IMPROVING DEW POINT MODELLING OF (CO_2 + POLAR IMPURITIES) MIXTURES AND ITS APPLICATION IN CORROSION ASSESSMENT

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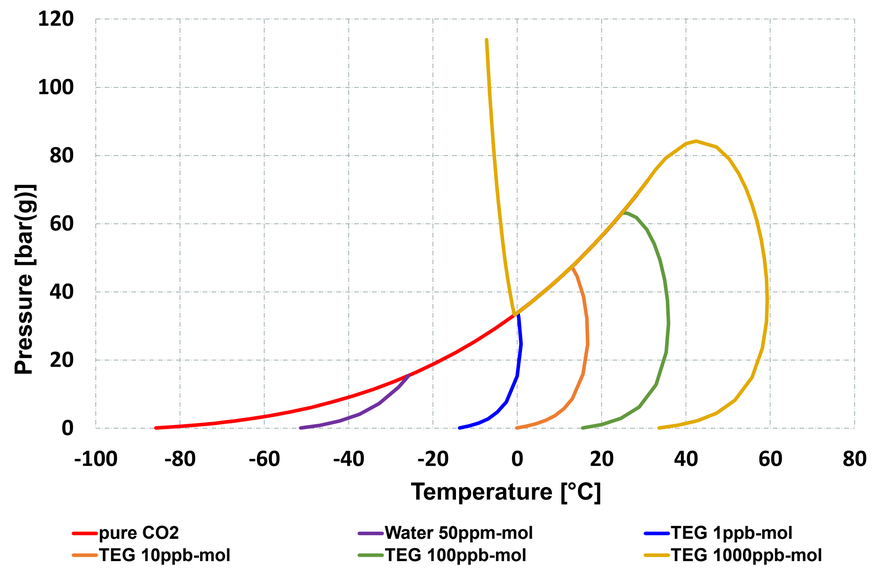
PACE CCS

Net Zero Technology Centre
Technology Driving Transition

TCCS 12

WHAT?

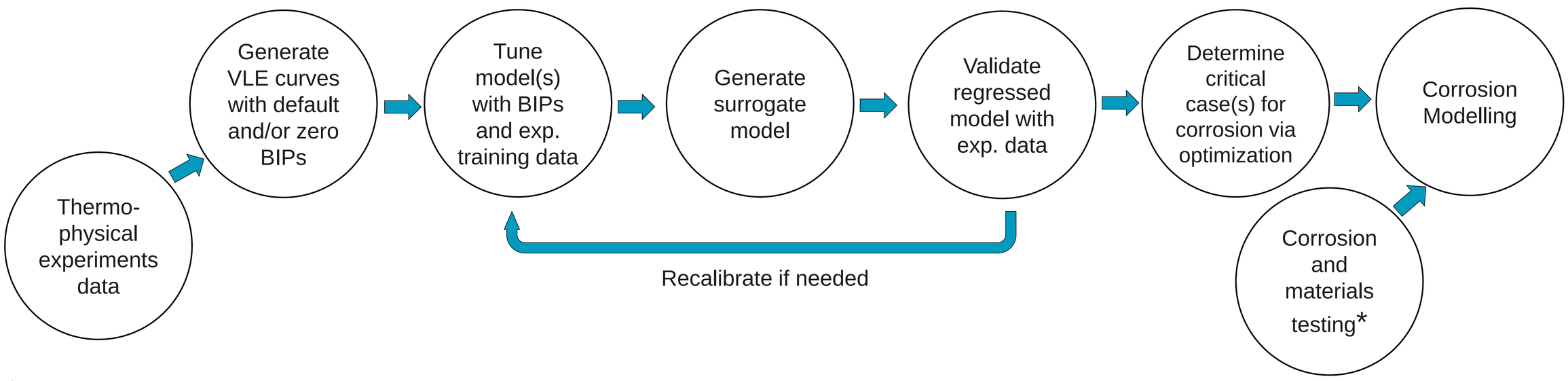
- In 2023, Pace CCS has initiated a Joint Industry Partner (JIP) with funding from The Net Zero Technology Centre (NZTC) and various partners.
- The project aims to understand and predict corrosive aqueous phase induced by polar impurities in CCS in low pressure gas transport pipelines.



WHY?

- Presence of polar impurities can influence the water solubility, the composition, and the corrosivity of the liquid phase.
- Under low pressure operation, multicomponent CO_2-rich mixture (+ glycol carryover) will induce liquid dropout and increase corrosion risk at temperatures significantly higher than water dewpoint.
- Models are inherently not validated for systems involving CO_2-rich mixtures with low content of polar impurities and not suitable for corrosion-related studies.
- Model tuning and validation is critical for preventing formation of corrosive aqueous phase and in the prediction of surface corrosion of a steel pipeline operating at low gas pressure.

HOW?



Outcome

A secure web-based software app that can be used for a wide range of operating conditions in the full CCS transport chain.

- Develop a thermodynamic model for prediction of aqueous phases (dew line) and composition in CCS fluids.
- Perform thermo-physical experiments to benchmark and tune the thermodynamic model to capture the complex physics (polar-polar interactions) in CCS mixtures.
- Predict the solubility and composition of corrosive aqueous phases in a CCS fluid.
- Determine the ‘worst-case’ for corrosion via an evolutionary optimisation algorithm.
- Provide corrosion rates assuming metal loss in carbon steel.

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