

Self presentation & Research

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About Me

➤ Born in Lugo (RA), 1996



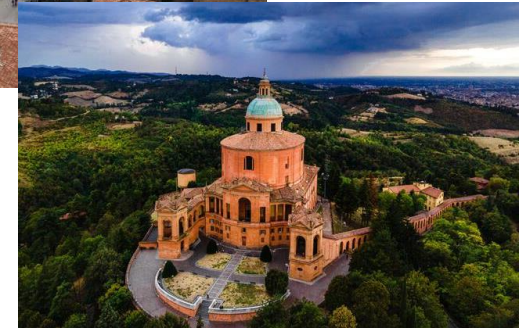
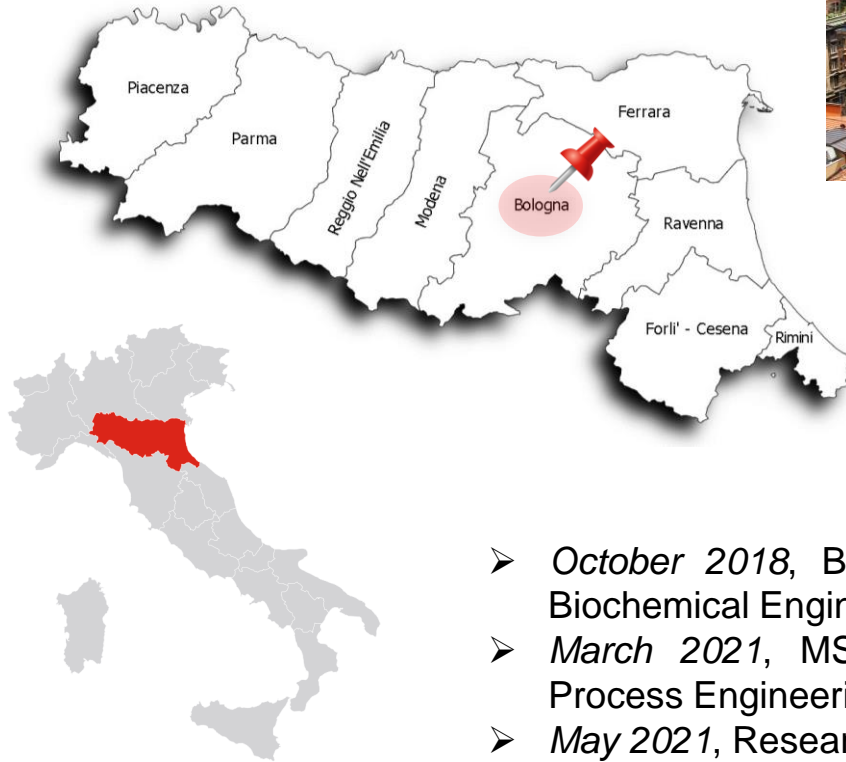
Basilica of San Vitale, Ravenna



➤ Hometown **Alfonsine** (RA)



Academic background



Sanctuary of San Luca, Bologna

- *October 2018*, BSc degree in Chemical and Biochemical Engineering
- *March 2021*, MSc degree in Chemical and Process Engineering
- *May 2021*, Research Fellow at DICAM



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

Academic background



ALMA MATER STUDIORUM
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NTNU

Norwegian University of
Science and Technology



**COTUTELLE
AGREEMENT**



➤ *November 2021*, PhD candidate
at DICAM, University of Bologna

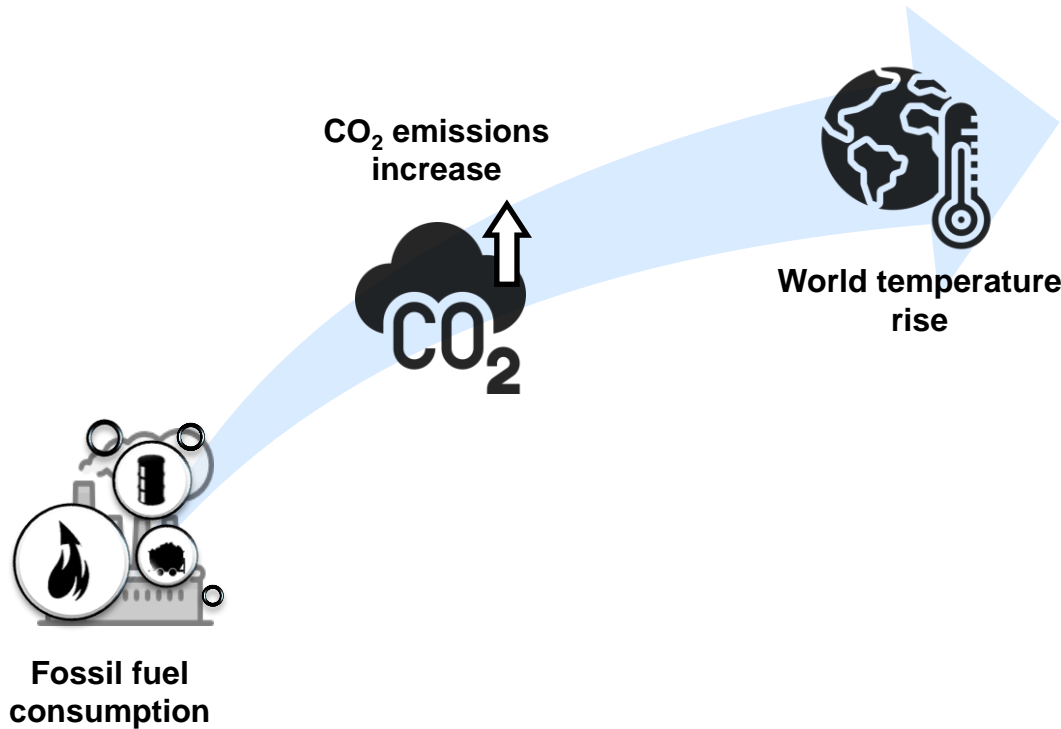
➤ *January 2023*, PhD candidate
at MTP, NTNU



“Advanced methods for the quantitative assessment of the safety of decarbonization technologies”



The global warming issue



Climate changes

- Sea level rise
- Wildfires
- Water shortage
- Biodiversity loss
- Crop failure
- Extreme weather

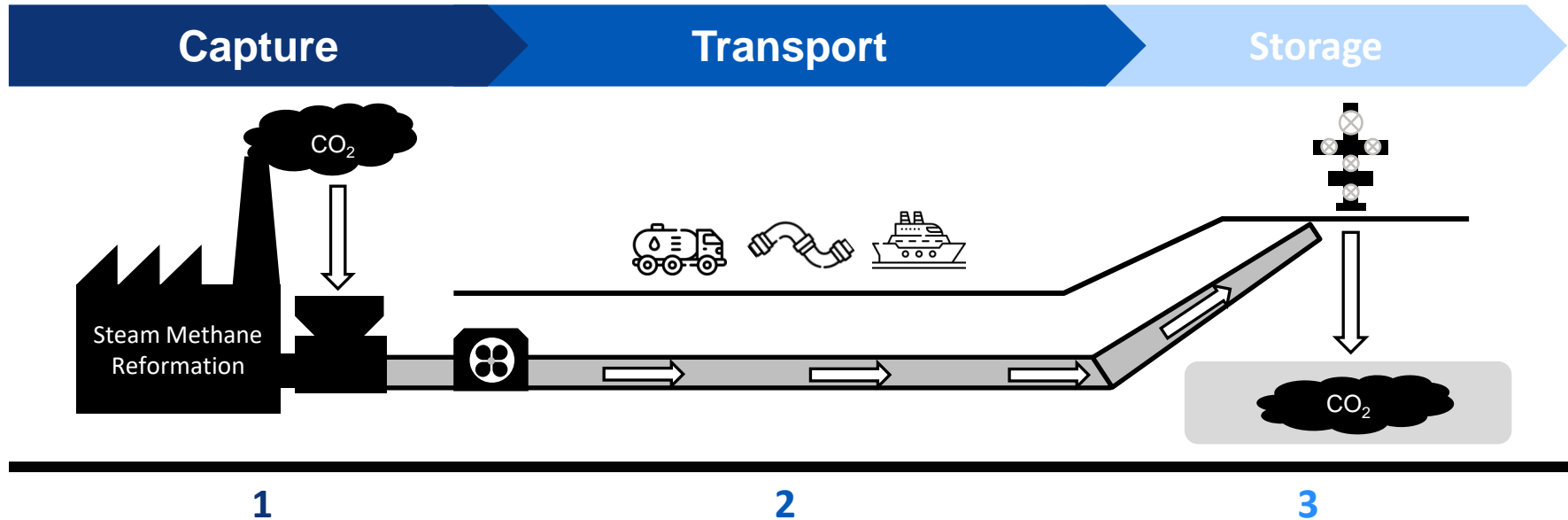
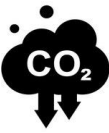


Consequences

- Spread of diseases
- Increased risk of wars and conflicts
- Impacts on human rights

...urgent decarbonization actions MUST be taken!

Carbon dioxide Capture and Sequestration (CCS)

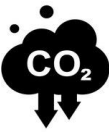


Capture plants take effluent streams from **steam methane reformer** and separate the offtake into CO₂ and other substances

The purified and compressed CO₂ is **pipelined, trucked** or **shipped** to the sequestration site

The pure CO₂ is **injected** into rock formations **deep underground**

CO₂ dangerous characteristics



For humans, CO₂ is both a **mildly toxic** and a **physical stressor**:

- ✓ toxicity thresholds: $LC50_{\text{hmn},30\text{min}} = 92000 \text{ ppm}$,
IDLH = 40000 ppm
- ✓ cold burns threshold: -18 °C

For assets, CO₂ is a **physical stressor**:

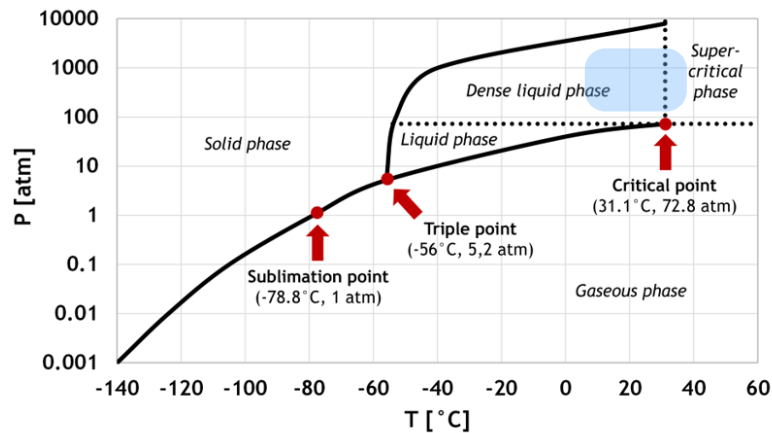
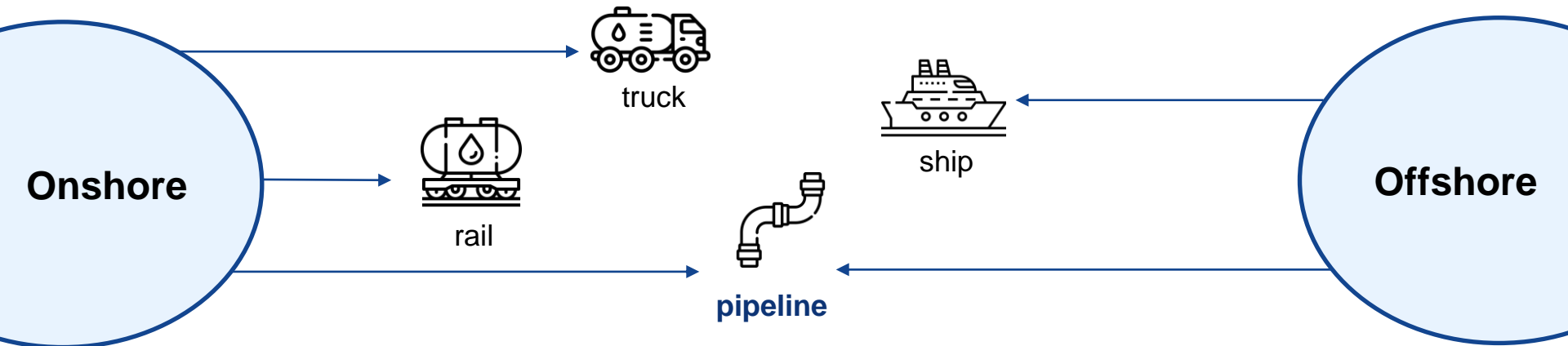
- ✓ cold embrittlement
- ✓ erosion due to abrasive solid dry ice particles

For the marine biota, CO₂ is a **toxic stressor**:

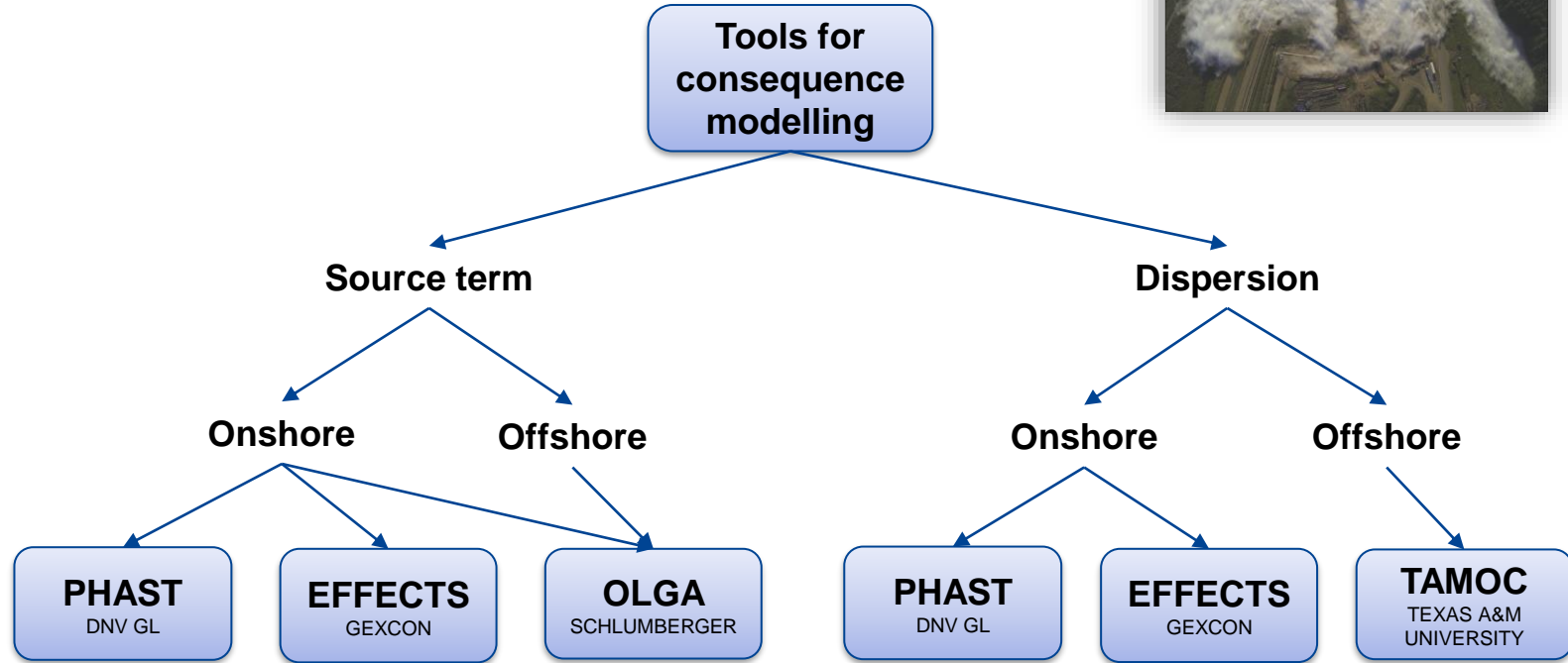
- ✓ pH ↓



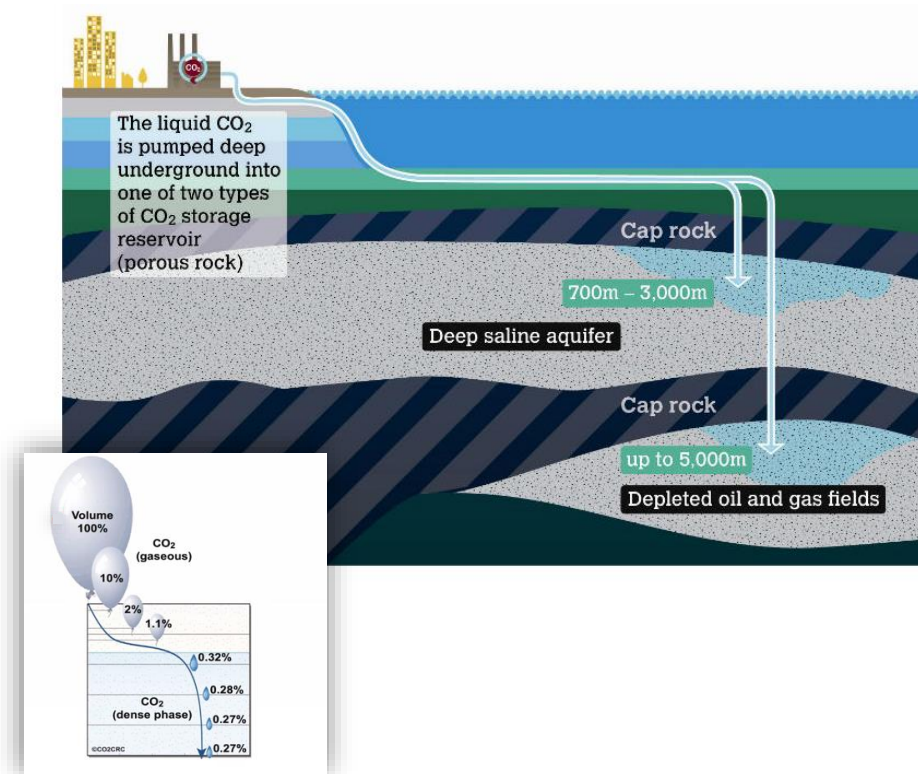
CO₂ transportation modes



Pipeline consequence analysis



CO₂ storage sites



Europe

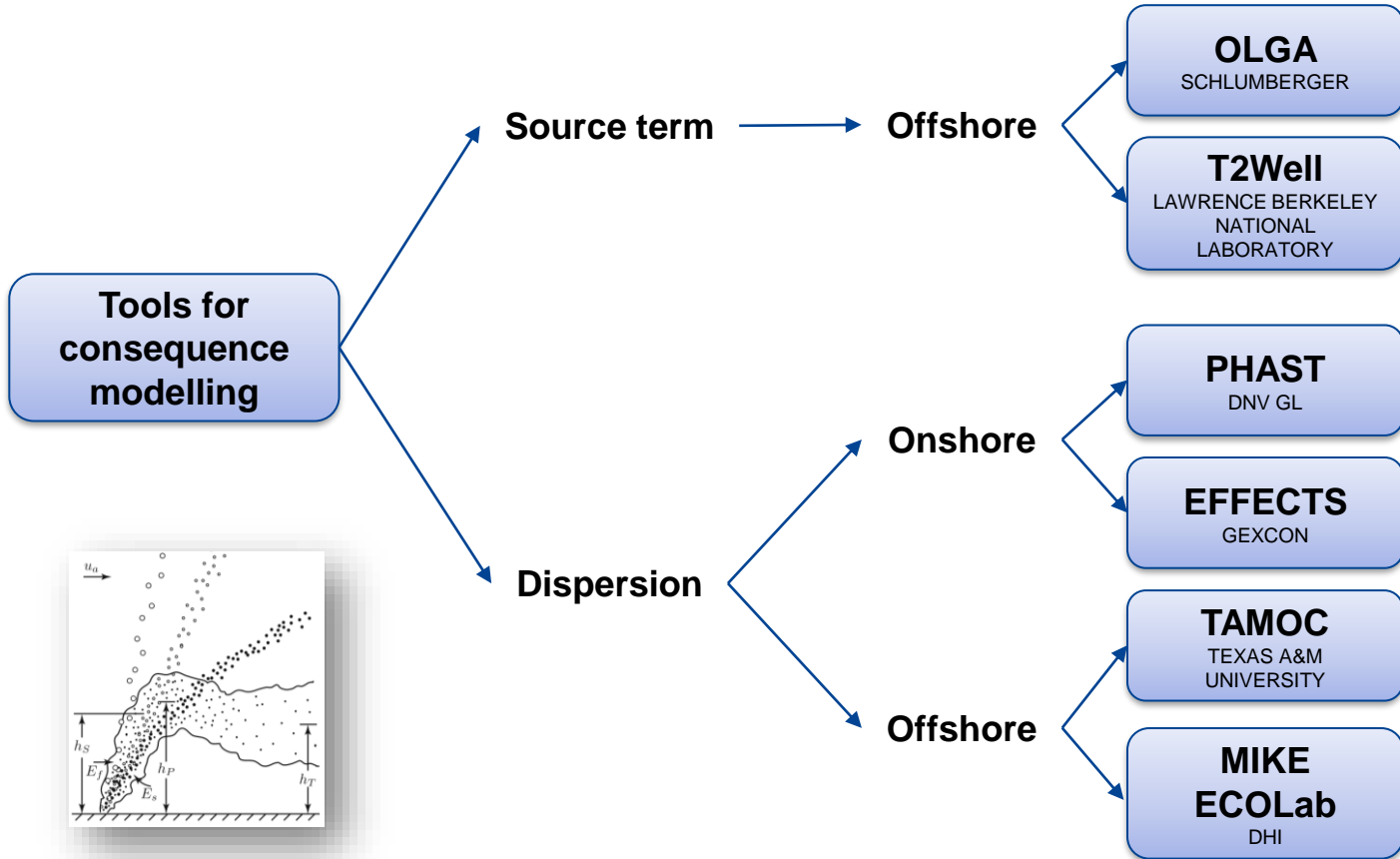
In the **North Sea**

- Saline aquifers

In the **Adriatic Sea**

- Depleted natural gas fields

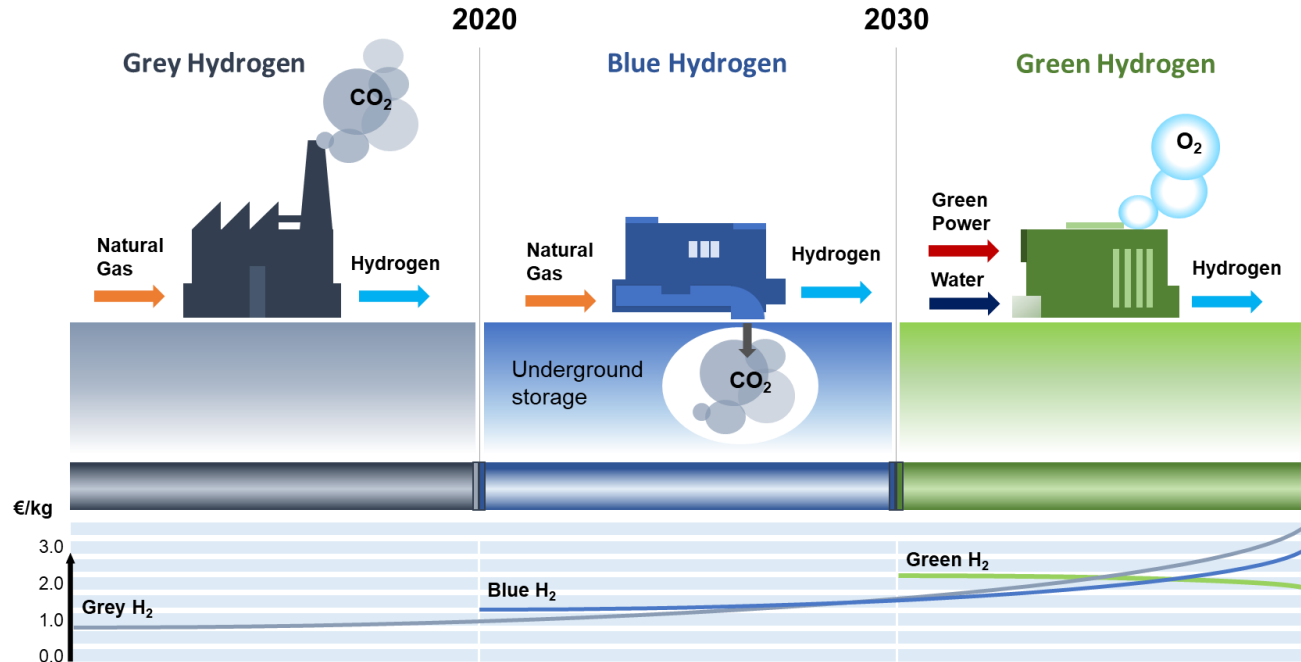
Injection well consequence analysis





Blue Hydrogen

The low-carbon technology supporting the energy transition



- Investigation of **Blue Hydrogen networks**
- Analysis of **Rapid Phase Transition (RPT)** phenomenon concerning **liquid H₂ (LH₂)** with potential validation of models against experimental data (SHIFT2 project)



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Thank you for your attention!

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