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Global warming and climate change



e e-CODUCT:

Fast-response **e**lectrically heated
catalytic reactor technology for
CO₂ re**DUCT**ion

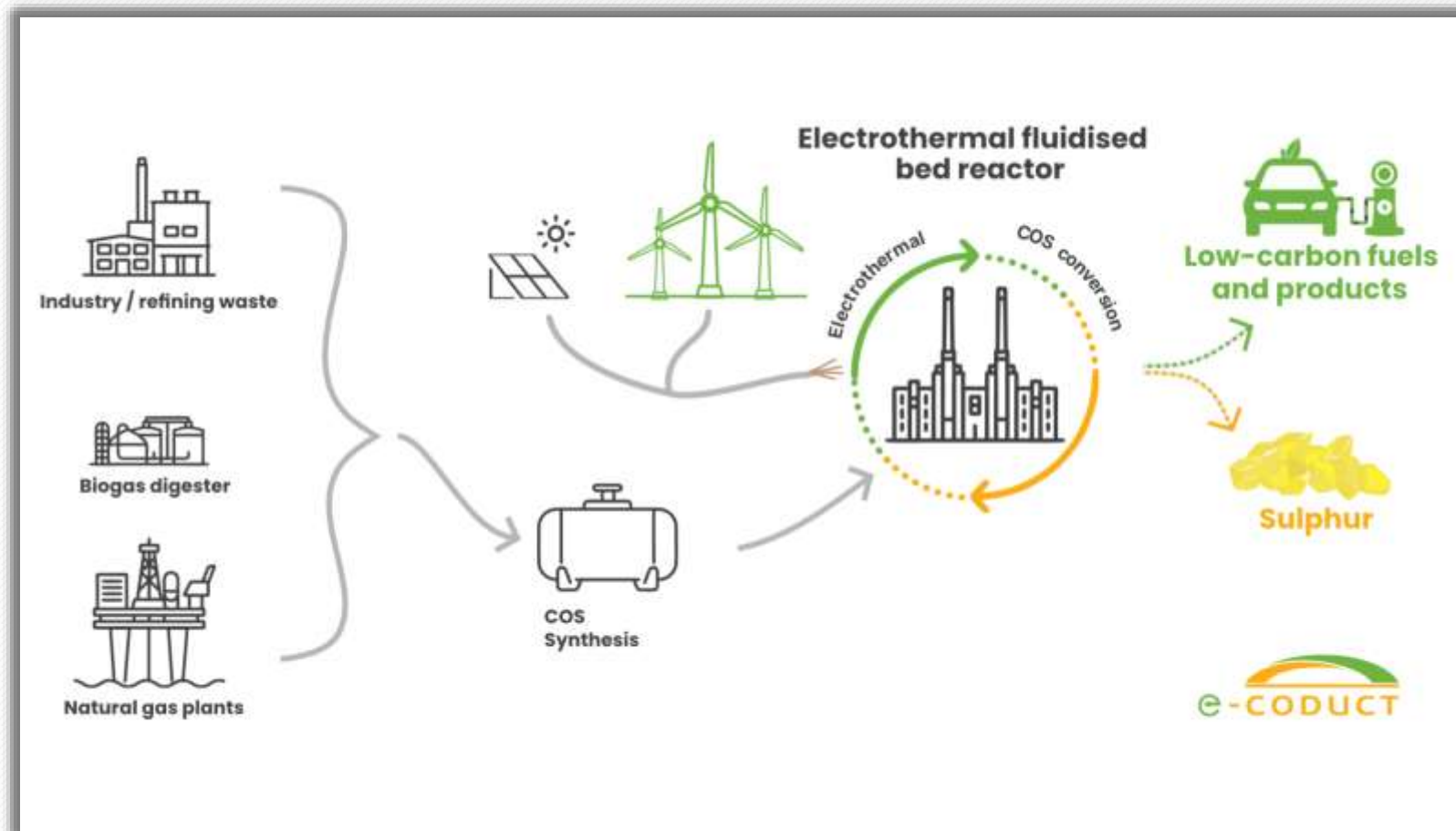
e-CODUCT: H₂S abatement

- Refinery effluents
- Natural gas treatment
- Renewable biogas treatment



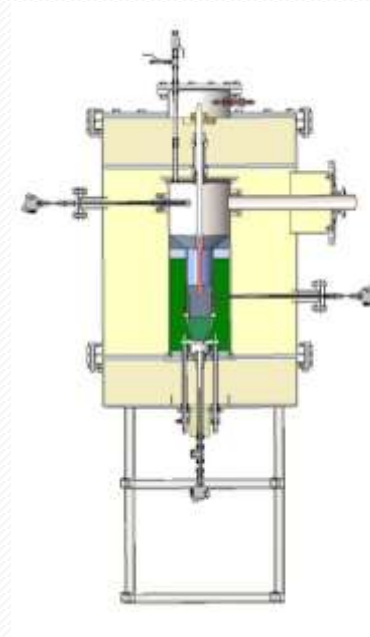
Acid rain causes tree dieback.

e-CODUCT process

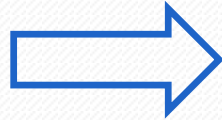


ElectroThermal Fluidized Bed (ETFB) reactor @ Ljubljana, SI

- Thermal decomposition of COS at $T > 1000\text{ }^{\circ}\text{C}$ and $P \sim 1\text{ bar}$;
- 3 m high for converting 2 kg/h of COS;
- TRL 6
- Fast response to changes in reactor load



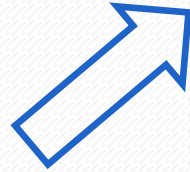
Using electricity?



Heat containment

Electrification

Just electricity? →



Microwave

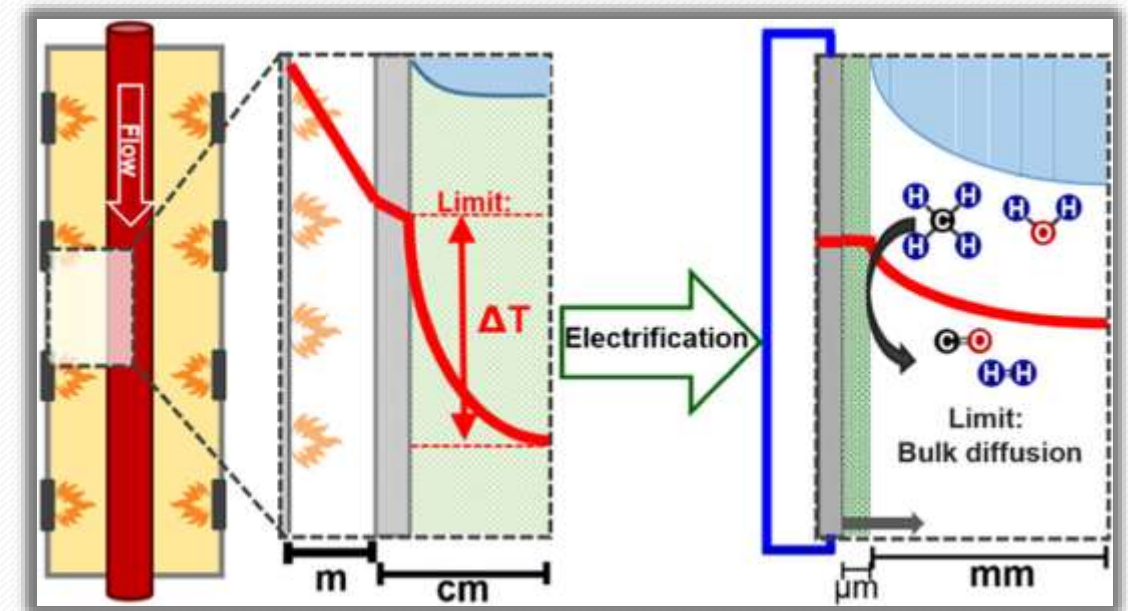


Induction

Heating from
the inside

Reactor electrification

- Ⓜ Advantageous in terms of
 - Ⓜ Carbon footprint
 - Ⓜ Energy efficiency
 - Ⓜ Process control
 - Ⓜ Safety and maintenance
 - Ⓜ Response time



Wismann, et al. *Ind. Eng. Chem. Res.* 58 (2019) 23380

Electrothermal fluidized bed reactor

- e Combination
 - e Joule heating
 - e Fluidization
- e Compared to conventional fluidized beds
 - e Better control over bed temperature
 - e Highly energy efficient
 - e Rapid and uniform heating



Fedorov *J. Fluids Eng.* 138 (2016) 044502

e-CODUCT rationale

- Fast-response electrically heated catalytic reactor technology for CO₂ reduction

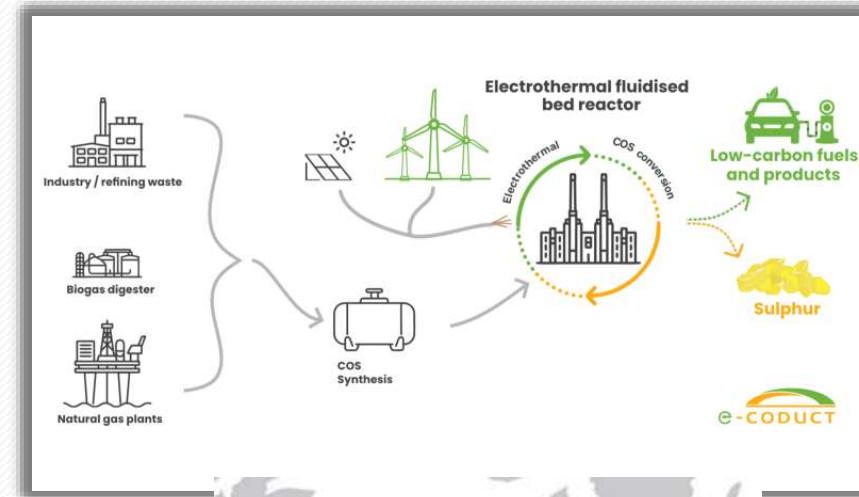


- Why?
 - Current CO₂ reduction technologies require highly pure streams
 - No existing technologies for simultaneous CO₂ and H₂S reduction
 - Making more feedstock sources available



e-CODUCT is running at full speed!

- e Triple win:
 - e Renewable electricity
 - e Greenhouse gas reduction
 - e Toxic gas abatement
- e 2 crucial chemical intermediates
 - e Carbon monoxide
 - e Elemental sulfur
- e 1 prime goal
 - e Realizing the Green Deal by 2050



e-CODUCT partnership





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Thanks, any questions?



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