UNDERGROUND SUN.CONVERSION

Underground Sun Conversion

Natural gas in a sustainable carbon cycle

Highlights of Energy Research 2018

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Challenges to meet for the future

- Ambitious goals set on COP21, Paris and within the EU to reduce green house gas emissions call for **research and innovation**
- Urgent development of renewable energy goes along with the need for **large scale, reliable storage solutions**
- **RAG among the leading storage operators** in Europe
  66 TWh volume; **30 GW** withdrawal-rate
- RAG started several years ago with research activities in Power-to-Gas = Conversion of volatile energy from PV and wind into the energy-carrier gas
- RAG feels confident, that the integration **of power- and natural gas system** is part of the solution

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Electricity Storage ≠ Energy Storage

Power Generation
from renewable sources

H2, Methane → Gasgrid

Electricity Storage

≠

Gas Storage = Energy Storage

Grid Balancing
Day-Night Shift

20%	30%	50%
Electricity	Mobility	Heating/Cooling Industry

Energy Demand

Underground Sun Storage

- In our first flagship project „Underground Sun Storage“ we assessed hydrogen admixture and its behavior in natural gas reservoirs (underground gas storage facilities)
- No curtailment of storage integrity detected
- No H2S detected
- No decrease of permeability, no pore glogging
- Good analogy between lab-tests and field test
- Handling within the existing legal framework
- Discovery of future potential

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Conclusion – Field Experiment

- Laboratory tests and „in situ“ experiments suggest a natural **conversion of Hydrogen and CO2 to Methane** (= natural gas) in suitable underground gas reservoirs
- Due to these results the follow up project **Underground Sun Conversion** was initiated:
- → renewable natural gas made in the reservoir by an natural microbial process
- = **Geological history in fast motion** – recreation of natural genesis of gas

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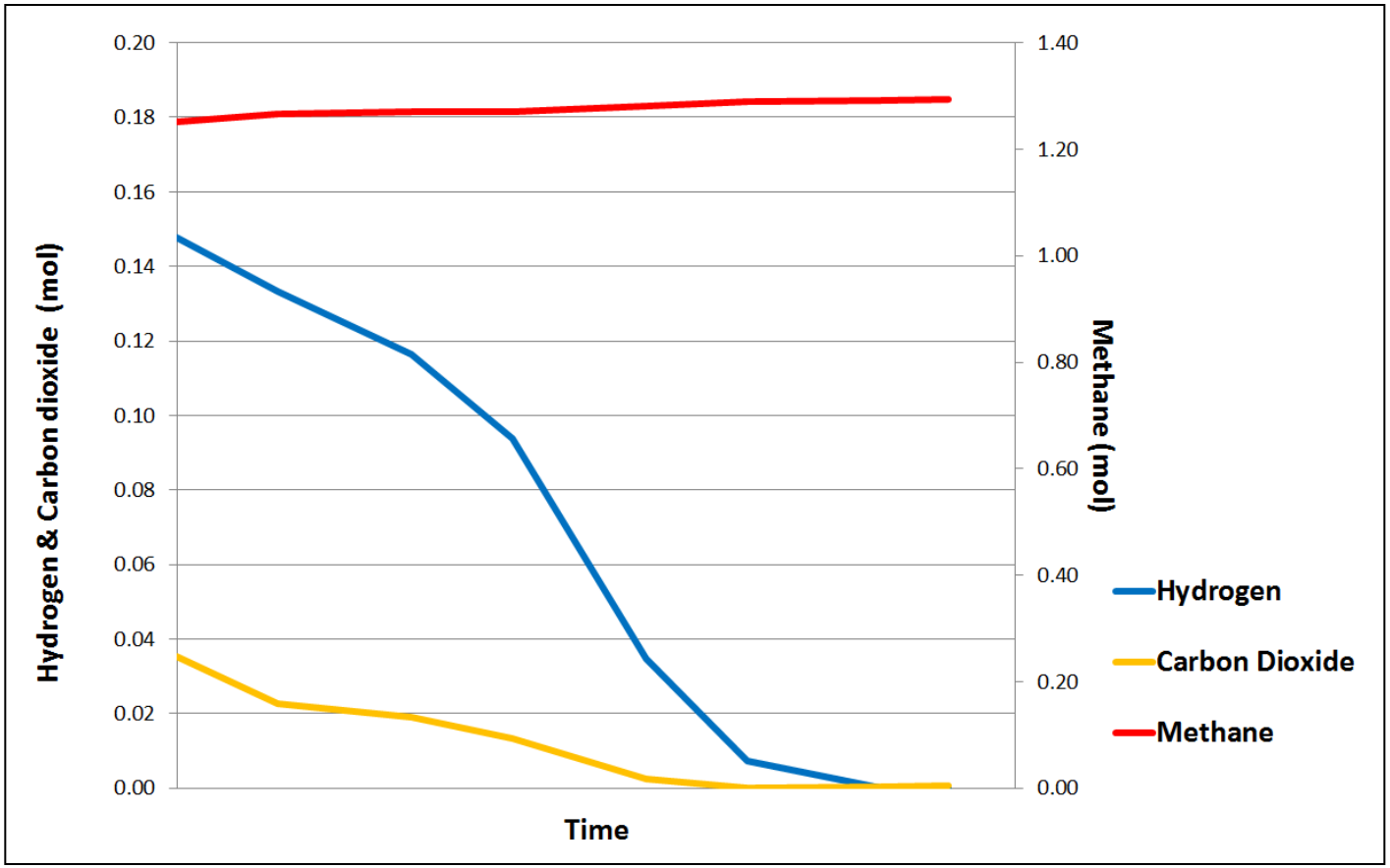
University of Natural Resources and Life Sciences, Vienna

Changes in gas composition



Formationswater UGS core

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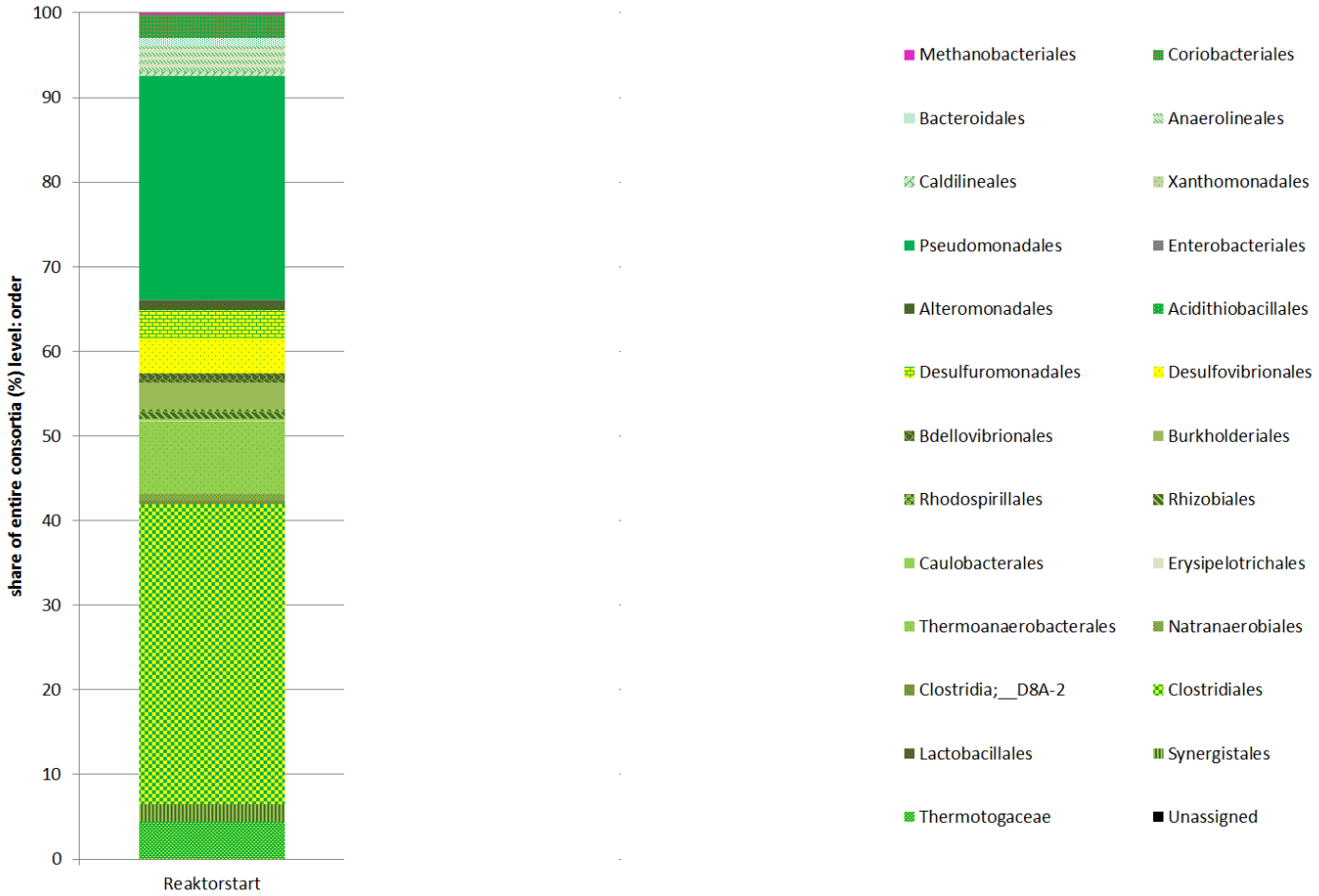
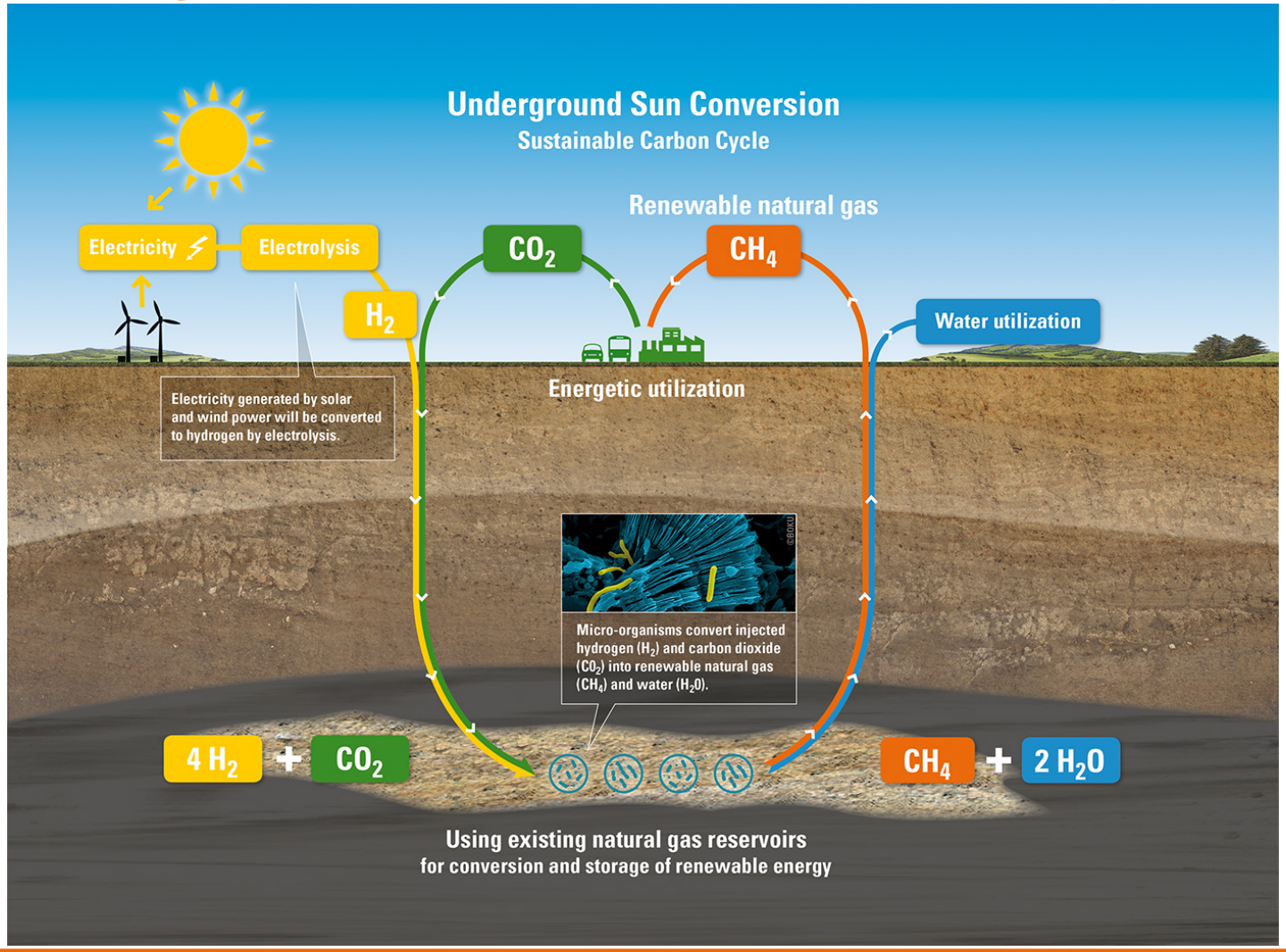
Microbiological Consortia (Orders)



Natural gas in a sustainable Carbon cycle



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High potential for the future

- Establishing a **sustainable carbon cycle**
- **Seasonal storage** of renewable energy
- Future use for **existing infrastructure** (grids, storages, appliances)
- **Renewable gas** for heat market and heavy duty mobility
- Import of renewable energy to Europe as gas
  - **Decarbonizing despite missing production potentials of renewables**

powered by klima+ energie fonds

Projektpartner:

RAG, Montan Universität, IFA Tulln, BOKU, acib, Energie Institut an der Johannes Kepler Universität Linz, axiom Angewandte Prozesstechnik GES.M.B.H.

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Thank you for your kind Attention!