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Technology
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Enhanced Oil Recovery





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21 – 24 Nov

Use of synthesis gas for enhanced recovery processes: an option for carbon capture

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Enhanced Oil Recovery

Agenda

- Applications
- Flue Gas without CO2 separation?
- Surface treatment
- EOR alternatives
- Challenges

“The world needs CCUS technology, not anti-fossil fuel ideology.”
Michael J. Nasi. 2022.

Applications:

Possibility of including Flue Gas/CO2 streams

Bio-Nanofluids Dispersed in Gas Streams

Alteration of wettability and interaction with reservoir fluids to increase reservoir productivity and recovery.

Bio-Nano Foams

Increased stability through the inclusion of nanoparticles. Divergence options to increase productivity in uncovered areas with biosurfactants.

eWAG

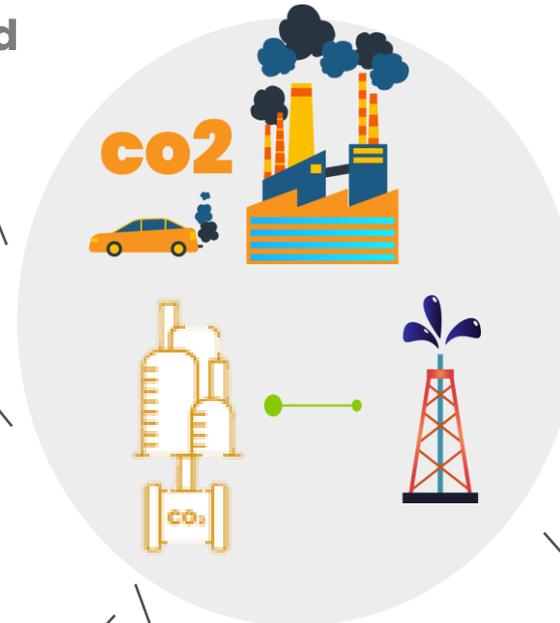
Water alternating gas with Gas injection (FlueGas without separation process) and inclusion of Nanoparticles and/or biofluids to increase Oil Recovery.

Unconventional resvs.

-Production in shale gas by CO2/Flue gas injection.-Energized Fracture Fluids

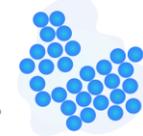
CCUS

Geostorage of CO2 in shallow reservoirs thanks to the inclusion of onvergent technologies, achieving considerable increases in storage efficiency.



Alternatives Powered by Nanotechnology increasing storage Efficiency and also the possibility of using it to increase hydrocarbon production.

Synergy with convergent tech.



Decarbonization applications in the Oil and Gas industry enhanced with Nanotechnology.
(Greater efficiency and better results)

Ongoing projects



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DE GRANADA

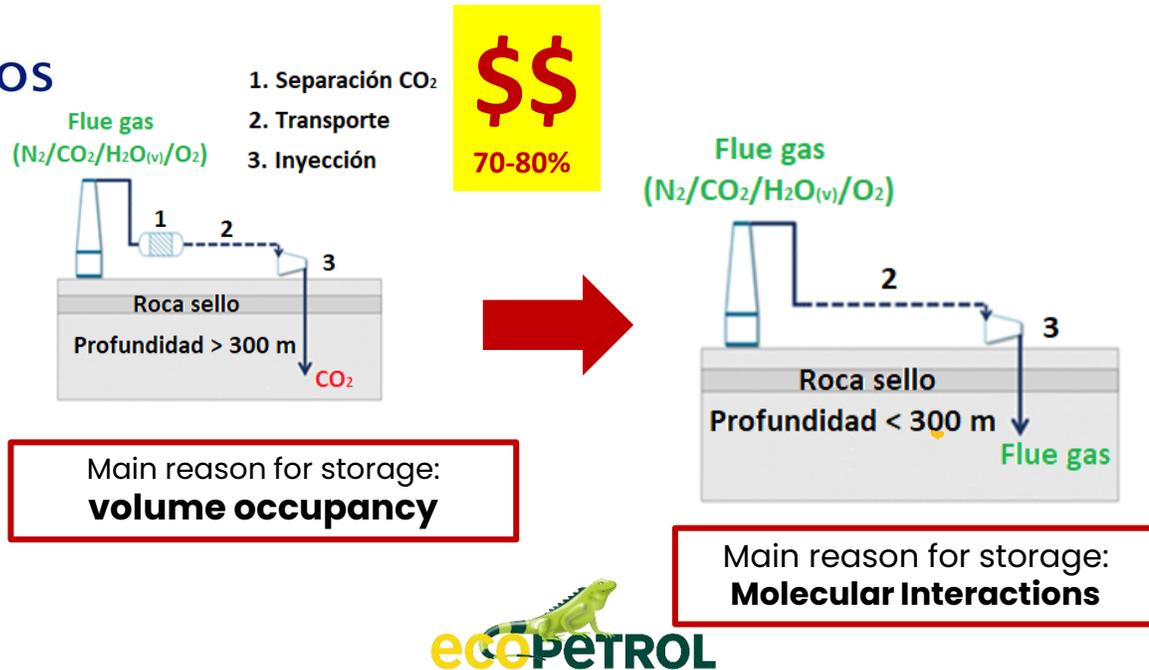


CCUS

Flue Gas without CO2 separation?

Flue Gas / CO2 Geostorage

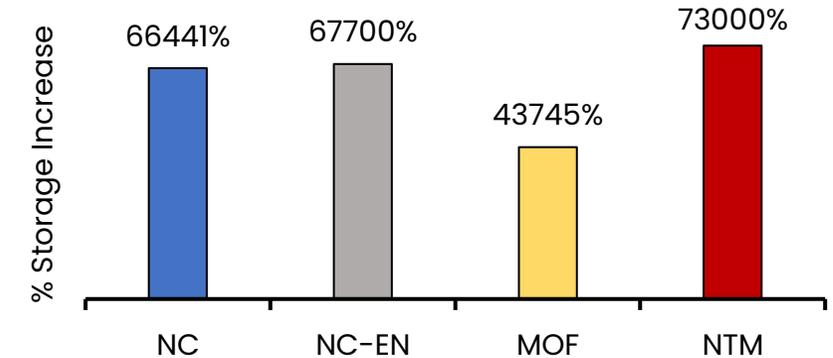
Inclusion of Nanotechnology in Shallow Reservoir to increase storage capacity.



Flue gas



Without separation



Inclusion of Nanotechnology in Shallow Reservoir to increase storage capacity.

Transport? Corrosion? Flue gas pre-treatment?

CCUS

Flue Gas without CO₂ separation?

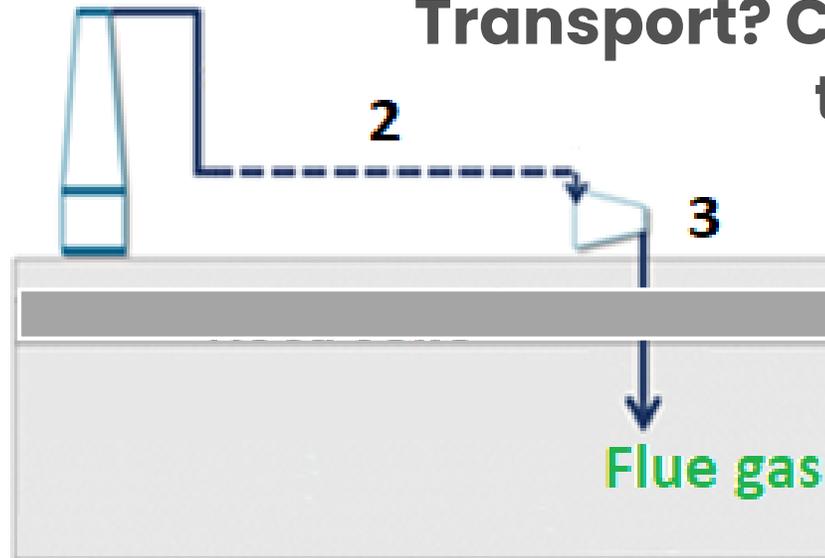
Flue Gas / CO₂ Geostorage

Inclusion of Nanotechnology in Shallow Reservoir to increase storage capacity.

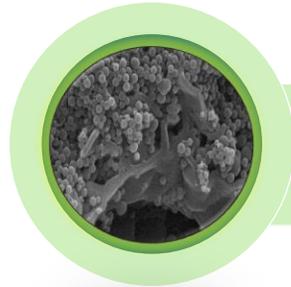
Flue gas
(N₂/CO₂/H₂O_(v)/O₂)


GRUPO ARGOS

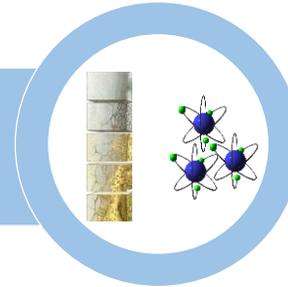
Transport? Corrosion? Flue gas pre-treatment?



Smart nanomaterials for cleaning water and gas streams



Bio-nanomaterials

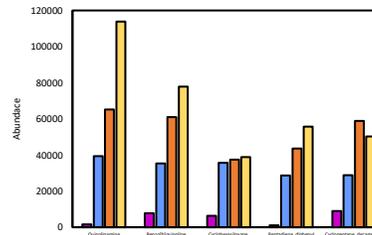
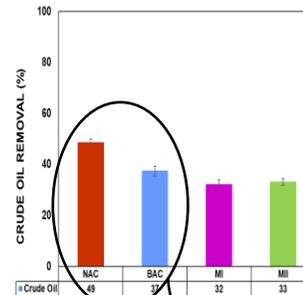


Nanointermediates

Biomaterials from hydrocarbon-degrading microorganisms (MHD) on chemically modified carbon nanointermediates (NIC) for selective removal of contaminants

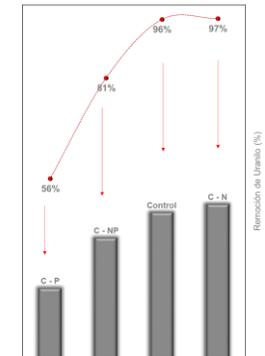


(MHD) + (NIC) = Biomaterial

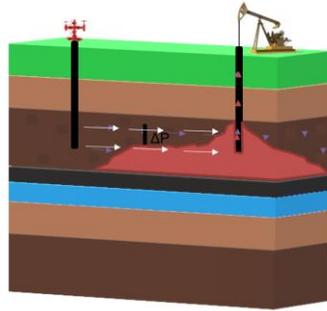


Nanointermediates obtained from agroindustry residues for the removal of radioactive elements from return waters during hydraulic fracturing

Radioactive URANIUM Adsorption Efficiencies – Up to 97% with basic carbons (500 mg/g of material in 4 hrs.)

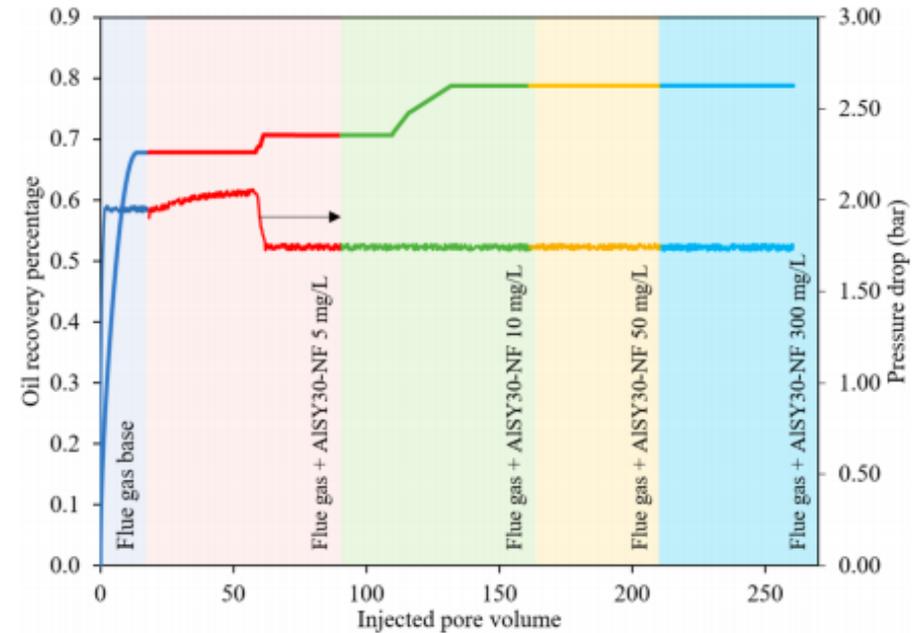
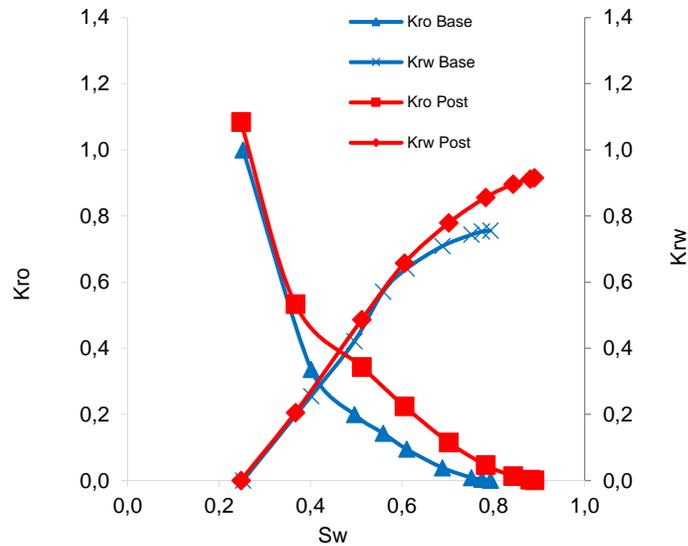


Reservoir Decarbonization Applications



Injection of chemicals (Bio-Nanofluids) dispersed in Flue Gas:

Stimulation based on the interaction with the rock
 Allowing to increase the N_c and decrease the saturation of residual oil, based on rock-fluid and fluid-fluid interactions.

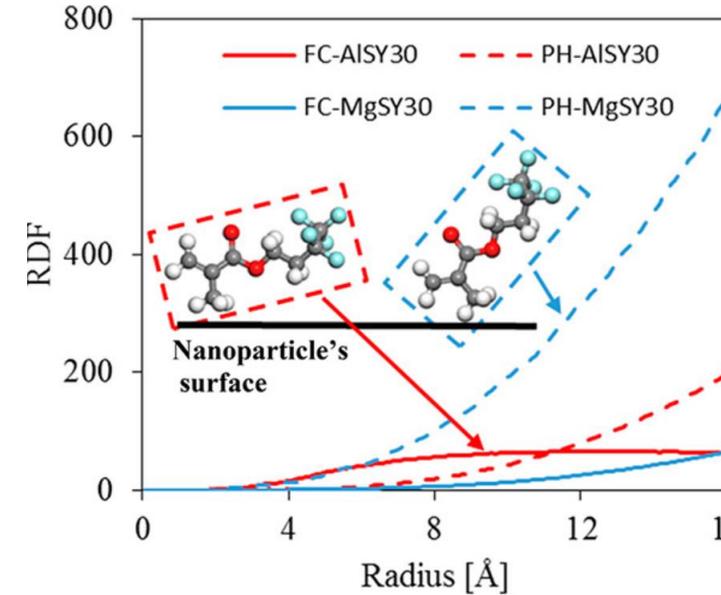
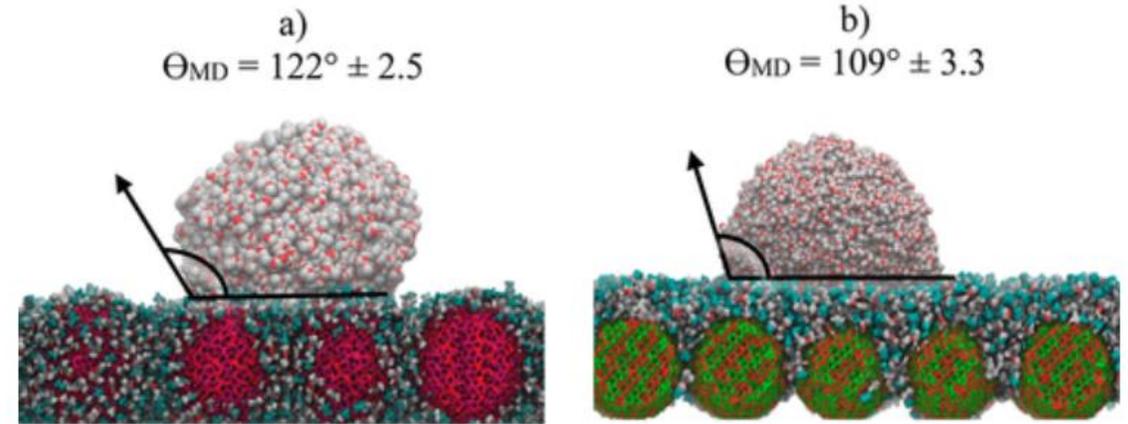
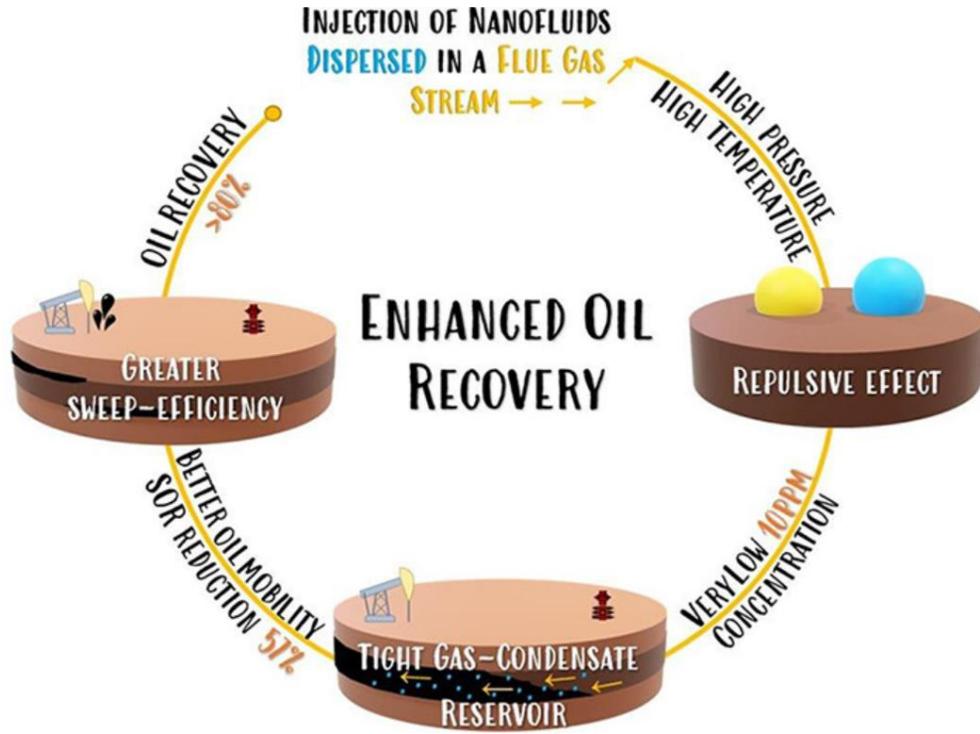


Wettability Alteration by Nanofluid

Las nanopartículas aumentan el % de aceite recuperado. La inyección de Flue Gas con Nps a 100 ppm disperso en su corriente mostró una reducción del 57% en la SOR.

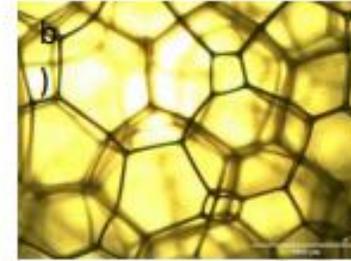
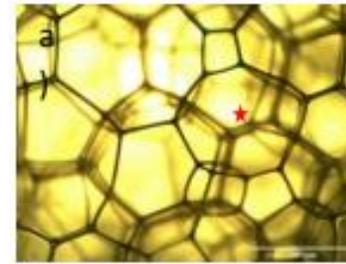
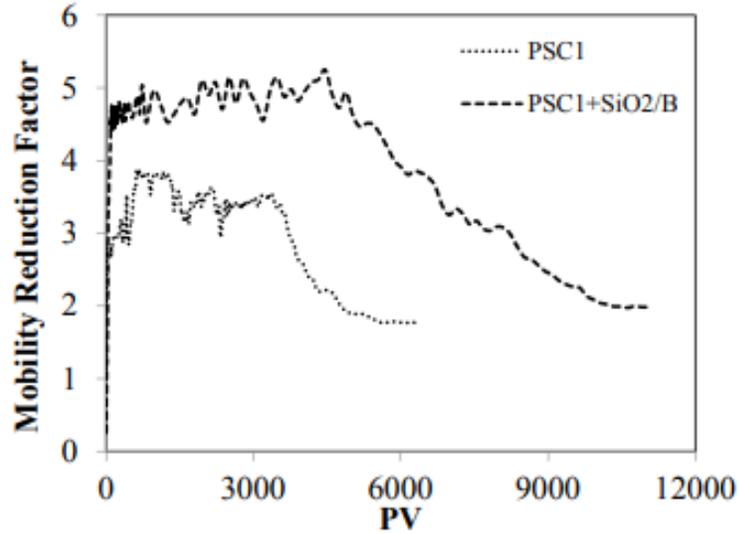
Reservoir Decarbonization Applications

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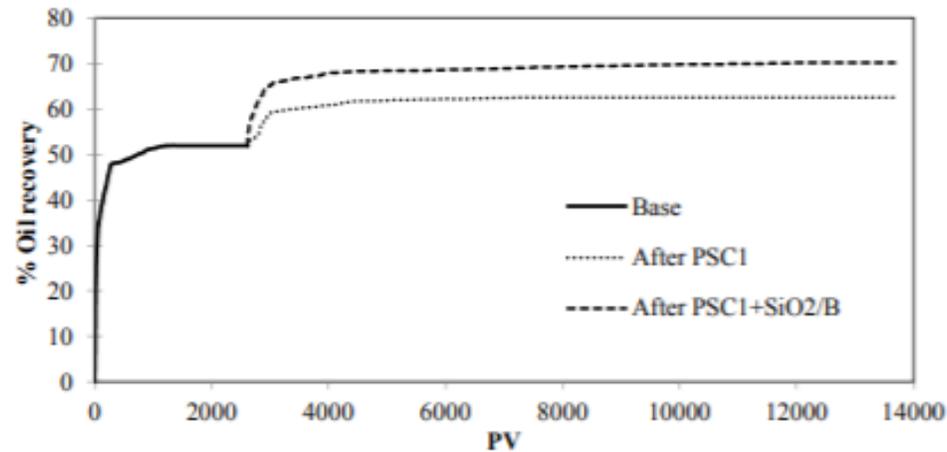
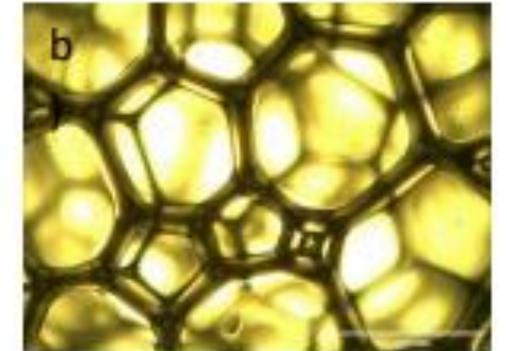
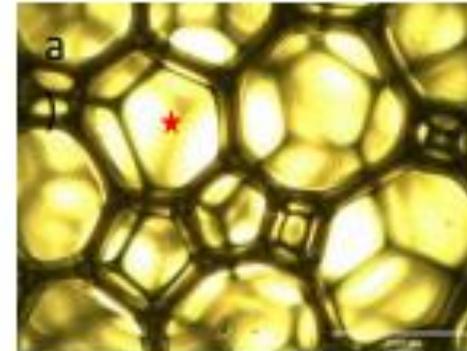


Reservoir Decarbonization Applications

CO₂ or Flue gas-based foams



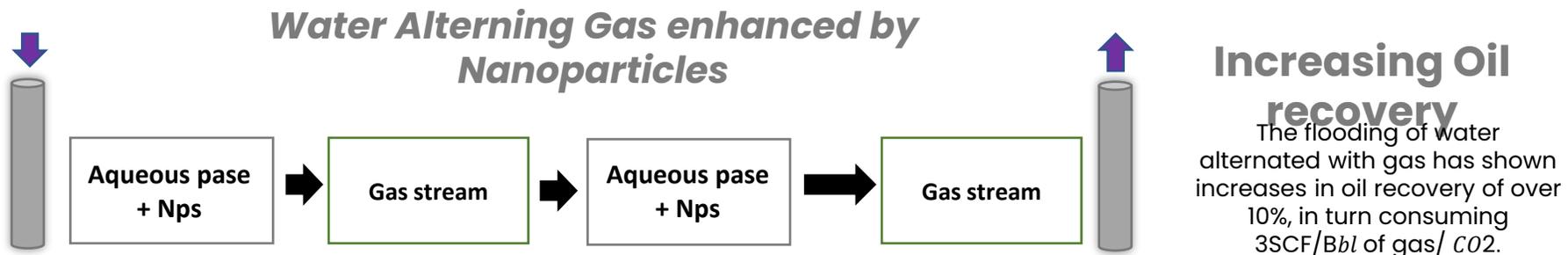
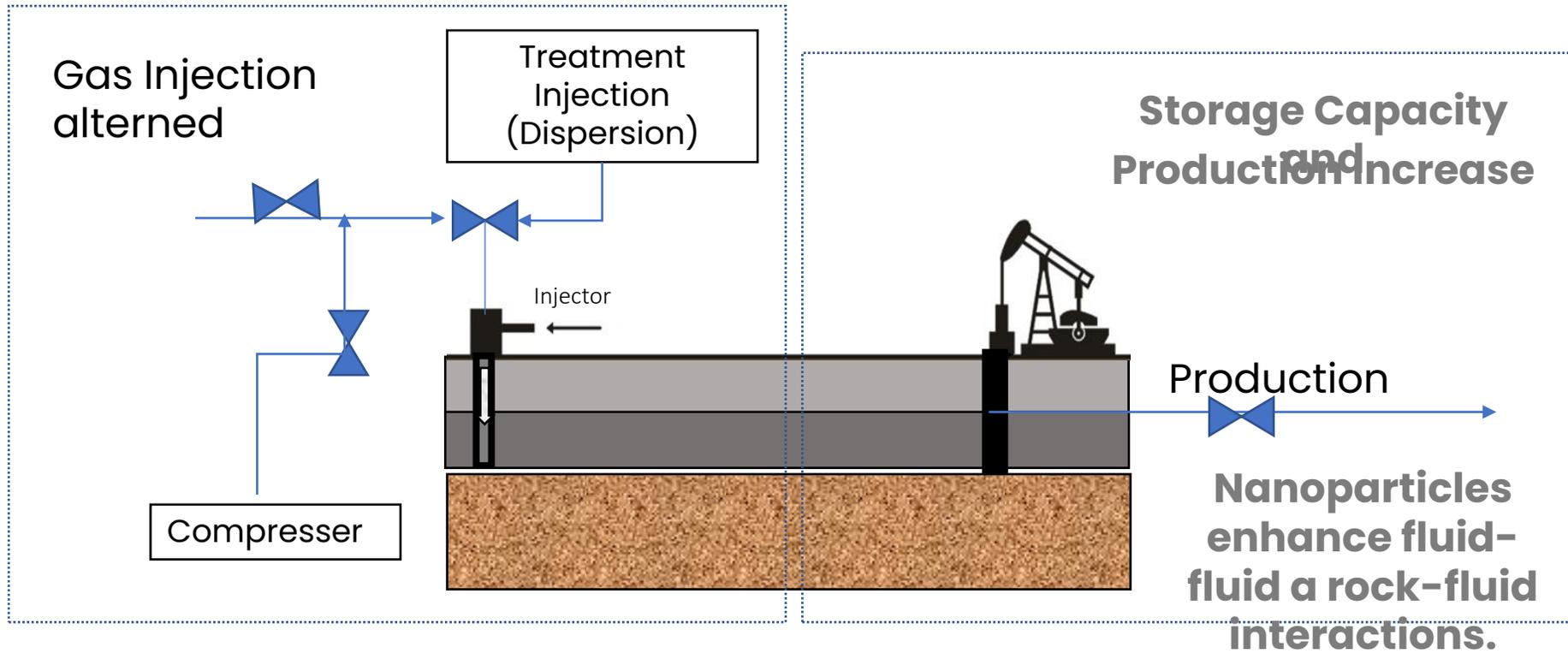
Greater foam stability due to the inclusion of nanoparticles



Mobility reduction factor in porous media with oil saturation. Oil recovery curves during foam tests in porous media

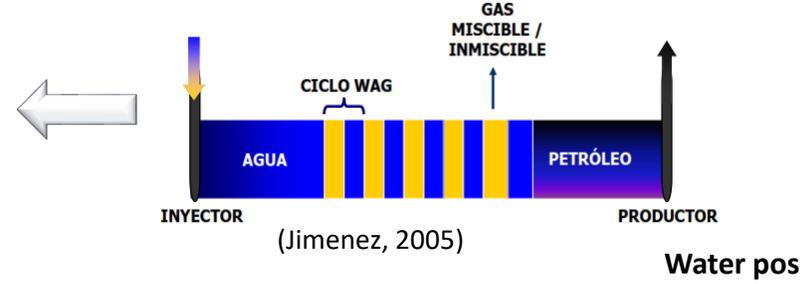
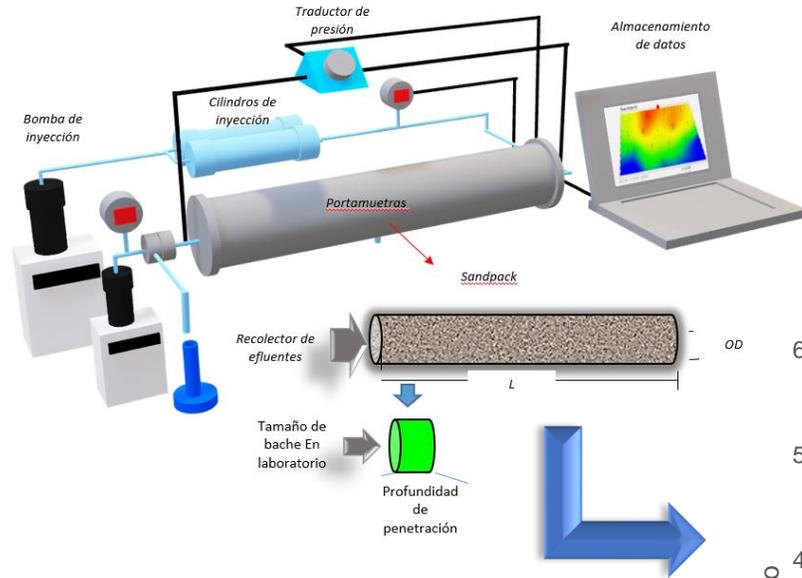
Other Options for Enhanced Oil Recovery (EOR)

EOR Procesos Enhanced Water Alternating Gas

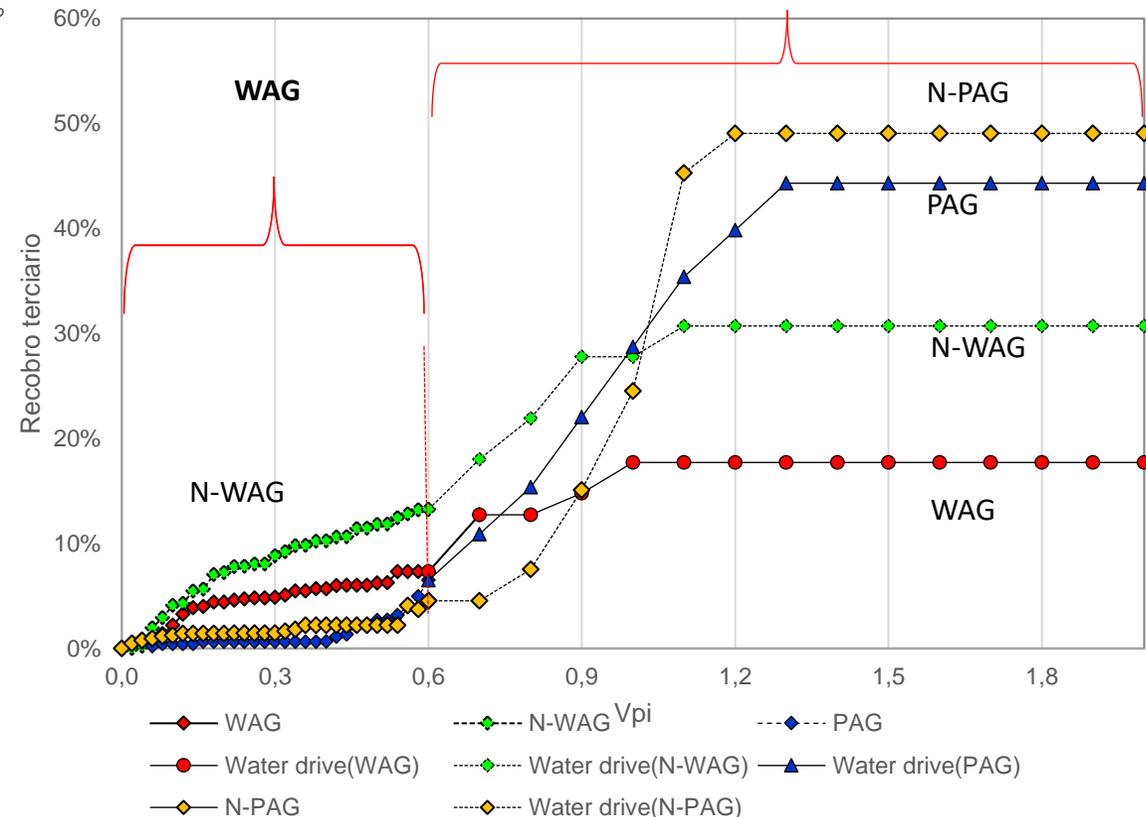
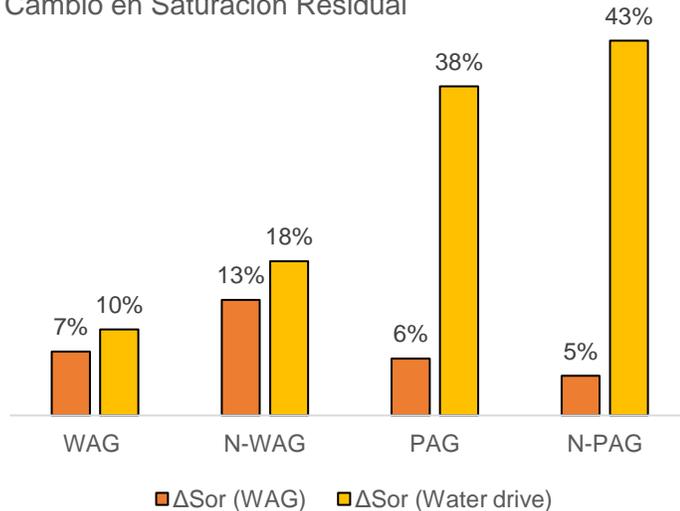


Reservoir Decarbonization Applications

EOR – eWAG (Enhanced Water Alternating Gas)

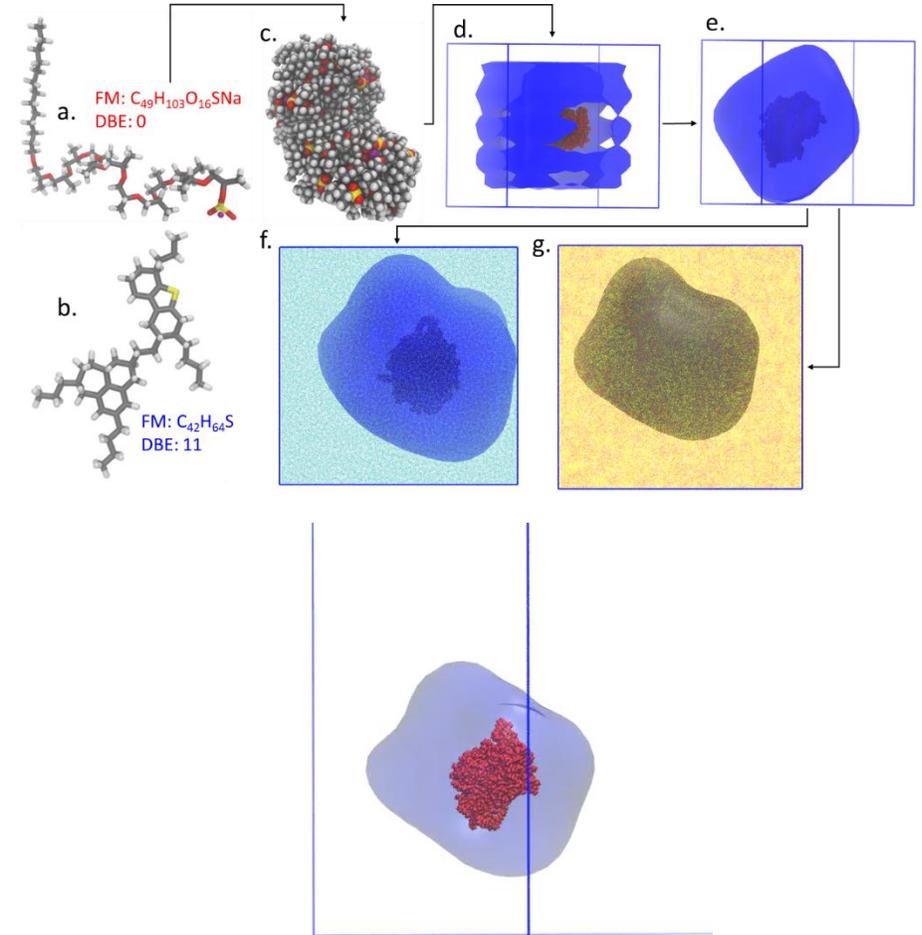
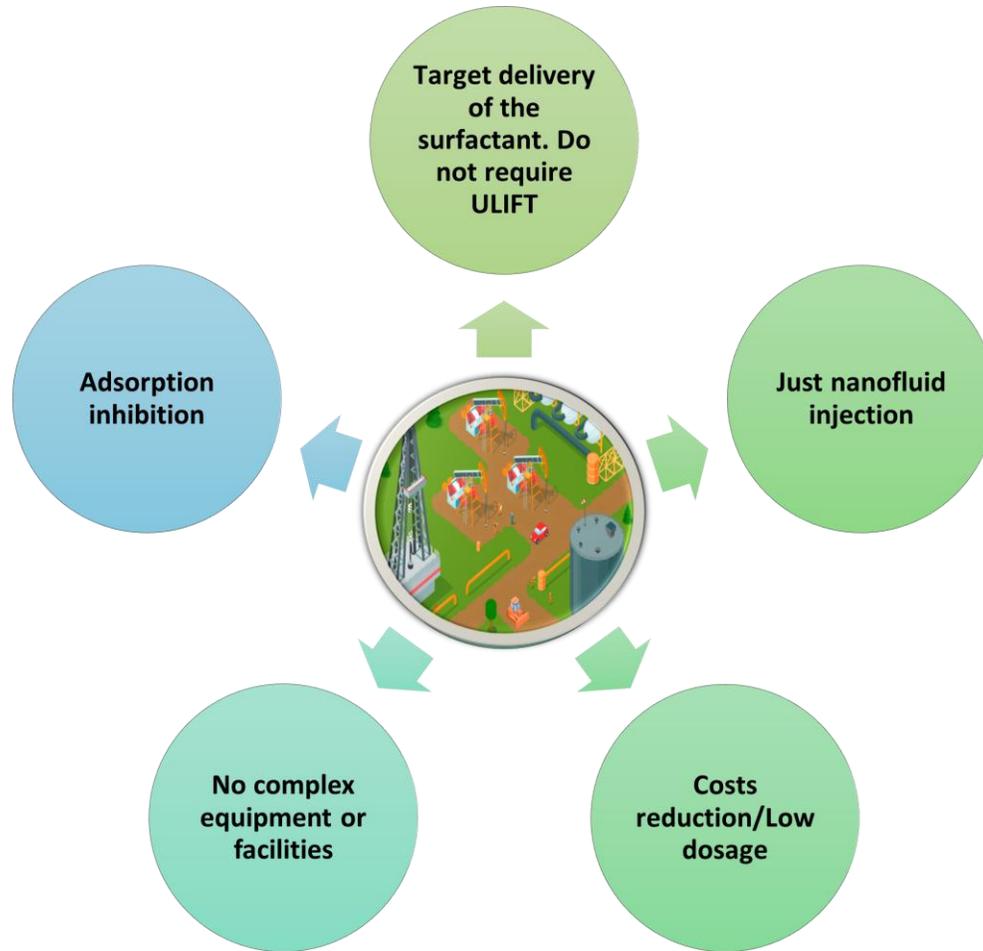


Cambio en Saturación Residual

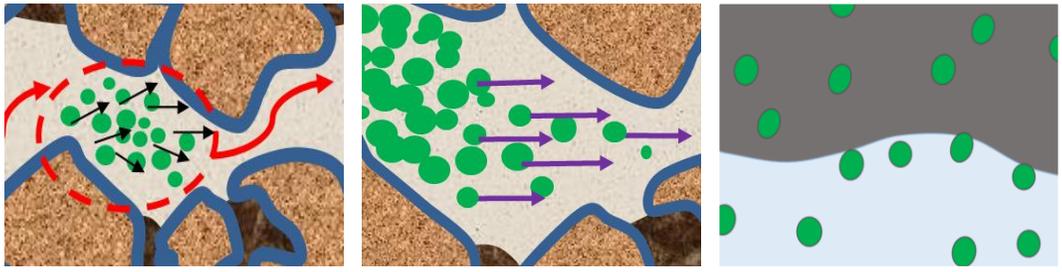
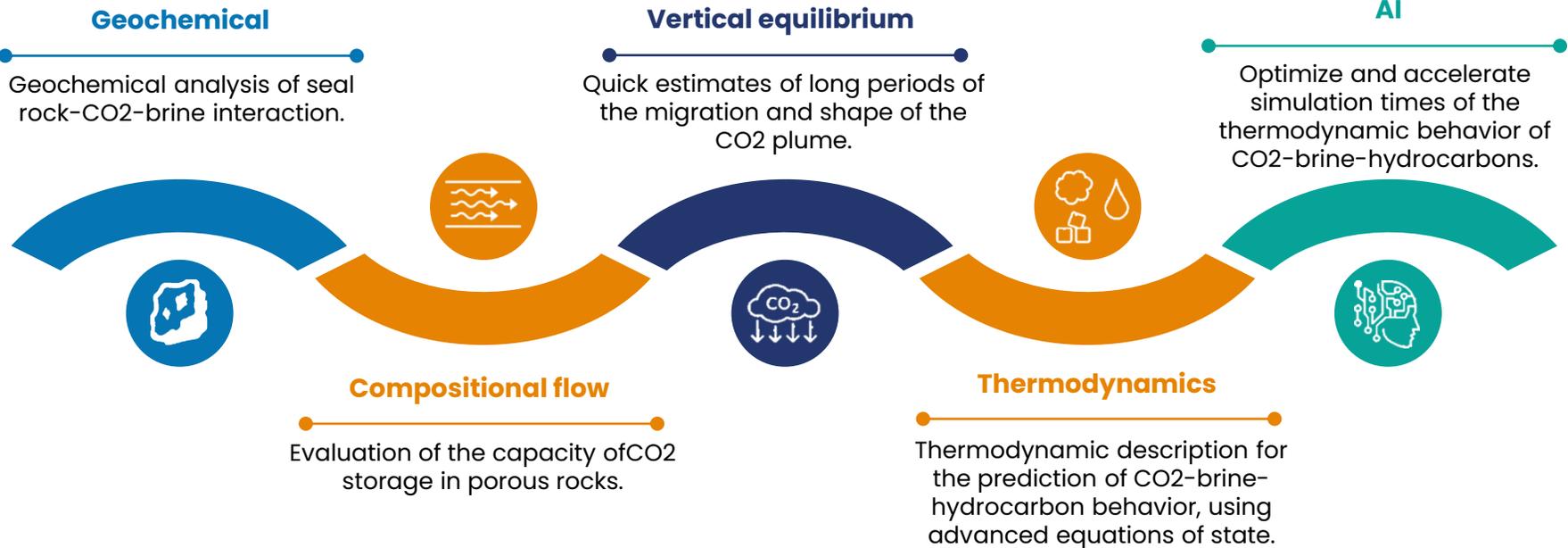


Reservoir Decarbonization Applications

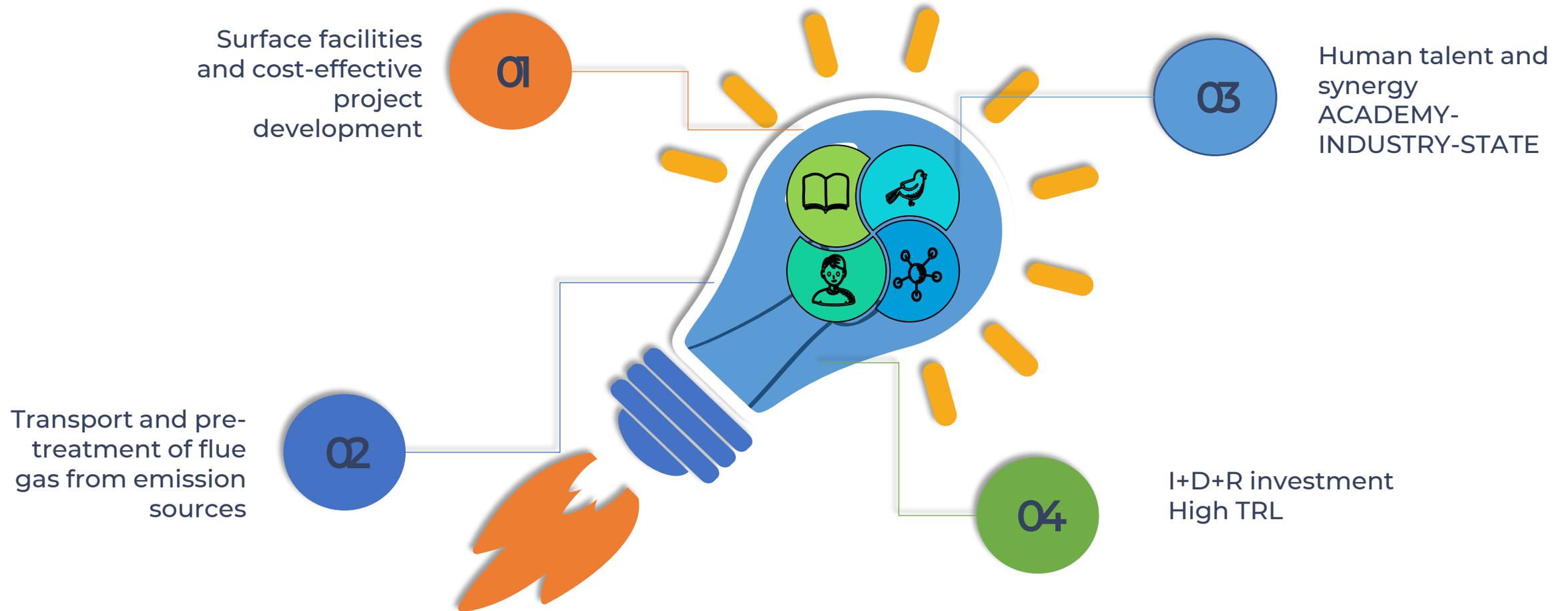
EOR – eWAG (Enhanced Water Alternating Gas)



Modeling



Challenges



ITHANKS!

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