

## **Appendix 1**

**To Business Terms of OTE, a.s.  
For the Gas Sector**

**Revision 15 – September 2018**

**XML MESSAGING FORMATS**

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## 1. USED ACRONYMS

Acronyms and definitions used in Business Terms of OTE, a.s. for the Gas Sector apply for this document. In addition, the following acronyms are used:

<i>Acronym</i>	<i>Definition</i>
<b>ČEPS</b>	ČEPS, a.s., Operator of the Transmission System of the Czech Republic
<b>ČHMÚ</b>	Czech Hydrometeorologic Institute
<b>EDI</b>	Electronic Data Interchange
<b>ENTSO</b>	European Network Transmission System Operators
<b>GMT</b>	Greenwich Mean Time
<b>IDE</b>	SAP module: Intercompany Data Exchange
<b>ISO</b>	International Organization for Standardization
<b>IS-U</b>	Industry Specific Solution of the SAP Information System for Utilities Industry
<b>ST/WT</b>	Summer / Winter Time
<b>MC</b>	Monthly Clearing
<b>PKI</b>	Public Key Infrastructure
<b>POF</b>	Supplementary data for invoicing gas distribution
<b>TSO</b>	Transmission System Operator
<b>GSSO</b>	Gas Storage System Operator
<b>SFVOT</b>	CS OTE module for financial security and clearing of gas and electricity market participants
<b>IM, IMP</b>	Intra-Day Gas Market organized by the market operator
<b>XSD</b>	XML Schema Definition
<b>OS</b>	Obligation to Supply
<b>FMC</b>	Final Monthly Clearing
<b>OT</b>	Obligation to Take
<b>AMQP</b>	Advanced Message Queuing Protocol, a standard defining data exchange through messages for the communication server RabbitMQ

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## 2. INTRODUCTION

This document aims to describe the governing rules for all CS OTE users. The rules are binding for all CS OTE users.

The CS OTE communication server ensures centrally communication with the other parts of the central system and provides support for processes related to the gas market in the following fields:

- registration of gas market participants
- registration of PDT
- registration of imbalance responsibility and change of supplier
- nominations and renominations
- intra-day gas market
- unused flexibility market
- gathering daily, monthly and adjusted monthly data and data aggregation
- calculation of substitute values using LP
- calculation of imbalances (daily, monthly and final monthly)
- financial settlement (daily, monthly and final monthly)
- financial security
- determination of and change in FS limit for IM
- claims and provision of information
- registration and provision of trade data
- trade data reporting

The principles of secure access to data using PKI technology and electronic signature have been applied across the entire CS OTE infrastructure.

Documents describing in detail communication between gas market participants and CS OTE are posted on OTE's public website as follows:

- “D1.4.2G XML Messaging Formats – Gas” and “XSD Templates”  
Documents specify the structure of XML messages and define particular services or transactions directly in relation to the nature of transferred data; the XSD template describes permissible contents of the message and, as a result, allows for review of data correctness.
- “D1.4.3G CS OTE Web Services Interface” and “WSDL Templates”  
The first document is a manual for using the interface of OTE's web services for the gas sector; WSDL template is the standard format for description of web services interface ensuring automatic communication between CS OTE and external market participants' platforms.
- “D1.4.4 CS OTE Automatic Communication Interface”  
The document is a manual for using automatic communication interface, describing the concept of CS OTE security, communication scenarios on IMG, and the methods of automated exchange of information between external entities and CS OTE (communication through SOAP protocol in 1.1, SOAP-Documents type for exchange of XML-structured data and SMTP communication using S/MIME messaging for XML and for other types of documents). One participant may combine using more communication channels (with respect to certain restrictions).
- “D1.5.1 CS OTE External Interface – Message Formats for IM”  
The document describes for external participants linking OTE's new IM to their systems through the AMQP server, including the structures of specific XML messages and communication scenarios.

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The aforementioned documents may change on the basis of amendments to applicable legislation and on the basis of immediate needs of markets participants. If any of the foregoing documents is updated, OTE shall post the updates on OTE's website at least one month before the relevant updates come into effect for a minimum of 10 business days so that market participants can contribute their comments, whereas all market participants and ERO are notified about the changes. The final version of the document is also posted for market participants for 10 business days prior to implementing the changes in the OTE system.

### 3. RULES OF COMMUNICATION

OTE, a.s. in its role of gas market operator maintains communication with market participants in the following fields:

Market participant	Information provided
Transmission system operator	<ul style="list-style-type: none"> <li>• Transmission nominations</li> <li>• Allocation at entry and exit points of the transmission system</li> <li>• Reserved capacity at PDT with A-type metering</li> <li>• Consumption data at PDT connected to the transmission system</li> <li>• PDT registration</li> <li>• Inputs (approval) in the process of change of supplier</li> </ul>
Distribution system operator	<ul style="list-style-type: none"> <li>• Distribution nominations</li> <li>• Allocation at cross-border gas pipes</li> <li>• Data on natural gas consumption and production in the relevant domestic zone</li> <li>• Registration of points of delivery</li> <li>• Reserved capacity at PDT with A and B-type metering</li> <li>• Inputs (approval) in the change of supplier process</li> </ul>
Gas storage system operator	<ul style="list-style-type: none"> <li>• Storage nominations</li> </ul>
Balance Responsible Party	<ul style="list-style-type: none"> <li>• Nominations of obligations to supply / take</li> <li>• Transmission nominations</li> <li>• Distribution nominations</li> <li>• Storage nominations</li> <li>• Gathering information on gas settlement results</li> <li>• Bids on organized short-term markets</li> <li>• Gathering information on results of trading on organized short-term markets</li> <li>• Bids on the unused flexibility market and gathering information on the results of trading on this market</li> <li>• Inputs (approval) in the change of supplier process</li> <li>• Registration of imbalance responsibility</li> <li>• Obtaining documentation for OTE's financial settlement</li> <li>• Registration and provision of trade data</li> <li>• Trade data reporting</li> </ul>
Registered market participant – gas supplier	<ul style="list-style-type: none"> <li>• Initiation and inputs in the change of supplier process</li> <li>• Gathering data for billing end customers for gas</li> <li>• Registration of imbalance responsibility</li> </ul>

In addition, CS OTE communicates with the following entities:

LP administrator	<ul style="list-style-type: none"> <li>• Submission of updated LP values</li> <li>• Collection of statistical data on LP application</li> </ul>
ČHMU	<ul style="list-style-type: none"> <li>• Submission of air temperature data (for LP application)</li> </ul>
ACER Agency	<ul style="list-style-type: none"> <li>• Trade data reporting</li> </ul>

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Data between OTE and market participants are transferred via:

- **Interactive interface,**  
where participants access OTE's secure website through which they can send data and receive the results of processes supported by CS OTE, and access IM through application,
- **Automatic communication,**  
where participants submit and receive data through the SOAP automatic communication system allowing for connecting the market participant with the CS OTE communication server access IM through AMQP – supporting platform; all data is transferred in agreed upon standardized formats.

A list of all messages sent via external interface of the CS OTE system is included in document “D1.4.2G XML Messaging Formats – Gas”. For the use of messaging in formats specified in this document rules apply as follows:

- Registered market participants are marked by means of ENTSO EIC (16) coding - codes are allocated by ČEPS,
- PDT are marked by means of ENTSO EIC (16) coding; codes are allocated by OTE or the transmission system operator and distribution system operators on the basis of a subclass allocated to them,
- messages containing interval data must cover an entire day (24 hours – except for the switch from ST to WT and back)
- should any adjusted data need to be resent, the new message must contain all data of the original message (when processing the data, the previous message as a whole is not taken into account),
- one data exchange (a data file with a message) must contain only one message type,
- all input messages serving to distribute instructions via the WAS portal for handling trading data are allocated a time identifier against which request validity assessment is performed (time of allocating the WAS server time depends on the type of channel through which the message was sent - HTTPs or SMTP or web interface for interactive work via user interface and the web browser).

Automatic communication formats are based on the XML communication protocol using EDIGAS v4.0 standard and XML under OTE specification and XML for AMQP communication under specification for IM.

The EDIGAS v4.0 (XML) format is used in automatic communication external interface for the following processes:

- submission of nominations (messages NOMINT, NOMRES, SHPCDS),
- submission of allocations (message ALOCAT),
- provision of metered data to the distribution system operator and by the transmission system operator (message GASDAT),
- provision of the results of imbalance settlement (message IMBNOT),
- provision of information about receiving or rejecting sent data (message APERAK),
- submission of information on balancing actions (BALACT).

XML messages for AMQP communication are defined only for IM.

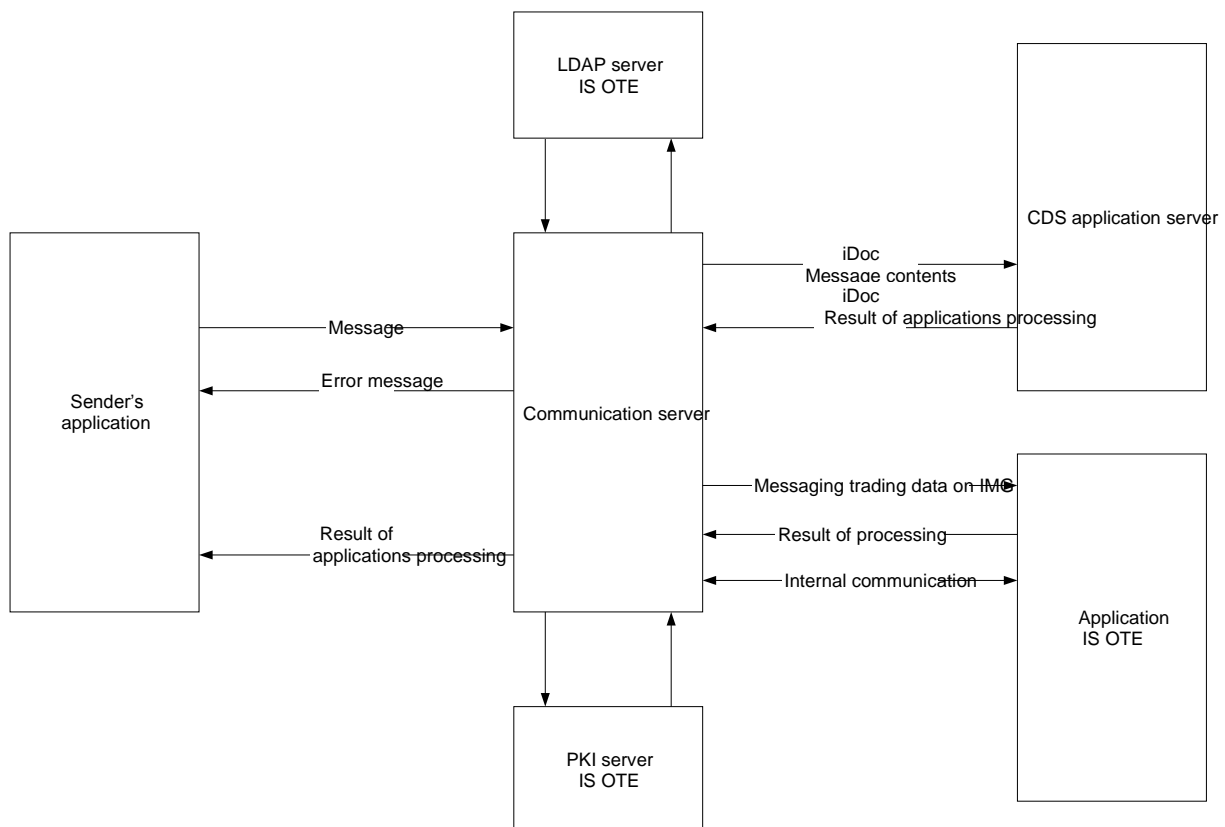
The use of formats in processes is designed in compliance with EDIGAS standards or with the application of these standards for communication scenarios corresponding to the market operator's position (the scenarios described for the EDIGAS standard primarily do not cover the role of an

independent market operator). It is assumed that the ENTSO-G organization shall continue to support the EDIGAS (XML) format as the communication standard for the gas market.

XML format messaging under OTE specification is used for communication in fields that are not supported by the EDIGAS standard, i.e. the following processes:

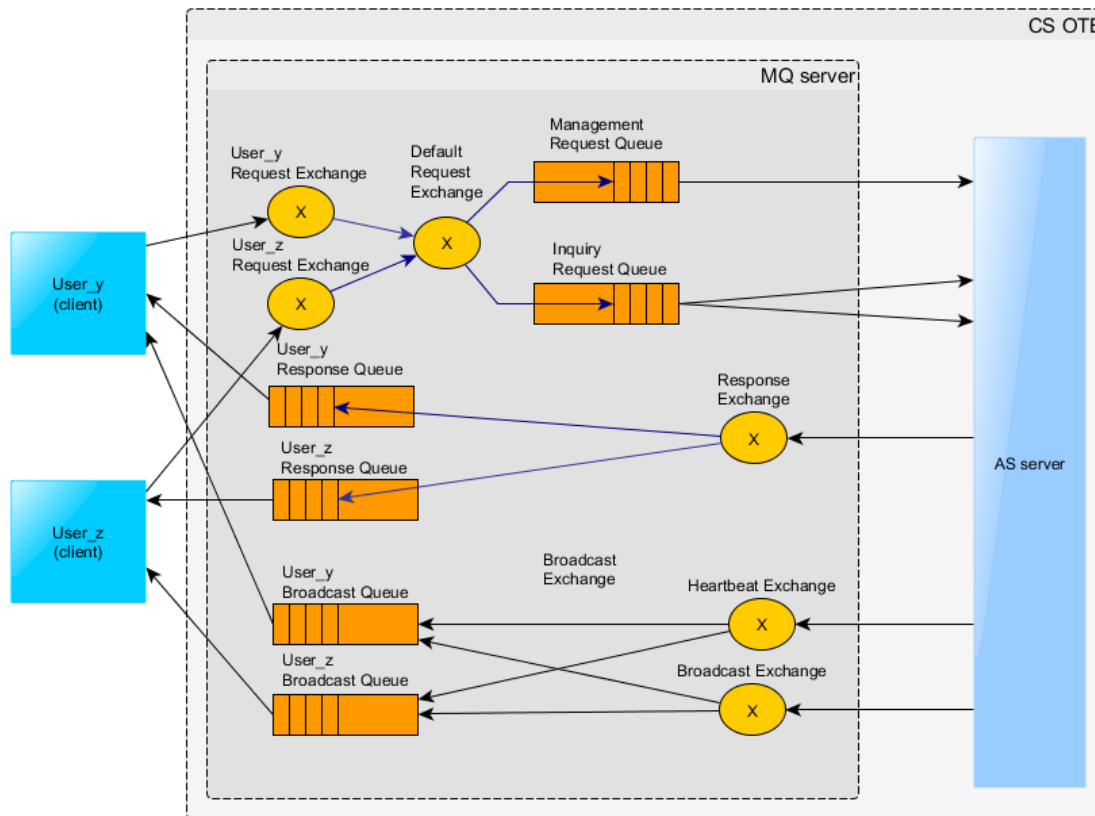
- registration of PDT,
- change of supplier,
- trading on the organized short-term gas market,
- document for OTE's financial settlement,
- filing of claims,
- inquiries about CDS data,
- transfer of documents for invoicing gas distribution.

Communication standards designed and administered by OTE, a.s. (XML format under OTE specification) are based on OTE's standards for the electricity market; special templates are used for the gas market.



**Scheme 1 – Basic principle of messaging**





**Schema 2 – Connection to MQ server and system of messages**

Messaging between market participants’ systems is automated and takes place in the following steps:

1. the market participant sends a message to CS OTE; the message may contain either particular data for processing in CS OTE or, conversely, a request to receive data from CS OTE;
2. the message is received through the CS OTE communication server; the sender’s electronic signature is verified against CS OTE LDAP server and PKI server decodes the message;
3. the CS OTE communication server checks the message syntax; in the event an error is detected in the previous steps a system error report is sent;
4. if the check finds no errors, in the event of asynchronous processing the CS OTE communication server passes the message on to the CDS respective application for additional processing;
5. in the event of synchronous processing the CDS application server processes the data and returns the result of processing to the CS OTE communication server for sending back; the result may be confirmation of receiving data in CDS or requested data from CDS, or an error report;
6. the CS OTE communication server encodes the response and signs and sends it back through the selected channel to the defined address.

The use and specification of time zones is governed by the ISO 8601 standard. In legitimate cases the template of the EDIGAS standard was modified to meet the processing requirements of the national environment.

For date and time formats it applies that

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- date and time are entered in local time (for all messages except messages for IM)
  - date and time are entered in UTC (only for messages for IM)
  - periods are marked with the time of the beginning and end of the particular period

#### Date and time entered in local time

The header of an XML message in DATA format always contains in the *date-time* attribute the date and time of the message in YYYY-MM-DDTHH:MM:SS format, or YYYY-MM-DDTHH:MM:SS+HH:MM format, including an off-set showing the difference between the message date and time and GMT (for data filed in ST it applies that the time-offset=+02:00, for data filed in WT it applies that the time-offset=+01:00); if no off-set is entered, the input value is interpreted as GMT time.

#### Date and time entered in UTC

Date entries are defined as "DateTime". The format of these entries in XML message is YYYY-MM-DDThh:mm:ssZ where Z marks the zero time zone (UTC).

#### Periods

The beginning of the day is defined as 06:00:00 hours, the end of the day is defined as 06:00:00 hours of the following day.

The time interval of value validity corresponds to the entire period for which the data is sent, i.e. the date "from" is the first gas day of the relevant period, including the time and off-set; and the date "to" is the last gas day of the relevant period, including the time and off-set (the meaning of data items is the date from/to INCLUSIVE). For instance, data for January 2011 are sent with the "from" date = 2011-01-01T06:00+01:00, and the "to" date = 2011-02-01T06:00+01:00.

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## 4. XML MESSAGING FORMATS UNDER EDIGAS STANDARD

In selected fields messages under the EDIGAS v4.0 standard are used for communication with CS OTE (with the exception of the SHPCDS and BALACT formats that are not part of standard EDIGAS formats).

These formats include:

- **GASDAT** – for submission of preliminary and metered data, gas calorific value, own losses, accumulation change
- **ALOCAT** – for submission of allocations
- **NOMINT** – for sending and forwarding nominations of all types and for sending bids on the unused flexibility market
- **NOMRES** – for sending and forwarding confirmation of nominations of all types and for confirmation of bids on the unused flexibility market
- **IMBNOT** – for submission of all types of imbalances to balance responsible parties (relevant versions) and unused flexibility (based on the msg\_code of the inquiry, a corresponding set of data is transferred)
- **APERAK** – for notification about the result of validation and receipt of the message by the recipient (received or error)
- **SHPCDS** – for sending a list of shipper codes by specific operators to OTE, the list defines admissible coupling of shipper codes for selected PDT, BRP and direction; the template uses solely data types used in standard messages
- **BALACT** – for sending data on intended issuing of instructions and on undertaking a balancing action by the transmission system operator

Document “D1.4.2G XML Messaging Formats – Gas” lists activities for which particular messaging formats are used, including a code list used in selected messages for some attributes in order to curtail permitted values. Possible communication scenarios are assigned to each field, along with mapping of data for message attributes. Each format refers to a XSD template (mandatory fields and list of permitted values may differ from the standard), and comes complete with examples. For selected messages additional code lists are used for some attributes in order to curtail permitted values.

Code lists and modified data types are saved in the XSD template. The template also contains CODE-LISTS-CDS and CORE-CMPTS-CDS files in .xsd format and permitted product combinations for sending to CS OTE of metered data (interval and non-interval metered data of supply and consumption) and other data (accumulation change, projected monthly and annual consumption, projected and metered own losses, distribution and transmission capacity and gas calorific value).

Within the scope of OTE activity transmission, distribution and storage nominations are processed, and nominations of the obligation to supply (OS) and the obligation to take (OT), and registration of unused tolerance transactions (as a specific subtype of OS/OT nominations). Communication scenarios are designed for

- sending metered data using the GASDAT (Gasdata) message, sending allocation using the ALOCAT (Allocation) message – schema of metered data transfer by DSO, TSO – according to type of metering, and schema of other data transfer,
- transmission, distribution and storage nominations,
- nominations of the obligation to supply (OS) and the obligation to take (OT)
  - subtypes of nominations of bilateral contracts of BRP,
  - subtype of nominations from OTE’s intra-day market,
  - subtype of nominations of the balancing service between TSO and BRP,
  - subtype of nominations of BRP’s daily imbalance quantity between BRP and OTE,

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- subtype of nominations of the balance of BRP's daily imbalance quantities between OTE and TSO,
  - subtype of nominations of the settlement of BRP's aggregate account of imbalances during the state of emergency between BRP and OTE,
  - subtype of nominations of the settlement of BRP's aggregate accounts of imbalances during the state of emergency between OTE and TSO,
  - subtype of nominations from the unused flexibility market,
  - code list of shipper codes.

#### Rules for sending and receipt of nominations

- only RMPs that have registered "Gas nomination" activity (typically BRPs) may nominate,
- OTE receives from RMPs OS/OT nominations, transmission, distribution and storage nominations,
- OTE receives transmission, distribution and storage nominations from relevant operators that have received nominations directly from the RMPs,
- if the RMP sends identical transmission, distribution and storage nomination to both OTE and the operator, the nomination received in the OTE system as last according to the time identifier of nomination receipt is used for processing,
- OTE confirms only nominations of those RMP that have sent their nominations directly to OTE.

Data in the CS OTE system required for calculation of imbalances can be provided with version identification depending on for what version of settlement is the data applied (daily, monthly and adjusted monthly values).

Upon sending data by the DS or TS operator, the data version need not be specified since the specification is performed in CDS. A request for specific data version is specified in the data inquiry. The code list for marking (identification/specification) of versions for particular messages (GASDAT, ALOCAT) is included in document "D1.4.2G XML Messaging Formats – Gas".

For numerical data in EDIGAS standard it applies that

- it is entered without spaces and separators of thousands, e.g.: 25000000
- initial zeros are not permitted, e.g.: 02
- values never carry a sign; other attributes than sign serve to determine direction (+ / -)

Roles in EDIGAS standard – transmission, distribution and storage:

- SZ - ZSH = Shipper
- PPS, PDS, PZP - ZSO = System Operator
- PDS - ZRO = Regional Grid Operator (GASDAT nad ALOCAT messages only)
- OTE - ZSX = Balance Area Operator
- External consumer/supplier, contract for storage, reserved storage capacity - ZES = External Shipper

Roles in EDIGAS standard – obligations to supply and take

- SZ - ZHC = Exchange Trader

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- OTE - ZSX = Balance Area Operator

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## 5. XML MESSAGING FORMATS UNDER OTE SPECIFICATION

Descriptions of particular formats are included in document “D1.4.2G XML Messaging Formats – Gas”. Each format description comprises brief characteristics, an overview of format usage, method of meeting the requirements for separate message attributes – meeting particular attributes and references to XML schema (\*.XSD), plus examples. Each type of message is uniquely identified through `msg_code`, which determines the nature of the message and the method of processing it.

For communication with CS OTE in the gas industry the following XML messaging formats are used:

- **CDSGASCLAIM** – for sending data on OTE’s claims and messages (message bulletin board) for market participants,
- **CDSGASPOF** – for sending supplementary data for DSO’s invoicing of distribution services to gas trader,
- **CDSGASREQ** – for requesting a document / message from CDS,
- **CDEDIGREQ** - for requesting a document / message from CDS, which is sent in a format under EDIGAS standard,
- **COMMONGASREQ** – for requesting asynchronously processed messages, for verification of connection with CDS and for sending a request for transfer of unsent messages,
- **CDSGASMASTERDATA** - for exchange of information about PDT between market participants and CDS; this message has various functions defined by the functionality code in the message head,
- **GASRESPONSE** – for confirmation of data exchange between market participants and CDS or CS OTE,
- **CDSGASTEMPERATURE** – for sending average daily temperatures from ČHMU to CDS,
- **ISOTEDATA** – for exchange of data related to CS OTE transactions on the organized gas market between BRP and CS OTE,
- **ISOTEMASTERDATA** - for sending the core data structure of CS OTE,
- **ISOTEREQ** - for requesting document / message related to CS OTE transactions on the organized short-term gas market between BRP and OTE,
- **SFVOTGASBILLING** - for sending financial reports from the SFVOT module - Documents for invoicing,
- **SFVOTGASBILLINGSUM** - for sending financial reports from the SFVOT module - Documents for invoicing with summary information for the inquired period - MC summary,
- **SFVOTGASCLAIM** - for sending financial reports from the SFVOT module - Overview of payments and claims,
- **SFVOTGASCLAIMSUM** – for sending financial reports from the SFVOT module – Overview of payments and claims with summary information about FMC for the inquired period,
- **SFVOTGASTDD** – for sending financial reports from the SFVOT module – Settlement of differences arising from LP method application,
- **SFVOTGASTDDNETT** - for sending financial reports from the SFVOT module- part Netting
- **SFVOTLIMITS** - for sending information about BRP’s overall financial limit,

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- **SFVOTGASREQ** - for requests for sending financial reports from SFVOT modules - part Gas,
  - **SFVOTREQ** - for requests for sending financial reports from SFVOT modules - common part for Electricity and Gas,
  - **SFVOTSETTINGS** – serves for determining the FS limit on IM,
  - **SFVOTLIMITCHANGE** – serves for notifications about change in FS limit on IM.

Some formats (e.g. **ISOTEDATA, ISOTEMASTERDATA, ISOTEREQ, RESPONSE**) are parallelly used for the electricity commodity, therefore comprise components (msg\_codes) that are of no use for the gas commodity.

Global XSD templates comprise data types definition of which would repeat in separate messaging formats. Singling them out reduces the length of the definition and facilitates maintenance. Particular formats refer to such data types. These types are common for the gas and electricity commodities.

- **OTE\_GLOBALS** – comprises data type common for all or most formats
- **XMLDSIG-CORE-SCHEMA** – comprises definition for electronic signature

For numerical data in XML formats under OTE specification it applies that

- it is entered without spaces and separators of thousands, e.g.: 25000000
- the separator of decimals is comma (.), e.g.: 3.14
- incomplete notation is not permitted, e.g.: .5 or 2.
- initial zeros are not permitted, e.g.: 02
- positive values carry no sign, e.g.: 112
- negative values always carry the minus (-) sign immediately before the first numeral, e.g.: -112
- zero value may not carry any sign, e.g.: 0

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## 6. XML MESSAGING FORMATS UNDER RABBIT MQ SPECIFICATION

The communication server Rabbit MQ communicates through the AMQP. It is an open standard for the communication layer of applications working on the basis of data exchange through messages. Its implementation is performed through the MQ server RabbitMQ, version 3.6.x.

The first step is to establish a connection to the MQ server. A participant's client certificate registered in CS OTE system is required to establish the connection.

Communication channels are created on the basis of the connection. These channels are linked with individual participants' "queues" serving for mutual communication between the client and the server.

For the Client – MQ server communication, two basic types of communication are used:

- **Request-Response** – requests initiated by the client to which the MQ server responds asynchronously. The response is sent only to the communication initiator.
- **Mass Message (Broadcast)** – mass message distribution from the MQ server to clients. The distribution is performed on the basis of defined distribution rules and access rights. The system provides two basic types of mass messages:
  - Market data messages – messages about change in trade data and change in market status. Messages are distributed to all logged-in users who have requested permission for the relevant markets.
  - Heartbeat messages – messages for verification of active connection with the client.

The communication server MQ uses the following types of messages for communication with CS OTE:

- Login Request (LoginReq) – request to log into the system.
- User Report (UserRprt) – response to "Login Request"; it is also distributed for change in the configuration of the user's assignment to products.
- Logout Request (LogoutReq) - request to log the user out of the system.
- Logout Report (LogoutRprt) – message about a user logout from the system sent as a response to "Logout Request" or as a mass message due to a competitive login of the same user with forced login.
- Acknowledgement Response (AckResp) – message confirming receipt of an instruction for processing.
- Error Response (ErrResp) – error message distributed in case of an unsuccessful execution of an instruction/a request.
- Order Entry (OrdrEntry) – submission of one or more bids.
- Order Modify (OrdrModify) – message for a modification of one or more bids.
- Order Request (OrdrReq) – request for status of own bids.
- Order Execution Report (OrdrExeRprt) – message about a successful bid modification.
- Modify All Orders (ModifyAllOrdrs) – message for mass activation, deactivation and cancellation of bids.



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- Public Order Books Request (PblcOrdrBooksReq) – request for notice board of the requested contract.
  - Public Order Books Response (PblcOrdrBooksResp) – public information on current bids of the relevant contract. The message is distributed as a response to “Public Order Book Request”.
  - Public Order Books Delta Report (PblcOrdrBooksDeltaRprt) – message sent for a bid entry or an active bid change. The message contains all modified bids since the previous distribution of PblcOrdrBooksDeltaRprt for the relevant contract.
  - Message Request (MsgReq) – request for trading system messages that were generated by the trading system in the past.
  - Message Report (MsgRprt) – message from the trading system sent as a response to “Message Request” that are further distributed when a new message is generated in the trading system.
  - Trade Capture Request (TradeCaptureReq) – request for own trades.
  - Trade Capture Report (TradeCaptureRprt) – message about initiation of a trade sent to both parties to the trade; for each party only the respective part of the trade is filled. The message is also sent as a response to “Trade Capture Request”.
  - Public Trade Confirmation Request (PblcTradeConfReq) – request for public information on initiated trades.
  - Public Trade Confirmation Report (PblcTradeConfRprt) – message about initiation of a trade. The message is distributed to all users assigned to the contract under which the trade was initiated. The message is also sent as a response to “Public Trade Confirmation Request”.
  - Contract Information Request (ContractInfoReq) – request for a contract.
  - Contract Information Report (ContractInfoRprt) – information on contracts. The message is distributed in the event of change in a contract attribute or as a response to “Contract Information Request”.
  - Product Information Request (ProdInfoReq) – detailed information on a product as a response to “Product Information Request”.
  - Market State Request (MktStateReq) – current information about the market trading status. The message is distributed in the event of change in the market status and also as a response to “Market State Request”.