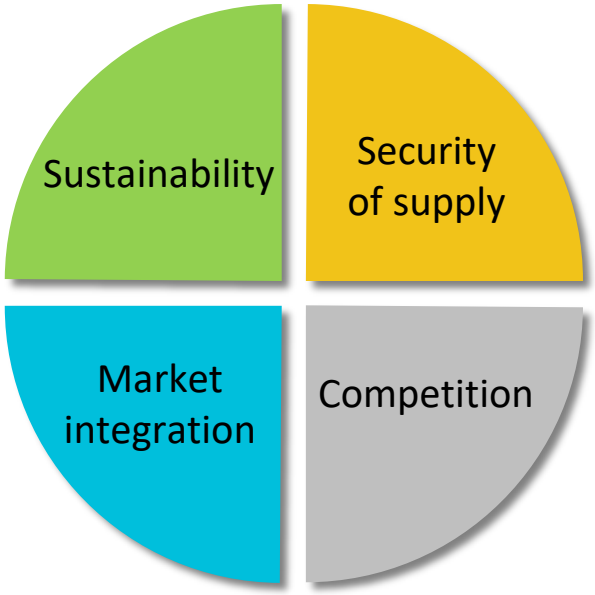
20TH ERRA ANNUAL CONFERENCE
EN ROUTE TO SUSTAINABLE REGULATION UNDER NEW MARKET PARADIGMS
09-10 October, 2023
BUDAPEST, HUNGARY
Hosted by: MEKH

Adapting the natural gas transmission system to accept renewable gases

Gábor Szokodi
FGSZ Plc.

EU renewable targets until 2030



Main aspects of the energy transition

REPowerEU

Reducing dependence from Russian natural gas

35 billion m3 biomethane and
10+10 million t green hydrogen on gas networks

Renewable Energy Directive

Increased utilization of **renewable energy sources**

RFNBO

Minimum **5.5%** Advanced Bio & RFNBO in liquid fuels
Share of green hydrogen in industrial hydrogen consumption at least **42%** by 2030 and **60%** by 2035

Natural gas transmission system of HU

Robust and well-developed system with proven track record

- **5 889 km** steel pipeline system, which could be converted to transmit biomethane, hydrogen and blend
- Almost **700 employees** with strong operation, engineering and business knowledge on the field of natural gas transmission

Benefits:

- Utilization of the **existing network**
- Larger energy amounts transmitted in gaseous form
- Underground pipelines – „hidden infrastructure
- **More economical** way of energy transmission

Case studies:

- Readiness for hydrogen blending
- Pure hydrogen vision
- Biomethane potential

Readiness for hydrogen blending

Flumen Phase I: done

Gas quality measurement 1

- Gas composition analysis
- Hydrogen ready gas chromatographs in Városföld, Csongrád and Kardoskút

Flumen Phase II: ongoing

Pipeline diagnostics

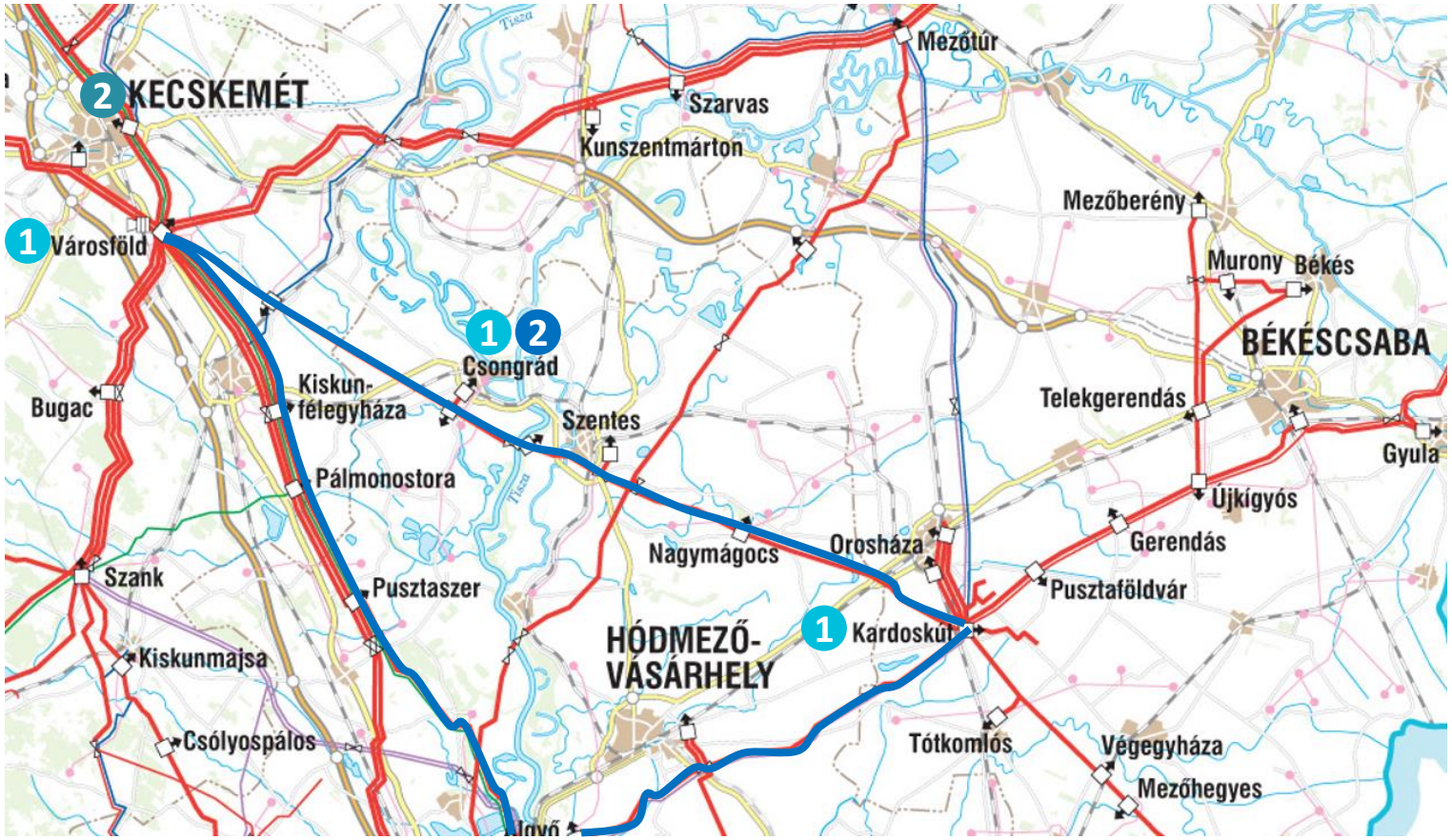
- Intelligent pigging of pipelines between Kardoskút and Városföld

Gas delivery facility 2

- Hydrogen ready facility in Csongrád

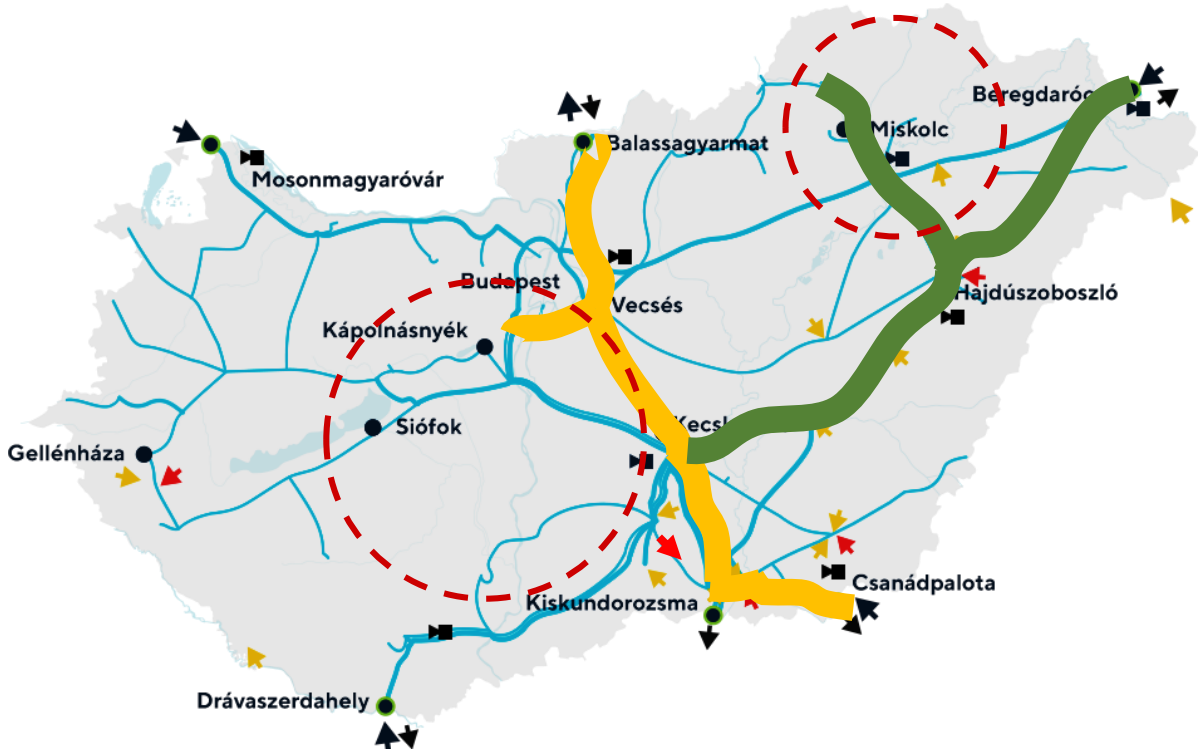
Gas quantity measurement 2

- Development of our calibrating laboratory facility in Kecskemét



Pure hydrogen vision

Potential future hydrogen valleys in Hungary

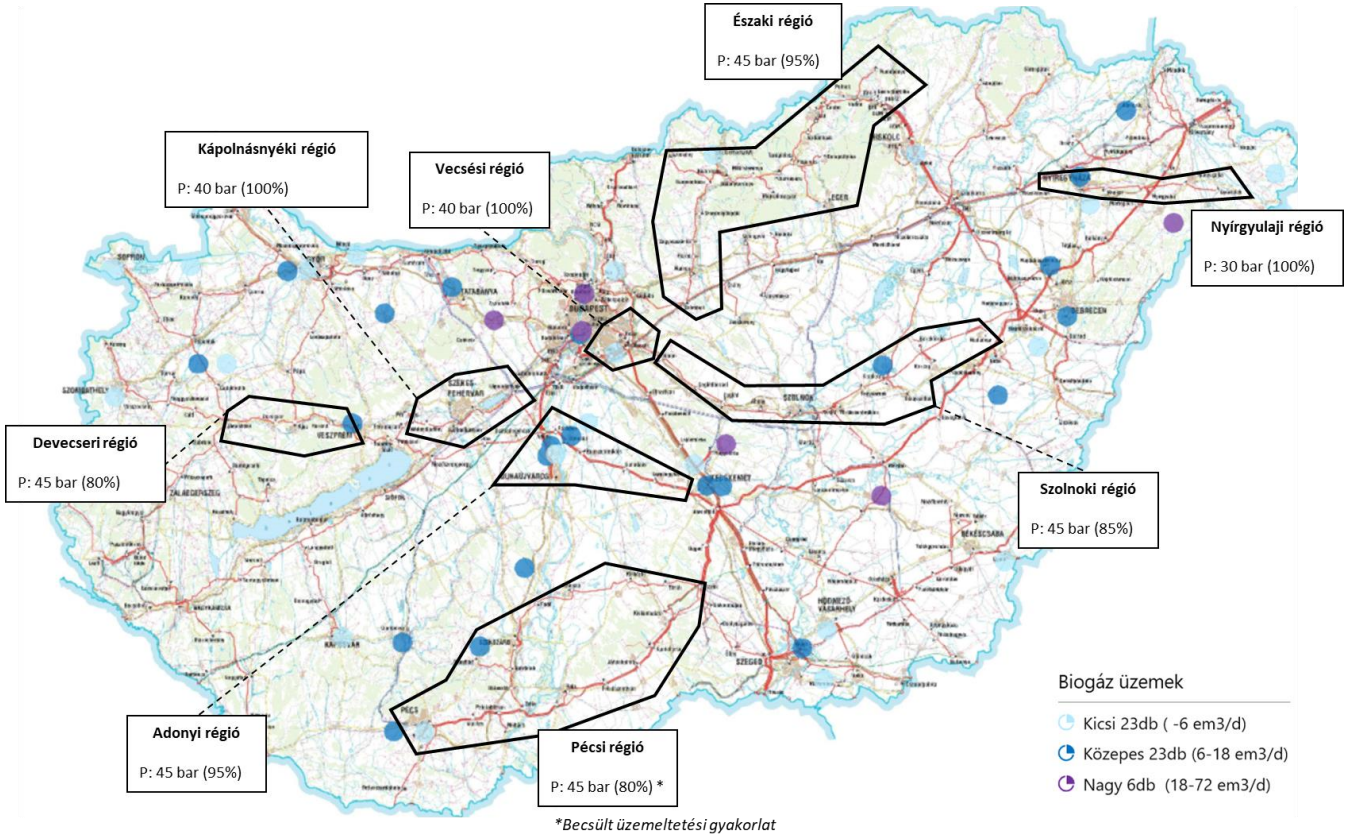


Hydrogen demand assessment

- Non-binding supply and demand assessment specifically for hydrogen
- Several indications received: forecasted demand of 1.5 GW_e hugely exceeds envisaged supply of 100-150 MW_e
- Import flows expected first from Slovakian, later from Romanian direction
- New north to south hydrogen backbone pipeline
- Potential repurpose of natural gas pipelines in Eastern Hungary
- Integrates well into to the European Hydrogen Backbone network concept

Biomethane potential

Potential future biomethane regions in Hungary



**Becsült üzemeltetési gyakorlat*

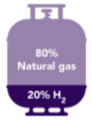
Main considerations

- Biomethane potential of 1 bcma by 2030
- Current production almost exclusively used for cogeneration
- Biomethane injection and usage to decrease CO_2 emission related costs of gas-based power generation
- Gas TSO supports the concept of creating biomethane production hub to reach economies of scale and efficient injection
- TSO as a coordinator in this process to find system level optimum beneficial for all involved parties

Biomethane injection options

	Injection into DSO system	Injection into DSO system + DSO/TSO reverse-flow	Injection into TSO system
Location (distance from the system)	In most cases closer to the biogas plant	In most cases closer to the biogas plant + no size limitation	Potentially larger distance
Biomethane injection potential (m3/h)	Limit: summer consumption in the DSO area	DSO>TSO reverse-flow to handle summer limits	No real limitation
Injection pressure	Typically 6-8 barg	Typically 6-8 barg, in case of reverse-flow 30-63 bar DSO>TSO, but only during summer	Depending on system hydraulics between 30-63 bar
Energy (OPEX) need	Lowest	Low to medium	Highest
Quality and quantity measurement	DSO protocol	DSO protocol In case of reverse-flow: TSO protocol	TSO protocol (parallel systems)
Odorization	Necessary	Most complex, depending on the TSO entry point de-odorization might be necessary	Depends on the odorization method of the connected TSO infrastructure

Conclusions

		Rationale	Challenge / Limitation	TSO role
Blending		Enhancing H2 procution without pure H2 system	Less efficient solution on long term	H2 readiness to ensure safe operation with blend
Hydrogen		Industrial networks with potential backbone connection	Identifying and connecting supply and demand	Network development and operation
Biomethane		Significant potential to replace natural gas	Smaller and remote production points	Coordination and settlement

Motivating regulatory framework and financing scheme is needed to incentivize investments and to find the most efficient system level solutions on these developing markets

FGSZ
MEMBER OF MOL GROUP

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THANK YOU FOR YOUR ATTENTION!

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gszokodi@fgsz.hu