Developing a successful gas exchange in Ukraine

Final report

European Bank for Reconstruction & Development (EBRD)

4 July 2018

Preface

This report represents the output of Baringa's project with EBRD to explore initialisation of the establishment of a Ukrainian gas exchange

- Over a period of 8 weeks, Baringa has undertaken a project to establish the way forward in the establishment of a gas exchange in Ukraine
- This document includes the output of that project, namely:
  - An overview of the scope and approach taken
  - An assessment, derived from extensive stakeholder conversations, of the status quo in the Ukrainian gas sector and in particular pertaining to market reform and status in relation to the establishment of a gas exchange
  - A case study of the Central European Gas Hub (CEGH), the gas hub and exchange based in Austria, to support an understanding of the critical developmental challenges and key steps
  - The introduction of the Baringa Analysis Framework for an exchange and an assessment of the Ukrainian situation against this framework (as well as a comparison with CEGH on the same basis)
  - An implementation roadmap for the establishment of a gas exchange in Ukraine, taking into account the specific context as articulated earlier in the report
- The purpose of this report is to provide a comprehensive and action-orientated assessment of the status quo with a sufficiently defined action plan to support progression towards the ultimate goal
- In moving into implementation, the immediate priorities are the establishment of a detailed ‘blueprint’ of both what a Ukrainian gas exchange could look like as well as for the key steps needed to get there
- Developing these blueprints and securing stakeholder buy-in is the immediate priority next step

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Overview of Baringa

A market-leading consultancy focused on the challenges of tomorrow in the energy, financial services, telecoms & technology sectors

Our people join from industry, tier 1 consultancies and SIs. We engage with our clients in a range of models, from taking accountability for deliverables and outcomes to client side advisory and assurance.

We help clients using our deep industry insight to:

- Run more effective businesses
- Launch new businesses and reach new markets
- Understand and navigate industry change

We are international, working jointly with US-based Energy and Environmental Economics

- Founded in 1989 and based in San Francisco
- E3 has 45 professionals focusing on electricity sector economics, regulation, planning and analysis

We bring Valuable, deep industry experience

We have an award-winning culture that attracts the brightest people

Our independence means we give you the best advice for your business

Collaboration runs through everything we do

We roll up our sleeves and deliver value from Day 1

Baringa was founded in 2000 and now has:

592 Employees

62 Partners

7 Offices worldwide

UK, Germany, Ireland, UAE, USA (New York, San Francisco), and Australia

Our reputation is hard won and we're determined to keep it growing.

FT UK's Leading Management Consultants 2018 statista

Ranked #1 Advisory firm in the UK&I for Energy, utilities & environment sector

In-house Recruitment awards WINNER 2015

Great Place To Work 2017

Best Workplaces Master 2007-2016 United Kingdom

Energy Risk AWARDS WINNER 2015

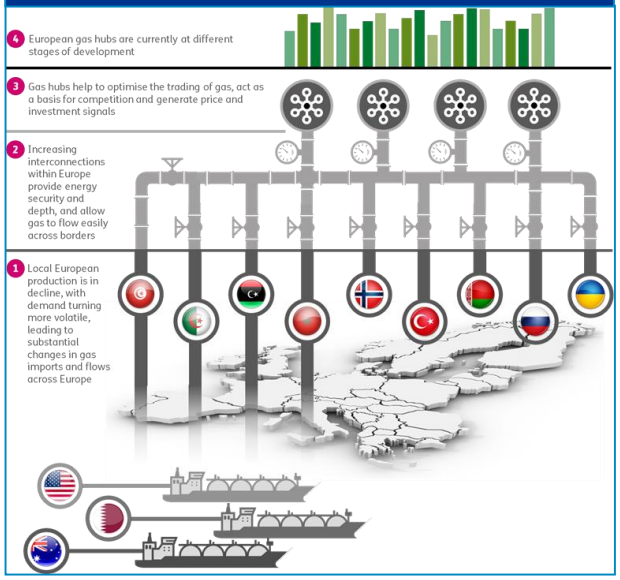
Commodity Business Awards 2016

National Business Awards 2017

Scope of and approach to our engagement with EBRD

Baringa has undertaken an assessment of the readiness of Ukraine to implement a gas exchange – a potential accelerant for gas market maturation and liberalisation

European gas trading landscape at a glance (Baringa, 2017):



Scope and objective of engagement:

- Understand the current situation in Ukraine in respect of the establishment of a gas exchange and any associated challenges and barriers
- Assess gas exchange models as potential options for Ukraine, based on a detailed understanding of the current and likely future Ukrainian gas market and broader business environment
- Assess the opportunity for the establishment of a gas exchange as an enabler for further market development, competition and price transparency, and identify a set of focused recommendations and actions
- Develop a potential roadmap to the development of a gas exchange

Approach:

- Desktop research to gather information and data on status and outlook of Ukrainian gas market relevant to the establishment of a gas exchange and international leading practice in exchange development
- Engagement with stakeholders via a series of meetings in Kiev in May 2018 and including Government institutions, commodity traders, relevant trade associations, energy sector advisors and experts, and international and local exchange experts
- Baringa qualitative analysis and assessments
- Stakeholder workshop on 13 June 2018
- Update of this report following the workshop and issued to EBRD on 26 June 2018.

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The current situation in Ukraine

A gas exchange is characterised by a number of dimensions

Definition of a gas exchange

- A gas exchange is defined, for the purposes of this work and consistent with general industry understanding, as a virtual market place that enables the buying and selling of gas in the form of a range of contracts such as day-ahead gas, month-ahead gas etc, for delivery at defined locations.
- The trades are anonymous – counterparties to the trade are not known to each other at any point.
- The products are standardized, and can be traded ahead of time.
- Prices are reported, allowing market prices to emerge.
- Trade is typically (and increasingly, exclusively) electronic.
- Exchanges are "cleared" whereby the contractual counterparties perform a buy or a sell trade through a financially stable central counterparty, thereby limiting credit risk for all parties.
- Exchanges have typically evolved and delivered more sophisticated products to cater for the requirements of their customers.
- Exchanges can be used to trade at one or more defined locations, wherever there is a market to be made.

Ukraine as of June 2018

- Reportedly hundreds of entities claiming to be "gas exchanges" but most of these are non-functional.
- There are some active examples, most notably the Ukrainian Energy Exchange (UEEX – more details are provided on page 46) which has also seen an impressive increase in volumes traded on its platform. In addition, UEEX is considering enhancements (status June 2018).
- However, even for the active examples, there are a number of limitations:
    - Trades are not anonymous
    - The exchanges are not cleared – parties are directly exposed to credit risk from other parties
    - Liquidity is limited.
- These exchanges have been described by stakeholders in Ukraine as "simple market places" allowing parties to find each other and to transact at an agreed price – a "gas eBay".
- There is a broader plan to have an exchange in Ukraine to cover off all commodities, pending financial regulatory reforms. A gas exchange, with its specific characteristics and benefits in supporting gas market development is proposed to move ahead, leaving market forces to rationalize when broader commodities exchange(s) arise in Ukraine.
- There are a number of reasons why a 'true' gas exchange has not yet emerged in Ukraine and discussion of these issues and a proposed way forward is the basis of much of this report

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CEGH: A case study of a successful gas exchange (1)

The Central European Gas Hub (CEGH), initiated to promote and develop a gas trading hub, has turned into a successful exchange, and is a good case study for Ukraine

- Whilst there are a relatively large – and growing – number of gas trading facilitation points (trading hubs), the institutions through which trade of gas is actually executed – exchanges – are relatively small in number
- The leading European examples are exchanges based in the UK/Netherlands, France/Germany and Austria
- Due to its geographic location, its home market characteristics and the approach to its development, the Central European Gas Hub (CEGH), Austria's gas hub and exchange, is a good case study for consideration by Ukraine as it considers the development of its own, comparable, gas exchange

CEGH: A case study of a successful gas exchange (2)

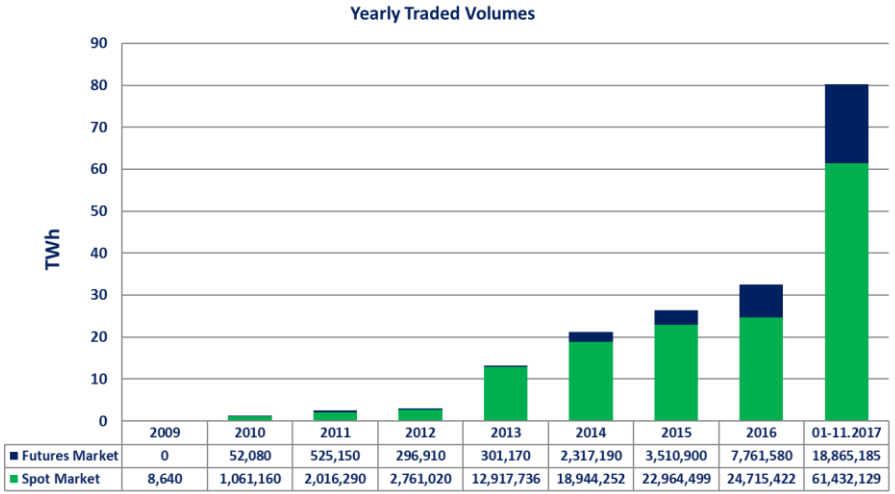
The Central European Gas Hub (CEGH), initiated to promote and develop a gas trading hub, has turned into a successful exchange, and is a good case study for Ukraine

- CEGH is a more appropriate example than the UK and Netherlands for a number of reasons:
  - At the time of CEGH's development, Austria's market landscape had similar characteristics to that which Ukraine has today – notably significant transit flows and (access to) a substantial level of storage capacity
  - Both the Dutch and UK markets were dominated by domestic production, and were developed at a time when the rest of Europe was not yet liberalised, with gas supplies dominated by pipeline and LNG imports on long term contracts. The transit role for these markets grew as more hubs developed and markets opened. Similarly, the storage access for the Netherlands grew only later
  - Whilst in the UK and the Netherlands, development was somewhat 'laissez faire' and at a time when traded markets in Europe were in their infancy, the development of the CEGH was a directed development, with identified roles for the incumbents, regulators and the TSO
  - In the UK and Netherlands, as the TTF and NBP were established and developed, the gas exchanges that emerged were as a result of the market forces and competition amongst industry players, albeit stimulated by initial roles of the TSO
    - In both the Netherlands and UK, the TSO played a big role at the start – co-operating with exchange stronger as the market developed
    - Professional exchanges (e.g. APX, ICE (Endex), Powernext) entered the market at a later stage
    - Broker trade was and is also very active
  - All three markets have strong and relatively stable regulatory history and institutions
- On the following slides we first present Baringa's gas exchange Analysis Framework, and then, with the cooperation of CEGH for background, data and analysis of CEGH's development. Some further details are provided in an Appendix

CEGH: History and initial development (1)

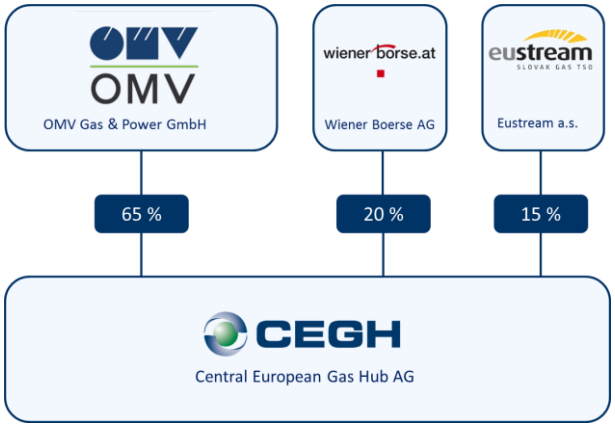
The Central European Gas Hub (CEGH), initiated to promote and develop a gas trading hub, has turned into a successful exchange, and is a good case study for Ukraine

- CEGH has been able to build on a favourable position in Europe – combining transit routes, a central location, substantial storage – and a strong forward looking regulatory environment viewed as stable and a financial sector viewed as reputable transparent by market parties
- CEGH followed ordained formation, with support of all key stakeholders in Austria
- CEGH started by facilitating OTC trades at the virtual trading hub in Austria – the point at which gas can be delivered and from which it can be taken
  - At that time, Austria's market was characterised by low liquidity, low numbers of counterparties, little standardization of products and dominance of long term contracts
- CEGH initially progressed as a platform for OTC trading, and later (in 2009) clearing and thus true exchange services emerged
  - As it matured, new products were developed, typcailly as a result of engagement with its users
  - In parallel, appropriate regulatory arrangements were put in place to support the creation of tradable products – parties could trade bilaterally or with brokers OTC. At this stage, CEGH enjoyed increased price visibility
- CEGH truly started growing as an exchange after 2009, when a supportive regulatory ecosystem was established. There was a further spurt in growth (including futures trade) when the new market model was introduced (see page 12 for detailed timeline)
  - (Liquid) exchange-based trading came about once there were an adequate numbers of parties trading
  - From December 2016, CEGH began co-operation with the PEGAS-platform of Powernext, leading to further growth of futures trade. CEGH can now make use of PEGAS technology to support its operations (see page 38)



	2009	2010	2011	2012	2013	2014	2015	2016	01-11.2017
Futures Market	0	52,080	525,150	296,910	301,170	2,317,190	3,510,900	7,761,580	18,865,185
Spot Market	8,640	1,061,160	2,016,290	2,761,020	12,917,736	18,944,252	22,964,499	24,715,422	61,432,129

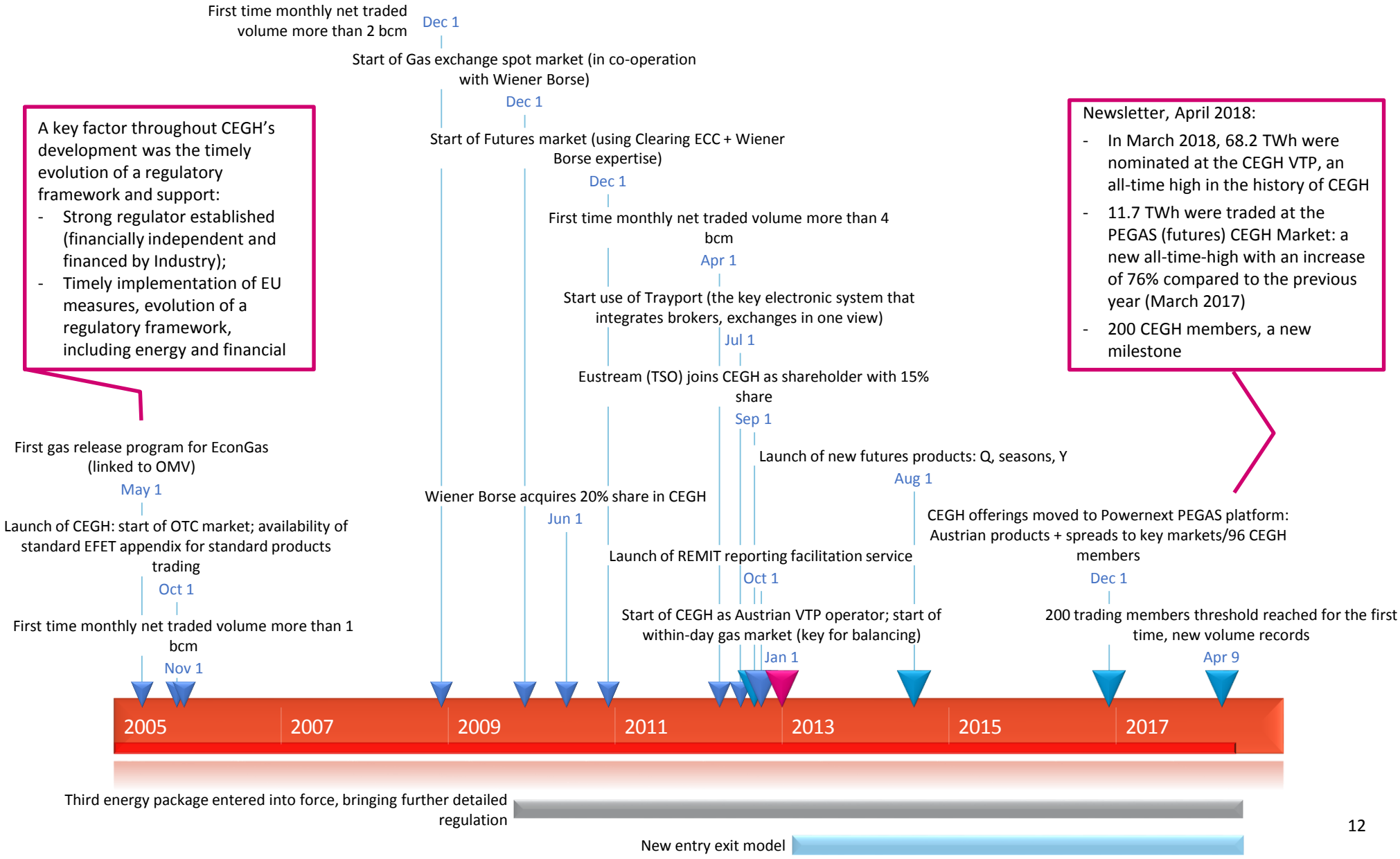
CEGH has a strong shareholder basis, and a strong regulator to support its development



CEGH: History and initial development (2)

A key factor throughout CEGH's development was the timely evolution of a regulatory framework and support:
- Strong regulator established (financially independent and financed by Industry);
- Timely implementation of EU measures, evolution of a regulatory framework, including energy and financial

Newsletter, April 2018:
- In March 2018, 68.2 TWh were nominated at the CEGH VTP, an all-time high in the history of CEGH
- 11.7 TWh were traded at the PEGAS (futures) CEGH Market: a new all-time-high with an increase of 76% compared to the previous year (March 2017)
- 200 CEGH members, a new milestone



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Baringa Analysis Framework for an exchange

Baringa considers the development of a gas exchange on the basis of seven key dimensions and assesses the status quo in Ukraine and the CEGH as a comparison on this basis

1. Infrastructure and access	▪ Sufficiency of transport capacity and availability of storage ▪ Effective third-party access ▪ Independence of the TSO
2. Market structure	▪ Diversity of buyers and sellers; size of market (i.e. natural gas demand) ▪ Presence of a suitable point of trade, to support trade of standardized OTC and exchange trade within the virtual, and/or physical hub, next to bilateral long term contracts.
3. Policy and regulatory support	▪ Third Party Access to networks, gas storage supported by a strong regulator; access based on cost-based entry exit tariffs to facilitate gas trading across borders ▪ Stable institutional framework and governance, enabling market rules, transparency, continuity and no barriers to trade (financial and energy regulation)
4. Financial backing of the trade(s)	▪ There is credit, clearing and settlement in place, derisking market participants ▪ Experienced financial regulator, supported by adequate regulatory framework ▪ Proven track record of solutions, trusted by market participants
5. Product design	▪ Appropriate products are traded, making use of standardisation, providing price transparency, and suited to fit local market needs ▪ Healthy dialogue and feedback with market participants
6. Technology	▪ Presence of state-of-the-art systems, vendors with proven track records, – flexible, and bespoke to market participants needs' . This concerns software for Bid/Offer platform (front-end); Matching engine (trades are matched); Clearing house; Supports regulatory reporting
7. Roles of key stakeholders involved in launching exchange	▪ Transparent ownership, high governance standards, institutional support, participants active on exchange, and the relation to broader energy market functioning (ecosystem)

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CEGH: Assessment against the Baringa Framework (1)

Infrastructure and access

1. Infrastructure and access	▪ Sufficiency of transport capacity and availability of storage ▪ Effective third-party access ▪ Independence of the TSO

"CEGH"

- Ample pipeline capacities, including reverse flows
- Storage facilities are ample
- Third party access (TPA) to network and gas storage
- Presence of an independent, certified under 3rd package, TSO – Gas Connect Austria
- Good (sufficiently sized to market demand, bi-directional) interconnection with adjacent markets

Ukraine today: Assessment against Baringa Framework (1)

Infrastructure and access

1. Infrastructure and access	▪ Sufficiency of transport capacity and availability of storage ▪ Effective third-party access ▪ Independence of the TSO

Ukraine in June 2018

- Significant Transmission and Distribution pipeline networks, reflecting once much greater gas demand and role as key transit country for Russian gas to Europe
- Over 30 bcm of gas storage (largest in Europe)
- Interconnection points with Poland, Moldova, Romania, Hungary and Slovakia
  - Ukrtransgaz has signed a number of Interconnection Agreements (IAs) with the neighboring TSOs of Poland (Gaz-System), Hungary (FGSZ), Slovakia (Eustream) and Romania (Transgaz). Velke Kapusany IA is pending (source: EnC)
- Prior to the cessation of Russian imports, Ukraine served as a transit country and significant market for Russian gas. Whilst it is still – at least until end-2019 – a significant transit country for Russian gas, it is now a destination market for imports from its neighbours other than Russia
- Profound uncertainty on future of Russian transit of gas and thus future utilisation and value of transmission infrastructure

Ukraine is blessed with significant physical gas infrastructure, although uncertainty over future of transit of Russian gas into Europe has paralysed decision-making on its future (including unbundling)

CEGH: Assessment against the Baringa Framework (2)

Market structure

2. Market structure	▪ Diversity of buyers and sellers; size of market (i.e. natural gas demand) ▪ Presence of a suitable point of trade, to support trade of standardized OTC and exchange trade within the virtual, and/or physical hub, next to bilateral long term contracts.

"CEGH"

- Diversity of buyers and sellers
- Through infrastructure, connection to sizable regional market demand
- Presence of Baumgarten, and evolution to VTP, supporting a clear point of trade, vested in regulatory framework

Ukraine today: Assessment against Baringa Framework (2)

Market structure

2. Market structure	▪ Diversity of buyers and sellers; size of market (i.e. natural gas demand) ▪ Presence of a suitable point of trade, to support trade of standardized OTC and exchange trade within the virtual, and/or physical hub, next to bilateral long term contracts.

Ukraine in June 2018

- Ukraine has gas demand of ~30 bcm, of which around 10 bcm is unregulated, and thus competitive (most of the balance being gas produced by Naftogaz affiliates and sold at regulated prices to residential customers)
- A VTP has been established and in 2017 saw non-regulated market gas transfers of around 20 bcm, representing a churn rate of about 2 of the competitive market or 0.7 of the the total gas market (nearly 37 bcm was transferred on VTP in 2017 including regulated market; UTG 2017)
- At an overall level, the market is still dominated by the incumbent Naftogaz although this is predominantly through its monopoly of the regulated sector – in the unregulated sector, it has market share of only ~5%
- A number of international traders are active, particularly in making sales at the border but increasingly within country too via local offices, necessary to overcome tax-related challenges of non-Ukrainian companies to trade in the country
- Gas production is also dominated by companies controlled by Naftogaz (it produced 16.4 bcm of the 20.5 bcm produced in Ukraine in 2017), with the balance produced by private Ukrainian enterprises
- There are around 200 active retailers (the largest has 32% market share) and 44 DSOs (34 unbundled), although there is virtually no customer switching in the residential sector where Naftogaz and regional DSOs maintain monopoly positions. In the industrial sector, there is much more supply switching by customer, based on – typically – monthly supply contracts
- The traded market is currently dominated by monthly products – reflecting industrial customers' buying habits and absence of a spot market driven by need for daily balancing. Although it has only ~5% of the non-regulated market, Naftogaz is a key price-setter as it must publish its prices
- The Law on Natural Gas Market foresees full market opening and gradual phase out of gas price regulation, subject to protection of vulnerable customers
- Current Public Service Decree is – according to Energy Community findings – not compliant with principles of non-discrimination, transparency and proportionality of the gas acquis – effectively prevents participation of new wholesale suppliers (other than Naftogaz) and independent retail suppliers (other than incumbent suppliers legally unbundled from DSOs)

Ukraine is a significantly sized gas market, albeit one with a large regulated sector currently inaccessible to the traded market
There are a number of barriers currently to export Ukrainin gas and for international traders to trade in Ukraine (without a local affiliate)

CEGH: Assessment against the Baringa Framework (3)

Policy and regulatory support are strongly in favour of an exchange

3. Policy and regulatory support*	▪ Third Party Access to networks, gas storage supported by a strong regulator; access based on cost-based entry exit tariffs to facilitate gas trading across borders ▪ Stable institutional framework and governance, enabling market rules, transparency, continuity and no barriers to trade (financial and energy regulation)

"CEGH"

- The key ingredient – policy and regulatory system (VTP, "trustful" policy of NRA to allow competition, easy access to market)
- Track record of stability and predictability, with no major unexpected changes at short notice.
- Transparency and timely announcement of upcoming changes, with sufficient lead-time to discuss and to prepare for changes
- CEGH had/has a specific role assigned in balancing process in Austria, and worked closely with Austrian regulator to establish the market rules and offered products (spot), linked to gas balancing market design
- Presence of a strong independent regulator. Regulator financed by surcharge on the tariff (so energy sector and consumer facilitate the presence of a regulator, and not Treasury)

* Includes:
- Appropriate financial regulation, and strong supervision in place to support exchange(s). Can be generic, or sector-specific.
- Effective unbunding of monopolies (e.g. practical and legal separation of TSO from gas supplier, producers, distributors)
- Alignment of relevant cross-border access regulations with EU/non-EU neighbours
- Effective and market-led balancing regime
- Consumer choice in supplier

Ukraine today: Assessment against Baringa Framework (3)

Policy and regulatory support

3. Policy and regulatory support*	▪ Third Party Access to networks, gas storage supported by a strong regulator; access based on cost-based entry exit tariffs to facilitate gas trading across borders ▪ Stable institutional framework and governance, enabling market rules, transparency, continuity and no barriers to trade (financial and energy regulation)

Ukraine in June 2018

- In the context of establishing a gas exchange in Ukraine, there are two key dimensions to the policy, legal and regulatory landscape to be considered:
  - Financial / capital market elements – to ensure an exchange can be effectively established and governed
  - Gas / energy sector specifics – that allow progressive alignment with EU network codes
- The financial / capital market dimension is discussed in detail under dimension 4 of the Baringa Framework (pages 22-23)
- Our focus in this report is the gas / energy sector aspects (albeit we note based on stakeholder feedback on 13 June 2018 workshop that power sector liberalisation is proceeding slower versus gas sector):
  - Unbundling has been partially implemented – functional unbundling has happened and legal unbundling initiated but, overall, it remains incomplete. Naftogaz remains owner of the TSO without 3rd package requirements for unbundling completed. Transfer of operational responsibility to new TSO entity (MGU) is pending. Progress of unbundling has slow and been complicated by uncertainty over Russian gas transit
  - Transmission and storage capacity available to market in principle, but practical access is constrained – including by charging of VAT on use of gas storage
  - Exit tariffs for exports (trade) to European Union at border connections which could be accessed by third parties, are not available and thus export of gas – and effective utilisation of storage capacity by anyone outside Ukraine – is not possible. Absence linked to uncertainty of future of transit
  - VAT charged on imports by non-Ukrainian entities which also limits ability to trade in Ukraine and use storage
  - Balancing regime in process of reform – daily balancing due to be implemented in August 2018 although unclear if this deadline will be met. If implemented effectively, will provide a significant boost to the trading of gas on the spot market
- A number of market refinements have been identified as necessary to reduce barriers to increased trade. These include:
  - Removal of restriction on consumers to be supplied by more than one supplier per exit (reduces ability to start supplying, and thus reduces incentive to trade) or per month (restricts consumer choice and competition);
  - Introduction of reasonable financial guarantee requirements for transportation capacity (currently 20% of value of gas);
  - Rationalisation and recalculation of transportation tariffs on cross-border entry-exit points;
  - Rationalising cross-border nomination and allocation processes;
  - Appropriately reflecting Ukrainian public procurement requirements in any engagement of state-owned entities in gas buy/sell activities on an gas exchange

Tariff structures are in place but their effective implementation is being held up by the challenge of transit gas uncertainty post-2019. Daily balancing viewed by market as key step in increasing volume of gas traded.

CEGH: Assessment against the Baringa Framework (4)

Financial backing of the trade(s)

4. Financial backing of the trade(s)*	▪ There is credit, clearing and settlement in place, derisking market participants ▪ Experienced financial regulator, supported by adequate regulatory framework ▪ Proven track record of solutions, trusted by market participants

"CEGH"

- Mature regulation, supportive of financial trade in general (no specific gas sector regulation for exchanges)
- CEGH has organised support of an established clearing house (ECC)
- Rationale if there is separate clearing, then barrier for traders. Hence clearing house known to traders is key
- CEGH also support the credit management process by looking at financial viability of members for exchange
- The exchange Know Your Customer (KYC) process happens via general terms and conditions, validating and assuring that only financially healthy and viable players can become members (e.g. management accounts, licences, chamber of commerce documents are verified)
- CEGH does not support bilateral trades financially (CEGH does check nominations)
  - Note, there is a separate, simpler, KYC process for nominations

* Includes:
- Full range of services provided for clearing, settlement and Collateral Management, includes all activities from the time a commitment is made for a transaction until it is settled (i.e. completed)
  - Facilitates turning the promise of payment (e.g. in the form of an electronic payment request) into actual movement of money from one bank to another
  - Covers the management of post-trading and pre-settlement credit exposures to ensure that trades are settled in accordance with market rules even where a buyer or seller becomes insolvent prior to settlement
  - Includes processes such as reporting / monitoring, risk margining, netting of trades to single positions, tax handling, and failure (default) handling

Ukraine today: Assessment against Baringa Framework (4)

Financial backing of the trade(s)

4. Financial backing of the trade(s)*	▪ There is credit, clearing and settlement in place, derisking market participants ▪ Experienced financial regulator, supported by adequate regulatory framework ▪ Proven track record of solutions, trusted by market participants

Ukraine in June 2018

- Existing energy 'exchanges' in Ukraine more closely resemble a market place where bilateral deals are struck through the matching of buyers' and sellers' needs and, crucially, does not include clearing
  - Deals are not anonymous, and not cleared
  - We note the planned enhancement by UEEX to move towards anonymous trading (status 7 June 2018).
- The Ukrainian banking sector role currently is in payment processing rather than in any counterparty derisking
- The view is that Ukrainian banks are not currently able to act in a clearing capacity
- Fundamental reform of the financial sector is underway, aimed at assuring an appropriately rigourous 'legislative framework' to facilitate the development of a cross-commodity exchange. This development is being driven via draft law 7055 – intended to create institutional basis for establishing a broad commodities exchange in Ukraine – currently there is insufficient confidence in governance and robustness of Ukrainian financial sector to support such an exchange (see details on page 53)

Reform of financial sector, driven by financial regulator (NSSMC), apparent focus of government efforts to establish robust institutional support

CEGH: Assessment against the Baringa Framework (5)

Product design

5. Product design	▪ Appropriate products are traded, making use of standardisation, providing price transparency, and suited to fit local market needs ▪ Healthy dialogue and feedback with market participants

"CEGH"

- Engagement with market when developing products (CEGH has an advisory panel supporting product development)
- Standardisation of contracts by EFET
- Product development has an established sequence
- Business plan-based development
- Regulatory perspective is important:
  - Launch of products needs to fit regulatory regime
  - Regimes differ across Europe
  - In some markets, one can launch any series of products to test the market. However, typically one starts with more limited curve, and then a build-out happens
- For Austria the sequence was:
  - 2010: Financial Regulator allowed monthly, as that was seen as liquid segment (after spot developed)
    - Not very successful uptake. Market was launched to show development. Lesson: one doesn't create liquid trading market, if ingredients are not there
  - 2014: New products were added: Quarterly, Yearly
  - End of 2016: PEGAS platform was incorporated, providing extra members access to CEGH (changing to operate under French financial regulator license rather than Austrian one)
- The full range of products are presented on pages 39-40

Ukraine today: Assessment against Baringa Framework (5)

Product design

5. Product design	▪ Appropriate products are traded, making use of standardisation, providing price transparency, and suited to fit local market needs ▪ Healthy dialogue and feedback with market participants

Ukraine in June 2018

- Trading within Ukraine is predominantly using monthly contracts, whereas border imports are more typically daily (alongside longer contracts)
- Stakeholders reported trades being concluded on border, in storage, and at VTP
- Use of standardised contracts is coming into play – Naftogaz, Engie publish their standards
- Monthly prices for Industrial market are disclosed by Naftogaz on their website, effectively providing a form of price transparency
- Introduction of daily balancing, with tight (or no) tolerances, would significantly stimulate spot trading and associated products
- In the future, likely to be value in a broader range of exchange traded products (e.g. month-ahead, quarterly and seasonal products)
- Ukrtransgaz is recognised as a key participant in future trade as responsible for balancing system, and needing gas for own-use (fuel gas). This concerns a substantial volume between 2 to 4 bcm/year
  - Initial intention is now to competitively tender to acquire gas needed for balancing (so-called balancing services), and to acquire fuel gas. This would concern 1 year contract(s), enabling flexibility to join gas trading on an exchange in the future

The status quo - without a qualifying exchange operating – means standard tradable products do not yet truly exist

CEGH: Assessment against the Baringa Framework (6)

Technology

6. Technology	▪ Presence of state-of-the-art systems, vendors with proven track records, – flexible, and bespoke to market participants needs' . This concerns software for Bid/Offer platform (front-end); Matching engine (trades are matched); Clearing house; Supports regulatory reporting

"CEGH"

- State of art systems, proven solutions to follow efficiency and traders preferences
- At the beginning in-house system was used for OTC trade facilitation
- For exchange, CEGH chose – for efficiency and traders connectivity purposes – to work with standard software vendors
- The system use was as follows:
  - On exchange front-end, started with Wiener Borse, then Trayport systems
  - PEGAS platform is now used, from which one can access multiple markets
  - Standard software for trade matching (DB-product for exchange)
  - Own systems to support OTC-operations
  - For clearing, from 2009 – ECC, the clearing house

Ukraine today: Assessment against Baringa Framework (6)

Technology

6. Technology	▪ Presence of state-of-the-art systems, vendors with proven track records, – flexible, and bespoke to market participants needs' . This concerns software for Bid/Offer platform (front-end); Matching engine (trades are matched); Clearing house; Supports regulatory reporting

Ukraine in June 2018

- Current technological position is immature – although Ukrtransgaz has been engaged in procurement of a system to enable daily balancing to be implemented – status currently unclear
- In addition Ukrtransgaz does not yet have sufficiently sophisticated systems and processes to enable maximum utilisation of any gas exchange. Nominations are currently managed via spreadsheets and a nominations modernisation programme is also pending
- Platforms and associated technological solutions for a new exchange are available and appropriate needs definition and supplier identification process should be undertaken when appropriate to do so
- Similarly partnering with existing exchanges will support alignment with industry norms and compatibility with other European trading hubs and exchanges

Options and experienced providers available on market. Technology used by the exchanges like CEGH, would adequately support the current role, and proven software exists externally if and when required

CEGH: Assessment against the Baringa Framework (7)

Roles of key stakeholders involved in launching exchange

7. Roles of key stakeholders involved in launching exchange*	▪ Transparent ownership, high governance standards, institutional support, participants active on exchange, and the relation to broader energy market functioning (ecosystem)

"CEGH"

- Ministry of Economics of Austria strongly supported the exchange (through policy, and legal framework)
- OMV took initiative – it was keen on exchange development to match support and benefit from market liberalisation
- Gas release programmes provided initial liquidity (Econgas), with Econgas thus acting as a de-facto market maker.
  - Programme and conditions were instigated by E-control, the Austrian NRA
- Support by regulator
- TSO, Gas Connect Austria (GCA), was key
- GCA closely worked with CEGH on market rules
- Shareholding structure supports exchange development
  - OMV at the start (100%)
  - OMV divested a share (20%) to Wiener Borse
  - OMV divested another share (15%), in view of new adjacent market development, to a neighbouring TSO, Eustream.

* Including

- Clarity on roles of key stakeholders
  - E.g. role of incumbent as potential market maker (including any commitment for degree of participation)
    - Producers
    - Wholesale suppliers
    - Distribution companies
  - TSO support and participation – either to support or incubate exchange development
  - Strategic partners presence [e.g. bringing knowhow on systems, clearing, international support – e.g. an exchange]
  - Policy makers: ensuring necessary legal framework is in place (i.e. passing appropriate laws)
  - Regulators: removing barriers, ensuring market structure supports development (e.g. daily balancing requirements), driving any necessary market mechanisms (e.g. gas release programmes such as that currently in Greece, or previously in UK, Spain, Italy)

Ukraine today: Assessment against Baringa Framework (7)

Roles of key stakeholders involved in launching exchange

7. Roles of key stakeholders involved in launching exchange*	▪ Transparent ownership, high governance standards, institutional support, participants active on exchange, and the relation to broader energy market functioning (ecosystem)

Ukraine in June 2018

- Key stakeholders include:
  - Uktransgaz (to become MGU) as TSO
  - Naftogaz – incumbent producer and supplier
  - Regulators (energy and financial)
  - Traders
  - Gas shippers
  - Financial community
  - Strategic Institutional investors (e.g. EBRD)
  - Government
  - International / Local Exchanges

  Note that clearing house solution providers have not emerged (yet).
- All stakeholders (that we engaged with) are broadly supportive. Concerns over trust of transactions being paid, delivered (counterparty risk), and appropriate KYC-processes were raised. This was translated as 'major concerns over credit risk'. There is no (formally) defined interaction between TSO and exchange. A stakeholder raised that an exchange may require a licence as supplier, if it were to act as central counterparty and nominate
- There is a question of sequence and timing to be agreed as well as commitments from key stakeholders for the role they will play

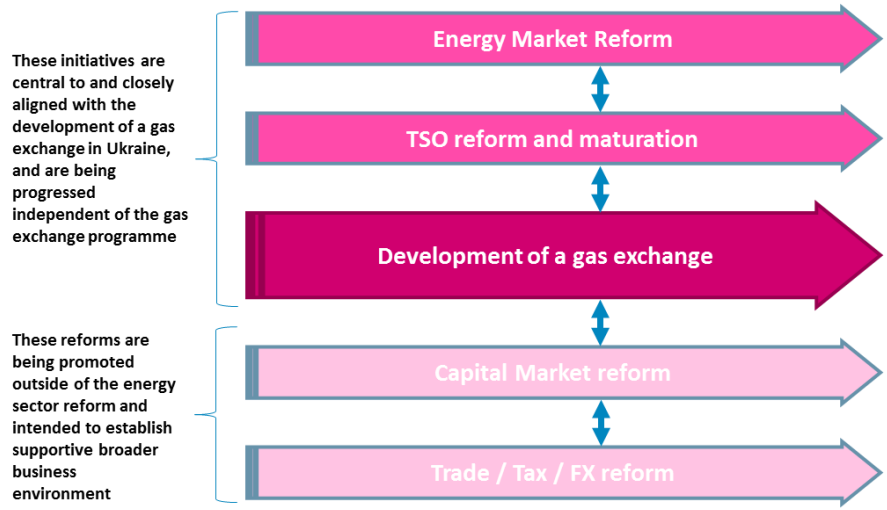
More details of the roles of key stakeholders is provided in the Roadmap to implementation and are to be discussed and agreed

Contents

Key considerations in establishing a development roadmap

There are a number of ongoing parallel initiatives in Ukraine that impact the establishment of a gas exchange

- Establishing a gas exchange in Ukraine is an initiative that sits within a wider legal, regulatory and market reform programme – both of gas / energy markets and the wider economy
- It should fit within the pace of overall market liberalization
  - The roadmap must anticipate that certain steps can be taken ahead of the final unbundling, which takes place in the next 18+ months, and with a view to dovetailing with that development
- It should align with related ongoing initiatives such as …
  - Daily balancing – planned to start in August 2018
  - Transformation of the TSO from UTG to MGU
  - Any other required network code reforms (e.g. entry/exit tariff adjustments)
  - Ongoing reforms of the financial regulation in the next 12+ months (see page 53)
- … and be cognisant of the time needed for capacity building of Ukrainian institutions, and market participants to operate and make use of a gas exchange
- The programme and eventual gas exchange will require participation and support of a number of key entities:
  - The TSO (aligning with network code reforms and active participation on the exchange)
  - Government
  - Regulators
  - Traders
  - Banking / financial sector
  - The international community (e.g. IFIs, commercial banks, neighbouring TSOs and exchange companies)



Key elements of other activity streams

Energy market, capital market and TSO reforms are all underway – now is the time to review their scope to ensure they are effectively aligned and they support the establishment of a gas exchange

TSO Reform and Maturation

- **Completion of unbundling**
- **Thorough implementation of 3rd Energy Package**

Must Haves

- Removal of restriction on multiple suppliers to buyer in one month
- Reduction in financial guarantee for transport capacity
- Reform and recalculation of entry/exit tariffs
- Technology improvements re. nominations, daily balancing

Nice-To-Haves

- Increased competition in DSO / gas supplier segments in regulated market

Capital Market Reform

- **As driven by Draft Law 7055: adding necessary integrity to Ukrainian Capital Markets sector to be suitable to support commodities exchange**

Must Haves

- Draft law approved, implemented and effective
- Market confidence that improvements will work
- Clarity of timeline for implementation
- Bank(s) and IFIs (e.g. EBRD) to provide financial support for trade

Nice-To-Haves

- A reformed banking sector capable of backing gas exchange in time for its implementation – or with a clear timeline for when it would be able to step in
- Commercial banks step to back exchange in sustainable way

Energy Market Reform

- **Confirmation of approach to establishing new TSO (MGU) and completion of unbundling**
- **Electronic nominations, daily balancing**

Must Haves

- Clear plan and timetable for unbundling – leading to independence
- Clarity on timing for implementation of electronic nominations and daily balancing
- Commitment by TSO to use gas exchange for its procurement and daily balancing (market maker)

Nice-To-Haves

- For transition/establishment period: Implementation of electronic nominations and daily balancing
- TSO has significant role in exchange

Trade / Tax / FX Reform

- **Various refroms to improve ease of international participation in Ukrainian gas sector through removal of barriers**
- **Not yet underway – some initial scoping of requirements to create a more supportive environment may be necessary**

Must Haves

- Alignment of tax and customs authorities on treatment of transactions in customs warehouse regime
- Treatment of tax on exchange not a barrier

Nice-To-Haves

- Reform of customs warehouse regime to address VAT issue for non-local trade
- Reform of currency control restrictions for non-local trade

Key:
Must Have = necessary for timely and effective establishment of gas exchange

Nice-To-Have = supportive of further development and enhancement of gas exchange

Gas Exchange Roadmap

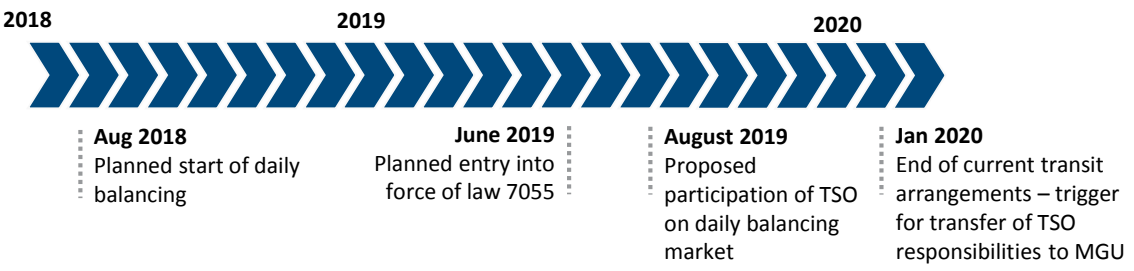
There is a reasonably complex programme of activity across number of dimensions that will need to be implemented to successfully and efficiently implement a gas exchange

It will be beneficial for Ukraine to have a functional gas exchange in place by January 2020 – to act as an enabling tool in the broader energy market reform agenda

There are a number of phases to the successful establishment of this gas exchange

The key next stage is a concept definition that would be followed by subsequent stages – design and implementation and go-live

Key External Reference Dates



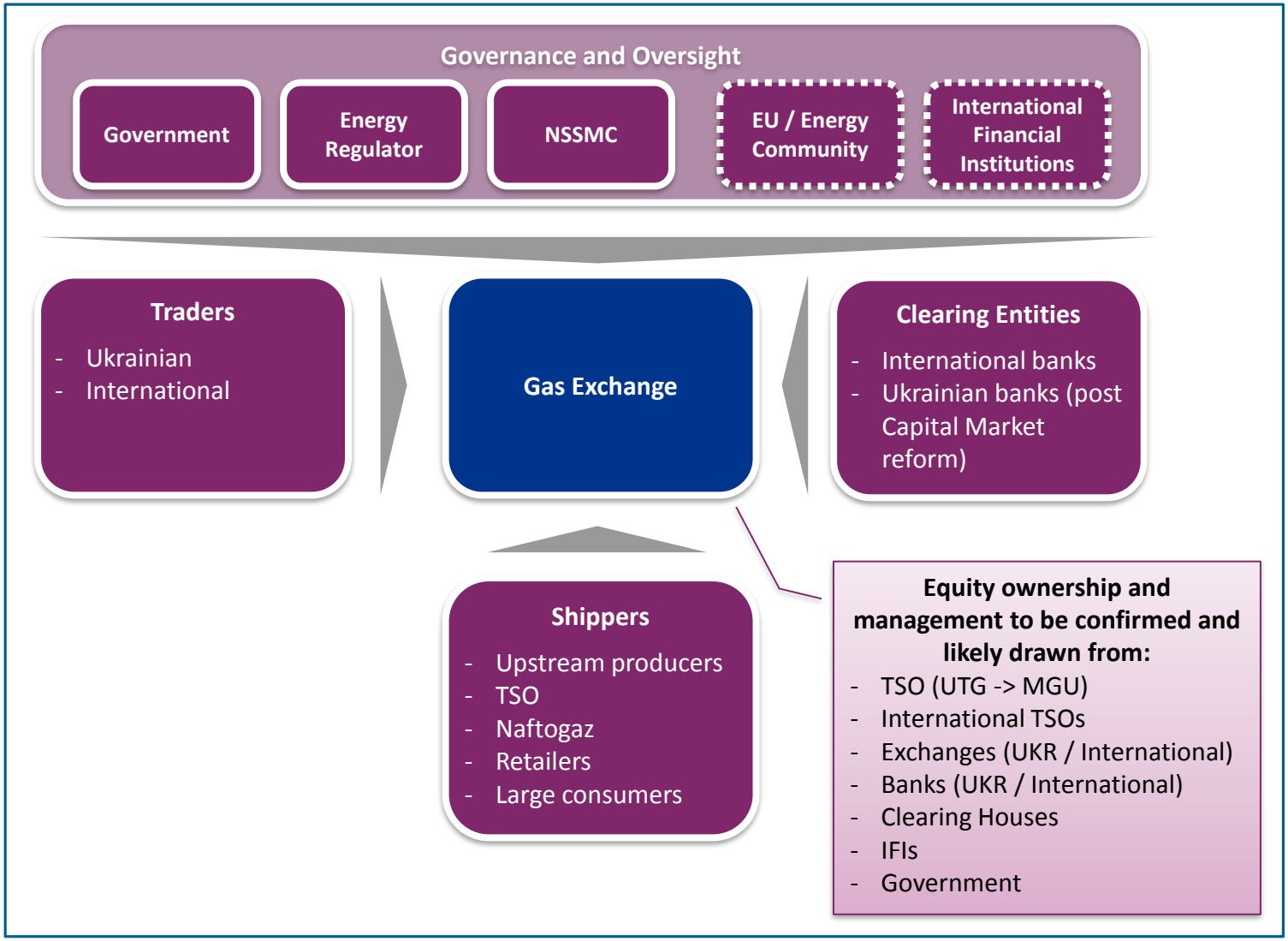
Gas Exchange development programme

	Concept Definition ~ 3 months	Design Timing TBC	Implementation Timing TBC	Go-Live
Governance	- Align with NSSMC Capital Market Reform - Define roles of regulators - Determine governance structure (e.g. management, advisory board)	- Set up corporate structure - Implement governance principles, processes and practices		
Stakeholder engagement	- Develop view of roles of key stakeholders - To include shareholding, financing, management, clearing approach - Confirm roles of stakeholders through engagement process	- Secure initial stakeholder agreement (MOU etc)		
Supply / demand development	- Review options for 'market-making' e.g. gas / demand release, TSO participation - Review any required infrastructure development	- Daily balancing managed via exchange		
EU network codes	- Confirm plan for TSO unbundling and align Gas Exchange development plan - Review other EU network codes and confirm key requirements	- Proactive alignment of gas exchange development with incorporation of EU network code requirements		
Market and liquidity development	- Confirm status of implementation of daily balancing and other market developments - Review requirements for key products to be traded on the exchange	- Align plan for daily balancing implementation with gas exchange development (e.g. use of exchange to facilitate)		
Procurement	- Call for EOI from potentially interested parties (e.g. exchange operators, clearing institutions, banks) - Define requirements to be met by potential partners and issue RFP	- Develop and issue EOI - Develop, review and issue RFP - Manage market engagement and responses		

Stakeholder roles and responsibilities

There are various stakeholders that must be involved in some capacity in a Ukrainian gas exchange

- The Concept Definition Stage will engage all of these stakeholders and more
- Definition of roles for stakeholders is an important dimension of this early work
- Ownership and management options need to be carefully considered
- Some stakeholder roles are intertwined with broader issues (e.g. role of banks is impacted by Capital Market Reform)



Conclusions and Next Steps

Conclusions on immediate considerations and role for EBRD

- EBRD is actively supporting the emerging economy of Ukraine. As a part of this it has an ambition to assist the restructuring of the gas industry so as to enable competition and deliver benefits to Ukrainian energy consumers and the wider economy. This entails the development of a liquid Ukrainian gas market including supporting Ukrainian gas TSO unbundling and selective investments in the network. As part of those supporting activities EBRD is considering how to support the development and the establishment of a gas exchange.
- EBRD is also supporting other reform initiatives in Ukraine, such as that relating to Capital Markets
- Through this project EBRD has promoted a dialogue on what needs to be done to create a functional gas exchange and articulated a roadmap to the future.
- A supportive minor investment in such a gas exchange, and the development and support of an implementation plan have been identified as steps toward this goal
- As such, the next step would be a “concept definition” stage, as part of which key stakeholders would make commitments to involvement and support
- There are a number of potential options for how a gas exchange could be developed – ranging from one lead by a local player, to an internationally led initiative, or a combination. In all of the options, the involvement of the gas TSO is key.
  - One option would be for the gas TSO (UTG, becoming MGU) to take the gas exchange project forward as a ‘project leader’. EBRD could offer its support, including bridging and organising a signing of an MoU involving international partners such as adjacent TSOs
    - EBRD support would derisk the set-up of a gas exchange through lending its wide network and capability to help establish a firmly trusted reputable institution trusted by international financial community.
    - EBRD support to the gas exchange project would need to fit the pace of Ukrainian gas market development, including the agenda for unbundling. In the context of unbundling we noted that a number of actions is being planned in the period July – September 2018 to provide clarity on functions which MGU could start taking up to prepare for final unbundling by December 2019.
- Immediate recommended actions are:
  - EBRD to fund the concept definition stage as described at a high level on page 33. This would include refining an approach for ownership and management of the gas exchange initiative, stakeholder engagement, and market engagement (e.g. through an EOI process)
  - Develop participation strategy by EBRD to the next level of granularity. The detailed plan should consider synergies with other activities and initiatives by EBRD

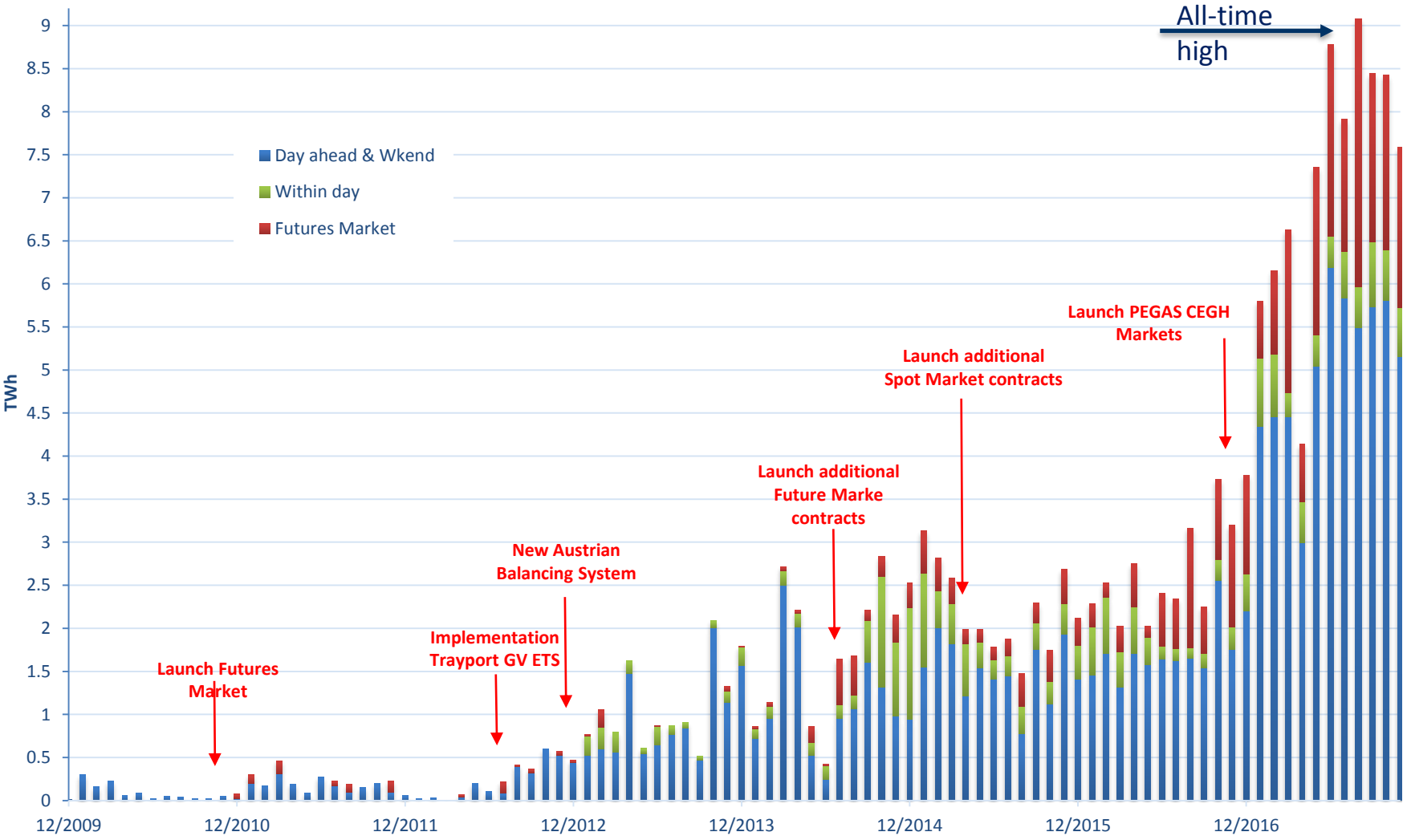
Contents

CEGH case study

Background

CEGH: Assessment against the Baringa Framework (5b)

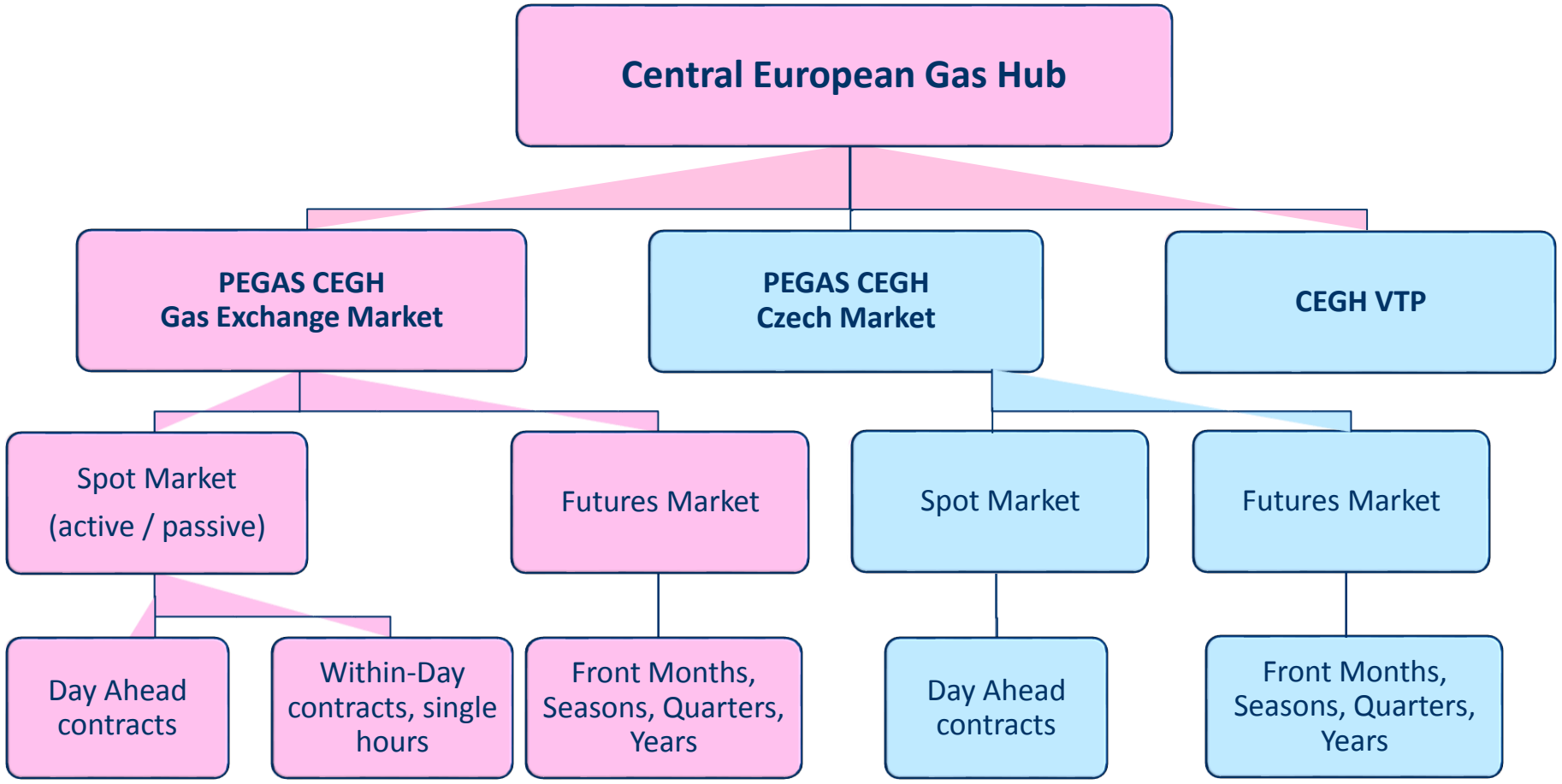
Product design: products and solutions matched to market development



Source: Central European Gas Hub AG, 2018

CEGH: Assessment against the Baringa Framework (5c)

Product design: products and solutions matched to market development



- Standardized Products
- Clearing (no counterparty risk)
- Anonymous
- 3 hours lead time
- Market Maker

- Flexible volume (kWh)
- Bilateral contracts
- 2 hours lead time

Source: Central European Gas Hub AG, 2018

CEGH: Assessment against the Baringa Framework (5c)

Product design: products and solutions matched to market development

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

Non-MTF markets

- Next 3 Months
- Next 4 Quarters
- Next 3 Seasons
- Next 2 Calendar years

Locational Spreads trading facility with TTF, GPL, NCG and PSV

Time Spreads

Trade registration for futures contracts

Bilateral trade clearing at ECC trough STP or OTC Web platform

Data and indices

All customers have free access to EEX ftp and PEGAS tools

CEGHIX, CEGHEDI, 1st FM, 1st FQ and 1st FM Reference Index are published on the CEGH website

Source: Central European Gas Hub AG, 2018

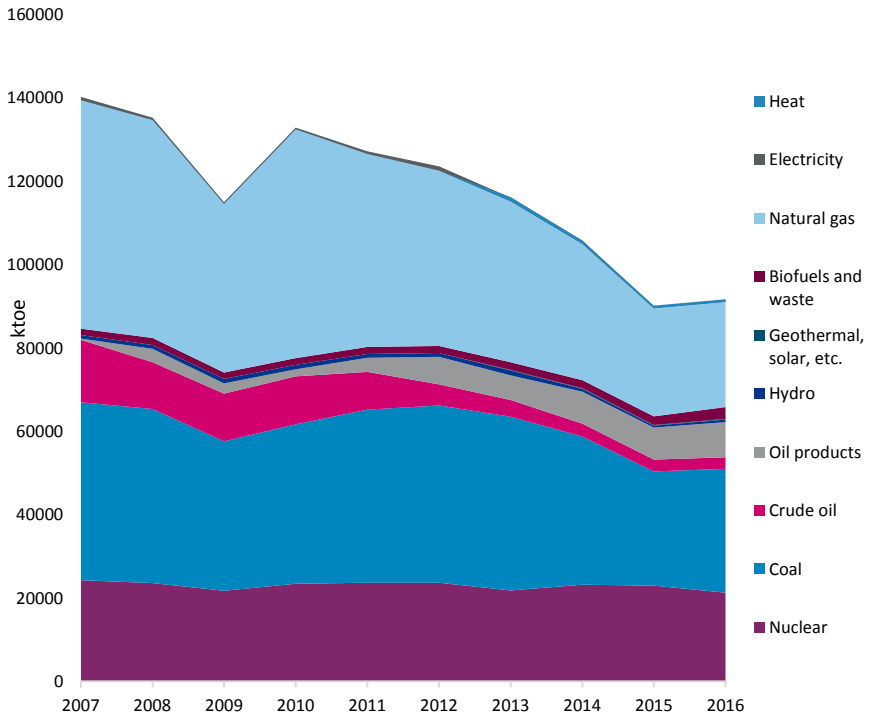
Ukraine gas market overview

Fundamentals demand/supply, state of liberalisation implementation, state of gas exchange(s)

Total Primary Energy Supply in Ukraine

Overall energy consumption has been in decline since 2010 although stabilised in 2016 – gas' market share has diminished from 40% to 28%

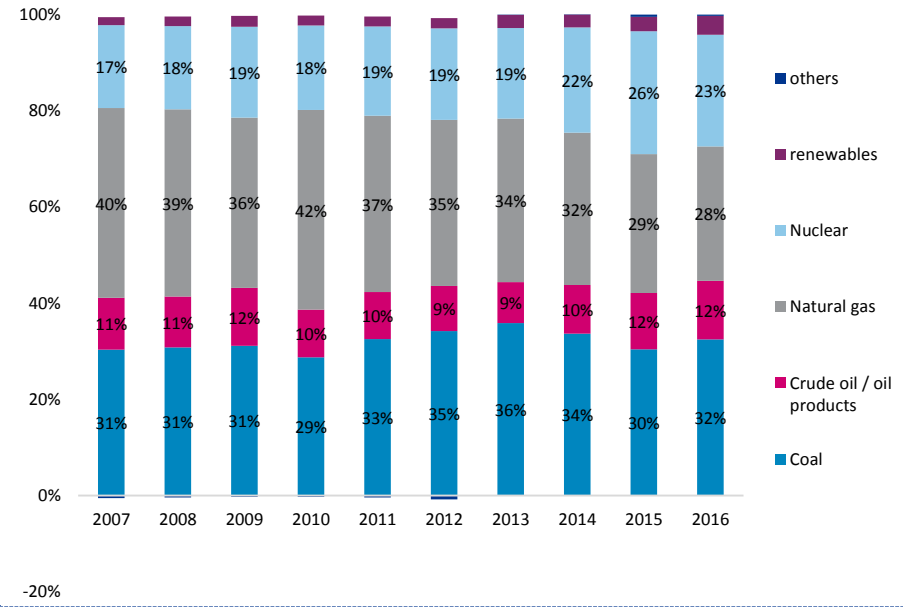
Ukrainian TPES



Source: IEA, State Statistics Service of Ukraine

- Gas volumes have declined in absolute terms and as a share of total energy since 2010
- Ukraine intends to reduce gas demand to around 27 bcm by 2020, all of which would be domestically produced

TPES share by fuel type

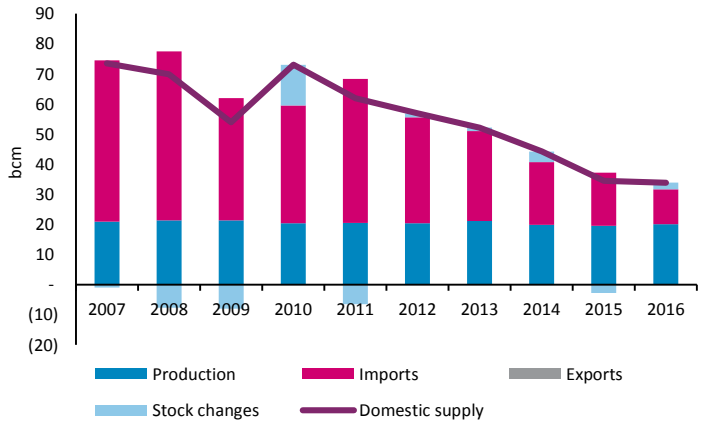


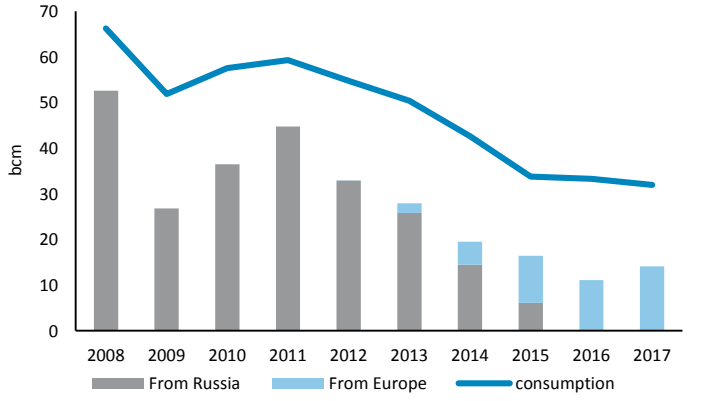
- Infrastructure and historical levels of consumption suggest that there is great latent potential for greater consumption of gas – especially as part of decarbonisation of the Ukrainian energy mix given high share of coal
- Regional imports could support greater gas consumption, facilitated by an attractive market place with a level playing field for suppliers and transparency

The gas market in Ukraine

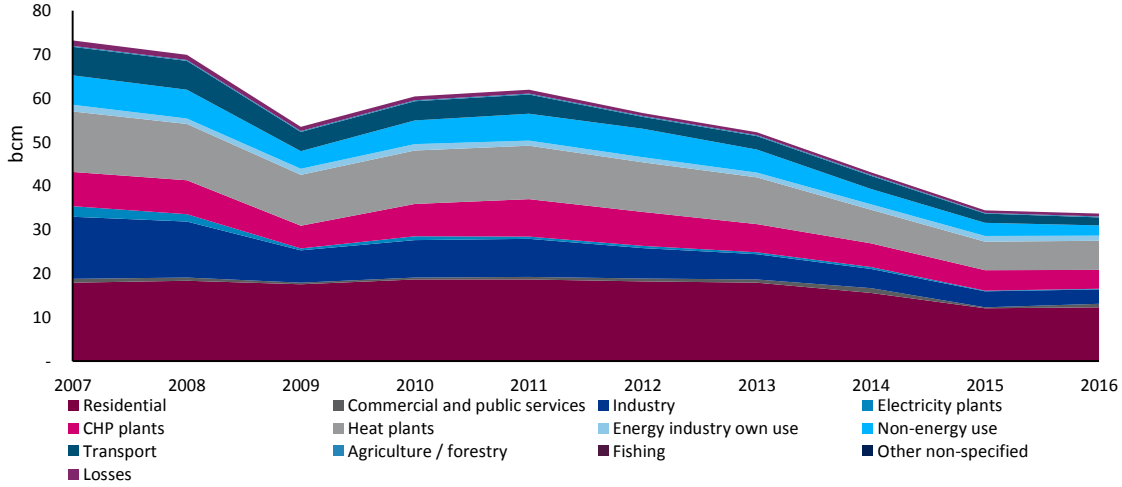
Cessation of Russian supply as well as geopolitical disruption has caused radical changes to the Ukrainian gas demand and supply situation

Ukrainian gas supply overview





Ukrainian gas demand overview



- All imports now sourced from Europe, rather than Russia
- Demand has fallen from ~70 bcm in 2007 to around 32 bcm in 2017
- Residential (12.3 bcm), heat plants and CHP (10.9 bcm) and Industry (3.3 bcm) are the largest sectors for consumption
- Naftogaz supplied 70% (22.6 bcm) of the wholesale gas market in 2016, down from 74% in 2014. UTG reports (February 2018) that Naftogaz market share in industrial segment dropped to < 5%.
- EU imports are via reverse-flow-dedicated interconnection points with Poland, Hungary and Slovakia
- Ukrtransgaz has signed a number of Interconnection Agreements (IAs) with the neighboring TSOs of Poland (Gaz-System), Hungary (FGSZ), Slovakia (EUStream) and Romania (Transgaz).
  - Velke Kapusany IA is pending (source: EnC)
- In the future, the intention is to be self-sufficient from indigenous gas production – an effective marketplace for selling gas will support upstream production, as will the prospect of regional supply via cross-border sales. These producers likely to be important players on any future gas exchange

Source: IEA, State Statistics Service of Ukraine

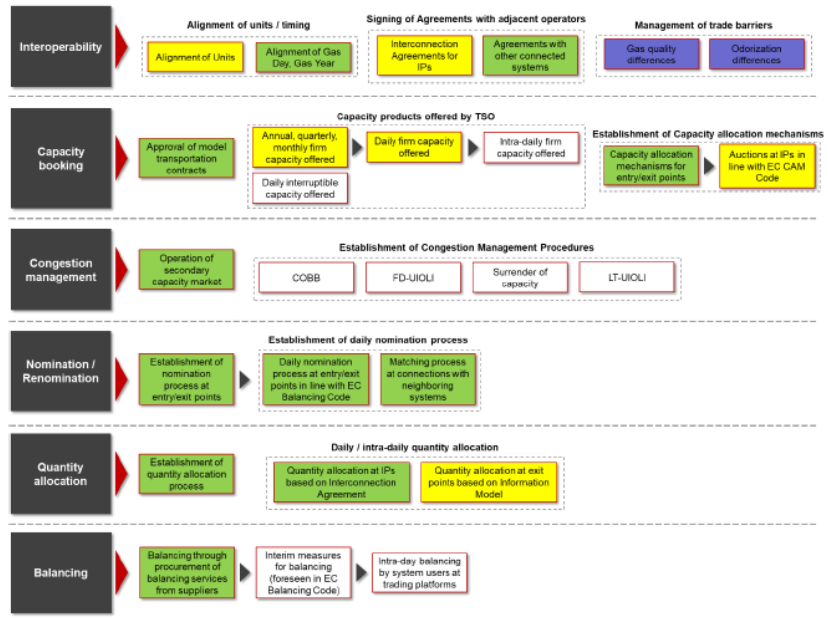
Current liberalisation progress in Ukrainian gas market (1)

Ukraine has made progress towards a market structure compliant with EU 3rd package (summary based on Energy Community, USAID publications, and stakeholder interviews)

- A new Gas Law, meant to transpose the 3rd Energy Package, entered into force in October 2015
- First version of transmission grid code was approved in September 2015 and entered into force in December 2015
  - A revision of the grid code has been accepted (December 2017) to introduce daily balancing rules from August 2018 – currently balancing is done monthly, at least partly because TSO (Ukrtransgaz; UTG) does not have an electronic platform in operation to support its operations. A Platform has been procured and is planned for testing soonest (status June 2018)
- Ukraine covers most of the key legislative prerequisites for efficient application of a grid code, in line with the 3rd Energy Package, but not the operation of an unbundled TSO, as ownership unbundling of Naftogaz has not been concluded yet. MGU, future entity to manage TSO-tasks, has been created, to commence its work at full once unbundling has been completed.
- Remaining challenges for Ukraine gas market development (including stakeholder feedback we noted):
  1. TSO unbundling must be completed
  2. Network Code structure complies with EC network codes but lacks a number of specific measures, including:
     - Establishment of electronic platform **planned for August 2018**
     - A broader range of capacity products (e.g. quarterly) need to be offered, and aligned with European auction calendar(s). Lack of exit tariffs to Europe on key border points.
     - Absence of deployed market-based daily balancing mechanism
- Progress on transposition of the 3rd Energy Package has slowed as uncertainty surrounds transit and infrastructure utilization post-2019
  - This has led to a slow-down on unbundling and is thus an impediment to the development and implementation of a gas exchange

Implementation of EC Network Code

Figure 7: Achievement of milestones for conformity with EC Network Codes – Ukraine



Source: USAID, 2017

Current liberalisation progress in Ukrainian gas market (2)

The Natural Gas Market Law transposed the majority of 3rd Package provisions, including legal background for TSO unbundling

Unbundling

- Legal unbundling of Ukrtransgaz (UTG) from Naftogaz has been initiated – but Uktransgaz remains a 100% subsidiary of Naftogaz
- MGU – the future TSO to take over from Uktransgaz has been created but as yet, there is no functional indelendce of UTG from Naftogaz
- Gas production and supply activities of Naftogaz to continue to be controlled by the Ministry of Economic Development and Trade
- In gas distribution, there are in total 44 DSOs, 34 of which are unbundled

Transmission tariffs

- Entry-exit transmission tariff methodology implemented
- Entry tariffs are available for interconnection points with neighbouring EU Member States and Moldova, for direct connections to transmission network and for exits to distribution networks
- Tariffs still not implemented at (Russian) exit points, to enable exit to European gas market
- Utilisation of entry/exit points from production fields currently charged at a zero rate

Transparency

- Majority of TSO transparency requirements transposed
- Information still missing on balancing measures; ex-ante and ex-post supply and demand situations, nominations and re-nominations, and availability of firm and interruptible capacities
- No REMIT implementation

Capacity Allocation and congestion management

- Long and short-term capacity allocation available
- In 2016, all capacity booked on monthly basis
- Auctioning of capacity only foreseen when amount of requested capacity exceeds available capacity at interconnection point
- Ukrtransgaz offers unused capacity on day-ahead and interruptible basis
- DSOs, producers, customers and storage operators not permitted re-sell booked but unused capacity

Balancing

- No increase in market liquidity as a result of announced balancing rules implemented observed
- Ukrtransgaz physically balances market with storage and linepack – commercial balancing only done monthly, with 15% tolerance. Paper nominations.
- Daily balancing obligations are now planned to start from August 2018. Network Code regarding balancing is under implementation.
- TSO intends to use balancing services to procure balancing gas initially.
- Storage Code allows for reserving an undefined capacity for network balancing purposes. Not market-based, and may create obstacle to balancing market development.

Trading Platforms issues and implications

- No gas exchanage (anonymous trading, clearing) exist
- Two commodity exchanges facilitate OTC-trading – UEEX and UGX. UGX reported by stakeholders to have closed.
- Practically, no-one needs to participate in trading platform for balancing purposes

Wholesale market

- Around 150 traders active in 2016, no license required. UTG reported in Feb 2018 that in 2016 35 importers were active, and in 2017 this rose to 67. VTP launch Jan 2016, 320 companies overall active on VTP in 2016, including all segments. Access to VTP granted alongside access to transmission network. For 2017, see next slide .
- Most trade done bilaterally on the phone, outside platforms. Only monthly OTC products reported as actively traded. Trading at borders, storage or VTP. Credit/FX/VAT issues.

Eligibility and switching

- ~200 active retailers in 2016 (largest has 32% market share)
- All households supplied by incumbents at regulated prices
- All customers have right to switch in principle
- Current Public Service Decree (PSO) are reported by energy Community to be non-compliant with principles of non-discrimination, transparency and proportionality of the gas acquis – effectively prevents participation of new wholesale suppliers (other than Naftogaz) and independent retail suppliers (other than incumbent suppliers legally unbundled from DSOs)
- Energy Community (based on NRA, DSOs and UTG info) reported that switching is only taking place among customers outside of the regulated framework; i.e. among those connected directly to transmission network and among industrial customers at distribution network (status June 2018)
- Law on Natural Gas Market foresees full market opening and gradual phase out of gas price regulation, subject to protection of vulnerable customers

Existing gas trading facilitation in Ukraine

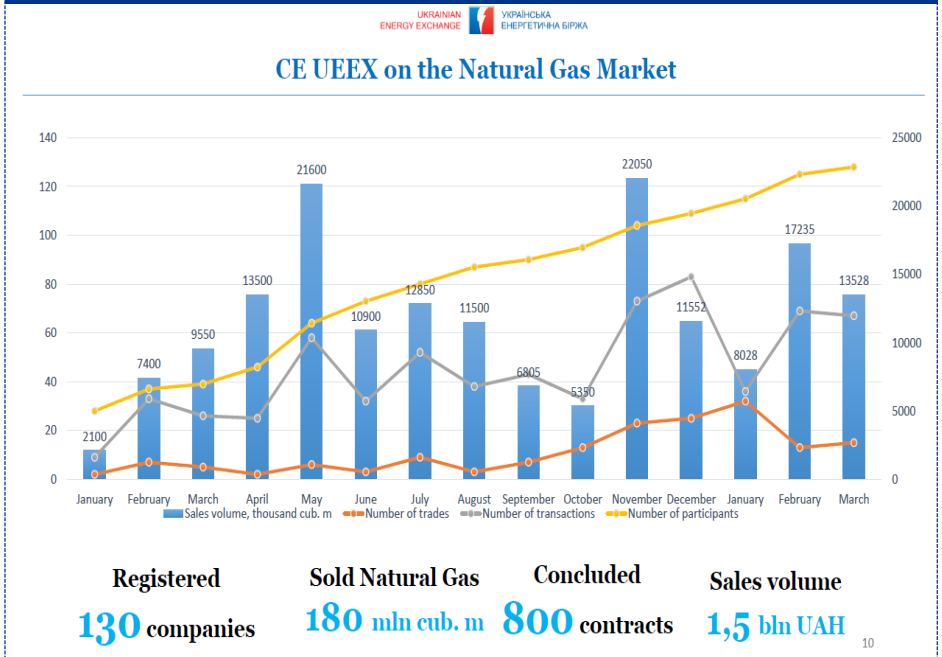
UEEX and UGX

- We note that in general numerous registered exchanges exist. There are reportedly two - relevant for gas trading - exchanges in Ukraine.
- Ukraine Energy Exchange (UEEX) is an energy exchange that facilitates trade in numerous commodities. For gas however, it does not function as an exchange. Its launched gas trading facilitation without anonymity and clearing in January 2017, and has steadily built activity, although it still remains very small (130 million m3/2017; source: UEEX). UEEX has plans to enhance its operations to provide anonymized trading, clearing and settlement (source: UEEX).
- UGX is a privately backed exchange which has a minimal web presence (LinkedIn page) and about which no meaningful information is available. Stakeholders in interviews reported for it to have been dismantled (status June 2018).

UGX

- Ukrainian Gas Exchange (UGX) claims to be the first platform for trading natural gas in terms of guaranteed exchange transactions
- Backed by Dragon Capital and launched in 2014; stakeholders reported its dismantling in May 2018 interviews.
- (website seems a broken URL)

UEEX

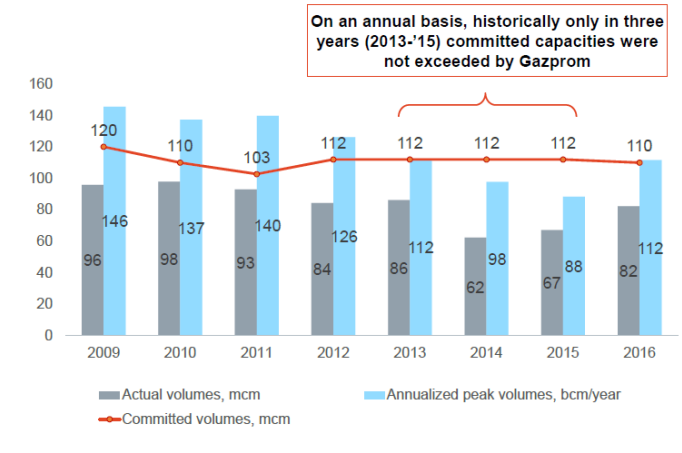


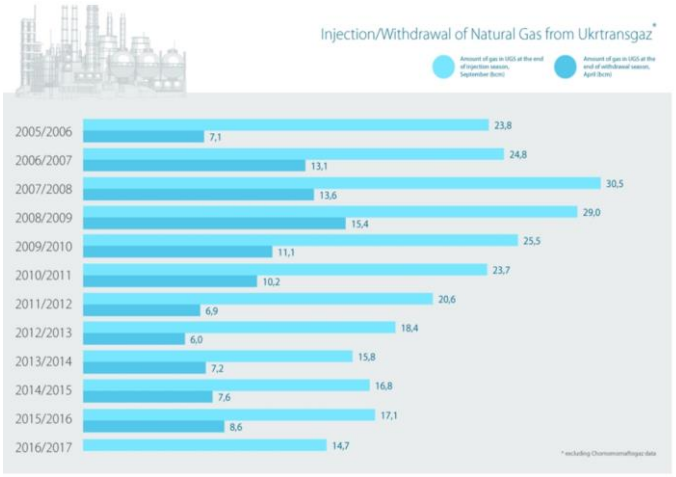
- Ukrainian Energy Exchange
- Established exchange for oil, oil products and coal
- Also has begun natural gas trading (reported 130 MMcm in 2017 (when gas trading started)

Huge gas volumes continue to be transited through Ukraine

Russia has stated intention to cease transit through Ukraine once alternatives (Turkstream, Nordstream 2) are in place

Russian transit gas through Ukraine and gas storage





Source: Naftogaz

Ukrainian gas transmission network

Source: ENTSO-G

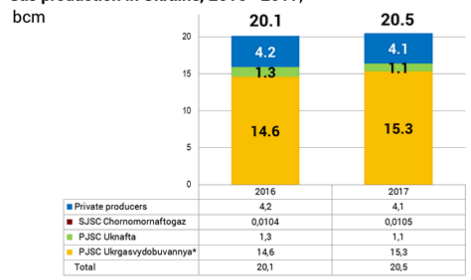
- Gazprom reportedly planning to reduce Ukrainian gas transit to 10-15 bcm/year from current level of ~ 93 bcm/year (48% of total Europe + Turkey exports from Russia)
- Current deal expires at end 2019 – Gazprom has stated it will not renew
- Nordstream 2 and Turkstream under development as an alternative routes for Russian gas to enter Europe and Turkey
- Future of Ukrainian transit unclear, Germany pressing for clarity as condition of support for Nordstream 2 – **lack of clarity challenging for understanding role and value of new TSO (and thus slows moves to fully unbundle and spin-off)**
- In 2017, Ukraine reportedly earned $3 billion in transit fees
- Ukraine also has over 30 bcm of gas storage which serves an important role as part of European gas supply flexibility – **similar uncertainty on future value linked to transit future**

Gas production in Ukraine

Naftogaz and its affiliates is the most significant gas producer in Ukraine

Gas production in Ukraine

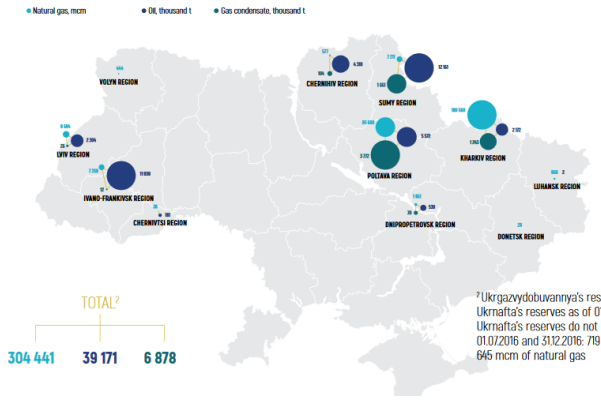
Gas production in Ukraine, 2016 - 2017,



	2016	2017
Private producers	4,2	4,1
SJSC Chornomornaftogaz	0,0104	0,0105
PJSC Ukrnafta	1,3	1,1
PJSC Ukrgasvydobuvannya*	14,6	15,3
Total	20,1	20,5

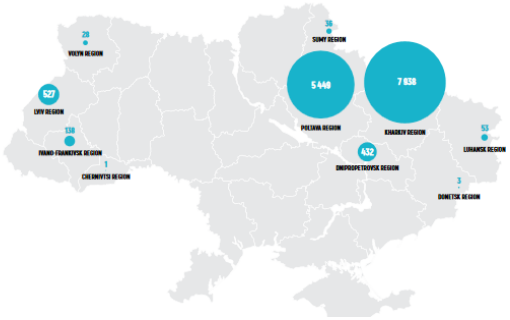
** Gross production (incl. private producers where UGV holds a minority stake; incl. operating needs)*
2017 data are operational and may be updated
Sources: Naftogaz, Ministry of Energy and Coal Industry of Ukraine, State Statistics Service of Ukraine

Natural gas reserves of Naftogaz group in Ukraine[2]

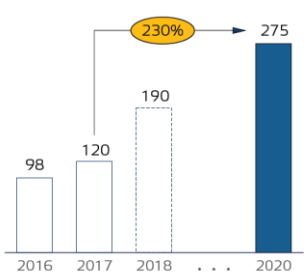


[2] Ukrgazvydobuvannya's reserves as of 31.12.2016, Ukrnafta's reserves as of 01.07.2016
Ukrnafta's reserves do not include production between 01.07.2016 and 31.12.2016: 719 thousand t of oil and 645 mcm of natural gas

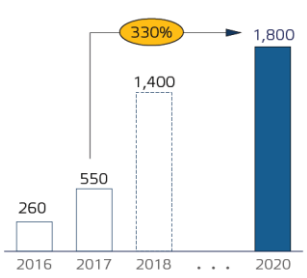
The geographical breakdown of natural gas production by Ukrgazvydobuvannya in Ukraine in 2016, mcm



GAS WELLS DRILLED HAS MORE THAN DOUBLE
Q-TY



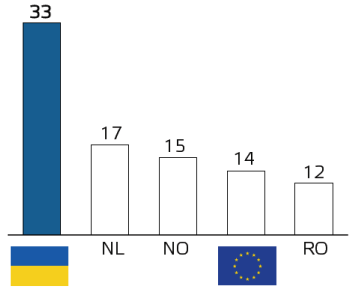
CAPEX HAS INCREASED THREEFOLD
$ MILLION



☐ Actual ☐ Planed ■ Target

Source: Naftogaz, Association of Gas Producers of Ukraine

Reserve / Production ratio (years) is highest in Europe (2016)



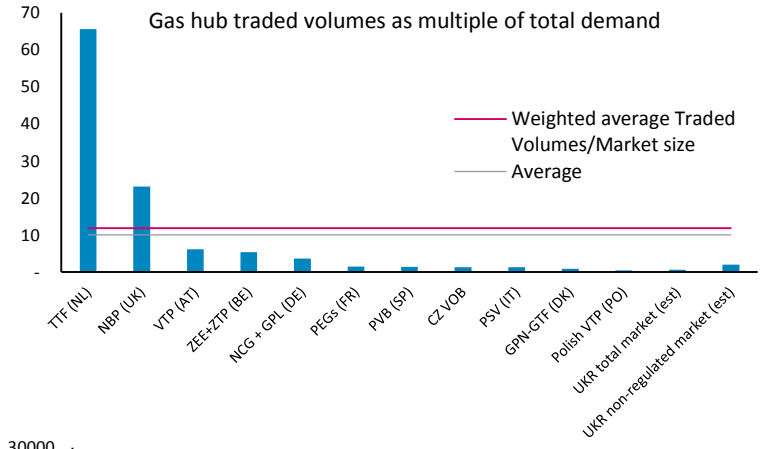
Source: Association of Gas Producers of Ukraine

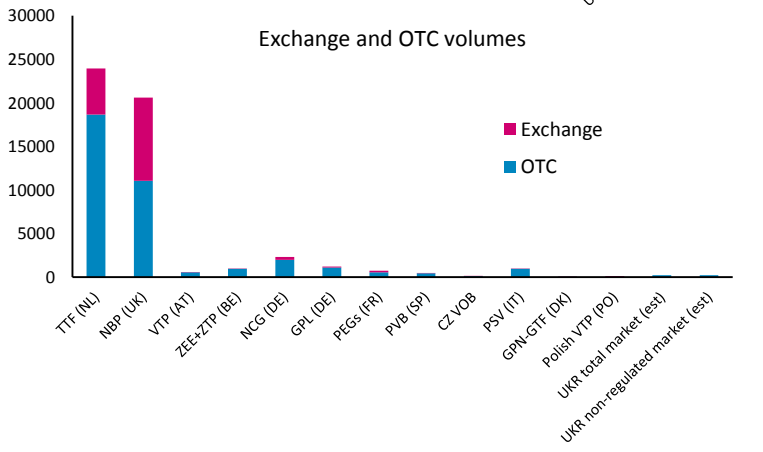
- Gas production in 2017 – 20.5 bcm (increase of 0.4 bcm from 2016)
- Ukrgazvydobuvannya (UGV), a 100%-owned subsidiary of Naftogaz, produced 15.3 bcm of gas (74.3% of Ukraine's total)
  - All marketable gas produced by UGV in 2017 was purchased by Naftogaz at a price of UAH 4849/Mcm (approx. €14.6/MWh) and sold at UAH 4942/Mcm (approx. €14.9/MWh) to cover household demand. This was a consequence of a PSO obligation.
  - Naftogaz does not supply to households directly but to designated private intermediaries who supply the gas to the households.
- Ukrnafta, 51% owned by Naftogaz, decreased its gas production by 17% from 1.3 bcm to 1.1 bcm in 2017
- Private companies produced 4.1 bcm of gas in 2017 (versus 4.2 bcm in 2016)

European hub and exchange trade

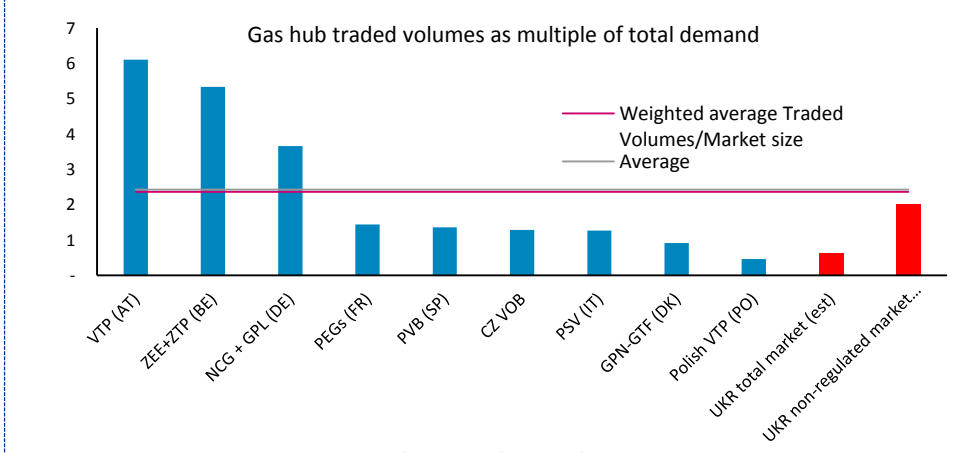
A reasonable volume of gas is traded at the Ukrainian VTP when compared to peers

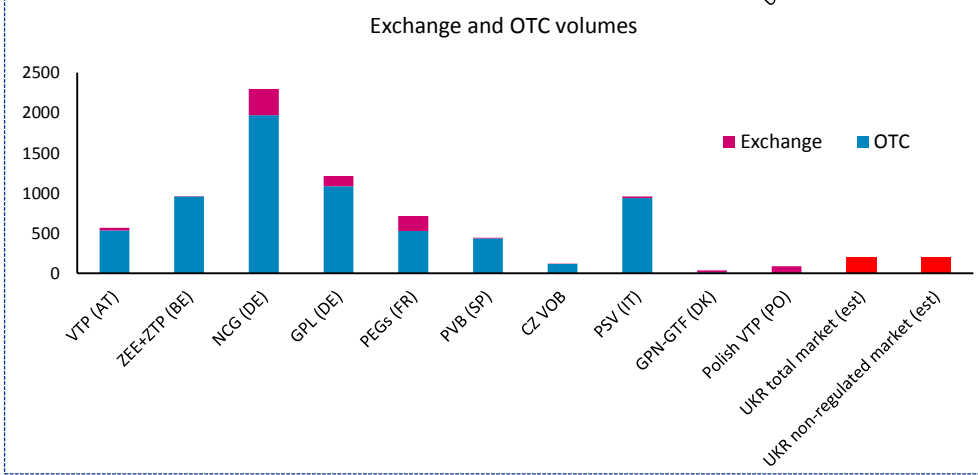
TTF and NBP dominate traded volumes in Europe





With TTF and NBP excluded, a clearer picture of other European traded markets can be seen





Notes: For EU countries, hub trade volumes are sourced from ACER Market Monitoring Report; Market size volumes from Eurostat
For Ukraine, traded volumes are those reported by Ukrtransgaz as being traded at the VTP and are compared to total Ukrainian gas demand and estimated 'unregulated' market (i.e. not included residential sales)

Relevant regulation landscape

Overview (as presented in workshop of 13 June 2018)

Relevant gas and broader regulations in Ukraine

A sample of key relevant regulations, with exception of financial regulation

- The Law of Ukraine “On Natural Gas Market” and secondary legislation, affecting:
  - PSO obligations
  - Free/regulated market boundaries
  - Balancing regime TSO
  - Entry-exit tariffs
- Currency Regulation and Currency Control”, Law of Ukraine #185/94-VR “On Procedure of Payments in Foreign Currency”, dated September 23, 1994 and a number of rules issued by the National Bank of Ukraine (“NBU”)
  - Ukrainian banks act as agents of currency control for the Ukrainian government. They are required to enforce compliance of their clients’ foreign currency transactions with Ukrainian law. The restrictions introduced in 2014 to settle the situation on Ukrainian monetary and foreign exchange markets have been extended quarterly, although certain deregulation of transactions in foreign currency is taking place
  - Currently NBU by its Resolution # 410 dated 13.12.2016 has extended monetary market and currency control restrictions in Ukraine initially introduced in 2014-2015. Thus, the following restrictions remain in effect: prohibition to early repayment of loans from non-resident lenders (with some exceptions); the limit for foreign currency purchase by individuals set at UAH 150,000 per day

Financial regulation landscape

Overview (as presented in workshop of 13 June 2018)

Financial regulation ecosystem

Summary based on interviews suggests financial regulation reform is underway in 12+ months

General financial regulation planning status.

- Financial regulation is undergoing transformation under leadership of the financial regulator (NSSMC). The broader ecosystem pathway (including commodities and thus gas) looks as follows:
  - bringing Commissions powers in line with international standards. According to IMF recommendations, draft law 6303 which is current in Rada, is being adopted. No final timeline.
  - introducing, through draft law 7055, to be brought to Rada, organized commodity trading venue to the current market abuse regulation with further enhancement of MAD regulation in line with EU regulations, at a later stage. No final timeline.
  - UPGRADE AND CONSOLIDATION OF POST-TRADE INFRASTRUCTURE IN UKRAINE, by Q1 2019. That includes broader clearing for all commodities.
- It is expected that relevant legislation (referred above as 7055 and 6303) will be reviewed by the financial committee on June 19th 2018, and submitted for first reading to Parliament (Rada) during this session.
  - 6303 is an IMF structural benchmark, while 7055 is on priority list of the government for development of energy hub.
- In parallel, operational transformation of the post-trade ecosystem is taking place under leadership of the financial regulator (NSSMC). The existing landscape does allow for limited manoeuvre in parallel to passing of relevant legislation.
- As part of the transformation NSSMC commissioned with donor support a specific analysis report. That report is summarised below, and contains recommendations on trade reporting and monitoring (including commodities: natural gas) which could be enacted by NSSMC subject to appropriate consultations, within the Ukrainian ecosystem.

Swift report.

- The report is focusing on data collection validation and standards, and sharing with relevant regulators. That would provide basis for surveillance and supervision. Surveillance systems are not part of the project, they would need to be procured by relevant regulators according to their functionalities including National Bank and National Energy Regulating Commission and others (ESMA, ACER, etc). The report is a starting point in defining the way to develop cost efficient, scalable, validated and credible reporting framework. Experts from interviews suggested a need for much more work on specific asset items.

Glossary

Key terms used for gas trading

Glossary (1)

- **Continuous Trading versus Auction Trading** - in continuous trading, the buy and sell orders (bids and asks) can be entered at any time (continuously). If the price is right, the orders are (via automatic matching tool of an exchange) matched with waiting orders. On broker screens, mostly traders 'aggress' the orders of a counterparty manually. For auctions, orders are entered during a call phase; afterwards, the orders are matched according to pre-established principles. In gas trading in Europe, continuous trading prevails.
- **Hedging –** offsetting trades in portfolio or trading product by taking a position in related trading product(s). Mostly, this involves using financial products such as futures, options and swaps. Hedging is mostly done to lock-in profits or to limit a risk in a trading/portfolio position that cannot be traded. An example, A trader has sold gas to a retail company for the next 3 years at a fixed price. At the buying side, the trader bought a bilateral 3-year supply contract with a price indexed to Brent-oil. In order to lock in the profit and avoid the risk of rising oil prices, the trader will buy financial instruments such as options, effectively 'fixing' the Brent-oil price maximum to current price level, which he used to calculate the fixed price of his sale to a retail company.
- **Balancing** - making the supply of gas into and the withdrawals from a gas pipeline system equal. Balancing may be accomplished hourly, daily, monthly or seasonally. In Europe, the gas balancing target model prescribes daily balancing.
- **BCM** or Billion Cubic Metres - 10^9 cubic metres.
- **Bid** - a proposal to buy a commodity/derivative at a specified price.
- **Churn** - a term used in gas markets to indicate the number of times, on average, that gas is traded between the initial sale and ultimate consumption. For example, a traded volume could be 100, consumption 20 units. This gives a churn of 5. It is an indicator of the liquidity of a gas market.
- **Clearing** - the procedure through which a **clearing house** becomes the buyer to each seller of a futures contract and the seller to each buyer (acts as **central counter party**), and assumes the responsibility of ensuring that each buyer and seller performs on each contract.
- **Curve –** It refers to all the products beyond day-ahead markets. Essentially, the curve is either up, or down, showing the expectations of rising or dropping price levels in the future.

Source: ISBN 978-0-692-34603-7; 2014 by Erik Rakhou. EUROPEAN GAS MARKET 2015 HANDBOOK.

Glossary (2)

- **Clearinghouse -** an energy exchange-associated body charged with the function of insuring the financial integrity of each trade. Orders are 'cleared' by means of the clearinghouse acting as the buyer to all sellers and the seller to all buyers. **ECC** is an example of a clearinghouse in Europe.
- **Clearing members -** members of an energy exchange who accept responsibility for all trades cleared through them and share secondary responsibility for the exchange's clearing operation by contributing to the guarantee fund and standing for potential cover the event of a default by another clearing member.
- **Delivery - t**he term has distinct meaning when used in connection with energy futures contracts. Delivery generally refers to the changing of ownership or control of a commodity under specific terms and procedures established by the energy exchange upon which the contract is traded. Reputable (approved by energy exchange) buyers or sellers of the underlying energy commodity can stand for delivery. If a buyer or seller stands for delivery, the contract is held through the termination of trading. The buyer and seller each file a notice of intent to make or take delivery with their respective clearing members, who file them with the energy exchange. Buyers and sellers are randomly matched by the energy exchange. The delivery payment is based on the contract's final settlement price.

Source: ISBN 978-0-692-34603-7; 2014 by Erik Rakhou. EUROPEAN GAS MARKET 2015 HANDBOOK.

Glossary (3)

- **Energy exchange** - an organisation that brings parties together to anonymously trade standardised, cleared, energy products. Sometimes, gas hubs would be confused with exchanges. Do note that a gas hub is a place of delivery of the product, whilst energy exchange is a place where products can be traded. For example, there is only one NBP or TTF. Yet, several exchanges offer products with delivery at NBP or TTF.
- **Front office** - the trading desk responsible for trading at spot and forward markets. A **middle office** would typically handle legal, business analytics, and regulatory and risk management issues. The **back office** would assure logistical and billing support to trading.
- **Futures** - exchange traded (gas) products for delivery on a future date. These products are freely tradable, and require that profits and losses are settled every day through margin payments. So-called forwards, traded OTC, may concern same products as futures, yet without financial arrangement of daily settlement.
- **Futures contract** - an agreement to make or take delivery of a commodity at a fixed date or a strip of dates in the future, at a price agreed upon at the time of dealing. We leave here the discussion what the status is of cleared forwards, which effectively resemble futures. As they no longer have credit risk.
- **What is the difference between Forward and Future?** Futures contracts are highly standardized and traded on exchanges, whereas forward contracts may be unique, and are traded over the counter via brokers, giving flexibility and the opportunity to customize contractual agreements in line with counterparty requirements. In the case of physical delivery, the forward contract specifies to whom to make the delivery. The counterparty for physical delivery on a futures contract is chosen by the clearinghouse. Forwards and futures for same products, say, calendar year TTF 2015, are very likely to have (nearly) the same price on a given moment. The product is the same; the details of the trading instrument and trading venue are just different.
- **Gas Day** - the gas day in Europe normally runs from 06:00 to 05:59 CET.
- **Henry Hub** - Sabine Pipe Line Company's Henry Hub in Louisiana, USA, location for physical delivery of natural gas futures as traded on e.g. American futures exchange NYMEX.

Source: ISBN 978-0-692-34603-7; 2014 by Erik Rakhou. EUROPEAN GAS MARKET 2015 HANDBOOK.

Glossary (4)

- **Indexation** - Inflation correction, accumulated over some time period; the index is usually set to 100 (or 1.000) at the beginning of this time period (the “reference time”).
- **Line Pack** - it is the capacity of pipelines to accommodate small fluctuations in gas demand by changing the pressure level in the pipeline. It is also referred as amount of gas in the pipeline system.
- **Liquidity** - the ability to buy and sell gas, without significantly changing the price level. A set of factors to consider include i) market depth and trading horizon ii) bid-offer spread iii) number and diversity of participants iv) the extent of the variety of available derivatives market products and v) used pricing mechanisms, including available indexes and assessments. By present, within Europe, many indicators for measuring liquidity of gas hubs are developed, inter alia in European Gas Target model discussions. A brief reference to Gas Target model is included in chapter on Key operational aspects. For further elaboration on EU Gas Target model please consult ACER-website. EU Gas Target model indicators for hub liquidity, or liquidities insufficiency, are for example a possible means to decide in the future on merging of certain national market areas into one, multi-jurisdictional, gas market area with a common gas hub. See http://www.acer.europa.eu/gas/gas-target-model/pages/default.aspx
- **Lot size** - it is the standard qualifying trades. Typically, from 30 to 150 MW for some gas trading market places. So a total volume of 1 standard lot of 30 MW Day-Ahead trade would be 30 MW * 24 hours equalling 720 MW. The size of a standard lot depends on the liquidity of a product. With more liquidity, the lot size becomes bigger.
- **Margin** - money held on account with an exchange to provide surety against default
- **Margin call** - the unfortunate event (for the holder of the position) where extra payments must be lodged with a brokerage, as a result of disadvantageous movements in the trader’s position.
- **Market maker** - an energy trader who is prepared to buy and sell-in the cash or derivatives market to provide a two-sided (bid-ask) market and greater liquidity.
- **Maturity date** - the date on which a forwards or futures contract becomes due for settlement or delivery.

Source: ISBN 978-0-692-34603-7; 2014 by Erik Rakhou. EUROPEAN GAS MARKET 2015 HANDBOOK.

Glossary (5)

- **NBP** - National Balancing Point – it is the virtual location for delivery of the UK natural gas into the National Grid, the UK. The NBP is a virtual trading point within the entry-exit system of the UK.
- **Nomination** - the prior reporting by the system user to the system operator of the actual flow that he or she wishes to inject into or withdraw from the system.
- **Offer (Ask)** - an indication of willingness to sell a specified amount of a commodity at a specific price.
- **Open Interest** - the number of contracts left open in a market which need to be closed out or taken through to delivery. It is used as an indicator of traders' activity in a market.
- **OTC,** Over-the-Counter Trading - non-anonymous bilateral trading, through a broker in contracts, tailored to specific customer requirements, as opposed to exchange traded (which are more standardised). A key difference of OTC with exchange-trading is non-anonymity. OTC gas trade in Europe refers to trading through brokers, through screens or voice intermediation. A **Broker** is an intermediary who helps buyers and sellers find each other for a small fee on the traded volumes. At present, most trades happen via broker screens, where parties do not see the name of the buying or selling parties. Only once the trade is made it becomes known to the parties who they traded with. This is also valid for 'phone'-brokered deals. Yet, the system only allows a trader to 'click' on those bids to buy or sell, where credit lines between relevant parties are sufficient, and who are approved as counterparties. Credit is a key limiting factor. Often parties also sign a Master-agreement, in order to 'approve' trading with each other. The EFET-agreement is an example of such a bilateral trade master agreement. The ISDA-agreement covers bilateral trading in financial products.
- **Regulator** - a government agency responsible for overseeing the functioning of the gas market. See NRA or ACER.
- **REMIT** - Regulation (EU) No 1227/2011 of the European Parliament and of the Council on wholesale energy market integrity and transparency (REMIT). REMIT introduces a sector-specific legal framework for the monitoring of wholesale energy markets. The objective is to detect and to deter market manipulation. For the first time, energy trading will be screened at EU level to uncover abuses. See http://www.acer.europa.eu/the_eu_energy_market/Legislation/Pages/default.aspx
- **Re-nomination** - a *nomination* received after the start of the Gas Day which is effective within the Gas Day.

Source: ISBN 978-0-692-34603-7; 2014 by Erik Rakhou. EUROPEAN GAS MARKET 2015 HANDBOOK.

Glossary (6)

- **Roll over** - the transfer of a position from one futures period to another — involving the purchase (sale) of the nearby month and simultaneous sale (purchase) of a further-forward month.
- **Seasonality** - the tendency of some commodities, including natural gas, to have repeated periodic highs and lows, as observed in the forward/futures markets, corresponding to somewhat predictable changes in demand over the course of a typical calendar year. In natural gas, in Europe, the typical seasonality is driven by more demand in winter and less demand in summer due to temperature differences.
- **Seasonal spread** or **Summer - Winter Price Differential** - it is the difference between the gas price in summer (usually Q3) and that of the next winter (Q1).
- **Settlement price** - a price established at the close of a trading day, used to calculate the settlement of futures contracts
- **Shale** - a very fine-grained sedimentary rock formed by consolidation of clay and silt -sized particles into thin, relatively impermeable layers. It is the most abundant sedimentary rock.
- **Shipper** - the owner of gas and nominates against service contracts with facility *operators* to ship gas through the gas supply (value) chain. Sells gas to *suppliers* or retailers.
- **Spot** - all products within 48 hours of delivery. Typically, they are day-ahead and intraday/within-day blocks of gas. Spot market can be very liquid, yet, volumes overall are small by the very nature of final fine-tuning.
- **SPOT, Prompt** - short-term trading focused at instant sale and delivery of natural gas. Typically, spot trades will concern the next 48 hours. Some definitions consider trading up to a month as spot and prompt. Opposite of forward, futures trading.
- **Spread** - (i) a contract, using the differential between two futures periods, to either to purchase one contract month and sell another contract month in the same commodity, or (ii) a long/short position to purchase and sell a basket of commodities (often as basket comprised only of two commodity assets) with the same maturity. Can also refer to the difference between bids and offers for a specific period.

Source: ISBN 978-0-692-34603-7; 2014 by Erik Rakhou. EUROPEAN GAS MARKET 2015 HANDBOOK.

Glossary (7)

- **TPA or Third Party Access** - the principle of making pipeline, LNG or storage capacity available to others for a fee.
- **Trader** - trades gas and capacity. Can be part of Producer/Shipper/Supplier organisation, making trades within overall portfolio; or may be a simple trader who only trades gas. He or she negotiates short and long term supply contracts. Can also be referred as a Merchant
- **Transmission System Operator**, referred as TSO, is responsible for the independent operation of gas networks, and providing third party access at fair and transparent conditions.
- **TTF - Title Transfer Facility** - it is a virtual location for the delivery of natural gas into the grid of Gasunie gas transport services, Netherlands. The TTF is a virtual trading point within the entry-exit system of the Netherlands.
- **Volatility** - a measure of the variability of market prices. Often calculated using standard deviation based on historical prices. More volatile means, on average, price moves are more. It is a key measure to price options. The more volatile, the less predictable a gas price outlook is.
- **VTP** - is a virtual trading point within the entry-exit system.

Source: ISBN 978-0-692-34603-7; 2014 by Erik Rakhou. EUROPEAN GAS MARKET 2015 HANDBOOK.