EASEE-gas

European Association for the Streamlining of Energy Exchange - gas

Common Business Practice

Number: 2023-001/01

Subject: Hydrogen units

Approved: 23 November 2023

Summary

This CBP defines the units to be used in the market processes contracting, nomination, balancing, allocation for hydrogen.

About EASEE-gas

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Version List

Number/ Version	Approved	Implementation date
(2023-001/01)	2023-11-23	Tbd

Reference List

Reference	Document name	Version
CEN/TS 17977	CEN/TS 17977, *Gas infrastructure - Quality of gas - Hydrogen used in rededicated gas systems*	

Common Business Practice 2023-001/01 "Hydrogen units"

1.1 APPLICATION AREA

This CBP defines the recommended units to be used in the market processes contracting, trading, nomination, balancing and allocation for hydrogen (non-blended with natural gas, see Note 1) flowing through dedicated hydrogen systems.

Note 1: This CBP is not applicable to blends of hydrogen and natural gas.

1.2 HYDROGEN UNITS TO BE USED IN MARKET PROCESSES

The proposed units in this CBP are based on an internal analysis conducted by EASEE-gas in which the different possibilities were ranked. A brief explanation on the units taken into consideration and the aspects on which the ranking is based can be found in the explanatory notes section.

Unlike the units used in natural gas market processes, the determination of the energy content of hydrogen is **only** based on the energy content of the hydrogen molecules present which means the energy content of all other components is not taken into account.

The gross calorific value of hydrogen is calculated at a reference combustion condition of 15 °C, a volume reference temperature of 15 °C and a volume reference pressure of 1,01325 bar.

Note 2: These reference conditions are used in CEN/TS 17977, "Gas infrastructure - Quality of gas - Hydrogen used in rededicated gas systems"

The units that have been agreed upon for this CBP are given in the table below.

Property	Unit
Transmission capacity	kWh/h (H_2)
Energy quantity	kWh (H_2)
Transmission fee	EUR/(kWh/h) (H_2)/y

Note 3: It is noted that in some countries a formal approval is required from the legal metrology authorities before implementation of the in this CBP proposed method is allowed.

1.3 EXPLANATORY NOTES

1.3.1 INTRODUCTION

(Natural) gas is traditionally used as an energy source and all market facilitating transactions, i.e. contracting, nominating, allocating and balancing are based on energy flow. In the determination of the energy content the contribution of **all**

combustible components is taken into account based on their gross calorific value.

Hydrogen is traditionally used as a feedstock, as an energy source and it has the possibility to store "green electricity". Feedstock users are **only** interested in the hydrogen molecules and classify the hydrocarbons and/or inerts present in the hydrogen as **unwanted** components that need to be removed before using the hydrogen.

1.3.2 ENERGY CONTENT OF COMPONENTS TAKEN INTO ACCOUNT

The two options to be considered in the determination of the energy content of hydrogen are:

- The contribution of all combustible components (total share)
- The contribution of only the hydrogen molecules present (hydrogen share)

Both options have specific advantages and disadvantages and were ranked on four properties: Acceptance by end users, future-proof, impact on system operations and cost allocation.

The results of this ranking are presented in the table below.

Property	Total share	Hydrogen share
end user acceptance	Match between end user measurement (all components) and TSO measurement	Mismatch between end user measurement (all components) and TSO measurement (only hydrogen) but is explainable
Future-proof	In delivery contracts, no incentive for producing hydrogen with higher purity and even a risk for adding additional combustible components (at the production site or even downstream on the network)	In delivery contracts, an incentive for producing hydrogen with higher purity and no risk on adding additional combustible components
Transmission fees	All combustible products are settled (allocation)	Only hydrogen quantities are settled (allocation).
	Transmission fees based on all combustible products (like for natural gas).	Transmission fee only based on hydrogen (Allocating of transmission costs based on the total amount of hydrogen transmitted).
Facilitating certification	The amount of all combustible components are taken into account	Only the amount of hydrogen present in the gas is taken into account

++ / no risk
+ / low risk
- / high risk

Note 4: Regarding facilitating certification: The traceable certificates will most likely contain only the produced amount of hydrogen. The advantage of only charging hydrogen in the commercial model is that there is a one-to-one relationship between the nominations and the value on the certificate.

Preference is given to the option "Hydrogen share" based on the ranking. Main drivers for this preference are:

- the correct cost allocation to the end users;
- the incentive for producers to strive for higher hydrogen purity level;
- the avoidance of blending other combustible products into the hydrogen.

1.3.3 BASIS USED FOR THE UNIT

The three options to be considered as a basis for the unit used for the hydrogen are:

- Mass
- Volume
- Energy

All three options have specific advantages and disadvantages and were ranked on two properties: Acceptance by end users and future-proof.

The results of this ranking are presented in the table below.

Basis	End user acceptance	Future proof
Mass (kg)	The market for chemicals mostly uses mass but gas and electricity are traded on energy basis	From the point of view of physical system integration of electricity and gas market, using mass is not desirable.
Energy (kWh)	Hydrogen energy (only consider the hydrogen content) could confuse end users and result in questions and / or measurement complaints. (Risk can be mitigated by information provision)	In the long term, the hydrogen market is expected to be closely integrated with the electricity market.
		The current gas market messages can be used without modifications
Volume (m^3)	Volume units are not relevant for hydrogen customers.	Volumes depend on chosen pressure and temperature conditions
		From the point of view of physical system integration, using flow is not desirable for the future

++ / no risk
0
- / high risk

Preference is given to the option "Energy (kWh)" based on the ranking. Main driver for this preference are:

- the expected integration of the energy markets, especially the electricity and hydrogen market;
- the possibility to use the current market messages (contracting, nomination, balancing and allocation) for (natural) gas without modification;

- the experiences gathered by the stake holders and regulatory authorities of the gas market.