



“GREENing” HYDROCARBONS: MYTH OR REALITY?

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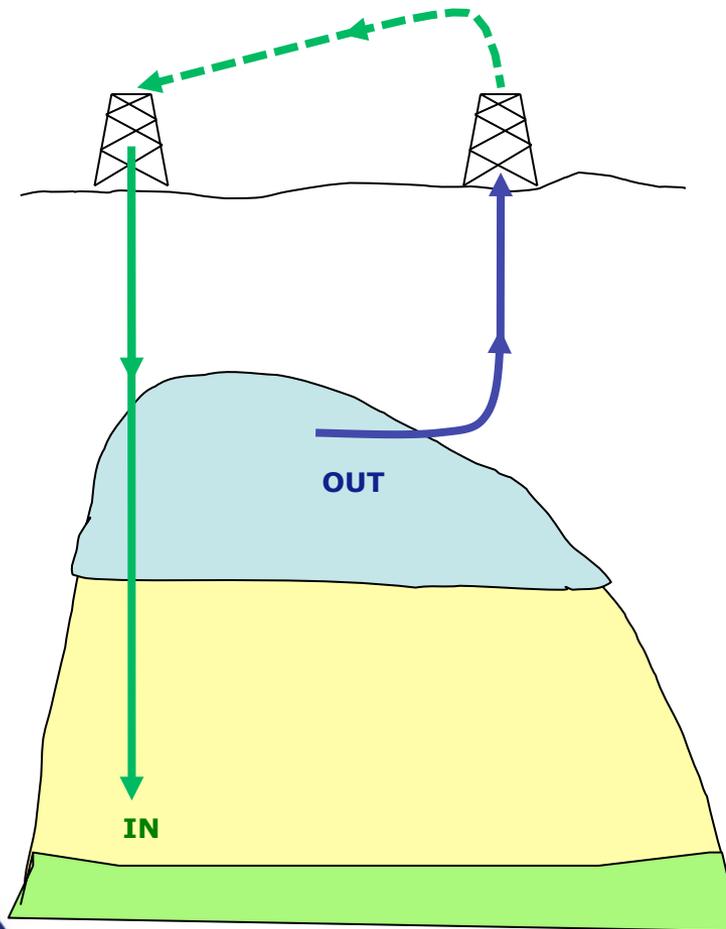
Presented by Sergio Persoglia, CO₂GeoNet

Setting the scene: CO₂ utilization and storage

- Humanity produces CO₂ which is a greenhouse gas
 - If an industrial unit is emitting CO₂ and not capturing it:
 - CO₂ is stored in the atmosphere
 - This is our default and **worst** way of storing CO₂!!
 - Any other utilization / storage solution is **a lot** better
 - Even if CO₂ would leak (risks are tiny and decreasing with time) it's a leakage is not an eruption of tons of CO₂ (and even in this hardly possible case we are just back to our **current** scenario)
- Lots of energy is used to capture and compress CO₂. Pure storage (injection of CO₂ underground) means all of this energy is wasted!



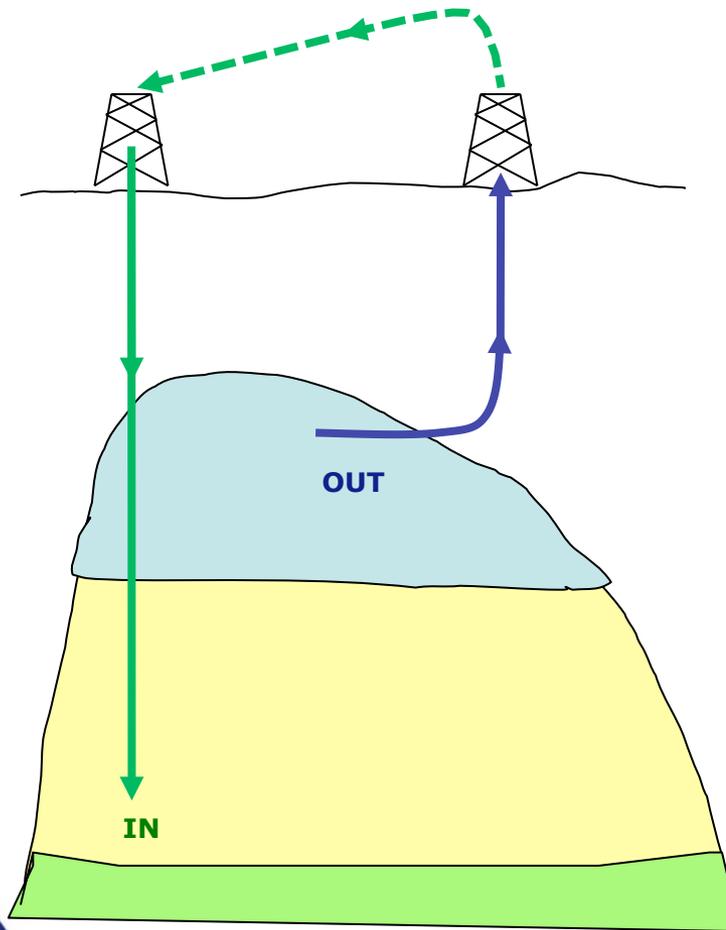
Traditional Enhanced Oil Recovery



Classical IOR/EOR

- Maximise:
 - Total "Out"
 - Rate of "Out" recovery
 - Profit
- At the same time minimize:
 - Total "In"
 - Purchased "In"
 - Expenses

I. EOR + Storage (CCS)



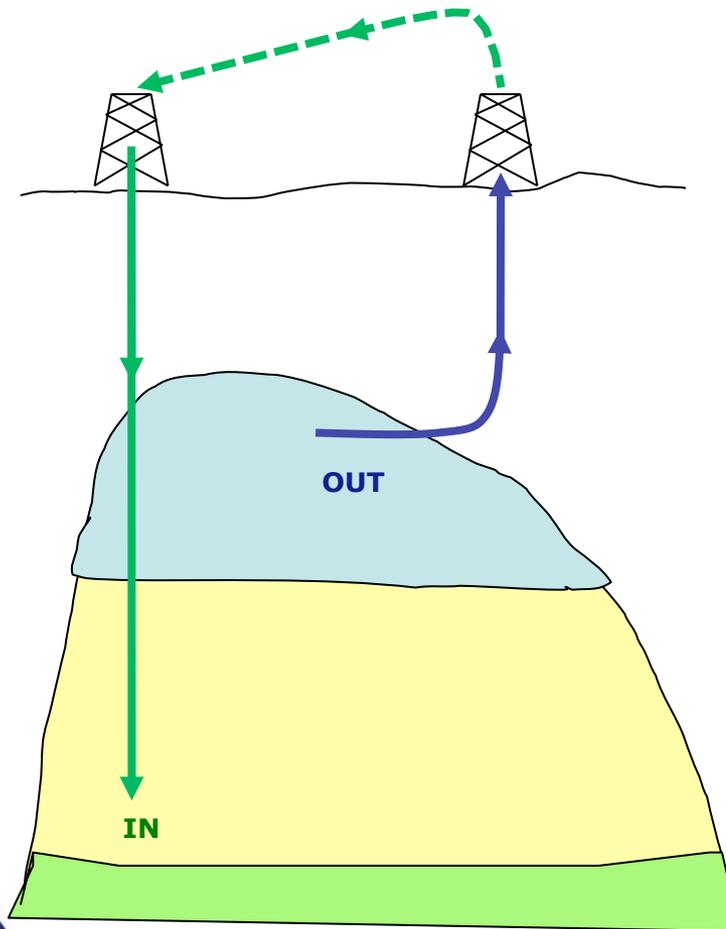
EOR + Storage = CCUS

- Maximise:
 - Total "Out"
 - Rate of "Out" recovery
 - Profit
 - Total "In"

- Optimise
 - Purchased "In"

- At the same time minimize:
 - Expenses

II. EOR + Storage (CCS)



Greening hydrocarbons?

→ Out:

→ Energy + H_xC_y

→ In:

→ CO_2

→ BALANCE is the key:

→ Energy + H_xC_y - CO_2

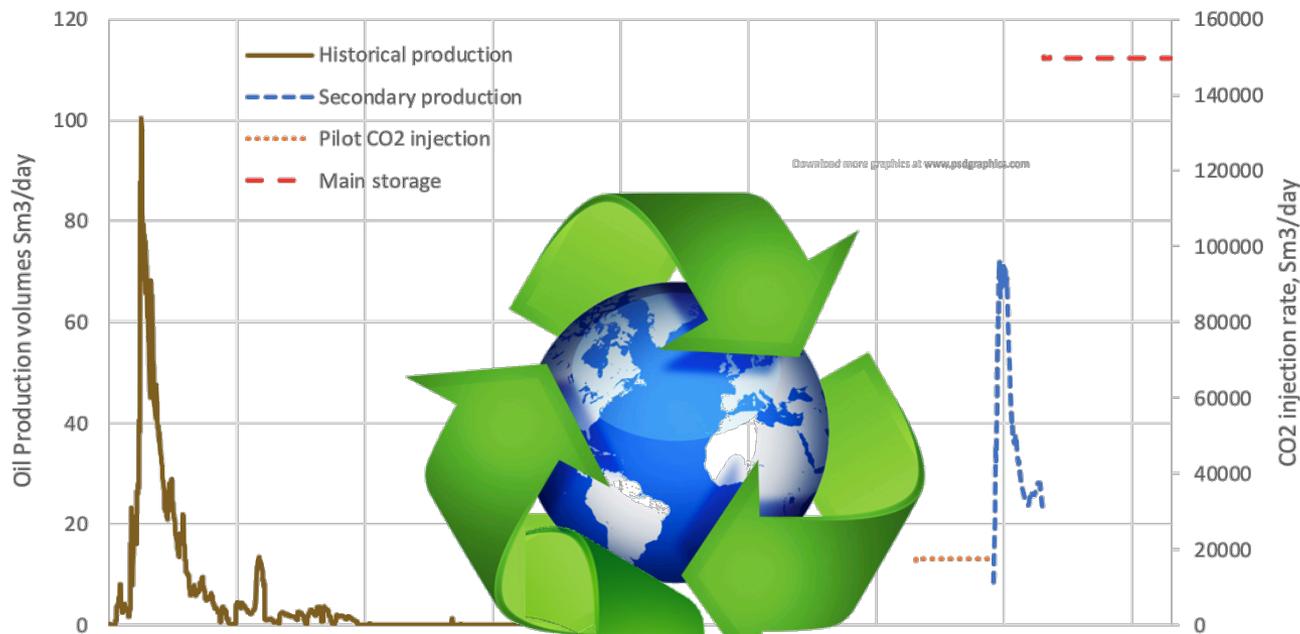
Enhanced hydrocarbon recovery (EHR)

- Extending field of life and utilizing existing infrastructure: saving on materials and energy use
- CO₂ stream is compressed. Injecting it underground without utilizing at least its energy is a waste!
- Among other gasses (nitrogen, hydrocarbon) CO₂ is typically the best displacing agent!
- In short: we would need HC (at least till 2050 according to IEA). Why don't make them greener (with CCS) and pay at least part of the bill to inject CO₂?



Simulated example case

- Pilot CO₂ storage 2020-2026; CO₂ EOR 2026-2029
- CO₂ storage 2030 – 2040



Total oil (both historical and EOR) recovery ~ 1.1 Million barrels

CO₂ generated from oil ~ 495 ktonns

Total stored: volume 523 ktonns (more storage volume available)



Way forward

- CO₂ – EOR is a proven and working method (mostly natural CO₂ onshore)
- None of the engineering questions in CCUS are show stoppers.
- Incentive to transition CO₂ EOR to CCS project is clear!
- Project proponents need regulatory clarity for CO₂ storage and EOR to meet the IPCC inventory guidelines for CCS!

