Underground Sun Conversion

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RAG Austria AG - Company Profile

- Among leading Underground Gas Storage Operators
- State of the art and most innovative Storage Operator
- Storage volume 66 TWh (6,0 bcm)
- Unload capacity 30 GW

Our vision:

- Positioning RAG's assets in a changing energy system

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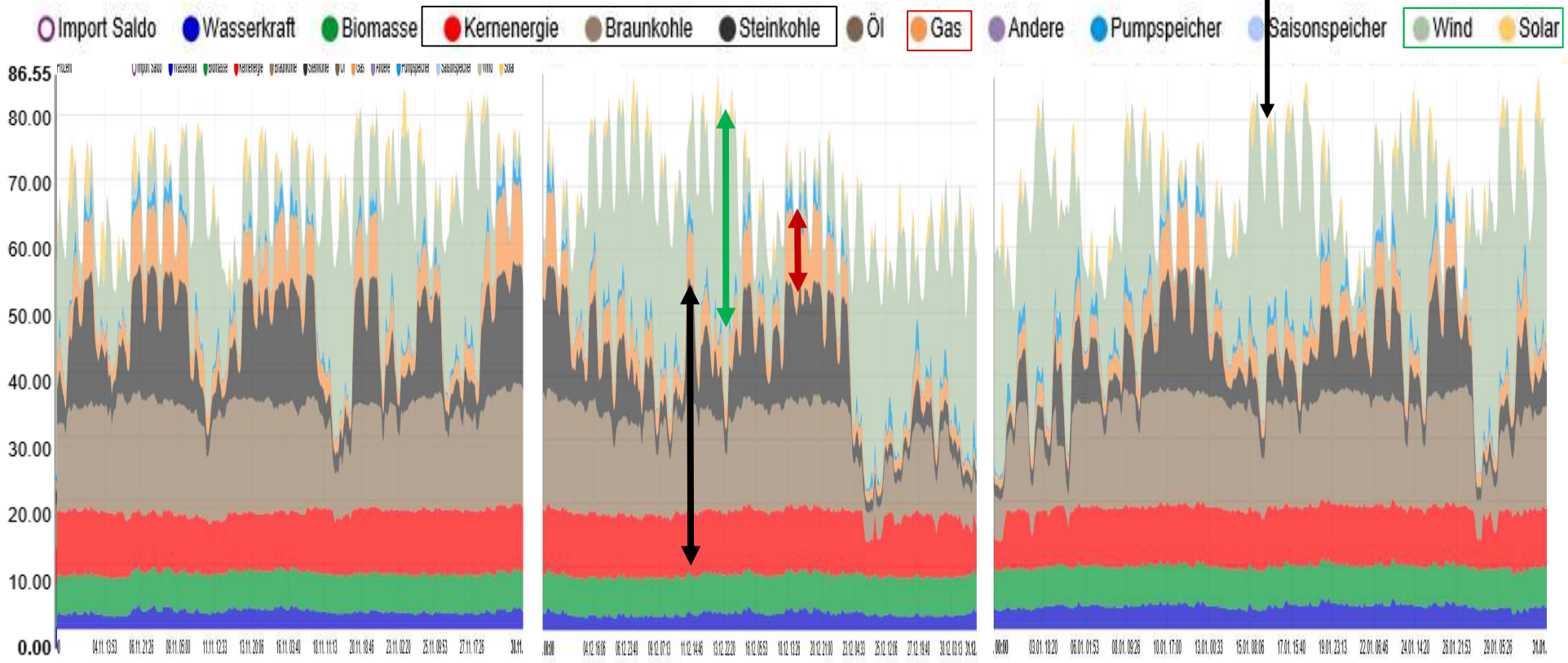
Additional electrification of transport and heat!

≈

Future perspective for UGS services



Nov. 2017 Dec. 2017 Jan. 2018

- Substitution of coal and nuclear power with wind, PV **and (green) gas**
- Required securing with gas power plants: Gas to Power
- Required management of surplus: Power to Gas

} Both leads to demand of storage capacities

Quelle: energy-charts.de

Underground Sun Storage

No negative influence on the existing storage facility

- Used steel grades take 10 vol. % of hydrogen
- Suitable elastomers available
- Cementation of wellbore does not react with hydrogen

Integrity of porous gas storages not threatened by hydrogen

- No migration through cap rock or cementation of the wellbore
- No H_2S generation
- No alteration of reservoir rock
- Microbial reactions can be handled

Conclusion – Sun Storage 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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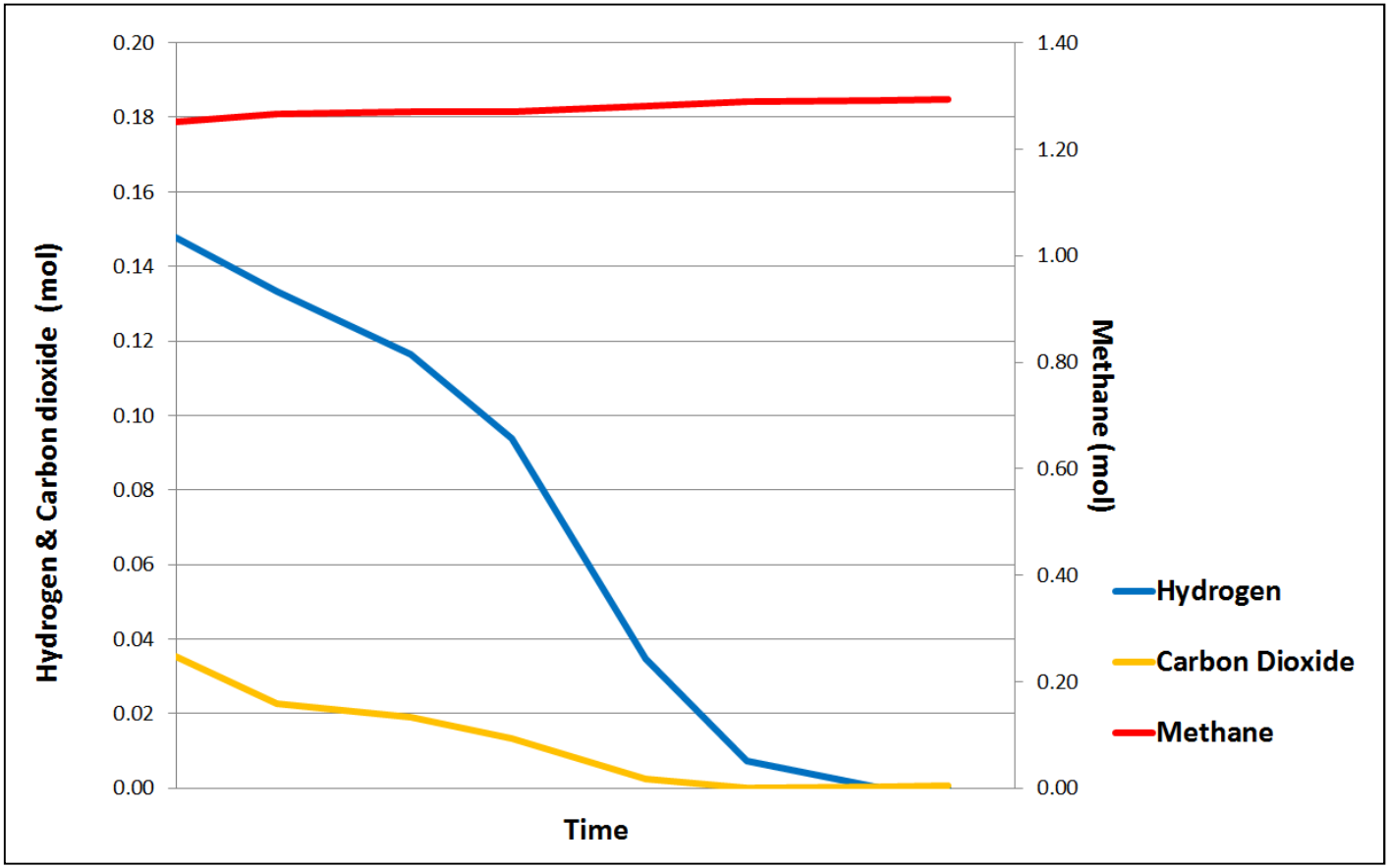
University of Natural Resources and Life Sciences, Vienna

Changes in gas composition



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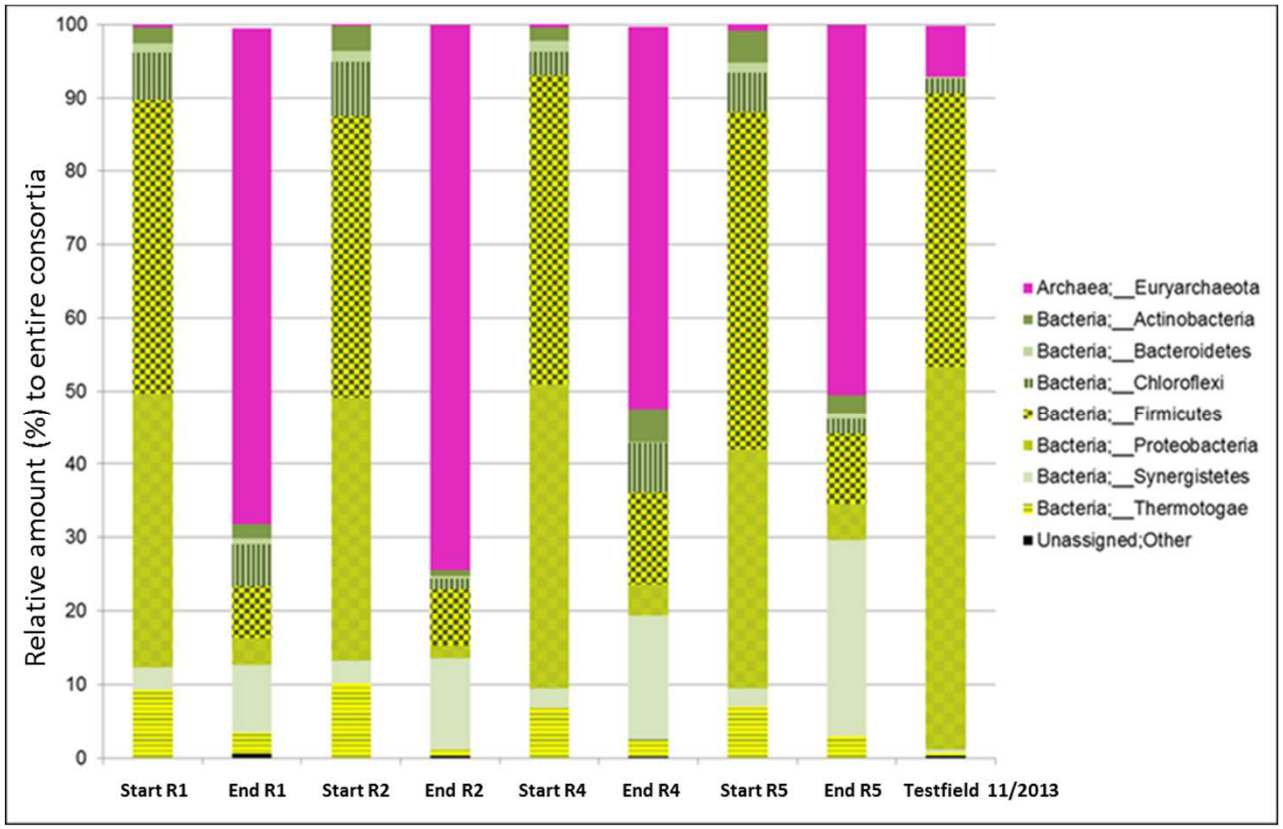
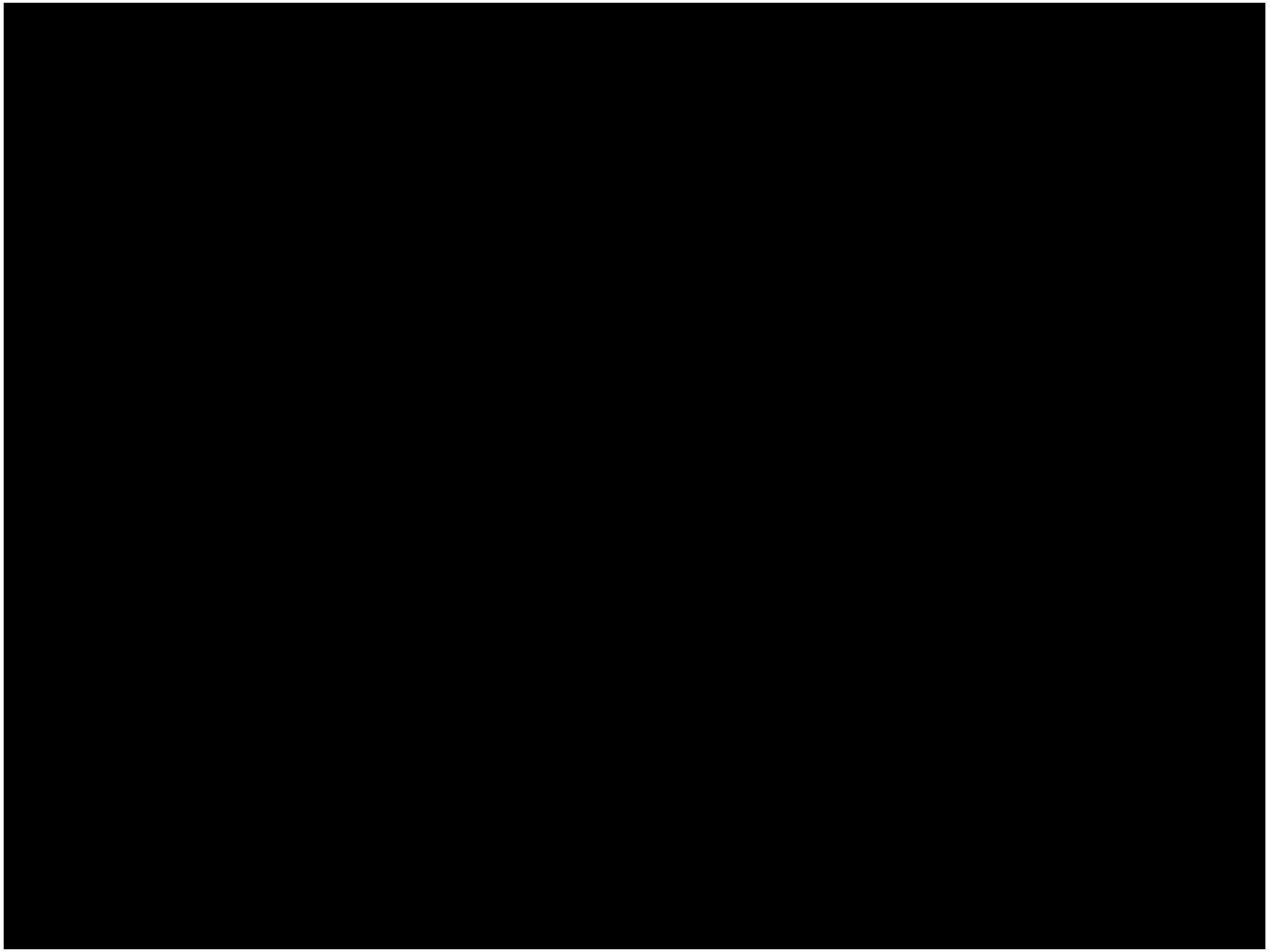
Changes in microbiology



Underground Sun Conversion - Concept



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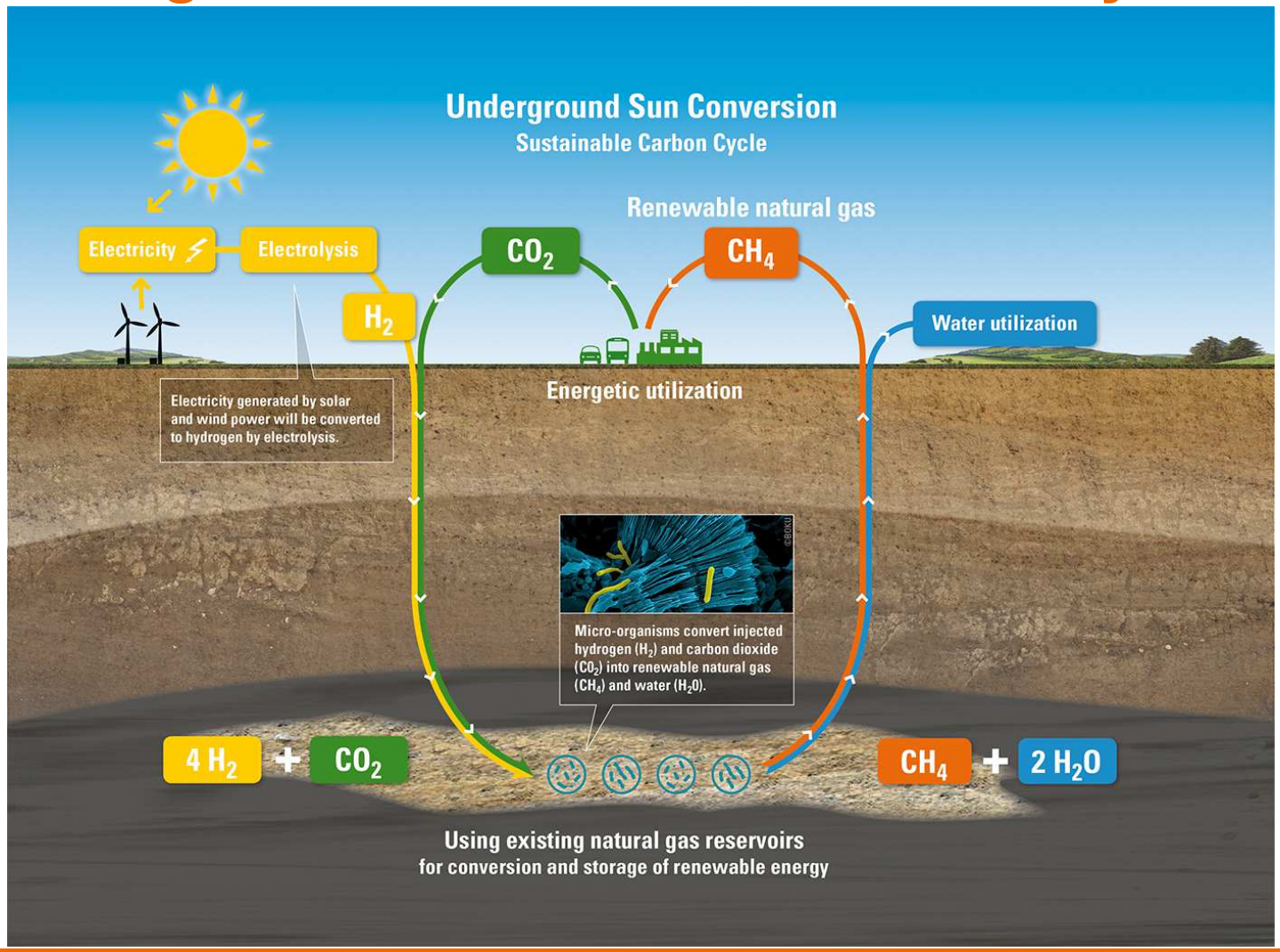
Natural gas in a sustainable Carbon cycle



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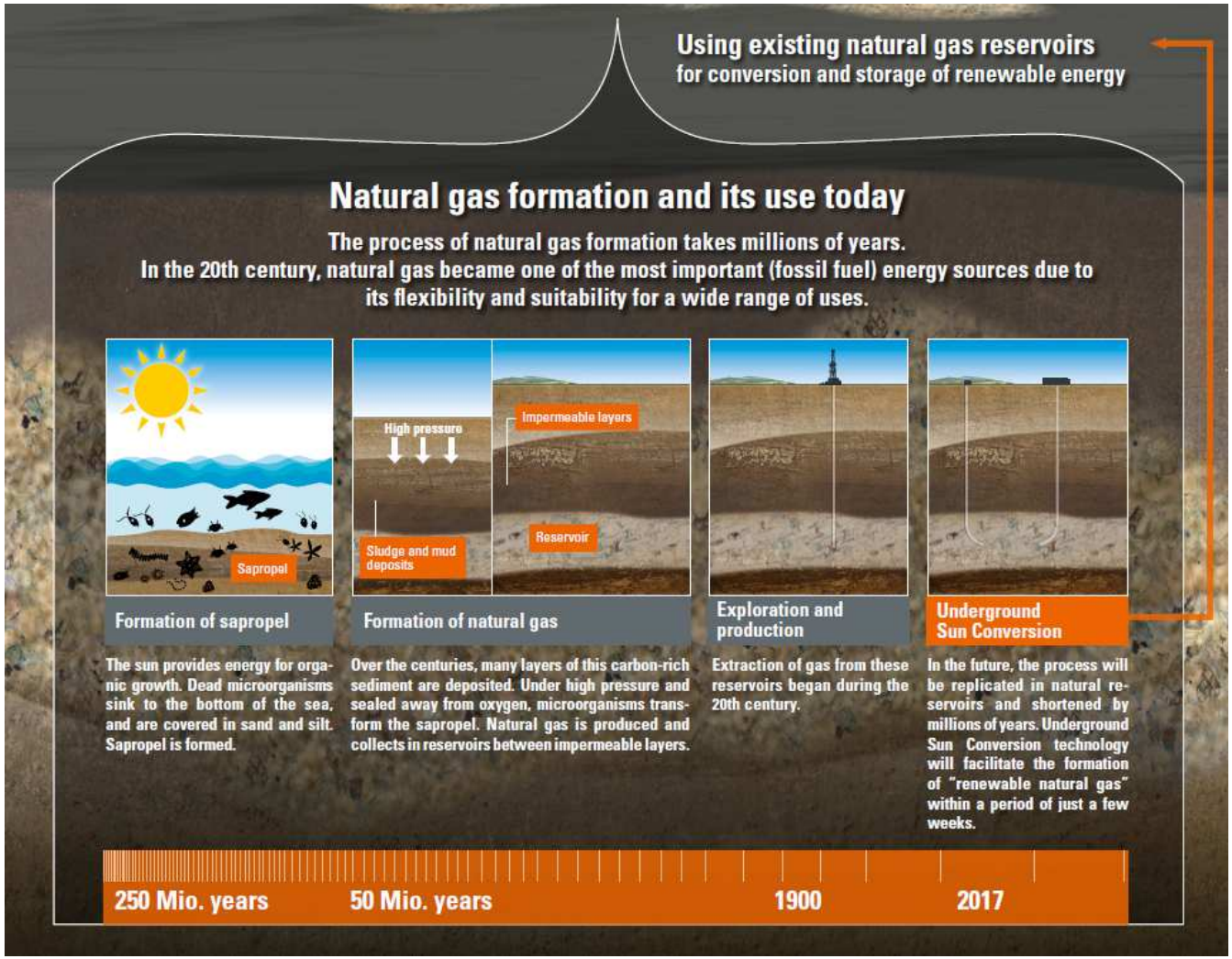
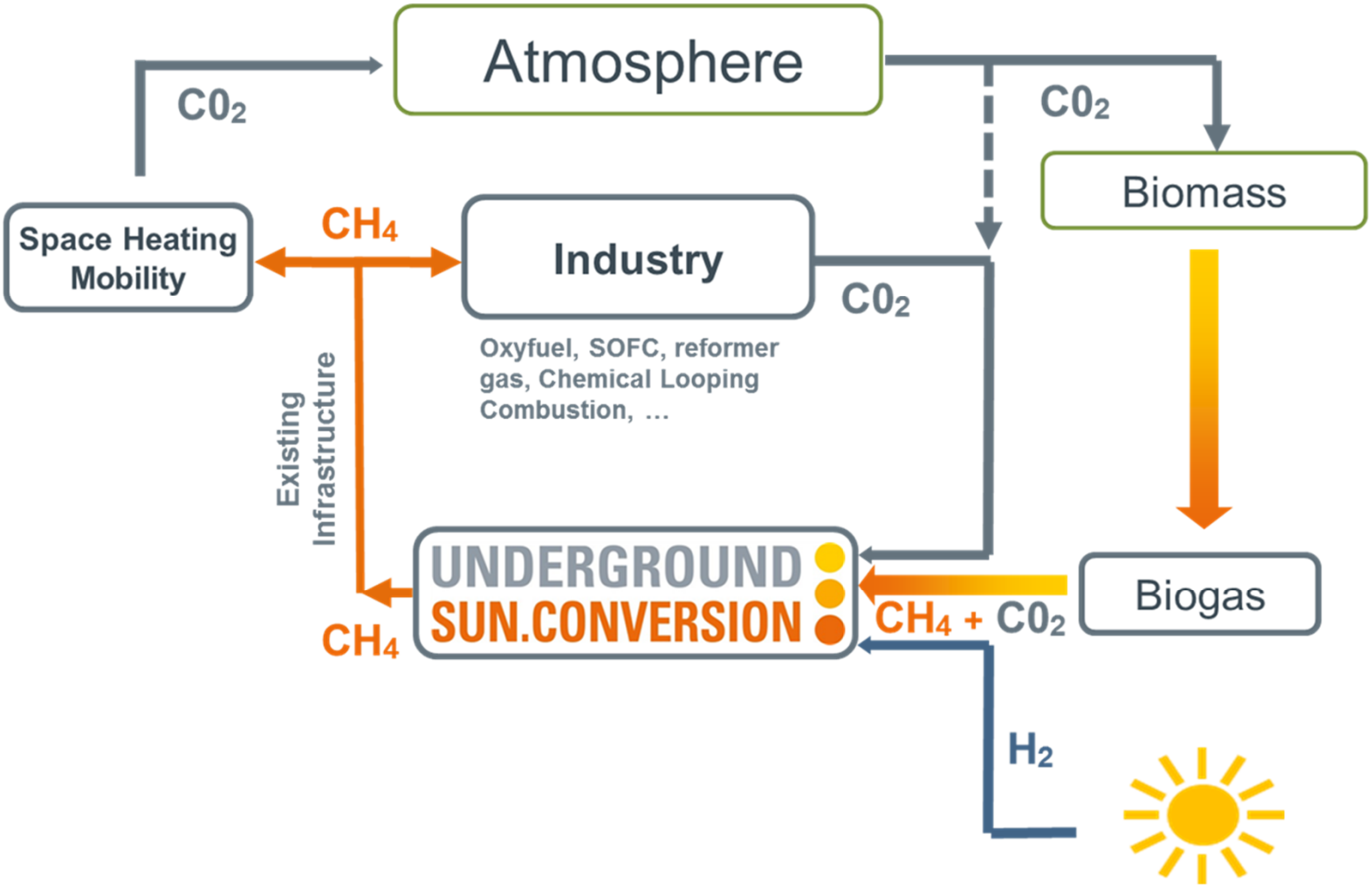
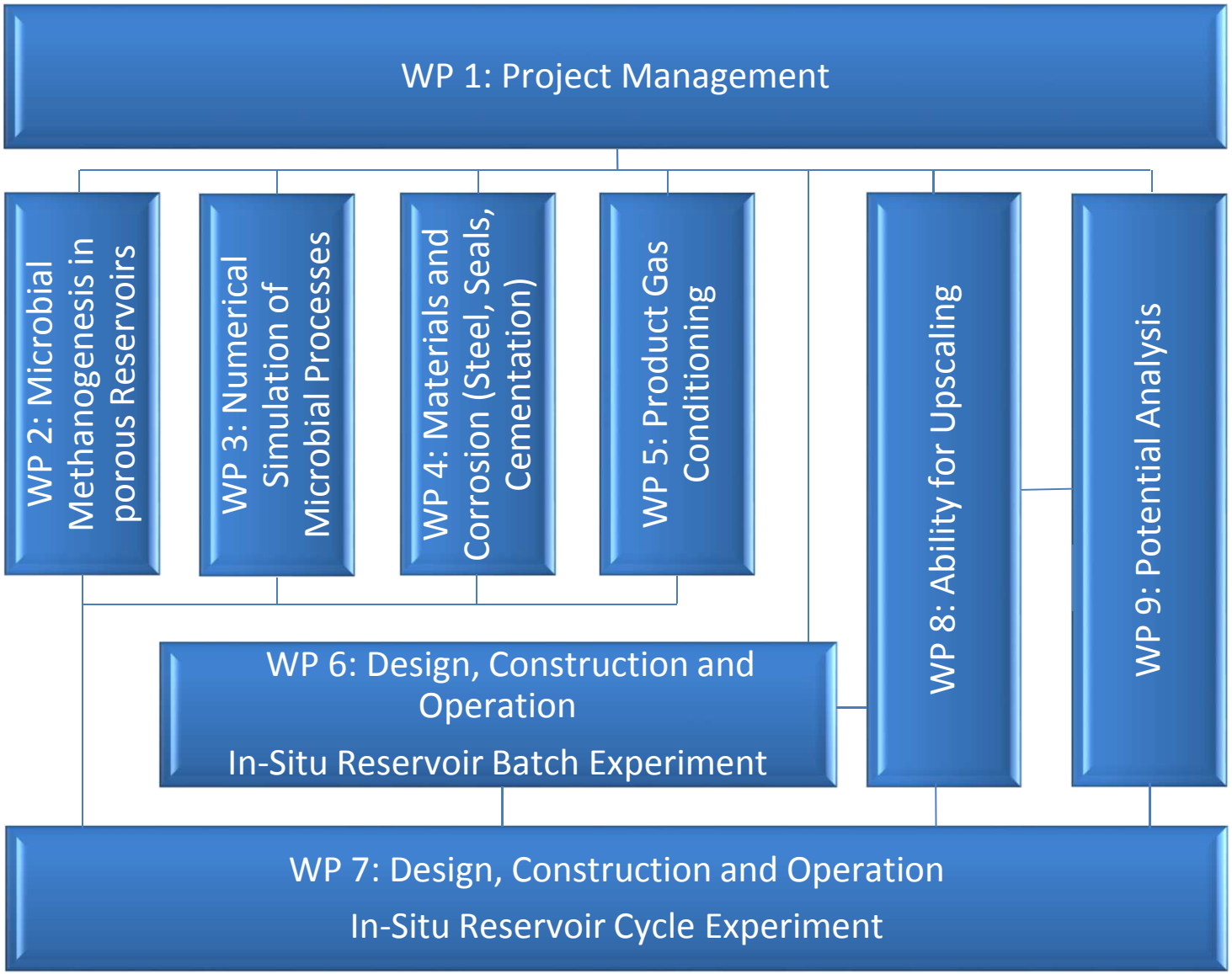
Geological history in fast motion



Establishing a Sustainable Carbon Cycle




WP 1: Project Management
WP 2: Microbial Methanogenesis in porous Reservoirs
WP 3: Numerical Simulation of Microbial Processes
WP 4: Materials and Corrosion (Steel, Seals, Cementation)
WP 5: Product Gas Conditioning
WP 8: Ability for Upscaling
WP 9: Potential Analysis
WP 6: Design, Construction and Operation
In-Situ Reservoir Batch Experiment
WP 7: Design, Construction and Operation
In-Situ Reservoir Cycle Experiment

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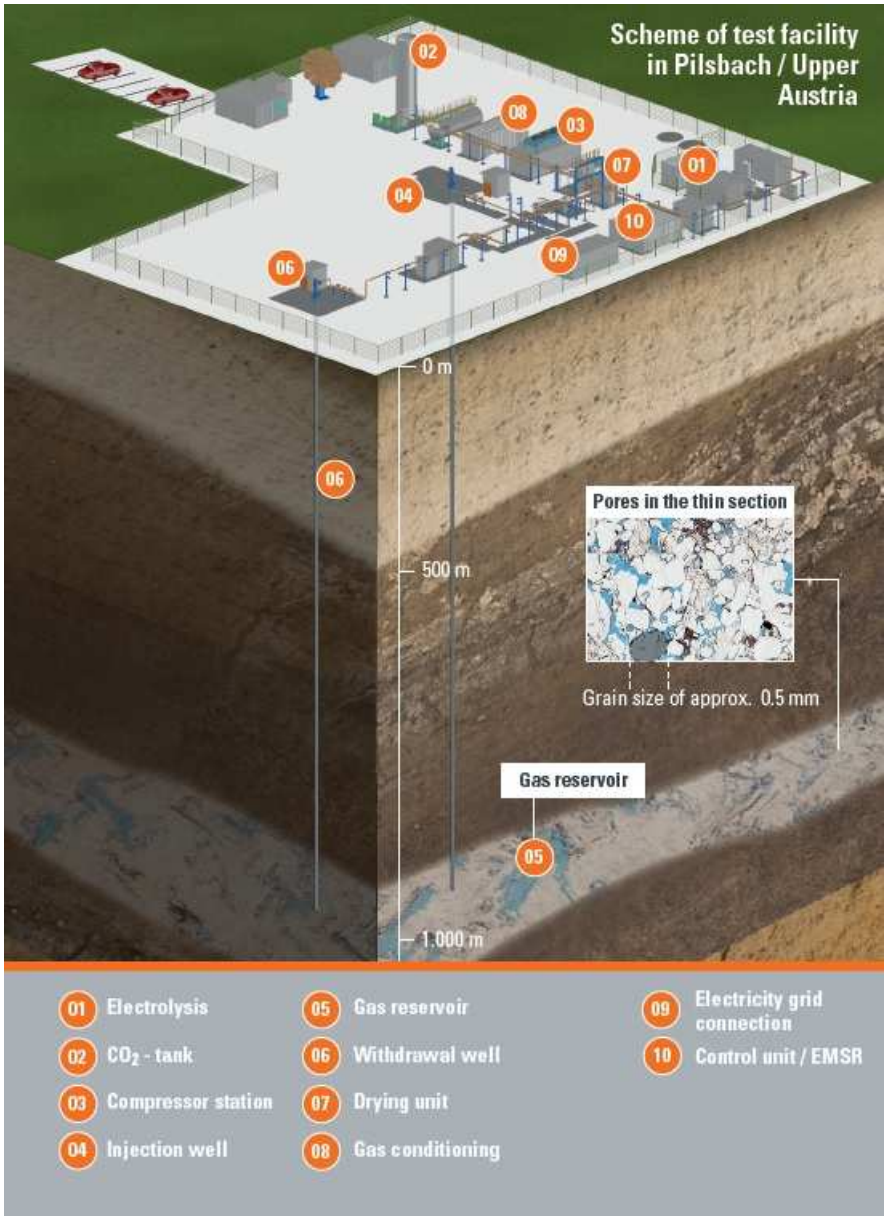
Schematic View



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Construction Works

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Timeline

- 03/2017: Start of project
- 01/2018: Approval by public authorities
- 03/2018: Start construction works
- 09/2018: Start batch experiments
- 02/2019: Drilling 2nd well
- 05/2019: Start cycle experiments
- 02/2021: End of project

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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 mobility
- Import of renewable energy to Europe as gas
  - **Decarbonizing despite missing production potentials**

powered by klima+ energie fonds

Projektpartner:

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- www.underground-sun-storage.at
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Thank you for your kind Attention!