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# Upgrading the gas processing system of UGS facilities in Hungary



**MAGYAR  
FÖLDGÁZTÁROLÓ**  
Az MVM Csoport tagja



# UPGRADING THE GAS PROCESSING SYSTEM OF UGS FACILITIES IN HUNGARY

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Presenters: Lajos Erdélyi, Norbert Ábrahám



About the Company

New EU regulation

Required modifications

Underground Gas Storage (UGS) facilities

Current situation

Summary

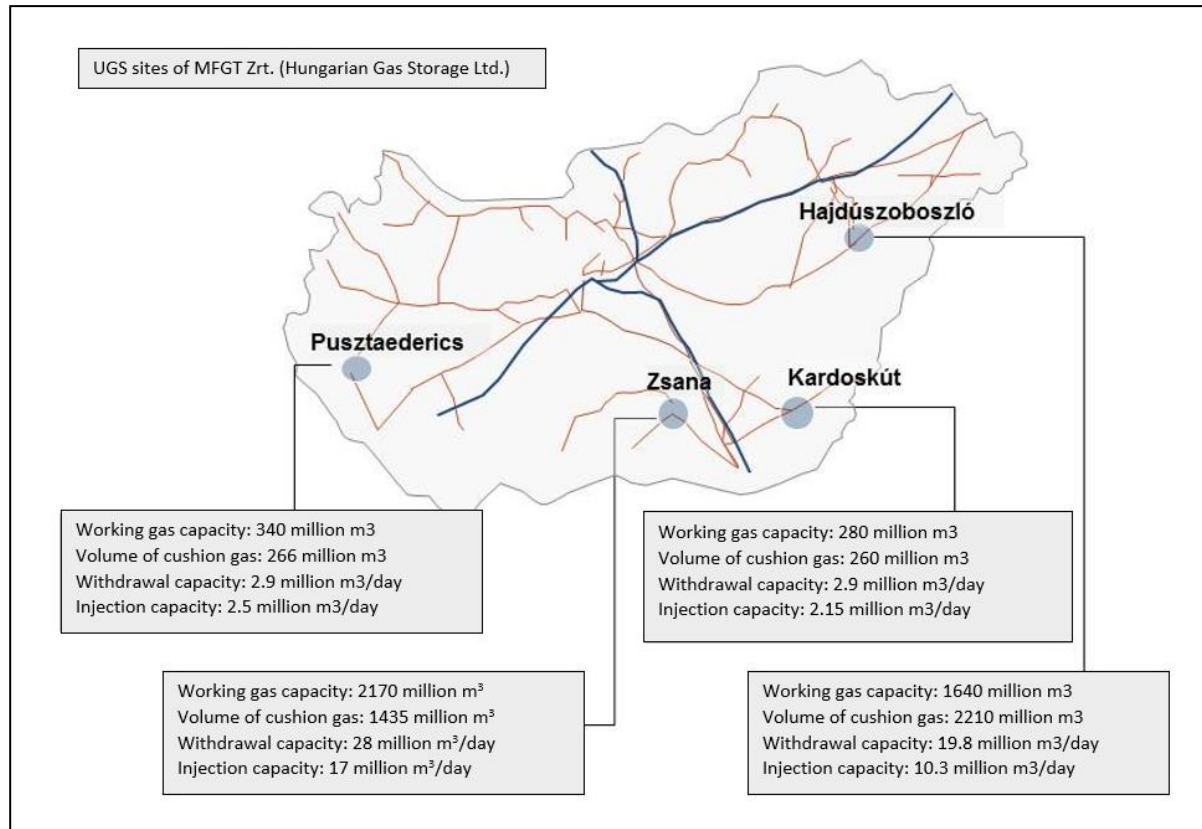
# About the Company



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- Magyar Földgáztároló Zrt. (Hungarian Gas Storage Plc.) is part of MVM Group
- Owns and operates 4 UGS facilities
- Max. total working gas volume: 4,43 billion m<sup>3</sup>
- Max. withdrawal peak: 53.6 million m<sup>3</sup>



# New EU regulation



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- EN 16726:2015 Standard was accepted by the EU
- ... and in Hungary as well - MSZ EN 16726:2016
- Standard specifies European wide the gas quality parameters and their limits
- Aim to allow the free flow of natural gas with uniform quality between the CEN (European Committee for Standardization) member states
- To intensify the trade and safety of supply

|   | Requirements of<br>MSZ 1648:2000 | Requirements of<br>MSZ EN 16726:2016 |
|---|----------------------------------|--------------------------------------|
| CO <sub>2</sub> content (v/v %)               | indirectly (Wobbe)               | 2,5 (4,0)                            |
| H <sub>2</sub> S content (mg/m <sup>3</sup> ) | 20                               | 5                                    |
| Water dew point (°C)                          | -                                | -8*                                  |
| Water content (mg/STDm <sup>3</sup> )         | 170                              | -                                    |
| Hydrocarbon dew points (°C)                   | 4**                              | -2***                                |

\* at 70 bar, or if less than 70 bar, at maximum operating pressure of the system in which the gas flows

\*\* at 40 bar

\*\*\* at any pressure from 1 to 70 bar

# Required modifications

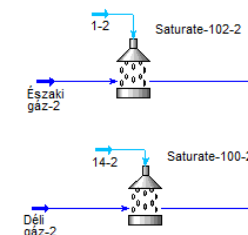


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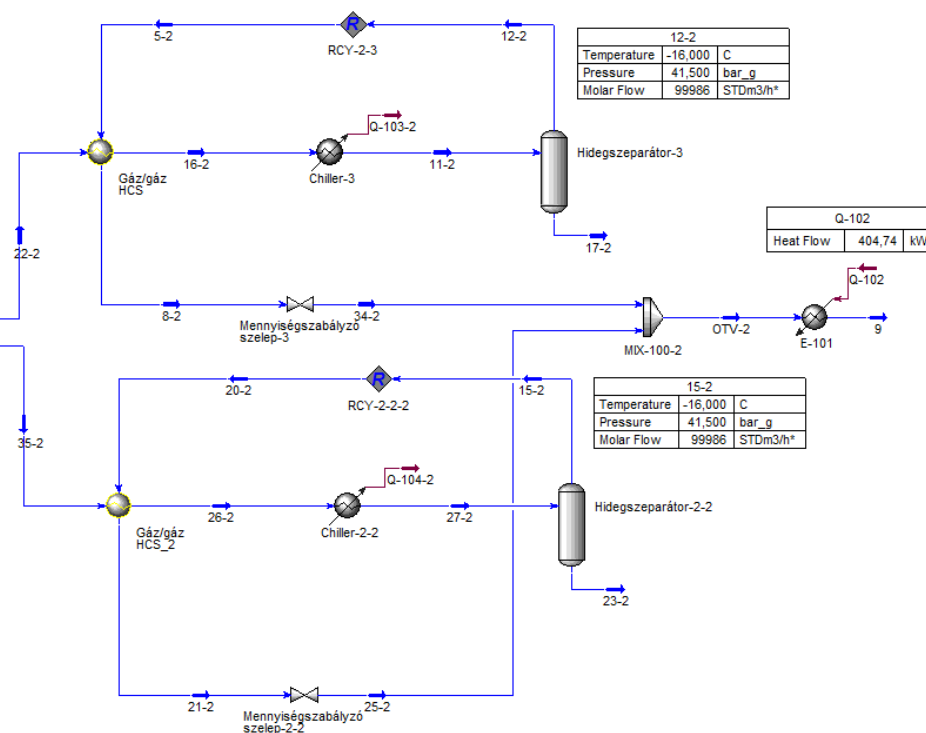
- Task:
  - modify the gas processing elements to comply with the new Standard
- Target parameters:
  - hydrocarbon and water dew point threshold values
- Method (process simulation):

| Északi gáz-2 |                      |
|--------------|----------------------|
| Temperature  | 15,000 C             |
| Pressure     | 75,000 bar_g         |
| Molar Flow   | 1,0000e+005 STDm3/h* |



| Déli gáz-2  |                      |
|-------------|----------------------|
| Temperature | 15,000 C             |
| Pressure    | 75,000 bar_g         |
| Molar Flow  | 1,0000e+005 STDm3/h* |

| 3-2         |                      |
|-------------|----------------------|
| Temperature | -9,6496e-002 C       |
| Pressure    | 44,500 bar_g         |
| Molar Flow  | 2,0005e+005 STDm3/h* |



| 12-2        |                |
|-------------|----------------|
| Temperature | -16,000 C      |
| Pressure    | 41,500 bar_g   |
| Molar Flow  | 99986 STDm3/h* |

| Q-102     |           |
|-----------|-----------|
| Heat Flow | 404,74 kW |

| 15-2        |                |
|-------------|----------------|
| Temperature | -16,000 C      |
| Pressure    | 41,500 bar_g   |
| Molar Flow  | 99986 STDm3/h* |

# Underground Gas Storage (UGS) facilities

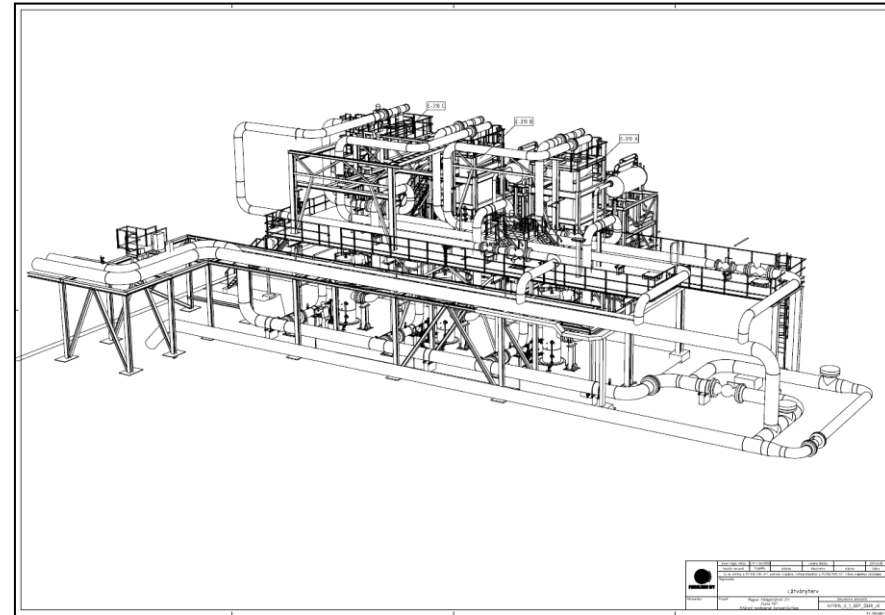
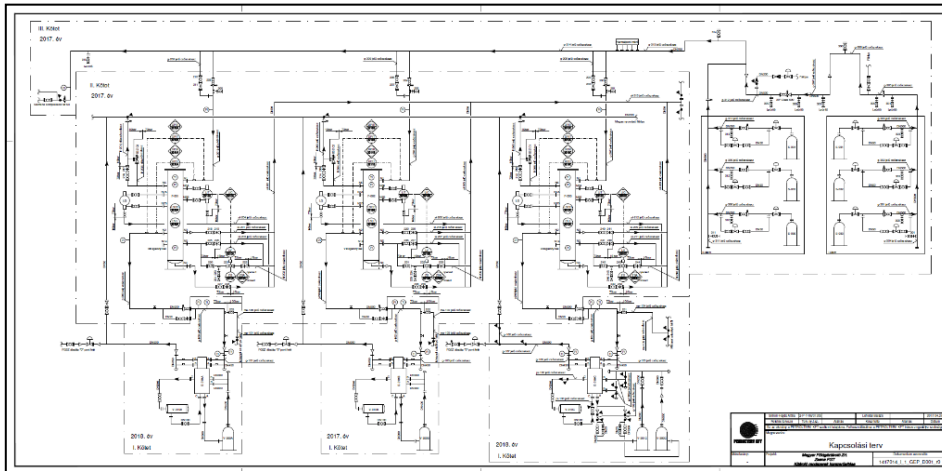
## Zsana UGS



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- Basic and Detail Engineering – Petroterv Kft.
- Development consists of:
  - to increase the refrigeration capacity (propane coolant),
  - To adjust the heat performance to the new requirements (replacement of Cold Boxes),
  - installation of filter separators to prevent dust entry to Cold Box

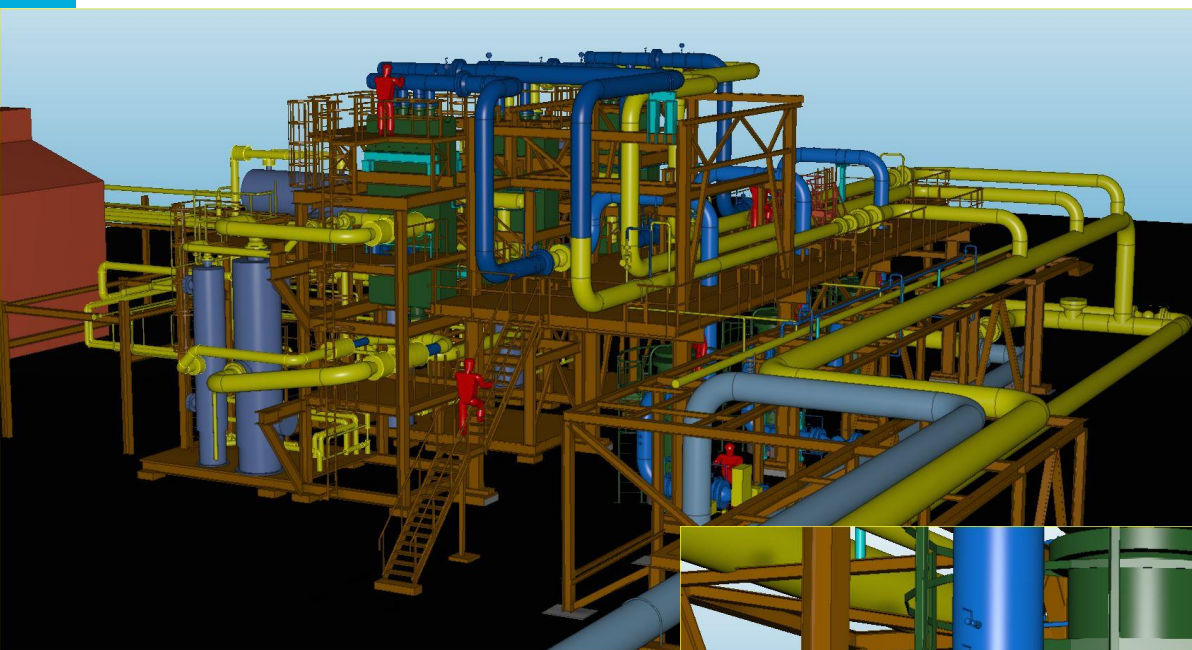




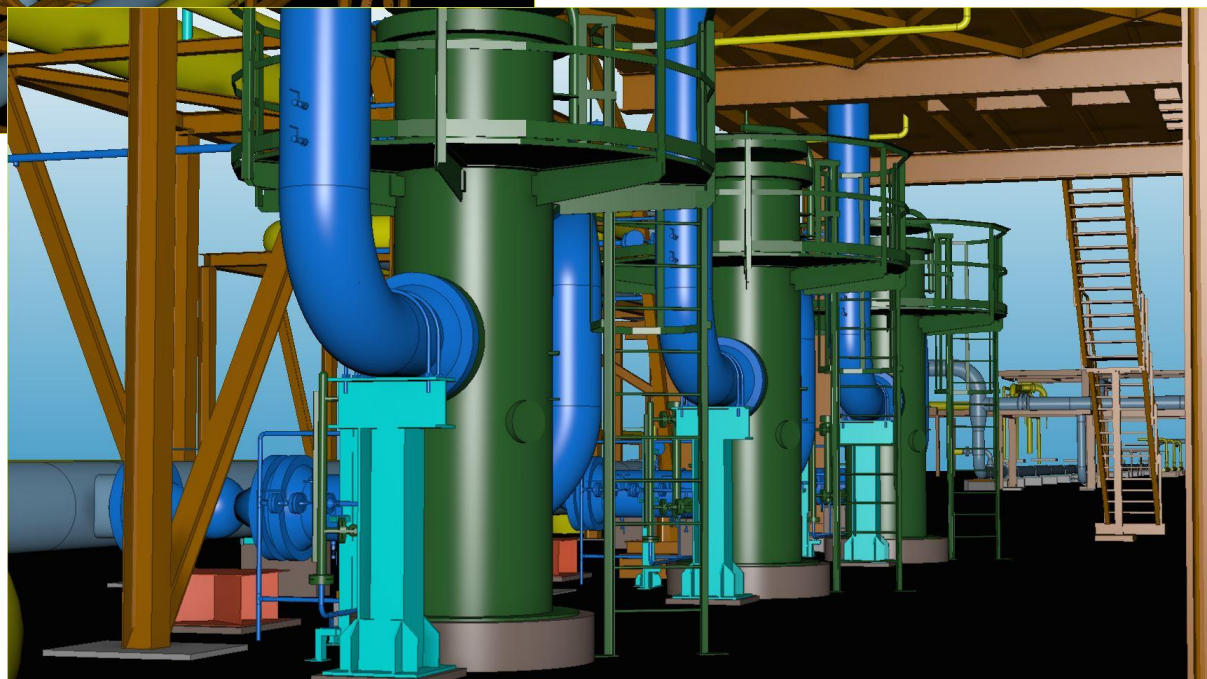
# Results - Zsana UGS



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- 3D scanning
- 3D planning
- Accurate design





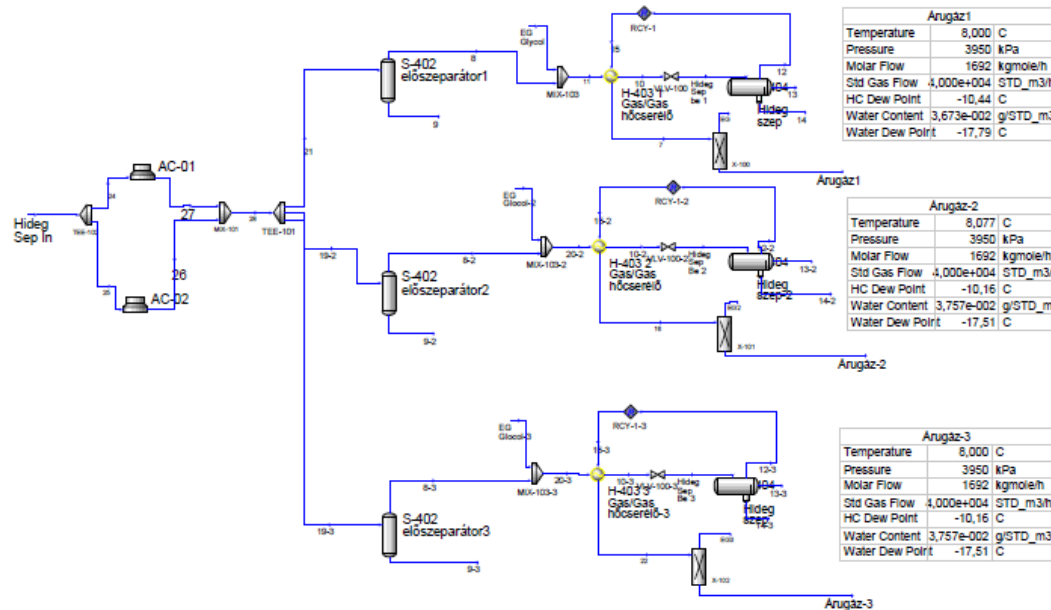
# Results - Pusztaederics UGS



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- When the pressure in the sales pipeline is relatively low (40 bara) and the inlet gas pressure is bigger than 66 bara (JT valve)
  - the process system fulfills the requirement of MSZ 1648:2000
- To meet the requirement of the new Standard, the inlet pressure has to be higher than 67 bara (JT valve)
- If not, than the air coolers of the recompression to be used



Simulation of the air cooler usage in the technology

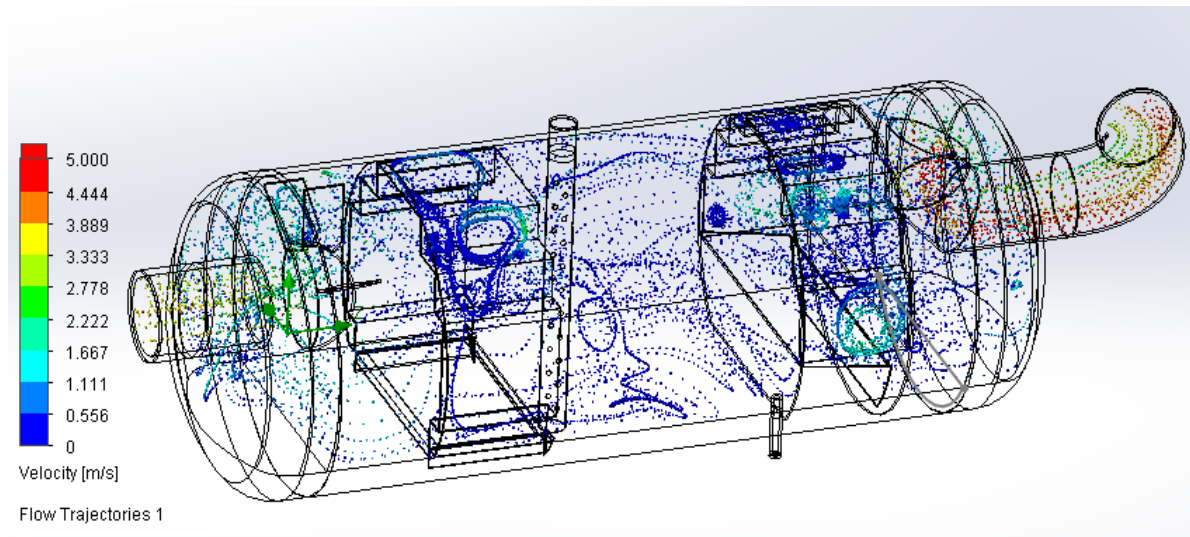
# Results - Pusztaederics UGS



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- The upgrade consists of:
  - air cooler for the inlet gas to use (same cooler like during injection)
  - flow simulation of low temperature separators -> installation of efficient coalescer separators,



Performance check of the existing separators

# Results - Hajduszoboszló UGS



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- FEED and Basic Engineering
- Goals:
  - to investigate the current process elements for the new requirements
  - to introduce process alternatives to ensure new gas quality
- The current technology cannot satisfy the new Standard



- Possible solutions:
  - Low Temperature Separation (PROSERMAT; FJORDS PROCESSING)
  - Solid bed adsorption with silica gels (SHELL; SILICA GmbH)
  - Twister (Honeywell UOP Technology; Twister BV)
  - Refrigeration, Joule-Thomson valve, Turbo-expander technology, Absorption, Membranes etc.
- **Evaluation results - low temperature separation process would be the long-term solution**



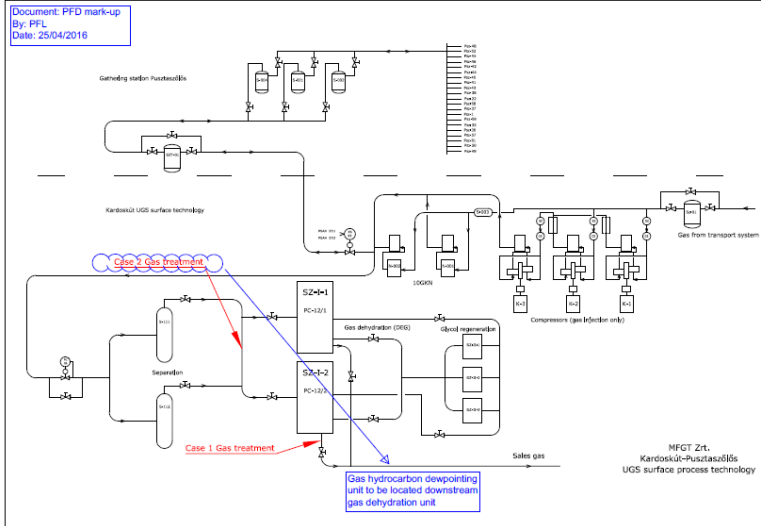
# Results - Hajduszoboszló UGS



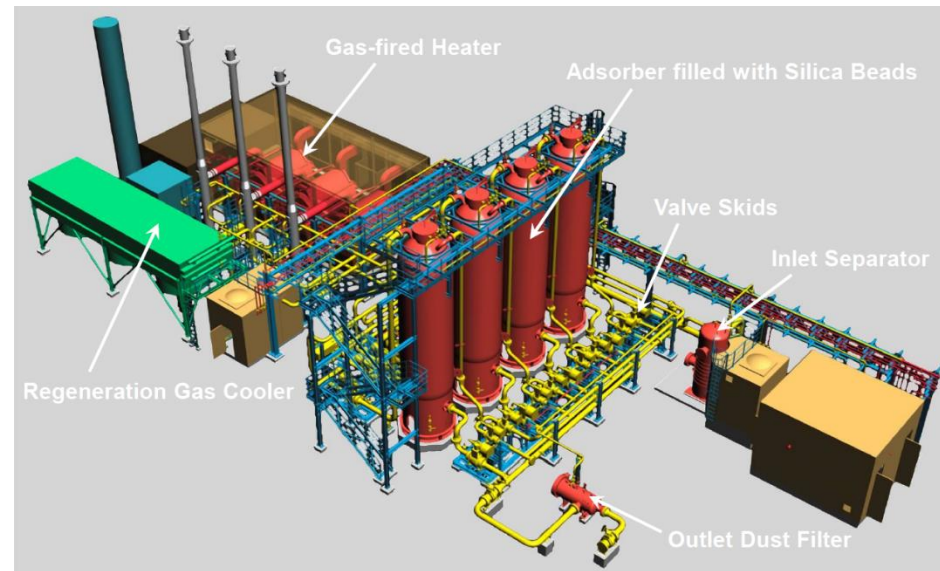
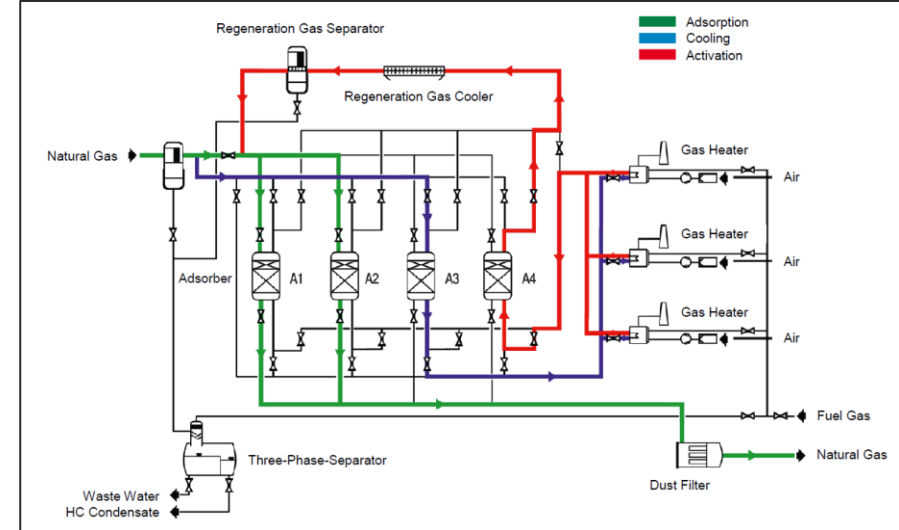
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## Low Temperature Separation



## Solid bed adsorption with silica gel



# Results - Kardoskut UGS



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- FEED and Basic Engineering Design
- Goals:
  - to investigate the current process for the new requirements
  - to introduce process alternatives to ensure new gas quality
- The current process cannot satisfy the new Standard
- Development consists of:
  - Short term - installation of a coalescer separator (reduction of liquid carry-over)
  - Long term - introduction of new gas treatment technology
- Possible solutions:
  - Low Temperature Separation (PROSERMAT; FJORDS PROCESSING)
  - Solid bed adsorption with silica gels (SHELL; SILICA GmbH)
  - Twister (Honeywell UOP Technology; Twister BV)
  - Refrigeration, Joule-Thomson valve, Turbo-expander technology, Absorption, Membranes etc.
- **Evaluation results - low temperature separation process would be the long-term solution**



# Summary



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- New Standard in force since June 2016 for gas quality parameters
- MFGT started the investigation
- What are the bottlenecks to meet the requirements
- What modifications are necessary on the process system
- Projects launched in 2016
  - in Zsana and Pusztaederics UGS
    - Engineering done
    - Contracting passed
    - Implementations are in progress
- Low scale project are also launched in Kardoskut and Hajduszoboszlo UGS
- Completion dates are in line with the requirements

Thank you for your attention!

