BALANCING SYSTEM IN POLAND

Vienna, April 10th 2019
POLISH GAS MARKET – CASE STUDY

TIMELINE

- 2013 January – 4th edition
  - New Entry – Exit model and virtual trading point
  - nominations and allocations in Energy units, gas day 6/6
- 2014 March/April – publication of BAL NC
- 2015 June – 1st Interim Measures Report approved by NRA
- 2015 October – BAL NC start of apply
- 2016/2017 September – 2nd /3rd Interim Measures Report approved by NRA
BALANCING AREAS IN POLAND

- H-gas balancing area
- L-gas balancing area
- TGPS balancing area (transit)
TGPS BALANCING ZONE - CHARACTERISTICS

- **TGPS** – Polish part of Transit Gas Pipeline System Yamal - Europa

**Entry points:**
- **Kondratki** (connection point, Belarus)
- **Mallnow** (connection point, GASPOOL - Gascade)
- **PWP reverse** (contractual connection point, H-gas balancing zone)

**Exit points:**
- **Mallnow** (connection point, GASPOOL - Gascade)
- **PWP** (virtual interconnection point based on physical points between TGPS and H-gas balancing zone)
L-GAS BALANCING ZONE - CHARACTERISTIC

- Typically local character
  - (2 subsystems: Lw1 and Lw2)
- No connection with any other systems
- 8 entry points (production)
- 80 exit points
  - 4 exit points to end users
  - 3 DSOs connected
- All gas sources belong to one Producer
- Local Production meets end users’ demand
- Only 3 active Shippers
H-GAS BALANCING ZONE – CHARACTERISTICS

### 62 entry points
- IPs
- LNG Terminal
- Production

### 902 exit points
- IPs
- End users (industry)
- DSOs (23)

#### Interconnection points:
- **BY → PL**: Tietierowka, Wysokoje
- **UA → PL**: Drozdowicze
- **PL → UA**: Hermanowice
- **PL → CZ**: Cieszyn
- **PL → DE (ONTRAS)**: GCP GAZ-SYSTEM/ONTRAS
- **PL → Yamal (transit)**: PWP
COOPERATION WITH GAS EXCHANGE

► TGE allows buying and selling gas on gas exchange based on market prices, transactions are anonymous.
► 2011 start of cooperation
► Net code (IRiESP) statements request of cooperation between Gas Exchange and TSO at VTP in areas:
  ► transactions realized at Virtual Trading Point of Gas Exchange
  ► Nominations at Virtual Trading Point of Gas Exchange (as shipper nominations)
► Transaction done at Gas Exchange is valid for contractors and realized by TSO
NOMINATIONS - GENERAL PRINCIPLES

- Nomination procedure
  - Nomination and renomination procedure according to BAL NC
    - day ahead nomination
    - intraday renomination
  - Hourly quantities for contractual entries and exits

- Notification procedure connected with VTP entry/exit
  - Based on gas exchange trade
    - sent to TSO by gas exchange operator (TGE)
    - „a priori” confirmed
  - Based on OTC trade
    - sent to TSO by sides of transactions
    - must be matched (lesser rule)
NOMINATIONS – DATA EXCHANGE (INT NC)

- Document based and interactive data exchange
- **Data exchange format**: Edig@S – XML (4.0. or 5.1. version):
  - Messages: NOMINT, ACKNOW, NOMRES
- **Data exchange protocol**: AS4

- Interactive data exchange - possibility to use web-portal – Information Exchange System IES - for submitting nomination
  (edig@S messages are automatically generated in Edig@S 5.1)
ALLOCATIONS – METHODS OF ALLOCATION

Virtual Exit Points
- OTC Gas exchange

Virtual Entry Points
- OTC Gas exchange

Entry points

Shipper_1

Entry points

Shipper_2

Exit points

Measurements

OBA

A=N

A=N

A=N

A=N

UGS Entry

UGS Exit

OBA

A=N

A=N
COMMERCIAL BALANCING

Shipper’s Balance

All entry points:
1. Import
2. Storages
3. Production
4. Virtual Trading Point - entry
   • Gas Exchange
   • Bilateral transactions (OTC)

All exit points:
1. Export
2. Exit points to DSOs
3. End users connected to transmission system
4. Storages
5. Virtual Trading Point - exit
   • Gas Exchange
   • Bilateral transactions (OTC)

➢ Daily balancing regime
➢ Shipper’s provisional imbalance is calculated after 4 hours, 8 hours of gas day and after gas day
➢ Final imbalance calculated after the end of the gas month, based on final allocations
➢ Imbalance settlement for each gas day (based on final allocations)
TSO calculate Shiper’s Daily Imbalance for each gas day as difference between gas amount delivered at entries and withdraw at exits from balancing area/zone by Shipper at each gas day.

\[ \text{DIN} = \sum A_{WE} - \sum A_{Wy} \]
IMBALANCE CHARGE – H-GAS BALANCING AREA

• Marginal prices in accordance with BAL NC

• **Marginal sell price** is equal to the lower of the two following prices:
  ➢ lowest price of any sales of title products, in which the TSO is involved in respect of the given gas day,
  ➢ CSRB in relation to this gas day, reduced by 10%.

• **Marginal buy price** is equal to the higher of the two following prices:
  ➢ highest price of any purchases of title products, in which the TSO is involved in respect of the given gas day,
  ➢ CSRB in relation to this gas day, plus 10%.

• where
  • CSRB is the volume-weighted average price from all transactions of TGE (Gas Exchange) session of the Intraday Market (RDB_G), related to the present gas day (index TGEgasID).
Group created by the Shippers in which one Shipper is responsible for the commercial imbalance of the whole group

- Mechanism implemented on 1st October 2014 – in H-gas and L-gas balancing areas
- The Shipper may be a participant of only one balancing group (the whole portfolio of this Shipper must be in such case in this balancing group)
- The Shipper may be responsible for balancing of only one balancing group. This Shipper may not be a participant of another balancing group
- The imbalance of a balancing group is settled between the TSO and Shipper responsible for the imbalance
- The neutrality charge is settled with each Shipper separately
- Shipper may join/leave the group on a monthly basis
## Balancing Groups – Imbalance Settlement

<table>
<thead>
<tr>
<th>Balancing group</th>
<th>Imbalance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipper 1</td>
<td>-20</td>
</tr>
<tr>
<td>(responsible for imbalance)</td>
<td></td>
</tr>
<tr>
<td>Shipper 2</td>
<td>+1</td>
</tr>
<tr>
<td>Shipper 3</td>
<td>+10</td>
</tr>
<tr>
<td><strong>total</strong></td>
<td><strong>+5</strong></td>
</tr>
</tbody>
</table>

**Imbalance settlement just between TSO and Shipper 1**

**TSO**

**Shipper 1**
(responsible for imbalance)

**5 x Marginal Sell Price**

**Imbalance settlement**
H-GAS BALANCING ZONE – BALANCING ACTIONS

Platforms

TGE trading platform (Polish gas exchange)
Balancing platform
➢ interim measure between October 2015 and March 2019
➢ implemented before entry into force of BAL NC in January 2014
➢ only locational products on the eastern boarder available

Trade within adjacent balancing zone
➢ GASPOOL
➢ approved by NRA

Merit order
➢ WD title product on TGE trading platform
➢ WD and DA locational product on the balancing platform
➢ WD and DA title product on the trading platform within the adjacent balancing zone
➢ balancing services

Balancing actions undertaken by TSO so far:
at TGE trading platform (WD title products):
➢ after the end of a gas day
➢ based on net total Shippers’ imbalance
introduction of balancing services - 1st Jan 2016
H-GAS BALANCING ZONE – BALANCING ACTIONS AT TRADING PLATFORM

➢ TGE trading platform (Polish gas exchange)
➢ TSO undertakes balancing actions at TGE trading platform (WD title products):

➢ After the end of gas day
➢ Based on net total Shippers’ imbalance
H-GAS BALANCING ZONE – BALANCING SERVICES

➢ Branice – entry point from Czech distribution system (GasNet) to Polish transmission system - the only source of gas for end users connected to distribution system in Poland in this region (no possibility to supply gas from another source/direction)

➢ Shipper holding 100% of the capacity at this entry point informed GAZ-SYSTEM at the end of 2015 that he is not going to provide gas in this point starting from 2016

➢ GAZ-SYSTEM had to undertake balancing action

➢ Reasons to apply Art. 8:
  ➢ STSPs are not providing the necessary response to keep transmission network within its operational limits
  ➢ Transport via Czech DSO requires trading license

➢ Balancing services used since 1st January 2016
Balancing services procured in a market-based manner – non-discriminatory public tender procedure

Details of procedure published at GAZ-SYSTEM website – portal dedicated to public procurement (public access, platform in Polish language only)

- Description of Product/Procurement criteria
- Questions and answers
- Results

Tenders submitted via email or official correspondence

Annual tender process:

- 1st process in December 2015 – for the period January – September 2016 (till end of gas year)
- 2nd process in September 2016 – for the period October 2016 – September 2017 (gas year)
- 3rd process in September 2017 – for the period October 2017 – September 2018 (gas year)
- 4th process in July 2018 – for the period October 2018 – September 2019 (gas year)

Description of Product/Procurement criteria

- Supply of gas at Branice entry point in quantities resulting from demand of end users supplied from this entry point
- Balancing services used in case when no Shipper nominates Branice entry point
- Price is determined by the tenderer
H-GAS BALANCING ZONE – BALANCING SERVICES – QUANTITIES & PRICES

<table>
<thead>
<tr>
<th>Gas year</th>
<th>quantity [kWh]</th>
<th>price [PLN/kWh]</th>
<th>costs [PLN]</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015/2016</td>
<td>1 716 778</td>
<td>0.10593</td>
<td>181 858</td>
</tr>
<tr>
<td>2016/2017</td>
<td>2 533 424</td>
<td>0.08535</td>
<td>216 228</td>
</tr>
<tr>
<td>2017/2018</td>
<td>2 863 191</td>
<td>0.14578</td>
<td>417 396</td>
</tr>
<tr>
<td>2018/2019</td>
<td>8</td>
<td>0.15700</td>
<td>8</td>
</tr>
</tbody>
</table>

Weighted average price vs balancing services price

Daily measured quantities at Brnice entry point (January 2016 - March 2019)

Art. 45

„1. In the absence of sufficient liquidity of the short term wholesale gas market, suitable interim measures referred to in Articles 47 to 50 shall be implemented by the transmission system operators. Balancing actions undertaken by the transmission system operator in case of interim measures shall foster the liquidity of the short term wholesale gas market to the extent possible."
INTERIM MEASURES AS A BRIDGE TO THE GOAL

- Oligopoly
  - at supply side of the gas market
  - at supply side of the wholesale gas market
- Bilateral contracts
- Competitive liquid gas market
- Most contracts at gas exchange
INTERIM MEASURES – TOOLS

➢ Balancing platform
  ➢ A trading platform where the transmission system operator is a trading participant to all trades
➢ Alternative to a balancing platform
➢ Interim imbalance charge
  ➢ charge which calculation method substitutes the method of the calculation of a daily imbalance charge set forth in Chapter V of the Regulation
➢ Tolerance
  ➢ the level of which defines the maximum quantity of gas that can be bought or sold by each network user in the settlement of the imbalance at a weighted average price
BALANCING PLATFORM

➢ Short Term Standardised Products
  ➢ L-gas balancing area: October 2015 – March 2019
  ➢ TGPS (ISO): October 2015 – September 2019

➢ Locational products (EU border)
  ➢ TGPS (ISO): October 2015 – March 2019

➢ Locational products (non-EU border)
  ➢ H-gas balancing area: October 2015 – March 2019
  ➢ TGPS (ISO): October 2015 – March 2019

➢ Locational products (internal points)
  ➢ L-gas balancing area: October 2015 – March 2019
TOLERANCE

Total Shippers’ imbalance (within and outside the tolerance): October 2015 - March 2018

- Total Shippers' imbalance within tolerance, kWh
- Total Shippers' imbalance outside tolerance, kWh
TOLERANCE

IP Entries
Production
UGS Entry

100
100 ±5
100 ±5

TGE
OTC

100 ±2.5
100

DSO

UGS Exits
IP Exits

DLN = 0.05 * MAX \left( \frac{\left( W_{ef} + W_{yf} \right)}{2} ; W_{yf} \right)
TOLERANCES – POSSIBLE TIMELINE
TOLERANCE (DAILY IMBALANCE LIMIT - DLN) INTERIM MEASURE IN H-GAS BALANCING AREA

- Tolerance (high-methane gas balancing area):
  \[
  DLN = t \% \times \text{MAX} \left[ \frac{\sum We_f + \sum Wy_f}{2}; \sum Wy_f \right]
  \]
  
  \(We_f, Wy_f\) – the quantities of gas delivered/offtaken, as appropriate, at Entry/Exit Points (excluding virtual entry/exit points – Gas Exchange, OTC, Balancing Services Market)
  
  \(t\) – the level of tolerance:
  - **5 %** before 1 April 2018
  - **2.5 %** from 1 April 2018 to 30 March 2019
  - **0 %** as of 1 April 2019

- **Within the tolerance (DLN)** – Settlement of imbalance at the CSRB price equal to TGE's TGEgasID index

- **Outside of the tolerance** – imbalance settled at KCK, KCS marginal prices
SHORT TERM WHOLESALE GAS MARKET DEVELOPMENT

Number of active participants of TGE

TGE participants  active DAMg participants  active IDMg participants
E_{LP}(t) = \frac{\pi}{4} \frac{273.15}{0.1013} \sum_{k=1}^{i=1} \left( d_i^2 \int_0^l \frac{z_n(x,t) p(x,t)}{z(x,t) T(x,t)} C_v(x,t) \cdot dx \right)

World of physics phenomena:
➢ Dispatchers
➢ Engineers
➢ Scientists (fluid mechanics)

MP = \sum_{i=1}^{n} N_{ENT_i} - \sum_{j=1}^{m} N_{EX_j}

World of market participants:
➢ Traders
➢ Market analysts
➢ Scientists (economy)
THANK YOU FOR YOUR ATTENTION