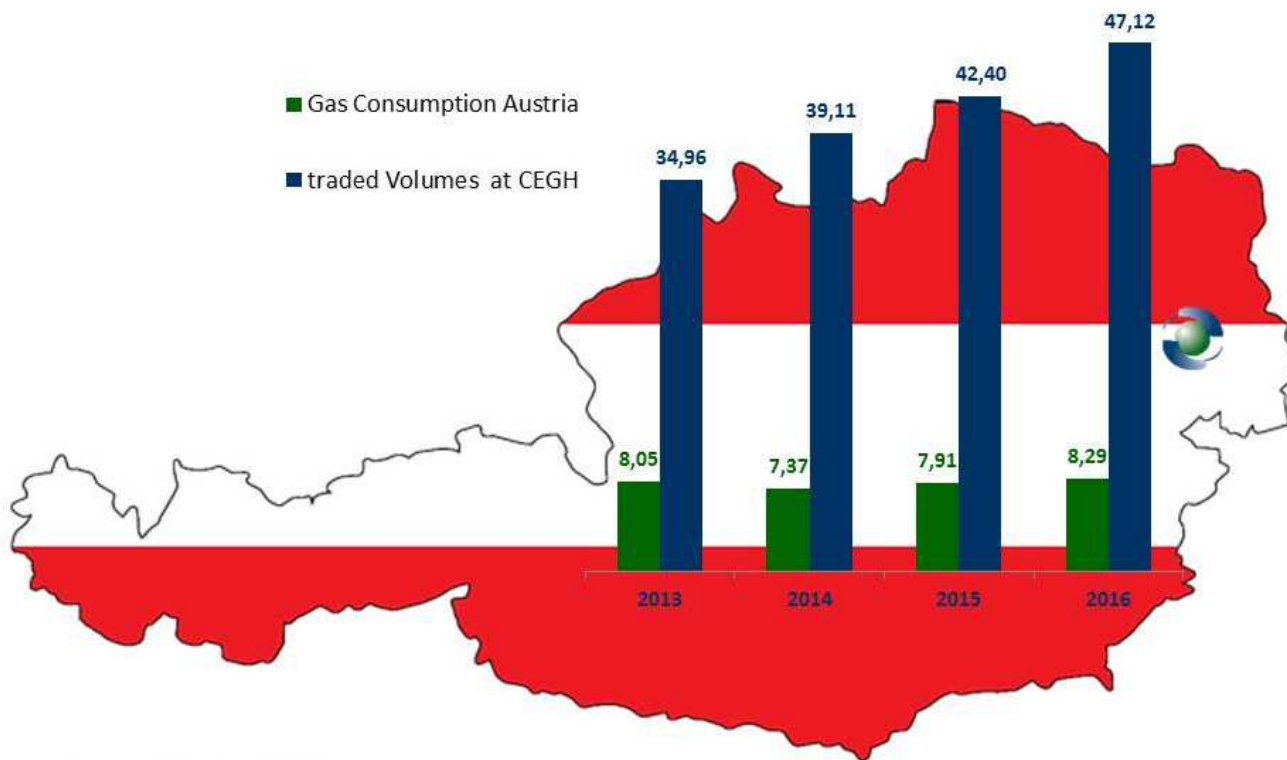
# CEGH - Development of VTP Diversity of Registered Members



# CEGH VTP Volume development and Austrian gas consumption (in bcm)



## Volume Development at CEGH VTP



Source: E-Control, CEGH

# *EFET Hub Transparency Guidelines*

## ***EFET Guide on the Features of a Successful Virtual Trading Point***

### ***Measures of Liquidity:***

Number of registered participants

Number of active participants (i.e. those who have conducted at least one trade in the last 12 months)

Number of independent companies actively trading (i.e. stripping out multiple affiliates in same group)

Numbers of trades

Quantity traded (in absolute terms, relative to local demand and relative to Demand + transit flows)

Concentration of trading (to understand whether a small number of traders are responsible for most trades or whether the market is highly diversified)

Products actively traded: Within Day, Day Ahead, Balance of Month, Month ahead, Quarter ahead, Season +1, Season + 2, Year + 1, Year + 2, Year + 3

Bid offer spread for products traded

Churn Rate

# EFET Hub Transparency Guidelines

## Measures of Liquidity – Publication at CEGH Website



### CEGH Market Statistics

CEGH publishes and regularly updates statistical values about the CEGH-VTP and CEGH Gas Exchange markets. The publication of market statistics follows the recommendation for measures of liquidity according to the "Guide on the Features of a Successful Virtual Trading Point" by the leading European Energy Trader organisation EFET (30<sup>th</sup> Oct 2013). The EFET Guide can be downloaded from the [EFET website](#).

Key facts are shown in the table below.  
The data to its full extend is available for download:

download as [pdf-file](#)  
download as [csv file](#)

Date	Registered participants	Active participants	Independent active participants	Quantity traded [MWh]	Churn rate
01.2013	161	75	72	25,611,679	2.98
02.2013	163	77	74	23,120,332	3.66
03.2013	160	81	77	28,989,886	3.95
04.2013	160	87	83	24,062,342	3.37
05.2013	161	87	84	25,601,291	2.97
06.2013	161	88	85	26,767,323	3.06
07.2013	161	91	87	32,174,656	3.61
08.2013	161	91	87	34,071,963	4.02
09.2013	160	93	89	33,268,933	4.19
10.2013	159	94	90	51,788,626	4.23
11.2013	162	95	91	43,351,652	4.04
12.2013	162	95	91	44,228,982	3.51

CEGH AT VTP Futures >>

Trading Day	Contract	Settlement Price EUR/MWh
04.02.2015	Mar 2015	21.436
04.02.2015	Apr 2015	21.213
04.02.2015	May 2015	20.864

[More Futures Market >>](#)

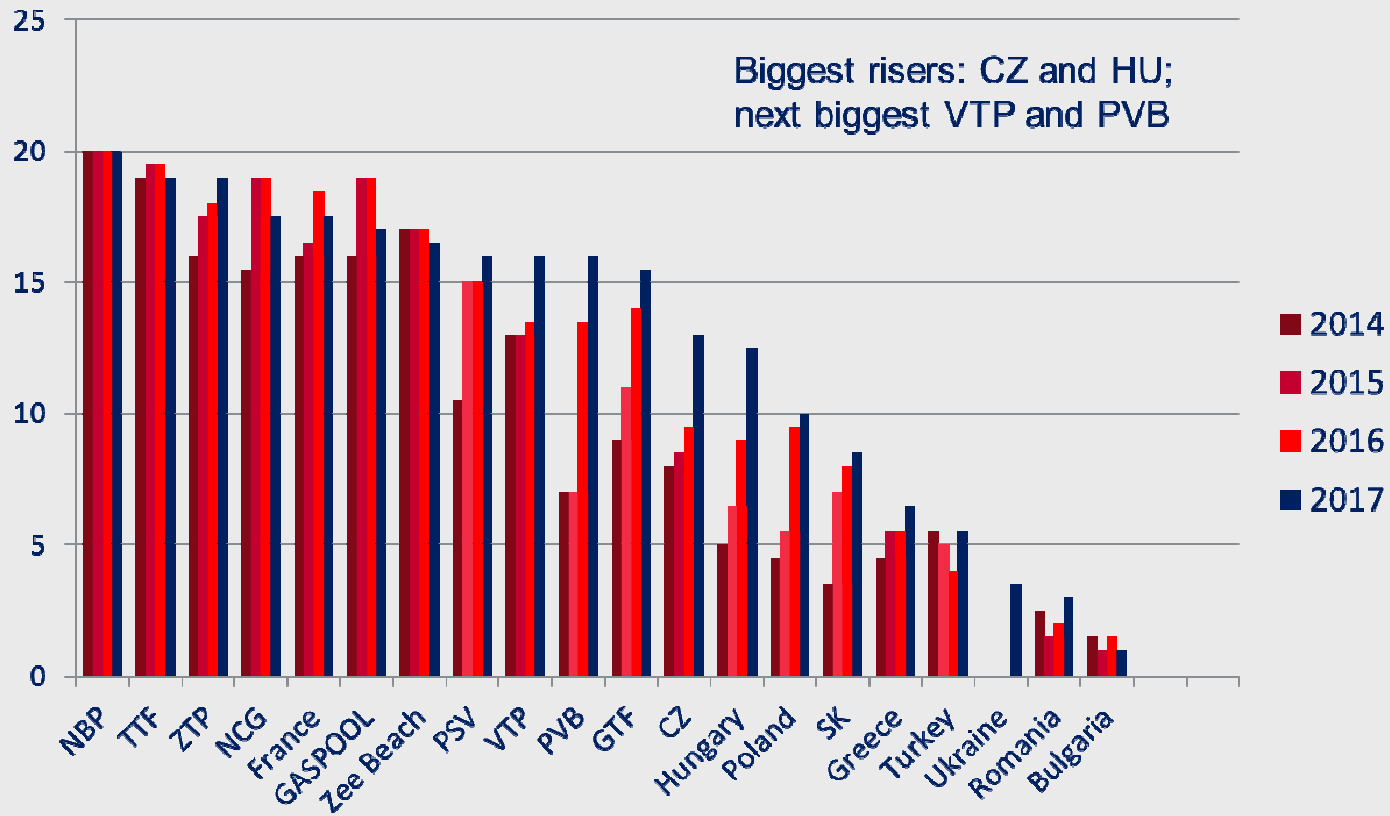
CEGH Czech Futures >>

Trading Day	Contract	Settlement Price EUR/MWh
04.02.2015	Mar 2015	21.010
04.02.2015	Quarter 2/2015	20.620
04.02.2015	Summer 2015	20.470
04.02.2015	2017	21.700

[More Czech Futures >>](#)

CEGH Exchange 2010 - 2014

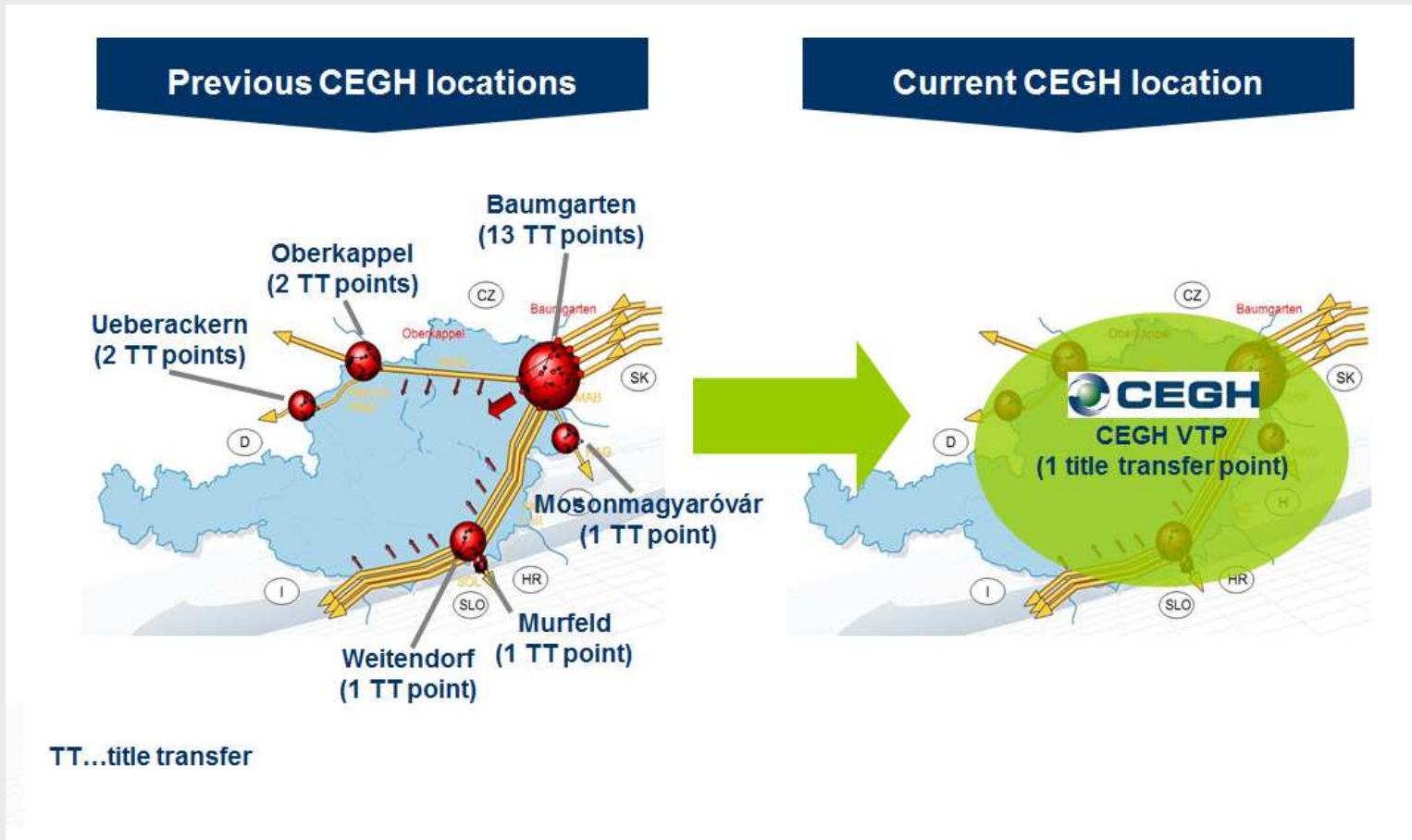
# EFET Hub Annual scorecard 2017



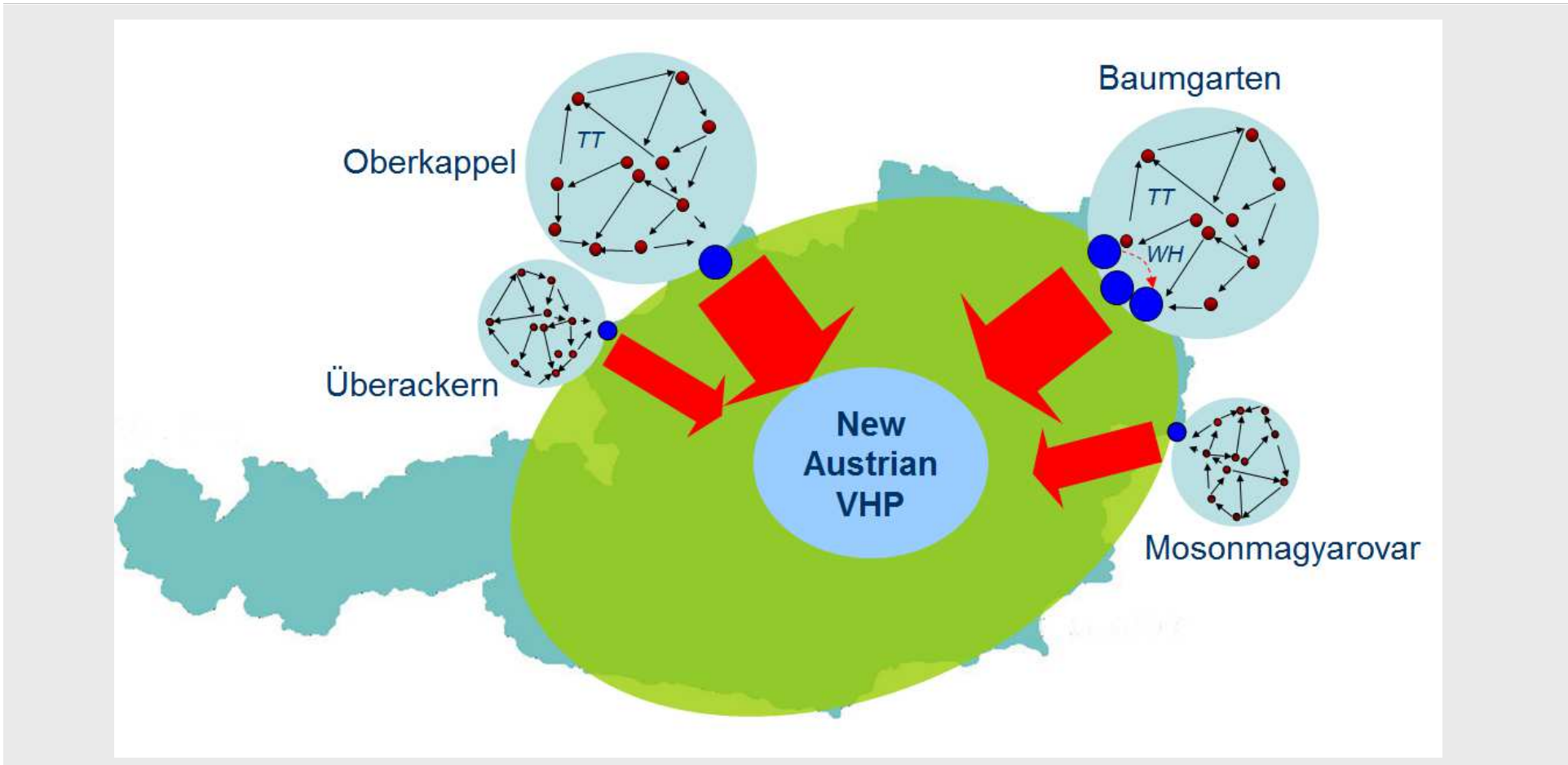


# ***Austrian Market Model & CEGH OTC Services***

# Introduction of the CEGH VTP and consequences for CEGH title transfer points



# 01.01.2013: Migration of flange-based trading to VTP-based trading



## *Operator of the VTP*



### **§ 68 Austrian Gas Act (2011)**

#### **Main Tasks:**

Operating Virtual Trading Point (VTP)

Providing commercial hub services

Matching of trade nominations

Cooperation with exchanges + clearinghouses

...

## *(Last-resort) balancing by MAM*

### ***Energie-Control Austria Executive Board Ordinance on Provisions for the Gas Market Model (“Gas Market Model Ordinance 2012”)***

*Section 26 (4) The market area manager shall net the volumes nominated for each balance group and inform the balance responsible parties of any imbalances over the day. Should the relevant balance responsible party fail to renominate and thereby eliminate **any daily imbalances** in the balance group within one hour, gas shall be purchased or sold at the virtual trading point to ensure that the group is in balance. Such **exchange transactions** at the virtual trading point shall be executed on behalf and for account of the balance responsible party, at the best available purchase/selling price at that time.*

## *MAM Structuring*

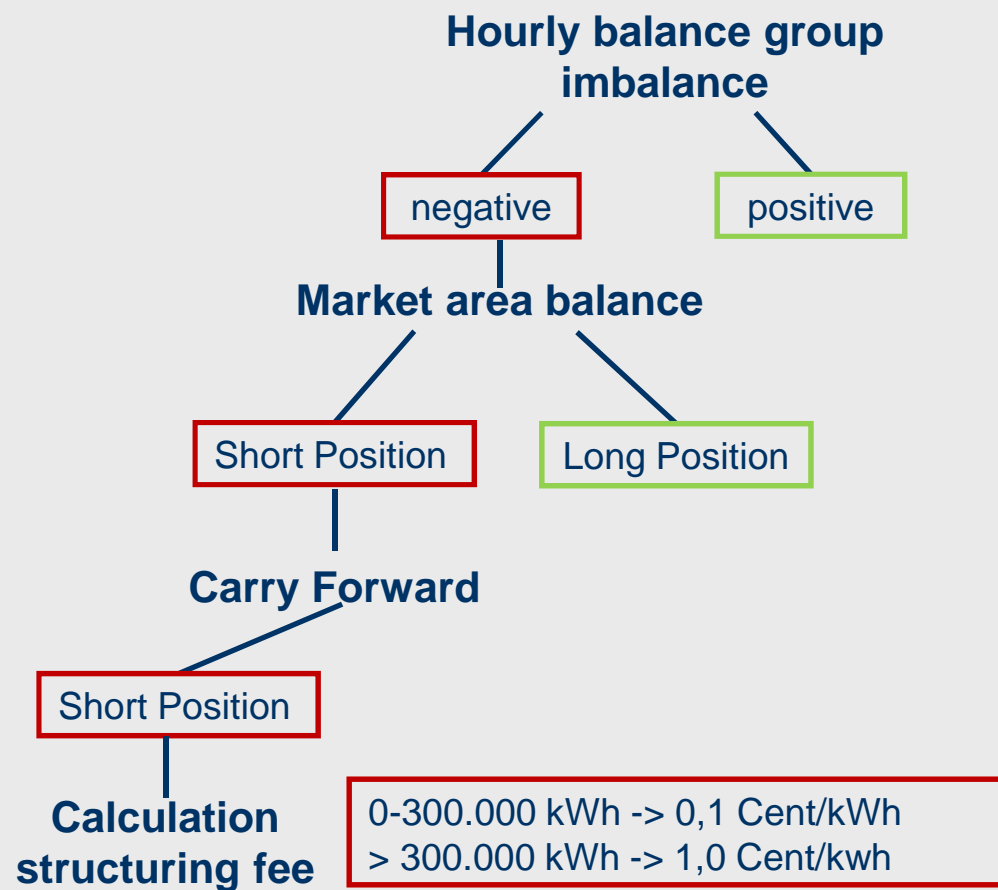
### ***Since 1 November 2015***

Balancing of hourly “short” position if contributing to the “short” position of the Market Area

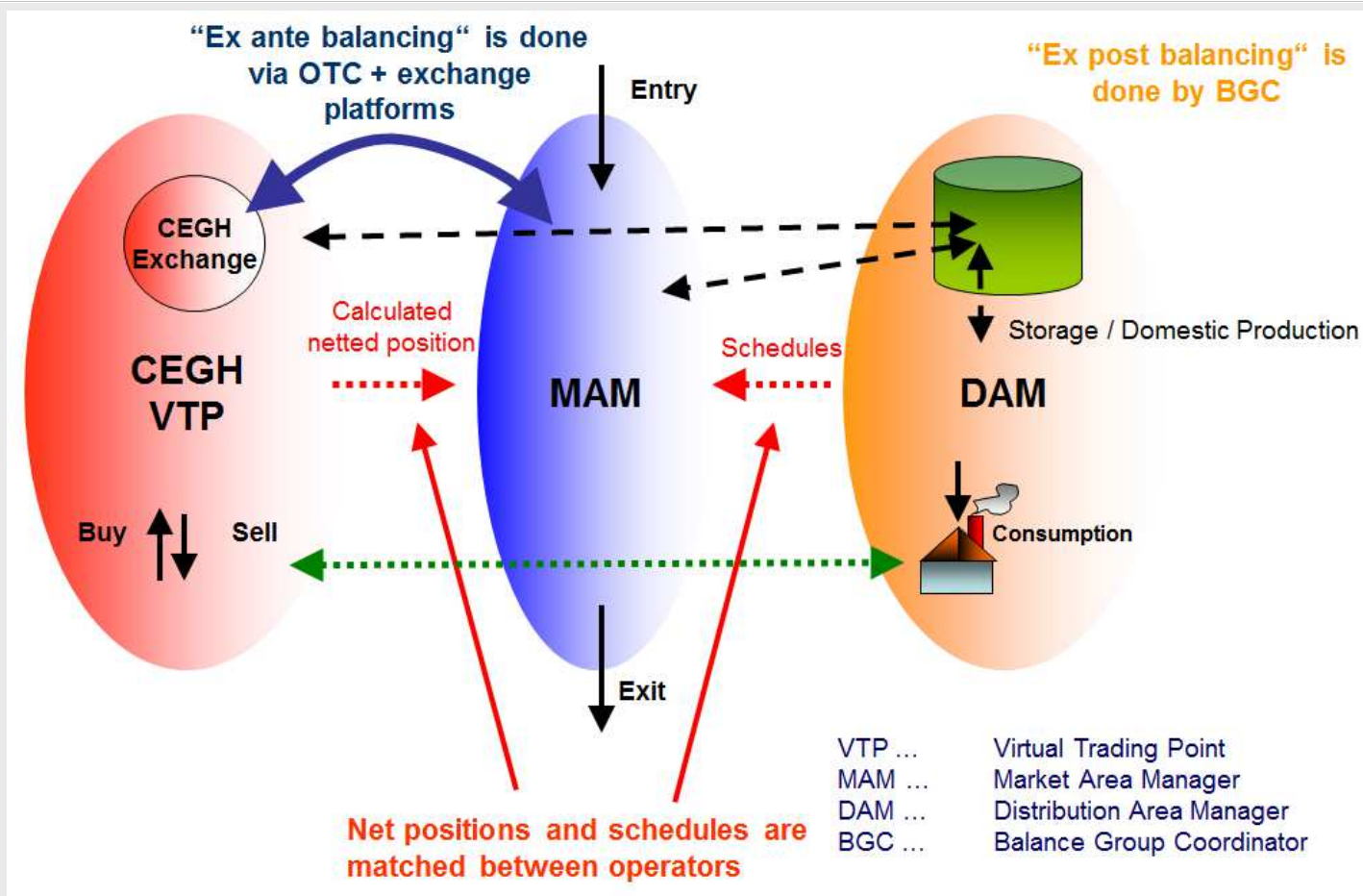
Fees base on hourly volume

- 0-300.000 kWh -> 0,1 Cent/kWh
- > 300.000 kWh -> 1,0 Cent/kwh

# MAM Structuring Scheme as of November 2015

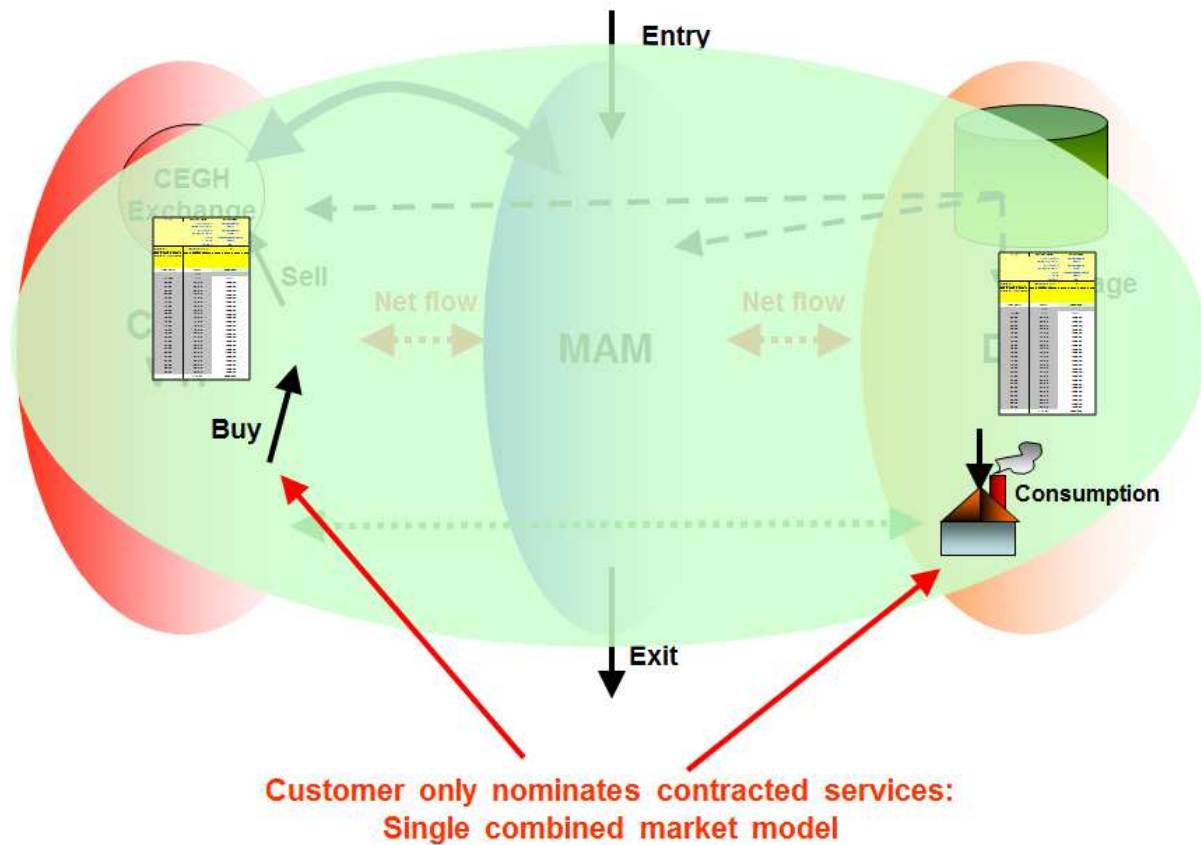


# Interaction between operators





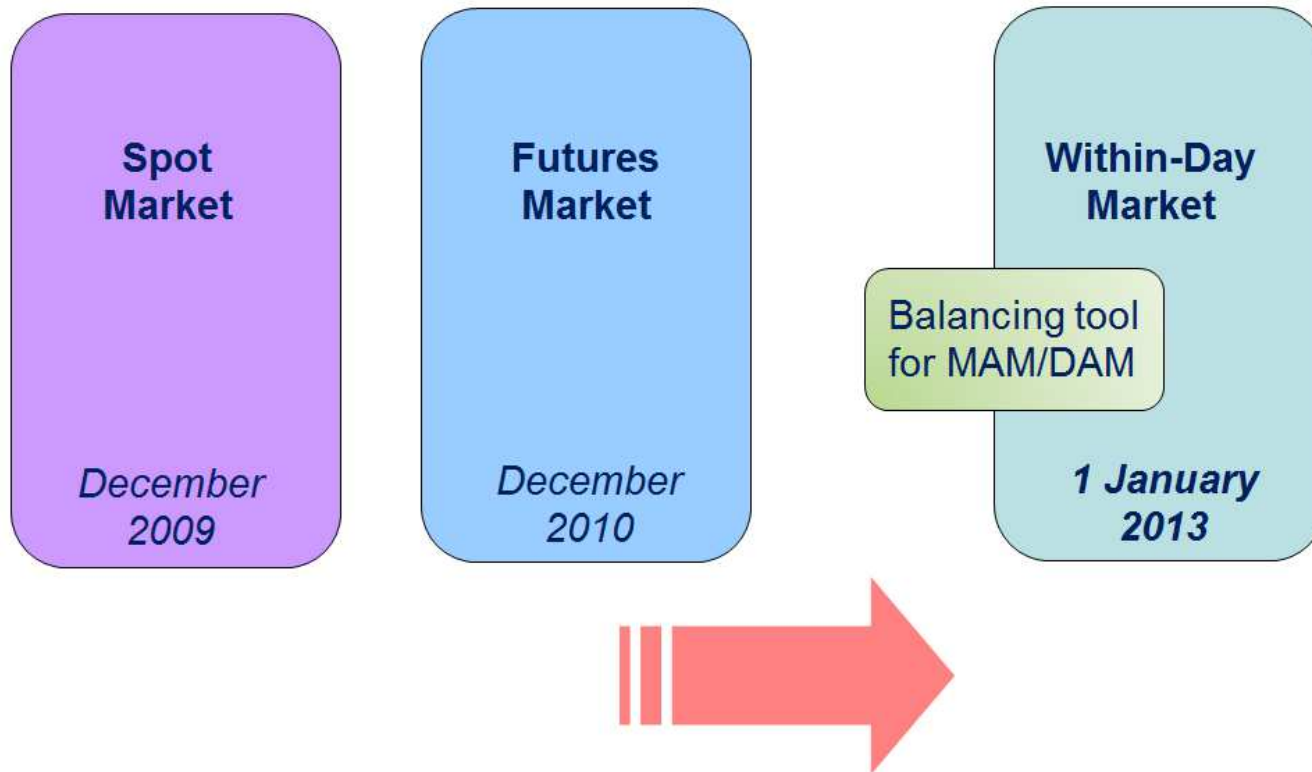
## Simplified + barrier-free access to VTP



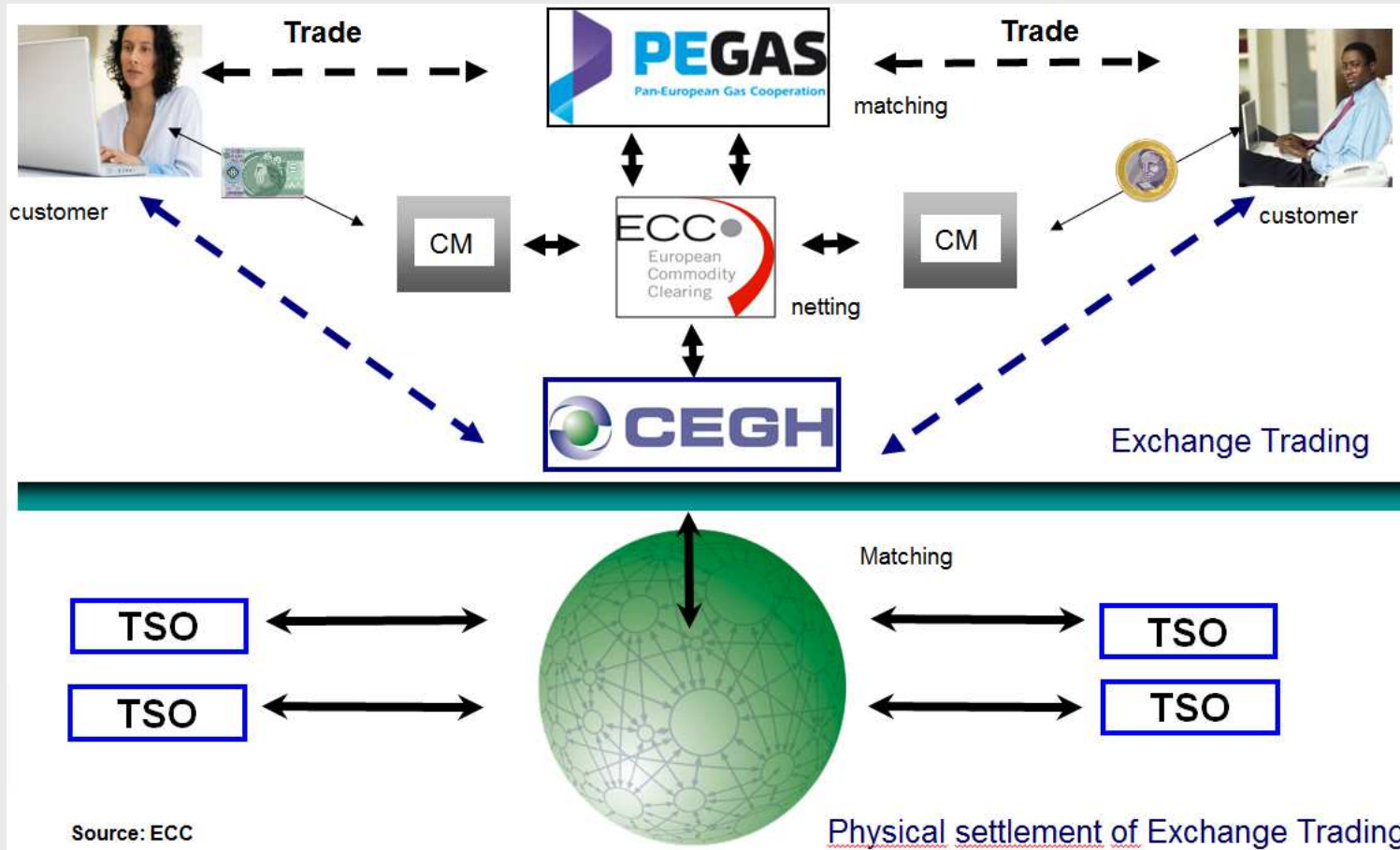
## Net position calculation per balance group

BGR @ CEGH			
Buy from A	+ 400	- 50	Sell to X
Buy from B	+ 40	- 40	Sell to Y
Buy from C	+ 10	- 10	Sell to Z
	<b>+ 350</b>	<b>OTC</b>	
		- 30	Sell on Exchange
		- 20	Sell on Exchange
<b>Exchange</b>		<b>- 50</b>	
	<b>+ 300</b>	<b>Total</b>	<b>net position to MAM</b>

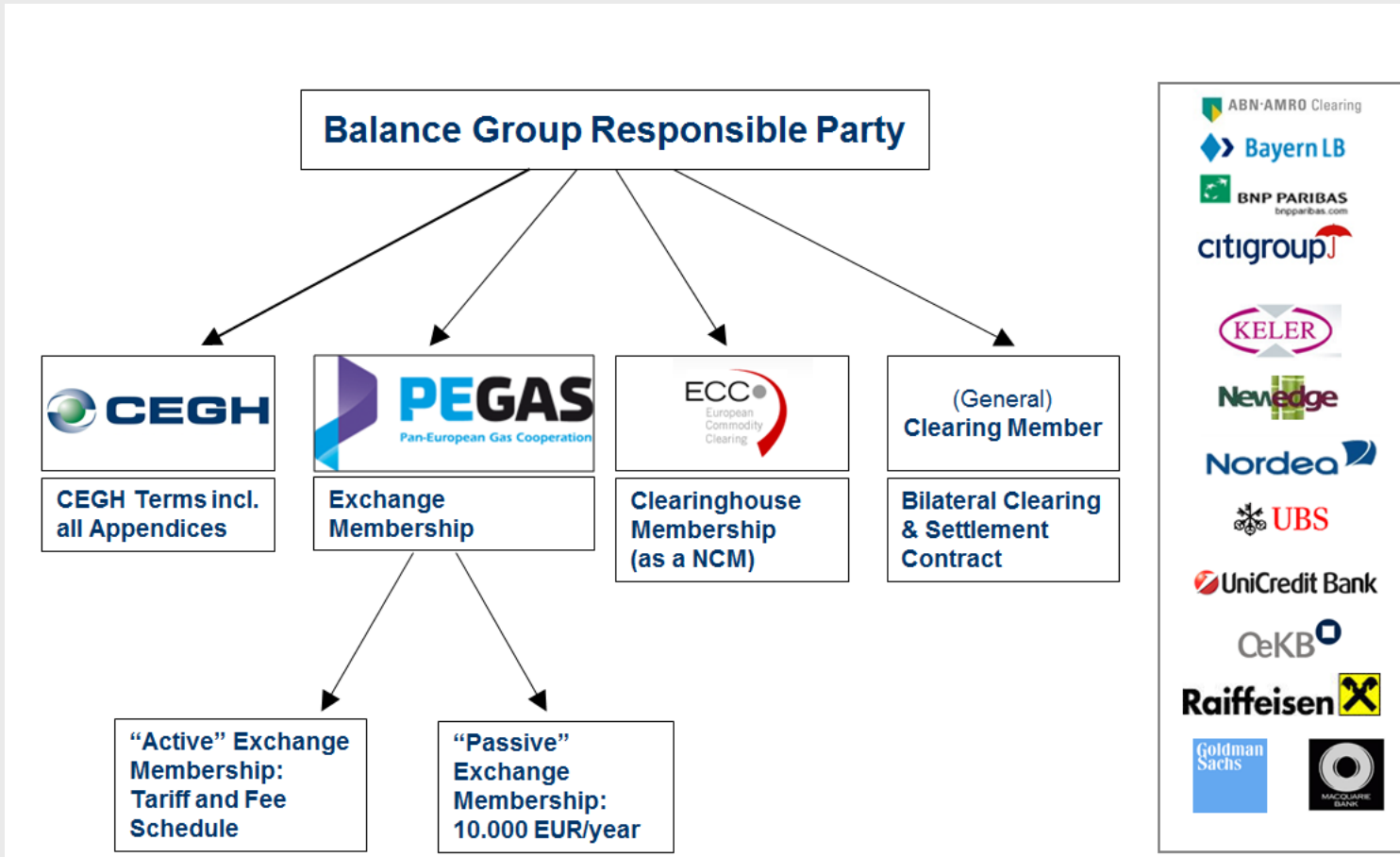
# PEGAS CEGH Gas Exchange Market: Market Segment for the Austrian Balancing System



# Physical Settlement Process



# Necessary Memberships to be active as a BGRP in the Austrian Market Model





## *Possibilities of registration / network useage*

### ***Different roles of BGRPs and Virtual Traders***

BGM – Not visible to the system operators except in case of exchange membership

BGRP – fully registered at all operators/entities depending on individual activities/portfolio

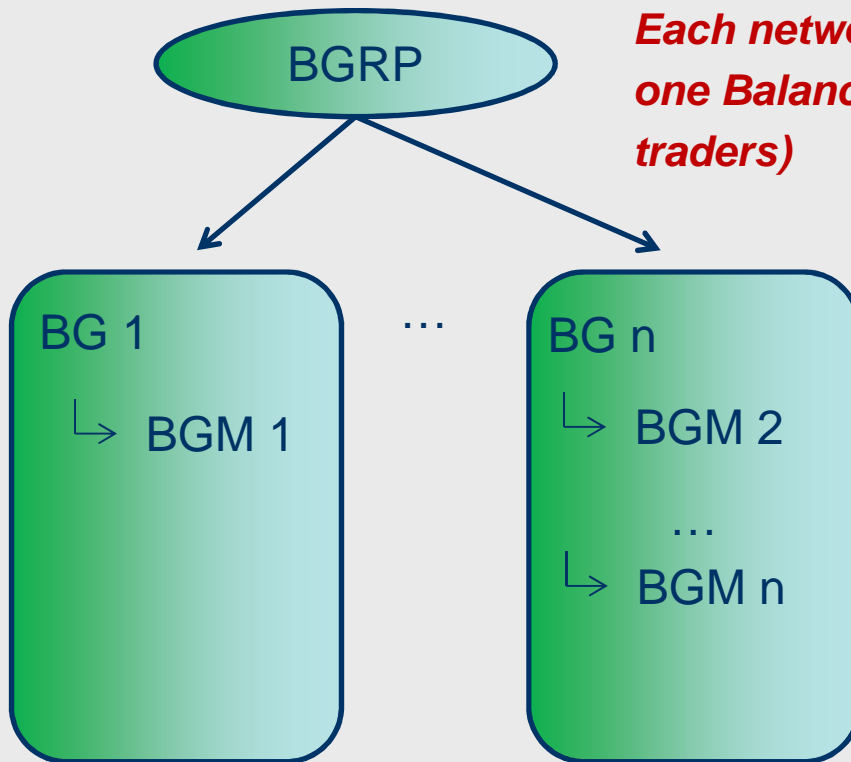
VT – only registered at CEGH for pure trading on the OTC market

# Balance Group Model according to § 26 Gas Market Ordinance



**A Balance Group is organized by a BGRP ↔ The BGRP is responsible for the Balance Group(s).**

**Each network user has to be assigned to (at least) one Balance Group. (Not applicable for virtual gas traders)**



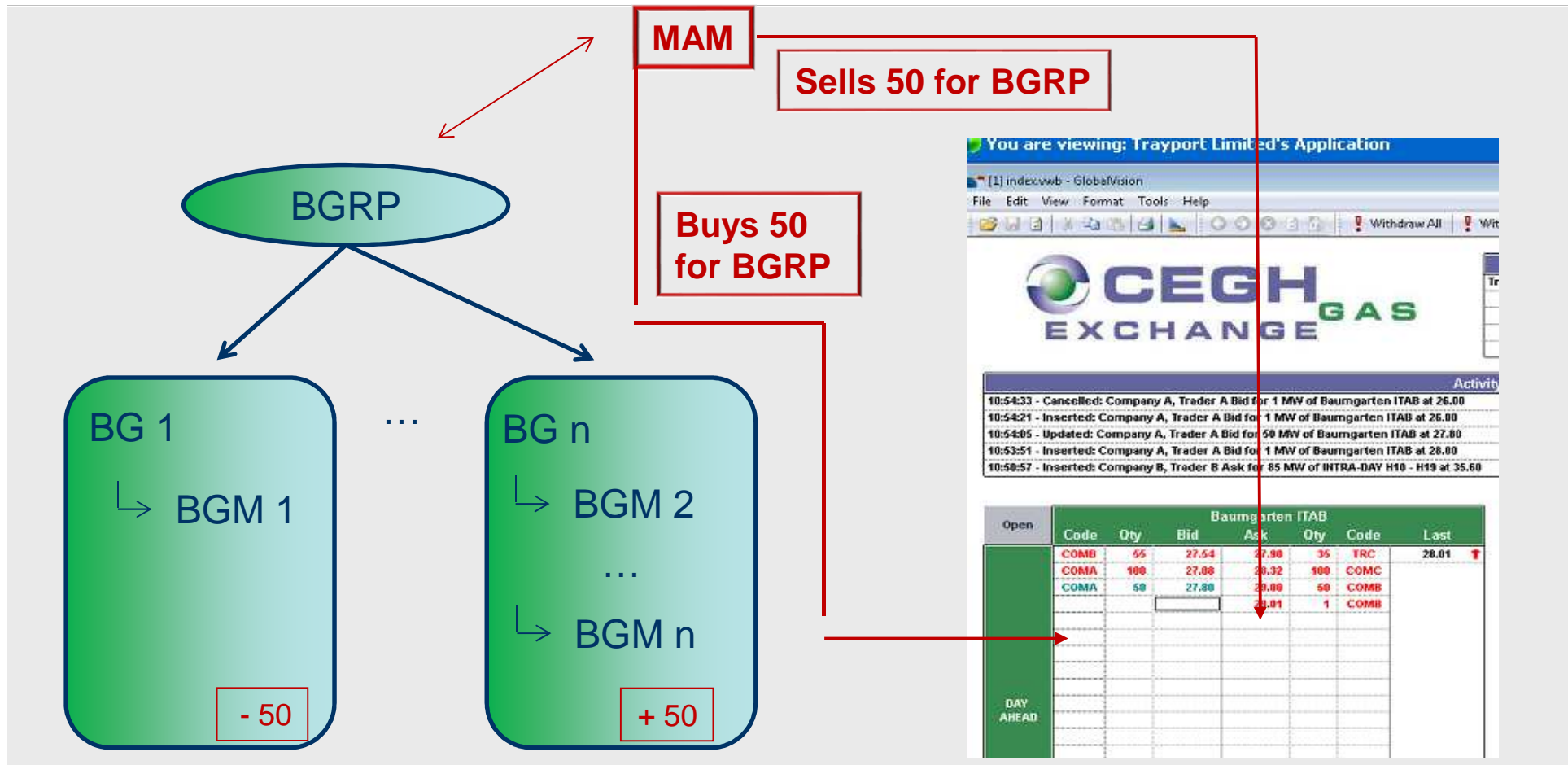
**One BGRP can have more than one balance group.**

**MAM is doing balancing on behalf of and on the account of the BGRP**

**→ Each BGRP has to be an exchange member of the Within-Day Market!**

**Balancing is done on Balance Group Level**

# The Impact of Balancing on BG Level

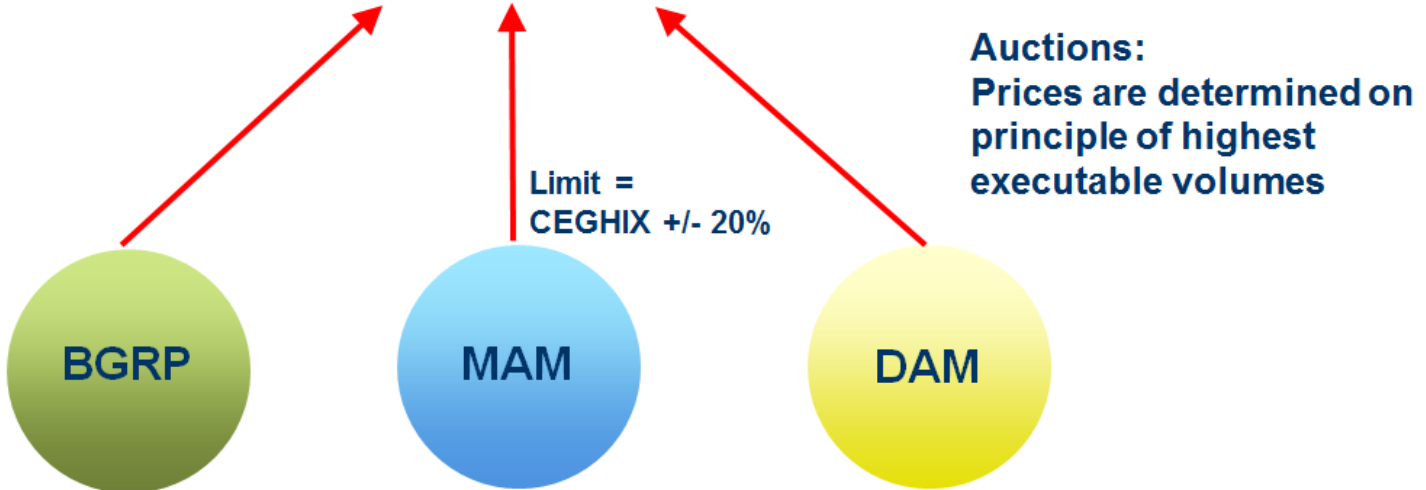




# Price determination for within-day / balancing volumes



**PEGAS CEGH Gas Exchange Within-Day Market =  
BALANCING PLATFORM**



**One single market clearing price for each auction!**

# ***PEGAS CEGH GAS MARKETS***

## CEGH – Powernext Cooperation

### ***With December 1st, 2016***

PEGAS CEGH products are listed on the PEGAS platform operated by Powernext

The delivery point of all PEGAS CEGH contracts is the CEGH Virtual Trading Point (VTP)

PEGAS CEGH contracts are regulated by the French “Autorité des Marchés

### ***Benefits for customers...***

One rulebook to access CEGH and PEGAS products including:

- All existing CEGH products integrated into PEGAS rulebook
- OTC Clearing services extended to PEGAS CEGH Futures
- Spreads with TTF, NCG, GASPOOL and PSV for all products
- Time Spreads for VTP
- 24/7 CEGH Spot DA products, lower minimum trade size CEGH Futures products

New products further down the curve will be offered based on customer feedback

Reduced technical fees

## *Detailed Products and Services Offering*



### ***Spot markets***

Hourly

Within-Day

Day-Ahead

Weekend

Saturday

Sunday

Individual Days

### ***Futures regulated markets***

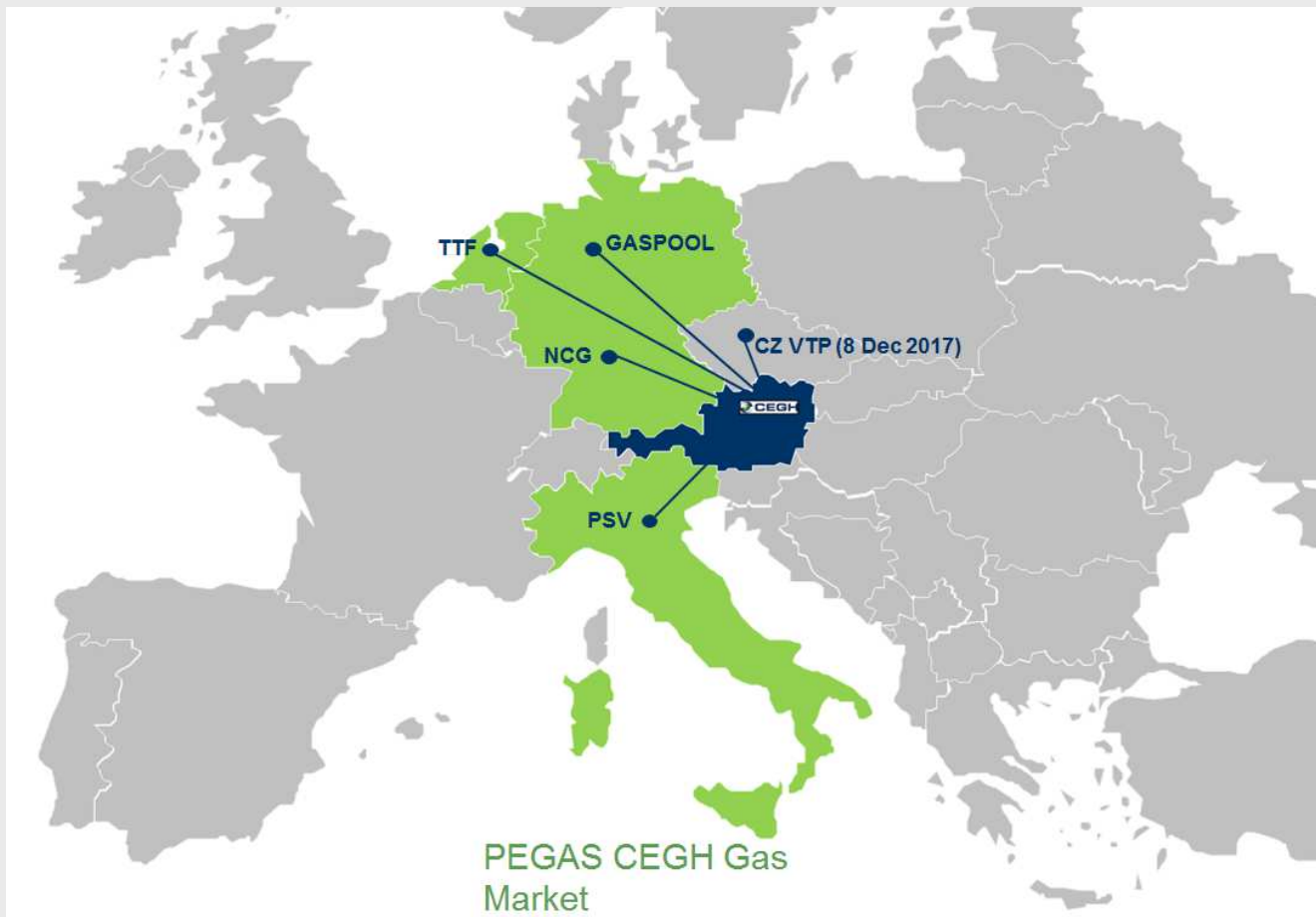
Next 3 Months

Next 4 Quarters

Next 3 Seasons

Next 2 Calendar years

# PEGAS and CEGH – Locational Spread products



## *Detailed Products and Services Offering*

***Location Spreads (Spot & Futures) trading facility with: TTF, GPL, NCG and PSV***

### ***Time Spreads***

*FM 1 x FM 2      FQ 1 x FQ 2      FQ 2 x FQ 3      FS 1 x FS 2      FY 1 x FY 2*

*FM 1 x FM 3      FQ 1 x FQ 3      FQ 2 x FQ 4      FS 1 X FS 3*

*FM 2 x FM 3      FQ 1 x FQ 4      FQ 3 x FQ 4*

### ***Trade registration for futures contracts***

*Bilateral trade clearing at ECC*

### ***Data and indices***

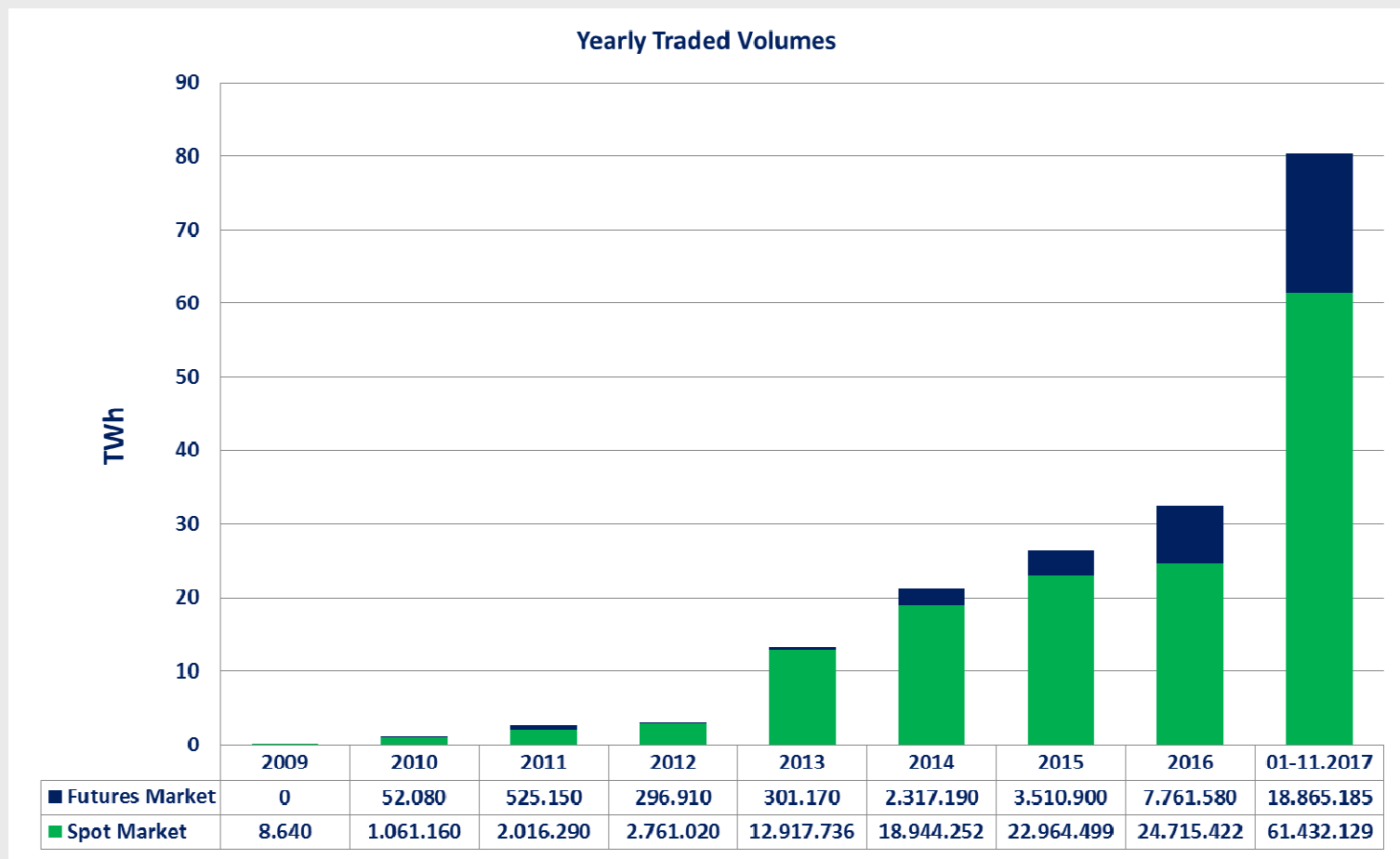
*All customers have free access to EEX ftp and PEGAS tools*

*CEGHIX and CEGHEDI be also published on the CEGH website*

# View into PEGAS Spot Market

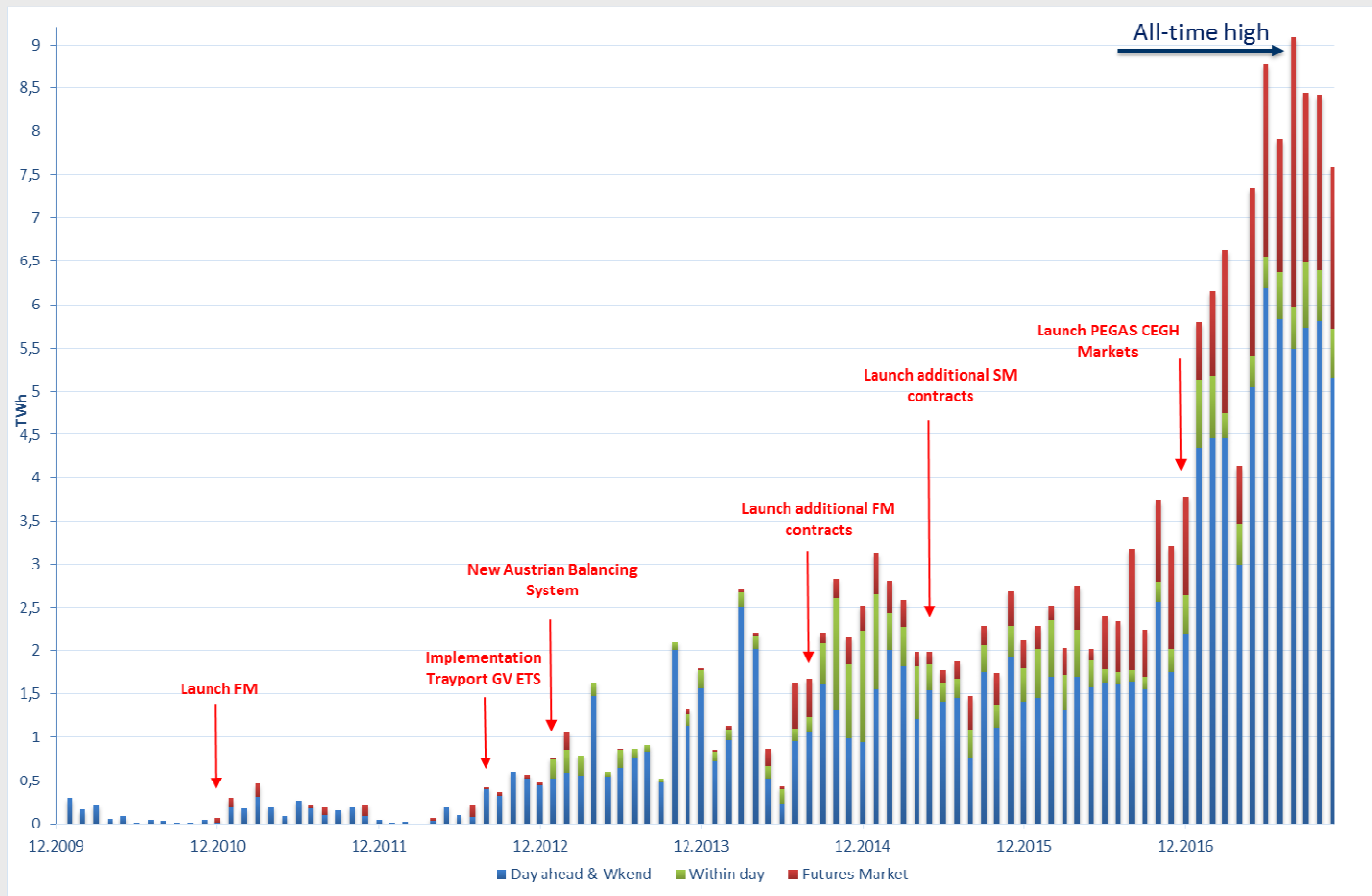
		TTF				24/7 Trading			NCG / TTF				NCG				GPL/TTF				GPL				GPL / NCG				
		Qty	Bid	Ask	Qty	Last	TQty	EoD	Qty	Bid	Ask	Qty	Qty	Bid	Ask	Qty	Qty	Bid	Ask	Qty	Qty	Bid	Ask	Qty	Qty	Bid	Ask	Qty	
WD		120	20.625	20.700	*150	20.725	13.660		*150	0.100	0.450	*50	154	20.800	21.075	*50			0.300	*50	*38	20.450	20.925	60	*38	-0.350	0.025	100	
DA		*30	20.600	20.675	120	20.625	7.964	20.851	*95	0.075	0.550	120	95	20.750	20.800	12	100	-0.325	-0.275	30	30	20.325	20.350	1	*90	-0.450	-0.400	*1	
WE																													
Saturday								16.210																					
Sunday								16.250																					
Bank Holidays display / hide																													
		PEG Nord / TTF				24/7 Trading			PEG Nord/NCG				ZTP/TTF				ZTP/NCG				ZTP				ZTP/GPL				
		Qty	Bid	Ask	Qty	Last	TQty	EoD	Qty	Bid	Ask	Qty	Qty	Bid	Ask	Qty	Qty	Bid	Ask	Qty	Qty	Bid	Ask	Qty	Qty	Bid	Ask	Qty	
WD													100	-0.050	0.775	*120	*50	-0.200	0.600	*154	100	20.875	21.400	200	*50	-0.050	0.950	*38	
DA				0.800	*720						0.650	2.400	20	0.250	0.350	100	*12	0.125	0.200	*95	50	20.925	20.950	100	*1	0.575	0.600	100	
WE																													
Saturday																													
Sunday																													
Bank Holidays display / hide																													
		PEG Nord				24/7 Trading			TRS / PEG Nord				TRS				PEG Nord / ZTP				ETF				ETF/TTF				
		Qty	Bid	Ask	Qty	Last	TQty	EoD	Qty	Bid	Ask	Qty	Qty	Bid	Ask	Qty	Qty	Bid	Ask	Qty	Qty	Bid	Ask	Qty	Qty	Bid	Ask	Qty	
WD		2.000	21.275	21.400	1.000	21.350	46.850		*750	3.950	4.725	*2.000	750	25.350	26.000	2.000					120	19.250	19.450	30	120	19.250	19.450	30	
DA		1.000	21.300	21.400	1.000	21.375	5.390	21.310	*1.000	4.250	4.500	*260	1.000	25.650	25.800	260					60	19.350	19.450	120	*60	-1.325	-1.150	*30	
WE								20.674																					
Saturday																													
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Bank Holidays display / hide																													
		CEGH VTP				24/7 Trading			CEGH VTP / TTF				CEGH VTP / NCG				CEGH VTP / GPL				ETF/NCG				ETF/GPL				
		Qty	Bid	Ask	Qty	Last	TQty	EoD	Qty	Bid	Ask	Qty	Qty	Bid	Ask	Qty	Qty	Bid	Ask	Qty	Qty	Bid	Ask	Qty	Qty	Bid	Ask	Qty	
WD		30	20.500	20.950	60																*50	-1.825	-1.350	*30	*50	-1.675			
		240	20.450	21.025	100																								
		140	20.425	21.050	30																								
		200	20.325	21.075	105																								
		200	20.325	21.375	200																								
		150	19.500	21.400	500																								
		160	19.000	21.650	120																								
		55	20.400																										
DA		40	20.725	20.750	100	20.725	2.155	20.767	*40	0.050	0.150	*30	120	-0.075	0.000	*95	*1	0.375	0.425	*30	*12	-1.450	-1.300	*95	*1	-1.000	-0.875	*30	
		17	20.700	20.850	10								*12	-0.075	0.600	120													
		*95	20.675	21.425	100																								
		10	20.650																										
		10	20.625																										
		100	20.300																										
		100	20.300																										
		100	20.200					20.641																					
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		NCG L / TTF				24/7 Trading			GPLL / TTF				NCG H				NCG L / H				NCG L				GPL H				
		Qty	Bid	Ask	Qty	Last	TQty	EoD	Qty	Bid	Ask	Qty	Qty	Bid	Ask	Qty	Qty	Bid	Ask	Qty	Qty	Bid	Ask	Qty	Qty	Bid	Ask	Qty	
WD		60	-0.200	0.650	20	-0.20					1.025	*100	100	20.325	21.950	200	*40	-0.850	1.625	*40	40	21.100	21.950	40	200	19.350	21.800	100	
DA		*78	0.400		20	0.25			*45	0.100			200	15.000	22.500	250	*78	-1.425	6.100	*14	78	21.075	21.100	14			21.950	200	
WE																													
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# Yearly Traded Volume CEGH Gas Exchange

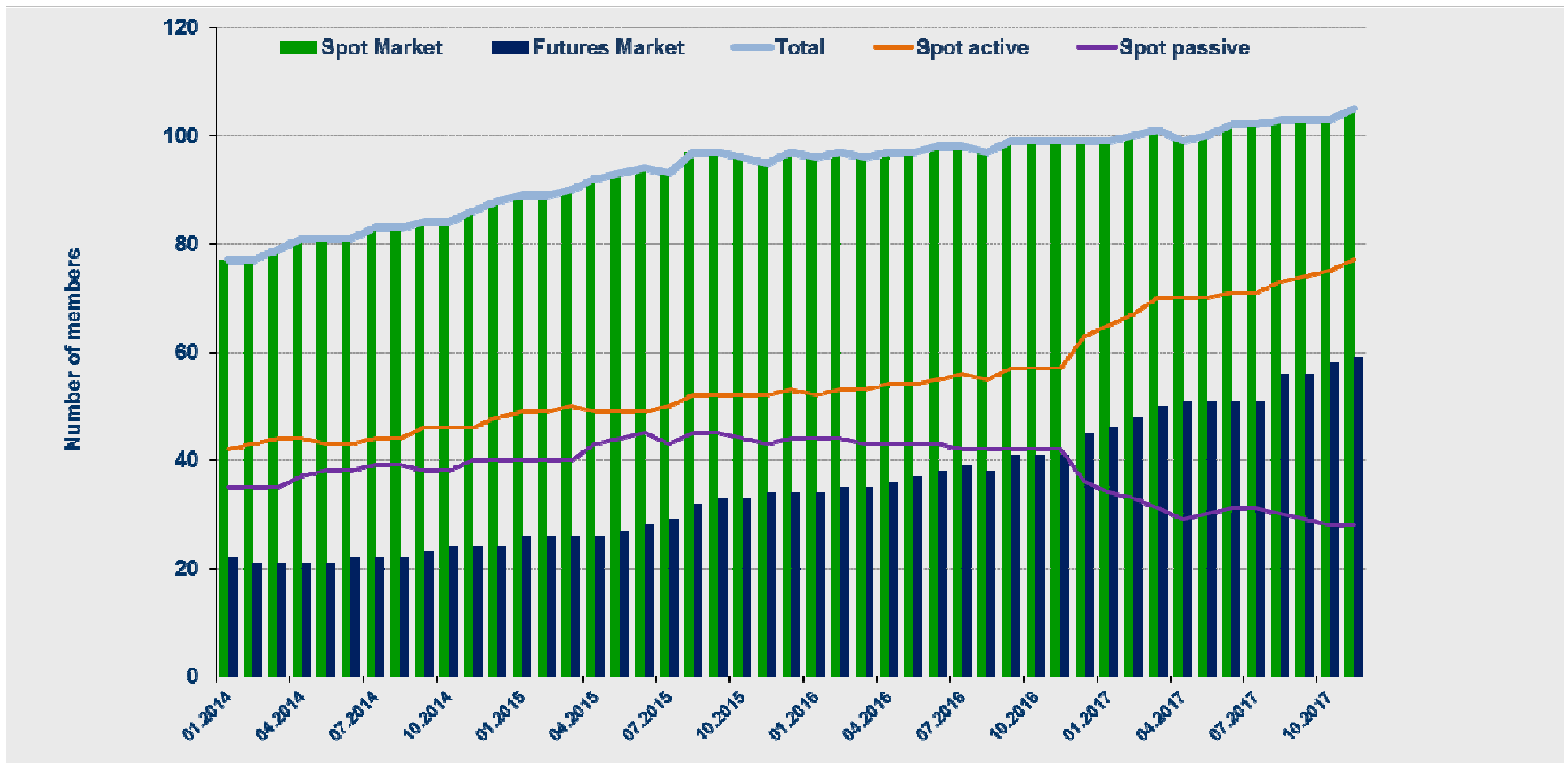




# PEGAS CEGH Gas Market since Dec 2009



# Number of registered participants



# Registered Members PEGAS CEGH Gas Exchange



# Contract Specification for Spot Market Products

**Basic principles:**

<b>Spot Exchange Products:</b>	<b>Day-ahead product, Weekend &amp; Saturday-, Sunday product, Individual Days</b>
<b>Gas product type:</b>	<b>Base load</b>
<b>Delivery point:</b>	<b>VTP</b>
<b>Settlement:</b>	<p><b>Physical delivery:</b></p> <p><b>D/A: from 06:00 am (d+1) to 06:00 am (d+2)</b></p> <p><b>W/E: from 06:00 am (d+1) to 06:00 am (d+3)</b></p> <p><b>(Monday: from 06:00 am (d+3) to 06:00 am (d+4))</b></p> <p><b>Individual days offered</b></p>
<b>Trading Mode:</b>	<b>Click trading on a 24/7 basis</b>
<b>Price units:</b>	<b>EUR/MWh</b>
<b>Minimum price change:</b>	<b>0.025 EUR/MWh</b>
<b>Minimum trade size:</b>	<b>1 MWh/h</b>
<b>Physical settlement:</b>	<b>single sided nomination (delivery instruction by ECC)</b>

## *Contract Specification – Rest of Day contract*

### ***Basic principles:***

#### ***Within-Day Exchange Products: Rest of Day contract***

***Physical delivery or receipt of the remaining hours (i.e. Rest of Day) of the respective gas day with a lead time of 3 hours based on the next full hour***

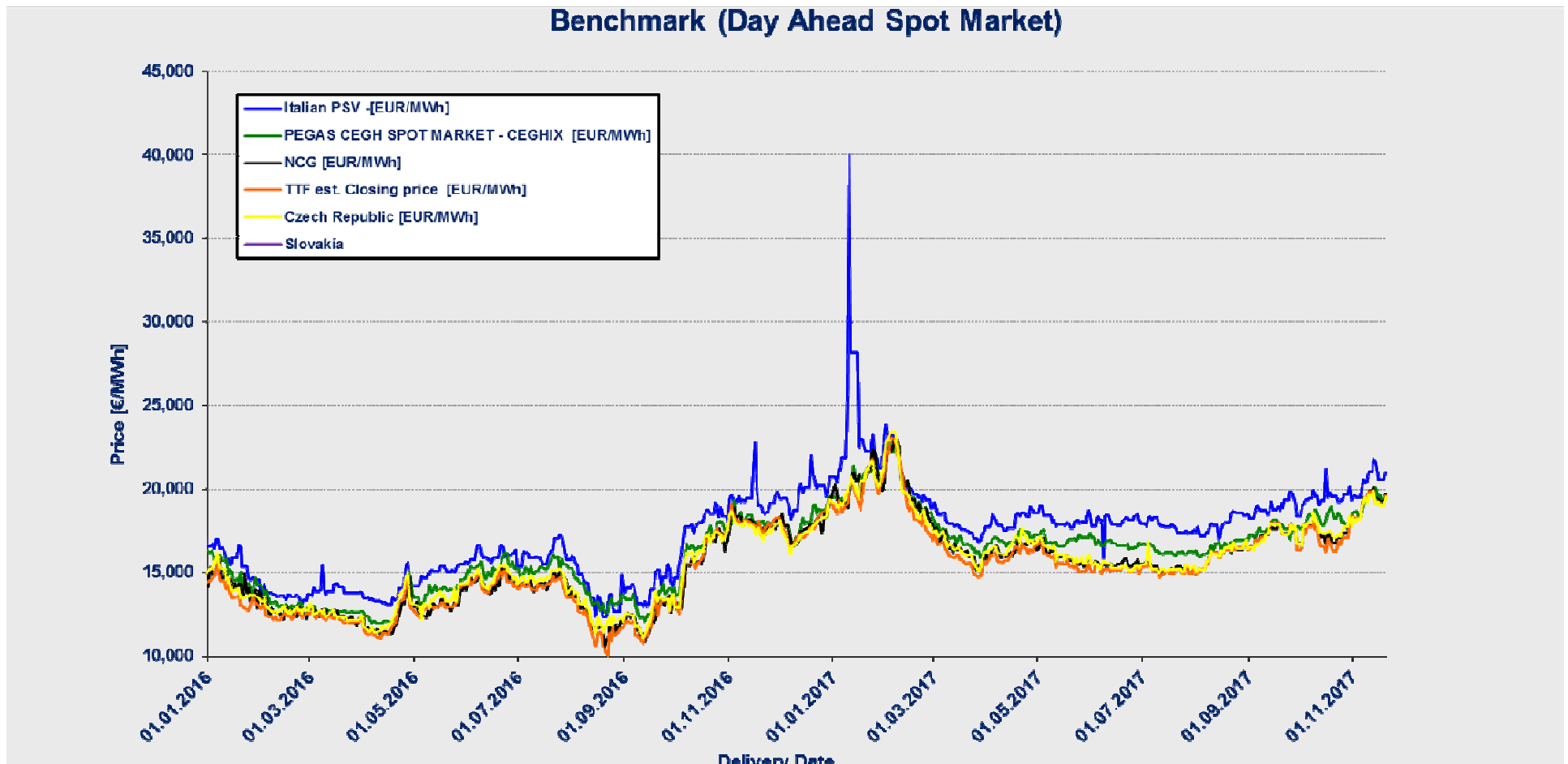
<b><i>Gas product type:</i></b>	<b><i>Base load</i></b>
<b><i>Delivery point:</i></b>	<b><i>VTP</i></b>
<b><i>Trade mode:</i></b>	<b><i>Continuous trading and hourly auctions</i></b>
<b><i>Trading hours:</i></b>	<b><i>24/7</i></b>
<b><i>Price units:</i></b>	<b><i>EUR / MWh</i></b>
<b><i>Minimum price increment:</i></b>	<b><i>0.025 EUR / MWh</i></b>
<b><i>Minimum trade size:</i></b>	<b><i>1 MWh</i></b>

## Contract Specification – Futures Market contracts



	<b>CEGH Gas Exchange of Wiener Boerse Futures Market</b>											
	Front Month			Front Quarter				Front Season			Front Year	
	1.	2.	3.	1.	2.	3.	4.	1.	2.	3.	1.	2.
Gas product type	Base load											
Delivery point	VTP Austria											
Settlement	Physical delivery											
Trading hours	From 09:00 am to 05:00 pm											
Price units	EUR/MWh											
Minimum price change	0.025 EUR / MWh											
Minimum trade size	10 MW											
Single sided nomination	By ECC, counter party nomination done by CEGH on behalf of exchange member											

# European Day Ahead Spot Market prices



## Near time exchange data at [www.cegh.at](http://www.cegh.at)

### PEGAS CEGH Day Ahead Market

Trading Day	Contract	Open €/MWh	High €/MWh	Low €/MWh	Close €/MWh	Volume acc.	Trades	CEGHEDI	VWAP/CEGHIX €/MWh	Trend	Best Bid	Best Ask
20.01.2017	Weekend	21.250	21.250	20.825		279,216	145		20.996	↘	20.775	21.100
20.01.2017	Monday	21.400	21.400	20.950		123,576	102		21.116	➤	20.900	21.150
20.01.2017	Sunday	21.200	21.200	21.200		120	1		21.2	↗	-	21.800
19.01.2017	Friday	21.200	21.300	20.800	21.600	220,008	178	21.090	21.100	↗		
18.01.2017	Thursday	20.725	21.075	20.725	20.800	218,808	152	20.200	20.880	↗		
17.01.2017	Wednesday	20.200	21.600	20.175	21.600	144,024	125	21.050	20.680	↗		
16.01.2017	Tuesday	20.000	20.400	19.825	20.000	219,096	165	20.140	20.170	↘		
13.01.2017	Monday	20.500	21.975	20.500	21.900	211,728	166	20.850	20.670	➤		
13.01.2017	Sunday	20.600	20.650	20.600	20.650	2,040	4		20.600	➤		
13.01.2017	Weekend	21.400	21.400	20.425	21.000	255,792	103	20.430	20.540	➤		
13.01.2017	Saturday	20.600	20.600	20.600	20.600	240	1		20.600	➤		

VWAP ... Volume Weighted Average Price published from 08:00 am CET until 06:00 pm CET. Prices 15 minutes delayed;

CEGHIX ... CEGH Gas Index published at 07:15 pm

Please mind that the price for Saturday and Sunday is no official CEGHIX (Index), but shows the VWAP to give a price indication for these products. The price for weekend products is the official CEGHIX for this time period.

Volume in single count method.

Price trend: difference to last CEGHIX more than 0.1€

The CEGHEDI is a price index based on exchange trades and/or orders in the settlement window between 05.15 pm and 5:30 pm.



## Near time exchange data at [www.cegh.at](http://www.cegh.at)

### PEGAS CEGH Monthly Futures

Trading Day	Contract	Settlement Price EUR/MWh	Last Price EUR/MWh	Volume acc. MWh	Best Bid	Best Ask
20.01.2017	Feb-17	-	-	-	20.800	21.000
20.01.2017	Mar-17	-	20.750	3,715	20.600	20.875
20.01.2017	Apr-17	-	-	-	19.700	20.200
19.01.2017	Feb 2017	20.370	20.250	238,560		
19.01.2017	Mar 2017	20.260	20.325	278,625		
19.01.2017	Apr 2017	19.690	19.600	7,200		

Settlement prices are updated after post trading phase. Prices 15 minutes delayed; Volume in single count method and Mistrades are excluded.

### PEGAS CEGH Quarterly Futures

Trading Day	Contract	Settlement Price EUR/MWh	Last Price EUR/MWh	Volume acc. MWh	Best Bid	Best Ask
20.01.2017	Quarter 2/2017	-	-	-	19.100	19.500
20.01.2017	Quarter 3/2017	-	-	-	18.800	19.225
20.01.2017	Quarter 4/2017	-	-	-	19.275	19.975
20.01.2017	Quarter 1/2018	-	-	-	19.200	20.100
19.01.2017	Quarter 2/2017	19.070	16.650	131,040		
19.01.2017	Quarter 3/2017	18.830	16.425	22,080		
19.01.2017	Quarter 4/2017	19.460	16.900	22,070		
19.01.2017	Quarter 1/2018	19.600	-	-		

Settlement prices are updated after post trading phase. Prices 15 minutes delayed; Volume in single count method.

## Near time exchange data at [www.cegh.at](http://www.cegh.at)

### PEGAS CEGH Seasons

Trading Day	Contract	Settlement Price EUR/MWh	Last Price EUR/MWh	Volume acc. MWh	Best Bid	Best Ask
20.01.2017	Summer 2017	-	-		19.050	19.350
20.01.2017	Winter 2017	-	-		19.500	19.900
20.01.2017	Summer 2018	-	-		18.250	18.850
19.01.2017	Summer 2017	18.950	18.375	1,207,800		
19.01.2017	Winter 2017	19.530	19.675	661,080		
19.01.2017	Summer 2018	18.350	18.400	109,800		

Settlement prices are updated after post trading phase. Prices 15 minutes delayed; Volume in single count method.

### PEGAS CEGH Yearly Futures

Trading Day	Contract	Settlement Price EUR/MWh	Last Price EUR/MWh	Volume acc. MWh	Best Bid	Best Ask
20.01.2017	2018	-	-	-	18.775	19.175
20.01.2017	2019	-	-	-	18.200	18.975
19.01.2017	2018	18.770	18.600	131,400		
19.01.2017	2019	18.570	-	-		

Settlement prices are updated after post trading phase. Prices 15 minutes delayed; Volume in single count method.

***THANK YOU VERY MUCH FOR  
YOUR ATTENTION***

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