15th meeting
of ECDSO–g Coordination Platform

17 May 2023, Tbilisi

Role of DSOs in decarbonization

Karolina Čegir, Senior Gas Expert, Energy Community Secretariat

EU Green Deal

The first climate-neutral continent

by 2050

At least 55% less

net greenhouse gas emissions by 2030, compared to 1990 levels

3 billion

additional trees to be planted in the EU by 2030

Decarbonisation =

Non-fossil fuels =

Non-fossil gas =

Renewable gases, synthetic gases =

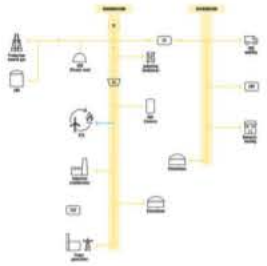
Biomethane, hydrogen

Energy transition =

Energy systems changes

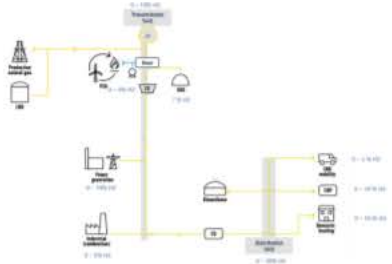
Gas systems

Today



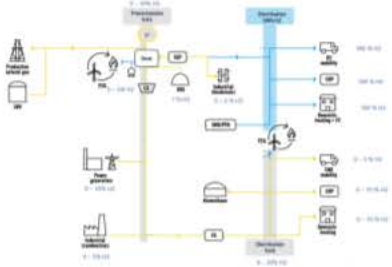
Short-term/Mid-term*

Delivering H2NG at TSO and DSO levels

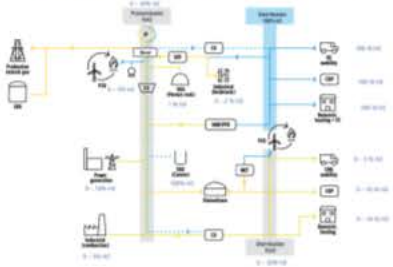


Delivering NG and H2 at TSO level and H2NG at DSO level

Delivering H2NG at TSO and DSO level, plus H2 at DSO level

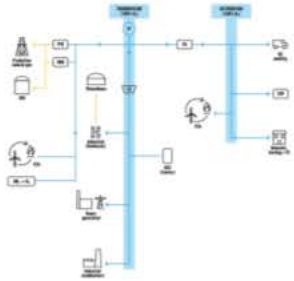


Delivering H2NG at TSO and DSO level, and H2 at DSO and TSO level

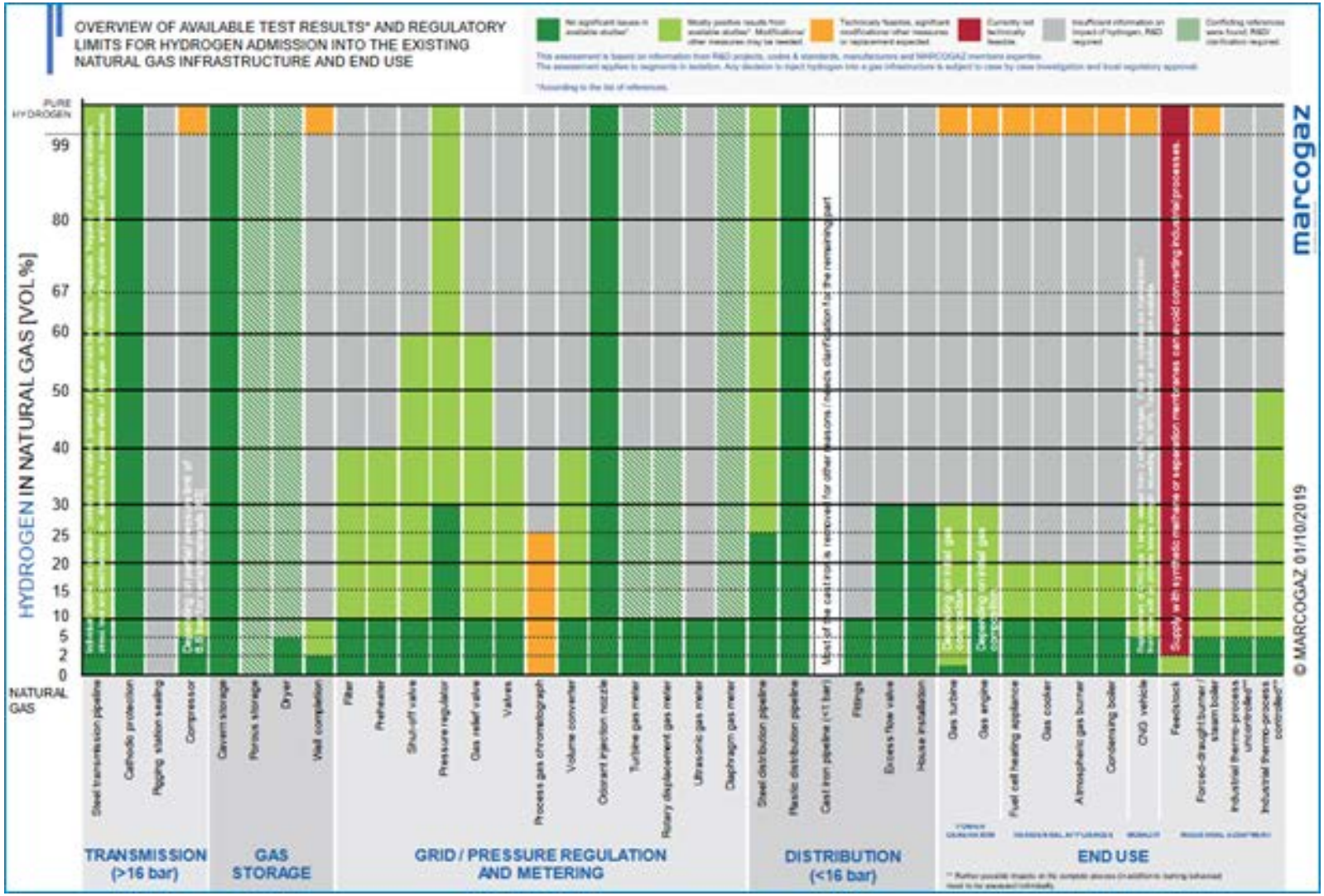


*They could be combined depending on region's requirements

Long-term*



Note: In some regions, the injection on H2 could be switched to H2 backbones. The NG demand is expected to decrease


OVERVIEW OF AVAILABLE TEST RESULTS* AND REGULATORY LIMITS FOR HYDROGEN ADMISSION INTO THE EXISTING NATURAL GAS INFRASTRUCTURE AND END USE
HYDROGEN IN NATURAL GAS [VOL %]
PURE HYDROGEN
99
80
67
60
50
40
30
25
20
15
10
5
2
0
NATURAL GAS
TRANSMISSION (>16 bar)
GAS STORAGE
GRID / PRESSURE REGULATION AND METERING
DISTRIBUTION (<16 bar)
END USE
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New gases - Gas quality issues

Natural Gas

CH_4 80-95%
CO_2 1-2%
N_2 1-5%
O_2 10-100 ppm
H_2 traces
S 5,5 mg/m^3

Component	Agricultural waste	Landfills	Industrial waste
Methane CH_4	50–80	50–80	50–70
Carbon dioxide CO_2	30–50	20–50	30–50
Hydrogen sulphide H_2S	0.70	0.10	0.80
Hydrogen H_2	0–2	0–5	0–2
Nitrogen N_2	0–1	0–3	0–1
Oxygen O_2	0–1	0–1	0–1
Carbon monoxide CO	0–1	0–1	0–1
Ammonia NH_3	Traces	Traces	Traces
Siloxanes	Traces	Traces	Traces
Water H_2O	Saturation	Saturation	Saturation

Biogas

1 cal = 4,19 J	
1 PJ = 3,6 TWh	
1 kWh = 3,6 MJ	
1 MJ = 0,2778 kWh	

kWh….Energy Units = solution for all?

Wobbe Index (WI or I_W)

the combustion energy output

$$I_W = \frac{V_C}{\sqrt{G_S}}.$$

V_C: High calorific value

$\sqrt{G_S}$: Specific gas gravity

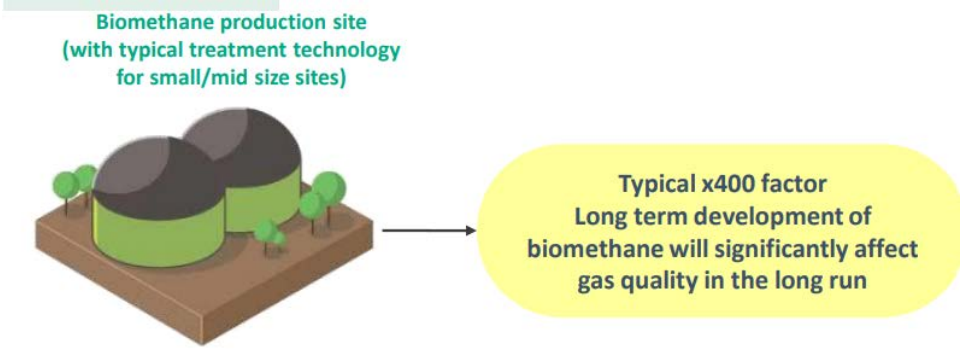
$$G_S = \frac{\rho_{STP}}{\rho_{air,STP}} = \frac{M}{M_{air}}$$

Blending
2% 10%.....100%

Reaction with sulphur…

Hydrogen

Biomethane gas quality



H2S treatment requires oxygen injection for an efficient operation of activated carbon. Residual oxygen content generally lies between **1000 and 4000 ppm mol**

BUT:

Oxygen in UGS?
"Oxygen unfriendly" specific industrial customers?

Issue of:

Fluctuation in biomethane production
Tracking gas quality along the route
Biomethane at interconnection points

Oxygen decrease:
Additional costs for biomethane producers

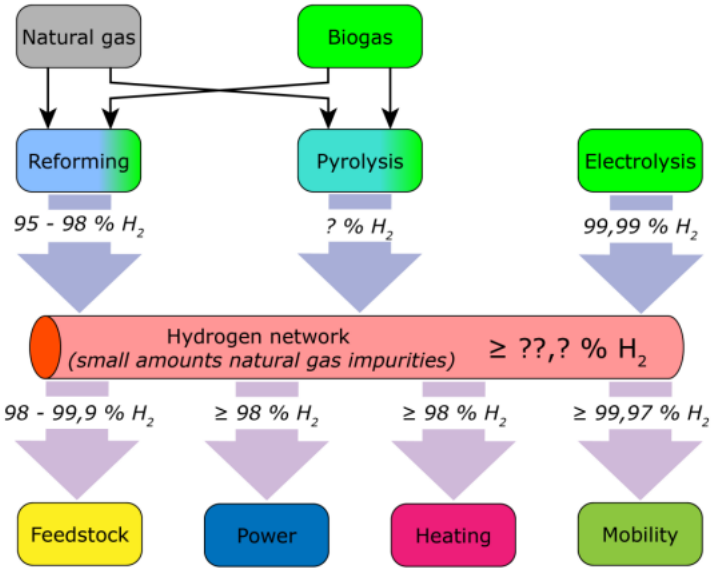
Or

Oxygen increase:
Change of national, and international gas standards

Source:ENTSOG PM WS 2022

Hydrogen gas quality

Hydrogen specification
Challenges to be solved



Draft Technical specification

CEN TC 234/WG11: Hydrogen used in rededicated gas systems

Origin	Component / Physico-chemical Property	Value
H_2 Generation	Hydrogen	≥ 98 mol-%
	Sum of Inerts (e.g. N_2, He, Ar)	≤ 2,0 mol-%
	Carbon Monoxide (CO)	≤ 20 µmol/mol
	Carbon Dioxide (CO_2)	≤ 20 µmol/mol
	Ammonia	≤ 13 µmol/mol
	Halogenated compounds	≤ 0,05 µmol/mol
Ubiquitary	Water	≤ 249 µmol/mol @ MOP ≤ 10 bar
		≤ 62 µmol/mol @ MOP > 10 bar
	Oxygen	≤ 1 mol-%
		≤ 0,001 mol-% if attached to UGS
NG Infra	Hydrocarbon dew point (HCDP)	≤ -2 °C @ 1 ≤ p ≤ 70 bar
	Gaseous Hydrocarbons	≤ 2,0 mol-%
	Total sulfur (*non-odorised hydrogen)*	≤ 7 µmol/mol
	Particulate concentration	Technical free
	Wobbe-Index (*min: 2% N_2, max: 100% H_2*)	40,09 – 45,88 MJ/m³ (15,15)
	Upper heating value (*min 2% N_2, max: 2% CH_4*)	11,86 – 12,10 MJ/m³ (15,15)

Hydrogen shall not contain solid, liquid or gaseous material that might interfere with the integrity or operation of pipes or any gas appliance

Source:ENTSOG PM WS 2022

New gases - Technical issues

Producers:
Size
Location
Source

Variety of **users:**
Transport
Heating
Electricity production
Chemical industry….

Safety issues

Impact to
pipe materials
meter devices
turbines
compressors
Boilers
Liquefaction / Compression
Specific consumers….

New gases - Market / Regulatory issues

Producers of green hydrogen = gas producers? Storage of electricity?

All colors of hydrogen

Injections to network / storage

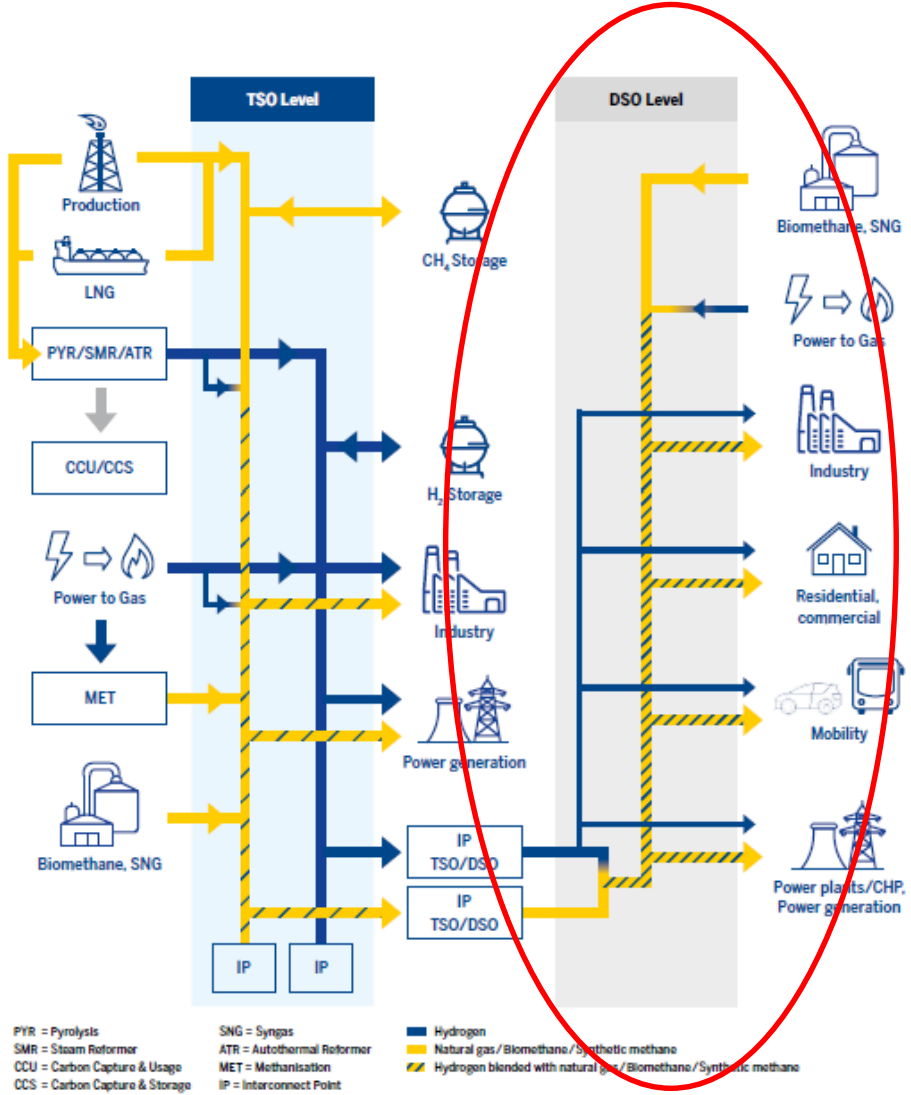
network balancing

Role of system operators/producers

DSO-TSO relationships

Proof of sustainability

Guarantees of origins



Transmission - distribution

Injections to a distribution network

Distribution network balancing

Role of DSOs

DSO-TSO relationships

Gas Package amendments

Hydrogen and natural gas

Blending? 100% hydrogen? When?

New infrastructure? Repurposing?

Infrastructure developments – TEN-E revision (PCI/PECI/PMI)

New operators? New institutions?

In the EU adoption procedure / in the EnC Decarbonisation Roadmap