Biogas Upgrading - Activities in Austria

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NEW:
http://bio.methan.at

Agenda

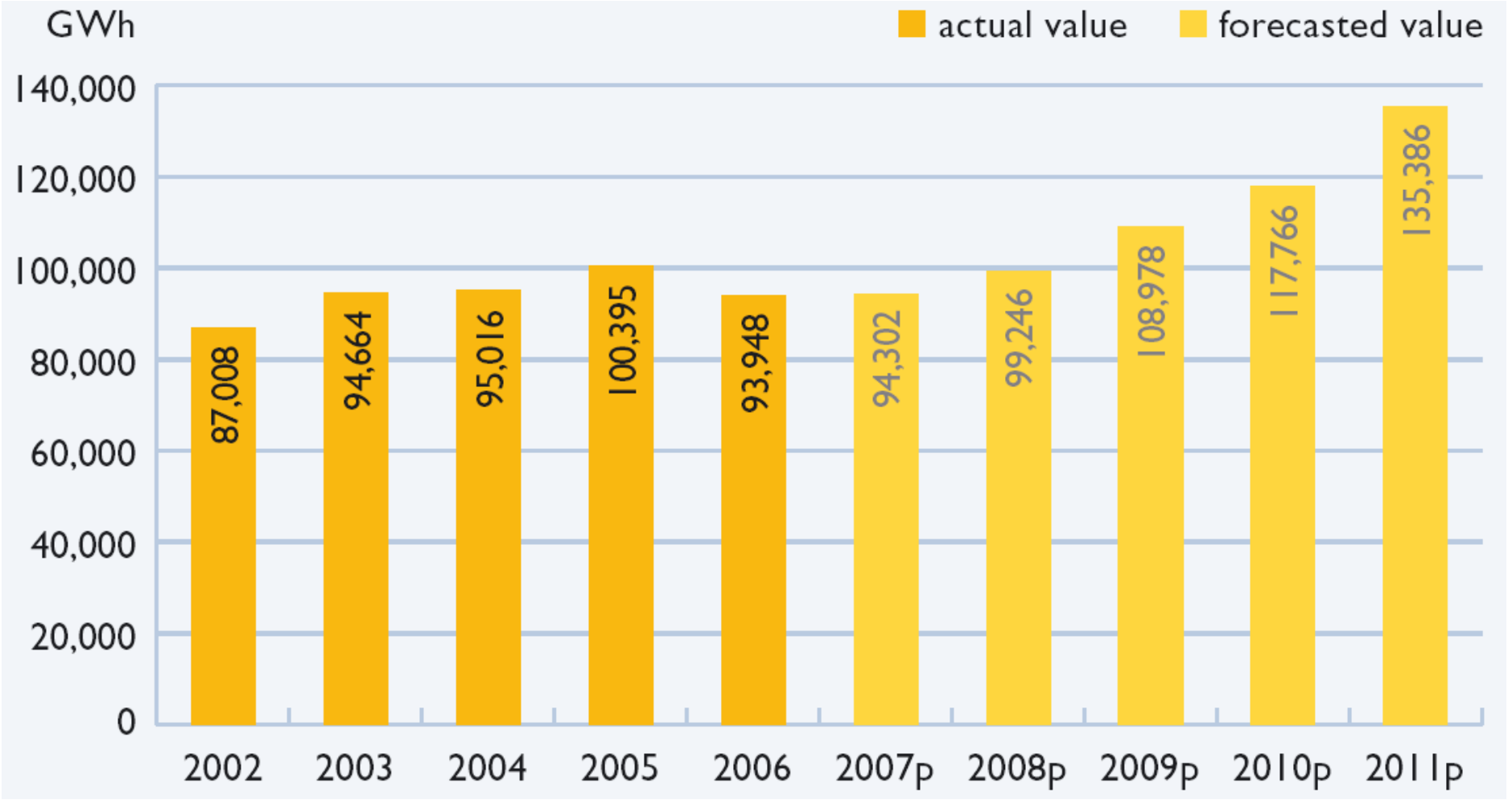
- Quality requirements of gas substitutes (biomethane) in Austria
- Biogas upgrading and grid injection
  - Projects in Austria
  - Projekt „Virtuelles Biogas“ Bruck/Leitha
- Bio-CNG fuel stations in Austria
  - Methapur fuel station Margarethen/Moos
- Economics
- Summary & Outlook

Typical Biogas Composition compared to Austrian Natural Gas Grid Standards

Parameter	Biogas	Quality according to Austrian Standard OEVGW G31 / G33	Unit
Methane (CH_4)	45 - 70	unspecified (> 97.0)	mol%
Carbon dioxide (CO_2)	30 - 45	≤ 2.0	mol%
Ammonia (NH_3)	< 1,000	Technically free	mg/m³(STP)
Hydrogen sulphide (H_2S)	< 2,000	≤ 5	mg/m³(STP)
Oxygen (O_2)	< 2	≤ 0.5	mol%
Nitrogen (N_2)	< 8	≤ 5	mol%
Water (H_2O) - Dewpoint	< 37 @ 1bar	≤ - 8 @ 40bar	°C
Upper Heating Value	6.7 – 8.4	10.7 – 12.8	kWh/m³(STP)
Wobbe-Index	6.9 – 9.5	13.3 – 15.7	kWh/m³(STP)

- OEVGW G31 defines natural gas, OEVGW G33 specifies grid injection standards for biogeneous gases

Natural gas consumption in Austria



Delivery to end users (exclusive of own consumption and errors of measurement)

[E-Control, AGGM (2007)]

Biogas upgrading and grid injection in Austria

- **In Operation**
  - Pucking (Upper Austria), PSA, 6 m³/h (since 2005)
  - Bruck/Leitha (Lower Austria), Membranw, 100 m³/h (since2007)
  - Eugendorf (Salzburg), PSA, 40 m³/h (since 2008)

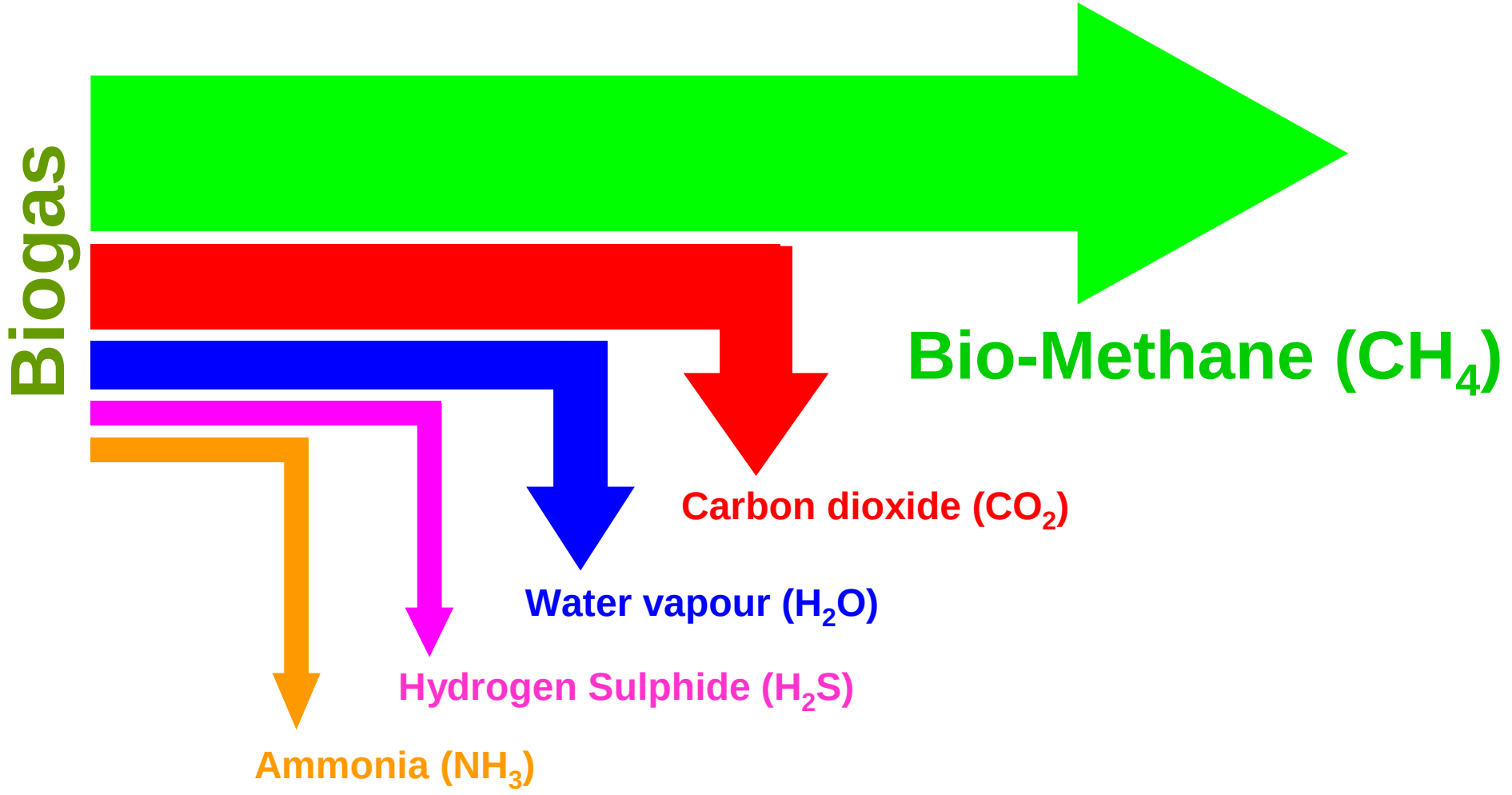
Source:AGGM
Date
18.08.2008

- **Planned**
  - Waste water treatment plant Asten/St.Florian (Upper Austria), water scrubber(?)
  - Leoben (Styria), amine scrubber (?)
  - Zell am See (Salzburg) PSA, water scrubber or membrane (?)
- **In discussion**
  - Wiener Neustadt (Lower Austria)
  - …

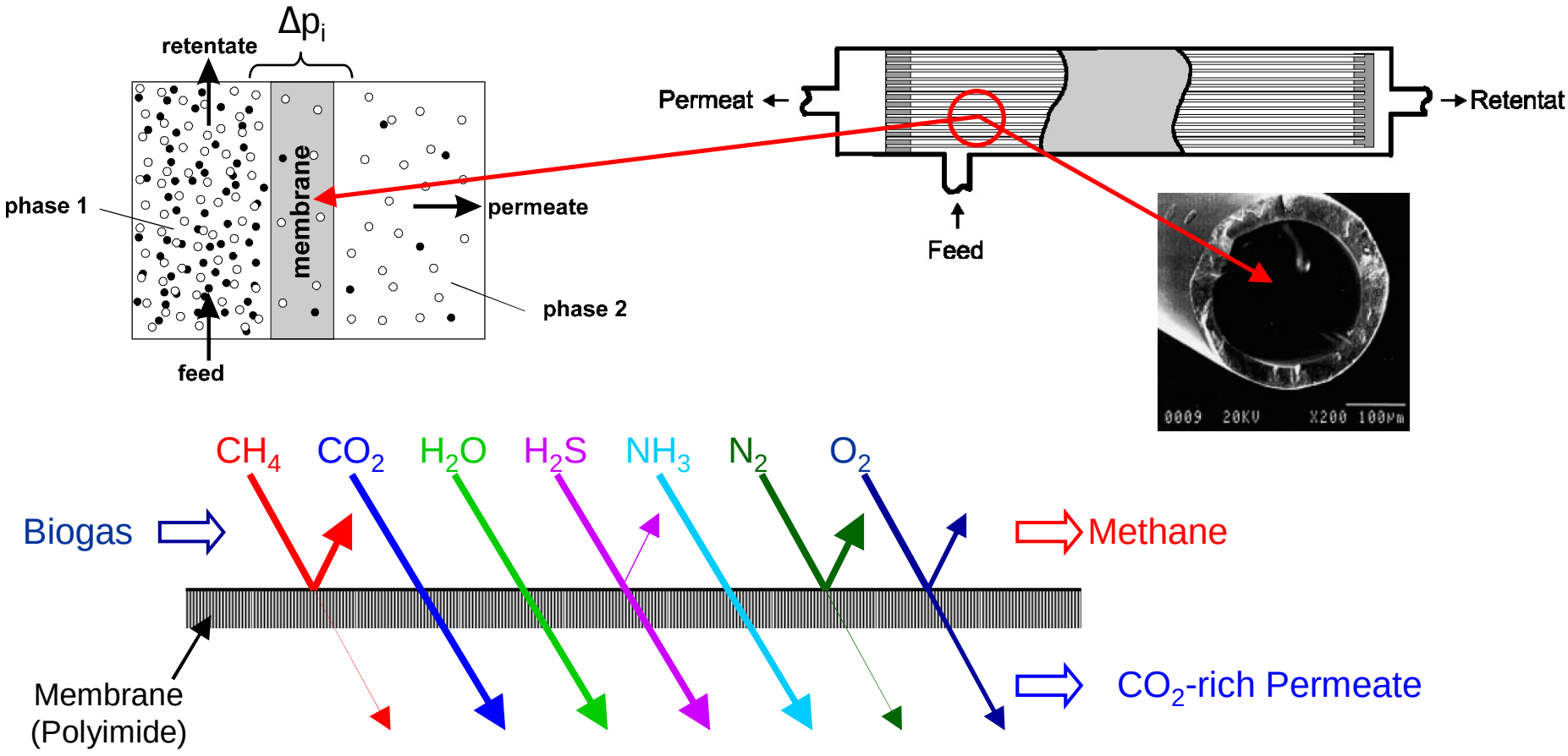
Biogas upgrading plant Bruck/Leitha

- **2-stage gas permeation** plant producing 100m³(STP)/h corresponding to about 180m³(STP)/h raw biogas
- **100% compatible natural gas substitute** according to Austrian laws ÖVGW G31 and G33
- **Supply to local gas grid** (3bar) and transported to city
- During summer additionally **high-pressure compression** (60bar) and supply to regional gas grid (up to 50m³/h)
- **Optimized process integration** into the existing biogas plant resulting in **zero-emission-operation** for methane
- Highly compact: whole plant fits into 30'-container
- **Opening mid 2007**, normal operation since 01/2008

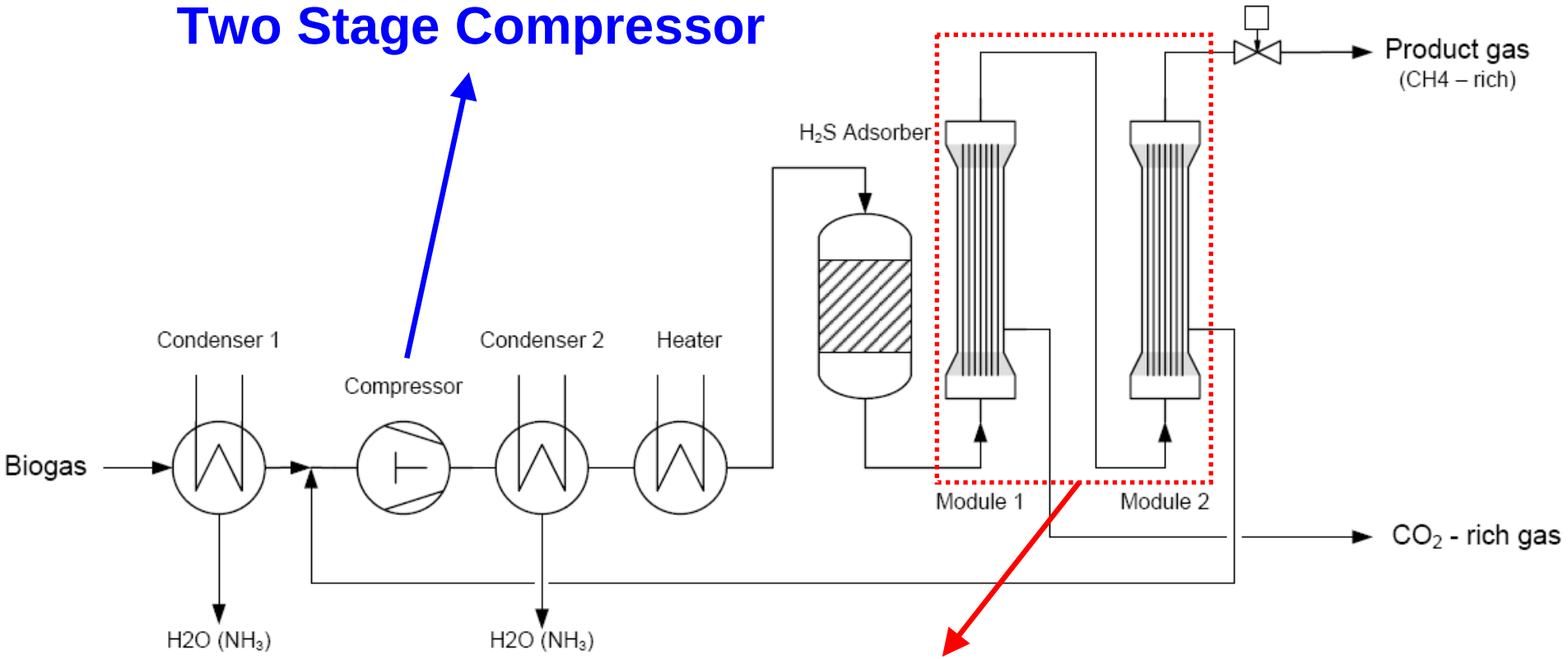
Biogas Upgrading – A Separation Problem



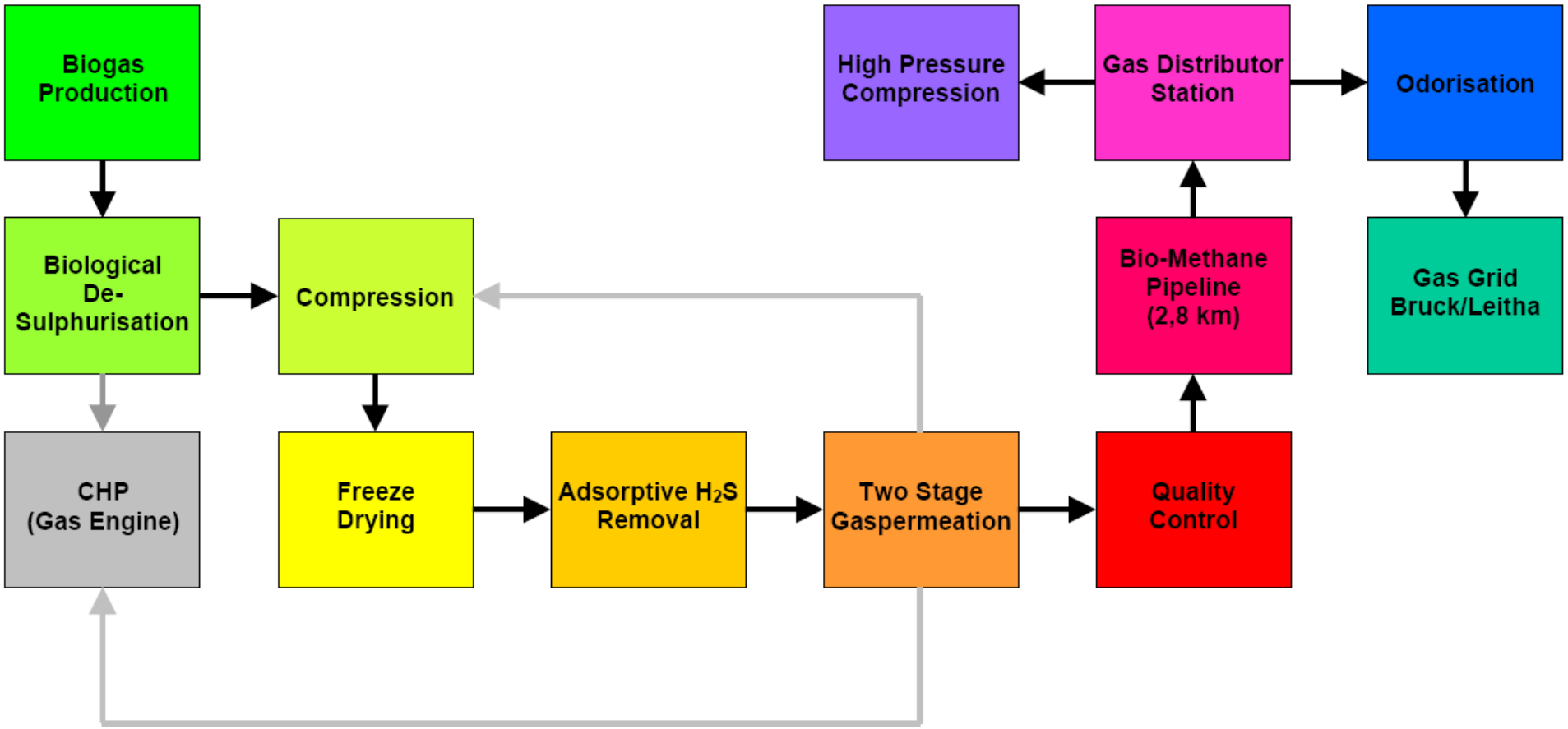
Separation principle of gas permeation (GP)



Process Concept

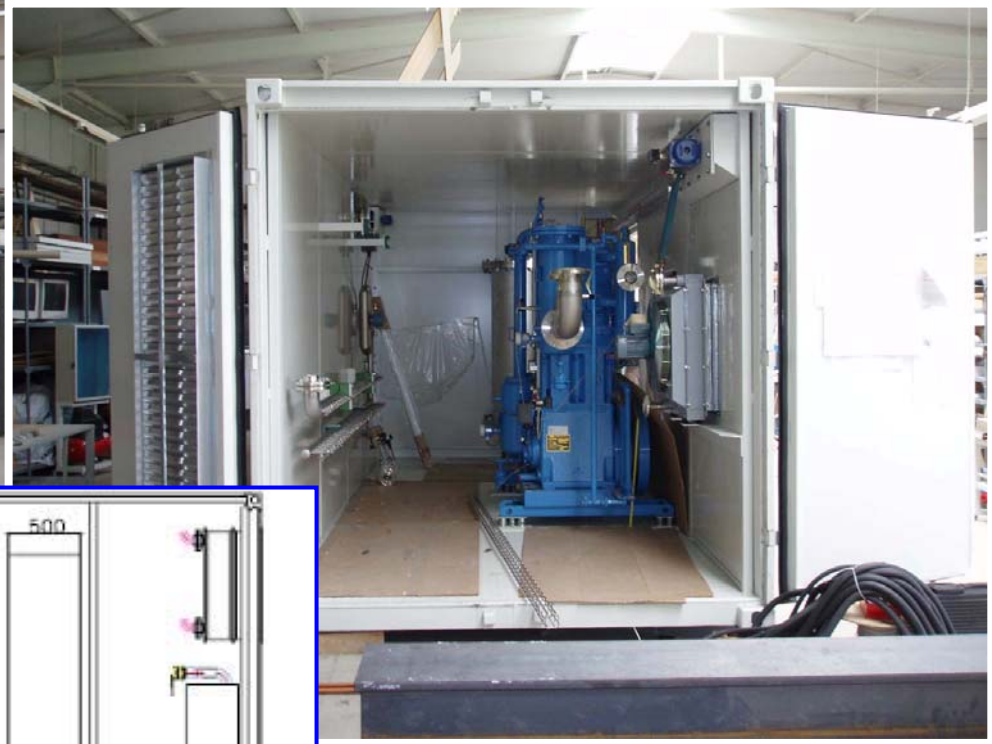


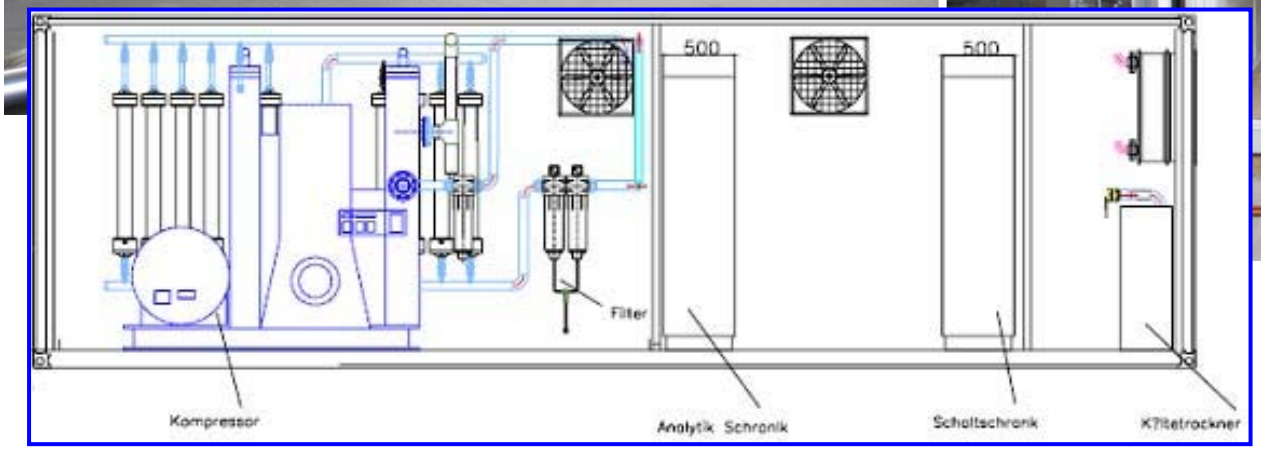
Process Integration



- **Biogas upgrading with prior biological desulphurisation**
- **Permeate goes back to CHP**

Container – Assembling at Axiom Angewandte Prozesstechnik GmbH



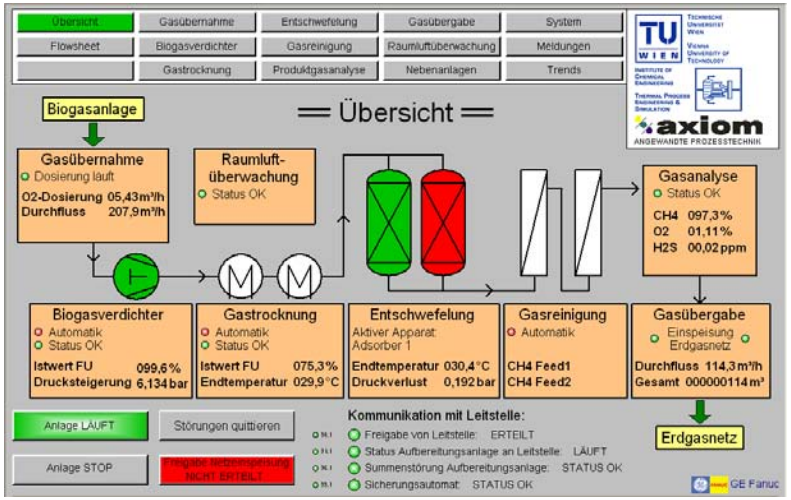


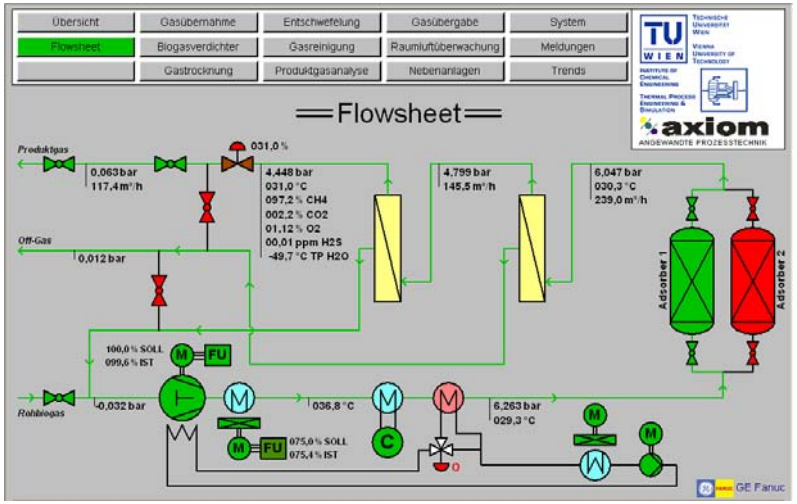
Construction Work in Bruck/Leitha

Construction Work in Bruck/Leitha

High Pressure Compressor

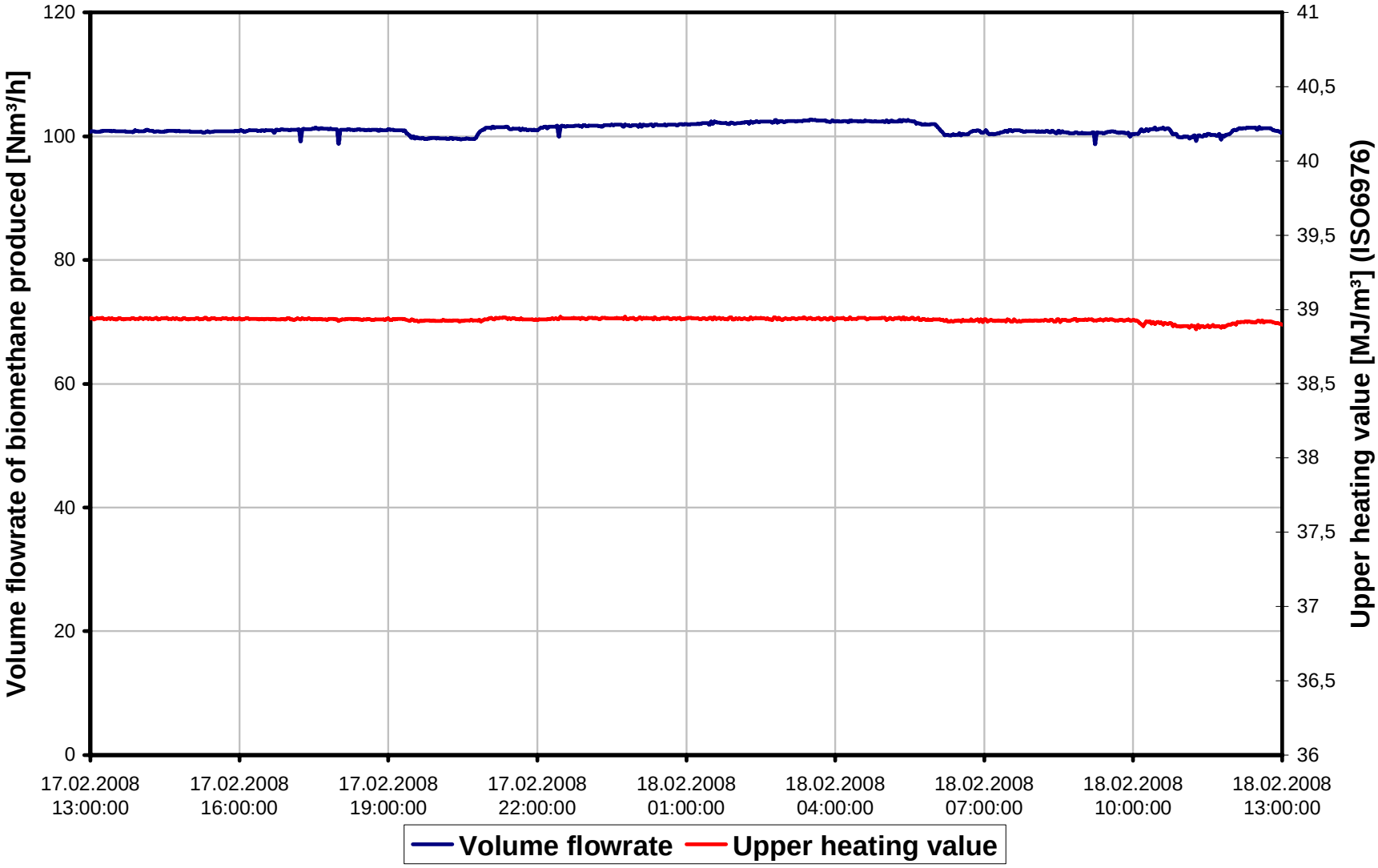
Process Control



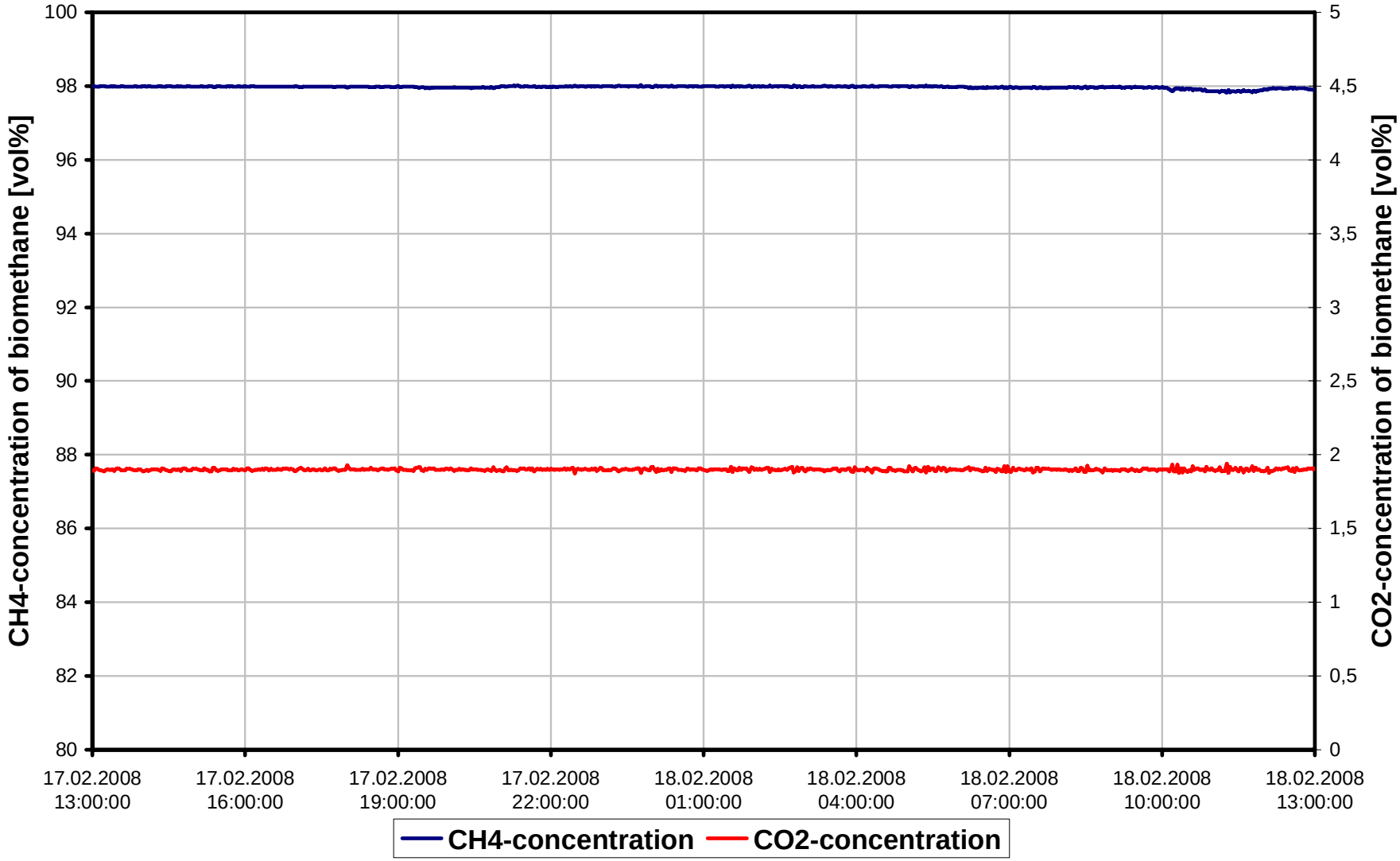


Opening Celebration an June 25, 2007

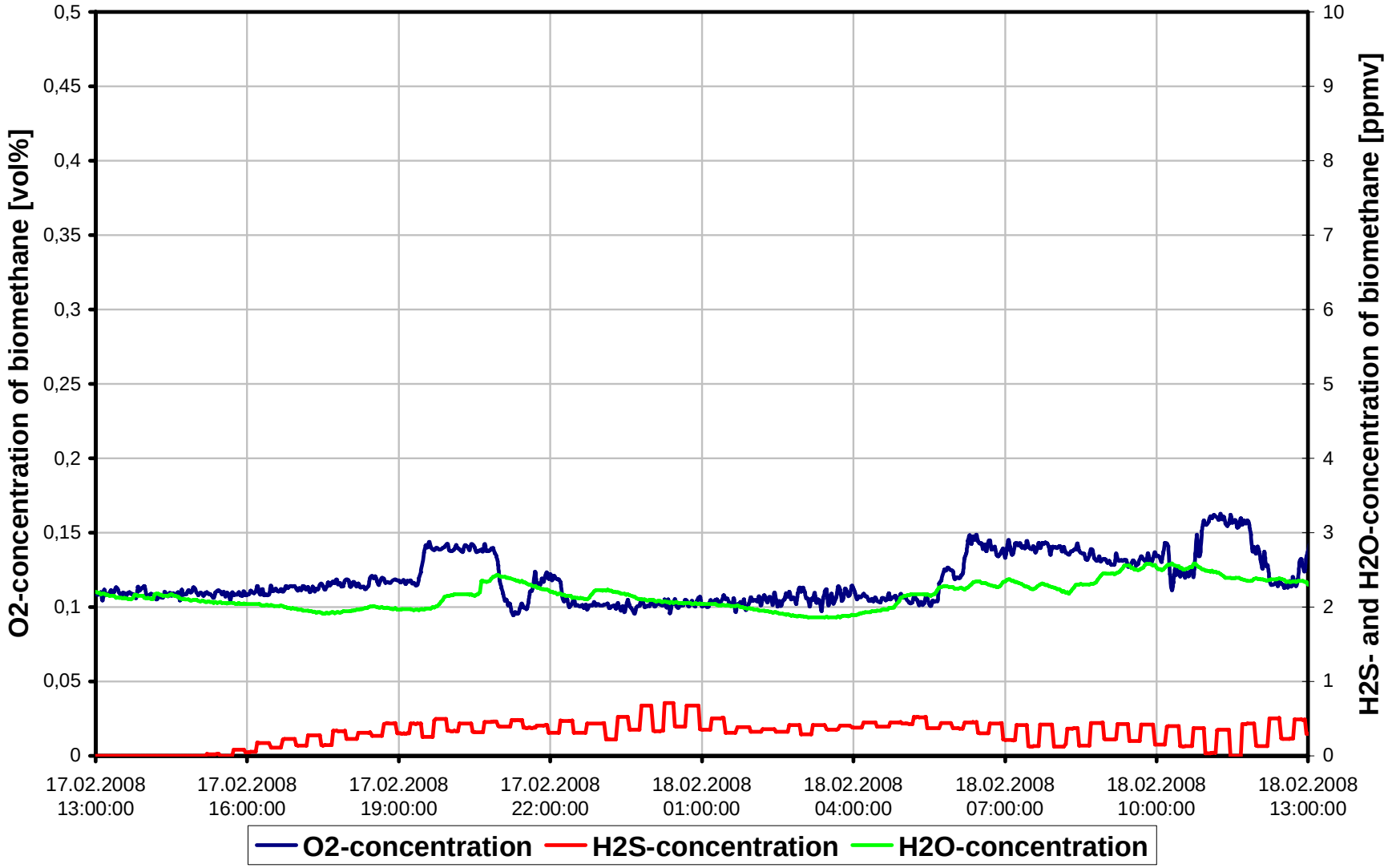
Typical feed-in performance of GP unit (I)



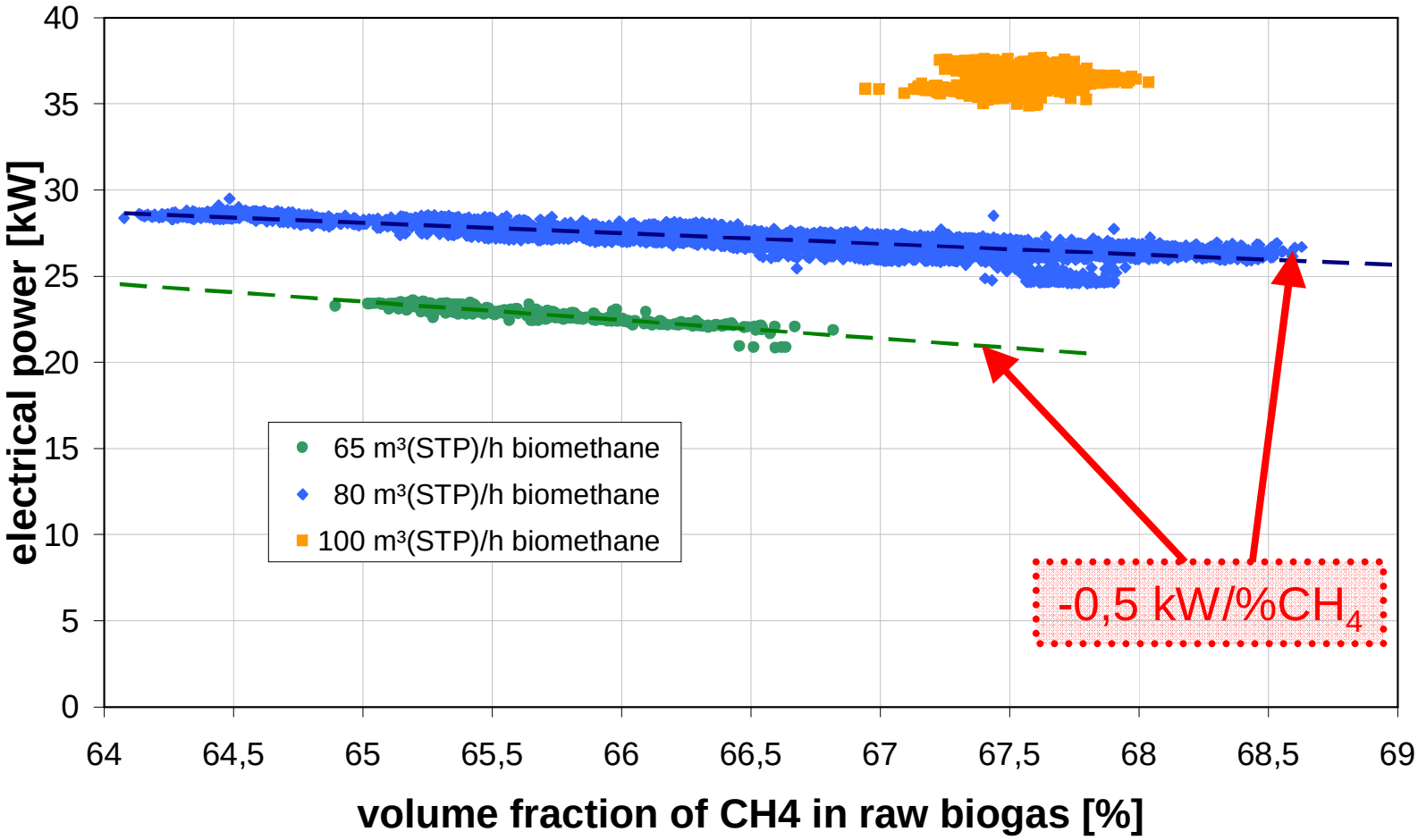
Typical feed-in performance of GP unit (II)



Typical feed-in performance of GP unit (III)



Upgrading plant Bruck/Leitha – compressor power consumption



First Austrian biomethane fueling station in Operation…

35 m³/h biomethane

- Further Information: **http://www.methapur.com**
  „Biomethantankstelle Margarethen/Moos“

Methapur concept: supply of max. 100 vehicles with biomethane

- Capacity up to 500 kg/d biomethane
- Official opening by Minister Josef Pröll on 28.08.2008 !!!

Economics of biomethane production in Austria

- To date **no innovation bonus**
- To date **no central combined heat and power production** with renewables feed-in tariffs
- Full competition with gas market (0,30 – 0,35 €/m³)
- **New law (Ökostromgesetz Novelle 2008)** could lead to **better legal and economic situation** – yet no new feed-in tariffs
- **Sale as Bio-CNG** still better revenues
- **Methapur concept** for the self supply of car fleets

Biomethane utilisation in Austria

- **Sale as Bio-CNG** best economic alternative
- Calculated = virtual Bio-CNG addition should enhance the Austrian CNG car market

Fuelmaker

Summary & Conclusions

- **Technology demonstration** successful
  - Bruck/Leitha
  - Margarethen/Moos
  - Eugendorf
  - Pucking
- **> 180.000 m³ fed into grid** within first few operation months in Bruck/Leitha
- **Quality requirements** easily met
- **Zero methane emission** of upgrading system
- Technology multiplication planned

Acknowledgements

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