Shipper-info event about Finnish open gas market

4th June 2019 Espoo and skype
SHIPPER-INFO EVENT ABOUT FINNISH OPEN GAS MARKET 4TH JUNE 2019

Program

11:30–12:00  Lunch

12:00–14:30  Opening
Anni Sarvaranta, Finnish Gas Transmission services

Timeline for market opening
Ville Rahkonen, Gasum TSO

Shipper-related market rules and contracts
Leena Sivill, Gasum TSO (HansenCX)

Registering process
Ville Rahkonen, Gasum TSO

Data exchange
Tiina Niinimäki, Gasum TSO

Capacity booking
Leena Sivill, Gasum TSO (HansenCX)

GET Baltic’s future plans in Finland
Gintaras Buzkys, GET Baltic
Towards an open gas market

Shipper's Info
Anni Sarvaranta / COO
4.6.2019
The Finnish Gas Market will be opened for competition in the beginning of 2020

- In accordance with Finnish new Natural Gas Market Act (2018) the wholesale and retail gas markets will be opened for competition at the beginning of 2020 when Balticconnector is commissioned
- At the same time, the current TSO, Gasum, will be unbundled (full ownership unbundling) and a new Gas-TSO for Finland will be established as of 1.1.2020
- In 2018 the Finnish State decided there will be only one TSO in Finland and it will have system responsibility, operate and maintain the whole gas transmission network in Finland >> Suomen Kaasuniirtopalvelut was established
- Key goal: successful opening of market and starting of new, independent Gas TSO
- Starting from 1.1.2020 Suomen Kaasuniirtopalvelut will become a part of the new Gas TSO along with Gasum TSO unit
Gas TSO 2020

- Will be called Gasgrid Finland
- **CEO: Olli Sipilä** (MSc (Industrial Management))
  - Olli is joining the company from ÅF Pöyry Management Consulting where he has served as the Director of the Energy Business in Finland
- **Will employ about 40 people** starting from 1.1.2020
  - New management to develop organization
- **Will be owned by the State of Finland** (Ministry of Finance)
- **Head-quarters will be situated in Helsinki Capital Area**
  - Operational staff will be situated in Kouvola Control Centre (~75% of total staff)
- **By 14.1.2020 official TSO status** will be applied from the Finnish Energy Authority (certification process) – process ongoing
# Gas TSO 2020 Services for the market

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<tr>
<th>Transmission and MAM Services</th>
<th>Connection Services</th>
<th>Other Services</th>
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<tr>
<td>Gas Transmission Service</td>
<td>Gas Network Connection Service</td>
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<td>Notice Board for Capacity Rights</td>
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<tr>
<td>Centralized Data Exchange Services for Distribution Networks</td>
<td></td>
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</table>

Gas Exchange Service
Thank you for your interest!

Anni.sarvaranta@figas.fi
Timeline for market opening

Ville Rahkonen, Gasum TSO
GASUM’S TSO ORGANISATION PREPARES FOR OPEN MARKET

- Market rules, terms and data exchange instructions
- Transmission tariffs
- IT systems:
  - Web portal
  - Gas datahub (retail market gas allocation)
  - Energy data management system
  - Interfaces for data exchange
PREPARATION OF MARKET RULES 2017-2019

1. Preparations for market rules project
2. Drafting the rules in open workshops with stakeholders
3. Public consultation (Ministry)
4. Additions to rules, guidelines and instructions, contract templates and terms
5. Data exchange workshops
6. Public consultation (NRA & TSO)
7. Registration and testing

2017 2018 2019

Done during phase 4:
- Gas measurement guidelines (in Finnish – “Kaasun mittaussuositukset”)
- Tariffs *
- Procedure and data exchange guideline (in Finnish – ”Menettelytapa- ja tiedonvaihto-ohje”) and related technical instructions
- Terms for TSO’s services *
- Finalisation of market rules based on feedback from public consultation *
- TSO-DSO cooperation agreement *
- Framework agreements (shipper, trader, retailer, transmission system level end user, biogas injector) *
- Capacity allocation rules for Balticconnector and Imatra *

To come during 2019:
- On-demand guarantee contract template
- Data exchange contract with gas exchanges
- Updating of the biocertificate system
- Updating of Kaasupörsä gas exchange
- Balance service agreement contracts

*Waiting for NRA approval (deadline 30.6.2019)
TIMELINE FOR MARKET OPENING 2019

- **Public consultation Tariffs**: During 2.-3.2019
- **Public consultation Rules, terms and contracts**: During 3.-4.2019, Starting 5.2019
- **Second public consultation, Terms**: During 6.2019
- **Market parties can test their systems (wholesale market)**: Starting 9.2019
- **TSO’s technical preparation**: 1.1.2020 kl 7.00
- **TSO-TSO data exchange starts**: 31.12.2019
- **First gas day**: 31.12.2019
- **Notifications about changes of retailer can be given**: 3.10.2019
- **3.10.2019 Capacity booking can start**: 1.10.2019
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Kaasumarkkinat avataan 1.1.2020
Sivusto toimii järjestelmävastaavan siirtoverkon haltijan informaatiokanavana Suomen kaasumarkkinoiden avaamiseen liittyvissä asioissa.

Avoimen kaasumarkkinan valmistelu
NON-BINDING* ENGLISH TRANSLATIONS WILL BE AVAILABLE AT THE END OF JUNE:

• Rules for gas transport

• Shipper’s and trader’s framework agreement

• Procedure and data exchange guideline (shipper-related parts)

* The Finnish version shall prevail over the English version
Market rules and contracts for shippers

Shipper info, 4th of June 2019
Leena Sivill, Gasum TSO (HansenCX)
CONTENTS

1. Market roles

2. Balance responsibility and supply relationships

3. Trade notifications and nominations

4. Gas allocation rules

5. Balance settlement process

6. Contracts between market parties and TSO
1. MARKET ROLES

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<td>Transmission system operation</td>
<td>Distribution system Operator (DSO)</td>
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<td>Market management</td>
<td>Retailer</td>
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<td>Transmission network end user</td>
<td>Kaasupörssi (gas exchange)</td>
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<tr>
<td>Biogas injecting party (transmission grid)</td>
<td>Biogas certificate system</td>
<td>Biogas injecting party (distribution network)</td>
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</table>
2. BALANCE RESPONSIBILITY

Shipper or trader must become a balance responsible party himself or join the balance group of another balance responsible party. All entries and exits of a shipper or trader must belong to the same balance group.
2. SUPPLY RELATIONSHIPS MUST BE REPORTED TO TSO

Retailers, transmission network end users and biogas suppliers must notify the TSO of their delivery relationships with shippers. The shippers must accept (or reject) every new supply relationship in the TSO portal. Termination of an existing supply relationship can be done single-sidedly by either party.
3. TRADE NOTIFICATIONS AND NOMINATIONS

- Providing trade notifications and nominations is possible using Edig@s XML 5.1 & AS4 protocol (national standard to be published) and by using the TSO portal.
- If a shipper/trader wishes to use Edig@s messages, data exchange requires a test approved by the TSO.

- TSO portal provides services for capacity booking and data exchange.
- TSO enables a REST API interface for data retrieval.
- TSO follows the obligations of the EU Gas Regulation and national Rules for Gas Transmission in information provision to balance responsible parties, shippers and traders.
4. GAS ALLOCATION RULES

<table>
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<th>Entry</th>
<th>Allocation rule</th>
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<td>As nominated or as measured*</td>
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<td>Balticconnector</td>
<td>As nominated</td>
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<td>Biogas entries</td>
<td>As measured</td>
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<table>
<thead>
<tr>
<th>Exit</th>
<th>Allocation rule</th>
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<tr>
<td>Balticconnector</td>
<td>As nominated</td>
</tr>
<tr>
<td>Exit zone</td>
<td>As measured</td>
</tr>
</tbody>
</table>

* Nominations are compulsory to all shippers. TSO forwards the nominated volumes to the adjacent TSO (nominated and transported quantities should match). Shipper may choose his gas allocation method according to his supply contract. Deviation between nominated and measured quantities is balanced on a monthly basis on a separate balancing account. Shipper is allowed to reduce the imbalance on the separate balancing account until the end of each month. The remaining imbalance is then cashed out by the TSO at neutral gas price (monthly average).
5. BALANCE SETTLEMENT

1st preliminary results for gas allocation and balance settlement

Further preliminary results until the end of the gas month

Measurement data from DSOs to TSO

Measurement data and estimates from DSOs to TSO

Final balance settlement

1st correction

2nd correction

D = gas day
+ x = x days afterwards
Time unit UTC wintertime

Sources: Gas Transmission Rules, Chapter 6
Gas Distribution Rules, Chapter 10
6. CONTRACTS BETWEEN MARKET PARTIES AND TSO

Shipper and trader only conclude a framework agreement with the TSO. In addition to this, shippers and traders need to deliver documents and information to the TSO as requested in the market registration process.
Materials available at
http://kaasumarkkina.fi
Registration as a market party

Ville Rahkonen, Gasum TSO
REGISTRATION AS A MARKET PARTY

Market party

Starting 1st Jul 2019
- Send basic data and attachments using www-registration form
- Deliver signed framework agreement to TSO
- Check the data
- Test the data exchange

Starting 1st Sep 2019
- Sign and return the framework agreement
- Admit user rights to web portal
- Approve data exchange testing
- Deliver on-demand guarantee to TSO if needed

TSO

Operation can start

Starting 1st Jul 2019

Starting 1st Sep 2019

Operation can start
REGISTRATION FORM WILL BE AVAILABLE AT KAASUMARKKINA.FI

- I want to register to the market as
  - [ ] Shipper  [ ] Trader  [ ] Biogas injector  [ ] Transmission Network End User
  - [ ] Retailer  [ ] TSO  [ ] DSO

- First name
- Last name

- E-mail
- Phone number

- Company name
- VAT number

- Street address
- Postal code

- City
- Country

- EIC-X
- GS1 GLN

- I consent to TSO checking my data given in this form
REGISTRATION PROCESS 1(2)

- Market parties are shipper, trader, transmission network end user, retailer and biogas injecting party
- Market party has to send its basic data to TSO by filing the online registration form. If market party is registering in shipper’s or trader’s role, it is required to attach Trade Register extract (less than 3 months old) and the latest financial statement (if existing). In addition to these, market party is required to deliver signed framework agreements in duplicate orginals. Same market party can deliver several framework agreements depending on which market roles it wants to register.
- TSO signs the received documents after 1st of September 2019 and returns one original within two weeks provided that market party has delivered all the needed information and documents. At the same time market party will be given access rights to TSO’s web portal. TSO will send the portal access information to the email address that was given by the market party in the registration form. TSO will send the signed original framework agreement(s) to the postal address that was given in the registration form.
REGISTRATION PROCESS 2(2)

- Shipper and trader has to provide the needed on-demand guarantee (as stated in the contract) before shipper can book capacity and/or act as a balance responsible party. It is recommended to use the example on-demand guarantee template provided in the TSO’s web page. The required amount of guarantee at any given time shall be the amount of the largest monthly Capacity invoice actually sent for the past 12 months times three. However, at the market opening and later with a new shipper this requirement will be applied so that when booking the capacity, TSO shall check the sufficiency of the security provided in conjunction with each Capacity Order so that the value of security must cover the amount of the largest monthly invoice for the upcoming months estimated on the basis of Capacity Agreements already concluded and the Capacity Agreement in accordance with the Capacity Order times three before the TSO can accept the Capacity Order. A further requirement for a Balance Responsible Shipper or Trader shall be that the value of security shall cover the Balance Responsible Party’s outstanding invoices at any given time for imbalance charges and estimated imbalance charges that have not yet been invoiced to the Balance Responsible Party, including a 10% security margin for monthly fluctuation in imbalance charges.
Data Exchange and Finnish Open Gas Market Systems

Tiina Niinimäki, Gasum TSO
Business Developer and project manager of IT-Business-systems

4.6.2019
IT-SYSTEMS AND INFORMATION EXCHANGE IN OPEN GAS MARKET

Market parties and participants

Transmission Network End User
Shippers and Traders
Biogas injecting party
Retailer and Distribution System Operator

GASDATATHUB

Shippers
TSO EE
TSO FI

Edig@s XML Nomination Trade notification

Amount of gas allocated certain point and time and the ownership. Commercial information, matching and balancing-information for the whole system and balance group’s imbalance. As well as state of booked and available capacity over the gasday.
Instruction for Finnish Gas Market Data Exchange and Best Practices

5/2019

Edig@s-testing (nomination and trade notification) by Shippers

Portal Phase 1 implemented

Receiving first nominations 2.12.2019 at 12:00

Gas Market Open in action 1.1.2020 at 7.00 (local Finnish time)

Portal phase 2 implemented

1/2020

Portal phase 1:
- Registration and roles
- Capacity Booking Imatra, Biogas virtual entry point, and exit zone 1.10.2019 at 10 (Finnish local time)
- Delivery relationship and member/responsible of balance group 3.10.2019 at 12.00
- User rights

Portal phase 2:
- Connecting to API-interface
- Nomination Baltic Connector and Imatra 2.12.2019 at 12:00
- Balance information

Portal phase 1 presentation and instruction

Portal phase 2 presentation

Portal API-interface resources, structure and documentation

Standard of nomination and trade notification published

3-4/2019

5/2019

Distribution Operator can implement gasdatahub to forward data and build integration

6/2019

Energy and balance calculation (retail market)

9/2019

Notification of exchange of retailer can be informed begin of 3.10.2019 with relation gas day in 2020

10/2019

11/2019

12/2019

1/2020

Technical instruction, data descriptions, infos, videos

Portal phase 2 implemented

Portal phase 2

Portal phase 1

Portal phase 1 implemented

Portal phase 1

Portal phase 1 presentation and instruction

Portal phase 1

Portal phase 1 presentation and instruction
Data Exchange between parties

**Edigas data Exchange**

- AS4-protocol
- Standard data exchange for commercial action
- Nominations per Interconnection Point: Imatra and Baltic Connector
- Trade notifications

**REST/JSON-API**

- HTTPS
- API is modern way to integrate systems to have access to the resources and endpoints to create, read/retrieve, update and delete information.
- Offer cost efficient manner to call API endpoints and use operations
- Integrate market participants’s own systems to daily routines and part of process.

User can manually act and fill or fetch data by using web-portal. Web-portal itself uses the same APIs which can be used by the systems themselves.

**User Interface**

- HTTPS
- Browser
- Portal for Whole Sale Market
- GasDatahub for Retail Market
# INFORMATION, DATA AND FUNCTIONS IN PORTAL

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<th>Feature</th>
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<td>Gas consumption</td>
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<td>Market Participants and parties</td>
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<td>Instruction</td>
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<td>Information about Network</td>
<td>Customer service</td>
<td>News, notifies, announcement, forecast, payments and charges</td>
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<tr>
<td>Customer service</td>
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</tbody>
</table>
# INFORMATION, DATA AND FUNCTION IN GASDATAHUB REGARDING RETAILMARKET

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<th>Distribution networks of DSO</th>
<th>Measuring points (City Gate, biogas injection, end user point)</th>
<th>Measured gasvolymes (m³n and kWh) of Daily reading metering site</th>
<th>Biogas injection, measuring data and it’s shipper information</th>
<th>Calorific values (kWh/m³n)</th>
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<td>Retailer</td>
<td>Shipper in each valid measuring point</td>
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<td>Correction rounds</td>
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<td>Energy calculation and results</td>
<td>Instruction and API documentation</td>
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<td>Each month has it’s initial amount per end point (audit trail)</td>
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<td>Balance settlement of Distribution network residual</td>
<td>Information for Balance Settlement</td>
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</table>
PARTY CODES

• Shipper and Traders have to use EIC, European Identification Codes -systems defined party codes EIC-X.
• In Finnish retail market is based on GS1-system’s codes and each party has it’s own GLN-code.
• Transmission System Operator with System Responsibility maintain national party codes
BALANCE RESPONSIBLE INFORMATION

- Acquisitions
- Injection to network
- Import
- Exit Zone
- Surrenders
- Export (Baltic Connector)

**BALANCE GROUP**

**Shipper (EIC-X)** Balance responsible

**ENTRY** per gas delivery day (7-7)

- ∑ Acquisition (Gas Exchange and OTC)
- ∑ Biogas
- ∑ Import Imatra, BC

**EXIT** per gas delivery day (7-7)

- ∑ Energy
- ∑ Surrenders (Gas Exchange and OTC)
- ∑ Export (BC)

**IMBALANCE = ENTRY-EXIT**

Members

- **Shipper 123 Oy EIC-X** IMBALANCE
- **Trader A Oy EIC-X** IMBALANCE
Instruction for Finnish Gas Market Data Exchange and Best Practices

Edig@s-testing (nomination and trade notification) by Shippers

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  Portal phase 2:
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- Nomination Baltic Connector and Imatra 2.12.2019 at 12:00
- Balance information

Demos

5/2019

Distribution Operator can implement gasdatahub to forward data and build integration

Energy and balance calculation (retail market)

6/2019

9/2019

10/2019

11/2019

12/2019

1/2020

Portal phase 1 presented and instruction

Portal Phase 1 implemented

Portal phase 2 presentation

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Standard of nomination and trade notification published

Portal API-interface resources, structure and documentation
Capacity booking

Leena Sivill, Gasum TSO (HansenCX)
Transmission tariff 2020

- TSO received 11 commentaries regarding preliminary transmission tariffs!!
- The target is to publish an answer to commentaries and the final tariff already in the beginning of June but at latest before July as demanded by the Finnish natural gas market act.
Finnish Entry-/Exit-zone

- Virtual entry-point for Biogas
- Domestic exit-zone
- Imatra
- Balticonnector
- LNG injection point
Imatra

- Entry – Following capacity products are offered:
  - Year
  - Quarter
  - Month
  - Day
  - Rest of the day
  - *Flexible year (starting from the next month) + Flexible month (30 days from the next gas day)*

- Firm products offered primarily – additionally interruptible if firm products are sold.

- Nominations are required

- Capacity allocation is done with FCFS (not confirmed by NRA)

- No overrun fee – capacity is allocated as nominated.

- Technical maximum capacity: firm ≈ 220 GWh/d; interruptible ≈ 30 GWh/d
Capacity management in IP’s

- **Technical maximum capacity**
- **Interruptible capacity** – offered only when firm capacities sold
- **Available firm capacity**
- **Booked capacity which is not nominated**

**NOMINATED CAPACITIES**

- Operation of the system

**Kapäsiteetit [MWh/h]**

| 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gas Day D | Gas Day D+1 |
Domestic exit-zone

- Exit - Following capacity products are offered:
  - Year
  - Quarter
  - Month
  - Day
  - Rest of the day
  - Flexible year (starting from the next month) + Flexible month (30 days from the next gas day)

- Shippers book capacity for their exit zone portfolio

- Nominations not required – TSO may ask indicative consumption forecast from big consumers

- Overrun fee applicable – Daily calculation.
Virtual entry-point for a biogas

• Exit - Following capacity products are offered:
  • Year
  • Quarter
  • Month
  • Day
  • Rest of the day
  • *Flexible year (starting from the next month) + Flexible month (30 days from the next gas day)*

• Shippers book entry capacity for their biogas portfolio

• Nominations are not required – allocation is done based on metered volumes.

• Overrun fee applicable – Daily calculation
BOOKING PERIODS FOR DIFFERENT CAPACITY PRODUCTS

Starting D-1 16:00 UTC (wintertime) or 15:00 UTC (summertime);
ending D 2:00 UTC (wintertime) or 1:00 UTC (summertime).

- **Day**: Max. 6 days forward
- **Month**: Max. 2 subsequent months
- **Quarter**: Q1 1.10.-31.12., Q2 1.1.-31.3., Q3 1.4.-30.6., Q4 1.7.-30.9.
- **Year**: 1.10.-30.9.

Opened ends

D-1 by 16 UTC (wintertime) or 15 UTC (summertime).
Balticconnector

Mechanism is currently waiting for an approval from Finnish and Estonian NRAs.

Proposed model:

• Capacity is allocated D-1 implicitly based on confirmed nominations.
• Under congestion nominations are confirmed pro rata.
• A confirmed nomination can only change if a shipper or his counterparty renominate and under exceptional situations (technical capacity is unexpectedly reduced, and the situation cannot be contemplated otherwise than by reducing confirmed nominations).
• If a shipper renominates downwards more than the allowed tolerance, the shipper is subject to an underutilisation fee. This is to be applied only under congestion.

Capacity offering:
- Technical maximum capacity ≈ 80 GWh/d
- In the beginning of 2020: EST → FIN = 28,4 – 39 GWh/d; FIN → EST = 42,2 – 58,5 GWh/d
- Virtual reverse flow allows to maximise commercial flows
- TSOs operational balancing account and linepack flexibility enable flexible market operation
IMPLICIT CAPACITY ALLOCATION BASED ON NOMINATION PROCESS

When shipper has submitted nomination or renomination, with this one ‘button press’ gas quantities and same amount of capacity will be allocated for shipper after TSOs matching process and comparison of confirmed nomination and available capacity → (re)nomination is a trigger which starts the allocation processes of gas quantity and capacity.
Baltic gas exchange

Gintaras Buzkys, GET Baltic
Baltic Gas Exchange
One trading platform for One Finnish - Baltic Gas Market

Gintaras Buzkys
Chief Business Development Officer
Shipper-info event about Finnish open gas market
4th June 2019 (Helsinki)
Key Facts

Relationship with Finland:
- Established in 2012 by „Lietuvos Dujos“ AB and “Gasum” Oy
- Exchange Trading System provided by Hansen Technologies Finland Oy

EU regulation:
- OMP status provided by ACER
- Regulated by ACER and Baltic NRA’s

Services provided:
- Administration of the Baltic Gas Exchange
- Implicit capacity allocation between the Baltic States
- Baltic Gas Spot Index (BGSI) publication
- REMIT and UMM data reporting to ACER

Experts in:
- Energy trading, IT projects management
- EU regulation (REMIT, MiFID II, Network Codes)
- International business development, risk management, sales and marketing
Trading volumes

Yearly volumes 1)

- Traded volumes, GWh
- Traded volumes (forecast), GWh
- Number of transactions
- Number of transactions (forecast)

1) updated on 01.05.2019
Benefits of trading on Regional Gas Exchange

- **One Rulebook for Trading and Settlement**
- **One Access to Finnish - Baltic Gas Market**
- **One Stop Shop for Gas Trading**
- **One Collateral for Trading in All Market Areas**
- **More Counterparties** (100+ Energy Traders)
- **Higher Liquidity** (~60 TWh Regional Market Size)
- **One Virtual Order Book** (Integrated Markets)
## Trading principles from 1st of January 2020

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<th>Details</th>
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<td>Gas day (takes place from day D 7:00 until D+1 7:00)</td>
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<td>▪ Day-ahead (up to 30 days)</td>
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<td></td>
<td>▪ Monthly <em>(longer term products are under investigation)</em></td>
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<td><strong>Trading hours</strong> 1)</td>
<td>▪ SPOT market – 24h/7d</td>
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<td></td>
<td>▪ FORWARD market - from 09:00 to 16:00 (EET)</td>
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<td><strong>Order types</strong></td>
<td>▪ Partial fulfilment</td>
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<td>▪ Full fulfilment</td>
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<td><strong>Trading method</strong></td>
<td>Continuous trading <em>(anonymous)</em></td>
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<td><strong>Capacity allocation</strong></td>
<td>Yes (for WD and DA via ICA model)</td>
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1) Trading session length will be confirmed, once GET Baltic consultation with Finnish – Baltic TSOs will be completed.
## Project roadmap

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<td>1</td>
<td>Assessment of legal environment in Finland</td>
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<td>Public consultation on Market Rules</td>
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<td>3</td>
<td>Finalisation of Technical specification for Trading Platform</td>
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<td>Data exchange agreement with Finnish TSO</td>
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<td>Holiday season</td>
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<td>IT solution development</td>
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<td>Trading Regulation update</td>
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<td>Registration of Market Participants</td>
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<td>Testing of IT systems and data exchange solution</td>
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<td>10</td>
<td>Training Day for Traders'</td>
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<td>Go live</td>
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The Evolution of Finnish - Baltic Gas Hub

- Non-competitive market - 2017 ¹)
- Developing market 2017 ¹) - 2021
- Competitive market 2022 -

Path to maturity

Early stage

1) Finnish gas market will be opened and unbundled from 1st January 2020

Source: “Hubs development ‘path to maturity’” - H.Rogers (OIES)

“There are five main requirements that lead to successful trading: they are **liquidity**, **volatility**, **anonymity**, **transparency** and **traded volumes**”

Patrick Heather, 2015
Thank You

Contact
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