



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

Florian Alexander Güttl

MSc

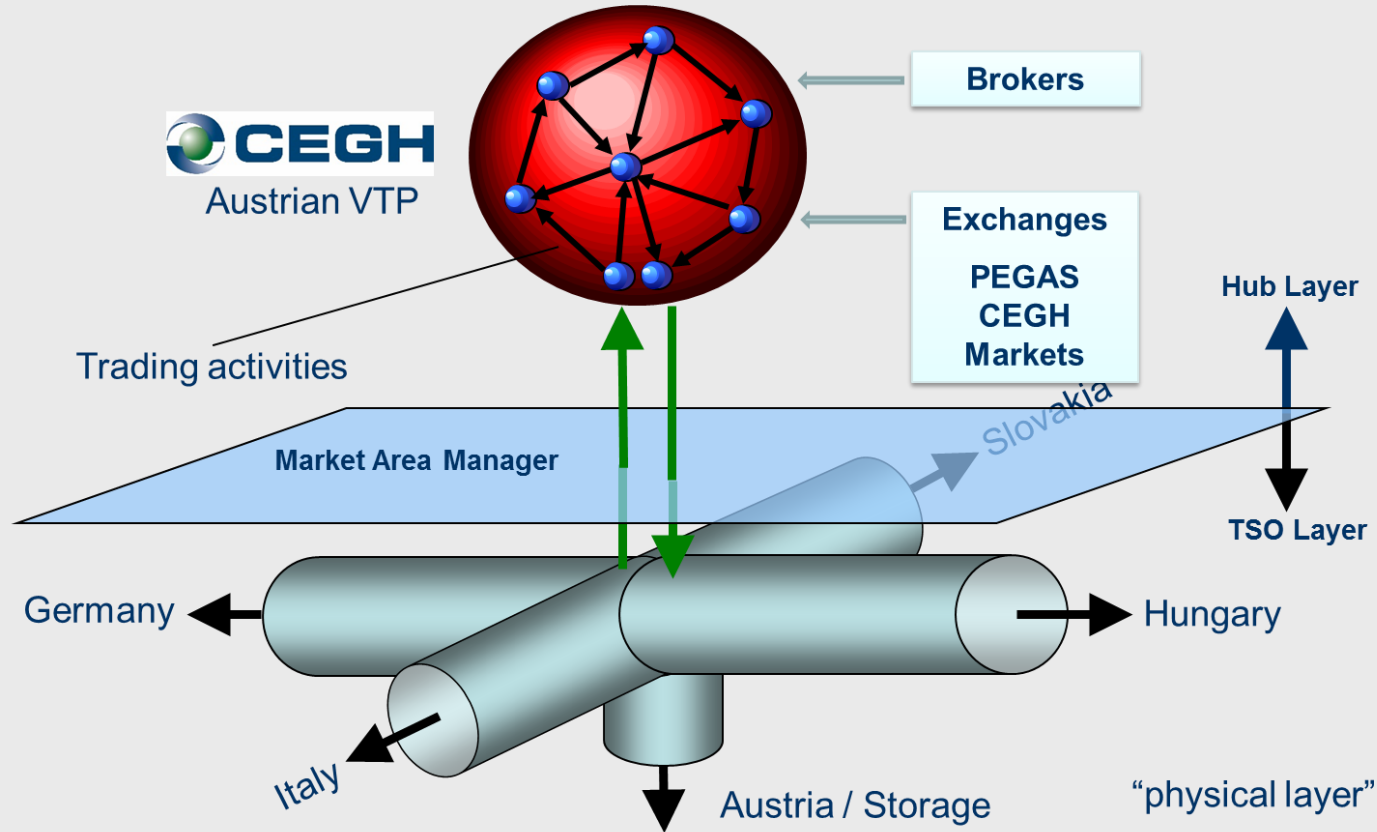
Central European Gas Hub AG

Key Account PEGAS CEGH Gas Exchange

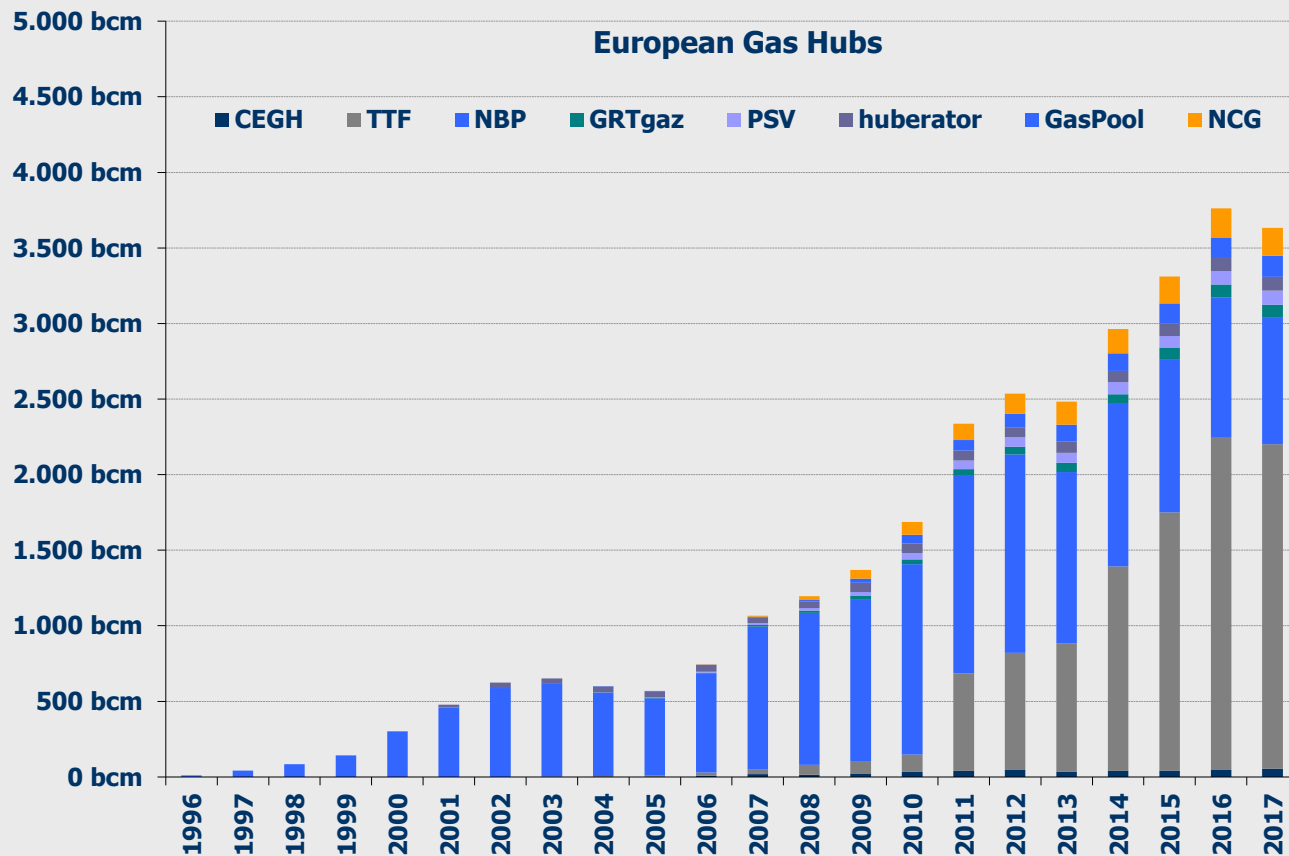
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- 1. *Introduction about HUBs & CEGH at a glance***
- 2. *Austrian Market Model***
- 3. *PEGAS CEGH GAS Markets***

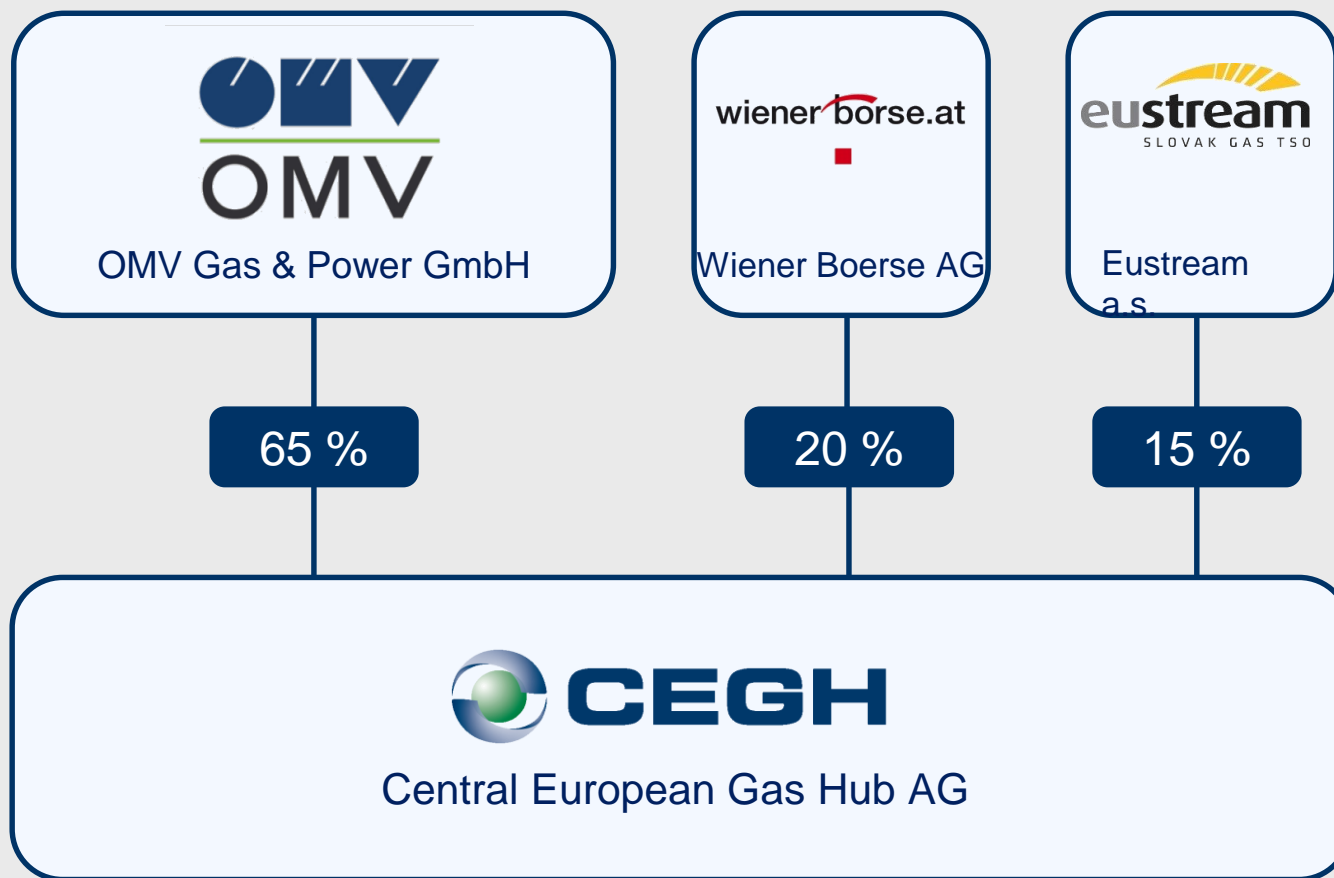
“Trading layer” (hub) versus “physical layer”



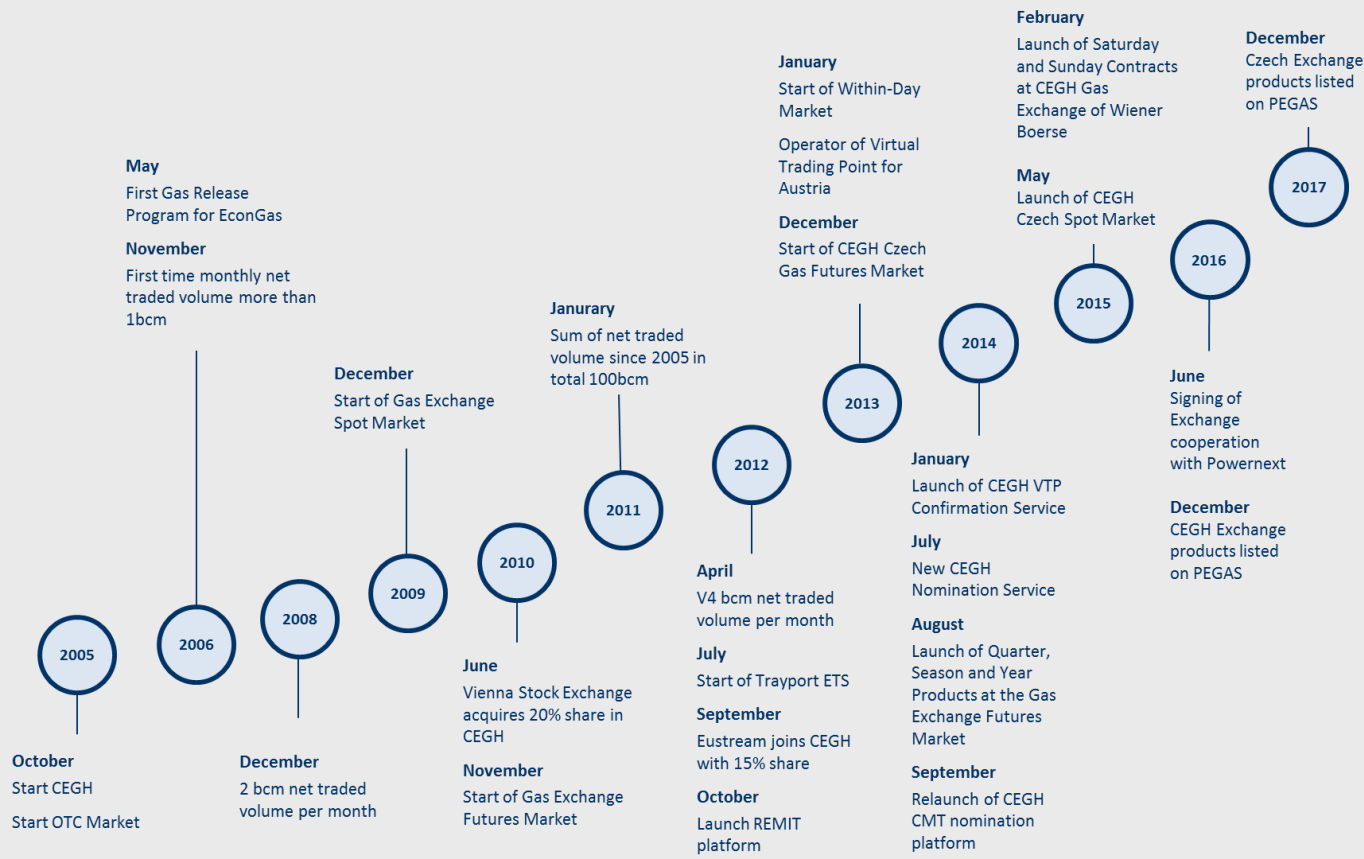
Development of Hubs – HUB Volumes



CEGH- Shareholder Structure



CEGH – Historic Development



CEGH VTP:

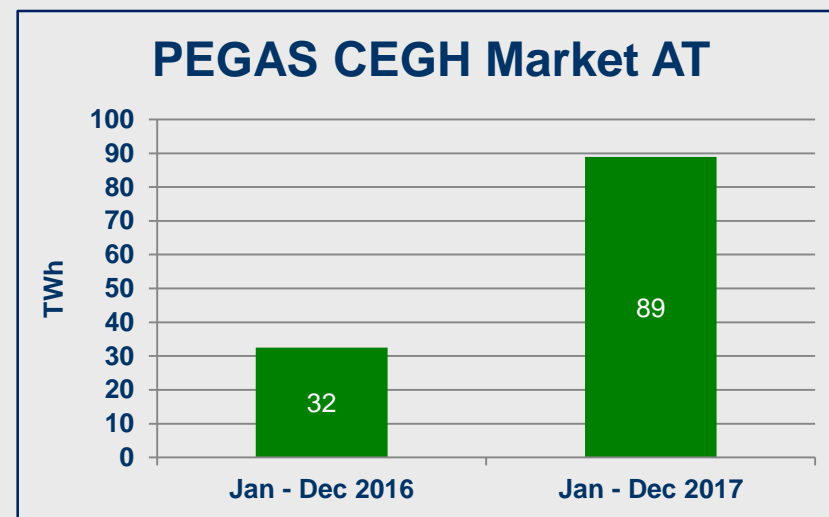
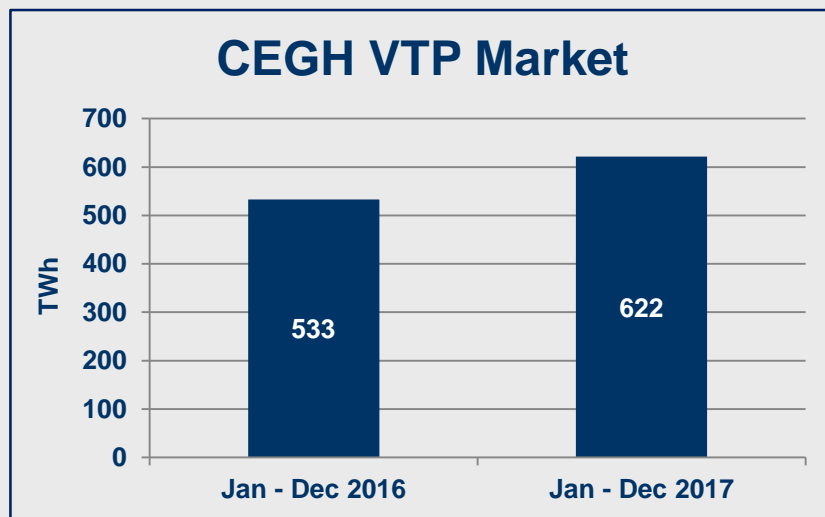
1 - 12 / 2017: 621.93 TWh

(y-t-y: **+16.7%**)

PEGAS CEGH Gas Exchange:

1 - 12 / 2017: 88.89 TWh

(y-t-y: **+173.73%**)



CEGH VTP:

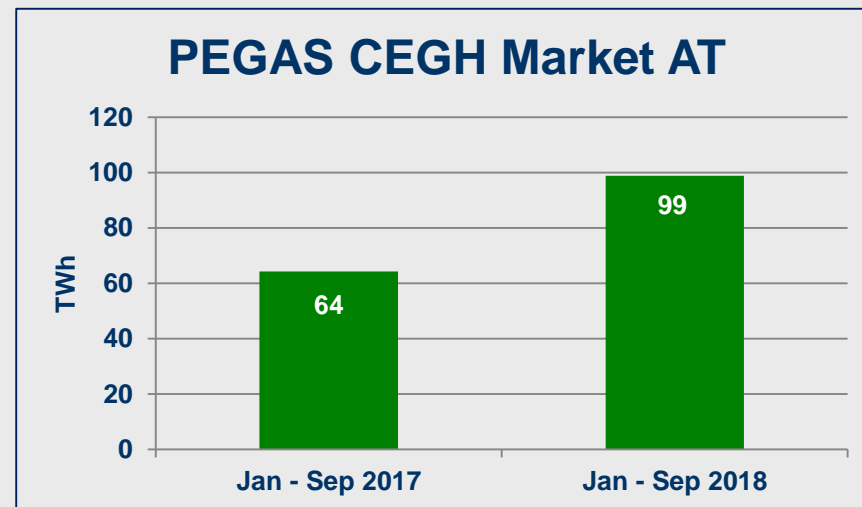
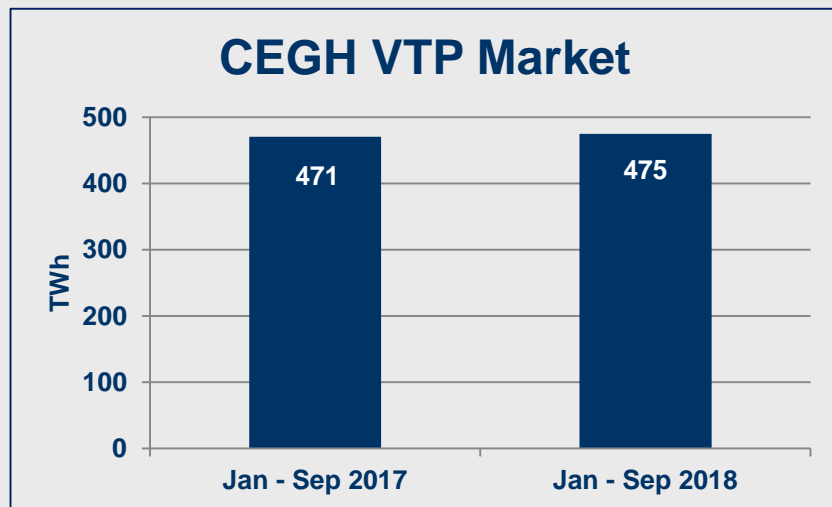
1 - 9 / 2018: 474.88 TWh

(y-t-y: **+0.9%**)

PEGAS CEGH Gas Exchange:

1 - 9 / 2018: 98.89 TWh

(y-t-y: **+53.8%**)



Central European Gas Hub

 **PEGAS CEGH**
Gas Markets 


Virtual Trading Point

CEGH VTP

CZ VTP

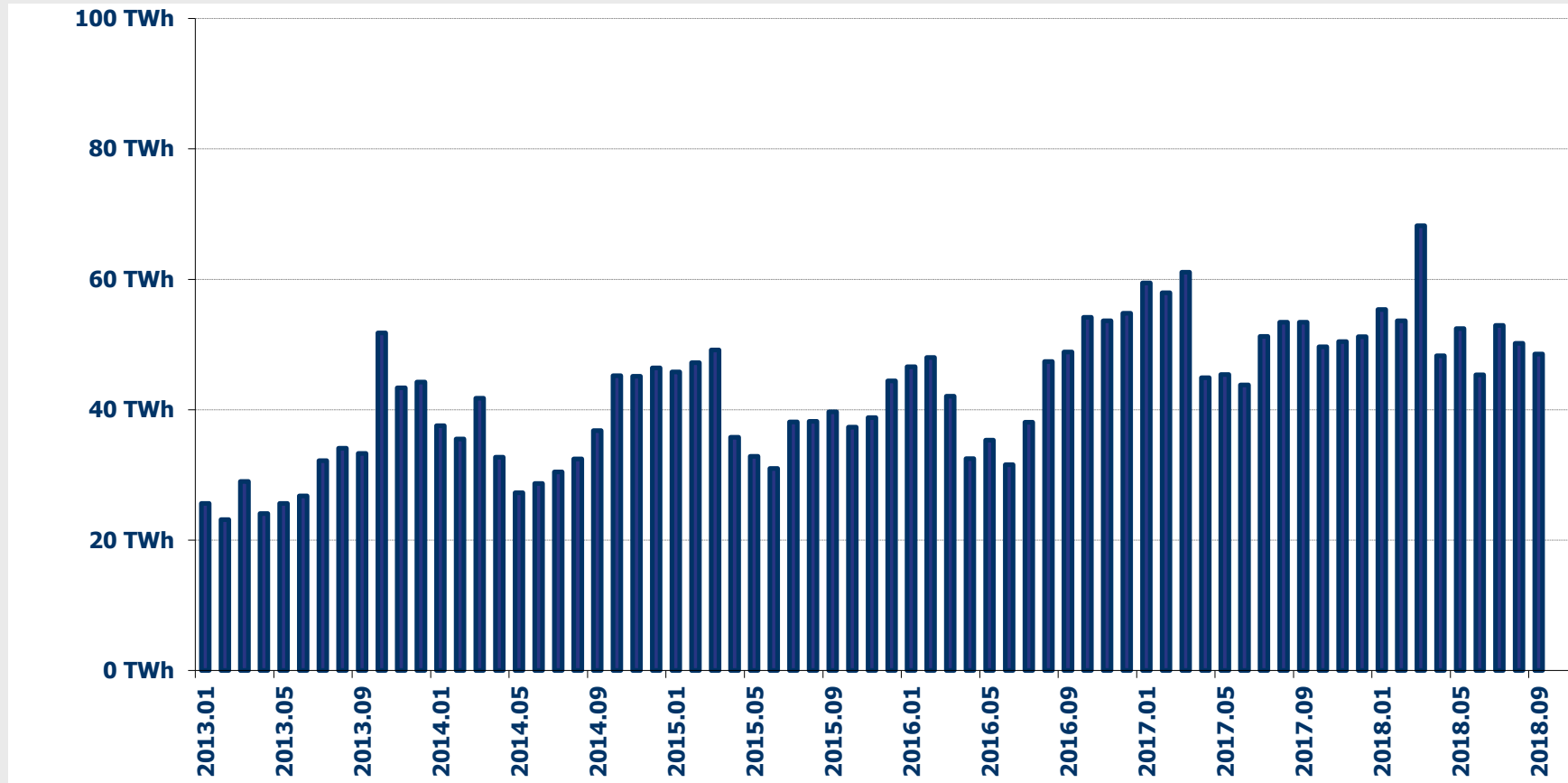
Spot & Futures Market

- ✓ Standardized Products
- ✓ Clearing (no counterparty risk)
- ✓ Anonymous trading
- ✓ Transparent prices
- ✓ Liquidity providers
- ✓ Market Makers
- ✓ Min. 1MWh
- ✓ 3 hours lead time

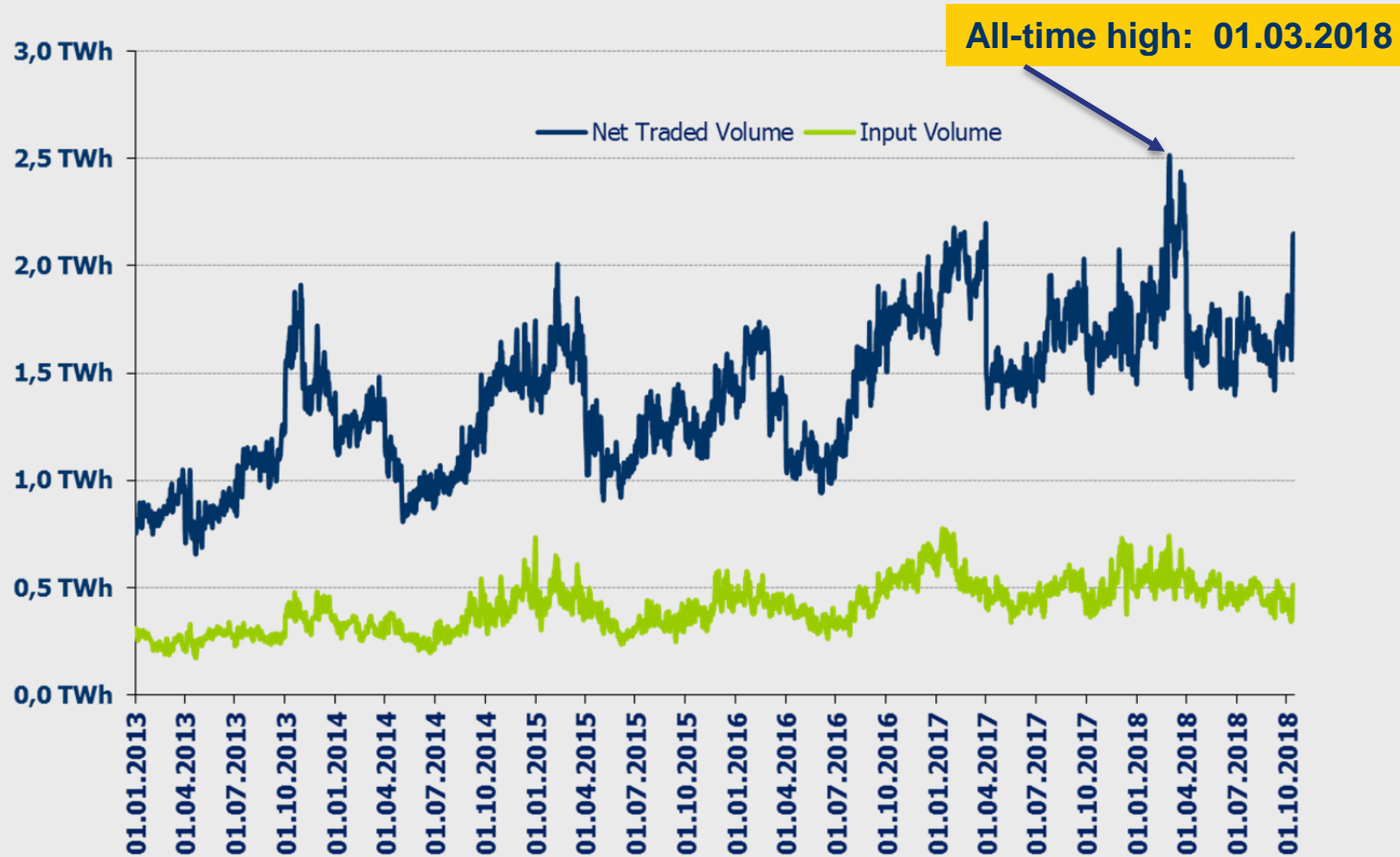
Nomination Platform

- ✓ Flexible volume (kWh)
- ✓ Bilateral contracts
- ✓ Renomination service,
- ✓ Edigas communication
- ✓ 1 hour lead time

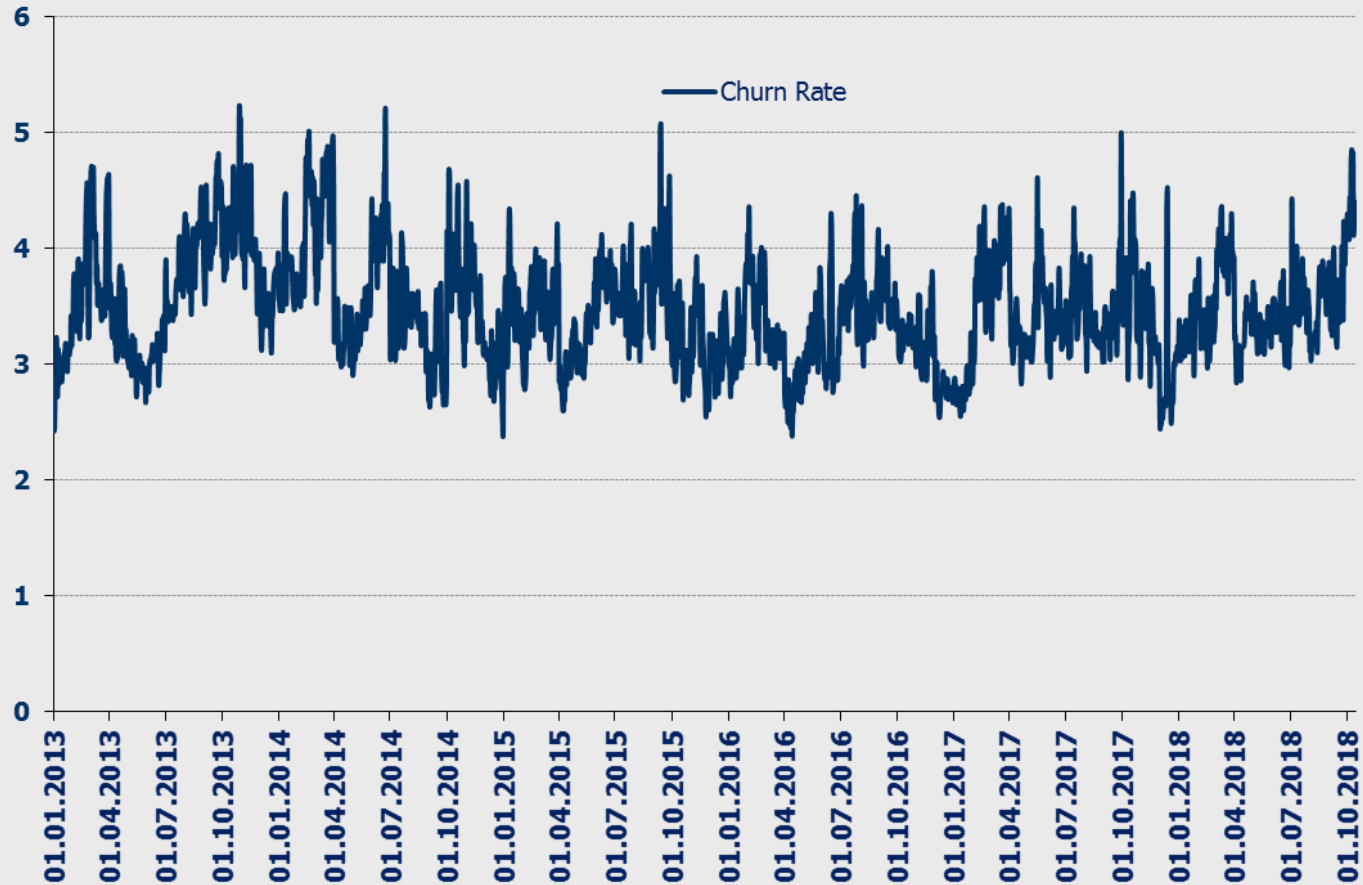
CEGH Development of HUB Trading Nominated Volume



CEGH VTP: Daily Nominations since Jan 2013



CEGH VTP: Daily Churn Rate since 01.2013

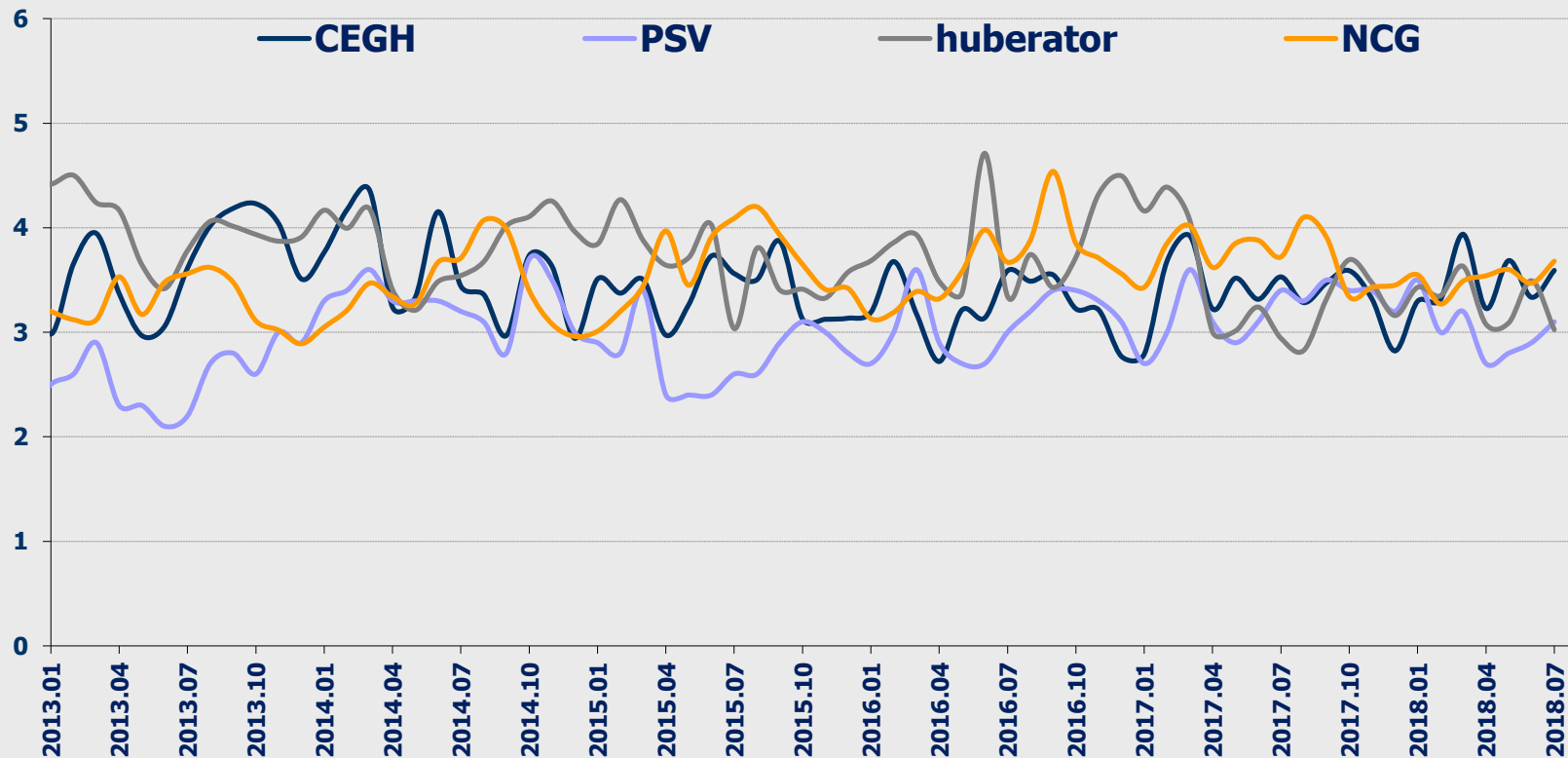


CEGH Development of HUB Trading

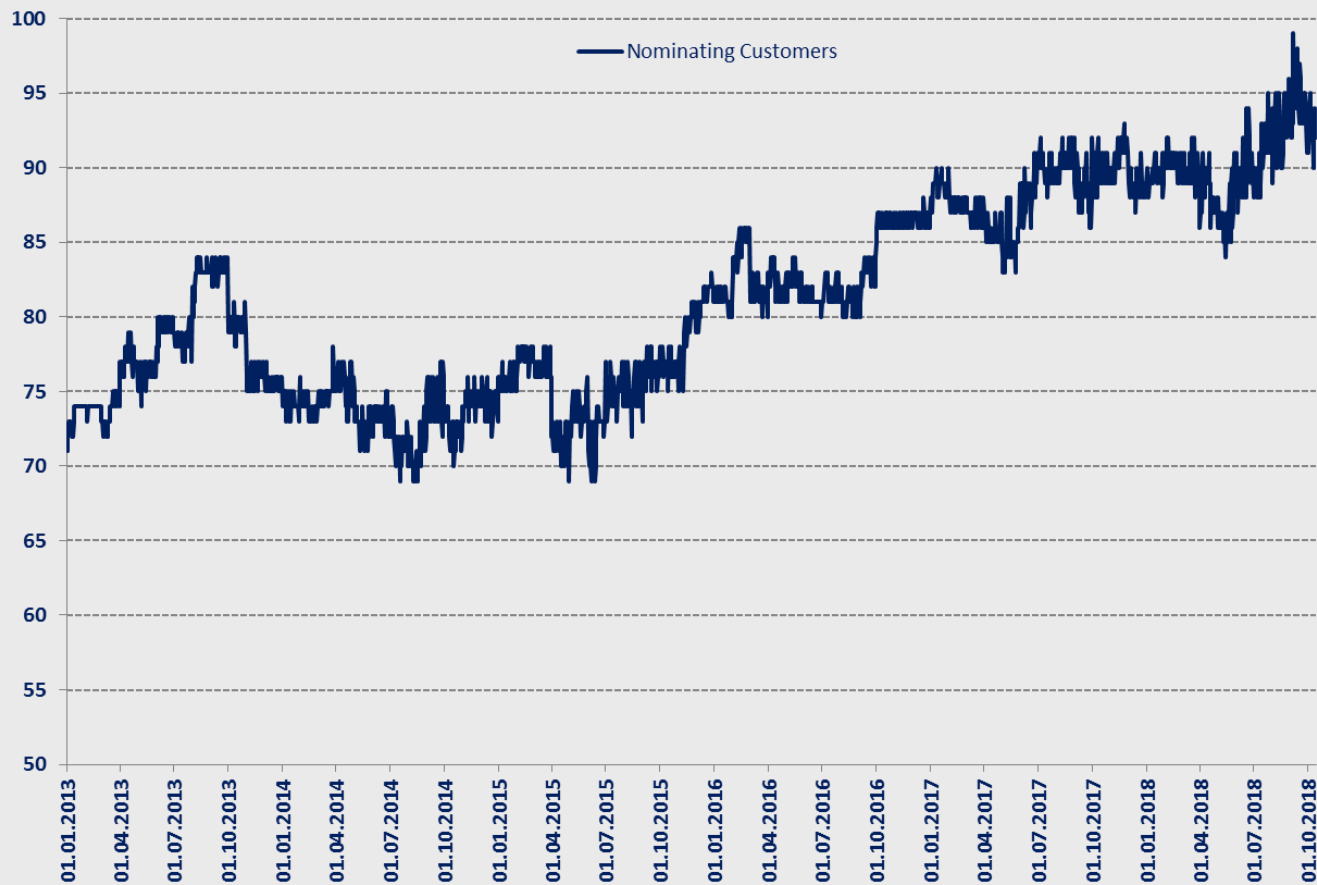
Continental European Gas Hubs - Churn Rate



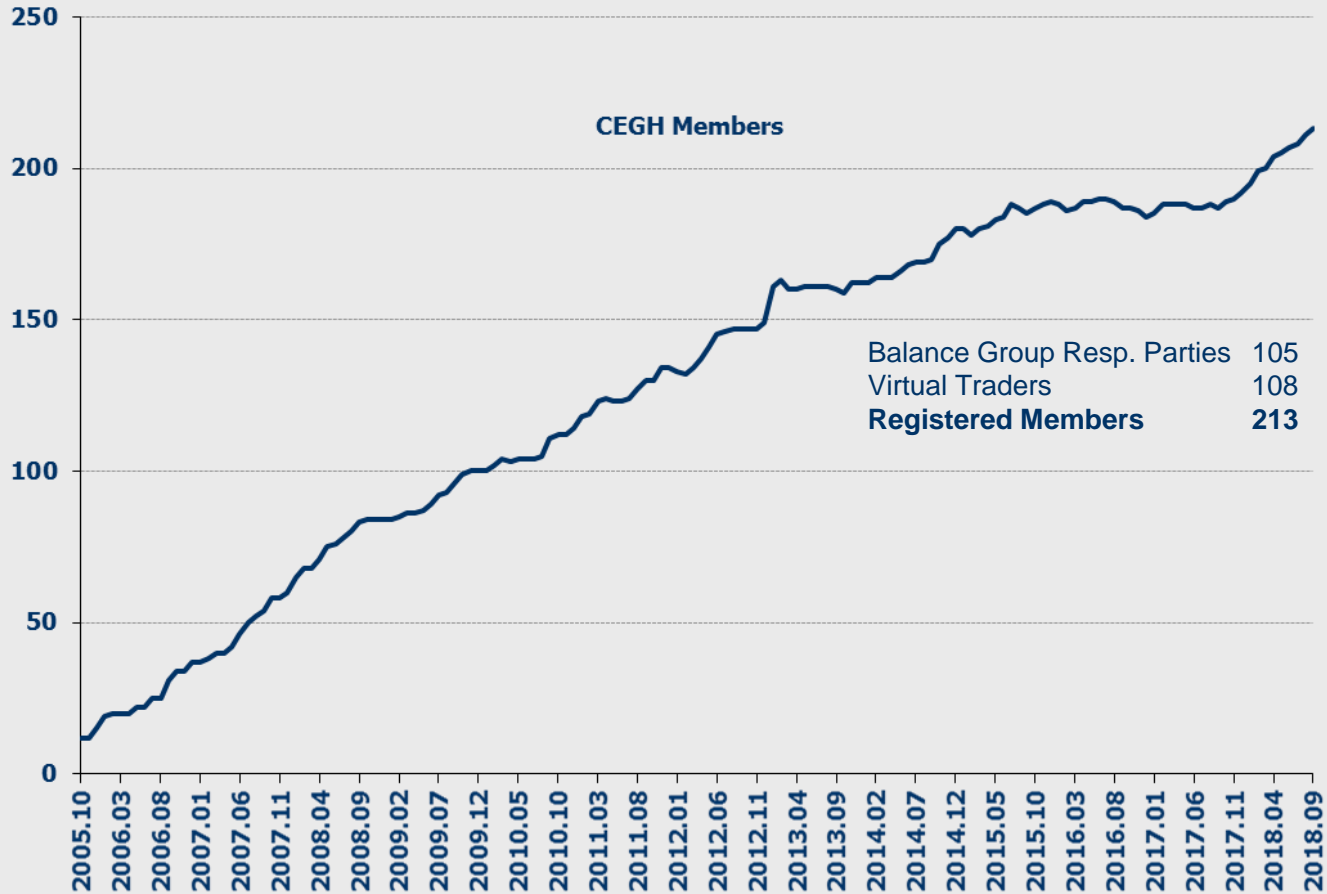
Continental European Gas Hubs - ChurnRate



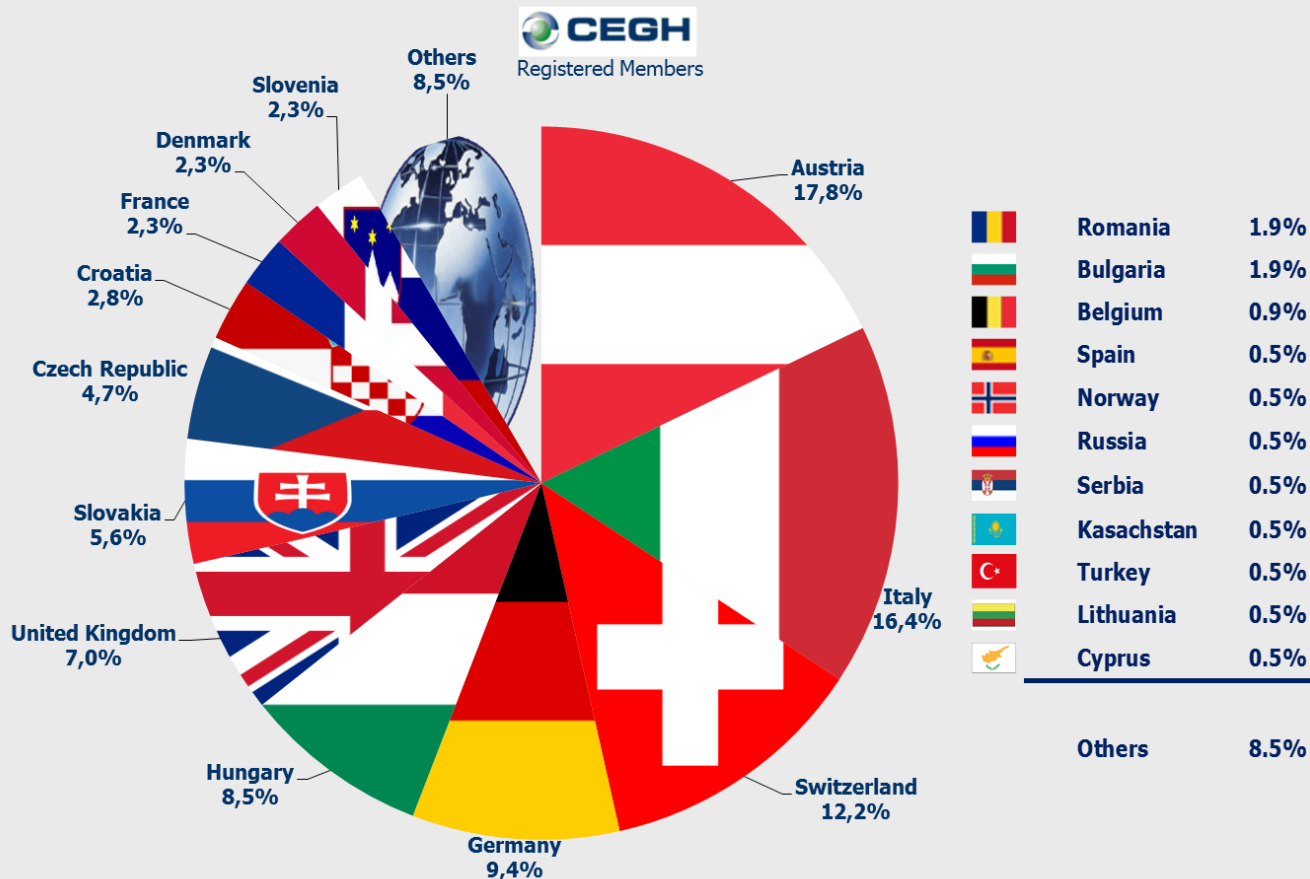
CEGH VTP: Active Customers on daily basis since 2013



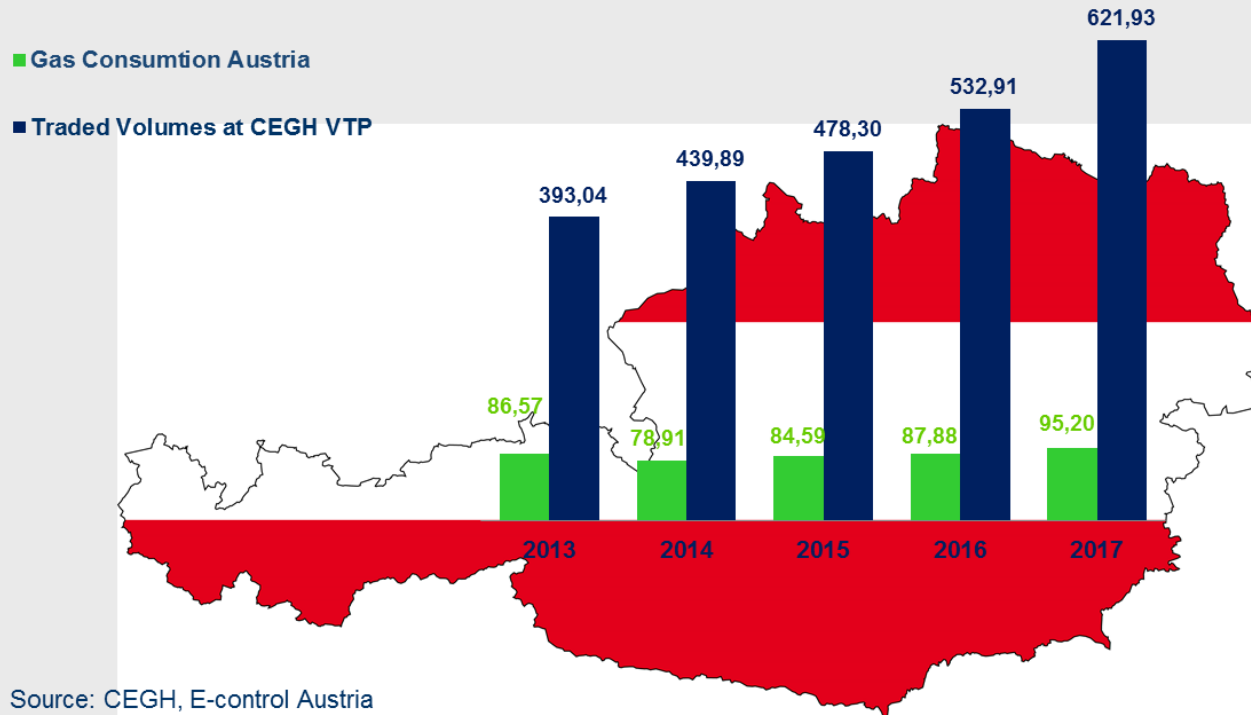
CEGH - Development of VTP Trading Registered Members



Member Structure CEGH VTP



Volume Development at CEGH VTP



Source: CEGH, E-control Austria
Graph: d-maps.com

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 Ask spread for products traded

Churn Rate



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 (30th 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 >>

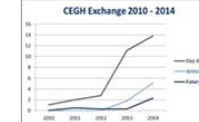
| Trading Day | Contract | Settlement Price EUR/MWh |
|-------------|----------|--------------------------|
| 04.02.2015 | Mar 2015 | 21.436 |
| 04.02.2015 | Apr 2015 | 21.213 |
| 04.02.2015 | May 2015 | 20.864 |

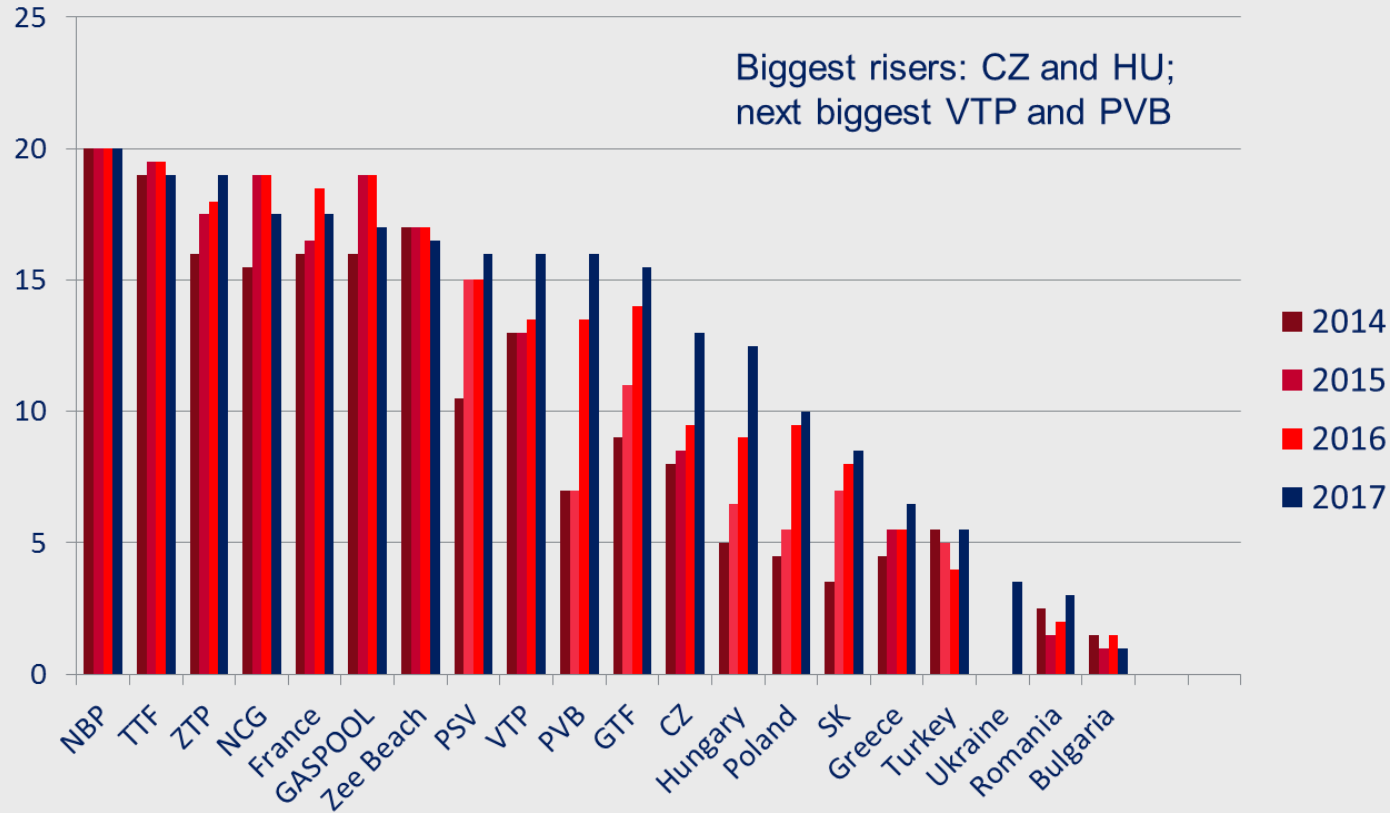
[More Futures Market >>](#)

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 >>](#)





Austrian Market Model

Baumgarten Station (*)

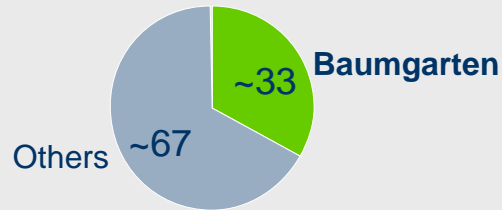


() ... owned and operated by
Gas Connect Austria*

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 facilities 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*

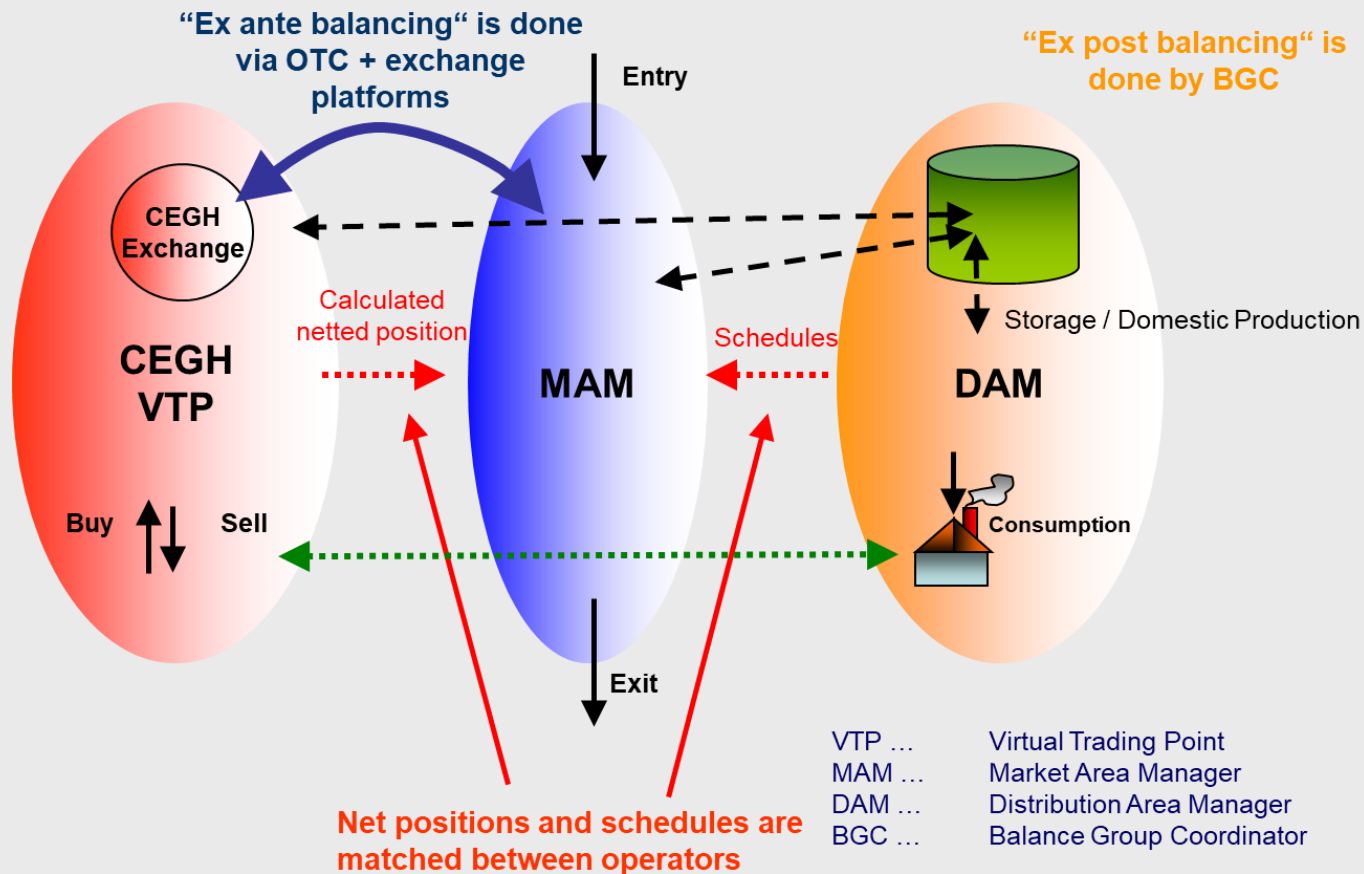
§ 68 Austrian Gas Act (2011)

Main Tasks:

- Operating Virtual Trading Point (VTP)
- Providing commercial hub services
- Matching of trade nominations
- Cooperation with exchanges + clearinghouses
- ...

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.*

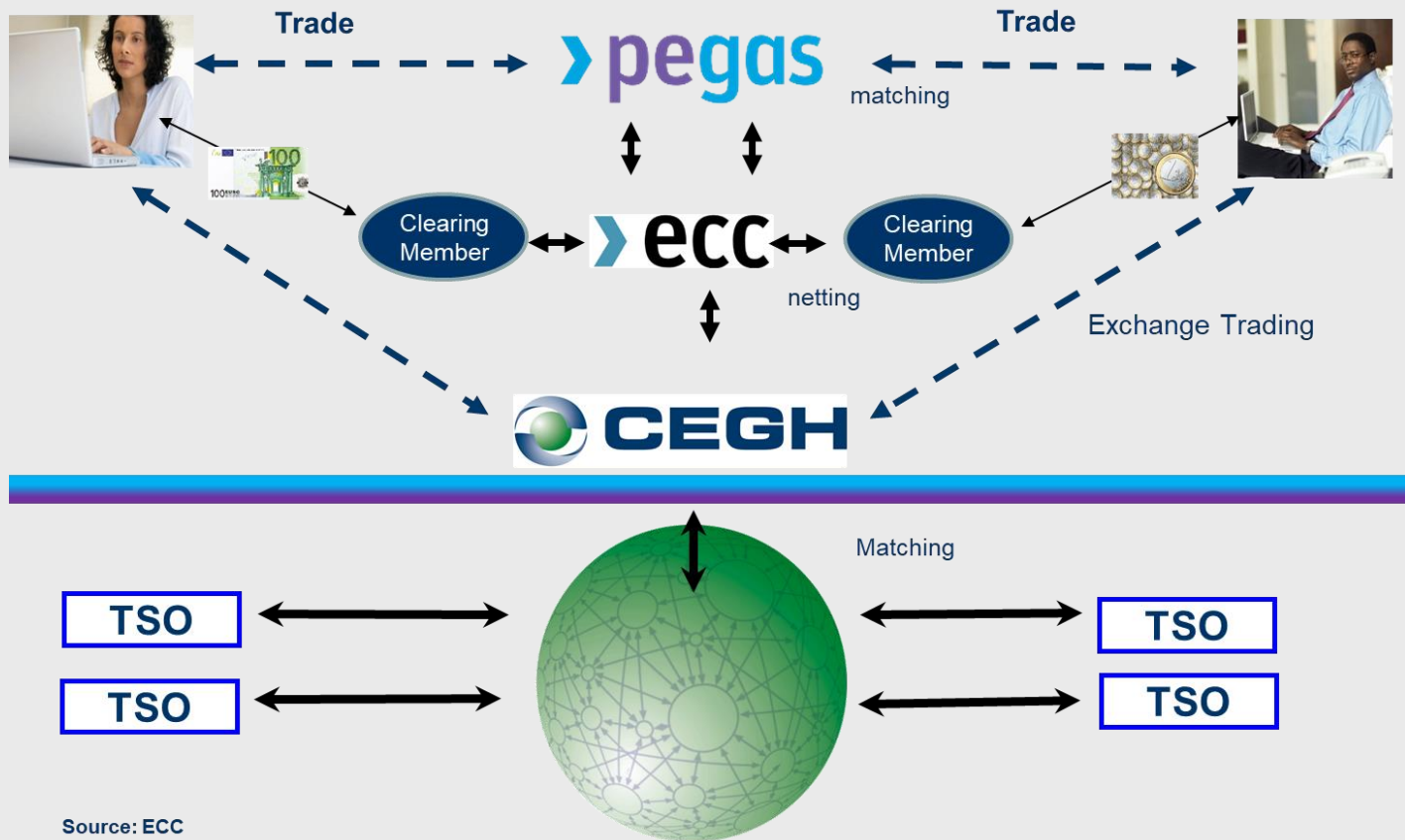


Net position calculation per balance group

| 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 |
| | + 350 | OTC | |
| | | - 30 | Sell on Exchange |
| | | - 20 | Sell on Exchange |
| Exchange | | - 50 | |
| | + 300 | Total | |

**net position to
MAM**

Physical Settlement Process



Source: ECC

Different roles of BGRPs and Virtual Traders

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

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

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).

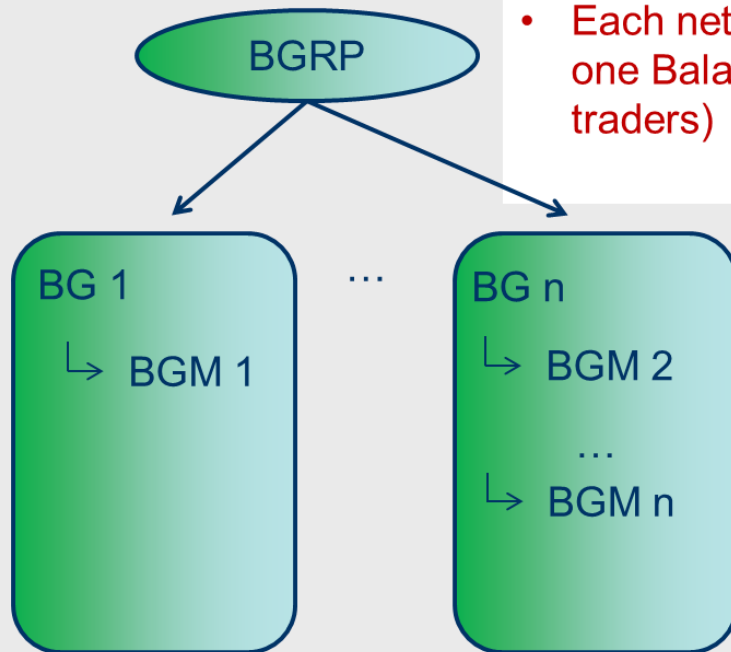
- Each network user has to be assigned to (at least) one Balance Group. (Not applicable for virtual gas traders)

- One BGRP can have more than one balance group.

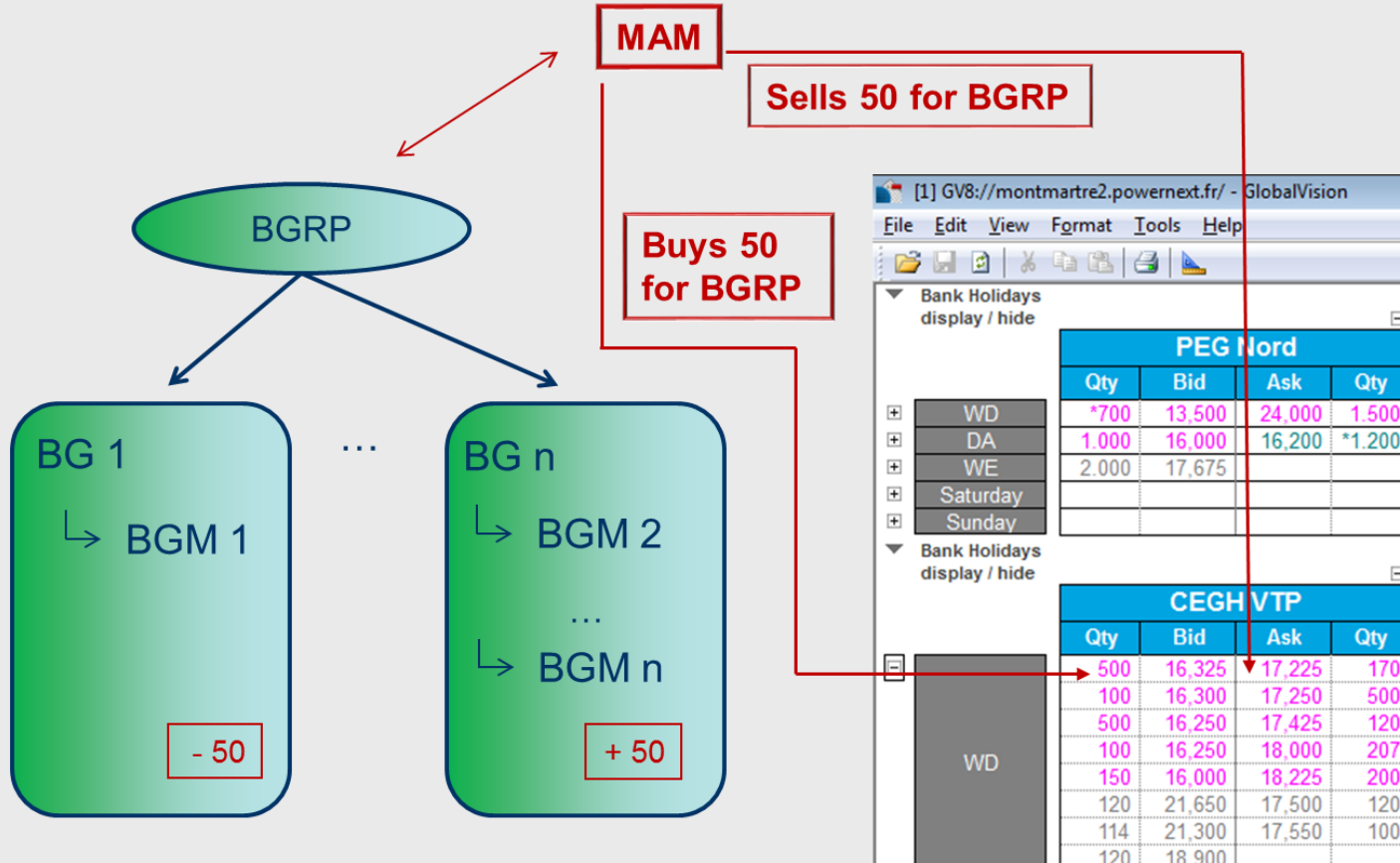
- MAM is doing balancing on behalf of and on the account of the BGRP

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

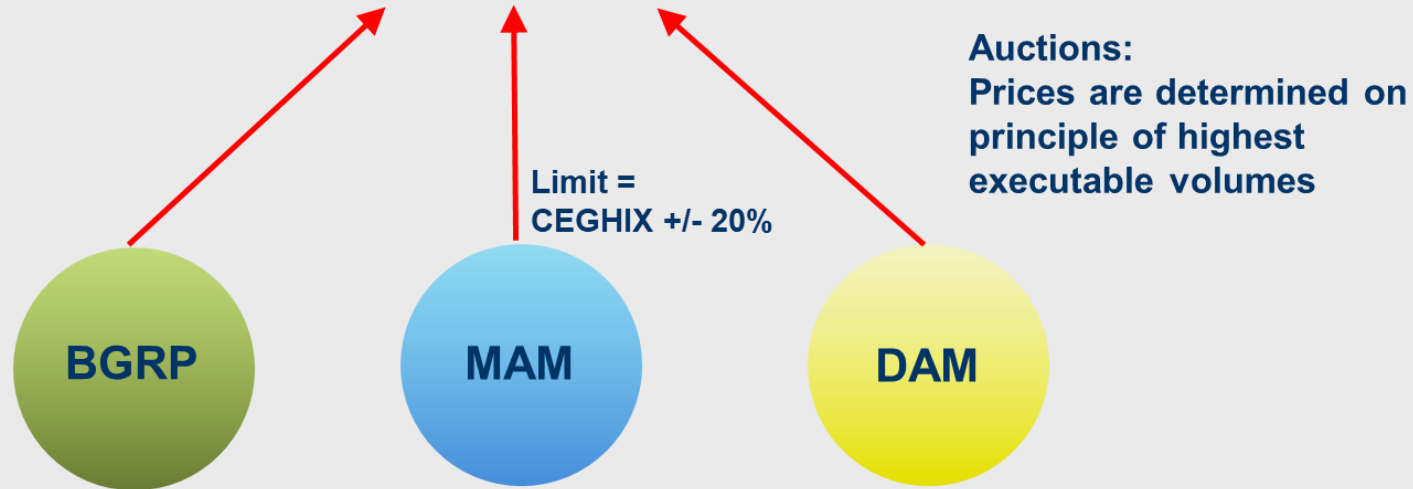
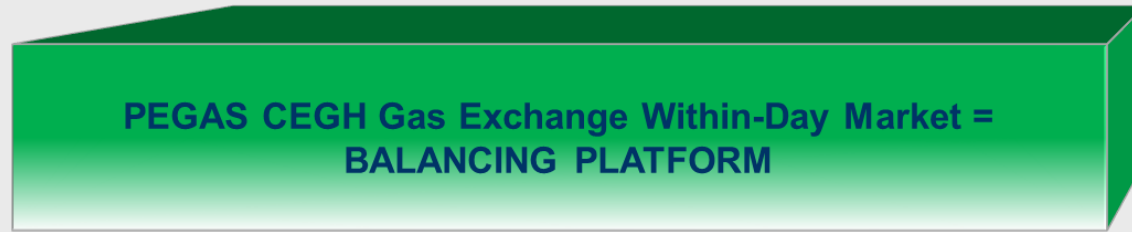
- Balancing is done on Balance Group Level



The Impact of Balancing on BG Level



Price determination for within-day / balancing volumes



One single market clearing price for each auction!

PEGAS CEGH GAS MARKETS

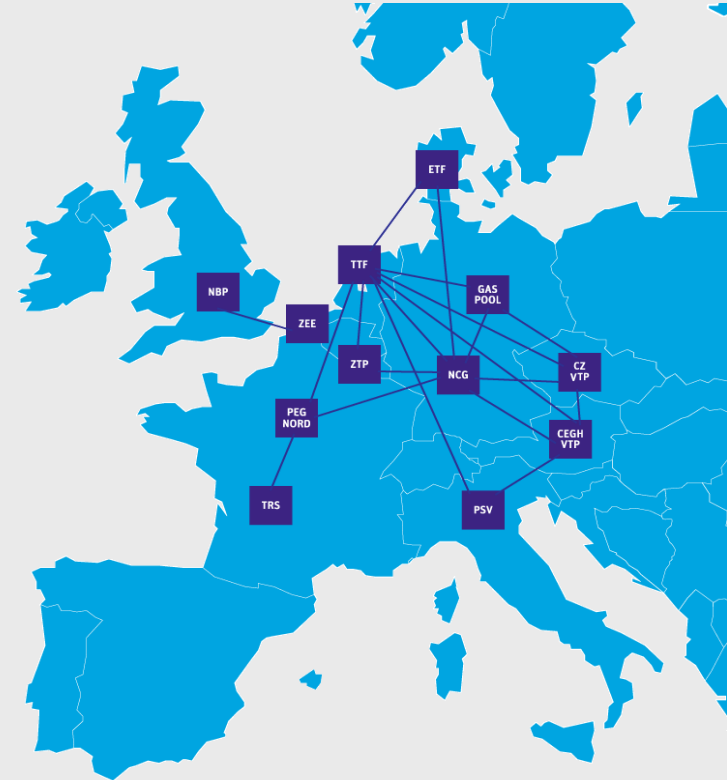
PEGAS: One Platform for one European Gas Market: Product offer



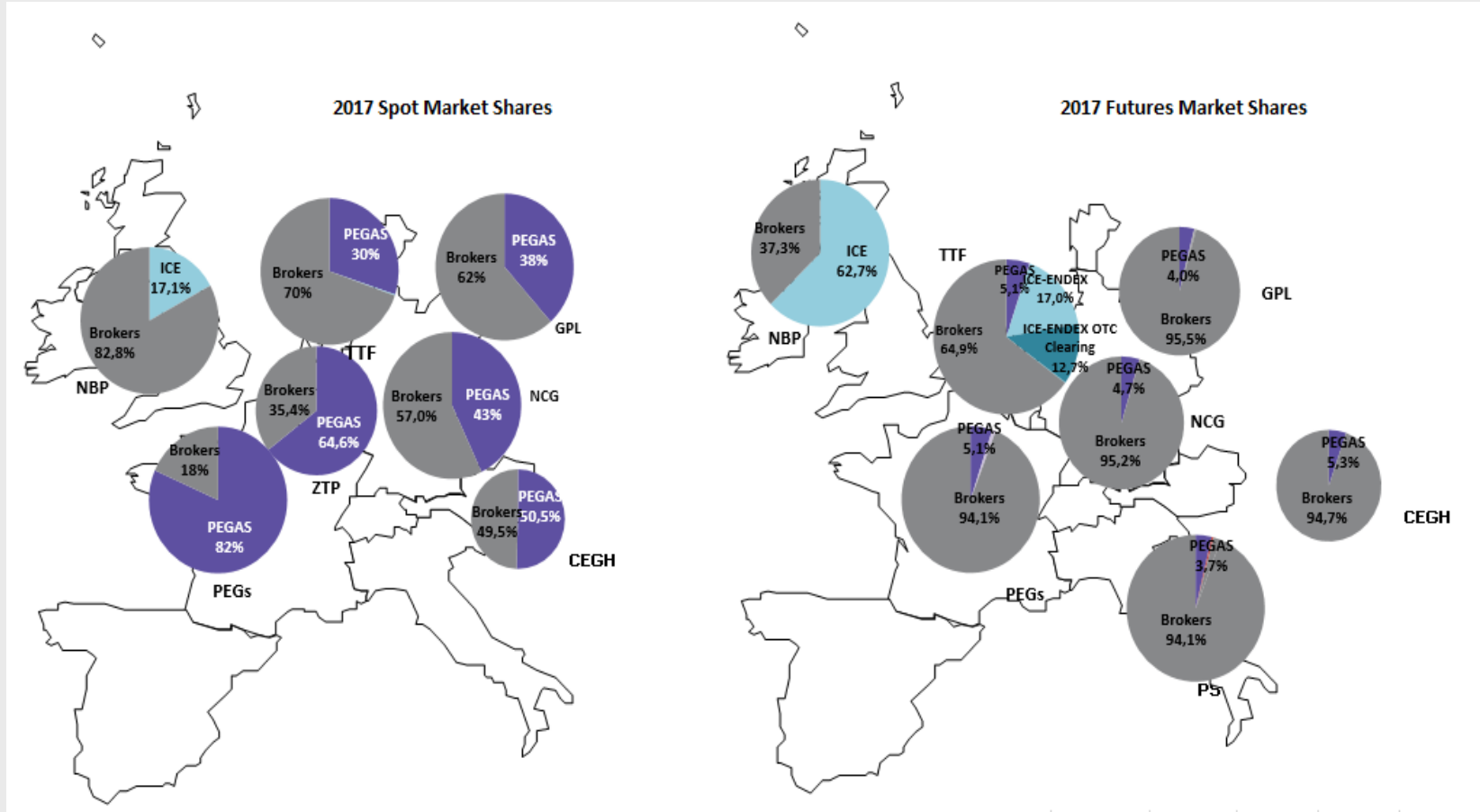
PEGAS is the central gas trading platform of EEX Group operated by Powernext, providing its members with access to all contracts in the Austrian, Belgian, Czech, Danish, Dutch, French, German, Italian and UK market areas

PEGAS covers spot and derivatives contracts for the major European gas Hubs as well as trading in location spread products between these market areas

This setup enables market harmonisation and forms the preferred pan European natural gas market



12 hubs in 8 countries



Spot markets

Hourly

Within-Day

Day-Ahead

Weekend

Saturday

Sunday

Individual Days

Spread Products

Time Spreads

Locational Spreads

Futures regulated & OTF markets

Next 6 Months

Next 6 Quarters

Next 6 Seasons

Next 6 Calendar years

Other Services

OTC Registration

STP Service

Gas Options

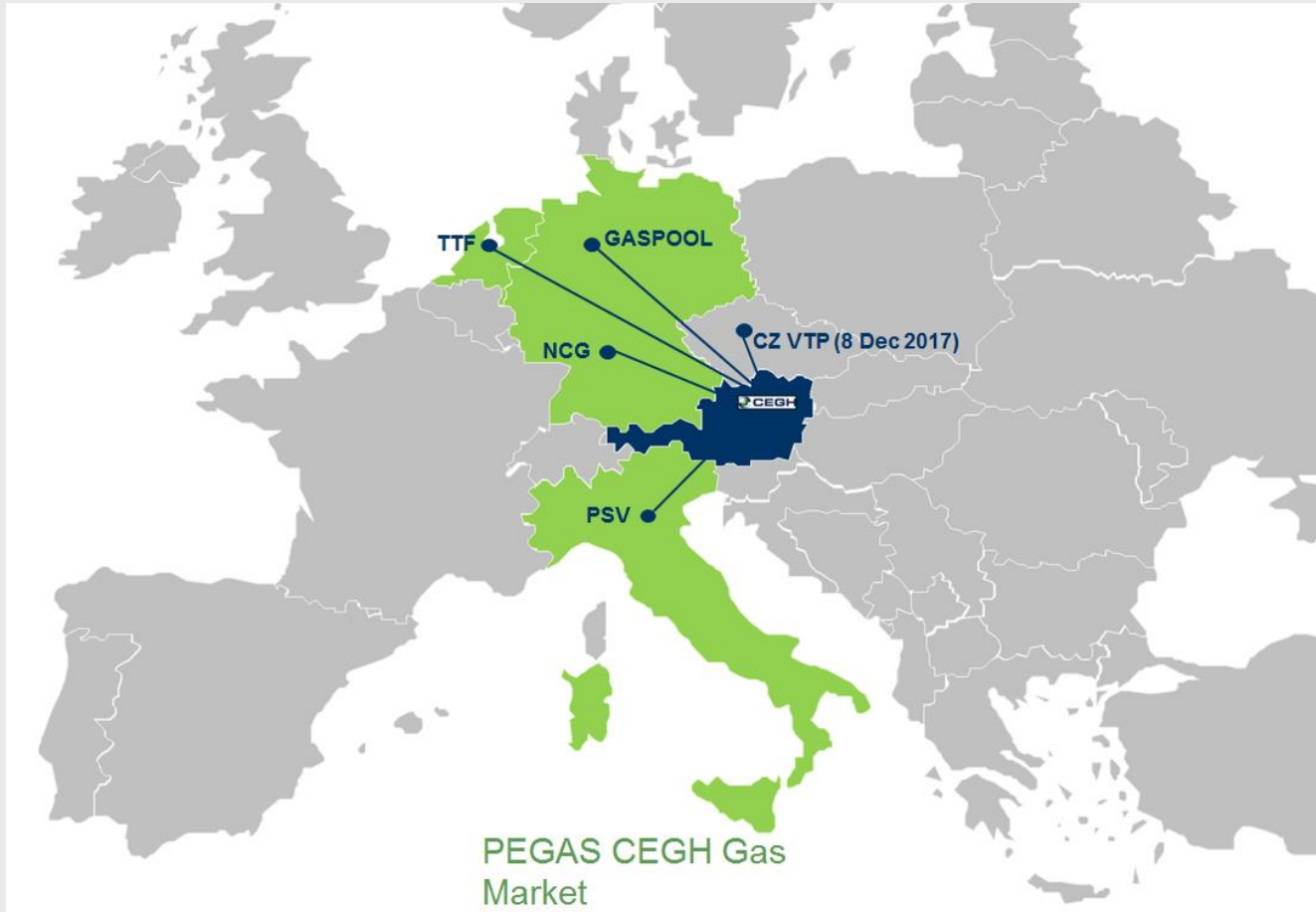
View into PEGAS Spot Market



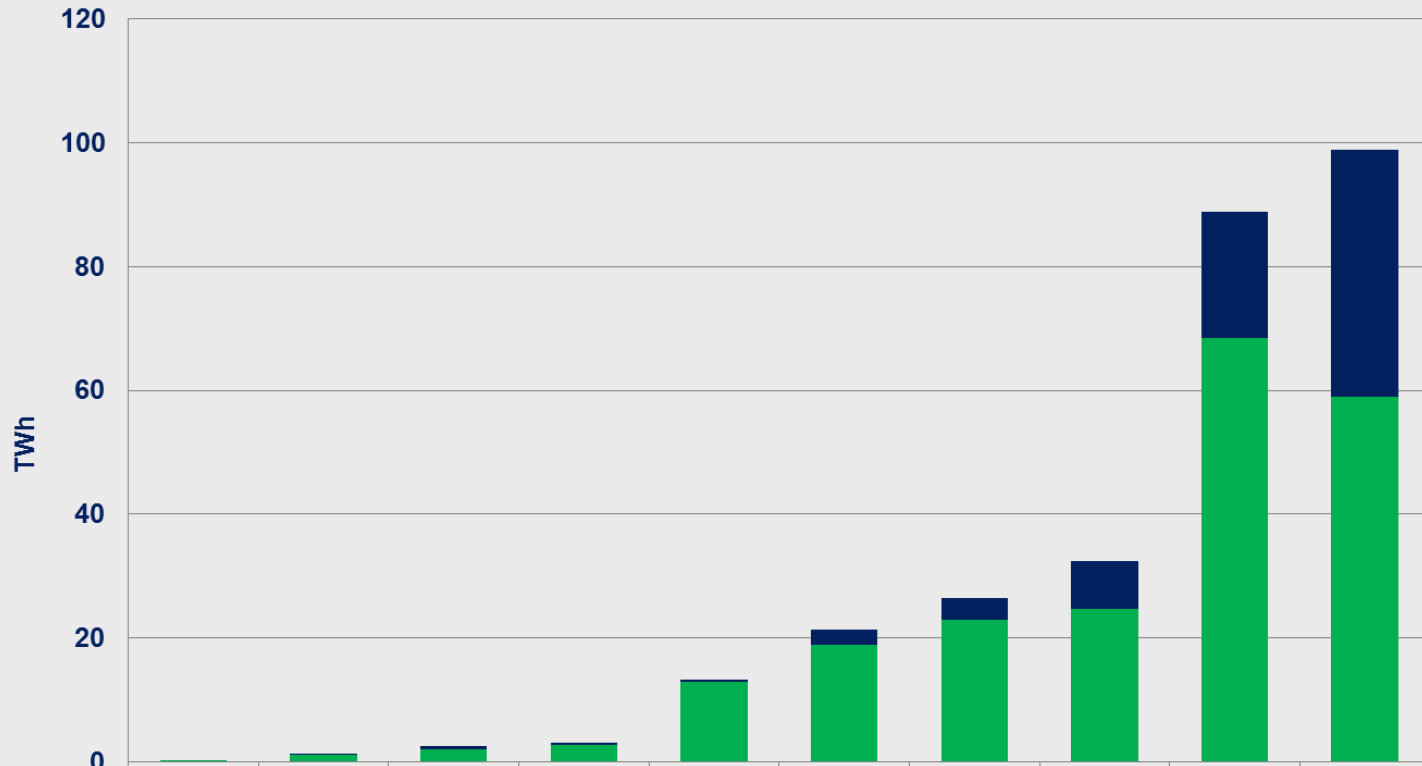
| | | 24/7 Trading | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------------------|--|----------------|--------|----------------|-------|----------------|--------|----------------|--------|---------|--------|-----------|--------|--------|--------|--------|-------|--------|--------|--------|--------|--------|--------|--------|--------|-----|
| | | TTF | | 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 | | | | | | |
| WD | | 120 | 20.625 | 20.700 | *150 | 20.725 | 13.660 | | *150 | 0.100 | 0.450 | *50 | 154 | 20.800 | 21.075 | 50 | *38 | 20.450 | 20.925 | 50 | *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 | | 30 | 20.325 | 20.350 | 1 | *90 | -0.450 | -0.400 | *1 | |
| WE | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Saturday | | | | | | | | 16.210 | | | | | | | | | | | | | | | | | | |
| Sunday | | | | | | | | 16.250 | | | | | | | | | | | | | | | | | | |
| Bank Holidays display / hide | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 24/7 Trading | | | | | | | | | | | | | | | | | | | | | | | | |
| | | PEG Nord / TTF | | PEG Nord/NCG | | ZTP/TTF | | ZTP/NCG | | ZTP | | ZTP/GPL | | | | | | | | | | | | | | |
| | | Qty | Bid | Ask | Qty | Last | Qty | Bid | Ask | Qty | Qty | Bid | Ask | Qty | Qty | Bid | Ask | Qty | | | | | | | | |
| WD | | | | 0.800 | *720 | | | | | 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 | | | | | | | | | 0.650 | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 24/7 Trading | | | | | | | | | | | | | | | | | | | | | | | | |
| | | PEG Nord | | 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 | | | | | | | | | | |
| 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 | | | | -1.175 | *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 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sunday | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bank Holidays display / hide | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 24/7 Trading | | | | | | | | | | | | | | | | | | | | | | | | |
| | | CEGH VTP | | 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 | | | | | | | | | | |
| WD | | 30 | 20.500 | 20.950 | 60 | 20.725 | 2.155 | 20.767 | | | | | | | | | | | | | | | | | | |
| | | 240 | 20.450 | 21.025 | 100 | | | | | | | | | | | | | | | | | | | | | |
| | | 140 | 20.425 | 21.050 | 30 | | | | | | | | | | | | | | | | | | | | | |
| | | 200 | 20.325 | 21.075 | 105 | | | | | | | | | | | | | | | | | | | | | |
| | | 200 | 20.325 | 21.375 | 200 | | | | | | | | | | | | | | | | | | | | | |
| DA | | 150 | 19.500 | 21.400 | 500 | | | | | | | | | | | | | | | | | | | | | |
| | | 160 | 19.000 | 21.650 | 120 | | | | | | | | | | | | | | | | | | | | | |
| | | 55 | 20.400 | | | | | | | | | | | | | | | | | | | | | | | |
| | | 40 | 20.725 | 20.750 | 100 | | | | | | | | | | | | | | | | | | | | | |
| | | 17 | 20.700 | 20.850 | 10 | | | | | | | | | | | | | | | | | | | | | |
| WE | | *95 | 20.675 | 21.425 | 100 | | | | | | | | | | | | | | | | | | | | | |
| | | 10 | 20.650 | | | | | | | | | | | | | | | | | | | | | | | |
| | | 10 | 20.625 | | | | | | | | | | | | | | | | | | | | | | | |
| | | 100 | 20.300 | | | | | | | | | | | | | | | | | | | | | | | |
| | | 100 | 20.300 | | | | | | | | | | | | | | | | | | | | | | | |
| Saturday | | | | | | | | 20.641 | | | | | | | | | | | | | | | | | | |
| Sunday | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bank Holidays display / hide | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 24/7 Trading | | | | | | | | | | | | | | | | | | | | | | | | |
| | | NCG L / TTF | | GPL L / TTF | | NCG H | | NCG L / H | | NCG L | | GPL H | | | | | | | | | | | | | | |
| | | Qty | Bid | Ask | Qty | Last | 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 | | 0.25 | | | | *45 | 0.100 | 200 | 16.000 | 22.500 | 250 | *78 | -1.425 | 6.100 | *14 | 78 | 21.075 | 21.100 | 14 | | 21.950 | 200 | |
| WE | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Saturday | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sunday | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bank Holidays display / hide | | | | | | | | | | | | | | | | | | | | | | | | | | |

[Localional SURV](#) /
 [HALT SPOT SURV](#) /
 [HALT FUT SURV](#) /
 [ALL SURV](#) /
 [Trades Status](#) /
 [GPL SPOT](#) /
 [NCG SPOT](#) /
 [SPOT / FUTURES](#) /
 [SPOT AND FUTURES](#)

PEGAS and CEGH – Locational Spread products

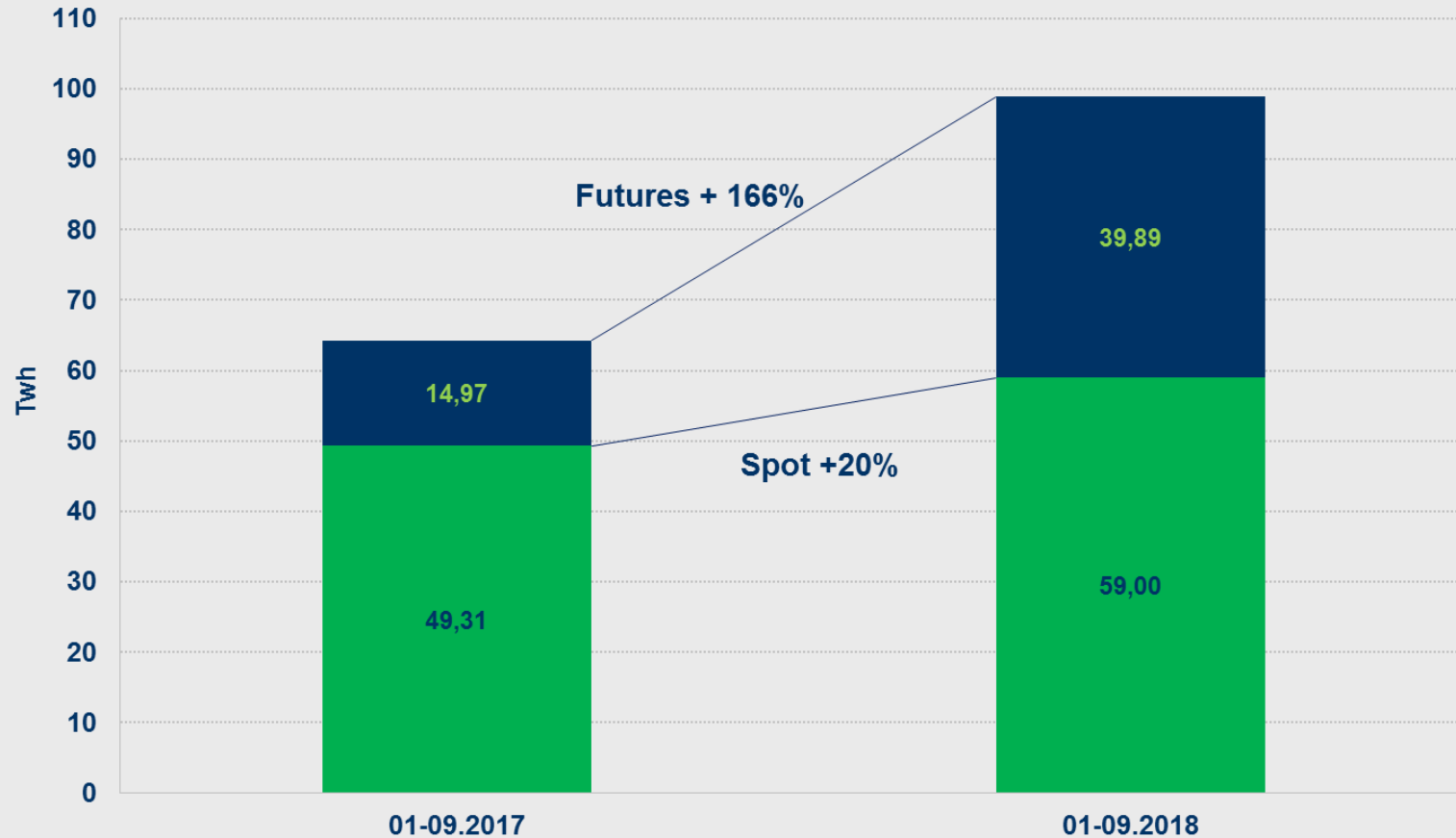


PEGAS CEGH Austrian Gas Market *: Yearly Trading Volume since 2009

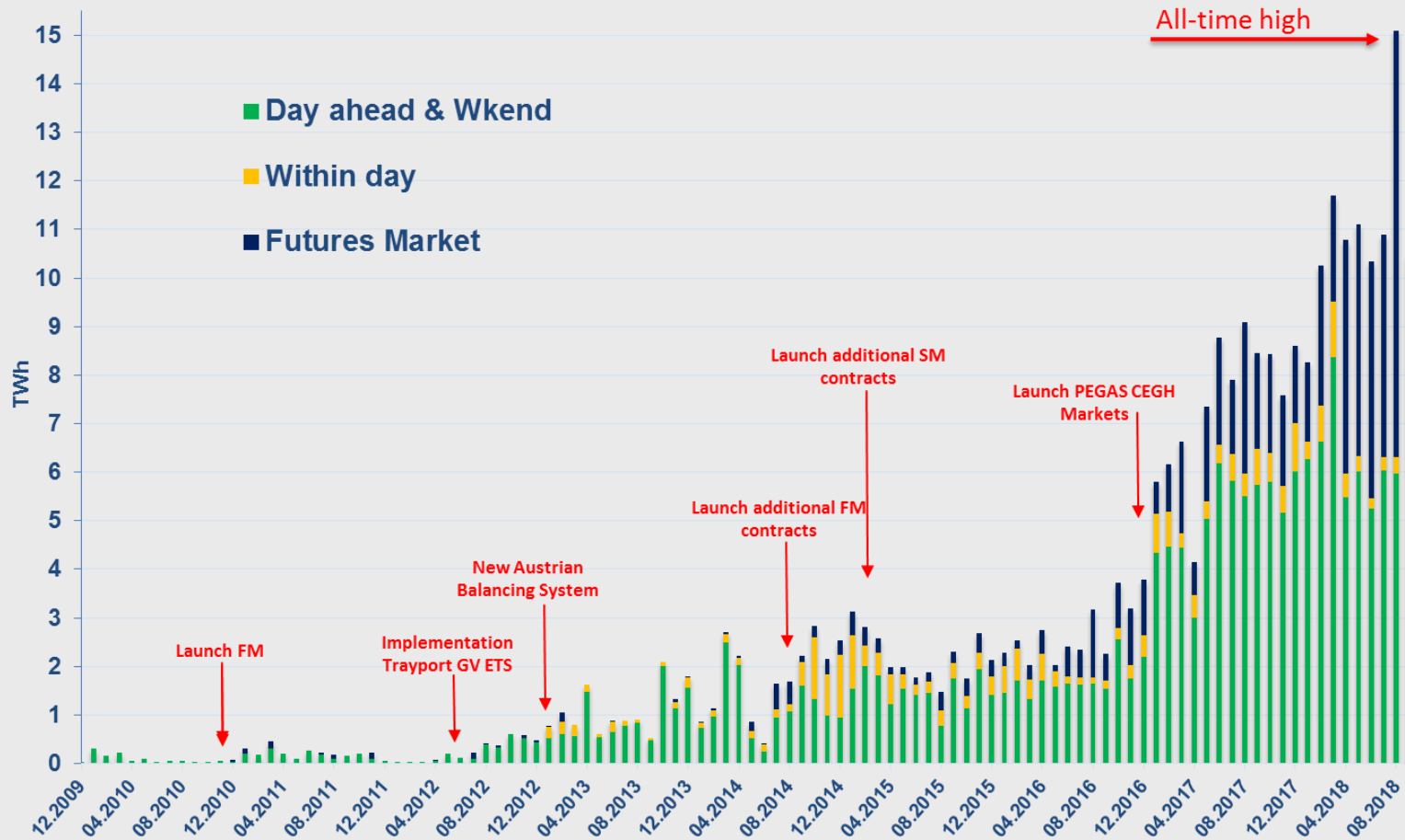


| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 01.2018-09.2018 |
|------------------|-------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------------|
| ■ Futures Market | 0 | 52.080 | 525.150 | 296.910 | 301.170 | 2.317.190 | 3.510.900 | 7.761.580 | 20.466.81 | 39.894.57 |
| ■ Spot Market | 8.640 | 1.061.160 | 2.016.290 | 2.761.020 | 12.917.73 | 18.944.25 | 22.964.49 | 24.715.42 | 68.432.92 | 58.997.61 |

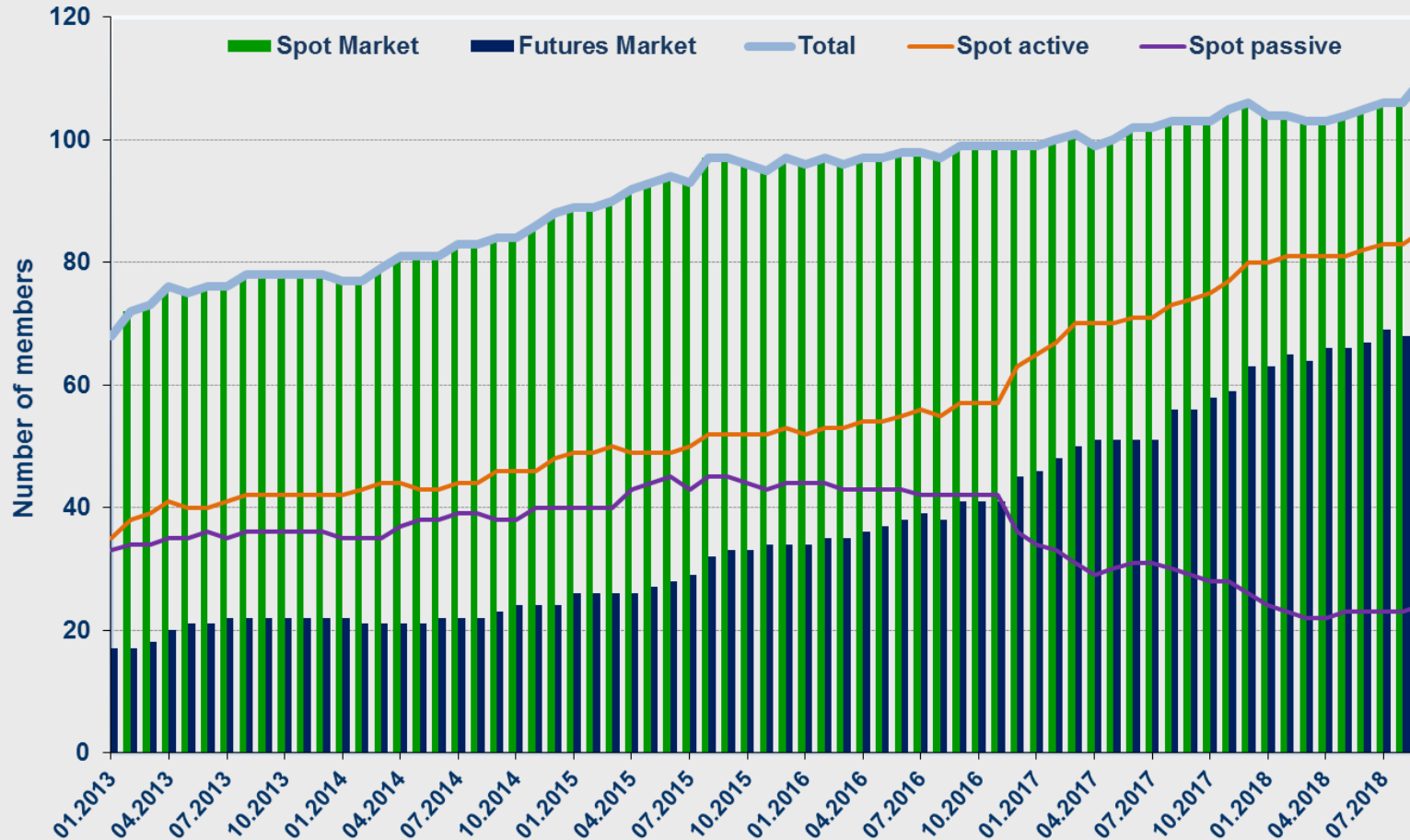
PEGAS CEGH Austria: Spot and Future Increase 1- 9 2017 vs 2018



Monthly Trading Volume since Dec 2009



Development of the Members since 2013



Registered Members PEGAS CEGH Gas Exchange



83 Active members



23 Solely passive members



13 Clearing Participants



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